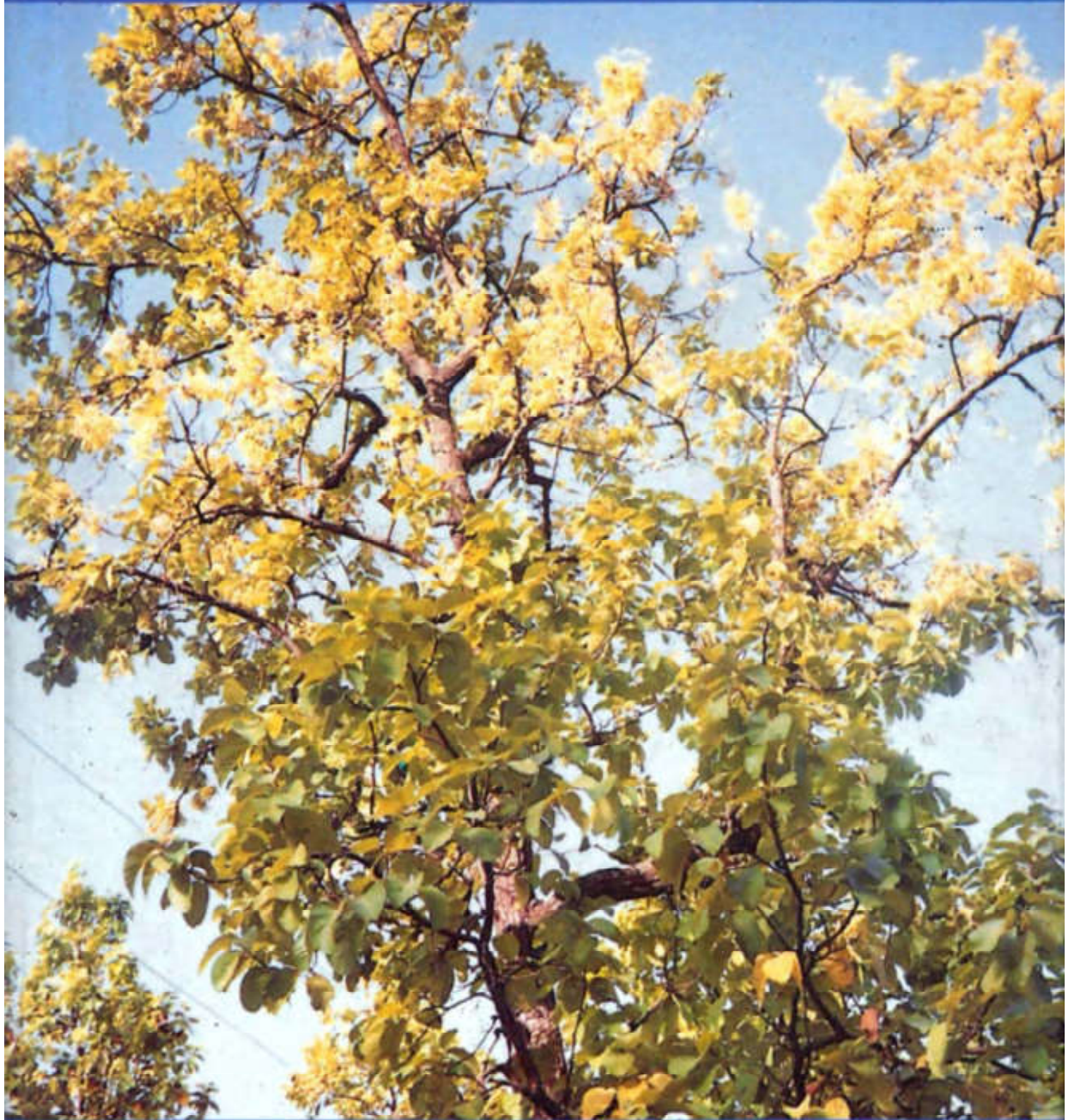


FLORA OF MADHYA PRADESH

VOLUME I

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MADHYA PRADESH



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FOREWORD

Madhya Pradesh, the heartland of India abounds in diverse wild-life forms. It harbours approximately 2400 species of higher plants within an area of 4,63,452 sq. km and constitute an important source for germ-plasm. A number of wild relatives of cultivated plants, endemics, rare and threatened plant species occur in this area.

The old literature, scriptures, epics etc. speak volumes of richness in biodiversity and culture of its people. A large number of *adivasis* (tribals) inhabit forest areas of Madhya Pradesh and depend on the forest wealth for their sustenance. They have lived in complete harmony with the nature since time immemorial. The advent of development-exploitation of mineral and metal resources, construction of minor and major hydro-electric or thermal plants, development of means of communication, felling of the forest tracts for rehabilitation and agricultural purposes are having telling effect on the plant resources of the area. The forest areas are gradually shrinking due to population explosion and increasing demand on forest resources for sustenance of the human at large. A number of plant forms may then disappear prematurely before their inventorisation, assessment and utilisation of potentialities for human welfare. Sustainable utilisation and conservation is the demand of the time.

The publication of Flora of Madhya Pradesh is very timely. It inventorises the plant resources available at this very moment in the area. It will go a long way in monitoring the progress or degradation of our resources and help taking corrective measures to protect this natural heritage so that it can be handed over to the posterity.

Calcutta

Oct. 20th, 1993.

P. K. Hajra

Director

Botanical Survey of India

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The arduous, sustained and tenuous exploration work and the endeavour to collect specimens of as many species as possible, sometimes even in perilous circumstances, by the Scientists, Scientific Assistants and field-staff working in the Central Circle, Botanical Survey of India, Allahabad provided rich materials for preparation of this Flora and was a continuous source of inspiration to us. Sincere thanks are also due to Shri S.M.A.Naqvi, Artist, Late M. A. Siddiqui, Photographer and Shri Raja Ram, Library Assistant for help pertaining to illustrations, photographs and library consultation, and to Shri M. D. Saroj, U. D. Clerk and Shri H. R. Srivastava, Stenographer for typing the manuscript.

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November 18th, 1993

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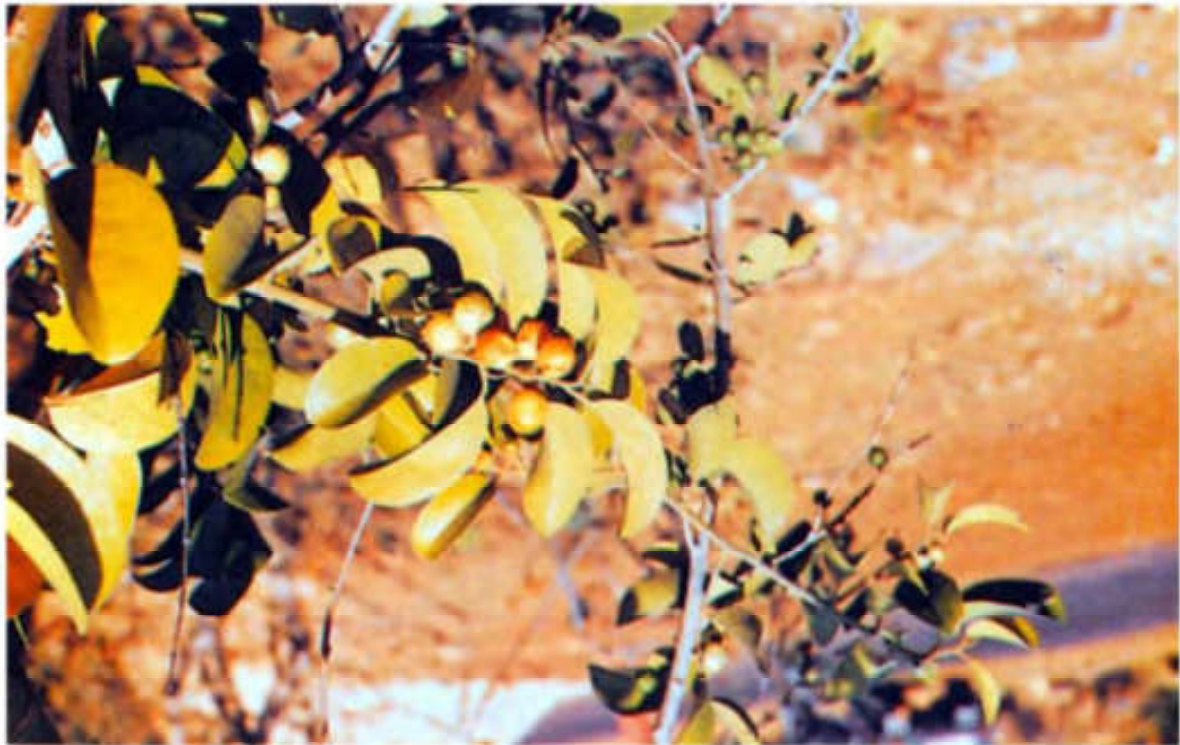


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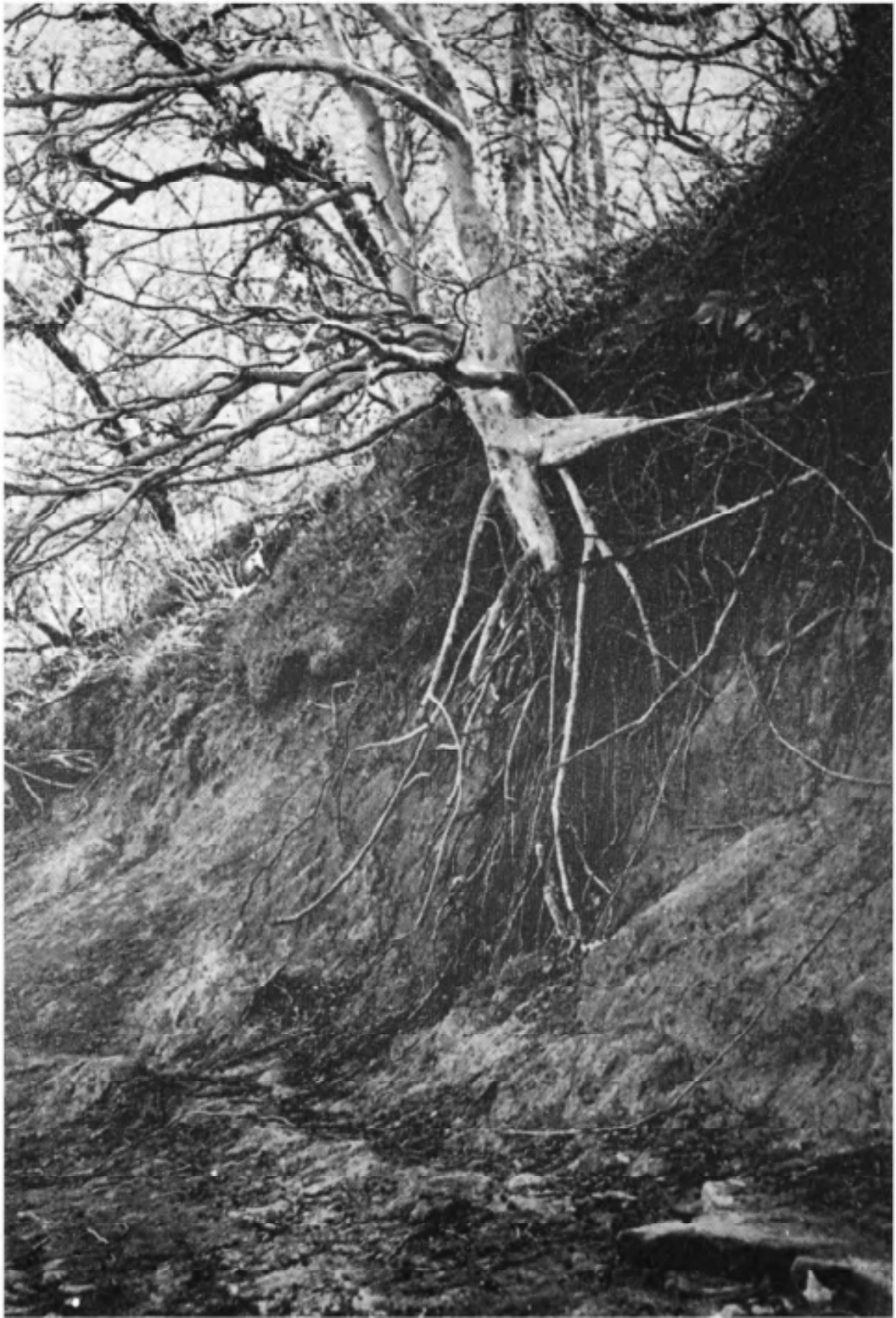


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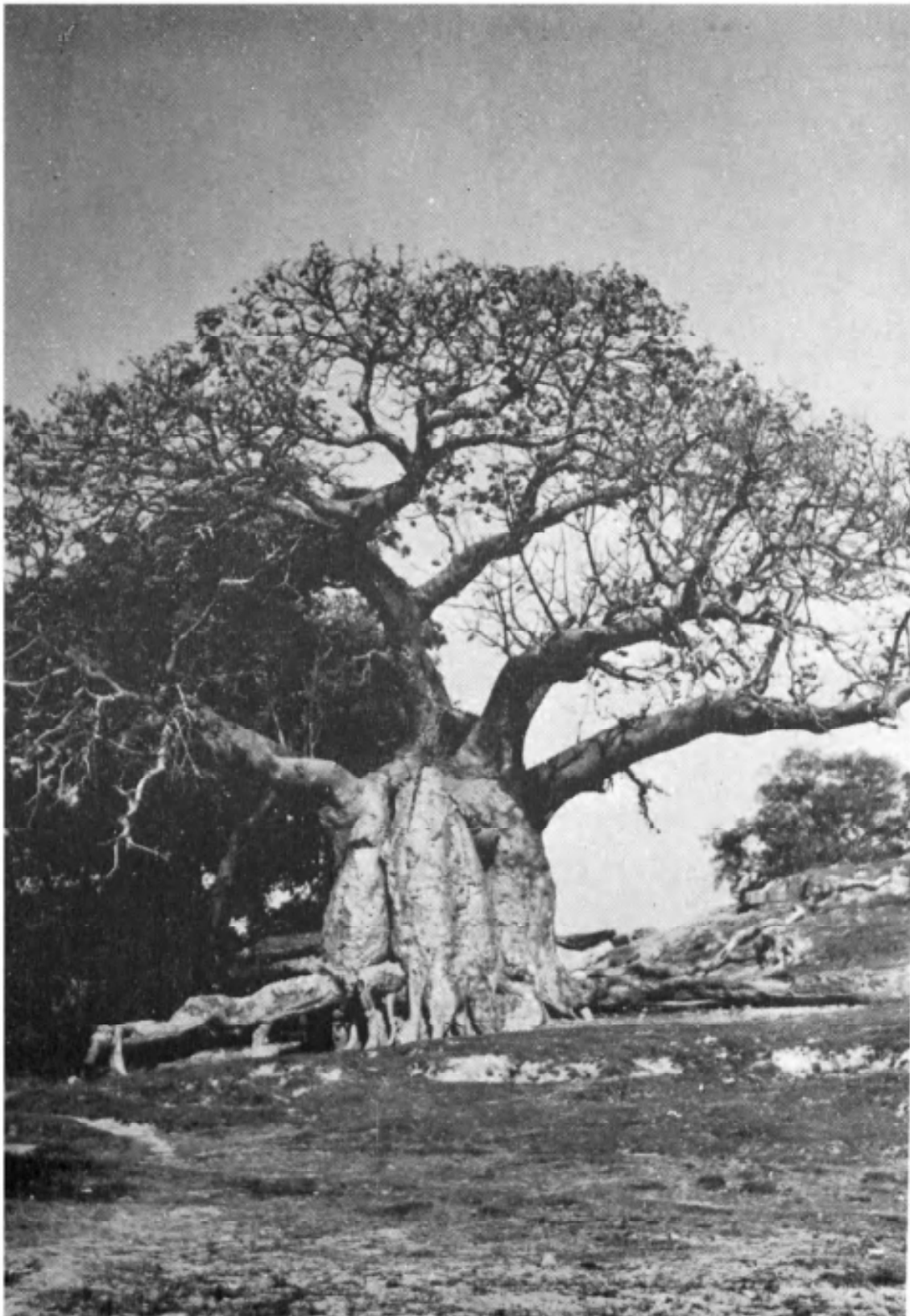


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INTRODUCTION

(D. M. Verma and A. K. Mukherjee)

Madhya Pradesh, as the name indicates, lies in the Central part of India between latitudes $17^{\circ} 48' N$ to $26^{\circ} 52' N$ and longitudes $74^{\circ} 02' E$ to $84^{\circ} 24' E$. It came into being as a result of state reorganization on the 11th November, 1956, including in its reconstituted political boundaries all or most of the districts of Vindhya Pradesh, old Madhya Pradesh, Mahakoshal, Bhopal and a part of the Kotah district of Rajasthan. The physiographic regions which now fall partly or fully in the present day Madhya Pradesh are Madhya Bharat Pathar, Bundelkhand Uplands, Malwa Plateau, Vindhya Range, Narmada Valley, Satpura Range, Baghelkhand Plateau, Vindhyan Scarplands or Bhandar Plateau, Mahanadi Basin or Chattisgarh Plains and Dandakarnya. These names, alongwith Chambal Valley, Mahadeo Hills, Pachmarhi Hills, Kaimur Hills, Maikal Range, Bastar and Bailadila Hills are frequently referred to in earlier plant collections and other botanical contributions.

This forest heart-land of the country with an area of about 4,63,452 sq. km and famous for its teak, tanks and temples is a naturalist's paradise with almost one-third of its area covered with tropical forests of teak, sal and miscellaneous kinds harbouring wild animals like tigers, panthers, wild boars, sloth bears, wild buffaloes, blue bulls, antelopes, deers, chinkaras and sambhars. The area also includes several eye-catching water falls at Pachmarhi in Hoshangabad, Chitrakoot in Bastar and Chachai in Rewa, and the enchanting Marble Rocks along Narmada river at Bheraghat in Jabalpur. The Sanchi stupa, the Heliodoras pillar and the Udayagiri caves with its magnificent relief sculptures in Vidisha, the Bagh caves in Indore comprising wall paintings in Ajanta style, the world famed Khajuraho temples - the monuments of human love and female beauty, built by Chandela Rajput rulers in the 10th - 11th centuries, the observatory at Ujjain, the Bhopal lake created by King Bhoj in 11th century and numerous other temples, tombs and forts speak of its rich scientific and cultural heritage. Some jewels of Indian poetry like Kalidas and Bhavabhuti and the famous musician of Akbar period, Tansen, also hailed from Madhya Pradesh. Alongside, in the south east corner, are the tribals of Bastar whose physique, primitive way of life, health and medicare, shelter, food-habits and social customs are a living link to our present day civilization.

AREA AND PHYSIOGRAPHY

Madhya Pradesh is the second largest state in India with an area of

about 4,63,452 sq. km and occupies the central region of the country. It is surrounded by Rajasthan on its north-west, Uttar Pradesh and Bihar on its north and north-east, Orissa on its east and south-east, Andhra Pradesh and Maharashtra on its south and Gujarat on its south-west. The State has been divided into seven Commissioner's Divisions of (i) *Indore* with districts of Jhabua, Mandasor, Ratlam, Dhar, Ujjain, Indore, Dewas, East Nimar and West Nimar; (ii) *Gwalior* with districts of Morena, Bhind, Gwalior, Datia, Shivpuri and Guna; (iii) *Bhopal* with districts of Raigarh, Shajapur, Schore, Bhopal, Vidisha, Raisen, Hoshangabad and Betul; (iv) *Jabalpur* with districts of Sagar, Damoh, Narsimhapur, Jabalpur, Chhindwara, Seoni, Mandla and Balaghat; (v) *Rewa* with districts of Tikamgarh, Chhatarpur, Panna, Satna, Rewa, Sidhi and Shahdol; (vi) *Surguja* with districts of Surguja, Bilaspur and Raigarh and (vii) *Raipur* with districts of Rajnandgaon, Durg, Raipur and Bastar. In all there are 45 districts. Bastar is the largest and the most backward, but floristically the richest of these districts.

The Vindhya and the Satpuras are two parallel mountain ranges running south-west to north-east through almost the middle of the state. The branch of the Vindhya which strikes across Bundelkhand is called the Panna Hills, while the arm which runs in the north of the Son river is known as the Kaimur Hills. The small chain of mountains which links up the Vindhya and the Satpura systems near Amarkantak in Shahdol is called the Maikal Range. The Bastar Hills in the south are the outcrops of the Eastern ghats. In the eastern fringes of Raigarh and Surguja are the Ramgarh Hills and Jashpur Pats continuing into Chhotanagpur Plateau in Bihar. According to Physiographic Divisions of India, Madhya Pradesh includes parts of North Central Highlands, South Central Highlands, North Deccan and Eastern Plateaus. The state has been broadly divided into the following physiographic regions.

1. **Gird Region** : It comprises the low-lying areas embracing the country around Gwalior and to the north and north east of it, extending thence across into the Bundelkhand of which it includes the greatest part till it meets the Kaimur Hills in Baghelkhand. The area of this tract is about 47,600 sq. km and it consists of a plain country with some undulations at elevations varying from 152 to 274 m above mean sea level.

2. **Malwa Plateau** : This plateau has an elevation between 450 – 600 m above mean sea level and an area of about 89,600 sq. km. It includes all the country lying between the great Vindhya barrier which forms the northern bank of the Narmada Valley and a point just south of Gwalior. Its eastern limit is marked by the ridge which runs from south to north starting through Bhilsa while its western limit marches into the Rajasthan border.

3. **Narmada Valley** : It is a long and narrow strip along the Narmada river walled in by the Vindhyas and the Satpuras to the north and to the south, respectively, and extending for a length of 320 km from Jabalpur to Handia with an average width of 32 km.

4. **Satpura Ridge** : South of the Narmada Valley the Satpura stretches across the state, in the shape of a large triangle, its eastern face extending for about 160 km from Amarkantak to Saletakadi in Balaghat district and its sides running westward for about 640 km and meeting gradually in Nimar. The Satpura plateau includes in its ranges southern parts of the West Nimar, East Nimar and Hoshangabad districts, whole of the Betul and Chhindwara districts, and northern parts of the Balaghat, Durg, and Bilaspur districts. The Satpuras form the watershed of the plains lying north and south of them.

5. **Chhattisgarh Plain** : On the eastern side of the Satpura range lies the Chhattisgarh Plain at a height of between 162- 457 m above mean sea level. Except for a few undulations, the level of the plain is generally unbroken. It includes major parts of Rajnandgaon, Durg and Raipur, the southern parts of the Bilaspur and Raigarh districts, and the northern plains of the Bastar district.

RIVER SYSTEM

Madhya Pradesh is criss-crossed with several rivers and numerous rivulets. These are rainfed and become raging torrents during monsoon rains, largely disrupting vehicular traffic from a few hours to several days, shrinking or drying during dry months. The Chambal originating at Mhow in Dhar and flowing north-east along the western boundary of Madhya Pradesh empties into Yamuna at Auraiya in Etawah, in Uttar Pradesh. The Betwa originating in Raisen, also flowing north-east, meets Yamuna near Hamirpur. The Ken, originating in Raisen, meets Yamuna near Fatehpur. The Tons originating in Kaimur Hills meets Ganga before Mirzapur. While Kali Sindh, Parbati and Sind are important tributaries of the Chambal, Dhasan is that of the Betwa and Sonar is that of the Ken. Similarly, the Son, originating at Amarkantak, after some south-western curves flows to the north-east and meets the Ganga near Patna in Bihar. Rihand river is one of its important tributary. All these rivers contribute waters to the fertile Northern Gangetic Plains. The Mahanadi originating at Mainpur Khurd in Raipur first flows westwards into northern Bastar then curving north and east through Raipur enters Orissa and ultimately empties into the Bay of Bengal. It forms the Mahanadi Basin in the Chhattisgarh Plains. Seonath and Hasdo are its main tributaries. The Indravati, originating in Koraput district of Orissa flows to the west, almost bisecting Bastar, then curves southwards and meets the easterly flowing Godavari. The

Narmada, originating at Amarkantak, forms the long narrow Narmada Valley between the Vindhyas and the Satpuras. The Narmada, along with the Tapti cutting through the southern fringes of Madhya Pradesh, flows westwards and empties into the Gulf of Cambay. A number of dams have been constructed on these rivers and more are in the offing.

CLIMATE

Madhya Pradesh enjoys the widespread Indian monsoon climate with maximum rain falling between the end of June and September, the post-monsoon periods of October-November, a winter season of December to the middle of February, sometimes extending to March with a few winter showers, and a dry hot summer season of April, May and June. The average annual rainfall varies from 700 mm to 2000 mm. A narrow strip starting from the western district of Vidisha and Bhopal and broadening south-east covering Sagar, Damoh, Narsimhapur, Jabalpur, Shahdol, Sidhi, Rewa, Surguja, Raigarh, Mandla, Bilaspur, Balaghat, Seoni, Durg, Raipur and Bastar experiences higher rainfall ranging between 1200 to 2000 mm. North-west regions of Bastar, eastern parts of Surguja and Raigarh, Pachmarhi in Hoshangabad and small patches in Shahdol, Mandla and Balaghat are the highest rainfall areas. The regions with minimum rainfall are found in the south-western districts of Mandasor, Ratlam, Jhabua, Dhar, Indore and West Nimar. Some of the northern districts of Morena, Bhind, Gwalior and Shivpuri are also quite dry.

The mean daily maximum temperature during May is around 42.5° C in parts of Gwalior, Morena, Shivpuri, Datia and south western fringes of Balaghat and Durg. The maximum temperature sometimes soars to as high as 47° C during some of the afternoons. The western parts of Mandasor, Ratlam, Ujjain, Dewas, Jhabua, Dhar, Indore and Shajapur, some parts of Betul, Chhindwara, Seoni, Mandla, Shahdol, Surguja and eastern Bastar experiences maximum summer temperature between 37.5° C and 40° C. However, in the remaining larger region of the state it varies between 40° C and 42.5° C. The mean daily minimum temperature in January varies between 7° C and 10° C in the northern half of Madhya Pradesh — the minimum sometimes reaching as low as 1° C to 3° C for a few days. In the southern half of the state it varies from 10° C to 15° C except for the south western fringe of Bastar where it fluctuates between 15° C and 17.5° C. Hail-storms and fog, though occur, are not very common.

GEOLOGY

Madhya Pradesh represents all the pre-Cambrian rock system, namely, Archaean, Dharwar, Cuddapah and Vindhyan. Cambrian to middle carboniferous strata are absent in this state. The Gondwana system, which

ranges in age from the upper Carboniferous to the Jurassic, derives its name from the ancient Gond kingdom of the area south of Narmada, where the formation was first discovered. There exists a chain of outcrops of marine Cretaceous strata along the Narmada valley.

Archaean rock outcrops are mainly found in the Gwalior, Tikamgarh, Chhatarpur, Surguja, Balaghat and Bastar districts. Outcrops of *Dharwar* rocks are found in the Rewa, Jabalpur, Chhindwara and Balaghat districts. Most of the India's manganese ores come from the rocks of Dharwar System. *Cuddapah* rocks are found in the Raigarh, Bilaspur, Raipur, Durg and Bastar districts. The *Vindhyan* System of rocks which derives its name from the Vindhya Range, north of Narmada Valley, are found particularly in Malwa, Bundelkhand, Panna Hills and Kaimur Hills in Rewa. These are also found in Chhattisgarh region. The famous Panna diamond bed lie in these rocks. Many of the historical buildings and monuments have been built by Vindhyan Sandstones. *Lower Gondwana* rocks are found in the Mahadeo and Pachmarhi Hills in Satpura Range and *Upper Gondwana* in Jabalpur region.

Deccan Trap, a step-like successive volcanic eruption that occurred in Eocene, originally covered almost all the earlier rock formations in the western and central Madhya Pradesh. However, since denudation has been going on for ages, a number of out-crops of rocks of older Systems have been exposed at different places, often widely separated. Much of the black cotton soil or *regur* is due to the subaerial weathering of the basalts in situ and a subsequent admixture of the weathered products with iron and organic matter.

MINERALS

The bulk of the valuable minerals in India are products of metamorphic rocks of pre-Cambrian period. The principal Ore and metal deposits, the precious and semi-precious stones, mica and a large number of valuable minerals are derived from the Dharwar System. About 98% of the coal is of Lower Gondwana age. The main petroleum horizons in India are Tertiary.

All the pre-Cambrian rock systems and also the Gondwana Systems are present in Madhya Pradesh. This state is considered the second most minerally rich province, next to Bihar and Orissa, carrying good reserves of iron and manganese, coal, limestone, bauxite, clays, ochres, corundum, sillimanite, silica sand, dolomite, steatite (talc), red oxide of iron ore, niobium, graphite, feldspar, diamond and lepidolite.

Nearly 30% of India's high grade iron ore occurs in Durg (supply to the Bhilai steel plant), Bailadila range in Bastar, and in Jabalpur

Gwalior districts. The state possesses about 25% of India's *Coal reserves* in five coalfield groups namely, North Chhattisgarh, South Chhattisgarh, Central India, North Satpura basin and South Satpura basin but the coal is non-coking in quality. The main contributor of *manganese* are the Balaghat and the Chhindwara districts, even though small quantities are also found in the Jabalpur and the Jhabua districts. The state possesses the largest reserves of *bauxite* in India. The important regions are in the Balaghat, Mandla, Jabalpur, Surguja, Bilaspur, Bastar and Raigarh districts. There are vast reserves of limestone in the Jabalpur, Satna, Morena, Raipur Durg, Bilaspur, Bastar, Mandasor, Dhar, Hoshangabad, Damoh, Panna, Raisen and Schore districts. Bilaspur supply all the *dolomite* required by the steel plants of Bhilai and Rourkela. *Fire-clay* and *China clay* occur mainly in the Jabalpur, Chhindwara, Durg, Bilaspur, Gwalior, Mandasor, Satna, Shahdol, Narsimhapur, Sidhi, Bastar, and Surguja districts. *Talc* and *Soap stone* occur in marble rocks of Jabalpur and also in the Durg and Jhabua districts. *Corundum* occurs in the Sidhi district. *Asbestos* occurs in the Jhabua district. *Diamonds* are found in Panna district in two types of deposits (i) conglomerate and gravel and (ii) pipe deposit. High quality *marble* deposit is found at Sukma in the Bastar district. It is also found at Gohirapahad in the Morena and at Bheraghat in the Jabalpur district. Red and yellow *ochres* of good quality occur in the Jabalpur, Gwalior and Satna districts. Minor deposits are also found in the Panna and Raisen districts. A deposit of white *Shale*, suitable for making slate pencil, occurs in the Mandasor district. Glass making *Silica sand* occurs in the Morena, Vidisha, Rewa and Jabalpur districts.

SOILS

The major soil groups found in Madhya Pradesh are alluvial, deep black or regur, medium black, shallow black, mixed red and black, red and yellow and skeletal soils.

1. **Alluvial Soils:** The north western part of Gird region are covered with these soils which are quite fertile. The soils of Bhind and Morena districts come under this group. The surface texture grades into sandy-loam to loam and clay-loam to clay. The pH is neutral to slightly alkaline.

2. **Black Soils:** These soils occupy almost half of Madhya Pradesh and mainly cover the Malwa Plateau, the Narmada Valley and the Satpura Ridge. The texture is loam to clay. Calcareous concretions are always present. They are usually deficient in phosphorus, nitrogen and organic matter, but are rich in potash and lime. Depending on some physical and chemical properties some of these soils are often called black-cotton or regur soil. The sub-groups of black soils are: (i) *Deep black soils* covering the major parts of the Narmada Valley, level portions of Vindhyan and Satpura

plateau, especially the areas of the Hoshangabad and Narsimhapur districts. The clay content varies between 20 and 60 percent. They have high moisture retention capacity. (ii) *Medium black soils* covering the largest area comprising mainly the Malwa Plateau, Nimar region and extending up to the Sidhi district and all along the northern side of the Vindhyan Range, and in the South-western districts of Jhabua, Dhar and other hilly areas. These soils vary greatly and a mosaic of different types is found. (iii) *Shallow Black Soils* mainly covering the Satpura Ridge comprising districts of Seoni, Chhindwara and Betul. These are clay loams with 15-30 percent clay.

3. Mixed Red and Black Soils: These are prevalent in the eastern part of the Gird region and in most parts of Bundelkhand and Baghelkhand area. Red and black soils usually alternate in these areas. The red soils are light-textured, and usually devoid of lime concretions and free carbonates. The commonest form is sandy clay. They are usually deficient in nitrogen phosphorus, organic matter and lime. Its important sub-types found in these areas are: (i) *Black clayey soils*; (ii) *Less dark clayey soils*; (iii) *Light medium deep yellowish soils*; (iv) *Shallow gravelly red soils* and (v) *Some alluvial soils* in the beds of rivers.

4. Red and Yellow Soils: These soils occupy mainly the Chhattisgarh plains and most of the eastern districts of the Madhya Pradesh. Red and yellow soils occur together. Although they are generally described as light sandy soils yet silty loam to silty clay soils are common. They are poor in phosphorus, organic matter and lime. They are acidic to alkaline. In the Bastar district most of the soils are acidic having wide range of C/N ratio. In the districts of Durg, Balaghat, Bilaspur and Raipur, deep clayey soils, yellow sandy loam soils, a mixture of these in the slopes, and reddish-yellow gravelly sandy soils are found in the wastelands of the upland regions.

5. Skeletal Soils: These are gravelly soils of the uplands of the Vindhya and the Satpura Ranges and cover parts of the districts of Shahdol, Mandla, Surguja, Raigarh, Bastar and Jhabua. They are generally poor, though some patches of good black soils are also met with.

LAND USE

Madhya Pradesh is predominantly a land of forests and agriculture. Approximately 31.5% of the area is under forest cover which is about 26.3% of India's forest area. The more densely forested districts are Bastar (70%), Surguja (52%), Balaghat (44%), Mandla (41%), East Nimar (40%), Shahdol (39%), Sidhi (38%), Raipur (38%), Raigarh (35%), Bilaspur (33%) and Chhindwara (32%). Agriculture occupies about 42% of the land area. Millets and wheat in the central and northern regions, paddy in the eastern and south eastern regions and cotton in the south-western parts are the major

crops. The remaining land area is lying fallow or under other uses.

PEOPLE

The people of the northern areas of Madhya Pradesh including the Narmada valley are mainly descendants from the *Indo-Aryan* stock. Those of the southern and eastern areas contain a good mixture of the *aboriginal* tribes, the *Gond* and the *Dravidian* stocks. The rest of the areas of the state was formerly peopled by the *Gonds* and other primitive tribes, such as the *Korwas*, the *Marias*, the *Baigas*.

The Adivasis of Madhya Pradesh include the *Muria*, *Maria*, *Paria*, the *Bhatara* in Bastar, the *Pondos* and *Kerwas* in Surguja, the *Uraons* in Jashpur, the *Munda* and *Korkus* in Betul, the *Gonds* and *Baigas* in Mandla, the *Bhils* in Jashpur, Bhopal, Jhabua, Dhar and Nimar.

The agriculturists form about 78% of the total population of the state. The Chief agricultural classes are the *Ahirs*, *Gaderias*, *Kachhis* and *Lodhis* in Bundelkhand and Baghelkhand, while the *Gujars*, *Malis* and *Kunbis* predominate in the Malwa. The *Rajputs*, *Kunbis*, *Lodhis* and *Gujars* are important cultivators in other wheat growing areas of the state. The *Pawars* are important cultivators in the Balaghat district. In Chhattisgarh district the *Kurmis*, *Telis*, *Chamars* and *Pankas* are the main cultivators. The *Rawats* of Chhattisgarh act as household servants.

The *Hill-Maria* and *Bison-Horn-Maria* of Bastar district follow shifting cultivation on the steep slopes of the hills.

FOREST TYPES

The forests in Madhya Pradesh cover about 1,46,000 sq. km, which comes to approximately 31.5% of the total area. These also, as usual in other tropical regions, have been subjected to general misuse and over-exploitation by shifting cultivation, fires, grazing and lopping. Besides, large areas have been directly or indirectly affected because of industrial development, construction of dams, road-building and various other human activities. Fortunately, some small scattered patches were preserved by the ex-rulers as their hunting reserves, or by the tribals because of their religious faith or because of these being simply inaccessible. Presently the Government of India, in an effort to preserve and develop these forests, have taken several legislative measures and also declared several forest pockets as Reserve Forest, Biosphere Reserve, National Parks and Game Sanctuaries. However, generally the forests that we find today in Madhya Pradesh are in various stages of degradation. Almost the whole of southern and central eastern and eastern parts of Madhya Pradesh receiving higher rainfall are more moist and green than its western, north western and central western regions. However, since the development of

vegetation is the net result of many complex factors, like climate, geology, soil, available moisture, topography, biota, soil organisms and wild life, and their interactions producing many types and intermediaries, it is often difficult to predict their relationship or attempt their classification. Patches of dry deciduous forests or scrubs may be found in the generally moist deciduous forest zones, the development of sal or teak, or the floristic composition, may be found to be markedly different in the adjoining areas. According to the classification given by Champion and Seth in *Forest Types of India* (1968), two main forest types, viz., *Tropical Forests* and *Montane Subtropical Forests*, occur in Madhya Pradesh. Except for some hill tops like Pachmarhi and Bailadila, the entire Madhya Pradesh falls under *Tropical Forests*, and these have been further divided into Northern semi-evergreen forests, Moist deciduous forests, Dry deciduous forests and Thorn forests. The moist deciduous forests and the dry deciduous forests have again been subdivided into various types as enumerated below, and in each such type, they again recognise two forms, viz., the North Indian forms and the South Indian forms. However, they also admit that these forms integrate in Madhya Pradesh and are scarcely distinguishable here.

L. TROPICAL FORESTS :

1. Northern tropical semi-evergreen forests :

These are dense forests with the canopy reaching a height of 24 — 36 m. While a number of top storey trees are deciduous, they are deciduous only for a short-period, and that also not simultaneously. The second storey is entirely evergreen. Woody climbers, epiphytes, orchids and ferns are generally abundant. Some eastern parts of Madhya Pradesh adjoining Orissa and receiving an annual rainfall of about 1400 — 1700 mm have this kind of forest, though in a rather degraded stage nearing the moist deciduous forests.

Terminalia alata, *Stereospermum suaveolens*, *Tetrameles* sp. and *Shorea robusta* form the top storey while the lower storeys consist of *Artocarpus lakoocha*, *Michelia champaca*, *Celtis tetrandia*, *Bridelia squamosa*, *Calamus* spp., *Dillenia* spp., *Ficus* spp., *Gluchidion* spp., *Phoebe lanceolata*, *Litsea nitida* and *Leca* spp. Moist bamboo brakes of *Bambusa arundinacea* are common.

2. Tropical moist deciduous forests :

In these the dominants are mainly deciduous spp. but subdominants and lower storeys are largely evergreen. Top canopy is rarely dense and even but over 25 m high, and comprises of only a few species. The evergreen habit of the lower storey gives the forests as a whole a more or less evergreen appearance. Climbers and epiphytes are generally abundant.

An almost leafless period during March — April of the upper storey is characteristic. The greater part of this forest type occurs on hilly ground in regions with about 1500 mm and higher annual rainfall, and with dry season of 4 — 5 months. Parts of Hoshangabad, Balaghat, Seoni, Raipur, Durg, Bastar, Surguja, Raigarh and Mandla districts have this type of forests.

The common constituents of these forests are the tall trees of *Shorea robusta*, *Tectona grandis*, *Pterocarpus marsupium*, *Terminalia alata*, *T. bellirica*, *T. chebula*, *Lannea coromandelica*, *Dalbergia paniculata*, *Adina cordifolia*, *Bombax ceiba*, *Stereospermum chelonoides*, *Garuga pinnata*, *Soymida febrifuga*, *Lagerstroemia parviflora* and *Anogeissus latifolia*, and smaller trees and shrubs of *Bridelia squamosa*, *Cleistanthus collinus*, *Mallotus philippensis*, *Diospyros melanoxyton*, *Buchanania lanzan*, *Cassia fistula*, *Schleichera oleosa*, *Ougeinia oojainensis*, *Miliusa tomentosa*, *Careya arborea*, *Dillenia pentagyna*, *D. indica*, *Chloroxylon swietenia*, *Helicteres isora*, *Antidesma ghaesembilla*, *Gmelina arborea*, *Grewia tiliifolia*, *Breynia vitisidaea*, *Shrebera swietenoides*, *Embelia tsjeriamcottam*, *Ochna obtusata*, *Casearia graveolens*, *Holarrhena antidysenterica*, *Semecarpus anacardium*, *Ficus* spp. and *Leea* spp. The common Madhya Pradesh bamboo, *Dendrocalamus strictus*, forms dense thickets. The conspicuous climbers and ramblers in these forests are *Millettia extensa*, *Ventilago denticulata*, *Bauhinia vahlii*, *Smilax zeylanica*, *Celastrus paniculatus*, *Ichnocarpus frutescens*, *Combretum roxburghii*, *Hemidesmus indicus*, *Olax scandens*, *Ziziphus oenophia*, *Dioscorea bulbifera*, *D. pentaphylla*, *D. puber* and *D. oppositifolia*. The undergrowth in dense forests is mostly sparse, and not much varied. The common species are *Eranthemum purpurascens*, *Perilepta edgeworthiana*, *Desmodium* spp., *Phoenix acaulis*, *Globba racemosa*, *G. bulbifera*, *Curcuma* spp., *Zingiber* spp., *Nelsonia canescens*, *Chlorophytum tuberosum* and *Carex speciosa*. Ground orchids like *Eulophia* spp., *Geodorum densiflorum*, *Habenaria* spp. and *Platanthera susanae* are common in well protected forests of this type. In the valleys and gorges of parts of Raipur, Bastar, Balaghat, Hoshangabad and Shahdol, the forests are dominated by evergreen species like *Trewia nudiflora*, *Toona ciliata*, *Diospyros montana*, *D. malabarica*, *Putranjiva roxburghii* and *Ficus* spp., with a thick undergrowth of ferns. Along the banks of several streams in places liable to erosion and temporary flooding and on coarse sandy non-retentive soil but with ample supply of water, *Terminalia arjuna* forms narrow belts.

This group of forests has been further divided on the basis of predominance of a particular species or according to ecological degradation into moist teak bearing forests; moist mixed deciduous forests; moist peninsular sal forests; *Terminalia alata* forests; secondary moist mixed deciduous forests and moist sal savannah. These are found scattered throughout the moist deciduous forest zone.

3. Tropical dry deciduous forests :

In these the dominants are almost entirely deciduous, and lower storeyed trees and shrubs are also composed of several deciduous spp. giving the whole forest a look of dryness. The top canopy is invariably open and light, usually between 8 -- 20 m high. Several species of moist deciduous forests may also be found particularly in sheltered places but they lack the finer development seen in the moist type. Woody climbers and epiphytes are few, and orchids and ferns are almost entirely absent. There is an almost leafless period during March -- April. This kind of forest is mostly found in undulating areas with low rising hills in regions receiving annual rainfall of 850 -- 1300 mm with a long dry season extending for about 6 months. Due to other factors and degradation, patches of dry deciduous forest are also found in parts of Raipur, Bastar, Raigarh, Surguja, Balaghat, Seoni, Mandla and other regions receiving higher annual rainfall. However, generally the dry deciduous forests are found in the northern, western and central western districts of Sidhi, Rewa, Satna, Panna, Chhatarpur, Sagar, Damoh, Vidisha, Guna, Morena, Shivpuri, Gwalior, Datia, Raisen, Mandasor, Ratlam, Ujjain, Indore, Dhar, East Nimar and Jabalpur.

The common constituents of these forests are the taller trees of *Terminalia* spp., *Tectona grandis*, *Pterocarpus marsupium*, *Cochlospermum religiosum*, *Soyimida febrifuga*, *Lannea coromandelica*, *Diospyros melanoxylon*, *Butea monosperma*, *Lagerstroemia parviflora*, *Anogeissus latifolia*, *A. pendula*, *Mitragyna parviflora*, *Embllica officinalis*, *Sterculia* spp., *Boswellia serrata*, *Bridelia squamosa*, *Albizia* spp., *Hardwickia binata*, *Bauhinia* spp., *Cordia obliqua*, *Aegle marmelos* and *Acacia* spp., and a variety of smaller trees and shrubs like *Acacia* spp., *Gardenia* spp., *Grewia* spp., *Helicteres isora*, *Holarrhena antidysenterica*, *Wrightia* spp., *Casearia elliptica*, *Carissa* spp., *Alangium salviifolium*, *Nyctanthes arbor-tristis*, *Ziziphus* spp., *Capparis zeylanica*, *Flacourtia indica*, *Mimosa* spp., *Securinega virosa*, *Kirganelia reticulata* and *Woodfordia fruticosa*. There are several species of rather slender climbers like *Rhynchosia minima*, *Atylosia scarabaeoides*, *Cocculus hirsutus*, *Cissampelos parira*, *Ipomoea* spp., *Coccinia indica*, *Mukia maderaspatana*, *Diplocyclos palmatus*, *Momordica dioica*, *Cryptolepis buehananii*, *Pueraria tuberosa*, *Marsdenia* spp., *Ziziphus oenoplia*, *Pergularia daemia* and *Tinospora cordifolia*. Lianas and extensive climbers are generally absent.

The degraded stages present a picture of scrub, savannah or even a dry grassland. It is common to see in the north western parts the reasonably tall trees of *Anogeissus pendula* reduced to spreading and creeping forms or even looking like cushions under heavy browsing, especially by goats. Scattered stunted and malformed trees or thickets of *Butea monosperma* sometimes reduced to a woody base bearing a few leaves

is also a common sight. Bamboo brakes of *Dendrocalamus strictus*, pure or sparsely mixed with a few deciduous species, are of a drier form than found in the moist deciduous forests. *Boswellia serrata*, sometimes mixed with *Sterculia* spp. and *Lannea coromandelica*, is often found dominating the ridges and the plateaus. The river-banks are frequently dominated by *Syzygium heyneana* or *Terminalia arjuna*.

This group of forests has also been further divided on the basis of predominance of a particular species or according to ecological degradation into *dry teak bearing forests*; *dry mixed deciduous forests*; *dry peninsular sal forests*; *dry deciduous scrub*; *dry savannah forests*; *dry grasslands*; *Anogeissus pendula forests*; *Boswellia forests*; *Babul forests*; *Hardwickia forests*; *Butea forests*; *Aegle forests*; *dry bamboo brakes* and *Riverain forests*. These are found throughout the drier regions of the state.

4. Tropical thorn forests :

In these the low thorny hard leaved evergreen trees and xerophytes dominate. The canopy is more or less broken and under 10 m high. Trees have short boles and low branching crown. Number of species is less but usually mixed. Climbers and epiphytes are scarce. There is an abundant growth of annual grasses during the rains. In Madhya Pradesh only small patches of these forests are found in the plains and the low hills of the north west border of Morena and in the south west corner of West Nimar receiving an annual rainfall of 700 — 1000 mm with long dry spell. The soil is generally shallow and poor.

The common constituents of these forests are *Acacia* spp., *Ziziphus* spp., *Albizia* spp., *Aegle marmelos*, *Gardenia* spp., *Randia* spp., *Cordia obliqua*, *Balanites roxburghii*, *Prosopis spicigera*, *Mimosa* spp., *Gymnosporia spinosa* and *Flacourtia indica*. The types of thorn forests occurring in Madhya Pradesh are *Southern thorn forest*; *Southern thorn scrub* and; *Ravine thorn forest*.

II. MONTANE SUBTROPICAL FORESTS :

It is represented only by the following central Indian type of Subtropical forests found on some hill tops of Madhya Pradesh, Orissa and Mt. Abu in Rajasthan.

Central Indian Sub-tropical Hill Forests :

The sites occupied are exposed and often with poor soil, and being subjected to human interference, the residual forest is mostly of an inferior type with short-boled and branchy trees. The forests resemble the dry deciduous forests though with a higher proportion of the evergreens.

It occurs as small patches on hill tops over 1200 m at places like Pachmarhi and Bailadila. The rainfall is relatively high but there is a long dry spell. The soil, except in the gullies, may be shallow to fairly deep on the flatter tops of Pachmarhi, and often lateritic.

Michelia champaca, *Syzygium cumini*, *Manilkara hexandra*, *Mungifera indica*, *Symplocos laurina*, *Salix tetrasperma*, *Carallia brachiata*, *Litsea monopetala*, *Dillenia* spp., *Mallotus philippensis*, *Toona ciliata*, *Gnetum scandens* and *Calamus* spp., together with tree ferns like *Cyathia* sp., are the common elements of these forests.

AQUATIC PLANTS

The numerous rivers, streams, drains, ponds and ditches throughout the state support a somewhat specialized flora grouped together as aquatic plants. However, the exact interpretation or circumscription of this group is debatable and there are innumerable borderline species which grow both in wetlands and in water, and still other which grow in drains and ditches temporarily filled up during the rains. The following list contains only those species which generally complete or almost complete their life-cycle in water. These have been classified into six categories :—

1. Free floating hydrophytes :

Azolla pinnata, *Eichhornia crassipes*, *Lemna perpusilla*, *Pistia stratiotes*, *Spirodela polyrrhiza*, *Trapa natans* var. *bispinosa* and *Wolffia globosa*.

2. Suspended submerged hydrophytes :

Ceratophyllum demersum, *Utricularia aurea* and *U. exoleta*.

3. Anchored submerged hydrophytes :

Aponogeton crispus, *Blyxa aubertii*, *B. octandra*, *Cryptocoryne retrospiralis*, *Hydrilla verticillata*, *Myriophyllum oliganthum*, *Najas* spp., *Nechamandra alternifolia*, *Podostemon wallichii*, *Polypleurum stylosum*, *Potamogeton crispus*, *P. mucronatus*, *P. pectinatus* and *Vallisneria natans*.

4. Anchored hydrophytes with floating shoots :

Alternanthera philoxeroides, *Cyperus platystylis*, *Hygroryza aristata*, *Ipomoea aquatica*, *Ludwigia adscendens* and *Neptunia oleracea*.

5. Anchored hydrophytes with floating leaves :

Aponogeton natans, *Caldesia parnassifolia*, *Limnophyton obtusifolium*,

Marsilea minuta, *Monochoria hastata*, *M. vaginalis*, *Nelumbo nucifera*, *Nymphaea pubescens*, *N. nouchali*, *N. rubra*, *Nymphoides hydrophylla*, *N. indica*, *Ottelia alismoides*, *Potamogeton nodosus*, *Sagittaria guayanensis* ssp. *lappula* and *Tenagocharis latifolia*.

6. Emergent amphibious hydrophytes :

Acorus calamus, *Aeschynomene aspera*, *A. indica*, *Ammannia baccifera*, *A. multiflora*, *Brachiaria reptans*, *Coix aquatica*, *Crinum defixum*, *Cyperus distans*, *C. nutans* var. *eleusinoides*, *C. pangorei*, *Echinochloa colona*, *E. stagnina*, *Eleocharis acutangula*, *E. congesta*, *E. dulcis*, *E. geniculata*, *E. palustris*, *Enhydra fluctuans*, *Eriocaulon achiton*, *E. cinereum*, *E. quinquangulare*, *E. sollyanum*, *Fimbristylis schoenoides*, *F. tetragona*, *Fuirena ciliaris*, *Hydrolea zeylanica*, *Hygrophila auriculata*, *Hymenachne pseudointerrupta*, *Isoetes coromandeliana*, *Limnophila aromatica*, *L. indica*, *L. sessiliflora*, *Lipocarpa chinensis*, *L. sphacelata*, *Ludwigia octovalvis*, *L. perennis*, *L. prostrata*, *Ophiuros exaltatus*, *Oryza sativa*, *Phragmites karka*, *Polygonum barbatum* *P. dichotomum*, *P. glabrum*, *P. hydropiper* ssp. *macrocarpum* var. *triquetrum*, *P. limbatum*, *Ranunculus scleratus*, *Rotala densiflora*, *R. indica*, *R. rotundifolia*, *Scirpus articulatus*, *S. juncoides*, *S. lateriflorus*, *S. maritimus* and *Typha angustata*.

BOTANICAL COLLECTIONS

Madhya Pradesh, as we know now, was formed as a result of state reorganization in 1956. It was carved out, in full or in part, of regions earlier falling under Central Provinces and Berar, Central India Agency or Central India, Madhya Bharat, Vindhya Pradesh, Baghelkhand, Bundelkhand and Jashpur, Surguja and Bastar belonging to the Eastern States Agency. Hence, earlier collections coming from any of these regions, as also from Vindhya Range, Satpura Range, Malwa Plateau, Chambal Valley and Narmada Valley, are likely to be from the present day Madhya Pradesh, but specific localities must be individually checked for confirmation.

The earliest record of exploration in the present day Madhya Pradesh appears to be that of V. Jacquemont, a French botanist, who collected in Sidhi, Rewa, Satna and Panna in 1830, and in Mandasor, Ratlam, Ujjain, Indore and West Nimar in 1832. Subsequently, N. Vicary (1833) collected in Central India, Bundelkhand, Sagar and Jabalpur; D. Ritchie (c. 1838) in Central India; M.P. Edgeworth (1838 and 1847—1848) in Bundelkhand, Dhar, Malwa and Indore, W. Griffith (c. 1839) in Malwa Plateau, Narmada Valley and Jabalpur, W. Munro (c. 1839) in Chambal (Morena); D.F. Macleod (c. 1839—40) in Jabalpur; M. Kittoe (1839—40) enroute from Northern Circars in Orissa to Nagpur in Maharashtra; R.H. Beddome (1848)

in Jabalpur; C.W.W. Hope (1860—61) in Panna, Rewa and Baghelkhand; D. Brandis (1863, 1888—89) in Satpura Range and Bijawar; G. King (c. 1867) in Bundelkhand, Malwa, Guna and Sagar; T.C. Jerdon (1868) in Central India and Sagar; R. Thompson (1870) in Central Provinces; J.C. Hobson (prior to 1874) in Asirgarh (Khandwa); O. Kuntze (c. 1875-76) in Jabalpur; A. Barclay (1876) in Guna; C.B. Clarke (c. 1876) in Jashpur, Surguja and Central India; J.J. Wood (1878) in Jashpur and Surguja; Mrs. C. Morris (1881) in Pachmarhi (Hoshangabad); W. Schlich (1883) in Central Provinces; J.F. Duthie (1888—91) in Bundelkhand, Indore, Nimar, Jabalpur, Sagar, Damoh, Betul, and Hoshangabad; C. Maries (1889—90) in Gwalior, Wingate (? 1890's) in Gwalior, Bundelkhand and Sagar; G. Watt (c. 1894) in Raipur and Bilaspur; J. Marten (1894) in Jabalpur, A.E. Lowrie (? 1896) in Indore; and R.S. Hole (1896—1902) in Central Provinces, Jabalpur and Seoni.

While some of the above-mentioned collectors, professionally botanists, foresters, administrators, surgeons, army personnels, missionaries and engineers etc., went in for a complete gathering of the botanical specimens, others made only stray collections or collected specimens of only specialized groups like ferns, woody elements or economic plants. However, these at the most were the collections available at the time of the publication of J.D. Hooker's *Flora of British India* (1872—1897). It is to be noticed that a large south eastern region of Madhya Pradesh comprising the districts of Bastar, Raigarh, Raipur, Bilaspur, Mandla, Durg, Rajnandgaon and Balaghat remained almost unrepresented in the above Flora.

The collections were continued by R.S. Hole, Rev. A. Campbell, Rev. L. Cardon, Mrs. A.S. Bell, A. Meebold, I.H. Burkill, D.O. Witt, Masters, Allington, W.F. Biscoe, C.G. Rogers, H.H. Haines, A.B. Pandey, R.R.D. Graham, P. Mukherjee and C.C. Stevens up to about 1920 in various parts including those of Balaghat, Bilaspur, Durg and Raipur by Haines (?1914—1920's). The collection activity almost ceased between 1920—1947. During this period only H.F. Mooney made a good gathering in Bailadila hills (Bastar), Jashpur and Surguja. L.A. Kenoyer, H. Crookshand and C.E. Hewetson also contributed to some extent.

From 1948 onwards, with the interest taken by the Forest Department and the Universities, the exploration and plant collection again gradually picked up. The revitalization of the Botanical Survey of India in 1955 and opening of its Central Circle at Allahabad on the 30th July, 1962 started an era of well planned intense plant collection activity in Madhya Pradesh. These collections housed in the Herbarium of the Botanical Survey of India, Central Circle, Allahabad (BSA) now form the main basis for writing the present Flora of Madhya Pradesh. It has not been possible to study all the collections of the past century, or more, scattered in various herbaria in

India, and abroad. A deeper insight into these early collections would highlight the changed pattern of the flora of Madhya Pradesh due to intense biotic interference and tremendous rate of urbanization and industrialization etc. in various parts of the state, particularly during the last about fifty years.

FLORISTIC PUBLICATIONS

There have been a number of publications on the botany of various parts of Madhya Pradesh. These include regional or district Floras, list of species, forest Floras, economic or medicinal species, new distributional records, new species, or a mention of floristic composition in ecological accounts. J.D. Hooker's *Flora of British India* (1872 - 1897) was the first Flora to deal with plants of this region. Stewart and Brandis *Forest Flora of North-West and Central India* (1874) covers a large part of the state while Duthie's *Flora of the Upper Gangetic plains and the adjacent Sivalik and sub-Himalayan tracts* (1903 — 29) covers the parts of Madhya Pradesh lying north and west of the Vindhyan Range. Forsyth gave an interesting account of the forests and tribal life in *The Highlands of Central India* (1871). Hole (1904), Haines (1916) and Witt (1908, 1911, 1916) published mainly on woody elements or economic plants of different regions. Mooney's *Supplement to the Botany of Bihar and Orissa* (1950) includes some plants from Jashpur and Surguja and his sketch of the flora of the Bailadila range published in *Indian Forest Records* (1942) is the first account of plants of Bastar district. Other significant contributions on the flora of Madhya Pradesh were made by Wood (1902), Biscoe (1910), Kenoyer (1924), Pathak (1926), Sagreiya (1938), Sagreiya and Singh (1959), Maheshwari (1958, 1960, 1961, 1962, 1963), Sebastine and Balakrishnan (1963), Joseph (1963), Joseph and Vajravelu (1967), Kapoor and Yadav (1962), A.S. Rao and Sastry (1965), Subramanyam and Henry (1967), S.D.N. Tiwari (1963, 1968, 1972, 1979), Jain (1963, 1964, 1965), Panigrahi *et al* (1965, 1966, 1967), Panigrahi and Murti (1989), Saxena (1972, 1976), Sengupta and Ram Lal (1973), Ommachan (1977), Verma *et al* (1981, 1985), Mukherjee (1984), Lal and Anand Kumar (1986), Khanna (1989, 1990, 1991) and Srivastava (1983, 1985, 1987, 1989), Sengupta (1977), Verma (1977), Chakraverty and Verma (1985) have given a detailed account of plant exploration and floristic publications concerning Madhya Pradesh.

It may be seen that unlike other Indian regions covered by various regional Floras like those of Cooke (1901 — 1908), Prain (1903), Haines (1921 — 1925), Duthie (1903 — 1929), Gamble (1915 — 1936), Kanjilal *et al* (1934 — 1940) and Bamber (1916), the State of Madhya Pradesh does not have a Flora of its own. There appears to be two main reasons for it. Firstly, the state with its present political boundaries did not exist in the first quarter of the century when Flora publications by some experienced and devoted

botanists were at its peak, and secondly large tracts were unexplored or inadequately explored. The present Flora of Madhya Pradesh fills up this gap in our knowledge of Indian botany.

USEFUL PLANTS

From times immemorial, plants have been used as a source of food, shelter, clothing, medicine, fibre, gum, resin and oil, and for an array of other miscellaneous purposes. Several species are put to more than one use, and some are more important than the others for the same purpose. There are quite a few monumental works like those of Watt (1889 — 1892), Kirtikar and Basu (1935), Wealth of India (Anonymous 1949 — 1976), Agarwal (1986), Useful Plants of India (Anonymous 1986), and others, dealing with the economic and medicinal plants of India. Detailed information on these aspects can always be obtained from these. However, an introduction to a regional Flora will appear incomplete without some insight into its useful elements but a detailed account would become a burden on the Flora. Hence, only a list of more important useful species has been provided below. These species have been categorized, as per their most common use, into timber wood, edible plants, medicinal plants and plants of miscellaneous use.

1. Timber Wood : (for construction work, railway sleepers, poles, agricultural implements, furniture, carts and instruments etc.) :

Acacia nilotica ssp. *indica*, *Adina cordifolia*, *Anogeissus latifolia*, *A. pendula*, *Azadirachta indica*, *Dalbergia latifolia*, *D. sissoo*, *Gmelina arborea*, *Hardwickia binata*, *Mangifera indica*, *Michelia champaca*, *Ougeinia oojeinensis*, *Prosopis cineraria*, *Pterocarpus marsupium*, *Schleichera oleosa*, *Shorea robusta*, *Syzygium cumini*, *Tectona grandis*, *Terminalia alata* and *Xylia xylocarpa* yield the more valued timber of long durability and strength, and are popularly in use. Other species falling into this group are *Acacia leucophloea*, *Alangium salvifolium*, *Albizia* spp., *Alstonia scholaris*, *Anthocephalus cadamba*, *Careya arborea*, *Toona ciliata*, *Cleistanthus collinus*, *Diospyros* spp., *Eucalyptus* spp., *Garuga pinnata*, *Kydia calycina*, *Lagerstroemia parviflora*, *Lannea coromandelica*, *Litsea monopetala*, *Mitragyna parvifolia*, *Putranjiva roxburghii*, *Schrebera swietenoides*, *Sterculia* spp., *Stereospermum* spp., *Trewia nudiflora* and *Ziziphus* spp.

2. Edible plants :

(i) Rhizomes / tubers (cooked) of *Curcuma* spp. *Dioscorea bulbifera*, *D. glabra*, *D. pentaphylla*, *D. puber*, *Eleocharis dulcis*, *Manihot esculenta*, *Nelumbo nucifera*, *Nymphaea* spp., *Nymphoides indicum*, *Sauromatum venosum* and *Tacca leontopetaloides*.

(ii) **Leaves and tender shoots** : (cooked) of *Amaranthus* spp., *Amorphophallus sylvaticus*, *Basella alba*, *Bauhinia* spp., *Cassia tora*, *Cleome gynandra*, *Cocculus hirsutus*, *Corchorus* spp., *Dendrocalamus strictus*, *Glossocardia bosvallea*, *Gnaphalium indicum*, *Hibiscus furcatus*, *H. radiatus*, *H. sabdariffa*, *Holostemma annularis*, *Ipomoea aquatica*, *I. quamoclit*, *Lysimachia candida*, *Martynia annua*, *Melochia corchorifolia*, *Melothria heterophylla*, *Merremia emarginata*, *Neptunia oleracea*, *Nymphoides heterophylla*, *N. Indica*, *Olax scandens*, *Ottelia alismoides*, *Oxalis corniculata*, *Oxystelma secamone*, *Pergularia daemia*, *Phoenix acaulis*, *Phyla nodiflora*, *Polygonum* spp., *Portulaca oleracea*, *Rivea hypocrateriformis*, *Sonchus* spp. and *Tribulus terrestris*.

(iii) **Flowers** : (cooked) of *Bauhinia purpurea*, *B. racemosa*, *Celastrus paniculatus*, *Hibiscus sabdariffa* (calyx), *Holostemma annularis*, *Madhuca longifolia* var. *latifolia*, *Moringa oleifera*, *Nelumbo nucifera* (carpels), *Oxystelma secamone*, *Pergularia daemia*, *Semecarpus anacardium*, *Sesbania grandiflora* and *Woodfordia fruticosa*.

(iv) **Fruits** : (raw, cooked or pickled) of *Abelmoschus esculentus*, *Aegle marmelos*, *Annona reticulata*, *A. squamosa*, *Antidesma ghaesembilla*, *Artocarpus* spp., *Buchanania lanzan* (seeds), *Carissa* spp., *Cordia obliqua*, *Dillenia indica*, *D. pentagyna*, *Diospyros malabarica*, *D. melanoxylon*, *Embelia isjeriam cottam*, *Embllica officinalis*, *Erycibe paniculata*, *Feronia limonia*, *Ficus hispida*, *F. racemosa*, *F. semicordata*, *F. virens*, *Flacourtia indica*, *Gmelina arborea*, *Grewia* spp., *Mangifera indica*, *Manilkara hexandra*, *Melothria heterophylla*, *Monardica dioica*, *Moringa oleifera*, *Ottelia alismoides*, *Oxystelma secamone*, *Parkia biglandulosa*, *Phoenix acaulis*, *P. sylvestris* (toddy), *Prosopis cineraria*, *Solanum torvum*, *Spondias pinnata*, *Syzygium cumini*, *S. heyneanum*, *Tamarindus indica*, *Trapa natans* var. *bispinosa*, *Xeromphis uliginosa*, *Ziziphus mauritiana* and *Z. rugosa*.

(v) **Seeds** : (cooked or roasted) of *Bauhinia vahlii*, *Cassia occidentalis*, *Coix aquatica*, *Eleusine coracana*, *Indigofera glandulosa*, *Oryza rufipogon*, *Panicum sumatrense*, *Paspalum flavidum*, *P. scrobiculatum*, *Pithecellobium dulce* (raw seed aril), *Semecarpus anacardium*, *Sterculia urens*, *Vigna aconitifolia*, *V. trilobata* and *V. umbellata*.

3. Medicinal plants :

Madhya Pradesh is known to harbour a rich wealth of medicinal plants which continues to be used for amelioration of people's sufferings.

The following list of 193 species contains only those with established medicinal properties and generally used by Indian Pharmacetical Industries. Scattered notes gathered during field exploration on medicinal uses by local people have been given under individual species.

Abrus precatorius, *Abutilon indicum*, *Acacia catechu*, *A. farnesiana*, *A. nilotica* spp. *indica*, *A. senegal*, *A. sinuata*, *Achyranthes aspera*, *Acorus calamus*, *Adhatoda vasica*, *Aegle marmelos*, *Alangium salvifolium*, *Albizia lebeck*, *Alternanthera sessilis*, *Alstonia scholaris*, *Amaranthus caudatus*, *A. spinosus*, *Andrographis echinoides*, *A. paniculata*, *Anogeissus latifolia*, *Anthocephalus cadamba*, *Argemone mexicana*, *Argyreia nervosa*, *A. strigosa*, *Asparagus racemosus*, *Azadirachta indica*, *Bacopa monnieri*, *Balanites aegyptiaca*, *Baliospermum montanum*, *Bambusa arundinacea*, *Barleria cristata*, *B. prionitis*, *Barringtonia acutangula*, *Bauhinia racemosa*, *B. tomentosa*, *B. vahlii*, *B. variegata*, *Berberis asiatica*, *B. lycium*, *Blepharispermum subsessile*, *Boerhavia diffusa*, *Bombax ceiba*, *Butea monosperma*, *Caesalpinia bonduc*, *Calotropis gigantea*, *C. procera*, *Canscora decussata*, *Careya arborea*, *Cassia absus*, *C. auriculata*, *C. fistula*, *C. obtusifolia*, *C. occidentalis*, *C. tora*, *Cassytha filiformis*, *Catharanthus pusillus*, *C. roseus*, *Celastrus paniculatus*, *Centella asiatica*, *Cissampelos pareira* var. *hirsuta*, *Cleome simplicifolia*, *C. viscosa*, *Clerodendrum indicum*, *C. phlomidis*, *C. serratum*, *Clitoria ternatea*, *Cocculus hirsutus*, *Convolvulus arvensis*, *C. microphyllus* *Cordia obliqua*, *Costus speciosus*, *Cratogeomys murvata*, *Crinum asiaticum*, *Crotalaria juncea*, *Curculigo orchioides*, *Curcuma aromatica*, *C. zedoaria*, *Cynodon dactylon*, *Cyperus rotundus*, *Dalbergia sisoo*, *Datura metel*, *D. stramonium*, *Desmodium gangeticum*, *D. triflorum*, *Desmostachya bipinnata*, *Diospyros peregrina*, *Diplocyclos palmatus*, *Dregea volubilis*, *Eclipta prostrata*, *Embelia tsjeriam-cottam*, *Embilica officinalis*, *Emilia sonchifolia*, *Emicostema axillare*, *Erythrina variegata*, *Eucalyptus* spp., *Eulophia nuda*, *Euphorbia hirta*, *E. nerifolia*, *E. tirucalli*, *Evolvulus alsinoides*, *Girardinia zeylanica*, *Gmelina arborea*, *Gossypium arboreum*, *G. herbaceum*, *Guizotia abyssinica*, *Gymnema sylvestre*, *Helicteres isora*, *Hemidesmus indica*, *Holarrhena antidysenterica*, *Hygrophila auriculata*, *Ichnocarpus frutescens*, *Ipomoea nil*, *Lawsonia inermis*, *Lepidium sativum*, *Leptadenia reticulata*, *Leucas capitata*, *Litsea monopetala*, *Macrotyloma uniflorum*, *Madhuca longifolia* var. *latifolia*, *Mallotus philippensis*, *Manilkara hexandra*, *Marsdenia volubilis*, *Martynia annua*, *Melia azedarach*, *Mimosa pudica*, *Momordica charantia*, *Mucuna prurita*, *Nelumbo nucifera*, *Nymphaea nouchali*, *N. pubescens*, *Ocimum basilicum*, *O. sanctum*, *Oldenlandia corymbosa*, *Operculina turpethum*, *Oroxylum indicum*, *Oxalis corniculata*, *Pavonia odorata*, *Peucedanum nagpurensis*, *Phyllanthus amarus*, *Pistia stratiotes*, *Plantago* sp., *Plumbago zeylanica*, *Polygala arvensis*, *Pongamia pinnata*, *Psoralea corylifolia*, *Pterocarpus marsupium*, *Rauwolfia serpentina*, *Saccharum spontaneum*, *Salvia plebeia*, *Sapindus emarginatus*, *Scirpus grossus*, *Semecarpus anacardium*, *Sesamum orientale*, *Shorea robusta*, *Sida acuta*, *S. alba*, *S. cordata*, *S. cordifolia*, *S. rhombifolia*, *Smilax zeylanica*, *Solanum indicum*, *S. nigrum*, *S. surattense*, *Sphaeranthus indicus*, *Spilanthes acmella*, *Sterculia urens*, *Stereospermum suaveolens*, *Strychnos nux-vomica*, *S. potatorum*, *Syzygium cumini*, *Tamarindus indica*, *Tectona grandis*, *Tephrosia purpurea*, *Terminalia arjuna*, *T. bellirica*, *T. chebula*, *Thalictrum foliolosum*, *Thespesea lampas*, *Tinospora cordifolia*, *Trewia nudiflora*, *Tribulus terrestris*, *Tridax procumbens*, *Uraria picta*,

Urginea indica, *Vanda tessellata*, *Vernonia cinerea*, *Vetiveria zizanioides*, *Vitex negundo*, *V. peduncularis*, *Woodfordia fruticosa*, *Xeromphis spinosa*, *Ziziphus mauritiana* and *Z. oenoplia*.

4. Plants of miscellaneous use :

- (i) **Aquaria plants** are *Hydrilla verticillata* and *Vallisneria spiralis*.
- (ii) **Bamboo sticks and poles** from *Bambusa* spp., *Cephalostachyum pergracile* and *Dendrocalamus strictus*.
- (iii) **Baskets, hats and mats etc.** from *Arundo donax*, *Calamus* spp., *Cyperus pangorei*, *Dendrocalamus strictus*, *Diospyros melanoxylon*, *Fimbristylis globulosa*, *Indigofera cassioides*, *Phoenix acaulis*, *P. sylvestris*, *Phragmites karka*, *Scirpus grossus* and *Typha angustata*.
- (iv) **Beverages and drinks** from *Cassia occidentalis*, *Madhuca longifolia* var. *latifolia*, *Oryza sativa*, *Phoenix sylvestris* and *Tamarindus indica*.
- (v) **Bidi rolling** from leaves of *Bauhinia vahlii* and *Diospyros melanoxylon*.
- (vi) **Brooms** from *Arundo donax*, *Dendrocalamus strictus*, *Phoenix acaulis*, *Sida acuta* and *Thysanolaena maxima*.
- (vii) **Cotton** from various species and hybrids of *Gossypium*, and silk cotton from *Bombax ceiba*.
- (viii) **Detergent** for washing hairs from powdered pods of *Acacia sinuata* known as Shikakai and liquid obtained after soaking fruits of *Sapindus emarginatus* in water.
- (ix) **Dye** from *Acacia catechu*, *Butea monosperma*, *Curcuma* spp., *Lawsonia inermis*, *Mallotus philippensis*, *Nyctanthes arbor-tristis*, *Pterocarpus marsupium*, *Toona ciliata*, *Woodfordia fruticosa* and *Wrightia tinctoria*.
- (x) **Fibre** from *Abelmoschus* spp., *Abutilon* spp., *Agave americana*, *Bauhinia purpurea*, *B. vahlii*, *Butea monosperma*, *Calotropis gigantea*, *C. procera*, *Corchorus* spp., *Crotalaria juncea*, *Eulaliopsis binata*, *Grewia* spp; *Helicteres isora*, *Hibiscus cannabinus*, *H. radiatus*, *H. sabdariffa*, *Marsdenia tenacissima*, *Melochia corchorifolia*, *Sida* spp., *Suymida febrifuga*, *Triumfetta rhomboidea*, *Typha angustata* and *Urena lobata*.
- (xi) **Fish poison** from fruit pulp of *Acacia sinuata*, *Casuarina elliptica*, *Cleistanthus collinus*, *Gardenia turgida* and *Xeromphis spinosa*, roots of *Millettia extensa* and bark of *Barringtonia acutangula*.
- (xii) **Floss** for stuffing pillows and seats from *Bombax ceiba*, *Calotropis gigantea*, *C. procera*, *Cochlospermum religiosum* and *Gossypium* spp.
- (xiii) **Gum** from *Acacia ferruginea*, *A. nilotica* ssp. *indica*, *A. senegal*, *Anogeissus latifolia*, *Boswellia serrata*, *Cochlospermum religiosum*,

- Gardenia gummitifera*, *Lannea coromandelica*, *Sterculia urens* and *Woodfordia fruticosa*.
- (xiv) **Insect repellent oil** from leaves of *Azadirachta indica* and *Cymbopogon martini*.
- (xv) **Jaggery** from stem sap of *Phoenix sylvestris*.
- (xvi) **Kattha** (Catechu) from Wood of *Acacia catechu*.
- (xvii) **Khus tatties** from roots of *Vetiveria zizanioides*.
- (xviii) **Oil** (for paints, varnishes, lubrication, tanning, soap, massaging and illumination etc.) from *Argemone mexicana*, *Boswellia serrata*, *Buchanania lanzan*, *Casearia graveolens*, *Celastrus paniculata*, *Cochlospermum religiosum*, *Gossypium* spp., *Guitotia abyssinica*, *Jatropha curcas*, *Litsea monopetala*, *Madhuca longifolia* var. *latifolia*, *Mallotus philippensis*, *Nyctanthes arbor-tristis*, *Pongamia pinnata*, *Putranjiva roxburghii*, *Ricinus communis*, *Schleichera oleosa*, *Semecarpus anacardium*, *Shorea robusta*, *Sterculia urens*, *Tamarindus indica* and *Ventilago denticulata*.
- (xix) **Paper pulp** from *Boswellia serrata*, *Dendrocalamus strictus*, *Eucalyptus* spp., *Kydia calycina* and *Pterocarpus marsupium*.
- (xx) **Perfume** from essential oil from *Cymbopogon* spp., *Jasminum* spp., *Michelia champaca* and *Vetiveria zizanioides*.
- (xxi) **Pith** (for cutting microscopic sections) from *Aeschynomene aspera* and *A. indica*.
- (xxii) **Platters and bowls** from leaves of *Bauhinia vahlii*, *Butea monosperma*, *Madhuca longifolia* var. *latifolia*, *Musa* spp. and *Shorea robusta*.
- (xxiii) **Ply-wood** from various soft timber spp.
- (xxiv) **Thatching of huts** from *Oryza sativa*, *Phoenix acaulis*, *P. sylvestris*, *Saccharum spontaneum* and *Typha angustata*.
- (xxv) **Weighting** (Ratti- the jeweller's weight) with seeds of *Abrus precatorius*.
- (xxvi) **Wood** (for toys, combs, decorations, matchsticks, packing cases, splinters, pencil and scale etc.) *Aeschynomene* spp., *Ailanthus excelsa*, *Boswellia serrata*, *Erythrina suberosa*, *Holarrhena antidysenterica*, *Holoptelia integrifolia*, *Kydia calycina*, *Mallotus philippensis*, *Toona ciliata* and *Wrightia tinctoria*.

MATERIALS AND PRESENTATION

The specimens deposited in the Herbarium of the Botanical Survey of India, Central Circle, Allahabad (BSA) have been the main source of material for writing the present Flora. The Herbarium contains all the plant collections made by the institution since its inception in July, 1962. The

exploration and plant collection tours were planned to several parts of Madhya Pradesh in different seasons, covering various vegetation types, altitudinal ranges, reserved and protected forests, wastelands, cultivated fields, road-sides, river-banks, stream-beds and all other conceivable ecological niches. Plant survey and collection is something that can never be achieved in full. Changes in floristic composition in any area due to biotic pressures and several other environmental stresses and plant migration, is a well-known phenomenon. Besides, there is always a likelihood of missing some plants during the plant collection trips. However, a total of about 40,000 field numbers, collected as above from Madhya Pradesh give a good spectrum of flora of the state. In addition to these, the authors have also consulted various other herbaria, like Central National Herbarium, Howrah (CAL), Regional herbaria of the Botanical Survey of India at Pune (BSI) and Coimbatore (MH), Herbarium of the State Forest Research Institute, Jabalpur, and National Botanical Research Institute, Lucknow. These have in general yielded in some additional distribution data. These are then the specimens studied, and the authors bear responsibility for their correct identity, descriptions and notes. There have also been a few taxa which have been reported from Madhya Pradesh by some earlier workers but of which the specimens have not been seen by the authors. These have been included giving reference to the publication, the details of which are given in the list of References.

The Flora generally includes correct botanical name, basionym, if any, and a very few selected synonyms, with original references, and a references to the Flora of British India by J.D. Hooker (1872-1897). Local names, if available, have been given in the same paragraph, italicized and separated by a hyphen. This is followed by a botanical description, and notes on habitat, distribution within the State (district-wise) and phenology. Concised notes on economic/medicinal uses from the field notes on the herbarium specimens or published literature have also been added. Keys to identification of genera and species have been given at appropriate places. A large number of research papers, monographs, revisions and other Floras have also been consulted for writing this Flora of Madhya Pradesh but these have not been mentioned with a view to save space.

The enumeration of the Flora starts with an account of the Pteridophytes. It includes 102 species belonging to 51 genera and 36 families and have been mainly classified according to the system proposed by Pichi-Sermolli (1977). The whole credit and responsibility of compiling account of this interesting assemblage of ferns and fern allies goes to one of the editors, Dr. R.D. Dixit.

The systematic treatment of Angiosperms broadly follows the classification provided by Bentham and Hooker (1862-1883) with some

deviations according to modern concepts and trends. This first volume contains an account of 83 families, from Ranunculaceae to Plumbaginaceae, with 874 species belonging to 407 genera. Several authors have contributed in this task and their names have been given below each family. It ends with an index to botanical and local names.

The remaining account of about 1500 species of Angiosperms, and a few Gymnosperms, mainly planted, is to be published subsequently with a general index to botanical and local names at the end.

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P T E R I D O P H Y T E S

(R.D. Dixit)

Key to the Families

- 1a. Leaves ligulate
 - 2a. Sporangia borne on the axils or on the adaxial surface of sporophylls.
 - 3a. Leaves usually arranged in 4-rows, strobili bearing micro and megasporangia ...3. SELAGINELLACEAE
 - 3b. Leaves awl shaped; outer leaves bearing megasporangia and inner ones bearing microsporangia ...4. ISOETACEAE
 - 1b. Leaves non-ligulate:
 - 2b. Sporangia not as above:
 - 4a. Spores not reticulate or pitted:
 - 5a. Aerial shoots jointed with hallow internodes, sporangia borne on the undersurface of stalked peltate sporophylls ...5. EQUISETACEAE
 - 5b. Aerial shoots dichotomously branched, sporangia in triads ...6. PSILOTACEAE
 - 4b. Spores pitted or reticulate
 - 6a. Stems erect to sub-erect, iso-dichotomously branched, leaves and sporophylls nearly isomorphous; spores pitted ...1. HUPERZIACEAE
 - 6b. Stems wide trailing, hetero-dichotomously branched, leaves and sporophylls heteromorphous; spores reticulate ...2. LYCOPODIACEAE
 - 7a. Sporangia developed from group of cells; sporangial wall more than one cell thick, annulus absentEUSPORANGIATE
 - 8a. Sporangia fused, prothallium without chlorophyll.

- 9a. Vegetative fronds simple; veins anastomosing;
sporangia arranged in two-lateral rows on a spike
like segment ...8. OPHIOGLOSSACEAE
- 9b. Vegetative fronds compound; veins free, forked;
sporangia in paniculate clusters ...7. BOTRYCHIACEAE
- 8b. Sporangia free in double rows; contiguous but not
coherent, prothallium with chlorophyll
...9. ANGIOPTERIDACEAE
- 7b. Sporangia developed from a single cell; sporangial
wall one-cell thick, annulus present ...LEPTOSPORANGIATE
- 10a. Spores of one kind
- 11a. Rhizome covered by hairs, scales absent
- 12a. sporangia forming distinct sori
- 13a. Sori marginal forming coenosori; margin
reflexed; veins free or basal ones
anastomosing.
- 14a. Rhizome wide without scales, creeping,
veins free; sori protected by two indusia
...25. PTERIDIACEAE
- 14b. Rhizome erect, scaly; sori lacking inner
indusium ...18. PTERIDACEAE
- 13b. Sori not marginal, nor forming coenosori,
terminal on veins, margins not reflexed,
indusia cup-shaped ...24. DENNSTAEDTIACEAE
- 12b. Sporangia not in sori, originally from the
margin of the fertile segments on receptacles.
- 15a. Fronds not tufted, ascending twining; sori
indusiate, sporangia solitary
...15. LYGODIACEAE
- 15b. Fronds tufted, erect; sori non-indusiate,
sporangia borne on the margins of reduced
leaflets ...10. OSMUNDACEAE
- 11b. Rhizome scaly
- 16a. Sori ex-indusiate, apex non-proliferous
- 17a. Fronds not dimorphic, or slightly dimorphic,
stipe articulate on rhizome; sori round:

- 17b. Fronds dimorphic:
- 18a. Plants epiphytes or lithophytes:
- 19a. Fronds simple or pinnate:
- 19b. Fronds simple:
- 20a. Pinnae articulated on rachis, sori not linear:
- 21a. Veins anastomosing with included veinlets
..... 13. POLYPODIACEAE
- 21b. Veins anastomosing with or without included veinlets; sori round, compital ...14 DRYNARIACEAE
- 20b. Pinnae not articulate, sori linear-elongate, oblique to midrib ...12. LOXOGRAMMACEAE
- 18b. Plants terrestrial
- 22a. Apex of the frond proliferous' ...32. LOMARIOPSIDACEAE
- 22b. Apex of the frond non-proliferous:
- 23a. Young parts protected by branched hairs of various forms, veins at least twice forked, sporangia 8 - 15 or more in each sorus
...11. DICRANOPTERIDACEAE
- 23b. Not as above:
- 24a. Lamina deltoid, undersurface farinose:
...16. CHEILANTHACEAE
- 24b. Lamina tripartite; under surface not farinose
- 25a. Segments forked, fertile frond larger than the sterile ones
...17. ACTINIOPTERIDACEAE
- 25b. Segments otherwise:
- 26a. Tree ferns; stems plicate; annulus oblique
...23. CYATHEACEAE
- 26b. Not tree ferns; stems not much plicate, annulus longitudinal:
- 27a. Sori protected by membranous indusium:
- 28a. Pinnules dimidiate to cuneiforme
...26. LINDSAEACEAE
- 27b. Sori protected by and borne on reflexed margin ...19. ADIANTACEAE

28b. Pinnules otherwise:

- 29a. Fronds simple, cordate-hastate, veins anastomosing;
sori covering the whole lower surface.

...20. HEMIONITIDACEAE

- 29b. Fronds pinnately compound, veins free; sori not
covering the whole lower surface:

- 30a. Plants aquatic or marshy, fronds dimorphic,
sporangia scattered, protected by reflexed margins

...21. PARKERIACEAE

30b. Plants otherwise:

- 31a. Rhizome densely scaly, scales golden in colour;
sori medial on the veinlets, lamina 3 - 4 pinnate,
deltoid, herbaceous, indusium villose

...30. HYPODEMATAEAE

- 31b. Rhizome not densely scaly, scales brownish in
colour, sori superficial, indusium single or
double, not villose:

- 32a. Sori reniforme or linear to J-shaped

...29. ATHYRIACEAE

- 32b. Sori linear along the veins, oblique to midrib

...28. ASPLENIACEAE

- 33a. Pinnae narrowed at both the ends, covered
with rigid uni-cellular hairs, veins of
adjacent group unite to form excurrent
veins

...27. THELYPTERIDACEAE

- 33b. Pinnae not narrowed at both the ends,
usually glabrous, excurrent veins absent

...31. ASPIDIACEAE

- 34a. Sori in long continuous line, close to
midrib forming coenosori

...35. BLECHNACEAE

34b. Sori not as above:

- 35a. Fronds simple pinnate, lamina
coriaceous, sori terminal on the
veins

...33. NEPHROLEPIDACEAE

- 35b. Fronds decomposed, lamina membranaceous; sori submarginal ...34. DAVALLIACEAE
- 10b. Spores of two kinds:
- 36a. Plants normally rooting in mud, leaflets 4, cruciform ...22. MARSILEACEAE
- 36b. Plants minute, floating aquatics, leaflets not cruciform ...36. AZOLLACEAE

1. HUPERZIACEAE

2 genera and nearly 400 species, cosmopolitan in distribution. Genus *Huperzia* with 1 species in M.P.

HUPERZIA Bernh.

Plants terrestrial, epiphytic or lithophytic, rarely semiaquatic; stems creeping, trailing or erect, simple to isodichotomously branched. Leaves ovate-oblong to subulate, entire or serrate, thin to coriaceous, uniform, multifarious. Sporophylls aggregated in dense terminal or lateral strobili; spores trilete.

Huperzia hamiltonii (Spring) Trev. in Atti. Soc. Ital. Sci. Nat. 17 : 248. 1875. *Lycopodium hamiltonii* Spring in Mem. Acad. Sci. Belg. 15 (1) : 35. 1843; Moony in Indian For. Rec. 3 (7) : 248. 1942.

Stems 7-15 cm, tufted, erect to pendulous, 2-4 times dichotomously branched, 10 × 25 mm thick including leaves; leaves close, subpentagonal, subpatent, oblong to linear-lanceolate, 10-15 × 2-5 mm, narrowed at both the ends, pale to shining green when dry, coriaceous, margins flat to slightly inflexed, midrib distinct. Sporophylls like leaves except slightly smaller in size.

Epiphytic on tree trunks and branches covered with moss. Bastar (Moony, 1942).

2. LYCOPODIACEAE

About 9 genera in the world comprising of about 200 species. Only one genus *Palhinhaea* (L.) Franco. & Vasc. with 1 species in M.P.

PALHINHAEA (L.) Franco. & Vasc.

Plants terrestrial; rhizome subterranean producing lateral stem, slender to thick, glabrous to glabrescent, simple in the basal part, copiously branched above, branches short, divaricate, ascending to pendulous. Leaves crowded, linear, 3-5 mm long, arcuate-ascending at apex, subulate, margins strongly revolute, subcoriaceous, pale to brownish-green in colour. Strobili 2-20 × 1-2 mm, sessile at the ends of branchlets. Sporophylls

ascending, whitish (-) green, broadly ovate, cuspidate, ciliate at the margins.

A monotypic genus represented by *Pathinhaea cernua* (L.) Franco. & Vasc.

Pathinhaea cernua (L.) Franco. & Vasc. in Vasc. and Franco. in Biol. Soc. Broter. Ser. 2. 41: 25, 1967. *Lycopodium cernuum* L., Sp. Pl. 2: 1103. 1753; Graham in J. Bomb. Nat. Hist. Soc. 23 (2): 501. 1915. *Runi-jhuni*

The distinguishing characters are same as given in generic description.

Trailing on ground among grasses in exposed places along stream side. Abundant. Bastar, Bilaspur, Chhindwara, Pachmarhi.

3. SELAGINELLACEAE

Monotypic family represented by the genus *Selaginella* P. Beauv. comprising about 700 species in the world flora. It is cosmopolitan in occurrence.

SELAGINELLA P. Beauv.

Plants herbaceous; stems short to elongated, creeping, ascending, erect or scandent, branched; rhizophores confined at the base to apical part. Leaves isomorphic to heteromorphic, usually arranged in two parallel planes, those of the lower plane larger called as 'lateral leaves' and those of the upper plane smaller called as 'median leaves'. Strobili terminal on the branches; sporophylls uniform or dimorphic, heterosporous; megasporangia placed in the axils of sporophylls occurring in the basal region; microsporangia in the axils of upper sporophylls. Young leaves provided with minute discoloured leaves on the upper inner side at base, called 'ligule' which falls off at early age. Megaspores usually 4 per megasporangium, 3 large and 1 small; microsporangium comprising of many microspores; spores trilete with various ornamentations.

About 75 species in India; 7 in M.P.

- 1a. Leaves linear, spirally arranged, isomorphic throughout ...3. *S. indica*
- 1b. Leaves arranged in four rows, usually heteromorphic
 - 2a. Sporophylls of the spike uniform; plants xerophytic
 - 3a. Leaves heteromorphic throughout; lateral leaves ciliate at the base; median leaves acute to acuminate ...7. *S. repanda*
 - 3b. Leaves isomorphic on the main stem, dimorphic on the branches
 - 4a. Median leaves acuminate to long aristate; spores without perispore ...1. *S. bryopteris*

- 4b. Median leaves short acuminate, spores with perispore
... 4. *S. involvens*
- 2b. Sporophylls of the spike dimorphic; plants not xerophytic
- 5a. Sporophylls not ciliate; lateral leaves denticulate on both sides
...5. *S. jainii*
- 5b. Sporophylls ciliate; lateral leaves ciliate or denticulate on the proximal side
- 6a. Lateral leaves distinctly ciliate at base, the rest entire; median leaves acute to acuminate
...2. *S. ciliaris*
- 6 b. Lateral leaves denticulate on the proximal side; median leaves subacute
...6. *S. panigrahi*

1. *Selaginella bryopteris* (L.) Baker in J.Bot. 22 : 376. 1884. *Lycopodium bryopteris* L., Sp. Pl. 2 : 1103: 1753. *Selaginella rupestris sensu* Graham in J. Bomb. Nat. Hist. Soc. 23 (2) : 501. 1915. Hatajoori of Hindu Materia Medica, Pashanbhedana; Sanjiwani, Sher-ka-Panja.

Plants xerophytic; stems 5–25 cm, sub-erect to erect, simple in basal region, copiously branched above. Leaves isomorphic on the main stem, dimorphic on the branches; isomorphic leaves distant, ovate, lanceolate, long acuminate, denticulate; heteromorphic leaves contiguous; lateral leaves ovate, oblique at base, acute to acuminate, denticulate and imbricate on the proximal side; axillary leaves somewhat like lateral leaves; median leaves small, ovate, oblique, acute to acuminate, entire to minutely denticulate. Strobili rare, 3–5 × 1–2.5 mm; sporophylls uniform, ovate, entire to minutely denticulate, acuminate.

Plants growing on heavy rock boulders forming thick, green carpet during rainy season. Leaves curled up in dry weather but retain original colour and shape if dipped upside down in water for some time. Abundant. Bastar, Bilaspur, Hoshangabad, Raipur, Rewa.

The plants are widely sold in local fairs and markets during summer and winter season, 50 paise per bundle in the name of Sanjiwani, used as tonic. The pounded fronds mixed with sugar are given to regain strength, a popular tonic amongst local people.

2. *Selaginella ciliaris* (Retz.) Spring in Bull. Acad. Brux. 10 : 23. 1843. *Lycopodium ciliare* Retz, Obs. 5 : 32. 1789; Panigr. and Dixit in Proc. Nat. Inst. Sci. 35 B (3) : 195. 1969.

Small plants; stems 2–8 cm, prostrate, copiously branched from the base, branches erectopotent; rhizophores thin, wiry, restricted in the basal part. Leaves heteromorphic throughout, membranous, usually

bright-green; lateral leaves ovate-oblong, cordate, subobtusely ciliate at base in the proximal side, the rest entire; median leaves ovate, subfalcate, cordate, acuminate, minutely serrulate. Strobili copious, 8-15 × 2-4 mm, single to double; sporophylls dimorphic, ciliate. Larger sporophylls ovate-oblong, resupinate; smaller sporophylls ovate, ascending, acute to acuminate.

Plants rooting in rock-crevices along streams with permanent source of trickling water. It is one of the common species in Madhya Pradesh. Bastar, Bilaspur, Hoshangabad, Sidhi.

3. *Selaginella indica* (Milde) Trayon in Anal. Miss. Bot. Gard. 42 : 52, f. 27. 1955. *S. rupestris* f. *indica* Milde in Fil. Eur. Atlant. 262. 1867. *S. longipila* of authors as Saxena and Shukla in Bull. Bot. Surv. India 12 : 202. 1970. *Mardjadi*.

Plants xerophytic; stems 10-25 cm, dorsiventral, copiously branched from the base; rhizophores wiry, long, occurring almost throughout the plant; leaves more or less isomorphic, long triangular, adnate, subulate, coriaceous, ciliate; cilia piliform at base, dentiform above. Strobili 5-7 × 1-1.5 mm, sporophylls uniform, triangular, dentate to ciliolate at base, denticulate above.

Plants rooting in rock crevices in open sunny situations. Extremely rare in occurrence. Bastar, Chhindwara.

4. *Selaginella involvens* (Sw.) Spring in Bull. Acad. Brux. 10 : 136. 1843. *Lycopodium involvens* Sw., Syn. Fil. 182. 186. *Selaginella caulescens* (Wall. ex Hook. et Grev.) Spring in Bull. Acad. Sci. Brux. 10 : 37. 1843; Moony in Ind. For. Rec. 3 (7) : 248. 1942. *Bachappa. Samohini*.

Plants xerophytic; stems 15-45 cm, ascending with trailing base, simple in the basal region, copiously branched above, branches curled up in dry weather. Rhizophores confined to the basal part only. Leaves isomorphic and distant on the main stem, ascending, ovate, greenish-brown, rigid, denticulate, dimorphic on the branches; lateral leaves ovate, denticulate on the proximal side; median leaves ovate, acute. Strobili 5-8 × 1-2 mm, quadrangular; sporophylls uniform, ovate, acute, denticulate.

Xerophytic species growing among rock boulders or on the ground in rocky soil. The fronds are curled up during dry weather. Bastar, Chhindwara.

5. *Selaginella jainii* Dixit in Bull. Bot. Surv. Ind. 25 : 225 t. 1, f. 2. 1983.

Stems 1.5-3.5 cm, erect, thin, pinkish-brown, copiously branched from the base; rhizophores confined to the base only. Leaves heteromorphic

throughout, contiguous, pale brownish-green, membranous; lateral leaves ovate-oblong, serrulate, subobtuse to rarely obtuse; median leaves small, ovate, serrulate, cordate, subacute. Sporophylls dimorphic, dentate; larger ones ovate-oblong; smaller ones ovate.

Small plants, growing abundantly on rock boulders full of moss and mud with trickling water. Bilaspur, Pachmarhi.

6. *Selaginella panigrahi* Dixit in Bull. Bot. Surv. India 25 : 226 t. 1, f. 4, text. fig. 4A H 1983.

Stems 1-3 cm, prostrate, wiry, branched from the base; rhizophores restricted to the base only. Leaves heteromorphic throughout, membranous, contiguous, lateral leaves ovate, subacute, dentate; median leaves small, ovate, dentate, subacute. Sporophylls dimorphic, larger sporophylls ovate-oblong, ciliate in the basal part, the rest dentate; smaller sporophylls ovate, long ciliate throughout.

On rock boulders among moss with permanent source of trickling water. Bilaspur.

7. *Selaginella repanda* (Desv. ex Poir.) Spring in Guad. Voy. Bon. Bot. 1 : 329. 1846. *Lycopodium repandum* Desv. ex Poir. in Lamk. Encycl. Suppl. 3 : 558. 1814.

Stems 5-25 cm, suberect, branched from the base; branches erecto-patent, lax, pinnately compound; rhizopores restricted at the base only. Leaves heteromorphic, contiguous, drying brown at age; lateral leaves spreading, ovate, subfalcate, ciliate at base, the rest dentate; median leaves ovate, imbricate, cordate, ciliate at base, the rest denticulate, acute to acuminate. Strobili 5-8 × 1-1.5 mm, tetragonous; sporophylls uniform, ovate, acuminate.

Plants rooting in rock crevices of moist mossy cover over rock boulders along streams. Fronds curled up in dry weather. Common. Bastar, Hoshangabad, Indore, Jabalpur, Rewa, Sidhi.

SPECIES OF DOUBTFUL OCCURRENCE

Selaginella proniflora (Lamk.) Bak. reported by Graham (1915) from Pachmarhi, is most probably based on wrong identification, since so far in India it is known to occur only in Karnataka and Maharashtra. Moreover, no subsequent collection or report was made afterwards.

4. ISOETACEAE

Two genera, cosmopolitan in distribution. Only one genus *Isoetes* L. in India and M.P.

ISOETES L.

Perennial, submerged aquatic or terrestrial, heterosporous plants with short, stout stems. Roots and leaves arising in tufts from 2-4 lobed corm called rhizomorph. It is divided into stem and rhizophore. Leaves crowded, in a dense rosette, broad spoon like at base and terete to flattened above. Ligule present near the base of leaf above the sporangium. All leaves fertile, bearing sporangia at the base below the ligule on adaxial surface covered partially or wholly by a membrane called velum. Sporangium comprises of two types of spores i.e. Megaspores or microspores. Megasporangium containing 50-300, trilete spores of various sizes; microsporangium containing numerous monolete microspores.

Seven species in M.P.

- 1a. Rhizomorph 3-lobed; leaves more than 25 cm long; velum absent :
 - 2a. Megaspores polymorphic, triradiate mark branched
...7. *I. unilocularis*
 - 2b. Megaspores dimorphic to polymorphic, triradiate mark simple :
 - 3a. Megaspores grey when wet, dimorphic ...2. *I. coromandelina*
 - 3b. Megaspores ash coloured when wet, trimorphic ...5. *I. pantii*
- 1b. Rhizomorphs 2-lobed, rarely 3-lobed; leaves usually less than 25 cm long; velum present :
 - 4a. Leaves 5-11 cm long; velum half-way to 3/4th of sporangial surface :
 - 5a. Megaspores greyish when wet, dimorphic and a few jointed, bilobed ones present, tuberculate, triradiate ridges ...1. *I. bilaspurensis*
 - 5b. Megaspores fuscous black when wet, dimorphic, jointed ones not present, tuberculate, tubercular bases confluent giving rise to irregular branched ridges
...6. *I. sampathkumaranii*
 - 4b. Leaves up to 24 cm long, velum rudimentary to covering about half of sporangial surface :
 - 6a. Rhizomorph 2-lobed; leaves 7-24 cm long; velum covering about half of sporangial surface; megaspores black when wet, surface reticulate
...4. *I. panchananii*

- 6b. Rhizomorph 3-lobed; leaves up to 20 cm long; velum rudimentary; megaspores ash-coloured when wet, surface unevenly tuberculate

...3. *I. dixitii*

1. *Isoetes bilaspurensis* Panigr. in Biol. Mem. 6(2) : 135. t. 2, f. 4; figs. 1-10. 1981.

Rhizomorph elongated, 6-10 mm long, 3-5 mm broad, 2-lobed. Leaves tufted erect, patent, gradually tapering to an acicular apex and closely imbricated, 5-10 cm long, 15-30 in number, ligule deltoid, lobed, abruptly acuminate, smaller than megasporangium; velum 2/3rd to 3/4th covering the sporangium; megasporangia ovate, truncate or retuse at the upper end; megaspores white when dry, greyish when wet, dimorphic, large megaspores 407 (390-440) μm long \times 373 (330 \times 440) μm broad; small megaspores 317 (250-300) μm long \times 280 (220-300) μm broad, a few jointed bilobed megaspores and sterile cells present within the same megasporangium.

Plants grow abundantly in shallow water along the edges of tanks. Bilaspur.

2. *Isoetes coromandelina* L.f. in Suppl. Fl. Syst. Veg. ed. II : 447. 1781. *I. coromandelina* var. *raipurensis* Unni in J. Bomb. Nat. Hist. Soc. 64 : 590. 1967.

Rhizomorph 3-lobed, rarely 4-5 lobed; peripheral strands present; leaves 30-60 (-80) cm long, 20-60 in number, velum absent; megasporangia circular to oval, 12 \times 9 mm; megaspores white when dry, grey when wet, dimorphic; larger ones 465-660 μm in diameter, smaller ones 356-458 μm in diameter, surface tuberculate, tubercle ends blunt and rounded, microspores red-brown in colour, 26-33 μm in diameter, smooth or rugulose to papillate.

One of the common species occurring along the edges of tanks, streams, paddy fields and shallow ponds during rainy season. It is one of the most variable species in the form of leaves, range of megaspores, etc. Bastar, Gwalior, Hoshangabad, Raipur, Shivpuri.

3. *Isoetes dixitii* Shende in J. Univ. Bombay 14 : 50. 1945; Ladha in Acta Bot. Indica 5 : 86. 1977.

Rhizomorph 3-lobed; leaves up to 2 cm long; 8-20 in number, peripheral strands absent, velum rudimentary. Megasporangia ovate, 2.6 \times 2-4.5 mm; microsporangia 3-5 \times 2-2.5 mm; megaspores white when dry, ash coloured when wet, dimorphic, larger ones 483-660 μm in diameter, smaller ones 320-485 μm in diameter, surface tuberculate, tubercles uneven; microspores reddish-brown, 27-30 μm in diameter,

surface muricate; sterile cells present, 20–22 μm in diameter, disc-shaped, transparent with yellow marginal ring. Bastar (Ladha, 1897).

4. *Isoetes panchananii* Pant & Srivastava in Proc. Natn. Inst. Sci. India 28 B(3) : 243, t. XIII, fig. 1–4, t. XVI, f. 41, text-fig. 1, 2 A-I. 1962; Ladha in Acta Bot. Indica 5 : 86. 1977.

Rhizomorph 2-lobed; leaves up to 2–4 cm long, 4–38 in number, peripheral strands absent, velum almost complete. Megasporangia ovoid, 3–5 mm long, 2–3 mm broad; microsporangia not known; megaspores white when dry, black when wet, dimorphic; larger ones 330–407 μm in diameter; smaller ones 240–330 μm in diameter; surface of larger ones reticulate, smaller ones with branched ridges formed by confluent tubercles; microspores not known, sterile cells absent.

Plants growing along the margins of shallow ponds mixed with *I. coromandelina* and *I. unilocularis*. Rewa.

5. *Isoetes pantii* Goswami and Arya in J. Ind. Bot. Soc. 49 : 30. 1970.

Rhizomorph 3-lobed, tilted; leaves 15–33 cm long, 15–39 in number; ligule broader than long. Megasporangia elongate, 3–7 mm long, 2–4 mm broad, microsporangia ovate-oblong, 5–9 mm long; megaspores white when dry, ash-coloured when wet, trimorphic; large ones 480–660 μm in diameter, surface finely granulose bearing rounded tubercles, medium ones 280–312 μm in diameter, small ones 70–110 μm ; microspores white when dry, ash-coloured when wet, trimorphic, occurring in the same sporangium; large ones 24–54 μm in diameter, surface hyaline and thick, medium ones monolete, 24–48 μm in diameter, small ones 15–39 μm in diameter, trilete, surface papillate.

Plants growing along the margins of ponds intermixed with *I. coromandelina* and *I. sampathkumarii*. Scarce. Rewa.

6. *Isoetes sampathkumarii* L.N. Rao in Curr. Sci. 13 : 286, f. 1–3. 1944; Ladha in Acta Bot. Indica 5 : 86. 1977.

Rhizomorph 2-lobed; leaves up to 11 cm, 3–6 in number; peripheral strands absent, velum half way to two thirds, megasporangia ovoid, 2–6 mm long, 2–4.5 mm broad, microsporangia not known; megaspores white when dry, fuscous black when wet, dimorphic; large ones 256–458 μm in diameter; small ones 280–380 μm in diameter, distal surface marked with a jumble of reticulate branched ridges; microspores not known; sterile cells absent.

Plants growing in shallow ponds. Bhopal, Shivpuri (Ladha 1977).

7. *Isoetes unilocularis* J.E. Smith in Rees, Cyclopaedia 19 : 150 1819.

I. indica Pant and Srivastava in Proc. Natn. Inst. Sci. India 28 B(3) : 246. t. XIV, f. 16-25, t. XV. f. 30-35, t. XVI, f. 30-40 text-fig. 4 A-D, 5 A-H, 7 A-M, 12. 1962; Ladha in Acta Bot. Indica 5 : 86. 1977.

Rhizomorph 3-lobed, rarely 4; leaves up to 56 cm, number of leaves 9 - 35; peripheral strands 4 - 6, with many accessory strands; velum absent. Megasporangia elongated, 6 - 19 mm long, 4 - 9 mm wide; microsporangia oval, 4 - 6 mm long, 3 - 4 mm wide; megaspores white when dry, grey when wet, polymorphic; large ones 458 - 636 μ m in diameter, medium ones 407 - 509 μ m in diameter, small ones 89 - 380 μ m in diameter, surface tuberculate, tubercles somewhat pointed; microspores white, dimorphic, bilateral or tetrahedral, 16 - 48 μ m in diameter, surface tuberculate, abortive; microspores present; sterile cells present, 13 - 18 μ m in diameter, round or roundly quadrangular, transparent, granulose with a thickened rim or margin.

Plants growing along the margins of shallow ponds. Bilaspur, Rewa.

5. EQUISETACEAE

A monotypic family of about 30 species in world, of which 7 species occur in India.

EQUISETUM L.

Terrestrial to subaquatical perennial plants, rhizome long-creeping, giving rise to erect stems; leaves very small, whorled, united at base into nodal ring, laterally connected so as to form distinct toothed, tubular or funnel shaped sheaths enclosing the base of the internodations of the stems and branches. Sporangia homosporous, paired, sporophylls, peltate, scale-like forming terminal strobili. Spores globose, provided with four long, filiform, circinate elaters.

Two in M.P.

- 1a. Small plants up to 50 cm high; branches diffuse, thick up to 6 branchlets at each node; sheaths loose ... 1. *E. diffusum*
- 1b. Large plants, up to 1.5 m or more high; branches lax, slender, up to 3 branchlets at each node, sheaths tight ... 2. *E. ramosissimum* subsp. *debile*

1. *Equisetum diffusum* D. Don, Prodr. Fl. Nepal 19. 1825.

Small plants, stems 30 - 50 cm long, erect, sterile and fertile stems alike, short firm, diffused; branchlets 5 - 6 at each node in whorl; internodes 2 - 4 cm, ridged, sheaths loose up to 1 cm long, linear-lanceolate, entire, 6 - 12 square grooved ribs. Strobilus stalked, 1 - 2 cm long, oblong-cylindrical.

Common in the edge of forest in water logged sandy places. Bastar, Bilaspur, Raigarh, Raipur, Sidhi, Shivpuri.

2. *Equisetum ramosissimum* Desf. subsp. *debile* (Roxb. ex Vauch.) Hauke in Amer. Fern. J. 52 : 33. 1962. *E. debile* Roxb. ex Vauch. in Mem. Soc. Phys. Hist. Nat. Genive 1. 387. 1822; Graham in J. Bomb. Nat. Hist. Soc. 23(2) : 501. 1915.— *Hedju, Haringir.*

Large plants, stems 1–1.5 m or more long, 2–15 mm or more in a diameter with a large central hollow, grooved, simple or irregularly branched, branches 1–3 in whorls, ribs 8–30, flattened towards the apex, sheaths tight, tubular to funnel shaped, short or elongated, the teeth deciduous, dark brown, internodes 2 to 5.5 cm long. Strobili terminal, sessile, 0.5–2.5 cm long, oblong, cuspidate.

Common in shady or open wet places preferring sandy-alluvial soil at lower elevations, trailing through bushes. Bastar, Bilaspur Raigarh, Raipur, Sidhi, Shivpuri.

6. PSILOTACEAE

A monotypic family of 3 species in the world flora, 2 in India.

PSILOTUM Sw.

Plants perennial; roots absent and represented by rhizoids. Aerial shoots dichotomously branched; leaves reduced to distant minute scales. Sporangia solitary in the axils of leaves, sessile, triquetrous, obovoid, 3-celled.

Only one species in M.P.

Psilotum nudum (L.) P. Beauv. in Prod. Fam. Actheog. 112. 1805. *Lycopodium nudum* L. Sp., Pl. 2 : 1100. 1753. *Psilotum triquetrum* Sw. in Schrad. J. Bot. 1800 (2) : 109, 1801; Graham in J. Bomb. Nat. Hist. Soc. 23 (2) : 501. 1915.— *Bhulbhari.*

Plants 15–35 cm, rootless, aerial shoots slender, dichotomously branched, branchlets triquetrous. Leaves minute, scale like, coriaceous. Sporangia in triads on short stalks, in the axils of minute, bifid sporophylls towards the apices of aerial shoots.

Plants grow as epiphytes, lithophytes, aerial shoots erect or hanging downwards along streams with perennial source of flowing water. Throughout Madhya Pradesh in hilly regions but everywhere scarce and in many localities threatened.

The species is threatened due to over exploration by academicians for studies of students and research workers.

7. BOTRYCHIACEAE

2 genera, only one genus *Botrychium* with 9 species in India.

BOTRYCHIUM Sw.

Terrestrial plants; Fronds dimorphic, sterile frond pinnately compound, leafy; fertile frond arising from common stalk inserted below the sterile blade.

Two species in M.P.

- 1a. Fertile segment arising from common stalk inserted below the sterile blade; texture coriaceous ...1. *B. daucifolium*
- 1b. Fertile segment arising laterally as a pinna of sterile blade; texture thin ...2. *B. lanuginosum*

1. *Botrychium daucifolium* Wall. ex Hook. et Grev. in Icon. Fil. t. 161. 1829; Crookshank in Mooney's Indian For. Rec. 3(7) 247. 1942.

Plants 20 - 50 cm high; rhizome short, erect. Common stalk 11 - 32 cm, sterile blade deltoid, tripinnatifid to tripinnate; penultimate segments elongate, acute, ultimate segments oblong, blunt or acutish, margins finely toothed; veins simple or forked. Fertile segment exceeding sterile segment at maturity, fertile stalk 4.5 - 15 cm, fruiting spike 6 - 19 cm, paniculate.

Plants growing among grasses in open places or among rock boulders on moist mossy cover. Bastar (Mooney 1942; Tiwari 1964).

2. *Botrychium lanuginosum* Wall. ex Hook. et Grev. in Icon. Fil. t. 79. 1831. *B. virginianum* (L.) Sw. var. *Lanuginosum* (Wall. ex Hook. Grev.) Bedd., Handb. Ferns Brit. Ind. 471, t. 295. 1883; Tiwari in J. Indian Bot. Soc. 43(3) : 433. 1964.

Plants 30 - 50 cm high, pilose. Common stalk 13 - 25 cm; sterile blade deltoid, 15 - 28 x 20 - 35 cm, quadripinnatifid with ultimate divisions obtuse or acute; fertile segment arising laterally above the base from rachis of the sterile blade on 20 - 35 cm long stalk; fertile blade 5 - 10 cm long, paniculate.

Plants growing in hilly slopes among grasses, on moist mossy cover of rock boulders along flowing streams. Hoshangabad (Tiwari, 1964).

8. OPHIOGLOSSACEAE

4 genera in the world; *Ophioglossum* L. in M.P.

OPHIOGLOSSUM L.

Rhizome usually short, erect, bearing a few fronds. Fronds dimorphic; sterile frond leafy, simple, usually entire, membranous to coriaceous;

venation reticulate; fertile frond simple, nearly furcate, lanceolate; sporangia placed in two lateral rows partially immersed in the axis.

It is of cosmopolitan occurrence. 15 species occur in India, of which eight taxa in M.P.

- 1a. Rhizome globose bearing many fibrous roots; tropophyll with a conspicuous, pale median band ...1. *O. costatum*
- 1b. Rhizome sub-globose to cylindrical, bearing a few or many roots, tropophylls without a conspicuous, pale median band :
 - 2a. Tropophyll linear, more than 6 times as long as broad, apex acute to rarely acuminate ...3. *O. gramineum*
 - 2b. Tropophyll not linear :
 - 3a. Rhizome sub-globose :
 - 4a. Tropophyll ovate, mucronate; spores trilete, bilate or monolete in one sporangium ...2. *O. eliminatum*
 - 4b. Tropophyll not as above, spores trilete :
 - 5a. Tropophyll attached to lower quarter of frond ...4. *O. nudicaule* var. *nudicaule*
 - 5b. Tropophyll attached at the base of frond ...5. *O. nudicaule* var. *macrorrhizum*
 - 3b. Rhizome cylindrical :
 - 6a. Rhizome with persistent, conspicuous brown sheath formed by the base of the old leaf stalk; tropophyll elliptical lanceolate to lanceolate ...7. *O. polyphyllum*
 - 6b. Rhizome without persistent brown sheaths; tropophyll ovate to ovate-lanceolate :
 - 7a. Tropophyll ovate, cordate to variable at base, subcoriaceous ...8. *O. reticulatum*
 - 7b. Tropophyll ovate-lanceolate, truncate or broadly cuneate at base, membranaceous ...6. *O. petiolatum*

1. *Ophioglossum costatum* R. Br. in Prod. Fl. Nov. Holl. 163. 1810; Subr. and Henry in Bull. Bot. Surv. India 8 : 208. 1968. *O. fibrosum* Schum. in Beskr. Guin. t. 452. 1827; Bedd., Handb. Ferns Brit. India 465, t. 289. 1883.

Fig. 1

Plants 5–30 cm high; rhizome globose. Common stalk 0.5–4 cm long; tropophyll 2.5–10 × 1–2.5 cm, elliptic, broadly ovate-lanceolate or

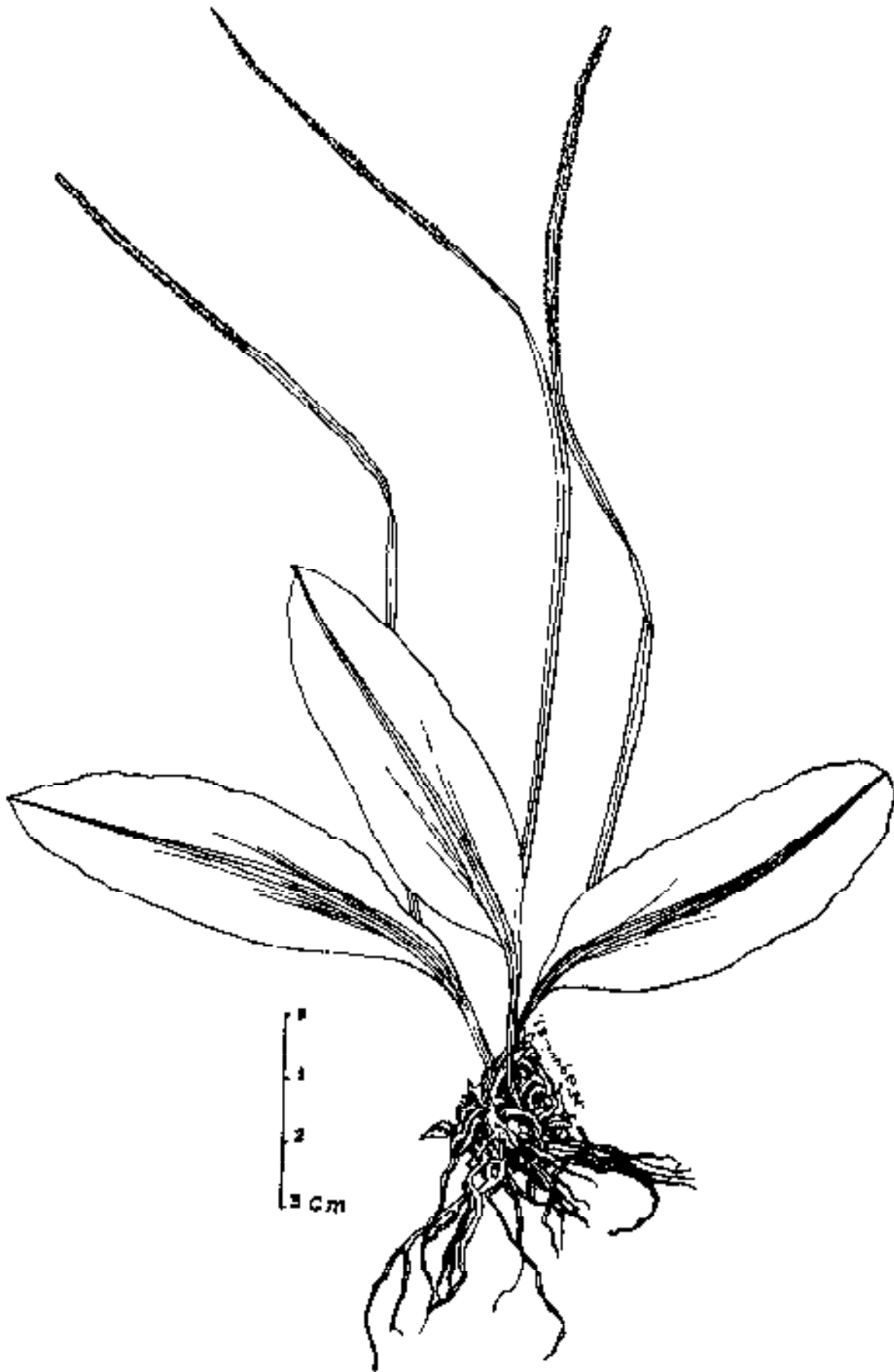


Fig. 1. *Ophioglossum costatum* R. Br.

obovate, cuneate at base, apiculate to obtuse at apex, subcoriaceous. Fertile frond longer than the sterile; stalk 3 - 18 cm long; strobilus 1 - 6 cm long.

Plants growing in open grassy forest floor, hill slopes in sandy laterite soil along streams in shady places. Throughout Madhya Pradesh.

2. *Ophioglossum eliminatum* Khandelwal and Goswami in Fern Gaz. 12(6) : 330. 1984.

Plants 1.8 - 15 cm high; rhizome subglobose; common stalk 0.5 - 4 cm long; tropophyll 0.5 - 3.5 × 0.3 - 2.5 cm, ovate, mucronate. Fertile stalk 1 - 8 cm long, strobilus 0.3 - 2 cm long; spores trilete, bilette, monolete and alete in the same sporangium, rarely jointed.

Plants growing among grasses under shady situations. Gwalior, Shivpuri (cf. *Khandelwal and Goswami, 1984*).

3. *Ophioglossum gramineum* Willd. in Nov. Act. Acad. Erf. 2 : 18, t. 1, f. 1. 1802; Bedd., Handb. Ferns Brit. India, Suppl. 108. 1892; Panigr. and Dixit in Proc. Nat. Inst. Sci. India 35 B(3) : 250, f. 40 - 41, 93. 1969.

Slender plants, 3 - 10 cm high; rhizome bearing 1 - 3 fronds simultaneously. Common stalk 1-3 cm long, linear-lanceolate, attenuate at base, subcoriaceous. Fertile stalk 1.5 - 5 cm long; strobilus 1 - 2.5 cm.

Plants occur among grasses in moist shady situations in the forest floor. Bastar, Hoshangabad, Shivpuri.

4. *Ophioglossum nudicaule* L.f. Suppl. Syst. Pl. 443. 1781; Tiwari in J. Indian Bot. Soc. 43 : 432. 1964. Panigr. and Dixit in Proc. Nat. Inst. Sci. India 35 B(3) : 252, f. 49, 51, 52, 100, 101. 1969. var. *nudicaule*

Plants 3 - 8 cm high; rhizome subglobose, rarely thick, cylindrical. Common stalk 0.2 - 1.5 cm; tropophyll 0.7 - 2.7 × 0.3 - 0.7 cm, attached at the lower quarter of the frond, ovate to elliptic, cordate, apiculate, coriaceous. Fertile stalk 2 - 5 cm long; strobilus 0.5 - 1.2 cm long.

Plants growing among grasses under shade in moist situations. Hoshangabad, Shivpuri.

5. *Ophioglossum nudicaule* L.f. var. *macrorrhizum* (Kunze) Clausen in Mem. Torrey Bot. Club 19(2) : 150. 1938; Panigr. and Dixit in Proc. Nat. Inst. Sci. 35 B(3) : 254, f. 53, 102, 103. 1969.

Plants slender, 3.5 - 6.5 cm high; rhizome subglobose. Common stalk 0.5 - 4 cm; tropophyll 5 - 8 × 4 - 6 mm, ovate, cordate, apiculate or obtuse, coriaceous. Fertile stalk 2 - 4.5 cm long; strobilus 0.5 - 1.5 cm.

Among grasses under shade of trees in the forest floor. Hoshangabad, Rewa, Shivpuri.

6. *Ophioglossum petiolatum* Hook. in Exotic Fl. 1 : t. 56. 1823; Panigr. and Dixit in Proc. Nat. Inst. Sci. India 35 B(3) : 260, f. 69-71, 114. 1969.

Plants 10-13 cm high, rhizome slender. Common stalk 1.5-3.5 cm long; tropophyll 1.5-2 × 0.6-1 cm; ovate-lanceolate; acute to mucronate, truncate to broadly cuneate at base. Fertile stalk 5-7.5 cm; strobilus 1.5-1.8 cm.

Plants growing on moist sandy alluvial soil amidst mosses etc. in sal forest. Bastar.

7. *Ophioglossum polyphyllum* A. Br. *apud* Seubert. Fl. Azor. 17. 1844; Panigr. and Dixit in Proc. Nat. Inst. Soc. India 35 B(3) : 255, f. 55, 81, 104. 1969.

Plants 8-11 cm high. Common stalk 3-4 cm long, tropophyll 3.5-4.5 × 0.5-1 cm, attenuate at base, acute or mucronate at apex, thin but firm in texture. Fertile stalk 3-4 cm long; Strobilus 1-2.5 cm long.

Plants growing in the forest floor among grasses. Bastar (MII).

8. *Ophioglossum reticulatum* L., Sp. Pl. 2 : 1063. 1753; Tiwari in J. Indian Bot. Soc. 43(3) : 432. 1964; Panigr. and Dixit in Proc. Nat. Inst. Sci. India 35 B(3) : 257, f. 58-60, 83; 10. 111. 1969. -Gondi.

Plants 5-30 cm high; rhizome cylindrical. Common Stalk 2-15 cm long; tropophyll 1-7.5 × 0.5-2.15 cm, ovate, and various interlinked shapes occur, subcoriaceous to thin in texture. Fertile stalk 2-20 cm long; strobilus 1-6 cm long.

Ophioglossum reticulatum L. seems to be one of the most common and polymorphic species, since a number of intermediate forms with various interlinked shapes of tropophyll are observed. Various forms may be recognised easily but in view of brevity and lack of cytomorphological studies in the field, all forms are lumped together.

Plants growing in the forest floor amidst grasses mosses etc or in moist alluvial sandy soil or heavy rock boulders along flowing streams with little of humus. Throughout Madhya Pradesh.

The local people prepare vegetable curry.

9. ANGIOPTERIDACEAE

A monotypic family comprising of single genus *Angiopteris* Hoffm.

ANGIOPTERIS Hoffm.

Rhizome short; globose, radially symmetrical, massive fleshy stock.

Fronde tripinnate, stipe fleshy, green, swollen at the base; veins free. Sori ca 20 in number in two rows, contiguous.

Species ca 111 in the world flora, of which 12 in India and one in M.P.

Angiopteris evecta (Forst.) Hoffm. in Comm. Soc. Reg. Gott. 12 : 29. t. 5. 1796; Tiwari in J. Indian Bot. Soc. 43(3) : 433. 1964; Dixit and Panigr. in Bull. Bot. Surv. India 11 (3 & 4) : 368. 1969. —Gondi. Fig. 2

Large fern, 2 - 3 m high; rhizome fleshy, ca 60 cm thick, often becoming erect in age; stipes green with scattered whitish streaks and covered with small brown hairs when young but not at age. Fronds usually bipinnate rarely tripinnate, pinnae about 1 m long, with pinnules 2 - 3 cm apart; 5 - 30 x 2 - 4 cm, dark green, glabrous, shining, sub-sessile, unequal at base, ovate-oblong in shape, subcoriaceous, margins entire when young, serrulate at age, apex acuminate, strongly toothed; veins free, simple or forked. Fertile pinnules not contracted; sori about 1 mm away from the margin, consisting of 7 - 12 sporangia in each group.

Abundant in swampy forest floor, in humid slopes near water fall in evergreen forest along the road side or among bamboo grooves, on rocky substratum and on sandy loam. Bastar, Hoshangabad.

The fleshy rhizome is eaten by tribals during scarcity. The pith boiled with mustard oil is used as massage for rib pain.

10. OSMUNDACEAE

A family of 3 genera in the world flora, of which only genus *Osmunda* L. occurs in Madhya Pradesh.

OSMUNDA L.

Rhizome thick, erect, without scales covered by persistent leaf base. Fronds dimorphic, tufted; lamina pinnate to bipinnate, coriaceous. Fertile fronds contracted more or less without lamina; leaflets intermediate between sterile and fertile forms common. Sporangia exindusiate, globose to pyriform on short stalks.

Five species in India, only one in M.P.

Osmunda regalis L. Sp. Pl. 2 : 1065. 1753; Tiwari in J. Indian Bot. Soc. 43(3) : 433. 1964; Panigr. and Dixit in J. Indian Bot. Soc. 48(1 - 2) : 95, f. 5 - 9. 1969. — Royal fern.

Rhizome erect to semi-erect. Fronds tufted, 30 - 150 cm long; stipes 20 - 50 cm long, firm, erect, naked; lamina bipinnate, 20 cm or more broad, broadly lanceolate. Fertile pinnae terminal, the lower ones always sterile. Sterile pinnae shortly stalked coriaceous, pale green to dark green,

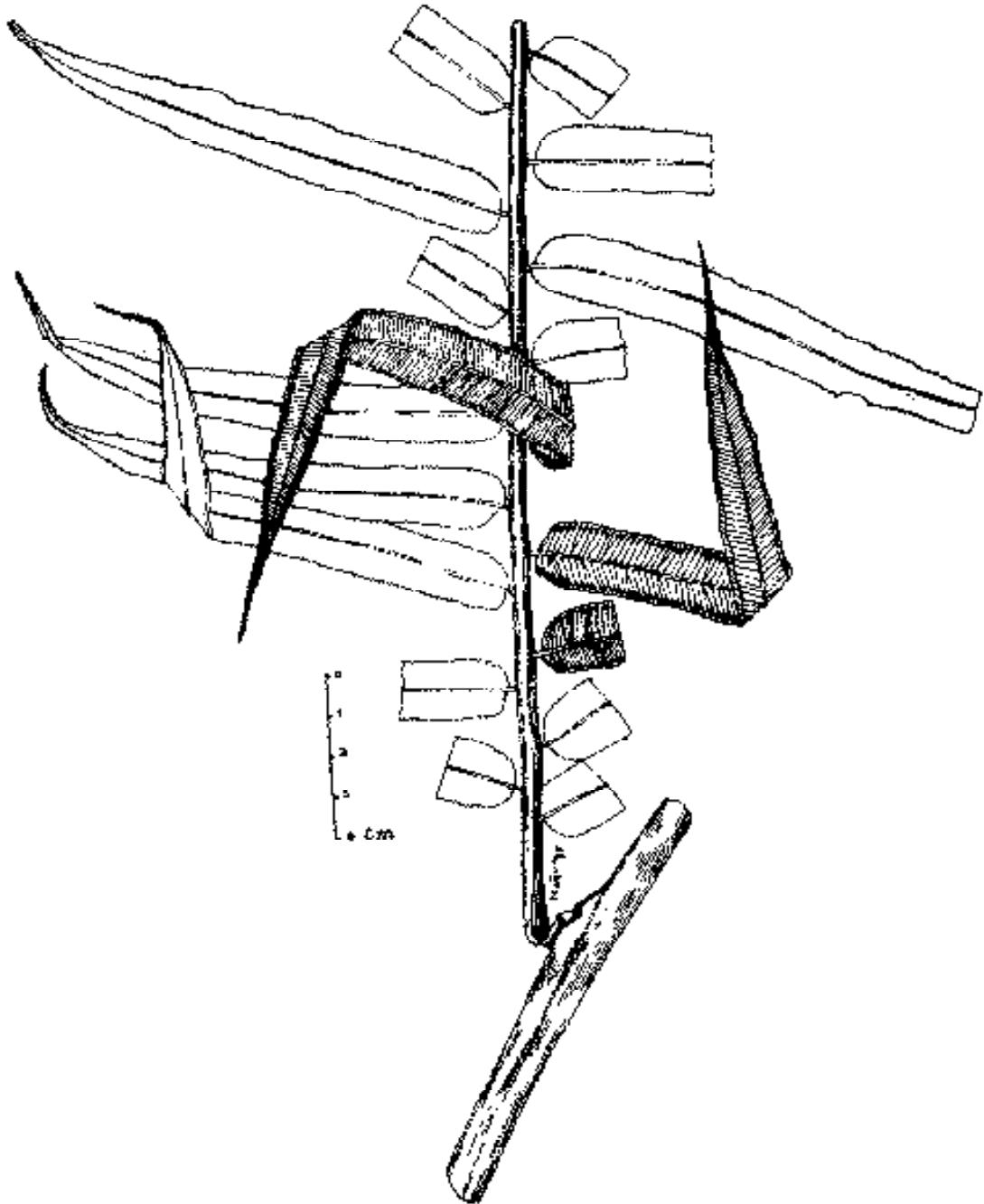


Fig. 2. *Angiopteris evecta* (Forst.) Hoffm.

oblong-lanceolate, 3-12 × 1-3 cm. cuneate at base, acute at apex, margins serrulate, veins free, 1-2 times forked. Fertile pinnae bearing cluster of sporangia which are dark brown when mature.

Plants collected by the author from Tridhara in Pachmarhi are smaller in height, pinnae small, close together and usually with suberect rhizome in comparison to typical *O. regalis* with larger fronds, lax, pinnae and erect rhizome. These forms have been recognised as *O. regalis* L. var. *panigrahiana* Dixit in Ind. Journ. For. 13 (1) : 7/. f. 1, 1990.

Plants growing among rock boulders among water falls with continuous flow of water in sunny situations in the forest, on sandy soil or in marshes in moist forest beds and along water ways near forest tracts. Bastar, Hoshangabad, Pachmarhi.

11. DICRANOPTERIDACEAE

Monotypic family comprising of 10 species in the world flora. Pantropic in distribution.

DICRANOPTERIS Bernh.

Terrestrial; rhizome long-creeping, hairy. Fronds pinnate, pseudodichotomous at the top of stipe; pinnae repeatedly pseudodichotomous, branched; young parts protected by branched hairs of various forms, scales lacking, veins free, 1-3 times forked. Sporangia 10-15 or more in each sorus.

Only one in M.P.

Dicranopteris linearis (Burm. f.) Underw. in Bull. Torrey Bot. Club 34 : 250. 1907; Tiwari in J. Indian Bot. Soc. Soc. 43(3) : 434. 1964. *Polypodium linearis* Burm. f., Fl. Ind. 235, t. 67, f. 2. 1768. *Gleichenia linearis* (Burm. f.) Clarke in Trans. Linn. Soc. Lond. II, Bot. 1 : 428. 1880; Mooney in Indian For. Rec. 3(7) : 247. 1942.

Rhizome long-creeping, slender, bearing hairs and distantly spaced stipes, growing apex covered with red-brown hairs. Stalks shining, erect, varying much in length, brown to purplish-brown; pseudodichotomously branched, ultimate branches in equal pairs; leafy. Segments at right angles to the costa, the lower most segment simple, deflexed, narrowly oblong, slightly narrowed towards notched apex, veins 1-3 times forked. Sori near to costae of the segments on the acroscopic branch of a vein, each with 10-15 sporangia.

Rhizome creeping on rock boulders with little humus or in rocky alluvial soil, along flowing streams in exposed places forming thickets. Bastar, Bilaspur, Chindwara, Hoshangabad.

Rhizome anthelmintic, extract of fronds antibacterial; stipes used for preparing pens for school children.

12. LOXOGRAMMACEAE

A monotypic family of 40 species in the world, of which 3 species occur in India.

LOXOGRAMME (Bl.) Presl

Plants epiphytic, fronds simple, veins anastomosing; sori exindusiate, elongate, on either side of the midrib.

Only one in M.P.

Loxogramme involuta (D. Don) Presl., Tent. Pterid. 215. 1836; Tiwari in J. Indian Bot. Soc. 43(3) : 449. 1964. *Grammitis lanceolata* D. Don, Fl. Nepal 14. 1825. *Gymnogramme involuta* Hook., Sp. Pl. 5 : 155. 1864.

Rhizome thick, creeping; scales clathrate, brown, ovate-lanceolate, 1.5 × 1–2 mm. Fronds simple, 10–30 × 1.5–5 cm, elliptic-lanceolate, acuminate at apex, lower part below middle narrowed slowly into short stipe; coriaceous in texture, margins entire, venation obscure, reticulate, areolles with free included veinlets. Sori exindusiate, on either side of midrib, oblique, not reaching up to margins.

Plants epiphytic on trees and shrubs in forest area. Common throughout India on hills and mountains, but no collection available in BSA herbarium from Madhya Pradesh. Tiwari (1964) reported its occurrence with a question mark and without quoting any specific locality from Madhya Pradesh.

13. POLYPODIACEAE

A family of about 63 genera in the world flora, of which about 25 genera occur in India and 5 genera in M.P.

- 1a. Sori in two regular rows, one on each side of midrib, covered with umbrella shaped paraphyses ...1. *Lepisorus*
- 1b. Sori distributed all over the lower surface, paraphyses if present not umbrella shaped :
 - 2a. Fertile fronds much contracted :
 - 3a. Lamina thin, main veins not well developed, hydathodes indistinct on drying ...2. *Leptochilus*
 - 3b. Lamina coriaceous, main veins well developed, hydathodes distinct on drying ...4. *Paraleptochilus*
 - 2b. Fertile fronds slightly or not contracted :

- 4a. Lamina membranaceous, without stellate hairs, veins prominent ...3. *Microsorium*
 4b. Lamina coriaceous, thickly covered with stellate hairs, veins concealed ...5. *Pyrrosia*

1. LEPISORUS Ching

Epiphytes; rhizome creeping, clothed with many scales. Fronds articulate to rhizome, simple, rarely pinnatifid, coriaceous in texture, margins entire, veins anastomosing with included veinlets. Sori on veinlets, round, protected by peltate, pedicellate paraphyses with flat, expanded heads.

About 20 species in India, only one in M.P.

Lepisorus nudus (Hook.) Ching in Bull. Fan Mem. Inst. Biol. Bot. 4 : 83. 1933. *Pleopeltis nuda* Hook., Exot. Fl. 1 : t. 63. 1823. *P. wightiana* (Thw.) Bedd., Ferns South. India 60, t. 180. 1865. *P. linearis sensu* Bedd., Handb. Ferns Brit. India 346. 1883 (*pro parte*).

Rhizome wide-creeping, clothed with many dull brown, lanceolate scales. Fronds 10-25 × 1-1.5 cm, stipes small, 1-5 cm long, glabrous, lamina simple, 15 × 40 × 0.2-0.3 cm, lower surface fully covered with sori.

Plants with creeping rhizome on bare gneissic rock boulders lying on the bed of running streams, or as epiphytes on tree trunks and branches. Bastar, Hoshangabad.

2. LEPTOCHILUS Kaulf.

Rhizome wide-creeping and freely branched, covered with dark, clathrate, ovate-acuminate, deciduous scales; stipes remote, inconspicuously articulate; fronds simple, dimorphic, the sterile lanceolate, entire, herbaceous, glabrous, margins entire, main veins hardly developed. Veinlets anastomosing to form numerous areolae with simple or branched free veinlets ending in hydathodes; fertile fronds linear, sporangia covering the whole lower surface.

Four species in India, only one in M.P.

Leptochilus axillaris (Cav.) Kaulf., Enum. Pl. Fil. 147, t. 1, f. 10. 1824. Tiwari in J. Indian Bot. Soc. 43(3) : 448. 1964. *Acrostichum axillare* Cav., Ann. Hist. Nat. 1 : 101. 1799. *Gymnopteris variabilis* var. *axillaris* Bedd., Handb. Ferns. Brit. India 430. 1883.

Rhizome wide-creeping, slender, tortuous bearing clathrate, ovate-lanceolate, brown scales; fronds approximate, 1-1.5 cm apart; dimorphic, sterile fronds larger, simple; stipes 2.5-10 cm long, lamina 15-20 × 1.5-2.5 cm, thin but firm in texture, dark green when live and

blackish-green on drying, narrowed equally to base and apex, margins smooth, no main veins; veins forming oblique polygonal main areoles, each divided into two to three smaller ones containing branched free veinlets. Fertile fronds longer than the sterile ones, stipes 11–35 cm long, lamina 11–20 × 0.2–0.3 cm, covering the whole lower surface except midrib edges inflexed on maturity.

Creeping on wet rocks, closely adhering to the surfaces. Madhya Pradesh forms are smaller in size. Pachmarhi, Bastar, Hoshangabad.

3. PARALEPTOCHILUS Copel.

Rhizome creeping, clothed with small, ovate scales, margins obscurely denticulate; inconspicuously articulate. Fronds dimorphic; sterile fronds larger with short stipe, oblanceolate, entire, acuminate, narrowly attenuate at the base, veins anastomosing, primary ones conspicuous, rest inconspicuous; fertile fronds contracted on larger stipes, linear-lanceolate.

2 species in world flora, one in India and Madhya Pradesh.

Paraleptochilus decurrens (Bl.) Copel. var. *lanceolata* (Fee) Dixit, *Comb-nov. Leptochilus lanceolatus* Fee, *Acrost.* 87 t. 47, f. 1, 1845. *Gymnopteris variabilis* (Hook.) Bedd. var. *lanceolata* (Hook.) Bedd., *Handb., Ferns Brit. India* 429. 1883.

Rhizome creeping, clothed with a few ovate-lanceolate, clathrate scales. Fronds close, but not tufted, dimorphic; simple sterile fronds on shorter stipes, 3–10 cm long; lamina lanceolate 5–25 × 1.5–2.5 cm, acute to acuminate at apex, narrowly long-attenuate and decurrent to stipes; margins smooth, leathery in texture, blackish-green in colour, midvein distinct on the lower surface, veins anastomosing, indistinct ending into hydathodes, distinct dots clear on drying. Fertile fronds longer than the sterile; stipes 15–20 cm long; lamina linear-lanceolate, very much contracted, gradually narrowed at both ends, coriaceous in texture, glabrous, margins entire, inflexed on drying; veins anastomosing, areole with free, forked veinlets. Sori forming a single row half-way between the costa and margin, when young covered with peltate scales.

Epiphytes on tree trunks and branches or as lithophytes on massive rock boulders, rooting in mossy cover, lamina curled up in dry weather. It is a drought resistance species. Bilaspur, Hoshangabad.

4. MICROSORIUM Link

Epiphytes; rhizome long-creeping, clothed with many clathrate scales. Fronds simple or pinnatifid, rarely pinnate; stipes distant, articulate herbaceous to coriaceous in texture, glabrous to glabrescent, margins wavy; veins anastomosing with included forked veinlets ending into hydathodes.

Sori compital, roundish, without paraphyses, spores monoletic.

About 17 species known from India, only one in M.P.

Microsorium membranaceum (D. Don) Ching in Bull. Fan. Mem. Inst. Biol. 4 : 309. 1933. *Polypodium membranaceum* D. Don, Prod. Fl. Nepal 2. 1925. *Pleopeltis membranacea* Moore Ind. Fil. 191. 1859; Bedd., Handb. Ferns. Brit. India 355. 1883; Tiwari in J. Indian Bot. Soc. 43(3) : 449. 1964. Fig. 3.

Rhizome creeping, subhypogaeous, branched, young part green, covered with blackish-green, ovate-lanceolate scales. Stipes distant, 3-12 cm long; lamina 15-50 × 5-15 cm, membranaceous and translucent when fresh, oblong-lanceolate, sometimes oblanceolate, gradually decurrent upon the stipes; margins wavy to deeply sinuate; veins distinct, visible, anastomosing, forming areoles, 4-8 series with free included veinlets, marginal veins free. Sori compital, many, rather small, usually in two series between the costules, rarely in 3-5 series.

Plants usually creep over heavy rock boulders near flowing streams. Plants appear in rainy season and disappear by the end of November. Bastar, Bilaspur, Hoshangabad.

5. PYRROSIA Mirb.

Epiphytes; rhizome creeping, clothed with many small, ovate scales. Fronds articulate to rhizome, slightly dimorphic, usually simple, entire, coriaceous, clothed with persistent stellate scales. Veins not visible, anastomosing with free included veinlets. Sori usually distal on the included veinlets.

About 25 species in India, only one in M.P.

Pyrrosia adnascens (Sw.) Ching in Bull. Chin. Bot. Soc. 1 : 45. 1935. *Polypodium adnascens* Sw., Syn. Fil. 25. 222. t. 2, f. 2. 1806. *Niphobolus adnascens* (Sw.) Kaulf., Enum. Fil. 124. 1824; Bedd., Handb. Ferns Brit. India 325. 1824 (*pro parte*).

Rhizome wide-creeping, clothed with many lanceolate-setaceous, hairy scales. Fronds distant, dimorphic, carinose-coriaceous, dark green, glabrous above, but hairy with sparse stellate hairs on the lower surface. Sterile fronds smaller in size, 3-7 × 1-2 cm; stipes 1-2 cm long, lamina spatulate or elliptic-lanceolate, obtuse; fertile fronds longer, 10-15 × 0.5-1.0 cm, stipes 2-4 cm long, lamina linear or oblong, obtuse or acute at apex, tapering towards base, costa distinct, sub-carinate, veins indistinct, anastomosing forming areoles, with free included veinlets ending into clavate apices. Sori among tomentum in 5-6 series on either side of costa.

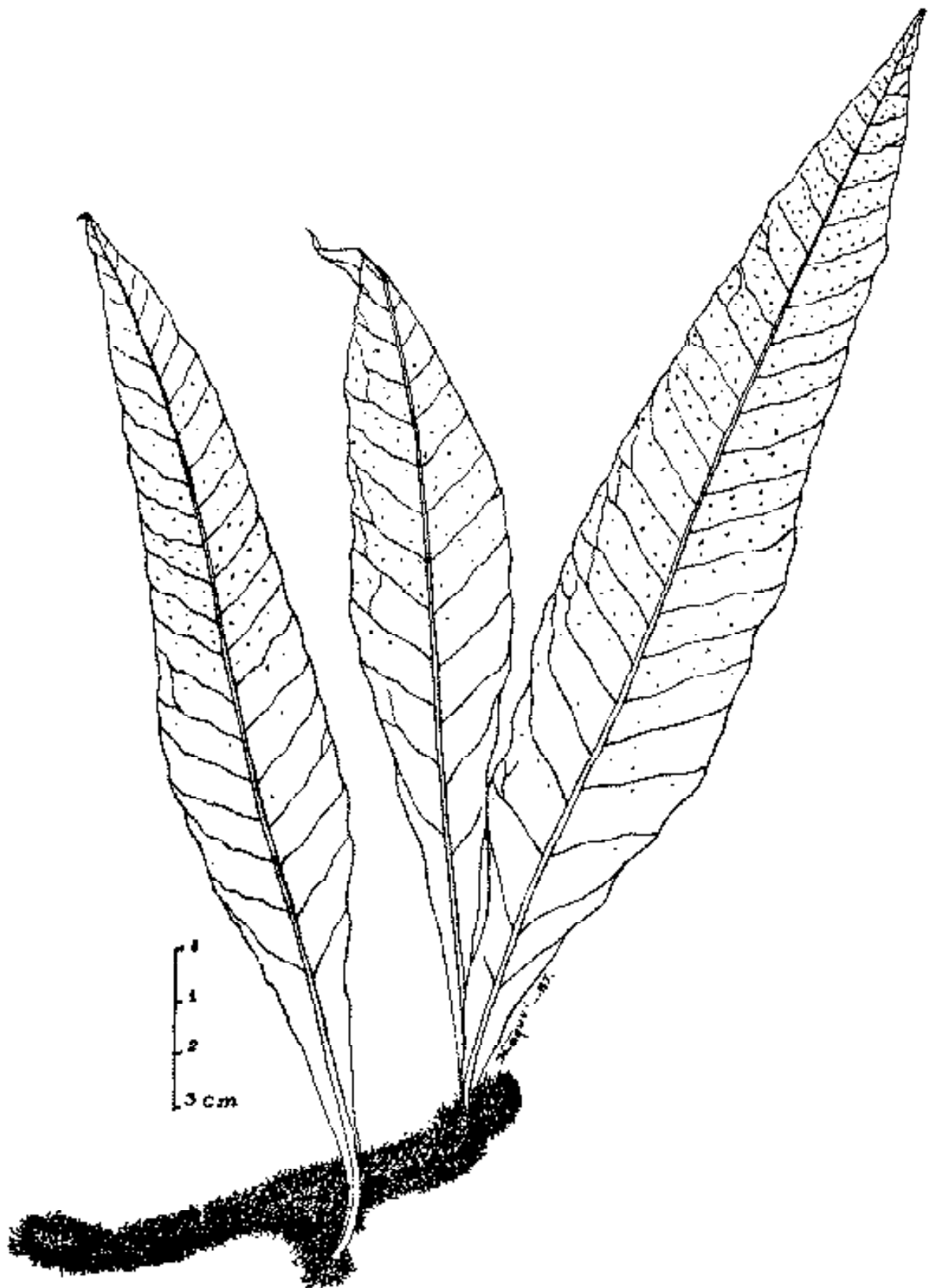


Fig. 3. *Microsorium membranaceum* (D. Don) Ching

Epiphytes or lithophytes in moist shady situations along flowing streams. Scarce. The fronds are curled up in absence of moisture. It is also a drought resistance species. Bastar.

14. DRYNARIACEAE

A monotypic family comprising of a single genus *Drynaria* (Bory) J. Sm. Twenty species occur in the world and three in India.

DRYNARIA (Bory) J. Sm.

Plants epiphytic; rhizome long-creeping, thick, fleshy. Fronds dimorphic, the sterile ones small, sessile, and close to rhizome; the fertile ones large, stalked, pinnatisect; veins anastomosing. Sori round, compital.

One in M.P.

Drynaria quercifolia (L.) J. Sm. in Hook., Journ. Bot. 3 : 398. 1841; Tiwari in J. Indian Bot. Soc. 43(3) : 448. 1964. *Polypodium quercifolium* L., Sp. Pl. 2 : 1087. 1753. *Ashavakutra*.

Rhizome creeping, thick, fleshy, clothed with many reddish-brown ovate-lanceolate scales, subulate at apex. Fronds dimorphic, subcoriaceous, the sterile fronds smaller, 7-5 × 1-2 cm, green when young, turning dark-brown at age, cordate-ovate, variously lobed, pinnatifid; the fertile fronds longer, 30-100 cm long, long-petiolate, broadly-ovate, deeply pinnatifid, segments 12-25 × 2.5-5 cm, oblong, acuminate, entire; veins anastomosing forming areoles with or without free included veinlets. Sori small, compital, many, two in each primary areole in two series.

Plants growing as epiphytes or lithophytes among heavy rock boulders along flowing streams in low-land areas. Throughout India in the plains or low hills.

The species has not been represented from Madhya Pradesh in the herbarium of BSA. However it has been reported by Tiwari (1964) but without citing any specific locality from Madhya Pradesh.

Rhizome bitter, astringent; fronds used in phthisis, hectic fever, dyspepsia and cough and in Malaysia used as poultice on swellings. The decoction of the plants used in typhoid fever by Ayurvedic Vaidyas.

15. LYGODIACEAE

Monotypic family of 40 species, cosmopolitan in distribution.

LYGODIUM Sw.

Terrestrial, climbing ferns; rhizome wide-creeping, dorsiventral, covered with brownish-black hairs. Stipe and rachis slender, several meters

long, twining, rachis with short primary branches ending in a tuft of brown hairs, each primary branch bearing a pair of secondary branches, secondary branches narrowly winged throughout, bearing pinnules in pinnate arrangement or dichotomously branched or bearing digitate leaflets. Sterile leaflets entire, toothed or lobed in the margins; veins free. Fertile pinnules often narrower than the sterile ones; sporangia indusiate, biseriate on marginal spikes; spores trilete.

Species 11 in India, 2 in M.P.

- 1a. Sterile pinnules 4 30×1 3.5 cm, elongate, subcoriaceous, subobtuse to acute at apex; margins finely toothed ...1. *L. flexuosum*
- 1b. Sterile pinnules 4 30×1 2 cm, ovate-oblong, thin, rounded at apex; margins entire or wavy ...2. *L. microphyllum*

1. *Lygodium flexuosum* (L.) Sw. in Schrad. in Journ. Bot. 1800 (2) : 7, 106. 1801; Bedd., Handb. Ferns Brit. India 457, t. 283. 1883; Tiwari in J. Indian Bot. Soc. 43 : 434. 1964. *Ophioglossum flexuosum* L., Sp. Pl. 2 : 1063. 1753.

Primary rachis branches abbreviated; secondary rachis branches alternately pinnate bearing 3-5 leaflets, variously lobed at base, gradually tapering towards apex, subcoriaceous, margins finely toothed; veins free. Fertile pinules slightly narrower than the sterile ones; fertile lobes marginal, 2-5 mm long.

Plants growing along the edges of forest, road sides, climbing on bushes and trees or trailing on the ground, rooting in gravelly, sandy soil near streams. Throughout Madhya Pradesh in Hilly regions, sometimes even cultivated as hedge plants in plains and flourishing well.

Young leafy shoots are used as leafy vegetables in Meghalaya and Darjeeling district. Plants used as expectorant. Rhizome boiled with mustard oil prepared in the form of paste which is locally applied to carbuncles, in rheumatism, sprains, scabies, ulcers, eczema, and cut wounds.

2. *Lygodium microphyllum* (Cav.) R. Br. in Prodr. Fl. Nov. Holl. 162. 1810; Bedd., Handb. Ferns Brit. India 455, t. 282. 1883. *Ugenia microphylla* Cav., Icon. Descr. 6 : 76, t. 59. 1810. *auct. viz.* Bedd., Ferns South India t. 61., 1863 (*non* L. 1753).

Primary rachis branches distinct, 3-6 mm long; secondary rachis branches zig-zag, bearing pinnately arranged leaflets, stalked, widened or sometimes lobed at the base, round at apex, thin; margins entire or wavy; veins free, 1-2 times forked, pinnately branched. Fertile pinnules usually

shorter than the sterile ones but hardly narrowed; fertile lobes marginal, 3-6 mm long.

Plants climbing through bushes or forming thickets along the edges of forests near stream side in dry deciduous forests in shady situations.: Bilaspur, extremely rare in Madhya Pradesh, only once collected in the year 1965.

16. CHEILANTHACEAE

A monotypic family represented by the genus *Cheilanthes* Sw., comprising of ca 200 species in the world, of which ca 25 species occur in India.

CHEILANTHES Sw.

Rhizome short, erect to short-creeping, bearing many fragile scales. Fronds tufted, narrow to deltoidely decomposed, sub-membranaceous to coriaceous, margins wavy to crenate, lower surface with white powdery deposits, veins free. Sori marginal on the tips of veins, confluent at maturity; indusium formed of reflexed margins, membranous; spores trilete.

Five in M.P.

- 1a. Fronds coriaceous to sub-coriaceous, pinnatifid to bipinnatifid, rarely lower most pair bipinnate; ultimate segments not enlarged :
 - 2a. Rhizome scales bicoloured; stipe and rachis glossy, ebaneous :
 - 3a. Plants scaly throughout 1. *C. albomarginata*
 - 3b. Plants not scaly throughout :
 - 4a. Stipe and rachis scaly ...2. *C. anceps*
 - 4b. Stipe sparsely scaly at base, naked above ...3. *C. farinosa*
 - 2b. Rhizome scales concolorous; stipe and rachis shining reddish-brown ...4. *C. grisea*
- 1b. Fronds submembranaceous, bipinnate to tripinnatifid; ultimate segments enlarged; stipe and rachis purplish - black ...5. *C. tenuifolia*

1. *Cheilanthes albomarginata* Clarke in Trans. Linn. Soc. Lond. II, Bot. 1 : 456. t. 52. 1880. *Aleuritopteris albomarginata* (Clarke) Panigr. in Bull. Bot. Surv. India 2 : 309. 1960. -*Bhoot kesari*.

Rhizome erect, bearing numerous scale; fronds tufted, 10-20 cm, scaly throughout on stipes, rachis and costa; stipes 3 to 10 cm, shining, dark chest-nut coloured. Fronds deltoid-lanceolate, quadripinnatifid, covered

beneath with yellowish-white powder; lowest pair of pinnae half deltoid, coriaceous. Sori occupying marginal lobes, protected by lacerate indusia.

Plants xerophytic, rooting in rock crevices, along newly built forest roads and in the forest floor in open sunny situations. Throughout the state.

All the species of *Cheilanthes* Sw. are used as a tool against 'evil eyes' or ghost by tribal/local people of Pachmarhi in Madhya Pradesh.

2. *Cheilanthes anceps* Blauf. in J. Simla Nat. Hist. Soc. 1 : 21. 1886. *Aleuritopteris anceps* (Blauf.) Panigr. in Bull. Bot. Surv. India 2 : 321. 1961.

Rhizome short, erect, clothed with many bicoloured, linear-lanceolate scales. Fronds tufted, 10-20 cm, deltoid-lanceolate; stipes 5-10 cm, blackish-brown, shining and scaly; lamina 8-15 × 6-10 cm, dull-green on upper surface, lower surface with snow-white coraceous covering; pinnate but the lower most 1-2 pairs bipinnatifid, half-deltoid, apex pinnatifid, acuminate, subcoriaceous. Sori marginal.

Abundant along hill slopes in brown-lime rich soil and along forest roads. Bastar, Bilaspur, Chindwara, Hoshangabad, Indore.

3. *Cheilanthes farinosa* (Forsk.) Kaulf, Enum. Fil. 212. 1824. *Pteris farinosa* Forsk. Fl. Aegypt. Arab. 187. 1775. *Aleuritopteris farinosa* (Forsk.) Fee, Gen. Fil. 154. t. 12. B. f. 1. 1850-52. -*Chhoti Brahmi*

Rhizome short, erect, bearing many bicoloured, linear-lanceolate scales. Fronds tufted, deltoid-lanceolate, 10-50 cm; stipes 5-25 cm, chestnut coloured, scaly at base, naked above; lamina 5-25 × 4-10 cm, farinose, white powdery beneath, subcoriaceous. Sori marginal, protected by brown, membranous indusium.

Plants rooting in rock crevices or under heavy rock boulders, along newly constructed roads, in lime rich soil. One of the common species occurring throughout the state in hilly regions.

4. *Cheilanthes grisea* (Blauf.) Blauf. in J. Simla Nat. Hist. Soc. 1 : 21. 1886. *Cheilanthes farinosa* var. *grisea* Blauf. in J. Asiat. Soc. Bengal 57(4) : 250 t. 11. 1881. *Aleuritopteris grisea* (Blauf.) Panigr. in Bull. Bot. Surv. India 2 : 321. 1960.

Rhizome short, erect, clothed with a few scales. Fronds tufted, deltoid-lanceolate, 7-20 cm; stipes thin, 3-20 cm, shining, reddish-brown, naked; lamina yellowish-green with flat blades, lower surface with white deposition, pinnate, except bipinnatifid, half-deltoid lowest pair, pinnatifid and acuminate at apex, thin but firm in texture. Sori marginal, protected by membranous indusia.

Plants rooting in rock-crevices along hill slopes and streams in sandy alluvial soil. Chindwara, Hoshangabad, Rewa, Sidhi. Khullar identified a few specimens of the species identified as *C. brevifrons* Khullar.

5. *C. tenuifolia* (Burm. f.) Sw, Syn. Fil. 129. 332. 1806. *Trichomanes tenuifolium* Burm. f., Fl. Ind. 237. 1768. -Veli-Choti

Rhizome short, creeping to ascending, bearing scales. Fronds distant, stipes 5-25 cm, scaly at base, naked above, purple-black; lamina 10-50 × 5-20 cm, ovate to deltoid-lanceolate, submembranaceous, glabrous; ultimate segments of the primary and secondary divisions the largest, pinnatifid, segments of various shapes; margins crenate. Sori marginal, confluent; indusia elongated, denticulate, wrinkled.

Abundant in forest floor along roadsides; rooting in rock crevices in open sunny situations. Throughout the state in hilly regions.

SPECIES OF DOUBTFUL OCCURRENCE

Cheilanthes rufo D. Don has been reported by Saxena and Shukla (*Bull. Bot. Surv. India* 12 : 201. 1970; and Saxena *Indian For.* 18 : 363. 1972) from Madhya Pradesh based on specimens cited as housed in State Forest Research Institute, Jabalpur. The author consulted the herbarium of SFRI, Jabalpur but could not trace the specimens, identified as *C. rufo* D. Don. Since, the species belongs to higher altitudes of above 1000 m, its occurrence in Madhya Pradesh is doubtful.

17. ACTINIOPTERIDACEAE

A monotypic family represented by the genus *Actiniopteris* comprising of 5 species in the world, one in India and M.P.

ACTINIOPTERIS Link

Terrestrial, rhizome short, erect to sub-erect. Fronds coriaceous, tripartite to the base and each part once or more dichotomous, the segments linear; veins free. Fertile frond taller than the sterile; sori at the vein tips covering the whole lower surface protected by inflexed margins of lamina.

Actiniopteris radiata (Sw.) Link, Fil. Sp. 80. 1841. *Asplenium radiatum* Sw. in Schrad. J. Bot. 1800 (2) : 50. 1801. *Actiniopteris dichotoma* Kuhn in Bot. Zeit. 504. 1871; Tiwari in J. Indian Bot. Soc. 43 (3) : 434. 1964. -Magur-sikha, Morphankhi Fig. 4.

Rhizome erect, clothed with scales. Fronds tufted, 5-20 cm, erect; stipes with a few persistent scales; lamina palmate, fan-like comprising of many dichotomous segments, 2-15 × 1-2 cm, coriaceous, edges inflexed on drying, apex toothed; fertile segments longer than the sterile ones. Sori copious covering the whole lower surface.

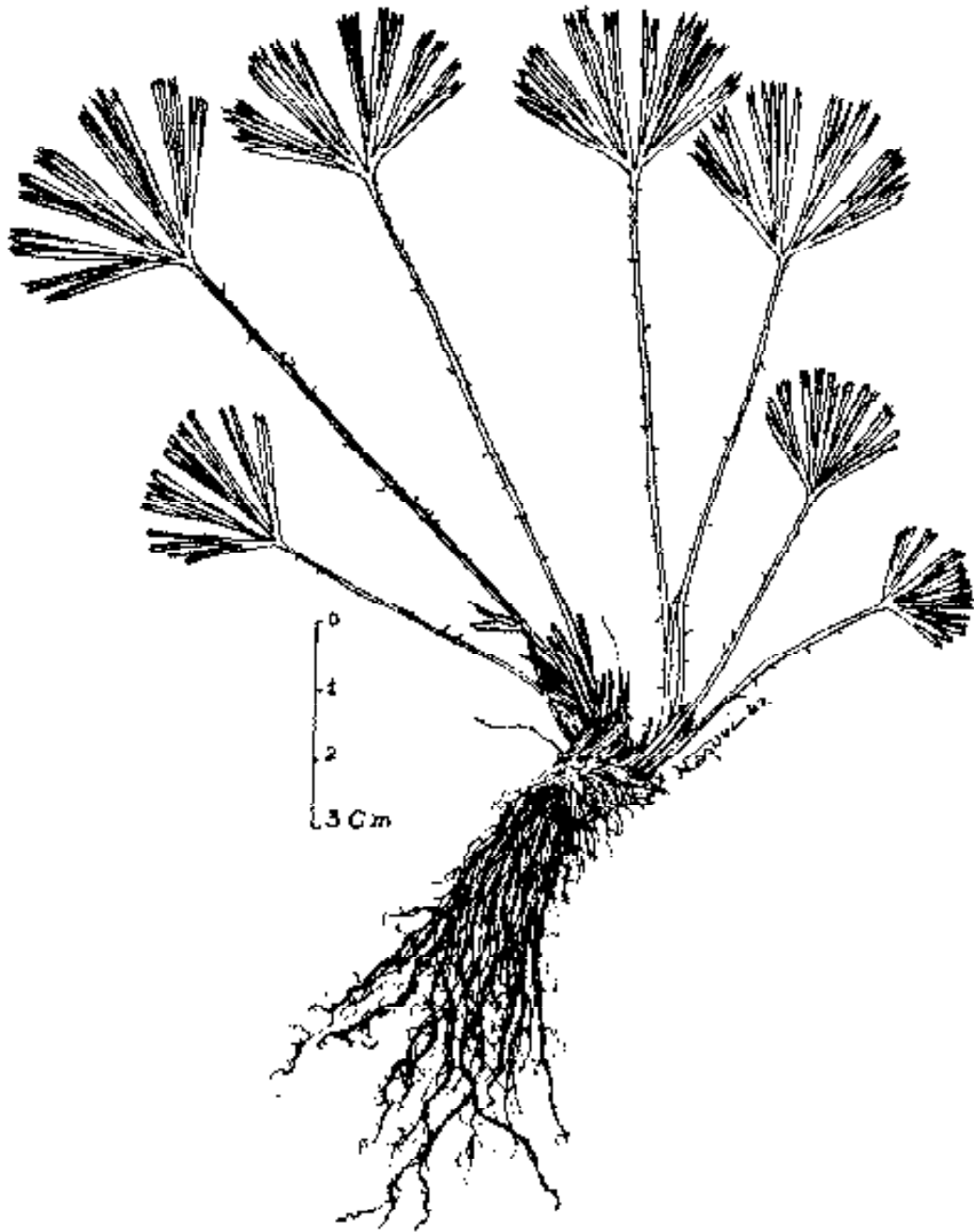


Fig. 4. *Actiniopteris radiata* (Sw.) Link

Plants xerophytic, growing on rocks along roadsides and walls of old building, usually in lime rich alluvial soil. Betul, Damoh, Gwalior, Hoshangabad, Indore, Khandwa, Raigarh, Shivpuri.

Plants used as styptic and anthelmintic; fresh fronds chewed for sore throat; rhizome boiled to cure dandruff in West Indies.

18. PTERIDACEAE

8 genera in the world, only genus *Pteris* L. in India.

PTERIS L.

Rhizome erect to short-creeping, clothed with hairs and a few scales. Fronds simple to bipinnate, rarely tripartite; rachis deeply grooved; veins free or anastomosing forming series of areoles along costa/costules ending into hydathode within the margin; in fertile fronds the ends of the veins connected laterally by a vascular commissure below the receptacle of the sorus. Sori submarginal, covered by membranous indusia formed by reflexed margins of the lamina, paraphyses often present; spores trilete.

About 43 species in India, 6 species in Madhya Pradesh.

- 1a. Fronds pinnate throughout :
 - 2a. Pinnae 10 - 35 on each side, linear, entire; lowest pair much reduced ...6. *P. vittata*
 - 2b. Pinnae less than 10 on each side, never linear or entire; lowest pair not reduced :
 - 3a. Lateral pinnae 2- 6 on each side; the basal 1 - 4 pairs cleft down near to the base into 2 - 3 linear pinnules; the sterile ones with spinulose serrated margins: ...2. *P. cretica*
 - 3b. Pinnae 1 - 7 on each side; the lowest pair simple or bifid; the sterile ones with undulate to crenulate margins ... 4. *P. pellucida*
- 1b. Fronds bipartite at base, the above rest bipinnatifid
 - 4a. Veins free throughout ...5. *P. quadriaurita*
 - 4b. Veins not free throughout; basal basioscopic vein always anastomosing forming arc
 - 5a. Pinnae not deeply dissected, segments smooth to wavy, not falcate ...1. *P. biaurita*
 - 5b. Pinnae deeply pinnatifid; segments crenate, falcate ...3. *P. geminata*

1. *Pteris biaurita* L., Sp. Pl. 2 : 1076. 1753; Tiwari in J. Indian Bot. Soc. 43 (3) : 437. 1964.

Rhizome erect, massive, clothed with scales in the apical part. Fronds densely tufted, 1-2 m high; stipes green to purplish, scaly at the basal part, glabrous above, 30-100 cm; adaxial surface grooved and hairy; rachis and midrib also grooved on adaxial surface; lamina 25-50 × 20-40 cm. Fertile fronds slightly narrower than the sterile; pinnae 5-10 pairs; lowest pinnae largest and bipartite, sometimes more pairs above also bipartite; sterile pinnae close whereas fertile ones distant, thin; veins distinct on both the surfaces; the basal basiscopic vein from each costule joining with the acroscopic basal vein of costule next below to form continuous arc with several branch veins passing from the arc to points on the edges near the base of sinus, remaining veins free, forked. Sori continuous around the sinuses but reaching the apices of lobes.

Plants growing along the edges of forests, generally in open places along stream sides. Rare. Bastar, Hoshangabad.

2. *Pteris cretica* L., Mant. Pl. 130. 1767; Moony in Indian For. Rec. 3 (7) : 248. 1942.

Fronds 15-60 cm; stipes 5-15 cm, erect, naked, straw coloured, shining; lamina 15-30 × 10-15 cm, pinnate; lateral pinnae 2-6, opposite, sessile, paired, the upper ones decurrent; pinnate, 1-2 cm; the sterile ones broader, margin spinulose-serrate; the basal 1-4 pairs often cleft down nearly to the base into 2-3 linear pinnules, coriaceous; veins fine, close, simple to once forked. Fertile pinnae slightly narrower; sori marginal, indusium membranous.

Edges of forests, along streams. Bastar, Hoshangabad.

3. *Pteris geminata* Wall. ex. Ag., Rec. Sp. Gen. Pteridis 31. 1839. *Campteria kleintiana* Presl, Tent. Pterid. 147, t. 5, f. 19. 1836; Bedd., Handb. Ferns. Brit. India 116, t. 60. 1883. *Pteris biaurita* var. *geminata sensu* Tiwari in J. Indian Bot. Soc. 438. 1964.

Plants 1-2 m high. Fronds pinnate; pinnae subsessile, lanceolate, long acuminate; lowest pair with two large pinnae descending from the lower margin of the costa, pinnae deeply pinnatifid, falcate; sterile ones crenate and fertile ones undulate, except crenate apices; basal veins anastomosing in pairs forming an arc below the sinus; rest of veins forked, free, ending within the margin. Sori marginal, indusia short, never reaching the base or apex of the segments.

Growing in the forests along water falls, rooting in rock crevices. Extremely rare in distribution. Bastar, Pachmarhi (Tiwari, 1964).

4. *Pteris pellucida* Presl, Rel. Haenk. 1 : 55. 1825; Tiwari in J. Indian Bot. Soc. 43 (3) : 438. 1964.

Rhizome short-creeping. Fronds tufted, 20 - 100 cm, pinnate; stipes 10 - 50 cm, pinkish in the basal part, stramineous above; pinnae, 2 - 7 pairs, opposite; the lowest pair bifid or simple; terminal pinnae larger than the lateral ones; pinnae 10 - 17 × 1.5 - 3 cm, elliptic, cuneate at base, coriaceous, surface bright green glossy, acuminate at apex; margins undulate to crenulate; veins free, forked. Sori marginal, indusium persistent.

In the forest floor, in dry situations, a little a way from stream sides. Bastar, Hoshangabad.

5. *Pteris quadriaurita* Retz., Obs. Bot. 6 : 38. 1791; Tiwari in J. Indian Bot. Soc. 43(3) : 438. 1964.

Rhizome erect, massive. Fronds tufted, 1 - 1.2 m high, bipinnatifid, glabrous; pinnae 3 - 11 pairs, subopposite; the lowermost pair bipartite, thin, margins wavy; veins distinct on both the surfaces, free, forked. Vegetative fronds larger than the fertile ones. Sori along the margins of lobes not reaching up to apex.

Plants abundant in the forest floor, along water falls and streams near rocks. Amarkantak, Bastar, Bilaspur, Hoshangabad.

6. *Pteris vittata* L., Sp. Pl. 2 : 1074. 1753.

Rhizome short, erect to suberect, clothed with concolorous scales. Fronds 20 - 100 cm, pinnate, with terminal pinna like lateral pinnae; stipes 5 - 50 cm, scaly; pinnae 1 - 5 cm apart, cuneate to cordate at base, slightly dilatated on the proximal side, acuminate at apex, toothed throughout, herbaceous in texture; veins distinct on both the surfaces, free, except as joined by the sorus; sterile pinnae broader, 1.5 - 3.2 × 1 - 1.5 cm. Sori marginal, continuous from base to nearing apex; a few pairs of pinnae reduced in the basal part; fertile pinnae linear-lanceolate, 10 - 20 × 0.5 - 0.7 cm.

Plants growing in moist situations near water falls or in the city areas on delapidated moist walls. Bilaspur, Raigarh.

19. ADIANTACEAE

A monotypic family comprising of the genus *Adiantum* L. About 200 species occur in the world, of which ca 26 species occur in India. The majority of the species are of ornamental importance and are often kept as pot plants. It is of cosmopolitan distribution.

ADIANTUM L.

Terrestrial, rhizome creeping, clothed with narrow brown to black scales. Fronds simple to tripinnate; stipes slender, brittle, dark brown to black, often polished, sometimes hairy; pinnae/pinnules of various shape, viz. fan-shaped to parallel-grammoid or dimidate or lunulate, subentire to deeply lobed; margins of sterile ones usually toothed; veins free, dichotomously branched. Sori on the under-surface of small reflexed marginal flaps; spores trilete.

Three species in M.P.

- 1a. Fronds decompose, not rooting in the apical part;
lamina deltoid-ovate ...1. *A. capillus-veneris*
- 1b. Fronds pinnate with the lowest pair of pinnae
deflexed or spreading, rooting in the apical part;
lamina linear-lanceolate :
 - 2a. Fronds hirsute; pinnae dimidiate, shortly stalked and
deeply lobed ...2. *A. incisum*
 - 2b. Fronds glabrous; pinnae lunulate and shallowly lobed
...3. *A. philippense*

1. *Adiantum capillus-veneris* L., Sp. Pl. 2 : 1096. 1753; Tiwari in J. Indian Bot. Soc. 43 (3) : 435. 1964. —Hansraj Fig. 5.

Rhizome creeping; stipes 5 - 10 cm, pendulous, sub-erect, wiry, shining black, glabrous. Fronds 5 - 30 cm, bipinnate with terminal short leaflet and lateral pinnae erectopate; segments 1 - 1.5 × 2 - 2.5 cm, cuneate at the base, rounded at outer edge, deeply cleft; the lobes crenate, thin, pellucid-herbaceous. Sori roundish to obreniform, placed in roundish sinuses of the crenations.

Plants rooting in moist soil cover over rocks along flowing streams in shady situations forming pure populations. Abundant. Bastar, Bilaspur, Chindwara, Hoshangabad, Sidhi, Shivpuri.

The plants are of much variable in size and shape of leaflets. Fronds used as demulcent, expectorant, diuretic, immenagogue tonic and febrifuge.

2. *Adiantum incisum* Forsk. Fl. Aeg., Arab. 187. 1775; Tiwari in J. Indian Bot. Soc. 43 (3) : 435. 1964.

Rhizome short-creeping, clothed with scales. Fronds 10 - 40 cm, pinnate; stipes 5 - 10 cm, dark chest-nut brown, wiry, spreading, tomentose; pinnae sessile, larger in the basal part, gradually reduced above and rooting in the apical part at intervals giving rise to independent plants after detachment; pinnae 3 - 5 × 1.5 - 2 cm, shortly petiolate, the lower one

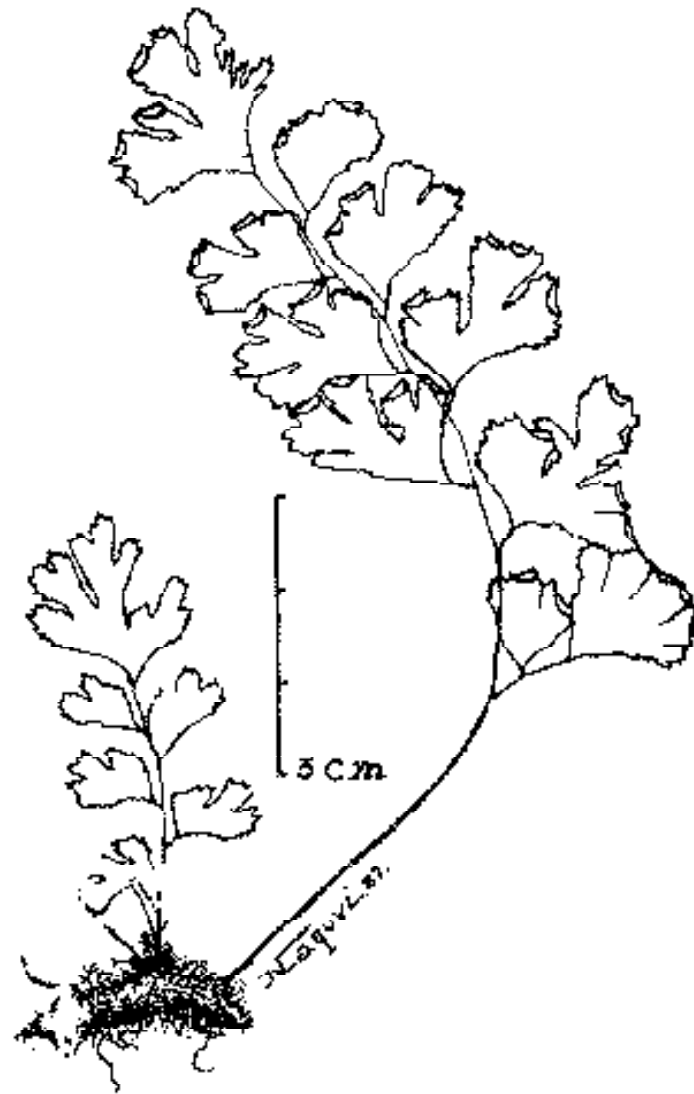


Fig. 5. *Adiantum capillus-veneris* L.

straight, horizontal; the upper rounded, deeply and repeatedly lobed. Sori marginal.

Plants abundant in the forest floor along the edges of forests forming patches. Fronds curl up in dry weather. Throughout the state in hilly regions.

Fronds used in skin diseases, diabetes, cough and fever.

3. *Adiantum philippense* L., Sp. Pl. 2 : 1094. 1753; Tiwari in J. Indian Bot. Soc. 43(3) : 435. 1964. *A. lunulatum* Burm. f., Fl. Ind. 235. 1768; Mooney in Indian For. Rec. 3(7) : 247. 1942. -*Kali-jhanti*, *Hansawati*.

Rhizome short-creeping. Fronds tufted, 10-50 cm; stipes 5-20 cm, dark chest-nut coloured, shining, rachis same as stipe; pinnae petiolate, lunulate to sub-dimidiolate, the lower edge nearly in a line or oblique with petiole; the upper edge rounded, more or less lobed, herbaceous. Sori continuous or interrupted.

Plants growing on rock boulders along streams in hilly regions or under heavy rock boulders. Throughout the State in hilly regions. Fronds used in fever.

20. HEMIONITIDACEAE

22 genera in the world, only genus *Hemionitis* L. in M.P.

HEMIONITIS L.

Terrestrial, rhizome short bearing thin brown scales. Fronds tufted, simple, entire to broadly lobed at margins, densely hairy on the lower surface; veins reticulate without free included veinlets. Sori covering the whole lower surface.

Only one in India and M.P.

Hemionitis arifolia (Burm. f.) Moore, Ind. Fil. 114. 1859; Tiwari in J. Indian Bot. Soc. 43(3) : 436. 1964. *Asplenium arifolium* Burm. f., Fl. Ind. 231. 1768. -*Rabbit ear's fern*.

Rhizome sub-erect, clothed with scales. Fronds tufted, 20-30 cm high; stipes shining black with a few persistent scales at base only; lamina simple, dimorphous; sterile fronds on shorter stipes, 7-10 cm long, lamina narrowly ovate, 5-7 × 3-4.5 cm, deeply cordate to sagittate base, coriaceous; margins entire bearing hairs; lower surface clothed with hairs and small scales; midrib distinct up to half way only. Fertile frond on longer stipes, 20-30 cm; lamina narrower in apical part, sagittate at base, acute to rotundate at apex; veins hidden, reticulate, forming elongate areoles. Sori copious, along veins covering whole lower surface mixed with

hairs and scales.

Plants rooting in rock crevices along flowing streams. Bastar.

It is extremely rare in distribution.

The fronds used in treatment of aches and as vermifuge.

21. PARKERIACEAE

A monotypic family comprising of the genus *Ceratopteris* Ad. Brongn. Five species occur in the tropics and sub-tropic of the world, 3 species in India.

CERATOPTERIS Ad. Brongn.

Plants aquatic to semiaquatic; rhizome short, erect, bearing a few fuscous scales. Fronds pinnately decomposed, dimorphic; veins anastomosing without included veinlets. Sporangia occupying the entire lower surface.

Only one species in M. P.

Ceratopteris thalictroides (L.) Ad. Brongn. in Bull. Sci. Soc. Philom. Paris 1821:186. 1822; Tiwari in J. Indian Bot. Soc. 43(3) : 435. 1964. *Acrostichum thalictroides* L., Sp. Pl. 2 : 1070. 1753. *Ceratopteris siliquosa* (L.) Copel. in Philip. J. Sci. 56 : 107. 1935; Subr. and Henry in Bull. Bot. Surv. India 8 : 209. 1966. —Panirkarela. Fig. 6.

Fronds succulent, dimorphic, green, up to 1 m long; stipes fleshy, bearing roots at intervals, copiously branched from the base; sterile fronds pinnatifid; fertile fronds bi-tripinnate with narrow linear segments. Sori copious on the whole lower surface protected by reflexed margins.

In fresh water ponds, shallow ditches and mud in open places. Throughout the State.

The tips of tender fronds are cooked as vegetable curry. Fronds used as poultice in skin complaints and in China as tonic and styptic.

22. MARSILEACEAE

A family of 3 genera in the world, only *Marsilea* L. in India. 60 species in the world, 14 in India.

MARSILEA L.

Plants herbaceous, aquatic or amphibious. Fronds simple, with 2-4 leaflets at the tip of stipe. Sporocarps heterosporous; megaspores solitary, microspores numerous. Only one species in Madhya Pradesh.

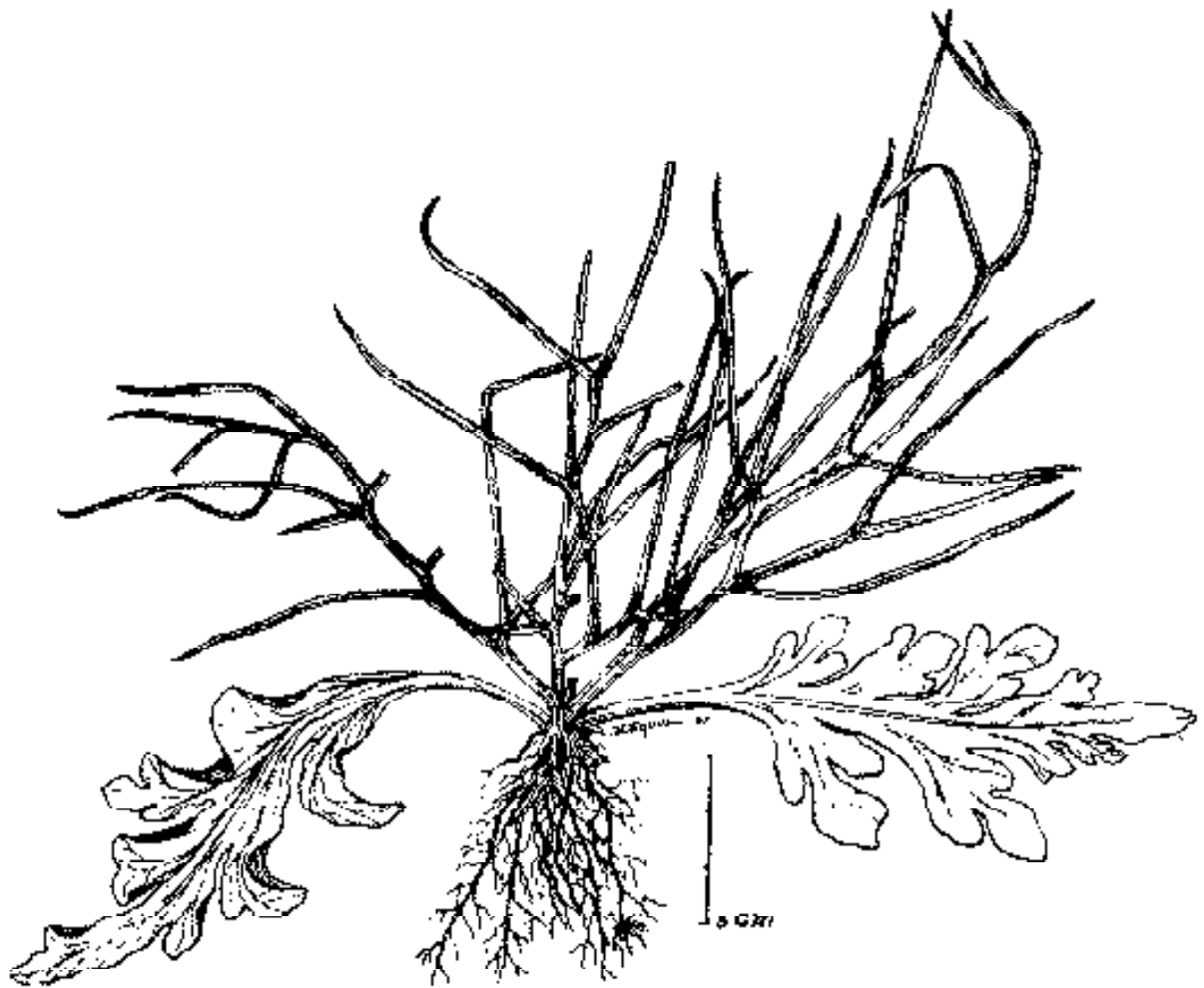


Fig. 6. *Ceratopteris thalictroides* (L.) Ad. Brongn.

Marsilea minuta L., Mant. Pl. 308. 1771. *M. quadrifolia sensu* Subr. & Henry in Bull. Bot. Surv. India 8 : 209. 1966. **Fig. 7.**

Rhizome wide-creeping, rooting in mud. Fronds erect; stipe length depends upon the depth of water, usually 0.5 - 30 cm; leaflets 4, cruciform, oblanceolate or obovate, size depends upon ecological conditions, thin shining dark-green; margins entire to crenate, if water is plenty, leaflets are of bigger in size, much reduced under xerophytic conditions. Sporocarps plenty, stalked, comprising of two types of spores, the larger megaspore and smaller microspores.

Plants growing abundant, especially in plains during rainy season and along the edges of water ponds, ditches, paddy fields, etc. Throughout the state in plains.

A vegetable curry is prepared from young leaves.

DOUBTFUL SPECIES

Marsilea erosa Willd. collected from Guna forest in 1969 housed in SFRI identified earlier after matching at CAL has been reexamined by the author and identified as *M. minuta* L.

23. CYATHEACEAE

About 650 species in the world. Only one genus *Alsophila* J. Sm. has been recognised. 12 species in India three in M.P.

ALSOPHILA J. Sm.

Caudex massive, erect, unbranched, covered with numerous scales. Fronds spirally arranged, stipes scaly at the base, lamina bipinnate to tripinnatifid; veins distinct, pinnate, free, simple or forked. Sori on veins indusiate or exindusiate often mixed with hairs, indusium completely encloses the sorus when young; spores trilete.

1a. Stipes spiny throughout; spines 3 - 5 mm long ... 3. *A. spinulosa*

1b. Stipes not spinose :

2a. Middle pinnules 7 - 10 × 1.5 - 2 cm, deeply lobed; veins
5 - 7 pairs per lobe ... 2. *A. gigantea*

2b. Middle pinnules 5 - 7 × 1 - 1.2 cm, shallowly lobed;
veins 2 - 3 pairs per lobe ... 1. *A. balakrishnanii*

1. *Alsophila balakrishnanii* (Dixit et Tripathi) R. D. Dixit, Indian Environ. 254. 1992. *Cyathea balarishnanii* Dixit et Tripathi in Bull. Bot. Surv. India 26 (3 4) : 170, f. 1 - 3, t. 1 - 2. 1984. *Jatamanshi*

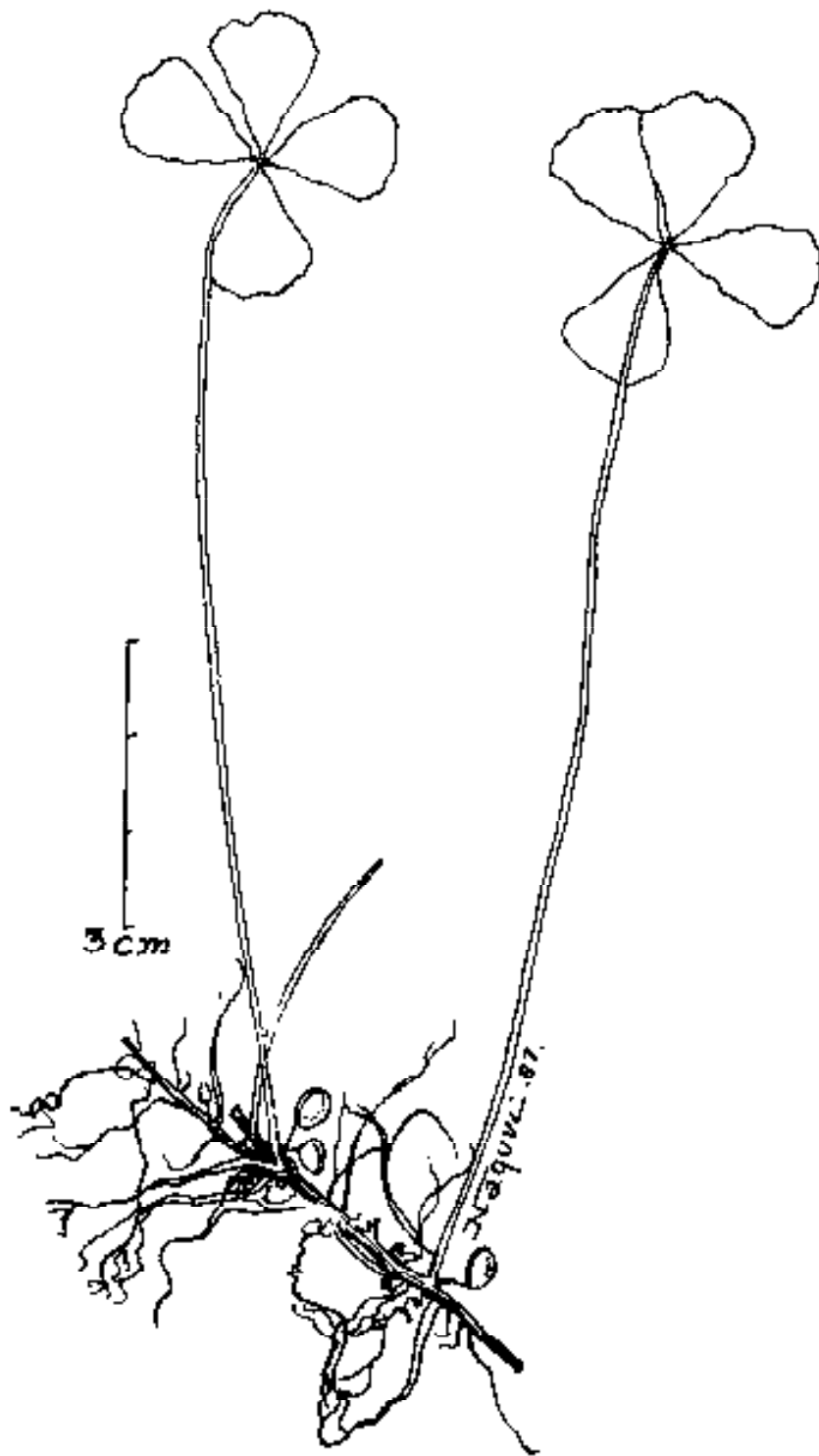


Fig. 7. *Marsilea minuta* L.

Tree fern, 1–1.5 m high, rhizome thick, massive, fronds tufted; stipes bearing numerous flabelloid scales at basal regions; stipes and rachises with the upper surface bearing many septate unicellular hairs and lower surface with a few smaller flabelloid scales ending into setiform apices; middle pinnules $5-7 \times 1-1.2$ cm, shallowly lobed throughout except the acuminate crenate apex, each lobe distinctly crenate, possessing 2–3 pairs of simple veins, upper surface of costae dark purplish, hairy to glabrous; lower surface bearing a few smaller scales similar to rachises, the lower-most pinnules small; fertile pinnules usually crenate throughout the margin with only slight constrictions forming lobes. Sori copious, 2–3 pairs.

Plants abundant in humid situations along streams having permanent source of water. Hilly regions of Madhya Pradesh.

A peculiar small species of tree ferns with only 1–1.5 m height, earlier confused with *A. gigantea* Wall. ex Hook.

The plant is worshiped during Deepawali and is considered to represent Goddess Laxmi by local people in Pachmarhi area.

2. *Alsophila gigantea* Wall. ex Hook., Sp. Fil. 1 : 53, 1844. *C. gigantea* (Wall. ex Hook.) Holtt. in Gard. Bull. Str. Settl. 8 : 318, 1953; Tiwari in J. Indian Bot. Soc. 43(3) : 451, 1964.

Tree fern, 2–3 m high; stipes 50–70 cm, deep black, bearing scales; main rachis dark, smooth to glabrescent, pinna rachis dark at base, paler distally. Pinnules $8-10 \times 1.5-2$ cm, basal pinnules distinctly stalked; lobes deeply lobed, each with 5–7 pairs of simple veins, margins distinctly crenate. Sori exindusiate, 5–6 pairs in the form of inverted V. Scales on costae narrow, dark with paler fragile edges lacking setae.

Plants growing along flowering streams in hilly regions in wet places. Bastar, Hoshangabad.

3. *Alsophila spinulosa* Wall. ex Hook., Sp. Fil. 1 : 25, t. 12C, 1844. *C. latebrosa* (auct. non Hook.) sensu Rao and Narayanswamy in J. Indian Bot. Soc. 39 : 234, 1960; Tiwari in J. Indian Bot. Soc. 43(3) : 451, 1964; Subr. & Henry in Bull. Bot. Surv. India 8 : 209, 1966.

Large plants, 2.5–3 m high; stipes 30–40 cm long, closely spinulose throughout, spines short and strong, 3–5 mm long; scales dark brown, glabrescent, bearing short spines; upper surface more or less smooth; middle pinnules $8-12 \times 1.5-2.5$ cm; veins 10–12 rarely 14, forked, lamina segments thin, crenate-serrate. Sori indusiate, near costules.

Hilly tracts along flowing streams in humid situations, extremely rare. Bastar, Hoshangabad.

24. DENSTAEDTIACEAE

Nine genera in the world flora, only the *Microlepia* in M.P.

MICROLEPIA Presl

Terrestrial, rhizome creeping, clothed with hairs. Fronds usually large, pinnately decomposed, stipes broader at base, hairy to glabrescent, lamina pinnately decomposed, pinnac/pinnules small. Sori indusiate, intramarginal in cups or at the end of veins close to the margin, indusium cup-shaped. Spores trilete.

About 10 species in India, only 2 in M.P.

- 1a. Fronds bipinnate to tripinnatifid, 40–50 cm high, pinnules to about 2.5 cm long, veins strongly raised below 2. *M. strigosa*
- 1b. Fronds tripinnate, 70–100 cm high, pinnules to about 8 cm long, veins hardly raised below 1. *M. speluncae*

1. *Microlepia speluncae* (L.) Moore, Ind. Fil. 93. 1857; Bedd., Handb. Ferns Brit. India 67. 1883. *Polypodium speluncae* L., Sp. Pl. 2 : 1093. 1753.

Rhizome wide-creeping, thick. Fronds up to 2 m high, stipes 30–150 cm long, thick, erect; lamina, ovate-deltoid, 3–4 pinnatifid bearing many glistening flaccid hairs, flaccid in texture; pinules of various shapes viz. oblong, ovate, linear-lanceolate, ultimate segments entire, subentire or rhomboid, margins irregularly serrate; veins free, pinnate. Sori indusiate, 1–5 to the entire segments, indusium hispid.

Plants grow in the edge of forest floor under shady situations. Bastar, Hoshangabad.

2. *Microlepia strigosa* (Thunb.) Presl, Epim. Bot. 95. 1849; Bedd., Ferns South. India t. 255. 1865; Handb. Ferns Brit. India 67. 1883; Graham in J. Bomb. nat. Hist. Soc. 23(2) : 500. 1915. *Dicksonia strigosa* Thunb. in Trans. Linn. Soc. Lond. 2 : 341. 1794.

Rhizome wide-creeping. Fronds distant, 50–100 cm tall, pubescent-hispid, bipinnate, primary pinnae petiolate, lanceolate, acuminate; secondary pinnules petiolate, sub-dimidate, ovate, obtuse, pinnatifid, chiefly on the upper edge, lower lobes obovate, the rest short, angulate-dentate; veins free, pinnate, clothed with a few long scattered hairs on both the surfaces. Sori indusiate, submarginal, indusium small, hairy.

Plants grow in the edge of forest in sunny situations. Bastar, Hoshangabad.

25. PTERIDIACEAE

Monotypic, represented by the only genus *Pteridium* Scop. and with single species with two varieties in temperate and tropical regions of the world.

PTERIDIUM Scop.

Rhizome wide-creeping, hypogaeal, clothed with many pale-brown hairs. Fronds large more than 1 m long; stipe long, erect, lamina tripinnate to quadripinnatifid, costules, costae and rachises grooved on the upper surface, ultimate leaflets or lobes small, subcoriaceous in texture, veins raised on the lower surface, free, forked except lowermost pair uniting to form arc. Sori submarginal linear, indusiate, indusium double, one consisting of the thin reflexed edge of the lamina and the other attached just below the receptacle; spores trilete.

One species with typical form in M.P.

Pteridium aquilinum (L.) Kuhn, v. deck Reis. 3(3) : 11. 1879. *Pteris aquilina* L., Sp. Pl. 2 : 1075. 1753.

Rhizome massive, creeping, clothed with numerous pale-brown hairs. Fronds tufted upto 1.5 m high, stipes 50–70 cm long, naked; lamina bipinnatifid to deeply tripinnatifid, 30–100 × 30–50 cm, rachises hairy in the groove on upper surface, glabrous on the lower surface; lamina segments contiguous, slightly falcate, apex round, subcoriaceous in texture; veins free, forked except basal one joining to form arc. Sori indusiate, submarginal, linear; spore trilete, papillose.

In hilly regions along stream-sides and in shady situations on the forest floor. It is extremely rare in occurrence. Bastar.

Rhizome astringent, anthelmintic, decoction of rhizomes and fronds given in chronic disorders of viscera and spleen; fronds are poisonous and sometimes fatal for the grazing animals.

26. LINDSAEACEAE

Nine genera in the world flora. 2 in India and M.P.

- 1a. Fronds pinnate; sori submarginal, linear uniting the apices of 2 to many veins, usually continuous ...1. *Lindsaea*
- 1b. Fronds decomposed, dissected; sori terminal on the vein or uniting the apices of 2–3 veins, close to apex ...2. *Sphenomeris*

LINDSAEA Dryand. ex Sm.

Plants mainly terrestrial, epithelic, scandent or rarely epiphytic. Rhizome creeping, covered by scales of various shapes and sizes, fragile, 2-8 seriate at base, uniseriate at apex. Fronds pinnate to decompose, anadromous; pinnae/pinnules of various shapes, veins free to rarely anastomosing without free included veinlets. Sori marginal; indusium opening towards margin; paraphyses filiform.

22 species in India, 4 in M.P.

- 1a. Rhizome scandent, clothed with broad triangular scales; fronds pinnate throughout; veins free
- 2a. Pinnae 20 - 30 to each side, deeply incised ...2. *L. glandulifera*
- 2b. Pinnae 30 - 80 to each side, shallowly incised.
4. *L. repens* var. *pectinata*
- 1b. Rhizome, creeping, clothed with narrow lanceolate scales; fronds pinnate to bipinnate; veins anastomosing:
- 3a. Fronds pinnate throughout; pinnae lanceolate, 15 - 20 x 0.5 - 3 cm ...1. *L. ensifolia*
- 3b. Fronds bipinnate at basal part, pinnate above; pinnae/pinnules parallelogrammoid to subtrapezoid, 1 - 1.2 x 0.3 - 0.7 cm3. *L. malabarica*

1. *Lindsaea ensifolia* Sw. in Schrad. J. Bot. 1800 (2): 77, 1801. *Schizoloma ensifolia* (Sw.) J. Sm. in Hook. J. Bot. 3: 414: 1841; Subr. & Henry in Bull. Bot. Surv. India 8: 209 1966.

Rhizome short-creeping, clothed with reddish-brown scales. Fronds close, pinnate; stipes 10-35 cm, stramineous to dark brown, rarely atropurpureous; ascending, evenly narrowed from the base to apex, sub-acute to acuminate, cuneate to sometimes lobed at base, herbaceous to subcoriaceous, dark green to olivaceous-green when dry; margins entire, except the crenate apical part; terminal segment enlarged; veins anastomosing, forming 2-3 series of areoles. Sori continuous, indusium entire, strongly reflexed and concealed at maturity.

Forest floors along stream-sides among rock boulders. Bastar, Hoshangabad.

2. *Lindsaea glandulifera* A.v. A.v.R., in Bull. Jard. Bot. Btzg. 2 (1) : 9, 1911. *L. repens* (Bory) Thw. var. *minor* (Thw.) Bedd., Ferns. South. India 72, t.214, 1865; Handb. Ferns Brit. Ind. 74, 1833.

Rhizome scandent, clothed with golden yellow to honey coloured scales. Fronds distant, rachis castaneous at base, stramineous above, pinnate; pinnac 20-30 to a side, linear, 10-20 x 1.5-2 cm, spreading, ascending, herbaceous, asymmetrically elongate-triangular, bright green to olivaceous, asymmetrically elongate-triangular, bright green to olivaceous when dry, gradually narrowed from the base to apex; lower margin concave at base, but convex in apical side, upper margin convex, deeply incised with 2 to 4 major incisions reaching down 1/2 to 2/3rd of the pinnules; veins simple to furcate. Sori intramarginal, one per lobe; indusium reflexed and often concealed at age.

Along stream sides among rock boulders. It is extremely rare being only once collected. Bastar.

3. *Lindsaea malabarica* (Bedd.) Bak. ex C. Chr. in Contr. U.S. Nat. Herb. 26: 195. 1931. *Schizoloma malabaricum* Bedd., Ferns Brit. India t. 268. 1868.

Rhizome creeping, clothed with brown deciduous scales; fronds tufted, bipinnate at basal part, pinnate above; stipes stramineous to light brown, quadrangular except the terete base; pinnae/pinnules 10-12 x 3-7mm, 25-30 to a side, ascending, parallelogrammoid to subtrapezoid, upper and lower margins somewhat convex; upper margin with 3-4 shallow incisions; veins sparingly anastomosing. Sori interrupted by the incisions, indusium entire to crenulate, reaching near the margin.

Along stream sides among rock boulders in humid, shady situations. Bastar. It is extremely rare being only once collected.

4. *Lindsaea repens* (Bory) Thw. var. *pectinata* (Bl.) Mett. ex Kuhn. in Miq. Ann. Mus. Lugd. Bat. 4: 277. 1868. *L. pectinata* Bl., Enum Pl. Jav. 217. 1828.

Rhizome scandent, clothed with deciduous, fragile scales. Fronds distant, pinnate; stipe short 1-2 cm, terete, stramineous-brown; rachis quadrangular, pinnac 40-80 to a side, spreading, lower ones falcately deflexed, herbaceous subtrapezoidal, decurved, ligulate or elliptic, narrowly rounded at apex, larger pinnac straight; veins free, forked. Sori interrupted by incisions, indusium away from the margins, concealed at maturity.

Along stream side among rock boulders in wet places. Bastar. It is extremely rare, only once collected in the year 1963.

2. SPHENOMERIS Maxon

Terrestrial, rhizome creeping, clothed with scales. Fronds erect, pinnately decomposed, the ultimate segments usually cuncate; veins free. Sori indusiate, marginal, terminal on the veins.

One species in India and M.P..

Sphenomeris chinensis (L.) Maxon in J. Wash. Acad. Sc. 3: 144. 1913. *Trichomanes chinensis* L., Sp. Pl. 2: 1099. 1753. *Davallia tenuifolia* Sw. in Schrad. J. Bot. 1800 (2): 88. 1801; Graham in J. Bomb. Nat. Hist. Soc. 23(2): 500. 1915. *Sphenomeris chusana* (L.) Copel. in Bishop Mus. Bull. 59: 69. 1929; Subr. & Henry in Bull. Bot. Surv. India 8: 209. 1966.

Rhizome creeping, clothed with dark narrow scales. Fronds green when young, flushed with dark brown at age, 10-70 cm, tufted, erect; stipes 5-30 cm; lamina tripinnate up to the ultimate segments, cuneate; pinnules oblique, deltoid, the basal acroscopic tertiary leaflet broader than the basioscopic one; fertile segments cuneate, the larger ones shallowly lobed. Sori marginal, terminal on the veins; indusium fixed by the base and sides opening towards margin, toothed.

In hilly regions along stream sides but in sunny situations, rooting in lime rich soil. Abundant throughout the State.

A red dye is extracted from the fronds by tribal people.

27. THELYPTERIDACEAE

A family of 32 genera in the world flora, of which 21 genera occur in India and 7 genera in Madhya Pradesh.

- 1a. Plants much proliferating, several buds from rachises giving rise new plants still attached to the old ones:1. *Ampelopteris*
- 1b. Plants never proliferating, rarely 1-2 buds on rachis:
 - 2a. Lower pinnae not or little reduced, glandular hairs absent from lower surface of veins and sporangium stalks:
 - 3a. Spores trilete7. *Trigonospora*
 - 3b. Spores monolete4. *Pronephrium*
 - 2b. Lower pinnae gradually or abruptly reduced:
 - 4a. Lower pinnae gradually reduced, lowest never minute, cylindrical unicellular hairs present on sporangium stalk.2. *Christella*
 - 4b. Lower pinnae abruptly reduced, lowest minute, cylindrical glandular hairs on sporangium stalk, absent:
 - 5a. Basal stipe scales broad and thin, spherical gland absent from sporangium:
 - 6a. Veins all free, no glands or hairs on sporangium5. *Pseudocyclosorus*

- 6b. Veins anastomosing at least basal vein, short club shaped glandular hairs present on sporangium...3. *Pneumatopteris*
- 5b. Basal stipe scales narrow and hairy spherical glands present on sporangium. ...6. *Sphaerostephanos*

1. AMPELOPTERIS Kunze

Terrestrial; fronds creeping or trailing several metres in length, reproducing through buds on rachis which form new plants freely, pinnate, pinnae subentire; veins anastomosing except a few, free ones running to the margin. Sori exindusiate, glandular hairs present on stalk of sporangium.

Only one species in the world flora.

Ampelopteris prolifera (Retz.) Copel., Gen. Fil. 144. 9447. *Hemonitis prolifera* Retz. in Obs. Bot. 6: 3. 1791. *Goniopteris prolifera* (Retz.) Presl, Tent. Pterid. 83. 1836; Bedd., Handb. Ferns Brit. India 296. t. 153. 1883.

Rhizome wide-creeping. Fronds of indefinite length spreading through buds on rachis giving rise new plants freely, pinnate, pinnae subentire, normal ones 10-15 x 1-2 cm; margins bluntly lobed or crenate, apex blunt or acute, subcoriaceous in texture, veins to 12 pairs on a side, anastomosing. Sori medial, oblong or linear, often confluent at age.

Plants trailing through grasses and bushes in the edge of forest preferring sunny situations. Throughout Madhya Pradesh in wet places near streams.

The young fresh fronds are cooked as vegetable curry and eaten with choice among villagers.

2. CHRISTELLA L'ev.

Rhizome erect, suberect or creeping. Fronds pinnate, hairy, pinnae crenate to lobed, often auriculate on acroscopic side, lower pinna reduced, distal veins free, veins of adjacent lobes anastomosing. Sori indusiate, sporangial stalk with unicellular, elongate, glandular hairs.

About 22 species in India, 3 in M.P.

- 1a. Rhizome long-creeping, basal pinnae not reduced or a few pairs gradually reduced but never auricled:
- 2a Lower pinnae not or little narrowed, basal 1 pair of veins anastomosing, lower surface covered with soft spreading hairs and a few orange glandular hairs ...3. *C. parasitica*
- 2b. Lower pinnae gradually reduced but not auricled, basal 1 1/2 pairs of veins anastomosing, lower surface bearing stiff erect hairs and few small scales ... *C. arida*

- 1b. Rhizome short creeping, several pairs of lower pinnae gradually reduced and strongly auricled ...2. *C. dentata*

1. ***Christella arida*** (D. Don) Holtt. in Nayar & Kaur, Comp. to Bedd. Handb. 206. 1974; Kew Bull. 31: 320. 1976. *Aspidium aridum* D. Don, Prodr. Fl. Nepal 4. 1825. *Nephrodium aridum* (D. Don) J. Sm. in Hook. J. Bot. 4: 188, 1841; Bedd., Handb. Ferns Brit. India 272. 1883.

Rhizome long-creeping, thin. Fronds 50-175 cm high; stipes 15-30 cm long, erect, glabrescent, scaly at the base, lamina pinnate, 30-150 x 30-40 cm, pinnatifid apex ending into terminal pinna, subcoriaceous in texture, lower surface hairy, glabrous above; pinnae 30 or more pairs, 12-16 x 1.5-1.8 cm, acuminate margins shallowly lobed, lobes subtriangular with a short stiff point, lower pinnae gradually reduced; veins 8-10 pairs, anastomosing. Sori indusiate, medial, lowers ones divergent.

Plants growing along streams near flowing water. Abundant. Bastar, Sarguja.

2. ***Christella dentata*** (Forssk.) Brownsey & Jermy in Brit. fern Gaz. 10: 338. 1973. *Polypodium dentatum* Forssk. in Fl. Aegypt. Arab. 185. 1875. *Thelypteris dentata* (Forssk). St. John. in Amer. Fern. Journ. 26: 44. 1936.

Rhizome short, ascending or creeping, apex scaly; scales brown, linear-lanceolate; margins hairy. Stipes 5-30 cm long, stramineous to light brown, hairy, hairs white, short, unicellular, acicular; lamina pinnate, 20-90 x 7-15 cm, oblong-lanceolate, apex pinnatifid, herbaceous in texture, hairy on both the surfaces; fronds dimorphic, fertile ones erect with distant pinnac; sterile spreading with closer pinnae; pinnae 15-20 pairs, 5-15 x 1-2.5 cm, sub-opposite to alternate, sessile, lanceolate, truncate at base, acuminate at apex, lobed halfway or more to the costa; lobes oblique, sub-falcate, basal acrosopic lobe of lower pinnae auricled, the lower most 1-4 pairs of pinnae distant and much reduced, slightly deflexed. Veins 6-9 pairs, free except the lower 1-2 pairs of adjacent lobes unite to form excurrent veinlet to sinus, hairy on both the surfaces. Sori indusiate, medial; sporangial stalk with thick blunt hairs.

Abundant along ravines in the edge of flowing water in shady situations. Bastar, Hoshangabad.

3. ***Christella parasitica*** (L.) Le'v. in Fl. Kouytcheou. 475. 1915. *Polypodium parasiticum* L., Sp. Pl. 2: 1090. 1753 *Thelypteris parasiticus* (L.) K. Iwats. in Mem. Coll. Kyoto B. no. 31: 172. 1965.

Rhizome short to long-creeping. Stipes 30-40 cm long, almost as long as lamina, hairy throughout; pinnae 20 or more pairs, 7-16 x 1-2 cm, truncate

at base, apex short-acuminate, margins deeply lobed from 2/3rd to 3/4th to costa, lobes slightly oblique entire, lower pinnae deflexed, not or slightly reduced, auricled at acroscopic base, auricle curved towards rachis, sometimes dentate; veins 8-10 pairs, lowermost vein anastomosing, glands present on veins. Sori medial or slightly nearer the margins, about 4 pairs of veins only fertile; spore perinate, granulose.

Along ravans in the edge of flowing water. Throughout M.P.

3. PNEUMATOPTERIS Nakai

Rhizome erect, scaly, scales with marginal hairs and glands. Stipes glabrescent; lamina pinnate, hairy, hairs short, acicular or capitate, ± pustular when dry; pinnae lobed, margins dentate and cartilaginous; several pairs of lower pinnae abruptly to gradually reduced; aerophores at base of lower pinnae distinct, ± swollen; veins anastomosing. Sori indusiate, sporangial stalks hairy, hairs 2-4 celled, terminal cell enlarged. Spores spinulose, winged.

2 species in India and 1 in M.P.

Pneumatopteris truncata (Poir.) Holtt. in *Blumea* 21: 314. 1973. *Polypodium truncatum* Poir. in *encycl. Meth.* 5: 534. 1804. *Nephrodium truncatum sensu* Bedd., *Handb. Ferns. Brit. India* 280 1883, non (Gaud.) C. Presl. *N. eusartum* (Thw.) Bedd., *Ferns Brit. India* t. 130. 1866.

Rhizome erect. Stipes tufted, 5-20 cm long, stramineous, glabrescent to glabrous at age; lamina pinnate, 60-120 × 50-60 cm, deeply lobed; pinnae 15-30 cm, cuneat at base, abruptly acuminate at apex; lobes subtruncate and much reduced, toothed, lower pinnae narrowed in basal part; veins upto 10 pairs, 1-2 pairs anastomosing, costae and costules ± hairy. Sori intramedial, indusia small, glabrous evanescent, sprangle hairy near annulus, hairs small, capitat.

In the edge of flowing streams, nalas etc. Rare Bastar, Raigarh.

4. PRONEPHRIUM Presl

Rhizome wide-creeping. Fronds pinnate, scanty hairy, pinnae crenate-serrate; veins anastomosing. Sori indusiate spreading along veins; spores monoletic, spinose. 9 species in India, one in M.P.

Pronephrium nudatum (Roxb. ex Griff.) Holtt. in *Blumea* 20 : 111. 1972. *Polypodium nudatum* Roxb. ex Griff. in *Calc. J. Nat. Hist.* 4 : 491. 1844. *P. multilineatum* Wall. ex Hook., *Sp. Fl.* 5 : 11. 1863; Tiwari in *J. Indian bot. Soc.* 43(3) : 441. 1966. *Abcopteris utrophylla sensu* Rao and Narayanswamy, in *J. Indian bot. Soc.* 39 : 234. 1960; Tiwari in *J. Indian Bot. Soc.* 39 : 234. 1960—Kakoti.

Rhizome creeping. Fronds 1-1.25 m high, stipes stout, erect, 2-3 cm apart, 30-50 cm long, light-brown, sparsely scaly; lamina pinnate, coriaceous, glabrous, pinnae upto 12 pairs, 18-35 × 2.5-4.5 cm, shortly petiolate, narrow oblong, base broadly cuneate, margins sharply crenate, cartilaginous; veins 15-20 pairs, upper 2-3 free, rest anastomosing into zig-zag ex-current veinlets, lower surface pustular. Sori indusiate, rounded, medial.

Plants abundant, growing along stream sides under the shade of trees and in exposed places. Bastar, Bilaspur, Chindwara, Hoshangabad.

5. PSEUDOCYCLOSORUS Ching

Rhizome short-creeping or erect, bearing broad, thin scales. Fronds bipinnatifid, stipes scaly near base, glabrous above; apical pinna not pinnae like, basal pinnae ± abruptly reduced; veins free, hairy on both the surfaces. Sori indusiate, indusium firm, pale glabrous, sporangia bearing 2-3 celled short hairs with swollen end-cell.

12 species in world, one in M.P.

Pseudocyclosorus falcilobus (Hook.) Ching in Acta Phytotax. Sinica 8 : 324(1963). *Lastrea falciloba* Hook. in Journ. Bot. & Kew Misc. 9 : 337. 1857. *Lastrea calcarata* var. *falciloba* (Hook.) Bedd., Handb. 237. 1883. *Thelypteris falciloba* (Hook.) Ching in Bull. Fan Mem. Inst. Biol. Bot. 6 : 298. 1936.

Rhizome erect, bearing elongate scales. Fronds 30-50 cm; stipes 7-10 cm long; pinnae about 20-25 pairs, lower ones reduced, texture thin but firm, middle pinnae 6-12 × 0.5-1.5 cm, acroscopic side of base broadly cuneate with elongate basal lobe, basal basioscopic side narrowly cuneate with short basal lobe apex acuminate, edges lobed to 0.5 mm from costa, basal basioscopic side narrowly cuneate with short basal lobe, lobes oblique, acute, veins to 10 pairs, basal basioscopic one to edge above base of sinus; lower surface clothed with long spreading hairs mixed with capitate hairs on costules, upper surface with pale hairs. Sori medial, indusium firm, with small glands or short capitate hairs.

Plants growing in the forest floor in the edge of flowing water. Bastar, Hoshangabad.

6. SPHAEROSTEOPHANOS J. Sm.

Rhizome short, scales narrow, bearing acicular hairs on edge and surface. Fronds with much reduced basal pinnae, acrophores at pinna-bases often swollen, apical pinna rarely pinna-like; veins anastomosing, acicular hairs present on both the surfaces of costae and costules. Sori round, sporangia usually bearing spherical gland or setae

near annulus.

About 20 species in world flora, 1 in M.P.

Sphaerostephanos arbuscula (Willd.) Holtt. in Nayar and Kaur, Comp. to Bedd. Handb. 207. 1974. *Aspidium arbuscula* Willd. in Linn. Sp. Pl. 5 : 233. 1810.

Rhizome short, erect. Fronds tufted, pinnate, 30-60 cm long, pinnae close, 5-9 × 1.5-2 cm, shortly petioled, auricled at the superior base, margins shallowly serrate, lower pinnae gradually reduced to mere deltoid auricles, texture herbaceous, pubescent. Veins 6-8 pairs, 3-4 basal ones anastomosing, rest free; lower surface of rachis and lamina pubescent. Sori indusiate, indusium reniform, solitary near the middle of 3-4 lower veins.

Plants growing along stream sides in the forest floor under moist situations. Amarkantak, Hoshangabad.

7. TRIGONOSPORA Holtt.

Terrestrial ferns, rhizome small, erect, clothed with scales. - Fronds pinnatifid, lower pinnae not reduced, acrophores not or little dilated; veins simple, free to lower ones rarely anastomosing. Sori medial, indusiate, sporangial stalk with multicellular hair ending into globose cell. Spores trilete, minutely papillose.

8 species in the world, one in India.

Trigonospora calcrata (Bl.) Holtt. in Nayar, Comp. Bedd. Handb. 203. 1974. *Aspidium calcaratum* Bl., Enum. Pl. Jav. 159. 1828. *Thelypteris calcarata* (Bl.) Ching in Bull. Fan. Mem. Inst. Biol. Bot. 6 : 288. 1936. *Lastrea calcarata* Moore, Ind. Fil. 87. 1858; Bedd., Handb. Ferns Brit. India 235. 1883.

Rhizome erect, thick. Fronds tufted, up to 1 m long, pinnatifid to pinnate, pinnae spreading 2.5-10 × 1-2 cm cut down two-thirds or more towards the rachis into oblique, falcate, linear-oblong segments, pubescent on both the surfaces; veins simple, 3-8 on a side. Sori indusiate, medial; indusium hairy.

Plants growing along the bank of streams in the forest. Bastar, Hoshangabad.

28. ASPLENIACEAE

A family of about 17 genera in the world flora, 4 genera known from India.

ASPLENIUM L.

Terrestrial or epiphytic ferns; rhizome usually short-creeping,

sometimes erect; scales clathrate; fronds small to large; stipes close, non articulate, lamina simple or decomposed, sub-coriaceous to leathery in texture, glabrous to scaly; veins free, forked, rarely anastomosing. Sori linear near margins, indusiate, indusium small (rarely exindusiate) usually along basiscopic side of each fertile veinlet; spores monoletic, perisporate, smooth or spinulose.

Cosmopolitan genus of about 700 species in the world. Only genus *Asplenium* L. with 6 species in M.P.

- 1a. Rhizome creeping :
 - 2a. Stipes chest-nut coloured, pinnae with upper margins deeply cut, lower margins entire; sori near the lower margins ... 1. *A. cheilosorum*
 - 2b. Stipes not chest-nut coloured, pinnae margins not deeply cut; sori not near the lower margins :
 - 3a. Stipes grey; pinnae margins lobed and serrate; sori linear, reaching nearly to the margins ... 2. *A. falcatum*
 - 3b. Stipes dirty-green; pinnae margins serrate-dentate, sometimes doubly serrate; sori short, somewhat in the middle ... 5. *A. obscurum*
- 1b. Rhizome ascending :
 - 4a. Stipes brownish-black, pinnae herbaceous in texture, margins crenate; sori linear-oblong ... 6. *A. trichomanes*
 - 4b. Stipes grey or straw coloured, pinnae coriaceous in texture, margins not crenate, sori otherwise
 - 5a. Stipes grey, pinnae margins inciso-seriated; sori elongate. ... 3. *A. indicum*
 - 5b. Stipes straw-coloured, pinnae margins deeply toothed; sori in lobes, 1 - 4 on each lobe ... 4. *A. laciniatum*

1. *Asplenium cheilosorum* Kunze ex Mett., *Aspl.* 133. 65. f. 12-13. 1859; Tiwari in *J. Indian Bot. Soc.* 43(3) : 447. 1964. *A. heterocarpum* Wall. ex Hook., *Sp. Fil.* 3 : 132. t. 175. 1860; Bedd., *Handb. Ferns Brit. India* 153. t. 77. 1883; Graham in *J. Bomb. Nat. Hist. Soc.* 23(2) : 500. 1915.

Rhizome short-creeping, fronds up to 30-50 cm high, erect; stipes chestnut-coloured, shining, 10-20 cm long, glabrous; lamina pinnate, pinnae many, dimidiate nearly the whole of lower margin being cut away, upper margin and apex deeply cut, the segments being again bifid, lower margin entire. Sori confined to segments near the lower margins.

Plants grow as epiphytes along streams. Bastar, Hoshangabad.

2. *Asplenium falcatum* Lam., Encycl. 2 : 306. 1786; Bedd., Handb. Ferns Brit. India 150. 1883.

Rhizome short-creeping; fronds tufted, 15-75 cm high; stipes 10-30 cm long, greying with few deciduous scales, lamina pinnate, pinnae stalked, 6-20 each side, sub-opposite, lanceolate-caudate, margins lobed and serrated, base unequal with obliquely truncate lower base, texture coriaceous; veins furcate, oblique. Sori linear reaching nearly to the margins.

On heavy rock boulders along stream side. Amarkantak, Chindwara, Hoshangabad, Raipur.

3. *Asplenium indicum* Sledge in Bull. Brit. Mus. (N.H.) 3 : 264. 1965. *Asplenium planicaule* Wall. ex Mett., Aspl. 158. 1828; Bedd., Ferns South. India t. 39. 1863; Handb. Ferns Brit. India 154. 1883 (*pro parte*); Tiwari in J. Ind. Bot. Soc. 43(3) : 447. 1964. Fig. 8.

Rhizome ascending, clothed with clathrate, brown scales; fronds tufted; stipes 5-15 cm long, erect, grey, possessing small brownish-fibrillose, deciduous scales; rachis with adaxial groove and flattened lower side; lamina pinnate, 15-30 x 6-8 cm, broadly-lanceolate, pinnae 10-20 pairs, alternate, stalked, margins incise-serrated, lobes acutely pointed, serrated, acroscopic basal lobe largest, upper side obliquely narrowed, lower one with truncate base, texture coriaceous; veins furcate, inconspicuous. Sori copious, elongate on acroscopic side reaching near the margins.

On rock boulders in moist places. Bastar.

4. *Asplenium laciniatum* D. Don, Prod. Fl. Nepal 8, 1825; Bedd., Ferns South. India t. 145. 1865; Handb. Ferns Brit. India 154. 1883 (*pro parte*); Tiwari in J. Ind. Bot. Soc. 43(3) : 447. 1964.

Rhizome ascending, scales bicolourous, linear, 5-8 x 1-2 mm; fronds tufted, stipes straw-coloured 7-15 cm long, covered with a few scales, adaxial groove present; lamina pinnate, 25-30 x 6-8 cm; pinnae up to 30 pairs, linear-oblong, 3-4 x 1-1.5 cm, upper and lower one reduced, 2-4 mm long, stalked, cutaway almost to the middle vein into lobes which are deeply toothed or pinnatifid, coriaceous in texture; veins oblique, furcate. Sori copious, 1-4 to each lobe.

Plants grow on rocks along streams. Bastar.

5. *Asplenium obscurum* Bl., Enum. Pl. Jav. 2 : 181. 1828. *A. cristatum* Wall., List. no. 9. 211. 1929. (*nom. nud.*).



Fig.8. *Asplenium indicum* Sledge

Rhizome creeping. Fronds tufted; stipes 15–20 cm long, dirty green, rachis of the same colour; lamina pinnate, oblong-lanceolate, 30–40 × 8–9 cm, pinnae 4–5.5 × 1–1.5 cm, acroscopic base broadly cuneate-truncate, basioscopic base cut down to the costa to nearly half the length of pinna, apex acute, margins serrate-dentate, sometimes doubly serrate above; veins free, once forked, entering to the apex of the teeth; herbaceous in texture. Sori short, somewhat in the middle.

Plants grow in crevices of rock boulders in moist situations. Bastar.

New record for Madhya Pradesh.

6. *Asplenium trichomanes* L., Sp. Pl. 2 : 1753.; Bedd., Handb. Ferns Brit. India 144. 1883; Tiwari in J. Ind. Bot. Soc. 43(3) : 448. 1964.

Rhizome ascending, clothed with dark brown, linear-lanceolate scales; fronds tufted, 15–30 cm long; stipes 2.5–10 cm long, naked, brown to blackish, shining; lamina pinnate, pinnae 15–30 pairs, sessile, horizontal, margins crenate, base unequal, truncate, the upper ones broader, suddenly narrowed towards the base, texture herbaceous; veins furcate. Sori linear-oblong, 2–4 on each side.

On rocks deep into the forest. Bastar.

29. ATHYRIACEAE

About 23 genera in the world, 14 genera in India. Only 2 in M.P. It is cosmopolitan in occurrence.

- 1a. Veins free, indusium naked, elongate along vein ...1. *Athyrium*
- 1b. Veins free except lower few ones anastomosing, indusium linear, double, the one opening interiorly and the other exteriorly ...2. *Diplazium*

ATHYRIUM Roth.

Terrestrial ferns; rhizome stout, erect or slightly curved, creeping and clothed with concolorous scales. Fronds tufted; stipes with two vascular strands usually uniting upward to form one periferal semicylindrical strand; fronds pinnately decomposed, rarely simple to pinnate, herbaceous to coriaceous in texture; veins free, rarely anastomosing without included veinlets. Sori dorsal, reniform or round; indusium typically curved across the vein at the distant end of sorus; spores monoletic.

About 38 species in India, 3 in M.P.

- 1a. Stipes scaly at base; fronds shallowly bipinnatifid, pinnae auricled on both sides at the base, falcate-ovate, the lower ones deflexed, margins crenate
....1. *A. falcatum*
- 1b. Stipes scaly throughout, fronds deeply bipinnatifid to bipinnate, pinnae neither auricled nor falcate, the lower ones not deflexed :
 - 2a. Fronds deeply pinnatifid, pinnae lanceolate, margins serrate
....3. *A. hohenackerianum*
 - 2b. Fronds bipinnate, pinnae narrow linear-oblong, margins acutely toothed
....2. *A. filix-femina*

1. *Athyrium falcatum* Bedd., Ferns South India f. 151. 1865; Handb. Ferns Brit. India 164. 1883; Tiwari in J. Ind. Bot. Soc. 43(3) : 442. 1964.

Fig. 9

Rhizome short, erect, clothed with linear-lanceolate golden scales; fronds not much close; stipes 3 - 10 cm long, erect, scaly at the base; lamina bipinnatifid, 15 - 25 × 3 - 5 cm, lanceolate, narrow at both ends, a few scales present on rachis, pinnae 10 - 30 on each side, sessile, alternate falcate-ovate, auriculate at the base on both sides, obtuse to acuminate at apex; lowest 2 - 3 pairs deflexed, cut down into 8 - 10 pairs of pinnules with crenate margins, herbaceous in texture, hairy; veins free, 1 - 2 times forked. Sori indusiate on each side of costa.

In moist places among exposed rocks along stream sides. Abundant. Balaghat, Bastar, Bilaspur, Chindwara, Hoshangabad, Sarguja.

2. *Athyrium filix-femina* (L.) Roth. in Rom Mag. 2(1) : 106. 1799; Bedd., Handb. Ferns. Brit. India 168. 1883; Tiwari in J. Ind. Bot. Soc. 43(3) : 442. 1964. *Polypodium filix-femina* L., Sp. Pl. 2 : 1090. 1753.

Rhizome thick, sub-erect, ascending, clothed with numerous, linear-lanceolate, brown scales, stipes and rachis bearing a few smaller scales. Fronds tufted, 30 - 100 cm high, stipes 10 - 20 cm, lamina lanceolate, narrowed at both the ends, 30 - 80 × 10 - 20 cm, dull-green, membranous in texture, rachis triangular or furrowed on drying, primary pinna narrow, linear-oblong, not narrowed at the base, secondary pinnae oblong, at right angles to the rachis, decurrent, serrate to pinnatifid, margins acutely toothed. Sori short, oblong sub-persistent.

Abundant on heavy rock boulders in moist shady situations along talas, streams etc. Abundant. Bastar, Balaghat, Hoshangabad.

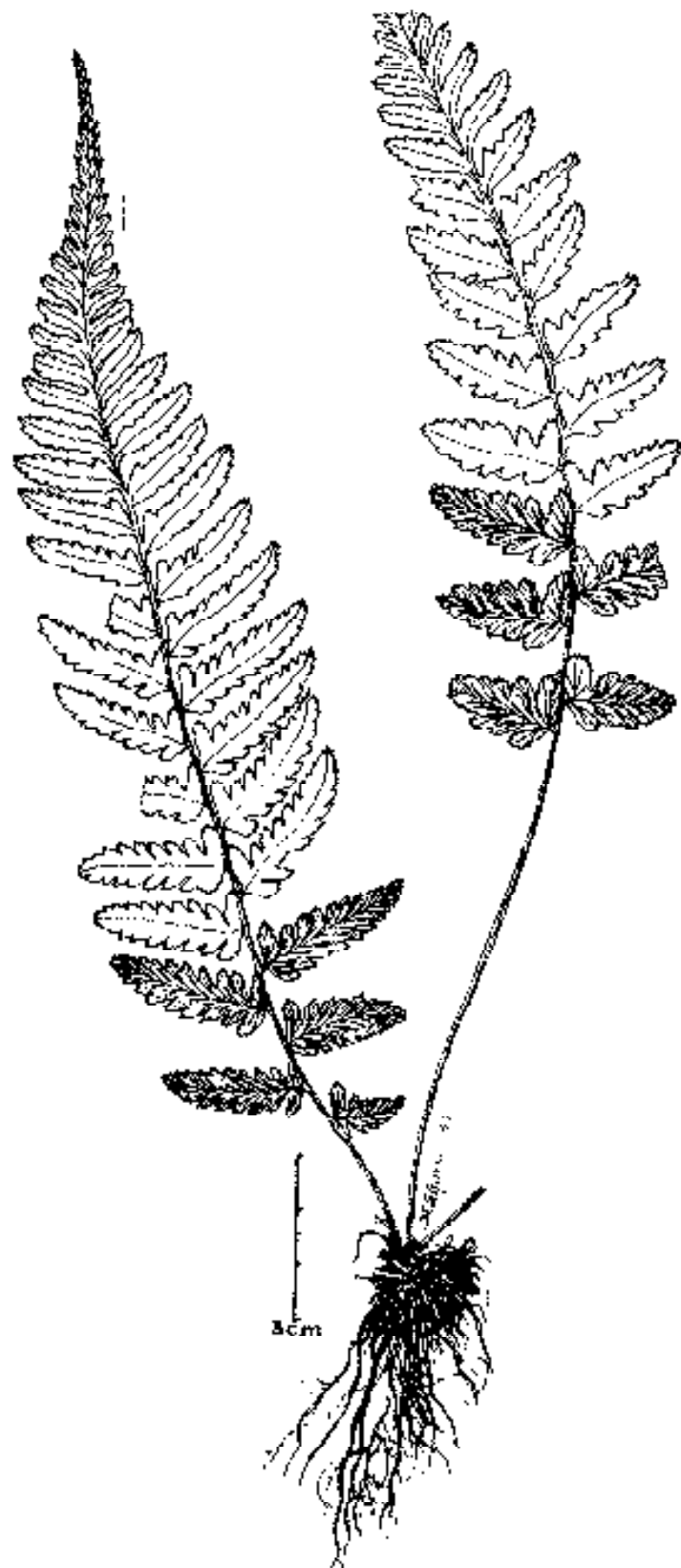


Fig. 9. *Athyrium falcatum* Bedd.

3. *Athyrium hohenackerianum* (Kunze.) Moore, Ind. Fil XLIX. 1857; Bedd., Handb. Ferns. Brit. India 163. 1883; Tiwari in J. Ind. Bot. Soc. 43(3) : 442. 1964. *Allantoidea hohenackerianum* Kunze in Farnkr. 2 : 63. t. 126. 1850. ('Hohenackeriana')

Rhizome thick, ascending, clothed with numerous brown linear-lanceolate scales; fronds tufted, 20-35 × 5-8 cm, stipes 3-10 cm long, scaly, pale-greenish in colour, rachis scaly in basal part, glabrous above; lamina ovate-lanceolate, tapering at both ends, pinnate to bipinnatifid, herbaceous in texture, pinnae sub-sessile, lanceolate, many pairs, distant in basal part, close upwards; 3-4 lower pairs reduced, margins sharply toothed; veins free. Sori copious, slightly curved.

Growing along nala in moist shady places. Hoshangabad, Rajnandgaon.

2. DIPLAZIUM Sw.

Terrestrial ferns; rhizome thick, erect to rarely creeping, clothed with scales; fronds tufted, stipes stout, long, erect or trailing; lamina decomposed, herbaceous in texture; veins free except a few anastomosing but without free included veinlets. Sori elongate, double on each side of vein, each furnished with a linear indusium, the one opening interiorly, the other exteriorly.

About 21 species in India, 1 in M.P.

Diplazium esculentum (Retz.) Sw. in Schrad. Journ. Bot. 1801 (1) : 312. 1803. Tiwari in J. Indian bot. Soc. 43(3) : 443 1964. *Hemionitis esculenta* Retz. in Obs. Bot. 6 : 38. 1791. *Anisogonium esculentum* (Retz.) Presl, Tent Pterid. 116. 1836; Bedd., Handb. Ferns Brit. India 192. 1883. *Callipteris esculenta* (Retz.) J. Sm. apud. Houlst. and Moore in Gard. Mag. Bot. 3 : 265. 1851; Bedd., Ferns South. India 54. t. 164. 1865.

Rhizome thick, erect, bearing dark brown scales, 6-10 × 0.5-1 mm, margins finely toothed. Fronds tufted, often 1 m or more long; stipes 50 cm or more long; lamina bipinnate; pinnae 30 cm or more long; bearing many distantly placed smaller pinnules, pinnules vary in size and cuttings about 2 cm wide, the lower ones stalked and rest above sessile, truncate or cuneate at base, sometimes auricled, margins slightly crenate or shallowly lobed, the lobes also crenate or toothed. Veins 6-10 pairs of side veins, the lower 2-3 pairs of adjacent groups anastomosing, or forming an irregular intermediate excurrent vein leading towards sinus between adjacent lobes, herbaceous in texture, rachises and costae hairy on the lower surface. Sori occupying whole length of vein.

Plants growing along streams in open places in the edge of forest. Jastar, Bilaspur, Hoshangabad.

Plants used as antidote to snake bite and also on swellings. The fresh fronds cooked as vegetable curry.

30. HYPODEMATAEAE

Monotypic family represented by the genus *Hypodematium* Kunze comprising of only three species in world.

HYPODEMATIUM Kunze

Rhizome short, creeping, stipes swollen at the base and jointed. Fronds small 3-4 pinnate, pubescent, deltoid-ovate, pinnae sub-opposite, texture thin, veins free, pinnate, sori dorsal indusiate, indusium reniform, ciliate. Only one in M.P.

Hypodematium crenatum (Forsk.) Kuhn v. Deck Reis. 3 (3): 37. 1879. *Polypodium crenatum* Forsk., Fl. Aeg. 185 1775. *Lactes crenata* (Forsk.) Bedd., Frns Brit. India Suppl. 1876; Handb. Ferns Brit. India 258. 1883.

Terrestrial; rhizome creeping, clothed with tuft of golden, lanceolate scales; fronds approximate, 20-35 cm high, stipes 10-15 cm long, straw coloured, shining, lamina deltoid, 3-4 pinnate, lowest pinnae the largest 10-12 x 4-6 cm, pinnules lanceolate, close, often imbricate with oblong pinnatifid segments of obtuse lobes, herbaceous in texture, pale green on drying; veins free, pinnate. Sori copious, median on veins.

Among rock boulders along streams. Extremely rare. Hoshangabad (Pachmaarhi).

31. ASPIDIACEAE

About 52 genera in world, 3 known from Madhya Pradesh.

1a Lamina subcoriaceous, veins free.

2a. Lamina finely dissected, margins aristate like bristles;
indusium orbicular

...1. *Arachinodes*

2b. Lamina not finely dissected, margins never aristate,
indusium round-reniform

...2. *Dryopteris*

1b. Lamina thin; veins variously anastomosing with free
included veinlets

....3. *Tectaria*

1. ARACHINODES Bl.

Terrestrial; rhizome creeping clothed with scales. Fronds pinnately decomposed; pinnules usually rhomboid, coriaceous in texture, margins aristate like bristles; veins free, pinnate. Sori indusiate, dorsal, subterminal on the veins.

About 8 species in India, only one in M.P.

Arachinodes amabilis (Bl.) Tindale in Contr. N.S. Wales Nat. Herb. 3 : 90. 1961. *Aspidium amabile* Bl. Enum. Pl. Jav. 165. 1828. *Lastrea amabila* Moore Ind. Fil. 85. 1858; Bedd., Handb. Ferns Brit. India 228. 1883.

Rhizome creeping clothed with brown scales. Fronds distant; stipes 10 - 30 cm long, sparsely scaly at the base; lamina bipinnate except pinnate apex, 30 - 40 × 15 - 25 cm, 2 - 6 lateral pinnae on each side, pinnules sub-rhomboid, lobes shallowly half way to costa, lobes terminate into long bristle, subcoriaceous in texture, glabrous on both the surfaces; veins free, pinnate. Sori indusiate, submarginal, indusium orbicular.

Plants rooting in rock-crevices along flowing stream in the forest. Hoshangabad.

2. DRYOPTERIS Adans.

Terrestrial ferns, rhizome short, thick, ascending to erect, clothed with many thin walled broad scales. Fronds usually tufted; stipes scaly at base; lamina bipinnatifid to decomposed, coriaceous in texture, glabrous; veins free, forked. Sori indusiate, round, dorsal on the veins, indusium round-reniform and attached by the inner end of the sinus; spores bilateral perisporate.

About 31 species in India; 2 in M.P.

1a. Fronds dimorphic, fertile frond much contracted ...1. *D. cochleata*

1b. Fronds not dimorphic, fertile frond not or slightly contracted ...2. *D. sparsa*

1. *Dryopteris cochleata* (D. Don) C. Chr. Ind. Fil. 258. 1905. *Nephrodium cochleatum* D. Don, Prod. Fl. Nepal 6. 1825. *Lastrea filix-mus* Presl var. *cochleata* (D. Don) Bedd., Handb. Ferns Brit. India 250. 1883.

Fig.10

Rhizome thick, erect, clothed with light-brown, lanceolate scales. Fronds approximate, dimorphic; stipes 15 - 30 cm long, castaneous-brown and scaly in basal region, stramineous above, sterile fronds larger 15 - 35 × 10 - 15 cm, bipinnatifid, pinnae alternate, sub-sessile, 10 - 15 jugate, 5 - 15 × 3 - 5 cm, deeply cut up to 2/3rd of the costa into 6 - 15 obtuse, dentate

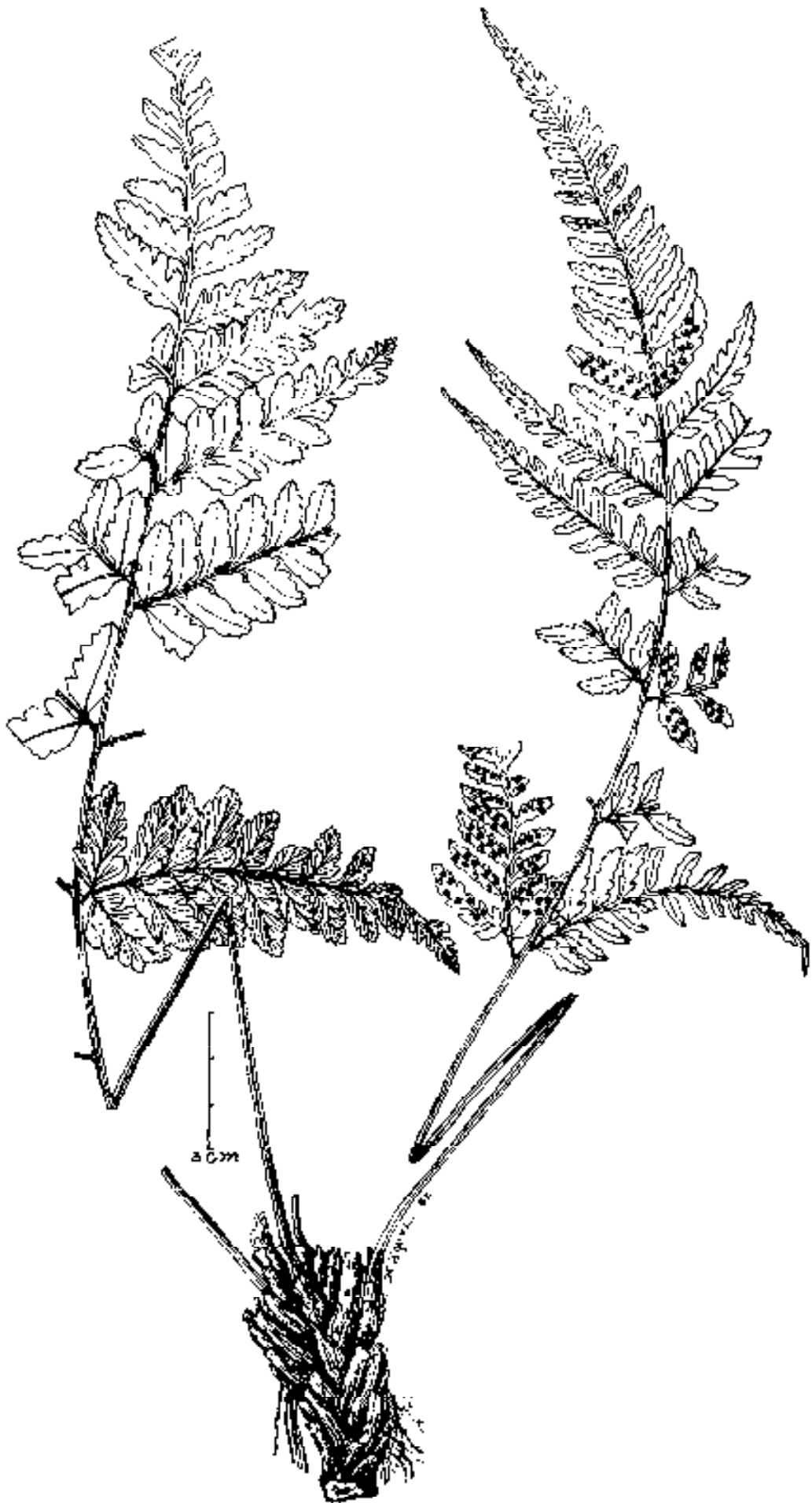


Fig. 10. *Dryopteris sparsa* (D. Don) O. Ktze

lobes; fertile fronds deeply contracted, bipinnate; rachis castaneous bearing a few small light brown scales, herbaceous in texture, hairy, light-green in colour; veins distinct, free, 2-5 pair of veins on either side of the costule, veinlets forked. Sori indusiate, indusium horse-shoe shaped.

Plants growing along the sides of streams and nalas in the forest floor in laterite soil preferring sunny situations. Bastar, Hoshangabad.

2. *Dryopteris sparsa* (D. Don.) O. Ktze, Rev. Gen. Pl. 2 : 613. 1891. *Nephrodium sparsum* D. Don, Prod. Fl. Nepal 6 : 1825. *Lastrea sparsa* (D. Don) Bedd., Ferns South India f. 103. 1863. (excl. parte). Handb. Ferns Brit. India 252. 1883 (excl. parte).

Rhizome thick, ascending, densely clothed with thin, ovate-lanceolate, golden or reddish scales. Fronds decomposed; stipes erect, scaly in basal part, dark purplish-brown near base, paler above to about 50 cm; lamina deltoid, 40-60 × 15-25 cm, the basal pinnae usually the largest and always with much elongated basiscopic basal pinnules rest unequal at the base round at the apex, margins shallowly lobed with one short tooth to each lobe, texture thin but firm, drying brown. Sori indusiate, medial on the acroscopic vein, indusium horse-shoe shaped, firm, brown, persistent.

Growing in the forest floor along stream banks in sunny situations. Bastar, Hoshangabad.

3. TECTARIA Cav.

Terrestrial plants of moderate to large size; rhizome thick, short-creeping to erect, clothed with thin entire, fragile scales; stipes densely tufted, ebencous; lamina pinnate to decomposed, rarely simple, broader at base, margins wavy or distantly crenate, surfaces glabrous to hairy, sometimes hairs glandular, thin but firm in texture; veins variously anastomosing forming areoles enclosing free or forked veinlets. Sori round, compital, dorsal or terminal on the veinlets, indusium peltate; spores monolete, perisporate.

About 20 species in India, 2 in M.P.

1. Rhizome creeping, stipes pale castaneous; lamina hairy
 - ...1. *T. coadunata*
- 1b. Rhizome sub-erect, stipes dark-brown at the base; lamina glabrous
 - ...2. *T. polymorpha*

1. *Tectaria coadunata* (Wall. ex Hook. et Grev.) C. Chr. in Contr. U.S. Nat. Herb. 26 : 331. 1931. *Aspidium coadunatum* Wall. ex Hook. et Grev., Icon Fil. 2 : 202. 1831. *Sagenia variolosa* Bedd., Ferns South. India t. 170.

1823. *S. gigantea* Bedd., Ferns South. India t. 81. 1863. *Nephrodium cicutarium* Hook. & Bak., Syn. Fil. 299. 1874; Clarke in Trans. Linn. Soc. Lond. II. Bot. 1 : 532. 1880; *N. cicutarium* var. *coadunatum* Clarke in Trans. Linn. Soc. Lond. II. Bot. 1 : 540. 1880.

Rhizome thick, creeping, clothed with brown broadly ovate-lanceolate scales. Fronds approximate, pale-castaneous, 30-70 cm high, thick, erect bearing scales in basal part and a few smaller ones above; lamina 70-150 cm, hairy on both the surfaces, membranaceous; bi to tri-pinnatifid in the basal part, deeply lobate-pinnatifid above, lowest pair with long stalk, margins lobed, ciliate, veins anastomosing forming large areoles with simple or forked veinlets. Sori indusiate, scattered, persistent, more copious near the margins of pinnae, compital or more frequently terminal on a vein.

Plants growing among rock boulder along flowing streams. Abundant. Bastar, Hoshangabad.

2. *Tectaria polymorpha* (Wall. ex Hook.) Copel. in Philip. Journ. Sci. 2C. 413. 1903. *Aspidium polymorphum* Wall. ex Hook., Sp. Fil. 4 : 54. 1862; Bedd., Handb. Ferns. Brit. India 218. 1883.

Rhizome sub-erect, clothed with linear, dark-brown, shining scales. Fronds 20-100 cm rarely more high; stipes tufted erect, dark-brown and scale at the base. Fertile fronds longer than the sterile ones; juvenile fronds simple to trifid with cordate base, the older fronds bearing 2-6 pairs of lateral pinnae, sub-sessile to stalked, sub-opposite, elliptic-oblong with acute to rounded apex, cuneate at the base, thin in texture, midrib distinct; veins anastomosing with areoles enclosing simple or forked veinlets. Sori many, small, dorsal on the connecting veins.

In the cave like earthmounds of laterite where perennial streams trickle down. Bastar, Bilaspur, Hoshangabad.

32. LOMARIOPSIOACEAE

About 8 genera in the world, 2 in India and one in M.P.

BOLBITIS Schott

Terrestrial to low epiphytic ferns; rhizome short to long-creeping bearing many sub-peltate, opaque to clathrate tufted to distant scales. Fronds dimorphic, simple, pinnate or rarely bipinnate; stipes stramineous to light brown in colour scaly at the base, \pm similar to those on rhizome, lamina green, shining, glabrescent, herbaceous to rarely coriaceous in texture, margins with or without teeth, distinct on the lower surface, veins free or anastomosed with free veinlets; fertile fronds contracted; longer than the sterile fronds, acrostichoid rarely in part sterile. Sori close, black on maturity; spores monolete, perisporate.

Bolbitis appendiculata (Willd.) Iwatsuki in Acta Phytotax. Geobot. 18 : 48. 1959. *Acrostichum appendiculatum* Willd. in Sp. Pl. 5 : 114. 1810. *Polybotrya appendiculata* (Willd.) J. Sm. in Hook. Journ. Bot. 4 : 150. 1841; Bedd., Ferns South. India 66, t. 194. 1864; Ferns Brit. India 111, t. 111. 1865; (*pro parte*, the 3 left hand top figs.); *P. appendiculata* (Willd.) J. Sm. var. *subintegra* Bedd., Handb. Ferns. Brit. India 427. 1883.

Rhizome thick, creeping clothed with black, subclathrate scales. Fronds pinate 15–100 cm long, stipes 3–25 cm long, lamina 10–50 × 25–30 cm, herbaceous, shining green in texture, rachis with narrow wing, pinnae alternate 20–80, up to 30 mm apart, opposite, oblique at base, margins finely serrate, apex acuminate, lowermost pinnae strongly deflexed; terminal segment triangular, apex prolonged, veins anastomosing; fertile fronds pinnae to tripinnate, lowermost pinnate stalked. Sori restricted all over the lower surface.

In rock crevices under shade with usually permanent source of trickling water. Hoshangabad.

33. NEPHROLEPIDACEAE

3 genera in world flora, of which only one *Nephrolepis* Schott occurs in Madhya Pradesh.

NEPHROLEPIS Schott

Rhizome short, erect bearing densely tufted fronds and slender lateral branches as runners spreading at distance which finally develop into new plants. Scales on the upper part of rhizome and basal part of stipes thin-walled with usually marginal hairs. Fronds large, narrow, pinnate, pinnae closely placed, slightly falcate, lower ones slightly reduced and distantly placed, articulate, sessile, unequal at base, often auriculate on acroscopic side, margins crenate, veins free, branched, ending into hydathode. Sori indusiate, indusium round reniform.

About 10 species in India, only two in M.P.

- 1a. Pinnae hardly more than 2 cm long ...1. *N. cordifolia*
 1b. Pinnae more than 5 cm long ...2. *N. exaltata*

1. **Nephrolepis cordifolia** (L.) Presl, Tent. Pterid. 79. 1836; Bedd., Handb. Ferns Brit. India 282, t. 144. 1883. *N. tuberosa* Presl, Tent. Pterid. 79. 1836; Bedd., Ferns South. India t. 92. 1865.

Rhizome suberect, densely clothed with thin shining, pale-brown scales towards apex runners many bearing tubers. Fronds tufted, wiry but firm up to 50 cm long; stipes 3–10 cm long, slightly scaly at base, lamina pinnate, pinnae numerous, crowded, imbricated, 1.5–2.5 × 0.7–1 cm,

margins undulate to crenate, upper base subcordate auricled, lower base narrower, non auriculate, apex rounded or bluntly pointed, coriaceous in texture, both surfaces glabrous, rachis scaly. Sori indusiate, about halfway between midrib and margin in a single row, indusium firm, persistent.

Plants rooting in rock crevices along streams in open sunny situations. Bhopal, Hoshangabad, Indore.

Tubers are sweet and eaten by villagers.

2. *Nephrolepis exaltata* (L.) Schott. Gen. Fil. t. 3. 1834; Bedd., Ferns South. India t. 93. 1865; Handb. Ferns Brit. India 283. 1883.

Rhizome massive, suberect. Fronds tufted, erect up to 1 m high, firm; stipes 10–20 cm long, sparsely scaly at basal portion; lamina pinnate, pinnae close, 5–10 × 1–1.5 cm, acute at apex, margins slightly crenate, superior base, strongly auriculate, inferior base rounded, both the surfaces glabrous except a few scales observed in young stage. Sori submarginal, indusiate, indusium reniform.

Among rock boulders along stream banks in open sunny situations. Bastar, Chhindwara, Hoshangabad.

There are number of cultivated forms commonly grown as pot plants in the garden. These are hardy plants and are attractive due to their various shapes of foliage. The cultivars are not included.

34. DAVALLIACEAE

A family of 10 genera in the world flora, of which only 2 occur in Madhya Pradesh.

- 1a. Rhizome bearing scales only, lamina finely dissected, ultimate segments narrow ...1. *Araiostegia*
- 1b. Rhizome bearing scales and hairs, lamina not finely dissected, ultimate segments more or less rhomboidal ... 2. *Leucostegia*

1. ARAIOSTEGIA Mett. ex Frank

Rhizome creeping, clothed with scales, peltate, at the base. Fronds tufted, stipes articulated to the rhizome, lamina deltoid, finely dissected, thin, ultimate divisions narrow. Sori terminal on the acroscopic branch of a forked vein, the other branch entering into segment; indusium small, roundish, attached by the base only.

One species in M.P.

Aralostegia pulchera (D. Don) Copel. in Philip. Journ. Sci. 34 : 241. 1927. *Davallia pulchera* D. Don, Prod. Fl. Nepal 2. 1825. *Leucostegia pulchera* (D. Don) J. Sm. in Lond. Journ. Bot. 1 : 426. 1842; Tiwari in J. Ind. Bot. Soc. 43 (3) : 439. 1964. – *Mai ki baju*.

Rhizome wide-creeping clothed with numerous peltately attached scales, fronds deltoid; stipes 10–15 cm, glabrous; lamina 15–35 × 10–20 cm, tri- to quadri-pinnatifid, lowest pinnules 2–5 × 2–2.5 cm, cut down to a narrowly-winged rachis into deeply pinnatifid segments; texture flaccid. Sori indusiate copious, on ultimate segments covering the segment.

Epiphytes at the base of tree trunks in shady situations. Rare. Bastar, Hoshangabad.

2. LEUCOSTEGIA Presl

Rhizome creeping, clothed with concolorous scales and hairs. Fronds deltoid; stipes pale stramineous, glabrescent to smooth, articulate to the rhizome; lamina decomposed, deltoid, pinnae rhomboidal, thin, pale-green in colour, margins toothed, veins free ultimate veinlets usually forked. Sori borne by the acroscopic veinlet and basioscopic vein passing to a blunt tooth on the margin, indusium circular attached by a narrow base or with a basal part cup-shaped, the apical half semi-circular and free; spores monoletic.

Leucostegia immersa (Wall. ex Hook.) Presl, Tent. Pterid. 95. f. 4. f. 11. 1836. *Davallia immersa* Wall. ex Hook., Sp. Fil. 1 : 56. 1846.

Rhizome thick, fleshy, creeping, scales rusty brown, entire, ovate. Fronds deltoid; stipes 10–20 cm, grooved on the upper surface, lamina 20–60 × 8–15 cm, quadripinnate at the base, tripinnate above the large part of the frond, pinnae/pinnules narrowly deltoid, ultimate leaflets more or less rhomboid, apex bluntly toothed. Sori borne on acroscopic branches of the vein, basal basioscopic vein longer passing through sorus and ending into broad marginal tooth; lamina below sori strongly depressed; indusium broader than long attached by the narrow base only.

Plants growing as lithophyte on heavy rock boulders near streams or under moist shady situation in the edge of forest. Abundant. Bastar, Hoshangabad (Pachmarhi).

35. BLECHNACEAE L.

BLECHNUM L.

12 genera and 250 species in the world; 5 genera and 6 species in India. Only genus *Blechnum* with one species in M.P.

Terrestrial; fronds large, 1–1.5 m high, tufted; lamina pinnate, sub-coriaceous. Sori in long continuous line close to the midrib; indusium

attached to the fertile commissure and opening on the side towards the midrib; spores monoletic.

Blechnum orientale L., Sp. Pl. 2 : 1077. 1753; Tiwari in J. Ind. Bot. Soc. 43 (3) : 446. 1964.

Rhizome massive, erect, above the ground. Fronds tufted, gigantic, up to 1.75 m high, tips covered with scales, stipes up to 70 cm, bearing small auricles, 2-3 cm apart throughout; lamina 100-130 × 30-50 cm, pinnate; pinnae many, close, oblique gradually narrowed towards apex; veins free, simple or forked. Sori copious, linear on either side of midrib throughout.

Plants abundant along newly constructed road sides in the forest area and in open situations along streams in the forest edges. Throughout the State.

Fresh fronds used as poultice for boils in Malaya; rhizome used as anthelmintic in China, eaten during scarcity of food in Malaya; as cure for intestinal worms, bladder complaints in India and as diaphoretic, aromatic and aperative in Philippines. Baskets and umbrellas are prepared by tribals in Maghalaya from stipes and rachises.

36. AZOLLACEAE

A monotypic family represented by the only genus *Azolla* Lam. and comprising of 6 species in the world, 2 in India.

AZOLLA Lam.

Aquatic plants; rhizome slender, bearing leaves in two alternate rows and many roots hanging downwards. Leaves bilobed with one floating and the other submerged, close together. Sori indusiate, on submerged leaf-lobes near the base of the branches; indusium basifixed; microsporangium many, each producing 64 microspores, megasporangia few, each maturing into only one megaspore.

One species in M.P.

Azolla pinnata R. Br. in Prod. Fl. N. Holl. 167. 1810.

Small aquatic plants 1.5-2 cm long and 1 cm wide, rhizome very slender, zigzag, branched, branches alternate, roots numerous hanging downwards bearing several root-hairs. Leaves in two rows, alternate, bilobed with one floating and one submerged lobe, close together, upper surface papillose, elder leaves dull red in colour.

Common in stagnant ponds and rice fields usually growing in association of duck weeds. Plants rapidly multiply vegetatively through breaking up of elder plants. Throughout the State.

A N G I O S P E R M S*Key to the Families*

(D.M. Verma and Anand Kumar)

- 1a. Stem with vascular bundles arranged in one or more rings; leaves usually reticulately veined; flowers generally 4-5-merous; cotyledons usually 2 :
 - 2a. Perianth present, biseriate or multiseriate :
 - 3a. Petals all free or only some united :
 - 4a. Ovary fully superior, or at least one whorl of the perianth inferior, or stamens inferior or inserted on the top of a hypogynous disc in which the ovary may be immersed :
 - 5a. Stamens more than twice as many as the petals :
 - 6a. Aquatic plants with rotundate peltate leaves; pistils many, embedded in a fleshy turbinate receptacle ...7. NYMPHAEACEAE
 - 6b. Plants not as above :
 - 7a. Stamens monadelphous or in bundles :
 - 8a. Leaves opposite, pellucid :
 ...21. HYPERICACEAE
 - 8b. Leaves alternate, not pellucid :
 - 9a. Anthers 2-celled ...26. STERCULIACEAE
 - 9b. Anthers 1-celled :
 - 10a. Trees; leaves digitately compound; styles as many as the carpels; pollens smooth; fruit a woody capsule
 ...25. BOMBACACEAE
 - 10b. Plants not as above ...24. MALVACEAE
 - 7b. Stamens all free :
 - 11a. Pistils more than one :
 - 12a. Stamens perigynous, arising from hypanthium ...54. ROSACEAE
 - 12b. Stamens hypogynous, arising from receptacle :

- 13a. Perianth 3 - more-seriate, 3 - 4-merous :
- 14a. Anthers extrorse ...4. ANNONACEAE
- 14b. Anthers introrse or latorse ...3. MAGNOLIACEAE
- 13b. Perianth 2-seriate, 5-merous :
- 15a. Trees; sepals persistent ...2. DILLENIACEAE
- 15b. Herbs; sepals caducous ...1. RANUNCULACEAE
- 11b. Pistil one :
- 16a. Stamens perigynous, arising from hypanthium :
- 17a. Leaves alternate ...54. ROSACEAE
- 17b. Leaves opposite ...65. LYTHRACEAE
- 16b. Stamens hypogynous, arising from receptacle :
- 18a. Ovary stipitate, on a gynophore ...10. CAPPARACEAE
- 18b. Ovary sessile :
- 19a. Flowers unisexual :
- 20a. Ovules many in each cell ...22. THEACEAE
- 20b. Ovules 1 - 2 in each cell ...123. EUPHORBIACEAE
- 19b. Flowers bisexual :
- 21a. Fruits long beaked ...31. GERANIACEAE
- 21b. Fruits not long beaked :
- 22a. Leaves opposite ...21. HYPERICACEAE
- 22b. Leaves alternate :
- 23a. Leaves palmately nerved :
- 24a. Flowers axillary; placentation axile ...27. TILIACEAE
- 24b. Flowers terminal; placentation parietal :
- 25a. Leaves simple; fruits echinate; seeds with red fleshy testa ...12. BIXACEAE
- 25b. Leaves palmately lobed; fruits and seeds not as above ...13. COCHLOSPERMACEAE
- 23b. Leaves pinnately nerved :
- 26a. Placentation free-central ...18. PORTULACACEAE
- 26b. Placentation otherwise :

- 27a. Sepals 2 ...28. PAPAVERACEAE
- 27b. Sepals 4 - 6 (usually 5) :
 - 28a. Leaves with pellucid, aromatic glands ...35. RUTACEAE
 - 28b. Leaves without the above glands :
 - 29a. Sepals accrescent :
 - 30a. Anthers dehiscing by pores ...38. OCHNACEAE
 - 30b. Anthers dehiscing by longitudinal slits :
 - 31a. Leaves stipulate ...23. DIPTEROCARPACEAE
 - 31b. Leaves exstipulate ...22. THEACEAE
 - 29b. Sepals not accrescent ...6. BERBERIDACEAE
- 5b. Stamens fewer, at the most twice as many as the petals :
 - 32a. Leaves scale-like ...19. TAMARICACEAE
 - 32b. Leaves well developed, expanded :
 - 33a. Leaves simple :
 - 34a. Ovary 1-celled :
 - 35a. Climbers or scandent shrubs :
 - 36a. Ovules many ...70. PASSIFLORACEAE
 - 36b. Ovule 1 :
 - 37a. Flowers 3-merous ...5. MENISPERMACEAE
 - 37b. Flowers 4 - 5-merous ...42. OPILIACEAE
 - 35b. Plants not as above :
 - 38a. Placentation free-central :
 - 39a. Sepals 2, jointed, the free part deciduous; capsules circumscissile ...18. PORTULACACEAE
 - 39b. Sepals and capsules not as above :
 - 40a. Stamens alternate to the petals ...17. CARYOPHYLLACEAE
 - 40b. Stamens opposite to the petals :
 - 41a. Shrubs or trees; leaves alternate, gland dotted ...85. MYRSINACEAE
 - 41b. Herbs; leaves opposite, not gland dotted ...84. PRIMULACEAE
 - 38b. Placentation otherwise :

- 42a. Ovules biseriate on posterior margins :
- 43a. Leaves 2-pinnate, rarely phyllodic; corolla actinomorphic, petals alvate; stamens 4-many; seeds with a U-shaped lateral line ...53. MIMOSACEAE
- 43b. Leaves simple, digitate or 1 - 2-pinnate; corolla zygomorphic; petals imbricate, rarely absent; stamens 10(- 5); seeds usually without a lateral line, rarely with a closed line :
- 44a. Adaxial petal exterior (ascending imbrication) or petals absent ...52. CAESALPINIACEAE
- 44b. Adaxial petal exterior (descending imbrication) ...51. FABACEAE
- 42b. Ovules not arranged as above :
- 45a. Plants insectivorous, covered with glandular hairs ...57. DROSERACEAE
- 45b. Plants not as above :
- 46a. Ovary stipitate, on elongated gynophore ...10. CAPPARACEAE
- 46b. Ovary sessile or subsessile :
- 47a. Anther connectives produced beyond the cells ...11. VIOLACEAE
- 47b. Anther connectives not produced :
- 48a. Seeds embedded in resinous pulp ...15. PITTOSPORACEAE
- 48b. Seeds not embedded in resinous pulp :
- 49a. Stamens alternating with staminodes ...14. FLACOURTIACEAE
- 49b. Staminodes absent ...6. BERBERIDACEAE
- 34b. Ovary 2 or more-celled :
- 50a. Stamens tetradynamous, 4 long and 2 short ...9. BRASSICACEAE
- 50b. Stamens not as above :
- 51a. Flowers irregular :
- 52a. Sepals 3, posterior petaloid, usually spurred; stamens 5; ovary 5-celled ...33. BALSAMINACEAE
- 52b. Sepals 5, inner 2 petaloid; stamens usually 8; ovary 2-celled ...16. POLYGALACEAE

- 51b. Flowers regular :
 - 53a. Leaves opposite :
 - 54a. Fruits prominently beaked ...31. GERANIACEAE
 - 54b. Fruits otherwise :
 - 55a. Herbs :
 - 56a. Style 1; placentation free-central ...65. LYTHRACEAE
 - 56b. Styles 2-5; placentation axile ...20. ELATINACEAE
 - 55b. Shrubs, small trees or climbers :
 - 57a. Stamens 2 ...89. OLEACEAE
 - 57b. Stamens 10 ...29. MALPIGHIACEAE
 - 53b. Leaves alternate :
 - 58a. Flowers all unisexual :
 - 59a. Pistil 1 ...123. EUPHORBIACEAE
 - 59b. Pistils 3 - 6 ...5. MENISPERMACEAE
 - 58b. Flowers all bisexual or intermixed with unisexuals :
 - 60a. Plants climbing or creeping, with tendrils ...45. VITACEAE
 - 60b. Plants of various habits, without tendrils :
 - 61a. Leaves with pellucid aromatic glands ...35. RUTACEAE
 - 61b. Leaves not as above :
 - 62a. Fertile stamens 2 or 3 :
 - 63a. Fertile stamens 2 : petals 4-5 ...48. SABIACEAE
 - 63b. Fertile stamens 3 : petals 3 ...41. OLACACEAE
 - 62b. Fertile stamens more than 3 :
 - 64a. Ovary 3-5-celled but spuriously
6-10-celled due to secondary septa ...28. LINACEAE
 - 64b. Ovary without secondary septa :
 - 65a. Fruits long beaked ...31. GERANIACEAE
 - 65b. Fruits not as above :
 - 66a. Stamens opposite to the petals
.....44. RHAMNACEAE
 - 66b. Stamens alternate to the petals :
 - 67a. Venation pinnate ...43. CELASTRACEAE
 - 67b. Venation palmate :
 - 68a. Stamens united below
...26. STERCULIACEAE

- 68b. Stamens free ... 27. TILIACEAE
- 33b. Leaves compound :
- 69a. Ovary 1-celled :
- 70a. Styles 3-4; ovule 1 ...49. ANACARDIACEAE
- 70b. Style 1, ovules usually 2 or more :
- 71a. Trees with 2-3-pinnate leaves; stamens 5; staminodes 5-7; fruit a ribbed cylindrical 3-valved capsule50. MORINGACEAE
- 71b. Plants not as above :
- 72a. Leaves 2-pinnate, rarely phyllodic; corolla actinomorphic, petals valvate; stamens 4-many; seeds with a U-shaped lateral line ...53. MIMOSACEAE
- 72b. Leaves simple, digitate, or 1-2-pinnate; corolla zygomorphic, petals imbricate, rarely absent; stamens 10 (-5); seeds usually without a lateral line, rarely with a closed line:
- 73a. Adaxial petal interior (ascending imbrication) or petals absent ... 52. CAESALPINIACEAE
- 73b. Adaxial petal exterior (descending imbrication) ...51. FABACEAE
- 69b. Ovary 2-or more-celled :
- 74a. Annual or perennial herbs, or climbers :
- 75a. Leaves stipulate :
- 76a. Stamens with basal scales ...30. ZYGOPHYLLACEAE
- 76b. Stamens without basal scales ...31. GERANIACEAE
- 75b. Leaves exstipulate :
- 77a. Leaves biternately compound ...47. SAPINDACEAE
- 77b. Leaves ternately or pinnately compound ...32. OXALIDACEAE
- 74b. Trees or shrubs (sometimes scandent) :
- 78a. Scandent shrubs, with tendrils ...45. VITACEAE
- 78b. Trees or shrubs, without tendrils :
- 79a. Stamens opposite to the petals, equal to or fewer than the petals ...48. SABIACEAE
- 79b. Stamens at least one whorl alternating with the petals, equal to or up to twice as many as the petals :

- 80a. Leaves with pellucid aromatic glands ...35. RUTACEAE
- 80b. Leaves without pellucid aromatic glands :
- 81a. Disc absent ... 34. AVERRHOACEAE
- 81b. Disc present :
- 82a. Leaves 2-foliolate ... 37. BALANITACEAE
- 82b. Leaves otherwise :
- 83a. Flowers regular, at least some unisexual;
stamens with scales at the base
... 36. SIMAROUBACEAE
- 83b. Flowers and stamens not as above :
- 84a. Flowers often irregular; disc extrastaminal
... 47. SAPINDACEAE
- 84b. Flowers regular; disc intra-staminal :
- 85a. Stamens twice as many as the petals;
filaments free or connate at the base
only ... 39. BURSERACEAE
- 85b. Stamens either less than twice as
many as the petals, or the filaments
united into a tube ... 40. MELIACEAE
- 4b. Ovary fully inferior, or perianth and stamens
perigynous :
- 86a. Stamens more than twice as many as the petals :
- 87a. Plants aquatic ... 7. NYMPHAEACEAE
- 87b. Plants terrestrial :
- 88a. Flowers unisexual; leaf base oblique ...73. BEGONIACEAE
- 88b. Flowers bisexual; leaf base not oblique :
- 89a. Plants succulent, spiny, almost leafless
... 74. CACTACEAE
- 89b. Plants otherwise :
- 90a. Leaves opposite or fasciculate:
- 91a. Leaves gland-dotted ...62. MYRTACEAE
- 91b. Leaves not gland-dotted ...66. PUNICACEAE
- 90b. Leaves alternate :
- 92a. Leaves stipulate ...54. ROSACEAE
- 92b. Leaves exstipulate :
- 93a. Disc present; stamens not
epipetalous ...63. LECYTHIDACEAE
- 93b. Disc absent; stamens epipetalous
... 88. SYMPLOCACEAE

- 86b. Stamens twice as many as the petals, or less :
- 94a. Plants aquatic, submerged; leaves upper simple, linear, lower pectinately dissected; flowers in axillary fascicles; stigmas 2-4, plumose, sessile. ...58. HALORAGACEAE
- 94b. Plants not as above :
- 95a. Plants aquatic; floating leaves rhomboid; fruits 2-spined ...68. TRAPACEAE
- 95b. Plants not as above :
- 96a. Inflorescence umbellate : ...77. APIACEAE
- 96b. Inflorescence otherwise :
- 97a. Fruits winged ... 61. COMBRETACEAE
- 97b. Fruits not winged :
- 98a. Leaves stipulate :
- 99a. Leaves opposite; stamens in pairs ...60. RHIZOPHORACEAE
- 99b. Leaves alternate; stamens not in pairs ...54. ROSACEAE
- 98b. Leaves exstipulate :
- 100a. Ovules on axile, parietal or central placenata :
- 101a. Leaves basal or opposite, palmately-nerved; stamens geniculate, anthers opening by pores ... 64. MELASTOMATACEAE
- 101b. Leaves cauline, alternate, pinnately-nerved; stamens not geniculate, anthers opening by slits ...67. ONAGRACEAE
- 100b. Ovules pendulous :
- 102a. Herbs; ovules many in each cell ...55. VAHLIACEAE
- 102b. Trees or shrubs; ovules 1-4 in each cell :
- 103a. Ovary 1-celled; ovule 1 in each cell ... 78. CORNACEAE
- 103b. Ovary 2-5 celled; ovules 2-4 in each cell ... 88. SYMPLOCACEAE

- 3b. Petals all united, at least at the base :
- 104a. Stamens more than the corolla-lobes:
- 105a. Ovary inferior ... 74. CACTACEAE
- 105b. Ovary superior :
- 106a. Plants succulent; ovary apocarpous or free almost to the base ... 56. CRASSULACEAE
- 106b. Plants not succulent; ovary syncarpous :
- 107a. Leaves usually compound; fruit a legume, sometimes indehiscent or lomentoid :
- 108a. Leaves 2-pinnate, rarely phyllodic; corolla actinomorphic, petals valvate ... 53. MIMOSACEAE
- 108b. Leaves simple, digitate or 1-pinnate; corolla zygomorphic, petals imbricate. 51. FABACEAE
- 107b. Leaves always simple or palmately-lobed; fruit a berry :
- 109a. Leaves palmately lobed ... 71. CARICACEAE
- 109b. Leaves not lobed:
- 110a. Petals united at the base only ... 22. THEACEAE
- 110b. Petals united most of their length :
- 111a. Flowers usually unisexual ; corolla urceolate, 3-5 -lobed .. 87. EBENACEAE
- 111b. Flowers always bisexual ; corolla rotate or campanulate, usually 8-lobed ... 86. SAPOTACEAE
- 104b. Stamens as many as the corolla-lobes, or fewer :
- 112a. Ovary partly or wholly inferior :
- 113a. Creepers or climbers with tendrils 72. CUCURBITACEAE
- 113b. Plants of various habits, without tendrils :
- 114a. Anthers united around the style (syngenesious) :
- 115a. Flowers in involucrate heads; ovary 1-celled ... 80. ASTERACEAE
- 115b. Flowers not in heads; ovary 2-or more-celled :
- 116a. Stamens 2 ... 81. STYLIDIACEAE
- 116b. Stamens 4-6 ... 82. CAMPANULACEAE

114b. Anthers free :

117a. Leaves alternate ... 82. CAMPANULACEAE

117b. Leaves opposite or apparently whorled due to
foliaceous stipules ... 79. RUBIACEAE

112b. Ovary superior :

118a. Plants succulent ... 56. CRASSULACEAE

118b. Plants not succulent :

119a. Stamens opposite to the corolla-lobes :

120a. Ovary 1-celled; placentation free central :

121a. Flowers long tubular; calyx with stalked
glands; styles 5 ... 83. PLUMBAGINACEAE

121b. Flowers rotate; calyx eglandular; style 1

122a. Shrubs; leaves alternate; perianth
gland-dotted; fruits fleshy ... 85. MYRSINACEAE122b. Herbs, leaves usually opposite; perianth
not gland-dotted; fruits circumscissile
... 84. PRIMULACEAE

120b. Ovary 2-many-celled; placentation axile :

123a. Leaves compound; stamens united by
filaments
... 46. LEEACEAE

123b. Leaves simple; stamens free :

124a. Flowers bisexual; corolla rotate or
campanulate, usually 8-lobed; stamens
epipetalous ... 86. SAPOTACEAE124b. Flowers unisexual; corolla urceolate,
3-5-lobed; stamens free from the
corolla-lobes ... 87. EBENACEAE

119b. Stamens alternate to the corolla-lobes :

125a. Corolla irregular; stamens 2 or 4 :

126a. Inflorescence usually with conspicuous
bracts; fruits elastically dehiscent; seeds often
on upcurved processes (retinacula)
... 106. ACANTHACEAE

126b. Plants not as above:

127a. Ovules and seeds few :

- 128a. Ovary 4-lobed; style arising from between the lobes
of the ovary (gynobasic) ... 108. LAMIACEAE
- 128b. Ovary not lobed, style terminal :
- 129a. Plants viscid hairy ...105. PEDALIACEAE
- 129b. Plants not viscid hairy ...107. VERBENACEAE
- 127b. Ovules and seeds many :
- 130a. Leaves compound; seeds winged ... 104. BIGNONIACEAE
- 130b. Leaves simple or dissected; seeds not winged
- 131a. Plants of aquatic or wet places, typically with
small insectivorous bladders; placentation
free-central. ... 102. LENTIBULARIACEAE
- 131b. Plants of various habitats, never insectivorous;
placentation axile or parietal:
- 132a. Plants root-parasites; leaves scale-like, never
green ...101. OROBANCHACEAE
- 132b. Plants free-living; leaves well developed, green:
- 133a. Placentation axile, solid and unbranched
... 100. SCROPHULARIACEAE
- 133b. Placentation parietal, sometimes intruded
and meeting below the middle of locule but
branched or winged :
- 134a. Perianth 4-5-merous ; corolla contorted
...94. GENTIANACEAE
- 134b. Perianth 5-merous: corolla imbricate or
valvate ... 103. GESNERIACEAE
- 125b. Corolla regular; stamens usually 5 :
- 135a. Leaves alternate :
- 136a. Flowers in scorpioid cymes; calyx with
appendaged sinuses; style terminal or gynobasic :
- 137a. Style terminal; fruit a capsule
...96. HYDROPHYLLACEAE
- 137b. Style usually gynobasic; fruit of 4 nutlets,
rarely a drupe ... 97. BORAGINACEAE
- 136b. Flowers neither in scorpioid cymes (though often
in dichasia) nor calyx appendaged; style always
terminal :
- 138a. Placentation parietal ... 95. MENYANTHACEAE
- 138b. Placentation axile or free-central :

- 139a. Corolla scarious; placentation axile or free-central
... 109. PLANTAGINACEAE
- 139b. Corolla not scarious; placentation axile :
140a. Ovules many in each cell ...99. SOLANACEAE
140b. Ovules 1-2 in each cell :
141a. Sepals free; corolla-lobes contorted and
infolded; fruit a capsule ... 98. CONVULVACEAE
141b. Sepals connate; corolla-lobes imbricate; fruit
dry with 4 nutlets or drupaceous with 1-4-celled
pyrene ...97. BORAGINACEAE
- 135b. Leaves opposite :
142a. Stamens 2 ... 89. OLEACEAE
142b. Stamens 4 or more :
143a. Corolla scarious ... 109. PLANTAGINACEAE
143b. Corolla not scarious :
144a. Carpels united only at stigmatic disc; pollen in
pollinia ... 91. ASCLEPIADACEAE
144b. Carpels and pollen not as above :
145a. Plants with milky sap; corolla-lobes
contorted in bud; fruit often of 2 follicles and
seeds with silky appendage ...90. APOCYNACEAE
145b. Plants with watery sap; corolla-lobes
contorted or not; fruits never follicular :
146a. Hispid herbs; anthers connate into a
cone, connectives produced and twisted
around each other; fruit of 4 nutlets
...97. BORAGINACEAE
146b. Plants not as above :
147a. Ovules one or two in each cell
...107. VERBENACEAE
147b. Ovules many in each cell :
148a. Plants covered with glandular,
stellate or lepidote indumentum
... 93. BUDDLEJACEAE
148b. Plants not as above :
149a. Placentation axile ... 92. LOGANIACEAE
149b. Placentation parietal
... 94. GENTIANACEAE

2b. Perianth absent, or if present then uniscriate :

150a. Plants submerged :

151a. Plants free-floating; flowers unisexual; ovule 1

... 130. CERATOPHYLLACEAE

151b. Plants attached to rocky substratum; flowers

bisexual; ovules many

... 116. PODOSTEMACEAE

150b. Plants not submerged:

152a. Perianth absent :

153a. Flowers solitary

... 59. CALLITRICHACEAE

153b. Flowers not solitary :

154a. Flowers in cyathia

... 123. EUPHORBIACEAE

154b. Flowers in spikes or catkins :

155a. Leaves reduced, scale-like

...128. CASUARINACEAE

155b. Leaves well developed :

156a. Flowers usually bisexual ; ovule 1

on basal placenta; fruit a berry or
nutlet

... 118. PIPERACEAE

156b. Flowers usually unisexual; ovules

many on parietal placentas; fruit a
capsule

... 129. SALICACEAE

152b. Perianth present :

157a. Ovary inferior or half-inferior :

158a. Plants stem-parasites

...121. LORANTHACEAE

158b. Plants free living or root-parasites (in
Santalaceae) :

159a. Plants herbaceous, erect or creeping :

160a. Leaves alternate; flowers unisexual ...

...73. BECONIACEAE

160b. Leaves opposite; flowers bisexual :

161a. Leaves sessile; perianth

calycine

... 65. LYTHRACEAE

161b. Leaves petiolate; perianth

corolline

... 110. NYCTAGINACEAE

159b. Plants woody, usually trees or shrubs :

- 162a. Perianth 2-3-lobed; ovary 6-celled, ovules many
... 117. ARISTOLOCHIACEAE
- 162b. Perianth 4-5-lobed; ovary 1-celled, ovules 1-3 :
- 163a. Stamens 4-5, as many as the calyx-lobes
... 122. SANTALACEAE
- 163b. Stamens 8-10, twice as many as the calyx-lobes
... 61. COMBRETACEAE
- 157b. Ovary superior :
- 164a. Anthers dehiscing by valves ... 119. LAURACEAE
- 164b. Anthers not dehiscing as above :
- 165a. Pistils 2 or more (carpels free) :
- 166a. Trees ... 26. STERCULIACEAE
- 166b. Herbs or climbing bushes ... 1. RANUNCULACEAE
- 165b. Pistil 1 (carpels solitary or united) :
- 167a. Ovary 2-5-celled :
- 168a. Ovules many in each cell ... 76. MOLLUGINACEAE
- 168b. Ovules 1-3 in each cell :
- 169a. Ovules axile ... 123. EUPHORBIACEAE
- 169b. Ovules all or mostly basal :
- 170a. Herbs; capsules circumscissile
... 75. AIZOACEAE
- 170b. Trees, shrubs or climbers; fruits not
circumscissile :
- 171a. Plants armed; leaves simple,
3-nerved ... 44. RHAMNACEAE
- 171b. Plants unarmed; leaves
compound or if simple then not
3-nerved ... 47. SAPINDACEAE
- 167b. Ovary 1-celled :
- 172a. Plants twining; female flower with a single
petal; male flower with a corolline cupule
... 5. MENISPERMACEAE
- 172b. Plants not as above :
- 173a. Annual or perennial herbs (rarely
undershrubs) :
- 174a. Plants with ochreate stipules
... 115. POLYGONACEAE

- 174b. Plants without ochreate stipules :
- 175a. Perianth and bracts scarious; stamens often connate below ...111. AMARANTHACEAE
- 175b. Perianth and bracts not scarious; stamens free :
- 176a. Flowers unisexual :
- 177a. Style 1 ... 124. URTICACEAE
- 177b. Style 2 ... 126. CANNABACEAE
- 176b. Flowers bisexual :
- 178a. Stamens (at least 1 whorl) alternating with the perianth lobes ... 114. PHYTOLACCACEAE
- 178b. Stamens opposite the perianth lobes :
- 179a. Twining herbs; bracteoles adnate to the perianth; anthers versatile ...113. BASELLACEAE
- 179b. Erect herbs; bracteoles free from the perianth; anthers erect or incurved ... 112. CHENOPODIACEAE
- 173b. Shrubs or trees :
- 180a. Stipules absent :
- 181a. Styles 5 ... 14. FLACOURTIACEAE
- 181b. Style 1 :
- 182a. Trees; leaves pinnately-lobed ...120. PROTEACEAE
- 182b. Scandent shrubs; leaves entire ...42. OPILIACEAE
- 180b. Stipules present :
- 183a. Style branched :
- 184a. Anthers inflexed and reversed in bud; ovule 1, apical ... 127. MORACEAE
- 184b. Anthers erect in bud; ovules 1-2, apical or basal :
- 185a. Ovule 1, apical ...125. ULMACEAE
- 185b. Ovules 2, basal ...123. EUPHORBIACEAE
- 183b. Style unbranched :
- 186a. Leaves pinnate ...52. CAESALPINIACEAE
- 186b. Leaves simple :
- 187a. Placentation parietal ...14. FLACOURTIACEAE
- 187b. Placentation otherwise :

- 188a. Ovule apical ...127. MORACEAE
- 188b. Ovule basal ...124. URTICACEAE
- 1b. Stem with scattered vascular bundles; leaves usually parallel-veined; flowers generally 3-merous; cotyledon 1 :
- 189a. Plant body thalloid, not differentiated into stem and leaves ...155. LEMNACEAE
- 189b. Plant body not thalloid, differentiated into stem and leaves :
- 190a. Inflorescence spadix of inconspicuous flowers subtended by a spathe which is usually large and showy; fruit a berry ...154. ARACEAE
- 190b. Plants not as above :
- 191a. Ovary inferior or half-inferior :
- 192a. Flowers actinomorphic or sometimes slightly zygomorphic :
- 193a. Plants climbing; flowers unisexual; capsules winged ...144. DIOSCOREACEAE
- 193b. Plants not as above :
- 194a. Slender aquatic herbs, usually submerged; flowers usually unisexual ...131. HYDROCHARITACEAE
- 194b. Plants not as above, usually terrestrial :
- 195a. Leaves armed at least with a prickle at the apex ... 142. AGAVACEAE
- 195b. Leaves not as above :
- 196a. Perianth persistent in fruit, tubular, often covered with branched hairs ... 138. HAEMODORACEAE
- 196b. Perianth not as above :
- 197a. Fertile stamens 3 :
- 198a. Plants with well developed leaves ...139. TRIDACEAE
- 198b. Plants with leaves usually reduced to a few scales ...132. BURMANNIACEAE

- 197b. Fertile stamens 6 :
- 199a. Placentation parietal ... 143. TACCACEAE
- 199b. Placentation axile :
- 200a. Flowers arranged in a scapose umbel
subtended by membranous spathaceous
bracts ... 140. AMARYLLIDACEAE
- 200b. Flowers not arranged as above
... 141. HYPOXIDACEAE
- 192b. Flowers strongly zygomorphic :
- 201a. Stamens 6 or 3 :
- 202a. Perianth persistent in fruit, tubular, often
covered with branched hairs ... 138. HAEMODORACEAE
- 202b. Perianth not as above ... 139. IRIDACEAE
- 201b. Stamens 5, 2 or 1 :
- 203a. Fertile stamens 5 ... 136. MUSACEAE
- 203b. Fertile stamens 1 or 2 :
- 204a. Median petal modified into a lip (labellum);
staminodes not petaloid; stamens and style
united in a column, pollen usually in pollinia
... 133. ORCHIDACEAE
- 204b. Flowers not as above :
- 205a. Anther 1-celled ... 137. CANNACEAE
- 205b. Anther 2-celled :
- 206a. Leaves spiral, sheaths closed ... 135. COSTACEAE
- 206b. Leaves distichous, sheaths open
... 134. ZINGIBERACEAE
- 191b. Ovary superior or naked :
- 207a. Perianth not petaloid, often reduced to scales or
bristles, or absent :
- 208a. Plants arborescent :
- 209a. Leaves plicate or pinnately-divided ... 151. ARECACEAE
- 209b. Leaves not as above :
- 210a. Leaves distichous; fruit a caryopsis; plants
not supported by stilt roots ... 164. POACEAE
- 210b. Leaves spiral; fruit a syncarp; plants often
supported by stilt roots ... 152. PANDANACEAE
- 208b. Plants herbaceous :

- 211a. Inflorescence a head subtended by an involucre of bracts; flowers unisexual; perianth typically 2-seriate, 2-3-merous, though sometimes petals absent
... 162. ERIOCAULACEAE
- 211b. Plants not as above :
- 212a. Flowers subtended by glumaceous bracts and arranged in variously disposed spikelets :
- 213a. Ovules many; fruit a capsule ...150. JUNCACEAE
- 213b. Ovule 1; fruit a nut or caryopsis :
- 214a. Stems terete with usually hollow internodes; leaf-sheaths usually open; flowers enclosed by 2-glumes (sometimes 1 or both absent), lemma and palea; anthers mostly dorsifixed and versatile ... 164. POACEAE
- 214b. Stems usually solid and 3-angled; leaf-sheaths usually closed; flower subtended by a single glume; anthers basifixed
...163. CYPERACEAE
- 212b. Flowers neither subtended by glumaceous bracts nor arranged as above :
- 215a. Flowers arranged in spike :
- 216a. Flowers unisexual ... 153. TYPHACEAE
- 216b. Flowers bisexual ... 160. POTAMOGETONACEAE
- 215b. Flowers not arranged in spike :
- 217a. Annuals; carpel 1 with 2-4 slender stigmas
... 158. NAJADACEAE
- 217b. Perennials; carpels 2-9, free, each with a dilated stigma ...161. ZANICHELLIACEAE
- 207b. Perianth petaloid, at least in part :
- 218a. Carpels many, free :
- 219a. Flowers arranged in spike ... 159. APONOGETONACEAE
- 219b. Flowers not arranged in spike :
- 220a. Inflorescence mostly an umbel; ovules many on reticulately-branched parietal placenta
...157. BUTOMACEAE
- 220b. Inflorescence a panicle, a raceme or a raceme of whorled flowers; ovule solitary, basal
... 156. ALISMATAACEAE

- 218b. Carpels solitary or united :
- 221a. Perianth biseriate with the outer whorl sepaloid and inner whorl petaloid :
- 222a. Flowers in bracteate heads; sepals heteromorphic
... 148. XYRIDACEAE
- 222b. Flowers otherwise; sepals homomorphic
... 149. COMMELINACEAE
- 221b. Perianth uniseriate, or if biseriate then the inner and outer whorls similar, often petaloid or united into a tube below :
- 223a. Perianth persistent in fruit, often densely hairy
... 138. HAEMODORACEAE
- 223b. Perianth not as above :
- 224a. Aquatic herbs; inflorescence subtended by a spathe-like leaf-sheath ...147. PONTEDERIACEAE
- 224b. Terrestrial herbs or climbers; inflorescence not subtended by a spathe-like leaf-sheath :
- 225a. Leaves armed at least with a prickle at the apex
... 142. AGAVACEAE
- 225b. Leaves unarmed :
- 226a. Leaves 3-5-nerved with reticulate venation; flowers mostly dioecious; anthers 1-celled
... 146. SMILACACEAE
- 226b. Leaves mostly with parallel nerves and veins; flowers mostly bisexual; anthers usually 2-celled
... 145. LILIACEAE

1. RANUNCULACEAE

(A. K. Mukherjee)

About 30 genera and 1900 species mainly in North-temperate regions of the world; 4 genera and 9 species in M.P.

- 1a. Leaves opposite; sepals valvate; climbing shrubs :
- 2a. Plants climbing by means of twining petioles; leaflet not produced as a tendril; petals absent ...1. *Clematis*
- 2b. Plants climbing by means of tendrils; terminal leaflet modified as a tendril; petals present ... 2. *Naravetia*
- 1b. Leaves alternate; sepals imbricate; herbs:
- 3a. Leaves simple; petals present ... 3. *Ranunculus*

- 3b. Leaves compound; petals absent ... 4. *Thalictrum*

1. CLEMATIS L.

Shrubs, usually climbing by means of their twisted petioles. Leaves opposite, usually pinnately compound and ending in a terminal leaflet. Sepals 4-8, petaloid. Petals absent. Stamens many. Carpels many, each with one ovule, distinct in fruits, each ending in a long feathery style or naked beak.

About 250 species, cosmopolitan but chiefly temperate; 4 in M.P.

1a Leaves pinnately compound:

- 2a. Sepals spreading from the base; stamens glabrous ... 1. *C. gouriana*

- 2b. Sepals erect with recurved tips; stamens hairy ... 2. *C. roylei*

1b. Leaves simple or 1-3 foliolate :

- 3a. Plants glabrous; flowers purplish brown ... 3. *C. smilacifolia*

- 3b. Plants villous or tomentose; flowers white ... 4. *C. triloba*

1. *Clematis gouriana* Roxb. ex DC., Syst. Nat. 1: 138. 1817; Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. 1: 4. 1872.

Extensive glabrous climbers with adpressed-hairy grooved branches. Leaves generally bipinnate; leaflets 3-8 × 1-4.5 cm, petiolulate, ovate, acuminate, veins distinct, 3-5 ribbed. Inflorescence axillary and terminal 3-chotomous panicles, many-flowered. Flowers white and cream, scented, 1.3-2 cm across. Stamens glabrous. Achenes narrow-oblong, hairy with 4cm long styles.

Over bushes on hill slopes. Bastar, Raigarh. Fl. & Fr. : Oct.-Jan.

Plants are poisonous.

2. *Clematis roylei* Rehder in J. Arn. Arb. 22:575.1941. *C. nutans* Royle, Ill. Bot. Himal. 51. 1834 (*non* Crantz, 1763); Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. 1: 5. 1872.

Climbing shrubs with angled silky pubescent branchlets and pinnate or bipinnate leaves; leaflets ovate or lanceolate, 2-7.5 cm long, entire or 3-5 lobed or partite, irregularly toothed, rarely entire. Flowers large, cream-coloured in leafy, axillary panicles; buds oblong acute, ovate, over 2.5 cm long, silky. Sepals pale yellow, not ribbed, 2.5-4 cm long, with curved tips. Filaments villous. Achenes large, ovate, silky-hairy.

Along hill slopes in dense forests. Bastar, Hoshangabad. Fl. & Fr.: Dec.-April

3. *Clematis smilacifolia* Wall., *Asiat. Res.* 13: 402. 1820; Hook. f. & Thoms. in Hook. f., *Fl. Brit. Ind.* 1: 3. 1872, p.p. *C. loureiriana* auct. non DC., Merr. in *Trans. Am. Phil. Soc.* n.s. 24 : 154. 1935, p. p. Fig. 11

Extensive glabrous climbers. Leaves simple, ovate, oblong-ovate, cordate or rounded at base, subacute or mucronate at apex, 6-8 × 8-10 cm. Petioles 8-10 cm long, flattened at base, tendrillar above. Inflorescence 3- or more-flowered in 3-chotomous panicles. Bracts foliaceous, elliptic-lanceolate, ± 1.5 × 0.5 cm. Flowers purplish-brown, ± 3.5 cm across. Sepals tomentose, purple within. Achenes flat, elliptic-ovate, very hairy, ± 1.0 × 0.3 cm, with thick margins and 6-7 cm long feathery styles, hairs often golden.

Climbing on trees in sal forests. Bastar, Bilaspur, Shahdol. *Fl. & Fr.* : Oct.-May.

4. *Clematis triloba* Heyne ex Roth, *Nov. Pl. Sp.* 251. 1821; Hook. f. & Thoms. in Hook. f., *Fl. Brit. Ind.* 1: 3. 1872. *Murhari*.

An extensive glabrous climber. Stem sulcate. Leaves opposite, simple or once ternate or lobed, ovate, acute or orbicular, base rounded, cuneate or cordate, 3-nerved. Petioles slender, twining, 2-8 cm long. Panicles many-flowered. Flowers white, 2-2.5 cm across; bracts leafy. Sepals 4-6, usually oblong or obovate, cuspidate. Stamens many; filaments ligulate, glabrous. Carpels many. Fruit a head or ovoid, compressed, villous achenes with long feathery *ca* 4 cm long styles.

As undergrowth in mixed deciduous forests. Hoshangabad, Narsimhapur. *Fl. & Fr.*: Oct.-Dec.

2. NARAVELIA Adans. *mut.* DC.

Climbing shrubs. Leaves opposite, 3-foliolate, the leaf rachis ending in a tendril in place of terminal leaflet. Flowers in axillary 1-flowered peduncles. Sepals 4-5. Petals 6-12, narrow, longer than the calyx. Achenes narrow, long stipitate, with long bearded styles.

A genus with 2 East Asiatic species; one in M.P.

Naravelia zeylanica (L.) DC., *Syst. Nat.* 1 : 167, 1817; Hook. f. & Thoms. in Hook. f., *Fl. Brit. Ind.* 1: 7. 1872. *Atragene zeylanica* L., *Sp. Pl.* 542, 1753.

Scandent or climbing woody shrubs with pubescent or tomentose branches and tuberous roots. Leaves 3-foliolate, two opposite leaflets ovate-cordate and the terminal one 3-branched tendril. Flowers yellowish green or whitish, 1.2-1.8 cm across in panicles. Petaloid stamnodes 10-14; stamens many; anthers with projecting connective. Achenes red, villous with long feathery styles, 5 cm long in fruits.

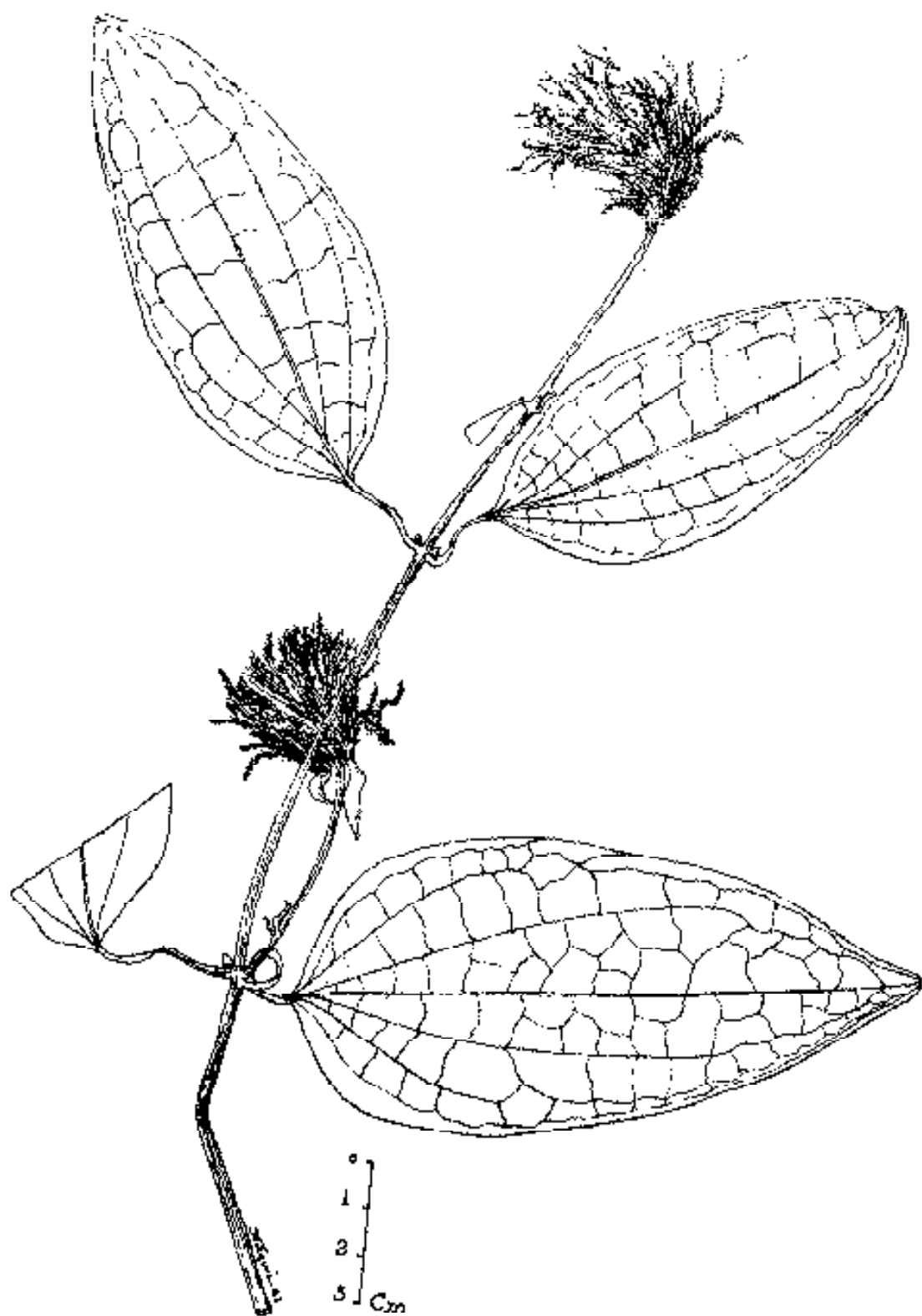


Fig. 11. *Clematis smilacifolia* Wall.

In dense forests on lower hill slopes. Bastar, Hoshangabad. *Fl. & Fr.*:
Nov.-Feb.

Ropes are made from the stems.

3. RANUNCULUS L.

Herbs with simple, lobed or dissected leaves with sheathing petioles. Flowers small to large, often panicled. Sepals 3-5, imbricate. Petals usually 5, rarely 0, often with a nectar gland near the base. Carpels many, styles very short. Fruits of beaked or apiculate achenes.

About 400 species, cosmopolitan, mainly in temperate and cold regions; one in M.P.

Ranunculus sceleratus L., Sp. Pl. 776. 1753; Hook.f. & Thoms. in Hook. f., *Fl. Brit. Ind.* 1: 19. 1872. -*Jaldhania*.

Erect glabrous annual herbs, 20-70 cm tall, much branched. Lower leaves up to 15 cm across with cuneate, obtusely-toothed segments, petiolate; upper leaves 3-fid, shortly stalked or sessile; uppermost usually simple, linear, sessile. Flowers yellow, 0.6-1 cm diam., numerous, terminating the branchlets, and from the forks. Sepals spreading and reflexed. Fruiting receptacle slightly hairy. Achenes many, rather turgid, not margined, glabrous, on an oblong hairy receptacle.

On moist river beds. Bilaspur, Panna. *Fl. & Fr.* : Dec.-March.

4. THALICTRUM L.

Erect herbs with compound, often ternately decomposed, leaves with sheathing petioles. Stipules often present as auricles or nearly free. Flowers small, racemed or panicled. Sepals 4-5, petaloid. Petals absent. Stamens many. Carpels few or many. Fruits small heads of achenes.

About 150 species in North temperate regions, tropical South America, and tropical South Africa; 3 in M.P.

1a. Achenes long stalked ...1. *T. chelidonii*

1b. Achenes sessile or subsessile :

2a. Stamens about 20; anthers 0.2-0.3 cm long; carpels 4-8
...2. *T. foliolosum*

2b. Stamens 40-60; anthers 0.8-1 cm long; carpels 10-25
...3. *T. javanicum*

1. *Thalictrum chelidonii* DC., Prodr. 1: 11. 1824; Hook.f. & Thoms. in Hook. f., *Fl. Brit. Ind.* 1: 11.1872, *p.p.*; Mooney in *Ind. For. Rec.* 3(7): 249. 1942.

Much-branched, erect, perennial herbs. Leaves large; leaflets of lower branches 2.5 cm in diam., glabrous beneath. Flowers large, 2.5 cm in diam. Carpels many, as long as their stalk.

In moist, shady places on higher hills. Bastar; rare. *Fl. & Fr.* : Aug.-Sept.

2. *Thalictrum foliolosum* DC., *Syst. Nat.* 1: 175. 1817; Hook.f. & Thoms. in Hook.f., *Fl. Brit. Ind.* 1: 14. 1872.—*Pilzari*.

Graceful fern-like erect herbs, 90-120 cm high with rhizomatous rootstocks. Stems flexuous. Leaves tri-pinnate, pinnate with usually ternate roundish lobulate 0.8-2 × 0.7-1.8 cm leaflets; petioles sheathing and auricled at base; stipules not distinct. Flowers small in large branched panicles; pedicels capillary. Stamens exserted, on filiform, white or pink filaments. Anthers yellow, linear. Achenes 0.3 cm, turbinate, 8-ridged.

In moist, shaded places on higher hill slopes. Bilaspur, Chhindwara, Hoshangabad, Raigarh, Shahdol, Sidhi, Surguja, *Fl. & Fr.* : July-Sept.

3. *Thalictrum javanicum* Blume, *Bijdr.* 2. 1825; Hook.f. & Thoms. in Hook.f., *Fl. Brit. Ind.* 1: 13. 1872.

Erect herbs, 50-90 cm high. Leaves tri-pinnate, pinnac with many ternately lobulate leaflets; stipules well developed. Flowers small, in terminal panicles; pedicels thick. Stamens exserted, 40-60; filaments club-shaped; anthers long, obtuse. Carpels 10-25, sessile.

Amidst boulders on high hill slopes. Rajnandgaon. *Fl. & Fr.* : July-Sept.

2. DILLENACEAE

(A. K. Mukherjee)

About 10 genera and 400 species, mainly in tropics and sub-tropics; one genus and 3 species in M.P.

DILLENIA L.

Trees with large leaves and very strong pinnate venation. Flowers solitary or fascicled. Stamens nearly free; filaments not thickened upwards; anthers linear, inner introse, outer recurved extrose. Carpels 5-20, cohering in the axis; styles stigmatose; ovules indefinite. Fruits composed of the enlarged fleshy imbricate sepals enclosing the ripe indehiscent carpels.

About 60 species in S. E. Asia, N. Queensland and Fiji; 3 in M.P.

- 1a. Flowers 15-20 cm across; petals white; fruits 8-10 cm across ...2. *D. indica*
 1b. Flowers 3-12 cm across; petals yellow; fruits upto 3.5 cm across :

- 2a. Flowers up to 5 cm across; anthers opening by longitudinal slits ...3. *D. pentagyna*
- 2b. Flowers 10-12 cm across; anthers opening by apical pores ...1. *D. aurea*

1. *Dillenia aurea* J. E. Smith in Exot. Bot. 2: 65, to. 92, 93.1806; Hook.f. & Thoms. in Hook.f., Fl. Brit. Ind. 1: 37.1872; Majumdar in Fasc. Fl. Ind. 2: 5, ff. 1-5. 1979. -*Kalle*.

Deciduous crookedly branched trees. Leaves 20-40 × 10- 25cm, elliptic-oblong, with slightly undulate dentate margins. Flowers usually solitary, rarely in pairs on leafless branches, 10-12 cm across. Sepals coriaceous, ciliate along margins. Petals yellow, obovate; opening by apical pores. Fruits orange-yellow, subglobose. Seeds obovoid, glossy, dark brown.

In sal forest. Bilaspur, Mandla, Raipur. Fl. : April-May; Fr. : May-June.

2. *Dillenia indica* L., Sp. Pl. 535. 1753; Hook.f. & Thoms. in Hook.f., Fl. Brit. Ind. 1. 36. 1872, *p.p.* (excl. *syn. D. elliptica* Thunb. 1791); Majumdar in Fasc. Fl. Ind. 2: 6. 1979. -*Chalta*.

Evergreen trees. Leaves 15-30 × 5-12,cm oblong, acute to acuminate, margins dentate, strigose on nerves abaxially. Flowers solitary, pendent 15-20 cm across. Sepals fleshy. Petals white. Stamens with reflexed tips. Fruits yellowish-green, with enclosed sepals; carpels 14-20. Seeds reniform, black, margin spiny.

Often planted near villages. Raigarh, Rajnandgaon. Fl. : May-June; Fr. : July-Feb.

3. *Dillenia pentagyna* Roxb, Pl. Cor. 1: 2, t. 20. 1795; Hook.f. & Thoms. in Hook.f., Fl. Brit. Ind. 1: 38. 1872; Majumdar in Fasc. Fl. Ind. 2: 7. 1979. -*Aggai, Kallai*.

Deciduous trees. Leaves 20-50 × 10-20cm, obovate- oblong, obtuse, with nearly entire to dentate margins; with wing-like persistent stipules, Flowers 2-7 together on short leafless shoots. Sepals elliptic. Petals yellow; anthers opening by longitudinal slits; carpels 5. Fruits subglobose, yellow, orange or red, 1-2 seeded. Seeds ovoid.

In valleys, especially at high elevations. Bastar, Chhindwara, Hoshangabad. Fl. : March-April; Fr. : May.

3. MAGNOLIACEAE

(A. K. Mukherjee)

About 12 genera and 230 species in temperate, tropical and subtropical Asia and America; 2 genera and 2 species in M.P.

- 1a. Flowers terminal; gynoecium sessile ...1. *Magnolia*
 1b. Flowers mostly axillary; gynoecium stipitate ...2. *Michelia*

1. MAGNOLIA L.

Deciduous or evergreen trees and shrubs with pubescent or glabrous branchlets. Leaves entire, usually minutely punctate. Flowers large, terminal. Perianth 9-21, in 3-5 series. Stamens numerous, in many series; filaments short; anthers adnate. Gynoecium sessile; carpels many; ovary sessile, unilocular; style and stigma short; ovules 1 or usually 2. Fruit a collection of woody follicles. Seeds 1-2, red or brown, suspended by a long silky thread.

About 80 species in temperate and tropical parts of Asia and America; one cultivated in M.P.

Magnolia grandiflora L., Syst. Nat. ed. 10, 2: 1082.1759; Mathew in Rec. Bot. Surv. Ind. 20: 37. 1969.- *Andachampa*, *Hinchampa*.

Evergreen trees with hoary tomentose young branches. Leaves elliptic-oblong, ovate to obovate, entire, usually rusty tomentose below; apex acute, obtuse or acuminate; buds concealed in stipular sheaths. Flowers solitary, terminal, fragrant, 15-25 cm across. Perianths 9-15, oblanceolate, acuminate. Stamens many; filaments bright purple; anthers adnate, yellow. Carpels 1-2 ovuled, ovate to obovate, rusty brown tomentose in fruits; seeds obovoid or triangle-obovoid, bright-red.

A native of Southern United States, planted in gardens as ornamental. *Fl. & Fr.* : April-May.

2. MICHELIA L.

Trees, sometimes flowering as shrubs. Stipules convolute, leaving a circular scar. Flowers solitary, yellow or white. Perianths in 3 or more 3-merous series. Filaments flat with introse anthers. Carpels spiral on an elongate axis which is on a gynophore, coriaceous and dorsally dehiscent in fruit.

About 50 species in tropical Asia; one in M.P.

Michelia champaca L., Sp. Pl. 536.1753; Hook.f. & Thoms. in Hook.f., Fl. Brit. Ind. 1: 42. 1872. -*Champa*.

Tall evergreen trees; bark grey or brownish. Leaves ovate-lanceolate, acute to acuminate, coriaceous, 15-20 × 7-9 cm. Flowers usually solitary, axillary, golden-yellow or orange, fragrant. Perianth segments 9 or more, oblong, fleshy. Fruits 5-10 cm long; ripe carpels ovoid or ellipsoid, woody. Seeds brown, angular, with pink fleshy aril.

Planted in gardens as ornamental. Hoshangabad. *Fl. & Fr.* : April-July.

4. ANNONACEAE

(A. K. Mukherjee)

About 120 genera and 2100 species mainly in tropics of the Old World; 5 genera and 8 species in M.P.

- 1a. Stamens loosely imbricate; connectives narrow, not concealing the anther cells ...3. *Miliusa*
- 1b. Stamens closely packed with overlapping connectives which conceal the anther cells:
 - 2a. Outer petals connivent; carpels sub-connate and fleshy in fruit ...1. *Annona*
 - 2b. Outer petals spreading, flat or only concave at base, carpels free:
 - 3a. Inner petals dissimilar to the outer ones, arching over the stamens and ovaries and meeting at their tips ...4. *Mitrephora*
 - 3b. Inner petals spreading like the outer ones:
 - 4a. Petals bent in at the base over the stamens and ovaries, then spreading ...2. *Artabotrys*
 - 4b. Petals flat, spreading from the base ...5. *Polyalthia*

1. ANNONA L.

Shrubs or small trees. Leaves pellucid dotted. Petals (second series of perianth) triquetrous with concave base. Carpels subconnate, ultimately confluent into an ovoid or globose syncarpus fruit. Carpels 1-ovuled

A genus with about 120 species in warm regions, especially of America; 2 in M.P.

- 1a. Fruits areolate, heart-shaped ...1. *A. reticulata*
- 1b. Fruits tubercled, globose ...2. *A. squamosa*

1. *Annona reticulata* L., Sp. Pl. 537. 1753; Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. 1: 78. 1872. - *Ramphal*.

Small deciduous trees. Leaves 10-20 cm, acuminate, glabrous. Flowers 2-3 together; innermost tepals narrow-oblong. Fruits arcolate, heart-shaped. When fruits mature the tree becomes leafless.

Planted in gardens. Bhopal, Mandla, Raipur. *Fl.* : Sept.- Feb.; *Fr.* : Dec.-May.

2. *Annona squamosa* L., Sp. Pl. 537. 1753; Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. 1: 78. 1872. - *Sharifa*.

Shrubs or small trees. Leaves 8-15 cm, oblong-lanceolate, acute to sub-acuminate, nearly glabrous. Flowers drooping, yellowish-green, 2-3 cm long; petals narrowly-oblong, third series of petals minute or absent. Fruits globose, tubercled.

Cultivated in gardens for its edible fruits as well as an escape along forest margins. Balaghat, Damoh, Dhar, Durg, Hoshangabad, Indore, Mandla, Raigarh, Raipur, Rajnandgaon, Rewa, Seoni, Tikamgarh. *Fl.* : March-May; *Fr.* : July-Sept.

Roots and leaves medicinal and also valuable insecticide.

2. ARTABOTRYS R. Br.

Scandent shrubs with shining leaves. Flowers solitary or fascicled, usually on woody hooked branches. Sepals 3, valvate. Petals 6, 2-seriate, with concave connivent bases and spreading limb which is flat, subterete or clavate. Stamens with dorsal anther cells. Carpels few or many with oblong or columnar style and 2 erect collateral ovules. Ripe carpels baccate.

About 100 species in tropical Africa and Indomalayn regions; one in M.P.

Artabotrys hexapetalus (L.f.) Bhandari in Bailey 12: 149. 1964. *Annona hexapetala* L. f., Suppl. 270. 1781. *Artabotrys odoratissimus* R. Br. in Edward's Bot. Reg. t. 423. 1820; Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. 1: 54. 1872.- *Harachampaka*.

Large sarmentose glabrous shrubs. Leaves 5-20 cm long, oblong or lanceolate, shining. Flowers solitary or paired on hooked woody peduncles, green when young, turning to yellow, highly scented. Sepals 3, valvate. Petals 6, 2-seriate with connivent bases. Stamens with dorsal anther cells. Ripe carpels large, green or ultimately yellow.

Planted in gardens. Raipur. *Fl. & Fr.* : April-Aug.

3. MILIUSA Leschn. ex A. DC.

Deciduous trees bearing on the new shoots greenish drooping flowers on long pedicels in extra-axillary scorpioid cymes. First and second series

of tepals small, sepaloid, third series petals, longer, ovate, valvate, not saccate. Stamens and carpels numerous, with 1 many ovules.

About 40 species in Indomalayan region and Australia; 2 in M.P.

- 1a. Flowers axillary or in short lateral cymes, dark purple;
pedicels slender ...1. *M. tomentosa*
- 1b. Flowers in few-flowered extra axillary scorpioid
cymes; pedicels drooping ...2. *M. velutina*

1. *Milium tomentosa* (Roxb.) Sinclair in Gard. Bull. Singapore 14, 378. 1955. *Uvaria tomentosa* Roxb. Fl. Cor. 1: 31. t. 35. 1795. *Saccopetalum tomentosum* (Roxb.) Hook.f. & Thoms., Fl. Ind. 152. 1855 & in Hook.f. Fl. Brit. Ind. 1: 88. 1872. —Kari, Kirva.

Medium-sized trees with pubescent or tomentose shoots. Leaves 5-15 cm long, ovate-oblong, obtuse with short acumen, secondary nerves 5-10, looped some distance from the margin. Flowers on slender pedicels nearly all lateral from previous year's shoot, solitary, dark purple. Fruits are umbels of roundish, black, fleshy carpels, 1.5-2.5 cm diam.

In deciduous forests. Balaghat, Bilaspur, Hoshangabad, Indore, Jabalpur, Mandla, Raigarh, Rewa, Seoni, Shahdol. Fl. & Fr. : May-July.

The wood is durable and strong and serves for house poles.

2. *Milium velutina* (Dunal) Hook.f. & Thoms., Fl. Ind. 151. 1855 & in Hook.f., Fl. Brit. Ind. 1: 87. 1872. *Uvaria velutina* Dunal, Monogr. Anon. 91. 1817. —Dom sal, Kari.

Large trees, sometimes 100-150 cm in girth, usually branched below. Leaves, 12-25 cm long, broadly ellipsoid or ovate, more or less permanently tomentose beneath. Flowers on very long drooping pedicels in few-flowered extra-axillary scorpioid cymes, green. Sepals lanceolate, 0.4-0.5 cm long. Petals ovate or orbicular ovate, 1-1.25 cm. Fruits of ellipsoid carpels on woody peduncles 5-10 cm long; ovules 2.

Bilaspur, Damoh, Hoshangabad, Jabalpur, Mandla, Raigarh, Surguja, Fl. & Fr. : May-June.

Fruits edible; wood durable, soft grained.

4. MITREPHORA (Blume) Hook.f. & Thoms.

Trees. Leaves coriaceous, strongly ribbed, plaited in vernation. Flowers usually terminal or leaf-opposed, sometimes 1-sexual. Sepals 3, orbicular or ovate. Petals 6, 2-seriate, valvate; outer ovate, thin, veined; inner clawed, vaulted and cohering. Stamens oblong-cuneate; above anther cells dorsal remote. Carpels oblong; style oblong or clavate, ventrally furrowed; ovules 4 or more, 2-seriate. Ripe carpels globose or ovoid, stalked or sub-sessile.

About 25 species in tropical S.E. Asia and W. Malaysia; One in M.P.

Mitrephora heyneana (Hook.f. & Thoms.) Thw., Enum. Pl. Zeyl. 8. 1858; Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. 1: 77. 1872. *Orophea heyneana* Hook. f. & Thoms., Fl. Ind. 110. 1855

Small trees with glabrous branches. Leaves 5-10 cm long, ovate-lanceolate, narrowed to an obtuse tip, base rounded, coriaceous, glabrous above. Flowers 3 cm across, solitary, shortly pedicelled, axillary or in leaf-opposed subracemose cymes. Petals yellow, inner with red spots. Carpels 6-9, ovoid or subglobose, 1-3 seeded.

In valleys at higher elevations. Bastar. Fl. & Fr. : Jan.-March.

5. POLYALTHIA Blume

Trees and shrubs with distichously spreading leaves. Flowers clustered, rarely solitary, often on small tubercles and extra-axillary. Sepals 3. Petals 2-seriate, flat. Carpels indefinite, succulent and 1-seeded in fruit; ovules 1-2. Seeds usually 1.

About 120 species in palaeotropical regions especially Indomalayan; 2 in M.P.

- 1a. Branchlets soon glabrous; petals linear; leaves narrow, lanceolate, undulate; trees ...1. *P. longifolia*
 1b. Branchlets pubescent; petals ovate; leaves oblong or oblong-lanceolate; shrubs or small trees ...2. *P. suberosa*

1. *Polyalthia longifolia* (Sonner.) Thw., Enum. Pl. Zeyl. 398. 1864; Hook.f. & Thoms. in Hook f., Fl. Brit. Ind. 1: 62. 1872. *Uvaria longifolia* Sonner., Voy. Aux. Indes 2: 233, t. 131. 1782. - Ashok. Fig.12.

Evergreen straight trees. Leaves 8-20 cm long, narrowly-lanceolate, glabrous, long acuminate, margins undulate. Flowers numerous, fascicled, green. Petals lanceolate, acuminate 0.7-1.25 cm long. Sometimes the flowers are racemed on short, special lateral branches or elongated tubercles, with slender pedicels up to 2.5 cm long. Carpels 1-2 ovuled, 1-seeded.

Planted as avenue tree. Jabalpur, Mandla, Rewa. Fl. : April-May; Fr.: May-Aug.

2. *Polyalthia suberosa* (Roxb.) Thw., Enum. Pl. Zeyl. 398. 1864; Hook.f. & Thoms. in Hook f., Fl. Brit. Ind. 1: 66. 1872. *Uvaria suberosa* Roxb., Pl. Corom. t. 34. 1795.

Small trees or shrubs with pubescent young branches. Sometimes with corky bark. Leaves oblong or oblong-lanceolate, 5-12 cm long, obtuse at both ends, glossy. Flowers green and yellow or reddish 1-1.2 cm long; peduncles 1.2-2.5 cm, slender, 2-3 on extra-axillary tubercles. Inner petals longer, oblong or oval. Dripes broadly ellipsoid, reddish, flesh very thin. Stalks of carpels about 0.7 cm long.

In dense sub-tropical forests. Bastar. Fl. : April-May; Fr. : May-Dec.

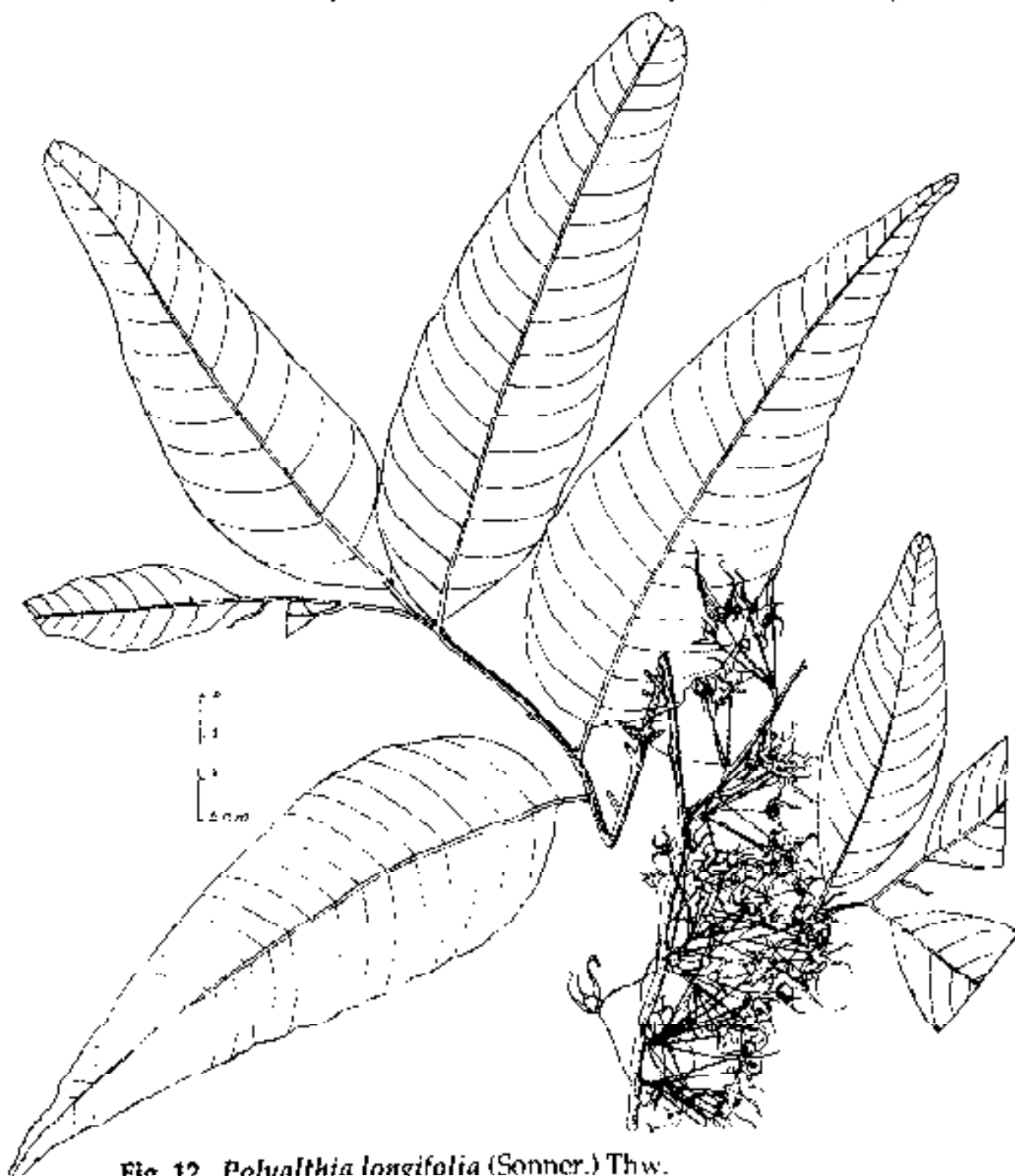


Fig. 12. *Polyalthia longifolia* (Sonner.) Thw.

5. MENISPERMACEAE

(A. K. Mukherjee)

About 65 genera and 350 species in warm regions of the world; 5 genera and 6 species in M.P.

1a. Flowers umbellate or cymose, or if racemose then clustered in the axils of large persistent bracts; stamens connate in a column; carpel 1 ;

2a. Male sepals 4 (5-6), petals 4; female tepals 2 ... 1. *Cissampelos*

- 2b. Male sepals 6-10, petals 3-5; female sepals and petals 3-5 ... 3. *Stephania*
- 1b. Flowers panicked, racemed or axillary, if racemed then without large bracts; stamens free; carpels 3 :
- 3a. Leaves deeply cordate; flowers axillary, terminal or from old wood, racemose; style scar subterminal ... 5. *Tinospora*
- 3b. Leaves not cordate, rarely subcordate; flowers in axillary racemes, capitate cymes or racemiform panicles; style scar sub-basal :
- 4a. Flowers in axillary racemes or racemiform panicle; leaves glabrous ... 4. *Tiliacora*
- 4b. Flowers in axillary or capitate cymes; leaves villous or pubescent ... 2. *Cocculus*

1. CISSAMPELOS L.

Slender climbers from perennial root stocks. Male flowers cymose. Sepals 4, rarely 5-6. Petals connate into a peltate or 4-lobed cup. Anthers 4, connate round the truncate top of the staminal column and bursting transversely. Female flowers clustered in the axils of imbricating leafy bracts which are in racemes. Tepals 2, adnate to the bracts. Carpel 1. Stigmas 3. Drupe ovoid with sub-basal style scar. Endocarp horseshoe-shaped, compressed, margins tubercled.

About 30 species, pantropical; one in M.P.

Cissampelos pareira L. var. *hirsuta* (Buch.-Ham. ex DC.) Forman in Kew Bull. 22: 356. 1968. *Cissampelos hirsuta* (non L.) sensu Hook.f. & Thoms. in Hookif., Fl. Brit. Ind. 1: 103. 1872, p.p. - *Akandi*.

Slender, twining, softly tomentose, perennial, herbaceous climbers. Leaves ovate to orbicular, apiculate, peltate-cordate at base, 2.5-5.5 × 2.5-4 cm, densely hairy beneath; venation obscure; petiole equalling the leaf-blade or longer. Female inflorescence longer than the male, with many conspicuous, imbricate bracts. Flowers greenish-white. Drupes ovoid-subglobose, red, pilose, with sub-basal persistent stylar scars.

Along road sides and in the forests. Common throughout the state. Fl. : June-Nov.; Fr. : Nov.-Jan.

2. COCCULUS A. DC.

Climbing shrubs. Flowers axillary or in short cymes or panicles, rarely shortly racemose. Sepals 6, inner larger. Petals 6, smaller than the inner sepals, with inflexed lateral auricles embracing the base of the stamens in the male. Anthers sub-globose, thecae dehiscing transversely. Staminodes

minute in the female. Carpels 3-6. Drupelets compressed, style scar sub-basal.

About 11 species in tropical and sub-tropical regions, except South America; 2 in M.P.

- 1a. Scarcely woody climbers; leaves ovate, obtuse at base, softly pubescent; male flowers in short axillary panicles; female flowers 1-3, axillary; sepals pubescent
... 1. *C. hirsutus*
- 1b. Woody climbers; leaves narrowly elliptic, acute at base, sub-glabrous; male flowers in axillary fascicles; female flowers sub-solitary;
... 2. *C. pendulus*

1. *Cocculus hirsutus* (L.) Diels in Engler, Pflanzenr. 46: 236. 1910. *Menispermum hirsutum* L., Sp. Pl. 341. 1753. *M. villosum* Lamk. Encycl. 4: 97. 1797. *Cocculus villosus* (Lamk.) DC., Syst. 1: 525. 1817; Hook.f. & Thoms. in Hook. f., Fl. Brit. Ind. 1: 101. 1872. — *Jantikibel*. Fig. 13.

A slender, perennial, dioecious, softly villous herb. Leaves deltoid to ovate-oblong, obtuse at base, softly pubescent, 7 × 5 cm, smaller upwards and oblong on flowering branches. Male flowers in axillary short-peduncled capitate cymes; female peduncles usually 1-3 flowered, axillary, minute, greenish. Drupes transversely rugose, deep-purple when ripe.

Over bushes and small trees. Common throughout the state. Fl: Nov.-April; Fr. : March-May.

2. *Cocculus pendulus* (Forst.) Diels in Engler, Pflanzenr. 46: 237, f. 78. 1910. *Epibaterium pendulum* Forst., Char. Gen. 108, t. 54. 1776. *Menispermum laeba* Del. in Fl. Aegypt. 140, t. 51. 1813. *Cocculus laeba* (Del.) DC., Syst. 1: 529. 1817; Hook.f. & Thoms. in Hook. f., Fl. Brit. Ind. 1: 102. 1872.

Twining monoecious shrubs with pubescent stem and branches. Leaves narrowly elliptic, acute at base, sub-glabrous, petiolate. Flowers greenish-yellow, male in axillary fascicles, females sub-solitary. Drupes ovoid, ridged, compressed; stylar mark basal.

In drier habitats. Gwalior, Nimar. Fl. & Fr. : Oct.-Dec.

3. STEPHANIA Lour.

Climbing undershrubs with usually peltate leaves. Flowers small, whitish, in compound cymose umbels. Male flowers: sepals 6-10, free; petals 3-5, fleshy; anthers 6, connate, dehiscing transversely. Female flowers: sepals 3-5; petals as in male; stamens absent; carpel 1 with 3-6 partite style. Drupe glabrous, endocarp horseshoe-shaped, compressed, margins tubercled.



Fig.13. *Cocculus hirsutus* (L.) Diels

About 40 species in tropical regions of Africa, Asia and Australia; one in M.P.

Stephania glabra (Roxb.) Miers in Ann. Nat. Hist. Ser. 3, 18: 14. 1866. *Cissampelos glabra* Roxb., Fl. Ind. 3: 840. 1832. *Clypea wightii* Arn. in Wight, Ill. 1: 22. 1840. *Stephania rotunda* (non Lour.) sensu Hook.f. & Thoms. Fl. Ind. 197. 1855, p.p. & in Hook.f., Fl. Brit. Ind. 1: 103. 1872, p.p. *Stephania wightii* (Arn.) Dunn in Gamble, Fl. Pres. Madras 1: 30. 1915.

Slender, glabrous, twining, perennial herbs. Leaves ovate-triangular-suborbicular, truncate-subcordate at base, obtuse, apiculate at apex, 7-20 cm across. Flowers greenish yellow; sepals 6 or 7; outer 3-4, lanceolate-spathulate; inner 3, spathulate. Petals 3, oblong-obovate, truncate, with a pair of glandular scales inside at base. Drupes obovoid, compressed, red, glabrous, with dorsal transverse ridges.

In sub-tropical forests on hill slopes. Bastar. Fl. : July-Sept.; Fr. : Oct.-Nov.

4. TILIACORA Colebr.

Large woody climbers. Flowers in racemose or narrow panicles; female sub-solitary, males clustered at the ends of the short panicle-branches. Sepals 6, 3 outer valvate, inner larger, imbricate. Petals 6, minute, fleshy, quadrate or cuneate. Male flower: stamens 6, anthers dehiscing vertically, somewhat introse; pistillode consisting of 3 rudimentary carpels or absent. Female flower: carpels 3-12; styles short, subulate. Drupelets obovoid, laterally sub-compressed, with a narrowly horseshoe-shaped putamen enclosing a long plate, the seeds being enclosed in the horseshoe.

About 25 species in tropical Africa and Indomalaya; one in M.P.

Tiliacora acuminata (Lamk.) Miers. in Ann. Mag. Nat. Hist. Ser. 2, 7: 39. 1851. *Menispermum acuminatum* Lamk., Encycl. 4: 101. 1797. *Tiliacora racemosa* Coleb in Trans. Linn. Soc. London 13: 67. 1822; Hook.f. & Thoms. in Hook. f., Fl. Brit. Ind. 1: 99. 1872. - *Bega*; *Karwanth*.

Large woody climbers; branches glabrous. Leaves 8-18 cm long, broadly ovate to ovate-lanceolate, acuminate, base rounded or cuneate; petioles articulate at the base. Inflorescence tomentose or pubescent, male 3-7 flowered, female 1-flowered. Flowers yellowish, 3-4 bracteolate. Drupes red, ca 1.25 cm long.

In forests near water falls. Rewa. Fl. : April-June; Fr. : June-Dec.

5. TINOSPORA Miers

Shrubs with twining stems, sometimes twisted petioles and cordate

leaves. Flowers in axillary or terminal racemes or from the old wood. Sepals 6, outer minute, inner larger. Petals 6, equal, smaller than the inner sepals. Male flowers: stamens 6, free, anther terminal on the thickened filament with 2 cells bursting obliquely. Female flowers: staminodes 6, clavate; carpels 3, with short style and lobed stigma. Drupelets 1-3, endocarp rugose, dorsally keeled, ventrally concave and intruded. Cotyledons foliaceous, ovate, spreading.

About 40 species in tropical regions of Africa, South East Asia, Indomalaya and Australia; one in M.P.

Tinospora cordifolia (Willd.) Miers ex Hook.f. & Thoms. in Hookf., Fl. Brit. Ind. 1:97. 1872. *Menispermum cordifolium* Willd., Sp. Pl. 4: 826. 1806. *Cocculus cordifolius* (Willd.) DC, Syst. 1: 517. 1817. – *Gulancha*, *Gurcha*.

Large deciduous climbers with lenticellate, corky stems; branches sending down slender pendulous, fleshy roots. Leaves deeply cordate with large basal lobes. Inflorescence racemose. Male flowers clustered in the axils of small subulate bracts; sepals 2-seriate, inner broadly elliptical; petals 6, equal. Female flowers usually solitary, similar to male; carpels 3. Drupelets pisiform, deep-red, marked with a sub-basal styler scar.

On trees in the forests. Bhopal, Indore, Rewa, Sagar, Satna, Surguja. Fl. : Aug.-Dec.; Fr. : Dec.-Feb.

The whole plant is used in indigenous drugs.

6. BERBERIDACEAE

(A. K. Mukherjee)

About 4 genera and 575 species, mainly in North temperate regions, tropical mountains and South America; one genus and 3 species in M.P.

BERBERIS L.

Shrubs with yellow wood and simple or pinnate or mostly dimorphic leaves, those on the main branches converted into 3-5 partite spines, bearing in their axils abbreviated branchlets with simple coriaceous leaves. Flowers yellow, solitary, fascicled or racemed, with 2-3 appressed bracts. Sepals 3 + 3. Petals 3 + 3. Stamens 6, anthers dehiscing by valves. Carpel 1 with peltate stigma. Ovules few, erect, basal. Fruit baccate.

About 450 species in North & South America, Eurasia and North Africa; 3 in M.P.

- 1a. Leaves lanceolate or oblanceolate, very spinulose ... 3. *B. lycium*
- 1b. Leaves obovate, oblong-obovate or elliptic, not very spinulose

2a. Spinescent shrubs; spines 10-30 mm long, 5-fid; leaves thick ... 1. *B. asiatica*

2b. Less spinescent shrubs; spines 4-8 mm long, solitary or trifid; leaves thinly membranous ... 2. *B. hainesii*

1. *Berberis asiatica* Roxb. ex DC., Syst. Nat. 2: 13. 1821; Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. 1: 110. 1872. - *Chitra, Dar-hald.*

Spinescent shrubs with terete stem. Spines 1-3 cm long. Leaves obovate or oblong-elliptic, thick, rigid, acute, mucronate. Inflorescence 15-20-flowered. Pedicels glabrous, red, 1.5-2.5 cm long. Outer sepals smaller than the inner. Petals obovate; glands obovate. Berries oblong-ovoid, black.

On higher elevations of Hoshangabad (Pachmarhi). Fl. : Feb.-April; Fr. : May-June.

2. *Berberis hainesii* Ahrendt. in J. Bot. Lond. 80 (Suppl.): 105. 1944; Razi in Rec. Bot. Surv. India 18 (1): 7. 1959.

Less spinescent shrubs with new branches minutely sulcate. Spines weak, solitary or trifid, 4-8 mm long; Leaves elliptic or ovate-elliptic, very thinly membranous; apex rotundate; base contracted in 1.5 mm long petiole; margin entire (rarely with 1-2 teeth). Inflorescence 1-2 cm long, 2-6 flowered. Pedicels slender, 1.5- 2.5 cm long. Berries ellipsoid or oblong-ellipsoid.

On higher elevations of Pachmarhi, Hoshangabad. Fl. : Feb.-April; Fr.: May-June. Rare and endemic.

3. *Berberis lycium* Royle in Trans. Linn. Soc. London 17: 94. 1834; Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. 1: 110. 1872. - *Chatroi.*

Spinescent, bushy undershrubs; stem subterete. Spines in clusters of 3, middle one longer, lateral ones 7-12 mm long. Leaves lanceolate or oblanceolate, subsessile. Flowers in axillary, subsessile, 5-7 cm long racemes. Pedicels 1-1.5 cm long. Outer sepals ovate, subobtuse, inner oblong-rounded, obtuse. Petals obovate with a pair of glands inside. Berries ovoid, black.

In rock crevices on higher elevations. Hoshangabad. Fl.: March-April; Fr. : May-June.

7. NYMPHAEACEAE

(A. K. Mukherjee)

About 3 genera and 75 species, cosmopolitan, 2 genera and 4 species in M.P.

- 1a. Leaves palmately-nerved, retuse at the base. Carpels free, sunk into pits of the obconic spongy torus ... 1. *Nelumbo*
- 1b. Leaves pinnately-nerved, cordate or sagitate at the base. Carpels more or less connate into syncarpous ovary ... 2. *Nymphaea*

1. NELUMBO Adans.

Large, beautiful aquatic herbs with milky juice and stout creeping rhizomes. Leaves floating and also raised high above the water, peltate. Sepals, petals and stamens spirally arranged, passing gradually into one another; anthers clavate at the end. Carpels many, irregularly sunk in the flat top of the large fleshy obconic torus, laterally attached. Ovules 1-2. Fruiting torus spongy and dry, containing the dry, ripe, loose carpels in its cavities.

A genus with 2 species. One species in America and the other is distributed in Asia and Australia. The species is reported from Madhya Pradesh.

Nelumbo nucifera Gaertn., *Fruct.*, 1: 73, t. 19, f. 2, 1788. *Nymphaea nelumbo* L., *Sp. Pl.* 511, 1753. *Nelumbium speciosum* Willd., *Sp. Pl.* 2: 1258, 1799; Hook.f. & Thoms. in Hook.f., *Fl. Brit. Ind.* 1: 116, 1872. -Kamal.

Perennial aquatic herbs. Leaves orbicular, peltate, up to 35 cm across glaucous above, petioles and peduncles sparsely prickly. Flowers solitary, pinkish or white; petals many, 4-12 cm long.

In old tanks and marshes. Bastar, Bilaspur, Damoh, Indore, Mandla, Raipur, Sagar *Fl.* : April-Nov.; *Fr.* : Dec.-Jan.

2. NYMPHAEA L.

Herbs with floating leaves rising from a perennial rhizome or corm. However large, white, blue or red. Sepals 4, inserted almost at the base of the torus. Petals numerous, the inner gradually passing into stamens, spiral, the upper most being almost superior. Carpels many whorled, sunk in the torus and forming a syncarpous ovary with concave top and radiating stigmas. Fruits spongy, maturing under water and irregularly breaking up.

About 50 species in tropical and temperate regions; 3 in M.P.

- 1a. Leaves glabrous beneath. Stamens appendaged ...1. *N. nouchali*
- 1b. Leaves pubescent or villous beneath; stamens not appendaged:
- 2a. Flowers white or outer few petals purple tinged at the tips; stamens yellow ...2. *N. pubescens*
- 2b. Flowers carmine red; stamens purple ... 3. *N. rubra*

1. *Nymphaea nouchali* Burm.f., Fl. Ind. 120. 1768. *Nymphaea stellata* Willd., Sp. Pl. 2. 1153. 1799; Wight, Ic. t. 178. 1839; Hook.f. & Thoms. in Hook. f., Fl. Brit. Ind. 1: 114. 1872. -*Neelkamal*.

Perennial aquatic herbs with small corms. Leaves rotundate, ca 10 cm across, entire or sinuate margined, glabrous beneath. Flowers ca 5 cm across, blue, sometimes purple; stamens appendaged.

In tanks and marshes. Balaghat, Bastar, Bilaspur, Damoh, Gwalior, Indore, Raigarh, Raipur, Rewa, Sagar, Satna. Fl. : May- Oct.; Fr. : Oct.-Nov.

Peduncle, rhizome and seeds are edible.

2. *Nymphaea pubescens* Willd., Sp. Pl. 2: 1154. 1799. *Nymphaea nouchali* auct. pl. (non Burm.f., 1768). *Nymphaea lotus* (auct. non L., 1753) sensu Hook.f. & Thoms. in Hook.f., Fl. Brit. Ind. 1: 114 1872, p.p. -*Kanwal, Koka*.

Perennial aquatic rhizomatous herbs. Leaves oblong or rotundate, hastate, entire or sinuate-margined, villous beneath; petioles and peduncles smooth, purplish. Flowers white or purple; petals ca 5 cm long; stamens and stigmas pale yellow.

In tanks and marshes. Bastar, Bilaspur, Indore, Raipur, Sagar, Satna, Seoni, Shivpuri. Fl. : May-Oct; Fr. : Oct.-Dec.

3. *Nymphaea rubra* Roxb. ex Andrews in Bot. Rep. 8 (104): t. 503. 1808; Mitra & Subramanyam in Bull. Bot. Surv. India 24 : 83-86. 1982. *Nymphaea lotus* auct. (non L. 1753); Hook.f. & Thoms. in Hook. f., Fl. Brit. Ind. 1: 114. 1872, p.p. -*Lal ratalu*. Fig. 14.

Perennial aquatic rhizomatous herbs; petioles and peduncles smooth. Leaves rotundate, denticulate, ca 20 cm across, purplish, villous beneath. Flowers carmine red; petals linear- oblong, 5-7 cm long; anthers purplish black.

Growing in old tanks. Bastar, Bilaspur, Raigarh, Raipur. Fl. : July-Oct; Fr.: Oct.-Dec.

Peduncle, rhizome and seeds are edible; petals are used in indigenous drugs.

8. PAPAVERACEAE

(A.K.Mukherjee)

About 27 genera (including *Fumaria*) and 200 species mostly in temperate and subtropical regions of northern hemisphere; 2 genera and 3 species in M.P.

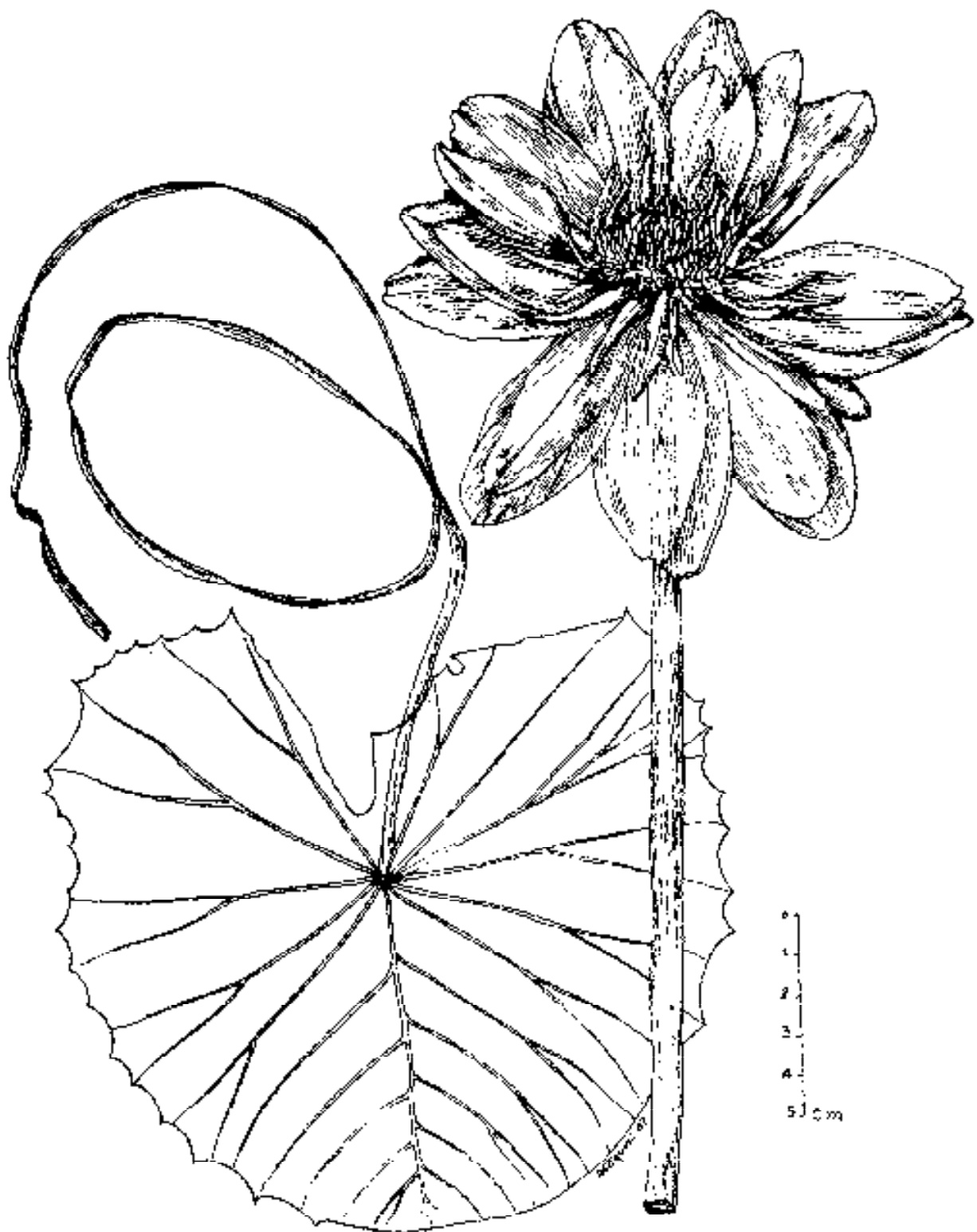


Fig. 14. *Nymphaea rubra* Roxb. ex Andrews

- 1a. Prickly herbs with sinuate pinnatifid green and white leaves; stamens numerous ...1. *Argemone*
 1b. Smooth much-branched herbs with flat linear leaf-segments; stamens 6, diadelphous ...2. *Fumaria*

1. ARGEMONE L.

Erect, prickly, annual, herbs, with, yellow latex. Leaves pinnatifid-dentate. Flowers terminal, solitary, yellow, rarely white. Sepals 2-3, free, valvate, caducous. Petals 4-6, obovate, caducous. Stamens many; filaments filiform; anthers basifixed. Ovary ovate-oblong, unilocular; ovules indefinite, borne on 4-7 parietal placentae. Style short or obscure; stigma radiating, 4-7 lobed. Capsule ellipsoid, prickly, dehiscent by 3-6 short valves at the top; seeds numerous, black.

About 22 species, mostly Mexican; 2 in M.P.

- 1a. Petals bright yellow, up to 2.5×1.5 cm; stigma-lobes more or less appressed ...1. *A. mexicana*
 1b. Petals white or pale yellow, up to 3.5×2 cm; stigma-lobes spreading ...2. *A. ochroleuca*

1. *Argemone mexicana* L., Sp. Pl. 508. 1753; Hook.f. & Thoms. in Hook. f., Fl. Brit. Ind. 1:117.1872. -*Bharband*.

Erect, prickly annual herbs with yellow juice. Leaves sinuate-pinnatifid, spinulose-dentate, prickly on both surfaces, lower ones petioled, upper sessile with semi-amplexicaule base. Flowers terminal, solitary, shortly pedicelled; bracts leafy. Sepals 3 (rarely 2), oblong, apex horned. Petals 6 (rarely 4), obovate, bright yellow. Stigma subsessile, 3-6 lobed, dark red. Capsule oblong-ellipsoid, 3-6 valved, spiny; seeds many, reticulate-ribbed.

In waste places. Common throughout the state. *Fl. & Fr.*: Jan.-Dec.

2. *Argemone ochroleuca* Sweet, Brit. Fl. Gard. 3: t. 242. 1828.

Erect, prickly, glaucous, annual herbs. Leaves sinuate-pinnatifid, spinulose-dentate, prickly on the nerves. Flowers sessile, white or yellowish white; stigma 5-lobed, spreading. Capsule ovate-lanceolate or lanceolate, clothed with spines; seeds numerous.

In waste lands. Bilaspur, Hoshangabad, Sagar. *Fl. & Fr.*: Jan-Dec.

2. FUMARIA L.

Herbs with watery juice, sometimes scandent. Leaves dissected with very narrow segments. One outer petal obtusely spurred. Stamens 6, diadelphous. Ovules 2. Fruits indehiscent, 1-seeded.

About 55 species mainly in Europe and Asia; one in M.P.

Fumaria indica (Hassk.) Pugsley in J. Linn. Soc. Bot. 44:313.1919. *Fumaria vaillantii* Loisel. var. *indica* Hassk. in Flora 56: 443. 1873. *Fumaria parviflora* subsp. *vaillantii sensu* Hook.f. & Thoms. in Hook. f., Fl. Brit. Ind. 1: 128. 1872. -*Pitpapra*.

Diffuse much-branched annual glaucous weeds of cultivated fields. Leaves with flat linear segments. Flowers small, whitish or rose-coloured; sepals 2, lanceolate; petals 2+2, one outer obtusely spurred. Stamens 6, diadelphous. Fruits globose, rugose when dry with 2 pits at the top, 1-seeded.

A weed in cultivated fields. Chhatarpur, Damoh, Satna, Shahdol, Surguja. Fl. & Fr.: Dec.-March.

9. BRASSICACEAE

(A.K.Mukherjee)

About 375 genera and 3200 species, cosmopolitan, chiefly in North temperate and Mediterranean region; 9 genera and 13 species in M.P.

1a. Pods dehiscent:

2a. Pods long and narrow, rarely torulose, terete or compressed; replum broad:

3a. Calyx saccate:

4a. Flowers pale to bright yellow; pods appressed to or spreading from floral axis, 3-6 cm long; seeds in one row; stigma free or bilobed ...1. *Brassica*

4b. Flowers lilac or yellow with purple veins; pods adnate to the floral axis, 1.3-1.5 cm long; seeds two seriate; stigma small, not lobed ...5. *Eruca*

3b. Calyx not saccate:

5a. Pods turgid almost cylindric; seeds round in two rows and irregularly arranged ...8. *Rorippa*

5b. Pods compressed, narrowly linear; seeds flat, in one row:

6a. Leaves pinnate; cotyledons accumbent ...2. *Cardamine*

6b. Leaves simple or lyrate-pinnatifid; cotyledons incumbent ...9. *Sisymbrium*

2b. Pods short and broad, replum broad or narrow:

7a. Replum broad; seeds many compressed, minute ...3. *Cochlearia*

7b. Replum narrow; seeds two ...6. *Lepidium*

- 1b. Pods didymous or long but not dehiscent:
- 8a. Racemes short, leaf-opposed; pods didymous, beakless, each part one-seeded; flowers white ...4. *Coronopus*
- 8b. Racemes long, terminal; pods long, turgid, beaked, at times transversely septate within; flowers pale to bright purple or violet, seldom white with purple lines ...7. *Raphanus*

L. BRASSICA L.

Herbs with entire, lyrate or pinnatifid leaves; sepals saccate or gibbous at base. Petals with long claws, yellow, rarely white. Pods with seedless indehiscent beak, sometimes 3-4 valved, replum membranous. Seeds globose, cotyledons incumbent.

A genus with very many forms in cultivation mainly distributed in Europe and Asia; 4 species in M.P.

- 1a. Upper cauline leaves with an amplexicaule base :
- 2a. Open flowers not overtopping the flower buds; leaves glabrous or sparsely pubescent ...1. *B. campestris*
- 2b. Open flowers overtopping the flower-buds; leaves hispid ...3. *B. napus*
- 1b. Upper cauline leaves narrowed to the base or short-petioled, without an amplexicaule base:
- 3a. Pods erect, adnate to inflorescence axis, 0.8-3cm long; beak thin, seedless; ovary 5-11 ovuled ...4. *B. nigra*
- 3b. Pods ascending or spreading, away from inflorescence axis, 1.5-10 cm long; beak stout, 1-2 seeded; ovary many ovuled ...2. *B. juncea*

1. *Brassica campestris* L., Sp. Pl. 666. 1753; Hook.f. & Anders. in Hook.f., Fl. Brit. Ind. 1:156.1872 (excl. subsp. *napus* & *rapa*); Babu, Herb. Fl. Dehra Dun 54. 1977. -*Kali Sarson*.

Erect, glaucous, annual herbs. Basal leaves lyrate-pinnatifid, 10-30 cm long, 5-10 cm broad dentate. Racemes 20-45 cm long, 30-40 flowered, terminal. Flowers 6-10 mm across, yellow. Pedicels 1- 2.5 cm long in fruiting. Sepals 4-6 mm long, 2 mm broad. Petals 8-10 mm long, 3.5-5 mm broad. Stamens 4-6 mm long. Pods up to 6 cm long (incl. 1.5-2 cm long beak), linear-cylindric, reticulately veined, glabrous.

In cultivation for edible oil and as an escape. Bilaspur, Raigarh, Raipur, Satna, Sidhi. Fl. & Fr.: Dec. - March.

Brassica napus & *Brassica rapa* are treated as distinct species by Bailey, 1930.

2. *Brassica juncea* (L.) Czern. & Coss. in Czern. Consp. Pl Chark. 8.n. 5. 1859; Hook.f. & Anders. in Hook.f., Fl. Brit. Ind. 1: 157. 1872. *Sinapis juncea* L., Sp. Pl. 668. 1753 (excl. syn. Herm.). -Rai.

Erect, 30-90 cm tall, branched, hispid, annual herbs. Basal leaves lyrate-pinnatifid; middle ones obovate-oblong, pinnatifid; upper ones lanceolate, entire-dentate. Racemes 20-40 flowered, up to 30 cm long in fruit. Flowers yellow, 7 mm across; pedicels 5-8 mm long, increasing to 15 mm in fruit. Sepals 4-6 × 1-1.5 mm, subequal. Petals 6-9 × 2.5-3 mm, obovate, clawed, apex rounded. Stamens 4-6, 5-8 mm long, 2-3 mm broad. Pods 2.5-6 cm long, linear; seeds rounded, reticulate, blackish-brown.

In cultivation and as escapes. Jabalpur, Raipur, Satna, Sidhi. Fl. & Fr.: Oct. - March.

3. *Brassica napus* L., Sp. Pl. 666. 1753. *Brassica campestris* L. subsp. *napus* (L.) Hook.f. & Anders. in Hook.f., Fl. Brit. Ind. 1:156. 1872. -Tori.

Erect, 30-150 cm tall, slender, glabrous, rather glaucous annual herbs. Basal leaves lyrate-pinnatifid 5-25 × 2-6 cm; upper ones entire-dentate often only 7.5 cm long. Racemes 15-40 flowered, bud overtopping opened flowers. Flowers pale golden yellow, 1-1.4 cm across; pedicels 6-12 mm long, increasing up to 20 mm in fruit. Sepals 5-8 × 1.5-2 mm, glabrous, subequal. Petals 10-15 × 3.5-6 mm, obovate, narrowed towards the base. Stamens 5-7, 7-9 mm long. Pods up to 7 cm long; seeds yellow, globose.

In cultivation. Bilaspur, Hoshangabad, Mandla, Surguja. Fl. & Fr.: Dec. - Feb.

4. *Brassica nigra* (L.) Koch in Koehl. Deutchl. Fl. ed. 3,4: 713. 1833; Hook.f. & Anders. in Hook.f., Fl. Brit. Ind. 1:156. 1872. *Sinapis nigra* L., Sp. Pl. 668. 1753. - Banarasi rai.

Erect 30-100 cm tall, branched, annual herbs. Leaves bristly, radical ones lyrate-pinnatifid, 6-25 × 3-12 cm, cauline ones linear-lanceolate, entire, or pinnatifid to pinnatifid. Racemes 45-60 cm long, 40-60 flowered, terminal. Flowers 5-8 mm across, yellow. Sepals 3-5 × 1-1.2 mm oblong, obtuse, yellowish. Petals 7-9 × 3-4 mm, obovate, clawed. Stamens 4-5 mm. Pods 3-4 cm long, linear, glabrous; seeds brownish-black, glabrous, minutely punctate.

In cultivation. Indore. Fl. & Fr. : Dec. - March.

2. CARDAMINE L.

Herbs. Leaves entire, lobed or pinnate, often flaccid. Flowers usually

white to violet. Sepals not gibbous. Petals clawed. Pods narrow-linear, compressed, tapering at both ends, but not beaked, valves with distinct midrib curling up elastically on dehiscence. Seeds 1-seriate, compressed, cotyledons accumbent.

About 160 species, cosmopolitan, chiefly in temperate regions; one in M.P.

Cardamine trichocarpa Hochst. ex A. Rich. Tent. Fl. Abyss. 1:18. 1847.
C. subumbellata Hook. ex Hook.f. & Anders. in Hook.f., Fl. Brit. Ind. 1: 138. 1872.

Prostrate or suberect perennial herbs; young parts with spreading hairs. Leaves 2-5 cm long, pinnately segmented; segments 5-7, ovate or ovate-elliptic, crenate. Flowers small, yellow, in 10-15 cm long racemes. Sepals 2-2.5 mm long. Petals about 3 mm long. Stamens 6, rarely 4, about 2 and 2.5 mm long. Pods irregularly corymbose, linear-lanceolate, compressed, shortly beaked, glabrous, few seeded; seeds minute, blackish-brown, glabrous.

In marshy places. Hoshangabad, Raipur (Unni, 1967). *Fl. & Fr.*: July - Sept.

3. COCHLEARIA L.

Glabrous, often fleshy herbs with entire or pinnatifid leaves. Flowers white, yellow or violet, shortly racemed or corymbose. Sepals spreading. Pods globose, ovoid or oblong, with convex turgid valves. Seeds compressed, cotyledons accumbent.

About 25 species mainly in North temperate regions, Himalaya and Java mountains; one in M.P.

Cochlearia cochlearioides (Roth) Sant. & Maheshw. in J. Bombay Nat. Hist. Soc. 54: 804. 1957. *Alyssum cochlearioides* Roth, Nov. Pl. Sp. 322. 1821.
C. flava Buch.-Ham. ex Roxb., Fl. Ind. 2:45. 1824; Hook.f. & Anders. in Hook.f., Fl. Brit. Ind. 1: 145. 1872. Fig. 15

Diffusely-branched annual herbs; branches 15-25 cm long. Radical leaves lyrate-pinnatifid, petiolate, toothed, 2.5-7.5 cm long, cauline ones elliptic-oblong or obovate-oblong, entire or pinnatifid, glabrous. Flowers small, yellow, in 3.5-15 cm long terminal racemes. Pods about 5 mm long, sub-globose, glabrous, shortly beaked. Seeds smooth, dark-brown.

Along river banks. East Nimar, Hoshangabad, Jabalpur, Mandla, Panna, Rewa, Sagar, Seoni, Shahdol, Sidhi. *Fl. & Fr.*: Dec. - Feb.

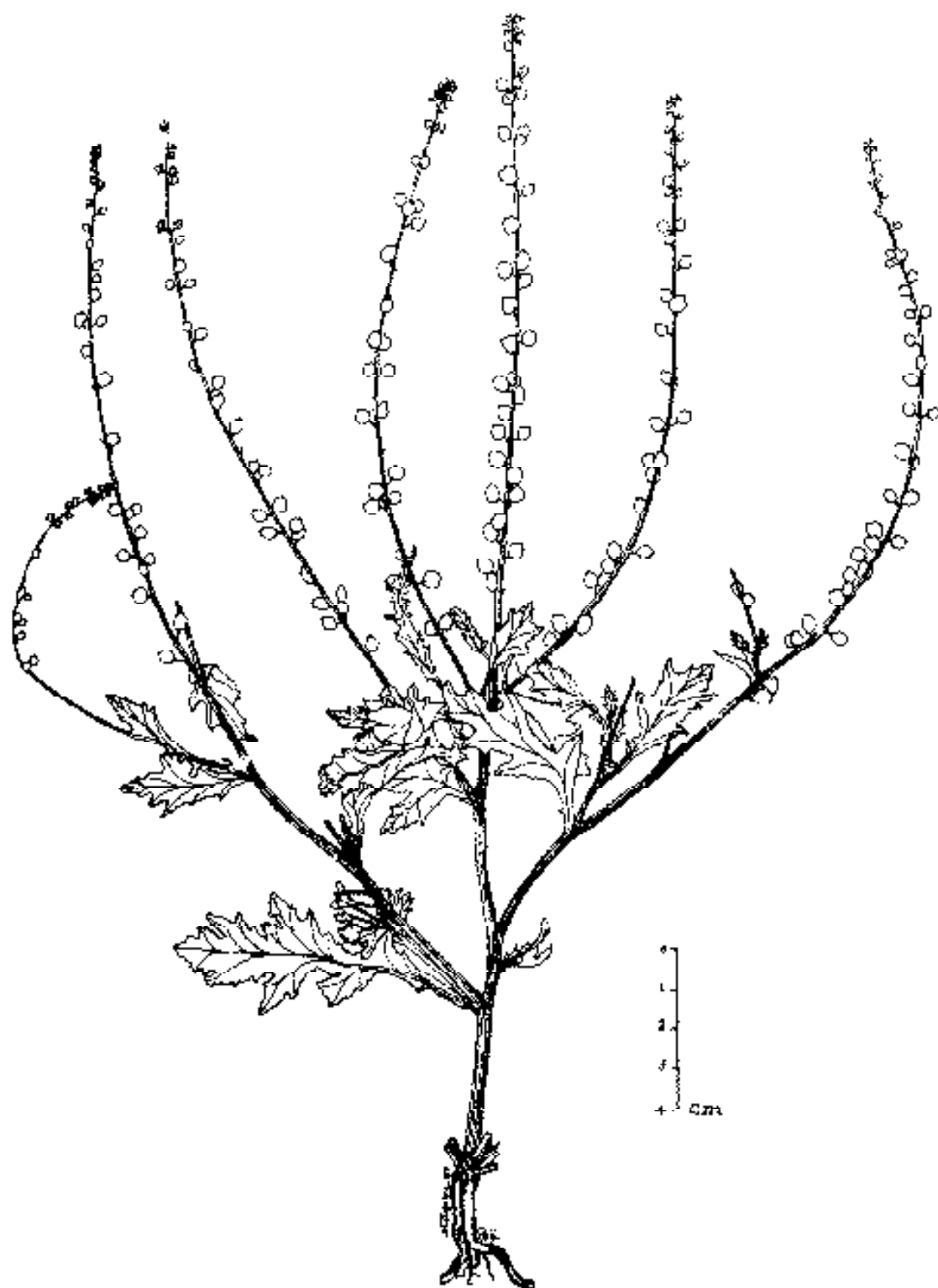


Fig. 15. *Cochlearia cochlearioides* (Roth) Sant. & Maheshw.

4. CORONOPUS Zinn.

Herbs with simple hairs or minute tubercles. Leaves pinnatisect or deeply dissected. Racemes short, axillary or terminal. Flowers minute. Sepals sub-spreading, ovate, lilac or pinkish. Petals minute, whitish or absent. Stamens 6 or 4 or 2 by abortion. Ovary subglobose-bilobed, 2-ovuled siliculae short, usually with 2 hemispherical lobes breaking away with 1 seed each; valves thick, reticulately pitted or tuberculated; septum very narrow.

About 10 species, mostly Eurasian; one in M.P.

Coronopus didymus (L.) J.E. Smith, Fl. Brit. 2:691. 1800; *Lepidium didymum* L., Syst. Nat. 2:433. 1759. *Senebiera didyma* (L.) Pers. Syn. Pl. 2: 185. 1805.

Diffusely branched, 15-30 cm long herbs. Stems glabrous or hairy, branched. Leaves 6-10 jugate, 5-10 cm long, pinnatipartite-pinnatifid; ultimate segments 3-5 jugate, lanceolate, apiculate, entire. Racemes 30-60 flowered, 6-8 cm long. Flowers minute about 1 mm across; sepals ovate-rounded; petals linear or absent. Stamens 2 or 4 but only 2 fertile. Pods of two indehiscent lobes which separate on falling; valves globose, septum very narrow, inconspicuous; seed 1 in each lobe, reniform, reddish-brown.

In cultivated fields. Hoshangabad, Indore. Fl. & Fr.: Nov. - June.

Native of South America; naturalized.

5. ERUCA Mill.

Hispid or glabrous herbs. Leaves pinnatifid, lower stalked, upper subsessile or sessile. Racemes lax, elongating in fruit. Flowers large, usually dull yellowish with brown or violet veined petals. Sepals subequal, inner pair sub-saccate at the base. Petals twice as long as the sepals, long clawed. Ovary cylindrical, 13-50 ovuled, beak prominent, stigma bilobed. Siliquae 1-3 cm long, tetragonal with flat, compressed seedless beak; valves with mid vein; septum hyaline; seeds biseriata, brown; cotyledons conduplicate. About 6 species in Mediterranean region and N.E. Africa; one in M.P.

Eruca sativa Mill., Gard. Dict. ed. 8, n. 1. 1768; Hook.f. & Anders. in Hook.f., Fl. Brit. Ind. 1: 158. 1872. *Brassica aruca* L., Sp. Pl. 667. 1753. -*Taramira*.

Erect annual herbs. Stem simple and hispid below, branched and glabrous upwards. Lower leaves petioled, upper ones sessile, lyrate-pinnatifid with entire or dentate segments. Racemes lax, elongating in fruit. Flowers yellow, turning to white; sepals sub-equal, caducous; petals about twice as long as the sepals, with dark purplish veins, up to 2 cm

long, obovate, long clawed. Ovary 13-50-ovuled. Pods erect, turgid, 1-3 cm long, tetragonal with a flat, conical, seedless, compressed beak; seeds biseriate, ovoid, 1-2.5 mm long, brown.

In cultivated fields. Indore, Surguja. *Fl. & Fr.*: Jan.- April.

Native of Mediterranean region; naturalized.

6. LEPIDIUM L.

Annual or perennial herbs. Leaves entire, toothed or pinnatifid; lower often stalked; upper sessile or sub-sessile. Racemes corymbose. Flowers small, white, rarely yellowish or pinkish. Sepals 4, subequal; inner slightly broad. Petals 4, sometimes shorter than the sepals, rarely absent. Stamens 6, or by abortion 4 or 2. Ovary flat with two pendulous ovules; style short or absent; stigma capitate. Siliculae ovate, obovate, orbicular or broadly elliptic, laterally flattened; valves usually strongly keeled; septum not veined; seeds generally 2, brown; radicle incumbent or obliquely so.

About 150 species, nearly cosmopolitan; one in M.P.

Lepidium sativum L., Sp. Pl. 644. 1753; Hook.f. & Anders. in Hook.f., *Fl. Brit. Ind.* 1:159. 1872. -*Halim.*

Erect, 30-60 cm tall, branched annual herbs. Lower leaves petioled, pinnatipartite, with pinnatifid segments, 4-10 × 2.5-3.5 cm; upper ones linear, sessile, nearly entire, glabrous. Racemes lax, 10-15 cm long 20-30 flowered. Flowers 3 mm across, white; pedicels suberect, 2-3 mm long, scarcely as long as the pods. Sepals about 1.5 mm long, oblong, obtuse. Petals about 3 mm long. Stamens 6, 1.8 and 2.2 mm long. Pods 4-6 × 3-5 mm broadly elliptic; winged at the top and notched at the apex with short style; seeds 3 mm long.

In cultivated fields and road sides. Bilaspur, Raipur, Sidhi. *Fl. & Fr.*: Feb. - May.

7. RAPHANUS L.

Annual or biennial herbs. Leaves lyrate-pinnate or pinnatifid. Flowers moderate-sized or large, white or purple in long bracteate racemes. Sepals erect, the lateral saccate at base. Pods indehiscent, elongate, terete and swollen, with a long acuminate beak, 1- or several-celled within by transverse pithy septa. Seeds globose or ovoid; cotyledons conduplicate, retuse. Radicle incumbent.

About 8 species mostly in Mediterranean region; one in M.P.

Raphanus sativus L., Sp. Pl. 669. 1753; Hook.f. & Anders. in Hook.f., *Fl. Brit. Ind.* 1:166. 1872. -*Muli.*

Erect herbs with fusiform tap root. Stem corymbosely branched, 20-90 cm tall. Lower leaves lyrate-pinnati-partite, with sinuate-dentate segments, very variable, 3-5 jugate; upper ones entire or dentate, subsessile or sessile. Racemes 10-30 flowered. Flowers 15-20 mm across, usually white or violet; pedicels 5-10 mm long increasing to 20 mm in fruit. Sepals 6-8 x 1.5-2 cm, oblong, subequal. Petals 15-20 x 5-7 mm, long clawed. Stamens 7-9 and 10-12 mm long; anthers 2-3 mm, long. Pods 20-60 x 4-5 mm, beak 9-20 mm long; seeds 6-12, subglobose, uniseriate, brown, reticulated.

Commonly cultivated as vegetable. *Fl. & Fr.*: Dec. - April.

8. RORIPPA Scop.

Herbs of damp places. Leaves pinnate to almost entire. Petals often about as long as the sepals, rarely absent. Stamens 6, rarely 4 by abortion. Ovary many ovuled. Siliquae bilocular, dehiscent; valves convex, membranous; septa membranous; seeds mostly biseriate, reddish-brown, with finely reticulated surface; radicle accumbent.

About 90 species in North temperate region; 2 in M.P.

- 1a. Flowers yellow; petals as long as the sepals; leaves simple entire or irregularly lyrate-pinnatifid ...1. *R. indica*
- 1b. Flowers white; petals longer than the sepals; leaves imparipinnate with 3-9 subentire to sinuate leaflets ...2. *R. nasturtium-aquaticum*

1. *Rorippa indica* (L.) Hiern, *Cat. Afr. Pl. Welw.* 1: 26. 1896. *Sisymbrium indicum* L., *Mant.* 1:93. 1767. *Nasturtium indicum* (L.) DC., *Syst. Nat.* 2: 199. 1821; Hook.f. & Anders. in Hook.f., *Fl. Brit.* 1: 134. 1872. p.p.

Erect, 50-60 cm tall, pubescent or glabrous, annual-biennial herbs, often much branched. Lower leaves petioled, 5-10 x 1.5-3 cm, lyrate-pinnati-partite or pinnatifid; upper ones sessile, with amplexicaule base, lanceolate-oblong, entire to lyrate-pinnatifid, sinuate-dentate. Racemes 25-35-flowered, up to 15 cm long in fruit. Flowers yellow, 2.5 mm across. Sepals 2-2.5 mm long. Petals usually as long as the sepals. Stamens 1.5 and 2 mm long. Pods 10-15 x 1.5 mm slender slightly upcurved; style 1 mm long and stigma capitate; seeds about 0.5 mm long, usually about 100 or more in each fruit.

In wet places. Bilaspur, Hoshangabad, Indore, Jabalpur, Mandla, Panna, Raipur, Sagar, Seoni. *Fl. & Fr.*: Dec. - July.

2. *Rorippa nasturtium-aquaticum* (L.) Hayek in *Sched. Fl. Stir. Exs.* 22. 1905. *Sisymbrium nasturtium-aquaticum* L., *Sp. Pl.* 657.1753. *Nasturtium officinale* R. Br. in Ait. *Hort. Kew.* ed 2A: 111. 1812; Hook.f. & Anders. in Hook.f., *Fl. Brit. Ind.* 1: 133. 1872. -*Lut-putiah*.

Glabrous aquatic herbs. Stem procumbent and rooting at the base, ascending or floating in the upper part. Leaves imparipinnate; leaflets 3-9, ovate-orbicular, subentire to sinuate with a cordate base. Flowers white in elongate racemes of 5-15 cm long. Pedicels 0.3-0.6 cm long increasing to 1 cm in fruit. Sepals 2-2.5 mm long. Petals 3.5-5 mm long. Pods patent, slightly upcurved, 8-15 mm long. Seeds 2-seriate, ovoid-rounded, rugose.

In running water, ditches and pools. Jabalpur. *Fl. & Fr.*: Dec. June.

9. SISYMBRIUM L.

Annual or perennial herbs. Leaves mostly lyrate-pinnatifid, lower petiolate, upper sessile or subsessile. Racemes many flowered. Flowers mostly yellow. Sepals erect. Petals nearly twice as long as the sepals, clawed. Stamens 6. Nectar glands present. Ovary sessile, usually many ovuled; style short, stigma 2-lobed, capitate. Siliquae erect to spreading, bilocular, dehiscent; valves 3-veined; septum hyaline; seeds 1-seriate, usually many, brown not mucilaginous when wet; radicle mostly incumbent.

About 70 species in temperate zones; one in M.P.

Sisymbrium irio L., Sp. Pl. 659. 1753; Hook. f. & Anders. in Hook. f., *Fl. Brit. Ind.* 1: 150. 1872.

Erect, 20-60 cm tall, annual-biennial, branched, glabrous herbs. Lower leaves petiolate, lyrate-pinnatifid or pinnatifid, segments remote, toothed, upper one larger. Racemes 50-80 flowered. Flowers up to 30 cm long in fruit with pods over topping young flowers and buds. Sepals 2-2.5 cm long. Petals 3-4x1 mm usually slightly longer than the sepals. Stamens about 2 and 3 mm long anthers about 0.5 mm long. Pods 30-45x1 mm, linear, often slightly upcurved, faintly 3-nerved; style inconspicuous; seeds 20-40 in each locule, oblong, ellipsoid, brown.

In moist places. Bhopal (*Oomachan*, 1977). *Fl. & Fr.*: Dec.-March.

10. CAPPARACEAE

(A. K. Mukherjee)

About 45 genera and 600 species, mostly in tropical and subtropical regions; 4 genera and 16 species in M.P.

- 1a. Herbs with 1-3 foliolate leaves; fruits capsular ... 2. *Cleome*
- 1b. Trees or shrubs with simple or trifoliate leaves;
fruits usually berry :
- 2a. Calyx tubular below ... 4. *Maerua*
- 2b. Calyx divided to the base into 4 sepals :

- 3a. Leaves simple ... 1. *Capparis*
 3b. Leaves trifoliolate ... 3. *Crataeva*

1. CAPPARIS L.

Shrubs, often climbing or sprawling, rarely small trees, with glabrescent or hairy young branches. Leaves simple, usually with two stipular spines. Flowers bisexual, solitary, racemose, corymbose or umbellate, axillary or terminal, rarely supra-axillary; bracts caducous. Sepals 4 (-5), free or nearly so. Petals 4 (-5), imbricate, mostly obovate, usually caducous; receptacle with a small adaxial disk. Stamens (5-) 20, or indefinite from the base of gynophore. Gynophore generally as long as the stamens. Ovary globose or cylindrical, usually 1-locular, with few to many ovules; stigma sessile, mostly obscure. Fruits generally globose to ellipsoid; seeds 1- many, obliquely reniform.

A genus with about 250 species in the tropics and subtropics; five species are reported from Madhya Pradesh.

- 1a. Mature branches leafless; leaves when present minute, caducous; flowers red or scarlet ... 1. *C. decidua*
 1b. Plants leafy; flowers white, creamy-yellow or with purple tinge :
 2a. Plants climbing or straggling :
 3a. Flowers 0.5-0.8 cm across in umbels; berries 0.6-1.2 cm across ... 3. *C. septaria*
 3b. Flowers 2.5-3.2 cm across, not in umbels; berries 2-2.5 cm across ... 5. *C. zeylancia*
 2b. Plants not climbing or straggling :
 4a. Leaves orbicular or ovate-oblong; spines hooked; flowers axillary, solitary or 2-3 fascicled ... 4. *C. spinosa*
 4b. Leaves obovate, elliptic-obovate or elliptic-oblong; unarmed or minutely armed; flowers in racemes ... 2. *C. grandis*

1. *Capparis decidua* (Forsk.) Edgew. in J. Linn. Soc. Bot. 6: 184. 1862. *Sodada decidua* Forsk., Fl. Aeg.-Arab. 81. 1775. *Capparis aphylla* Roth, Nov. Pl. Sp. 238. 1821; Hook.f. & Thoms. in Hook.f., Fl. Brit. Ind. 1: 174. 1872. -Karer; Kurrel.

Nearly leafless glabrous shrubs or small trees; bark corky, greyish-white, longitudinally furrowed; thorns in pairs, straight. Leaves only on young shoots, glabrous, linear-oblong with spinescent apex, caducous, buds pubescent. Flowers red or scarlet, about 2 cm across, in short corymbs on short lateral shoots. Outer sepals subvalvate, ciliate; inner

very saccate. Stamens 18-20. Fruits 0.8-1.5 cm, globose, smooth, red when ripe.

In drier areas. Gwalior, Indore, Shivpuri. *Fl.* : March – April; *Fr.* : May – July.

2. *Capparis grandis* L.f., Suppl. Pl. 263. 1781; Hook.f. & Thoms. in Hook. f., *Fl. Brit. Ind.* 1: 176. 1872.

Large shrubs or small trees; bark longitudinally fissured, yellowish-brown; branches pubescent, thorns absent or recurved. Leaves broad-ovate or obovate, 5-7.5 × 3.5-5 cm, base acute, velvety pubescent, at length glabrous, petiolate. Flowers 1.5-2.5 cm across, white, in terminal corymbs or racemes, with leafy bracts; pedicels 2.5 cm long. Petals narrowly obovate, obliquely ascending. Gynophore 2.5 cm long, sometimes smaller. Fruits 1.5-2.5 cm across, globose, purple; seeds 2-6.

In dry deciduous forests. Indore (*Rao & Sastry*, 1965). *Fl.* : Jan. – March; *Fr.* : March – June.

3. *Capparis sepiaria* L., *Syst. Nat.* ed. 10, 2: 1071. 1759; Hook.f. & Thoms. in Hook. f., *Fl. Brit. Ind.* 1: 177. 1872.

Scandent or straggling shrubs; shoots zigzag, tomentose. Leaves elliptic-oblong or obovate, coriaceous, short-petioled, 3.5-5.5 × 1.5-2.5 cm; stipular spines recurved, 3-5 mm long. Flowers white in axillary or terminal umbels of up to 20 flowers. Sepals 4-6 × 3-5 mm, very thin. Petals 4.5-7.5 × 1.5-3 mm, very thin, white, pubescent. Stamens 30-45. Gynophore 6-10 mm. Fruits on slender stalks, 1-1.5 cm across, black when ripe, 1-seeded.

In scrub forests. Damoh, Gwalior, Indore, Rewa, Shivpuri. *Fl.* March-June; *Fr.* : Nov. – Dec.

4. *Capparis spinosa* L., *Sp. Pl.* 503. 1753; Hook.f. & Thoms. in Hook. f., *Fl. Brit. Ind.* 1: 173. 1872. – *Kabra*.

Much-branched shrubs. Leaves orbicular or broadly ovate, petiolate, 2.5-6 cm diam. Flowers solitary axillary, white, with white filaments turning to purple; pedicels 4.5-7.5 cm long. Sepals 2.5-2.8 cm long, ovate. Petals white, 3.5-4.5 cm across. Stamens more than 100, white, turning to red; anthers 4 mm long, brown. Gynophore 6-7 cm long. Fruits 2.5-5 cm long, ovoid or oblong, red when ripe.

In dry hilly places. Central Provinces (CAL). *Fl.* : Jan.-March; *Fr.* : April – Sept.

5. *Capparis zeylanica* L., *Sp. Pl.* ed. 2, 720. 1762. *C. horrida* L.f., Suppl. Pl. 264. 1781; Hook.f. & Thoms. in Hook. f., *Fl. Brit. Ind.* 1: 178. 1872. – *Ardanda*.

Climbing shrubs with hooked spines and reddish brown tomentum on young parts. Leaves 5-7.5 cm long, ovate, obovate or elliptic-oblong, grey-tomentose beneath, shortly petiolate. Flowers white, turning pink, 2.5-5 cm across, supra-axillary, solitary or 2-3 together, pedunculate. Sepals 6-10 mm long. Petals very thin, 9-12 mm long, white, turning pink. Stamens 3-4.5 cm long, white, turning red. Gynophore 4.5-5 cm long. Fruits 2.5-3.5 cm across, ellipsoid or ovoid, red when ripe.

Along roads and in dry deciduous forests. Balaghat, Bilaspur, Indore, Jabalpur, Mandla, Raigarh, Raipur, Rewa, Seoni, Satna, Sagar, Sidhi, Surguja. Fl. Jan. - March; Fr. : March - June.

2. CLEOME L.

Herbs or undershrubs generally glandular-hairy. Leaves alternate, petiolate, simple or palmately 3-5 (-9)-foliolate. Flowers in racemes, usually pedicellate, yellow, white or pinkish. Sepals 4, often clawed, imbricate. Androphore present or absent. Stamens generally 4-12, subequal, free, sometimes staminodes present. Gynophore present or absent; ovary 1-locular, with many ovules on 2 parietal placentae. Capsule usually elongated with two dehiscent valves and persistent replum; seeds many, reniform or discoid, smooth, rugulose or ridged.

About 200 species in the tropical and subtropical regions; 7 in M.P.

- 1a. Flowers yellow or dirty-white; leaves compound :
 - 2a. Androgynophore present; flowers dirty-white ... 4. *C. gynandra*
 - 2b. Androgynophore absent; flowers yellow :
 - 3a. Leaflets 3; stamens 6; plants 10-20 cm tall ... 1. *C. brachycarpa*
 - 3b. Leaflets 3-5; stamens numerous; plants 30 cm or more tall ... 7. *C. viscosa*
- 1b. Flowers pale to bright-rosy or purple; leaves simple or compound :
 - 4a. Leaves simple :
 - 5a. Stamens 6 or less ... 5. *C. monophylla*
 - 5b. Stamens 10-12 ... 6. *C. simplicifolia*
 - 4b. Leaves compound :
 - 6a. Leaflets 3; seeds not echinate ... 3. *C. felina*
 - 6b. Leaflets 5-9; seeds echinate ... 2. *C. chelidonii*

1. *Cleome brachycarpa* Vahl ex DC., Prodr. 1: 240. 1824; Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. 1: 169. 1872; Agarkar in Bull. Bot. Surv. Ind. 11: 399. 1972.

Perennial herbs, 10-20 cm tall, branched, glandular-hairy. Leaves 3-5-foliolate, upper simple. Leaflets obovate-oblong or oblanceolate, 0.6-1.2 cm long; lower petioled, floral subsessile. Flowers 0.5- 1.2 cm long, yellow, long-peduncled, in leafy racemes; stamens 6. Capsules 8 mm long, ovate-lanceolate or oblong; seeds minute, smooth.

Growing in ravines. Chambal valley (*Agarkar*, 1969). *Fl. & Fr.* : Aug. - Sept.

2. *Cleome chelidonii* L. f., *Suppl. Pl.* 300. 1781; *Hook.f. & Thoms.* in *Hook.f., Fl. Brit. Ind.* 1: 170. 1872.

Glabrous or sparsely prickly annual herbs, 30-60 cm tall. Leaves 5-9 foliolate, with obovate leaflets or upper 3-foliolate with linear leaflets. Flowers bright-rosy, 2.5 cm across, with long pedicels; sepals 2-4 mm long, scaly-hairy outside. Petals 7-20 mm long, red; stamens 30-50, shorter than petals. Capsules 5-10 cm long, linear, glabrous, with parallel, wavy striations; seeds 2 mm long, brownish-black, obliquely reniform, warty.

In cultivated fields. East Nimar, Hoshangabad, Indore, Mandla, Raipur. *Fl.* : June - Sept.; *Fr.* : July - Oct.

3. *Cleome felina* L. f., *Suppl. Pl.* 300. 1781; *Hook.f. & Thoms.* in *Hook.f., Fl. Brit. Ind.* 1: 170. 1872.

Erect, much-branched, 30-60 cm tall, annual herbs, covered with rigid hairs. Leaves 3-foliolate; leaflets obovate, obtuse, 1.2-2.5 cm long, equalling or shorter than the petiole. Flowers axillary, solitary, long-pedicelled, 1.2-2 cm long, purple; stamens 25-30. Capsules 2.5-4 cm long, compressed, linear-oblong, acute at both ends, striate; seeds large, tubercled, glabrous.

In dried up rocky river-bed. Indore (*Rao & Sastry*, 1965). *Fl. & Fr.* : July - Sept.

4. *Cleome gynandra* L., *Sp. Pl.* 671. 1753. *C. pentaphylla* L., *Sp. Pl.* ed. 2, 938. 1762, *nom. illegit.* *Gynandropsis pentaphylla* (L.) DC., *Prodr.* 1: 238. 1824; *Hook.f. & Thoms.* in *Hook.f., Fl. Brit. Ind.* 11 : 171. 1872. Fig. 16.

Erect, viscidly hairy, 30-60 cm tall, annual herbs. Leaves digitately 3-5 foliolate; leaflets elliptic-obovate or elliptic-lanceolate, sessile. Racemes terminal. Flowers white or purplish. Sepals 2.5-5 mm, acute. Petals 7-15 mm long. Androgynophore 9-16 mm. Capsules 5-8 cm long, linear-cylindric, minutely beaked, viscidly pubescent; seeds depressed-spherical, blackish-brown, 1.2 mm across.

In waste lands. Damoh, Gwalior, Jabalpur, Mandla, Raipur, Rajnandgaon, Sagar, Satna, Sidhi. *Fl. & Fr.* : July - Nov.

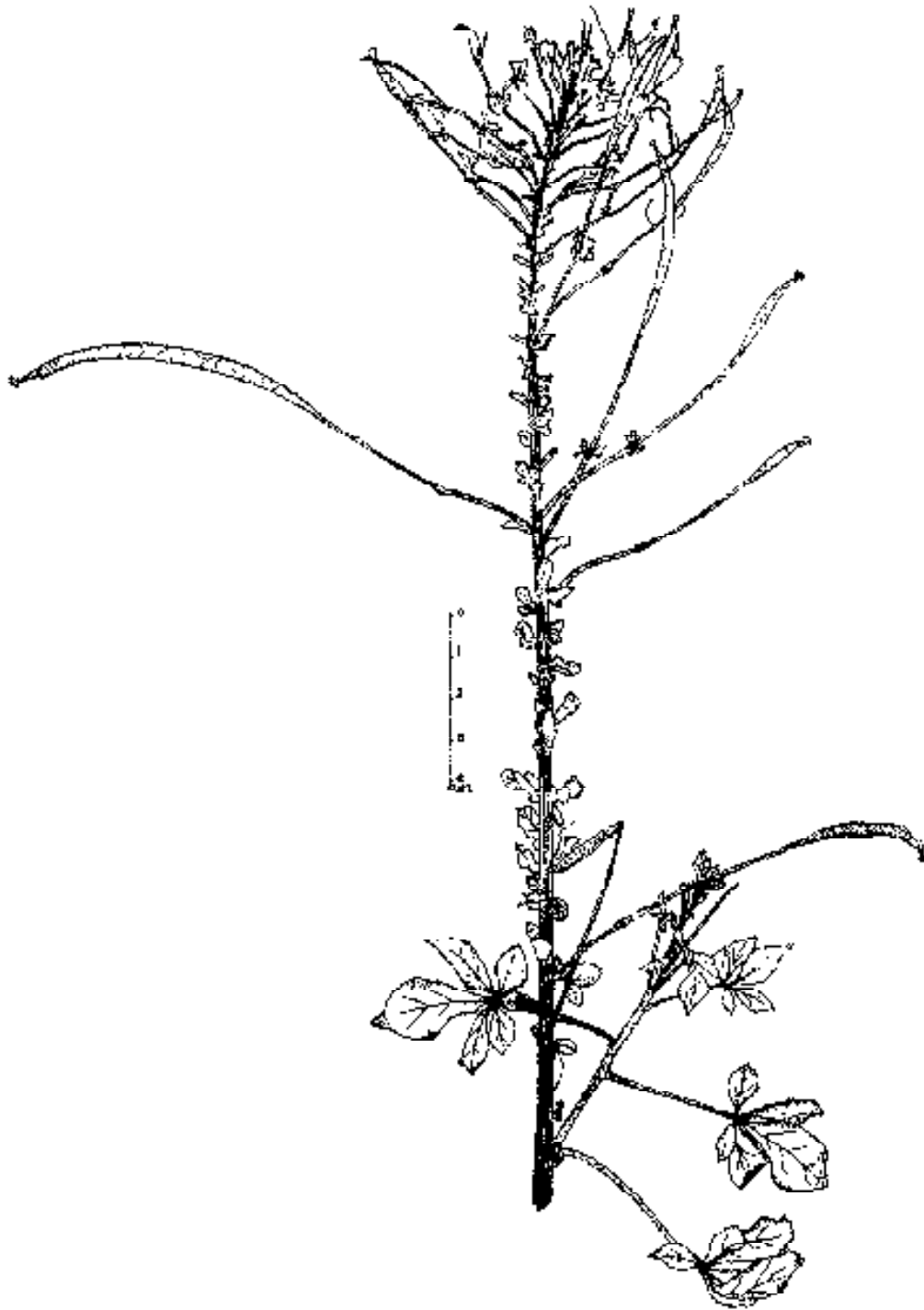


Fig. 16. *Cleome gynandra* L.

5. *Cleome monophylla* L., Sp. Pl. 672. 1753; Hook.f. & Thoms. in Hook.f., Fl. Brit. Ind. 1: 168. 1872.

Erect, hairy, branched herbs, 30-60 cm tall. Leaves oblong or oblong-lanceolate or ovate-lanceolate, 2.5-5 cm long. Flowers 1.2-2.5 cm long in racemes in the axils of petioled bracts, purple coloured; racemes elongating in fruit; petals long-clawed ascending; stamens 6. Capsules 5-10 cm long, linear, striate, beaked; seeds nearly orbicular, flat, prominently ribbed.

Along road sides and in cultivated fields. Balaghat, Bastar, Bilaspur, Hoshangabad, Indore, Jabalpur, Mandla, Raigarh, Rajnandgaon, Seoni, Surguja. Fl. & Fr. : July - Nov.

6. *Cleome simplicifolia* (Camb.) Hook.f. & Thoms. in Hook.f., Fl. Brit. Ind. 1: 169. 1872. *Polanisia simplicifolia* Camb. in Jacq. Voy. Bot. 20, t. 20. 1844.

Erect herbs, 10-25 cm tall, hairy. Leaves 2.5-5 cm long, obovate-oblong or elliptic-oblong, obtuse or acute, scabrid. Flowers 8 mm long, pale to bright-purple in elongate racemes; stamens 10-12, filaments filiform. Capsules 1.5-2.5 cm long, subsessile, spindle shaped, glabrous, torulose or subtorulose, beak 4 mm long; seeds pale-brown, glabrous, smooth, large.

In dry waste places. Gwalior, Hoshangabad, Indore, Mandla, Raigarh, Satna. Fl. & Fr. : July - Sept.

7. *Cleome viscosa* L., Sp. Pl. 672. 1753; Hook.f. & Thoms. in Hook.f., Fl. Brit. Ind. 1: 170. 1872. - *Hulhul*, *Hurhur*.

Glandular-pubescent annual herbs, 30-80 cm tall. Leaves 3-5 foliolate, petioled; leaflets elliptic-oblong, glabrous above, pubescent beneath, sessile or subsessile. Flowers 1-1.5 cm across, solitary, axillary in terminal lax racemes. Sepals 6-7 mm long. Petals 7-12 mm long, yellow. Stamens 10-20. Capsules 4-8 cm long, cylindric, viscid, minutely beaked, pedicels 2-3 cm long; seeds numerous, dark-brown, reniform, 1.2 mm long.

Growing in waste land. Balaghat, Bilaspur, Dhar, Durg, Hoshangabad, Indore, Jabalpur, Mandla, Raipur, Rajnandgaon, Rewa, Satna, Sidhi, Tikamgarh. Fl. & Fr. : Throughout the year.

3. CRATEVA L.

Trees or shrubs, deciduous, often flowering when leafless, glabrous; branchlets often lenticellate; stipules minute, caducous. Petioles straight, sulcate above, about as long as the leaflets. Leaves palmately compound, 3-foliolate; leaflets short-stalked to sometimes subsessile, widest about the middle, lateral ones asymmetrical, base acute to cuneate, apex mostly

acuminate. Racemes terminal on new twigs, corymbiform. Flowers long-pedicelled. Sepals 4, equal, valvate, ovate-spathulate. Petals 4, long-clawed, mostly subequal, white turning to cream colour. Stamens on androphore adnate to gynophore, (8-) 12-50; filaments approximately equalling the gynophore, filiform. Gynophore slender; ovary 1-locular, placentae 2, the ovules in 4 or more rows. Fruits 1.5-6 (-20) cm long, globose to elongate berries; seeds ca 1 cm, dull brown, horseshoe-shaped.

About 8 species, pantropical, except in Australia and New Caledonia, and absent in desert areas; 3 in M.P.

1a. Fruits greyish, anyway when dried, mostly roughish with dry flat papillae; trees in full foliage during anthesis; flowers not orange-brown in the herbarium:

2a. Leaflets very thin, even when mature, mostly sessile dull above; twigs mostly straw-coloured when dried

... 2. *C. religiosa*

2b. Leaflets subcoriaceous when mature, at least 3 mm long stalked, less glossy above, the under surface paler; twigs mostly brownish when dried

... 3. *C. unilocularis*

1b. Fruits red-violet-brownish tinged, anyway when dried, throughout smooth; tree during anthesis bare or the foliage at that time very young; flowers, especially their basal parts, orange-brown tinged in the herbarium

... 1. *C. adansonii* ssp. *odora*

1. *Cratogeomys adansonii* DC., Prodr. 1: 243. 1824. ssp. *odora* (Buch.-Ham.) Jacobs in Blumea 12 (2): 198. 1964. *Cratogeomys odora* Buch.-Ham. in Trans. Linn. Soc. London 15: 118. 1827. *Cratogeomys roxburghii* R. Br. in Denh. & Clapp. Nar. Trav. Disc. Afr. App. 224. 1826, as interpreted by Wight & Arn. Prodr. 23. 1834; Wight in Hook. Ic. Pl. t. 137. 1837. *Cratogeomys religiosa* Forst f. var. *roxburghii* (R.Br.) Hook.f. & Thoms. in Hook.f., Fl. Brit. Ind. 1: 172. 1872, p.p.

Small trees. Petiole 7-9 (-10.5) cm long, with small glands above at the top. Leaflets with 5 (-10) mm long petiolules, widest about the middle, the lateral ones asymmetric, narrowed to base, abruptly narrowed to apex into 1.5-2.5 cm long acumen, the tip acute; nerves 4-5 pairs; petiole 10-15 cm long on vegetative shoots; leaflets up to 1 cm long stalked, 5-6 nerved. Inflorescence producing a few flowers, sometimes 12-20 flowers; pedicels 3-5 (-7) cm long. Sepals elliptic. Petals initially green later white-yellowish or pale pink, clawed, elliptic. Stamens 15-26, initially white, later lilac or purplish. Gynophore 2.75-5 cm long, lilac; ovary ellipsoid. Fruit globose.

Bilaspur, Jabalpur, Rewa, Raigarh. Fl. & Fr. : April - June.

2. *Crateva religiosa* Forst.f., Pl. Escul. Ins. Oc. Austral. 45. 1786; Hook.f. & Thoms. in Hook.f., Fl. Brit. Ind. 1: 172. 1872, p.p. (excl. vars.); Jacobs in Blumea 12 (2) : 191. 1964.

Small trees, with foliage during anthesis; twigs with many large lenticels. Petiole 6-10 cm long; leaflets mostly sessile, thinly herbaceous, dull green, variable in size, top abruptly acuminate; nerves 7-11 pairs; petiole up to 22 cm long on sterile twigs; leaflets up to 27 cm long. Flowers a few to 25, above the axils of smaller leaves; pedicels 2-9 cm long. Petals white, turning creamy, sometimes orangish. Stamens (10-) 13-18 (- 30), dark red or violet. Gynophore 4-7 cm long ovary subcylindrical to ovoid. Fruit on 5-14 cm long gynophore, elongate to subglobose, covered with flat, pale, dry papillae on maturity.

Planted along road sides. Damoh. Fl. & Fr. : March - June.

3. *Crateva unilocularis* Buch.-Ham. in Trans. Linn. Soc. London 15: 121. 1827; Jacobs in Blumea 12 (2): 193. 1964. *Crateva religiosa* sensu Hook.f. & Thoms. (non Forst.f.) var. *roxburghii* (R. Br.) Hook.f. & Thoms. in Hook.f., Fl. Brit. Ind. 1: 172. 1872, p.p; Kaushik in Bull. Bot. Surv. India 11: 53.1971. -*Varuna*.

Small trees with full foliage during anthesis. Petiole 5-12 cm long, with distinct glands. Leaflets 4-12 mm long stalked, thinly coriaceous, the lateral ones asymmetric, with a short acute acumen, midrib reddish; nerves 5-10 pairs, reticulation distinct. Inflorescence bearing 10-40 flowers; pedicels 3.5-7 cm long. Sepals 7-12 mm long. Petals 7-18 mm long, clawed, the limb 12-25 mm long. Stamens 15-20; androphore negligible. Gynophore 3.5 - 6.5 cm long. Fruits globose, rough with minute flat papillae; seeds smooth, dull brown.

In dry deciduous forests. Central Province (CAL), Shivpuri (Kaushik, 1971). Fl. & Fr. : March - June.

4. MAERUA Forsk.

Climbing shrubs. Leaves simple. Flowers corymbose. Calyx tube lined by the disk, with 4 valvate lobes. Petals 4, inserted on the edge of the disk, ovate, smaller than the calyx lobes. Stamens many, inserted on the torus. Ovary long-stalked, 1-celled or becoming 2-celled by the cohesion of the placentae. Berry fleshy, elongate, moniliform, 1 or more-seeded. Cotyledons fleshy, involute.

About 100 species, tropical; one in M.P.

Maerua arenaria (DC.) Hook.f. & Thoms. in Hook.f., Fl. Brit. Ind. 1: 171. 1872. *Nieburhia arenaria* DC., Prodr. 1: 244. 1824.

Unarmed, large, glabrous, climbing shrubs. Leaves entire, glabrous, leathery, petiolate. Flowers 1.5-2.5 cm across, in axillary and terminal corymbs; calyx tube half as long as the limbs, dilated upwards. Fruits 4-5 cm long, glabrous, pendulous, deeply constricted between the seeds; seeds brown, glabrous, echinate.

On lower hill slopes in dry deciduous forests. Gwalior, Hoshangabad. Fl. & Fr. : Feb. - June.

11. VIOLACEAE

(A. K. Mukherjee)

About 16 genera and 900 species cosmopolitan; 2 genera and 3 species in M.P.

- 1a. Sepals not produced at base; anthers free ... 1. *Hybanthus*
 1b. Sepals produced at base; anthers connate ... 2. *Viola*

1. HYBANTHUS Jacq.

Herbs or undershrubs. Leaves alternate or rarely sub-opposite to opposite; stipules persistent, rarely deciduous. Peduncles articulate. Flowers purple or white to orange, single or several in the axils of leaves or racemose. Sepals sub-equal. Petals unequal, the anterior petal sometimes small or much enlarged than the rest with prolongation beyond the base, umbonate or somewhat pouch-like, spurred. Stamens free or coherent, anther free or more or less united, 2 (rarely 4) of them gibbous or spurred. Style clavate, incurved; stigma oblique, anteriorly directed. Capsules 3-valved, elastic.

About 150 species in tropical and subtropical areas of America, Africa, Asia, Australia; one in M.P.

Hybanthus enneaspermus (L.) F. v. Muell., *Fragm. Phyt. Austr.* 10: 81. 1876. *Viola enneasperma* L., *Sp. Pl.* 937. 1753. *Viola suffruticosa* L., *Sp. Pl.* 937. 1753. *Ionidium suffruticosum* (L.) Roem. & Schult., *Syst. Veg.* 5: 394. 1819; Hook.f. & Thoms. in Hook. f., *Fl. Brit. India* 1: 185. 1872. -*Ratanpurus*.

Annual or perennial herbs, spreading or half erect, very variable in habits and in leaf form; branched near the base, pubescent. Leaves variable, sub-sessile, oblong-lanceolate, mucronate, crenate or serrate; stipules subulate. Peduncles 2-bracteolate, shorter than the leaves. Flowers red, axillary, solitary. Sepals keeled, sub-equal, triangular, acuminate. Petals 4, variable in size and shape, oblong, acute or mucronate, the lower one nearly orbicular, obtuse, reticulate. Capsules ca 5 mm long; seeds conspicuously longitudinally ribbed.

Among grasses along roadsides, forest fringes, banks of streams, amongst forest undergrowth, and in cultivated fields. In almost all the districts. *Fl. & Fr.* : Aug. - Feb.

2. VIOLA L.

Herbs, often suffruticose, rarely shrubby. Leaves alternate, entire to pinnatisect; stipules persistent, free or adnate to petiole. Flowers irregular, 1-2 on 2 bracteolate axillary peduncles, often cleistogamous. Sepals persistent. Petals erect or spreading, the lowest usually spurred and largest, others sub-equal, flat. Anthers sub-sessile, the connectives of the lower 2 often produced into spurs within the spur of the corolla. Style often geniculate at base, filiform or clavate. Stigma obtuse, lobed or triangular marginate, somewhat truncate, often beaked or not. Fruits 3-valved loculicidal capsules.

About 500 species in temperate regions; 2 in M.P.

- 1a. Plants with superterranean, decumbent or ascending stems or stolons; stipules free from petioles

... 2. *V. cinerea* var. *stocksii*

- 1b. Plants without superterranean stems or stolons; stipules more or less adnate to the petioles

... 1. *V. betonicifolia*

1. *Viola betonicifolia* J.E. Smith in Rees Cyclop. 37: Viola n. 7. 1819; Banerjee & Pramanik in Fasc. Fl. India 12: 15. 1983. *Viola patrinii* sensu Hook.f. & Thoms. in Hook.f., Fl. Brit. Ind. 1: 183. 1872 *pro max. p., non* DC. 1824) Fig.17,

Leaves in rosette; lamina 2-8×1-3 cm, glabrous to more or less pubescent, roundish obtuse; petioles more or less winged above. Stipules 0.5-1 cm long, ovate-lanceolate, acuminate, sparsely short fimbriate, adnate up to the middle point. Peduncles 5-15 cm long, 2-bracteolate at the middle. Flowers lilac. Sepals ovate to ovate-lanceolate, acute or acuminate. Petals up to 1 cm long, obovate-oblong, lateral petals usually bearded at the base; spur cylindrical. Capsules up to 1 cm long, ellipsoid to oblong, glabrous.

In moist shaded rock crevices: Hoshangabad - Jabalpur, Surguja. *Fl. & Fr.* : Jan. - May.

2. *Viola cinerea* Boiss. var. *stocksii* (Boiss.) W. Beck. in Beih. Bot. Centralbl. Abt. 2, 36. 37. 1918; Banerjee & Pramanik in Fasc. Fl. India 12: 20. 1983. *Viola stocksii* Boiss., Fl. Orient. 1: 453. 1867. *Viola cinerea* sensu Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. 1: 185. 1872; *non* Boiss. 1867.

Suffruticose, much branched herbs. Leaves ovate, oblong-obovate to elliptic-lanceolate or sub-spathulate, acute, glabrous, crenulate to sub-dentate. Stipules subulate, mostly denticulate. Peduncles up to 4.5 cm

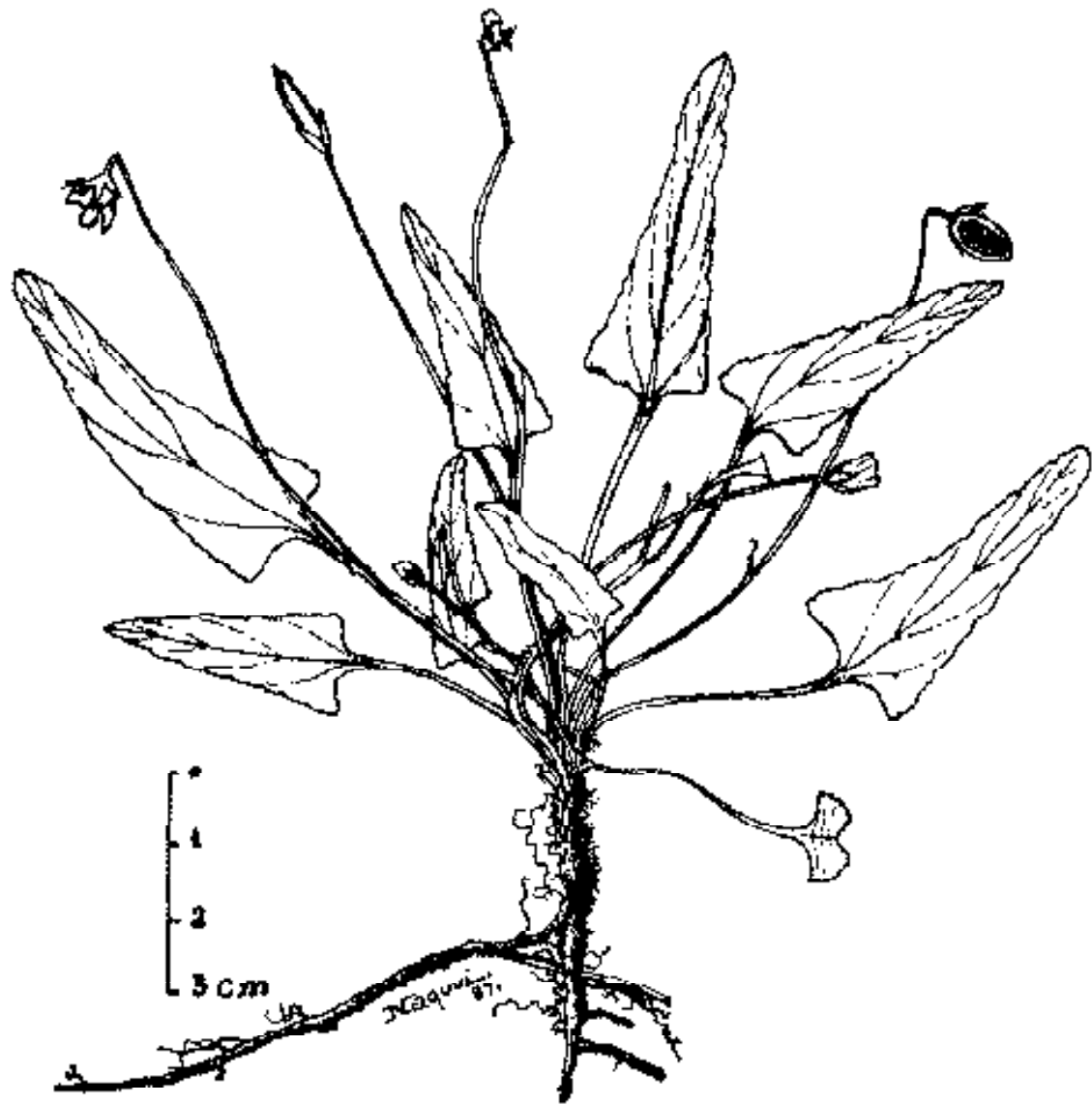


Fig. 17. *Viola betonicifolia* J.E. Smith

long. Flowers pale violate or white. Sepals lanceolate, aristate, glabrous. Lower petal shortly spurred. Style clavate, compressed; stigma of 2 oblong parallel discs. Capsules cylindric, acute; seeds ovoid, white, shining.

On hill slopes. Chambal valley (Agarkar, 1969). Fl. : July - Sept.; Fr. : Aug. - Oct.

12. BIXACEAE

(A. K. Mukherjee)

A monotypic family with 4 species distributed in the tropical regions; one in M.P.

BIXA L.

Shrubs or small trees. Leaves simple, stipules minute. Flowers in terminal panicles, bisexual. Sepals 5, imbricate, deciduous. Petals 5, contorted in bud. Anthers opening by 2 terminal pores. Ovary 1-celled; style slender, curved; ovules numerous, on 2 parietal placentae. Capsules loculicidally 2-valved. Seeds many, testa red and pulpy; albumen fleshy; embryo large; cotyledons flat.

Bixa orellana L., Sp. Pl. 512. 1753; Hook.f. & Thoms. in Hook.f., Fl. Brit. Ind. 1: 190. 1872.

Small evergreen trees. Leaves cordate, acuminate, 10-20 cm long, glabrous and somewhat shining; petioles slender, 5-7 cm long. Flowers white or rose, 2.5-5 cm in diameter, in terminal panicles. Ovary 1-celled. Ovules on 2 parietal placentae. Capsules 4 cm long, ovoid, softly echinate.

Planted and often found as an escape. Bilaspur. Fl.: July - Sept.; Fr. : Oct. - Nov.

13. COCHLOSPERMACEAE

(A. K. Mukherjee)

About 2 genera and 20-25 species in the tropical regions; one in M.P.

COCHLOSPERMUM Kunth

Trees or shrubs with yellow or red juice. Leaves palmately lobed. Flowers bisexual. Sepals 5, deciduous. Petals 5, large, contorted in bud. Stamens many, inserted on an eglandular disk; anthers opening by a short slit at the top. Ovary nearly 3-5 celled; ovules numerous on 3-5 parietal placentae; style 1, filiform. Capsules 3-5-valved; seeds numerous, cochleate; testa with long woolly hairs; albumen oily; embryo curved.

About 20 species in the tropics; one in M.P.

Cochlospermum religiosum (L.) Alston in Trimen, Handb. Fl. Ceyl. 6 (Suppl.) 14. 1931. *Bombax religiosum* L., Sp. Pl. 512. 1753. *Cochlospermum gossypium* DC., Prodr. 1: 527. 1824; Hook.f. & Thoms. in Hook.f., Fl. Brit. Ind. 1: 190. 1872.— *Kumbi; Galgal.*

Small trees with very soft wood. Leaves palmately 3-5-lobed, tomentose beneath when young, glossy above. Flowers yellow, 10-12 cm in diameter, in few-flowered terminal panicles, produced when leafless. Petals emarginate. Capsules 7-10×6 cm, 5-celled at the base, dehiscing on different lines; seeds many, reniform, brown, clothed with floss.

In deciduous forests on hill slopes. Bastar, Bilaspur, Durg, Jabalpur, Raipur, Rajnandgaon, Seoni, Satna. Fl. : Jan. – March; Fr. : March – June.

14. FLACOURTIACEAE

(A. K. Mukherjee)

About 90 genera and over 1,000 species in the tropical and sub-tropical regions; 3 genera and 5 species in M.P.

- 1a. Flowers bisexual; staminodes present ... 1. *Casearia*
- 1b. Flowers unisexual, plants dioecious; staminodes absent:
 - 2a. Styles 2 or more ; ovary 2 or more locular ; leaves pubescent, ovate ... 2 *Flacourtia*
 - 2b. Style 1; ovary unilocular; leaves glabrous, lanceolate. ... 3. *Xylosma*

1. CASEARIA Jacq.

Small trees or shrubs. Leaves simple, alternate, petiolate; margin entire or slightly serrate; stipules caducous. Flowers in axillary fascicles; calyx 4-5-lobed, persistent; petals absent; stamens 10-12, alternating with the staminodes; ovary ovoid, unilocular. Fruits capsular, globose or ovoid; dehiscence loculicidal; seeds numerous, embedded in a fleshy aril.

About 250 species, mostly American; 2 in M.P.

- 1a. Leaves and petioles tomentose ... 1. *C. elliptica*
- 1b. Leaves and petioles glabrous ... 2. *C. graveolens*

1. *Casearia elliptica* Willd., Sp. Pl. 2: 628. 1799. *Casearia tomentosa* Roxb., Fl. Ind. 2: 421. 1832; Clarke in Hook.f., Fl. Brit. Ind. 2: 593. 1879. — *Chilla; Kirchi.*

Small trees with tomentose branches. Leaves oblong to lanceolate, tomentose; margins slightly serrate. Flowers in clusters; sepals ovate to obovate, tomentose; stamens 6-10, alternating with the fleshy staminodes; style short; stigma capitate. Capsules 6- angular; ellipsoid, soft green; seeds

many, embedded in red pulp.

In dry deciduous forests. Bastar, Balaghat, Bilaspur, Damoh, Durg, Hoshangabad, Mandla, Raigarh, Raipur, Seoni, Sidhi, Surguja. *Fl.*: March - May; *Fr.*: April - May.

2. *Casearia graveolens* Dalz. in Hook. Kew. J. Bot. 4: 107. 1852; Clarke in Hook. f., *Fl. Brit. Ind.* 2: 592. 1879.

Small trees with glabrous twigs. Leaves elliptic or elliptic-oblong or ovate, glabrous. Flowers greenish, in dense clusters from the leafless axils; sepals 5, gland dotted; stamens 6-8, alternating with linear-oblong villous staminodes. Fruits broadly ellipsoid or broadly oblong, yellow.

In dry deciduous forests. Bilaspur, Chhindwara, Hoshangabad, Jabalpur, Mandla, Raipur, Sidhi, Surguja. *Fl.*: May - June; *Fr.*: May - July.

2. FLACOURTIA Commers. ex L' Herit.

Small trees or shrubs, usually thorny. Leaves toothed or crenate. Flowers small, usually dioecious; sepals imbricate, small; petals absent; stamens numerous, anthers versatile; disc lobulate and glandular; ovary 2-8 celled; styles 2 or more, stigmas usually notched. Berries with several 1-seeded pyrenes.

About 60 species in tropical Africa and Asia; 2 in M.P.

1a. Leaves and twigs pubescent; leaf apex obtuse to acute. 1. *F. indica*

1b. Leaves and twigs glabrous; leaf apex acuminate ... 2. *F. jangomas*

1. *Flacourtia indica* (Burm.f.) Merr., *Interpr. Rumph. Herb. Amb.* 377. 1917. *Gmelina indica* Burm.f., *Fl. Ind.* 132. t. 39. f. 5. 1768. *Flacourtia ramontchi* L' Herit., *Strip. Nov.* 3: 59, tt. 30 & 30 b. 1786; Hook.f. & Thoms. in Hook.f., *Fl. Brit. Ind.* 1: 193. 1872. *Flacourtia sepiaria* Roxb., *Pl. Corom.* 68. 1796; Hook.f. & Thoms. in Hook.f., *Fl. Brit. Ind.* 1: 194. 1872. -*Bilanga; Kanju.*

Deciduous shrubs or small trees with young branches and leaves pubescent; spines axillary. Leaves ovate to almost orbicular; veins prominent, pubescent; margins crenate to serrate, apex obtuse to acute. Male flowers in short branched clustered racemes, sometimes on the thorns; calyx pubescent; stamens numerous. Female flowers on short branches, solitary or in pairs; pedicels villous; sepals villous; ovary glabrous; stigmas 5-10. Fruits globose; seeds obovoid.

In scrub forests. In almost all the districts. *Fl.*: March - April; *Fr.*: April - May.

2. *Flacourtia jangomas* (Lour.) Raeusch., *Nomencl. Bot.* ed. 3, 280. 1797. *Stigmarota jangomas* Lour., *Fl. Cochinch.* 634. 1790. -*Flacourtia*

cataphracta Roxb. ex Willd., Sp. Pl. 4: 830. 1806; Hook.f. & Thoms. in Hook.f., Fl. Brit. Ind. 1: 193. 1872. -*Paniafah*.

Small trees, long thorned when young, deciduous. Leaves oblong to oblong-lanceolate, acuminate, quite glabrous, crenate, serrate. Flowers in glabrous racemes, dioecious. Stigmas 4-6, capitate; ovary flask-shaped, contracted at neck. Fruits 1-2.5 cm in diameter, purple when ripe.

In sal forests. In almost all the districts. Fl. : June - July; Fr. : Aug. - Dec.

3. XYLOSMA Forst. f.

Deciduous trees, spiny when young. Leaves lanceolate, alternate, glabrous. Flowers in clusters. Stamens numerous with glandular disc at the base. Ovary on a disc, unilocular; style short; stigma lobed. Fruit a berry; seeds 2-8.

About 100 species in tropical and sub-tropical regions except in Africa; one in M.P.

Xylosma longifolia Clos. in Ann. Sci. Nat. Bot. Sér. 4, 8: 231. 1857; Hook.f. & Thoms. in Hook.f., Fl. Brit. Ind. 1: 194. 1872. -*Dandal, Katari*.

Small, glabrous trees often with long thorns when young. Leaves lanceolate, acuminate, shallowly toothed. Flowers small, greenish in short axillary compound racemes. In male flowers sepals ovate; anthers dorsifixed. In female flowers sepals imbricate; pedicels articulate, pubescent; style short; stigma lobed. Fruits globose, deep-red; seeds oblong to obovoid.

In mixed forests on the hills. Raigarh. Fl. : Dec. - Jan.; Fr. : Feb. - April.

15. PITTOSPORACEAE

(A. K. Mukherjee)

About 9 genera and 200 species in tropical Africa, Asia, Australia, New Zealand and Pacific Islands; one in M.P.

PITTOSPORUM Banks & Soland ex Gaertn.

Trees or erect shrubs, usually green. Leaves alternate or sub-verticillate, entire, ostipulate. Flowers terminal or axillary. Sepals 5, imbricate. Petals 5, hypogynous, imbricate, erect, with connivent or connate claws. Torus small. Stamens 5, erect; anthers versatile, 2-celled, introrse. Ovary incompletely 2-3 celled by the projection of the parietal placentae, not on a gynophore; style simple; stigma terminal, 2-3 lobed; ovules 2 or more on each placenta. Capsules 1-celled, 2-3 valved, with the valves placentiferous in the middle; seeds smooth, embedded in pulp, with

copious rather leathery albumen.

About 150 species in tropical and sub-tropical Africa, Asia, Australia, New Zealand and Pacific Islands; one in M.P.

Pittosporum wightii A.K. Mukherjee in J. Econ. Tax. Bot. 5:50. 1984. *Pittosporum floribundum* Wight & Arn., Prodr. 1: 154. Oct. 1834 (non Wight & Arn. ex Royle, June 1834); Hook.f. & Thoms. in Hook.f., Fl. Brit. Ind. 1: 199. 1872, p.p.; Gowda in J. Arn. Arb. 32 (4): 332. 1951. *Pittosporum napaulensis sensu* Blatt. in Bombay nat. Hist. Soc. 34: 302. 1930; non (DC.)Rehder & Wilson, 1916. *Pittosporum napaulensis sensu* Nayar & Giri in Fasc. Fl. India 6: 8. 1980, p.p.

Small trees with branches and leaves often sub-verticillate. Leaves lanceolate, oblong or oblanceolate, 6-12 cm long, 2-4 cm wide, thinly coriaceous, acute at apex; petiole slender, 1.5-2 cm long. Flowers small, yellow, numerous in sub-corymbose inflorescence, slightly pubescent with whitish silky short hairs. Sepals oblong to oblong-ovate, aciliate. Capsules globose, 2-valved, 3-4 seeded; seeds surrounded by viscid juice, with red testa.

In forests on higher hill slopes. Bilaspur, Surguja. Fl.: June - July; Fr.: Aug. - Oct.

16. POLYGALACEAE

(A. K. Mukherjee)

About 12 genera and 800 species, cosmopolitan, excluding New Zealand, Polynesia and arctic zone; 2 genera and 14 species in M.P.

- 1a. Herbs or shrubs; two inner sepals (wings) larger, petaloid; stamens 8; seeds strophiolate ... 1. *Polygala*
- 1b. Small annual herbs; all sepals petaloid, subequal; stamens 4-5; seeds not strophiolate ... 2. *Salomonina*

1. POLYGALA L.

Herbs, rarely shrubs. Leaves alternate. Inflorescence racemose with irregular papilionaceous flowers, with the "wings" formed of the two inner, larger, usually petaloid and persistent sepals. Petals 3, united at the base with the staminal tube, inferior, tubular or keel-shaped and generally crested. Stamens 8; filaments united for their lower half into a split tube or sheath; anthers opening by pores. Ovary 2-celled; ovule 1 in each cell, pendulous. Capsules 2-celled, loculicidal, 2-seeded; seeds usually carunculate at micropyle and albuminous.

About 600 species, cosmopolitan, excluding New Zealand, Polynesia and arctic zone; 13 in M.P.

- 1a. Sepals caducous; wing sepals clawed at base; keel crested with 2 flap-like appendages; style urceolate at apex; capsule truncate at apex ... 7. *P. furcata*
- 1b. Sepals persistent; wing sepals not clawed at base; keel crested with more than 8 filiform or flattened appendages; style not urceolate at apex; capsule not truncate at apex:
- 2a. Caruncle without appendages; seeds covered with long hairs ... 1. *P. abyssinica*
- 2b. Caruncle with a broad membranous, short tooth or linear to oblong appendages; seeds not covered with long hairs:
- 3a. Caruncle with broad membranous winged appendages, covering more than half the length of seeds:
- 4a. Flowers purple or violet; style apex horseshoe-shaped; capsules winged, almost glabrous; caruncle appendages oblong-obovate ... 12. *P. sibirica*
- 4b. Flowers yellow; style apex hooked; capsules margined, ciliate along the margins; caruncle appendages sub-orbicular ... 8. *P. jacobii*
- 3b. Caruncle with short toothed or linear to narrowly oblong appendages :
- 5a. Wing sepals symmetric, petaloid; lateral petals obliquely quadrangular or oblong:
- 6a. Bracts persistent; flowers 5-6 mm long; wing sepals sub-orbicular or ovate-rounded :
- 7a. Perennial herbs with woody base; leaves 3-times as long as broad or shorter; caruncle with 2 appendages ... 4. *P. crotarioides*
- 7b. Annual herbs; leaves 5 times as long as broad or shorter; caruncle with 3 appendages ... 10. *P. persicariifolia*
- 6b. Bracts caducous; flowers 3.5 mm long; wing sepals elliptic-obovate ... 9. *P. longifolia*
- 5b. Wing sepals asymmetric, herbaceous; lateral petal obovate, ovate or suborbicular :
- 8a. Capsules orbicular or sub-orbicular :

- 9a. Perennials; bracts caducous; staminal sheath bearing 2 free filaments at the centre and 2 bundles of 3 filaments; style broadened like a knob with a tooth at apex ... 13. *P. telephioides*
- 9b. Annuals; bracts persistent; staminal sheath bearing 8 free filaments; style horseshoe-shaped at apex ... 3. *P. chinensis*
- 8b. Capsules oblong, obliquely oblong, elliptic-oblong, ovate-oblong or rhomboid :
- 10a. Wing sepals elliptic-oblong or elliptic-obovate, obtuse to subobtusate at apex; style widened at apex like a knob. ... 6. *P. erioptera*
- 10b. Wing sepals obliquely ovate or ovate-elliptic, acute or acuminate at apex; style horseshoe-shaped or hook-like with wings at apex :
- 11a. Keel crested with shortly or deeply forked filiform appendages; caruncle with 2 oblong membranous appendages and a pointed tooth ... 11. *P. rosmarinifolia*
- 11b. Keel crested with shortly forked or notched blunt appendages; caruncle 3-toothed :
- 12a. Racemes up to 2 cm long; wing sepals sparsely pubescent without; style apex hooked; capsule symmetric, ovate-oblong, densely ciliate ... 2. *P. arvensis*
- 12b. Racemes 4-5 cm long; wing sepals glabrous sometimes sparsely puberulous only along the margins; style horseshoe-shaped at apex; capsules asymmetric, rhomboid; not or scarcely ciliate ... 5. *P. elongata*

1. *Polygala abyssinica* R. Br. ex Fresen., Mus. Senck. 2: 273. 1837; Bennett in Hook.f., Fl. Brit. Ind. 1: 202. 1872.

Perennial hairy herbs. Leaves narrow-linear, glabrous or sparsely hairy, acuminate, scarcely petioled. Flowers pale rose in terminal lax racemes; bracts caducous, narrowly ovate, margins membranous as are the outer sepals; wings obovate, obtuse, nerved. Capsules oblong, retuse, glabrous or glabrescent, ciliate on margins; seeds brown, oblong, laxly hairy.

Amongst grasses. Shahdol (Tiwari, 1968). Fl. & Fr. : June - March.

2. *Polygala arvensis* Willd., Sp. Pl. 3: 876. 1802; Burt in Notes Roy. Bot. Gard. Edinb. 32: 404. 1973. *Polygala chinensis* auct. pl. (non L. 1753); Bennett in Hook.f., Fl. Brit. Ind. 1: 204. 1872, p.p. -Meradu, Miragu.

Herbs with leaves orbicular, obovate, elliptic, elliptic-oblong, linear-oblong, recurved, mucronate, narrowed towards base, shortly petioled. Flowers usually yellow, solitary or in lateral racemes. Outer sepals sub-equal, pubescent without; wing sepals obliquely ovate. Lateral petals as long as the keel; keel crested with appendages. Staminal sheath free. Style curved, hooked at apex. Capsules ovate-oblong; seeds black, elliptic-obovate, pilose; caruncle hood-shaped with 3-toothed appendages.

On hill slopes in open situations and in plains. Bastar, Betul, Bilaspur, Durg, Hoshangabad, Indore, Mandla, Rajnandgaon, Raigarh, Raipur, Rewa, Satna, Seoni, Sidhi, Surguja, Tikamgarh. *Fl. & Fr.* : Almost throughout the year.

3. *Polygala chinensis* L., Sp. Pl. 704. 1753. *Polygala glomerata* Lour., Fl. Cochinch. 426. 1790; Bennett in Hook.f., Fl. Brit. Ind. 1: 206. 1872.

Erect or ascending herbs, up to 50 cm tall. Leaves elliptic, elliptic-oblanccolate or obovate, shortly petiolate. Flowers pale blue in few-flowered supra-axillary racemes. Outer sepals unequal, ciliate along the margins. Lateral petals almost as long as the keel, obovate; keel crested with filiform appendages. Staminal sheath and filaments free. Style horseshoe-shaped at apex. Capsule suborbicular, caruncle hood-shaped with 2 membranous appendages and a short tooth.

An undergrowth in hill forests. Bastar, Satna, Seoni. *Fl. & Fr.* : April - Dec.

4. *Polygala crotalarioides* Buch.-Ham. ex DC., Prodr. 1: 327. 1824; Bennett in Hook.f., Fl. Brit. Ind. 1: 201. 1872.

Erect perennial herbs. Leaves obovate or oblanceolate, obtuse, pubescent, short-petioled. Flowers pinkish in axillary racemes. Outer sepals ovate-oblong; wing sepals obovate-rounded, ciliate. Keel crested with filiform appendages. Capsules orbicular, notched at apex, ciliate; seeds obovoid, dark brown, hairy; caruncle hood-shaped with 2 small ovate appendages.

An undergrowth in hill forests. Bilaspur, Jabalpur, Sagar, Sidhi, Surguja. *Fl. & Fr.* : July - Dec.

5. *Polygala elongata* Klein ex Willd., Sp. Pl. 3: 879. 1802; Bennett in Hook.f., Fl. Brit. Ind. 1: 203. 1872, *p.p.*

Erect-ascending annual herbs. Leaves oblong or elliptic-oblong, shortly petioled. Flowers yellow in lateral, leaf-opposed or terminal racemes. Outer sepals ovate-elliptic; wing sepals obliquely obovate-elliptic, acute. Lateral petals as long as the keel, obovate; keel crested with shortly forked and notched appendages. Capsules rhomboid, margined, obliquely

emarginate at apex; seeds oblong-obovate, densely hairy; caruncle hood-shaped with 3-toothed appendages.

An undergrowth in mixed forests. Balaghat, Bhopal, Durg, Gwalior, Hoshangabad, Narsimhapur, Raigarh, Raipur, Rajnandgaon, Satna, Seoni, Surguja. *Fl. & Fr.* : Aug. - Feb.

6. *Polygala erioptera* DC., Prodr. 1: 326. 1824; Bennett in Hook.f., Fl. Brit. Ind. 1: 203. 1872.

Erect or diffuse annual herbs. Leaves linear-oblong, elliptic-obovate, pubescent, subsessile. Flowers yellow in short few-flowered racemes. Outer sepals ovate. Lateral petals shorter than the keel, ovate; keel crested with filiform appendages. Capsules oblong, obliquely emarginate, margined, pubescent; seeds oblong, black, densely pilose; caruncle galeate with 3 short appendages.

In moist shaded places. Balaghat, Bhopal, Narsimhapur, Rewa, Satna, Seoni, Shivpuri, Sidhi, Tikamgarh. *Fl. & Fr.* : Almost throughout the year.

7. *Polygala furcata* Royle, Illus. Bot. Himal. t.19B. 1834. *Polygala triphylla* Buch.-Ham. ex D. Don var. *glaucescens* Wall. ex Bennett in Hook.f., Fl. Brit. Ind. 1: 120. 1872 (excl. syn. *Semiocardium hyalinum* Hassk.).

Erect ascending annual herbs. Leaves broadly elliptic; petioles up to 1 cm long. Flowers yellow in long racemes. Outer sepals ovate; wing sepals broadly ovate. Lateral petals as long as the keel, oblong-obtuse; keel crested with 2 flap like appendages. Capsules suborbicular, truncate and notched at apex narrowly winged; seeds elliptic-oblong, black, tuberculate; caruncle hood-shaped with 2 minute appendages.

In moist, shaded places on rocky slopes. Bastar, Bilaspur, Raigarh, Raipur, Seoni, Surguja. *Fl. & Fr.* : Aug.- Nov.

8. *Polygala jacobii* Chandrabose in Bull. Bot. Surv. Ind. 9: 288. ff. 1-7. 1968. *Polygala chinensis* sensu R. Mudaliar & Rao, Handb. South Indian Weeds 85. t. 32. 1955; non L., 1753. *Polygala dunii* Panigrahi in Kew Bull. 29: 655. 1974.

Erect ascending perennial herbs. Leaves oblong-obovate, oblanceolate, short-petioled. Flowers yellow, solitary, axillary or in small racemes. Outer sepals ovate-lanceolate; wing sepals obliquely ovate-oblong. Lateral petals as long as the keels, sub-orbicular, notched at apex; margins thick, ciliate; seeds obovoid, blackish-brown, with silky hairs; caruncle hood-shaped, with 3 broad membranous winged appendages covering 2/3 length of the seed.

In waste places and fallow fields. Hoshangabad, Indore, Mandla, Raipur, Satna, Seoni. *Fl. & Fr.* : Sept.- March.

9. *Polygala longifolia* Poir. in Lamk., *Encycl.* 5: 501. 1804. *Polygala leptalea* DC., *Prodr.* 1: 325. 1824; Bennett in *Hook.f.*, *Fl. Brit. Ind.* 1: 202. 1872.

Erect annual herbs. Lower leaves elliptic, elliptic-oblong; upper linear-oblong, glabrous or glabrescent, subsessile. Flowers pink in terminal racemes. Outer sepals unequal, lanceolate to oblanceolate; wing sepals elliptic-obovate, glabrous, 3-nerved. Lateral petals almost as long as the keel, obliquely quadrangular; keel crested with flattened appendages. Staminal sheath free; filaments free, united at the same level. Capsules obovate, oblong-obovate, notched at apex, margins winged, glabrous; seeds black, narrowly oblong, ciliate; caruncle small, with bluntly 3-toothed short appendages.

In moist, shaded places of forests. Bilaspur, Raigarh, Surguja. *Fl. & Fr.* : Nov. - March.

10. *Polygala persicariifolia* DC., *Prodr.* 1: 326. 1824; Bennett in *Hook.f.*, *Fl. Brit. Ind.* 1: 202. 1872.

Erect herbs. Leaves lanceolate, elliptic-lanceolate, linear-lanceolate or linear-oblong, subsessile. Flowers purple in terminal or extra-axillary racemes. Outer sepals subequal, elliptic-oblong, obtuse, puberulous on the margins; wing sepals suborbicular, puberulous on the margins or glabrescent. Lateral petals obliquely oblong, almost as long as the keel; keel crested with linear appendages. Staminal sheath free, filaments united at the same level. Capsules completely enclosed by the wing sepals, elliptic-oblong, emarginate, winged and ciliate along the margins; seeds blackish-brown, oblong, hirsute; caruncle hook-shaped with 3 short blunt appendages.

Growing amongst grasses. Indore. *Fl. & Fr.*: Sept. - Oct.

11. *Polygala rosmarinifolia* Wight & Arn., *Prodr.* 1: 37. 1834; Bennett in *Hook.f.*, *Fl. Brit. Ind.* 1: 204. 1872.

Erect, ascending or prostrate herbs. Leaves linear, oblong, elliptic-oblong, subsessile. Flowers yellow, in lateral or extra-axillary racemes, sometimes solitary. Outer sepals unequal, lanceolate to ovate-lanceolate, ciliate on margins; wing sepals obliquely ovate-elliptic, ciliate on margins. Lateral petals suborbicular, as long as or shorter than keel; keel crested with shortly forked filiform appendages. Style apex horseshoe-shaped. Capsules rhomboid or obliquely oblong, ciliate along the margins; seeds black, oblong-obovate, ciliate; caruncle hood-shaped with 2

oblong appendages and a short tooth.

Amongst grasses on hill slopes. Bastar, Jabalpur, Mandla. Fl. & Fr.: Aug. - Nov.

12. *Polygala sibirica* L., Sp. Pl. 702. 1753; Bennett in Hook.f., Fl. Brit. Ind. 1: 205. 1872, p.p.

Prostrate, ascending or erect herbs. Leaves oblong, elliptic-oblong, elliptic-lanceolate, lanceolate, obovate or oblanceolate, shortly petioled. Flowers purple or violet in axillary or extra-axillary racemes. Outer sepals unequal, elliptic-lanceolate, ciliate along the margins; wing sepals obliquely ovate-elliptic. Lateral petals sub-orbicular, almost as long as the keel; keel crested with filiform appendages. Staminal sheath free; filaments free, connate at different levels. Style apex horseshoe-shaped. Capsules suborbicular, notched at apex, margins winged; seeds blackish-brown, sparsely hairy; caruncle hood-shaped with 3-winged membranous appendages covering 2/3 length of seed.

Among grasses on the slopes. Sagar. Fl. & Fr. : Sept. - Nov.

13. *Polygala telephioides* Willd., Sp. Pl. 3:871-802; Bennett in Hook.f., Fl. Brit. Ind. 1: 205. 1872. *Polygala brachystachya* A.C., Prodr. 1: 326. 1824. *Polygala chinensis sensu* Adema in Blumea 14: 269. 1966 (non L. 1753).

Prostrate, ascending or erect herbs. Leaves elliptic-obovate, elliptic-oblong or oblanceolate, shortly petioled. Flowers violet or blue, crowded in lateral or leaf-opposed racemes. Outer sepals lanceolate to ovate-lanceolate, ciliate along the margins; wing sepals elliptic. Lateral petals much shorter than the keel, ovate keel; crested with thick, finger-like appendages. Staminal sheath split 2/3 its length with 2 free filaments in the middle and 2 bundles of 3 connate filaments on either side; anthers sessile. Style with a knob like stigma and a teeth. Capsules suborbicular; seeds obovate-oblong, ciliate, black; caruncle hood-shaped, with 3 linear appendages.

In open fields. Bastar. Fl. & Fr.: Jan. - Feb.

2. SALOMONIA Lour.

Leafy annuals or parasites, with leaves reduced to scales. Flowers minute in dense terminal spikes. Sepals nearly equal, inner 2 somewhat larger. Petals 3, adnate at the base with the staminal sheath; keel not crested. Stamens 4-5, connate into a sheath in the lower half. Ovary 2-celled, each with 1 ovule. Capsules laterally compressed, margins toothed; seeds not or scarcely caruncled.

About 8 species in Indo-Malayan region and Australia; one in M.P.

Salomonina ciliata (L.) DC., Prodr. 1: 334. 1824; Bennett in Hook.f., Fl. Brit. Ind. 1: 206. 1872. *Polygala ciliata* L., Sp. Pl. 705. 1753. *Salomonina oblongifolia* DC., l.c. Bennett in Hook.f., Fl. Brit. Ind. 1: 207. 1872.

Erect, glabrous, furrowed, scarcely winged, simple or branched annuals. Leaves small, sessile, ciliate or long hairy in the margins. Flowers crowded, small, pink, sessile. Sepals nearly equal, ciliate. Lateral petals much smaller than the keel. Capsules small with a row of red teeth, broader than long; seeds black, shining without or with a membranous caruncle.

In marshy places. Balaghat, Bastar, Rajnandgaon, Surguja. Fl. & Fr.: Aug. - Oct.

17. CARYOPHYLLACEAE

(A.K. Mukherjee)

About 70 genera and 1750 species, cosmopolitan; 6 genera and 9 species in M.P.

- 1a. Sepals connate into a tube; petals clawed ...6. *Vaccaria*
- 1b. Sepals free or nearly so; petals not clawed, or absent:
 - 2a. Styles free:
 - 3a. Petals 2-fid; stipules absent; leaves obovate or oblong...5. *Stellaria*
 - 3b. Petals entire; stipules scarious; leaves linear ...4. *Spergula*
 - 2b. Styles connate:
 - 4a. Petals 2-6 fid ...1. *Drymaria*
 - 4b. Petals entire or toothed:
 - 5a. Sepals keeled on the back; style 3-fid ...3. *Polycarpon*
 - 5b. Sepals scarious, not keeled on the back; style 3-toothed ...2. *Polycarpaea*

1. DRYMARIA Willd. ex Roem. & Schult.

Diffuse herbs. Leaves opposite, small, often with fugacious or bristly stipules. Sepals 5, herbaceous. Petals 5, 2-6 fid. Stamens 3-5, slightly perigynous. Ovary 1-celled. Style 2-3- fid. Capsules 2-3- valved; seeds usually few.

About 44 species, mainly from Mexico to Patagonia & West Indies; one in M.P.

Drymaria cordata (L.) Willd. ex Roem. & Schult. subsp. *diandra* (Bl.) Duke in Ann. Miss. Bot. Gard. 48: 253. 1961. *Drymaria diandra* Bl., Bijdr. 62. 1825. *Drymaria cordata sensu* Edgew. & Hook.f. in Hook.f., Fl. Brit. Ind. 1:

244. 1874, p.p.

Herbs with long, slender bases or creeping and rooting branches, often 30 cm long. Leaves in distant pairs, orbicular-ovate, 3-5-nerved from the base. Inflorescence sometimes glandular-pubescent, panicle branches very slender. Flowers very small. Sepals with membranous margins. Petals very small, 2-fid to the middle. Capsules 2-3-valved; seeds 1-2, brown, reniform, compressed.

In moist places along streams. Bilaspur. Fl. & Fr. : Throughout the year.

2. POLYCARPAEA Lamk.

Herbs, usually erect. Leaves opposite, sometimes pseudo-whorled; stipules scarious. Flowers in cymes. Sepals 5, free, scarious, and often coloured. Petals 5, entire, 2-toothed or crose. Stamens 5, hypogynous or subperigynous, sometimes cohering and adnate to petals. Ovary 1-celled; style slender, 3-fid or 3-toothed. Capsules 3-valved.

About 50 species, mainly tropical and subtropical; 2 in M.P.

- 1a. Much branched shrubs; leaves with inrolled margins; leaves in axils few or absent; stipules hardly fimbriate; internodes densely white-tomentose; sepals coloured ...1. *P. aurea*
- 1b. Erect herbs; leaves flat with leaf-fascicles in the axils; stipules much fimbriate; internodes with scattered hairs; sepals white ...2. *P. corymbosa*

1. *Polycarpaea aurea* Wight & Arn. in Ann. Nat. Hist. ser. 1,3: 91. 1839. *Polycarpaea corymbosa* (L.) Lamk. var. *aurea* (Wt. & Arn.) Wight, Ill. 2: 44. t. 110. 1850; Edgew. & Hook.f., Fl. Brit. Ind. 1: 245. 1874.

Much-branched shrubs. Leaves subulate with inrolled margins, axillary leaves a few or absent; stipules hardly fimbriate; internodes densely white-tomentose. Flowers very small. Sepals highly coloured, much exceeding the petals and capsules. Capsules oblong-ovoid, 3-valved; seeds numerous, glabrous, somewhat compressed, reniform, yellowish-brown.

Growing in rock crevices. Bastar, Bilaspur, Raipur. Fl. & Fr.: Aug. - Feb.

2. *Polycarpaea corymbosa* (L.) Lamk., Encycl. 2: 129. 1797; Edgew. & Hook.f. in Hook.f., Fl. Brit. Ind. 1: 245. 1874. *Achyranthes corymbosa* L., Sp. Pl. 205. 1753. Fig. 18.

Erect herbs with woody rootstocks and very slender, hairy, erect branches. Leaves linear, opposite, flat; sometimes pseudo-whorled from the



Fig. 18. *Polycarpha corymbosa* (L.) Lamk.

axillary leaf fascicles. Flowers small in terminal, silvery, paniced, dense, dichotomous cymes. Sepals lanceolate, very acute, brown and shining or silvery in fruit. Petals minute, red, entire, free. Ovary sometimes 4-ovuled. Capsules oblong-ovoid, 3-valved, brown; seeds numerous, glabrous, somewhat compressed, reniform, yellowish brown.

Growing in sandy soil. Bastar, Balaghat, Bilaspur Indore, Mandla, Narsimhapur, Raigarh, Raipur, Sagar, Sidhi, Surguja, Tikamgarh. *Fl. & Fr.*: Aug.-Feb.

3. POLYCARPON Loebl. ex L.

Diffuse herbs. Leaves opposite and pseudo-whorled; stipules scarious. Flowers small, inconspicuous, in crowded, many flowered cymes, with scarious bracts or solitary in the forks of the branches. Sepals 5. Petals 5, small or absent, white or hyaline, entire or toothed. Stamens 3-5. Ovary 1-celled; style short, 3-fid.

About 16 species, cosmopolitan; one in M.P.

Polycarpon prostratum (Forsk.) Asch. & Schweinf. in Oesterr. Bot. Zeitschr. 39: 128. 1889. *Alsine prostrata* Forsk., Fl. Aeg.-Arab. 207. 1775. *Hapalosa loeflingiae* Wall. ex Wight & Arn., Prodr. 358. 1834. *Polycarpon loeflingiae* (Wall. ex Wight & Arn.) Benth. ex Edgew & Hook.f. Hook.f., Fl. Brit. Ind. 1245. 1874. - *Sureta*.

Prostrate, dichotomously much branched herbs with hairy or pubescent branches. Leaves small, pseudo-whorled, narrow, oblong, oblanceolate or spatulate. Flowers in crowded cymes, with silvery bracts or sessile in the forks of branches. Petals shorter than the obtusely keeled sepals, white, linear, delicate, inserted, with the delicate stamens in a slightly perigynous ring. Petals white, half as long as the calyx, lanceolate, notched or truncate, dentate at apex or rarely absent. Stamens 3. Capsule ovoid; seeds pale brownish, minutely tuberculate.

Growing in moist sandy soil. Bastar, Balaghat, Bilaspur, Damoh, Hoshangabad, Jabalpur, Mandla, Raipur, Satna Shivpuri, Sidhi, Surguja. *Fl. & Fr.*: April - June.

4. SPERGULA L.

Annual herbs. Leaves opposite, often with abbreviated branchlets in the leaf axils, so that the leaves appear to be whorled or fascicled. Stipules small, scarious. Flowers in paniced cymes. Petals entire. Stamens 5 or 10 on a perigynous disc. Ovary 1-celled; styles 3 or 5. Capsules with 3-5 entire valves; seeds compressed.

About 5 species, mainly temperate; 2 in M.P.

1a. Capsules 5-valved; styles 5; seeds granulose or papillose

...1. *S. arvensis*

1b. Capsules 3-valved; styles 3; seeds smooth

...2. *S. fallax*

1. *Spergula arvensis* L., Sp. Pl. 440. 1753; Edgew. & Hook.f. in Hook.f. Fl. Brit. Ind. 1: 243. 1874.

Small, pubescent or glandular, diffuse green herbs. Leaves linear-subulate, semi-terete, rather fleshy. Flowers white; petals obtuse. Capsules 5-valved; seeds papillose, keeled or narrowly winged; fruiting pedicels deflexed.

In cultivated fields and along river banks. Rewa, Sagar, Sidhi. Fl. & Fr.: Oct. – Jan.

2. *Spergula fallax* (Lowe) Krause in Sturm. Fl. Deutsch. ed. 2, 19. 1901. *Spergularia fallax* Lowe in Hook. in Kew J. 8: 289. 1856. *Arenaria flaccida* Roxb., Fl. Ind. 2: 447. 1832 (non Clairv. 1811 nec Schleich. 1815). *Spergula flaccida* (Roxb.) Aschers. Verh. Bot. Ver. Brand. 30: 43. 1889. *Spergula pentandra sensu* Edgew. & Hook.f. in Hook.f., Fl. Brit. Ind. 1: 243. 1874.

Slender annual herbs. Leaves linear-subulate, fleshy, falsely whorled. Flowers white, in branched cymes. Petals ovate-oblong, sub-obtuse. Capsules 3-valved; seeds granulate, winged, wing striate.

In waste places. Chhatarpur, Sagar, Sidhi. Fl. & Fr.: Dec. – Feb.

5. STELLARIA L.

Herbs with white flowers in dichotomous or dichasial cymes, or solitary between the forks of the dichotomous branches. Sepals free, or connate at the base only. Petals usually 5, bifid or bipartite or sometimes absent. Stamens 10 or fewer, hypogynous or sub-perigynous. Ovary one-celled, rarely 3-celled. Style 2-3, rarely more. Capsule short, splitting into as many entire or bifid valves as there are styles; seeds compressed.

About 120 species, cosmopolitan; one in M.P.

Stellaria media (L.) Vill., Cyr. Ess. Pl. Char. 36. 1784; Edgew. & Hook.f. in Hook. f., Fl. Brit. Ind. 1: 230. 1874. *Alsine media* L., Sp. Pl. 272. 1753.

Small diffuse herbs with a line of hairs on the branches and inflorescence. Leaves ovate with rounded, rarely sub-cordate base, lower long-petioled, upper sessile, elliptic. Flowers greenish-white in leafy cymes. Petals 5, bifid to the base or absent. Stamens 3, 5 or 10. Capsules ovoid-cylindric, longer than the sepals; seeds brown, tuberculate.

On meadows. Surguja. Fl. & Fr.: Nov. – March.

6. VACCARIA Medik.

Annual herbs. Flowers terminal on dichotomously branched inflorescence. Calyx tube angular-alate, 5-toothed or lobed. Petals 5, clawed without scales. Stamens 10. Ovary 1- or imperfectly 2-3-celled; ovules numerous. Capsules 4-toothed.

About 4 species mainly in Europe and temperate Asia; one in M.P.

Vaccaria pyramidata Medicus, Phil. Bot. 1:96. 1789. *Saponaria vaccaria* L., Sp. pl. 407. 1753; Edgew. & Hook.f. in Hook.f., Fl. Brit. Ind. 1: 217. 1874. -*Musna*, *Sabuni*.

Erect annual herbs, corymbosely branched above. Leaves sessile, glaucous beneath, up to 12 cm long. Flowers pink or red in repeatedly forked cymes which combines into terminal panicle. Petals obovate or oblong-obovate. Stamens 10, alternate, filaments short. Styles 2. Capsules included within the calyx; seeds blackish, somewhat angled.

In cultivated fields. Bhopal. Damoh, Hohangabad. *Fl. & Fr.*: March - May.

18. PORTULACACEAE

(A.K. Mukherjee)

About 19 genera and 580 species, cosmopolitan but especially in America; one genus and 3 species in M.P.

PORTULACA L.

Diffuse or ascending fleshy herbs. Leaves alternate or opposite; stipules scarious or reduced to fascicles of hairs or scales (nodal appendages) at the nodes or absent. Flowers terminal, solitary or clustered. Sepals 2, united at the base and adnate to ovary. Petals 4-6, distinct or united at the base. Stamens 8 or numerous. Ovary ovoid, semi inferior, 1-celled; ovules numerous; style deeply 3-8 fid. Capsule membranous, semi-inferior, free part circumscissile; seeds numerous, compressed, reniform.

About 200 species, tropical and subtropical ; 3 in M.P.

1a. Nodal appendages absent ...1. *P. oleracea*

1b. Nodal appendages present:

2a. Leaves opposite, lanceolate or ovate; flowers solitary...3. *P. quadrifida*

2b. Leaves alternate, linear or cylindric ...2. *P. pilosa*

1. *Portulaca oleracea* L., Sp. Pl. 445. 1753; Dyer in Hook.f., Fl. Brit. Ind. 1: 246. 1874. -*Gol bhaji*, *Kulfa*.

Erect or prostrate, subsucculent annual herbs. Leaves cuneate-oblong or cuneate-obovate, usually truncate, whorled above; stipular hairs scarious, minute, or absent. Flowers yellow, sessile, solitary, or in clusters or cymes, supported by a whorl of leaves. Petals oblong-obovate, notched. Stamens 8-12. Style 5-6-fid. Capsules dehiscent above the base; seeds reniform, black, granulate.

In open waste places. Balaghat, Bastar, Chhindwara, Durg, Gwalior, Indore, Jabalpur, Mandla, Panna, Raipur, Rewa, Seoni, Shivpuri, Sidhi, Tikamgarh. *Fl. & Fr.* Almost throughout the year.

Sold in markets as a leafy vegetable.

2. *Portulaca pilosa* L., Sp. Pl. 445. 1753. ssp. *pilosa*; Geesink in *Blumea* 17: 294. 1969. *Portulaca tuberosa* Roxb., *Fl. Ind.* 2: 464. 1832; Dyer in *Hook.f., Fl. Brit. Ind.* 1: 247. 1874.

Prostrate or decumbent-ascending much-branched herbs. Leaves sessile, linear, terete, fleshy, with midrib decurrent on the stem and with long tufted brown hairs at the nodes. Flowers solitary or 3-4 together, 8-10 mm across, within an involucre of 8-10 leaves and tufted hairs. Stamens 10-30. Style 5-fid. Capsules dehiscent at about the middle; seeds blackish, rugose.

In sandy river beds and waste places. Bilaspur, Panna, Shivpuri. *Fl. & Fr.* : July-Oct.

2.1. ssp. *grandiflora* (Hook.) Geesink in *Blumea* 17: 297. 1969. *Portulaca grandiflora* Hook. in *Bot. Mag.* t. 2885. 1829.

Nodal hairs short. Flowers 25-30 mm across, red, yellow, pink or white.

Commonly cultivated as ornamental herbs. *Fl. & Fr.* : April - Oct.

3. *Portulaca quadrifida* L., *Syst. Nat.* ed. 12,328. 1766; Dyer in *Hook.f., Fl. Brit. Ind.* 1: 247. 1874. -*Chounlayi, Loniya*.

Prostrate, creeping and rooting, sub-succulent herbs with numerous ascending branches. Leaves opposite, narrowly elliptic or ovate or ovate-lanceolate; petioles very short; stipules bristly. Flowers solitary, terminal, yellow. Sepals hyaline, united at base. Petals 4, oblong, united below. Stamens 8-12, filaments hairy at base. Style long, 3-4 cleft. Capsules ovoid or conical; seeds blackish-brown, minutely tubercled, concentrically horizontally ribbed.

A weed of waste places. Durg, Indore, Rajnandgaon, Raipur. *Fl. & Fr.* : July - Oct.

19. TAMARICACEAE

(A.K. Mukherjee)

About 4 genera and 120 species, mainly in temperate and subtropical desert, steppes and sea shores; one genus and 2 species in M.P.

TAMARIX L.

Small trees or shrubs. Leaves alternate, scale-like, exstipulate, sometimes with amplexicaul or sheathing base. Flowers in lateral or terminal spikes or racemes, white or pink, regular. Sepals and petals 5, rarely 4, imbricate, free or connate below. Stamens 4-10; anthers versatile. Ovary free, narrowed upwards, 1-celled; styles 2-4, short; dilated into the stigma; ovules numerous; seeds plumose.

About 54 species, mainly in West Europe, Mediterranean to India and North China as halophytes; 2 in M.P.

1a. Stamens 5, flowers unisexual, ca 3 mm long ...1. *T. dioica*

1b. Stamens 10; flowers bisexual, 5-6 mm long ...2. *T. ericoides*

1. *Tamarix dioica* Roxb. ex Roth. Nov. Pl. Sp. 185. 1821; Shrubs or small Dyer in Hook.f., Fl. Brit. Ind. 1:249. 1874. -Saran.

Trees with numerous spreading branches with drooping tips. Leaves scale-like, obliquely-truncated, apex acute, base amplexicaul. Flowers dioecious, numerous, pink, in drooping paniced spikes; bracts triangular. Petals linear-oblong. Stamens 5; anthers purple in the males and bilobed. Capsule 3-valved, not longer than the corolla.

On river beds. Betul (Witt, 1908). Fl. & Fr.: Aug. - Oct.

2. *Tamarix ericoides* Rottl. ex Willd. in Ges Naturf. Fr. Berlin Neue Schr. 4: 214. 1803; Dyer in Hook.f., Fl. Brit. Ind. 1: 249. 1874. -Jhau.

Shrubs with fastigiâte branches. Leaves scale-like, sheathing, amplexicaul, shortly acuminate, glaucous, persistent and brown on old branches. Flowers pink in dense erect 3.5-15 cm long racemes. Sepals only half as long as the corolla. Capsules about 1 cm long, 2-3 valved, opening and disclosing the silky coma of the seeds; seeds oblong; hairs pale-white.

On sandy river beds. Balaghat, Bilaspur, East Nimar, Hoshangabad, Indore, Jabalpur, Narsimhapur, Raipur, Satna. Fl. & Fr.: Oct. - March.

20. ELATINACEAE

(Anand Kumar)

About 2 genera and 45 species, tropical and temperate; both genera

and 3 species in M.P.

- 1a. Plants erect; sepals acute with a distinct midrib ...1. *Bergia*
 1b. Plants creeping; sepals obtuse without a midrib ...2. *Elatine*

1. BERGIA L.

Erect, annual or perennial herbs or undershrubs, often glandular hairy. Leaves opposite, serrate (sometimes entire). Flowers axillary, sessile or pedicellate, solitary or fascicled, mostly bracteate, usually 5-merous. Sepals elliptic, oblong or lanceolate, with a herbaceous midrib and hyaline margins. Petals usually oblong or elliptic, free, imbricate. Stamens usually 5 or 10, filaments free. Ovary globose or ovoid, usually 5-locular, each locule with numerous ovules; styles usually 5. Capsules usually 5-locular, septicidal or septifragal. Seeds many, deep brown, smooth or ribbed.

About 25 species in tropics or subtropics; 2 in M.P.

- 1a. Stem stiff with glandular and simple hairs; stamens 3-5
 ...1. *B. ammannioides*
 1b. Stem succulent, glabrous; stamens 10
 ...2. *B. capensis*

1. *Bergia ammannioides* Roxb., Hort. Beng. 34. 1814 ("*ammnoides*"); Dyer in Hook. f., Fl. Brit. Ind. 1: 251. 1874.

Annual herbs up to 35 cm high. Leaves sessile or subsessile, opposite, sometimes whorled, 0.5-3.0 x 0.2-1.0 cm, elliptic-oblongate, acute at apex, margin serrulate. Flowers red, subsessile, in axillary fascicles. Sepals 5, lanceolate, subacuminate, margin scarious, ciliate. Petals 5, oblong, acute, shorter than sepals. Stamens 3-5, anthers versatile. Ovary ovoid, styles 5, stigmas globose. Capsules ovoid, 1-2 mm long, 5-valved. Seeds linear-oblong or ovoid, sometimes slightly curved, rounded at both ends, polished.

Common in wet places along the banks of lakes and rivers and in fallow fields. Bhopal, Bilaspur, Durg, Hoshangabad, Narsimhapur, Raigarh, Raipur, Sagar, Sidhi. Fl. & Fr. : Aug.- April.

2. *Bergia capensis* L., Mant. Pl. 2: 241. 1771; Unni in J. Bombay Nat. Hist. Soc. 64: 98. 1967. *B. verticillata* Willd., Sp. Pl. 2: 770. 1799, nom. illeg.; Dyer in Hook. f., Fl. Brit. Ind. 1: 252. 1874. *B. aquatica* Roxb., Pl. Corom. t. 142. 1800.

Annual herbs up to 30 cm high, rooting at the lower nodes. Leaves stipulate, opposite, sessile, 1.0-4.0 x 0.6-2.0 cm, elliptic, elliptic-lanceolate or oblongate, apex acute, margin crenate-serrate. Flowers pink, sessile or sub-sessile in axillary clusters. Sepals 5, lanceolate, obliquely acuminate,

margin membranous. Petals 5, ovate-oblong. Stamens 10, anthers versatile. Ovary globose; styles 5, short. Capsules globose, 1-2 mm broad, 5-valved, apiculate. Seeds cylindrical, slightly curved, transversely rugose.

Along banks of ponds in muddy places. Rare. Raipur. *Fl. & Fr.* : Aug. - Nov.

2. ELATINE L.

Delicate, creeping, annual herbs. Leaves opposite or verticillate. Flowers minute, solitary, axillary, 2-4 -merous, ebracteate. Sepals 2-4, shortly connate at the base, obtuse, nerveless. Petals 2-4, free, imbricate. Stamens as many as petals or twice their number, filaments free. Ovary globose, 2-4 celled; styles very short, stigmas clavate. Capsules globose or subglobose with a very thin pellucid wall. Seeds many, straight or curved, with scalariform reticulations.

About 20 species, cosmopolitan; one in M.P.

Elatine ambigua Wight in Hook. Bot. Misc.2: 103. Suppl. t. 5. 1831; Dyer in Hook. *f.*, Fl. Brit. Ind. 1: 251. 1874; Prasad & Lal in J. Econ. Tax. Bot. 5: 981. 1984.

Creeping herbs, forming dense mats, rooting at nodes. Leaves opposite, 2-4.5 × 0.5-2 mm elliptic-oblong or spatulate, apex subacute or obtuse, base decurrent, penninerved with distinct gland-like hydathodes on the margin; stipules ca 1 mm long. Flowers solitary, axillary, pink. Sepals 3, ca 1 mm long. Petals 3, ca 1 mm long, ovate. Stamens 3, shorter than the sepals. Ovary 3-locular; stigmas 3. Capsules brown, subglobose, faintly 3-lobed. Seeds light brown, straight or slightly curved, 0.5-0.8 mm long with scalariform reticulations.

Along river-banks; rare. Morena. *Fl. & Fr.* : Nov.

21. HYPERICACEAE

(Anand Kumar)

About 8 genera and 440 species in mountains of tropics and temperate regions; one genus and 2 species in M.P.

HYPERICUM L.

Herbs, shrubs or small trees. Leaves sessile, opposite or whorled, glandular-punctate, venation pinnate. Flowers bisexual, yellow, in terminal or lateral fascicles or cymes or flowers solitary. Sepals 5. Petals 5, contorted in bud. Stamens usually many, free or in bundles, anthers versatile. Ovary 1-celled with 3 or 5 parietal or 3-5-celled with axile placentation, many ovuled; styles free or united. Fruit a septicial capsule.

About 400 species in temperate and tropical mountains; 2 in M.P.

- 1a. Shrubs; branches terete; flowers 5-7 cm across ... 1. *H. gaitii*
 1b. Herbs; branches quadrangular; flowers 0.4-0.6 cm
 across ... 2. *H. laxum*

1. *Hypericum gaitii* Haines in J. As. Soc. Beng. n.s. 15: 311. 1920 et in Bot. Bihar & Orissa 52. 1925.

Shrubs up to 2 m high. Leaves exstipulate, opposite, 1.5-5.0 × 0.5-1.5 cm, elliptic-oblong, apex apiculate, base rounded or subamplexicaul. Flowers in 3-chothomous cymes. Pedicels up to 4 cm long. Sepals 5, 6-10 × 4-6 mm, ovate or ovate-lanceolate. Petals 5, 3.0-3.5 × 1.0-1.8 cm, obovate. Stamens numerous in 5 bundles; filaments slender, ca 1.5 cm long. Ovary ovoid, 5-locular, up to 1 cm long; styles 5, free, up to 1.5 cm long. Capsules ca 1.0 × 0.7 cm, ovoid or conical. Seeds many, ca 1 mm long, linear.

Along roadsides in forest clearings and near streams. Bilaspur, Surguja. Fl. & Fr. : March - May.

2. *Hypericum laxum* (Bl.) Koidzumi in Bot. Mag. Tokyo 4: 344. 1926; Balakr., Fl. Jowai 1: 86. 1981. *Brathys laxa* Bl., Mus. Bot. Lugd.-Bat. 2: 19. 1856. *Hypericum japonicum sensu* Dyer in Hook.f., Fl. Brit. Ind. 1: 256. 1874 (non Thunb. 1784).

Annual herbs up to 25 cm high. Leaves exstipulate, opposite, distant, 3-7 × 1-3 mm, ovate, elliptic or elliptic-oblong; apex obtuse or subacute; base amplexicaul, 3-5 nerved. Flowers solitary or in few flowered axillary and terminal dichasial cymes. Pedicels up to 8 mm long. Bracts linear-lanceolate. Sepals 5 (sometimes 4), 3-4 mm long, elliptic or elliptic-lanceolate. Petals 5 (sometimes 4), 3-4 mm long. Stamens 5-25, connate at the base; filaments slender, nearly as long as petals. Ovary more or less ovoid, 1-celled; styles 3; stigmas cupular. Capsules 3-5 mm long, subcylindrical, styles persistent. Seeds yellow, many, linear-oblong, angled, ends pointed.

In marshy places along streams and in meadows. Balaghat, Bilaspur, Mandla, Raigarh, Sidhi, Surguja. Fl. & Fr. : Feb.- Nov.

22. THEACEAE

(Anand Kumar)

About 16 genera and 500 species in tropics and subtropics of the world; one species in M.P.

EURYA Thunb.

Shrubs or small trees. Leaves crenate-serrate, usually glabrous. Flowers small, unisexual, dioecious, in axillary clusters or rarely solitary. Sepals 5.

Petals 5, united at the base, imbricate. Stamens 5-15, free or shortly connate, adnate to the corolla base. Ovary 2-5-celled, with as many free or united styles; ovules many. Fruit a small globular or ovoid berry. Seeds minute, angled or pitted.

About 130 species in S.E. Asia, Indomalasia and Pacific Islands; one in M.P.

Eurya nitida Korth. in Temminck, Verh. Nat. Gesch. Bot. 3: 115, t. 17. 1840. *E. japonica* auct. non Thunb. 1784 var. *nitida* (Korth.) Dyer in Hook.f., Fl. Brit. Ind. 1: 284. 1874.

Shrubs or small trees, up to 5 m high. Leaves exstipulate, alternate, 1.3-7.0 × 0.7-3.0 cm, elliptic, apex acute or subacuminate, base acute, coriaceous. Petiole 1-4 mm. Flowers white in axillary fascicles of 1-3, bracteate; pedicel 1-2 mm long, recurved in fruits. Sepals 5, unequal, broadly ovate or suborbicular, imbricate. Petals 5, elliptic-oblong or orbicular. Stamens 5-15, free, anthers basifixed. Ovary 3-locular, styles 3. Berries ovoid or globose, 3-5 mm across with persistent styles and sepals. Seeds many, black, angled, tuberculate with concentric rings.

In semi-evergreen forests on higher hill slopes. Rare. Bastar. Fl. & Fr.: Most parts of the year.

23. DIPTEROCARPACEAE

(Anand Kumar)

About 16 genera and 580 species, pantropical; one species in M.P.

SHOREA Roxb. ex Gaertn. f.

Resinous lofty trees. Stipules large, persistent or small and deciduous or inconspicuous. Leaves entire or repand. Panicles axillary or terminal. Calyx tube very short, segments ovate or lanceolate, imbricate. Petals 5, contorted. Stamens 15 to many, anthers usually ovate or oblong with a subulate extension of the connective. Ovary 3-celled, cells 2-ovuled, style subulate, stigma entire or 3-toothed. Capsule indehiscent, 1-seeded, closely surrounded by the bases of the accrescent calyx segments.

About 180 species, from Ceylon to S. China, W. Malaysia, Moluccas and Lesser Sunda Island; one in M.P.

Shorea robusta Gaertn. f., Fruct. 3: 48, t. 186. 1805; Bedd. Fl. Sylv. t. 4. 1869; Dyer in Hook. f., Fl. Brit. Ind. 1: 306. 1874. -*Pinjal*, *Sal*, *Sarai*.

Fig. 19.

Trees up to 30 m high. Bark black, furrowed. Young branches, petioles and inflorescence pubescent. Stipules up to 7 mm long, falcate, caducous. Leaves alternate, 8-17.5 × 5-12.5 cm, ovate or ovate-oblong, apex

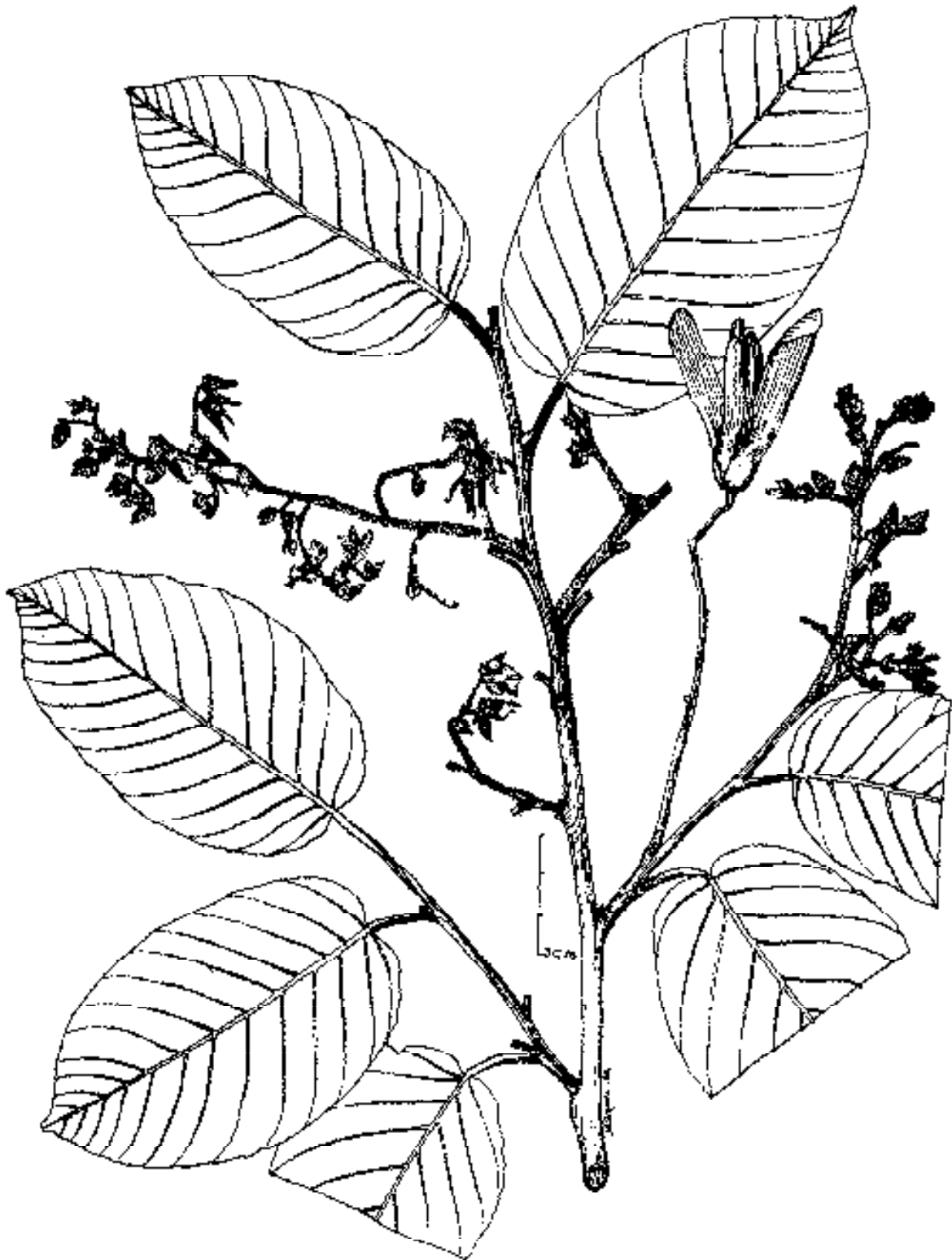


Fig. 19. *Shorea robusta* Gaertn.f.

subacuminate, base cordate or round, coriaceous above, pale beneath. Petiole up to 2.5 cm long. Flowers cream-coloured in axillary panicles. Sepals 5, ovate-triangular, grey-pubescent. Petals up to 11 cm long, contorted, grey-pubescent without, orange-coloured inside. Stamens many, anthers basifixed, connective appendaged. Ovary 3-celled, style subulate, stigma 3-toothed. Fruit ovoid, up to 1.2 cm long crowned with up to 1.2 cm long tapering style remnant. Fruit covered by the bases of accrescent sepals, of which 3 sepals are usually longer (wings). Seeds 7-10 mm long, ovoid, acute.

In well drained soil on lower hill slopes. Balaghat, Bastar, Bilaspur, Hoshangabad, Mandla, Raigarh, Raipur, Rajnandgaon, Rewa, Surguja. Fl. & Fr. : March - June.

Wood of high timber value; seed oil variously used.

24. MALVACEAE

(D. M. Verma)

About 50 genera and 1000 species, mainly distributed in the tropics and subtropics; 13 genera and 40 species in M.P.

- 1a. Trees; inflorescence a panicle; flowers polygamous; fruits winged ... 6. *Kydia*
- 1b. Plants not as above:
 - 2a. Staminal column at apex 5-toothed or truncate; filaments projecting from the outer surface of the column; fruit a capsule or a schizocarp:
 - 3a. Styles 10; fruit a schizocarp:
 - 4a. Flowers in much contracted head-like racemes, almost hidden within 3-4 ovate-orbicular folded bracts; epicalyx absent ... 7. *Malachra*
 - 4b. Flowers solitary, axillary or in open clusters; epicalyx present:
 - 5a. Mericarps covered with hooked spines or glochidia ... 13. *Urena*
 - 5b. Mericarps muciculate, reticulately veined or 3-awned, never covered with spines or glochidia ... 10. *Pavonia*
 - 3b. Style 1, undivided or 5-branched; fruit a capsule:
 - 6a. Style undivided, with a ribbed or lobed stigma:
 - 7a. Epicalyx lobes 3, foliaceous, cordate, persistent; seeds enveloped in a floss ... 4. *Gossypium*

- 7b. Epicalyx lobes 3-8, small and narrow, mostly caducous; seeds without floss ... 12. *Thespesia*
- 6b. Style divided into 5 spreading branches :
- 8a. Calyx 5-toothed, splitting on one side, adnate to and falling off with the corolla ... 1. *Abelmoschus*
- 8b. Calyx deeply 5-lobed, not splitting, free from the corolla and persistent ... 5. *Hibiscus*
- 2b. Staminal column at apex split into numerous filaments; fruit always a schizocarp :
- 9a. Epicalyx absent :
- 10a. Seed solitary in each mericarp ... 11. *Sida*
- 10b. Seeds two or more in each mericarp ... 2. *Abutilon*
- 9b. Epicalyx present :
- 11a. Leaves penninerved (with foot-nerves); style branches with capitate stigma ... 9. *Malvastrum*
- 11b. Leaves palminerved; style branches at apex acute :
- 12a. Epicalyx lobes 6-9, connate at the base ... 3. *Althaea*
- 12b. Epicalyx lobes 3, free or sometimes adnate to the calyx ... 8. *Malva*

1. ABELMOSCHUS Medic.

Herbs or undershrubs, usually hairy. Leaves petiolate, mostly palmately lobed or partite, sometimes hastate or sagittate. Flowers solitary, axillary, or racemose; pedicels not jointed. Epicalyx lobes 4-16, usually free, persistent or rarely caducous. Calyx spathaceous, 5-toothed, splitting on one side during expansion of the corolla, adnate to and falling with the corolla. Corolla usually large and showy, mostly yellow with a purple centre. Staminal column shorter than the petals, antheriferous throughout. Ovary 5-celled, style 1, 5-branched; stigmas discoid. Capsules loculicidally dehiscent; seeds numerous, usually reniform.

About 6 species in S. and S.E. Asia and N. Australia; 5 in M.P.

- 1a. Epicalyx lobes caducous even before expansion of the flowers; calyx in bud flask-shaped, with 5 linear ca 3 mm long segments ... 3. *A. ficulneus*
- 1b. Epicalyx lobes persistent; calyx in bud not as above :
- 2a. Epicalyx lobes 4-6, ovate-oblong ... 4. *A. manihot*
- 2b. Epicalyx lobes 6-16, linear-lanceolate :

- 3a. Mature capsules fusiform, 5-15 cm long, prominently angled, usually sulcate. Cultivated ... 2. *A. esculentus*
- 3b. Mature capsules ovoid-subglobose, 2-6 cm long, terete or faintly angled, never sulcate. Wild :
- 4a. Capsules clothed with bristle bearing tubercles ... 2. *A. esculentus*
- 4b. Capsules hairy or glabrous, never with tubercled bristles :
- 5a. Upper leaves usually hastate or sagittate at the base; epicalyx lobes 6-10, linear or lanceolate ... 5. *A. moschatus*
- 5b. Leaves all cordate at the base; epicalyx lobes 10-16, linear ... 1. *A. crinitus*

1. *Abelmoschus crinitus* Wall., Pl. Asiat. Rar. 1: 39. t. 44. 1830. *Hibiscus cancellatus* Roxb., Fl. Ind. 3: 201. 1832; Mast. in Hook. f., Fl. Brit. Ind. 1: 342. 1874. (non L.f. 1781). *A. cancellatus* (Roxb.) Voigt. Hort. Calc. 119. 1845. Fig. 20.

Erect hispid herbs, 0.5-2.5 m high, usually with tuber-like tap root. Leaves suborbicular in outline, cordate, 5-15 cm across, angular or palmately 5-7 lobed, lobes ovate-oblong, serrate. Epicalyx lobes linear, ciliate, 2-4 cm long, mostly curving upwards and convergent. Calyx 2-2.5 cm long, pubescent. Corolla yellow with a purple centre; petals obovate, 5-8 cm long. Staminal column ca 2 cm long. Stigma purple. Capsules broadly ovoid, apiculate, 3-5 cm long, hairy; seeds globular to reniform, ca 3 mm long, with concentric rings, usually rusty tomentose.

On hill slopes, forest margins, and along streams and cultivated fields. Balaghat, Bastar, Bilaspur, Mandla, Raigarh, Raipur, Rajnandgaon, Surguja. Fl.: Aug. - Sept.; Fr.: Oct. - May.

2. *Abelmoschus esculentus* (L.) Moench, Meth. Pl. 617. 1794; Borss. in Blumea 14: 100. 1966. *Hibiscus esculentus* L., Sp. Pl. 696. 1753; Mast. in Hook. f., Fl. Brit. Ind. 1: 343. 1874. -*Bhindi*.

Annual erect hispid herbs, 0.5-1.5 m high, often red-tinged. Leaves suborbicular, cordate, 5-20 cm across, angular or palmatilobed, serrate; lobes ovate-lanceolate. Flowers solitary, axillary. Epicalyx lobes 7-12, linear-lanceolate, 5-15 mm long, soon caducous. Calyx 2-3 cm long, silvery inside. Corolla yellow or white, with a purple centre; petals obovate, 3-4 cm long. Staminal column 2-2.5 cm long. Ovary 5 (-9) celled; style arms 5 (-9); stigmas purple. Capsules fusiform, acuminate, 5-15 x 1.5-3 cm, angular, sulcate, hispidulous; seeds subglobose-reniform, 3-6 mm across, dark brown or grey.

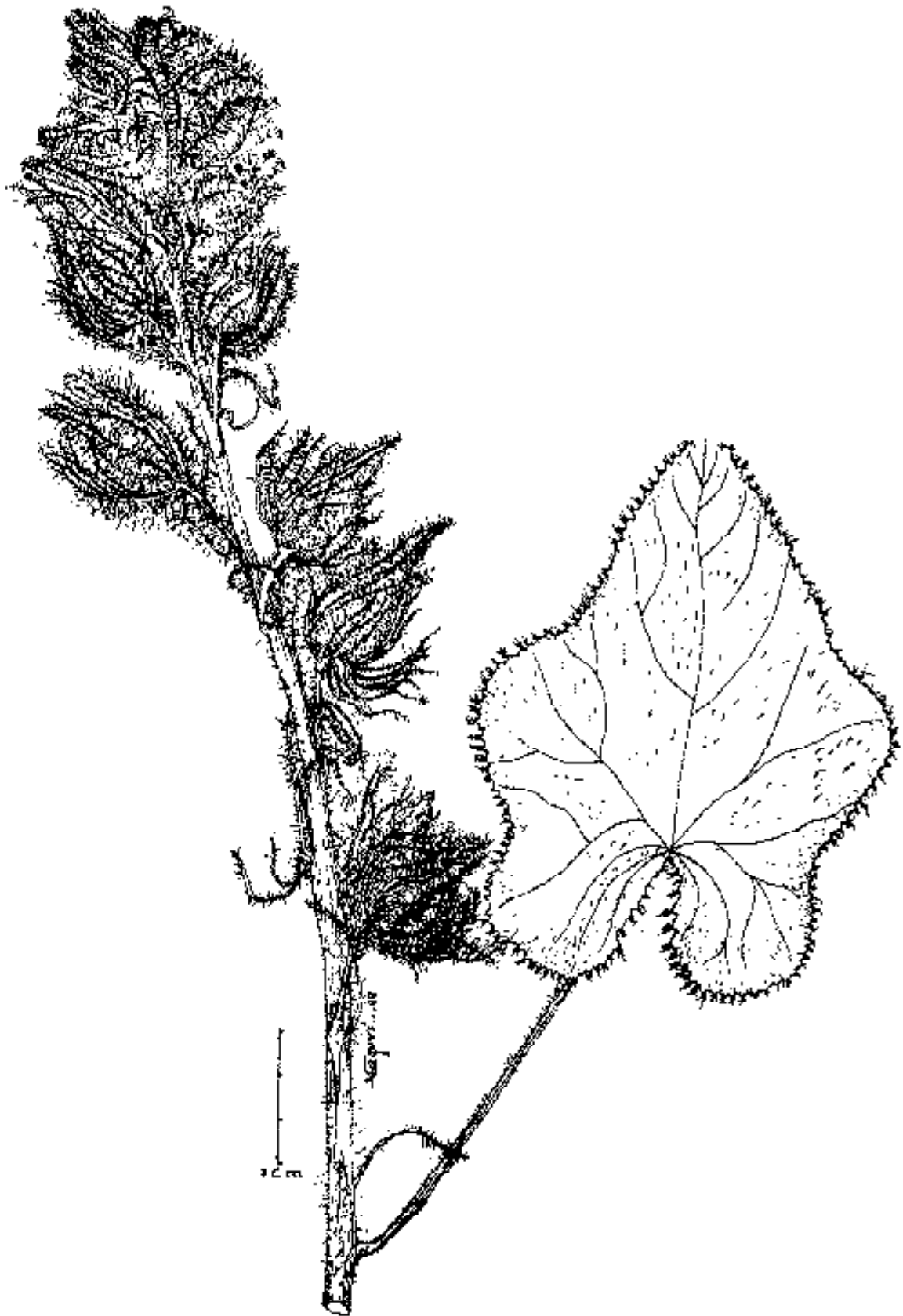


Fig. 20. *Abelmoschus crinitus* Wall.

Commonly cultivated throughout Madhya Pradesh. *Fl. & Fr.* : April - Sept.

Unripe fruits are cooked and eaten as vegetable. *Abelmoschus tuberculatus* Pal & Singh (in Bot. Gaz. 113: 458. 1952) characterized by strigose indumentum and shorter capsules (5-7.5 cm long) densely studded with bristle bearing tubercles is considered by Borss. (*l.c.* 100) to be only a form of *A. esculentus*, possibly one of the wild ancestors. A solitary collection from Mandla (J. Lal & A. Kumar 33380, 20-9-1982 in BSA) matches with the characters of *A. tuberculatus*.

3. *Abelmoschus ficulneus* (L.) W. & A. ex Wt., Cat. 14. 1833 & Prodr. 53. 1834; Borss. in Blumea 14: 101. 1966. *Hibiscus ficulneus* L., Sp. Pl. 695. 1753; Mast. in Hook.f. Fl., Brit. Ind. 1: 340. 1874. - *Ran bhindi*.

Annual erect hispid undershrubs, 0.5-2 m high, sometimes prickly. Leaves suborbicular in outline, cordate, 2-15 cm across, palmately 3-5 lobed, with spatulate to obovate serrate lobes. Epicalyx lobes 5-6, linear-lanceolate, 5-10 mm long, usually falling before anthesis. Calyx ca 15 mm long, with 5 linear ca 3 mm long lobes. Corolla white turning pink mauve, with dark purple centre; petals obovate, 2-3 cm long. Staminal column ca 15 mm long. Capsules more or less secund on the lateral branches, ovoid, 5-angled, obtuse or acuminate, 3-3.5 cm long, tomentose; valves inside with long white hairs; seeds globose, ca 3 mm across, black.

In mixed forests, and along roads and cultivated fields. Bilaspur, Rajnandgaon, Satna, Shivpuri. *Fl. & Fr.* : Sept. - Nov.

4. *Abelmoschus manihot* (L.) Medic. ssp. *tetraphyllus* (Roxb. ex Hornem.) Borss. in Blumea 14: 97. 1966. *Hibiscus tetraphyllus* Roxb. ex Hornem., Hort. Hafn. 661. 1815; Mast. in Hook.f., Fl., Brit. Ind. 1: 341. 1874. - *Junglee bhindi*.

Perennial undershrubs, up to 3 m high. Stems, petioles, pedicels and sometimes also the nerves of the leaves more or less densely covered with prickly hairs. Leaves suborbicular in outline, cordate, generally palmately 3-7 lobed, 5-20 cm across. Flowers solitary, axillary, or racemed. Epicalyx lobes 4-6, ovate-oblong, 1-3 cm long. Calyx 2-3 cm long, tomentose. Corolla yellow with a purple throat, petals obovate, 5-8 cm long. Staminal column ca 2 cm long. Capsules ovoid-oblong, acuminate, 5-angled, 4-6 cm long, densely hairy; valves inside with long white hairs; seeds globose-reniform, ca 3 mm across, with concentric rings, brown or black.

Along streams and cultivated fields. Balaghat, Bhopal, Bilaspur, Narsimhapur, Raisen, Seoni, Sidhi. *Fl. & Fr.* : Aug. - May.

5. *Abelmoschus moschatus* Medic. Malv. 46. 1787. *Hibiscus abelmoschus* L., Sp. Pl. 696. 1753; Mast. in Hook.f., Fl. Brit. Ind. 1: 342. 1874. - *Mushk dana, Kasturi-bhindi*.

Erect hispid herbs or undershrubs, 0.5-2.5 m high, with a long slender tap root. Leaves extremely variable, lower suborbicular in outline, cordate, angular or palmately 3-7 lobed, upper narrower, hastate or sagittate at the base with linear-oblong or triangular lobes. Flowers solitary, axillary. Epicalyx lobes 6-10, linear-lanceolate, usually appressed to the capsule, 10-15 mm long. Calyx 2-3 cm long, tomentose. Corolla yellow with a dark purple centre; petals obovate, 4-7 cm long. Staminal column ca 2 cm long. Capsules narrowly oblong, beaked, 5-8 cm long, deciduously hairy, on thickened pedicels; seeds subglobose-reniform, ca 3 mm long, mostly glabrous.

In mixed forests and along cultivated fields. Bastar, Bilaspur, Mandla, Raigarh, Raipur. *Fl. & Fr.* : Aug. - Nov.

Stems yield a good quality fibre.

S.I. ssp. tuberosus (Span.) Borss. in *Blumea* 14: 93. 1966. *Hibiscus longifolius* var. *tuberosus* Span. in *Linnaea* 15: 170. 1841. *Abelmoschus rugosus* Wall. ex W. & A., *Prodr.* 53. 1834. *H. rugosus* (Wall. ex W. & A.) Steud. *Nomencl.* ed. 2, 760. 1840; Mast. in *Hook.f., Fl. Brit. Ind.* 1: 342. 1874.

Small herbs, up to 75 cm high, with a short tuber-like turgid tap-root. Epicalyx lobes in fruits spreading or reflexed. Corolla mostly white or pink. Capsules 2-5 cm long; seeds mostly ferruginously tomentose.

In sal and mixed forests. Balaghat, Rajnandgaon. *Fl. & Fr.* : Sept. Oct.

2. ABUTILON Mill.

Herbs, undershrubs or shrubs, usually hairy. Leaves generally ovate-orbicular, cordate, entire or shallowly lobed, palmatinerved. Flowers solitary, axillary, or paniced; pedicels usually jointed above the middle. Epicalyx absent. Calyx usually campanulate. Corolla rotate or campanulate, mostly yellow or orange-yellow. Staminal column usually much shorter than the petals, split into numerous filaments at the tip. Carpels and style branches five to many; ovary cells 2-9 ovuled, but sometimes 1-ovuled due to abortion. Schizocarp sub-globose or sub-cylindric, truncate; mericarps five to many, dehiscent, follicular, after separating often remaining pendulous on a basal carpophore before falling; seeds reniform, 1-9 per cell.

About 150 species in tropics and sub-tropics; 4 in M.P.

- | | |
|----------------------------------|---------------------------|
| 1a. Styles and mericarps 5-6 | ... 4. <i>A. persicum</i> |
| 1b. Styles and mericarps 12-30 : | |
| 2a. Styles and mericarps 27-30 | ... 3. <i>A. pannosum</i> |
| 2b. Styles and mericarps 12-20 : | |

- 3a. Stems, petioles and pedicels with long spreading simple hairs in addition to pubescence of short stellate hairs; corolla orange-yellow, usually with a purple centre ... 1. *A. hirtum*
- 3b. Stems, petioles and pedicels pubescent with short stellate hairs, without or with few long spreading simple hairs; flowers yellow or orange-yellow, without a purple centre.2. *A. indicum*

1. **Abutilon hirtum** (Lamk.) Sweet, Hort. Brit. ed. 1, 53. 1826; Borss. in Blumea 14: 168. 1966. *Sida hirta* Lamk., Encycl. 1: 7. 1783. *A. graveolens* var. *hirtum* (Lamk.) Mast. in Hook.f., Fl. Brit. Ind. 1: 327. 1874. *A. graveolens* (Roxb. ex Hornem.) W. & A. ex Wt., Cat. 13. 1833; Mast. in Hook.f., Fl. Brit. Ind. 1: 327. 1874. *S. graveolens* Roxb. ex Hornem., Hort. Hafn. Suppl. 77. 1819. -*Barkanghi*.

Foetid smelling viscid annual herbs or undershrubs, 1-2m high. Stems, petioles, pedicels and calyx with minute stellate hairs, long spreading simple hairs and short gland-hairs. Leaves broadly ovate-orbicular, 2-8 cm long, usually crenate, often 3-lobed. Flowers solitary, axillary. Calyx campanulate, rather inflated, 7-10mm long, hairy. Corolla 25-35 mm across, hairy, orange-yellow, mostly with a dark purple blotch; petals obovate. Staminal column 7-9mm long. Styles connate up to the middle. Schizocarps globular, 17-20 mm across. Mericarps tomentose, usually shortly acuminate; seeds reniform, hairy.

In wastelands, along roads, streams and tanks. Damoh, Durg, Indore. Fl. & Fr.: Sept. - April.

2. **Abutilon indicum** (L.) Sweet, Hort. Brit. ed. 1, 54. 1826; Mast. in Hook.f., Fl. Brit. Ind. 1: 326. 1874. *Sida indica* L., Cent. Pl. 2: 26. 1756. *S. populifolia* Lamk., Encycl. 1: 7. 1783. *A. indicum* var. *populifolium* (Lamk.) W. & A. ex Mast. in Hook.f., Fl. Brit. Ind. 1: 326. 1874. *Kanghi, Mudra*.

Erect annual hairy herbs or undershrubs, 0.3-3 m high. Leaves broadly ovate-orbicular, acute or obtuse, 2-7 cm long, crenate-dentate or undulate. Flowers solitary, axillary; pedicels usually geniculate. Calyx campanulate, in fruit stellately spreading, much shorter than the schizocarp; lobes 3-4 mm long, triangular, hairy. Corolla 25-30 mm across, hairy, yellow or orange-yellow; petals obovate. Staminal column ca 8 mm long. Schizocarps globular with a flat or indented apex, ca 2 cm across. Mericarps mucronate, dorsally hairy; seeds 2-3 mm across, glabrous or hairy.

In wastelands, stream sides and hill slopes. Balaghat, Bastar, Bhopal, Damoh, Durg, Indore, Panna, Raipur, Rajnandgaon, Satna, Shahdol, Sidhi. Fl.: Aug. - Feb.; Fr.: Oct. - May.

3. *Abutilon pannosum* (Forst.f.) Schlect., Bot. Zeit. 9: 828. 1851. *Sida pannosa* Forst.f., Comm. Soc. Reg. Goetting ser. 2: 9. 1787. *S. glauca* Cav., Icon. 1:8, t.11. 1791. *S. mutica* Delile ex DC., Prodr. 1: 470. 1824. *A. glaucum* (Cav.) Sweet, Hort. Brit.ed.1,54. 1826. *A. muticum* (Delile ex DC.) Sweet, Hort. Brit. ed. 2, 65. 1830; Mast.in Hook. f., Fl. Brit. Ind. 1: 327. 1874. -Kasili.

Erect tomentose herbs or undershrubs, 1-3 m high. Leaves broadly ovate or suborbicular, cordate, 5-10 cm long, crenate; stipules lanceolate. Flowers solitary, axillary; pedicel jointed slightly below the tip. Calyx ca 1 cm long, villous. Corolla ca 25 mm across, orange-yellow; petals obovate, usually with uneven margins. Staminal columns pubescent. Schizocarp globose with a flat top, ca 25 mm across, silky villous. Mericarps 27-30, mucronate; seeds reniform, hairy.

In wastelands and along cultivated fields. Gwalior, Indore, Rajnandgaon. Fl. & Fr. : Oct. - Dec.

4. *Abutilon persicum* (Burm.f.) Merr. in Philip. J. Sci. 19: 364. 1921. *Sida persica* Burm.f., Fl. Ind. 148. t. 47. f. 1. 1768. *S. polyandra* Roxb., Fl. Ind. 3: 173. 1832. *A. polyandrum* (Roxb.) W. & A. ex Wt., Cat. 12: 1833; Mast. In Hook.f., Fl. Brit. Ind. 1: 325. 1874 (non G. Don, 1831). -Madan.

Undershrubs, 1-3 m high, tomentose with minute stellate hairs; also with scattered simple spreading hairs, usually also with some gland-hairs. Lower leaves suborbicular, cordate, 5-20 cm across, acuminate, upper leaves usually narrower, ovate-lanceolate. Flowers solitary, axillary, upwards sometimes racemed or paniced. Calyx rather inflated, ca 1 cm long, deeply lobed, hairy. Corolla 3-4 cm across, orange-yellow, purple-veined at the base; petals obovate. Staminal column ca 5 mm long, pubescent above. Schizocarp campanulate, 12-15 mm long. Mericarps 5-6, oblong, with a long curved mucro, hairy, dehiscent; seeds 4-6 in each mericarp, reniform, glabrous or hairy.

In open rocky hill slopes and in teak plantations. Bastar, Bilaspur, Hoshangabad, Raigarh. Fl.: Oct. - April; Fr.: Dec. - May.

3. ALTHAEA L.

Erect or prostrate annual herbs. Leaves petioled, usually palmately lobed, palmnerved. Flowers axillary, solitary or clustered or in terminal racemes. Epicalyx lobes 6-9, connate at the base. Staminal column divided at the apex into numerous filaments. Carpels several; ovary many-celled; ovule solitary in each cell; styles as many as the carpels. Fruit a schizocarp. Mericarps diverging from each other and leaving a short central axis.

About 20 species in Europe and Asia; one in M.P.

Althaea ludwigii L., Mant. Pl. 98. 1767; Mast. in Hook., *f.*, Fl. Brit. Ind. 1: 319. 1874.

Annual hairy herbs, profusely branched at the base, with ascending or prostrate branches. Leaves suborbicular in outline, 2-4 cm across, palmately lobed. Flowers axillary, solitary or 2-3 together. Epicalyx lobes 7-9, linear, hispid. Calyx lobes deltoid, ca 8 mm long. Corolla ca 15 mm across, whitish. Anthers globose. Carpels 8-9, keeled, wrinkled at the sides, glabrous; seeds smooth, brown.

In wastelands. Bastar, Bhopal, Bilaspur, Durg. Fl. & Fr. : March - April.

4. GOSSYPIUM L.

Annual or perennial undershrubs or shrubs, mostly dotted with black oil-glands. Leaves usually palmatilobed, palminerved, usually with nectaries on the midrib beneath. Flowers solitary, axillary. Epicalyx lobes 3, foliaceous, entire, dentate or deeply gashed. Calyx cupular, undulate or 5-lobed. Corolla yellow, white, red or purple. Staminal column much shorter than the petals, antheriferous throughout. Ovary 3-5-celled, cells 2-many ovuled; style 1. Capsules ovoid-globular; seeds ovoid, with a dense covering of long woolly hairs (lint or floss), and sometimes also with a short tomentum (fuzz).

About 20 species, wild or cultivated in tropics and subtropics; 3 species cultivated for cotton, or found as escapes in M.P.

- 1a. Epicalyx lobes united for about 10 mm or more, entire or subserrate ... 1. *G. arboreum*
- 1b. Epicalyx lobes free or united only for up to 5 mm or less, deeply gashed, with long triangular to almost linear teeth:
 - 2a. Flowers 5-8 cm long; staminal column 3.5-4 cm long; filaments of all stamens equal ... 2. *G. barbadense*
 - 2b. Flowers 2.5-5 cm long; staminal column 1-2 cm long; filaments of higher inserted stamens longer ... 3. *G. hirsutum*

1. *Gossypium arboreum* L., Sp. Pl. 693. 1753; Borss. in Blumea 14: 121. 1966.

Shrubs or undershrubs, 1-2 m high with slender, often prostrate-decumbent branches. Leaves ovate or orbicular, palmately 3-7-lobed, frequently with an extra tooth in the sinuses, usually hairy. Epicalyx lobes broadly ovate, cordate, 1.5-3.5 cm long, entire or toothed. Calyx cupular, truncate or minutely 5-toothed, ca 5 mm long. Corolla mostly light yellow, with or without a purple centre, sometimes red-purple; petals 3-4 cm long. Staminal column 15-20 mm long. Capsules subglobose, beaked, pitted;

seeds with floss and fuzz; floss copious, fairly long.

Raipur, Shivpuri, Sidhi. *Fl. & Fr.* : Jan. - April.

Cultivated for cotton.

2. *Gossypium barbadense* L., Sp. Pl. 639. 1753; Borss. in Blumea 14: 127. 1966. -*Kapas*.

Annual or perennial bushes, sometimes small trees, branches often purplish. Leaves broadly ovate-orbicular, cordate, palmately 3-5 (-7)-lobed with the central lobe usually much larger, upper leaves sometimes entire. Flowers usually terminal. Epicalyx lobes ovate-orbicular with long acuminate teeth, auricled at base. Calyx cupular, truncate or toothed. Corolla pale yellow, usually with a purple centre; petals obovate. Staminal column erect. Capsules ovoid-fusiform, beaked, pitted black; seeds ovoid, with long white fine floss, usually with fuzz only at the hilum.

Raigarh. *Fl. & Fr.*: Dec.

Cultivated for cotton.

3. *Gossypium hirsutum* L., Sp. Pl. ed. 2, 975. 1762; Borss. in Blumea 14: 123. 1966. -*Kapas*.

Annual or perennial bushes, 1-3 m high. Leaves suborbicular, cordate, 3-15 cm across, mostly 3-lobed, lower sometimes 5-lobed, upper sometimes entire. Flowers terminal on axillary shoots. Epicalyx lobe ovate-triangular, auricled at base, 2-5 cm long, toothed. Calyx campanulate or cupular, usually with 5 rounded lobes. Corolla pale yellow or white, sometimes purple tinged when young. Capsules ovoid, beaked, 2-5 cm long, pitted; seeds with white floss and with fuzz throughout or only at the hilum.

Bhopal, Bilaspur, Damoh, Durg, Raipur, Sconi, Shivpuri, Sidhi. *Fl. & Fr.*: Dec. April.

Cultivated for cotton.

5. HIBISCUS L.

Herbs, shrubs or trees. Leaves simple or palmatilobed, sometimes with extra floral nectaries. Flowers solitary axillary or racemose, or paniced; pedicels usually jointed. Epicalyx lobes 3 to several, free or connate at the base, usually persistent, sometimes absent. Calyx 5-lobed, usually campanulate, persistent. Corolla usually large and showy. Staminal column mostly as long as the petals, sometimes shorter or longer, antheriferous throughout or only in the upper half. Ovary 5-celled; cells 3 to many ovuled; style 1, 5-branched. Capsules loculicidally dehiscent; seeds globose or reniform.

About 250 species in tropics and subtropics; 10 in M.P.

- 1a. Garden shrubs, usually with ovate penninerved leaves; corolla large; staminal column longer than the petals, antheriferous in the upper half:
 - 2a. Petals entire; staminal column slightly longer than the petals ... 6. *H. rosa-sinensis*
 - 2b. Petals penni-lobed or parted; staminal column about twice as long as the petals ... 8. *H. schizopetalus*
- 1b. Plants not as above:
 - 3a. Epicalyx absent or minute; flowers pure white, 2-3 cm across ... 2. *H. lobatus*
 - 3b. Epicalyx present and conspicuous; flowers not as above:
 - 4a. Epicalyx lobes with a linear-oblong appendage in the upper half ... 5. *H. radiatus*
 - 4b. Epicalyx lobes without appendage:
 - 5a. Epicalyx lobes spathulate:
 - 6a. Calyx inflated, membranaceous ... 9. *H. trionum*
 - 6b. Calyx not inflated, herbaceous, velutinous and prickly ... 4. *H. panduriformis*
 - 5b. Epicalyx lobes linear-lanceolate or filiform:
 - 7a. Petals 1-1.5 cm long; seeds with an auriole of long silky ferruginous hairs ... 3. *H. ovalifolius*
 - 7b. Petals 2.5-7.0 cm long; seeds not as above:
 - 8a. Epicalyx lobes adnate to the calyx for about one-third way up; calyx lobes outside with a gland on the costae:
 - 9a. Calyx with white arachnoid tomentum ... 1. *H. cannabinus*
 - 9b. Calyx without such tomentum ... 7. *H. sabdariffa*
 - 8b. Epicalyx lobes free from the calyx or almost so; calyx eglandular:
 - 10a. Leaves stellate pubescent; corolla hairy; capsules 5-winged ... 10. *H. vitifolius*
 - 10b. Leaves glabrous or glabrescent; corolla glabrous; capsules not winged ... 5. *H. radiatus*

1. *Hibiscus cannabinus* L., Syst. Nat. ed. 10, 1149. 1759; Mast. in Hook. f., Fl. Brit. Ind. 1: 339. 1874. —*Kudrung, Patsan*.

Annual or perennial prickly herbs, ca 1 m high. Leaves ovate-orbicular, cordate, 4-8 cm across, upper palmately divided into 3-5 narrowly lanceolate serrate lobes, lower sometimes entire, uppermost lanceolate. Epicalyx lobes subulate. Calyx with white arachnoid tomentum, deeply divided into lanceolate lobes. Corolla large, white or yellow with a purple centre. Capsules ovoid, beaked, hairy.

Bilaspur, Damoh, Raigarh, Raipur, Sidhi, Surguja. Fl. & Fr. : Sept. Nov.

Cultivated for its soft white silky fibre. The oily seeds are eaten cooked.

2. *Hibiscus lobatus* (J.A. Murr.) O. Ktze., Rev. Gen. Pl. 3, 2: 19. 1898. *Solantra lobata* J.A. Murr., Comm. Soc. Reg. Sc. Goetting 6: 20, t. 1. 1785. *H. solandra* L. Herit., Stirp. Nov. 1: 103, t. 49. 1798, *nom. illeg.*; Mast. in Hook. f., Fl. Brit. Ind. 1: 336. 1874.

Annual erect pubescent herbs, 0.5-1 m high. Leaves lower ovate-orbicular, 2-10 cm long, serrate, entire or lobed; upper usually linear-lanceolate. Flowers solitary, axillary or racemed. Epicalyx absent (or reportedly minute in buds only). Calyx campanulate, 5-lobed, tomentose and ciliate. Corolla 20-25 mm across, white; petals obovate, 10-15 mm long. Staminal column as long as the petals. Style arms short; stigmas discoid. Capsules ovoid, 12-15 mm long, beaked, hairy; seeds numerous, tetragonal or globular, verruculose, black.

Along roads and streams, and on hill slopes. Balaghat, Bhopal, Damoh, Durg, Indore, Mandla, Raipur, Raisen, Rajnandgaon, Seoni, Sidhi, Surguja, Tikamgarh. Fl.: Aug. – Oct.; Fr.: Dec. – Feb.

3. *Hibiscus ovalifolius* (Forsk.) Vahl, Symb. 1:50. 1790; Ramamoorthy in Saldanha & Nicolson, Fl. Hassan 151. 1976. *Urena ovalifolia* Forsk., Fl. Aegypt.-Arab. 124. 1775. *H. micranthus* L. f., Syst. 308. 1781; Mast. in Hook. f., Fl. Brit. Ind. 1: 335. 1874. *Bombyx micranthus* (L.f.) Riedl in Reichinger, Fl. Iranica no. 120: 34. 1976.

Rigidly branched undershrubs, 30-70 cm high, strigose with 4-armed stellate hairs of which 2 usually point upwards and 2 point downwards. Leaves ovate, 2-5 cm long, serrate. Flowers solitary, axillary; pedicels jointed above the middle. Epicalyx lobes 6, filiform, hairy. Calyx short, deeply lobed, hairy. Corolla small, reddish with yellow tips; petals 10-15 mm across; seeds reniform with an auricle of long silky ferruginous hairs.

In wastelands and foot-hills. Gwalior, Satna. *Fl. & Fr.* : Aug. - Nov.

4. *Hibiscus panduriformis* Burm. *f.*, *Fl. Ind.* 151, t. 47, f. 2. 1768; Mast. in Hook., *f.*, *Fl. Brit. Ind.* 1: 338. 1874.

Stout tomentose herbs or undershrubs, 0.5-2 m high. Lower leaves broadly ovate-suborbicular, cordate, 5-20 cm long, palmatilobed, serrate-dentate; upper narrower, oblong-lanceolate, less lobed or subentire. Flowers solitary, axillary, or upper racemed. Epicalyx lobes 7-12, connate at the base, spatulate, 1-2 cm long. Calyx campanulate, deeply 5-lobed. Corolla yellow with a purple centre; petals obovate, 15-35 mm long, hairy outside. Staminal column purple. Capsules ovoid-globose, acute, hairy; seeds reniform, with concentric ribs.

In wastelands, fallow-fields and teak plantations. Balaghat, Bilaspur, Damoh, Hoshangabad, Mandla, Raigarh, Raipur, Raisen, Rajnandgaon, Rewa, Satna, Seoni, Sidhi. *Fl. & Fr.* : Oct. - March.

5. *Hibiscus radiatus* Cav., *Diss.* 3: 150, t. 54, f. 2. 1787; Mast. in Hook. *f.*, *Fl. Brit. Ind.* 1: 335. 1874.

Erect, somewhat prickly herbs, 0.5-2 m high, usually with reddish stems. Leaves 2-12 cm long, serrate, lower broadly ovate-oblong, entire, upper suborbicular, palmately 3-5-lobed. Flowers solitary, axillary. Epicalyx lobes 10, linear, 15-20 mm long, ciliate by bulbous-based bristles, below the apex on the outside mostly with a 4-8 mm long linear-ovate appendage. Calyx urceolate, bristly. Corolla yellow, pink or red with a dark purple centre; petals ca 7 mm long. Capsules ovoid-globose, ca 15 mm across, beaked, bristly; seeds trigonous, brown.

Raigarh, Raipur, Rewa. *Fl. & Fr.* : Oct. - Nov.

Sometimes cultivated as a leafy vegetable.

6. *Hibiscus rosa-sinensis* L., *Sp. Pl.* 694. 1753; Mast. in Hook. *f.*, *Fl. Brit. Ind.* 1: 344. 1874. -*Gurhal, Jasut.*

Shrubs or small trees. Leaves ovate, acuminate, irregularly serrate towards the top, entire near the base, penninerved, glabrous or pubescent on the nerves beneath. Flowers solitary, axillary, on long pedicels jointed above the middle. Epicalyx lobes 5-7, lanceolate. Calyx deeply 5-lobed. Corolla large, showy, 5-10 cm across, red in the more commonly cultivated variety, pink or yellow in other cultivars; petals obovate, cuncate. Staminal column exceeding the corolla, pendulous, antheriferous in the upper part.

Commonly grown in the gardens throughout Madhya Pradesh, mostly as a hedge, and as an ornamental. *Fl.*: Throughout the year.

7. *Hibiscus sabdariffa* L., Sp. Pl. 695. 1753; Mast. in Hook. f., Fl. Brit. Ind. 1: 340. 1874. *Patwa*.

Annual erect herbs ca 1.5 m high; stems and petioles usually purple-red. Leaves suborbicular, serrate-dentate, 5-10 cm across, palmately 3-5-lobed, or lower sometimes entire; midlobe longest, often with a purple blotch. Flowers solitary, axillary, large, showy. Epicalyx lobes 10, lanceolate, adnate to the calyx. Calyx fleshy, red-purple, muricate. Corolla ca 7 cm across, pink or yellow, often with a dark purple centre. Capsules ovoid, beaked, hairy; seeds blackish, hairy.

Bilaspur, Raigarh, Raipur, Surguja. *Fl. & Fr.* : Aug. Jan.

Cultivated for its fleshy and sour calyces that are made into a jelly and chutney. Leaves also eaten cooked. Stems yield fibre.

8. *Hibiscus schizopetalus* (Mast.) Hook. f. in Curtis, Bot. Mag. t. 6524. 1880. *H. rosa-sinensis* var. *schizopetalus* Mast., Gard. Chron. n. s, 12: 272. f. 45. 1879.

Shrubs. Leaves ovate-elliptic, 5-10 cm long, palmately nerved, serrate in the upper half. Flowers axillary, solitary, drooping and fuschia-like, red or scarlet, with white or creamy lines, on long slender jointed pedicels. Epicalyx lobes 6-7, subulate. Calyx spathaceous ca 2 cm long, 2-3-lobed. Petals deeply lacinate and reflexed, 5-7 cm long. Staminal column long, pendulous, red, up to 15 cm long. Style arms 5; stigmas capitate.

Sometimes grown in gardens as an ornamental. *Fl. & Fr.* : April - Sept.

9. *Hibiscus trionum* L., Sp. Pl. 697. 1753; Mast. in Hook. f., Fl. Brit. Ind. 1: 334. 1874.

Annual pubescent herbs, 30-50 cm high. Leaves broadly ovate or suborbicular, 3-7 cm long, lower undivided, upper palmately 3-5 lobed, lobes obovate-oblong, pinnatisect. Flowers solitary, axillary, yellow with dark purple centre. Epicalyx lobes 8-12, linear, hairy. Calyx campanulate, inflated, membranaceous, with hispid green nerves turning purple. Petals adnate to the staminal column. Style-branches 5. Capsules oblong, obtuse, hairy; seeds reniform, glandular papillose, rugose.

In open moist places. Damoh. *Fl. & Fr.* : Aug. - Sept.

Various parts considered medicinal.

10. *Hibiscus vitifolius* L., Sp. Pl. 696. 1753; Mast. in Hook. f., Fl. Brit. Ind. 1: 338. 1874; Borss. in Blumea 14: 82. 1966. *Fioria vitifolia* (L.) Mattei, Bot. Ort. Bot. Palermo, n.s. 2: 71. 1917; Kundu & Biswas in Bull. Bot. Surv. Ind. 16. 125-137. 1977. -*Ban kapas*.

Annual slender climbing herbs, 1-2 m high, sparsely to densely hairy. Leaves ovate, cordate, 3-10 cm long, palmately 3-7 lobed, margins toothed; petioles coppery red on adaxial side. Flowers axillary, solitary or clustered, drooping, 5-6 cm across, yellow with a purple centre. Epicalyx lobes 7-12, linear, 10-12 mm long, hairy. Calyx ca 2 cm long, 5-lobed, with a soft tomentum and a few bristles. Corolla twisted. Staminal columns 15-20 mm long, antheriferous throughout. Capsules suborbicular, apiculate, ca 15 mm across, 5-winged; wings reticulately nerved; seeds reniform, minutely tubercled.

In wastelands and forest-margins. Damoh, Hoshangabad, Shivpuri. Fl. & Fr. : Oct. - March.

6. KYDIA Roxb.

Trees with stellate tomentum. Leaves petioled, palmatinerved, usually angular or lobed. Flowers paniced, polygamous; epicalyx lobes, stamens and styles varying in different sexual forms. Epicalyx lobes 4-6, spathulate, connate at the base, accrescent and spreading in fruits, forming a wing. Calyx deeply 5-lobed, persistent. Petals normally 5, unequally bilobed. Staminal column divided into 5 arms, each bearing 3-4 anthers which are imperfect or absent in some flowers. Ovary 2-3-celled, with 2 ovules in each cell, sometimes imperfectly developed; style 3-branched. Capsules globose, loculicidally dehiscent; seeds reniform.

Two species in South Asia; one in M.P.

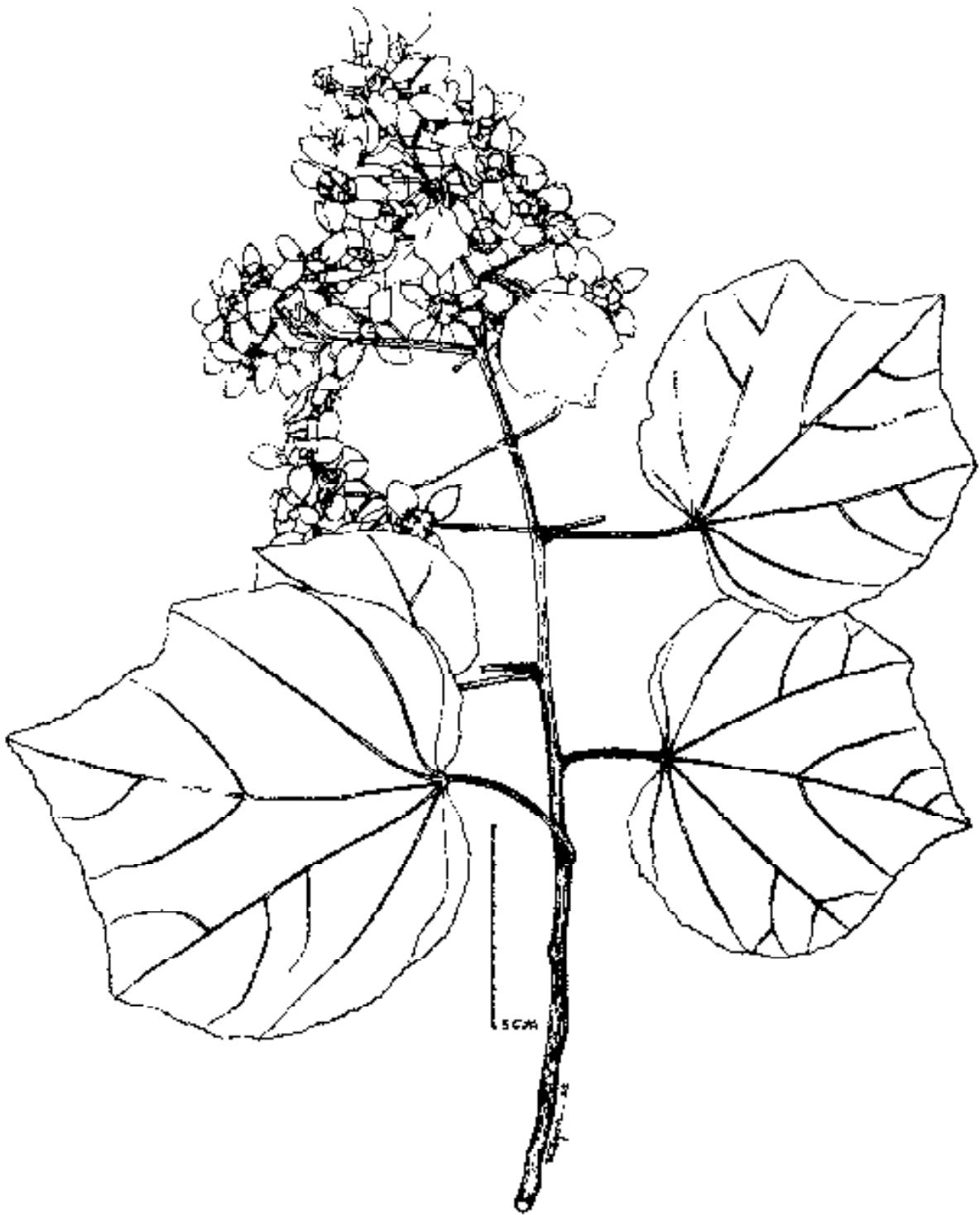
Kydia calycina Roxb., Pl. Corom. 3: 11, t. 215, 1811; Mast. in Hook. f., Fl. Brit. Ind. 1: 348, 1874. -Barang. Fig. 21.

Medium-sized trees with very soft wood, sometimes flowering as a shrub, bark greyish, blaze white with pink markings. Leaves suborbicular, 8-15 cm across, sinuate, angled, or shallowly lobed with a large gland on the nerves beneath. Flowers copious, in large dense attractive panicles. Epicalyx lobes 4-6, oblong-spathulate, ca 1 cm long in fruit forming a dry stramineous wing. Corolla rotate, white or cream-coloured with age, ca 15 mm across; petals obovate, long-clawed, hairy. Capsules ca 7 mm across, enclosed within calyx, mealy with stellate hairs, slightly umbonate, subtended by stellately spreading epicalyx lobes.

Common in sal and mixed forests. Balaghat, Bastar, Bhopal, Bilaspur, Chhatarpur, Damoh, Hoshangabad, Indore, Jabalpur, Mandla, Raigarh, Raipur, Raisen, Rajnandgaon, Rewa, Satna, Sagar, Seoni, Sidhi, Surguja. Fl.: Aug. - Oct.; Fr. : Sept. - March.

7. MALACHRA L.

Annual or perennial herbs or undershrubs. Leaves undivided or lobed.



Flowers in condensed capitate racemes in the axils of foliaceous cordate bracts. Pedicels very short. Epicalyx absent. Calyx small. Staminal column as long as or shorter than the petals, antheriferous throughout. Carpels 5; ovule solitary. Style split into 10 arms; stigmas capitate. Schizocarp globular; mericarps trigonous, indehiscent.

About 10 tropical American species, 2-3 species found as weeds in tropics of the Old World; one in M.P.

Malachra capitata (L.) L., Syst. ed. 12, 458. 1767; Mast. in Hook. f., Fl. Brit. Ind. 1:329. 1874. *Sida capitata* L., Sp. Pl. 685. 1753.

Herbs or undershrubs, 0.5 - 2 m high, cinereously velutinous by simple and stellate prickly hairs. Leaves ovate-orbicular, angular or shallowly lobed, cordate, 5-10 cm across, serrate. Floral heads 3-7 in each axil; inflorescence axis 5-15 mm long with 2-5 flowers; bracts 3-4 per head, foliaceous, folded, 5-20 mm across, accompanied by filiform stipules. Calyx ca 4 mm long. Corolla 10-15 mm across, yellow; petals obovate ciliate. Schizocarps obpyriform, ca 5 mm across. Mericarps obovoid, trigonous; seeds obpyriform, hairy.

In wastelands. Durg, Raipur. Fl. & Fr. : Aug.-Jan.

Probably introduced into Bombay in the nineteenth century from Brazil as a fibre plant, now wild.

8. MALVA L.

Annual or perennial herbs or undershrubs. Leaves undivided or palmately lobed. Flowers solitary or in axillary clusters, small or medium-sized. Epicalyx lobes 3, small, free. Calyx cupular or rotate. Corolla rotate or infundibuliform. Staminal column shorter than the petals. Carpels and styles 9-15; ovule solitary in each cell. Schizocarp discoid with a depressed centre; mericarps usually reniform, flattened, indehiscent.

About 30 species in the Old World; 2 in M.P.

- 1a. Flowers large; petals 20-25 mm long; schizocarp ca 8 mm across ... 1. *M. sylvestris*
 1b. Flowers small; petals 6-7 mm long; schizocarp ca 5 mm across ... 2. *M. verticillata* var. *chinensis*

1. *Malva sylvestris* L., Sp. Pl. 689. 1753; Mast. in Hook. f., Fl. Brit. Ind. 1: 320. 1874; Whitmore in Hara *et al.*, Enum. Fl. Pl. Nepal 2: 68. 1979. *M. sylvestris* var. *mauritiana* Mast. in Hook. f., Fl. Brit. Ind. 1: 320. 1874.

Herbs or undershrubs, almost glabrous. Leaves suborbicular, cordate, 3-6 cm across, angled or shallowly lobed, long petioled. Flowers axillary, several together on long pedicels. Epicalyx lobes small, ovate. Corolla 3-4

cm across, pink-purple; petals long clawed, bearded at the base. Schizocarps ca 6 mm across. Mericarps reticulated at the back, 2-keeled, nearly glabrous; seeds brownish-black.

Indore. Fl. : Sept. Grown in gardens as an ornamental.

2. *Malva verticillata* L. var. *chinensis* (Mill.) Hu, Fl. China 153: 6. 1955; N.C. Nair in Rec. Bot Surv. Ind. 21: 37. 1978. *M. chinensis* Mill., Dict. ed. 8. 670. 1968. *M. parviflora* auct.(non L.); Mast. in Hook. f., Fl. Brit. Ind. 1: 321. 1874. -Nar.

Small annual pubescent herbs branching at the base, with prostrate or ascending branches, up to 50 cm long. Leaves suborbicular or reniform, cordate, 2-6 cm across, crenate, usually sinuate, or 5-7 angled. Flowers axillary, solitary or few together. Epicalyx lobes small, linear, hairy, caducous. Calyx reticulately veined. Corolla 10-15 mm across, pink-purple; petals 6-7 mm long, clawed, glabrous. Schizocarps ca 6 mm across. Mericarps strongly reticulated on the back, 2-keeled, sometimes slightly winged or toothed.

In cultivated fields. Sidhi. Fl. & Fr. : Jan.

9. MALVASTRUM A. Gray

Annual herbs or undershrubs. Leaves simple or shallowly lobed, penninerved. Flowers solitary, axillary, or in axillary clusters, or in terminal and axillary spikes, sessile or subsessile. Epicalyx lobes 3, small, slightly adnate to the calyx. Calyx campanulate. Corolla small, rotate, yellow. Staminal column shorter than the petals. Carpels and styles 10-15; ovule solitary; styles connate at the base. Schizocarps discoid; mericarps reniform, flattened, indehiscent.

About 3 species, native of America; one in M.P.

Malvastrum coromandelianum (L.) Garcke in Bonplandia 5: 295. 1857. *Malva coromandeliana* L., Sp. Pl. 687. 1753. *Malva tricuspidata* R. Br. in Ait., f., Hort. Kew. ed. 2, 4: 210. 1812. *Malvastrum tricuspdatum* (R.Br.) A. Gray, Pl. Wright. 1: 16. 1852; Mast. in Hook. f., Fl. Brit. Ind. 1: 321. 1874.

Annual hairy herbs or undershrubs, 0.3-1 m high. Leaves ovate-oblong or suborbicular, 2-6 cm long, serrate-dentate. Flowers axillary, solitary or 2-4 together. Epicalyx lobes linear-lanceolate, 5-7 mm long. Calyx campanulate, 7-9 mm long, with 3-5 mm long ovate deltoid segments. Corolla ca 15 mm across, yellow; petals spatulate, ciliate at base. Staminal column conical, 2-3 mm long. Mericarps 10-14, curved, ca 2 mm long, shortly awned at the tip and with 2 awns dorsally at the middle; seed solitary in each cell, reniform.

In wastelands and on old walls. Balaghat, Bhopal, Bilaspur, Damoh, Indore, Raipur, Raisen, Rewa. *Fl. & Fr.* : Oct.-Jan.

10. PAVONIA Cav.

Annual or perennial herbs or shrubs. Leaves simple or palmately lobed, usually palmatinerved, with or without nectaries. Flowers mostly solitary, axillary, sometimes clustered, racemed or paniced. Pedicels usually jointed. Epicalyx lobes 5-16, free or connate at the base. Calyx campanulate, urceolate or tubular. Corolla small or medium-sized, rotate. Staminal column as long as or shorter than the petals, antheriferous throughout or only in upper part. Carpels 5, ovule solitary in each cell; style arms 10; stigmas capitate. Schizocarp discoid or globular; mericarps trigonous, muricate, tuberculate or smooth, dehiscent or indehiscent, sometimes with 1-3 hairy awns.

About 200 species, pantropical; 3 in M.P.

- 1a. Leaves with a gland on the midrib beneath near the base; epicalyx lobes 5, linear-subulate, united into a cup below ...2. *P. repanda*
- 1b. Leaves eglandular; epicalyx lobes about 10, thread-like, free to the base:
 - 2a. Carpels flat at the back, keeled and narrowly winged along the edges, glabrous ...3. *P. zeylanica*
 - 2b. Carpels somewhat rounded at the back, neither keeled nor winged, usually pubescent ...1. *P. odorata*

1. *Pavonia odorata* Willd., *Sp. Pl.* 3: 837. 1800; Mast. in Hook. *f.*, *Fl. Brit. Ind.* 1: 331. 1874.

Annual erect viscous hairy herbs, ca 0.5 m high. Leaves broadly ovate or suborbicular, cordate, 2-8 cm long, shallowly 3-5-lobed or -angled, toothed; lower petioles generally longer than the blade. Flowers axillary, clustered at the ends of the branches. Epicalyx lobes 10-12, linear, ca 7 mm long, white hairy. Calyx ca 3 mm long. Corolla 8-10 mm long, pink with deep pink striations. Mericarps obovate, unarmed, wingless.

In wastelands. Indore. *Fl. & Fr.* : Jan.

2. *Pavonia repanda* (Roxb. ex J.E. Smith) Spreng., *Syst.* 3: 98. 1826. *Urena repanda* Roxb. ex J. E. Smith in Rees, *Cyclop.* 37 no. 6. 1819; Mast. in Hook. *f.*, *Fl. Brit. Ind.* 1: 330. 1874: *Sikuar*.

Undershrubs, 0.5-1.2 m high. Lower leaves suborbicular or repand, 5-10 cm across, often somewhat lobed, serrate, densely stellate hairy; upper leaves narrower, lanceolate. Flowers axillary and racemed. Epicalyx lobes

5, linear, 8-12 mm long, connate below. Calyx ca 8 mm long, with linear-oblong lobes. Corolla pink, mauve or red, 15-20 mm long. Mericarps smooth, unarmed, dehiscent.

In wastelands and roadsides. Balaghat, Bastar, Damoh, Hoshangabad, Raigarh, Raipur. *Fl. & Fr.* : Aug.-Oct.

3. *Pavonia zeylanica* (L.) Cav., Diss. 3: 134. 1787; Mast. in Hook. f., *Fl. Brit. Ind.* 1:331. 1874. *Hibiscus zeylanicus* L., *Sp. Pl.* 697. 1753.

Stout hairy herbs or undershrubs, 0.5-1.2 m high. Leaves roundish with cordate or truncate base, 1-3 cm broad, dentate, shallowly or deeply 3-5-lobed, midlobe longest; petioles as long as or longer than the blade. Flowers axillary, solitary. Epicalyx lobes 8-12, free, 8-12 mm long, ciliolate. Calyx ca 4 mm long, lobes lanceolate. Corolla exceeding the epicalyx lobes, pink or white. Mericarps oblong, trigonous, narrowly winged.

On river-banks and marshy places. Gwalior. *Fl. & Fr.* : Oct.-Nov.

11. SIDA L.

Annual or perennial herbs or undershrubs. Leaves mostly simple or sometimes palmately lobed. Flowers small, solitary, axillary, or in axillary clusters, or racemed or paniced. Pedicels jointed. Epicalyx (ours) absent. Calyx campanulate, with a strong midrib. Corolla small, rotate, usually yellow. Staminal column usually shorter than the petals. Carpels and styles 5-14; ovule solitary in each cell. Schizocarp globular or oblate; mericarps trigonous, indehiscent or dehiscing only at the tip.

About 15 species in tropical and subtropical regions; 6 in M.P.

- 1a. Leaves palmately nerved, styles and mericarps 5:
- 2a. Erect herbs with many gland hairs ... 5. *S. mysorensis*
 - 2b. Trailing or ascending herbs without gland hairs ... 3. *S. cordata*
- 1b. Leaves pinnately nerved; styles and mericarps 5-12:
- 3a. Mericarps 8-10 with 3.5-5 mm long awns conspicuously protruding out of the calyx ... 4. *S. cordifolia*
 - 3b. Mericarps 5-12 with 1-3 mm long awns always included within the calyx:
 - 4a. Plants sparsely hairy or glabrescent; stipules of each pair dissimilar, one linear-lanceolate and the other linear-filiform ... 1. *S. acuta*
 - 4b. Plants more or less densely hairy; stipules of each pair similar, linear filiform:
 - 5a. Mericarps 5 ... 2. *S. alba*
 - 5b. Mericarps 9-12 ... 6. *S. rhombifolia*

1. *Sida acuta* Burm. f., Fl. Ind. 147. 1768. *S. carpinifolia* Mast. in Hook. f., Fl. Brit. Ind. 1: 323. 1874 (non L.f. 1781). *Maha bala*.

Annual herbs or undershrubs, 0.3-1.3 m high, sparsely hairy or glabrous. Leaves mostly linear-lanceolate, acute, 2-7 cm long, remotely serrate, sometimes a few lower ovate-oblong. Flowers axillary, solitary or two together; pedicel jointed in the middle. Calyx campanulate, ca 5 mm long. Corolla 12-15 mm across, pale yellow or whitish, petals obovate, ciliate at base. Mericarps 6-10, tetrahedral, ca 2 mm long, usually with 2 awns at apex; seeds ovoid, ca 2 mm long.

In wastelands, fallow-fields, and along roads and forests. Balaghat, Bastar, Bilaspur, Damoh, Durg, Gwalior, Hoshangabad, Mandla, Raigarh, Raipur, Raisen, Rajnandgaon, Rewa, Sagar, Seoni, Shivpuri, Sidhi, Surguja. *Fl. & Fr.* : Aug.-Jan.

Plants used for brooms; yields fibre; also medicinal.

2. *Sida alba* L., Sp. Pl. ed. 2, 2: 960. 1763; Bhandari, Fl. Ind. Desert 71. 1978. *S. spinosa* L., Sp. Pl. ed. 1, 2: 683. 1753 *p.p.* Mast. in Hook. f., Fl. Brit. Ind. 1: 323. 1874.

Erect annual hairy herbs, up to 70 cm high. Leaves ovate-oblong or lanceolate, obtuse or acute, 1-4 cm long, serrate; stipules linear, 2-4 mm long, leaving a distinctive spine-like scar on falling. Flowers axillary, solitary or 2-5 together; pedicels jointed in the middle. Calyx campanulate, 3-5 mm across. Corolla ca 1 cm across, yellow. Styles 5. Mericarps 5, trigonous, 2-3 mm long, strongly reticulately veined, hairy at apex, with two short horns or awns; seeds ovoid.

In wastelands and fallow fields. Bilaspur, Hoshangabad, Indore, Mandla, Raigarh, Raipur, Raisen, Sidhi. *Fl. & Fr.* : Oct.-Dec.

3. *Sida cordata* (Burm. f.) Borss. in Blumea 14: 382. 1966. *Melochia cordata* Burm. f., Fl. Ind. 143. 1768. *S. humilis* Cav., Diss. 5, t. 134. f. 2. 1788; Mast. in Hook. f., Fl. Brit. Ind. 1: 322. 1874. *S. humilis* var. *veronicifolia* (Lamk.) Mast. in Hook. f., Fl. Brit. Ind. 1: 322. 1874.

Annual hairy herbs, mostly branching at the base with slender prostrate or ascending branches, up to 50 cm long. Leaves broadly ovate or orbicular, cordate, acuminate, 1-5 cm long, crenate-serrate. Flowers solitary, racemed or paniced; pedicels slender, jointed in the middle. Calyx campanulate, ca 5 mm across. Corolla 7-9 mm across, yellow; petals obovate, ciliate at base. Mericarps 5, tetrahedral, ca 2.5 mm long, awnless; seeds ovoid, ca 2 mm long.

In wastelands, fallow-fields and forest margins. Balaghat, Bastar, Bilaspur, Bhopal, Damoh, Durg, Hoshangabad, Indore, Jabalpur, Mandla,

Raigarh, Raipur, Raisen, Rajnandgaon, Rewa, Satna, Sagar, Seoni, Shivpuri, Sidhi, Surguja. *Fl. & Fr.* : Throughout the year.

4. *Sida cordifolia* L., Sp. Pl. 684. 1753; Mast. in Hook. f., Fl. Brit. Ind. 1: 324. 1874. -*Bala*.

Profusely branched tomentose herbs or undershrubs, 0.5-1 m high. Leaves ovate-oblong, shallowly cordate or truncate, 1-6 cm long, crenate-serrate. Flowers axillary, mostly solitary, sometimes 2-5 together; Pedicels jointed near the apex. Calyx campanulate, 5-8 mm across, with triangular acute or acuminate segments. Corolla 12-15 mm across, pale yellow or whitish, obovate, ciliate at base. Mericarps 8-10, compressed, trigonous, 3-3.5 mm long, with 2 retrorsely hairy awns at the apex; seeds reniform, ca 2.5 mm long.

In wastelands, forest margins and roadsides. Balaghat, Bastar, Bilaspur, Bhopal, Durg, Hoshangabad, Mandla, Raigarh, Raipur, Seoni, Shivpuri, Sidhi, Surguja. *Fl. & Fr.* : Aug.-Oct.

5. *Sida mysorensis* W. & A., Prodr. 59. 1834; Mast. in Hook. f., Fl. Brit. Ind. 1: 322. 1874; Borss. in Blumea 14: 180. 1966. *S. glutinosa* Roxb., Fl. Ind. 3: 172. 1832 (non Cav. 1785).

Annual herbs or undershrubs, 0.5-1 m high; stems, petioles and pedicels covered by minute stellate hairs, spreading simple hairs, and gland-hairs. Leaves ovate-oblong, or sometimes orbicular, cordate, acuminate, 2-9 cm long, crenate-serrate, clothed with stellate and gland hairs. Flowers axillary, solitary, or racemed or paniced; pedicels slender, jointed at or above the middle. Calyx campanulate, 6-8 mm long, hairy. Corolla 10-12 mm long, yellow; petals obovate, glabrous. Styles connate below. Mericarps 5, tetrahedral, ca 2.5 mm long, hairy at the top, awnless; seeds ovoid, ca 2 mm long.

In wastelands. Hoshangabad, Indore, Rewa, Shahdol. *Fl. & Fr.* : Oct.-Jan.

6. *Sida rhombifolia* L., Sp. Pl. 684. 1753; Mast. in Hook. f., Fl. Brit. Ind. 1: 323. 1874; Borss. in Blumea 14: 193. 1966. *S. rhomboidea* Roxb. ex Fleming in As. Res. 6: 178. 1810. *S. rhombifolia* var. *rhomboidea* (Roxb. ex Fleming) Mast. in Hook. f., Fl. Brit. Ind. 1: 196. 1874. -*Ati bala*.

Erect herbs or undershrubs, up to 1.5 m high, usually covered with shining stellate hairs, branches often red-tinged. Leaves usually ovate-oblong or rhomboid, sometimes lanceolate, 1-10 cm long, usually serrate-crenate in the upper part. Flowers axillary, solitary or 2-5 together; pedicels up to 4 cm long, jointed below apex. Calyx campanulate, ca 1 cm across, with 5 prominent nerves splitting above. Corolla ca 15 mm across,

yellow or orange; petals obliquely obovate. Mericarps 9-12, flattened trigonous, 2.5-3.5 mm long, mostly mucous, sometimes with two small mucros or awns.

In wastelands, rock-crevices, forests and along streams. Balaghat, Bilaspur, Bhopal, Damoh, Dhar, Mandla, Panna, Raisen, Rajnandgaon, Sidhi, Surguja. *Fl.* : Sept.-Oct.; *Fr.* : Oct. April.

12. THESPESIA Sol. ex Correa

Trees or shrubs. Leaves entire or palmately lobed, palmatinerved, often with nectaries. Flowers solitary, axillary or in terminal racemes. Pedicels swollen above into a hypanthium. Epicalyx lobes small, 3-5, caducous. Calyx cupular, entire or 5-toothed. Corolla large and showy. Staminal column much shorter than the petals, antheriferous throughout. Ovary 5- or (as a result of 5 false dissepiments) 10-celled; style 1, short; stigma clavate. Capsules with a woody pericarp, loculicidally dehiscent or indehiscent. Seeds 3 to several in each cells, obovoid.

About 15 species, pantropical; 2 in M.P.

- 1a. Shrubs, 0.5-3 m high; leaves except a few uppermost, 3-5 lobed, with a linear nectary on the midrib beneath ... 1. *T. lampas*
- 1b. Trees, 3-10 m high; leaves never lobed, without nectary on the midrib beneath ... 2. *T. populnea*

1. *Thespesia lampas* (Cav.) Dalz. & Gibs., Bombay Fl. 19. 1861; Mast. in Hook. *f.*, Fl. Brit. Ind. 1: 345. 1874. *Hibiscus lampas* Cav., Diss. 3: 154, t. 56, f. 2. 1787. - *Ban kapas*.

Small tomentose shrubs, 0.5-3 m high. Lower leaves orbicular, cordate, 3-5-lobed with deltoid segments, 8-20 cm across; upper leaves smaller and narrower, angled or entire. Flowers axillary, solitary or in few-flowered racemes. Epicalyx lobes 4-6, subulate, 5-10 mm long. Calyx cupular, coriaceous, ca 8 mm across, with distant subulate lobes. Corolla large and showy, yellow with a dark purple centre; petals obovate, 6-7 cm long, with hairs and scales at base. Capsules ovoid-globose, acuminate, 2-3 cm long, thick and woody, black; seeds 8-14 per cell, obovoid, ca 4 mm long, hairy.

In sal, teak and mixed forests. Balaghat, Bastar, Bilaspur, Damoh, Hoshangabad, Indore, Mandla, Raigarh, Raipur, Raisen, Rewa, Sagar, Seoni, Sidhi, Surguja. *Fl.* : Sept.-Dec.; *Fr.* : Sept.- July.

2. *Thespesia populnea* (L.) Sol. ex Correa in Ann. Mus. Hist. Nat. Paris 9: 290, t. 8, f. 1. 1807; Mast. in Hook. *f.*, Fl. Brit. Ind. 1: 345. 1874; Borss. in Blumea 14: 106. 1966. *Hibiscus populneus* L., Sp. Pl. 694. 1753.

Medium-sized trees; twigs clothed with minute brown to silvery scales. Leaves deltoid-orbicular or ovate, cordate, acuminate, 8-22 cm long, entire. Flowers axillary, solitary, large and showy. Epicalyx lobes 3, oblong-lanceolate, 5-15 mm long. Calyx coriaceous, cupular, 1-1.5 cm long, with 5 distant teeth. Corolla campanulate, yellow with a purple centre, fading orange or pink-purple; petals obovate, 6-7 cm long, somewhat scaly and ciliate at base. Fruits subglobose, 2-4 cm across, shortly beaked, usually indehiscent. Seeds 4 per cell, obovoid, 8-15 mm long.

Bhopal, Dhar, Raipur. *Fl.* : Sept.-Nov.; *Fr.* : Nov. Aug.

Commonly planted as an avenue tree.

13. URENA L.

Annual or perennial undershrubs. Leaves petiolate, usually shallowly or deeply palmately lobed, sometimes twice divided or undivided, palmatinerved, with nectaries on the nerves beneath. Flowers mostly solitary axillary or in axillary clusters, or racemed. Epicalyx lobes 5, connate below. Calyx campanulate or tubular, usually bearing nectaries on the costae. Corolla small, rotate. Staminal column as long as the petals, antheriferous in the upper half. Carpels 5, ovule solitary in each cell; style arms 10; stigmas capitate. Mericarps trigonous, glochidiate, indehiscent.

A monotypic pantropical genus, probably of asiatic origin.

1. *Urena lobata* L., Sp. Pl. 692. 1753; Mast. in Hook. f., Fl. Brit. Ind. 1: 329. 1874; Borss. in Blumea 14: 138. 1966. *U. callifera* Clarke in J. Linn. Soc. Bot. 25: 7. t. 3. 1889. *Bachita*, Kunguya.

Annual undershrubs, 0.5-1.5 m high, often with slender branches, more or less densely stellate hairy throughout and usually also with some scattered simple hairs. Leaves highly variable; lower suborbicular in outline, angular or shallowly palmately lobed, 1-10 cm across; upper oblong-lanceolate, margins serrate, midrib beneath or sometimes also the side nerves with a linear nectary at base. Epicalyx adnate to the calyx at base, 7-8 mm long; lobes narrowly triangular, appressed to the mericarps in fruits, 4.5-7 mm long. Calyx 5-6 mm long. Corolla rotate, 2-3 cm across, pink with a purple centre, often hairy. Staminal column 10-15 mm long, more or less curved, anthers and stigmas purple. Mericarps 4-5 mm long, shortly acuminate, stellate hairy, reticulately veined, with retrose sharp hooks at the top; seeds reniform.

In wastelands, fallow fields, mixed and sal forests. Balaghat, Bastar, Bilaspur, Hoshangabad, Narsimhapur, Panna, Raigarh, Raipur, Satna, Seoni, Shahdol, Sidhi, Surguja. *Fl.* & *Fr.* : Throughout the year.

1.1. ssp. *sinuata* (L.) Borss. in Blumea 14: 142. 1966. var. *sinuata*. *U.*

sinuata L., Sp. Pl. 692. 1753; Mast. in Hook. f., Fl. Brit. Ind. 1: 329. 1874; Bennet, Fl. Howrah 239. 1979.

Leaves palmatifid to palmatipartite with its segments serrate or pinnatilobed to pinnatipartite. Epicalyx lobes in fruits never appressed to the mericarps, more or less spreading or reflexed, linear-lanceolate, 3-4 mm long.

In wastelands, sal, teak and mixed forests. Balaghat, Bastar, Bilaspur, Chhindwara, Damoh, Hoshangabad, Mandla, Raigarh, Raipur, Rajnandgaon, Rewa, Seoni, Sidhi, Surguja.

1.1.1 *ssp. sinuata var. glauca* (Bl.) Borss. in Blumea 14: 144. 1966. *U. lappago var. glauca* Bl., Bijdr. 2: 65. 1825. *U. lobata var. scabriuscula* (DC.) Mast. in Hook. f., Fl. Brit. Ind. 1: 329. 1874. *U. scabriuscula* DC., Prodr. 1: 441. 1824.

Leaves angular or shallowly palmatilobed, glaucous.

In forests, along streams. Sidhi. Fl. & Fr. : July.

25. BOMBACACEAE

(M. I. Hanfi)

About 20 genera and 180 species, pantropical, especially in America; 4 genera and 5 species in M.P.

- 1a. Trunk bottle-shaped, smooth; flowers solitary, pendulous on 5-25 cm long peduncles; staminal tube naked below, divided above into numerous filaments forming a truncately globose head; calyx deeply 5-fid; capsule indehiscent, without cotton ...1. *Adausonia*
- 1b. Trunk subcylindrical or bottle-shaped; mostly prickly; flowers and stamens differently arranged; calyx irregularly lobed or 5-toothed; capsule dehiscent, full of cotton:
 - 2a. Trunk bottle-shaped; stamens in double staminal tube, the outer tube short with sterile anthers; capsule pear-shaped ...3. *Chorisia*
 - 2b. Trunk subcylindric; stamens differently arranged; capsule oblong-ellipsoid:
 - 3a. Flowers about 10 cm long; calyx irregularly lobed; stamens numerous, polyadelphous, each branch bearing a solitary anther; capsule woody ... 2. *Bombax*
 - 3b. Flowers 2-4 cm long; calyx 5-toothed; staminal tube short, dividing into 5 filiform branches, each branch bearing 2-3 anthers; capsule leathery ... 4. *Eriodendron*

1. ADANSONIA L.

Tree with a short thick trunk and very widely spreading branches forming a mushroom-shaped canopy. Leaves digitate, deciduous, pubescent beneath when young. Flowers solitary, axillary, pendulous, long peduncled. Calyx leathery, cup-shaped, 5-cleft, bibracteolate. Petals 5, exceeding the sepals, adnate below to the stamens. Staminal tube cylindrical, dividing above into numerous filaments; anthers reniform, 1-celled. Ovary 5-10 celled; style long, exerted, divided into as many stigmatic branches as there are cells to the ovary; stigmas radiating; ovules many in each cell. Fruits oblong, woody, indehiscent. Seeds reniform.

About 10 species, palaeotropical; one planted in M. P.

Adansonia digitata L., Sp. Pl. 1190. 1753; Mast. in Hook. f., Fl. Brit. Ind. 1: 348. 1874. *Gorakh Imli, Khurasani Imli*

Trees with trunk of great diameter at the base, rapidly narrowing upwards. Leaves digitate with 3-9 leaflets, downy brownish, obovate-oblong, pubescent. Flowers large, white, solitary, axillary, pendulous. Calyx cup shaped, leathery, 5-lobed, persistent. Petals large, deciduous. Staminal tube cylindrical, thick, divided into numerous filaments; anthers linear. Fruit pendulous, oblong-obovoid, woody, indehiscent.

A native of tropical Africa, planted in various parts of Madhya Pradesh. Bhopal, Dhar, Indore. Fl. : May-July; Fr. : Sept.

The subacid pulp of the fruit is edible.

2. BOMBAX L.

Trees with buttressed trunk, clear of branches for a long distance from the ground. Leaves digitate; stipules small. Flowers falling off before the leaves appear, clustered towards the ends of the branchlets; bracteoles absent. Calyx leathery, cup-shaped, irregularly lobed. Petals 5, oblong, obovate or linear. Stamens polyadelphous, very numerous; filaments often combined so that the cells appear to be 2 instead of 1. Ovary 5-celled; ovules numerous in each cell; style clavate, divided into 5 spreading stigmatic branches at the top. Capsule dehiscent by 5 woody deciduous valves. Seeds smooth, globose, embedded in long white wool; albumen scanty.

About 8 species, in tropical Africa and Asia; 2 in M.P.

- 1a. Trunk prickly; leaflets lanceolate; flowers about 8 cm long, bright-red; filaments flattened; stamens ca 60-80; capsule velvety

... 1. *B. ceiba*

- 1b. Trunk smooth; leaflets obovate; flowers 12-18 cm long,

scarlet or white; filaments filiform; stamens ca 600;
capsule glabrous

... 2. *B. insigne*

1. *Bombax ceiba* L., Sp. Pl. 511. 1753; Mast. in Hook. f., Fl. Brit. Ind. 1: 349. 1874. *B. malabaricum* DC., Prodr. 1: 479. 1824. *Salmalia malabarica* Schott. & Endl., Melet. Bot. 35. 1832. *Semal*, *Semar Kanada*, *Simul*.

Large deciduous trees; trunk and branches with bulbous prickles when young, greyish blaze pink. Leaves large; leaflets 3-7, entire, 7-18 cm long, glabrous, penninerved, reticulately veined, lanceolate, cuspidate; petioles 20 cm long; stipules small, triangular, caducous. Flowers numerous, near the ends of the branches, appearing before the new leaves. Calyx thick, usually 3-lobed; lobes rounded, densely silky within, glabrous without. Corolla bright red, petals elliptic-oblong, recurved. Stamens more than 60, arranged in 5 bundles of about 9-12 each; filaments flattened, slightly pubescent, rather more than half as long as the petals, connate only at the base of the bundles. Ovary conical, glabrous; style a little longer than the stamens; stigmas 5, linear. Capsules 5-valved; seeds numerous, ovoid, bearing cotton.

Bilaspur, Damoh, Jabalpur, Raipur, Sagar, Seoni, Sidhi, Surguja. Fl. : Jan.-March; Fr. : April-May; Leafless: Dec.-April.

Cotton used for stuffing pillows and mattresses.

2. *Bombax insigne* Wall., Pl. As. Rar. 1: 71. 1830; Mast. in Hook. f., Fl. Brit. Ind. 1: 349. 1874. *Salmalia insignis* Schott. & Endl., Melet. Bot. 35. 1832.

Deciduous trees, up to 12 m tall; trunk unarmed; branchlets sometimes prickly. Leaves glabrous; petioles longer than the leaflets; leaflets 7-9, glabrous, cuspidate, short petioled. Flowers solitary scattered on the leafless branches. Calyx urceolate-globose, truncate or slightly 2-lobed, finally deeply 2-cleft, sometimes prickly outside, densely silky-hairy within. Corolla showy, stellately tomentose outside. Stamens in 5 phalanges opposite to the petals, filaments ca two-third the length of the corolla. Ovary ovoid, tomentose; stigma 5-lobed. Capsules oblong, woody, 18-25 cm long, obtusely 5-angled.

Sometimes planted. Bhopal (*Commachan*, 1977). Fl. & Fr. : Feb.-March.

3. CHORISIA HBK

Spiny trees. Leaves alternate, digitate of 5-7 entire or serrate leaflets. Flowers large, axillary or racemose. Petals 5, linear or oblong. Staminal tube double, the outer one short and with sterile anthers. Ovary 5-celled, each cell many-ovuled. Fruits pear-shaped. Seeds many, embedded in silky cotton.

About 5 species in Brazil and South America; one planted in M.P.

Chorisia speciosa St. Hill., Pl. Us. Bras. t. 63. 1824; Maheshwari, Fl. Delhi (repr. ed.) 83. 1976. *Floss Silk tree*.

An introduced tree with a striking appearance. Trunk bottle-shaped, green, covered with conical shaped prickles. Leaflets digitate, lanceolate, acuminate, dentate. Flowers numerous, light yellow to reddish, in usually leafless condition. Calyx irregular, shining outside but silky inside. Petals 5, obtuse, yellowish and brown-striped at the base, pubescent on the back. Seeds many, embedded in silk cotton.

A native of Brazil and S. America, sometimes planted. Bhopal (Oommachan, 1977). Fl.: Oct.-Nov.

The soft silk or cotton is used for stuffing pillows and cushions.

4. ERIODENDRON DC.

Trees. Leaves digitate, deciduous. Flowers appearing before the leaves, tufted at the ends of the branches, or axillary, large, white or rose-coloured. Bracteoles 0. Calyx cup-shaped, truncate, or 3-5-fid. Petals oblong. Staminal bundles 5, opposite the petals connate at the base, each bearing 2-3 sinuous or linear anthers. Ovary ovoid, 5-celled; style cylindrical, dilated; stigma obscurely 5-lobed. Capsule oblong, coriaceous, 5-celled, 5-valved, full of silk cotton within. Seeds globose or obovoid.

About 3 species, mostly American; one sometimes planted in M.P.

Eriodendron pentandrum Kurz in Journ. As. Soc. Beng. 43(11) : 113. 1874; Gamble, Fl. Pres. Madras, repr. ed. 1: 72. 1957. *E. anfractuosum* DC., Prodr. 1: 479. 1824; Mast. in Hook. f., Fl. Brit. Ind. 1: 350. 1874. *Kapok*, *Safed Semal*.

A tall tree with smooth green trunk, prickly when young. Leaves glabrous; petioles 10-15 cm long; leaflets 5-8, lanceolate, 5-12 cm long, cuspidate, entire, glaucous beneath; petiolules very short; stipules filiform, caducous. Flowers dirty white or yellowish, appearing with the young leaves at the ends of the branches; pedicellate, in clusters of 2-8. Calyx glabrous outside, hairy at the base within, 5-lobed; lobes rounded or triangular. Petals twice the length of the calyx, woolly outside. Stamens 5. Ovary conical, glabrous. Capsule cylindric, 10-13 cm long, green, lined with silky hairs. Seeds pyriform, glabrous, black, enveloped in silky wool.

Native of S. America, sometimes planted. Bhopal (Oommachan, 1977). Fl.: Jan.-Feb.; Fr.: March-May.

Gives a useful silky cotton from the pods.

26. STERCULIACEAE

(M. I. Hanfi)

About 60 genera and 700 species, chiefly in tropical regions; 10 genera and 12 species in M.P.

- 1a. Trees; leaves plamately lobed; flowers unisexual; petals absent:
 - 2a. Leaves tomentose beneath; follicles woody ... 9. *Sterculia*
 - 2b. Leaves sparsely hirsute beneath; follicles membranaceous ... 3. *Firmiana*
- 1b. Trees, shrubs or herbs. Leaves simple; flowers bisexual; petals present:
 - 3a. Fruit of 5 spirally twisted follicles ... 4. *Helicteres*
 - 3b. Fruit a capsule:
 - 4a. Staminal tube long, adnate to the gynophore, forming a more or less elongated stalk:
 - 5a. Capsules membranous, 5-winged ... 5. *Kleinhovia*
 - 5b. Capsules woody, not winged ... 8. *Pterospermum*
 - 4b. Staminal tube long or short, free from the carpels:
 - 6a. Staminal tube long, enclosing the carpels and bearing stamens on its outer surface in a cone ... 2. *Eriolaena*
 - 6b. Staminal tube short, bearing anthers on its margins:
 - 7a. Leaves velvety on both the surfaces; capsules 2-valved ... 10. *Waltheria*
 - 7b. Leaves glabrous or hairy; capsules 5-valved:
 - 8a. Flowers in capitate cymes; staminodes absent ... 7. *Melochia*
 - 8b. Flowers solitary or in open cymes; staminodes present:
 - 9a. Petals with a concave base and a filiform tip, caducous; capsules echinate ... 1. *Byttneria*
 - 9b. Petals simple, oblong-lanceolate, persistent; capsules smooth ... 6. *Melhania*

1. BYTTNERIA Loefl.

Herbs, trees or shrubs, often climbing and frequently prickly. Leaves glabrous. Flowers minute, in much-branched axillary or terminal cymes.

Sepals 5, connate below. Petals 5, claws concave, limb with a long strap-shaped 2-fid appendage. Stamens 10, connate below, anther bearing stamens alternating with 5 staminodes. Ovary 5-locular; style simple; stigma capitate. Capsules septically 5-valved, globose-ovoid, covered with short prickles. Seeds 5, grey.

About 70 species in tropical regions; one in M.P.

Byttneria herbacea Roxb., Pl. Corom. 1: 28, t. 29. 1795; Mast. in Hook. f., Fl. Brit. Ind. 1: 376. 1874.

Decumbent herbs; branches up to 1 m long, faintly angled. Leaves 4.5 × 0.7 cm, ovate-acuminate, rounded or truncate at base, serrate; nerves 3 from base; petioles 2 cm long; stipules linear. Flowers reddish-pink, 5 mm long in 2-3 flowered cymes, bracteate, bracteolate; peduncles 5 mm long; pedicels 5 mm long. Sepals ovate, long acuminate, connate at base, prominently 3-nerved. Petals linear, shortly winged at base. Stamens 10, filaments connate at base; anthers conspicuously 2-lobed. Style and stigmas bluish-purple. Capsules 1 cm across, echinate.

In mixed forests. Balaghat, Bastar, Bilaspur, Durg, Raigarh, Raipur, Sidhi, Surguja. *Fl. & Fr.*: May-June.

2. ERIOLAENA DC.

Trees or shrubs. Leaves simple, palmately nerved, downy or stellate tomentose beneath. Flowers large, yellow, on 1-many flowered peduncles. Bracteoles 3-5, usually lacinate. Calyx at first spathaceous, later on 5-partite. Petals deciduous, staminal tube short bearing many antheriferous filaments. Staminode 0. Ovary sessile, 5-10 celled, enclosed by the staminal tube; styles connate; stigmas 5-10; ovules many in each cell. Capsules woody, loculicidal. Seeds winged above, albumen thin.

About 17 species in South and South East Asia; one in M.P.

Eriolaena candollei Wall., Pl. Asiat. Rar. 1: 51, t. 64. 1830; Mast. in Hook. f., Fl. Brit. Ind. 1: 370. 1874. *E. hookeriana* Wt. & Arn., Prodr. 1: 70. 1834; Mast. l. c. 370.

Shrubs, 1.5-2.0 m high. Leaves 12.5 × 10 cm, rotundate, serrulate, grey tomentose beneath. Flowers crowded, yellow, 4 cm long. Peduncles shorter than the leaves. Sepals lanceolate, glandular within at the base, slightly exceeding the bracteoles. Petals oblong, apex notched, claw thick, villous. Ovary ovoid; style glabrous, stigmas 8-10, revolute. Capsule 5 × 2.5 cm, woody, ovoid, acute, beaked or rounded at the back, villous or rarely glabrous at the inner margin; seeds imbricate; embryo erect, cotyledons flat.

In sal and mixed forests. Balaghat, Bastar, Narsimhapur, Panna, Raipur, Rajnandgaon, Satna, Sidhi, Surguja. *Fl. & Fr.*: Throughout the year.

3. FIRMIANA Marsili

Trees. Leaves palmately lobed. Flowers in terminal panicles, brightly coloured. Calyx tubular, covered with stellate tomentum, lobes short. Petals absent. Stamens 5-15; anthers sessile, crowded, borne at the tip of an elongate gynandrophore; pistillodes 5, free, hidden by anthers, embedded at tip of gynandrophore. Pistils 5, free, each 2-locular; style short, somewhat excentric. Fruit of 5 free stalked membranous prematurely dehiscent follicles, 1-few-seeded.

About 15 species in Africa, South East and Eastern Asia; one in M.P.

Firmiana colorata (Roxb.) R. Br. in Bennett & Brown, Pl. Jav. Rar. 235. 1844. *Sterculia colorata* Roxb., Pl. Corom. 1: 26. t. 25. 1795; Mast. in Hook. f., Fl. Brit. Ind. 1: 359. 1874.

Trees, ca 10 m tall, with grey-brown rough bark. Leaves up to 17 x 7 cm, palmately lobed or not, cordate at base, entire or faintly serrulate, 7-nerved at base, lobes acuminate; petioles up to 9 cm long; stipules linear. Flowers orange red without, rose within, ca 2.5 cm long, in terminal panicles, ca 8 cm long. Calyx 2 cm long, infundibuliform, slightly falcate, rusty-brown stellate tomentose without, sparsely so within. Filaments connate forming staminal column. Styles recurved. Follicles 5, stipitate, ca 3 cm long. Seeds 2, attached to margins of follicles.

In deciduous forests. Bilaspur, Hoshangabad, Seoni. Fl. & Fr. : Feb.-May.

Used medicinally.

4. HELICTERES L.

Trees or shrubs. Leaves entire or serrate. Flowers axillary, solitary or fascicled. Calyx tubular, 5-toothed at the apex, teeth often unequal. Petals 5, equal or unequal, with long sometimes divided claws. Staminal column elongated, adnate to the gynophore, 5-toothed or lobed; anthers 5-10, in groups at the top of the column between the teeth. Ovary 5-lobed, 5-celled, at the top of the column; ovules many in each cell; styles 5, subulate, more or less united. Follicles spirally twisted or straight. Seed tubercled.

About 60 species in tropical Asia and America; one in M.P.

Helicteres isora L., Sp. Pl. 963. 1753; Mast. in Hook. f., Fl. Brit. Ind. 1: 365. 1874. - *Maror phali*. Fig. 22

Large shrubs or small trees; stems terete, bark fissured. Leaves up to 18 x 14 cm, ovate, orbicular, abruptly acuminate, cordate at base, serrate or crenate-serrate, sparsely scabrous to tomentose, especially on the lower

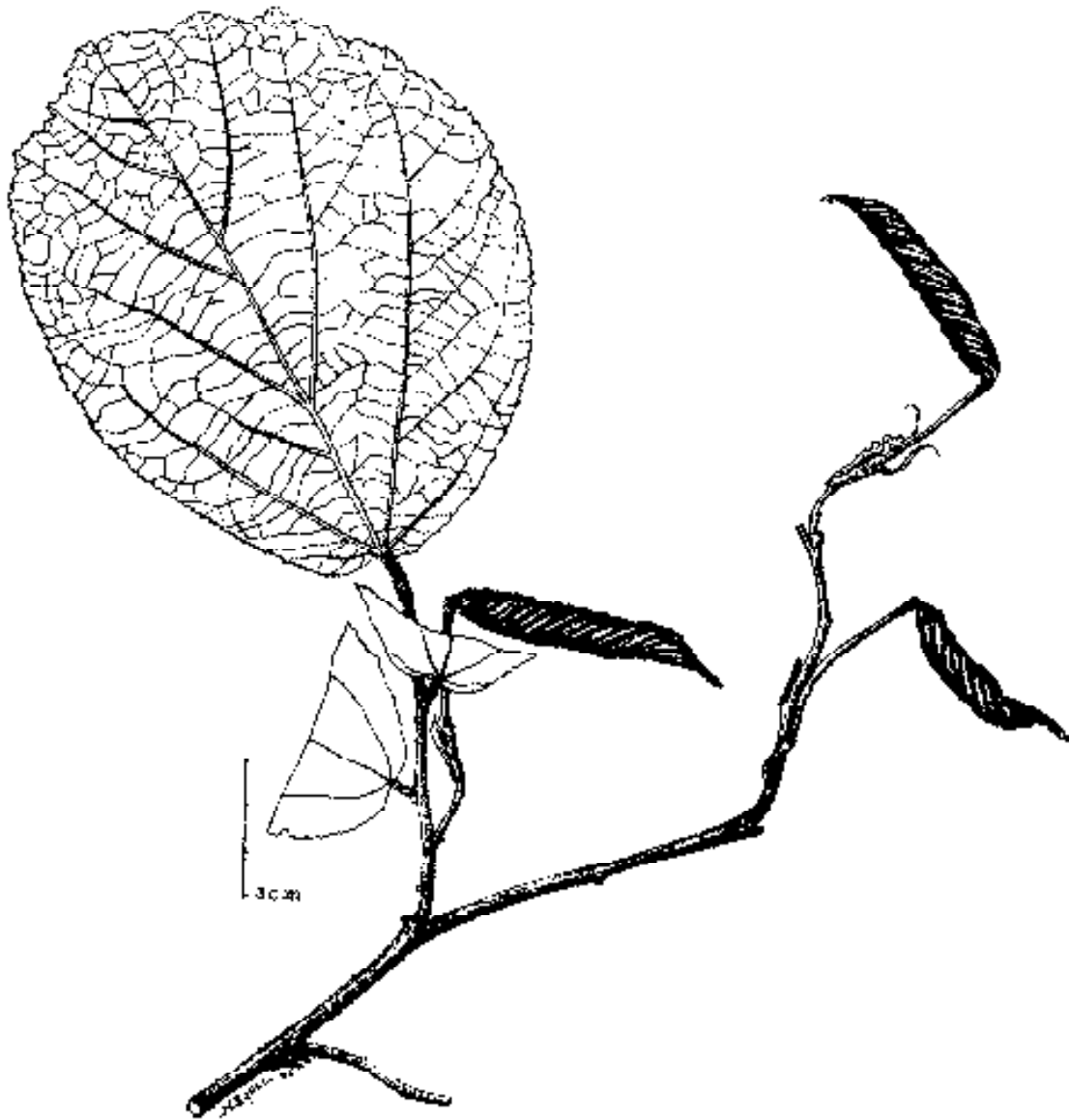


Fig. 22. *Helicteres isora* L.

surface; nerves 5 from base; petioles about 1.5 cm long; stipules small. Flowers reddish turning purplish-grey, slightly falcate, *ca* 2 × 1 cm in about 8 cm long; 8-9-flowered cymes. Calyx 1.5 cm long, tomentose without. Petals reflexed, clawed at base, glandular near base, staminal column fused with gynophore, styles bent near top, stigmas recurved. Capsules 5 cm long, elongated, spirally twisted; seeds black, 6-angled.

Common in deciduous forests and open areas. Balaghat, Bastar, Betul, Bilaspur, Damoh, Durg, Hoshangabad, Indore, Narsimhapur, Panna, Raigarh, Raipur, Rajnandgaon, Sagar, Seoni, Surguja, Tikamgarh. *Fl.*: Aug.; *Fr.*: Oct.-June.

5. KLEINHOVIA L.

Small tree. Leaves palmatinerved, ovate, acuminate. Inflorescence terminal lax cymose. Bracteoles small, ensiform. Sepals deciduous. Petals 5, unequal, upper with longer claws. Staminal columns dilated above into a cup-shaped, 5-fid cup. Ovary inserted in the staminal cup, 5-lobed, 5-celled. Capsules membranous, inflated, pyriform. Seeds 1 or 2 in each cell, tubercled.

Monotypic, in tropical Asia.

Kleinhovia hospita L., *Sp. Pl.* ed. 2: 1365. 1763; Mast. in *Hook.f.*, *Fl. Brit. Ind.* 1: 364. 1874.

A medium sized tree. Leaves 5-10 cm long, 4-9 cm broad, entire, acute or obtuse, glabrous; stipules ensiform or linear, about 8 mm long; petiole 2-6 cm long. Flowers 4-7 mm across; pedicels 2-5 mm long; bracteoles lanceolate, 2-4 mm long, pubescent. Sepals linear-lanceolate, 6-8 × 2 mm, pink, tomentose. Petals 4-6 cm long, *ca* 2 mm broad, upper one saccate, ovate-oblong, middle pair concave-ovate, clawed, incurved, lower pair oblique-oblong, flat, yellow. Stamens exserted, 8-10 mm long. Ovary ovoid, 1.5 mm long, tomentose, on a 6-8 mm long gynophore. Capsule turbinate, up to 2.5 cm across, pink, drooping; seeds whitish.

Often planted. Mandla. *Fl.*: Oct.; *Fr.*: Dec.

6. MELHANIA Forsk.

Shrub or undershrub. Leaves simple, crenate-serrate with filiform stipules. Inflorescence racemose, cymes binate or sometimes solitary, pedunculate, axillary. Flowers bisexual, regular; bracteoles 3, forming an epicalyx. Calyx deeply 5-partite. Petals 5, free, semipersistent, not clawed. Fertile stamens 5, alternating with 5 staminodes, all united below into a short cup; staminodes spatulate. Pistils 5, free, each 1-locular, 1-many ovuled. Seeds tuberculate.

About 60 species in warm tropical Africa, Madagascar, India and probably also in Australia; 2 in M.P.

- 1a. Leaves oblong-lanceolate, with uniformly serrate margins; bracteoles as long as the calyx ... 1. *M. futteyporensis*
 1b. Leaves ovate with unequally toothed margins; bracteoles longer than the calyx ... 2. *M. hamiltoniana*

1. *Melhanhia futteyporensis* Munro ex Mast. in Hook. f., Fl. Brit. Ind. 1: 373. 1874. *M. tomentosa* Stocks ex Mast., l.c. 373.

An undershrub, 40-70 cm tall. Leaves 5-6 costate, lanceolate, elliptic-lanceolate or ovate, unlobed or obscurely 3-lobed, 2-9 × 1-6 cm, velvety on both sides, serrate-crenate; petiole 1-3 cm long, hairy; stipules filiform, brown. Inflorescence a 2-4 flowered cyme. Flowers 1.5-2 cm across; pedicel 5-10 mm long, pubescent, elongated in fruit; bracts ovate, cuspidate. Sepals linear-lanceolate, 0.8-1.8 cm long, acuminate or cuspidate, pubescent, persistent. Petals oblique, obovate, about 1.6 cm long, 6-8 mm broad. Stamens 8-10 mm long, staminodes ca 15 mm long. Capsule oblong-subglobose, 6-15 × 3.5-8 mm, obtuse or rarely minutely beaked, villous; seeds angular, muricate, black.

Indore, Shivpuri. Fl. & Fr. : Aug.-Dec.

Rare in Madhya Pradesh.

2. *Melhanhia hamiltoniana* Wall., Pl. Asiat. Rar. 1: 69. t.77. 1830; Mast. in Hook. f., Fl. Brit. Ind. 1: 372. 1874.

Small shrubs, young parts, branchlets and inflorescence hoary. Leaves 4-10 (-13) × 2-6 cm, ovate-lanceolate, acute or acuminate, 3-5 nerved and cordate at the base, unequally toothed, softly stellate pubescent above, hoary tomentose beneath; petiole up to 4 cm long, dilated at the top; stipules subulate. Flowers up to 2.8 cm across, 2-3 on long peduncles about twice the length of petioles. Bracteoles 3, persistent as epicalyx, ovate, acuminate with recurved edges. Sepals 5, persistent, shorter than the bracteoles, or equalling them, lanceolate, tomentose outside. Petals yellow with darker veins, obovate. Capsules 1.25 cm across, ovoid, villous.

Rewa. Fl.: June-Aug.; Fr.: Oct.-Jan.

7. MELOCHIA L.

Trees, shrubs or herbs. Leaves alternate with erect lanceolate stipules, serrate. Inflorescence axillary or terminal, cymes, heads or fascicled, sometimes collected into corymbs or panicles. Flowers bisexual, regular. Calyx tube toothed or deeply partite. Petals 5, free, spatulate, not clawed. Receptacle flat. Stamens 5; filaments connate in a tube. Ovary densely hairy or pubescent, 5-locular. Capsules 5-valved; loculicidal, each 1-2 seeded.

About 54 species, tropical, especially in America; one in M.P.

Melochia corchorifolia L., Sp. Pl. 675. 1753; Mast. in Hook. f., Fl. Brit.

Ind. 1: 374. 1874. *Riedleia corchorifolia* (L.) DC., Prodr. 1: 491. 1824; Wt. & Arn., Prodr. 1: 66. 1834.

Herbs or undershrubs; branches terete, sparsely stellately tomentose. Leaves 5 × 3 cm, ovate, elliptic-lanceolate, faintly lobed, truncate to slightly cordate at base, serrate or serrulate, glabrous; nerves 5 from base; petioles 1 cm long; stipules ovate. Flowers pink, ca 5 mm long, in terminal clustered sessile racemes; bracts and bracteoles hispid along margins. Sepals 3 mm long, linear-lanceolate, slightly falcate, hispid along margins. Petals obovate or spatulate, clawed at base, persistent. Stamens 5; filaments connate. Ovary pilose. Capsules 5 mm across, ovoid-globose, sparingly hispid; seeds mottled black and brown.

In wastelands and along canals. Balaghat, Bastar, Bilaspur, Damoh, Durg, Indore, Raipur, Rajnandgaon, Satna, Seoni, Sidhi, Surguja. Fl. & Fr. : May-Sept.

Leaves eaten cooked.

8. PTEROSPERMUM Schreb.

Trees or shrubs, scaly or stellately tomentose. Leaves coriaceous, often oblique, penninerved. Flowers often very long, on short axillary 1- or few flowered peduncles; bracteoles 3, entire, lacinate, pectinate, fimbriate or absent. Calyx tubular, 5-fid or 5-partite, deciduous. Petals 5, deciduous. Staminal column adnate to the gynophore, bearing 5 groups of 3 stamens each between the staminodes. Ovary within the apex of the column, 5-celled. Capsule woody or leathery, ovoid or oblong, terete or angled, loculicidally 5-valved; seeds ascending, winged above.

About 40 species in Eastern Himalayas, South East Asia and Western Malaysia; one in M.P.

Pterospermum acerifolium (L.) Willd., Sp. Pl. 3: 729. 1801; Mast. in Hook.f., Fl. Brit. Ind. 1: 368. 1874. *Pentapetes acerifolia* L., Sp. Pl. 698. 1753.

A large tree, up to 30 m tall. Leaves oblong, obovate, ovate, orbicular or rectangular, 10-40 × 8-35 cm, cordate, often peltate, margin wavy to distantly coarse toothed or irregularly lobed; silvery to rusty pubescent beneath, glabrescent and dark green above; petiole 5-15 cm long, tomentose; stipules pinnatifid, caducous. Flowers mostly solitary, 10-15 cm long and across, white, fragrant; pedicels ca 2 cm long; bracts lacinate. Sepals linear-lanceolate, united at base into a short tube, 8-12 cm long, about 1 cm broad, obtuse, rusty pubescent outside, thick, reflexed, deciduous. Petals linear-oblong or obovate, 6-12 cm long, reflexed. Fertile stamens 5-9 cm long, staminodes equalling the petals; anthers 1-1.5 cm long. Carpels 5; ovary pentagonal, rusty tomentose. Capsule 5-10 cm long, 5-valved. Seeds compressed.

Frequent in semi-evergreen forests. Bilaspur. Fl. & Fr. : Sept.-May.

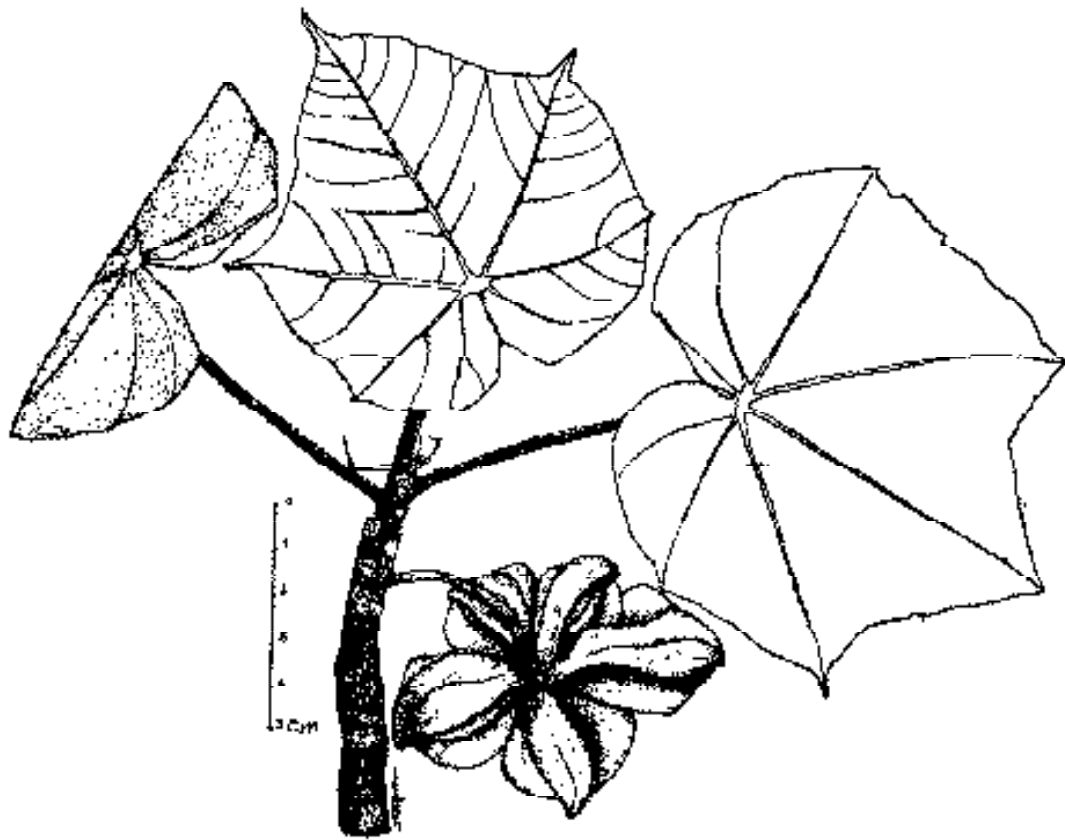


Fig. 23. *Sterculia urens* Roxb.

9. STERCULIA L.

Deciduous trees. Leaves alternate, usually crowded towards apices of stem, entire or digitately lobed; stipules caducous. Inflorescence a raceme or a panicle, axillary or terminal. Flowers usually unisexual. Calyx tube 5-toothed. Petals absent. Receptacle produced into an elongated gynandrophore. Stamens 5-15; anthers sessile, crowded together at tip of gynandrophore, surrounding reduced pistillodes; staminodes absent. Pistils 3-6, stalked, each 1-locular, 2-many ovuled. Follicles woody, stalked, with many, usually arillate, smooth seeds.

About 300 species in tropical regions; 2 in M.P.

- 1a. Bark papery; leaves 5-lobed, lobes entire ... 1. *S. urens*
 1b. Bark not papery; leaves 5-7-lobed, lobes mostly again
 3-lobed ... 2. *S. villosa*

1. *Sterculia urens* Roxb., Pl. Corom. t. 24. 1795; Mast. in Hook. f., Fl. Brit. Ind. 1: 355. 1874. Fig. 23.

Trees, about 8 m tall; bark peeling off in flakes. Leaves 40 × 40 cm, palmately 3-5 lobed, cordate at base, entire, pubescent to tomentose beneath, 6-nerved from base; petioles ca 40 cm long, hairy. Flowers pale green within with bright red centre, yellowish to yellowish-red without, scented, in glandular, pubescent terminal panicles about 15 cm long. Calyx 5 × 5 cm, 5-lobed at top, campanulate, glandular-pubescent within, tube 3 cm long. Filaments connate to form staminal column; anthers 2-lobed. Carpels 5, stigmas peltate. Follicles 4-6, 4 × 2 cm, ovoid-oblong, woody, covered with rusty-brown stinging hairs; seeds black, oblong.

On exposed hills. Bastar, Bhopal, Bilaspur, Durg, Hoshangabad, Indore, Jabalpur, Mandla, Rewa, Satna, Sagar, Seoni, Shivpuri, Sidhi, Surguja. Fl.: Jan.-Feb.; Fr.: April. Leafless: Dec.-May.

2. *Sterculia villosa* Roxb. ex Smith in Rees, Cyclop. 34: n. 16. 1816; Roxb., Fl. Ind. 3: 153. 1832; Mast. in Hook. f., Fl. Brit. Ind. 1: 355. 1874. *Udal.*

Medium sized trees. Leaves with 25-40 cm long petiole; lamina palmately 5-7-lobed, 20-40 cm long and broad, glabrescent above, tomentose below, cordate at the base, lobes somewhat oblong or obovate, entire or 3-fid, acuminate-cuspidate. Panicles 15-30 cm long, rusty pubescent, pendulous. Flowers unisexual, pedicel 4-8 mm long, bracteole filiform, caducous. Calyx campanulate, 5-partite, 6-10 mm long, 10-15 mm across, yellow with pinkish throat, lobes lanceolate, 4-6 mm long, patent, acute. Staminal column 4-5 mm long, recurved, glabrous; anthers 10. Carpels 5; ovary globose, strigose, 5-loculed, many-ovuled. Follicles 5, sessile, 4-6 cm

long, many seeded, red when ripe. Seeds oblong, smooth, black.

On hill slopes. Bilaspur, Hoshangabad, Raipur. *Fl.*: Jan.- March; *Fr.*: May-June; *Leafless*: Dec.-May.

10. WALTHERIA L.

Herbs or undershrubs, usually stellately pubescent. Leaves alternate, crenate-serrate, with narrow stipules. Inflorescence of fascicles, axillary or terminal, bracteate. Flowers bisexual, regular. Calyx deeply 5-partite. Petals 5, clawed; receptacle flat. Stamens 5; filaments fused at base forming a short column; staminodes absent. Ovary 1-locular, 2-ovuled; style excentric; stigma penicillate. Fruit a 2-valved, 1-seeded capsule.

About 50 species in tropical America, West Indies, and S.E. Asia; one in M.P.

Waltheria indica L., Sp. Pl. 673. 1753; Mast. in Hook. f., Fl. Brit. Ind. 1: 374. 1874. *W. americana* L., Sp. Pl. 673. 1753.

Erect herbs, ca 1 m high. Leaves ovate, elliptic, sometimes orbicular, ca 6 × 5 cm, subcordate at base, serrate, tomentose on both surfaces; nerves parallel, prominently impressed above; petioles up to 25 mm long; stipules subulate, hairy. Flowers yellow, small, in axillary and terminal, sessile or shortly peduncled heads, ca 1 cm across. Calyx red finged, lobes ca 2mm long, ciliate, strongly 3-nerved, tube small. Petals ovate, wrinkled on margins clawed at base. Stamens connate. Style and stigma pubescent. Capsules 4 mm across, 1-seeded.

In wastelands and exposed rock crevices. Balaghat, Bilaspur, Damoh, Durg, Hoshangabad, Indore, Narsimhapur, Panna, Raigarh, Raipur, Rajmandgaon, Satna, Seoni, Shahdol, Sidhi, Surguja, Tikamgarh. *Fl. & Fr.*: June - Oct.

27. TILIACEAE

(M. I. Hanfi)

About 50 genera and 750 species, chiefly in South East Asia and Brazil; 3 genera and 23 species in M.P.

- | | |
|--|-------------------------|
| 1a. Fruits covered with hooked bristles all over the surface | ...3. <i>Triumfetta</i> |
| 1b. Fruits unarmed or horned only at the tip: | |
| 2a. Trees or shrubs. Fruit a subglobose drupe | ... 2. <i>Grewia</i> |
| 2b. Herbs or undershrubs. Fruit a subglobose or subcylindric capsule | ... 1. <i>Corchorus</i> |

1. CORCHORUS L.

Herbs or undershrubs, more or less covered with stellate pubescence. Leaves simple. Peduncles axillary or opposite to the leaves, 1-2-flowered. Flowers small, yellow. Sepals 4-5. Petals 4-5, glandless. Stamens free, indefinite or rarely twice the number of the petals, springing from a short torus. Ovary 2-6-celled, style short, stigma cup-shaped. Capsule elongated, slender or subglobose, smooth or prickly, loculicidally 2-5-valved, sometimes with transverse partitions; seeds numerous, albuminous, pendulous or horizontal; embryo curved.

About 100 species, mainly pantropical; 6 in M.P.

- 1a. Capsule spherical, beak absent ... 2. *C. capsularis*
- 1b. Capsule elongate, beak present:
 - 2a. Capsule beak entire:
 - 3a. Capsule glabrous, beak long ... 4. *C. olitorius*
 - 3b. Capsule scabrous, beak short ... 6. *C. trilocularis*
 - 2b. Capsule beak trifid or lobed:
 - 4a. Capsule 6-angled, 3-winged ... 1. *C. aestuans*
 - 4b. Capsule cylindrical, neither angled nor winged:
 - 5a. Capsule ending in three radiating points ... 5. *C. tridens*
 - 5b. Capsule ending in a single beak, lobed at the summit ... 3. *C. fascicularis*

1. *Corchorus aestuans* L., Syst. Nat. ed. 10. 1079. 1759. *C. acutangulus* Lamk., Encycl. 2: 104. 1786; Mast. in Hook.f., Fl. Brit. Ind. 1: 398. 1874.

Herbs up to 1 m high; branches woody at base, terete, hairy; bark evenly fissured. Leaves elliptic-acuminate, ca 5 × 1.5 cm, rounded or acute at base, crenate-serrate, with basal serratures caudate-serrate, sparingly hairy; nerves 3 from base; petioles up to 4 cm long; stipules linear-caudate. Flowers yellow, ca 5 mm long, shortly pedicellate, in about 12 mm long leaf-opposed 2-flowered cymes. Sepals obovate, slightly cucullate, apiculate. Petals obovate, clawed at base, slightly puberulous on margins at base. Capsules elongated, ca 3 cm long, 6-angled, winged, beaks spreading. Seeds many, brown, angled.

Common in waste places. Balaghat, Durg, Damoh, Hoshangabad, Mandla, Panna, Raigarh, Satna, Shivpuri, Sidhi, Surguja, Tikamgarh. Fl. & Fr. : Sept. Feb.

2. *Corchorus capsularis* L., Sp. Pl. 529. 1753; Mast. in Hook.f., Fl. Brit. Ind. 1: 397. 1874. *Cheja*.

Annual erect herbs 20-50 cm high with glabrous stem and branches. Leaves oblong-lanceolate, 3-10 cm long, acuminate, serrate, sometimes tailed at the base. Flowers less than 1.3 mm across, in short cymes; buds obovoid, shortly apiculate; peduncles short, pedicels 1-2, short. Capsules subglobose, ca 12 mm in diam., depressed, broader than long, rigid and muricated, 5-valved; valves woody, without transverse septa. Seeds few in each cell, wedge-shaped, smooth, brown.

In wastelands. Dhar, Gwalior, Indore, Panna, Raipur, Rajnandgaon, Sagar, Satna, Sidhi, Surguja, Tikamgarh. *Fl. & Fr.* : June-Nov.

3. *Corchorus fascicularis* Lamk., *Encycl.* 2: 104. 1786; Mast. in Hook.f., *Fl. Brit. Ind.* 1: 398. 1874.

Erect herbs, 15-30 cm high, often woody at base, branches terete, bark sparingly hairy and evenly fissured. Leaves elliptic-ovate, up to 4.2 x 2.2 cm, crenate-serrate to dentate, glabrous; 3-nerved from base; petioles ca 2 cm long; stipules linear, caudate. Flowers yellow, ca 5 mm long, in ca 15 mm long leaf-opposed 3-4-flowered cymes. Sepals linear-elliptic, 3 mm long. Petals linear-elliptic, 3 mm long. Filaments dilated. Capsules cylindric, 1.5 cm long, drawn at apex, angled.

Balaghat Bastar, Bilaspur, Damoh, Durg, Gwalior, Raigarh, Raipur, Rajnandgaon, Sagar, Satna, Shivpuri, Sidhi. *Fl. & Fr.* : Oct. April.

4. *Corchorus olitorius* L., *Sp. Pl.* 529. 1753; Mast. in Hook. f., *Fl. Brit. Ind.* 1: 397. 1874.

Suffrutescent herbs, about 80 cm high; branches woody, terete, bark evenly fissured. Leaves elliptic-acuminate, 13 x 5 cm, serrulate, basal serratures recurved, caudate-acuminate, glabrous; petioles ca 3.5 cm long; stipules reddish, falcate, caudate-acuminate. Flowers yellow, ca 5 mm long, in 1.5 cm long leaf-opposed 1-2-flowered cymes. Sepals obovate, 3 mm long, slightly cucullate, hairy on margins below. Petals spathulate, 3 mm long. Capsules elongated inconspicuously 10-angled, 5 cm long. Seeds several, brown, angled.

Along paddy fields. Balaghat, Bilaspur, Damoh, Dhar, Gwalior, Hoshangabad, Mandla, E.Nimar, Panna, Raigarh, Raipur, Rajnandgaon, Satna, Shivpuri, Sidhi. *Fl. & Fr.* : Sept. Jan.

5. *Corchorus tridens* L., *Mant. Pl.* 566. 1771; Mast. in Hook.f., *Fl. Brit. Ind.* 1: 398. 1874.

Annual herbs, 30-60 cm high; branches glabrous. Leaves linear-oblong or lanceolate, 3.5-9 x 1-2.5 cm, crenate-serrate, glabrous or puberulous, the lower serratures on each side usually prolonged into filiform appendages; petioles about 12 mm long; stipules subulate, ca 6 mm long. Flowers 1-4

together, nearly sessile; buds obovoid, apiculate. Sepals linear-oblong, apiculate. Petals obovate-oblong, slightly longer than the sepals. Capsules 2.5-3.7 cm long, slender, glabrous, terminating in 3 stellately spreading or deflexed points, 3 valved; valves without partitions. Seeds truncate at both ends, black.

In mixed forest. Damoh. Fl. & Fr. : Sept.-Nov.

6. *Corchorus trilocularis* L., Mant. Pl. 77. 1771; Mast. in Hook.f., Fl. Brit. Ind. 1: 397. 1874.

Annual herbs with hairy stem and branches. Leaves linear-oblong, 2-7 cm long, serrate, usually pubescent. Flowers in short cymes; buds ovoid or obovoid, apiculate; bracts lanceolate-subulate; peduncles very short, leaf-opposed, hairy; pedicels very short, pubescent. Sepals linear-oblong, ca 6 mm long, acuminate. Petals oblong, slightly longer than the sepals. Capsules 5-7.5 cm long, with a short erect beak, hairy when young with stiff stellate hairs, scabrous when old, 3-4-angled, 3-4-valved; valves with transverse partitions between the seeds. Seeds trigonous, black.

In wastelands. Dhar, Gwalior, Hoshangabad, Indore, Narsimhapur, Rajnandgaon, Sidhi, Tikamgarh. Fl. & Fr. : Nov.

2. GREWIA L.

Trees or shrubs, more or less stellate pubescent. Leaves usually distichous, more or less toothed, often inequilateral, with 3-7 basal nerves. Flowers white or yellow, usually in cymes, peduncles solitary or fascicled, usually axillary. Sepals 5, free, often coloured within, deciduous. Petals 5, mostly shorter than the sepals, usually glandular at the base; glands usually with hairy rims. Stamens numerous, usually free, inserted on a gynophore. Ovary 2-4-celled, ovules 2 or more in each cell; style 1; stigma lobed. Drupes crustaceous or fleshy, often lobed, with 1-4 stones, each of which is 1 or more seeded.

About 150 species, especially in tropics of Africa, Asia and Australia; 12 in M.P.

1a. Sepals 12-15 mm long:

2a. Flowers white, solitary (rarely paired) on leaf-opposed peduncle; petals (8-)11-14 mm long ... 11. *G. tenax*

2b. Flowers yellow or whitish, two or more on axillary peduncle; petals 4-8 mm long:

3a. Leaves broadly ovate or suborbicular, 5-7-costate at the base ... 10. *G. subinaequalis*

- 3b. Leaves narrowly elliptic or oblong-lanceolate, 3-costate at the base:
- 4a. Leaves hoary tomentose and greyish white beneath ... 2. *G. damine*
- 4b. Leaves glabrous or with a few simple hairs along the midrib beneath and green ... 9. *G. serrulata*
- 1b. Sepals 3-8 mm long:
- 5a. Leaves 3-costate at the base:
- 6a. Leaves broadly ovate or orbicular ... 1. *G. abutilifolia*
- 6b. Leaves linear-lanceolate or oblong-lanceolate:
- 7a. Lower surface of leaves greyish white throughout with silky pubescence of simple hairs ... 7. *G. rothii*
- 7b. Lower surface of leaves not as above:
- 8a. Flowers bisexual; buds oblong, mostly constricted in the middle ... 4. *G. flavescens*
- 8b. Flowers polygamous or dioecious; buds ovoid not constricted:
- 9a. Hairs on the twigs long persistent; fruits mostly 2-4-lobed, on slender ca 0.5 mm thick peduncle ... 5. *G. helectrifolia*
- 9b. Hairs on the twigs soon deciduous; fruits not lobed, on rather stout ca 1 mm thick peduncle ... 6. *G. hirsuta*
- 5b. Leaves 5-7-costate at the base:
- 10a. Trees:
- 11a. Leaves white tomentose beneath; petals 3-4 mm long ... 3. *G. elastica*
- 11b. Leaves green beneath, almost glabrous; petals ca 7 mm long ... 12. *G. tiliifolia*
- 10b. Shrubs:
- 12a. Leaves narrowly elliptic-ovate or lanceolate, acute at apex, white tomentose beneath ... 7. *G. rothii*
- 12b. Leaves broadly oblong-obovate or suborbicular, rounded at apex, green beneath ... 8. *G. sapida*

1. *Grewia abutilifolia* Vent. ex Juss. in Ann. Mus. Nat. Hist. Paris 4:

92. 1804: Mast. in Hook. *f.*, Fl. Brit. Ind. 1: 390. 1874: -*Bhainsuri*. Fig. 24.

Bushy shrubs; young parts and inflorescence stellately pubescent. Leaves 7-15 cm long, broadly-ovate or suborbicular, stellately hairy on both surfaces, often lobed, irregularly serrate, usually acuminate, base subcordate or rounded, 3-nerved; petiole up to 17 mm long; stipules subulate, adpressed hairy; peduncles much shorter than the pedicels, clustered in leaf axils, 3-4-flowered; buds ellipsoid, tomentose. Sepals oblong, 7 mm long. Petals much shorter than the sepals, glands about half the length of the petals. Drupes minutely stellate pubescent, ca 12 mm across; stones up to 4.

Common in sal and mixed forests. Bastar, Indore, Raipur. Fl. : May; Fr. : persisting throughout the year.

2. *Grewia damine* Gaertn., Fruct. 2: 113. 1791. *G. salvifolia* Heyne ex Roth, Nov. Sp. 239. 1821; Mast. in Hook. *f.*, Fl. Brit. Ind. 1: 386. 1874, *p.p.*

Trees, about 4 m tall, younger branches rusty brown or white tomentose. Leaves elliptic-ovate or oblong, 5 × 2 cm, finely serrulate, sparingly stellate-puberulous above, white-tomentose beneath, 3-nerved from the rounded base; petioles 5 mm long. Flowers yellow, in axillary 4 cm long; 2-flowered umbels; peduncles and pedicels ca 7 mm long. Sepals linear-elliptic, 12-13 mm long. Petals obovate, clawed at base, 3 mm long. Drupes ca 8 mm across, prominently 2-lobed, generally one lobe smaller, faintly stellate-puberulous.

In mixed forests. Rewa. Fl. & Fr. : July-Dec.

3. *Grewia elastica* Royle, Ill Bot. Himal. 104. t. 22. 1834. *G. asiatica* L. var. *vestita* Mast. in Hook. *f.*, Fl. Brit. Ind. 1: 387. 1874.

Trees with greyish bark; branches with large white blotches. Leaves obliquely ovate, 7-13 × 5-8 cm, rounded or slightly cordate at the base acuminate, minutely serrate, sometimes obscurely 3-lobed, pale and softly downy beneath, especially when young; basal nerves 5-6; petiole generally not exceeding 12 mm; stipules linear. Flowers in densely crowded (rarely solitary) axillary cymes; peduncles hairy, bearing 2-3 bracteolate pedicels. Sepals slightly pubescent and yellow inside. Petals yellow, much shorter than the sepals, claw distinct or absent. Drupes globose, 5-7.5 mm diam, sometimes indistinctly 2-4-lobed, dark brown or black when ripe.

In mixed and sal forests. Hoshangabad. (*Mukherjee*, 1984) Fl. April-June; Fr. : Aug. Nov.

4. *Grewia flavescens* Juss., Ann. Mus. Par. 4: 91. 1804. *G. pilosa* Lamk., Encycl. Suppl. 3: 43. 1813; Mast. in Hook. *f.*, Fl. Brit. Ind. 1: 388. 1874.

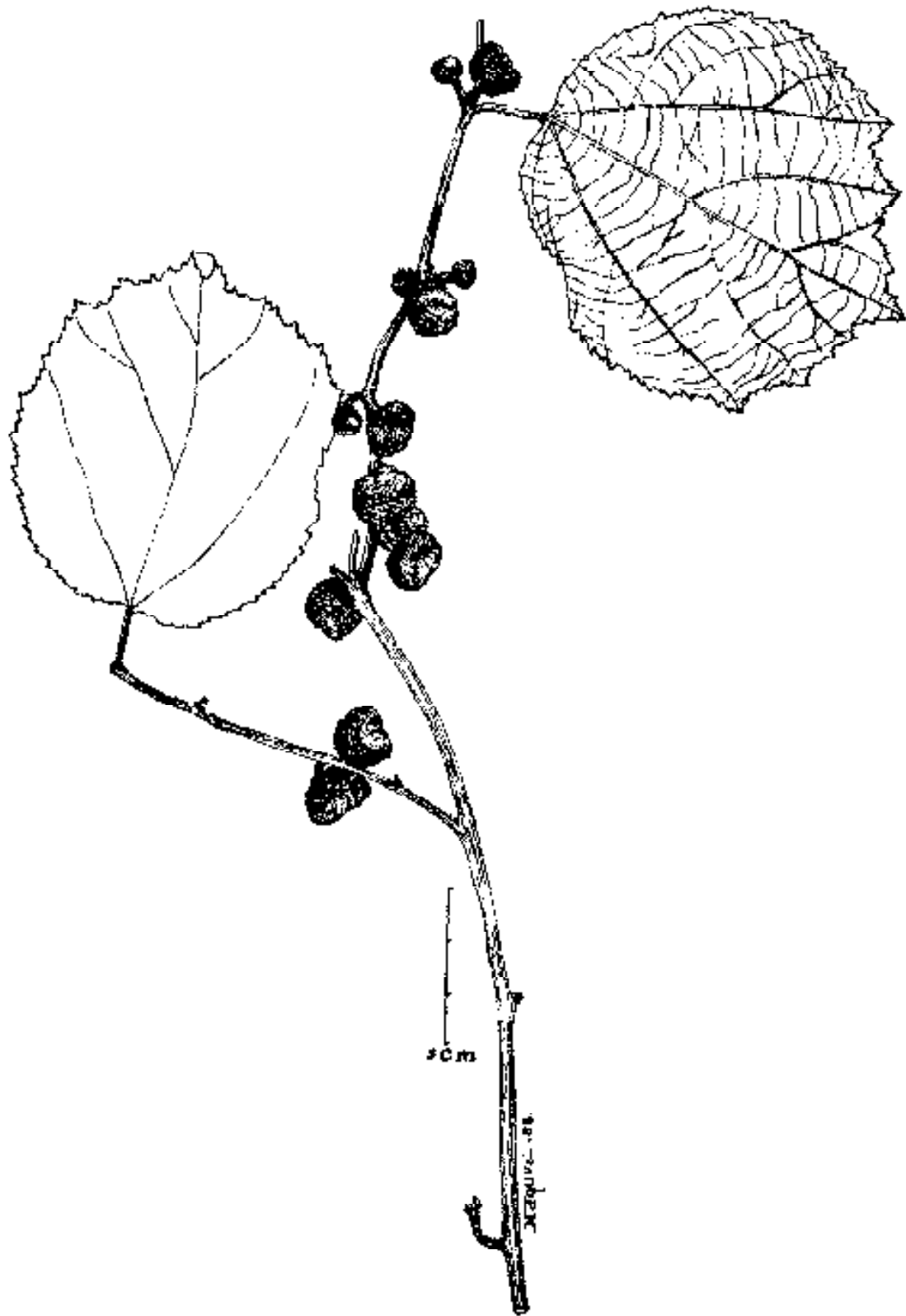


Fig. 24. *Grewia abutilifolia* Vent. ex Juss.

Small trees, 3-4 m tall; younger branches hirsute. Leaves elliptic-ovate, obovate, 9×4.5 cm, abruptly acuminate, cordate at base, serrulate, stellate-pubescent on both surfaces, 3 nerved from base; petioles 4 mm long; stipules linear, falcate. Flowers yellow, 1 cm across, in axillary or extra-axillary *ca* 6 cm long 2-3-flowered cymes; buds constricted in the middle. Sepals *ca* 5 mm long, tomentose. Petals *ca* 8 mm long, linear-elliptic, notched; torus hirtellous at top. Ovary and style hirsute; stigmas faintly 4-angled. Drupes *ca* 15×6 mm, bilobed, hirsute; stones 4.

In wastelands. Bastar, Gwalior, Hoshangabad, Raipur, Seoni, Shivpuri. Fl. & Fr. : July - Jan.

5. *Grewia helicterifolia* Wall. ex G. Don, Gen. Syst. 1: 548. 1831. *G. polygama* (auct. non Roxb. 1832); Mast. in Hook.f., Fl. Brit. Ind. 1: 391. 1874. p.p. *Ban-Sulai*.

Small shrubs, up to 1 m tall; young shoots densely hirsute, older ones purplish-puberulous. Leaves narrowly lanceolate to lanceolate, 3-7.3 \times 0.5-1.2 cm, serrulate, acute, oblique at the base; stipules setose, 3-4 mm long. Cymes axillary, 2-6-flowered; peduncles 1-3 together, hirsute, 2-3 cm long. Flowers polygamous, 8-10 mm across, white, becoming yellowish; pedicel 3-8 mm long, hairy. Sepals linear-oblong, 5-6 \times 1.5 mm, densely hairy. Petals oblong, claw hairy outside, limb half as long as sepals, obtuse. Ovary with hairs as long as the stamens, stigma penicillate. Drupe subglobose, 8-10 mm in diam. somewhat 4-lobed, fleshy, sparsely stellate hairy, shining brown.

In teak and sal forests. Damoh, Durg, Hoshangabad, Indore, Panna, Raipur, Rajnandgaon, Sagar, Seoni, Sidhi, Surguja, Tikamgarh. Fl. & Fr. : July-Dec.

6. *Grewia hirsuta* Vahl, Symb. 1: 34. 1790; Mast. in Hook. f., Fl. Brit. Ind. 1: 391. 1874. *Gur-sukri*.

Shrubs, about 1 m tall; younger branches brown pubescent, older glabrous, evenly fissured. Leaves elliptic-acuminate, 9×3.5 cm, rounded at base, nerves and nervules impressed above; petiole *ca* 5 mm long; stipules *ca* 5 mm long, linear, falcate. Flowers white, *ca* 8 mm across, in about 4 cm long axillary 3-flowered umbellate cymes. Sepals 6 mm long, elliptic, pubescent. Petals *ca* 8 mm long, ovate-oblong, villous outside, glandular within. Ovary villous; styles glabrous; stigmas slightly lobed lacerate. Drupes *ca* 1 cm across, lobed, sparsely hairy, 4-stoned.

In mixed forests. Balaghat, Bastar, Bilaspur, Durg, Hoshangabad, Indore, Panna, Raigarh, Raipur, Satna, Seoni, Shahdol, Sidhi, Surguja. Fl.: Sept., Fr.: Dec.-June.

7. *Grewia rothii* DC., Prodr. 1: 509. 1824. *G. excelsa* Mast. in Hook.f., Fl. Brit. Ind. 1: 385. 1874, *p.p. non Vahl.* -*Bhansuli.*

Shrubs about 1.5 m high; young branches brown tomentose, bark evenly fissured in older ones. Leaves elliptic-ovate or lanceolate, 13 × 5 cm, acute or acuminate, rounded or equally or unequally cordate at base, finely serrate, pale tomentose beneath; nerves 3 from base; petioles ca 5 mm long. Flowers greenish, ca 4 mm across; in long-peduncled 3-flowered, ca 4 cm long, axillary cymes. Sepals 3 mm long, obovate, slightly cucullate, white-tomentose outside, reddish brown inside. Stigmas shortly 3-lobed. Drupes ca 4 × 4 mm, faintly lobed, white-tomentose, edible.

In sal and mixed forests. Balaghat, Bastar, Bilaspur, Hoshangabad, Panna, Raigarh, Raipur, Rajnandgaon, Sagar, Satna, Seoni, Sidhi, Surguja. Fl.: May-Sept.; Fr.: Oct.-June.

8. *Grewia sapida* Roxb. ex DC., Prodr. 1: 52. 1824; Mast. in Hook.f., Fl. Brit. Ind. 1: 387. 1874.

An undershrub with a woody underground root-stock from which switchy shoots are sent out every year; young parts pubescent. Leaves oblong-elliptic or obovate, 5-12.5 × 3.5-7.5 cm, irregularly serrate or doubly serrate, rough above, usually grey pubescent beneath, apex rounded, abruptly acute or acuminate, base cuneate usually 5, sometimes up to 7-nerved, rounded or subcordate, often oblique; petiole short; stipules subulate or tapering from a broad or auricled base. Peduncles several from each axil, slender usually much longer than the petioles, 12-37 mm long, usually 3, sometimes up to 5-flowered; pedicels up to 12 mm long; buds tomentose, oblong-obovoid. Sepals oblong or oblanceolate. Petals often emarginate at the apex. Drupes ca 8 mm across, slightly lobed, black when ripe, stellate hairy.

Common in open grass-lands. Raigarh. Fl.: April-May; Fr.: Oct. - Nov.

9. *Grewia serrulata* DC., Prodr. 1: 510. 1824. *G. disperma* Rottl. ex Spreng., Syst. 2: 579. 1825. *G. laevigata* (auct. non Vahl); Mast. in Hook.f., Fl. Brit. Ind. 1: 389. 1874.

Small trees, young shoots stellately hairy. Leaves narrowly elliptic or oblong-lanceolate, 7-15 × 3-5 cm, almost glabrous, serrate, lower serratures often with cupular glands, long acuminate; stipules linear-lanceolate, setose. Cymes 2-3-flowered; peduncles axillary solitary or 2-3 together. Flowers yellowish white; pedicels as long as peduncles. Sepals oblong, 12-15 mm long, densely stellate tomentose outside. Petals oblong-elliptic, 4-5 mm long. Ovary mostly bilobed, hairy; style longer than the stamens. Drupes mostly

of 2 connate lobes, rarely entire or 4-lobed, lobes 6-8 mm in diam glabrous, black on maturity.

In mixed and sal forests. Bastar, Balaghat, Bilaspur, Raipur. *Fl.*: June Oct.; *Fr.*: Jan.

10. *Grewia subinaequalis* DC., Prodr. 1: 511. 1824; Mukherjee, Fl. Pachmarhi & Bori Reserve 49.1984. *G. asiatica* (auct. non L. 1767); Mast. in Hook.f., Fl. Brit. Ind. 1: 386. 1874. *Phalsa*.

Shrubs or small trees, young parts stellately pubescent. Leaves ovate or suborbicular, 7-18 × 6-13 cm, acute or subacuminate, irregularly and coarsely toothed, subglabrous above, hoary tomentose beneath, obliquely cordate or rounded at the base 5-6-nerved; petioles ca 12 mm long, thickened at the top; stipules nearly as long as the petioles, linear or lanceolate. Peduncles axillary, 1-4 together, slender, 12-37 mm long, puberulous; pedicels 2-5 shorter than the peduncles. Sepals linear-oblong, acute, pubescent. Petals oblong, with a ring of hairs around the gland. Filaments 4-6 mm long, orange-yellow, turning purplish. Ovary strigose; stigma 4-lobed. Drupe dark purple, edible.

Occasional in sal forest. Balaghat, Hoshangabad, Rajnandgaon, Satna. *Fl. & Fr.*: March Aug.

11. *Grewia tenax* (Forsk.) Fiori in Agric. Colon. 1911. Suppl. 23. 1912. *Chadara tenax* Forsk., Fl. Aeg.-Arab. 105. 1775. *C. populifolia* Vahl, Symb. Bot. 1: 33. 1790; Mast. in Hook.f., Fl. Brit. Ind. 1: 385. 1874.

Shrubs, about 1.5 m high; older branches dark, rather stunted, woody, younger terete, striated, sparingly stellate-puberulous. Leaves obovate, ovate or more or less orbicular, 0.6 - 4.5 × 0.4 - 4 cm faintly angled, dentate to crenate-serrate, coriaceous, glabrous or faintly stellate puberulous, rounded or cordate at base; nerves 3 from base both nerves and nervules prominent; petioles 8 mm long; stipules small. Flowers yellow, solitary, leaf-opposed; pedicels ca 1 cm long, jointed. Sepals linear-acute, ca 15 mm long, tomentose outside. Petals linear-spathulate, (8-) 11-14 mm long, notched at top, glandular at base within; torus glabrous, hairy at top. Ovary 4-lobed; stigmas flattened. Drupes ca 1 × 1.5 cm, deeply bilobed; stones 4.

In mixed forests. Gwalior. *Fl. & Fr.*: May-Sept.

12. *Grewia tiliifolia* Vahl, Symb. Bot. 1: 35. 1790; Mast. in Hook.f., Fl. Brit. Ind. 1: 386. 1874. (*Tiliaefolia*) -*Dhaman*.

Small trees, up to 10 m tall; young branches dark brown, faintly pubescent. Leaves ovate-orbicular or elliptic-ovate, 15 × 13.5 cm, crenate-serrate, acute or acuminate, cordate and unequal sided at base, 3-nerved from base; petioles up to 18 mm long; stipules falcately acuminate.

Flowers yellow, in axillary groups of 3-flowered peduncles, cymes 7 cm long. Sepals elliptic-obovate or ovate, with incurved tips, ca 6 mm long, brown tomentose. Petals ca 7 mm long, hairy and glandular at base within. Drupes ca 1 cm across, bilobed, glabrous or sparingly pubescent.

In mixed & sal forests. Balaghat, Bilaspur, Hoshangabad, Raigarh, Raipur, Rajnandgaon, Rewa, Seoni, Shahdol, Shivpuri, Surguja. Fl.: May-June; Fr.: Jan.

3. TRIUMFETTA L.

Herbs or undershrubs, generally more or less covered with stellate hairs. Leaves simple or lobed, serrate. Flowers yellowish, in dense cymes. Sepals 5, oblong, concave. Petals 5. Stamens 5-35, springing from a fleshy lobed glandular torus. Ovary 2-5-celled, cells 2-ovuled; style filiform, stigma 5-toothed. Capsules globose or oblong, spiny or bristly, indehiscent or 3-6 valved. Seeds 1-2 in each cell, pendulous, albuminous; embryo straight, cotyledons flat.

About 150 species, mostly tropical weeds; 5 in M.P.

- 1a. Stem glabrous except for a line of hairs on purplish side of internode, alternating at each node; flowers orange; capsule and spines glabrous ... 1. *T. annua*
- 1b. Stem hairy all around; flowers yellow; capsule tomentose or pubescent, spines hairy or glabrous:
 - 2a. Leaves lanceolate or ovate-lanceolate, tapering towards the apex ... 3. *T. pilosa*
 - 2b. Leaves, some or all, orbicular, 3-lobed or rounded at the apex:
 - 3a. Leaves yellowish white beneath ... 5. *T. rotundifolia*
 - 3b. Leaves green beneath:
 - 4a. Bristles on the fruit hispid ciliate ... 2. *T. pentandra*
 - 4b. Bristles on the fruit glabrous ... 4. *T. rhomboidea*

1. *Triumfetta annua* L., Mant. 1: 73. 1767; Mast. in Hook.f., Fl. Brit. Ind. 1: 396. 1874.

Annual herbs. Stem glabrous except a line of crispy hairs. Leaves membranous, ovate or ovate-lanceolate, 5-7 × 2-5 cm, acuminate-acute, coarsely serrate; petioles long; stipules subulate. Cymes 3-flowered; peduncles ca 12 mm long, extra-axillary. Flowers ca 7 mm, orange. Sepals lorate, cuculate and awned at the apex. Petals nearly as long as the apiculate sepals, spatulate, obtuse. Stamens 10. Carpels 4; ovary globose, 4-loculed; hairy, stigma 4-lobed. Capsules globose, glabrous, ca 1 cm across including

- 4 5 mm long glabrous conical uncinatc spines.

Common in wastelands along waysides. Hoshangabad. *Fl. & Fr.* : Aug. Sept.

2. *Triumfetta pentandra* A. Rich. in Guill. & Pert., *Fl. Seneg.* Tent. 93. t. 19. 1831. *T. neglecta* Wt. & Arn., *Prodr.* 1: 75. 1834; Mast. in Hook.f., *Fl. Brit. Ind.* 1: 396. 1874. Fig. 25.

Erect branched annual herbs. Stems stellate hairy. Basal leaves rhomboid-ovate, palmately 3-lobed, terminal ones ovate-lanceolate, acuminate-acute, unequally coarsely serrate. Cymes antiphyllous. Flowers small, ca 3 mm, yellow. Sepals lorate, cuculate and awned at the apex. Petals spathulate, obtuse. Stamens 5, rarely up to 10. Carpels 2; ovary oblong, 2-loculed, hairy, stigma 4-lobed. Capsule oblong, densely tomentose with uncinatc spines.

Abundant in mixed forests and on roadsides. Balaghat, Bastar, Bilaspur, Damoh, Hoshangabad, Indore, Panna, Raigarh, Raipur, Rajnandgaon, Seoni, Sidhi, Surguja. *Fl. & Fr.* : Sept.-Jan.

3. *Triumfetta pilosa* Roth, *Nov. Pl. Sp.* 223. 1821; Mast. in Hook.f., *Fl. Brit. Ind.* 1: 394. 1874.

Erect or decumbent suffrutescent herbs; branches hirsute. Leaves elliptic-acuminate, ca 12 x 5 cm, irregularly crenate-serrate, hirsute below, less so above; rounded to cordate at base; nerves 7 from base; petioles up to 4 cm long. Flowers yellow, ca 1 cm long, in ca 5 cm long axillary and terminal fascicled cymes. Sepals 3 mm long, connate, apiculate, sparsely stellate-tomentose. Petals 5 mm long, obovate, clawed at base. Styles filiform; stigmas 5-fid. Capsules globose, ca 12 mm across; bristles conspicuously recurved at tips, hairy. Seeds dark brown, shining.

In wastelands and along roads. Balaghat, Bastar, Bilaspur, Dhar, Hoshangabad, Indore, Raigarh, Raipur, Surguja.

4. *Triumfetta rhomboidea* Jacq., *Enum. Pl. Carib.* 22: 1760; Mast. in Hook.f., *Fl. Brit. Ind.* 1: 395. 1874.

Erect herbs, about 20 cm high, sometimes suffrutescent. Branches stellate-pubescent when young. Leaves 6 x 8 cm, ovate-elliptic, rhomboid or orbicular-ovate, often 3-lobed, ca 6 x 8 cm; lobes irregularly serrate or crenate; acuminate, acute to rounded at base; petioles up to 6 cm long, sparingly stellate-pubescent; stipules ovate, acuminate. Flowers yellow, 5 mm long, in ca 18 mm long axillary and terminal 4-6-flowered cymes. Sepals linear-spathulate, 3 mm long, pubescent. Petals obovate-oblong, cuculate, 5 mm long, clawed at base. Capsules ca 6 mm across, ovoid, hairy, echinate with hooked glabrous bristles; seeds dark brown, pointed at top.



Fig. 23. *Triumfetta pentandra* A. Rich.

Along forest margins and road sides. Bastar, Bilaspur, Hoshangabad, Jabalpur, Mandla, Rajnandgaon, Sagar, Seoni, Shahdol, Sidhi, Surguja. Fl. & Fr. : Aug. Nov.

5. *Triumfetta rotundifolia* Lamk., *Encycl.* 3: 421. 1792; Mast. in Hook.f., *Fl. Brit. Ind.* 1: 395. 1874.

Woody shrubs or undershrub, 30-70 cm high. Leaves coriaceous, rotundate, ca 4 cm broad, rugose above, yellowish pubescent beneath, unequally serrate, lower serratures thickened; petiole 12 mm long. Inflorescence a terminal raceme. Flowers yellow. Sepals apiculate, white tomentose. Petals oblong, ciliate at the base. Stamens 15-25. Fruit globose, ca 6 mm across, pubescent, spines dilated at the base.

On roadsides and along paddy fields. Balaghat, Bilaspur, Damoh, Dhar, Durg, Hoshangabad, Narsimhapur, Panna, Raipur, Rajnandgaon, Satna, Seoni. Fl. & Fr. : April Oct.

28. LINACEAE

(R. C. Srivastava)

About 12 genera and 290 species, mainly temperate; 2 genera and 4 species in M.P.

- 1a. Leaves sessile, mostly one nerved; styles 5; capsules 5
locular ... 1. *Linum*
- 1b. Leaves petiolate, pinnately nerved; styles 3-4; capsules
3-4 locular ... 2. *Reinwardtia*

1. LINUM L.

Herbs. Leaves simple, usually alternate, narrow, entire, 1-many nerved. Flowers bisexual, in corymbose panicles or in cymes. Sepals 5. Petals 5, fugaceous. Stamens united at base; 5 stamens fertile, alternating with 5 staminodes. Glands 5. Ovary 5-carpellate, becoming ca 10 locular by false septa; ovules 2 in each carpel; styles 5, free; stigma capitate to linear. Fruits capsular, splitting into 5 simple, 2-seeded or ten 1-seeded cocci. Seeds compressed, usually smooth.

About 230 species mainly in temperate and sub-tropical regions; 3 in M.P.

- 1a. Plants wild; leaves oblong, elliptic or obovate; flowers
yellow ... 2. *L. mysurense*
- 1b. Plants cultivated or ornamental; leaves linear to
ovate-lanceolate; flowers otherwise:
 - 2a. Sepals longer than capsules; flowers red ... 1. *L. grandiflorum*

- 2b. Sepals equalling to or shorter than capsules; flowers
blue or white

... 3. *L. usitatissimum*

1. *Linum grandiflorum* Desf., Fl. Atlant. 1: 278, t. 79. 1798; Babu, Herb. Fl. Dehradun 98. 1977.

Annual, woody glabrous herbs, 30-60 cm tall. Leaves linear to ovate-lanceolate, acuminate, greyish-green. Flowers 1.5-4 cm across, red in different shades, terminating a very slender 1.5-4.5 cm long pedicel, forming a lax panicle. Petals much exceeding the sepals. Sepals scarious-margined, ciliate, longer than capsules.

Cultivated and sometimes found as an escape. Fl. & Fr. : Feb.-June.

2. *Linum mysurense* Heyne ex Benth. in Edward, Bot. Reg. 16. Sub. t. 1326. 1830; Hook. f., Fl. Brit. India. 1: 411. 1874.

Annual, glabrous herbs, 10-50 cm tall, branched above. Leaves oblong-elliptic or obovate, 5-20 mm long, mucronate at apex, tapering at base. Flowers in paniced corymbs. Pedicels 2-5 mm long. Sepals elliptic-lanceolate ca 3 mm long, glabrous. Petals obovate, ca 5 mm long, yellow, rounded at apices, acute at base. Stamens 5, connate at base; filaments dilated below. Ovary ca 2 mm long. Fruits globose, 2-3 mm across, enclosed by persistent sepals.

Hoshangabad, Raigarh. Fl. & Fr. : Sept.-Jan.

3. *Linum usitatissimum* L., Sp. Pl. 277. 1753; Hook. f., Fl. Brit. Ind. 1: 410. 1874. *Aisi*.

Annual erect herbs, 30-60 cm tall. Leaves sessile, lanceolate, ca 30 x 2 mm. Flowers blue, solitary axillary, in terminal corymbs. Sepals acuminate, interior ones scarious-margined, ciliate, about half long as petals. Stigma clavate. Capsules globose, 5-valved, slightly longer than calyx; seeds brown.

Mostly cultivated, sometimes as an escape. Bastar, Bilasput, Hoshangabad, Raigarh, Raipur, Sidhi, Surguja. Fl. & Fr.: Oct.-Dec.

Common flax plant cultivated for Linseed oil.

2. REINWARDTIA Dumort.

Undershrubs. Leaves alternate, entire or crenate-serrate, membranaceous, pinnately nerved. Flowers yellow or white, produced in fasciculate axillary racemes or in dense corymbs at the end of the branches or solitary. Sepals 5, ovate or lanceolate, acuminate, entire. Petals 5, much longer than sepals. Stamens 5, alternating with interposed subulate staminodes; glands 2-3, adnate to the staminal tube. Ovary 3-5 locular, each locule 2-ovulate. Styles 3-4(-7), filiform, free or connate below. Fruits capsular, globose, splitting usually into 6-8 valves; seeds reniform, endosperm thin.

Two species in India, China and Malaysia; one in M.P.

Reinwardtia indica Dumort., Comm. Bott. 19. 1822. *Linum trigynum* Roxb., Asiat. Res. 6. 357. 1799 (non L. 1753). *Reinwardtia trigyna* (Roxb.) Planch. in Hook. Lond. J. Bot. 7: 522. 1848; Hook.f., Fl. Brit. Ind. 1: 412. 1874. *Balbasant*.

Herbs or undershrubs, 75-120 cm tall. Leaves elliptic-obovate or narrowly oblong-lanceolate, 1-2 × 0.5-4.5 cm, acute or rounded at apex, mucronate, decurrent into a short petiole at base, glabrous. Flowers ca 25 mm across. Sepals 5-10 mm long, lanceolate, acute. Petals upto 35 mm long, bright golden yellow, obovate, abruptly narrowed at base. Stamens 5-30 mm long. Ovary ovoid; styles 3 (-7) free or connate at base; stigmas of the longer styles larger than those of the shorter ones. Fruits capsular, globose, shorter than sepals.

Bastar, Bilaspur, Raigarh, Shahdol, Sidhi, Surguja. *Fl. & Fr.* : Jan.-Dec.

29. MALPIGHIACEAE

(R. C. Srivastava)

About 65 genera and 1280 species, mainly in tropical sub-tropical South America; 3 genera and 4 species in M.P.

- 1a. Leaves with two glands at base; fruit a capsule ... 2. *Galphimia*
- 1b. Leaves eglandular; fruit a samara:
 - 2a. Flowers actinomorphic; styles 3; samaras surrounded by a disc-like lateral wing ... 1 *Aspidopterys*
 - 2b. Flowers zygomorphic; style 1; samaras with one long median wing and two short lateral wings ... 3. *Hiptage*

1. ASPIDOPTERYS Juss.

Twining shrubs. Leaves opposite, entire, eglandular. Panicles or racemes axillary or terminal; pedicels bracteate at base and 2-bracteolate in middle or apex, often slender. Calyx short, 5-partite, eglandular. Petals not clawed, entire. Stamens 10; filaments filiform, free or shortly united at base; anthers ovate, glabrous. Ovary 3-lobed, lobes dorsally flattened, winged on the margins. Styles 3; stigmas capitellate. Samaras 3, wings ovate-oblong or orbicular, membranous, sometimes crested in middle. Seeds oblong.

About 32 species in South-East Asia; 2 in M.P.

- 1a. Leaves abruptly terminated by a broad based acumen, tomentose; samaras almost orbicular ... 1. *A. cordata*

- 1b. Leaves elliptic, acute, glabrous; samaras ovate or lanceolate

... 2. *A. glabriuscula*

1. *Aspidopterys cordata* (Heyne ex Wall.) Juss. in Ann. Sci. Nat. Ser. 2. Bot. 13. 267. 1840.; Hook. f., Fl. Brit. Ind. I: 421. 1874. *Hiraea cordata* Heyne ex Wall., Pl. As. Rar. 1: 13. 1830.

Twiners; young branches white silky tomentose, glabrescent with age. Leaves orbicular or ovate, 5-14 × 4-13 cm, cordate at base, glabrous above, white silky tomentose beneath. Panicles white or yellow-tomentose, 9-20 cm long. Pedicels slender, filiform, articulated below middle, tomentose above articulation (in fruits). Flowers white or pale yellow, ca 1 cm across; buds oblong, ca 2-3 × 1 mm, glabrous. Sepals ovate or elliptic, 2-3 × 1 mm. Petals broadly oblong, 4-5 × 2-2.5 mm. Anthers ca 1.5 × 0.5 mm, yellowish; filaments 2-5 mm long. Samaras suborbicular, 2-3 × 1.5-2 cm, distinctly wavy at margins, deep brown.

Chhindwara, Seoni. Fl. & Fr.: Sept.-Dec. Endemic to India.

2. *Aspidopterys glabriuscula* (Wall.) Juss. in Ann. Sci. Nat. Ser. 2. Bot. 13: 267. 1840. *Hiraea glabriuscula* Wall., Cat. no. 6626. 1826, *nom. nud.* *Aspidopterys roxburghina* var. β . Hook. f., Fl. Brit. India 1: 420. 1874.

Twiners; young parts glabrescent. Leaves elliptic, elliptic-lanceolate or ovate, 5-11 × 1.6-5.8 cm, shortly acuminate or acute. Panicles rusty tomentose; pedicels sub-umbellately crowded or racemed on the ultimate branches of the panicles, filiform, jointed below middle. Flowers white, ca 2 mm across, buds ovoid, ca 2 × 1.5 mm. Sepals obovate, oblong to elliptic, ca 1.5 mm long, pubescent or glabrescent. Petals ovate-oblong or ovate, 2-6 mm long, rounded at apex, reflexed. Anthers ovoid, ca 1 mm long; filaments ca 1 mm long. Samara wings ovate-oblong to lanceolate or elliptic, oblong, 3.5-4.6 × 1.5-2 cm, broader at base, rounded and narrow at apices, membranous, pale brown.

Bastar. Fl. & Fr.: May-Nov.

2. GALPHIMIA Cav.

Shrubs. Leaves entire, with two small glands at the base of the limb. Inflorescence terminal, racemose, bracteate, bractcoles 2. Flowers actinomorphic. Sepals 5, eglandular, shorter than petals. Petals clawed, entire. Filaments 10, episepalous ones the longest. Ovary globular, 3-lobed sometimes 2 cells, abortive; styles 3, free, coiled in buds, divergent, acute. Fruits dry, smooth, mericarps not winged, dehiscent.

About 10 species, mainly tropical American; one in M.P.

Galphimia gracilis Bartl. in Linnaea 13:552 1839.

Shrubs. Leaves elliptic-oblong, 3-5 × 1-2 cm, acute. Inflorescence overtopped by two lateral branches. Flowers 1-2 cm across, yellow. Sepals ovate, ca 2 × 1 mm, top rounded, sub-acute, sometimes recurved. Petals unequal, clawed, limbs triangular, 3-7 × 2-3 mm, entire on margins. Anthers oblong, ca 2 mm long; filaments ca 2.5 mm long. Ovary hairy. Styles terete, 5-6 mm long, caducous. Fruits globular, ca 5 mm across, brown.

Cultivated in gardens. Shivpuri. *Fl. & Fr.* : Almost throughout the year.

3. HIPTAGE Gaertn.

Lianas. Leaves opposite entire, usually glandular at base. Racemes terminal or axillary, sometimes, branched. Peduncles bracteate; pedicels jointed, 2-bracteate. Flowers white, fragrant, 5th petal discoloured. Calyx 5-partite with 1 large gland partly adnate to the pedicel. Petals clawed, unequal, silky. Stamens 10, declinate, all fertile, one much longer than others; filaments connate at base. Ovary 3-lobed, appendaged on the back. Style 1, filiform, at first circinate; stigma capitate. Samara 1-3, 3-winged; seeds subglobose.

About 30 species in W. China, subtropical Asia, Formosa, Malaya and Pacific Islands; one in M.P.

Hiptage benghalensis (L.) Kurz in J. As. Soc. Beng. 43(2): 136. 1879. *Banisteria benghalensis* L., Sp. Pl. 427. 1753. *Gaertnera racemosa* Roxb., Pl. Coron. 1, t. 18. 1795. *Hiptage madablota* Gaertn., Fruct. 2: 169, t. 116. 1791; Hook.f., Fl. Brit. Ind. 1: 418. 1874. *Madhavilata*. Fig. 26.

Lianas. Leaves oblong or ovate-lanceolate, 9-14 × 4-8 cm, acute or acuminate, subcoriaceous, glabrous. Racemes longer than leaves, 10-20 cm long, appressed tomentose. Flowers white, ca 3 cm across. Sepals ovate, elliptic or oblong, 8-10 × 2-4 mm, fulvous sericeous outside, 4-5 mm long, half decurrent on the pedicels. Petals suborbiculate to obovate, ca 1 cm long, hairy outside, margins fimbriate. Anthers ovoid, ca 2 mm long; filaments ca 6 mm long, one filament ca 10 mm long. Ovary pubescent; style terete, 14-15 mm long, acute, curved. Middle wing of samara oblanceolate, acute and narrow at apices, 4-6 × 1-1.5 cm; lateral wings lanceolate or oblong, 2-3 × 0.8-1.5 cm; dorsal crista sometimes present.

Bastar, Chindwara, Raigarh, Rewa, Sidhi. *Fl. & Fr.* : Jan.- April.

30. ZYGOPHYLLACEAE

(Ram Lal)

About 25 genera and 240 species in tropics and subtropics usually in drier parts; one genus and one species in M.P.



Fig. 26. *Hiptage benghalensis* (L.) Kurz

TRIBULUS L.

Prostrate silky herbs. Leaves opposite or alternate with one leaf aborted paripinnate, leaflets unequal. Flowers solitary, bisexual, regular, 5-merous, yellow or white. Sepals imbricate, free, deciduous. Petals imbricate, free. Stamens 5-10, subequal or unequal, inserted on the base of the disk, the longer opposite to the petals, the shorter with small gland outside; filaments filiform, naked; anthers medifixed. Ovary superior, sessile, hirsute, 5-12-lobed, 5-12-celled; ovules 1-5 in each cell, superposed; style short pyramidal or filiform; stigmas 5-12. Fruits 5-angled, 5-12 winged or spinous or tuberculate; cocci indurated. Seeds obliquely pendulous, 3-5, separated by horizontal septa.

About 15 species in warmer parts of the world; one in M.P.

Tribulus terrestris L., Sp. Pl. 387. 1753; Edgew. & Hook.f. in Hook. f., Fl. Brit. Ind. 1: 423. 1874. *Tribulus lanuginosus* L., Sp. Pl. 387. 1753. Fig. 27.

A prostrate silky herb, with pilose hairy stem and branches. Young parts silky villous. Leaves opposite 2-4 cm long, abruptly pinnate; leaflets 5-7 pairs, one of each pair usually smaller or wanting; stipules lanceolate, hairy. Flowers axillary or leaf-opposed, solitary, ca 1 cm across, yellow; peduncles 1-15 cm long. Sepals lanceolate, acute, hairy. Petals oblong, obovate, with a short hairy claw. Stamens 10. Disc of 10 erect scales in 2 rows, on inner and outer sides of stamens, opposite to the sepals. Ovary hirsute, 5-locular. Cocci of fruits 5, woody, globose, each with 2 pairs of hard sharp spines, one pair longer than the other. Seeds several in each coccus with transverse septa.

Hoshangabad, Indore, Satna, Sidhi, Tikamgarh. Fl. & Fr. : May-June.

Fruit is used medicinally and also eaten by many people during famine.

31. GERANIACEAE

(Ram Lal)

About 11 genera and 750 species. in temperate and subtropical regions; one species in M.P.

GERANIUM L.

Herbs or undershrubs. Leaves opposite or alternate, stipulate. Peduncles axillary bracteate, 1-2-flowered on umbellate pedicels. Flowers regular, sepals and petals imbricate, the later alternating with 5 glands. Stamens 10, fertile, free or connate at the base. Ovary 5-celled, beaked. Styles 5, longitudinally, stigmatose; ovules superposed. Capsules 5-lobed, 5-celled, dehiscent ventrally, often separating septifragally from the axis, their beaks

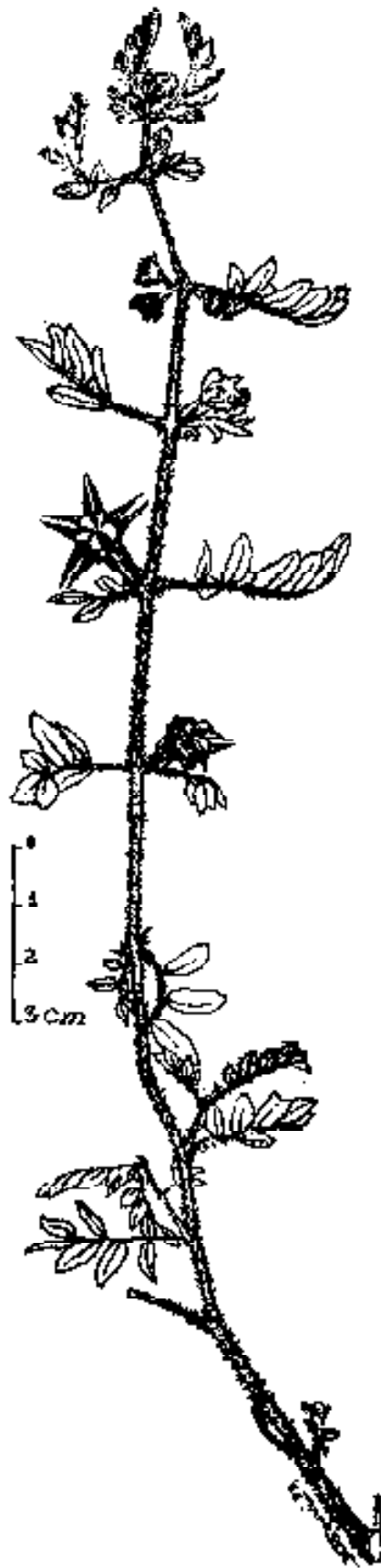


Fig. 27. *Tribulus terrestris* L.

elastically coiling upwards; cells 1-seeded.

About 160 species in the Northern hemisphere; some species are also found within the Arctic, while others in the Antarctica; one in M.P.

Geranium macrotense Boiss., *Diagn.* 1: 59. 1842; Babu, *Herb. Fl. Dehradun* 100. 1977. *Geranium ocellatum* Cambess. in *Jacq., Voy. Ind.* 33, t. 38. 1844; Edgew & Hook.f. in *Hook.f., Fl. Brit. Ind.* 1: 433. 1874.

A much branched prostrate annual pubescent herb. Leaves orbicular, subreniform, palmately 5-7-partite, sparsely pubescent, segments obovate-cuneate 3-5 lobed. Peduncles clustered or solitary and 1-flowered; flowers rose coloured with a dark purple eye. Sepals ovate, mucronate, hairy outside. Petals broadly obcordate, longer than the sepals. Capsule beaked, mericarp transversely rugose, hairy; seeds smooth.

Hoshangabad, Surguja. *Fl. & Fr.* : March-Dec.

Ornamental plants, also used in diarrhoea, dysentery and cholera.

32. OXALIDACEAE

(Ram Lal)

About 3 genera and 900 species, mostly tropical and subtropical; 2 genera and 6 species in M.P.

- 1a. Leaves pinnately many-foliolate ... 1. *Biophytum*
- 1b. Leaves palmately 3-foliolate ... 2. *Oxalis*

1. BIOPHYTUM DC.

Annual or perennial herbs. Leaves even pinnate, fascicled or almost whorled at the top of the stem. Leaflets opposite, oblique; petiole swollen at the base. Peduncles terminal; pedicels umbelled. Flowers small, yellow. Sepals 5, lanceolate, acuminate. Petals 5. Stamens 10; filaments free; styles 5. Capsules few-seeded splitting loculicidally into 5 spreading valves.

About 70 species, mainly tropical; 3 in M.P.

- 1a. Sepals hardly exceeding the capsule; pedicels equaling or exceeding the flowers ... 2. *B. reinwardtii*
- 1b. Sepals much exceeding the capsule; pedicels smaller than the flowers:
 - 2a. Leaflets 10-15 pairs; seeds with transverse tuberculed ridges ... 3. *B. sensitivum*
 - 2b. Leaflets 5-7 pairs; seeds with simple tubercies ... 1. *B. petersianum*

1. *Biophytum peterianum* Klotz. in Peters, Reise Mossamb. Bot. 1: 81, t. 15. 1862. *Oxalis apodiscias* Turcz. in Bull. Soc. Nat. Moscou. 36: 430. 1863. *Biophytum apodiscias* (Turcz.) Edgew. & Hook.f. in Hook.f., Fl. Brit. Ind. 1: 437. 1874.

Erect annual herbs; stems 2-5 cm long. Leaves 2.5-4 cm, crowded; leaflets 5-7 pairs, small, shortly and reniformly obovoid widening towards the rounded tip coriaceous, pale; the lowest smallest, orbicular, ovate; the middle ones truncate at the base; the terminal with a contracted oblique base and much arched midrib. Pedicels sessile. Petals puberulous; pedicels very short or 0. Flowers ca 5 mm across. Sepals exceeding the pedicels. Seeds simple, tubercled.

Bilaspur, Indore, Raigarh. Fl. & Fr. : July-Nov.

Leaves act as diuretic; flowers and seeds are applied to wounds.

Biophytum reinwardtii (Zucc.) Klotz. in Peters, Reise Mossamb. Bot. 1: 85. 1863; Edgew. & Hook.f. in Hook.f., Fl. Brit. Ind. 1: 437. 1874. *Oxalis reinwardtii* Zucc., Abh. Ak. Wiss. Munich. 1: 274. 1830.

Erect, hairy, annual herbs, 4-12 cm tall. Leaves even pinnate, rachis 5-6 cm long; leaflets 10-20 pairs, oblong, rounded at tip, equal at the base, glabrous; midrib straight; nerves slender, oblique. Flowers pseudoumbellate, clustered on 2-5 cm long peduncles; pedicels equalling or exceeding the small flowers. Sepals lanceolate, acute, hairy, exceeding the capsule. Petals yellow, spatulate, obtuse. Stamens 10. Styles 5. Capsules globose; seeds with spiral warts.

Balaghat, Bilaspur, Damoh, Hoshangabad, Panna, Raigarh, Raipur, Rajnandgaon, Satna, Surguja. Fl. & Fr. : Aug.-Dec.

3. *Biophytum sensitivum* (L.) DC., Prodr. 1: 690. 1824; Edgew. & Hook. f. in Hook. f., Fl. Brit. Ind. 1: 436. 1874. *Oxalis sensitivum* L., Sp. Pl. 434. 1753.

Erect, slender or robust, pubescent, annual herbs, 5-15 cm long. Leaves up to 12 cm long; leaflets 6-15 pairs, very variable in size, 1-1.5 cm long, sometimes arched a little upward, nearly equal at the base except the terminal one, which is obovate and oblique at the contracted base. Peduncles very variable, up to 1 cm, hispid, sometimes swollen at the base; bracts rigid, setaceous. Flowers yellow, pedicels shorter than the petals, sometimes equal or a little longer. Sepals rigid, subulate, grooved, glandular and hispid, usually much exceeding the capsules. Petals usually twice as long as sepals, hispid or ciliate. Capsules elliptic, shining; cells few-seeded. Seeds variable, minute with transverse oblique or acute ridges which are broken up into tubercles.

Bilaspur, Durg, Hoshangabad, Indore, Narsimhapur, Panna, Raigarh, Raipur, Rajnandgaon, Satna, Sagar, Seoni, Sidhi, Tikamgarh. *Fl. & Fr.* : May-Oct.

Plants used medicinally.

2. OXALIS L.

Herbs, rarely shrubs with acid juice. Leaves usually palmately 3-foliolate, with or without stipules. Inflorescence 1-10- flowered; pseudoumbels, axillary, regular. Sepals 5, imbricate; glands of disc 0. Stamens 10, in two equal rows, free or connate at base, all anther-bearing. Ovary lobed, 5-celled; styles 5 distinct; stigma terminal; ovules 1 or more in each cell. Capsule loculicidal, valves persistent to the axis; seeds many with a outer fleshy coat, which burst elastically, testa crustaceous.

About 800 species, tropical and temperate; 3 in M.P.

- 1a. Plants caulescent with creeping stem; leaves obovate; flowers yellow ... 1. *O. corniculata*
- 1b. Plants acaulescent with an underground bulbous root-stock; leaves obtriangular or obcordate; flowers purplish:
 - 2a. Pedicels and calyces hairy; leaves obcordate ... 2. *O. corymbosa*
 - 2b. Pedicels and calyces glabrous; leaves obtriangular ... 3. *O. richardiana*

1. *Oxalis corniculata* L., Sp. Pl. 435. 1753; Edgew. & Hook.f. in Hook. f., Fl. Brit. Ind. 1: 436. 1874. *Anrulsak*.

A perennial appressed pubescent herb with long creeping or subterranean stems, rooting at nodes, roots often tuberous. Leaves digitately 3-foliolate; leaflets obcordate, cuneate or acute at base; petiole 3.5-8 cm long, very slender, pubescent; stipules adnate to the petiole. Flowers axillary, subumbellate, bracts setaceous. Peduncles solitary up to 8 cm long, deflexed in fruit; bracts lanceolate, hairy. Sepals lanceolate-oblong, obtuse. Petals oblanceolate, notched, yellow, twice as long as sepals. Style hairy. Stigma papillose. Capsules sub-cylindric, pubescent; 5-angled, shortly beaked; seeds transeversely ribbed, numerous, broadly ovoid, acute, brown.

Balaghat, Bilaspur, Hoshangabad, Jabalpur, Mandla, Narsimhapur, Panna, Raigarh, Raipur, Rajnandgaon, Sagar, Seoni, Sidhi, Surguja. *Fl. & Fr.* : Jan.-Dec.

Leaves medicinal.

2. *Oxalis corymbosa* DC., Prodr. 1: 696. 1824.

Acaulescent, perennial herbs with bulbous root stock. Bulb scales few, fleshy, 3-nerved. Leaves erect; petioles 8-30 cm long with dilated base; leaflets subsessile cuneate at base, deeply notched at apex, lobes rounded at apex-appressed hairy beneath, punctate nearly glabrous. Flowers 2-many in subumbellate corymbs. Peduncles hairy 5-25 cm long; pedicels 3-4 cm long, hairy. Sepals with 2 orange dots at apices. Petals with dark purplish streaks, 1.5-2 cm long, hairy outside, longer filaments pubescent, shorter sparsely hairy or glabrous. Ovary glabrous, style pubescent.

Hoshangabad. Fl. & Fr. : Dec.-May.

Leaves medicinal.

3. *Oxalis richardiana* Babu, Herb. Fl. Dehradun 104. 1977. *O. intermedia* A. Rich, Ess. Pl. Cuba 315. 1845 (1842) (non Steud. 1841). *O. latifolia* (auct. pl. non HBK. 1821); Calder in Rec. Bot. Surv. Ind. 6. 337. 1919.

Acaulescent, perennial glabrous, bulbous herbs. Bulb scales many fleshy, 5 or more nerved. Leaves 3-foliolate, obtriangular; petiole 10-20 cm long; leaflets obovate, cuneate at base; notched with oblique, obtuse lobes impunctate except with 2 glands below the notched apex. Flowers umbellate few flowered. Peduncles 12-30 cm long, hairy; pedicels 1-5 cm long. Sepals 4-5 cm long with 2 glands at apex. Petals obcuneate, purple with green veined base, longer filaments inappendiculate, pubescent, shorter one hairy. Style glabrous.

Hoshangabad, Sagar, Sidhi. Fl. & Fr. : July-Nov.

Leaves medicinal.

33. AVERRHOACEAE

(Ram Lal)

About 3 genera and 16 species in tropical countries, probably native of New World; one species in M.P.

AVERRHOA L.

Trees. Leaves alternate, exstipulate, imparipinnate; leaflets subopposite. Flowers small, regular, paniced, axillary, in cymes. Sepals 5, imbricate. Petals 5, contorted. Stamens 10 connate at base all perfect or 5 without anthers. Ovary 5 celled, not beaked; styles 5, distinct; stigma capitate; ovules many in each cell. Fruits oblong, 5-lobed, indehiscent; seeds 2-5 in each cell with or without an aril.

About 4 species in tropical countries, native of New World; one cultivated in M.P.

Averrhoa carambola L., Sp. Pl. 428. 1753. Edgew. & Hook. f. in Hook. f., Fl. Brit. Ind. 1: 439. 1874.

Densely branched, small tree. Leaves imparipinnate; leaflets 2-5 pairs, ovate or ovate lanceolate, acute, glabrous and glaucous beneath; petiole stout pubescent. Flowers axillary, small, regular, variegated, white or purple. Sepals 5, glabrous, half as long as petals. Petals 5, contorted. Stamens 10, 5 shorter without anthers or sometimes 1 or 2 of these longer and antheriform. Ovary pubescent, 5-lobed, 5-celled not beaked. Fruits acutely angled, oblong, 5-lobed, indeshiscent; seeds arrillate.

East Nimar. Fl. & Fr. : March-Aug.

Cultivated for its edible frutis. Ripe fruits medicinal.

34. BALSAMINACEAE

(Ram Lal)

About 4 genera and 500 to 600 species, cosmopolitan; one genus and 3 species in M.P.

IMPATIENS L.

Herbs or rarely shrubs. Leaves alternate, opposite or whorled, exstipulate; petioles sometimes with glands, blades serrate, dentate. Inflorescence fascicled, racemose or sometimes paniced, rarely solitary. Flowers bisexual, irregular. Sepals 3, imbricate, 2 small and sepaloid, the posterior lip longer, petaloid, usually produced into a hollow spur. Petals 3 (or 5) free, anterior standard smaller, the lateral wings 2. Disc none. Stamens 5, anthers coherent, covering stigma, dehiscent by longitudinal slits or terminal pores. Ovary superior, 5-locular; ovules many, per locule, axile; stigma 5 lobed. Fruits 5-valved, loculicidal, dehiscing explosively; seeds few to many, smooth or tubercled.

About 500, species widely distributed; 3 in M.P.

- 1a. Leaves all alternate ... 1. *I. balsamina*
- 1b. Leaves opposite and/or whorled:
 - 2a. Pedicels hairy along margins; flowers usually 2-3, fascicled; lip short, spurred or not ... 2. *I. inconspicua*
 - 2b. Pedicels glabrous; flowers usually solitary; lip long, spurred ... 3. *I. kleinii*

1. *Impatiens balsamina* L., Sp. Pl. 938. 1753; Edgew. & Hook. f. in Hook. f., Fl. Brit. Ind. 1: 453. 1874.

Annual erect pubescent or glabrous 30-90 cm high herb. Leaves petioled, 4-12 x 1.2-1.5 cm, alternate, narrow, lanceolate or elliptic-acute at

both ends, acuminate, deeply serrate, decurrent in to glandular petiole. Flowers pink in fascicles of 1-3 axillary, lateral showy. Sepals broad, ovate, minute; lip saccate, 1.5-3.5 cm; spur glabrous or hairy; standard rounded, orbicular or retuse, broad, aristate; wings unequally 2-lobed. Spur short or long, incurved. Capsule tomentose or woolly with smooth glabrous seeds, testa ellipsoid, narrow at both ends, reticulate.

Balaghat, Bilaspur, Damoh, Hoshangabad, Indore, Mandla, Panna, Satna, Surguja. *Fl. & Fr.* : July-Oct.

Ornamental plants, also used for dye.

2. *Impatiens inconspicua* Benth. ex Wt. & Arn., Prodr. 139. 1834; Edgew. & Hook. f. in Hook. f., Fl. Brit. Ind. 1: 447. 1874.

Slender, glabrous, much-branched annual herb; stems 10-30 cm long. Leaves variable, lower usually petioled, upper sessile, opposite, 2.5 × 5-1.5 cm, ovate-lanceolate, serrate, glaucous beneath. Stipules setaceous or 0. Flowers pink, usually 2-3 fascicled, pedicels shorter than the leaves. Sepals subulate, very long and narrow; Wings with a large rounded almost obovate, clawed terminal lobe and small linear lateral ones; lip saccate, acuminate, not spurred, or with a very minute spur, standard ovate, mucronate with ovate acuminate basal lobe. Capsule 8 cm long, turgid in the middle acute at both ends; seeds few, almost globose but little compressed, black, shining.

Hoshangabad. *Fl. & Fr.* : Aug.-Sept.

This rare plant is used for dye.

3. *Impatiens kleinii* Wt. & Arn., Prodr. 140. 1834; Edgew. & Hook. f. in Hook. f., Fl. Brit. Ind. 1: 445. 1874; Raman. in Sald. & Nicols., Fl. Hassan 403. 1876. Fig. 28.

Slender branched glabrous annual herb, 15- 40 cm high. Leaves all opposite, 2.5 × 7-2 cm, elliptic, lanceolate or ovate-oblong or obovate, glaucous beneath, hairy on nerves, base narrowed into a short petiole. Stipules 0 or of 2 small glands. Flowers usually solitary, pink, purple or white, spur hardly exceeding the flower. Pedicels 1.5-2 cm long, axillary, filiform, deflexed in fruit. Sepals subulate; lip saccate, long-spurred; standard ovate, dorsally winged with stipitate wings, entire, obovate, rounded. Capsule glabrous, ellipsoid, lanceolate; seeds few, globose, black, shining.

Balaghat, Bilaspur, Hoshangabad. *Fl. & Fr.* : July-Oct.

Ornamental plants, also used for dye.

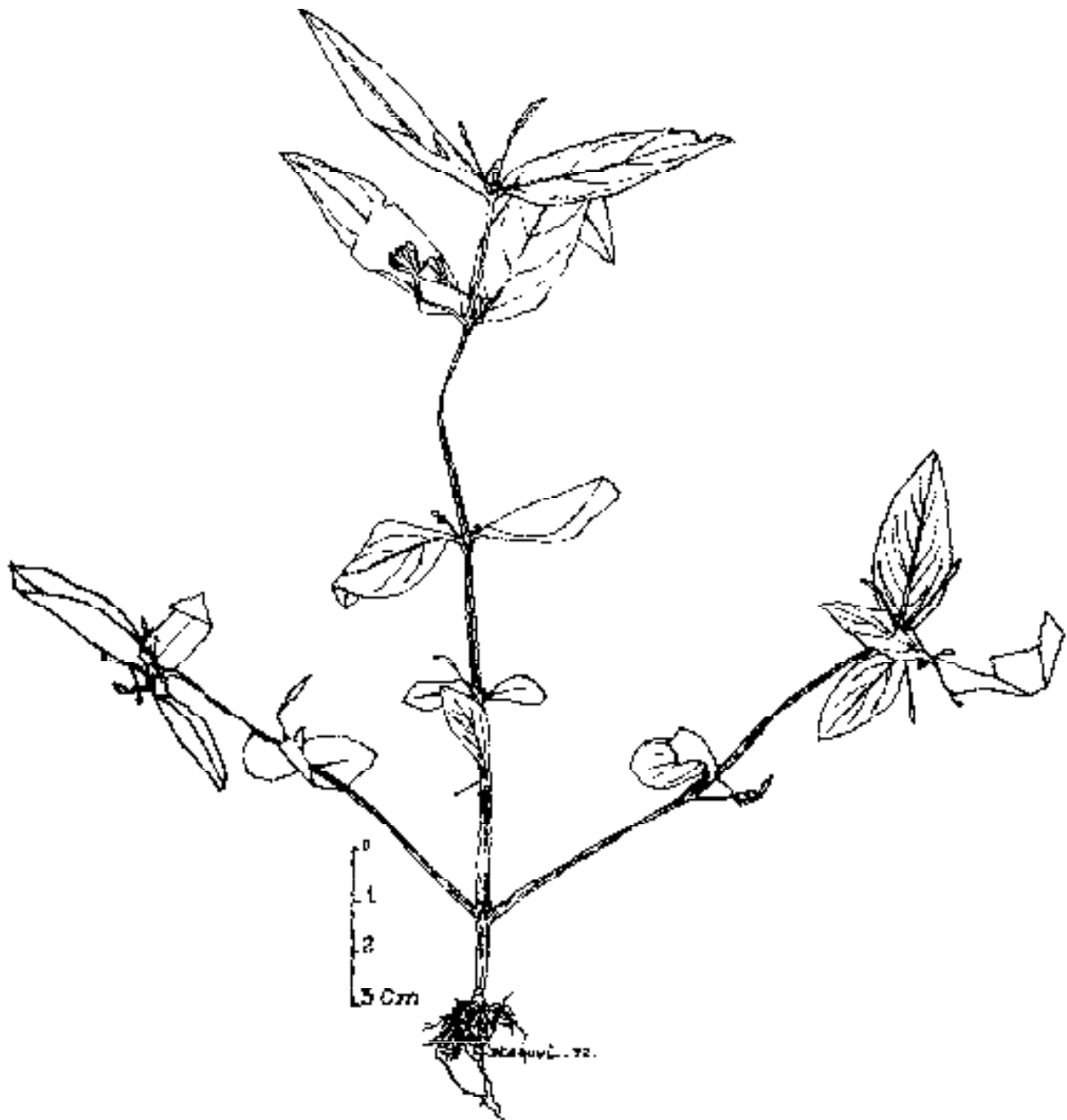


Fig. 28. *Impatiens kleinii* Wight

35. RUTACEAE

(Ram Lal)

About 150 genera and 900 species widely distributed in southern hemisphere, especially in Australia and S. Africa; 10 genera and 16 species in M.P.

1a. Fruits dehiscent:

2a. Plants unarmed, pods winged ... 3. *Chloroxylon*

2b. Plants armed, pods not winged :

3a. Strong smelling herbs or shrubs; stamens 8-10 ... 9. *Ruta*3b. Not strong smelling climbing shrubs or trees;
stamens 3-5 ... 10. *Zanthoxylum*

1b. Fruits indehiscent:

4a. Ovules solitary or two in each cell:

5a. Unarmed trees or shrubs:

6a. Style very short, not jointed at top, persistent ... 6. *Glycosmis*6b. Style long, jointed on the top of ovary, deciduous. 7. *Murraya*

5b. Armed or unarmed shrubs or small trees:

7a. Leaves 3-8-foliolate; petiole winged ... 8. *Naringi*7b. Leaves 1-foliolate; petiole not winged ... 2. *Atalantia*

4b. Ovules many in each cell:

8a. Leaves 1-foliolate; berry globose, pericarp fleshy,
many celled, filled with juice ... 4. *Citrus*8b. Leaves 3-many-foliolate; berry globose, pericarp
woody, filled with pulp:9a. Leaves imparipinnate; stamens 10-12 ... 5. *Feronia*9b. Leaves 3-foliolate; stamens many ... 1. *Aegle*

1. AEGLE Correa

Trees, armed with spines. Leaves alternate, 3-foliolate; leaflets, petiolulate, entire or sub-crenulate, membranous. Flowers large, white in axillary panicles. Calyx small, campanulate, toothed, deciduous. Petals 4-5, spreading, imbricate. Stamens many, inserted around an inconspicuous disc; filaments short, subulate; anthers elongate. Ovary ovoid, 8-20-locular; ovules many per locule, 2-seriate; style short, deciduous; stigma capitate, oblong or fusiform, deciduous. Fruits large, globose, ovoid or reniform, smooth and woody outside, many-locular, many-seeded, with woody rind; seeds embedded in aromatic pulp; testa woolly and mucous.

Two to three species in tropical Asia and Africa; one in M.P.

Aegle marmelos (L.) Correa in Trans. Linn. Soc. 5. 223. 1800; Hook f., Fl. Brit. Ind. 1: 516. 1875. *Crateva marmelos* L., Sp. Pl. 444. 1753.

A medium sized, deciduous, spiny tree; spines 2-3 cm long. Leaflets usually 3, ovate, lanceolate, rounded at base; lateral sessile, terminal, stalked. Flowers 5-merous, greenish-white, sweet scented; peduncles 3-5 cm long; pedicels auriculate, pubescent. Filaments fascicled. Ovary glabrous. Berry 8-16 cm, globose, oblong or pyriform; rind grey or yellow; pulp orange, sweet, edible.

Balaghat, Bilaspur, Damoh, Dhar, Durg, Hoshangabad, Panna, Raipur, Seoni, Surguja, Tikamgarh. Fl. & Fr. : April-Aug.

2. ATALANTIA Correa

Unarmed or spinous shrubs or trees. Leaves alternate, 1-foliolate, shortly petioled, entire or crenulate, persistent; stipules scaly, in between petiole and spines. Flowers axillary, rarely terminal fascicled or in short racemes, corymbs or panicles, rarely solitary. Calyx 3-5-lobed or partite. Petals 3-5, free or connate to the stamens forming a tube, imbricate. Stamens 6-8, rarely 15-20, inserted around an annular or cupular disc. Filaments free or irregular, connate; anthers short, ovate, oblong or cordate at base. Ovary 2-4 (3-5)-celled; ovules 1 or 2 per locule, collateral; style deciduous; stigma capitate. Berry large, subglobose, 1-5-celled, 1-5-seeded.

About 10 species in tropical Asia and Australia; one in M.P.

Atalantia monophylla (L.) Correa in Ann. Mus. Nat. Hist. Nat. 6: 383. 1805; Hook.f., Fl. Brit. Ind. 1: 511. 1875. *Limonia monophylla* L., Mant. Pl. 237. 1771. *Atalantia floribunda* Wight, Icon. t. 1611. 1850. Fig. 29.

Large shrubs or small trees; branches rigid, older ones armed with spines; branchlets puberulous. Leaves 1-foliolate; leaflets 6-12 × 2-4 cm, lanceolate or elliptic, ovate-lanceolate bluntly acuminate, emarginate at tip, glabrous; petiole channelled with 2 subulate stipular scales at the base. Flowers white, in puberulous fascicles or contracted corymbose axillary cymes; bracts minute. Calyx irregularly split to the base, at the time of flowering or after; lobes very short, ciliolate. Petals obovate-oblong, adnate to the stamens. Stamens 8, filaments united throughout the entire length into a cleft tube; anthers small, elliptic. Ovary tapering to the style, 3-5-celled; style long, cylindrical; ovules 1 or 2, collateral. Berry globose like a lime, rugose and glandular outside, 4-celled; cells 1 seeded.

Bastar, Bilaspur. Fl. & Fr. : July-Feb.

Oil from seeds warmed and applied for chronic rheumatism in native medicine.

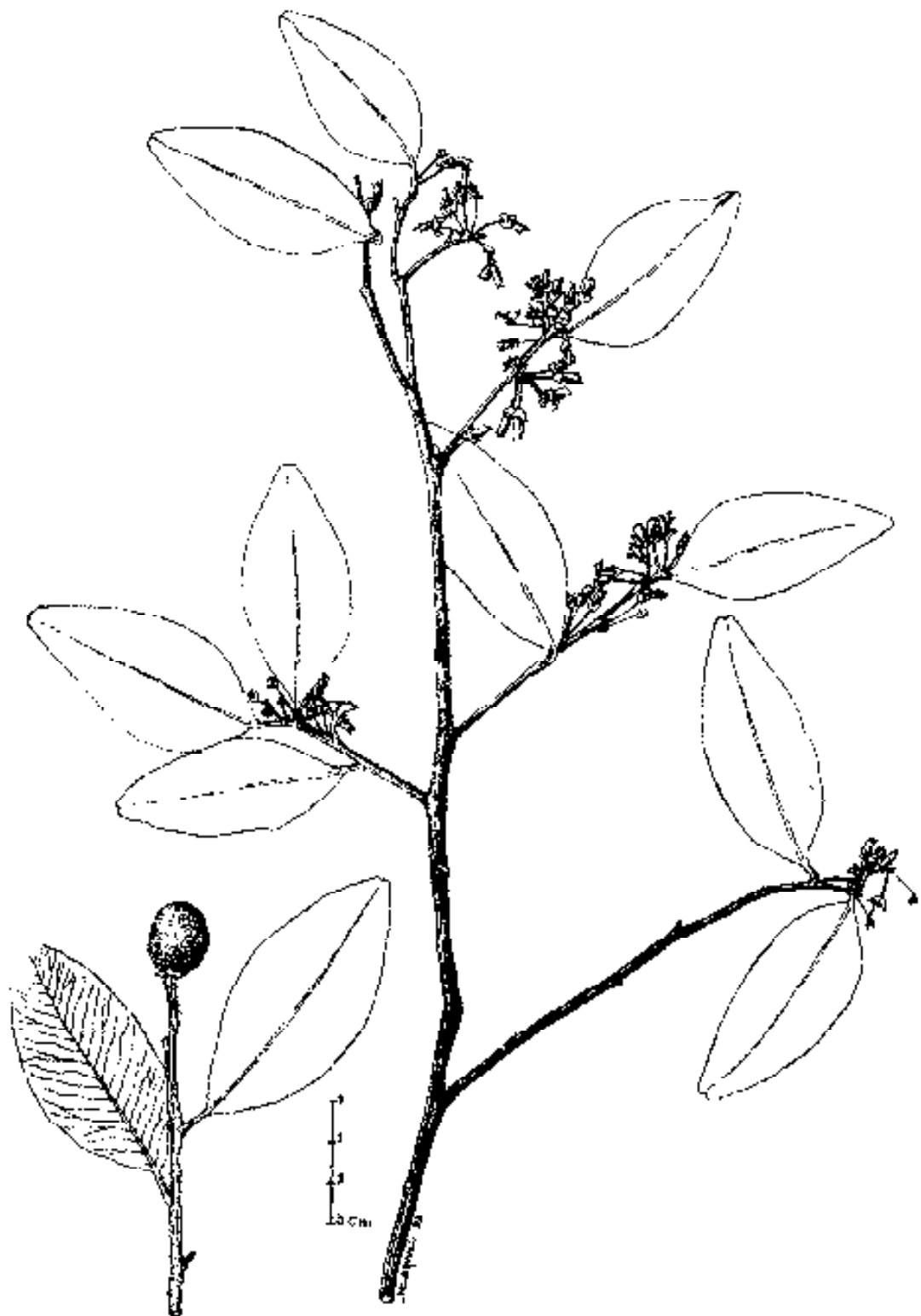


Fig. 29. *Atalantia monophylla* L.

3. CHLOROXYLON DC.

Unarmed trees. Leaves abruptly pinnate; leaflets many, alternate, obtuse, oblique, entire. Inflorescence paniced, terminal and axillary, pubescent. Flowers small, pedicellate, pentamerous. Calyx partite, deciduous. Petals clawed, spreading. Disc thick, 10-lobed. Stamens 10, dimorphic, placed in depressions of disc; anthers filiform, subulate, alternate ones longer; anthers small, versatile; ovary partly immersed into disc, 3-lobed, 3-celled, 8 ovules per locule, axillary; style short; stigma obscurely 3-lobed. Capsule 3-valved; seeds compressed.

Monotypic genus distributed in India and Sri Lanka.

Chloroxylon swietenia DC., Prodr. 1: 625. 1834, Hiern in Hook.f., Fl. Brit. Ind. 1: 569. 1875; Gandhi in Sald. & Nicols. Fl. Hassan 383. 1976.

Trees with fragrant heartwood. Leaves paripinnate; leaflets 20-40, opposite, subopposite or alternate, glabrous, pale and dotted on lower surface, oblong-lanceolate, obtuse with oblique base, 3 × 1 cm long, membranous. Flowers white; peduncles up to 10 cm long, hardly as long as the leaves. Capsule ovoid or oblong, 3 × 1.5 cm long, dark brown; seeds compressed, winged above.

Balaghat, Bilaspur, Durg, Hoshangabad, Raipur, Seoni, Sidhi. Fl. & Fr. : May-Aug.

Wood very valuable for timber, gum and yellow dye. Leaves applied in wounds and rheumatism.

4. CITRUS L.

Spinous shrubs or trees. Leaves alternate, 1-foliolate, coriaceous, persistent; petiole often winged. Flowers axillary, solitary, fascicled or in small cymes, white or pinkish, sweet-scented. Calyx 3-5-fid, cupular or urceolate. Petals 4-8, linear-oblong, imbricate. Stamens 20-60, inserted around large cupular or annular disc; filaments variously connate; anthers oblong. Ovary many-celled; style stout, large, oblong or globose, fleshy; ovules 4-8, 2-seriate in each cell. Berry large, oblong or globose, fleshy; septa membranous, cells few-seeded and filled with horizontal fusiform cells filled with juice. Seeds horizontal or pendulous.

About 7 species in Asia and Australia; 6 cultivated in M.P.

1a. Leaves beneath and young shoots pubescent ...5. *C. maxima*

1b. Leaves and young shoots glabrous:

2a. Young shoots greenish-white; flowers white, bisexual

...2. *C. aurantium*

- 2b. Young shoots purple; flowers bisexual:
- 3a. Leaflets short margined or without wings ...6. *C. medica*
- 3b. Leaflets winged:
- 4a. Rind with concave vesicles ...3. *C. limettoides*
- 4b. Rind thin, smooth:
- 5a. Leaflets ovate; fruits medium sized; wild plants...4. *C. limona*
- 5b. Leaflets elliptic-oblong; fruits small; cultivated plants ...1. *C. aurantifolia*

1. *Citrus aurantifolia* (Christon.) Sw. in J. Wash. Acad. Sci 3: 465. 1913. *Limonia aurantifolia* Christon, Pflanzen. Syst. 1: 618. 1777. *Citrus medica* var. *acida* Brand., For. Fl. 52. 1874.

Small trees, 3-6 m tall, with stout, stiff, thorns. Leaves unifoliolate, pale green, oblong to elliptic, ovate. Flowers solitary or clustered in the axil, white or pinkish outside. Fruits globose with thin rind, yellow when ripe; pulp pale, very sour, not mamillate.

Mandla, Sagar. Fl. & Fr.: July-June.

Fruit (lime) used for culinary purposes, flavouring jams, jelly, marmalades, liquors and other drinks.

2. *Citrus aurantium* L., Sp. Pl. 782. 1753; Hook f., Fl. Brit. Ind. 1: 515. 1875. -*Santara*.

Small trees rarely shrubs young shoots glabrous, greenish-white. Leaves 1-foliolate; leaflets 8-15 cm, elliptic or ovate, acute, obtuse or acuminate; petiole naked or winged; wings often obovate and nearly as large as leaf-blade. Flowers bisexual, pure white. Stamens 20-30. Fruit globose, oblate, not mamillate, orange in colour; rind loose or adherent; pulp sweet, yellow, rarely red.

Mandla, Shahdol. Fl. & Fr.: July-March.

Fruits with much vitamin C, used for preparation of confections, marmalade, liquors and other drinks.

3. *Citrus limettoides* Tanaka in J. Indian Bot. Soc. 6 (4): 227. 1937. *C. medica* L. var. *lametta* Hook. f., Fl. Brit. Ind. 1: 515. 1875.

Spinous shrubs or small trees. Leaves elliptic, oblong; petiole many times shorter than leaflet, linear or obovate. Flowers small, petals 4. Fruits globose, 8-12 cm in diam.; rind thin, smooth juice abundant, sweet, not aromatic.

East Nimar, Sagar. Fl. & Fr.: April-May.

Fruit used as refrigerant in fever and jaundice.

4. *Citrus limona* (L.) Burm.f., Fl. Ind. 1173. 1768; Lushington in Ind. For. 28: 347. 1910. *C. medica* var. *limonum* L., Sp. Pl. 2: 782. 1753; Hook. f. Fl. Brit. Ind. 1: 515. 1875.

Large spiny shrubs or small trees. Leaves unifoliolate, elliptic-oblong, obtuse, crenate; petiole narrowly winged. Flowers white, in axillary cymes. Fruit globose or ovoid, medium sized, yellow, mamillate; rind thin; pulp abundant, acid.

Bastar, Bilaspur, Damoh, Sagar. *Fl. & Fr.*: April- May.

Fruit juice used in preparation of lemonade, squash and sharbat, medicinally used in hypertrophy of spleen.

5. *Citrus maxima* (Murr.) Merr., Sp. Blancoanae 1918. *C. decumana* Murr. in L., Syst. ed. 13. 580. 1774; Hook. f., Fl. Brit. Ind. 1: 516. 1875.-*Chakotra*.

A tree, 9-12 m high; young shoots pubescent. Leaflets large, 15- 22 cm, ovate-oblong, frequently emarginate, pubescent beneath; petiole broadly winged. Flowers large, white. Stamens 16-24. Fruits large, pale yellow, globose or pear-shaped; rind thick; pulp yellow, pink or crimson or acid; vesicle distinct.

Sagar. *Fl. & Fr.* : Jan.-Dec.

Fruits used as refrigerant and are nutritive.

6. *Citrus medica* L., Sp. Pl. 782. 1753; Hook. f., Fl. Brit. Ind. 1: 514. 1875. -*Bara nimbu*.

Shrubs or small trees. Young shoots glabrous, purple. Leaflets 5- 12 cm long, elliptic-ovate or ovate-lanceolate, glabrous; petiole naked or winged. Flowers up to 2.5 cm long, in racemes, white, often tinged with pink; frequently unisexual. Stamens 20-60. Ovary many-celled. Fruits large, globose, ovoid, oblong; rind leathery.

Hoshangabad. *Fl. & Fr.* : Jan.-Dec.

Fruit juice refrigerant and astringent; rind used for dysentery.

5. FERONIA Correa

Spinous tree. Leaves alternate, imparipinnate; leaflets opposite, subsessile, entire; petiole winged or unwinged. Flowers in terminal or lateral loose panicles or racemes, polygamous. Calyx small, toothed, deciduous. Petals 5, rarely 4-6, spreading, imbricate. Stamens 10-12, sometimes a few imperfect inserted in short disc; filaments dilated, subulate

at tip; anthers linear-oblong. Ovary oblong, 5-6-celled, at length 1-celled; style 0; stigma oblong, fusiform, deciduous. Fruits large, globose with rough woody rind, 1-celled, many-seeded; seeds buried in pulp, oblong, compressed.

A monotypic genus distributed in India and Sri Lanka.

Feronia limonia (L.) Swingle in J. Wash. Acad. Sc. 4:328. 1914. *Schinus limonia* L., Sp. Pl. 389. 1753. *Feronia elephantum* Corr. in Trans. Linn. Soc. 5: 224. 1800; Hook. f., Fl. Brit. Ind. 1: 516. 1875. -*Kaitha*.

A small deciduous spiny tree; bark dark grey or nearly black, wrinkled and with longitudinal furrows. Leaves smelling of aniseeds. Leaflets 5-7, cuneate or obovate, cuneate at tip. Flowers pale green, stained with red, in racemes or panicles. Fruits globose, 5-8 cm, with rough-greyish woody rind and white sour pulp.

Bilaspur, Hoshangabad, Panna, Rajnandgaon. *Fl.*: Feb.-May; *Fr.*: Oct.

Pulp edible, used in diarrhoea and dysentery and also as tonic. Tree is lopped for fodder.

6. GLYCOSMIS Correa

Unarmed shrubs or trees. Leaves 1-foliate or imparipinnate. Leaflets alternate, serrate. Inflorescence paniced, usually axillary. Flowers 5-merous, bisexual, sessile. Calyx 4-5 partite, segments broad, imbricate. Petals 4-5, imbricate. Stamens 8-10, free, dilated below; anthers small, often with dorsal or apical glands. Disc stipitate. Ovary 2-5 celled, elliptic; ovule 1 per locule, pendulous; style very short, persistent; stigma broad and flat. Berry glandular or ellipsoid, 1-3-seeded, oblong; testa membranous.

About 6 species in Asia and Australia; one in M.P.

Glycosmis arborea (Roxb.) DC., Prodr. 1: 538. 1824. *Limonia pentaphylla* Retz., Obs. Bot. 5: 24. 1788 (non *G. pentaphylla* (Roxb.) DC.), *Limonia arborea* Roxb., Pl. Corom. t. 85. 1798. *G. pentaphylla auct. non* (Roxb.) DC. Tanaka in Bot. Not. 159. 1928; Sald. & Nicols., Fl. Hassan 384. 1976.

Small glabrous shrubs. Leaves 3-5-foliate, oblong lanceolate, 16x5 cm, entire or obscurely crenate. Flowers small, white, fragrant, in erect terminal panicles. Ovary curved, with mamillary gland, usually 5-celled; style very short and stout. Berry 5 mm across, subglobose, somewhat compressed, white, pink or blue.

Bastar. *Fl. & Fr.*: Dec.-Feb.

Plants medicinal.

7. MURRAYA L.

Unarmed shrubs or small trees. Leaves odd pinnate; leaflets alternate, petioled. Inflorescence cymose, racemose or solitary. Flowers bisexual, 5-merous. Calyx deeply partite. Petals oblong, free, imbricate or valvate. Disc erect. Stamens 10; filaments alternately longer and shorter, subulate; anthers short, basifixed. Ovary 2 locular, superimposed ovules per locule; stigma dilated, 2 fid. Berry 1-2-celled, oblong or ovoid 1-2 seeded.

About 4 species, distributed in Tropical Asia; one in M.P

- 1a. Plants scented; leaflets 10-25, pubescent, deciduous;
flowers numerous · ...1. *M. koenigii*
- 1b. Plants not strongly scented; leaflets 3-7, glabrous,
evergreen; flowers few ...2. *M. paniculata*

Murraya koenigii (L.) Spreng., Syst. Veg. 2: 315. 1825; Hook. f., Fl. Brit. Ind. 1: 503. 1875. *Bergera koenigii* L., Mant. 565. 1767. - *Kathrim*.

A deciduous, strong-scented shrub or small tree; bark brownish. Leaves often 30 cm long; leaflets 9-25, usually oblique-ovate, obtuse, acuminate, notched at tip, crenulate. Flowers in corymbs or panicles, white. Sepals acute. Petals linear, oblong, obtuse. ovary 2-celled; style cylindrical; stigma capitate, grooved. Fruits ovoid, ca 8 cm in diam., rugose, black when ripe; seeds embedded in mucilage.

Bilaspur, Hoshangabad, Raipur, Surguja. Fl. & Fr.: Dec.-June.

Leaves much eaten in curries.

2. *Murraya paniculata* (L.) Jack, Mal. Misc. 1(5)31. 1820. *Chalcas paniculata* L., Mant. Pl. 68. 1767. *Murraya exotica* L., Mant. Alt. 2: 563. 1771. Hook. f., Fl. Brit. Ind. 1: 502. 1875. - *Kamini*.

An evergreen shrub or small tree, Leaflets 3-7, elliptic-ovate, acuminate, often oblique at base, dark green and shining above. Flowers few or many in short terminal and axillary corymbs, white, very fragrant. Sepals minute, acute. Petals oblong, lanceolate. Ovary hirsute, 2 celled; style filiform. Berry red elliptic, apiculate; seeds woolly.

Bastar, Bhopal, Damoh, Raigarh. Fl. & Fr.: Oct.-April.

Commonly grown in the garden for its glossy green leaves and large clusters of fragrant flowers; also a common hedge plant.

8. NARINGI Adans.

Armed, erect shrub or small tree. Leaves pinnate; leaf rachis winged; leaflets sessile, crenulate, chartaceous. Inflorescence racemose or cymose on

old wood. Flowers pedicelled. Calyx 4-5-lobed or partite. Petals 4-5, imbricate. Stamens 8-10, inserted around disc; filaments subulate; anthers cordate or linear-oblong. Ovary oblong, 4-5-celled; style short, deciduous; stigma obtuse or capitate. Berry globose, ca 1.5 cm across, bluish-black.

Two-three species, native of tropical Asia; one in M.P.

Naringi crenulata (Roxb.) Nicolson in Sald. & Nicols., Fl. Hassan 387. 1976. *Limonia crenulata* Roxb., Pl. Corom. 86. 1798. *Limonia acidissima* auct. non Hook. f., Fl. Brit. Ind. 1: 507. 1875. *Hesperenthusa crenulata* Roem., Syst. Monogr. 1: 38. 1846.

Small, spiny tree. Leaves 5-7-foliolate; petiole and rachis auriculate; leaflets elliptic-obovate, 2-5 cm long, crenate, obtuse, usually notched. Racemes subumbellate, short pubescent, often leafy. Flowers 4-merous, white. Ovary 4-locular. Berry globose, ca 1.5 cm across, bluish-black.

Bastar, Damoh, Gwalior, Raipur. Fl. & Fr.: Sept.-Dec.

Leaves, fruits and roots medicinal.

9. RUTAL.

Strong smelling glandular-punctate herbs or shrubs. Leaves alternate, simple or compound. Flowers in terminal corymbs, cymes or panicles, greenish or yellow. Calyx short, 4-5-partite, persistent. Petals 4-5, concave, often toothed or ciliate, imbricate. Disc thick. 8-10 glandular. Stamens 8-10, inserted around the base of the disc filaments dilated at base. Ovary sessile, deeply 3-5-lobed, 3-5-locular; ovules pendulous; style central, stigmatose at apex. Capsule 4-5-lobed, dehiscent at apex or indehiscent, many-seeded; seeds angled, testa pitted.

About 4 species, in Mediterranean region and West Asia; one in M.P.

Ruta graveolens L., Sp Pl. 383. 1753. *R. graveolens* L. var. *angustifolia* Hook. f., Fl. Brit. Ind. 1: 485. 1875.

Strongly scented herbs or shrubs. Leaves petioled, decomposed; segments cuneate, spatulate, oblong or linear-oblong. Flowers in divaricately spreading corymbs, hermaphrodite. Sepals triangular, acute. Petals oblong, obovate, pectinate, abruptly clawed. Ovary 2-5 lobed. Capsule obtuse, shortly pedicelled; seeds angled.

Bastar. Fl. & Fr.: Oct.-April.

Used for fumigation in infants catarrh. Rue-oil is obtained which has medicinal property.

10. ZANTHOXYLUM L.

Erect or climbing shrubs or trees often armed with stout prickles. Leaves alternate, 3-foliolate or odd-pinnate. Leaflets petiolulate, entire or crenate, often oblique. Inflorescences polygamous, pedicelled. Calyx 3-5 fid. Petals 3-5, ovate, rarely 0. Male flowers with 3-5 filaments. Disc inconspicuous, pistillodes 1-5. Female flowers : stamens absent or squamiform staminodes, disc very short, pistils 1-5, free or connate, erect with 2 ovules. Styles sublateral, free with entire stigma or connate with 2-5 lobed stigma. Fruits of globose, dry or drupaceous 1-seeded cocci, ventrally dehiscent. Seeds with bony or crustaceous, blue or black shining tests.

About 80 species tropical and subtropical; one in M.P.

Zanthoxylum armatum DC., Prodr. 1: 727. 1824. *Zanthoxylum alatum* Roxb., Fl. Ind. 2: 768. 1832: Hook. f., Fl. Brit. Ind. 1: 493. 1875. Fig. 30.

A shrub or small tree, all parts pungent aromatic; branches and stem prickly, the older with corky base. Leaves unequally pinnate. Leaflets 2-6 pairs, lanceolate, glabrous beneath. Petiole and rachis usually winged. Petiole with 2 stipular prickles at the base. Flowers small, yellow in lax panicles, 5-15 cm long; glabrous or pubescent. Calyx with 6-8 acute segments. Petals 0. Stamens 6-8. Ripe carpels 1-3, reniform or ovoid, the size of a small pea, reddish, when fresh, tubercled.

Raigarh. Fl.: April-June; Fr.: Aug.-Oct.

The bark, fruits and seeds are extensively used in indigenous systems of medicine as carminating, stomachic and anthelmintic.

36. SIMAROUBACEAE

(K. K. Khanna)

About 30 genera and 200 species in tropical regions, centering tropical America and tropical West Africa; one in M.P.

AILANTHUS Desf.

Lofty trees. Leaves long petiolate, alternate, pinnate. Inflorescence a terminal or axillary branched panicle. Flowers small, bracteate, pedicellate. Calyx 5-fid, short. Corolla 5, spreading. Disk 10-lobed. Stamens number variable, 10 in male, 2-3 in bisexual and 0 in female flowers, filaments short or filiform. Ovary 2-5-celled (rudimentary in male flower); styles connate, one ovule in each cell. Fruit a samara, 1-5, large, membranous, linear-oblong.

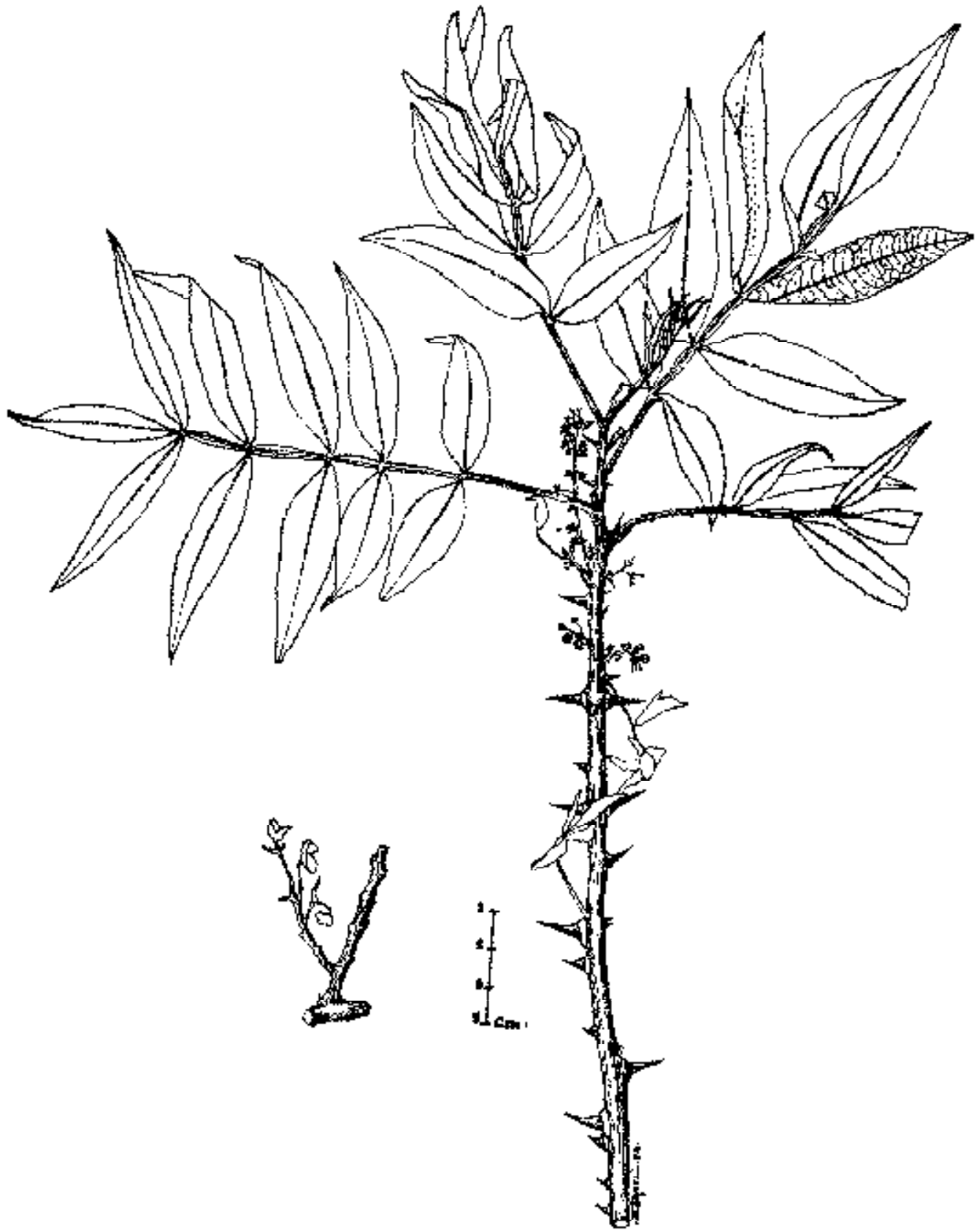


Fig. 30. *Zanthoxylum armatum* DC.

About 10 species in tropical and subtropical Central and S.E. Asia and Australia; one in M.P.

Ailanthus excelsa Roxb., Pl. Corom. 1: 24, t. 23: 1795; Bennett in Hook. f., Fl. Brit. Ind. 1: 518. 1875. *Maharukh*.

Tall trees, up to 20 m high. Leaves unequally or equally pinnate, younger tomentose, older glabrous, on long petioles, 30-60 cm long, leaflets 8-14 pairs, alternate or subopposite, variable in shape, coarsely and irregularly denticulate. Flowers in branched panicle. Pedicel long, slender. Calyx lobes ovate-triangular. Petals ovate-lanceolate, glabrous. Fruit lanceolate, reddish brown; seed solitary in the samara.

Chhatarpur, Hoshangabad, Indore, Jabalpur, Raipur, Seoni, Sidhi. *Fl. & Fr.*: Jan.-March.

37. BALANITACEAE

(K. K. Khanna)

Only one genus and about 25 species in Africa and Asia; one in M.P.

BALANITES Delile

Small trees or shrubs, armed with sharp spines; spines simple or forked. Leaves exstipulate, alternate, bifoliate; leaflets entire. Inflorescence an axillary cyme. Flowers small, green. Sepals 5, free, imbricate. Petals 5, glabrous, oblong, spreading. Stamens 10, inserted in the furrows at the base of the disk. Disk 10-grooved. Ovary globose, 5-celled or 1-celled. Ovule one in each locule. Fruit a drupe, fleshy, oily. Seeds pendulous.

About 25 species, tropical; one in M.P.

Balanites aegyptiaca (L.) Delile, Fl. Egypte 77 & 221, t. 28, f. 1. 1813. *Ximenia aegyptiaca* L., Sp. Pl. 1194. 1753. *Balanites roxburghii* Planchon in Ann. Sc. Nat. (Ser. 4) 2: 258. 1854; Bennett in Hook. f., Fl. Brit. Ind. 1: 522. 1875. -*Hingan, Hingua*

A middle-sized armed tree attaining a height of about 6 m; younger parts pubescent; spines strong, straight, very sharp. Leaflet elliptic or obovate, coriaceous, rounded at base, acute at apex, 1.5-5 × 1-2.5 cm; petiolules very short. Flowers 4-12 in cyme. Sepals ovate, pubescent outside. Petals obovate, glabrous outside. Disk cupular, 10-grooved. Drupe ovoid, 5-angular, yellow when ripe.

Gwalior, Satna. *Fl.*: Oct.-June; *Fr.*: Oct.-Aug.

38. OCHNACEAE

(R. C. Srivastava)

About 30 genera and 250 species, pantropical, chiefly in S. America and Africa; one genus and two species in M.P.

OCHNA L.

Shrubs or trees. Leaves alternate; stipules intrapetiolar, connate, deciduous; blades simple, entire, pinnately veined. Inflorescence of cymose or thyrsoid panicles. Flowers bisexual, regular, with hemispherical terminal torus turning red with age. Sepals 5, free or sharply connate accrescent. Petals 5-10, free, caducous. Stamens many; anthers with two apical pores. Ovary superior, 5-10-lobed. Style gynobasic, persistent. Fruits of 3-5 drupes on swollen torus, each 1-seeded.

About 85 species in tropical Asia and Africa; 2 in M.P.

- 1a. Sepals in fruits usually distinctly reflexed ...1. *O. integerrima*
 1b. Sepals in fruits spreading or inflexed ...2. *O. obtusata*

1. *Ochna integerrima* (Lour.) Merr. in Trans. Am. Phil. Soc. n.s. 24 (2); 2: 265. 1935. *Elaeocarpus integerrimus* Lour., Fl. Cochinch. 338. 1790. *O. wallichii* Planch. in Hook., Lond. J. Bot. 5: 650. 1846; Bennet in Hook.f., Fl. Brit. Ind. 1: 524. 1875. *O. crocea* Griff. Not. 4: 463. 1854. *O. grandis* Ridley in J. Str. Br. Roy. Asiatic Soc. 83: 59. 1911.

Shrubs or trees, 1-8 m tall; branchlets annulate with scars of bud scales. Leaves lanceolate or oblong-lanceolate, 10-25 × 2-6 cm, acute, serrate; petioles 2.5 mm. Inflorescence a many flowered cyme; pedicels 2-3 cm long. Flowers yellow. Sepals 5, ovate to ovate-oblong, 12-15 × 4-8 mm, dark red in fruits. Petals 5-6, obovate, 15-22 × 8-14 mm, tapering at base. Stamens 25-60; anthers 4-6 mm long; filaments 3.5-6 mm long. Ovary 6-10; styles 10-15 mm long. Fruits of 2-4 drupelets, ca 9 × 7 mm.

Raigarh. Fl. & Fr.: March-April.

2. *Ochna obtusata* DC., in Ann. Mus. Paris 17: 411. 1811. *O. squarrosa* (non L. 1762); Bennett in Hook. f., Fl. Brit. Ind. 1: 523. 1875.

Shrubs or small trees. Leaves chartaceous or subcoriaceous, oblong-lanceolate or elliptic-obovate, 4-11 × 2.5-4.5 cm, not waxy, acute to acuminate at apex, acute to attenuate at base, margin finely denticulate; petioles ca 5 mm. Inflorescence a compound cyme, many flowered, on up to 2 cm long peduncle; pedicels up to 2.5 cm long; bracts many, distichously conferted, caducous, leaving a broad annulus of scars. Sepals oblong, ca 15 × 8 mm. Petals 5 (-10), golden-yellow, obovate, ca 25 × 1 mm. Stamens up to 60; filaments ca 4 mm long; anthers ca 8 mm long. Ovary 10-lobed; style

up to 1.5 cm long. Drupes 3-10-lobed; lobes ovoid, up to 1 cm long.

Balaghat, Bastar, Bilaspur, Raigarh, Raipur, Satna, *Fl. & Fr.*: April-June.

var. *gamblei* (King ex Brandis) Kanis in *Blumea* 16: 34. 1968. *O. gamblei* King ex Brandis, *Ind. Trees* 128. 1906. *O. beddomei* Gamble in *Bull. Misc. Inform.* 34. 1916.

Shrubs or small trees with slightly succulent appearance. Leaves waxy, whitish or glaucous, coriaceous, apically clustered on branchlets. Inflorescence cymosely paniculate, extra axillary, many-flowered, on short 1-2 cm long peduncles. Petals 5 (-8), ca 15 × 4 mm. Stamens up to 70, filaments 6-7 mm long. Drupes 10-lobed, ca 1.5 × 1 cm.

Raigarh. *Fl. & Fr.*: March-June.

var. *pumila* (Buch.-Ham. ex DC.) Kanis in *Blumea* 16: 34. 1968. *O. pumila* Buch.-Ham. ex DC., *Prodr.* 1: 736. 1824; Bennett in Hook. *f., l.c.* 524. -*Simalkanta*.

Undershrubs with slender stem, up to 60 cm tall, sprouting yearly from tuberous roots. Leaves obtuse to acute at apex, acute at base, margins faintly but distinctly denticulate, herbaceous or chartaceous. Inflorescence a 2-3-flowered simple cyme, on 3-8 cm long peduncle without annulus; pedicels up to 4 cm long. Flowers ca 2 cm in diam. Sepals spreading, deep red in fruits. Petals ca 14 mm long. Stamens 70-120; anthers 2.5-4 mm long, almost equal to filaments or slightly longer. Drupes 4-6 lobed.

Balaghat, Bilaspur, Mandla, Raigarh. *Fl. & Fr.*: April-July. Roots medicinal.

39. BURSERACEAE

(R. C. Srivastava)

A family of about 16 genera & nearly 200 species distributed in tropics; 3 genera and 3 species reported from Madhya Pradesh.

- | | |
|---|------------------------|
| 1a. Leaf rachis winged. Ovary 2-celled. Cultivated | ...2. <i>Bursera</i> |
| 1b. Leaf rachis not winged. Ovary 3-5-celled. Wild: | |
| 2a. Bark peeling off in thin flakes; fruit 3-lobed drupe; hypanthium absent | ...1. <i>Boswellia</i> |
| 2b. Bark not peeling; fruit entire; hypanthium present | ...3. <i>Caruga</i> |

1. BOSWELLIA Roxb. ex Colebr.

Deciduous trees with papery bark. Flowers pentamerous. Calyx toothed. Stamens dimorphic, free, disc annular. Ovary 3-locular. Drupe

trigonous, 3-valved; pyrenes falling from the persistent trigonous axis. Seeds flattened with winged margins.

About 24 species in tropical Africa, Madagascar & tropical Asia; one in M.P.

Boswellia serrata Roxb. ex Colebr. in *Asiat. Res.* 9: 379, t. 5. 1807; Hook. f., *Fl. Brit. Ind.* 1: 528. 1875. -*Salai. Saliha.*

Trees; bark greenish-grey, smooth. Leaves crowded at the ends of branches, pubescent, rachis stout; leaflets opposite, 19-23, sessile, 4-9 x 1.5-2 cm, variable in shape, coarsely serrate, unequal sided, acute. Flowers small, in axillary racemes. Calyx pubescent outside, 5-7 cleft, persistent. Disc annular, red, crenate. Petals 5-7, imbricate, ovate, inflexed, white. Stamens 10, anthers hairy. Ovary 3-celled, surrounded by disc; style grooved; stigma 4-5-lobed. Drupes 1-2 cm long, green, smooth.

Bhopal, Durg, Raigarh, Raipur, Rewa, Seoni, Shahdol, Surguja. Fl. & Fr.: Feb.-April.

Wood used as fuel and for manufacture of paper and packing cases; gum used in medicine.

2. BURSERA Jacq. ex L.

Trees. Leaves imparipinnate. Panicles axillary or terminal. Flowers bisexual, sometimes polygamous. Sepals and petals 4-6; disc annular, crenate. Stamens double the number of petals. Ovary 3-5-celled; ovules 2 in each cell. Fruit a drupe with 3-5 stones.

About 80 species mostly in tropical America; one in M.P.

Bursera serrata Wall. ex Colebr. in *Trans. Linn. Soc.* 15: 361. t.4. 1827; Bennett in Hook. f., *Fl. Brit. Ind.* 1: 528. 1875. *Lindwi.*

Medium trees with greyish bark and brown blaze. Leaves 15 x 30 cm long; leaflets oblong, shortly petiolulate, 7-15 cm long, entire or distantly serrulate. Flowers in lax axillary panicles, green, ca 3 mm across. Fruits globose, 1-2 cm across, red.

Raipur. Fr.: June.

3. GARUGA Roxb.

Deciduous trees. Leaflets often stipulate, crenate-serrate. Inflorescence crowded. Flowers polygamous, 5-merous. Calyx lobed, campanulate, pubescent. Petals inserted above mid-hypanthium. Ovary sessile, 4-locular; style elongate. Drupe globose, fleshy with 1-5 rugose, 1-seeded pyrenes.

About 4 species, from Himalayas to S. China, S. E. Asia, N.E. Australia & Pacific; one in M.P.

Garuga pinnata Roxb., Pl. Corom. t. 208. 1811; Bennett in Hook.f., Fl. Brit. Ind. 1: 528. 1875. -*Kekad*.

Large trees with dark grey bark. Leaflets more than 10, subsessile, lanceolate or ovate, acuminate, oblique, crenate. Flowers yellow, in much branched axillary large terminal tomentose panicles. Calyx campanulate, green, pubescent, cleft almost halfway; lobes ovate-oblong, subobtuse. Petals 5, linear, valvate, inflexed. Disc large, clothing the calyx tube, crenate. Stamens 10; filaments hairy. Ovary 4-5-celled; style long, stout, hairy; stigma capitate, 5-lobed. Drupes fleshy, smooth, globose; pyrenes 1-3, bony. Seeds with a membranous wing.

Bastar, Bhopal, Bilaspur, Mandla, Raigarh, Raipur, Seoni. Fl. & Fr. : Feb.-June.

Fruits edible; foliage used as fodder; bark used for tanning; wood for fuel and packing.

40. MELIACEAE

(R. C. Srivastava)

About 50 genera and over 800 species, mainly tropical; 8 genera and 9 species in M.P.

- 1a. Ovules many in each cell; seeds winged:
 - 2a. Stamens united to form a tube ... 7. *Toona*
 - 2b. Stamens free:
 - 3a. Anthers between the teeth of the staminal tube ... 5. *Swietenia*
 - 3b. Anthers between the two teeth of nearly free lobes of the tube ... 6. *Soyimida*
- 1b. Ovules 1-2 in each cell; seeds not winged:
 - 4a. Leaflets toothed; petals spreading:
 - 5a. Fruits drupaceous; staminal tube oblong:
 - 6a. Leaves 1-pinnate ... 2. *Azadirachta*
 - 6b. Leaves 2-3-pinnate ... 4. *Melia*
 - 5b. Fruits nearly dry, 5-gonous; staminal tube very short ... 3. *Cipadessa*
 - 4b. Leaflets entire; petals erect or sub-erect:
 - 7a. Leaflets 3-7 ... 1. *Aglaia*
 - 7b. Leaflets 5-11 ... 8. *Trichilia*

1. **AGLAIA** Lour.

Evergreen trees. Flowers bisexual or polygamo-dioecious, (4-) 5-merous. Petals free or shortly adnate to staminal tube. Disc obscure. Stamens 5-10; staminal column short, globose, entire or dentate. Ovary 1-3 locular; stigma subcapitate, sessile. Berry 1-3-seeded with a coriaceous pericarp.

About 250 species, chiefly Indo-Malayan; one in M.P.

Aglaia elaeagnoidea (Juss.) Benth., Fl. Austral. 1: 383. 1863. *Nemeda elaeagnoidea* A. Juss., Mem. Mus. Hist. Nat. Paris 19: 259, t. 14. 1830. *A. roxburghiana* (Wt. & Arn.) Miq., Ann. Mus. Lugd. Bat. 4: 41. 1868; Hiern in Hook. f., Fl. Brit. Ind. 1: 555. 1875. *Milnea roxburghiana* (Miq.) Wt. & Arn., Prodr. Fl. Ind. Orient. 119. 1834.

Trees. Leaflets, oblong-lanceolate, 7.5-10 × 2-3.5 cm, rounded at base, drying brown beneath. Inflorescence rufous-scaly. Calyx scaly. Petals erect, oblong, ca 1.5 × 1 mm. Berry globose to sub-globose, ferruginous; seeds ex-arillate.

Bastar. Fl. & Fr. : Dec.-Feb.

2. **AZADIRACHTA** A. Juss.

Trees. Leaves pinnate; leaflets serrate, oblique. Panicles axillary. Flowers 5-merous; staminal tube 10-fid at tip, disc annular. Ovary 3-celled. Drupe pulpy, cylindric; seed solitary, ex-arillate.

Two species, Indo-Malayan; one in M.P.

Azadirachta indica A. Juss. in Mem. Mus. Hist. Nat. Paris 19. 220. t. 2, f. 5. 1830. *Melia azadirachta* L., Sp. Pl. 385. 1753; Hiern in Hook. f., Fl. Brit. Ind. 1: 544. 1875. *Nem.*

Trees. Leaves up to 30 cm long; leaflets 5-13, obliquely lanceolate, 3-7 × 1-3 cm, acuminate at apex, cuneate at base, dentate at margins. Panicles up to 30 cm long. Flowers white, ca 10 mm across. Calyx 5-fid, lobes ovate. Petals oblanceolate, ca 5 mm across. Staminal tube dilated above. Fruits baccate, 1-seeded, pulpy, green when young, yellow when ripe.

Almost throughout the State, commonly planted. Fl. & Fr. : April-June.

Twigs used as tooth brush; all parts medicinally useful.

3. **CIPADESSA** Bl.

Shrubs or small trees. Leaves odd-pinnate, opposite or sub-opposite leaflets axillary or extra-axillary. Flowers subglobose. Petals 5, oblong,

spreading, valvate. Staminal tube deeply 10-lobed, lobes linear, loosely cohering, forked, anthers short in the forks. Disc shortly cupular, adnate to base of the staminal tube. Ovary 5-celled. Fruits scarcely fleshy, 5-gonous.

About 5 species in Madagascar to Indo-Malayan region; one in M.P.

Cipadessa baccifera (Roth) Miq., Ann. Mus. Lug. -Bat. 4: 6. 1868-1869.
Melia baccifera Roth, Nov. Pl. Sp. 215. 1821. *Cipadessa fruticosa* Bl., Bijdr. 162. 1825; Hiern in Hook. f., Fl. Brit. Ind. 1: 545. 1879.

Shrubs. Leaves odd-pinnate, up to 30 cm long; leaflets 7-11 pairs, 5-10 cm long, entire, serrate or gashed on margins, usually hairy beneath. Panicles 7-11 cm long. Flowers ca 3 mm across, white. Sepals ciliate. Berries grooved, ca 4 mm in diam.

Bastar, Damoh, Raigarh, Raipur. Fl. & Fr. : May- Oct.

4. MELIA L.

Trees. Leaves 2-3-pinnate; leaflets crenate or entire. Panicles axillary. Flowers 5-6 merous. Petals free or adnate to the staminal tube. Staminal tube 10-12 fid at apex; disc cupular, fleshy. Ovary 4-8-celled. Drupe ellipsoid, pulpy, usually 5-celled.

About 15 species, tropical; 2 in M.P.

- 1a. Leaves 2-pinnate; flowers white; fruits more than 15 mm long ... 2. *M. dubia*
1b. Leaves 3-pinnate; flowers lilac; fruits less than 15 mm long ... 1. *M. azedarach*

Melia azedarach L., Sp. Pl. 384. 1753; Hiern in Hook. f., Fl. Brit. Ind. 1: 544. 1875. -*Bakain*.

Medium sized trees. Leaves bi- or tri-pinnate, 30-80 cm long; leaflets 2.5-5 × 1.2-2 cm, ovate-lanceolate, oblanceolate, or elliptic-lanceolate, acuminate at apex, bases cuneate, oblique, serrate to entire at margins. Flowers ca 15 mm across, purple. Calyx minute. Petals white, ca 7 mm long, deflexed. Staminal tube purple. Drupes fleshy, yellow when ripe, 1-seeded.

Usually planted throughout M.P. Fl. & Fr. : April.

Melia dubia Cav., Diss. 7: 364. 1789; Hiern, in Hook. f., Fl. Brit. Ind. 1: 545. 1875. *M. composita* Willd., Sp. Pl. 509. 1799. *Garuga*.

Trees ca 25 m tall, crown large, oval, dark, blackish with grey patches. Leaves 30-60 cm long, 2-pinnate; leaflets 3-6 × 1.5-3 cm, ovate-lanceolate to ovate-rounded, acuminate, serrate to entire, bases oblique. Panicles 12-18 cm long. Flowers 6-8 mm across, white. Calyx 5-partite. Petals linear with white dots. Drupes 1-6-seeded.

Bastar, Cuna (SFRI). *Fl. & Fr.* : March-April.

5. SOYMIDA Juss.

Trees. Leaves paripinnate. Flowers in axillary and terminal panicles. Petals 5, obovate, clawed, spreading. Staminal tube cupular, 10-cleft or sometimes stamens nearly free and spreading; lobes fleshy, apex minutely 2-lobed with the anther in the sinus. Disc flat. Ovary 5-celled; style short; stigma large, capitate. Capsule 5-valved, woody; seeds numerous.

A monotypic Indo-Malayan genus with its only species also found in M.P.

Soymida febrifuga (Roxb.) A. Juss. in Mem. Mus. Hist. Nat. Paris 19: 251, t. 22, f. 26. 1832. *Swietenia febrifuga* Roxb., Bot. Desr. Swietenia: 1. 1793 et. in Med. Facts. Obs. 6: 129. 1795. et in Pl. Corom. t. 17. 1795. *Rohan*.

Trees. Leaves clustered at the tips of branches, paripinnate, up to 40 cm long; rachis and midrib red; leaflets 3-6 pairs, obliquely elliptic, 5-10 cm long. Flowers in large terminal panicles, ca 8 mm across, white. Fruits pendulous, 5-8 cm long, 5-valved.

Bastar, Bilaspur, Jabalpur, Raigarh, Raipur, Surguja. *Fl. & Fr.* : March-May.

6. SWIETENIA Jacq.

Trees. Leaves even-pinnate, leaflets (sub-) opposite. Panicles axillary. Flowers 5-merous, bisexual. Calyx tube shallowly 5-lobed, lobes suborbicular or ovate, imbricate. Petals 5, contorted. Disc annular. Staminal tube urceolate, 10-lobed. Ovary 5-celled, ovules many per cell; style attenuate; stigma peltate. Capsule woody, oblong-globose, 5-celled. Seeds with an elongate wing.

About 7 species in tropical America & West Indies; one in M.P.

Swietenia mahagoni Jacq., Enum. Pl. Carib. 20. 1760. -*Small leaved Mahogany*.

Evergreen profusely branched trees. Leaves pari-pinnate; leaflets 3-4 pairs, obliquely ovate or lanceolate, entire, glabrous. Flowers greenish-yellow in axillary panicles. Sepals 5, very small, Petals 5. Stamens 10. Ovary arising from the scarlet disc; style short; stigma umbrella like. Fruits ovoid large, hard woody. Seeds winged.

Sometimes planted. Bhopal (*Oommachan, 1977*). *Fl. & Fr.* : April-May.

7. TOONA (Endl.) Roem.

Trees. Leaves pinnate; leaflets opposite or sub-opposite, entire or

serrate. Panicles axillary. Flowers 4-5 merous. Petals attached to the disc. Stamens 5, free, included, inserted on the annular lobed disc. Ovary 5-celled. Capsules woody, 5-valved. Seeds winged.

About 6 species in tropics and subtropics; one in M.P.

Toona ciliata Roem., Syn. Hesper. 139. 1846. *Cedrela toona* Roxb. ex Rottl., Ges. Nat. Fr. Berlin Neue Schr. 2: 198. 1803; Hiern in Hook. f., Fl. Brit. Ind. 1: 568. 1875.

Trees up to 40 m tall. Leaves even-or odd-pinnate, 30-75 cm long; leaflets obliquely ovate-or oblong-lanceolate, 6-15 cm long, acuminate at apex, entire or undulate, glabrous, base obtuse, cuneate. Flowers in suberect panicles, ca 7 mm across, white. Calyx minutely lobed or sub-entire. Petals white, oblong, erect or suberect. Filaments hairy. Disc orange-red. Stigma free. Capsules ellipsoid up to 2.5 cm long, 5-valved. Seeds brown, membranous, winged at both ends.

Hoshangabad, Mandla, Raigarh, Rajnandgaon, Surguja. Fl. & Fr. : March-April.

8. TRICHILIA P. Br.

Trees or shrubs. Leaves pinnate; leaflets opposite, entire. Inflorescence a corymbose panicle. Flowers 4-5 merous. Stamens united half way with anthers at the notches. Disc fleshy, cupular. Ovary 2-3-celled, immersed in disc. Capsules 2-valved, 1-seeded.

About 200 species in tropics, mostly African and American; one in M.P.

Trichilia connaroides (Wt. & Arn.) Benth. in Acta Bot. Neerl. 11: 13. 1962. *Zanthoxylum connaroides* Wt. & Arn., Prodr. 148. 1834. *Heynea trijuga* Roxb. ex Sims in Curtis, Bot. Mag. 41. t. 1738. 1815; Hiern in Hook. f., Fl. Brit. Ind. 1: 565. 1875.

Trees up to 10 m tall. Leaves 25-45 cm long; leaflets 5-11, ovate-oblong or ovate-lanceolate, 6-17 × 2-7 cm, oblique, entire, acuminate at apex, entire, subacute at base, glaucous beneath. Cymes corymbosely paniculate. Flowers minute, ca 3 mm across, white. Capsules ca 1 cm across, 1-celled, 1-seeded.

Raigarh. Fl. & Fr. : March-Dec.

41. OLACACEAE

(A. K. Tripathi)

About 25 genera and 250 species, mainly in tropical Africa, Asia and

America; one genus and 2 species in M.P.

OLAX L.

Shrubs or trees, often scandent, sometimes armed. Leaves alternate, simple petioled. Flowers small, bisexual, in axillary simple or branched racemes, minutely bracteate. Calyx minute, cup-shaped, truncate or obscurely toothed, accrescent. Petals 4-6, hypogynous, valvate, free or slightly connate at base. Fertile stamens 3, opposite to the petals and attached to their bases; anthers adnate to the filaments, oblong, 2-celled, dehiscing longitudinally. Staminodes 5-6, opposite to petals. Ovary free, usually surrounded by a cup-shaped disc, more or less 3-celled below, 1-celled above; ovules 3, linear, pendulous; style simple, terminal; stigma 3-lobed. Fruit a small drupe, globose or oblong, more or less covered by the accrescent fleshy calyx; stone crustaceous, 1-celled, 1-seeded. Seed inverted; albumen fleshy; embryo minute, apical.

About 25-30 species confined to old World tropics and a few in Australia; 2 in M.P.

- 1a. Undershrubs, unarmed, with short erect woody root-stocks and herbaceous branches; flower solitary ... 1. *O. nana*
 1b. Shrubs with thorns on old wood, usually scandent, with woody twigs, flower in racemes ... 2. *O. scandens*

1. *Olax nana* Wall. ex Benth. in Trans. Linn. Soc. 18: 678. 1838-1841; Mast. in Hook. f., Fl. Brit. Ind. 1: 576. 1875.

A low undershrub, with woody rootstock, up to 60 cm high. Leaves subsessile, narrowly oblong-lanceolate, obtuse, glabrous, base usually acute, 2.5-5.5 × 0.5-1.5 cm; midrib strong. Flowers white, solitary, axillary, 0.5-1.5 cm long; pedicels slender, 0.5-1.5 cm long. Calyx minute, free, cup-shaped, truncate or obscurely lobed. Petals 3, oblong-obovate, rounded at apex. Stamens 3, in the centre of each petal; filaments white; anthers yellow. Staminodes 3, white, bifid. Ovary ovoid; style shorter than the stamens. Fruit globose, up to 0.75 cm long, apiculate, deep yellow when ripe, 1-seeded.

Balaghat. Fl. & Fr. : Feb.-June.

2. *Olax scandens* Roxb., Pl. Corom. 3: 2, t. 102. 1798 et Fl. Ind. 1: 163. 1832; Mast. in Hook. f., Fl. Brit. Ind. 1: 575. 1875.

Scandent, much-branched shrubs, often prickly, up to 7 m long. Leaves ovate-oblong or oblong-lanceolate, 6.5-12 × 2.5-3.5 cm long, usually obtuse, glabrous above, glabrous or pubescent beneath, base narrowed; petioles ca 7.5 mm long; lateral nerves 5 pairs, faint. Flowers white, ca 5 mm long, fragrant, in axillary racemes which are shorter than the leaves;

pedicels short. Calyx cup-shaped, truncate, ciliate. Petals 3, 5 or 6, linear, acute, more or less connate. Stamens 3; staminodes bifid. Ovary ovoid, glabrous; style about half as long as the petals; stigma 3-lobed. Drupe ovoid or globose, up to 1 cm long, almost covered by the calyx.

Balaghat, Bastar, Bilaspur, Durg, Jabalpur, Raigarh, Raipur, Rajnandgaon, Seoni, Sidhi. *Fl. & Fr.* : April- Oct.

42. OPILIAEAE

(Anand Kumar)

A family of about 8 genera and 60 species mainly distributed in tropical Asia. Two genera and 2 species occur in Madhya Pradesh.

- 1a. Flowers sessile; petals united ... 1. *Cansjera*
 1b. Flowers pedicelled; petals free ... 2. *Opilia*

1. CANSJERA A.L. Juss.

Climbing or scandent shrubs. Leaves simple, alternate, exstipulate, penninerved. Flowers in short axillary spikes or fascicles. Flowers regular, bracteate. Calyx minute, 4-lobed. Corolla tubular or urceolate, 4-5-lobed. Stamens 4-5, opposite the petals; filaments subequalling the corolla tube. Disc 4-5-lobed; lobes ovate-triangular. Ovary superior, 1-celled; stigma 4-lobed; ovule 1, pendulous. Fruit drupaceous.

A genus of about 5 species confined to tropical Asia and Australia. One species occurs in Madhya Pradesh.

Cansjera rheedii Gmel., Syst. 1: 280. 1791; Mast. in Hook. *f.*, Fl. Brit. Ind. 1: 582. 1875.

Climbing shrubs, usually armed; bark light brown. Leaves alternate, opaque, ovate-lanceolate, acuminate, 2.5-8 × 1.5-3.5 cm, often oblique at the base. Flowers sessile, 2-3 mm long, in 1-2.5 cm long axillary pubescent spikes. Corolla urceolate, white, pubescent outside; lobes 4-5, triangular, recurved. Stamens as many as the corolla lobes. Drupes ovoid-ellipsoid, 8-12 mm long, green becoming scarlet on ripening, 1-seeded.

In dry deciduous forests. Bastar (CAL). *Fl. & Fr.* : Jan.-May.

2. OPILIA Roxb.

Shrubs, usually scandent. Leaves alternate, simple, penninerved. Flowers in fascicles on axillary racemes; bracts large, deciduous, concealing the flowers in bud. Calyx annular, obscurely 5-lobed. Petals 5, valvate. Disc glands 5, alternating with the petals; filaments slender, exceeding the petals. Ovary oblong; style very short; ovule solitary, pendulous. Fruit drupaceous.

A genus with about 22 species palaeotropical in distribution. One species occurs in Madhya Pradesh.

Opilia amentacea Roxb., Pl. Corom. t. 158. 1802; Mast. in Hook. f., Fl. Brit. Ind. 1: 583. 1875.

Scandent shrubs, upto 3.5 m high; young branches tomentose. Leaves alternate, ovate-lanceolate, 2.5-7.5 × 2-4 cm, subcoriaceous, acuminate or subacuminate; petioles 2-4 mm long. Flowers cream-coloured, in up to 3 cm long axillary racemes. Petals 4-5, oblong. Stamens 5; filaments slender. Ovary globose; style short or absent. Drupes ovoid, 8-12 mm long, 1-seeded.

In deciduous forests. Bastar (CAL). Fl. & Fr. : April-May.

43. CELASTRACEAE

(K. K. Khanna)

A family of 55 genera and 850 species mainly distributed in tropical and subtropical regions. 3 genera and 7 species are reported from Madhya Pradesh.

- 1a. Leaves opposite or decussate; fruit a drupe ... 1. *Cassine*
- 1b. Leaves alternate or spirally arranged; fruit a capsule:
 - 2a. Unarmed climbing shrub ; ovary free from the disc; ovules with a cup-shaped aril at the base; seeds completely enveloped by the aril ... 2. *Celastrus*
 - 2b. Armed erect shrub or small tree; ovary usually partly immersed in the disk; ovules without arillar cup at the base ; seeds incompletely enveloped by the aril ... 3. *Maytenus*

1. CASSINE L.

Shrubs or trees. Leaves opposite, decussate (rarely alternate), stipulate; stipules small, caducous. Flowers small, bisexual (rarely unisexual), in axillary cymes, 4-5-merous. Calyx lobes and petals imbricate. Stamens 4-5, inserted on or under the margin of the disk. Disk flat, fleshy. Pistil conical or flask-like. Ovary 2-4-celled. Ovules erect, 2 in each cell. Fruit indehiscent drupe. Seeds 1-2, exarillate.

About 40 species in Asia, America, Australia and South Africa; one species in M.P.

Cassine glauca (Rottb.) O. Kuntze, Rev. Gen. Pl. 1: 114. 1891. *Mangifera glauca* Rottb. in Nye Samml. Vid. Selsk. Skrift. 2: 534. 1783. *Elaeodendron glaucum* Pers., Synops. 1: 241. 1805; Lawson in Hook. f., Fl. Brit. Ind. 1: 623. 1875. *E. roxburghii* Wt. & Arn., Prodr. 157. 1834. -*Jamrasi*

A large evergreen tree, up to 5 m high. Leaves simple, opposite, 3-16 × 1.5-7.5 cm, coriaceous, elliptic or obovate, crenate, acuminate, glabrous, dark green at maturity, upper surface shining; undersurface glaucous. Inflorescence an axillary dichotomous cyme. Flowers white or greenish yellow. Sepals 4, green, lobed, margin membranous. Petals 4, cordate, greenish yellow. Stamens 4, inserted on the margin of the disk, recurved; anthers with a 2-lobed connective. Disk fleshy, 3-lobed. Ovary 4-celled, united with the disk; ovules 2 in each cell; style short; stigma 5-lobed. Fruit green, ovoid, a drupe.

Bilaspur, Damoh, Hoshangabad, Panna, Satna, Shivpuri, Surguja. *Fl.*: March-May; *Fr.*: May-Aug.

Wood used for cabinet work.

2. CELASTRUS L.

Scandent deciduous shrubs. Leaves simple, alternate or spirally arranged, petiolate, elliptic-orbicular, dentate or crenate; stipules small. Inflorescence terminal or axillary raceme or panicle. Flowers unisexual, rarely bisexual, 5-merous, small, greenish white. Calyx campanulate. Disk entire or 5-lobed. In male flowers, stamens 4-5, inserted on the margin of the disk; filaments glabrous or papillose; anthers dorsifixed. In female flowers, staminodes 4-5. Ovary 2-4-lobed, free from the disk. Capsule 3-lobed, free from the disk. Capsule 3-celled, subglobose, loculicidally 3-valved. Seeds 1-6, enveloped by fleshy red aril, sticking together.

About 31 species in Asia, Latin America, North America, New-Caledonia, Australia, Fiji and Madagascar; one species in M.P.

Celastrus paniculatus Willd., *Sp. Pl.* 1: 1125. 1797; Lawson in Hook. *f.*, *Fl. Brit. Ind.* 1: 617. 1875.- *Malkangani*, Fig. 31.

An unarmed large woody climber. Leaves simple, alternate, very variable, elliptic, ovate, broadly obovate or sub-orbicular, glabrous, sometimes pubescent beneath along the venation, up to 6 × 11 cm; base cuneate, obtuse, or rounded; apex acute, acuminate or obtuse; margin crenate or serrate. Panicles large, terminal, pubescent. Male flowers minute, pale green. Calyx lobes suborbicular, toothed. Petals oblong or obovate-oblong, entire. Disk cupular. Stamens ca 3 mm long; anthers ovoid, obtuse. Female flowers having sepals, petals and disk similar to those of male flowers. Sterile stamen present. Ovary globose; style short, columnar; stigmas 3. Capsule subglobose, bright yellow, trivalved, 3-6-seeded. Seeds ellipsoid, yellowish brown, enclosed in a red fleshy aril.

Balaghat, Bastar, Bilaspur, Damoh, Durg, Hoshangabad, Panna, Raigarh, Raipur, Rajnandgaon, Satna, Seoni, Shivpuri, Sidhi, Surguja. *Fl.*: March-May; *Fr.*: May-Aug.



Fig. 31. *Celastrus paniculatus* Willd.

An oil of some therapeutic value is extracted from the seeds.

3. MAYTENUS Molina

An armed shrub or small tree; spines terminating in a short shoot. Leaves alternate, exstipulate, shape and texture variable. Inflorescence a dichotomous cyme, axillary or in axillary fascicles, sometimes on the spines. Flowers bisexual. Calyx 4 - 5-lobed. Petals 4-5. Stamens 4-5, inserted on the margin of the disk. Disk fleshy, flat or rounded, lobed. Ovary sunk in the disk, 2-3-celled; ovules 2 in each cell. Style short. Stigma 2-3-lobed or obscure. Fruit a capsule, globose, turbinate or obtriangular, 2- 3-valved, 1-4-seeded. Seeds with aril at the base.

About 200 species distributed mostly in the tropical and subtropical Africa, Asia and Australia; 5 species occur in M.P.

- 1a. Ovary 2-celled; capsule 2-valved, 2-celled, globose
...5. *M. senegalensis*
- 1b. Ovary 3-celled; capsule 3-valved, 3-celled,
obtriangular, ovoid or turbinate:
 - 2a. Leaves ovate-lanceolate, serrate; aril of seed thin
membranous
...4. *M. rufa*
 - 2b. Leaves elliptic to elliptic-ovate, obovate,
subspathulate, crenulate, crenate or entire, sometimes
emarginate; aril of seed fleshy, never membranous:
 - 3a. Leaf margin minutely glandular; capsule
obtriangular, 6-7 mm long x 10 mm broad; seed
ovoid, aril completely covering young seed
...1. *M. bailadillana*
 - 3b. Leaf margin not glandular; capsule subglobose to
turbinate, 8-9 x 10-12 mm; seed clasped, aril at the
base:
 - 4a. Leaves obovate to subspathulate, apex obtuse or
rounded, sometimes emarginate, base attenuate,
margin entire to crenate; flower white; seeds
bright red
...2. *M. emarginata*
 - 4b. Leaves broadly obovate or elliptic, apex rounded
or acuminate, base cuneate, margin crenulate;
flower greenish white; seeds brownish orange
...3. *M. rothiana*

1. *Maytenus bailadillana* (Narayan. & Mooney) Raju & Babu in Bull. Bot. Surv. Ind. 10: 384. 1968. *Gymnosporia bailadillana* Narayan. & Mooney

in J. Ind. Bot. Soc. 20 : 191. 1941.

Shrubs or small trees, up to 7 m; branches with few thorns or sometimes thornless. Leaves simple, 4-9 x 1.5-5 cm, shortly petiolate, elliptic to elliptic-ovate; apex obtuse; base cuneate; margin sometimes minutely glandular, glaucous above. Inflorescence in simple or dichotomous cymes of 2-3 flowers. Flower solitary or sometimes in fascicles of 2-4, bracteate, bracteolate. Sepals 5, broadly ovate, 0.8-1 mm long. Petals 5, 2.5-3 mm long. Stamens 5. Ovary 3-celled. Fruit a loculicidal capsule, obtriangular, 3-lobed. Seeds ovoid; aril covering young seed.

Bastar. Fl.: Oct.-Dec.; Fr.: Jan.-Feb.

2. *Maytenus emarginata* (Willd.) Ding Hou in Fl. Malesiana 1,6:241. 1962. *Celastrus emarginatus* Willd., Sp. Pl. 1,2: 1128. 1798. *Gymnosporia emarginata* Roth, Nov. Pl. Sp. 155. 1821; Lawson in Hook. f., Fl. Brit. Ind. 1: 621. 1875. *Baikal*.

Shrubs, 2-5 m; spines terminating in short shoots and/or axillary. Leaves obovate to subspathulate, coriaceous, 4-10 x 2-6.5 cm; base attenuate; apex obtuse, rounded or emarginate. Cyme simple or fascicled at the leaf axil, occasionally on the spines. Flowers white. Sepals lobes deltoid. Petals obovate-oblong. Stamens attached on the disk margin or slightly beneath. Ovary 3-celled, semi-immersed; style short, cylindrical, never cleft; stigma 3, reflexed. Fruit 3-valved, turbinate, obovoid or subglobose, 5 - 10 x 4-8 mm. Seeds red, ellipsoid; aril white, fleshy.

Rewa, Seoni. Fl.: Oct.-Jan.; Fr.: Dec.-April.

3. *Maytenus rothiana* (Lawson) D. Lobreau-Callen in Adansonia Ser. 15: 223. 1975. *Gymnosporia rothiana* Lawson in Hook. f., Fl. Brit. Ind. 1: 620. 1875. *Celastrus rothiana* Wt. & Arn., Prodr. Fl. Pen. Ind. Ori. 1: 159. 1834, *nom. illeg.* *Maytenus wightiana* Babu in Bull. Bot. Surv. India 10: 349. 1969.

Large shrubs or small trees. Armed with long straight thorns. Leaves coriaceous, elliptic or obovate, 7.5-10x3-5.5 cm; apex rounded or acuminate; base cuneate, glabrous, crenulate. Flowers greenish white in short peduncled or subsessile cyme or in fascicles. Stamens shorter than petals, inserted below the disk at alternate sinuses. Disk roughly 10-lobed. Ovary glabrous; style short, subcylindric; stigma 3, as long as the style, spreading. Fruit bright red, 3-lobed. Seeds brownish orange, shining, ellipsoid with a basal aril.

Shivpuri. Fl.: April-June; Fr.: June-July.

4. *Maytenus rufa* (Wall.) Hara in J. Jap. Bot. 40: 327. 1965. *Celastrus*

rufa Wall. in Roxb., Fl. Ind. 2: 397. 1824. *Gymnosporia rufa* Lawson in Hook. f., Fl. Brit. Ind. 1: 620. 1875.

An armed branching tree; spines slender. Leaves lanceolate, acuminate, 4-10×2-4 cm, serrate, often green above, pale beneath, subcoriaceous, glabrous. Cymes dichotomously branched or fascicled. Flowers pale brown, small. Fruits obovoid or obtriangular, 3-celled, pale-yellow inside; cells 1-seeded. Seeds black; aril thin, membranous.

Shivpuri. Fl.: March-April; Fr.: Nov.-Dec.

5. *Maytenus senegalensis* (Lamk.) Exell. in Bol. Soc. Brot., Ser. 2, 26: 223. 1952. *Celastrus senegalensis* Lamk., Encycl. 1:661. 1783. *Gymnosporia montana* (Roth) Benth., Fl. Austral. 1:400. 1863; Lawson in Hook. f., Fl. Brit. Ind. 1: 621. 1875. *Celastrus montanus* Roth in Roem. & Schult. in L., Syst. Veg. ed. nov. 5: 427. 1819. *Gymnosporia senegalensis* (Lamk.) Loes. in Engl. & Prantl, Pflanzenfam. 3, 5: 207. 1892.- *Kakera*.

Erect armed shrubs or small trees; spines bearing leaves and flowers. Leaves glabrous, coriaceous, obovate, oblanceolate or linear spathulate, entire or crenulate, apex obtuse, base decurrent, 3.5-7.5×2-6 cm. Cymes dichotomously branched or fascicled. Flowers small, white, axillary. Bracts small, lanceolate. Calyx lobes ciliate. Petals 5, oblong. Disk many-lobed, fleshy. Stamens 5; filament attached beneath the margin of the disk. Ovary glabrous, orbicular, 2-celled; style deeply 2-3-cleft. Capsules globose, 2-valved, 2-celled, never 3-valved, purple. Seeds rugose, chestnut brown, arillode orange.

Bastar, Panna. Fl.: Oct.-Dec.; Fr.: Nov.-March.

44. RHAMNACEAE

(K. K. Khanna)

A family of 58 genera and about 900 species distributed in tropical and temperate regions. Five genera and 12 species are reported from Madhya Pradesh.

1a. Plants with tendrils; fruiting calyx epigynous:

2a. Flowers in paniculate spikes or racemes ...1. *Gouania*

2b. Flowers in peduncled cymose umbels ...2. *Helinus*

1b. Plants without tendrils; fruiting calyx hypogynous or perigynous:

3a. Plants with stipular prickles; leaves oblique at base,
3-5 nerved at the base ...5. *Ziziphus*

3b. Plants without stipular prickles; leaves symmetrical at

base, without basal nerves:

- 4a. Climbing shrubs; fruit a samara ...4. *Ventilago*
- 4b. Erect shrubs; fruit a berry like drupe ...3. *Rhamnus*

1. **GOUANIA** Jacq.

Unarmed climbing shrubs. Branchlets often modified into tendrils. Leaves alternate, petiolate; stipules deciduous. Flowers in axillary or terminal spikes or racemes which are sometimes paniced. Calyx superior; tube short, 5-fid. Petals 5, inserted below the margin of the disk. Stamens 5, enclosed within the petals. Disk filling the calyx tube, with 3 processes alternating with the stamens. Ovary sunk in the disk, 3-celled; style 3-cleft. Fruit coriaceous, inferior, crowned with persistent limb in the calyx, boldly 3-angled or 3-winged.

About 70 species of pantropical distribution; one species in M.P.

Gouania liliaefolia Lamk., *Encycl.* 3: 6. 1789. *Gouania leptostachya* DC., *Prodr.* 2: 40. 1825; Lawson in Hook.f., *Fl. Brit. Ind.* 1: 643. 1875. *Retinaria scandens* Gaertn., *Fruct.* 2: 187. t. 120. f. 4. 1791. *Gouania retinaria* DC., *Prodr.* 2: 40. 1825.- *Rakta, Pitchali.*

Shrubs, climbing by tendrils at the end of branchlets, unarmed, young parts and inflorescences pubescent. Leaves 4- 6x 3-4.5 cm, alternate, ovate or ovate-elliptic, crenate, acuminate; base subcordate or rounded; petiole short. Flowers minute, white. Calyx superior, 5-fid. Disk 5-angled. Petals 5. Stamens 5. Ovary 3-celled; style 3-cleft. Fruit 1-1.5 cm across, 3-seeded, boldly 3-angled or 3-winged; seeds black, compressed.

Bastar. *Fl.*: Aug.-Sept.; *Fr.*: Nov.-Dec.

Leaves are medicinal.

2. **HELINUS** E. Meyer

Unarmed shrubs, climbing by terminal tendrils. Leaves entire, alternate, stipulate; stipules small, deciduous. Flowers small, in umbels on long slender peduncles. Calyx superior, 5-fid; tube short. Disc filling the calyx tube. Petals 5. Stamens 5, opposite the petals. Ovary inferior, 3-ocular; style 3-cleft; stigmas minute, recurved. Fruit coriaceous, inferior, drupaceous, tipped by the persistent calyx teeth, 3-winged and 3-celled; seeds obovate.

A genus of 3 species distributed in Africa and India; one species occurs in M.P.

Helinus lanceolatus Brandis, For. Fl. N.W. & Cent. Ind. 574. 1874;
Lawson in Hook. f., Fl. Brit. Ind. 1: 644. 1875. Fig. 32.

Bright green, slender, unarmed shrubs, climbing by terminal tendrils. Leaves alternate, lanceolate or ovate, 3-9 × 0.8-4 cm, entire, glaucous beneath. Flowers creamy yellow, in peduncled cymose umbel. Stamens on the margin of the disk. Fruits globose, ultimately dehiscent; seeds 3, brown, ca 4 mm long, with fleshy albumen.

Bastar, Hoshangabad, Raigarh, Rajnandgaon, Surguja. Fl.: March-May; Fr.: May-Sept.

3. RHAMNUS L.

Shrubs or trees. Leaves petiolate, alternate; stipules small, nonpersistent. Flowers axillary, racemose or cymose, bisexual or unisexual. Calyx 4-5-lobed; lobes keeled within; tube turbinate or urceolate. Petals 4-5 or 0. Disc lining the calyx tube. Stamens 4-5; filaments short. Ovary 3-4-celled, free; stigmas obtuse. Fruit a berry like drupe, oblong or globose, dehiscent or indehiscent, girt at the base by calyx tube; seeds solitary, obovoid.

About 160 species in temperate and tropical zones particularly in North America and East Asia; 4 species occur in M.P.

- 1a. Armed shrubs, branches ending in a thorn; flowers 4-merous ...3. *R. virgatus*
- 1b. Unarmed shrubs; flowers 5-merous:
 - 2a. Leaves membranous; petals absent ...1. *R. purpurens*
 - 2b. Leaves subcoriaceous; petals present:
 - 3a. Young branches pubescent; petals emarginate; fruit brownish blue, obovoid ...2. *R. triqueter*
 - 3b. Young branches glabrous; petals apiculate; fruit reddish purple, globose ...4. *R. wightii*

1. **Rhamnus purpurens** Edgew. in Trans. Linn. Soc. 20:44. 1846;
Lawson in Hook. f., Fl. Brit. Ind. 1: 639. 1875.

Deciduous unarmed shrubs. Young shoots minutely puberulous, green at first, afterwards purplish. Leaves alternate, membranous, elliptic-lanceolate, acuminate, serrate. Flowers bisexual, 5-merous, greenish purple, minutely pubescent, in axillary cyme. Calyx cup-shaped. Petals usually absent. Style short, 3-cleft. Fruit a drupe, obovoid or subglobose, green to black; seeds black, heart-shaped.

Bilaspur. Fl.: April-May; Fr.: July-Oct.

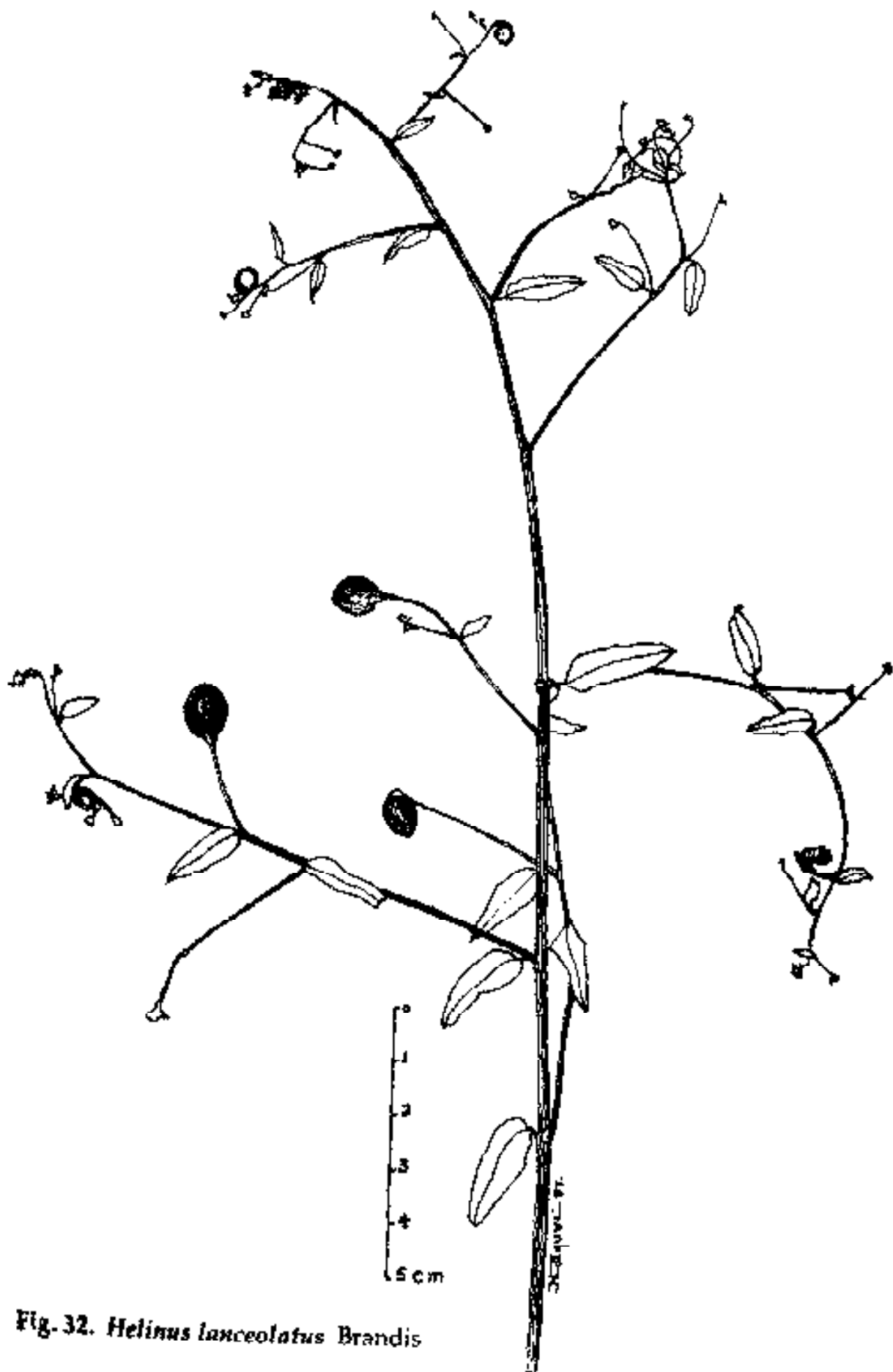


Fig-32. *Helinus lanceolatus* Brandis

Fruit used as purgative.

2. *Rhamnus triqueter* (Wall.) Lawson in Hook. *f.*, Fl. Brit. Ind. 1: 639. 1875. *Ceanothus triquetra* Wall. in Roxb., Fl. Ind. ed. Carey 2: 376. 1824.

Unarmed evergreen shrubs or small trees; young shoots grey tomentose, afterwards ashy grey. Leaves subcoriaceous, minutely pubescent on upper surface, elliptic or elliptic-oblong, 5-12×2-4 cm, serrate, apex acute, base rounded; petiole tomentose. Flowers bisexual, 5-merous, solitary or in cymes which are arranged in axillary racemes, yellowish green, usually with a few small leaves. Calyx lobed, pubescent. Petals clawed, emarginate. Style short. Fruits 3-lobed, obovoid, brownish blue.

Hoshangabad, Surguja. *Fl.*: July-Sept.; *Fr.*: Oct.-Dec.

3. *Rhamnus virgatus* Roxb., Fl. Ind. ed. Carey 2: 351. 1824. *R. dahuricus* Lawson in Hook. *f.*, Fl. Brit. Ind. 1: 639. 1875 (*non* Pall. 1815) *Chadua-Chato*.

Deciduous armed shrubs or small trees; young shoots minutely pubescent. Leaves opposite or fascicled on dwarf shoots, elliptic-lanceolate to broadly ovate, thin, acuminate; base acute; margin crenate-serrate; petiole pubescent. Flowers 4-merous, in axillary clusters, unisexual, green. Calyx-tube campanulate. Petals minute. Style deeply-fid. Fruits obovoid or globose, black; seeds 2-4, dark brown, shining.

Bilaspur. *Fl.*: March-May; *Fr.*: June-Oct.

4. *Rhamnus wightii* Wt. & Arn., Prodr. 164. 1834; Lawson in Hook. *f.*, Fl. Brit. Ind. 1:639. 1875.

Large unarmed glabrous shrubs; young parts often black. Leaves subcoriaceous, elliptic or narrowly elliptic, shortly acuminate, closely serrate, 6-12 × 2.5-5.5 cm. Petals 5, obovate, apiculate. Styles 3-4. Fruit a berry like drupe, globose, reddish purple when ripe.

Hoshangabad. *Fl.* & *Fr.*: Nov.- March.

4. VENTILAGO Gaertn.

Scandent shrubs. Leaves alternate, petiolate, stipulate; stipules very small, caducous. Flowers in terminal axillary panicles, sometimes in fascicles, small. Calyx 5-fid, lobed; lobes spreading, acute, keeled within; tube obconic. Petals 5, deltoid or obcordate. Stamens 5, adnate at the base of the petals. Disk 5-lobed, margin free. Ovary immersed in the disk, 2-locular; style very short; stigmas 2, short. Mature fruit 1-celled, 1-seeded nut, adnate to calyx-tube either at the base or covering more than half of the nut, fruit prolonging into a linear, coriaceous apical wing (samara); seeds subglobose.

About 37 species in tropical regions of Asia, Africa, America, Australia and Pacific islands; one species occurs in M.P.

Ventilago denticulata Willd. in Ges. Naturf. Fr. Neue. Schr. 3: 417. 1801. *V. maderaspata* Roxb., Pl. Corom. 1: 55, t. 76. 1796-98 (non Gaertn. 1788). *V. calyculata* Tulasne in Ann. Sci. Nat. (Ser.4) 8: 124. 1857; Lawson in Hook. f., Fl. Brit. Ind. 1: 631. 1875.- *Keonti*, Lal-Bel. **Fig. 33.**

Extensive climber; branchlets more pubescent. Leaves 6-13 x 3-7.5 cm, elliptic-oblong, more or less ovate and obtuse, rarely acuminate, serrate-crenate; base oblique, rounded or acute; undersurface of young leaves pubescent. Panicles densely pubescent. Flowers green, numerous. Ovary pubescent. Fruit with a linear-oblong 3-5 cm long wing, calyx tube covering more than half of the nut; wing pubescent.

Balaghat, Bastar, Bilaspur, Bori, Chhatarpur, Damoh, Dhar, Durg, Hoshangabad, Indore, Jabalpur, Mandla, Narsimhapur, Raigarh, Raipur, Rajnandgaon, Satna, Sagar, Seoni, Shahdol, Sidhi, Surguja. Fl.: Sept.-Nov.; Fr. : Feb.-April.

Bark yields cordage fibre. Oil from seeds is used in cooking.

5. ZIZIPHUS Mill.

Trees or shrubs, sometimes climbing, armed with straight or recurved spines. Leaves simple, coriaceous, alternate, distichous. Flowers small, greenish, in axillary fascicles or in terminal peduncled cymes. Calyx 5-fid; lobes triangular-ovate, keeled within. Petals 5 or absent, deflexed. Disk flat. Stamens 5, enclosed by the petals. Ovary immersed in the disk and often adnate to it at the base, 2-4-celled; styles 2-4, free or connate. Fruit a fleshy or dry drupe, globose or oblong, with a hard 1-4-celled stone; seeds plano-convex.

About 100 species mainly distributed in tropical Asia and America and in temperate regions of both hemisphere; 6 species and one variety occur in M.P.

- 1a. Branches divaricate, zigzag; spines in pairs, one slender, straight, other short, curved ...3. *Z. nummularia*
- 1b. Plants not as above:
 - 2a. Petals absent; fruit white; stone crustaceous, thin-walled ...5. *Z. rugosa*
 - 2b. Petals present; stone hard, thick:
 - 3a. Flowers fascicled or in axillary sessile cyme:
 - 4a. Straggling; leaves softly pubescent above, pilose beneath; fruit black when ripe ...4. *Z. oenoplia*

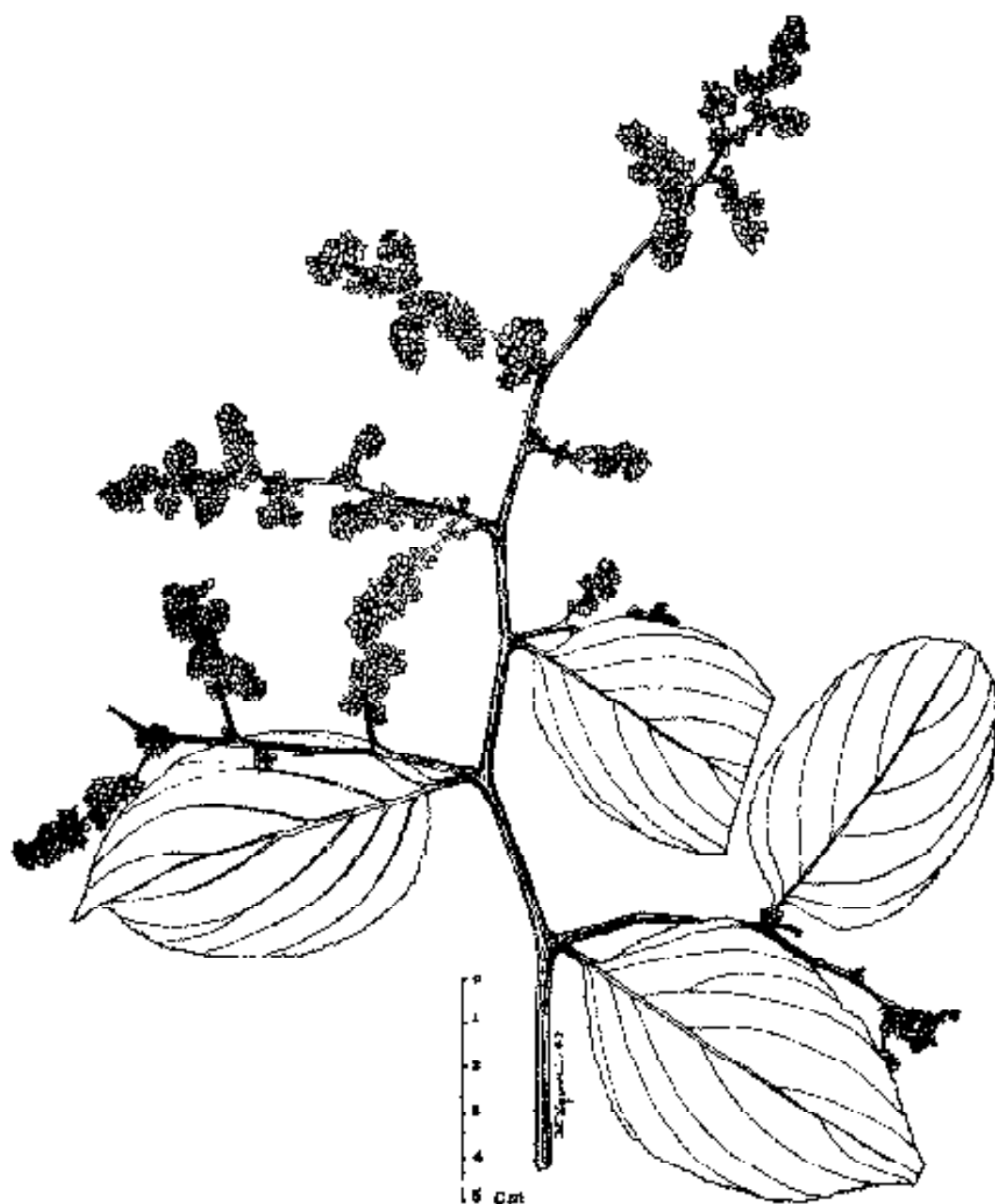


Fig. 33. *Ventilago denticulata* Willd.

- 4b. Erect; leaves glabrous above woolly beneath; fruit orange or red when ripe ...2. *Z. mauritiana*
- 3b. Flowers in peduncled cyme, arranged in large panicles:
- 5a. Stipules filiform, caducous; leaves glabrous; fruit greyish brown to black when ripe ...1. *Z. glaberrima*
- 5b. Stipules modified into prickles; leaves pubescent beneath; fruit green when ripe ...6. *Z. xylopyrus*
1. *Ziziphus glaberrima* (Sedgw.) Santap. in J. Bomb. Nat. Hist. Soc. 51: 803. 1953. *Ziziphus xylopyra* Willd. var. *glaberrima* Sedgw. in Ind. For. 45: 71-72. 1919.

Shrubs, sparsely armed. Leaves glabrous, only primary nerves slightly pubescent, acute, elliptic-oblong, 3-nerved from the base, 4-8×3-4 cm, irregularly denticulate. Stipules filiform, caducous. Inflorescence an axillary cyme on long peduncles. Flowers pale-green. Drupe at first green but greyish brown to black when ripe, globose or ellipsoid, glabrous, woody.

Raipur, Shahdol. *Fl.*: May-June; *Fr.*: June-Aug.

2. *Ziziphus mauritiana* Lamk., *Encycl.* 3: 319. 1789; *Z. jujuba* Lamk., *Encycl.* 3: 318. 1789; Lawson in Hook. *f.*, *Fl. Brit. Ind.* 1: 632, 1875.- *Ber.*

Moderate sized armed trees. Leaves elliptic-ovate or ovate, entire or crenate, rounded, glabrous above, tomentose beneath, shortly petiolate, 4-6 × 3-4 cm. Inflorescence an axillary fasciated cyme. Flowers minute, greenish yellow. Calyx 5-lobed, glabrous within. Petals 5, clawed. Disk 10-lobed. Ovary 2-celled. Drupe single-seeded, globose, red or orange when ripe, ca 1.5 cm diam.

Balaghat, Bilaspur, Damoh, Hoshangabad, Indore, Mandla, Panna, Raigarh, Raipur, Rajnandgaon, Satna, Sagar, Shivpuri, Sidhi, Surguja. *Fl.*: Sept.-Nov.; *Fr.*: Dec.-June.

Fruits are edible.

var. *fruticosa* (Haines) Seb. & Balakr. in Ind. For. 89: 525. 1963; Verma in *Fl. Raipur, Durg & Rajnandgaon* 74. 1985. *Ziziphus jujuba* Lamk. var. *fruticosa* Haines, *For. Fl. Chhota Nagpur* 270. 1910 & *Bot. Bihar & Orissa* 2: 195. 1921.

Armed profusely branched undershrub. Leaves white beneath, pale brown above, 1.5-4.5 × 1.0-2.5 cm. Drupe globose, ca 7 mm diam.

Raipur, Rewa, Sagar. *Fl.*: Aug.; *Fr.*: Oct.

3. *Ziziphus nummularia* (Burm.f.) Wight & Arn., *Prodr.* 162. 1834; Lawson in Hook. *f.*, *Fl. Brit. Ind.* 1: 633. 1875. *Rhamnus nummularia* Burm.f.,

Fl. Ind. 61. 1768. *Ziziphus rotundifolia* Lamk., Encycl. 3: 319. 1789.- *sharberi*.

Small shrubs, up to 2.5 m high; branches divaricate, zigzag. Leaves alternate, obovate, entire, mucronate, tomentose beneath, less tomentose above, 1.2-3 × 0.8-1.5 cm; stipular spines usually in pairs, one slender, straight, other short, curved. Flowers in axillary sessile cyme or fascicle. Calyx pubescent outside; lobes triangular, ovate. Corolla cuneate, rounded at the apex, greenish yellow. Stamens 5; filaments short. Disc 10-lobed. Ovary 2-celled; styles 2, connate at base. Drupe globose, fleshy, orange yellow.

Bilaspur, Hoshangabad, Rajnandgaon, Shivpuri, Sidhi. Fl.: Feb.-April; Fr.: Sept.-Oct.

4. *Ziziphus oenoplia* (L.) Mill., Gard. Dict. ed. 8, 3. 1768; Lawson in Hook. f., Fl. Brit. Ind. 1: 634. 1875. *Rhamnus oenoplia* L., Sp. Pl. 1: 194. 1753. - *Makoya*, *Mokha*. Fig. 34.

A straggling shrub. Leaves alternate, ovate or ovate-lanceolate, bifarious, entire or crenate, obtuse or acute, base oblique, 2-6 × 1-3 cm, minutely pubescent above, silky pubescent beneath; stipular prickles one, recurved. Flowers in paniculate cyme. Calyx tomentose outside; lobes ovate, acute. Corolla hooded, shorter than the calyx lobes, greenish. Stamens 5. Disc 10-lobed, pitted. Ovary 2-celled, sunk in the disk; style 2. Drupe black, small, globose.

Balaghat, Bastar, Bhopal, Damoh, Durg, Gwalior, Hoshangabad, Panna, Raigarh, Raipur, Rajnandgaon, Rewa, Satna, Sagar, Seoni, Shahdol, Shivpuri, Sidhi, Surguja, Tikamgarh. Fl.: May- Aug.; Fr.: Sept.-Oct.

5. *Ziziphus rugosa* Lamk., Encycl. 3: 319. 1789; Lawson in Hook. f., Fl. Brit. Ind. 1: 636. 1875. *Churna*, *Pitondi*.

A large straggling thorny shrub. Leaves ovate or elliptic, serrate, acute, 6-13 × 5-11 cm; prickles one, recurved. Inflorescence a cyme in axillary or terminal panicle. Flowers yellowish green. Calyx pubescent outside; lobes acute. Corolla absent. Disc 5-lobed, pubescent. Ovary 2-celled, hairy; styles 2, connate at the base. Drupe one-seeded, globose or pyriform, white when ripe.

Bastar, Bilaspur, Durg, Hoshangabad, Raigarh, Raipur, Rajnandgaon, Seoni, Sidhi, Surguja. Fl.: March-April; Fr.: April-June.

6. *Ziziphus xylopyrus* (Retz.) Willd., Sp. Pl. 1: 1104. 1797; Lawson in Hook. f., Fl. Brit. Ind. 1: 634. 1875. *Rhamnus xylopyrus* Retz., Obs. Bot. 2: 11. 1781. *GhonL*.

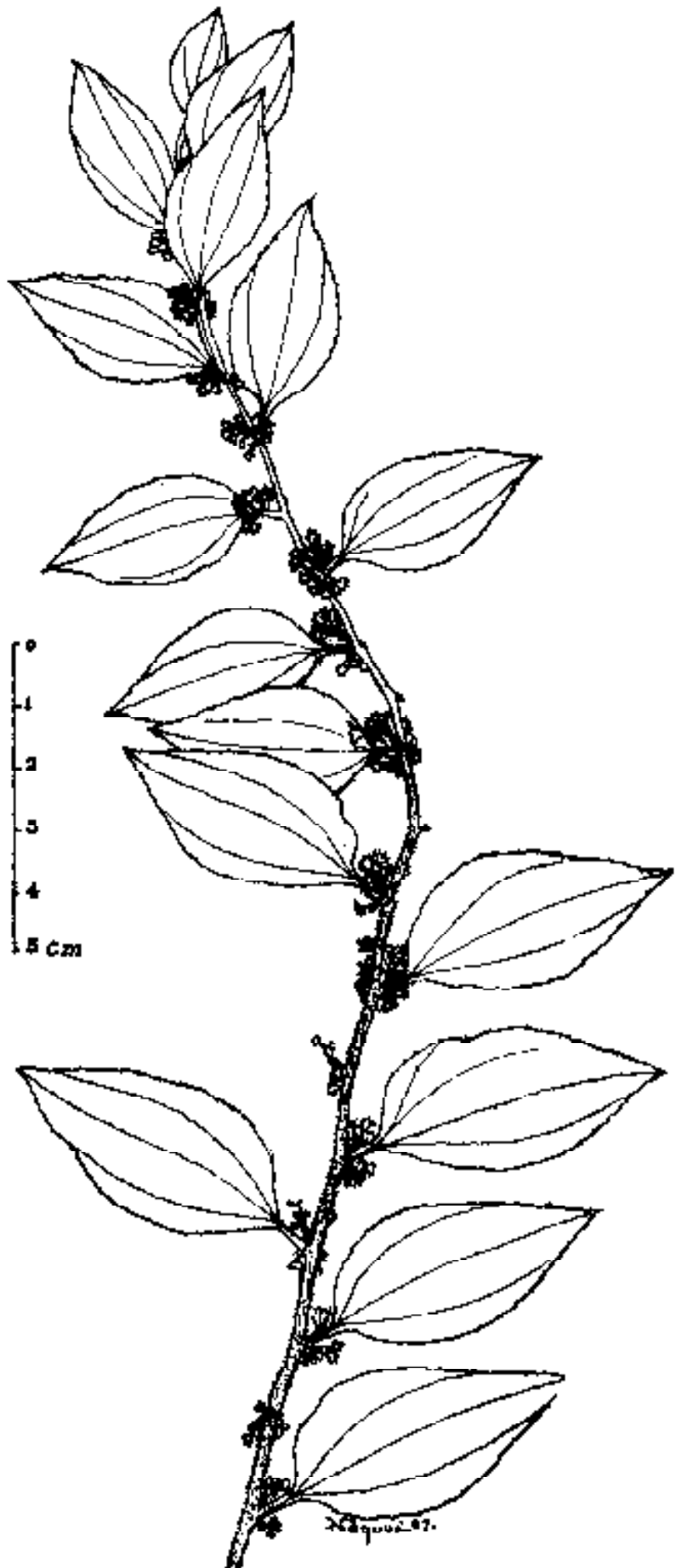


Fig. 34. *Ziziphus oenoptia* (L.) Mill.

Prickly straggling shrub or small tree. Leaves ovate or elliptic, serrulate, rounded at the apex, oblique at the base, 4-9 × 2-6.5 cm, pubescent beneath. Inflorescence a cymose panicle. Calyx pubescent outside. Corolla 5, obovate, small. Disc 10-lobed. Stamens 5. Ovary 3-celled; styles 2-3. Drupe globose, tomentose, green, 1.5-2 cm diam.

Balaghat, Bastar, Bilaspur, Damoh, Durg, Hoshangabad, Mandla, Raigarh, Raipur, Rajnandgaon, Satna, Seoni, Shahdol, Shivpuri, Sidhi, Surguja. *Fl.*: June; *Fr.*: Aug.-Jan.

45. VITACEAE

(K. K. Khanna)

A family of 12 genera and about 700 species widely distributed in the tropics and subtropics, extending into north and south temperate regions; 4 genera and 6 species are reported from M.P.

- 1a. Fruits one seeded ... 3. *Cissus*
- 1b. Fruits 2-4 seeded:
 - 2a. Leaves simple:
 - 3a. Plants dioecious ... 4. *Vitis*
 - 3b. Plants monoecious ... 1. *Ampelocissus*
 - 2b. Leaves compound ... 2. *Cayratia*

I. AMPELOCISSUS Planch.

Climbing shrubs with tendrils on peduncles. Leaves simple, entire or lobed, sometimes digitate or pedate or biternate. Flowers polygamous, monoecious, in leaf opposed pedunculate cymes or thyrses. Calyx cupular, with 4-5 obscure teeth. Petals 4-5, spreading or recurved. Stamens 4-5; filaments slender. Disc annular, erect, 5-10 furrowed. Ovary 2-celled, immersed more or less in the disc, with 2 ovules in each cells; style short, conical. Fruits 2-3-seeded, succulent berries; seeds oblong or obovoid.

A genus of about 95 species in the tropical regions of Asia, Africa, America and Australia; 2 species in M.P.

- 1a. Branches and leaves glabrous on undersurface ... 1. *A. latifolia*
- 1b. Branches and leaves tomentose on undersurface ... 2. *A. tomentosa*

1. *Ampelocissus latifolia* (Roxb.) Planch. in J. Vigne Am. 8: 374. 1884; *Vitis latifolia* Roxb., Fl. Ind. 1: 661. 1820; Lawson in Hook. f., Fl. Brit. Ind. 1: 652. 1875. -*Panibel* Fig. 35.

Extensive glabrous climbers with tuberous rootstock; shoots glaucous, slender. Leaves 3-7 angled or lobed, cordate, crenate-dentate, 10-20 cm long

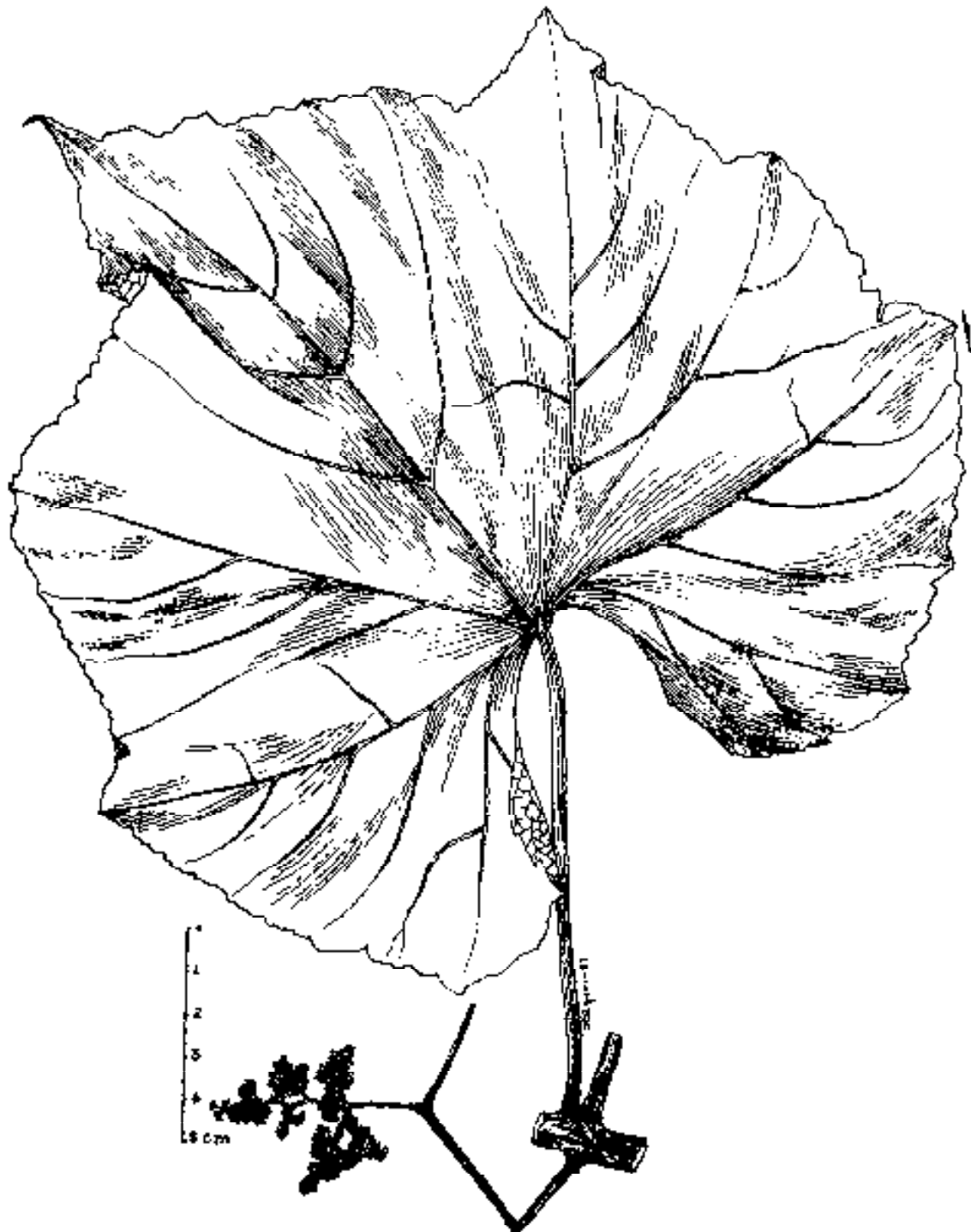


Fig. 35. *Ampelocissus latifolia* (Roxb.) Planch.

and equally broad. Flowers in cymes, usually during the leafless condition of the plant, deep red. Petals *ca* 1.5 mm long. Berries *ca* 8 mm diam., black, succulent, sweet.

Balaghat, Bastar, Bilaspur, Damoh, Dhar, Hoshangabad, Mandla, Raipur, Rajnandgaon, Rewa, Satna, Seoni, Shivpuri, Surguja. *Fl. & Fr.* : Aug. Nov.

2. *Ampelocissus tomentosa* (Heyne ex Roth) Planch. in J. Vigne *Ann.* 8: 374. 1884. *Vitis tomentosa* Heyne ex Roth, *Nov. Pl. Sp.* 157. 1821; Lawson in Hook. *f.*, *Fl. Brit. Ind.* 1: 650. 1875. -*Dhotto*.

A perennial climber with woolly tomentose branches. Leaves variable in shape, orbicular, deeply cordate, 3-5-lobed, serrate, brown tomentose beneath. Flowers red. Petals spreading. Berries globose, black, *ca* 8 mm diam.

Balaghat, Bilaspur, Durg, Hoshangabad, Jabalpur, Mandla, Raigarh, Raipur, Rajnandgaon, Seoni, Sidhi, Surguja. *Fl. & Fr.* : Aug.- Nov.

2. CAYRATIA Juss.

Climbing shrubs with tendrils opposite to the leaves. Leaves alternate, trifoliate or pedate, with 2 stipules. Flowers bisexual, tetramerous, leaf-opposed or seemingly terminal, long-peduncled, in corymbiform or umbellate cymes. Calyx cupular, subtruncate. Petals 4, free, patent or reflexed. Disc entire or lobed, adnate to the base of the ovary. Stamens 4, inserted round the disc. Ovary 2-celled, cells 2-ovuled; style terete; stigma small or indistinct. Fruits 2-4-seeded berry, globose or transversely ellipsoid; seeds obcordate, smooth or angular.

About 45 species from India to New Guinea, Australia, Africa and Madagascar; 2 species occur in M.P.

- 1a. Stems spongy, succulent; leaves 5-foliolate; berries red,
1-seeded ... 1. *C. auriculata*
- 1b. Stems not spongy, not succulent; leaves 3-foliolate;
berries green or black, 2-4-seeded ... 2. *C. trifolia*

1. *Cayratia auriculata* (Wall.) Gamble, *Fl. Madras Pres.* 1:234. 1918. *Cissus auriculata* Wall. in Roxb., *Fl. Ind.* 1: 130. 1820. *Vitis auriculata* Wt. & Arn., *Prodr.* 129. 1834; Lawson in Hook. *f.*, *Fl. Brit. Ind.* 1: 658. 1875.

A large climber with spongy succulent stems; young parts softly pubescent; tendrils 2-3 fid. Leaflets 5 (rarely 3), elliptic-obovate, acuminate, crenate, 7-12 cm long; stipules hemispherical. Flowers greenish white, pedunculate; peduncles and pedicels fleshy. Berries red, succulent, globose, smooth, 1-seeded.

Bilaspur, Jabalpur, Mandla, Rajnandgaon, Seoni. *Fl. & Fr.* : April-Aug.

2. *Cayratia trifolia* (L.) Domin in Biblioth. Bot. 89: 371. 1927. *Vitis trifolia* L., Sp. Pl. 203. 1753. *Cissus carnososa* Lamk. Encycl. 1: 31. 1783. *Vitis carnososa* (Lamk.) Wall. ex Wight. & Arn., Prodr. 127. 1834; Lawson in Hook. f., Fl. Brit. Ind. 1: 654. 1875. *Amal-bel*.

Slender, creeper or climber with pubescent young branches; tendrils forked. Leaves digitately trifoliate; leaflets 5-10 × 3-6 cm, elliptic-obovate, acute or crenate. Cymes hairy. Flowers greenish white. Calyx tube truncate. Petals hairy outside. Berries green, 10-18 mm diam., depressed globose, 2-4 seeded.

Balaghat, Bilaspur, Damoh, Dhar, Gwalior, Hoshangabad, Indore, Mandla, Panna, Raigarh, Raipur, Rajnandgaon, Rewa, Satna, Sagar, Seoni, Shivpuri, Sidhi, Surguja. *Fl. & Fr.* : Aug.-Nov.

3. CISSUS L.

Climbing shrubs or creeping herbs. Tendrils simple or forked, opposite to the leaves. Leaves simple or lobed, sometimes 3-foliolate, dentate. Flowers bisexual, tetramerous, in umbellate cymes, opposite to the leaves. Calyx cup-shaped, obscurely 4-lobed. Petals 4, free, triangular-ovate, patent or reflexed, with a cucullate apex. Disc cupular, 4-lobed, adnate to the base of the ovary. Stamens 4; filaments slender. Ovary 2-celled with 2 ovules in each cell; style subulate; stigma small. Fruits globose or obovoid fleshy berries, usually one seeded, dark purple to black; seeds ellipsoid or pyriform.

A pantropical genus of about 350 species, a few in the warmer parts of the temperate zones; one species found in M.P.

Cissus repanda Vahl, Symb. 3: 18. 1794. *Vitis repanda* Wight & Arn., Prodr. 125. 1834; Lawson in Hook. f., Fl. Brit. Ind. 1: 648. 1875. *Dekra-bela*, *Pani-bel*.

Large climbing shrubs, young branches tomentose. Leaves simple, 12-20 cm across, ovate to orbicular, cordate, serrate or sublobed, often repand, acuminate, pubescent beneath; tendrils forked; stipules free. Cymes leaf opposed, long peduncled, tomentose; bracts and bracteoles woolly. Flowers reddish brown, bisexual. Petals ovate. Disc 4-lobed. Fruits pyriform, ca 8 mm long, purplish black, one-seeded.

Hoshangabad, Raipur. *Fl. & Fr.* : May-June.

4. VITIS L.

Climbing shrubs. Tendrils opposite to the leaves or on the peduncles, once or more times forked. Leaves simple, variously lobed, dentate, with 2

deciduous stipules. Flowers polygamo-dioecious, in leaf-opposed thyrses. Calyx cupular with 5 obscure teeth. Petals 5, coherent by their tips and falling off as a calyptra. Stamens 5; filaments slender, long in male flowers and short in bisexual flowers. Disc of 5 glands, sometimes confluent. Ovary 2-celled with 2 ovules in each cell; style absent or short; stigma obtuse. Fruits 2-celled globular succulent berries; seeds 2-4, pyriform.

About 50 species distributed in the temperate and tropical regions of northern hemisphere centering round China and Eastern North America; one species found in M.P.

Vitis vinifera L., Sp. Pl. 202. 1753; Lawson in Hook. f., Fl. Brit. Ind. 1: 652. 1875. *Angebot*.

Stout climbers. Leaves roundish or ovate or suborbicular, for the greater part 3-5 lobed, dentate, cordate, acute, glabrescent above, tomentose beneath; tendrils simple or forked. Berries oblong, succulent, variable as regards to shape, size, colour and taste, seeds none or small, obovoid or pyriform. *Fl. & Fr.* : Feb.- May.

Often cultivated for its edible fruits.

46. LEEACEAE

(K. K. Khanna)

A monotypic family of about 34 species in Indo-Malaysian regions, Australia, Africa and Madagascar; 5 species in M.P.

LEEAE L.

Erect shrubs or small trees. Leaves distichous, 1-3 pinnate, rarely simple; stipules persistent or caducous, forming a sheath. Flowers pentamerous, bisexual, in leaf-opposed compound corymbs. Calyx 5-lobed. Petals connate at base, adnate to paracorolla. Paracorolla subglobose or urceolate, divided into 5 emarginate thick lobes which are connected on the inner side with a pendent ring. Stamens inserted on the outside of the base of the paracorolla, synantherous; anthers forming a funnel shaped body inside the disc. Ovary 6-celled, each cell one ovuled; style short. Berry 3-6 seeded.

- 1a. Flowers bright red ... 1. *L. alata*
- 1b. Flowers greenish white or pale green:
 - 2a. Stem and petiole vertically crisp-winged ... 2. *L. asiatica*
 - 2b. Stem and petiole not crisp-winged:
 - 3a. Peduncle up to 25 cm long ... 5. *L. macrophylla*
 - 3b. Peduncle up to 10 cm long:

- 4a. Leaves glabrous; petiolar stipules obovate ... 4. *L. indica*
 4b. Leaves undersurface pubescent along the veins;
 petiolar stipules narrow winged ... 3. *L. compactiflora*

1. *Leea alata* Edgew. in Trans. Linn. Soc. Lond. 20: 36. 1846; Lawson in Hook. f., Fl. Brit. Ind. 1: 665. 1875.

Shrubs, up to 1.5 m high with scandent branches. Leaves large, 1-pinnate; leaflets sessile or sub-sessile, oblong, rounded or rhomboid at base, shortly acute, serrate, glabrous or minutely hairy beneath; stipules deciduous, rounded. Inflorescence a dense red corymb; bracts and bracteoles absent. Flowers minute, red. Berries red, with 4-6 pyrenes.

Bilaspur. Fl.: June-Aug.; Fr.: Sept.

2. *Leea asiatica* (L.) Ridsdale in Manilal, Bot. Hist. Hort. Malabaricus 189. 1980. *Phytolacca asiatica* L., Sp. Pl. 1: 477. 1753. *Leea crispata* L., Syst. Nat. ed. 12, 2: 627. 1767 et Mant. Pl. 124. 1767; Lawson in Hook. f., Fl. Brit. Ind. 1: 665. 1875. *L. aspera* Edgew. in Trans. Linn. Soc. 20: 36. 1846 (non Wall. ex G. Don, 1831). *L. edgeworthii* Santapau in Rec. Bot. Surv. Ind. 16: 54. 1953.

Fig. 36.

Undershrubs, 1-2 m high, characterised by crisped wings on the branches and petioles. Leaves 20-35 cm long; leaflets 3-5, 10-20 × 5-8 cm, oblong or oblong-elliptic, rounded at base, apex acute or acuminate, serrate. Corymbs axillary, solitary or paired; flowers greenish white or pale yellow. Berries 7-8 mm, subglobose, grey turning black, 5-6 seeded.

Balaghat, Bastar, Bilaspur, Damoh, Durg, Hoshangabad, Indore, Mandla, Panna, Raigarh, Raipur, Rajnandgaon, Satna, Seoni, Sidhi, Surguja. Fl. & Fr. : June-Dec.

3. *Leea compactiflora* Kurz in J. As. Soc. Beng. 42 (II): 65. 1873. *L. robusta* auct. non Roxb., Lawson in Hook. f., Fl. Brit. Ind. 1: 667. 1875, *pro parte*. *L. bracteata* Clarke in Journ. Bot. 19: 164. 1881.

A large straggling shrub. Leaves 2-3 pinnate. Leaflets large, ovate or oblong-lanceolate, acuminate, shortly caudate, serrate, glabrous above and pubescent beneath on the veins; basal pair of leaflets often highly reduced; petiolar stipules a narrow wing, 5-8 × 0.2-0.5 cm; stipular scars narrow. Inflorescence 8-15 cm long, short and compact, pubescent; peduncle 3-5 cm long, ultimate branches short. Berries brownish yellow when ripe, 7-10 mm; seeds usually 6.

Hoshangabad. Fl. & Fr. : Sept. Nov.

4. *Leea indica* (Burm. f.) Merr. in Philip. J. Sci. Bot. 14: 245. 1919. *Staphylea indica* Burm. f., Fl. Ind. 75, t. 24, f. 2. 1768. *L. sambucina* (L.) Willd., Sp. Pl. 1: 1177. 1797; Lawson in Hook. f., Fl. Brit. Ind. 1: 666. 1875.

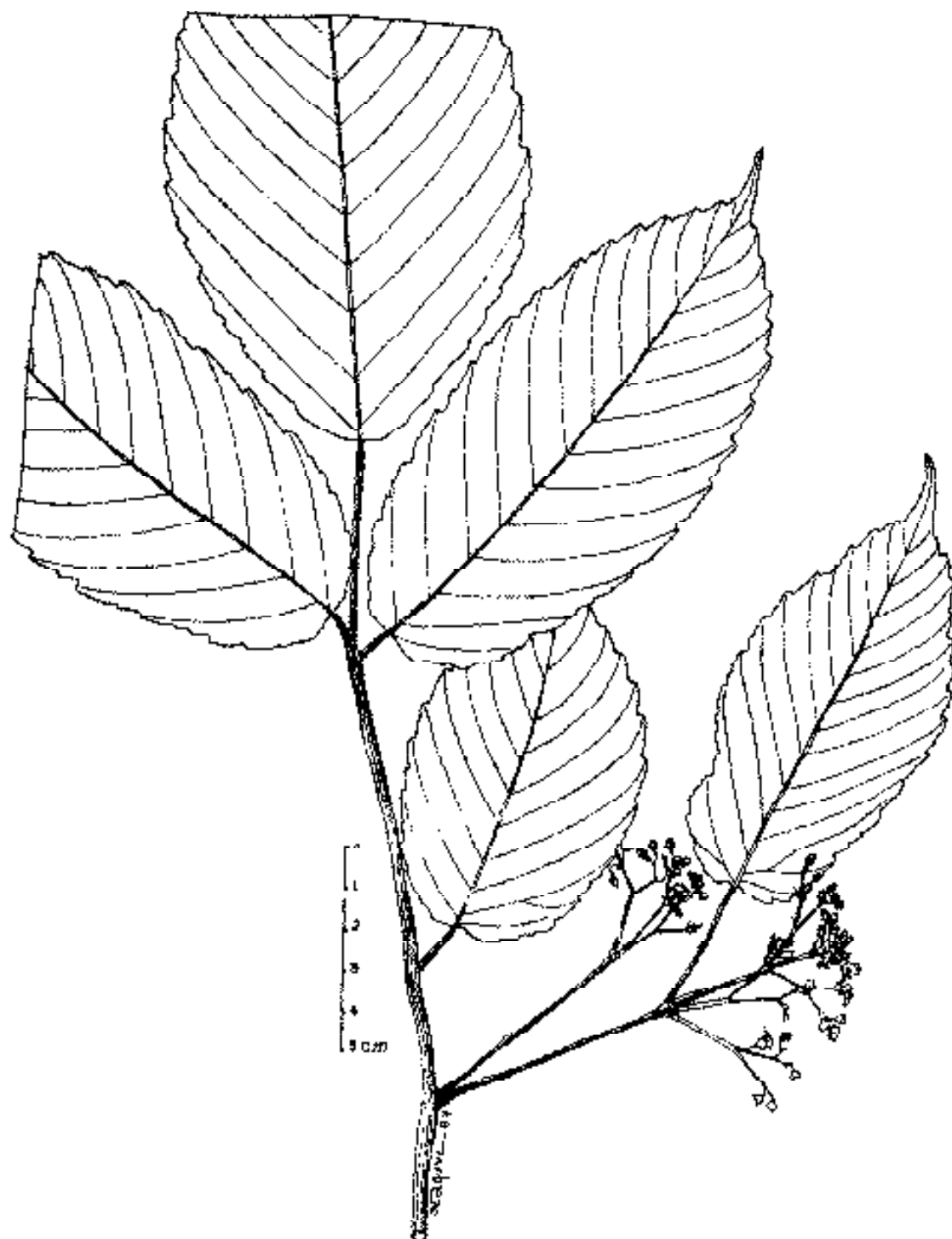


Fig. 36. *Leea asiatica* (L.) Ridsdale

Shrubs up to 5 m as an undergrowth. Leaves 2-3-pinnate, up to 1 m long; leaflets many, 5-15 × 2-9 cm, oblong, ovate-lanceolate, apex long acuminate, base acute or truncate, margins sharply serrate; stipules obovate, caducous. Cymes peduncled; peduncle up to 5 cm long, in subterminal corymbs; flowers pale green. Berries subglobose, 5-7 mm in diam., red to black, 3-6 seeded.

Bilaspur. *Fl. & Fr.* : June-Dec.

5. *Leea macrophylla* Roxb. ex Hornem., Hort. Hafn. 1: 231. 1813; Lawson in Hook.f., Fl. Brit. Ind. 1: 664. 1875. *L. integrifolia* Roxb., Fl. Ind. 2: 472. 1824. *L. robusta* Roxb., l.c. 468. *L. cinerea* Lawson in Hook.f., l.c. 665. *L. coriacea* Lawson in Hook.f., l.c. 665. *L. diffusa* Lawson in Hook.f., l.c. 667. *L. angustifolia* Lawson in Hook.f., l.c. 665. *L. parallela* Wall. ex Lawson in Hook.f., l.c. 666.

Shrubs, up to 1.5 m high, young branches pubescent. Leaves 1-3 pinnate, uni- or- trifoliolate; petiolar stipules obovate, 2-6 × 1-4 cm, scars broad; leaflets usually 1-3 or numerous; unifoliolate, broadly ovate, 20-60 × 15-60 cm, acuminate, cordate, serrate; pinnac variable, ovate to ovate-lanceolate, 14-26 × 4-8 cm, acuminate, subcordate, cuneate. Cyme peduncles up to 25 cm long; flowers greenish-white. Fruits 10-15 mm in diam., globose, green, 6-seeded.

Indore, Mandla, Raipur. *Fl. & Fr.* : Oct.-Jan.

47. SAPINDACEAE

(Anand Kumar and Ram Lal)

About 150 genera and 2,000 species in tropics and subtropics; 8 genera and 10 species in M.P.

- 1a. Climbing herbs ... 1. *Cardiospermum*
- 1b. Shrubs or trees:
 - 2a. Leaves simple ... 3. *Dodonaea*
 - 2b. Leaves compound:
 - 3a. Leaf-rachis prominently winged between the leaflets ... 4. *Filicium*
 - 3b. Leaf-rachis not winged:
 - 4a. Petals absent:
 - 5a. Calyx-lobes acute; fruits tipped with a persistent rigid style ... 8. *Schleichera*
 - 5b. Calyx-lobes broadly rounded; fruits without persistent style ... 6. *Litchi*

4b. Petals present:

6a. Fruits tubercled ... 2. *Dimocarpus*

6b. Fruits not tubercled:

7a. Petaline scales on the back with a pilose crest; cocci oblong ... 5. *Lepisanthes*7b. Petaline scales when present without a crest; cocci globose ... 7. *Sapindus*1. **CARDIOSPERMUM** L.

Climbing tendrillar herbs. Leaves alternate, bipinnate; leaflets inciso-dentate. Flowers zygomorphic, polygamo-dioecious, in few flowered axillary cymes; cymes subtended by a pair of tendrils. Sepals 4, 2 outer ones smaller, imbricate. Petals 4 in 2 pairs. Disc unilateral, of 2 glands opposite the lower petals. Stamens 8, eccentric; filaments unequal, free or connate at the base. Ovary 3-locular, each cell 1-ovuled; style short, 3-fid. Fruit a membranous loculicidal capsule, inflated, 3-valved; seeds globose, usually arillate at base.

About 14 species mainly in tropical and subtropical regions of India, Africa and America; one species in M.P.

Cardiospermum halicacabum L., Sp. Pl. 366. 1753; Hiern in Hook. f., Fl. Brit. Ind. 1: 670. 1875. *Kanphuta*.

Climbing, annual (sometimes perennial) herbs, up to 3 m long. Stem and branches furrowed. Leaves 5-6.5 cm long; petioles 2-3.5 cm long. Leaflets opposite, 4-4.5 × 1-2.5 cm, ovate or ovate-lanceolate, apex acute to acuminate, base rounded. Flowers white, in 3-7-flowered axillary cymes. Sepals: two outer *ca* 2 mm long, orbicular, ciliate; two inner ones 3-4 mm long, oblong-ovate, glabrous. Petals: two upper ones with a crested, inflexed appendage. Stamens 8: filaments hairy; pistillode present in male. Ovary 2-2.5 mm long, obovoid, hairy; style 3-fid, segments bearing inner stigmatic surfaces; staminodes 8 in the female. Capsules 1-1.5 × 2-3 cm, trigonous, angles winged, pyriform; each locule 1-seeded; seeds black, 4-5 mm in diam.; aril white, 3-4 mm long, cordate.

Climbing on bushes and hedges along road-sides, forest-clearings, grasslands and in dry deciduous forests. Also common in cultivated fields. Balaghat, Betul, Bilaspur, Chhatarpur, Damoh, Durg, East Nimar, Guna, Cwalior, Hoshangabad, Indore, Jabalpur, Jhabua, Mandla, Raipur, Sagar, Sama, Seoni, Sidhi, Tikamgarh. Fl. & Fr. : Almost throughout the year.

2. DIMOCARPUS Lour.

Trees or shrubs. Leaves spiral, paripinnate, rarely unifoliolate, exstipulate. Leaflets opposite, subopposite or alternate, papyraceous to thin-coriaceous, glabrous or hairy. Inflorescence terminal, thyrsoid; pedicels slender; bracts triangular-lanceolate to subulate, patent to reflexed. Flowers unisexual, monoecious. Calyx cupular, 5(-6)-lobed, imbricate. Petals 0-5(-6), more or less oblanceolate. Disc slightly 5-lobed, densely hairy. Stamens (6-)8 (-10), filaments filiform, anthers basifixed. Pistils 2-merous; ovary sessile, broadly cordate, tuberculate, hairy; style apical, slender, stigma lobes spreading; ovules 1 per cell. Pistillode small, densely pilose. Fruits globular to broad-ellipsoid, indehiscent, often warty; seeds more or less globular, ariloid present.

About 5 species in South and South East Asia; one in M.P.

Dimocarpus longan Lour., Fl. Cochinch. 233. 1790. *Euphoria longan* (Lour.) Steud., Nomencl. Bot. 1: 328. 1921 (non Blume 1825). *E. longana* Lamk., Encycl. 3: 574. 1792. *Nephelium longana* (Lamk.) Camb., Mem. Hist. Nat. 18: 30. 1829; Hiern in Hook. f., Fl. Brit. Ind. 1: 688. 1875.

Tree, up to 25 m high. Bark yellowish-grey, smooth. Young parts ferruginous-tomentose. Leaves 10-30 cm long. Leaflets 4-10, subopposite, reddish when young, 3-15×1.5-4.5 cm, coriaceous above, oblong or elliptic-oblong, more or less oblique, margin entire, apex obtuse or subacute or subacuminate. Flowers yellowish-brown, polygamous in terminal and axillary 12-25 cm long, rusty-tomentose panicles. Pedicels 1-2 mm long, pubescent. Calyx 5-6 fid; segments 2-3 mm long, ovate-triangular, imbricate, yellow pubescent. Petal 5-6, lanceolate-spathulate, 2.5-4 mm long, pubescent. Disc velutinous. Stamens 6-8, filaments 1-6 mm long. Ovary 2-3 lobed, lobes 1-celled; styles long; stigmas 2. Fruits red, 6-9 mm across, globular, tubercled.

Planted. Guna. Fl. & Fr.: April-Sept.

3. DODONAEA P. Miller

Small trees or shrubs. Leaves simple, alternate, exstipulate. Flowers small, regular, polygamous, in axillary or terminal racemes or panicles. Sepals 2-5, imbricate or valvate. Petals absent. Disc absent in male, small in female flowers. Stamens usually 8, anthers linear-oblong. Ovary 2-6 locular, styles 2-6, ovules 2 in each locule. Fruit a septicidal capsule, 2-6 valved, winged at the back. Seeds lenticular or subglobose, 1-2 in each cell, exarillate.

About 60 species in tropics and subtropics especially Australia; one in M.P.

Dodonaea angustifolia L.f., Suppl. Pl. 18. 1782; Leenhouts in Blumea 28: 280. 1983. *D. viscosa* auct. non Jacq.; Hiern in Hook f., Fl. Brit. Ind. 1: 697. 1875. — Sukha-Kamer,

Resinous shrubs or small trees up to 4 m tall. Leaves subsessile, 3-10×1-3 cm, elliptic or oblanceolate, glabrous, subcoriaceous, gland dotted. Flowers green, in 3-4 cm long axillary and terminal racemes or panicles; pedicels 8-15 mm long. Sepals 3-5, oblong or ovate-oblong, 2-4 mm long, connate at the base, pubescent. Petals absent. Stamens 5-10; anthers oblong, slightly hairy at the tip; pistillode present in the male. Disc annular. Ovary ca 2 mm long, globose, 3-locular, sparsely hairy, stigma 3-fid; rudimentary in male. Capsules 1-1.5 × 1.5-2.2 cm, membranous, 2-3 winged, apex and base retuse; seeds black, 3-4 mm long, sub-globose.

In scrub and dry deciduous forests. Often grown as a hedge plant. Bastar, Bhopal, Bilaspur, Hoshangabad, Mandla, Narsimhapur, Raigarh, Satna, Seoni, Sidhi, Surguja. Fl.: Jan-March; Fr.: Most parts of the year.

4. FILICIUM Thw. ex Benth. & Hook.f.

Tall trees with angular, often scaly branches. Leaves alternate, imparipinnate; leaflets opposite, sessile, rachis broadly winged. Flowers polygamous. Calyx 5-lobed, caducous, imbricate. Petals 5, imbricate. Disc 5-lobed, hairy. Stamen 5, inserted within the disc, equal; filaments subulate, free. Ovary globose, 2-loculed, style bent, stigma simple or bilobed; ovules 1 in each cell. Drupes fleshy, usually 1-celled, 1-seeded.

About 3 species in tropical Asia and Africa; one planted in M.P.

Filicium decipiens (Wight & Arn.) Thw., Enum. Pl. Zeyl. 408, 1864; Bennett in Hook.f., Fl. Brit. Ind. 1: 539. 1875. *Rhus decipiens* Wight & Arn., Prodr. 172. 1834. Fern Tree.

Trees, up to 20 m tall. Bark reddish-brown, flaky. Leaflets 6-12 pairs. 5-15 × 1-2.5 cm, linear-lanceolate or somewhat obovate, subcoriaceous, resinous dotted, margin entire, apex emarginate, base acute. Flowers greenish-white, in axillary 10-30 × 4-5 cm panicles. Pedicels 3-4 mm. Sepals ca 2 mm long, ovate, upcurved. Petals 1.5-2 mm long, suborbicular, incurved, sparingly hairy at the apex. Disc orange coloured. Stamens 5, anthers ovoid. Ovary sessile, compressed-globose, in male merely a pistillode. Fruits ca 1.5 × 1 cm, purple, ellipsoid, apiculate, smooth, shining, 1-2-seeded. Seeds oblong.

Planted as an ornamental or a shade tree. Young trees resemble ferns in appearance.

Bhopal (Oommachan, 1977). Fl.: Oct.-Jan.; Fr.: April.

5. LEPISANTHES Blume

Trees or shrubs. Leaves alternate, paripinnate, exstipulate. Flowers regular or irregular, polygamous in axillary or lateral racemes or panicles. Sepals 5 (sometimes 4), outer 2-smaller, imbricate. Petals 4 (sometimes 5), each with 1-2 cristate scales at the base. Disc entire or crenate. Stamens usually 8; filaments free, equal. Ovary excentric, 3-celled, ovule solitary in each cell, style simple, stigma oblique. Fruits 3-celled, trigonous. Seeds oblong, exarillate.

About 40 species in tropical Asia; one in M.P.

Lepisanthes rubiginosa (Roxb.) Leenh. in *Blumea* 17: 82. 1969. *Sapindus rubiginosus* Roxb., *Pl. Cor.* 1: 44. t. 62. 1795. *Erioglossum edule* Blume, *Bijdr.* 229. 1825; Hiern in *Hook.f., Fl. Brit. Ind.* 1: 672. 1875. *E. rubiginosum* (Roxb.) Blume in *Rumphia* 3: 118. 1849; Saxena & Khotele in *J. Bombay Nat. Hist. Soc.* 73: 23. 1976.

Trees, up to 15 m tall; young parts densely brown-pubescent, glabrescent with age. Leaflets 4-14, 5-20 × 2-5.5 cm, subopposite, ovate to oblong-lanceolate, subcoriaceous, margin entire, apex acute to acuminate; base obliquely subacute to rounded; petiolules 2-5 mm long. Flowers irregular, polygamodioecious, in 10-35 cm, long terminal (or upper axillary) panicles. Pedicels 2-5 mm long. Sepals 5, unequal, orbicular, concave. Petals 4, ca 5 mm long, unequal; claw soft-pilose; limb obovate-oblong, glabrous. Disc annular, 3-angled. Ovary in male rudimentary. Ovary in female stipitate, 3-lobed, ovule solitary in each cell; style curved, hairy; stigma indistinctly lobed. Drupes red, succulent with 1-3 cocci, cocci cohering at the base. Seeds black, 10-15 mm long.

In dense hilly forests. Bastar (Saxena & Khotele, l.c.), Fl. & Fr. : Jan.-May.

6. LITCHI Sonner.

Trees. Leaves spiral, paripinnate; leaflets entire, coriaceous above, dull glaucous beneath. Flowers polygamous, regular in terminal or axillary (in the upper leaf-axils only) racemes or panicles. Calyx 4-5 lobed, valvate. Petals absent. Disc annular. Stamens 6-10; filaments short hairy, Ovary rudimentary in male. In female ovary deeply 2(-3) lobed; lobes 1-celled, cells 1-ovuled; styles 2(-3) branched with inner stigmatic surfaces. Schizocarp covered with mucronate tubercles; aril fleshy, white.

About 12 species in India, S. China, S.E. Asia and W. Malaysia. *L. chinensis* Sonner. is cultivated for its fruits (aril edible).

Litchi chinensis Sonner., *Voy. Ind. Or. Chine* 2: 230. t. 129. 1782.

Nephelium litchi Camb. in Mem. Mus. Natl. Hist. Nat. 18: 30. 1829; Hiern in Hook.f., Fl. Brit. Ind. 1: 687. 1875. -*Leechi*.

Trees, up to 20 m high. Leaves 4-16 cm long. Leaflets 4-12, opposite or subopposite, 5-18 × 2-6 cm, oblong, lanceolate or ovate, apex acuminate, base cuneate to acute; petiolules 3-10 mm long. Flowers pale green in 10-20 cm long terminal and axillary panicles. Pedicels 2-3 mm long. Sepals 4-5, 1-1.5 mm long, sparsely hairy without, appressed pilose within. Stamens 6-10. Ovary 2-lobed, only one lobe usually developing in fruits; style 2-branched, branches recurved. Fruits green when young, pink or red on ripening, subglobose, ca 2.5 cm in diam., 1-seeded; seeds brown, 1.5-2 cm long, oblong-ovoid, enclosed in large, fleshy, white aril.

Native of China. Bhopal, Raigarh. Fl. & Fr. : March-June.

7. SAPINDUS L.

Trees. Leaves alternate, paripinnate; leaflets entire, herbaceous to coriaceous. Flowers regular polygamous in terminal or axillary panicles or racemes. Sepals 5, unequal, imbricate. Petals 4-5. Disc annular, lobed. Stamens 8-10 attached within the disc; filaments free, usually hairy. Ovary entire or 2-4 lobed, 2-4 celled; style terminal; stigma 2-4 lobed; ovule solitary; pistillode present in male. Fruit fleshy or coriaceous of 1-3 indehiscent cocci, seeds globose, black.

About 13 species in tropics and subtropics; 3 in M.P.

- 1a. Leaflets 4-8 pairs; anthers non-apiculate ... 3. *S. mukorossi*
- 1b. Leaflets 2-3 pairs; anthers apiculate :
 - 2a. Apex of leaflets obtuse or emarginate; petals with woolly scales ... 1. *S. emarginatus*
 - 2b. Apex of leaflets acute or acuminate; petals with minute scales or scales absent ... 2. *S. laurifolia*

1. *Sapindus emarginatus* Vahl, Symb. Bot. 3: 54. 1794. *S. trifoliata* sensu Hiern in Hook.f., Fl. Brit. Ind. 1: 682. 1875, p.p. ('*trifoliatus*') non L. 1753.

Trees, up to 12 m high. Young parts tomentose. Leaves up to 15 cm long. Leaflets opposite, 4.5-11 × 2.2-6 cm, glabrous above, tomentose beneath, oblong or elliptic-oblong, apex obtuse to emarginate. Petiolules 2-3 mm long, tomentose. Flowers white, in terminal up to 15 cm long pubescent panicles. Pedicels 2-3.5 mm long. Sepals 3-3.5 mm long, ovate, apex obtuse. Petals 5, 3-4 mm long, lanceolate, clawed, margin ciliate with woolly scales above the claw. Disc 5-lobed, hirsute. Stamens 8;

filaments 3-4 mm long, pistillode present in male. Ovary 2.5-3.5 mm long, ovoid, 3-locular, densely ferruginous-tomentose; stigma trifid; staminodes 8 in the female. Drupes 1-1.5 × 1.5 cm, yellowish-brown, 3-lobed, rusty pubescent, glabrescent, 1 or 2 cocci undeveloped. Seeds 5-7 mm in diam.

Often planted near villages; also found in dry deciduous forests, probably as an escape. Balaghat, Bastar, Damoh, Gwalior, Indore, Raipur, Sagar, Seoni, Shivpuri. *Fl. & Fr.* : Oct.-Jan.

Fruit used as a substitute for soap because of its saponin contents.

2. *Sapindus laurifolia* Vahl, *Symb. Bot.* 3: 54, 1794 ('*laurifolius*'). *S. trifoliata sensu* Hiern in Hook.f., *Fl. Brit. Ind.* 1: 682, 1875 *p.p.* ('*trifoliatius*') non L., 1753. - *Reetha*.

Trees, up to 20 m high. Leaves up to 20 cm long. Leaflets 5.5-15 × 3-5.5 cm, elliptic-lanceolate, glabrous, apex acute or subacuminate, base oblique. Petiolule 3-4 mm long. Flowers white in terminal up to 20 cm long, tomentose panicles. Pedicels 1-2.5 mm long, tomentose. Sepals 3-4 mm long, slightly connate at the base, ovate, apex obtuse, pubescent. Petals 5, 5-6 mm long, lanceolate, clawed, woolly on inner surface. Disc 5-lobed, hirsute. Stamens 8; filaments 2-3 mm long, villous; pistillode present in male. Ovary 2.5-3.5 mm long, ovoid, 3-locular, 3-lobed, rusty tomentose; stigma 3-lobed; staminodes present in female. Drupes 1.5-2 cm long, 2-3 lobed, ferruginous-velvety, at length glaucescent; seeds 6-8 mm long.

In deciduous forests; also planted.

Fruits used for washing clothes. Indore, Raisen, Seoni. *Fl. & Fr.* : Nov.-April.

3. *Sapindus mukorossi* Gaertn., *Fruct.* 1: 342, t. 70, 1788; Hiern in Hook.f., *Fl. Brit. Ind.* 1: 683, 1875; Abudulla in Nasir & Ali, *Fl. W. Pak*, no. 39: 5, f. 2A-E, 1973; Gommachan in *Fl. Bhopal* 103, 1977. *Soap-nut tree*.

Trees, up to 20 m high. Leaves 15-40 cm long. Leaflets subsessile, subopposite, 7-15 × 3-5.5 cm, lanceolate-oblong, apex acute to acuminate, base oblique. Flowers white or purple, subsessile, in terminal and lateral up to 25 cm long, pubescent panicles. Pedicels up to 4 mm long in fruits. Sepals ca 2 mm long, elliptic-oblong to ovate, margin ciliate, glandular hairy at the apex. Petals 5, ca 3 mm long, lanceolate-ovate, clawed, ciliate, with 2 woolly scales on the claw. Disc 5-ridged, glabrous. Stamens 8; filaments exerted, pubescent in the lower half; anthers oblong; reduced to staminodes in female flowers. Ovary obovate, 3-locular; stigma 3-lobed; reduced to pistillode in male. Drupes yellowish-brown, 1.5-2.5 cm long, globose, 1-seeded with 2 small, undeveloped carpels at the base. Seeds ca 1.5 cm in diam.

Native of China. Cultivated for its fruits (pericarp used for washing purposes). Bhopal (*Ommachan*, 1977), Surguja (*Wood*, 1902). *Fl. & Fr.* : May-Feb.

8. SCHLEICHERA Willd.

Trees. Leaves alternate, paripinnate, exstipulate. Flowers regular, polygamodioecious, fascicled in interrupted slender racemes or panicles. Calyx 4-6 lobed, valvate. Petals absent. Disc flat, undulate at margin. Stamens 5-8, filaments slender, anthers oblong. Ovary ovoid, 3-celled; style rigid, stigmas 3-4 lobed; ovule solitary. Fruits ovoid, crustaceous, indehiscent; seed enclosed by pulpy aril.

Monotypic genus distributed in Indo-Malaysia.

Schleicheria oleosa (Lour.) Oken., *Allg. Naturgesch.* 3(2): 1341. 1841. *Pistacia oleosa* Lour., *Fl. Cochinch.* 2: 615. 1790. *Schleicheria trijuga* Willd., *Sp. Pl.* 4: 1096. 1805; Hiern in *Hook.f.*, *Fl. Brit. Ind.* 1: 681. 1875. -*Kusum*.

Fig. 37.

Trees, up to 18 m high. Bark grey. Leaves bright red when young; rachis up to 15 cm long; leaflets 2-4 pairs, opposite or subopposite, 7.5-20 × 2.5-10 cm, elliptic or elliptic-obovate, glabrous, apex obtuse or mucronate, base truncate or tapering; petiolule ca 2 mm long. Flowers greenish-white, fascicled in interrupted up to 15 cm long racemes or panicles in the axils of fallen or young leaves near the apex of branches. Pedicels 2-5 mm long in fruits. Calyx-lobes 4-6, ovate-oblong, acute, valvate or somewhat imbricate. Petals absent. Stamens 5-8, exserted. Ovary 3-4 loculed, ovoid, pubescent, stigma 3-4 lobed, lobes reflexed; pistillode present in male. Drupes 1-2 × 0.7-1.3 cm, ovoid, style persistent, surface smooth or with blunt prickles. Seeds 1-2, brown, enclosed in pulpy aril.

Common in dry deciduous forests, often along river banks. Bastar, Bhopal, Bilaspur, Hoshangabad, Indore, Mandla, Raigarh, Raipur, Sama, Seoni, Shahdol, Surguja. *Fl. & Fr.* : March-Aug.

Useful timber; aril of the seed edible; oil expressed from the seed itself. Furnishes the best lac.

48. SABIACEAE

(Anand Kumar)

About 4 genera and 157 species in tropics and subtropics, absent from Africa; one species known from M.P.



Fig. 37. *Schleicheria oleosa* (Lour.) Oken.

MELIOSMA Blume

Trees or shrubs. Leaves alternate, simple or imparipinnate, exstipulate. Flowers bisexual, irregular in terminal or axillary panicles; bracts caducous. Sepals 5, imbricate, sometimes with sepal like empty bracteoles. Petals usually 5; 3 large, unequal, sub-orbicular; 2 small, equal, usually bifid. Androecium forming a hood over the pistil. Stamens 5, two fertile attached to bifid petals, three sterile opposite the large petals. Disc annular or cupular with 2-5 simple or dentate teeth. Ovary sessile, usually 2-locular with 2-axile ovules per locule; style simple or bifid. Drupes obliquely sub-globose, 1-seeded; seed globose.

About 100 species in tropical and subtropical Asia, Mexico, West-Indies to Brazil; one in M.P.

Meliosma simplicifolia (Roxb.) Walp., Rep. 1: 423. 1842; Hook.f., Fl. Brit. Ind. 2: 5. 1876. *Millingtonia simplicifolia* Roxb., Pl. Corom. t. 254. 1820.

Evergreen trees, up to 12 m high. Leaves simple, chartaceous, 12.5-25 × 5-10 cm, obovate or oblanceolate, glabrous, margin entire (usually serrate when young), apex acute or subacuminate, base cuneate; petiole 2.5-6 cm long. Flowers yellowish-white, sessile, in up to 25 cm long panicles. Sepals 4-5, unequal, ovate, apex subacute, imbricate, ciliate. Petals 5, unequal; 3 outer orbicular, concave; 2 inner small, bifid. Ovary ovoid, 2-celled, base surrounded by cupular, dentate disc; style and stigma simple. Drupes 5-6 mm across, obliquely globose, keeled, rugose, 1-celled, 1-seeded.

In dense mixed forests, often near the streams.

Bastar, Bilaspur, Raigarh, Surguja. Fl. & Fr. : Dec.-June.

49. ANACARDIACEAE

(Anand Kumar)

About 70 genera and 600 species chiefly throughout the tropics and subtropics; 7 genera and 8 species in M.P.

1a. Leaves simple:

2a. Stamens as many as petals or fewer:

3a. Leaves obovate, apex broadly rounded; drupes situated on a fleshy hypocarp ... 6. *Semecarpus*

3b. Leaves oblong or oblong-lanceolate, apex acute, acuminate or subobtusely; drupes not on fleshy hypocarp ... 4. *Mangifera*

- 2b. Stamens twice the number of petals:
- 4a. Style 1; flowers polygamous ... 1. *Anacardium*
- 4b. Styles 5-6; flowers bisexual ... 2. *Buchanania*
- 1b. Leaves compound:
- 5a. Ovary 4-5 celled ... 7. *Spondias*
- 5b. Ovary 1-celled:
- 6a. Leaflets 5 or more; drupes reniform ... 3. *Lannea*
- 6b. Leaflets 3 (in ours); drupes not reniform ... 5. *Rhus*

1. ANACARDIUM L.

Trees or shrubs. Leaves simple, alternate, coriaceous, petioled. Flowers polygamous in terminal (sometimes also in upper leaf-axils) bracteate panicles. Calyx 5-lobed; lobes erect, deciduous, imbricate. Petals 5, puberulous on either side, imbricate. Stamens 7-10, all fertile or some sterile, one usually longer than the others; filaments subulate, basally connate into a short tube; anthers basifixed, ovoid or broadly ellipsoid. Ovary ovoid or obcordate, 1-celled and 1-ovuled, abortive and rudimentary in male flowers; style filiform, stigma obscure. Drupes 1-celled on a fleshy pyriform hypocarp (enlarged receptacle and pedicel); seeds reniform, cotyledons semilunar.

About 8 species in tropical America; one cultivated in M.P.

Anacardium occidentale L., Sp. Pl. 383. 1753; Hook. f., Fl. Brit. Ind. 2: 20. 1876; Ding Hou in van Steenis, Fl. Males. ser. 1, 8(3): 421 f. 6. 1978.
Kaju.

Evergreen trees, up to 10 m high; bark grey. Leaves 3.5-12 × 3-7.5 cm, obovate-oblongate, margin entire, apex rounded or emarginate, base attenuate; petiole 1-2 cm long. Flowers white or pale pink in terminal, up to 25 cm long, pubescent panicles. Sepals 3-4 mm long, ovate-lanceolate. Petals 6.5-10 mm long, linear-lanceolate, apex acute, deflexed. Stamens 9-10, one longer and always fertile, the rest often sterile. Ovary 2-3 mm long, style lateral, stigma minute, ovule solitary. Drupes 2-3 cm long; hypocarp 2.5-6 cm long, yellowish-orange.

Cultivated for its edible cotyledons.

Bastar, Bhopal, Bilaspur, Narsimhapur, Raigarh, Raipur, Seoni, Surguja. *Fl. & Fr.* : Sept.-June.

2. BUCHANANIA Spreng.

Trees. Leaves simple, alternate, coriaceous, exstipulate, petioled.

Flowers bisexual in terminal and axillary panicles. Calyx 5 (rarely 4 or 6)-lobed, imbricate. Petals 5 (rarely 4 or 6) imbricate. Disc urceolate or cupular, 5-lobed. Stamens twice the number of petals; anthers ovate, basifixed. Ovary of 4-6 free carpels, each carpel 1-ovuled; style short; stigma oblique, truncate. Drupe 1-celled, lenticular, stone woody or bony, 2-valved. Seeds plano-convex.

About 25 species in tropical Asia; one in M.P.

Buchanania lanzan Spreng. in J. Bot. (Schrader) 2: 234. 1800. *B. latifolia* Roxb., Fl. Ind. 2: 385. 1832; Hook.f., Fl. Brit. Ind. 2:23 1876. Char, Chironji.

Deciduous trees, up to 20 m tall; bark rough, tessellated; young branches, undersurface and petiole of young leaves tomentose, glabrescent with age. Leaves 8-20 × 4-12.5 cm, oblong or elliptic-oblong, glabrescent above, tomentose beneath, margin entire, apex obtuse or emarginate, base rounded; petiole 1.2-2 cm long, tomentose. Flowers greenish-white, sessile, bisexual, in 5-15 cm long panicles. Calyx 3-5 lobed, ca 1 mm long, ovate, apex obtuse. Petals 4-5, ca 3 mm long, ovate, subacute. Disc fleshy, 5-lobed. Stamens 10, inserted at the base of the disc; filaments linear. Ovary of 5-6 free carpels, situated inside the disc, only 1 carpel fertile. Drupes black, 5-8 mm across, lenticular, stone woody; seeds edible.

Very common in dry deciduous forests.

Balaghat, Bastar, Bhopal, Bilaspur, Hoshangabad, Indore, Jabalpur, Mandla, Raigarh, Raipur, Rewa, Sagar, Satna, Seoni, Shivpuri, Surguja, Tikamgarh. Fl. & Fr. : [an.-]June.

3. LANNEA A. Rich.

Diocious trees. Leaves imparipinnate, alternate; leaflets opposite, exstipulate. Flowers unisexual in terminal simple, paniced or fascicled racemes. Calyx 4-lobed. Petals 4, imbricate. Stamens 8, filaments subulate; anthers ovoid, dorso-basifixed. Disc intrastaminal, round, flat or concave. Ovary ovoid or oblong; styles 4, short; stigmas small, subglobose. Sterile pistil in male small. Drupe 1-4-celled, usually 1-seeded. Seed testa free from endocarp, cotylendons plano-convex.

About 40 species, chiefly in tropical Africa; one in M.P.

Lannea coromandelica (Houtt.) Merr. in J. Arn. Arb. 19: 353. 1938. *Dialium coromandelicum* Houtt. in Nat. Hist. ser. 2, 2: 39, t. 5, f. 2. 1774. *Odina wodier* Roxb., Fl. Ind. 2: 293. 1832; Hook.f., Fl. Brit. Ind. 2: 29. 1876. — Gunja, Moyen.

Deciduous trees, up to 15 m tall; bark smooth, grey. Leaves 15-30 cm

long, clustered at the ends of branchlets. Leaflets 7-11, 5-12 × 3-5.5 cm, ovate-oblong, membranous, apex acuminate, base inequilateral, pinkish tinged when young. Flowering when tree is leafless. Flowers greenish-yellow, sessile; the female flowers in simple and the male in compound, pubescent, 10-25 cm long racemes crowded at the tips of branches. Calyx lobes 1-1.5 mm long, ovate, obtuse, ciliate imbricate. Petals 2-3 mm long, ovate-oblong, obtuse. Disc annular 8-lobed. Stamens 8-10, inserted below the disc; reduced to staminodes in female flowers. Ovary subglobose, 1-celled; styles 3-4. Drupes red, 0.8-1.2 × 0.5-0.7 cm, reniform, 1-seeded; on enlarged 5-9 mm long, pedicel.

Common in dry deciduous forests. Bastar, Bhopal, Bilaspur, Hoshangabad, Indore, Jabalpur, Mandla, Seoni, Shivpuri, Surguja. *Fl. & Fr.* : Feb.-May.

4. MANGIFERA L.

Trees. Leaves simple, alternate, coriaceous, petioled. Flowers polygamous in terminal or axillary panicles. Calyx 4-5 lobed, imbricate, caducous. Petals 4-5, imbricate, often with excrescences from the glands thickened into ridges on the inner surface. Disc 4-5 lobed. Stamens usually 5, rarely 10, usually 1-2 fertile, the other much shorter and smaller; anthers dorsifixed. Ovary 1-celled, abortive in male flowers; style excentric or lateral, stigma simple. Drupe 1-celled, resinous, mesocarp fleshy; endocarp woody, fibrous. Seed ovoid-oblong, compressed; cotyledons plano-convex.

About 35 species chiefly in tropical Asia; one in M.P.

Mangifera indica L., Sp. Pl. 200. 1753; Hook.f., Fl. Brit. Ind. 2: 13. 1876. - *Aam.*

Evergreen trees, up to 20 m tall; bark black, smooth. Leaves 8.5-21.0 × 2.5-6.0 cm, elliptic-oblong or oblong-lanceolate, margin entire, apex acute or acuminate; base acute, equal or unequal. Petiole 1.8-4.5 cm long. Flowers pale yellow, in dense terminal up to 35 cm long pubescent panicles; pedicels 1-3 mm long. Sepals 1-1.5 mm long, apex acute, pubescent without. Petals 2-2.5 mm long, ovate-oblong with 2-3 ridges on the inner side, subacute, reflexed, imbricate. Disc 5-lobed. Fertile stamen 1, inserted inside the disc; staminodes 3-4, slender, gland-tipped. Ovary oblique; ovule pendulous; style subulate, excentric, stigma obscure. Drupes yellow, 5-20 cm long, pyriform, fleshy.

Commonly planted throughout the state for its edible fruits.

Bhopal, Bilaspur, Chhindwara, Damoh, Hoshangabad, Jabalpur, Mandla, Raipur, Raisen, Rewa, Shahdol, Shivpuri, Surguja. *Fl. & Fr.* : Feb. July.

5. RHUS Tourn.

Trees or shrubs, often deciduous. Leaves simple, trifoliolate (in Madhya Pradesh species) or imparipinnate, petioled; leaflets entire or serrate. Flowers polygamous in terminal or axillary panicles. Calyx 5-lobed, imbricate. Petals 5, imbricate. Disc intrastaminal, discoid, shortly cupular or round and flat. Stamens 5, filaments subulate, anthers dorsifixed, imperfect or sterile in female flowers. Ovary 1-celled; style short, distinct or obscure; stigmas 3, free or united, capitate or obscure. Pistillodes in male very small. Drupe 1-celled; endocarp coriaceous, crustaceous or bony. Seed pendulous from the funicle; cotyledons free, flat.

About 200 species widely distributed in the temperate zones of both hemispheres extending in the subtropics and tropics; 2 in M.P.

1a. Glabrous; disc cup-shaped; sepals not reflexed in fruits

...1. *R. paniculata*

1b. Softly-tomentose; disc 5-lobed; sepals reflexed in fruits

... 2. *R. parviflora*

1. *Rhus paniculata* Wall. ex Hook. f., Fl. Brit. Ind. 2 : 10. 1876.

Shrubs, up to 3 m high; bark white. Leaves 3-foliolate; petiole 2.5 - 3 cm long; terminal leaflets 5 - 12 × 3 - 7.5 cm, elliptic or elliptic-ovate, margin entire or slightly undulate, apex obtuse or retuse; lateral leaflets sessile, 0.8 - 2.2 × 0.5 - 1.2 cm, elliptic-obovate, margin entire or crenate, apex rounded, base attenuate. Flowers minute in slender, axillary and terminal 8 - 20 cm long, effuse panicles. Sepals ca 0.5 mm long, ovate. Petals ca 1 mm long, ovate-oblong, obtuse. Stamens inserted below the disc, rudimentary in male. Ovary globose. Drupes pale green, turning to brown on ripening, ca 3 mm in diam., more or less orbicular, depressed.

In dense hilly forests. Bastar, Raigarh, Raisen. Fl. & Fr. : Sept. - Feb.

2. *Rhus parviflora* Roxb. ex DC., Prodr. 2: 70. 1825; Hook. f., Fl. Brit. Ind. 2: 9. 1876. = *Khatua*, *Tung*.

Shrubs, up to 3 m high; young branches, petioles, under surface of leaves and panicle rusty-tomentose. Leaves 3-foliolate; petiole 1-2.5 cm long; terminal leaflet 4.5 - 6.5 × 3 - 4 cm; lateral ones 1.5 - 3.5 × 1.5 - 3 cm; sessile, elliptic, obovate or suborbicular, irregularly crenate in the upper 2/3rd portion, apex rounded or emarginate; base of lateral leaflets oblique. Flowers yellowish-green, in terminal and axillary, 4 - 12.5 cm long panicles. Pedicels very short. Bracts linear. Sepals ovate, apex acute, unequal. Petals more than twice the length of the sepals, oblong. Stamens 5-6; staminodes present in the female. Ovary ovoid. Drupes brown, 3-4 mm across, shining, subglobose or ovoid.

On higher hill slopes in mixed forests. Chhindwara, Hoshangabad. *Fl.* & *Fr.* : Aug. Feb.

6. SEMECARPUS L. f.

Trees. Leaves simple, alternate, coriaceous, exstipulate. Flowers polygamous or dioecious in terminal or axillary panicles. Calyx usually 5-lobed, caducous. Petals 5 (or 3 or 4), imbricate. Disc annular. Stamens 5 (or 4); filaments subulate; anthers dorsifixed. Imperfect stamens in female similar to fertile ones but much smaller and shorter. Ovary 1-celled, styles 3, stigmas capitate or bilobed. Pistil rudimentary or absent in male. Drupe 1-celled, laterally compressed, seated on a fleshy hypocarp (formed by the calyx and floral axis); exocarp and mesocarp fleshy, filled with acrid resin; endocarp crustaceous.

About 60 species in tropical Asia, Formosa, Australia and Micronesia; one in M.P.

Semecarpus anacardium L. f., *Suppl. Pl.* 182. 1781; *Hook. f.*, *Fl. Brit. Ind.* 2: 30. 1876. -*Bhelwa*.

Deciduous trees, up to 10 m tall. Young branches, petiole, under surface of leaves and inflorescence tomentose. Leaves 8-40 × 4.5-2 cm, coriaceous above, margin entire, base rounded or cordate; petioles 1-4.5 cm long. Flowers greenish-yellow, subsessile, in erect, terminal 12-30 cm long panicles. Pedicels accrescent, up to 1.5 cm long in fruits. Sepals 5, ca 1 mm long, ovate, acute, pubescent without. Petals 5, 2.5-4 mm long, ovate-triangular, acute. Disc villous. Stamens 5, inserted at the base of the disc. Ovary sub-globose, densely hairy, rudimentary in male. Drupes black on ripening, 2-2.5 cm long, ovoid or oblong.

Common in dry deciduous and sal forests. Balaghat, Bastar, Bhopal, Bilaspur, Chhindwara, Durg, Hoshangabad, Jabalpur, Mandla, Raigarh, Raipur, Rajnandgaon, Rewa, Seoni, Shadol, Surguja. *Fl.* : May-Oct.; *Fr.* : Dec.-March

7. SPONDIAS L.

Deciduous trees. Leaves imparipinnate, alternate, crowded at the ends of branches. Leaflets subopposite, usually caudate-acuminate; exstipulate. Flowers polygamous in terminal panicles. Calyx 4-5 lobed, caducous, imbricate. Petals 4-5, valvate. Disc annular, 8-10-crenated. Stamens 8-10, inserted below the disc; filaments filiform; anthers dorsifixed. Ovary 4-5 celled, ovoid or sub-globose; styles 4-5. Drupes 1-5-celled; seeds oblong, pendulous, cotyledons plano-convex.

About 10 species in the Indo-Malesian and American tropics; one in

M.P.

Spondias pinnata (L.f.) Kurz, Prelim. Rep. For. & Veg. Pegu, Append. A. 44 & B. 42. 1875. *Mangifera pinnata* L. f., Suppl. Pl. 156. 1781. *Spondias mangifera* Willd., Sp. Pl. 2: 751. 1799; Hook. f., Fl. Brit. Ind. 2: 42. 1876. *S. acuminata* Roxb., Fl. Ind. 2: 453. 1832; Hook. f., l. c. - *Amera, Amra*.

Trees, up to 10 m high; bark smooth, white or brownish-grey. Leaves 15-25 cm long; leaflets 7-11, 4-13 × 2.5-7 cm, elliptic-oblong, margin more or less undulate, apex caudate-acuminate, base subacute or oblique; petiolules 2-3 mm long. Flowers white in axillary or terminal, 15-30 cm long panicles. Sepals minute, ovate-triangular, imbricate. Petals 3-3.5 mm long, ovate, acute. Disc fleshy, 10-crenated. Stamens 8-10. Ovary ovoid, situated inside the disc; ovule 1 in each locule. Drupe yellow, 2-3.5 cm long, ovoid; pyrene woody with tuberculate, fibrous surface, 1-5-celled.

Usually planted in the vicinity of villages; also found wild along the streams. Bilaspur, Raigarh, Raipur. *Fl. & Fr.* : April - Oct.

50. MORINGACEAE

(Anand Kumar)

Monotypic family of 14 species distributed from Southern Angola and South-Western Africa across to Madagascar and India; 2 species in M.P.

MORINGA Adans.

Trees with soft wood. Leaves alternate, 2-3 (-4) pinnate, the pinnae and pinnules impari-pinnate, opposite, glandular at the base, exstipulate, caducous. Flowers large, irregular, hermaphrodite in axillary panicles. Calyx cupular, 5-segmented; segments unequal, petaloid, imbricate. Petals 5, unequal. Disc lining the calyx-tube. Stamens inserted on the edge of the disc, declinate; 5 fertile opposite to petals with 5-7 alternate sterile stamens; anthers dorsifixed. Ovary stipitate, 1-celled; style slender, cylindrical; stigma truncate, perforated; ovules many, biscriate on 3 parietal placentae. Capsule elongate, beaked, 3-6 angled, 1-celled, 3-valved; seeds many, in pits of the valves; testa corky, winged or not; cotyledons plano-convex.

- 1a. Leaves mostly 2-pinnate; leaflets 2-5 × 0.8-3 cm, thick
with distinct veins ...1. *M. concanensis*
- 1b. Leaves 2-3 (-4) pinnate; leaflets 0.5-2.5 × 0.3-1.5 cm,
thin with obscure veins ...2. *M. oleifera*

1. *Moringa concanensis* Nimmo in Graham, Cat. Bomb. Pl. 43. 1839; Hook. f., Fl. Brit. Ind. 2: 45. 1876; Verdcourt in Kew Bull. 40: 12. 1985.

Trees, up to 12 m high. Leaves up to 45 cm long; primary and

secondary rachises thickened at the base; pinnules 9-15, broadly elliptic or suborbicular, apex obtuse or retuse; petiolules 2.5-3 mm long. Flowers in dense, divaricate, puberulous, 40-50 cm long panicles. Pedicels 0.8-1.2 cm long. Bracts ca 1 mm long, caducous. Calyx 0.8-1.2 cm long, minutely tomentose; segments white, oblong, reflexed. Petals yellow, red streaked, up to 1.5 cm long, oblong-spathulate. Stamens 5; staminodes 4-5; filaments hairy at the base. Capsules 30-50 × 1.5-2 cm, valves hard; seeds 1.5-2 cm long, 3-angled, 3-winged.

Found near habitations, Gwalior, Indore (Rao & Sastry, 1965). *Fl. & Fr.*: Nov.-April.

2. *Moringa oleifera* Lamk., *Encycl.* 1: 398. 1785; Verdcourt in *Kew Bull.* 40:7. 1985. *M. pterygosperma* Gaertn., *Fruct* 2: 314, t. 147, f. 2. 1791; Hook.f., *Fl. Brit. Ind.* 2: 45. 1876. ~ *Munga*, *Sahjan*.

Trees, up to 7 m high; young parts tomentose. Leaves up to 50 cm long; rachis thickened and articulated at the base; terminal pinnule obovate, slightly larger than lateral leaflets; lateral pinnules elliptic, apex obtuse or emarginate. Petiolules of lateral pinnules 1.5-2.5 mm long and those of terminal leaflets 3-7 mm long. Flowers white or yellowish, in large, puberulous, effuse panicles. Calyx lobes 1.3-1.5 × 0.4 cm, linear-lanceolate. Petals 1.5-2 × 0.7-1 cm, spathulate, unequal. Stamens 5; fertile alternating with 5-7 sterile stamens; filaments hairy at the base. Ovary oblong, villous. Capsules up to 40 cm long, pendulous ribbed, more or less obtusely trigonous; seeds up to 2.5 cm long, 3-angled, 3-winged.

Planted in the vicinity of villages. Bastar, Bilaspur, Guna, Indore, Jabalpur, Mandla, Raigarh, Rajnandgaon, Raipur, Raisen, Seoni, Shivpuri, Sidhi. *Fl. & Fr.*: Feb.-June.

Leaves, flower buds and fruits are consumed as vegetables.

51 FABACEAE

(Papilionaceae)

(A. N. Singh)

About 480 genera and 12000 species, cosmopolitan, abundant in tropics and subtropics; 61 genera and 194 species in M.P.

1a. Stamens free:

2a. Pods moniliform, thick or pulpy, dehiscent or not ...53. *Sophora*

2b. Pods flat, membranous, indehiscent ...9. *Calpurnea*

1b. Stamens mono or di-adelphous:

3a. Stipellae absent:

- 4a. Leaves simple or digitately 3-foliolate (rarely 5-foliolate); leaflets entire:
- 5a. Anthers uniform; keel petal scarcely cohering ...49. *Rothia*
- 5b. Anthers dimorphous; keel petal firmly cohering:
- 6a. Keel obtuse ...5. *Argyrolobium*
- 6b. Keel beaked:
- 7a. Flowers solitary axillary; pod flattened ...25. *Goniogyna*
- 7b. Flowers in terminal racemes; pod turgid ...13. *Crotalaria*
- 4b. Leaves simple or digitately or pinnately 3-many foliolate; leaflets entire or toothed:
- 8a. Leaflets usually toothed and veins of leaflets usually excurrent with teeth:
- 9a. Leaves digitately 3-foliolate; flowers in condensed or sub-spicate racemes ...56. *Trifolium*
- 9b. Leaves pinnately 3-foliolate; flower in lax racemes:
- 10a. Racemes long; pods short, round or oblong ...34. *Melilotus*
- 10b. Racemes short; pods not as above:
- 11a. Pods elongated, straight or recurved ...57. *Trigonella*
- 11b. Pods not elongated, falcate or spiral ...33. *Medicago*
- 8b. Leaflets not as above:
- 12a. Pods not jointed:
- 13a. Leaves odd-pinnate:
- 14a. Stamens monadelphous ...14. *Cyamopsis*
- 14b. Stamens diadelphous:
- 15a. Anthers apiculate or gland-tipped; hairs medifixed ...26. *Indigofera*
- 15b. Anthers obtuse or mucicous; hairs basifixed:
- 16a. Flowers usually in leaf-opposed racemes ...54. *Tephrosia*
- 16b. Inflorescence not as above:
- 17a. Flowers in condensed or sub-capitate heads; pods one-seeded ...44. *Psoralea*
- 17b. Flowers in axillary and terminal racemes; pods many-seeded:
- 18a. Pods septate ...50. *Sesbania*
- 18b. Pods not septate:

- 19a. Pods indehiscent; small trees ...23. *Gliricidia*
- 19b. Pods late in dehiscing; woody climbers or small trees ...35. *Millettia*
- 13b. Leaves even-pinnate:
- 20a. Climbing shrubs with the 10th stamen absent or abortive ...1. *Abrus*
- 20b. Herbs with all perfect diadelphous stamens:
- 21a. Leaflets toothed; style glabrous; pods turgid ... 11. *Cicer*
- 21b. Leaflets entire; style usually hairy; pods compressed:
- 22a. Staminal tube oblique at mouth:
- 23a. Ovules 2, style throughout longitudinally bearded ...29. *Lens*
- 23b. Ovules 3-many, style bearded below stigma ...59. *Vicia*
- 22b. Staminal tube truncate at mouth:
- 24a. Style bearded longitudinally and not recurved at margins ...28. *Lathyrus*
- 24b. Style bearded below the stigma and recurved at margins ...41. *Pisum*
- 12b. Pods jointed and constricted between seeds and breaking transversely into 1-seeded portions:
- 25a. Stamens monadelphous, anthers dimorphous:
- 26a. Leaflets 2; stipules leafy peltate; flowers in interrupted spikes; pod glochidiate, not subterranean ...61. *Zornia*
- 26b. Leaflets 4; stipules adnate to the petiole; flowers solitary, pod not glochidiate, subterranean ...4. *Arachis*
- 25b. Stamens diadelphous, anthers uniform:
- 27a. Stamens 9+1; ovules solitary ...31. *Lespedeza*
- 27b. Stamens 5+5; ovules many:
- 28a. Pods twisted inside the calyx; stamens all similar ...52. *Smithia*
- 28b. Pods straight, exserted; stamens alternately long and short ...2. *Aeschynomene*

- 3b. Stipellae present:
- 29a. Pods jointed (joints 1-seeded):
- 30a. Ovary one-ovuled:
- 31a. Racemes in terminal capitate plumose heads; leaflets longer than broad ...30. *Leptodesmia*
- 31b. Racemes axillary, lax, with distant flowers; leaflets broader than long ...18. *Eleiotis*
- 30b. Ovary 2 or more-ovuled:
- 32a. Pods not distinctly jointed, continuous within:
- 33a. Pod flattened, viscidly pubescent, leaflets large, rhomboid, crenate ...43. *Pseudarthria*
- 33b. Pod inflated, not viscidly pubescent; leaflets small obovate, not crenate ...47. *Pycnospora*
- 32b. Pods distinctly jointed:
- 34a. Pods bent backward, included within calyx ...58. *Urvia*
- 34b. Pods neither bent backward, nor included within calyx:
- 35a. Joints of pods turgid ...3. *Alysicarpus*
- 35b. Joints of pods flattened:
- 36a. Trees; racemes fascicled on the old wood ...38. *Ougeinia*
- 36b. Herbs or shrubs; racemes simple or panicled or axillary from the current year's shoot ...16. *Desmodium*
- 29b. Pods not jointed:
- 37a. Usually climbers, rarely shrubs or trees; pods dehiscent:
- 38a. Leaves gland dotted beneath:
- 39a. Pods 3-many seeded:
- 40a. Slender twiners; flowers paired in leaf axils; pods septate between the seeds; seeds strophiolate ...6. *Atylosia*
- 40b. Erect undershrubs or shrubs; flowers in subspicate axillary racemes; pods obliquely sub-torulose; seeds not strophiolate ...8. *Cajanus*
- 39b. Pods 1-2-seeded:

- 41a. Calyx teeth strongly accrescent, lowest sepal largest,
boat-shaped ...39. *Paracalyx*
- 41b. Calyx teeth not accrescent, lowest sepal not as above:
- 42a. Funiculus at the end of the hilum ...19. *Eriosema*
- 42b. Funiculus centric on the hilum:
- 43a. Leaves pinnate; pods compressed ...48. *Rhynchosia*
- 43b. Leaves simple or digitate; pods inflated ...21. *Flemingia*
- 38b. Leaves not gland dotted beneath:
- 44a. Style bearded below the stigma:
- 45a. Style divided into a thin basal and a thick upper
part:
- 46a. Stipules truncate at base; keel spirally twisted;
pods not septate ...40. *Phaseolus*
- 46b. Stipules cordate or appendaged below the base;
keel straight or spirally twisted; pods septate ...60. *Vigna*
- 45b. Style uniformly thick or thin or tapering, not
divided into two distinct parts:
- 47a. Pollen grains smooth; style distinctly thickened,
conspicuous; stigma not penicillate;
pods septate ...27. *Lablab*
- 47b. Pollen grains tuberculate or spinulose; style
distinctly not thickened, short and in-
conspicuous; stigma penicillate; pods not septate
...32. *Macrotyloma*
- 44b. Style not bearded below the stigma (except *Clitoria*
where it is bearded on the inner side):
- 48a. Rachis of inflorescence not swollen at nodes:
- 49a. Stipules and bracts large and persistent:
- 50a. Petals very unequal, stamens monadelphous
...12. *Clitoria*
- 50b. Petals nearly equal; stamens diadelphous:
- 51a. Calyx teeth distinct; style filiform without a
flattened part in the middle ...51. *Stuteria*
- 51b. Calyx truncate at mouth; style filiform with
a flattened part in the middle ...17. *Dumasia*
- 49b. Stipules and bracts minute, caducous:
- 52a. Leaves 3-7-foliolate; anthers uniform, all
fertile; pods not hooked at apex ...24. *Glycine*

- 52b. Leaves 3-foliolate; anthers dimorphous, alternate
anthers abortive; pods conspicuously hooked
at apex ...55. *Teramnus*
- 48b. Rachis of inflorescence swollen at nodes:
- 53a. Stamens monadelphous:
- 54a. Calyx lobes almost equal in size, all acute;
pods narrow, not furrowed along the upper
suture ...46. *Pueraria*
- 54b. Calyx lobes unequal in size, upper two
rounded and larger than the lower three;
pods broad, furrowed along with the upper
suture ...10. *Canavalia*
- 53b. Stamens diadelphous:
- 55a. Petals very unequal in length:
- 56a. Climbing shrubs; anthers dimorphous; keel
exceeding the wing and the standard ...36. *Mucuna*
- 56b. Trees; anthers uniform; standard exceeding
the keel and the wing ...20. *Erythrina*
- 55b. Petals nearly equal in length:
- 57a. Twining herbs; pods dehiscent throughout:
- 58a. Leaves 3-foliolate; two upper calyx
teeth fused into one; keel not straight...22. *Galactia*
- 58b. Leaves one-foliolate; two upper calyx
teeth not fused; keel nearly straight ...37. *Nogra*
- 57b. Small trees; pods divided in two parts, thin
seedless indehiscent lower part and one
seeded sub-dehiscent apical part ...7. *Butea*
- 37b. Usually shrubs or trees; pods indehiscent:
- 59a. Leaflets distinctly alternate; pods not thick woody:
- 60a. Flowers small, whitish reddish or pale blue; pods
oblong or linear; anthers small terminal, dehiscing
in a vertical slit ...15. *Dalbergia*
- 60b. Flowers large, yellow; pods sub-orbicular, winged;
anthers versatile, dehiscing longitudinally ...45. *Pterocarpus*
- 59b. Leaflets opposite; pods thick woody ...42. *Pongamia*

1. ABRUS Adans.

Climbing shrubs. Leaves paripinnate with many pairs of deciduous leaflets; rachis ending into a bristle. Flower small, pedicelled, in dense terminal paniced racemes. Calyx campanulate; teeth very short. Corolla

much exserted; standard ovate, narrowed to a short claw, adnate to staminal tube; wings falcate, oblong, free. Stamens 9, connate in a tube, slit above filaments alternately longer and shorter. Ovary few-many-ovuled; style incurved; stigma capitate. Pods oblong to linear-oblong, much compressed, finely septate.

About 12 species in tropics; one in M.P.

Abrus precatorious L., Syst. Nat. ed. 12. 472. 1767; Baker in Hook. f., Fl. Brit. Ind. 2: 175. 1876. – *Ratti*.

Perennial climbing shrubs with slender glabrous and finely silky branches. Leaves pinnate, 5-10 cm long; leaflets 10-20 pairs, linear or linear oblong, 15-25 × 4-6 mm, apiculate, glabrous or minutely silky beneath. Flowers in 2.5-8 cm long dense pedunculate racemes, pinkish white. Calyx campanulate, truncate, finely silky. Corolla ca 1 cm long, pink or white. Stamens 9, monadelphous. Pods oblong with a sharp deflexed beak, 2.5-4 × 1.2 cm; seeds 3-5, subglobose, shining scarlet with a black spot at hilum, sometimes white.

On roadside trees and shrubs. Balaghat, Bastar, Bhopal, Bilaspur, Damoh, Hoshangabad, Indore, Jabalpur, Mandla, Panna, Raigarh, Raipur, Raisen, Rajnandgaon, Rewa, Sagar, Satna, Sconi, Shahdol, Shivpuri, Sidhi, Surguja, W.Nimar. Fl. & Fr.: Aug.-March.

2. AESCHYNOMENE L.

Erect herbs or undershrubs. Leaves imparipinnate; leaflets numerous, small, linear. Flowers in axillary or terminal racemes. Calyx bilipped. Corolla with unequal petals; standard slightly clawed, orbicular, wings obovate or oblong, keel not beaked. Stamens 5+5. Ovary stipitate, many-ovuled. Pods linear to linear-oblong, jointed or constricted between seeds.

About 150 species, tropical and sub-tropical; 2 in M.P.

- 1a. Stems fistular; calyx hispid; mature pods echinate ...1. *A. aspera*
 1b. Stems slender; calyx glabrous; pods always smooth ...2. *A. indica*

1. *Aeschynomene aspera* L., Sp. Pl. 713. 1753; Baker in Hook. f., Fl. Brit. Ind. 2 : 152. 1876. – *Sola*.

Aquatic or marshy erect herbs with spongy stems. Leaves 7-15 cm long; leaflets numerous, alternate or opposite, linear-oblong, obtuse, glabrous, 1-nerved, 5-15 × 2 mm; stipules linear to lanceolate, auricled at base, 12-13 mm long, deciduous. Racemes simple or branched, 2-6-flowered, 4-8 cm long. Flowers ca 2 cm long. Calyx bilabiate, upper lip rounded, lower 3-lobed, 5-10 mm long; bracteoles 2. Corolla 16-20 mm long, yellow

to brown yellow. Pods 3.5-8 cm long, 3-8 jointed, echinate on both the surfaces.

Near pools and puddles. Bastar (*Saxena & Khotele, 1976*), Raipur (Unni, 1967), Sidhi. *Fl. & Fr.* Aug.-Jan.

2. *Aeschynomene indica* L., Sp. Pl. 713. 1753; Baker in Hook. f., *Fl. Brit. Ind.* 2 : 151. 1876. - *Antwa, Didhan, Phulan.*

Much branched slender annual herbs, 20-100 cm high, with small warts on the stem. Leaves 3-8 cm long; leaflets numerous, sessile, linear, obtuse, apiculate, glabrous, sensitive to touch, 3-6 × 1-2 mm; stipules lanceolate, toothed above, auricled at base, 12-13 mm long, deciduous. Flowers 1-4 in axillary racemes; peduncles and pedicels viscid; bracts lanceolate. Calyx 5-6 mm, glabrous, deeply bilipped, upper lip bifid, lower minutely 3 toothed. Corolla yellow, standard veined with purple, 10-12 mm long. Stamens 10, diadelphous. Pods 2.5-5 cm long, straight, flattened, indented along lower suture with 6-10 one-seeded joints.

In cultivated fields and along ditches. Balaghat, Bastar, Bhopal, Bilaspur, Damoh, Durg, Hoshangabad, Indore, Jabalpur, Mandla, Panna, Raigarh, Raipur, Raisen, Rajnandgaon, Rewa, Sagar, Satna, Seoni, Shahdol, Shivpuri, Sidhi, Tikamgarh. *Fl. & Fr.*: Aug.-Dec.

3. ALYSICARPUS Desv.

Diffuse or erect herbs. Leaves usually simple, rarely 3-foliolate; stipules scarious or acuminate, stipels subulate. Flowers small, in terminal or axillary racemes or panicles, bracteate. Calyx deeply 5-cleft, lobes subequal, 2 upper connate to near the apex. Corolla usually included; standard obovate or orbicular, narrowed into a claw; wings oblong, oblique, adnate to the incurved appendaged keel. Stamens diadelphous, 9+1. Ovary sessile or stipitate, many-ovuled; style incurved; stigma capitate. Pods a lomentum with 1-seeded joints.

About 25-30 spp. in Africa, Asia, Australia, Polynesia and Tropical America; 10 in M.P.

1a. Calyx segments not longer than the first joint of pod:

2a. Stems with spreading hairs:

3a. Pod joints compressed ...2. *A. humosus*

3b. Pod joints globose ...4. *A. monilifer*

2b. Stems glabrous or appressed hairy:

4a. Pods with cylindrical joints, not constricted in between. ...9. *A. vaginalis*

4b. Pods moniliform and constricted in between ...3. *A. longifolius*

- 1b. Calyx segments longer than the first joint of pod:
- 5a. Flowers sessile, in dense spikes:
- 6a. Pods 3-4-jointed, joints globose ...5. *A. pubescens*
- 6b. Pods one-seeded, flat ...10. *A. v. sativae*
- 5b. Flowers pedicellate, in lax or dense racemes:
- 7a. Pods strongly transversely rugose:
- 8a. Leaflets elliptic-oblong; racemes compact; calyx densely ciliate ...7. *A. scariosus*
- 8b. Leaflets linear-lanceolate or oblong; racemes lax; calyx glabrous or sparsely ciliate ...6. *A. rugosus*
- 7b. Pods smooth or faintly rugose:
- 9a. Pods tetragonous ...8. *A. tetragonolobus*
- 9b. Pods not tetragonous ...1. *A. bupleurifolius*

1. *Alysicarpus bupleurifolius* (L.) DC., Prodr. 2: 252. 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 158. 1876. *Hedysarum bupleurifolium* L., Sp. Pl. 745. 1753.

Slender annual glabrous herbs, 20-80 cm high. Leaves 1-foliolate; petiole 1.5-2.5 cm long; leaflet linear-elliptic, 2-9 cm long, glabrous above, sparsely pubescent beneath; stipules 5-10 mm long, scarious. Racemes 8-20 cm long with 10-20 distant pairs of shortly pedicellate flowers; bracts 6-8 mm long. Calyx 5-6 mm long, ciliate. Corolla purplish red. Pods 8-13 mm long, 4-6-jointed, exserted, smooth or reticulately nerved.

In rock-crevices. Balaghat, Bastar, Bilaspur, Chhattarpur, Hoshangabad, Mandla, Panna, Raigarh, Raipur, Raisen, Rajnandgaon, Rewa, Sagar, Seoni, Shahdol, Sidhi, Surguja, W. Nimar. Fl. & Fr.: Aug.-Jan.

1.1. var. *gracilis* (Edgew.) Baker in Hook. f., Fl. Brit. Ind. 2: 158. 1876. *Alysicarpus gracilis* Edgew. in J. Linn. Soc. 9: 312. 1866.

Leaflets oblong-lanceolate, obtuse, 2.5-5 cm long. Calyx ca 4 mm long. Pods 1-2-jointed, included or slightly exserted.

In mixed forests. Chhattarpur, Chhindwara (Rao, 1960) Raipur, Shahdol, Sidhi. Fl. & Fr.: Oct.-Jan.

2. *Alysicarpus hamosus* Edgew. in J. Asiat. Soc. Beng. 21: 171. 1853; Baker in Hook. f., Fl. Brit. Ind. 2: 157. 1876. *Hedysarum procumbens* Roxb., Fl. Ind. 3: 345. 1832; non Mill. 1768. *Alysicarpus procumbens* (Roxb.) Schindler in Fedde. Rep. 21: 11. t. 43. 1925, *nom. illeg.*

Procumbent branched annual hairy herbs, 20-50 cm high, Leaves 1-foliolate, stipulate; petiole 3-6 mm long; leaflet broadly elliptic or

suborbicular, obtuse at apex, subcordate at base, 1.5 - 5 cm long, glabrous except on nerves beneath. Racemes terminal or axillary, short, dense, with paired flowers. Calyx 1-3 mm long; teeth linear. Corolla pink or yellow. Pods compressed, pubescent, 10-18 x 2-4 mm, 4-6-jointed, reticulately veined.

On roadsides, hill-slopes and wastelands. Balaghat, Bastar, Bhopal, Bilaspur, Dhar, Hoshangabad, Indore, Mandla, Rajnandgaon, Sagar, Seoni, Surguja, Tikamgarh, W. Nimar. Fl. & Fr. : Aug.-Nov.

3. *Alysicarpus longifolius* (Rottl. ex Spreng.) Wight & Arn., Prodr. Pen. Ind. Or. 233. 1834; Baker in Hook. f., Fl. Brit. Ind. 2 : 159. 1876. *Hedysarum longifolium* Rottl. ex Spreng., Syst. 3: 319. 1826. - *Jungli gailia*.

Erect stout glabrous herbs, 1-1.5 m high. Leaves 1-foliolate, stipulate; petioles 3-10 mm long; leaflets linear-lanceolate to oblong, obtuse or subacute, 4-15 x 0.8-3.0 cm, sparsely pubescent on both the surfaces. Racemes terminal or axillary, 15-30 cm long; rachis pubescent; bracts 12-15 mm long. Calyx 6-10 mm long, pubescent, ciliate; teeth much longer than the tube. Corolla pink or purple. Pods 9-15 x 2-3 mm, pubescent, reticulately veined, 4-6-jointed.

In wastelands and cultivated fields. Bhopal, Damoh, Hoshangabad, Indore, Rajnandgaon, Rewa, Sagar, W. Nimar. Fl. & Fr. : Aug.-Nov.

4. *Alysicarpus monilifer* (L.) DC., Prodr. 2: 353. 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 157. 1876. *Hedysarum moniliferum* L., Mant. Pl. 1: 102. 1767.

Slender prostrate tufted herbs with 10-50 cm long hairy branches. Leaves 1-foliolate, stipulate; petioles 3-7 mm long, pubescent; leaflets elliptic-oblong, 5-15 x 7-10 mm, rounded and mucronate at apex, subcordate at base, glabrous except on nerves beneath; stipules 3-8 mm long, scarious. Racemes dense, short, axillary, 4-10-flowered. Calyx 2-3 mm long, pilose; teeth narrow, acute. Corolla scarlet red to bluish red. Pods 10-20 x 2 mm, 3-8-jointed, joints globose, smooth, pubescent.

In wastelands, on dried alluvial loam. Balaghat, Bilaspur, Bind, Bhopal, Damoh, Durg, Hoshangabad, Indore, Mandla, Morena, Panna, Raigarh, Raipur, Raisen, Rajnandgaon, Sagar, Shahdol, Shivpuri, Sidhi, W. Nimar. Fl. & Fr.: Aug.-June.

5. *Alysicarpus pubescens* Law. in Wight, Ic. t.250. 1840; Baker in Hook. f., Fl. Brit. Ind. 2: 160. 1876.

Erect appressed hairy herbs, 0.3-1.0 m high. Leaves 1-foliolate, stipulate; petioles 1.5-3.0 mm long; leaflets linear-oblong or oblanceolate, 2-6 cm long, hairy on the nerves beneath. Racemes dense, 5-15 cm long,

plumose with white-grey hairs. Calyx 8-10 mm long, plumose; teeth setaceous. Corolla white; wings purple, included. Pods 3-4-jointed, included, 6-10 mm long, joints globose and reticulately veined.

E. Nimar, Indore, Sagar *Fl. & Fr.*: Sept.-Nov.

6. *Alysicarpus rugosus* (Willd.) DC., *Prodr.* 2: 353. 1825; Baker in *Hook. f., Fl. Brit. Ind.* 2: 159. 1876. *Hedysarum rugosum* Willd., *Sp. Pl.* 3(2): 1172. 1802. *A. wallichii* Wight & Arn., *Prodr.* 234. 1834.

Erect stout glabrescent herbs, 0.3-1.0 m high. Leaves 1-foliolate, stipulate; stipules 5-10 mm long, scarious, encircling the stem; petioles 2-6 mm long; leaflets elliptic-oblong, obtuse, 2-7 × 1-3 cm, glabrous above, pubescent beneath, particularly along the nerves and the margins. Racemes dense, 3-10 cm long, elongating in fruits to 30 cm. Calyx 6-9 mm long, glabrous; teeth lanceolate, minutely ciliate. Corolla pinkish-yellow. Pods 3-6-jointed, included, joints ca 2.0 × 2.5 mm, transversely ribbed.

In wastelands and cultivated fields. Bastar, Bhopal, Bind, Chhattarpur, Gwalior, Hoshangabad, Indore, Mandla, Morena, Narsimhapur, Raipur, Raisen, Sagar, Seoni, Shahdol, Shivpuri, W. Nimar. *Fl. & Fr.*: Sept.-Jan.

7. *Alysicarpus scariosus* Grah. ex Thw., *Enum. Pl. Zeyl.* 88. 1858. *Alysicarpus rugosus* var. *styracifolius* Baker in *Hook. f., Fl. Brit. Ind.* 2: 159. 1876.

Diffusely branched herbs with 10-20 cm long pubescent branches. Leaves 1-foliolate; petioles 2-6 mm long; leaflet elliptic-oblong, 5-25 × 4-15 mm, glabrous above, pilose beneath. Racemes dense, short, axillary, 1-2 cm long, pilose. Calyx glumaceous, 6-9 mm long, pale brown, ciliate. Corolla pinkish yellow. Pods moniliform, 3-jointed, joints 1.5-2 × 2.5 mm, transversely ribbed, sparsely pilose.

On dried loam, under shade and in fallow fields. Balaghat, Bastar, Bilaspur, Chhattarpur, Durg, Hoshangabad, Jabalpur, Raisen, Rajnandgaon, Sagar, Seoni, Sidhi. *Fl. & Fr.*: Sept.-April.

8. *Alysicarpus tetragonolobus* Edgew. in *Asiat. Soc. Beng.* 26: 126. 1853; Baker in *Hook. f., Fl. Brit. Ind.* 2: 159. 1876.

Diffuse or procumbent herbs with slender hairy stems, 15-45 cm high. Leaves simple, linear-oblong to elliptic-oblong, obtuse or subacute, rounded or subcordate at base, 20-40 × 3-10 mm, glabrous above, adpressed hairy beneath; stipule 4-5 mm long, scarious. Flowers in axillary 5-8 cm long lax racemes, bracteate. Calyx 4-5 mm long, linear-lanceolate, acute, deeply divided, densely villous. Corolla purplish, included. Pods 8-13 mm long, moniliform quadrangular, 2-6-jointed, constricted between joints, glabrous.

In dried up roadside ditches. Bhopal (Oommachan, 1977), E. Nimar (Maheshwari, 1960), Indore, Sagar (Bhattacharya, 1955), Sidhi. *Fl. & Fr.* : Oct.-Jan.

9. *Alysicarpus vaginalis* (L.) DC., *Prodr.* 2: 353. 1825; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 158. 1876. *Hedysarum vaginalis* L., *Sp. Pl.* 746. 1753.

Procumbent to robust herbs, 20-90 cm high. Leaves simple, elliptic lanceolate, oblong or linear - oblong, cordate at base, 0.5-8.0 x 0.5-3.0 cm, finely hairy beneath. Racemes 6-12 - flowered, 5-8 cm long, pedicels shorter than calyx. Calyx 3-4 mm long, nearly glabrous; teeth linear-lanceolate, exceeding the tube, bifid. Corolla included, purplish. Pods 12-30 x 2 mm, 6-8-jointed, joints about half as long as broad, turgid, tetragonous, reticulately veined, pubescent.

On hills slopes and wastelands. Balaghat, Bastar, Bilaspur, Chhindwara, Damoh, Durg, Gwalior, Hoshangabad, Indore, Jabalpur, Mandla, Panna, Raigarh, Raipur, Raisen, Rajnandgaon, Sagar, Seoni, Shahdol, Shivpuri, Sidhi, Surguja, W.Nimar. *Fl. & Fr.* : Through the year.

9.1 var. *nummularifolius* (DC.) Miq., *Fl. Ind. Bat.* 1: 232. 1855; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 158. 1876. *Alysicarpus nummularifolius* DC., *Prodr.* 2: 353. 1825.

Dwarf herbs. Leaflets smaller, oblong or roundish, obtuse. Racemes more crowded.

On roadsides. Hoshangabad (Bir & Kumari, 1982), Indore (Rao & Sastri, 1964), Raigarh (Wood, 1902), Sagar (Bhattacharya, 1955).

10. *Alysicarpus vasavadae* Hemadri in *Ind. For.* 97(1): 65-69. 1971.

Much branched erect annual herbs, 20-90 cm high. Leaves 1-foliolate; petioles 2-5 mm long, stipules ovate-lanceolate, acuminate, 5-10 mm long; lamina linear-oblong, hairy on both sides, 3-nerved at the base, 1.5 x 0.2-1 cm. Flowers sub-sessile in terminal racemes; bracts ovate, acuminate, villous, 6-10 mm long. Calyx 7-10 mm long; teeth lanceolate, acuminate, villous. Corolla included or slightly exerted; standard orange yellow with two orange-red spots at base inside, wing and keel red turning purplish to orange-red. Stamens diadelphous, 9+1. Pods obovate, 5-7 mm long, flat, 1-seeded.

W. Nimar (Hemadri, *l.c.*).

4. ARACHIS L.

Erect or semi-erect annual or perennial herbs. Leaves even-pinnate; stipules, adnate; leaflets usually 4. Flowers solitary axillary or in many-flowered axillary sessile capitate spikes. Calyx 5-lobed, the 4 upper

lobes jointed and lower one free. Petals and stamens inserted at the throat of the hypanthium, keel beaked, incurved. Stamens 9-10, monadelphous. Ovary sessile, much raised by elongating torus which ultimately fixes the fruit under the ground.

About 15-19 species, probably south American; one commonly cultivated in M.P.

Arachis hypogea L., Sp. Pl. 741. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 161. 1876.—*Chiniabadam*, *Moongphali*.

Semi-erect much branched slightly hairy annual herbs. Leaves stipulate, even-pinnate; stipules 2-4 cm long, adnate to the petiole; leaflets 2 pairs, ovate to obovate or elliptic, obtuse or mucronate, 2-6.5 x 0.7-3.2 cm, glabrous or faintly pilose beneath. Flowers solitary axillary, or few in axils, pedicellate; primary bracts ovate-lanceolate, 10-14 x 4-5 mm, secondary bracts bifid; hypanthium pubescent. Corolla yellow, streaked with red, 0.5-1.5 cm long; standard rounded, narrowed towards base; wings free; keel beaked, incurved. Stamens 9. Pedicel elongates soon and enters the ground where ovary develops into 1-4-seeded jointed turgid pods.

Cultivated for seeds which yield edible oil and also eaten after roasting. Bhopal, Chhindwara, Indore, Raigarh, Shivpuri, Sidhi, Surguja. Fl.: Aug.-Oct.; Fr.: Oct.-Nov.

5. ARGYROLOBIUM Eckl. & Zeyh.

Herbs or shrubs. Leaves digitately 3-foliolate. Flowers yellow in terminal or leaf-opposed racemes or umbels, bracteate and bracteolate. Calyx bilipped, upper lip 2-toothed and lower lip 3-toothed. Corolla rarely exerted, standard sub-orbicular; wings oblong or obovate; keel broad, incurved. Ovary sessile, many-ovuled; style glabrous; stigma oblique. Pods linear-oblong, compressed, villous.

About 130 species, mainly in tropical Africa; one in M.P.

Argyrolobium flaccidum (Royle) Jaub. & Spach. in Ann. Sci. Nat. Ser. 2: 19:48. 1843; Baker in Hook. f., Fl. Brit. Ind. 2: 63. 1876. *Cytisus flaccidus* Royle, Ill. Bot. Himal. 197. 1835.

Diffusely branched perennial herbs or under-shrubs, 15-30 cm high, densely clothed with adpressed silky hairs. Leaves 3-foliolate, petiole 2-6 mm long; leaflets sessile, oblong, oblanceolate or elliptic, acute, 10-25 x 4-10 mm. Racemes leaf-opposed, 1-6-flowered. Flowers ca 8 mm long. Calyx bilipped, 5-7 mm long. Corolla yellow, included or slightly exerted, standard notched. Pods narrowly oblong, 2-3 cm long, silvery hairy, 6-8 seeded.

Bhopal (Oomachan, 1977), Hoshangabad (Bir & Kumari, 1982). *Fl. & Fr.* : May-Oct.

6. ATYLOSIA Wight & Arn.

Erect or twining herbs or shrubs with pinnately or sub-digitately 3-foliolate leaves; leaflets gland-dotted beneath. Flowers axillary or racemose, bracteate. Calyx teeth distinct. Corolla exserted; standard orbicular, auricled at base; wings obliquely ovate or oblong; keel not beaked. Stamens diadelphous, 9+1. Ovary sessile, 3 or more ovuled; style incurved, glabrous; stigma terminal. Pods linear or oblong, septate.

About 20-35 species in tropical Africa, Asia and Australia; 3 in M.P.

1a. Twining or trailing herbs; flowers solitary or in axillary clusters:

2a. Leaflets orbicular; pods grey pubescent ...1. *A. platycarpa*

2b. Leaflets elliptic or obovate-oblong; pods rusty brown tomentose ...2. *A. scarabaeoides*

1b. Climbing shrubs; flowers in axillary racemes ...3. *A. volubilis*

1. *Atylosia platycarpa* Benth. in Miq., Pl. Jungh. 243. 1852; Baker in Hook. f., Fl. Brit. India 2: 216. 1876.

Slender climbing or trailing herbs; branches densely clothed with brownish short spreading hairs. Leaves pinnately 3-foliolate, stipulate; petioles 2.5-8 cm long; leaflets 3-6 cm long and broad, orbicular, acute or acuminate, membranous, finely pilose on both sides. Flowers solitary axillary or in 2-flowered racemes. Calyx 8-12 mm long, pilose; teeth long, setaceous. Corolla 12-14 mm long, pale yellow. Pods linear-oblong, 2.5-4 x 1.2-1.4 cm, flattened, mucronate, pubescent, with transverse depressions between seeds, 4-6-seeded.

Bastar. *Fl. & Fr.* : Aug.-Sept.

2. *Atylosia scarabaeoides* (L.) Benth. in Miq., Pl. Jungh. 2: 242. 1852; Baker in Hook. f., Fl. Brit. Ind. 2: 215. 1876. *Dolichos scarabaeoides* L., Sp. Pl. 726. 1753. *Cantharospermum pauciflorum* Wight & Arn., Prodr. 225. 1834. -Bankulthi

Slender profusely branched, greyish green perennial climbers with striate stem. Leaves trifoliolate, ca 5 cm long, stipulate; leaflets elliptic or obovate-oblong, obtuse and mucronate, 1.5-4.5 x 0.5-3 cm, pubescent, yellow glandular beneath; lateral ones unequally truncate at base, margins excurved. Flowers ca 8 mm long, in 2-6-flowered axillary 2 cm long racemes, bracteate. Calyx 6-7 mm long, silky tomentose. Petals 8-10 x 4 mm, yellow with maroon venations, glabrous, exserted. Pods linear-oblong, 20-25 x 5-

8 mm, pilose, 5-seeded.

On shrubs, in wastelands and mixed forests. Balaghat, Bastar, Bilaspur, Chhatarpur, Damoh, Dhar, Durg, Hoshangabad, Indore, Jabalpur, Mandla, Narsimhapur, Panna, Raigarh, Raipur, Rajnandgaon, Ratlam, Sagar, Satna, Seoni, Sidhi, Shahdol, Surguja. *Fl. & Fr.* Aug.-March.

3. *Atylosia volubilis* (Blanco), Gamble, Fl.Pres. Madras 2:369.1918. *Cytisus volubilis* Blanco, Fl. Philipp. ed.1. 599. 1879. *Atylosia mollis*. auct. non Benth. sensu. Baker in Hook. f., Fl. Brit. Ind. 2: 213. 1876. p. p. *A. crassa* Prain in J. Asiat. Soc. Bengal 45. 1898.

Perennial slender climbing shrubs with terete, striate, brown-puberulous branches. Leaves 3-foliolate, ca 10 cm long, stipulate; petioles 2.5-6 cm long; leaflets ovate or rounded-obovate, 5-10 cm long, cuspidate, coriaceous, densely brown tomentose and glandular beneath. Flowers up to 2 cm long, in lax pedunculate axillary racemes, bracteate. Calyx 8-9 mm long, campanulate; pubescent, the two upper teeth connate, the lowest one the longest. Petals yellow, twice as long as calyx, exserted, glabrous. Pods linear-oblong, 2.5-5 x 0.8-1 cm, pubescent, with oblique depressions between seeds. Seeds 4-9, orbicular, strophiolate.

In moist valleys along streams. Bastar, Mandla, Raigarh, Seoni, Sidhi, Surguja. *Fl. & Fr.* : Nov.-April

7. BUTEA Koenig ex Roxb.

Trees, shrubs, or large woody climbers. Leaves pinnately 3-foliolate; leaflets large; stipules caducous. Flowers showy, large or small, in axillary or terminal racemes or panicles, fasciated on nodes. Calyx broadly campanulate; teeth short, lanceolate or deltoid. Corolla much exserted; petals 5, standard ovate, acute, recurved; wings adnate to the acute keel. Stamens diadelphous, 9+1. Ovary sessile or stipitate, 2-ovuled; style incurved; stigma terminal. Pods oblong, compressed. Seed solitary near the apex, obovoid, compressed.

About 30 species in Indo-Malaya and China; 3 in M.P.

- 1a. Small to medium-sized trees ...1. *B. monosperma*
- 1b. Large woody climbers:
 - 2a. Flowers white, in 20-60 cm long terminal panicle. ...2. *B. parviflora*
 - 2b. Flowers scarlet or flame coloured, in 20-30 cm long racemes. ...3. *B. superba*

1. *Butea monosperma* (Lamk.) Taub.in Engler & Prantl, Pflanzenfam. 3(3): 366.1894. *Erythrina monosperma* Lamk., Encycl. 2 : 391.1786. *Butea frondosa* Koen. ex. Roxb. in Asiat. Res. 3:469.1792. Baker in Hook. f., Fl. Brit.

Ind. 2:194.1876. - *Dhak, Palas*

Medium-sized deciduous trees, 10-15 m high. Leaves pinnately 3-foliolate; petioles 7-15 cm long; leaflets grey-tomentose beneath, terminal ovate-rhomboid, 10-20 cm long, equally broad, rounded at apex; lateral ones oblique and smaller. Flowers ca 5 cm long in fascicle, on 8-10 cm long racemes on leafless branches. Calyx black velvety; teeth 5, the upper 2 connate, the lower 3 deltoid. Corolla showy, flame-coloured or scarlet to orange coloured, silky outside; standard 2.5-5 cm long; keel semi-circular, beaked. Pods 10-20 x 2.5-4 cm, stalked, rounded at base, 1-seeded at apex.

In sal and mixed forests and wastelands. Balaghat, Bastar, Bhopal, Bilaspur, Chhattarpur, Damoh, Durg, Hoshangabad, Indore, Jabalpur, Mandla, Raigarh, Raipur, Raisen, Rajnandgaon, Rewa, Sagar, Seoni, Shahdol, Shivpuri, Sidhi, Surguja, W. Nimar. *Fl. & Fr.* : Jan.-May.

Leaves used for making plates and bowls; stem yields a red gum. Flowers yields a yellow dye widely used for colour throwing during Holi festival.

1.1. var. *lutea* (Witt) Maheshwari in Bull. Bot. Surv. Ind. 3:92.1961. *Butea frondosa* Koen. ex Roxb. var. *lutea* Witt, Descript. List. N. & Berar. For. Circ. C.P. 75. 1916. *Butea lutea* Sagreya in Ind. For. 65: 560. 1939.

Similar to the type species variety but the flowers are yellow.

W. Nimar (Maheshwari 1960), Satna.

2. *Butea parviflora* Roxb., Fl. Ind. 3:248. 1832. *Spatholobus roxburghii* Benth. in Miq. Pl. Jungh. 238. 1852; Baker in Hook. f., Fl. Brit. Ind. 2:193.1876. *S. parviflorus* (Roxb.) O.Kuntze, Rev. Gen. Pl. 1:205. 1891. - *Murdhabel*.

Gigantic woody climbers. Leaves pinnately 3-foliolate; petioles 8-10 cm long; leaflets sub-coriaceous, grey tomentose beneath, terminal obovate, elliptic or sub-rhomboid, cuspidate, 12-30 cm long, lateral ones oblique; lateral nerves 7-10 on each side. Flowers sub-sessile, in 20-60 cm long terminal panicles. Calyx campanulate, grey-velvety; teeth acute, upper two connate. Corolla cream-coloured or white; standard longer than the keel, emarginate; wings free. Pods stalked, flat, 7-15 x 2-4 cm, often constricted below the solitary seed.

Climbing on trees in mixed and sal forests. Balaghat, Bilaspur, Jabalpur, Mandla, Raigarh, Raipur, Shahdol, Sidhi, Surguja. *Fl.*: Sept.-Feb.; *Fr.* : Feb.-April

3 *Butea superba* Roxb., Pl. Corom. 23, t. 22. 1795 ; Baker in Hook. f., Fl. Brit. Ind. 2 : 195. 1876. -*Bodla, Palas-bel*.

Large woody climbers, 10-15 m high. Leaves pinnately 3-foliolate;

petioles 15-20 cm long; leaflets obovate, rhomboid, retuse, rounded at base, 20-50 cm long; Flowers 4-6.5 cm long, in 20-30 cm long racemes. Calyx broadly campanulate; teeth lanceolate, deltoid velvety tomentose. Corolla very much exserted, showy, orange-scarlet or flame-coloured; standard acute, recurved; wings adnate to much curved acute keel. Pods stalked, 10-15 cm long, narrowed and rounded at base, 1-seeded.

In mixed forests. Bilaspur, Chhindwara, Durg, Hoshangabad, Jabalpur, Mandla, Raipur, Raisen, Rajnandgaon, Seoni, Shahdol. Fl.: March-April; Fr.: April-June.

8. CAJANUS DC.

A monotypic genus, probably native of the old world. Widely cultivated throughout M.P. for the seeds used as pulses.

Cajanus cajan (L.) Huth in Helios 11.133.1893; Millsp. in Publ. Mus. Nat. Hist. Bot. Sr. 2: 53. 1900. *Cytisus cajan* L., Sp. Pl. 2: 739. 1753. *Cajanus indicus* Spreng., Syst. Veg. 3: 248. 1826; Baker in Hook. f., Fl. Brit. Ind. 2: 217. 1876. -*Arahar*.

Erect shrubs, 1-3 m high, with many sulcate silky branches. Leaves pinnately 3-foliolate, minutely stipulate; leaflets 2.5-10 x 1.5-3.5 cm, oblong-lanceolate, acute, entire, white-silky beneath, glandular on both surfaces. Flowers in axillary racemes or terminal panicles, ca 2 cm long. Calyx 6-7 mm long, campanulate, teeth short, glandular pubescent. Corolla 18-21 mm long, yellow streaked with reddish-brown, petals equal, keel truncate. Stamens diadelphous, 9+1. Ovary sessile; style filiform; stigma capitate. Pods 5-10 cm long, linear-oblong, pubescent, narrowed at both ends with oblique depressions between the seeds; seed 3-5.

Cultivated as a Kharif crop for its seeds used as pulses. Bastar, Bhopal, Bilaspur, Indore, Jabalpur, Mandla, Raigarh, Raipur, Sagar, Shahdol, Shivpuri, Sidhi, Surguja. Fl. & Fr. : Aug.-March.

9. CALPURNEA E. Meyer

Shrubs or small trees. Leaves imparipinnate, leaflets numerous. Inflorescence a raceme or a panicle. Calyx tube campanulate; teeth triangular. Corolla exserted; petals equal; keel obtuse, incurved. Stamens free. Ovary stipitate, linear, many-ovuled; style filiform; stigma capitate. Pods flat, strap-shaped, many-seeded, winged along the dorsal suture.

About 6 species in Cape and Abyssinia; one in M.P.

Calpurnea aurea (Ait.) Benth., Comm. Leg. Gen. 26. 1837; Baker in Hook. f., Fl. Brit. Ind. 2: 251. 1876. *Sophora aurea* Ait., Hort. Kew. ed. 2: 44. 1789. *Bansam*.

Small trees, 3-5 m high, with slender finely adpressed grey silky branches. Leaves imparipinnate; petioles slender, 1.2-2.5 cm long; rachis 7-10 cm long; leaflets 13-21, opposite, shortly stalked, oblong, obtuse to elliptic, rounded at both ends, 2.5-4.5 cm long, membranous, glabrous. Flowers copious, in 12-20-flowered axillary racemes; bracts ovate. Calyx 3-7 mm long, oblique; teeth deltoid, the upper 2 connate. Corolla yellow, 6-10 mm long; standard sub-orbicular; wings falcate, oblong; keel incurved, obtuse. Pods paliabile, 7-10 x 1.2-1.5 cm, stalked acute, glabrous, winged along the upper suture, 5-6-seeded.

In wastelands. Hoshangabad. *Fl. & Fr.* : Aug.-Oct.

10. CANAVALLIA DC.

Large twining or prostrate herbs with pinnately 3-foliolate leaves and large showy flowers in axillary racemes or in groups along rachis, bracteate and bracteolate. Calyx bilipped, upper lip entire, the lower 3-toothed. Corolla exserted, standard rounded reflexed; keel incurved, obtuse or beaked. Stamens monadelphous, 10. Ovary shortly stipitate, many ovules; style incurved; stigma capitate. Pods large, linear or linear-oblong, flat, with a wing or rib near upper suture.

About 50 species, tropical and subtropical, ? in M.P.

- 1a. Leaflets ovate to rhomboid-elliptic, abruptly acuminate ... 1. *C. gladiata*
 1b. Leaflets ovate or orbicular, shortly mucronate ... 2. *C. virosa*

1. *Canavalia gladiata* (Jacq.) DC., Prodr. 2: 404. 1825. *Dolichos gladiatus* Jacq., Coll. Bot. 2: 276. 1788. *C. ensiformis* sensu Baker in Hook. f., Fl. Brit. Ind. 2: 195. 1876, p.p. et alior auct. (non DC. nec *Dolichos ensiformis* L.). -Banssem, Makhanssem.

Large perennial shrubby climbers with terete glabrous branches. Leaves pinnately 3-foliolate, stipulate; petioles 8-13 cm long; leaflets ovate to rhomboid-elliptic, abruptly acuminate, rounded at base, 5-15 x 3.5-10 cm, glabrous, lateral ones oblique. Flowers ca 4 cm long, in axillary 10-30 cm long racemes. Calyx ca 15 mm long, bilabiate, upper lip notched, lower 3-toothed. Corolla purple or white tinged with purple, 2-5 cm long; standard suborbicular, reflexed, auricled at base. Pods linear or oblong, compressed, 15-40 x 2-4 cm, thickened along both the sutures. Seeds 8-15, pinkish brown.

On roadside bushes. Chhatarpur, Gwalior, Indore, Mandla, Satna, W. Nimar. *Fl.*: Aug.-Dec.; *Fr.* : Oct.-Feb. Often cultivated for edible pods.

2. *Canavalia virosa* (Roxb.) Wight & Arn., Prodr. 253. 1834. *Dolichos virosus* Roxb., Fl. Ind. ed. Carey, 3: 301. 1832. excl. syn. *C. ensiformis* (L.) DC. var. *virosa* (Roxb.) Baker in Hook. f., Fl. Brit. Ind. 2: 196. 1876. -Kathsem.

Trailing or climbing shrubs, 3-5 m high; stem and branches adpressed pubescent when young, glabrous afterwards. Leaves pinnately 3-foliolate; petioles 8-16 cm long; leaflets ovate or orbicular, sub-acute, obtuse or rarely shortly mucronate at apex, cuneate or sub-truncate at base, 6-16 × 3.5-10 cm, pubescent on both sides. Flowers in pedunculate 12-28 cm long axillary racemes. Calyx bilabiate, upper lip emarginate, lower 3-toothed, pubescent. Corolla rose purple, standard, 2.7-3 cm long, reflexed, auricled at base. Pods elliptic-oblong, compressed, 10-16 × 2-3 cm, thickened along both the sutures, sparsely hairy or glabrous. Seeds 4-8, ovoid or ellipsoid.

On shrubs, near streams, Damoh, Sagar. *Fl. & Fr.* Oct.-April.

11. CICER L.

Annual herbs with slender glandular pubescent stem. Leaves usually odd pinnate; leaflets and stipules deeply toothed, terminal leaflets sometimes modified into a tendril or a spine. Flowers solitary axillary. Calyx tube oblique, teeth unequal, lanceolate. Corolla much longer than calyx; standard broad, exceeding the wings and keel. Stamens diadelphous, 9+1. Ovary 2-few-ovuled; style not bearded; stigma terminal. Pods sessile, oblong to ellipsoid, inflated, style persistent; seeds ovoid with a slender funicle.

About 20 species from North Africa, E. Mediterranean to Central Asia; one widely cultivated in M.P. as a winter crop.

Cicer arietinum L., Sp. Pl. 738. 1753; Baker in Hook. *f.*, Fl. Brit. Ind. 2: 176. 1876. -*Chana*.

A much branched annual herb up to 45 cm tall with glandular pubescent stem. Leaves imparipinnately compound, 3-5 cm long; leaflets many, 10-15 × 5-7 mm, deeply toothed and strongly veined; stipules dentate. Flowers solitary, axillary, 10-15 mm long, purple or white. Calyx 7-9 mm long, teeth linear. Corolla twice to thrice the length of the calyx. Pods oblong-ellipsoid, inflated, 1.5-2.5 × 1 cm, glandular pubescent; seeds 1-4, ovoid.

Commonly cultivated as a cold weather crop for its seeds used as a pulse and vegetable. Bhopal, Bilaspur, Chhindwara, Hoshangabad, Indore, Mandla, Sagar, Shivpuri, Sidhi, Surguja. *Fl. & Fr.*: Nov.-March.

12. CLITORIA L.

Twining or erect herbs or shrubs. Leaves 3-9-foliolate; stipules persistent. Flowers large, showy, axillary, solitary or in pairs; bracts and bracteoles persistent. Calyx tubular, 5-toothed, the 2 upper ones subconnate. Corolla white, blue or red; standard large, emarginate, narrowed at base; wings oblong, falcate, adnate to the incurved keel. Stamens 10, mono- or di-adelphous. Ovary stalked, many-ovuled; style incurved, dilated at top,

longitudinally bearded. Pods linear, oblong, flat, compressed.

About 40 species in tropical and sub-tropical regions, 2 in M.P.

- 1a. Erect pubescent herbs; flowers in pairs. ...1. *C. biflora*
 1b. Twining glabrous herbs; flowers solitary. ...2. *C. ternatea*

1. *Clitoria biflora* Dalz. in Kew Journ. 2: 35. 1850; Baker in Hook. f., Fl. Brit. Ind. 2: 208. 1876.

Annual erect herbs, 40-60 cm high, with densely pubescent young branches. Leaves imparipinnate, 5-foliolate; leaflets elliptic to ovate-lanceolate, acute, 2.5-8 × 1-2 cm; stipules minute, lanceolate. Flowers sessile, axillary, geminate, rarely solitary, deflexed; bracteoles ovate-lanceolate, aristate. Calyx 1-1.5 cm long, tubular; teeth lanceolate, aristate, shorter than the tube. Corolla white or bluish. Pods flat, 2.5-5 cm long, pubescent, 5-6-seeded.

In wastelands. Balaghat, Damoh, Dhar, Hoshangabad, Panna, Seoni, Shahdol. Fl. & Fr.: Aug.-Oct.

2. *Clitoria ternatea* L., Sp. Pl. 753. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 208. 1876. -*Aparjit*, *Kajroti*

Slender twining perennial climbers with a few trailing branches. Leaves 5-12 cm long, imparipinnate, 5-foliolate; leaflets elliptic, obtuse or emarginate, 2.5 × 1.5-3 cm; stipules persistent, lanceolate, striate. Flowers solitary on axillary peduncles; bracteoles 2, foliaceous, obtuse. Calyx tubular, ca 1 cm long; teeth lanceolate, as long as the tube. Corolla 4-5 cm, long, blue or white; standard spoon shaped, longer than wings and keel. Stamens 10, diadelphous. Pods linear, flat, 5-10 cm long, 8-10-seeded.

On roadside bushes. Bastar, Bilaspur, Chhindwara, Hoshangabad, Indore, Mandla, Raigarh, Raipur, Raisen, Ratlam, Rewa, Sagar, Satna, Seoni, Shahdol, Shivpuri, Sidhi, W. Nimar. Fl. & Fr.: July-March.

13. CROTALARIA L.

Herbs or shrubs with simple or digitately 3-foliolate or 5-7-foliolate stipulate leaves. Flowers in terminal or leaf opposed racemes, rarely solitary; bracts and bracteoles minute or absent. Calyx tube short; teeth linear-lanceolate, subequal, free or the upper two connate, forming a lip. Corolla exserted; standard orbicular, exceeding the obovate-oblong wing; keel incurved, beaked. Stamens monadelphous. Ovary sessile, 2-many-ovuled; style incurved, bearded above; stigma oblique. Pods sessile or stalked, globose or linear oblong, turgid or inflated, 2-many-seeded.

About 550 species in tropical and subtropical regions; 27 in M.P.

- 1a. Leaves compound:
- 2a. Leaves mostly 5-foliolate ...19. *C. quinquefolia*
- 2b. Leaves strictly 3-foliolate:
- 3a. Pods 2-seeded:
- 4a. Leaflets 5-20 mm long; branches and leaflets white pubescent ...12. *C. medicaginea*
- 4b. Leaflets 25-35 mm long; branches and leaflets not white pubescent:
- 5a. Branches cylindrical, clothed with yellow grey silky hairs; racemes 3-7 cm long ...15. *C. notonii*
- 5b. Branches slender, pubescent; racemes 10-15 cm long ...24. *C. trifoliatrum*
- 3b. Pods more than 2-seeded:
- 6a. Branches glabrous; leaflets 2.5-5 cm long; calyx 6-18 mm long, glabrous; pods 3.5-5 cm long, glabrous ...10. *C. laburnifolia*
- 6b. Branches clothed with bulbous based brown-hairs; leaflets 2.5-3.5 cm long; calyx 4-5 mm long, pubescent; pods ca 1.2 cm long ...16. *C. orixensis*
- 1b. Leaves simple:
- 7a. Stem winged or spiny at tip:
- 8a. Stems winged; racemes leaf opposed; calyx 9-10 mm long; pods 3-4 cm long, glabrous, many-seeded ...3. *C. bialata*
- 8b. Stems spine-tipped; racemes terminal; calyx 6-8 mm long; pods 5 mm long, brownish, 1-2-seeded ...4. *C. burhia*
- 7b. Stems neither winged nor spiny at tip:
- 9a. Inflorescence a terminal umbel, or capitate, often with axillary flowers below:
- 10a. Plants much branched; inflorescence terminal umbel ...26. *C. umbellata*
- 10b. Plants unbranched; inflorescence capitate ...14. *C. nana*
- 9b. Inflorescence a raceme, or flowers solitary:
- 11a. Racemes lateral or leaf-opposed:
- 12a. Stipules present:
- 13a. Pods more than 1.5 cm long, densely hirsute ...6. *C. hirsuta*
- 13b. Pods less than 1 cm long, glabrous:

- 14a. Racemes 12-20-flowered ...1. *C. acicularis*.
- 14b. Racemes 3-8-flowered ...8. *C. humifusa*
- 12b. Stipules absent:
- 15a. Bracts minute, subulate; peduncle
2-4-flowered ...17. *C. prostrata*
- 15b. Bracts foliaceous, lanceolate; peduncle, 4-5-
flowered ...27. *C. vestita*
- 11b. Racemes terminal:
- 16a. Stipules present:
- 17a. Corolla about half as long as the calyx ...5. *C. calycina*
- 17b. Corolla about as long as or longer than the calyx:
- 18a. Flowers blue ...22. *C. sessiliflora*
- 18b. Flowers yellow:
- 19a. Inflorescence glandular; pods one-
seeded ...20. *C. ramosissima*
- 19b. Inflorescence not glandular; pods more than
one-seeded:
- 20a. Stipules foliaceous:
- 21a. Bracts glabrous; pods cylindrical,
glabrous ...23. *C. spectabilis*
- 21b. Bracts pilose; pods obovoid, silky
hairy ...13. *C. mysorensis*
- 20b. Stipules not as above:
- 22a. Pods linear-oblong, glabrous ...21. *C. retusa*
- 22b. Pods oblong-subcylindrical, hirsute or
velvety:
- 23a. Racemes 2-3-flowered; calyx 6-8
mm long ...25. *C. triquetra*
- 23b. Racemes 12-20-flowered; calyx 9-12
mm long ...9. *C. juncea*
- 16b. Stipules absent:
- 24a. Racemes short:
- 25a. Racemes 2-6-flowered; bracts foliaceous
lanceolate; corolla yellow, standard and keel not
fimbriate; pods ca 10 mm long, oblong, glabrous ...7. *C. hirta*
- 25b. Racemes 6-10-flowered; bracts subulate; corolla
white tinged with pink, standard and keel

fimbriate; pods 5-8 mm long ovoid or orbicular,
silky brown ...18. *C. pusilla*

24b. Racemes elongated:

26a. Upper calyx lobes connate almost to the tip;
pods not exerted ...2. *C. albida*

26b. Upper calyx lobes nearly free to the base; pods
much exerted ...11. *C. linifolia*

1. *Crotalaria acicularis* Benth. in Hook. Lond. J. Bot. 2: 476. 1843;
Baker in Hook. f., Fl. Brit. Ind. 2: 68. 1876. -*Bhursa*.

Small diffuse herbs with a woody root-stock, 20-35 cm high, clothed with short spreading silky hairs. Leaves simple, sessile, 1.2-3.5 cm long, elliptic or orbicular-oblong, obtuse, obliquely cordate at base, membranous, faintly silky. Racemes lateral or leaf-opposed, short peduncled, 12-20-flowered, densely silky hairy. Flowers ca 6 mm long, bracts reflexed. Calyx 3-4 mm long, densely silky; teeth linear. Corolla included, yellow. Pods sessile, linear-oblong, 6-8 mm long, glabrous, 15-20-seeded.

In cultivated fields. Balaghat, Raigarh, Shahdol, Surguja. Fl.: Nov.-Feb.

2. *Crotalaria albida* Heyne ex Roth, Nov. Sp. Pl. 333. 1821; Baker in Hook. f., Fl. Brit. Ind. 2: 71. 1876.

Much branched silky pubescent herbs, 20-70 cm high. Leaves simple, 15-70 × 4-10 mm, linear, oblong or obovate, obtuse or emarginate, cuneate at base, glabrescent above, faintly silky beneath. Racemes terminal, 5-10 cm long; flowers 8-12 mm long, pedicels 2.5-4.5 mm long; bracts and bracteoles linear. Calyx 5-7 mm long, silky; 2 upper lobes oblong, obtuse, 3 lower teeth linear. Corolla yellow, glabrous. Pods sessile, oblong, 10-12 mm long glabrous, 6-12-seeded.

In mixed forests and wastelands. Balaghat, Bastar, Bilaspur, Chhindwara, Damoh, Durg, Hoshangabad, Mandla, Narshimhapur, Panna, Raigarh, Raipur, Raisen, Rajnandgaon, Rewa, Satna, Seoni, Shahdol, Sidhi, Surguja, W. Nimar. Fl. & Fr.: Aug.-April.

3. *Crotalaria bialata* Schrank, Pl. Rar. Hort. Monac. t. 13. 1819. *C. alata* Buch.-Ham. & Roxb. ex D. Don, Prodr. 241. 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 69. 1876.

Erect or sub-erect annual pubescent herbs, 30-70 cm high; stems winged. Leaves simple, 2-8 cm long, sub-sessile, elliptic-oblong or ovate-oblong, oblique at base, silky pubescent below; stipules decurrent as wings on the branches. Racemes leaf-opposed, 7-10 cm long, few-flowered; bracts lanceolate. Flowers 12-15 mm long. Calyx 9-10 mm long, silky. Corolla yellow. Pods oblong, glabrous, 3-4 cm long, many-seeded.

In forest floor. Balaghat, Bastar, Bilaspur, Mandla, Raigarh, Raipur, Seoni, Sidhi, Surguja. *Fl. & Fr.*: Aug.-Dec.

4. *Crotalaria burhia* Buch.-Ham. ex Benth. in Hook. Lond. J. Bot. 2: 474. 1843; Baker in Hook. *f.*, Fl. Brit. Ind. 2: 66. 1876.

Small erect or procumbent undershrubs, 20-40 cm high, with numerous rigid, often spine-tipped, branches, clothed with fine pale tomentum. Leaves simple, sessile, distant, oblong, silky mucronate, 15-40 × 4-8 mm. Racemes terminal, 6-8 mm long, 4-12-flowered, flowers bracteolate. Calyx 6-8 mm long villous; teeth lanceolate. Corolla yellow, streaked with darker yellow; standard ovate, folded, obtuse with a woolly claw; wings oblong; keel incurved, beaked. Pods oblong or obliquely ovoid, ca 5 × 4 mm, brownish, 1-2-seeded.

Chhindwara, Gwalior, Mandasaur, Morena, Ratlam. *Fl. & Fr.*: Aug.-Feb.

5. *Crotalaria calycina* Schrank, Pl. Rar. Hort. Monac. t. 12. 1817; Baker in Hook. *f.*, Fl. Brit. Ind. 2: 72. 1876.

Erect annual pubescent herbs, 0.3-1 m high. Leaves simple, sessile, linear-lanceolate, acute, 2.5-10 cm long, 5-13 mm broad, glabrous above, silky pubescent beneath; petiole 1.5-4 mm long; stipules minute. Racemes axillary or terminal, up to 15 cm long, many flowered; bract linear lanceolate. Calyx 1.8-2.5 cm long, densely pilose, lower teeth lanceolate and acuminate, upper teeth broader and subobtuse. Corolla yellow, glabrous. Pods sessile, subcylindric, 20-25 × 8 mm, glabrous, many-seeded.

In sandy soil, along streams. Balaghat, Bastar, Bilaspur, Chhindwara, Gwalior, Mandla, Raigarh, Raipur, Rajnandgaon, Satna, Seoni, Shahdol, Sidhi, Surguja. *Fl. & Fr.*: Aug.-March.

6. *Crotalaria hirsuta* Willd., Sp. Pl. 3: 978. 1803; Baker in Hook. *f.*, Fl. Brit. Ind. 2: 68. 1876.

An erect or diffuse perennial herb, 60 cm to 1 m high, clothed with softly spreading hairs. Branches slightly arched. Leaves simple, broadly ovate acute, 2.5-5 cm long, rounded or slightly oblique at base and mucronate at apex; stipules linear, minute, reflexed, 2.5-3.5 mm. Racemes short peduncled, up to 5 cm long, 2-3-flowered. Peduncles slender, often leafy, clothed with short spreading hairs. Bracts lanceolate, minute. Calyx 6-7 mm, densely pubescent. Corolla yellow, standard with purple spots, exserted. Pods sessile, oblong, clothed with short spreading hairs. Bracts lanceolate, minute. Calyx 6-7 mm, densely pubescent. Corolla yellow, standard with purple spots, exserted. Pods sessile, oblong, clothed with spreading brown hairs, 1.5-2.5 cm long, 6-10-seeded.

Common in rocky places and wastelands. Damoh, Indore, Raigarh, Tikamgarh. *Fl. & Fr.* : Sept.

7. *Crotalaria hirta* Willd. in Ges. Naturf. Fr. Neue. Schr. 4: 217. 1803; Baker in Hook *f.*, Brit. Ind. 2: 70. 1876.

Diffuse annual herbs with 20-30 cm long sub-erect branches. Leaves simple linear or linear lanceolate, rounded at base, 1.5-4 × 0.3-1.0 cm, densely hairy; petioles 12-18 mm long. Racemes subcapitate, 2-6-flowered; bracts foliaceous, lanceolate. Calyx 6-7 mm long, densely hairy. Corolla yellow. Pods oblong, ca 10 × 7 mm, glabrous, many-seeded.

In cultivated fields. Bastar, Hoshangabad, Jabalpur, Narsimhapur, Rajnandgaon, Raisen, Sagar, Sidhi. *Fl. & Fr.*: Sept.-Feb.

8. *Crotalaria humifusa* Grah. ex Benth. in Hook. Lond. J. Bot. 2: 478. 1843; Baker in Hook. *f.*, Fl. Brit. Ind. 2: 67. 1876.

Trailing slender much branched herbs; branches 10-25 cm long, clothed with short spreading yellow-brown silky hairs. Leaves sessile, orbicular or oblong, 12-25 × 5-20 mm, obtuse, membranous, pale, glaucous beneath, stipulate. Racemes lateral, 2.5 - 4 cm long, densely silky, 3-8-flowered, bracteate. Calyx 3-4 mm long, villous; teeth linear, longer than the tube. Corolla yellow, equalling calyx, glabrous. Pods 5-6 mm long, oblong, glabrous, 6-10-seeded.

In wastelands. Bastar (*Saxena & Khotele*, 1976) Shahdol (*Saxena*, 1970). *Fl. & Fr.* : Sept.-Jan.

9. *Crotalaria juncea* L., Sp. Pl. 714. 1753; Baker in Hook *f.*, Fl. Brit. Ind. 2: 79. 1876. - *Sanai*.

Tall stiff annual undershrubs, 0.8-2.5 m high, with terete sulcate thinly silky branches. Leaves simple, linear or linear-oblong, 2.5-10×0.5-2 cm, obtuse or acute, shining pubescent on both the surfaces. Racemes terminal up to 30 cm long, 12-20-flowered. Flowers ca 25 mm long. Calyx 12- 20 mm long, brown velvety, deeply toothed. Corolla bright yellow, glabrous. Pods oblong, 2.5-4 cm long, inflated, silky, 10-15-seeded.

Balaghat, Bhopal, Chhindwara, Gwalior, Hoshangabad, Indore, Jabalpur, Panna, Sagar, Shivpuri. *Fl. & Fr.*: Oct.-Nov.

Cultivated throughout the area as a fibre yielding plants and for green manure; flowers are also used as vegetable by the poor people.

10. *Crotalaria laburnifolia* L., Sp. Pl. 715. 1753; Baker in Hook. *f.*, Fl. Brit. Ind. 2:84. 1876.

Erect shrubs, 0.5-1.2 m high, with slender terete glabrous branches.

Leaves 3-foliolate; petioles 3.5-8 cm long; leaflets obovate-oblong, acute at both ends, 2.5-5 × 1.5-4 cm, glabrous. Racemes terminal and lateral, few-flowered, 15-30 cm long; pedicels 12 mm long. Calyx 6-10 mm long, turbinate, glabrous; teeth lanceolate, as long as the tube. Corolla yellow, ca 25 mm long, glabrous; keel broad, with a long incurved beak. Pods cylindrical, long stalked, 3.5-5.0 cm long, glabrous, 20-30-seeded.

Bastar (*Saxena & Khotale*, 1976). *Fl. & Fr.*: Sept.-Jan.

11. *Crotalaria linifolia* L. *f.*, *Suppl.* 322. 1781; Baker in Hook *f.*, *Fl. Brit. Ind.* 2: 72. 1876.

Erect annual herbs, 15-60 cm high, with white hairy ascending branches. Leaves simple, sessile, oblong-linear to linear-oblancheolate, subcuneate at base, mucronate at apex, 3-7 × 0.5-1.3 cm, silky. Racemes terminal, 7-15 cm long, many-flowered, bracts subulate. Calyx 4-6 mm long, bilabiate, densely silky. Corolla yellow, glabrous. Pods globose or oblong-ovoid, glabrous, ca 8 mm long, 8-10-seeded.

In wastelands. Balaghat, Bastar, Bhopal, Chhindwara, Dhar, Hoshangabad, Indore, Mandla, Panna, Raigarh, Rajnandgaon, Sagar, Surguja. *Fl. & Fr.*: Aug.-March.

12. *Crotalaria medicaginea* Lamk., *Encycl.* 2: 201. 1790; Baker in Hook *f.*, *Fl. Brit. Ind.* 2: 81. 1876.- *Gulabi*.

Slender perennial hairy herbs, 10-35 cm high. Leaves 3-foliolate; petiole 2-5 mm long; leaflets oblanceolate, 5-15 × 2-5 mm, obtuse to subtruncate, apiculate glabrous above, pubescent beneath; stipules setaceous. Racemes terminal and leaf-opposed, few-flowered; bracts linear. Calyx 2-3 mm long, pubescent; teeth acute, longer than the tube. Corolla yellow. Pods subglobose, apiculate, ca 3 mm diam., pubescent, 2-seeded.

In wastelands, on sandy to clayey soil. Bastar, Bhind, Bhopal, Bilaspur, Gwalior, Hoshangabad, Indore, Mandla, Morena, Panna, Raigarh, Rajnandgaon, Sagar, Satna, Shahdol, Shivpuri, Surguja, W. Nimar. *Fl. & Fr.*: Sept.-April.

13. *Crotalaria mysorensis* Roth, *Nov. Sp. Pl.* 338. 1821; Baker in Hook *f.*, *Fl. Brit. Ind.* 2: 70. 1876.

Much branched erect annual herbs, 20-60 cm high, densely clothed with brown silky hairs. Leaves simple, sessile, oblong or elliptic ovate, 1.5-8 cm long 3-15 mm broad, obtuse to subacute, apiculate, membranous, silky hairy. Racemes terminal, 6-25 cm long, laxly 3-12-flowered; bracts foliaceous, lanceolate, pilose, 1-2 cm long. Calyx 12-16 mm long, densely pilose, upper lobes lanceolate, lower linear. Corolla yellow; standard ovate, 13-18 mm long. Pods oblong, inflated, 18-35 mm long, clothed with yellow

brown silky hairs, 20-30-seeded.

Along streams. Balaghat, Bilaspur, Hoshangabad, Indore, Sagar, Satna, Shahdol, Shivpuri. *Fl.*: Aug.-Dec.; *Fr.*: Sept.-April.

14. *Crotalaria nana* Burm. f., *Fl. Ind.* 156. t. 48. f. 2. 1768; Baker in Hook. f., *Fl. Brit. Ind.* 2: 71. 1876, *p.p.*

Erect hairy less-branched annual herbs, 20-30 cm high, with cylindrical ascending branches clothed with long spreading hairs. Leaves simple, subsessile, oblong or oblanceolate, obtuse or apiculate at apex, subacute at base, 18-35 × 5-10 mm, sparsely hairy above, densely silky hairy beneath. Flowers in terminal or axillary umbels, 6-8-flowered. Calyx 3-4 mm long, densely silky hairy, upper two lobes nearly connate. Corolla yellow, glabrous, scarcely exerted. Pods ovoid or globose, ca 5 mm long, glabrous, few-seeded.

In shade and mixed forests. Chhindwara, Hoshangabad, Shahdol. *Fl. & Fr.* : Sept.-Dec.

15. *Crotalaria notonii* Wt. & Arn., *Prodr.* 192. 1834; Baker in Hook. f., *Fl. Brit. Ind.* 2: 82. 1876.

Small shrubs or undershrubs with cylindrical branches clothed with yellow-grey silky hairs. Leaves 3-foliolate; leaflets obovate-oblong, 2-4 cm long, glabrous above, silky hairy beneath; stipules setaceous, ca 4 mm long. Racemes 3-7 cm long, terminal, dense-flowered; bracts setaceous. Calyx 4-5 mm long, pubescent; teeth lanceolate as long as the tube. Corolla bright yellow; keel with a long beak. Pods sub-quadrangular, pubescent, 6-7 mm long.

In mixed forests. Raipur. *Fl. & Fr.*: Oct.

16. *Crotalaria orixensis* Rottl. ex Willd., in *Ges. Naturf. Fr. Neue. Schr.* 4: 217. 1803; Baker in Hook. f., *Fl. Brit. Ind.* 2: 83. 1876. -*Sann.*

Perennial diffuse herbs with 30-45 cm long slender branches clothed with bulbous based brown hairs. Leaves 3-foliolate; petiole 10-25 mm long; leaflets elliptic or obovate-oblong, obtuse, 2-3.5 cm long, glabrous above long hairy beneath; stipules linear. Racemes long, lax, numerous, few-flowered; bracts large, foliaceous, acuminate, reflexed. Flowers ca 7 mm long; pedicels 12-16 mm long. Calyx 4-5 mm long; teeth linear. Corolla yellow. Pods oblong, ca 1 cm long, stalk 4-5 mm long, glabrous, 8-10-seeded.

On hill slopes and on black-cotton soil. Bastar, Dhar, Gwalior, Hoshangabad, Indore, Raisen, Rajnandgaon, Sagar, W. Nimar. *Fl. & Fr.* : Aug.-Feb.

17. *Crotalaria prostrata* Rottl. ex Willd., Enum. Hort. Berol. 747, 1809. *C. prostrata* Roxb., Hort. Beng. 54. 1814. *nom. nud.*; Baker in Hook. f., Fl. Brit. Ind. 2: 67. 1876. —*Kartik jhumka*.

Diffuse herbs, 15-50 cm high, with perennial root stock and stem and branches clothed with silky yellowish brown hairs. Leaves simple, 18-40×10-20 mm, subsessile, oblong or obovate-oblong, obtuse, oblique at base, silky above, glaucous beneath. Racemes on long slender peduncle, 2-4-flowered. Calyx 2-4 mm long, densely silky; teeth linear. Corolla yellow, scarcely exerted. Pods shortly stalked, linear-oblong, 12-20 mm long, inflated, glabrous, 12-15-seeded.

In forest floors and cultivated fields. Balagahat, Bastar, Bilaspur, Chhindwara, Durg, Damoh, Hoshangabad, Indore, Jabalpur, Mandla, Panna, Raigarh, Raipur, Raisen, Rajnandgaon, Sagar, Seoni, Sidhi, Shahdol, Surguja. *Fl. & Fr.*: July-June.

18. *Crotalaria pusilla* Heyne ex Roth, Nov. Pl. Sp. 235. 1821; Baker in Hook. f., Fl. Brit. Ind. 2: 70. 1876.

Diffusely branched pubescent herbs with terete brown pubescent branches. Leaves sessile, linear-elliptic or lanceolate, obtuse, brown pubescent, 5-15×2-4 mm, membranous. Racemes terminal and lateral, 3.5-4.5 cm long, 6-10-flowered. Calyx 2-4 mm long, campanulate; teeth linear, brown silky. Corolla white with pink tinge, 3-4 mm long; petals clawed; standard and keel fimbriate above the claw. Pods 5-8×3 mm, ovoid-orbicular, silky brown, 4-8-seeded.

In open forests. Bastar (*Subramanyam & Henry*, 1966). *Fl. & Fr.*: Sept.-Jan.

19. *Crotalaria quinquefolia* L., Sp. Pl. 716. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 84. 1876.

Erect annual herbs, 0.2-1.0 m high, with sulcate pubescent branches. Leaves usually 5, rarely 3, linear or narrowly oblanceolate, obtuse, 5-10 cm long, glabrous above, silky beneath; petioles 2.5-8 cm long stipules linear. Racemes terminal, 5-10 cm long many flowered, bracts reflexed, linear lanceolate. Calyx 10-12 mm long, glabrescent, teeth lanceolate, as long as the tube. Corolla yellow, ca 15 mm long. Pods stalked, oblong, glabrous, 3-5 cm long, many-seeded.

In paddy fields. Rajnandgaon. *Fl. & Fr.*: Sept.

20. *Crotalaria ramosissima* Roxb., Fl. Ind. 3: 268. 1832; Baker in Hook. f., Fl. Brit. Ind. 2: 80. 1876. —*Harduli*.

Erect much branched woody annual herbs, 20-30 cm high. Stem and

branches densely clothed with brown silky hairs. Leaves simple, subsessile, oblanceolate, cuncate at base, 2-3 cm long, densely clothed with silky brown hairs. Racemes paniced; bracts lanceolate, silky. Calyx 6-7 mm long, dark brown; teeth linear, reflexed at margins. Corolla slightly exserted, 10-12 mm long, yellowish-white to dull orange-yellow, standard pointed, silky on back. Pods sessile, oblong, 6-7 mm long, silky hairy, 1-seeded.

On bare sandstone rocks. Sidhi. Fl. & Fr.: Oct.

21. *Crotalaria retusa* L., Sp. Pl. 715. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 75. 1876. - *Chunghunia*.

Robust undershrubs, 0.6-1.2 m high, with striate pubescent branches. Leaves simple, obovate oblong, obtuse or retuse, cuneate at base, up to 20 × 1-3 cm, chartaceous; stipules subulate to subacute. Racemes terminal, 10-20-flowered. Calyx 9-12 mm long, glabrous; teeth twice as long as the tube. Corolla 18-25 mm long, yellow, glabrous, standard suborbicular. Pods 2-4 × 1.2 cm, linear-oblong, 15-20 seeded.

Balaghat, Hoshangabad, Mandla, Satna, Sconi. Fl. & Fr.: Nov.-April.

22. *Crotalaria sessiliflora* L., Sp. Pl. 714. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 73. 1876.

Sparsely branched erect annual pubescent herbs or undershrubs, 0.3-2.0 m high. Leaves sessile, linear or lanceolate, narrowed at both ends, 5-15 × 0.5-1.0 cm, glabrous above, thinly silky beneath; petioles ca 2.5 mm long. Racemes rarely solitary, 2-25 cm long, 2-20-flowered. Flowers deflexed; bracts 4-12 mm long, setaceous. Calyx 9-13 mm long, densely silky hairy; teeth acute. Corolla bluish white; standard violet, orbicular. Pods sessile, oblong, 10-15 mm long, glabrous, 5-25-seeded.

Hoshangabad, Shahdol, Surguja. Fl. & Fr.: Sept.-Dec.

23. *Crotalaria spectabilis* Roth, Nov. Pl. Sp. 341. 1821. *C. sericea* Retz., Obs. 5: 26. 1789 (non Burm. f. 1768); Baker in Hook. f., Fl. Brit. Ind. 2: 75. 1876. - *Dhundhani*, *Dhundhunja*, *Shunjhunia*.

Tall glaucous green herbs, 0.5-1.5 m high, with stout striated branches. Leaves simple, obovate or oblanceolate, subacute or obtuse, mucronate, 5-15 cm long, glabrous above, silky pubescent beneath; petioles 1.5-3 cm long; stipule leafy, persistent. Racemes 20-40 cm long, terminal often paniced, 20-50-flowered; bracts reflexed, foliaceous, 1-2 cm long. Calyx 10-12 mm long; teeth lanceolate, twice as long as the tube. Corolla bright yellow. Pods linear-oblong, inflated, 3-5 cm long, glabrous, 20-30-seeded.

In forest openings and along streams. Balaghat, Bhopal, Bilaspur, Chhatarpur, Gwalior, Hoshangabad, Indore, Jabalpur, Mandla, Raigarh,

Raipur, Raisen, Rajnandgaon, Sagar, Satna, Seoni, Shahdol, Sidhi, Surguja. Fl. & Fr. : Nov.-June.

24. *Crotalaria trifoliastrum* Willd., Sp. Pl. 3: 983. 1803; Baker in Hook. f., Fl. Brit. Ind. 2: 82. 1876.

Much branched erect perennial undershrubs, 0.5-1.0 m high; branches slender pubescent. Leaves 3-foliolate; petiole 2-3 cm long; leaflets obovate-oblong, 12-25 mm long, obtuse, or emarginate, membranous, glabrous above, silky beneath; stipules setaceous, minute. Racemes terminal, short peduncled, 10-15 cm long, 12-40-flowered; bracts setaceous. Calyx 3-4 mm long, pubescent; lobes twice as long as tube. Corolla yellow, 9-12 mm long, glabrous. Pods sessile, subquadrangular, 6-7 mm long, thinly silky.

In forest floors. Hoshangabad. Fl. & Fr.: Oct. -Dec.

25. *Crotalaria triquetra* Dalz. in Hook. J. Bot. Kew Gard. Misc. 2: 34. 1850; Baker in Hook. f., Fl. Brit. Ind. 2: 71. 1876.

Copiously branched herbs, 30-60 cm high, branches slender, 3-4-angled, pubescent. Leaves simple, elliptic-lanceolate, obtuse, rounded at base, 2-6 cm long, glabrous above, pubescent beneath, membranous; stipules lanceolate. Racemes terminal, long peduncled, lax, 2-3-flowered; bracts lanceolate. Calyx 6-8 mm long, pubescent; teeth linear acuminate. Corolla yellow, 10-12 mm long, glabrous. Pods oblong-cylindrical, 1.5-2.0 cm long clothed with yellow-brown silky hairs, 10-20-seeded.

In forest floors. Hoshangabad. Fl. & Fr.: Oct.-Feb.

26. *Crotalaria umbellata* Wight ex Wt. et Arn., Prodr. 191. 1834. *C. nana* sensu Baker in Hook. f., Fl. Brit. Ind. 2: 71. 1876, p.p.

Much branched erect dark brown villous herbs. Leaves simple, oblong, obtuse, ca 3.2 × 0.7 cm, membranous, sparsely hairy above, silky hairy beneath. Inflorescence ca 8-12-flowered umbel. Calyx ca 5 mm long, 2 upper lobes connate. Corolla glabrous, equalling the calyx. Pods globose, glabrous, equalling or included in the calyx, few-seeded.

Hoshangabad. Fl. & Fr.: Sept.-Nov.

27. *Crotalaria vestita* Baker in Hook. f., Fl. Brit. Ind. 2: 67. 1876.

Much branched erect herbs, 20-60 cm high; stem and branches terete, slender, clothed with silky hairs. Leaves simple, subsessile, linear-oblong or oblong-obovate, 12-37 × 6-15 mm, densely clothed with white or yellowish hairs. Racemes lateral, leaf-opposed, 4-5-flowered, densely silky; bracts foliaceous, lanceolate, silky, 6-18 mm long. Calyx 6-18 mm long, shaggy; the 2 upper teeth lanceolate, acute, the 3 lower linear. Corolla

included; standard suborbicular, oblong; wings linear oblong. Pods sessile, oblong, turgid, glabrous 12-18 mm long, 15-20-seeded.

Indore (Rao & Sastry, 1964). *Fl. & Fr.*: Sept.-Jan.

14. CYAMOPSIS DC.

Erect annual herbs with pubescent branches. Leaves pinnately 3-foliolate; leaflets toothed. Flowers in axillary racemes. Calyx tube oblique. Corolla purplish; standard and wings narrow; keel spurred at the sides. Stamens monadelphous. Ovary sessile, many ovuled, style incurved, stigma capitate. Pods linear, straight, beaked.

Two-three species in Tropical Africa, Arabia, India, and Pakistan; one cultivated in M.P.

Cyamopsis tetragonoloba (L.) Taub. in Engl. & Prantl, *Pflanzenfam.* 3(3): 259. 1894. *Psoralea tetragonoloba* L., *Mant. Pl.* 1: 104. 1767. *Dolichos psoralioides* Lamk., *Encycl. Meth.* 2: 300. 1786. *Cyamopsis psoralioides* (Lamk.) DC., *Mem. Leg.* 230. 1825; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 92. 1878. -Guar.

Robust erect annual herbs, up to 1.5 m high; branches appressed hairy. Leaves 3-foliolate, petioles 2-4 cm long; leaflets 5-8 x 1.5-5 cm, broadly ovate, elliptic, acute, dentate, pubescent on both the surfaces. Flowers dense in short peduncled axillary racemes. Calyx 4-5 mm long, teeth unequal, the lowest largest. Corolla exserted, pink to purplish; standard and wings narrow; keel obtuse, slightly incurved. Pods 3.5-8 cm long, linear, straight, subtetragonous, 8-12-seeded.

Raisen (Gupta, 1979), Sagar (Bhattacharya, 1955). *Fl. & Fr.*: April-Dec.

Cultivated for pods eaten as vegetable; also a good fodder. Seeds are commercial source of a gum used in food, paper and textile industries.

15. DALBERGIA L.f.

Trees or shrubs, often scandent. Leaves imparipinnate; leaflets alternate, subcoriaceous. Flowers small, numerous, in axillary or terminal paniced cymes; bracts and bracteoles small. Calyx campanulate with unequal teeth. Corolla exserted; standard ovate or orbicular; wings oblong. Stamens 9 or 10, monadelphous, or 5+5, diadelphous, rarely 9+1. Ovary stipitate, few-ovuled; style short incurved; stigma capitate. Pods flat, strap-shaped or oblong, indehiscent, 1-4-seeded.

About 300 species in tropical and sub-tropical regions; 5 in M.P.

1a. Stamens 9, monadelphous:

2a. Leaflets 3-5, cuspidate; corolla yellowish ...4. *D. sissoo*

2b. Leaflets 5-7, obtuse or emarginate; corolla white ...2. *D. latifolia*

- 1b. Stamens 10, diadelphous:
- 3a. Standard longer than broad ...3. *D. paniculata*
- 3b. Standard as long as broad:
- 4a. Trees; flowers in loose panicles ...1. *D. lanceolaria*
- 4b. Woody climbers; flowers in dense panicles ...5. *D. volubilis*

1. *Dalbergia lanceolaria* L.f., Suppl. 316.1781; Baker in Hook.f., Fl. Brit. Ind. 2: 235. 1876.—*Dhamosi, Takoli*.

Large deciduous trees with smooth bark and glabrous branches; young parts rusty hairy. Leaves 25-30 cm long; leaflets 7-17, ovate, obovate or elliptic, 2.5-5 cm long, rounded at base, emarginate at apex, glabrous above, pilose beneath. Flowers in large axillary or terminal panicles with corymbose branches and unilaterally arranged flowers; branches of the panicles silky or subglabrous. Calyx tube silky pubescent outside; upper teeth obtuse, lower three longer and acute. Corolla dull white or pinkish; standard as long as broad with two auricles at the base. Stamens 5+5. Pods 5-10 × 1-2 cm, bright brown, narrowed at both ends, glabrous, usually one seeded, stipitate.

On forest edges. Bhopal, Bilaspur, Damoh, Hoshangabad, Indore, Jabalpur, Raigarh, Raisen, Seoni, Shahdol, Sidhi, Surguja. *Fl. & Fr.*: April-Jan.

Bark and leaves medicinal.

2. *Dalbergia latifolia* Roxb., Pl. Corom. 2: 71. 113. 1799; Baker in Hook. f., Fl. Brit. Ind. 2: 231. 1876.—*Sheesham*.

Large trees with glabrous branches. Leaves imparipinnate, 10-15 cm long; leaflets 5-7, broadly elliptic-obovate or suborbicular, 3.5-6.5 cm long, cuneate at base, emarginate at apex. Flowers in broad lax 5-10 cm long axillary panicles, branches of panicles sub-corymbose and shorter than the leaves. Calyx teeth obtuse, shorter than the tube. Corolla white, twice as long as calyx. Stamens 9, monadelphous. Pods oblong-lanceolate, 3.5-7.5 × 2 cm, shining brown, 1-4-seeded.

On roadsides. Bhopal, Bilaspur, Gwalior, Indore, Jabalpur, Raigarh, Rajmandgaon, Rewa, Shahdol, W. Nimar. *Fl.*: Sept.; *Fr.*: Oct.-April.

The black heart wood with purple streaks is much valued for furniture.

3. *Dalbergia paniculata* Roxb., Pl. Corom. t. 114. 1799; Baker in Hook. f., Fl. Brit. Ind. 2: 236. 1876.—*Dhoban, Pharsi*.

Large deciduous trees up to 20 m high with smooth whitish bark and yellowish blaze becoming brown on exposure; young branches silky pubescent. Leaves imparipinnate; leaflets 7-15, alternate, elliptic-oblong, obovate or orbicular, 10-35 mm long, glabrous or sparsely hairy above. Flowers in 5-8 cm long axillary and terminal panicles, branches silky pubescent. Calyx 3-4 mm long, densely silky. Corolla pinkish or bluish, 6-8 mm long, petals clawed, except the standard. Stamens 5+5. Pods strap-shaped, 5-8 cm long, cuneate at both ends, glabrous, 1-3-seeded.

In mixed forests. Bastar, Bhopal, Bilaspur, Damoh, Hoshangabad, Indore, Jabalpur, Mandla, Panna, Raigarh, Raisen, Sagar, Shahdol, Shivpuri, W. Nimar. *Fl.* : April; *Fr.* : July -June.

4. *Daibergia sissoo* Roxb., *Fl. Ind.* 3: 223. 1832; Baker in Hook *f.*, *Fl. Brit. Ind.* 2: 231. 1876. -*Sheesham, Sissoo.*

Large trees up to 25 m high with rough grey bark and young branches pubescent; wood brown, very hard. Leaves imparipinnate, 10-20 cm long; leaflets 3-5, alternate, broadly ovate or sub-orbicular, acuminate or long cuspidate, 2.5-6 cm long. Flowers small, subsessile, in dense paniced 5-8 cm long axillary racemes. Calyx 4-5 mm long; teeth ciliate, shorter than the tube. Corolla yellowish, 8-10 mm long, standard with a long claw. Stamens 9, monadelphous, sheath splitted along the top. Pods flat, strap-shaped, 3.5-10 × 0.5-1.5cm, with cuneate base, 1-4-seeded.

On road sides and in mixed forests. Balaghat, Bastar, Bhopal, Bilaspur, Chhatarpur, Damoh, Durg, Gwalior, Hoshangabad, Indore, Jabalpur, Mandla, Raigarh, Raipur, Rajnandgaon, Rewa, Ratlam, Sagar, Satna, Seoni, Shahdol, Shivpuri, Sidhi, Surguja. *Fl.* : Feb-April; *Fr.* : July-June.

5. *Dalbergia volubilis* Roxb., *Pl. Corom.* 2: 48. t. 191. 1805 et *Fl. Ind.* 3: 231. 1832; Baker in Hook *f.*, *Fl. Brit. Ind.* 2: 235. 1876. -*Adhari, Dhoban bel.*

Large woody climbers with deeply fluted ash coloured stems and dark brown bark; branchlets often terminating into tendril. Leaves 7-13-foliolate, 10-25 cm long; leaflets elliptic oblong, obovate, cuneate at base, obtuse or emarginate at apex, 2.5-5 × 1.2-2.8 cm, glabrous above, appressed hairy beneath. Flowers in terminal and axillary dense panicles; branches of panicles rusty pubescent. Calyx minute, velvety outside; upper two lobes obtuse, lower ones acute. Corolla purplish blue, petals all clawed. Stamens diadelphous, 5+5. Pods oblong, obtuse, 4-7 × 2-2.5 cm, glabrous, 1-seeded.

In mixed forests. Balaghat, Bastar, Bilaspur, Hoshangabad, Jabalpur, Raigarh, Raipur, Seoni, Shahdol, Sidhi. *Fl.* : Dec. -June.

16. DESMODIUM Desv.

Herbs or shrubs, prostrate to erect. Leaves 1-3-foliolate, stipellate; leaflets petiolulate, stipels 1 in lateral and 2 in terminal leaflet; stipules free or jointed. Flowers small, in simple or paniced racemes, umbels or fascicles; bracts striate and pubescent. Calyx campanulate or turbinate, upper lobe bifid and often connate, the lower 3 toothed. Corolla exerted; standard broad, shortly clawed, obovate, oblong or orbicular; wings obliquely oblong, adnate to the keel. Stamens monadelphous or diadelphous, 9+1, connate in a tube. Ovary sessile or stipitate, 2-many-ovuled. Pods flat or compressed, jointed. Seeds orbicular or reniform.

About 450 species in tropical and sub-tropical regions; 16 in M.P.

1a. Leaves simple:

2a. Leaves under 3 cm long:

3a. Leaves elliptic, reflexed, obtuse or emarginate;
racemes 1-2.5 cm long; calyx white villous; pods
1-3 jointed 1. ...*D. brachystachyum*

3b. Leaves orbicular, obtuse, cuspidate, obscurely
cordate at base; racemes 7-10 cm long; calyx hairy;
pods 3-5 jointed ...11. *D. rotundifolium*

2b. Leaves over 3 cm long:

4a. Petioles broadly winged ...15. *D. triquetrum*

4b. Petioles not winged;

5a. Stem angled, hairs appressed; leaves
ovate-lanceolate, acute or acuminate; pods 6-8
jointed, indented along lower suture ...4. *D. gangeticum*

5b. Stem terete, fulvous tomentose; leaves deltoidly
ovate; pods 3-6 jointed, indented along both the
sutures ...16. *D. velutinum*

1b. Leaves 3-foliolate:

6a. Leaflets never below 3 cm long:

7a. Pods distinctly divided into several 1-seeded joints
and not dehiscing in a line along a suture:

8a. Clusters of flowers concealed by 2 large
foliaceous bracts ...10. *D. pulchellum*

8b. Flowers not concealed:

- 9a. Branches triangular; flowers in pedunculate umbels
 ...13. *D. triangulare*
- 9b. Branches not triangular; flowers not in pedunculate umbels:
- 10a. Joints of pods much longer than broad ...7. *D. laxiflorum*
- 10b. Joints of pods not much longer than broad:
- 11a. Bracts triangular; flowers densely arranged:
- 12a. Stems angular densely pubescent; leaflets densely hairy beneath, acute to subacute-mucronate at apex; pods with short appressed straight hairs ...3. *D. floribundum*
- 12b. Stems terete, sparsely hairy; leaflets sparsely hairy beneath, obtuse to subacute at apex; pods with long hooked hairs at sutures ...6. *D. heterocarpon*
- 11b. Bracts and flowers not as above:
- 13a. Stipules auricled, cuspidate; pedicels short; bracts lanceolate ...2. *D. dichotomum*
- 13b. Stipules not as above; pedicels long; bracts fugaceous (curled) ...12. *D. tortuosum*
- 7b. Pods indistinctly jointed, not separating into 1-seeded segments, dehiscing all along the ventral suture:
- 14a. Branches softly hairy; terminal leaflets elliptic obovate, acute or obtuse; rachis with appressed or patent straight hairs; lateral leaflets minute or wanting; bracts ovate deciduous; pods long hooked hairy ...5. *D. gyroides*
- 14b. Branches striated; terminal leaflets linear lanceolate to elliptic ovate; rachis with hooked hairs; lateral leaflets well developed; bracts ovate-acuminate concealing the bud; pods short hooked hairy ...9. *D. motorium*
- 6b. Leaflets never above 3 cm long:
- 15a. Flowers axillary; pods indehiscent, indented on ventral suture and longer than broad ...14. *D. triflorum*
- 15b. Flowers in short racemes; pods dehiscent, indented on both the sutures and broader than long ...8. *D. microphyllum*
1. *Desmodium brachystachyum* Grah. ex Benth. in Miq., Pl. Jungh. 223. 1852; Baker in Hook. f., Fl. Brit. Ind. 2: 171. 1876.

Undershrubs, 25-60 cm high, with appressed hairy angular stems. Leaves 1-foliolate; leaflets elliptic, reflexed, round or oblong, cordate, 25-30 mm long, obtuse or emarginate, glabrous above, sericeous beneath. Flowers in 1-2.5 cm long dense axillary and terminal racemes; bracts ovate, acuminate, persistent. Calyx white villous; teeth as long as corolla, lanceolate, cuspidate. Corolla purple. Pods hairy, ca 3.0 × 1.5 mm, 1-3-jointed.

In sal forests. Bilaspur, Raigarh, Raipur, Surguja. Fr. : Oct.-Nov.

2. *Desmodium dichotomum* (Willd.) DC., Prodr. 2: 336. 1825. *Hedysarum dichotomum* Willd., Sp. Pl. 3: 1180. 1802. *Hedysarum diffusum* Willd., l.c. *Desmodium diffusum* (Willd.) DC. in Ann. Sci. Nat. Paris ser. 1, 4: 100. 1825.

Much branched stout herbs 0.5-1 m high, with angled hairy stems. Leaves 3-foliolate, stipules large, oblong, auricled, cuspidate; leaflets elliptic, broadly ovate or oblong, 5-8 cm long, prominently many-nerved. Flowers very small, bluish or pink, in terminal paniced racemes, in the axils of 3-nate small lanceolate bracts. Pods 5-6-jointed, joints subcircular, clothed with hooked hairs.

Along streams and in cultivated fields. Balaghat, Bastar, Bilaspur, Hoshangabad, Indore, Narsimhapur, Panna, Raipur, Raisen, Rajnandgaon, Sagar, Seoni. Fl. & Fr. : Sept.-May.

3. *Desmodium floribundum* (D. Don) G. Don, Gen. Syst. 2: 297. 1832; Baker in Hook. f., Fl. Brit. Ind. 2: 167. 1876. *Hedysarum floribundum* D. Don, Prodr. 224. 1825. *H. sambuense* D. Don, l.c. 243. *D. sambuense* (D. Don) DC., Prodr. 2: 335. 1825.

Shrubs, 0.5-1.5 m high, with woody angular densely pubescent branches. Leaves 3-foliolate; leaf rachis 2-10 cm long; stipules lanceolate ca 1 cm long; leaflets ovate or oblong-obovate, rounded or narrowly obtuse at base, acute, 5-10 × 1-5 cm, lateral nerve 6-8-pairs. Flowers in 5-15 cm long axillary and terminal dense racemes, often paniced; bracts acuminate, ciliate. Calyx campanulate; teeth as long as the tube. Corolla exserted, pink or nearly white. Pods 2-3 cm long, joints 6-8, clothed with appressed silky hairs.

Hoshangabad (Bir & Kumari, 1982). Fl. & Fr. : Aug.-Nov.

4. *Desmodium gangeticum* (L.) DC., Prodr. 2: 327. 1825; Baker in Hook. f., Fl. Brit. India. 2: 168. 1876, incl. var. *maculatum* (L.) Baker l.c. *Hedysarum gangeticum* L., Sp. Pl. 746. 1753. *H. maculatum* L., Sp. Pl. 746. 1753. -Srivani.

slightly angular stem and appressed hairy branches. Leaves 1-foliolate; petiole 1.5-2.5 cm long; leaflets ovate to lanceolate, 3-15 × 2-8 cm, acute or acuminate, subcordate or truncate at base, glabrous above, grey silky beneath; stipules subulate, scarious. Flowers in axillary and terminal paniced raceme; bracts setaceous. Calyx pubescent, teeth lanceolate. Corolla white or purplish. Pods 10-22 mm long, falcate, 6-8-jointed, deeply indented along lower suture, clothed with minute hooked hairs.

In sal and teak forests. Balaghat, Bastar, Bhopal, Bilaspur, Chhindwara, Damoh, Durg, Hoshangabad, Gwalior, Indore, Jabalpur, Mandla, Narsimhapur, Panna, Raigarh, Raipur, Raisen, Rajnandgaon, Rewa, Satna, Seoni, Shahdol, Shivpuri, Sidhi, Surguja, Tikamgarh. *Fl. & Fr.* : July-April.

5. *Desmodium gyroides* (Link) DC., Prodr. 2: 326. 1825; Baker in Hook. *f.*, Fl. Brit. Ind. 2: 175. 1876. *Hedysarum gyroides* Link, Enum. Alt. 2: 247. 1822.- *Kardhana*.

Undershrubs or shrubs, 1-3 m high with softly hairy branches. Leaves 1-3-foliolate; rachis 1.5-3 cm long; terminal leaflet obtuse, oblong or obovate-oblong, 2.5-7 × 1.5-4.5 cm, truncate or cordate at base, pubescent beneath, lateral ones wanting or 1-3 × 0.5-1 cm. Flowers in axillary or terminal 3.5-15 cm long racemes; bracts ovate, deciduous. Corolla pale pink to purple, both standard and keel broader. Pods 3-5 cm long, jointed, densely hairy, indented along lower sutures. Seeds 6-10.

On hill slopes and along streams. Surguja. *Fl. & Fr.*: Sept.-Jan.

The poultice made out of pulped leaves is used for lumbago.

6. *Desmodium heterocarpon* (L.) DC., Prodr. 2: 337. 1825. *Hedysarum heterocarpon* L., Sp. Pl. 747. 1753. *H. polycarpum* Poir. in Lamk., Encycl. 6: 413. 1804. *D. polycarpum* (Poir.) DC., Prodr. 2: 334. 1825; Baker in Hook *f.*, Fl. Brit. Ind. 2: 171. 1876.

Perennial herbs or undershrubs, 0.5-1.5 m high with angular slender appressed hairy branches. Leaves 3-foliolate; rachis 2-4 cm long; stipules lanceolate; leaflets elliptic-oblong, obovate or oblanceolate, obtuse or rounded at base, terminal leaflets 2-9 × 1-4 cm, glabrous above, pubescent beneath. Flowers in 2-10 cm long terminal or axillary racemes or panicles. Calyx campanulate; teeth unequal, lanceolate. Corolla bluish purple. Pods linear, curved, 1-3 cm long, joints 5-8, with spreading hairs along sutures.

In sal forests. Balaghat, Bastar, Bilaspur, Chhindwara, Hoshangabad, Mandla, Raigarh, Raipur, Rajnandgaon, Sagar, Seoni, Shahdol, Sidhi, Surguja. *Fl.* : Sept.; *Fr.* : Oct.-June.

Medicinal, decoction considered good tonic and useful for cough.

7. *Desmodium laxiflorum* DC. in Ann. Sci. Nat. Paris Ser. 1, 4: 100. 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 164. 1876. *Latkani*.

Undershrubs, 0.5-1.5 m high with appressed hairy quadrangular branches. Leaves 3-foliolate; stipules triangular, pubescent; leaflets ovate, lanceolate, acute or rhomboid, rounded at base, glabrous above, hairy beneath; terminal leaflets 8-15 × 4-8 cm, lateral about half as long. Flowers in 12-40 cm long axillary or terminal racemes or fascicled; bracts lanceolate. Calyx hairy; teeth longer than the tube. Corolla purple; standard white; keel and wings blue or violet. Pods linear, 2.5-4 cm long, 4-6-jointed, clothed with minute hooked hairs.

In moist places and sal forests. Balaghat, Bastar, Hoshangabad, Jabalpur, Mandla, Rajnandgaon, Shahdol, Surguja. *Fl. & Fr.*: Sept.-Nov.

8. *Desmodium microphyllum* (Thunb.) DC., Prodr. 2: 337. 1825. *Hedysarum microphyllum* Thunb., Fl. Jap. 284. 1784. *Desmodium parvifolium* DC., Ann. Sci. Nat. Paris 4: 100, 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 174. 1876.

Much branched decumbent or prostrate annual herbs, often forming dense entangled masses; stems hairy. Leaves 1-3-foliolate; stipules lanceolate, brown striate; leaflets ovate or oblong-ovate, mucronate; terminal leaflets 3-15 × 1.5-4 mm; lateral leaflets orbicular, ca 3 mm diam. Flowers in terminal and lateral 1.5-5 cm long racemes; pedicels filiform. Calyx pubescent, teeth setaceous. Corolla purplish pink; standard orbicular, broad, obtuse, clawed; wings and keel shorter; keel petal spurred. Pods 5-13 × 2-2.5 mm, pubescent, slightly constricted between seeds, 2-4-jointed, indented along both sutures.

In wastelands. E. Nimar (*Maheshwari*, 1960), Raigarh (*Wood*, 1902), Surguja. *Fl. & Fr.*: Nov.

9. *Desmodium motorium* (Houtt.) Merr. in J. Arn. Arb. 345. 1938. *Hedysarum motorium* Houtt., Nat. Hist. 2. 10: 246. 1779. *H. gyrans* L. f., Suppl. 332. 1781. *D. gyrans* (L. f.) DC., Prodr. 2: 326. 1825; Baker in Hook. f., Fl. Brit. India 2: 174. 1876. -*The telegraph plant*.

Erect perennial herbs or undershrubs, 1-1.5 m high with striated branches. Leaves 3-foliolate; leaf-rachis 2-2.5 cm long; terminal leaflet elliptic, oblong or oblong lanceolate, rounded at both ends, 2.5-10 × 0.5-1.3 cm, glabrous above, silky beneath, lateral leaflets much smaller. Flowers in axillary and terminal racemes, often paniced; bracts large, ovate, acuminate, concealing the bud. Calyx campanulate, glabrous; teeth deltoid. Corolla purplish pink. Pods 2.5-4.5 cm long, falcate, 6-10-jointed, pubescent, dehiscing along the ventral suture.

In mixed forests, among rocks. Balaghat, Bastar, Bilaspur, Chhindwara, Hoshangabad, Jabalpur, Mandla, Raigarh, Rajnandgaon, Shahdol, Sidhi, Surguja. *Fl. & Fr.* : Sept.-Feb.

The lateral leaflets move in jerks in warm and humid weather.

10. *Desmodium pulchellum* (L.) Benth., *Fl. Hongk.* 83. 1861; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 162. 1876. *Hedysarum pulchellum* L., *Sp. Pl.* 747. 1753.- *Chipoto*.

Shrubs or undershrubs, 0.5-2 m high with grey hairy branches. Leaves trifoliolate, petioles 5-15 mm long; stipules deltoid, acuminate, 4-6 mm long, leaflets elliptic to ovate-oblong, obtuse at apex, rounded at base, glabrous above, downy beneath; terminal leaflets 6-15 × 1.5-4 cm, laterals about half as long. Flowers in terminal or axillary 10-50 cm long racemes composed of 2-6-flowered umbellules, each umbellule subtended by a pair of orbicular, leaflike bract placed back to back. Calyx hairy; teeth lanceolate. Corolla yellow or white, tinged with pink. Pods less than 1 cm long, 2-jointed, constricted at both sutures.

In sal forests. Balaghat, Bastar, Bilaspur, Damoh, Jabalpur, Mandla, Panna, Raigarh, Raipur, Rajnandgaon, Satna, Seoni, Shahdol, Sidhi, Surguja. *Fl. & Fr.* : Sept. - May.

Bark considered medicinal.

11. *Desmodium rotundifolium* Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 172. 1876.

Prostrate or erect annual herbs, 10-30 cm long with many appressed hairy ascending branches, often tinged with red. Leaves 1-foliolate; leaflets orbicular, 1-2 cm, obtuse or minutely cuspidate, obscurely cordate at base, membranous. Flowers in lax terminal and axillary 7-10 cm long racemes. Calyx hairy; teeth setaceous. Corolla pink, exserted. Pods 5-10 mm long, compressed, falcate, 3-5-jointed, glabrescent.

In forests and along roads, on clayey soil. Hoshangabad. *Fl. & Fr.* : Aug.-Oct.

12. *Desmodium tortuosum* (Sw.) DC., *Prodr.* 2: 392. 1825. *Hedysarum tortuosum* Sw., *Prodr.* 107. 1788. *H. purpureum* Mill., *Gard. Dict.* ed. 8. n. 6. 1768. (non Hk. & Arn. 1832). *D. stipulaceum* DC., *Prodr.* 2: 330. 1825. *D. purpureum* (Mill.) Fawcett. & Rendle, *Fl. Jam.* 4: 36. 1920 (non Hk. & Arn., 1832).

Erect annual herbs, 0.3-1.0 m high. Leaves 1-3-foliolate; petioles not winged; terminal leaflets 2.5-13 × 1.5-7 cm, acute or obtuse, cuneate or rounded at base, glabrous above, long hairy beneath and along the

margins. Racemes panicle; bracts fugaceous; pedicels 10-15 mm long. Calyx connate half way up. Standard 4-5 mm long, bluish white with two pink or purple blotches outside. Pods. 8-30 mm long, 1-8-jointed.

On sandy soil. Hoshangabad. *Fl. & Fr.*: Oct. -Feb.

Considered a rich poultry feed.

13. *Desmodium triangulare* (Retz.) Merr. in J. Arn. Arb. 23: 170. 1942. *Hedysarum triangulare* Retz. Obs. Bot. 3: 40. 1783. *H. cephalotes* Roxb., Fl. Ind. 3: 360. 1832. *D. cephalotes* (Roxb.) Wt. & Arn., Prodr. 224. 1834; Baker in Hook. f., Fl. Brit. Ind. 2: 161. 1876.

Undershrubs or shrubs, 1-2.5 m high with triangular silky hairy branches. Leaves 3-foliolate; stipules linear lanceolate; leaflets oblong-elliptic or obovate to lanceolate, acute at both ends, grey silky beneath, terminal leaflet 6.5-15 × 3-6.5 cm, lateral ones smaller. Flowers in many flowered, axillary pedunculate umbels. Calyx campanulate, pubescent; teeth unequal. Corolla reddish-yellow. Pods ca 2.5 cm, white silky, slightly curved, 4-6-jointed, indented along lower suture.

In sal forests. Raipur, Raisen. *Fl. & Fr.*: Sept.-Jan.

14. *Desmodium triflorum* (L.) DC., Prodr. 2: 334. 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 173. 1876. *Hedysarum triflorum* L., Sp. Pl. 749. 1753. *Desmodium triflorum* var. *minus* Wt. & Arn., Prodr. 229. 1834.

Long trailing or prostrate perennial herbs with patently hairy stem, often rooting at nodes. Leaves small, 3-foliolate, 1.2-1.5 cm long; stipules lanceolate, persistent; leaflets obovate, truncate or emarginate, membranous, glabrous above, sparsely hairy beneath. Flowers 1-5 together in axillary fascicles. Calyx pubescent; teeth longer than the tube. Corolla pink or white. Pods ca 1.5 cm long, curved, on filiform pedicels, joints 3-5, indented on lower sutures, glabrous or hairy.

Along streams. Balaghat, Bastar, Bhind, Bhopal, Bilaspur, Ghindwara, Damoh, Durg, Hoshangabad, Indore, Mandla, Morena, Narsimhapur, Panna, Raigarh, Raipur, Raisen, Rajnandgaon, Rewa, Sagar, Shivpuri, Sidhi, Surguja, W. Nimar. *Fl. & Fr.*: Sept.-April.

Leaves medicinal.

15. *Desmodium triquetrum* (L.) DC., Prodr. 2: 326. 1825; Baker in Hook. f., Fr. Brit. Ind. 2: 163. 1876. *Hedysarum triquetrum* L., Sp. Pl. 746. 1753. *Tadehagi triquetrum* (L.) Ohashi in *Gingkoana* 1: 290. 1973.

Erect undershrubs, 1-1.5 m high, with grooved triangular glabrescent branches. Leaves 1-foliolate; petioles 2-2.5 cm long; broadly winged on each side, leaflets 5-20 cm long, oblong or lanceolate, acute at apex, subcordate

or rounded at base, glabrous above, hairy on the ribs beneath. Flowers in 15-30 cm long axillary and terminal racemes. Calyx tubular; upper teeth deltoid, lower linear. Corolla purple. Pods 25-50 × 4-8 mm, flat, 5-8-jointed, glabrous or hairy.

In sal forests. Bastar. *Fl. & Fr.* : Aug.-March.

Leaves medicinal

16. *Desmodium velutinum* (Willd.) DC., *Prodr.* 2: 228. 1825. *Hedysarum velutinum* Willd., *Sp. Pl.* 3, 2: 117. 1803. *Desmodium latifolium* DC., *Prodr.* 2: 328. 1825; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 168. 1876.

Undershrubs or shrubs, 0.5-2 m high with branches rather terete, fulvous tomentose. Leaves 1-foliolate; leaflets broadly ovate, 7-15 × 3-5 cm, truncate or cordate at base, obtuse, or rounded at apex, appressed hairy above, tomentose beneath. Flowers in 5-30 cm long axillary or terminal paniced racemes. Calyx campanulate; teeth as long as the tube. Corolla purple, 3-4 times the calyx. Pods 3-6-jointed, falcate, densely clothed with minute hooked hairs, indented along both sutures.

On forest edges. Balaghat, Bastar, Bhopal, Bilaspur, Chhindwara, Hoshangabad, Indore, Mandla, Panna, Raigarh, Raipur, Raisen, Rajnandgaon, Rewa, Sagar, Seoni, Shahdol, Surguja. *Fl. & Fr.* : Aug. -Jan.

17. DUMASIA DC.

Slender climbing herbs. Leaves pinnately 3-foliolate with stipellate leaflets. Flowers in axillary racemes. Calyx tube cylindrical, gibbous at base, obliquely truncate at mouth; teeth obsolete. Corolla exserted; petals sub-equal, standard spurred; wings and keel adherent with small limb and long claws. Stamens diadelphous, 9+1. Ovary shortly stipitate; style flattened above; stigma capitate. Pods linear, falcate, torulose.

About 10 species; Palaeotropical; one in M.P.

Dumasia villosa DC., in *Ann. Sci. Nat.* 4: 96. 1825; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 183. 1876.

Slender twiners; stem densely clothed with spreading grey hairs. Leaves 3-foliolate; petiole 2.5-9 cm long; stipules minute, setaceous; leaflets broadly ovate-oblong, subcuneate at base, mucronate at apex, terminal one 5-8 × 2-5 cm; lateral ones smaller, rounded or truncate at base, glabrous to sparsely hairy above, pilose beneath. Flowers in 5-15 cm long peduncled axillary racemes. Calyx 6-9 mm long, pubescent, obliquely truncate at mouth. Corolla 12-18 mm long, yellow or purple; standard reflexed, spurred above the long cuneate claw. Pods 2.5-4 cm long, linear, velvety, torulose, 3-4-seeded.

Bilaspur. *Fl. & Fr.* : Aug.-Nov.

18. ELEIOTIS DC.

Monotypic; endemic to India and Sri Lanka.

Eleiotis monophylla (Burm. f.) DC., *Prod.* 2: 348. 1825. *Glycine monophylla* Burm. f., *Fl. Ind.* 161. t. 50. f. 2. 1768. *Hedysarum sororium* L., *Mant.* 2: 270. 1771. *E. sororia* DC., *Prodr.* 2: 348. 1825; Baker in Hook. f., *Fl. Brit. Ind.* 2: 153. 1876.

Annual procumbent herbs with long trailing slender triquetrous branches. Leaves one-foliolate; leaflets suborbicular, 2-4 cm broad, obtuse or emarginate at both ends, hairy beneath. Flowers reddish, ca 2 mm long, in 5-8 cm long axillary, hairy racemes. Calyx with short tube and five unequal setaceous teeth. Corolla minute. Stamens diadelphous, 9+1. Pod of a solitary boat shaped joint, ca 7 mm long, reticulately veined.

In moist shady places and rock-crevices. Bastar, Bhopal, Bilaspur, Hoshangabad, Indore, Raigarh, Raipur, Raisen, Shahdol, Surguja. *Fl. & Fr.* : Sept.-Nov.

19. ERIOSEMA (A.P.DC.) G. Don

Suberect or erect usually unbranched shrubs or herbs. Leaves 1-3-foliolate. Flowers 1-3, axillary or racemed. Calyx tube campanulate; teeth 5, as long as tube. Corolla not included; standard roundish, auricled and longer than wings, keel beaked. Stamens diadelphous. Ovary sessile, 2-ovuled; style filiform; stigma capitate. Pods oblong-turgid. Seeds 1-2, oblique.

A genus with about 50 species distributed in tropical Africa and America; one in M. P.

Eriosema himalaicum Ohashi in J. Jap. Bot. 41. 96. 1966. *E. chinense* auct. non Vogel. 1843; Baker in Hook. f., *Fl. Brit. Ind.* 2: 219. 1876, p.p.

Undershrubs, 20-90 cm tall, with perennial tuberous root-stock; stems covered with long hairs. Leaves simple, stipulate, petioled, linear, mucronate at apex, 2-7 × 0.3-0.5 cm, silky beneath, pilose on midrib and margins; stipules subulate, linear, persistent, 2-3 mm long. Flowers 1-2, axillary, 7-8 mm long, shortly pedunculate. Calyx pubescent, 3-4.5 mm long. Corolla 6-9 mm long, yellowish with purple veins fading to purple-black when dried. Pods oblong or orbicular, 8-12 mm, densely pubescent.

On forest edges. Balaghat, Sidhi, Surguja. *Fl. & Fr.* : Sept.

Tubers sometimes eaten.

20. ERYTHRINA L.

Trees, shrubs or undershrubs with prickly branches and pinnately 3-foliolate leaves; stipules glandular. Flowers large, showy, scarlet, in long peduncled axillary or terminal racemes. Calyx oblique, spathaceous, bilabiate. Corolla with unequal petals, standard much longer than the wings and keel. Stamens 10, mono-or-diadelphous, alternately long and short. Ovary stipitate, many-ovuled; style incurved, beardless; stigma capitate. Pods stipitate, linear-falcate, turgid, torulose, many seeded.

About 100 species chiefly tropical and subtropical; 3 planted in M.P.

- 1a. Calyx not spathaceous, more or less distinctly
2-lipped, not splitting ...2. *E. suberosa*
- 1b. Calyx obliquely spathaceous, not 2-lipped:
- 2a. Calyx splitting half-way down, apex entire ...1. *E. stricta*
- 2b. Calyx splitting up to the base, apex 5-toothed
...3. *E. variegata*

1. *Erythrina stricta* Roxb., Fl. Ind. 3: 252. 1832; Baker in Hook. f., Fl. Brit. Ind. 2: 189. 1876.

Large deciduous trees, armed with sharp prickles arising from woody lamellate tubercles. Leaves pinnately 3-foliolate, sometimes armed; petioles 5-15 cm long; leaflets broadly rhomboid-ovate, 7.5-15 cm long and broad, glabrous above, densely pubescent beneath; lateral ones obliquely deltoid. Racemes clustered at the ends of leafless branchlets. Calyx spathaceous, split half way down on one side, 6-10 mm long, pubescent. Corolla scarlet, standard linear-lanceolate, 3.7-5 cm long; keel ovate-lanceolate; wings falcate, acuminate. Pods 10-15 cm long, stipitate, subturgid, 2-3-seeded.

Planted as an ornamental. Hoshangabad (R.S. Rao, 1960). Fl. & Fr. : Jan-May.

2. *Erythrina suberosa* Roxb., Fl. Ind. 3: 253. 1832; Baker in Hook. f., Fl. Brit. Ind. 2: 189. 1876. -Gadhapalas, Handua, Panjra.

Medium-sized deciduous trees armed with short sharp prickles. Bark thick, deeply longitudinally cracked, pale coloured, cracks laminate. Leaves 3-foliolate, 7-15 cm long, greyish white tomentose beneath, terminal leaflet broadly ovate-rhomboid; lateral ones obliquely deltoid. Racemes clustered at the ends of leafless branchlets. Flowers 4-5 cm long. Calyx bilabiate, 6-10 mm long, pubescent. Corolla scarlet; standard 3.7-5 cm long; wings rhomboid, cuneate; keel ovate, acute. Pods stipitate, 10-15 cm long, torulose, 2-3-seeded.

In mixed forests, also planted as an ornamental. Chhindwara, Durg,

Hoshangabad, Indore, Jabalpur, Mandla, Raisen, Sagar, Seoni, Shahdol. *Fl. & Fr.* : March-April.

2.1. var. *sublobata* Roxb., *Fl. Ind.* 3: 254. 1832; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 190. 1876.

Exactly like the type variety, except for larger leaflets which are lobed or lobulate and very tomentose beneath.

Planted as an ornamental. Surguja. *Fl. & Fr.* : March-June.

3. *Erythrina variegata* L., *Herb. Amboin.* 10. 1754; Krukoff in J. Arn. *Arb.* 53: 132. 1972. *E. indica* Lamk., *Encycl.* 2: 391. 1786; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 188. 1876.

Deciduous trees armed with short sharp conical black prickles arising from woody tubercles; bark thin, yellowish; wood white, soft. Leaves 3-foliolate; petioles 10-20 cm long, unarmed; leaflets broadly ovate or rhomboid, acuminate, entire, 10-20 cm long and broad, membranous, glabrescent, lateral ones oblique. Racemes 10-15 cm long, clustered at the end of leafless branchlets. Calyx spathaceous, recurved, truncate at mouth, 5-toothed at the narrow tip. Corolla bright scarlet, standard much larger than wings and keel. Pods 15-30 cm long, curved, torulose, beaked, 6-12-seeded.

Planted as an ornamental. Bhopal, Bilaspur, Indore, Seoni. *Fl.* : March April; *Fr.* : April-Sept.

21. FLEMINGIA Roxb. ex Ait.

Shrubs or undershrubs, rarely herbs with perennial root-stock. Leaves 1-foliolate or palmately 3-foliolate; leaflets gland-dotted beneath. Flowers in axillary or terminal racemes or panicles; bracts foliaceous or scarious. Calyx tube short; teeth unequal. Corolla greenish or yellowish, or red veined, exerted or not; standard obovate or orbicular, auricled at base; wings obliquely oblong, adnate to the beaked keel. Stamens diadelphous, 9+1. Ovary sessile, 2-ovuled; style filiform, not bearded; stigma terminal. Pod obliquely oblong, inflated, 2-seeded.

About 30 species, Indo-Malayan and north Australian; 14 in M.P.

1a. Leaves unifoliolate:

2a. Bracts large, membranous, concealing a small cluster of flowers:

3a. Plants trailing; leaf blunt, obtuse (rarely subacute)

...3. *F. fruticulosa*

3b. Plants erect; leaves not as above:

- 4a. Leaves broadly ovate, cordate, acuminate ...2. *F. chappari*
- 4b. Leaves lanceolate or acute:
- 5a. Bracts reniform, emarginate, hairy ...3. *F. bracteata*
- 5b. Bracts ovate cordate, hairy ...14. *F. strobilifera*
- 2b. Bracts much smaller, caducous ...9. *F. paniculata*
- 1b. Leaves 3-foliolate:
- 6a. Bracts not forming an involucre:
- 7a. Flowers in lax paniced racemes ...6. *F. lineata*
- 7b. Flowers in dense subspicate racemes:
- 8a. Low shrubs with stout sub-terranean stem ...8. *F. nana*
- 8b. Erect shrubs or undershrubs with rather tall stem:
- 9a. Leaflets more than twice as long as broad or longer:
- 10a. Petioles winged; racemes 5-8 cm long; calyx 6 mm long; pods 2.0-2.5 cm long ...10. *F. praecox*
- 10b. Petioles angular; racemes 2-3 cm long; calyx 7-8 mm long; pods 0.8-1 cm long ...11. *F. prostrata*
- 9b. Leaflets twice as long as broad or broader:
- 11a. Lower surface of leaflets densely tomentose or puberulous ...4. *F. graharrhiana*
- 11b. Lower surface of leaflets glabrous or hairy on the nerves only:
- 12a. Racemes exceeding the petiole ...12. *F. semialata*
- 12b. Racemes shorter than the petiole:
- 13a. Bracts much exceeding the flower ...13. *F. stricta*
- 13b. Bracts shorter than the flowers ...7. *F. macrophylla*
- 6b. Bracts forming an involucre round the capitulate inflorescence ...5. *F. involucreta*

1. *Flemingia bracteata* (Roxb.) Wt., Ic. Pl. Ind. Or. t. 268. 1840.
Hedysarum bracteatum Roxb., Fl. Ind. 3: 351. 1832. *Flemingia strobilifera* (L.)
 R. Br. var. *bracteata* (Roxb.) Baker in Hook. f., Fl. Brit. Ind. 2: 227. 1876.
 -*Galfulla*, *Kusrunt*.

Erect undershrubs or shrubs, 0.3-1 m high, with densely pubescent branches. Leaves 1-foliolate; petiole 3-18 mm long; stipules 12-25 mm long, linear, scarious; leaflets ovate or oblong-lanceolate, 7-18 × 2.5-7 cm,

sub-cordate at base, acute or acuminate at apex, glabrescent above, pubescent and gland dotted beneath. Flowers in axillary and terminal branched 5-15 cm long racemes, arranged in clusters hidden by distichously arranged reniform, 12-25 mm long emarginate hairy bracts. Calyx 4-6 mm long, pubescent; teeth longer than the tube. Corolla pink, 5-8 mm long. Pods 7-12 mm, pubescent, 2-seeded.

In sal and mixed forests. Chhindwara, Hoshangabad, Jabalpur, Mandla, Rewa, Shahdol. *Fl. & Fr.* : Oct.-Dec.

2. *Flemingia chappar* Buch-Ham. ex Benth. in Miq., Pl. Jungh. 244. 1853; Baker in Hook. f., *Fl. Brit. Ind.* 2: 227. 1876. - *Galfulla*.

Erect shrubs, 1-3 m high, with cylindrical appressedly hairy branches. Leaves simple, suborbicular, cordate at base, acuminate or cuspidate at apex, 5-12 cm long and broad, glabrous above, faintly pubescent beneath; petioles 2-4 cm long. Racemes axillary, simple or paniced; bracts 2-2.5 x 3-3.5 cm emarginate, enclosing few flowered small cymes. Calyx 4.5 mm long; teeth lanceolate. Corolla white, 8-12 mm long. Pods 8-12 mm long, clothed with bright red glands.

In shady situations. Raigarh, Sidhi, Surguja. *Fl. & Fr.* : Nov.-March.

3. *Flemingia fruticulosa* Wall. ex Benth. in Miq., Pl. Jungh. 245. 1852. *Flemingia strobilifera* (L.) R. Br. var. *fruticulosa* Baker in Hook. f., *Fl. Brit. Ind.* 2: 227. 1876. *Moghania fruticulosa* (Wall. ex Benth.); Mukerjee in *Bull. Bot. Soc. Beng.* 6(1): 12. 1953. - *Kusrunt*.

Undershrubs with trailing striate, grey tomentose branches. Leaves 1-foliolate; petioles 3-5 mm long; stipules 5-10 mm long, striate, lanceolate; leaflets elliptic, ovate or suborbicular, 2.5-10 cm long, acute or obtuse at apex, cordate at base, glabrescent above, pubescent and gland dotted beneath. Racemes terminal, 7-15 cm long. Flowers in clusters enclosed by reniform folded 2-2.5 x 2.5-3 cm bracts. Calyx 5-7 mm, brown silky; teeth longer than the tube. Corolla white, sparsely exerted. Pods 7-8 mm long, pubescent.

In forests, under shade. Hoshangabad. *Fl. & Fr.* : Feb.-April.

4. *Flemingia grahamiana* Wight & Arn., *Prodr.* 1: 242. 1834; Baker in Hook. f., *Fl. Brit. Ind.* 2: 228. 1876.

Small erect shrubs, with slender tomentose branches when young. Leaves digitately 3-foliolate; stipules 6-8 mm long, lanceolate; petioles 12-25 mm long, not winged; leaflets obovate, obtuse or subacute, 5-8 cm long, plicate, glabrous above, grey silky beneath. Racemes axillary, spicate, 2.5-5 cm long, often fascicled; bracts 8-10 mm long, pubescent. Calyx ca 9 mm long, setaceous, plumose, covered with red glands. Corolla included. Pods oblong, ca 9 mm long, pubescent, covered with viscid red glands.

Raigarh. *Fl. & Fr.* : Jan.-May.

5. *Flemingia involucrata* Wall. ex Benth. in Miq., Pl. Jungh. 246. 1852; Baker in Hook. *f.*, Fl. Brit. Ind. 2: 229. 1876. -*Kukarkand*.

Erect shrubs, 0.5-1.5 m high; stem cylindrical; branches pubescent. Leaves digitately 3-foliolate; petioles 6-15 mm long, grooved; leaflets elliptic-oblong or lanceolate, narrowed at both ends, 4-8 cm long, grey tomentose with dark-brown glands beneath, laterals oblique. Flowers in dense globose heads surrounded by large bracts, terminal and axillary, heads 2-3 cm in diam., peduncles 1-2 cm; bracts lanceolate, 10-15 mm long, acuminate, ciliate. Calyx 12-15 mm long, grey-pubescent, teeth twice as long as the tube. Corolla pink, purple, blue or mauve, included. Pods oblong, 4-5 mm long, pubescent, 1-seeded.

Balaghat (Haines, 1914). *Fl. & Fr.* : Oct. -Feb.

6. *Flemingia lineata* (L.) Roxb. ex Ait. in Hort. Kew. ed. 2 (4): 350. 1812; Baker in Hook. *f.*, Fl. Brit. Ind. 2: 228. 1876. *Hedysarum lineatum* L., Sp. Pl. 1054. 1753.

Erect shrubs up to 1 m high with terete pubescent branches. Leaves digitately 3-foliolate, obovate to oblanceolate, 2-7 cm long, glabrescent above, adpressedly hairy beneath, lateral oblique, petioles 0.5-5 cm long; stipules lanceolate, 6-10 mm long, scarious. Racemes lax, paniced, 5-12 cm long; bracts subulate. Calyx 2-4 mm long, glandular pubescent and sprinkled with copious red resinous glands. Corolla purple, exserted; keel beaked. Pods obovoid-oblong, 6-10 mm long, dotted with red glands, puberulous; 2-seeded.

On roadsides and wastelands, generally on black cotton soil. Jabalpur (Hole, 1904). *Fl. & Fr.*: Dec. -March.

7. *Flemingia macrophylla* (Willd.) Kuntze ex Merrill in Philipp. J. Sci., Bot. 5: 130. 1910. *Crotalaria macrophylla* Willd., Sp. Pl. 3: 982. 1802. *Flemingia congesta* Roxb. ex Ait. Hort. Kew ed 2 (4): 349. 1812; Baker in Hook. *f.*, Fl. Brit. Ind. 2: 228. 1876, *excl. vars.* - *Bara-Salpan*.

Erect bushy shrubs, 0.7-2.5 m high, with pubescent young branches. Leaves digitately trifoliolate; petioles 3-10 cm long, angular; stipules 10-13 mm long, linear, lanceolate; leaflets ovate-oblong or lanceolate, acute or obtuse, cuncate at base, 10-20 × 3-15 cm, glabrous above and faintly silky and black gland dotted beneath. Flowers in dense axillary racemes, or paniced; bracts 3-8 mm long. Calyx 6-10 mm long silky, dotted with black glands; teeth much longer than the tube. Corolla purplish, rarely exserted. Pods 10-15 mm long, brown pubescent, dotted with black glands, 2-seeded.

On hill slopes, in sal forests. Balaghat, Bastar, Bilaspur, Hoshangabad.

Mandla, Raigarh, Rajnandgaon, Sidhi, Surguja. *Fl.* : Sept.- Feb.; *Fr.* : Nov.-May.

8. *Flemingia nana* Roxb., *Fl. Ind.* 3: 339. 1832. *F. congesta* var. *nana* Baker in Hook. f., *Fl. Brit. Ind.* 2: 229. 1876.

Dwarf shrubs. Stems 10-20 cm long, brown tomentose, from a woody rootstock. Leaves digitately 3-foliolate; petioles 10-20 cm long, winged; leaflets broadly elliptic or rhomboid to obovate, cuneate, mucronate, 7-17 cm long, laterals very oblique, mucronate, pubescent; stipules ensiform, 1.2-2 cm long. Racemes or panicles dense, 7-10 cm long, shortly peduncled, tomentose; bracts lanceolate. Flowers 5-6 mm long. Calyx covered with minute viscid bright red glands. Corolla reddish or pink. Pods 7-12 mm long, inflated, clothed with minute viscid bright red glands.

In sal and mixed forests among rock boulders and lateritic soil. Balaghat, Bastar, Bilaspur, Damoh, Hoshangabad, Jabalpur, Mandla, Rajnandgaon, Sagar, Seoni, Sidhi, Surguja. *Fl. & Fr.* : Jan. -April.

Roots medicinal.

9. *Flemingia paniculata* Wall. ex Benth. in Miq., *Pl. Jungh.* 245. 1853; Baker in Hook. f., *Fl. Brit. Ind.* 2: 227. 1876. - *Ramdant Katta, Salpin.*

Erect shrubs, 1-3 m high, with slender pubescent branches. Leaves simple, ovate to ovate-lanceolate, 7-15 cm long, acute, acuminate or cuspidate, cordate, glabrous except on veins beneath; petioles 1-2.5 cm long, thickened at both the ends. Racemes axillary or terminal, paniced or fascicled, up to 15 cm long, tomentose; bracts pilose, boat-shaped. Calyx 4-5 mm long, tomentose; teeth lanceolate, acuminate. Corolla purple or pink, exerted. Pods oblong, 12-14 mm long, pubescent, 2-seeded.

In sal forests and damp valleys. Bastar, Seoni, Sidhi, Surguja. *Fl.* : Feb.-March.

10. *Flemingia praecox* C.B. Clarke ex Prain in *Journ. Asiat. Soc. Beng.* 66 (2): 439. 1897.

Erect undershrubs with woody glabrous triquetrous stem and terete branches. Leaves digitately 3-foliolate; petioles 7-10 cm long, deeply grooved, winged; leaflets oblong, acuminate, 10-16 cm long, glabrous except on nerves beneath. Racemes axillary, dense, 5-8 cm long, ciliate at margins with silky hairs. Calyx ca 6 mm long, ribbed, teeth silky hairy, lowest longest. Corolla bluish-white, equalling longest calyx tooth. Pods 20-25 mm long.

In forest floor. Bastar. *Fl. & Fr.*: Feb. -April.

11. *Flemingia prostrata* Roxb., *Fl. Ind.* 3: 338. 1832. *F. congesta* var.

semialata Baker in Hook. f., Fl. Brit. Ind. 2: 229. 1876, p.p. *Moghania prostrata* (Roxb.) Mukerjee in Bull. Bot. Soc. Beng. 6(1) : 19. 1953.

Diffuse undershrubs with woody rootstock and short woody stem and long annual angular branches clothed with brown hairs. Leaves digitately 3-foliolate; petioles 2-5 cm long, angular; stipules linear; leaflets 5-10 cm long, lanceolate or oblong-lanceolate, pubescent, rounded at base. Flowers in dense sub-spicate 2-3 cm long axillary racemes; bracts ovate, brown silky. Calyx 7-8 mm long, villous; teeth 5. Corolla yellow, tinged with purple red. Pods turgid, 8-10 mm long.

Balaghat, Bastar, Mandla (Tiwari, 1979). Fl. & Fr. : Aug. -Dec.

12. *Flemingia semialata* Roxb. ex Ait., Hort. Kew. ed. 2(4): 349. 1812. *Flemingia congesta* Roxb. ex Ait. var. *semialata* Baker in Hook. f., Fl. Brit. Ind. 2: 229. 1876, p.p. -*Ban-rakar*.

Erect bushy shrubs, 0.8-2.5 m high with densely hairy young branches. Leaves digitately 3-foliolate; petioles 2-8 cm long, slightly winged; stipules linear, 10-13 mm long, leaflets broadly lanceolate, 10-15 × 2.5-5 cm, acuminate, glabrescent except on the nerves beneath, laterals oblique. Flowers 7-10 mm long, in axillary or terminal, often branched, 10-15 cm long hairy racemes; bracts ovate to linear. Calyx 6-7 mm long, silky; teeth longer than the tube. Corolla purple, 6-7 mm long. Pods 10-12 mm pubescent; seeds 2, shining black.

In sal forests. Balaghat, Bilaspur, (Haines, 1914), Hoshangabad (Joseph, 1963), Raigarh (Haines, 1914), Shahdol (Saxena, 1970). Fl. & Fr. : Aug.-Feb.

13. *Flemingia stricta* Roxb., Pl. Corom. 3.t. 248. 1815 et Fl. Ind. 3: 340. 1832; Baker in Hook. f., Fl. Brit. Ind. 2: 228. 1876. *Moghania stricta* (Roxb.) Kuntze, Rev. Gen. Pl. 1: 199. 1891. -*Salpani*.

Tall shrubs, 1-3 m high with woody triquetrous branches clothed with few short adpressed hairs. Leaves digitately 3-foliolate; leaflets 15-30 cm long, oblong to elliptic lanceolate, acuminate, narrowed at both ends, glabrous above, pubescent on nerves below; petioles 8-15 cm long; stipules large, lanceolate, 4-8 cm long, scarious. Flowers 6-9 mm, in dense axillary 5-10 cm long bracts racemes; 1.2-2 cm long, linear-lanceolate, brown, silky. Calyx 6-10 mm long; teeth linear, lowest longest. Corolla purplish. Pods 1.2-1.5 cm long, glabrescent; seeds black, deltoid.

In rocky soil, under shade. Balaghat (Haines, 1914), Bastar (Subramanyam & Henry, 1966), Chhindwara (Saxena, 1970).

14. *Flemingia strobilifera* (L.) R. Br. in Ait. Hort. Kew. ed. 2. 4: 350. 1812; Baker in Hook. f., Fl. Brit. Ind. 2: 227. 1876 (excl. vars). *Hedysarum strobiliferum* L., Sp. Pl. 746. 1753. - *Chipti Kusrunt*.

Much branched erect shrubs, 1-3 m high. Leaves 1-foliolate; leaflets oblong to ovate-lanceolate, 4-16 × 3-8 cm, acute or acuminate, rounded or subcordate at base, thinly pubescent above, silky pubescent and gland dotted below. Petioles 0.6-2.5 cm long; stipules scarious, 5-10 mm long. Flowers in axillary and terminal 5-20 cm long racemes or panicles; bracts 1.5-2.5 cm long, ovate, cordate, pubescent, enclosing 2 or more flowers. Calyx 5-7 mm long, pubescent; teeth linear, larger than the tube. Corolla pale yellow, streaked with red. Pods oblong, 7-12 × 4-7 mm, densely pubescent, concealed by bracts, 2-seeded.

In sal and mixed forests, under shade. Balaghat, Bastar, Bilaspur, Durg, Indore, Jabalpur, Mandla, Narsimhapur, Raigarh, Raipur, Rajnandgaon, Rewa, Sagar, Seoni, Shahdol, Sidhi, Surguja. *Fl. & Fr.* : Sept.-March.

22. GALACTIA P. Br.

Prostrate to slender twining herbs with 3-foliolate stipellate leaves. Flowers in racemes; nodes of the racemes somewhat tumid. Calyx campanulate, tube short; teeth linear or lanceolate, the two uppermost completely jointed. Corolla exerted. Stamens diadelphous, 9+1. Ovary many-ovuled; style filiform, not bearded; stigma capitate. Pods linear, flattened, recurved, subseptate; seeds without strophiole.

About 45 species mostly in tropical America; one in M. P.

Galactia tenuiflora (Klein ex Willd.) Wt. & Arn., Prodr. 206. 1834; Baker in Hook. f., Fl. Brit. Ind. 2: 192. 1876. *Glycine tenuiflora* Klein ex Willd., Sp. Pl. 3: 1059. 1802. Fig. 38.

Slender climbing herbs with downy-grey stem. Leaves usually pinnately trifoliolate; petioles 2.5-4 cm long; stipules minute, deciduous; leaflets ovate, oblong or lanceolate, 1-5 cm long, subacute, truncate at base, glabrescent above, silky beneath. Flowers in axillary peduncled 6-15 cm long paniced raceme. Calyx 5-10 mm long, pubescent; teeth longer than the tube, upper 2 connate, middle one of the lower 3 longer. Corolla reddish purple, 10-13 mm long. Stamens 9+1. Pods linear, flat, curved, septate between seeds, glabrescent, 6-8-seeded.

In sal forests. Damoh, Hoshangabad, Panna, Raigarh, Shahdol, Shivpuri, Sidhi, Surguja. *Fl. & Fr.* : Aug.-Jan.

23. GURICIDIA H.B.K.

Small deciduous trees with large grey arching branches. Leaves pinnate, long feathery with small black spotting glands on its underside. Flowers pale pink, produced in profuse abundance after the leaf-fall. Stamens diadelphous. Pods thick, woody, pale-yellow, slightly constricted

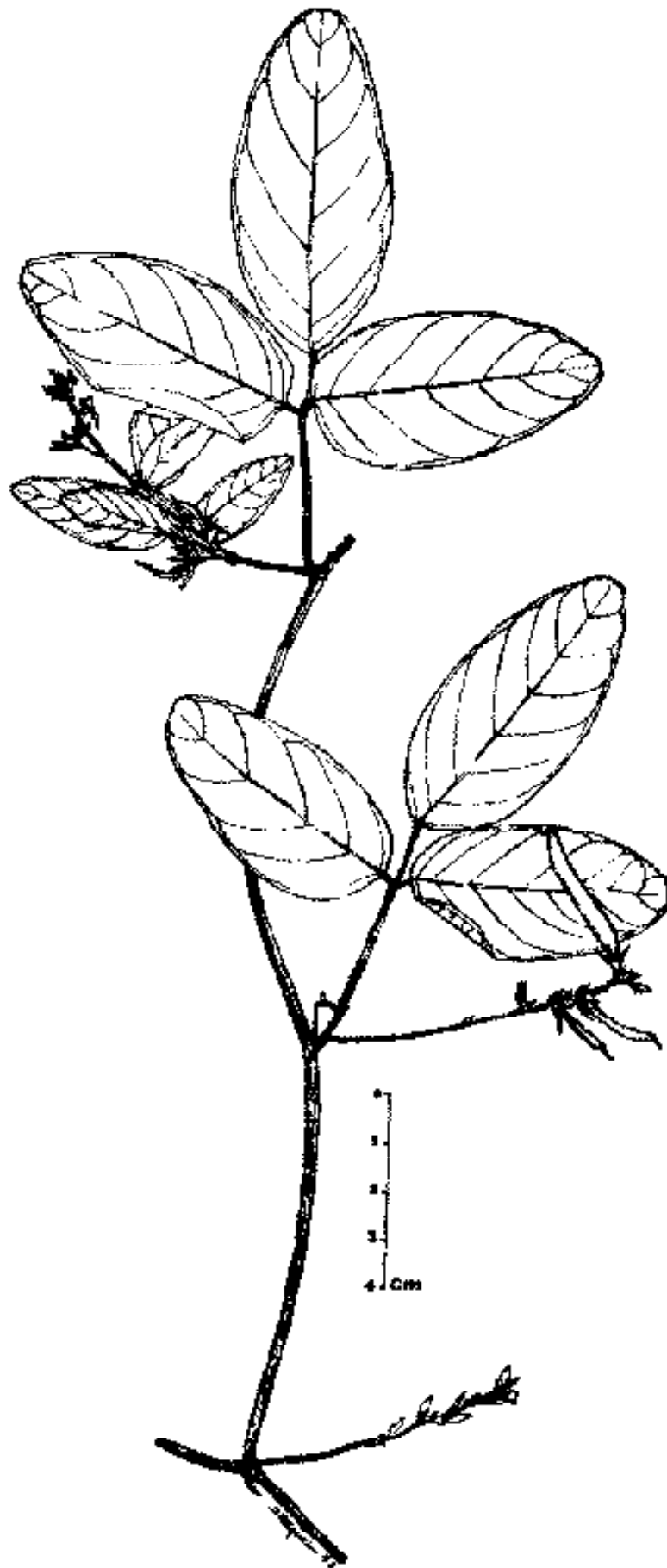


Fig. 36. *Galactia tenuiflora* (Klein ex Willd.) Wt. & Arn.

between the seeds.

About 5 species in south America and West Indies; one planted in M. P.

Gliricidia sepium (Jacq.) Kunth ex Walp., Repert. 1: 679, 1842. *Robinia sepium* Jacq., Enum. Pl. Carib. 28, 1760. *G. maculata* (Steud.) Kunth, Nov. Gen. Sp. 6: 393, 1824.

Small deciduous trees up to 4 m high; branches large, grey spreading in an arch like fashion. Leaves alternate, grey pubescent when young, up to 20 cm long; leaflets opposite, 12-14 pairs, elliptic-ovate, entire, subacute, subcordate at base, up to 4.5 x 2.5 cm, strongly odorous. Racemes simple or branched, in axils of fallen leaves. Calyx cup shaped, slightly lobed or truncate. Corolla much exerted; standard sub-orbicular; wings narrow. Pods thick, woody, narrow at both the ends, up to 16 cm long, glabrous, 4-12-seeded; seeds compressed, suborbicular, pale brown.

Planted. Bhopal (*Oomachan*, 1977). Fl. & Fr. : Feb.-Sept.

24. GLYCINE Willd.

Twining or suberect annual herbs with 3-7 foliolate stipellate leaves. Flowers in axillary racemes. Calyx campanulate, teeth distinct. Corolla exerted; petals subequal, standard slightly auricled at base, stamens monadelphous. Ovary sessile; style incurved; stigma capitate. Pods linear or oblong, straight or falcate, more or less septate between seeds.

A genus with about 12 species distributed throughout tropics and subtropics of the old world; one species cultivated in M. P.

Glycine max (L.) Merr., Intrpr. Herb. Amboin. 274, 1917. *Phaseolus max* L., Sp. Pl. 725, 1753. *Dolichos soja* L., Sp. Pl. 727, 1753. *Soja hispida* Moench, Meth. Pl. 153, 1794. *Glycine hispida* (Moench) Maxim. in Bull. Acad. St. Petersb. 18: 398, 1873. *G. soja auct. non Sieb. & Zucc. sensu Baker* in Hook. f., Fl. Brit. Ind 2: 184, 1876. *p.p.* Bhat. English name - Soyabean.

Suberect or trailing annual herbs, 30-60 cm high, stem and branches densely clothed with fine ferruginous hairs. Leaves 3-foliolate; petioles 10-15 cm long, leaflets 5-15 cm long, ovate-elliptical or oblong-lanceolate, acute, more or less hairy on both the sides. Flowers in few-flowered sessile racemes. Calyx 5-7 mm, densely hairy, teeth long setaceous. Corolla violet, pink or reddish, 6-7 mm long. Pods 3.5-5 cm, linear-oblong, slightly falcate, densely pubescent, 3-4 seeded.

Bhopal Fl. & Fr. : Sept.-May.

Cultivated. Seeds eaten roasted or cooked; sprouted seeds are used for the preparation of various milk products; oil used in cooking; cakes used to feed livestock and poultry.

25. GONIOGYNA DC.

Monotypic genus, distributed in Sri Lanka, India and Pakistan.

Goniogyna hirta (Willd.) Ali in Taxon 16 : 463, 1967. *Halia hirta* Willd., Sp. Pl. 3(2): 1169, 1803. *Heylandia latebrosa* auct.; Baker in Hook. f., Fl. Brit. Ind. 2: 65, 1876.

Prostrate perennial dichotomously branched pilose herbs with whitish root-stock. Leaves simple, alternate, entire, sub-sessile, ovate, sub-acute, obliquely cordate at base, 5-15 x 3-5 mm, woolly at margins. Flowers solitary, axillary, sub-sessile. Calyx tube turbinate, short, teeth lanceolate, the upper 2 partly connate, the lower 3 free. Corolla 3-6 mm long, yellow to orange-yellow, tinged with purple; keel beaked. Stamens monadelphous. Pods flattened, subglabrous to pubescent, 2.5-5 mm long. Seeds 1-2, reniform.

In wasteland, on dry sandy soil. Bastar, Bhopal, Chhindwara, Dhar, E. Nimar, Gwalior, Hoshangabad, Indore, Jabalpur, Mandla, Rewa, Raisen, Satna, Seoni, Shivpuri, Shahdol. Fl. & Fr. : July-March.

26. INDIGOFERA L.

Herbs or shrubs, clothed with appressed medifixed hairs. Leaves simple or pinnate, or palmately 1-3-foliolate. Flowers in copious axillary racemes, sometimes sub-capitate. Calyx small, campanulate; teeth unequal, lowest longer. Corolla pink or purple, caducous; standard orbicular, obovate or ovate; wings oblong; keel spurred on each side near the base. Stamens diadelphous, 9+1. Ovary sessile, many ovuled; style incurved; stigmas terminal, penicillate. Pods linear or oblong, truncate, compressed.

About 300 species in tropical Africa and sub-tropical regions, mostly tropical; 17 in M.P.

1a. Pods 1-2-seeded:

2a. Leaves simple:

3a. Leaves ovate-cordate ...5. *I. cordifolia*

3b. Leaves not ovate - cordate:

4a. Leaves linear; pods globose ...10. *I. linifolia*

4b. Leaves broadly obovate, obtuse; pods sickle shaped, beaked ...12. *I. nummularifolia*

2b. Leaves compound:

5a. Leaflets 3, glandular ...7. *I. glandulosa*

5b. Leaflets 5-11, not glandular ...11. *I. linnaei*

1b. Pods more than 2-seeded:

6a. Pods flat, slightly curved ...9. *I. hochstetteri*

6b. Pods not as above:

- 7a. Racemes shorter than the leaves:
- 8a. Leaflets 5-9; pods torulose, segmented ...3. *I. caerulea*
- 8b. Leaflets 3; pods neither torulose nor segmented:
- 9a. Leaflets strigosely hairy; pods narrowly 4 - winged ...16. *I. trifoliata*
- 9b. Leaflets pubescent; pods not winged ...17. *I. trita*
- 7b. Racemes longer than the leaves:
- 10a. Pods torulose:
- 11a. Leaflets usually 5, rarely 3, opposite; pods 5-10 mm long, constricted between the seeds ...1. *I. angulosa*
- 11b. Leaflets 3 to 5, rarely simple, alternate; pods 10-20 mm long, not constricted between the seeds ...13. *I. oblongifolia*
- 10b. Pods not torulose:
- 12a. Pods tetragonal:
- 13a. Leaflets opposite, calyx rusty-brown tomentose; pods densely hirsute ...2. *I. astragalina*
- 13b. Leaflets alternate; calyx not rusty brown tomentose; pods puberulous ...14. *I. spicata*
- 12b. Pods not tetragonal:
- 14a. Stem woody at base; leaflets 3, rarely 5; pods ligulate, compressed, appressed hairy ...8. *I. hamiltonii*
- 14b. Stem not woody at base; leaflets 5 or more; pods not ligulate, glabrous:
- 15a. Pods purplish, up to 2 cm long ...6. *I. glabra*
- 15b. Pods not purplish, more than 2 cm long:
- 16a. Leaflets 13 - 31, sub-opposite; bracts boat shaped, acuminate; calyx silky brown ...4. *I. cassioides*
- 16b. Leaflets 7 - 13, opposite; bracts setaceous; calyx not silky brown ...15. *I. tinctoria*

1. *Indigofera angulosa* Edgew. in J. Asiat. Soc. Beng. 21, 168. 1853; Baker in Hook. f., Fl. Brit. Ind. 2: 97. 1876.

Suffruticose herbs with woody base, up to 2 m high, branches adpressed hairy. Leaves imparipinnately compound; leaflets 5, oblong to ovate, acuminate, mucronate, 1.5 - 3.0 × 0.5 - 1.5 cm, membranous, clothed with appressed silvery white hairs on both the surfaces. Racemes axillary, 10 - 15 cm long. Flowers ca 4 mm long. Calyx 1 - 2 mm long; teeth setaceous, pubescent. Corolla pink. Pods 5 - 10 mm long, torulose,

constricted between the seeds, pointing downwards. Seeds 1-4, concave with a raised ridge in the centre.

In open moist places and hill slopes in mixed forests. Rajnandgaon. Fl.: Sept.; Fr. : Nov.

2. *Indigofera astragalina* DC., Prodr. 2: 228. 1825. *I. hirsuta sensu* Baker in Hook. f., Fl. Brit. Ind. 2: 98. 1876. *p.p.* (non L., 1753.).

Robust, much-branched annual herbs, 0.4 - 1.2 m high, clothed with long spreading brown hairs. Stems quadrangular. Leaves imparipinnate, up to 13 cm long, leaflets 5 - 11, obovate-rounded to oblong, obtuse, retuse, terminal longer, 10 - 40 × 7 - 25 mm, pilose on both the surfaces. Stipules 5 - 10 mm long, pilose. Racemes axillary, 5 - 15 cm long; peduncles 1 - 2 cm long. Flowers 4 - 5 mm long. Calyx 3 - 4 mm long, densely pilose; teeth setaceous. Corolla 4 - 5 mm long, orange - yellow to red. Pods tetragonal, 10 - 20 × 2 - 3 mm, densely hirsute, 4 - 6 seeded.

On roadsides and forest margins. Balaghat, Bastar, Bhopal, Bilaspur, Chhindwara, Hoshangabad, Indore, Mandla, Raigarh, Raipur, Raisen, Sagar, Satna, Seoni, Shahdol, Shivpuri, Surguja, W. Nimar. Fl. & Fr.: Aug.-March.

3. *Indigofera caerulea* Roxb., Fl. Ind. ed. Carey, 3: 377. 1832; Ali in Bot. Notiser 111: 553. 1959.

Erect herbs, 0.4 - 1.0 m high with whitish hoary branches. Leaves imparipinnate, 5 - 8 cm long; leaflets 5 - 9, obovate - oblong, 12 - 32 × 6 - 23 mm, glabrous above, densely pubescent below. Racemes axillary, sessile, 2.5 - 5 cm long. Calyx 1 - 2 mm long, pubescent; teeth equalling the tube. Corolla reddish - yellow, 3 - 5 mm long. Pods 2 - 4 mm long, curved, torulose, usually segmented (2-) 3 - 4 (-5)-seeded,

E. Nimar (*Maheshwari*, 1960). Fl. & Fr. : Sept.-Oct.

4. *Indigofera cassioides* Rottl. ex DC., Prodr. 2: 225. 1825. *I. pulchella* (auct. non Roxb. 1832); Baker in Hook. f., Fl. Brit. Ind. 2: 101. 1876. - Baroli, Girgoli, Sakena.

Erect much - branched pubescent undershrubs, 1 - 3 m high, branches striate. Leaves imparipinnate, 10 - 25 cm long; leaflets 13 - 23, elliptic - oblong to obovate, obtuse to retuse, 15 - 25 × 6 - 15 mm, glabrescent. Racemes lax, axillary, 3 - 8 cm long; bracts navicular, acuminate, caducous. Calyx 2 - 3 mm long, silky brown; teeth unequal, deltoid. Corolla 8 - 10 mm long, pink to lilac red. Pods 2 - 5 cm long, turgid, reflexed, glabrous, 8 - 12-seeded.

In mixed and teak forests. Chhatarpur, Chhindwara, Durg, Hoshangabad, Indore, Jabalpur, Mandla, Narsimhapur, Panna, Raigarh,

Raipur, Raisen, Rajnandgaon, Sagar, Seoni, Shahdol, Sidhi, Surguja. *Fl. & Fr.* : July-April.

Flowers sometimes eaten as vegetable.

5. *Indigofera cordifolia* Heyne ex Roth., Nov. Pl. Sp. 357. 1821; Baker in Hook. f., *Fl. Brit. Ind.* 2: 93. 1876. - *Nilawari, Vekriavas.*

Diffuse much branched pubescent annual herbs, 15-30 cm high. Leaves simple, 5-15 × 3-12 mm, ovate cordate or truncate at base, subobtusate or mucronate at apex, pubescent on both sides; stipules setaceous, 1-2 mm long. Flowers in dense axillary subsessile 4-8-flowered heads. Calyx 3-5 mm long, pubescent; teeth linear. Corolla scarlet red, shorter than the calyx. Pods oblong, 4-5 mm long, pubescent, usually 2-seeded.

Along streams and drains. Bhind, Bhopal, Damoh, Gwalior, Hoshangabad, Indore, Mandla, Morena, Panna, Raigarh, Rewa, Sagar, Seoni, Shivpuri, W. Nimar. *Fl. & Fr.* : Aug.-March.

6. *Indigofera glabra* L., Sp. Pl. 752. 1753. *I. pentaphylla* Murr., Syst. Veg. ed. 13. 564. 1774; Baker in Hook. f., *Fl. Brit. Ind.* 2: 95. 1876.

Slender diffusely branched hairy annual herbs, 20-50 cm high; stem and branches purplish. Leaves imparipinnate, 5-foliolate, 1.5-3 cm long; leaflets elliptic-obovate, 5-20 × 2-10 mm, glaucous beneath, with a few adpressed bristly hairs. Racemes axillary, short, 2-4-flowered. Flowers ca 3 mm long. Calyx ca 2 mm, teeth setaceous. Corolla bright red or purple, ca 3 mm long. Pods cylindrical, turgid, straight, 1.5-2 cm long, glabrous, slightly beaked, purplish, 6-12-seeded.

In dried up sandy river beds and rock crevices. Balaghat, Bastar, Hoshangabad, Narsimhapur, Raigarh, Raipur, Seoni, Shahdol, Surguja. *Fl. & Fr.* : Aug.-Jan.

7. *Indigofera glandulosa* Roxb. ex Willd., Sp. Pl. 3: 1227. 1803; Baker in Hook. f., *Fl. Brit. Ind.* 2: 94. 1876. - *Barbara, Barbata, Jhugin, Lirdana.*

Erect much branched pubescent annual herbs, 20-50 cm long. Leaves 3-foliolate; petiole 1-2.5 cm long, stipules setaceous; leaflets oblanceolate, 1-2.5 cm long, glaucous and with numerous black dots beneath. Flowers 6-11 in dense axillary sessile clusters. Calyx ca 2 mm long, pubescent, teeth setaceous. Corolla 6-8 mm long pink or red. Pods oblong, turgid, ca 5 mm long, brownish, pubescent, denticulate along the sutures, 1-2-seeded.

Along cultivated fields and roadside ditches. Balaghat, Bastar, Bhopal, Chhindwara, Damoh, Durg, Hoshangabad, Indore, Jabalpur, Mandla, Raipur, Raisen, Rajnandgaon, Rewa, Sagar, Shivpuri, W. Nimar. *Fl. & Fr.* : Aug.-April.

Seeds eaten in times of scarcity.

8. *Indigofera hamiltonii* Grah. ex Duthie & Prain in Ann. R. Bot. Gard. Calcutta 9 (1) : 22. t. 29. 1901.

Small much branched undershrubs with 10-20 cm long adpressedly hairy branches. Leaves imparipinnate, 2-6.5 cm long; petiole ca 12 mm long; leaflets usually 3, rarely 5, obovate or oblong, emarginate, membranous, 10-20 mm long, pubescent on both the surfaces. Racemes 15-30 cm long, arising from the base of the stem; flowers scattered throughout the rachis, bracts lanceolate. Calyx campanulate; teeth deltoid. Corolla pale purple. Pods ligulate, compressed, 2.5-3.8 cm long, 9-12 seeded.

On hill slopes, in sal forests. Balaghat, Raigarh. Fl.: April.

9. *Indigofera hochstetteri* Baker in Oliver, Fl. Trop. Afr. 2: 101. 1871. *I. anabaptista* Steud. ex Baker in Hook. f., Fl. Brit. Ind. 2: 102. 1876.

Diffuse or prostrate annual herbs with glabrous or faintly hairy branches. Leaves imparipinnate, 1.5-5 cm long; petioles 5-12 mm long; stipules 2-4 mm long; leaflets 3-5 (-7), oblanceolate, 12-20 (-30) × 3-8 (-12) mm, pubescent on both the sides. Racemes axillary, 10-20 flowered, 8-10 cm long. Calyx 2-3 mm long, densely hairy; teeth setaceous, longer than the tube. Corolla purplish, 3-5 mm long. Pods flat, falcate, 12-20 × 3-4 mm, deflexed, 6-8-seeded.

In rock-crevices. Hoshangabad (Bir & Kumari, 1982). Fl. & Fr. Aug.-Oct.

10. *Indigofera linifolia* (L. f.) Retz., Obs. 4: 29. 1786; Baker in Hook. f., Fl. Brit. Ind. 2: 92. 1876, p.p. *Hedysarum linifolia* L. f., Suppl. 331. 1781. -Torki

Diffusely branched prostrate annual herbs with 10-50 cm long angular silvery canescent branches. Leaves simple, sessile, linear-oblong to lanceolate, apiculate, 7-25 × 2-4 mm, hairy on both the surfaces. Racemes axillary, short peduncled, 2-3 cm long, 6-10-flowered. Flowers ca 3 mm long. Calyx 2-3 mm long, pubescent; teeth linear, longer than the tube. Corolla bright red or pink. Pods globose, ca 1.5 mm in diam., apiculate, silvery silky, 1-seeded.

Along roadside ditches, on sandy loam soil. Balaghat, Bhind, Bhopal, Bilaspur, Chhindwara, Chhatarpur, Damoh, Durg, Gwalior, Hoshangabad, Indore, Jabalpur, Mandla, Morena, Narsimhapur, Raigarh, Raipur, Raisen, Rajnandgaon, Ratlam, Sagar, Satna, Seoni, Shahdol, Shivpuri, Sidhi, Surguja, Tikamgarh, W. Nimar. Fl. & Fr. : Aug.-April.

10.1 var. *campbellii* Wt., Ic. t. 313. 1840; Baker in Hook. f., Fl. Brit. Ind. 2: 93. 1876.

Internodes and leaves shorter. Leaves obovate to obtuse, 6-10 × 2-3 mm mucronate, glaucous. Racemes short, axillary. 1-4-flowered.

In ditches and dried up river-beds. Bilaspur, Hoshangabad, Raisen, Sagar. *Fl. & Fr.* : July-Dec.

11. *Indigofera tinnael* Ali in Bot. Notis. 3: 549. 1958. *I. enneaphylla* L., Mant. Pl. 2: 272. 571. 1773 *nom. ille.*; Baker in Hook. f., Fl. Brit. Ind. 2: 94. 1876. -*Bhuinguli, Atahai.*

Much branched slender trailing herbs with 10-50 cm long pubescent branches. Leaves imparipinnate, 2.8-5.0 cm long; leaflets 5-11, alternate, linear-oblanccolate to obovate, 7-12 × 2-5 mm, pubescent on both the surfaces. Racemes axillary, spicate, short-peduncled, 10-15-flowered. Calyx 3-4 mm, pubescent, teeth linear, longer than the tube. Corolla bright red or pink. Pods oblong to subovoid, turgid, 3-6 × 2-3 mm, pubescent, 2-seeded.

In wastelands and teak forests. Balaghat, Bastar, Bhind, Bhopal, Chhatarpur, Damoh, Dhar, Durg, Gwalior, Hoshangabad, Indore, Jabalpur, Mandla, Morena, Panna, Raigarh, Raipur, Rajnandgaon, Sagar, Satna, Seoni, Shivpuri, Sidhi, W. Nimar. *Fl. & Fr.* : Aug.-April.

12. *Indigofera nummularifolia* (L.) Liv. ex Alston in Trimen Handb. Fl. Ceylon, Suppl. 6: 72. 1931. *Hedysarum nummularifolium* L., Sp. Pl. 746. 1753. *I. echinata* Willd., Sp. Pl. 3: 1222. 1802; Baker in Hook. f., Fl. Brit. Ind. 2: 92. 1876.

Diffusely branched annual herbs with 15-40 cm long spreading branches from the base. Leaves simple, broadly obovate 1.2-2.4 × 0.8-1.7 cm, obtuse, mucronate at apex, shortly cuneate at base, sparsely hairy on both the surfaces; petioles 1-2 mm, stipules 2-2.5 mm, subulate. Racemes axillary. Peduncles 1-2.5 cm long, 6-10-flowered. Calyx 2-2.5 mm long, teeth lanceolate, acute. Corolla pink, 2.5-3 mm long. Pods 5-6 mm long, beaked with hooked spines along dorsal suture, pubescent, 1-seeded.

In wastelands, on sandy soil. Bhopal, Damoh, Hoshangabad, Panna, Raigarh, Shahdol, Shivpuri, Surguja. *Fl. & Fr.* : Sept.-Dec.

13. *Indigofera oblongifolia* Forsk., Fl. Aegypt. Arab. 137. 1775. *I. paucifolia* Delile, Fl. Aegypt. 251. 1821, Baker in Hook. f., Fl. Brit. Ind. 2: 97. 1876. -*Jhilla, Jhugi.*

Erect branched shrubs, 0.6-2.0 m high with divaricate cylindrical branches. Leaves imparipinnate, rarely simple, petioles 5-12 mm long; stipules 2-3 mm long, leaflets oblanceolate to elliptic-oblong 10-25 × 6-8 mm, pubescent above, silky beneath. Racemes axillary, 8-10 cm. long,

many-flowered. Calyx 1-2 mm long; teeth lanceolate-cuspidate, as long as the tube. Corolla scarlet red, 4-5 mm long, pubescent outside. Pod upcurved, torulose 10-20 mm long, pubescent, 6-8-seeded.

Among rock boulders. Shivpuri (Kaushik, 1969). *Fl. & Fr.* : Sept.-Nov.

14. *Indigofera spicata* Forsk., *Fl. Aegypt.-Arab.* 138. 1775. *I. hendecaphylla* Jacq., *Coll. Bot.* 2: 358. 1789. *I. endecaphylla* Jacq., *Icon. Rar.* t. 570. 1783; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 98. 1876.

Procumbent or prostrate branched herbs with ascending branches up to 60 cm long. Leaves alternate; pinnae 2.5-6.5 cm long; stipules 6-8 mm long, ovate or lanceolate, acuminate; leaflets 5-11, obovate, cuneate, entire, rounded, 12-25 × 2-8 mm. Racemes 2.5-11.5 cm long. Calyx 3-4 mm long, deeply lobed, lobes linear, silky pubescent. Corolla ca 6 mm long, pink; standard orbicular. Pods subtetragonal, 18-32 mm long, deflexed, mucronate, puberulous; 6-10-seeded.

In wasteland, on sandy loam soil. Rajnandgaon, Seoni, Surguja. *Fl. & Fr.* : Sept.-March.

15. *Indigofera tinctoria* L., *Sp. Pl.* 751. 1753; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 99. 1876. -*Neel*.

Much branched 0.3-2.0 m high shrubs with slightly angular silvery pubescent branches. Leaves imparipinnate 5-10 cm long; petioles 12-25 mm long; leaflets 7-13, elliptic or oblong, obtuse or retuse, 10-25 × 5-12 mm, pubescent beneath. Racemes axillary, subsessile, 4-12 cm long, many-flowered. Calyx 1-2 mm long, pubescent. Corolla lilac red, 3-5 mm long. Pods 2-4 cm long, turgid, straight or slightly curved, 8-10-seeded.

On hill slopes and moist wasteland. Bastar, Bilaspur, Chhindwara, Damoh, Hoshangabad, Indore, Panna, Raipur, Raisen, Ratlam, Sagar, Satna, Seoni, Shivpuri, Sidhi, Tikamgarh, W. Nimar. *Fl. & Fr.* : July-May.

Plants are source of indigo.

16. *Indigofera trifoliata* L., *Cent. Pl.* 2: 29. 1756; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 96. 1876. *I. prostrata* Willd., *Sp. Pl. ed.* 4. 3: 1226. 1803; Nair, *Fl. Bash. Himal.* 81. 1977.

Much branched small undershrubs, 20-50 cm high with young branches hairy. Leaves 3-foliolate; petioles 5-12 mm, leaflets oblanceolate, mucronate, 10-25 × 5-10 mm, pubescent on both the surfaces, glandular punctate beneath. Racemes sessile, congested, 4-10 mm long, 6-12-flowered. Calyx 1-3 mm long; teeth lanceolate. Corolla pink, 3-5 mm long. Pods brown, deflexed, 12-20 mm long, narrowly 4-winged, 6-9-seeded.

Along road side ditches on gravelly soil. Balaghat, Bastar, Chhindwara, Damoh, Hoshangabad, Indore, Khandwa, Raigarh, Raipur, Rajnandgaon, Sagar, Seoni, Shahdol, Shivpuri, W. Nimar. *Fl. & Fr.*: July Oct.

17. *Indigofera trita* L. *f.*, *Suppl. Pl.* 335. 1781; Baker in *Hook. f.*, *Fl. Brit. Ind.* 2: 96. 1876.

Much branched erect pubescent undershrubs, 0.5 - 1 m high. Leaves 3 foliolate; petioles 0.8 - 2.5 cm long; leaflets 10 - 25 mm long, terminal longer, obovate or oblong, pubescent on both the surfaces. Racemes sessile, axillary, 6 - 12-flowered. Calyx 2 - 3 mm long, white pubescent, teeth linear. Corolla pink, 4 - 6 mm long. Pods 18 - 30 mm long, deflexed, tetragonous, glabrescent, 6 - 10-seeded.

On sandy alluvium, Bhind, Chhindwara, Damoh, E. Nimar, Hoshangabad, Indore, Jabalpur, Morena, Narsimhapur, Panna, Raisen, Rewa, Sagar, Satna, Tikamgarh. *Fl. & Fr.*: July - Feb.

The seeds are sometimes eaten and considered nutritive.

17.1. subsp. *subulata* (Vahl ex Poir.) Ali in *Bot. Notiser* 111: 558. 1958. *I. subulata* Vahl ex Poir. in *Lamk., Encycl. Meth. Bot. (Suppl.)* 3: 150. 1813; Baker in *Hook. f.*, *Fl. Brit. Ind.* 2: 97. 1876.

Robust undershrubs, 30 - 60 cm high with branches adpressedly hairy. Leaves 3 - foliolate; leaflets-elliptic or obovate, slightly emarginate at apex, acute at base, 17 - 23 × 5 - 15 mm, pubescent on both the surfaces. Racemes axillary, 2 - 5 cm long, more flowered. Pods 2.5 - 5 cm long, linear, pubescent, drooping, curved upwards; seeds pyramidal.

In moist places. Chhindwara (R.S. Rao, 1960). *Fl. & Fr.*: Aug.-Dec.

27. LABLAB Adans.

A monotypic genus distributed throughout the tropical Africa and Asia; widely cultivated in M. P.

Lablab purpureus (L.) Sweet, *Hort. Brit.* ed. 1: 481. 1927. *Dolichos purpureus* L., *Sp. Pl.* ed. 2: 1021. 1761. *D. lablab* L., *Sp. Pl.* 725. 1753; Baker in *Hook. f.*, *Fl. Brit. Ind.* 2: 209. 1876. - *Seem, Sem.*

Annual or perennial climbing herbs. Leaves pinnately 3 foliolate, stipulate; petioles 1 - 18 cm long; leaflets broadly ovate, acuminate, 5 - 12 × 4 - 10 cm, glabrous or pubescent. Flowers axillary, peduncled; peduncles and racemes 15 - 22 cm long; pedicels fascicled. Calyx 3 - 6 mm long, teeth deltoid. Corolla much exserted, purple or white; standard 12 - 15 mm long, auriculate with appendages; keel incurved, rostrate. Stamens diadelphous, 9 + 1. Ovary nearly sessile; style bearded along inner edge; stigma terminal. Pods flat, strap shaped, up to 10 × 4 cm, 2 - 5 seeded.

Bhopal, Bilaspur, Chhatarpur, Damoh, Hoshangabad, Jabalpur, Raigarh, Raipur, Sagar, Sidhi. Fl. & Fr. : Nov. April.

Several forms are in cultivation for its pods used as vegetable.

28. LATHYRUS L.

A climbing or straggling annual or perennial herb. Leaves paripinnately compound, terminating into a tendril or a bristle; leaflets 2 many, or often absent; stipules entire or semisagittate. Flowers in axillary racemes, or solitary. Calyx tube obliquely bell-shaped. Corolla longer than calyx; standard broad; keel shorter than wings. Stamens diadelphous, 9 + 1. Sheath truncate. Ovary sessile or stipitate; style flattened and hairy beneath the stigma. Pods cylindrical to flattened, 2 many-seeded.

About 170 species, distributed chiefly in North temperate zone, South America and Africa; 3 in M. P.

- 1a. Leaves with all the leaflets reduced to tendrils; flowers yellow ...1. *L. aphaca*
- 1b. Leaves with 1-2 pair of leaflets and a terminal tendril, flowers purple or blue:
 - 2a. Pods winged on the back ...3. *L. sativus*
 - 2b. Pods not winged on the back ...2. *L. odoratus*

1. *Lathyrus aphaca* L., Sp. Pl. 729. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 179. 1876. -*Jungli matar*. Fig. 39.

Annual trailing or slender glabrous herbs. Stems not winged. Leaves modified into tendrils, at the base of which there is a 5-30 mm long broadly ovate hastate truncate appressed foliaceous stipule. Flowers 1-2, axillary, yellow. Calyx tube oblique, campanulate, teeth equal. Corolla 9-13 mm. Pods 1.5-3.5 cm linear oblong or subfalcate, wingless, glabrous. Seeds 4-6.

A common weed in cultivated fields. Bastar, Bhopal, E. Nimar, Sagar, Shivpuri. Fl. & Fr. : Feb.-April.

2. *Lathyrus odoratus* L., Sp. Pl. 732. 1753; Bailey, Man. Cult. Pl. ed. 2. 551. 1949.

Annual climbing herbs with glabrescent winged stems. Leaves paripinnate; leaflets in a pair, 2-6 × 1.5-2.5 cm, ovate-oblong or elliptic, glabrous above, hairy along the veins beneath; petioles 2-2.5 cm long; stipules falcate, auricled at base, 1.5-2.5 cm long. Flowers 1-3 on short pedicels 3-4 cm long, purple. Calyx ca 1 cm long, cleft halfway down. Corolla white pink or purple, 2.5-3 cm long. Pods 5-7 × 1 cm, slightly curved, pubescent, 6-8-seeded.

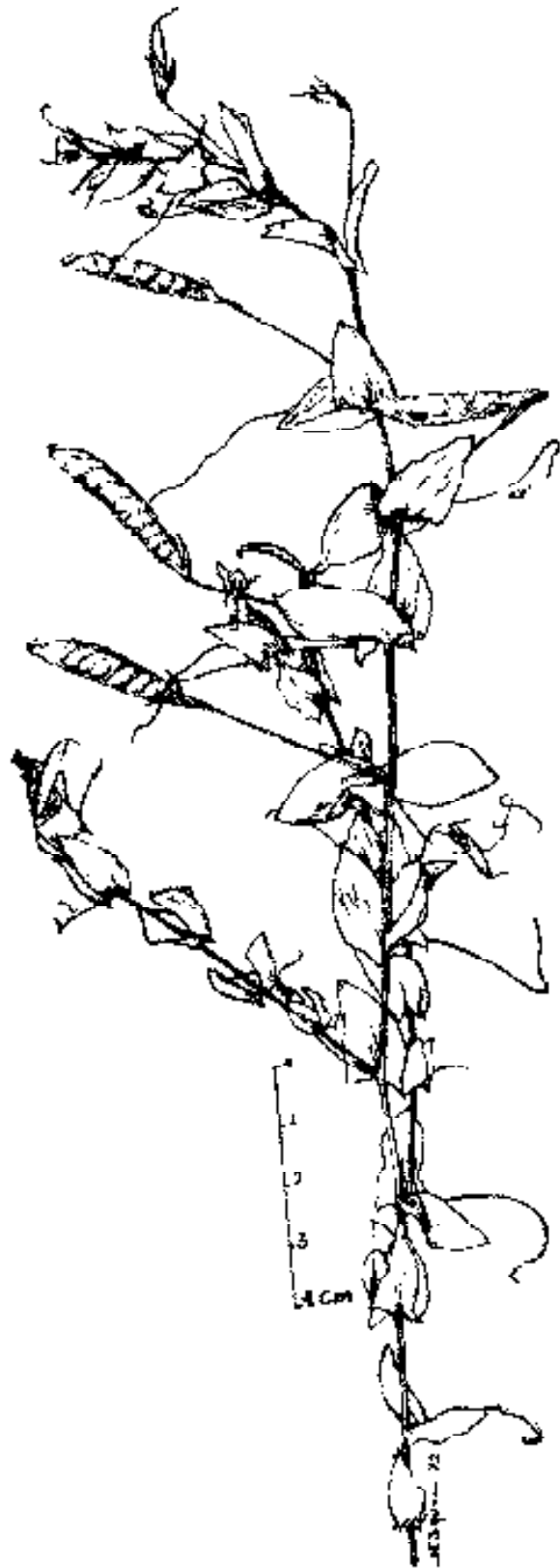


Fig. 39. *Lathyrus aphaca* L.

Commonly known as Sweet pea and is cultivated in the gardens as an ornamental plant. Bhopal. *Fl. & Fr.* : Jan.-March.

3. *Lathyrus sativus* L., Sp. Pl. 730. 1753; Baker in Hook. *f.*, Brit. Ind. 2: 179. 1876. -*Batra, Khesari, Teori.*

An annual much branched glabrous herb with narrowly winged stem. Leaves paripinnately compound; leaflets 2, linear-lanceolate, acuminate, entire, 2-10 cm long, 1-3 mm. broad; stipules semi-sagittate, lanceolate; rachis of median and upper leaves usually terminating in trifid tendrils. Flowers solitary axillary on long peduncles, blue. Calyx 5-10 mm long, teeth unequal. Corolla 10-25 mm long. Pods 2.5-4 cm long, winged on the back, 3-5-seeded.

Cultivated for fodder, and seeds used as pulses. Regular consumption of its seeds is harmful and causes lathyrism. Bastar, Bhopal, Bilaspur, Chhatarpur, Damoh, E. Nimar, Hoshangabad, Indore, Mandla, Raigarh, Raipur, Sagar, Satna, Sidhi. *Fl. & Fr.* : Nov.-March.

29. LENS Mill.

Erect spreading annual herbs. Leaf usually paripinnate, ending in a bristle or a tendril, rarely with a terminal leaflet. Leaflets 2-several pairs, entire; stipules entire, dentate or auricled. Inflorescence axillary, few-flowered, racemose or flowers solitary. Calyx teeth subequal. Corolla pale purple, wings adnate to the keel and to the staminal tube. Stamens diadelphous, 9+1. Style bearded longitudinally on the inner face. Pods compressed, 2-1-seeded.

About 6 species in S.E. Europe, W. & C. Asia and E. Africa; one widely cultivated in M.P.

Lens culinaris Medic. in Vorles Churf. Phys. Ges. 2: 361. 1787. *Ervum lens* L., Sp. Pl. 738. 1753; Baker in Hook. *f.*, Fl. Brit. Ind. 2: 179. 1876. *Lens esculenta* Moench., Meth. 131. 1794. -*Masur.*

Erect much branched hairy herb, 30-60 cm tall, with angular branches. Leaves paripinnately compound, ending in a short bristle, sometimes in a tendril, leaflets 4-7 pairs, subopposite, pilose on both sides, entire, tip truncate to retuse, apiculate. Inflorescence peduncled, 1-4-flowered, ending in a bristle. Calyx pilose, teeth subequal, acute. Corolla pale purple, wings adnate to the keel and to the staminal tube. Style bearded longitudinally on the inner face. Pods rhomboid, glabrous, 8-14 × 5-8 mm. Seeds 2, compressed, grey.

Cultivated as a cold weather crop for its seeds, cooked as a pulse. Chhatarpur, Hoshangabad, Mandla, Raigarh, Sagar, Shivpuri. *Fl. & Fr.* : Nov.-April.

30. LEPTODESMIA Benth.

Perennial diffuse herbs with simple or 3-foliolate stipellate leaves. Flowers clustered in dense terminal racemose heads. Calyx campanulate; teeth unequal. Corolla minute, included; standard broad; keel obtuse. Stamens diadelphous. Ovary sessile, 1-ovuled; style incurved; stigma capitate. Pods small, oblong, flat, 1-seeded.

A genus with 2 species distributed in tropical regions; one in M.P.

Leptodesmia congesta Benth. ex Baker in Hook. f., Fl. Brit. Ind. 2: 152. 1876.

Perennial herbs with slender trailing caespitose stems, 30-60 cm high. Leaves 1-3-foliolate, petiole small; leaflets membranous, 6-18 mm long, orbicular or oblong, obtuse, sparsely hairy beneath. Flowers in dense oblong terminal capitate about 2.5 cm long racemes; bracts large, ovate, pubescent. Calyx 5-6 mm long, tube short, teeth densely plumose. Corolla minute, included. Pods 5-6 mm long, oblong, membranous, flattened, 1-seeded, opening along the ventral suture.

Raigarh (Wood, 1902).

31. LESPEDEZA Michx.

Herbs or undershrubs with pubescent branches. Leaves exstipulate, 3-foliolate. Flowers in racemes or axillary fascicles. Calyx tube campanulate; teeth narrow, unequal. Corolla exerted, with broad standard and obtuse or truncate keel. Stamens diadelphous, 9+1. Ovary sessile or stipitate, 1-ovuled; style filiform, incurved; stigma terminal. Pods small, oblong or orbicular, compressed, 1-seeded.

About 40 species in temperate North America, East and tropical Asia and tropical Australia; one in M.P.

Lespedeza juncea (L. f.) Pers., Syn. Pl. 2: 318. 1807; Baker in Hook. f., Fl. Brit. Ind. 2: 142. 1876. *Hedysarum junceum* L. f., Dec. Prim. Pl. Hort. Upsal. 1: t. 4. 1762; *H. sericeum* Thunb., Fl. Jap. 289. 1784; *L. sericea* (Thunb) Miq. in Ann. Mus. Lugd. Bat. 3: 49. 1867; Baker in Hook. f., Fl. Brit. Ind. 2: 142. 1876; non Benth., 1852.

Erect undershrubs, 0.5-1.5 m high, with slender pubescent branches. Leaves 3-foliolate; petioles 1-6 mm long; stipules linear, 2-5 mm long, leaflets obovate to linear-oblancheolate, cuneate at base, obtuse or truncate at apex, mucronate, 5-20 × 2-6 mm, glabrous above, silky beneath. Flowers axillary, solitary or 2-4-nate, 4-6 mm long. Calyx 2-3 mm long, pubescent, teeth longer than the tube. Corolla yellowish-white or purplish, 4-6 mm long. Pods sessile, ellipsoid or ovoid, 3-4 mm long, finely silky, 1-seeded.

In mixed forests. Raigarh. *Fl. & Fr.* : Nov.-Jan.

32. **MACROTYLOMA** (Wt. & Arn.) Verdc.

Annual or perennial, sub-erect, prostrate or climbing herbs. Leaves pinnately 3-foliolate or unifoliolate. Flowers axillary, fasciculate or racemed. Calyx campanulate, 4-5-toothed or bifid. Corolla exserted, auricled with two appendages; wings narrow, keel not twisted. Stamens diadelphous, 9+1. Ovary 3-many-ovuled; style slender, penicillate around the stigma, not bearded down the edge.

About 24 species, mainly African and Asian, some pantropical; one in M.P.

Macrotyloma uniflorum (Lamk.) Verdc. in Kew Bull. 24: 322 & 401. 1970. *Dolichos uniflorus* Lamk., Encycl. 2: 299. 1786. *D. biflorus* auct. non L., Roxb., Fl. Ind. ed. 2, 3: 311. 1832; Baker in Hook. f., Fl. Brit. Ind. 2: 210. 1876.

Slender climbing pubescent annual herbs. Leaves pinnately 3-foliolate; petioles 1-7 cm long; leaflets ovate-elliptic to rhomboid, cuneate at base, acute at apex, 2.5 × 1.5-3 cm. Flowers solitary or in fascicles of 2-3 in the axil of leaves. Corolla 8-18 mm long, cream or greenish yellow, standard with two appendages at base. Pods linear, compressed, 3-5 cm long, 5-8 mm broad, recurved or falcate, densely hairy.

On roadside shrubs. Bastar, Bilaspur, Hoshangabad, Raipur, Rajnandgaon, Surguja. *Fl. & Fr.* : Sept.-Nov.

33. **MEDICAGO** L.

Annual or perennial herbs. Leaves pinnately trifoliolate; leaflets toothed; stipules adnate. Flowers in axillary, pedunculate racemes. Calyx tube campanulate; teeth 5, unequal. Corolla exserted; standard and wings oblong; keel obtuse, straight. Stamens diadelphous, 9+1. Ovary sessile, many ovuled; style filiform, slightly incurved; stigma oblique. Pods usually spirally twisted or sickle-shaped, 1-many-seeded.

About 50 species in Mediterranean region; 3 in M.P.

- 1a. Pods reniform, one-seeded ... 1. *M. lupulina*
- 1b. Pods spirally twisted, many-seeded:
 - 2a. Flowers yellow; pods armed with 2 rows of hooked prickles ... 2. *M. polymorpha*
 - 2b. Flowers purple; pods not armed with hooked prickles ... 3. *M. sativa*

1. *Medicago lupulina* L., Sp. Pl. 779. 1753; Baker in Hook. *f.*, Fl. Brit. Ind. 2: 90. 1876.

Trailing or procumbent biennial herbs, with finely downy stems and branches. Leaves 3-foliolate; stipules toothed, cordate; leaflets obovate, crenulate, cuneate, retuse or cordate at base, 5-15 × 4-6 mm. Flowers in ovoid heads on axillary leafless branches. Calyx 1-1.5 mm long; teeth setaceous, as long as the tube. Corolla yellow, 2-3 mm long. Pods minute, subglobose, reniform, 2-3 mm long, unarmed, 1-seeded.

In moist depressions. Jabalpur, Sagar. *Fl. & Fr.* : March.

2. *Medicago polymorpha* L., Sp. Pl. 779. 1753. *M. denticulata* Willd., Sp. Pl. 3: 1414. 1802; Baker in Hook. *f.*, Fl. Brit. Ind. 2: 90. 1876.

Erect annual herbs, up to 30 cm high, with somewhat spreading subglabrous branches. Leaves 3-foliolate; stipules laciniate; leaflets obovate to cuneate, obtuse, truncate to retuse, 12-20 × 7-15 mm, serrate. Flowers in 2-8-flowered racemes, peduncles 5-15 mm long. Calyx 2-3 mm long; teeth lanceolate, as long as the tube. Corolla yellow, ca 4 mm long. Pods spirally twisted, 2-3 mm high, subglobose, reticulate, bordered with two rows of hooked spines, many-seeded.

In moist depressions and cultivated fields. Bhopal, Chhatarpur, Raipur, Rewa, Shivpuri. *Fl.* : Jan.-Feb.; *Fr.* : Feb.

3. *Medicago sativa* L., Sp. Pl. 778. 1753; Baker in Hook. *f.*, Fl. Brit. Ind. 2: 90. 1876. -*Alfa Alfa*.

Erect perennial herbs, 30-60 cm high, with slightly hairy branches. Leaves 3-foliolate; leaflets narrowly oblong, obovate-oblanccolate, cuneate at base, dentate at apex, 12-30 × 4-12 mm. Flowers in 3.5-6.5 cm long peduncled racemes. Calyx tube campanulate; teeth as long as the tube. Corolla purple, 5-15 mm long, standard and wings narrow; keel obtuse. Pods forming double spirals, glabrous to subglabrous, 10-20-seeded.

Usually cultivated as a fodder crop. Bhopal (Oommachan, 1977). Indore (Rao & Sastry, 1964). *Fl. & Fr.* : May-Sept.

34. MELILOTUS Mill.

Annual or biennial herbs. Leaves pinnately 3-foliolate, with toothed leaflets; stipules adnate to the petiole. Flowers in long slender axillary racemes. Calyx tube campanulate; teeth 5, unequal, lanceolate. Corolla white or yellow; standard and wings narrow; keel obtuse, shorter than wings. Stamens diadelphous, 9+1. Ovary sessile or stipitate, few-ovuled; style filiform, incurved, glabrous; stigma terminal. Pods oblong, 1-4-seeded.

About 25 species in Mediterranean and Central Asia; 2 in M.P.

- 1a. Stipules triangular; flowers white, in loose racemes;
pods 2-seeded ...1. *M. alba*
- 1b. Stipules lanceolate; flowers yellow, in dense racemes;
pods 1-seeded ...2. *M. indica*

1. *Melilotus alba* Desr. in Lamk., *Encycl. Meth.* 4: 63. 1796; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 89. 1876. —*Ran Methi*.

Erect annual glabrous herbs, 30-100 cm high, with stout striate-angular stems. Leaves 3-foliolate; petioles 1-3.5 cm long; leaflets obovate or oblanceolate, cuneate at base, truncate or rounded at apex, glabrous, 10-25 × 7-10 mm, toothed. Flowers in 7-10 cm long axillary racemes, elongating to 10-15 cm in fruit. Calyx 1.7-2 mm long; teeth lanceolate, shorter than tube, pubescent. Corolla white, 3-5 mm long; standard longer than wings and keels. Pods ellipsoid, compressed, 3.5-5 mm long, glabrous. Seeds usually 2, dark brown, glabrous.

In cultivated fields. Bhopal, Damoh, Jabalpur, Mandla, Panna, Raigarh, Raisen, Sagar, Shahdol, Shivpuri. *Fl.* : Feb.-April; *Fr.* : April.

2. *Melilotus indica* (L.) All., *Fl. Pedem.* 1: 308. 1785. *Trifolium melilotus* L., *Sp. Pl.* 1: 764. 1753. *T. indicum* L., *Sp. Pl.* 765. 1753; Thunb., *Prodr. Fl. Cap.* 136. 1800. *M. parviflora* Desf., *Fl. Atl.* 2: 192. 1800; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 89. 1876. —*Ban methi*.

Erect annual herbs, 20-60 cm high with sparsely hairy stem and branches. Leaves 3-foliolate; petioles 1.5-4 cm long; leaflets 12-15 × 7-10 mm, obovate or oblanceolate or ovate-cuneate, toothed, glabrous or with few scattered hairs on both sides, truncate or retuse at apex. Flowers in 3-6 cm long dense racemes. Calyx 1-2 mm long, teeth triangular. Corolla yellow, 2-3 mm long; wings and keel shorter than standard. Pods 1.5-4 mm long, ellipsoid, compressed, glabrous; seed usually solitary, oblong, ellipsoid, brown.

In cultivated fields. Bhopal, Raisen, Rewa, Sagar, Satna, Shahdol Shivpuri. *Fl. & Fr.* : Dec.-April.

35. MILLETTIA Wt. & Arn.

Trees, shrubs or woody climbers. Leaves imparipinnate; leaflets usually opposite and stipellate. Flowers showy, in axillary, often fascicled, racemes, or racemes paniced and terminal. Calyx campanulate; teeth small or absent. Corolla much exerted; petals clawed, standard broad; keel incurved; obtuse. Stamens monadelphous or diadelphous. Ovary sessile, few-ovuled; style incurved; stigma capitate. Pods linear or oblong, compressed, 1-few-seeded.

About 150 species, mostly tropical and subtropical; 3 in M.P.

- 1a. Medium-sized trees; leaflets 5-7, glabrous, 0.5-5 cm long; pods 5-8 cm long ...2. *M. peguensis*
- 1b. Large woody climbing shrubs; leaflets more than 7, silky, more than 7 cm long; pods more than 8 cm long:
- 2a. Leaflets 7-9, silky on both the surfaces, 8-15 cm long; standard auricled, pubescent ...1. *M. extensa*
- 2b. Leaflets 11-17, silky only beneath, 5-8 cm long; standard not auricled, glabrous ...3. *M. racemosa*

1. *Millettia extensa* (Benth.) Baker in Hook. f., Fl. Brit. Ind. 2: 109. 1876. *Otusema extensa* Benth. in Miq., Pl. Jungh. 249. 1852. *M. auriculata* Baker ex Brandis, For. Fl. N.W. & C. Ind. 138. 1874; Baker, l. c. 108. -Agarbel, Kauj, Patani. Fig. 40

Woody climbers, 2-6 m high. Leaves imparipinnate, 15-30 cm long; leaflets 7-9, ovate-oblong, shortly acuminate, 8-15 cm long, appressed silky on both sides. Flowers in 10-30 cm long axillary racemes near the ends of branches. Calyx campanulate, tomentose, teeth short. Corolla yellowish-white, 8-12 mm long, pubescent, standard auricled. Stamens monadelphous. Pods woody strap-shaped, 10-15 × 2-4 cm velvety when young, becoming glabrous on maturity, 6-8-seeded.

On large trees in sal, teak and mixed forests. Balaghat, Bastar, Bilaspur, Chhindwara, Damoh, Durg, Hoshangabad, Indore, Jabalpur, Raigarh, Raipur, Rajnandgaon, Sconi, Shahdol, Shivpuri, Sidhi, Surguja, W. Nimar. Fl. : April -July; Fr. : Aug.-March.

Branches yield a coarse fibre.

2. *Millettia peguensis* Ali in Kew Bull. 2: 489. 1968. *M. ovalifolia* sensu Kurz in J. As. Soc. Beng. 42 (2): 68. 1873; Baker in Hook. f., Fl. Brit. Ind. 2: 107. 1876.

Medium-sized deciduous trees. Leaves imparipinnate, 10-45 cm long; leaflets 5-7, ovate-elliptic, obtuse, acute to acuminate, 0.5-5 cm long, glabrous. Flowers in 5-20 cm long racemes, one or several together arising from young branchlets. Calyx 1-2 mm long, glabrous. Corolla blue; standard glabrous, auriculate. Pods linear-oblong, 5-8 × 1-1.5 cm, glabrous, flatish with obtuse sutures.

Generally planted in the gardens. Shahdol (Tiwari, 1968). Fl. & Fr.: Feb.-April.

3. *Millettia racemosa* Benth. in Miq., Pl. Jungh. 249. 1852; Baker in Hook. f., Fl. Brit. Ind. 2: 105. 1876. -Ardhga, Junginar.

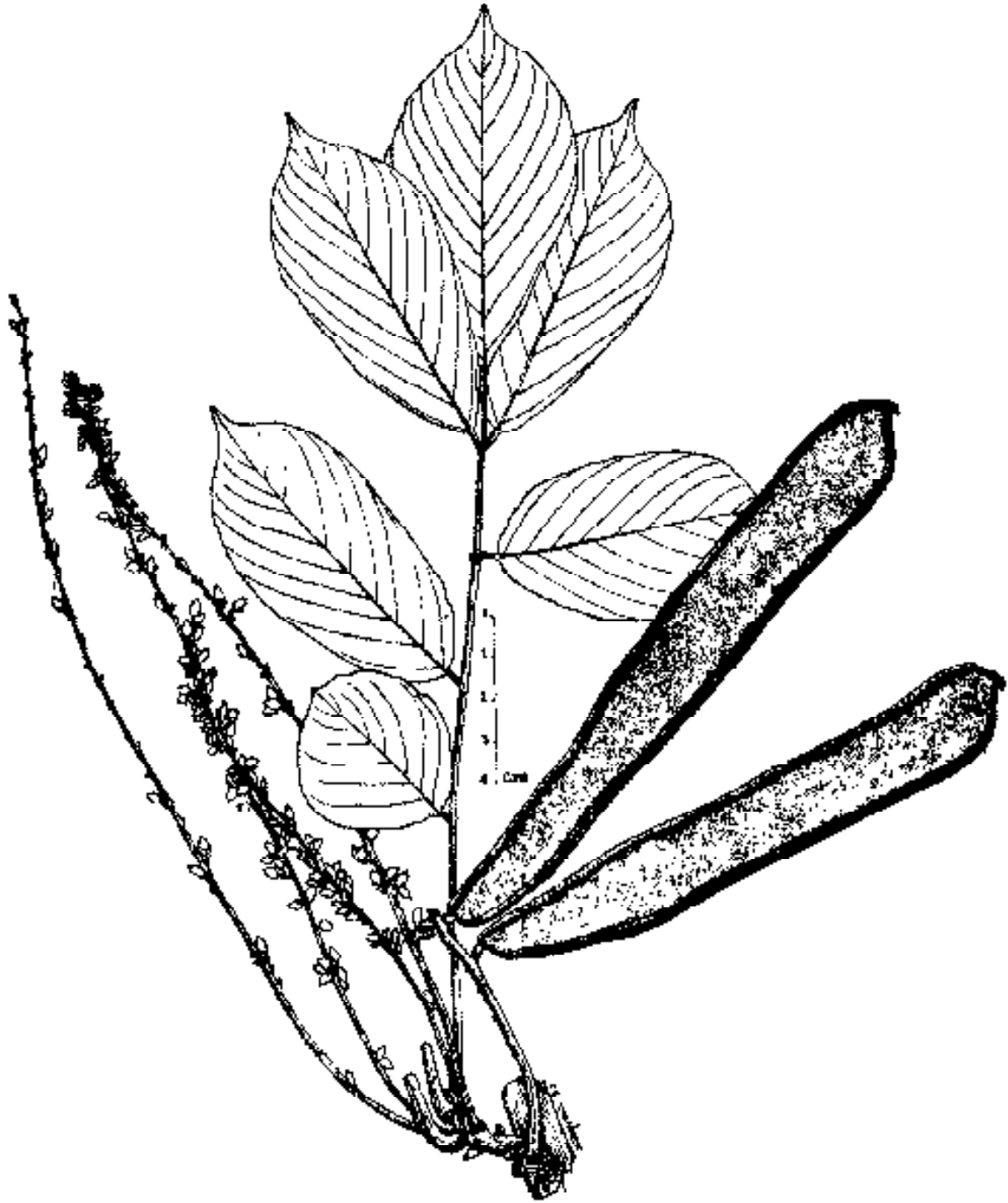


Fig. 40. *Millettia extensa* (Benth.) Baker

Large woody climbing shrubs, up to 15 m high, with white-grey branches. Leaves imparipinnate, 25-30 cm long; leaflets 11-17, obovate-oblong, acute, 5-8 cm long, nearly glabrous, young slightly silky beneath. Flowers in 25-45 cm long paniced racemes; bracts conspicuous, subulate, setaceous. Calyx 3-4 mm long, silky. Corolla 8-13 mm long, creamy white, reddish or blue; standard glabrous. Stamens diadelphous. Pods flat, linear, torulose, 10-20 × 2 cm, 4-5-seeded.

In mixed forest. Balaghat, Bilaspur, Raigarh Raipur, Rajnandgaon, Fl. : May; Fr. : Sept.-Feb.

36. MUCUNA Adans.

Perennial or annual shrubs or herbs with tomentose young branches. Leaves pinnately 3-foliolate, minutely stipellate. Flowers large, dark purple, on the tumid nodes of the axillary or lateral racemes which are some times corymbose. Calyx tube campanulate, two upper teeth connate, two lower longer than the middle. Corolla exerted, standard and wings shorter than the incurved keel. Stamens diadelphous, 9+1; anthers dimorphic. Ovary sessile, villous, many-ovuled; style incurved; stigma capitate. Pods variable in shape and size, usually clothed with large stinging hairs.

About 120 species in tropical and sub-tropical regions; 2 in M.P.

- 1a. Large woody climbers, keel-petal 5.5-6 cm long,
pods oblong; winged along sutures ...1. *M. nigricans*
- 1b. Slender climbers, keel-petal 4-4.5 cm long, pods
linear, not winged along sutures ...2. *M. pruriens*

1. *Mucuna nigricans* (Lour.) Steud., Nomencl. Bot. ed. 2(2) : 163. 1841; Wilmot Dear in Kew Bull. 42: 30. 1987. *Citta nigricans* Lour., Fl. Cochinch. 456. 1790. *M. imbricata* DC. ex Baker in Hook. f., Fl. Brit. Ind. 2: 185. 1876, p.p.

Woody climbers with slender sparsely hairy or setose branches. Leaves 3-foliolate, 20-45 cm long; petiole 8-15 cm long, twisted at the base; leaflets ovate-oblong or elliptic, 10-15 × 8-10 cm, acuminate, glabrous above, sparsely hairy beneath, lateral leaflets oblique. Flowers in 5-30 cm long axillary pendulous racemes, clustered in threes; each cluster subtended by a deciduous bract. Calyx campanulate, sparsely covered with stinging hairs, teeth as long as tube. Corolla purple; standard 3.5 - 3.8 cm long; keel incurved. Pods oblong, 10-15 × 4-5 cm, clothed with stinging hairs, winged along sutures, 2-4-seeded.

Bilaspur (Haines, 1914), Surguja. Fl. & Fr. : July-Dec.

2. *Mucuna pruriens* (L.) DC., Prodr. 2: 405. 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 184. 1876. *Dolichos pruriens* L. in Stickman, Herb. Amb. 23:

1754 *et in* Syst. Nat. ed. 10: 1162. 1759. *Miscana prurita* Hook., Bot. Misc. 2: 348. 1831. -*Kenwanch*.

Large extensive annual climbers with pubescent young branches. Leaves 3-foliolate; petioles 10-20 cm long; leaflets obovate, rhomboid or ovate, elliptic, membranous, 5-15 × 3-12 cm, glabrescent above, grey silky beneath; lateral leaflets obliquely acute or acuminate. Racemes axillary, 15-30 cm long. Flowers 25-40 mm long, solitary or 2-3- together. Calyx bristly, tubes as long as teeth. Corolla purple, wings shorter than keel. Pods 5-7.5 cm long, densely clothed with grey to brown stinging hairs, 5-6-seeded.

Climbing on shrubs and trees on road sides and forest edges. Balaghat, Bastar, Bhopal, Bilaspur, Damoh, Dhar, Gwalior, Hoshangabad, Indore, Jabalpur, Mandla, Panna, Raigarh, Raipur, Raisen, Rajnandgaon, Seoni, Shahdol, Sidhi, W. Nimar. *Fl. & Fr.* : Sept.-May.

Pods sometimes eaten as vegetable after removing the irritating hairs.

37. NOGRA Merr.

Annual or perennial twiners with stipellate 1-3-foliolate leaves. Stipules and bracts deciduous. Flowers in racemes; racemes swollen at nodes. Calyx tube campanulate; teeth narrow, upper 2 shorter, connate or free. Corolla exserted, petals nearly equal; standard and wings spurred; keel obtuse. Stamens diadelphous, 9 + 1. Ovary sub-sessile, many ovuled; style filiform, not bearded; stigma capitate. Pods linear, oblong, compressed, septate, many seeded.

About 3 species in India and Burma; 2 in M.P.

- 1a. Stem filiform, densely clothed with hispid brown hairs; flowers arranged in clusters along the hairy rachis ...1. *N. dalzelli*
 1b. Stem slender, not as above; flowers 1-2(-3) axillary ...2. *N. filicaulis*

1. *Nogra dalzelli* (Baker) Merr. in Trans. Amer. Phil. Soc. n.s. 24(2): 201. 1935. *Grona dalzelli* Baker in Hook. f., Fl. Brit. Ind. 2: 191. 1876. *Galactia simplicifolia* Dalzell in Hook., J. Bot. Kew Gard. Misc. 3: 209. 1851, non Sprengel (1827).

Large twining herbs with filiform stem, densely clothed with hispid brown retrorse hairs. Leaves 1-foliolate, petiole 1.2-4.0 cm long, hairy; stipules ovate, acute, hairy; leaflets ovate 7.5-11.5 × 5-8 cm, acute or mucronate, glabrous above, hairy beneath, ciliate on margins, cordate at base. Racemes dense, elongated; flowers subsessile in clusters of 1-3 along a hairy rachis; bracts ca 6 mm long, clothed with reddish-brown hairs. Calyx 6-8 mm long, clothed with reddish-brown hairs; teeth longer than

the tube. Corolla ca 12 mm long; standard broad clawed, with two small auricles at base. Pods linear 5.8 × 0.8 cm, acuminate, clothed with brown hairs, 8-10-seeded.

Madhya Pradesh, s.l. *Fl. & Fr.* : Sept.-Oct.

2. *Nogra filicaulis* (Kurz) Merr. in Trans. Amer. Phil. Soc. 11, 25 (2) : 201. 1935. *Grona filicaulis* Kurz in J. Asiat. Soc. Beng. 42: 232. 1874; Baker in Hook. f., *Fl. Brit. Ind.* 2: 191. 1876.

Twining herbs with slender stem up to 2 m long and pubescent younger parts. Leaves mostly 1 foliolate, rarely 3 foliolate; stipules lanceolate, acuminate, truncate; leaflets narrowly to broadly ovate-cordate, occasionally slightly 3 lobed, 5-9 × 3.5-6 cm, pubescent. Flowers 1-2 (-3) from the axils; bracteoles ovate, lanceolate. Calyx ca 3 mm long, hairy, upper 2 connate, laterals triangular. Corolla yellow to light pink; standard ovate, elliptic, auriculate at base, ca 7 mm long; wings oblong; keel oblong, falcate, upcurved. Pods shortly stipitate, linear-oblong, slightly curved, 5.5-6 × 0.4-0.5 cm, pubescent; seeds 8-10, asymmetrically oblong-ellipsoid.

On lateritic soil in sal forests. Raigarh (*Panigrahi & Tiwari*, 1975). *Fl & Fr.* : Sept.-Oct.

38. OUGEINIA Benth.

A monotypic genus endemic to India and Pakistan.

Ougeinia ougeinsis (Roxb.) Hockhr. in Ann. Cons. Jard. Bot. Geneve 13 & 14: 51. 1909. *Dalbergia ougeinsis* Roxb., *Fl. Ind.* 3: 220. 1832. *O. dalbergioides* Benth in Miq., *Pl. Jung.* 214. 1852; Baker in Hook. f., *Fl. Brit. Ind.* 2: 161. 1876. *Desmodium ougeinense* (Roxb.) Ohashi in *Ginkgoana* 1: 117 1973. -*Tinsa*.

Medium-sized deciduous trees; bark thin, grey or pale brown, blaze streaked with red. Leaves pinnately 3 foliolate, stipulate; petioles 5-15 cm long, leaflets broadly elliptic-obovate, acute 6-15 × 3-9 cm, glabrous above, finely pubescent below, entire or obscurely crenate. Flowers in axillary racemes, fascicled at the nodes of old wood; bracts scale-like. Calyx 3-4 mm, tube campanulate; teeth small, 2 upper teeth connate, lower ones longer than laterals. Corolla white or pink, exserted, 8-13 mm long; standard orbicular; wings spurred and slightly connate to the obtuse keel. Stamens 9+1, diadelphous. Pods linear-oblong, flat, 5-10 cm long, 2-5 jointed; seeds reniform.

In mixed forests. Balaghat, Bastar, Bhopal, Bilaspur, Chhindwara, Gwalior, Indore, Jabalpur, Mandla, Panna, Raigarh, Raipur, Raisen, Sagar, Seoni, Shahdol, Surguja. *Fl.* : Feb.-April; *Fr.* : April-June.

Wood commonly used for agricultural implements and in buildings.

39. PARACALYX Ali

Climbing or twining herbs. Leaves pinnately 3-foliolate. Flowers in axillary racemes. Calyx campanulate, scarious. Corolla included; petals equal; keel incurved, truncate. Stamens diadelphous. Ovary sessile, 1-3-ovuled; style filiform; stigma capitate. Pods included.

About 6 species in India and Africa; one in M.P.

Paracalyx scariousus (Roxb.) Ali in Univ. Stud. Karachi 5(3): 95. 1968. *Cylista scariosa* Roxb., Pl. Corom. 1: 64, t. 92. 1795; Baker in Hook. f., Fl. Brit. Ind. 2: 219. 1876.

Woody twinners with slender pubescent branches. Leaves pinnately 3-foliolate; petiole 1.2-5 cm long; leaflets ovate or rhomboid, 5-10 × 3.5-5.5 cm, acute, pubescent on both sides, laterals obliquely ovate. Flowers in axillary peduncled racemes or panicles. Calyx 1.5-3 cm long, pubescent, teeth scarious, the lowest largest and boat shaped, two side ones smaller than the two upper ones. Corolla 1-1.2 cm long, yellow, included. Pods small, obliquely oblong, ca 6 mm long, enclosed in the calyx.

Bastar, Indore, Jabalpur, Seoni, Shahdol. Fl.: Nov.-March.

40. PHASEOLUS L.

Erect prostrate or climbing herbs or undershrubs. Leaves 3-foliolate, rarely 1-foliolate, stipulate. Racemes axillary, short peduncled, tuberculate or not. Flowers in fascicles along the rachis, bracteate and bracteolate. Calyx bilabiate; upper lip 2-lobed, lower 3-lobed. Corolla white, yellow or purple; standard orbicular, not auricled at base; wings equal or longer than the standard; keels with spirally twisted beak. Stamens diadelphous. Ovary sessile, many-ovuled; style filiform, twisted; stigma oblique. Pods linear or oblong, compressed or subcylindrical, often beaked.

About 50 spp., American in distribution; 2 in M.P.

- 1a. Plants densely clothed with reflexed brown hairs; racemes long peduncled, peduncles tuberculate; corolla yellow with reddish-purple streaks ...1. *P. subramanyanus*
- 1b. Plants glabrescent; racemes sessile, peduncles not tuberculate; corolla white or lilac-purple ...2. *P. vulgaris*

1. *Phaseolus subramanyanus* Babu ex Raizada in Suppl. to Duthie's Fl. Upp. Gang. Pl. 56. 1976. *P. calcaratus* auct. non Roxb. 1832; Haines, Bot. Bih. & Orissa 2: 288. 1922. *P. sublobatus* auct. non Roxb. 1832.

Slender annual twiner, clothed with reflexed brown hairs. Leaflets shortly petioled, broadly ovate-rhomboid, oblong, acuminate; terminal

cuneate at base; laterals subtruncate, repand, shallowly 3-lobed, hairy, 8-10 (-12) mm long. Racemes long peduncled; peduncles 3-15 cm long, few tubercled; bracts ovate-lanceolate, 5-6 × 2-3 mm. Calyx 2 mm long; upper teeth connate, ovate, deltoid. Corolla 6-8 mm long, yellow with reddish-purple streaks; wings falcate, oblong; keel pink. Pods cylindrical, recurved at tip, 3-5 cm long, hairy, 6-12-seeded.

Panna, Surguja, Tikamgarh. *Fl. & Fr.*; Sept.-Nov.

2. *Phaseolus vulgaris* L., *Sp. Pl.* 723. 1753; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 200. 1876. - *Vilayati sem.*

Low and suberect, or tall and climbing, glabrescent annual herbs, stem up to 3 m long. Leaves 3-foliolate; stipules 5-20 mm long, foliaceous; petioles up to 7 cm long; leaflets ovate-deltoid, acuminate or rounded, 5-15 × 3-10 cm, pubescent on both the surfaces. Racemes axillary, sessile, 2-4-flowered, peduncles up to 6 cm long, not tuberculate, pedicels 5-8 mm long; bracteoles 4 × 2 mm, ovate, glabrescent. Calyx ca 4 mm long, pubescent; teeth deltoid, acute or acuminate. Corolla 10-15 mm long, white or lilac purple. Pods slender, laterally compressed, 7-13 × 0.5-1.5 cm, beaked, 4-12-seeded.

Cultivated for its edible pods. Damoh. *Fl. & Fr.* : Sept.- Nov.

41. PISUM L.

Annual herbs, climbing by tendrils. Leaves even-pinnate; upper leaflets and rachis modified into tendril; leaflets 1-4 pairs; stipules large, foliaceous. Flowers solitary axillary or in axillary racemes. Calyx campanulate; teeth unequal. Corolla exserted; wings jointed at middle to the shorter keel and to the truncated staminal tube. Stamens diadelphous, 9+1. Ovary 2-many ovuled; style thickened, inflexed, laterally compressed, dilated above, with margins bent back forming more or less a channel beneath, bearded below the stigma. Pods compressed.

About 6 species in Mediterranean and W. Asia; 2 widely cultivated in M. P.

- 1a. Leaflets 1-2 pairs; pods 2.5-4 cm long; seeds angular, greenish yellow, mottled with red ...1. *P. arvense*
 1b. Leaflets 2-3 pairs, pods 10-15 cm long; seeds not angular, uniformly whitish ...2. *P. sativum*

1. *Pisum arvense* L., *Sp. Pl.* 727. 1753; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 181. 1876. - *Batra, Golia, Matar.*

Climbing annual herbs with hollow glabrous stems. Leaves paripinnate; rachis terminating in a tendril; stipules large, ovate, semicordate,

auricled at base; leaflets 1-2 pairs, 5-15 mm long, obovate or elliptic, rachis ending into a branched tendril. Flowers pale purple or white, wings and keel deep purple. Pods 2.5-4 cm long, turgid, 3-5-seeded, reticulately veined; seeds compressed angular, smooth, greenish-yellow, mottled with red.

Cultivated as a cold weather crop for the seeds used as pulse. Bhopal (Oommachan, 1977), Sagar (Bhattacharya, 1955). *Fl. & Fr.* : Jan.-March.

2. *Pisum sativum* L., Sp. Pl. 727. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 181. 1876.-*Matar*.

Climbing annual herbs with hollow glabrous stems. Leaves paripinnate; rachis ending in a branched tendril; leaflets 2-3 pairs; stipules large, foliaceous, ovate, semicordate, irregularly toothed at base, auricled. Flowers white, peduncles 1-few-flowered. Calyx tube campanulate; teeth unequal. Standard broad, clawed; wings larger than and adnate to the keel. Pods 10-15 cm long, turgid; seeds globose, green maturing dirty white.

Commonly cultivated as a cold weather crop for seeds used as pulse. Bhopal, Chhatarpur, Damoh, Indore, Mandla, Sagar, Shahdol, Shivpuri, Sidhi. *Fl. & Fr.* : Dec.-April.

42. PONGAMIA Vent.

A monotypic genus in Indo-Malayan region; commonly planted in gardens and as an avenue tree in M.P.

Pongamia pinnata (L.) Pierre, Fl. For. Cochinch. 385. 1899; *Cytisus pinnatus* L., Sp. Pl. 741. 1753, *Pongamia glabra* Vent., Jard. Malm. 1: 28. 1803; Baker in Hook. f., Fl. Brit. Ind. 2: 240. 1876. *Galadupa indica* Lamk., Encycl. 2: 594. 1788. *Derris indica* Bennet in J. Bomb. Nat. Hist. Soc. 68: 303. 1971. -*Karanj*.

Medium-sized trees with spreading glabrous branches forming dense canopy. Leaves imparipinnate, 7-25 cm long; leaflets 5-7, ovate-oblong, obtuse at base, acute or acuminate at apex, 5-10 cm long. Flowers in peduncled axillary racemes, shorter than leaves. Calyx brown-pubescent, subtruncate, obscurely toothed. Corolla white, tinged with pink, ca 1.2 cm long; standard silky, appendiculate at base, shortly clawed; wings adnate to keel. Stamens monadelphous. Ovary sub-sessile, 2-ovuled; style incurved, glabrous; stigma capitate. Pods woody, obliquely-oblong, glabrous, shortly beaked, 4-5 cm long. Seeds 1-2, reniform, dirty white, with brown streaks.

Generally planted as an avenue tree. Balaghat, Bastar, Betul, Bhopal, Bilaspur, Damoh, Dhar, Durg, Hoshangabad, Indore, Jabalpur, Mandla,

Panna, Raigarh, Raipur, Rajnandgaon, Rewa. Fl. : March -July; Fr. : July - Feb.

Oil obtained from seeds (Karanj oil) is used for various medicinal purposes, also used for burning.

43. PSEUDARTHRIA Wight & Arn.

Herbs or undershrubs, villous or viscidly pubescent. Leaves pinnately 3-foliolate; leaflets stipellate. Flowers fasciated on long terminal racemes. Calyx teeth equalling the tube, two upper ones subconnate. Corolla twice or thrice as long as the calyx. Stamens diadelphous. Ovary shortly stipitate, many-ovuled; style filiform, inflexed; stigma capitate. Pods linear, oblong, flat, continuous within, not jointed.

About 5 species, mainly African; one in M.P.

Pseudarthria viscida (L.) Wight & Arn., Prodr. 209. 1834. *Hedysarum viscidum* L., Sp. Pl. 747. 1753.

Prostrate or climbing, viscid pubescent undershrubs, 30-90 cm long. Leaves pinnately 3-foliolate; rachis about 10 cm long; leaflets 4-9 × 3.5-5 cm, rhomboid, obtuse or acute, membranous. Flowers in pairs or fasciated in terminal or axillary about 20 cm long racemes. Calyx minute, teeth equalling the tube, the two upper subconnate. Corolla pink, twice or thrice as long as the calyx. Pods 15-20 × 4-6 mm, linear, oblong, flat, viscid, 4-6-seeded.

Bastar (Saxena & Khotale, 1976). Fl. & Fr. : Oct.-April.

44. PSORALEA L.

Herbs or undershrubs. Leaves simple or 3-foliolate, gland-dotted; stipules large; leaflets entire or toothed. Flowers in spikes or racemes, often capitate. Calyx campanulate, teeth unequal. Corolla with clawed petals; keel obtuse, incurved. Stamens diadelphous, 9 + 1, or 10, monadelphous. Ovary sessile or stipitate, 1-ovuled; style filiform, incurved; stigma terminal. Pods ovate or oblong, 1-seeded.

About 130 species in tropical and temperate regions and South Africa; one in M.P.

Psoralea corylifolia L., Sp. Pl. 764. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 103. 1876. -*Balchi*

Erect annual pubescent herbs, 0.5-1.25 m high, with gland-dotted branches. Leaves simple, alternate, 4-7 × 3-5 cm, cordate, dentate, obtuse, subtruncate, mucronate, pubescent on both sides. Inflorescence a short and dense long peduncled raceme; peduncles 2.5-7 cm long with 3 flowers in

the axil of each bract. Calyx bilabiate, upper lip formed of 4 teeth, lower of 1 tooth. Corolla blue - purple, petals all clawed; standard 5 - 6 mm long; keel incurved, obtuse. Stamens diadelphous. Pods 4 - 5 mm ovoid, glabrous, black, pitted, mucronate, 1-seeded.

Generally on black clayey soil. Bastar, Bhopal, Durg. E.Nimar, Hoshangabad, Indore, Jabalpur, Raipur, Raisen, Rajnandgaon, Rewa, Sagar, Seoni, Shivpuri. *Fl. & Fr.* : Sept.-April.

Seeds used for various skin diseases.

45. PTEROCARPUS Jacq.

Tall evergreen trees. Leaves with alternate coriaceous exstipellate leaflets. Flowers yellow, in copious paniced racemes with minute caducous bracts and bracteoles, pedicels distinctly jointed at the apex. Corolla exserted, petals long clawed, teeth short, standard and wings crisped; keel obtuse. Stamens di- or mon-adelphous with the sheath slit both above and below or above only, upper stamens often free. Ovary stipitate, 2-ovuled; style incurved. Pods orbicular with a broad wing; apex turned down to the base, one-seeded.

About 15 species widely distributed in the Tropics; one in M.P.

Pterocarpus marsupium Roxb., Pl. Corom. 1. 116. 1799; Baker in Hook. f., Fl. Brit. Ind. 2: 239. 1876. -*Bijasal*.

Tall evergreen trees; blaze grey-streaked, then pink and finally red. Leaflets 5 - 7, elliptic-oblong to ovate, coriaceous, 7 - 13 cm long, obtuse or subacute, often slightly or deeply emarginate, glaucous beneath. Panicles terminal, 15 - 30 cm long. Flowers yellow, ca 1 cm long. Calyx dark brown, pubescent, teeth deltoid, unequal. Corolla yellow, standard and wings crisped. Pods orbicular, winged all around, 2.5 - 4 cm diam.

In sal and mixed forests, also planted as avenue tree. Balaghat, Bastar, Bhopal, Bilaspur, Chhindwara, Damoh, Gwalior, Hoshangabad, Indore, Jabalpur, Mandla, Raigarh, Raipur, Raisen, Rajnandgaon, Rewa, Sagar, Seoni, Shahdol, Shivpuri, Sidhi, Surguja. *Fl. & Fr.* : July-March.

Wood valued for furniture and agricultural implements, bark and gum medicinally used.

46. PUERARIA DC.

Large woody climbers or twining herbs. Leaves 3-foliolate, stipellate; leaflets sometimes lobed. Flowers large or small, fascicled on the tumid nodes of long, often paniced, racemes. Calyx-teeth long or short, the two upper connate. Corolla exserted; standard usually spurred at the base;

wings narrow, often falcate, adnate to the keel. Stamens monadelphous, 10 or diadelphous, 9+1. Ovary sessile or shortly stipitate, many-ovuled; style filiform, incurved; stigma capitate. Pods linear or compressed, sometimes constricted between seeds.

15-35 species from Himalayas to Japan, South East Asia and Malaysia; one in M.P.

Pueraria tuberosa (Roxb. ex Willd.) DC., in Ann. Sci. Nat. 4: 97. 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 197. 1876. *Hedysarum tuberosum* Roxb. ex Willd., Sp. Pl. 3: 1197. 1803. — *Bandrapatel*, *Badrikand*, *Bankumhra*, *Bhuinkumhra*, *Patal Kumhra*.

Large woody climbers; roots tuberous with several strings of tubers connected by thin roots; young branches pubescent. Leaves 3-foliolate, silky pubescent beneath; petioles 15-20 cm long; terminal leaflet broadly ovate or rhomboid, acuminate, 10 - 20 × 8 - 17 cm; laterals obliquely ovate-oblong, acuminate. Flowers when leafless, in 15-30 cm long axillary or terminal racemes or panicles. Calyx ca 8 mm long, silky; teeth unequal, 2 upper teeth connate. Corolla 1 - 1.5 cm long, blue, fading to bluish-purple, often white. Stamens diadelphous, 9 + 1. Pods 5 - 7.5 cm long, constricted between seeds, densely clothed with bristly hairs, 3 - 6 seeded.

On shrubs and small trees in mixed forests; tubers highly medicinal. Balaghat, Bastar, Bilaspur, Chhindwara, Hoshangabad, Indore, Jabalpur, Raigarh, Raipur, Shahdol, Surguja. Fl. : Feb.-March; Fr. : April.

47. PYCNOSPORA R. Br. ex Wight & Arn.

Monotypic genus, in Tropical Africa, Asia and Australia.

Pycnospora lutescens (Poir.) Schindl. in Journ. Bot. 64: 145. 1926. *Hedysarum lutescens* Poir. in Lamk., Encycl. Meth. 6. 417. 1805. *Pycnospora hedysarioides* R. Br. ex Wight & Arn., Prodr. 197. 1834; Baker in Hook. f., Fl. Brit. Ind. 2: 153. 1876. *P. nervosa* (Grah.) Wight & Arn., Prodr. 197. 1834.

Perennial herbs with slender densely caespitose 15-75 cm long trailing stems. Leaves pinnately 3-foliolate; petiole flattened, sparsely ciliate; stipules free, scarious, striate; leaflets stipellate, obovate, suborbicular, obtuse, subcoriaceous, glabrous above, pubescent beneath, 8 - 35 mm long. Flowers minute, in terminal or axillary racemes; pedicels pubescent; bracts membranous, deciduous. Calyx 2 - 2.5 mm, deeply cleft, upper teeth slightly connate. Corolla exserted, purplish; standard roundish; keel obtuse, adnate to the wings. Stamens diadelphous, 9+1. Pods oblong, inflated, turgid, 8-10 × 4-5 mm, apiculate, 8-10-seeded.

Surguja. Fl. : Aug.-Sept.; Fr. : Dec.

48. RHYNCHOSIA Lour.

Climbing or prostrate or erect herbs or undershrubs. Leaves pinnately 3-foliolate; stipulate; leaflets prominently gland-dotted beneath. Flowers in axillary or terminal racemes or panicles, bracteate. Calyx teeth unequal, the upper 2 connate, usually longer than tube. Corolla included or exerted; standard with small auricles, pubescent or glabrous. Stamens diadelphous, 9+1. Ovary sessile, 1-2-ovuled; style incurved, pubescent; stigma terminal. Pods oblong, compressed, flattened, 1-2-seeded.

About 150 species in the tropics; 4 in M.P.

- 1a. Slender twiners; racemes capitate; pods orbicular, seeds with a waxy arillus ...2. *R. capitata*
- 1b. Twining herbs or shrubs; racemes elongated; pods flattened, seeds without waxy arillus:
 - 2a. Flowers purple ...4. *R. rothii*
 - 2b. Flowers yellow:
 - 3a. Leaflets 5-10 cm long, rhomboid-cuspidate; flowers 8-13 mm long ...1. *R. bracteata*
 - 3b. Leaflets 1-5 cm long, orbicular or rhomboid ovate, acute; flowers 5-8 mm long ...3. *R. minima*

1. *Rhynchosia bracteata* Benth. ex Baker in Hook. f., Fl. Brit. Ind. 2: 225. 1876.

Annual or perennial climbing or trailing herbs, with angular twining pilose branches. Leaves pinnately 3-foliolate, stipulate. Leaflets rhomboid cuspidate, 5-10 cm long and broad, puberulous above downy beneath. Flowers 8-13 mm long, in subpanicked or peduncled racemes, longer than the leaves, bracteate. Calyx 6-8 mm long, glandular pubescent; teeth acuminate and shorter than the tube. Corolla yellow, 10-13 mm long; standard auricled. Pods 10-35 × 10-12 mm, slightly pubescent, 2-seeded.

Hoshangabad (Bir & Kumari, 1982), Jabalpur. Fl. & Fr. : March.

2. *Rhynchosia capitata* DC., Prodr. 2: 386. 1825: Vajravelu in Nair et al., Fl. Tamilnadu 1: 119. 1983. *R. aurea* auct. non (Willd.) DC. 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 221. 1876, *p.p. Nomisia capitata* Wt. & Arn., Prodr. 237. 1834.

Annual herbs up to 75 cm high with trailing striate and faintly pubescent branches. Leaves pinnately 3-foliolate, about 10 cm long, stipulate; leaflets ovate-rhomboid, 2.5 × 2.5 cm, puberulous, acute or obtuse, shortly stipellate; lateral leaflets obliquely rhomboid-ovate. Flowers ca 15 mm long, in few to many-flowered 7-10 cm long axillary capitate racemes.

Calyx 5-10 mm long, lobes unequal, pubescent, the 2 upper connate. Corolla yellow, 5-10 mm long, standard puberulous. Pods 15 mm long, orbicular, flattened, puberulous, 2-seeded.

Along streams. Bhopal, East Nimar, Hoshangabad, Indore, Panna, Raigarh, Shahdol, Surguja. *Fl. & Fr.* : Aug.-Jan.

3. *Rhynchosia minima* (L.) DC., Prodr. 2: 385. 1825; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 223. 1876; Verdc. in Kew Bull. 25: 103. 1971. *Dolichos minimum* L., Sp. Pl. 726. 1753. *R. minima* var. *laxiflora* (Camb.) Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 223. 1876.

Slender climbing or trailing perennial herbs with glabrescent stems and branches. Leaves pinnately 3-foliolate, stipulate; leaflets ovate-rhomboid or rhomboid obovate or orbicular, 1-5 cm long, pubescent, gland-dotted beneath. Flowers 5-8 mm long in lax axillary racemes, bracteate. Calyx 3-5 mm long, pubescent; teeth setaceous. Corolla yellow or pinkish, 5-6 mm long; standard pubescent outside. Pods 1-2 cm long, flat, pubescent or glabrescent, 2-seeded.

On shrubs in wastelands and forest edges. Bastar, Bhand, Bhopal, Bilaspur, Dhar, Durg, Gwalior, Hoshangabad, Indore, Panna, Morena, Narsimhapur, Panna, Raipur, Raisen, Rajnandgaon, Sagar, Satna, Seoni, Shivpuri, Sidhi, Tikamgarh, W. Nimar. *Fl. & Fr.* : July-April.

4. *Rhynchosia rothii* Benth. ex Aitch., Cat. Pl. Punjab & Sindh, 50. 1869; Verdc. in Kew Bull. 25: 91. 1971. *R. sericea* Span. in Linnæa 15: 195. 1841; *non* Gill. ex H.K. & Arn. 1833; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 225. 1876.

Slender twiners with woody stems clothed with soft spreading grey glandular hairs. Leaves pinnately 3-foliolate; petioles 5-10 cm long, stipulate; leaflets rhomboid or suborbicular, obtuse or subacute, 5-7.5 cm long and broad; lateral leaflets obliquely acute-acuminate, pubescent on both sides, gland-dotted below. Flowers in many-flowered axillary 15-30 cm long pedunculate racemes, bracteate. Calyx ca 7.5 mm long; pubescent, gland-dotted, the 2 upper connate, deltoid, cuspidate. Corolla purple, silky pubescent on the back. Pods 25-30 × 6-8 mm, pubescent, recurved at tip, 2-seeded.

Hoshangabad (*Bir & Kumari*, 1982), Satna (*Sebastine & Balakrishnan*, 1963).

49. *ROTHIA* Pers.

Diffuse annuals. Leaves petioled, digitately 3-foliolate. Flowers minute, copious, in short axillary racemes. Calyx tube turbinate, teeth equalling the tube. Corolla scarcely exerted. Stamens monadelphous. Pods

linear, slender, nearly straight, compressed, many-seeded, continuous within.

Two species in India and trop. Africa; one in M.P.

Rothia indica (L.) Druce, Bot. Exch. Club Soc. Brit. Isles 3: 423. 1914. *Trigonella indica* L., Sp. Pl. 778. 1753. *Dillwynia trifoliata* Pers., Syn. Pl. 2: 302, 1807. *Rothia trifoliata* (Pers.) DC., prodr. 2: 382. 1825; Baker in Hook f., Fl. Brit. Ind. 2: 63. 1876.

Diffusely branched hairy herb with slender 30-45 cm long stems, stipules free, small, elliptical, 3-4 mm long, persistent. Leaves 3-foliolate; petioles short; leaflets sessile, oblanceolate to oblong 12-25 mm long; obtuse minutely mucronate, rather fleshy, silky. Flowers 1-4, shortly pedicelled, in the axil of most of the leaves. Calyx tube turbinate, 3-4 mm long, lobes lanceolate, subequal, silky, up to 5 mm long. Corolla yellow, scarcely exerted; petals clawed, equal. Pods linear, compressed, 3.5-6 cm long mucronate, silky. Seeds many, reniform, purple.

Balaghat, Mandla Surguja. Fl & Fr. : Aug.-Dec. In cultivated or fallow fields. Leaves and pods used as vegetable by poor class.

50. SESBANIA Scop.

Herbs, shrubs or soft wooded small trees, often prickly. Leaves paripinnate or imparipinnate; leaflets numerous; stipules narrow, deciduous. Flowers in axillary racemes; bracts and bracteoles setaceous. Calyx tube truncate, teeth unequal. Corolla exerted, petals clawed, standard orbicular or ovate; wings falcate-oblong; keel obtuse or subrostrate. Stamens diadelphous, 9+1. Ovary stipitate, many-ovuled; style filiform. Pods linear, septate, many-seeded.

A genus with about 50 species widely distributed in tropics and sub-tropics of the world; 3 in M.P.

- 1a. Annual or biennial prickly herbs; flowers ca 1 cm long
...1. *S. bispinosa*
- 1b. Soft-wooded shrubs or small trees; flowers more than
1 cm long;
 - 2a. Flowers white or red, 6-10 cm long; pods 30-45 cm
long
...2. *S. grandiflora*
 - 2b. Flowers yellow or maroon to purple, ca 2 cm long;
pods 15-25 cm long
...3. *S. sesban*

1. *Sesbania bispinosa* (Jacq.) W.F. Wight in U.S. Deptt. Agr. Bur. Pl. Indust. Bull. No. 137, 15, 1909. *Aeschynomiene bispinosa* Jacq., Ic. Pl. Rar. 3:

t. 564. 1795. *A. aculeata* Schreb. in Nov. Act. Cur. 4: 134. 1770. *Sesbania aculeata* (Schreb.) Poir. in Lamk., Encycl. 7: 128. 1806 as *Sesban aculeatus*, nom. illegit.; Baker in Hook. f., Fl. Brit. Ind. 2: 114. 1876.

Annual or biennial prickly herbs, 0.7-2 m high. Leaves paripinnate, 15-30 cm long; rachis mucronate or prickly; leaflets numerous, small, linear, 5-20 mm long, obtuse, apiculate, glabrous above, sparsely hairy along margins and nerves beneath. Flowers in 8-13 cm long racemes of 3-12 flowers. Calyx 3-4 mm long, teeth pubescent along margins. Corolla yellow or pale yellow with red or black dots outside. Pods linear, slightly falcate, 15-25 cm long, septate, beaked, many-seeded.

In moist depressions and cultivated fields. Balaghat, Bhopal, Bilaspur, Damoh, Dhar, Gwalior, Hoshangabad, Indore, Jabalpur, Narsimhapur, Panna, Raigarh, Raipur, Raisen, Sagar, Satna, Seoni, Sidhi, Shahdol, Tikamgarh, W. Nimar. Fl. & Fr.: Sept. - Jan.

2. *Sesbania grandiflora* (L.) Poir. in Lamk., Encycl. Meth. 7: 127. 1806; Baker in Hook. f., Fl. Brit. Ind. 2: 115. 1876. *Robinia grandiflora* L., Sp. Pl. 722. 1753. *Aeschynomene grandiflora* L., Sp. Pl. ed. 2. 1060. 1763. -Agast.

Soft-wooded trees, 5-10 m high with virgate cylindrical branches. Leaves 15-30 cm long, paripinnate; leaflets 10-30 pairs, linear-oblong, obtuse, 1.8-4 × 0.5-1 cm, glabrous; stipules minute, deciduous. Flowers in 5-8 cm long, lax, 2-4-flowered axillary racemes. Calyx ca 2.5 cm long, somewhat 2-lipped, glabrous. Corolla white or red, 7-10 cm long. Stamens diadelphous, 9+1. Pods slightly falcate, compressed, 30-45 cm long, many-seeded, markedly thickened along sutures.

Usually planted in gardens, flowers and pods eaten cooked. Bhopal, Chhatarpur, Indore, Raigarh, Raipur, Sagar, Seoni. Fl. & Fr. Sept. -March.

3. *Sesbania sesban* (L.) Merr. in Philip. Journ. Sci. Bot. 7: 235. 1912. *Aeschynomene sesban* L., Sp. Pl. 714. 1753. *Sesbania aegyptiaca* Poir. in Lamk., Encycl. 7: 128. 1806; Baker in Hook. f., Fl. Brit. Ind. 2: 114. 1876. -Jainti.

Soft-wooded unarmed trees, 2-7 m high, with slender terete branches. Leaves paripinnate, 8-15 cm long, rachis 5-13 cm long; leaflets 10-15 pairs, linear-oblong, obtuse, apiculate, glabrous, 1.8-2.8 cm long; stipules 5-7 mm long. Flowers in 10-15 cm long lax 3-20-flowered axillary racemes. Calyx 3-4 mm long; teeth broadly triangular. Corolla exserted, yellow, 1.2-2 cm long. Pods torulose, thickened along sutures, twisted, 15-25 cm long, 20-40-seeded.

Planted as an ornamental. Bastar, Bhopal, Chhatarpur, Indore, Jabalpur, Raipur, Raisen, Rewa, Sagar, Shahdol, Shivpuri, Vidisha. Fl. & Fr. : Feb. -Dec.

3.1. var. *bicolor* (Wight & Arn.) F.W. Andr., Fl. Pl. Sudan 214. 1834.
S. aegyptiaca var. *bicolor* Wight & Arn., Prodr. 214. 1834.

Corolla dark maroon or purple coloured outside Planted as an ornamental. Bilaspur, Dhar, Seoni, Shivpuri, Sidhi. *Fl. & Fr.* : Feb. -Oct.

3.2. var. *picta* Prain, Bengal Pl. 1903 (repr. ed. 1: 288. 1963).

Corolla with dark maroon or purple spots out side. Planted as an ornamental. Shivpuri. *Fl. & Fr.* : Feb. -March.

51. SHUTERIA Wight & Arn.

Climbing herbs. Leaves pinnately 3-foliolate, stipellate. Flowers small, paired or fasciculate in an axillary raceme. Bracts and bracteoles persistent. Calyx tube gibbous, teeth shorter than tube. Corolla exerted; standard narrowed to the base, not auricled, larger than the keel and spurred wings. Stamens diadelphous, 9+1. Ovary sessile or stipitate, many ovuled; style filiform, incurved; stigma capitate. Pods flat, linear, recurved, septate between seeds.

About 10 species in tropical Africa, Eastern Asia and Java; one in M.P.

Shuteria vestita Wight & Arn., Prodr. 207. 1834; Baker in Hook. f., Fl. Brit. Ind. 2: 181. 1876 (incl. var. *densiflora* & *glabrata*) *S. glabrata* Wight & Arn., Prodr. 207. 1834.

Slender twiners with spreading hairs on the stem. Leaves 3-foliolate; stipules 4-6 mm long, oblong-lanceolate, scarious; petioles 2.5-8 cm long hairy or glabrous; leaflets 2.5-6 × 2-3.5 cm, ovate-obtuse, subcordate at base, obscurely hairy on both sides or glabrescent. Flowers in dense axillary 2.5-10 cm long fascicled racemes; bracts and bracteoles lanceolate, persistent. Calyx tube gibbous, teeth shorter than the tube, upper lanceolate, cuspidate. Corolla purple, ca 12 mm long, standard larger than keel, wings spurred. Stamens diadelphous, 9+1. Pods linear, strap-shaped, 2.5-3 cm long, pubescent, 5-8-seeded.

Bastar, Bilaspur, Hoshangabad, Raigarh, Surguja. *Fl. & Fr.* : Jan.-April.

52. SMITHIA Ait.

Herbs or undershrubs. Leaves even or odd-pinnate, rachis ending into a bristle; stipules scarious, auriculate; leaflets small, numerous, sensitive to touch. Inflorescence racemose or an axillary, umbel-like, scorpioid cyme. Calyx deeply bilipped; lips toothed or entire. Corolla exerted; standard orbicular; keel obtuse, incurved; wings clawed and auriculate. Stamens diadelphous, 5+5. Ovary stalked, many-ovuled; style filiform; stigma small. Pods of few or many flattened or turgid 1-seeded smooth or tuberculate joints enclosed with in calyx.

About 70 species in Asia and Tropical Africa; 4 in M.P.

- 1a. Calyx veins simple, parallel:
- 2a. Flowers in short peduncled racemes; corolla as long as the calyx ...4. *S. sensitiva*
- 2b. Flowers in axillary pairs; corolla about twice as long as the calyx ...2. *S. conferta*
- 1b. Calyx veins distinctly reticulate:
- 3a. Flowers in globose terminal heads; corolla half as long as the calyx ...3. *S. pycnantha*
- 3b. Flowers in paniced racemes; corolla twice as long as the calyx. ...1. *S. blanda*

1. *Smithia blanda* Wall. ex Wight & Arn., Prodr. 221. 1834; Baker in Hook. f., Fl. Brit. Ind. 2: 151. 1876.

Perennial suffruticose bristly herbs, 20-60 cm high. Leaves paripinnate, rachis 20-30 mm long, bristly; leaflets 3-5 pairs, oblong, lanceolate, 12-15 mm long, rounded at base, obtuse and bristle tipped at apex, bristly along midrib and edges. Flowers in terminal racemes forming a dense panicle with corymbose branches; bracts linear ciliate along margins; bracteoles half as long as calyx. Calyx 4-7 mm long, bristly, bilipped, lips equal, upper broad, truncate. Corolla bright yellow, 8-15 mm long; standard obovate; shortly clawed. Pods twisted, 5-6-jointed, reticulately veined.

In forest floor, Hoshangabad. Fl. & Fr. : Sept. -Nov.

2. *Smithia conferta* J. E. Smith in Rees., Cyclop. 33: no. 2. 1816. *S. geminiflora* Roth, Nov. Pl. Sp. 352. 1821; Baker in Hook. f., Fl. Brit. Ind. 2: 149. 1876, incl. var. *conferta* Baker l.c.

A much branched prostrate annual herb with 20-45 cm long branches. Leaves paripinnate, 2-4 cm long, with bristly rachis; stipules scarious, persistent with long appendaged auricles; leaflets 2-6 pairs, linear-oblong, obtuse, 6-12 mm long, bristles a long midrib and margins long and copious. Flowers in pairs, clustered in the axils of terminal leaves of lateral branches; bracts and bracteoles scarious, persistent. Calyx 6-7 mm long, bristly, bilipped, lips equal, entire, acute. Corolla 12-14 mm long, yellow with a brown band on the throat. Pods turgid, moniliform, ca 8 mm long, 4-6-jointed, pappilose.

In wastelands and along streams. Balaghat, Bastar, Bhopal, Bilaspur, Chhatarpur, Damoh, Hoshangabad, Indore, Jabalpur, Mandla, Panna, Raigarh, Raipur, Raisen, Rajnandgaon, Sagar, Seoni, Shahdol, Shivpuri, Sidhi Surguja, W. Nimar. Fl. & Fr. : Sept.-Jan.

3. *Smithia pycnantha* Benth. ex Baker in Hook. f., Fl. Brit. Ind. 2: 150. 1876.

An erect annual herb, 20-60 cm high with stems and branches densely clothed with minute bristles. Leaves paripinnate, stipulate; rachis 10-12 mm long, densely bristly; stipules scarious, auricled; leaflets 3-4 pairs, linear with minute yellow bristles beneath and along margins. Flowers in globose terminal heads formed of densely congested racemes; bracts linear, ciliate; bracteoles obtuse, smaller than calyx. Calyx 3-4 mm long, bilipped; lips equal, truncate, clothed with black glands and minute yellow bristles on back and along margins. Corolla yellow, half as long as the calyx. Pods 5-6-jointed.

On roadsides. Hoshangabad (Saxena, 1971, 1972). Fl. & Fr. : Sept.-Dec.

4. *Smithia sensitiva* Ait., Hort. Kew 3: 496. 1789; Baker in Hook. f., Fl. Brit. Ind. 2: 148. 1876.

A much branched procumbent or prostrate annual herb with 20-80 cm long branches and a woody base. Leaves paripinnate, 10-25 mm long; rachis 12-25 mm long, terminating in a bristle; stipules scarious; leaflets 2-10 pairs, small, linear, bristly or ciliate along midrib and margins, sensitive to touch, 5-12 mm long. Flowers in axillary short-peduncled 1-6-flowered racemes. Bracts and bracteoles scarious, persistent. Calyx 6-8 mm long, bristly, deeply 2-lipped, lips acute, entire. Corolla bright yellow, with a brown band on the throat. Pods flattened, 4-6-jointed, papillose

In moist places, along streams. Bilaspur, Raipur, Sagar (Bhattacharya, 1955) Surguja (Wood, 1902) Fl. & Fr. : Oct.-Nov.

53. SOPHORA L.

Shrubs or small trees with imparipinnate leaves. Flowers showy, yellow or purple, in terminal racemes or panicles. Calyx tube oblique with short deltoid teeth. Corolla exserted, petals equal, clawed, standard broad; keel obtuse or appendiculate. Stamens free or connate at base. Ovary stipitate, many-ovuled; style incurved; stigma terminal. Pod a moniliform lomentum.

About 80 species in warm temperate regions of both the hemispheres; 2 in M.P.

- 1a. Racemes terminal, 8-10 cm long; corolla white, pink or purple; joint of pods not winged ...1. *S. glauca*
- 1b. Racemes axillary, 10-20 cm long; corolla golden yellow; joints of pods with four distinct wings ...2. *S. interrupta*

1. *Sophora glauca* Lesch ex DC. in Ann. Sci. Nat. Ser. 1: 4: 98. 1825;

Baker in Hook. f., Fl. Brit. Ind. 2: 249. 1876.

Shrubs 2-3.5 m high, with terete branches densely clothed with brown hairs when young. Leaves pinnate, 10-14 cm long; leaflets 21-31, oblong, obovate or elliptic, subacute, mucronate, 12-30 × 5-10 mm. Racemes terminal, 8-10 cm, rachis brown tomentose; flowers distant, pedicels 3-4 mm long. Calyx ca 6 mm long, silky hairy. Corolla ca 12 mm long, white or pinkish to dark red, standard narrow, attenuate into a broad claw. Pods velvety, constricted between the seeds not winged, 1-6-seeded.

On hill slopes, in teak forests. Raigarh. Fl. : April-May.

2. *Sophora interrupta* Bedd., Forest. Man. Bot. 90. 1872; Baker in Hook. f., Fl. Brit. Ind. 2: 251. 1876. *Pili girgoli*.

Shrubs, 2-3 m high. Leaves imparipinnate, 15-30 cm long; leaflets 19-29, obtuse, emarginate, 18-35 mm long, glabrous above, sparsely hairy beneath. Racemes axillary, peduncled, 10-20 cm long; pedicels 10-15 mm long. Calyx 6-7 mm long, oblique, silky pubescent. Corolla 18-22 mm long, golden yellow. Pods 7-10 cm long, glabrous, 5-6-jointed; joints with four distinct wings.

On hill slopes. Chhindwara (Saxena, 1970), Hoshangabad. Fl. & Fr. : Feb.

54. *TEPHROSIA* Pers.

Herbs, undershrubs or shrubs. Leaves simple or odd pinnate, stipulate; leaflets opposite, entire. Flowers in leaf-opposed racemes, or solitary or geminate in the axils of leaves, bracteate. Calyx campanulate, teeth unequal. Corolla pink or purple or white; standard pubescent outside, orbicular; wings slightly adnate to the beaked keel. Stamens 10, mono- or diadelphous. Ovary sessile, many-ovuled; style in curved, glabrous or bearded; stigma terminal, often penicillate. Pods linear, flattened, compressed.

About 300 species, pantropical; 6 in M.P.

- 1a. Leaves simple ...4. *T. strigosa*
- 1b. Leaves compound:
 - 2a. Pod villous ... 6. *T. villosa*
 - 2b. Pods not villous:
 - 3a. Procumbent herbs; racemes 1-3-flowered, terminal or leaf-opposed. ...2. *T. pumila*
 - 3b. Erect herbs, undershrub or shrubs; racemes many-flowered, leaf-opposed, axillary, terminal or fascicled:

- 4a. Erect herbs; racemes leafopposed and a few flowers in the axil of upper leaves ...3. *T. purpurea*
- 4b. Undershrubs or shrubs; racemes axillary, terminal or fascicled:
- 5a. Racemes axillary ...5. *T. tinctoria*
- 5b. Racemes terminal or fascicled. ...1. *T. hookeriana*

1. *Tephrosia hookeriana* Wight & Arn., Prodr. 212. 1834; Baker in Hook. f., Fl. Brit. Ind. 2: 113. 1876. *p.p.*

Erect diffuse shrubs with villous branches. Leaves odd-pinnate, stipulate; petioles 1-2 mm long; leaflets 5-7 pairs, ovate to oblong-obovate, truncate or emarginate, 6-25 × 3-10 mm, softly pubescent above and silky hairy beneath. Flowers terminal or fascicled on many-flowered racemes, bracteate. Calyx 4-5 mm long, silky hairy; teeth setaceous, exceeding the tube. Corolla pinkish-purple, exserted, 8-13 mm long. Pods linear, nearly straight, flattened, pubescent, 3.5-5 cm long.

On forest edges. Shahdol (Tiwari 1968), W. Nimar (R. S. Rao, 1960) Fl. & Fr. : Aug.-Oct.

2. *Tephrosia pumila* (Lamk.) Pers., Syn. 2: 230. 1806. *Galega pumila* Lamk., Encycl. 2: 599. 1786. *G. procumbens* Buch.-Ham. in Trans. Linn. Soc. (Bot.) 13: 547. 1822. *T. purpurea* L. var. *pumila* Baker in Hook. f., Fl. Brit. Ind. 2: 113. 1876. *T. procumbens* (Buch.-Ham.) Drum. ex Gamble, Fl. Madras Pres. 1: 317. 1918, non Macfad. 1837.

Much-branched annual or perennial herbs, 15-40 cm high with villous stem and branches. Leaves imparipinnate ca 4.5 cm long; petioles 3-10 mm long; leaflets 7-13, oblanceolate or oblong, truncate to retuse, 10-20 × 5-30 mm, glabrescent above, densely pubescent beneath. Flowers in terminal or leaf-opposed, 1-3-flowered racemes. Flowers 6-8 mm long. Calyx 3-5 mm long; teeth setaceous, twice as long as tube, densely hairy. Corolla white or pink-purple, 6-10 mm long; standard suborbicular. Pods 2.5-4 × 0.3-0.4 cm, pubescent, curved at the tip, 8-14-seeded.

In wastelands and among boulders. Balaghat, Bhind, Damoh, Durg, Indore, Morena, Panna, Raigarh, Raipur, Raisen, Rajnandgaon, Sagar, Satna, Seoni, Shivpuri, Surguja, Tikamgarh, W. Nimar. Fl. & Fr. : Aug. -Nov.

3. *Tephrosia purpurea* (L.) Pers., Syn. 2: 329. 1807; Baker in Hook. f., Fl. Brit. Ind. 2: 112. 1876. *Cracca purpurea* L., Sp. Pl. 752. 1753. *Tephrosia hamiltonii* Drum. ex Gamble, Fl. Madras pres. 1: 320. 1918. *T. purpurea* var. *pubescens* Baker in Oliver, Fl. Trop. Afr. 2: 125. 1871 et in Hook. f., l. c. 113. -*Bhamasia*, *Sarphunka*.

Annual or perennial herbs, 2-10 dm high, with rounded glabrous or slightly hairy branches. Leaves imparipinnate, 7-15 cm long; leaflets 9-21, elliptic-oblong, obtuse or truncate, mucronate, 18-28 × 6-10 mm, glabrous above, silky beneath; stipules deltoid, hairy. Flowers in leafopposed 10-13 cm long racemes, sometimes also with a few flowers in the upper leaf axils. Flowers 6-9 mm long. Calyx 2.5-4.5 mm long, pubescent; teeth acuminate. Corolla 6-10 mm long, pink-red or purple, pubescent outside. Pods 3.5-4 cm long, pubescent, nearly straight, 6-9-seeded.

Roots medicinal.

Widely spread in open places. Balaghat, Bastar, Bhind, Bhopal, Bilaspur, Dhar, Durg, Hoshangabad, Indore, Jabalpur, Mandla, Morena, Narsimhapur, Panna, Raigarh, Raipur, Raisen, Rajnandgaon, Rewa, Sagar, Satna, Seoni, Shahdol, Shivpuri, Sidhi, Surguja, Tikamgarh, W. Nimar. *Fl. & Fr.* throughout the year

4. *Tephrosia strigosa* (Dalz.) Sant. & Maheshw. in J. Bomb. Nat. Hist. Soc. 54 (3): 903. 1957. *Macronyx strigosus* Dalz. in Hook. J. Bot. 2: 35. 1850. *T. tenuis* Wall. ex Dalz. & Gibs., Bomb. Pl. 61. 1861; Baker in Hook. f., Fl. Brit. Ind. 2: 111. 1876.

Sub erect much-branched, pubescent annual herbs, 15-40 cm high. Leaves simple, linear or elliptic, acute, apiculate 2-5 × 0.3-0.6 cm, glabrescent above, silky beneath; petioles 1.5-2.5 mm long; stipules setaceous. Flowers solitary, axillary or in pairs; pedicels 5-12 mm long. Calyx ca 2.5 mm long, silky; teeth lanceolate; unequal, shorter than the tube; Corolla ca 4 mm long, bluish or bluish purple, petals clawed. Pods linear, 15-25 × 3-5 mm, finely adpressed hairy, 6-10-seeded.

In teak and mixed forests. Bhind, Bhopal, Chhindwara, Damoh, Hoshangabad, Morena, Panna, Raisen, Sagar, Satna, Seoni, Shivpuri, Tikamgarh, W. Nimar. *Fl. & Fr.* : Aug.-Oct.

5. *Tephrosia tinctoria* Pers., Syn. 2: 329. 1807; Baker in Hook. f., Fl. Brit. Ind. 2: 111. 1876.

Herbs or undershrubs, up to 1 m high, with angled striate brown pubescent branches. Leaves pinnately 5-9-foliolate, ca 8 cm long, stipulate; petioles 2-3 cm long; leaflets ovate or obovate, apiculate, emarginate, 5-7.6 × 1.5-2.5 cm, glabrous above, white silky beneath. Flowers ca 1 cm long in up to 23 cm long axillary racemes. Calyx ca 4 mm long, teeth equal or unequal, setaceous, densely pubescent. Corolla 9-13 mm long, orange to pale red, silky outside. Pods flattened, 5-5.5 × 0.5 cm pubescent; seeds 10-12, dark brown, flattened.

In wastelands. Bastar. *Fl. & Fr.* : Oct.-Feb.

6. *Tephrosia villosa* (L.) Pers., Syn. Pl. 2: 329. 1807; Baker in Hook. f., Fl. Brit. Ind. 2: 113. 1876. *Cracca villosa* L., Sp. Pl. 752. 1753.

Erect much-branched perennial herbs, 30-60 cm high, with slender hairy branches. Leaves imparipinnate, 5-8 cm long; petioles 10-12 mm long; leaflets 11-19, oblanceolate, cuncate at base, rounded, emarginate or mucronate at apex, 10-20 × 5-10 mm, glabrescent above, densely silky beneath. Flowers in elongated 12-15 cm long racemes; lower flowers fascicled or some axillary. Calyx 8-9 mm long, densely villous outside, teeth longer than the tube. Corolla red or pink purple; standard 9-15 mm long, pubescent outside. Pods deflexed, falcately up-curved, 2.5-4 × 0.4-0.6 cm, densely villous, 5-8-seeded.

In wastelands. Bilaspur, Dhar, Hoshangabad, Panna, Raipur, Shivpuri, W. Nimar. Fl. & Fr. : July-Dec.

55. TERAMNUS P. Br.

Slender twinners or trailing perennial herbs with pinnately 3-foliolate stipellate leaves. Flowers paired or whorled in axillary racemes, or fascicled. Calyx-tube campanulate; teeth subequal. Corolla slightly exerted; petals unequal, standard not spurred. Stamens monadelphous or diadelphous, 9+1, with 4 alternate anthers small or sterile. Ovary sessile, many-ovuled; style curved; stigma capitate. Pods linear, flat, septate between seeds, beaked.

About 8 species in the tropics; 2 in M.P.

- 1a. Stem and pods clothed with a few short hairs; leaflets membranous; calyx teeth as long as the tube. ...1. *T. labialis*
- 1b. Stem and pods clothed with long spreading hairs; leaflets sub-coriaceous; calyx teeth shorter than the tube. ...2. *T. mollis*

1. *Teramnus labialis* (L.f.) Spreng., Syst. 3: 235. 1826; Baker in Hook. f., Fl. Brit. Ind. 2: 184. 1876, p.p. *Glycine labialis* L., f. Suppl. 325. 1781. -*Mashoni*.

Slender climbers or trailing twining herbs with pubescent branches. Leaves 3-foliolate; rachis up to 10 cm long; leaflets rhomboid, elliptic-oblong to ovate lanceolate, acute at base, 2-10 × 1.5-5 cm, pubescent below. Flowers in lax axillary racemes; racemes solitary or 2-3-nate. Calyx 3-5 mm long, villous, 5-toothed. Corolla bluish-white to reddish. Pods sessile, linear-compressed, brown-hairy, 3-6 × 0.3-0.5 cm, recurved, beaked, 5-12 seeded.

Climbing on roadsides bushes. Balaghat, Bastar, Damoh, Gwalior, Hoshangabad, Indore, Jabalpur, Mandla, Narsimhapur, Panna, Raisen, Rajnandgaon, Raisen, Rewa, Sagar, Seoni, Shahdol, Shivpuri, Sidhi, W.

Nimar. *Fl. & Fr.* : Aug.-April.

2. *Teramnus mollis* Benth. in J. Linn. Soc. Bot. 8: 265. 1865 (*non Glycine mollis* Wight & Arn., 1834). *Teramnus labialis* (L. f.) Spreng. var. *mollis* (Benth.) Baker in Hook. f., *Fl. Brit. Ind.* 2: 184. 1876.

Climbing herbs with strigose stem and branches. Leaves 3-foliolate; rachis 1.5-7 cm long, clothed with long spreading hairs; leaflets variable, unequal, elliptic-ovate, 1.5-8 × 1.2-3.5 cm, truncate at base, mucronate or subacute at apex, sparsely pubescent to glabrescent above, densely hairy beneath. Flowers in 10-15 cm long pedunculate axillary racemes; peduncles 0.5-3.5 cm long strigose. Calyx ca 3 mm long, pubescent, teeth shorter than the tube. Corolla reddish. Pods linear, flat, 3.5-4.5 cm, clothed with long spreading hairs, 6-12-seeded.

Bastar, Hoshangabad. *Fr. & Fl.* : July-Dec.

56. TRIFOLIUM L.

Annual or perennial herbs. Leaves trifoliolate; stipules adnate to the petiole; leaflets dentate. Flowers in dense axillary heads, short racemes or solitary. Calyx-tube turbinate, teeth mostly 5, subequal. Corolla pink, red, purple or yellow, adnate to the staminal tube; standard and wings narrow; keel straight. Stamens diadelphous 9+1; filaments more or less dilated; ovary sessile or stalked; style incurved; stigma oblique. Pods included in calyx, 1-few-seeded.

About 300 species, mostly European and Oriental, many N. American and tropical African; 2 cultivated in M.P. for fodder.

- 1a. Annual herbs; inflorescence pedunculate; petals
cream., yellow ...1. *T. alexandrium*
- 1b. Perennial herbs; inflorescence sessile; petals pink or
purple ...2. *T. pratense*

1. *Trifolium alexandrium* L., *Cent. Pl.* 1: 25. 1755. -*Barseem*.

Erect annual herb with glabrous or sparsely hairy branches. Leaves trifoliolate; leaflets 1.5-4 cm long, broadly elliptic, linear or oblong-lanceolate, mucronate; stipules oblong, lanceolate, ciliate. Flowers in ovoid or oblong conical axillary peduncled heads. Calyx tube turbinate, teeth unequal, spinescent. Corolla creamy yellow; standard 8-13 mm long. Pods included within the calyx, indehiscent.

Cultivated as a fodder crop, and for green manure. Bhopal (*Oommachan*, 1977). *Fl.* : April-June.

2. *Trifolium pratense* L., *Sp. Pl.* 768. 1753; Baker in Hook. f., *Fl. Brit. Ind.* 2: 86. 1876.

Erect to decumbent perennial herbs, 20-45 cm high, with sparsely hairy branches. Leaves trifoliolate; stipules broad; leaflets oblong, obovate to broadly elliptic, obscurely toothed, 1.5-3 cm long. Flowers dense in axillary ovoid or round heads; sessile and subtended by a pair of opposite leaves. Calyx pubescent; teeth unequal, lowest longer. Corolla pink to purple; standard 13-18 mm long. Pods included within the calyx, 1-seeded, opening by a lid.

Cultivated as a fodder crop; flowers yield a yellow dye. Indore (Rao & Sastri, 1964). Fl. & Fr. : April-Sept.

57. TRIGONELLA L.

Annual herbs with pinnately 3-foliolate leaves and adnate stipules. Leaflets usually dentate. Flowers solitary axillary or in axillary racemes, or often capitate. Calyx tube campanulate, teeth unequal or equal. Corolla yellow, blue or purplish; petals free from the staminal tube; standard and wings narrow; keel obtuse. Stamens diadelphous, 9+1. Ovary sessile or stalked, many-ovuled; style glabrous; stigma terminal. Pods straight or falcate, linear or oblong, sometimes beaked, many-seeded.

About 70 species in Mediterranean and Oriental regions; 3 in M.P.

1a. Pods oblong, ellipsoid, less than 1 cm long ...3. *T. occulta*

1b. Pods linear-falcate, more than 1 cm long:

2a. Pods 1.5-2.5 cm long, not beaked ...1. *T. corniculata*

2b. Pods 10-15 cm long, beaked. ...2. *T. foenum-graecum*

1. *Trigonella corniculata* (L.) L., Syst. Nat. ed. 10, 1180 1759; Baker in Hook. f., Fl. Brit. Ind. 2: 88. 1876, p.p. *Trifolium corniculatum* L., Sp. Pl. 766. 1753.

Much branched annual herbs with 20-30 cm long glabrous or subglabrous procumbent branches. Leaves stipulate, 3-foliolate; stipules feathery, 6-12 mm long; leaflets obovate-cuneate, obtuse to emarginate, dentate, 2-4 × 0.5-3 cm, glabrous above, sparsely pilose along nerves beneath. Flowers 6-15 in dense racemes at the end of 2-6 cm long axillary peduncles. Calyx 2.5-3 mm long; teeth unequal, shorter than the tube. Corolla bright yellow, 5-9 mm long; wings shorter than keel. Pods linear, falcately recurved, 1-2 × 0.25 cm, glabrous, transversely reticulate; seeds 4-8 ovoid, compressed, dotted.

In cultivated fields. Panna, Sagar, Shivpuri. Fl. & Fr. : Febr.

2. *Trigonella foenum-graecum* L., Sp. Pl. 777. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 70. 1876. -*Methi*.

Erect, glabrous or hispid, annual herbs, 20-60 cm high. Leaves

3-foliolate; petioles 1-2 cm long; leaflets obovate, oblanceolate or oblong, cuneate, toothed, 1.5-3 × 0.5-1.5 cm, stipes 6-8 mm long, lanceolate, acuminate, entire. Flowers 1-2, sessile, axillary. Calyx 4-8 mm long, teeth linear. Corolla yellow, sometimes tinged with lilac, 8-18 mm long. Pods linear falcate, 5-15 cm long, hispid, with a long persistent beak, 10-20-seeded.

Cultivated as a cold weather leafy vegetable; seeds used as a spice. Bastar, Bhopal, Bilaspur, Shivpuri. Fl. : Feb.

3. *Trigonella occulta* Delile ex DC., Prodr. 2: 185. 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 87. 1876.

Herbs, annual, diffuse or prostrate, glabrous, with slender stems. Leaves pinnately 3-foliolate; petioles 5-9 mm long; leaflets oblanceolate, cuneate, toothed, 4-6 × 3-3.5 mm, subglabrous above, sparsely silky pubescent beneath. Flowers 2-4 in sessile axillary clusters. Calyx 3-3.5 mm long, hairy; teeth setaceous. Corolla yellow, 3-4 mm long. Pods oblong, elliptic, turgid, scarcely exserted, 3.5-4 mm long, reticulate, sparsely covered with spreading white hairs, beaked, 2-seeded.

In roadside ditches. Bastar, Bhopal, Sagar. Fl. : Feb.

58. URARIA Desv.

Erect or suberect, perennial herbs or shrubs. Leaves imparipinnate 1-9-foliolate, stipulate. Flowers in terminal racemes or panicles, bracteate. Calyx tube very short, 2-lipped, 5-lobed. Corolla yellowish or purplish; standard broad, wings adnate to the obtuse keel, Stamens diadelphous, 9+1. Ovary sessile or shortly stipitate, 2-many-ovuled; style filiform, inflexed; stigma capitate. Pods of 2-6-small turgid, one seeded joints.

About 20 species in tropical Africa, Asia and Australia; 4 in M.P.

- 1a. Lower leaves 1-3 and upper 5-9-foliolate ...3. *U. picta*
- 1b. All leaves 1-3-foliolate:
 - 2a. Racemes long, lax, paniced; flowers distant; rachis visible ...4. *U. rufescens*
 - 2b. Racemes shorter, dense, not paniced; flowers close; rachis not visible:
 - 3a. Pods glabrous ...1. *U. alopecuroides*
 - 3b. Pods pubescent ...2. *U. lagopodioides*

1. *Uraria alopecuroides* (Roxb.) Wight, Ic. t. 290. 1840. *Doodia alopecuroides* Roxb., Fl. Ind. 3: 368. 1832. *Uraria lagopus sensu* Baker in Hook. f., Fl. Brit. Ind. 2: 156. 1876. *p.p.*; non DC., 1825.

Erect or suberect 1-2 m high herbs or undershrubs, usually woody at

base. Stem and branches clothed with hooked hairs. Leaves all 1- or 3-foliolate or the lower 1-foliolate and the upper 3-foliolate or intermixed; stipules subulate, 6-10 mm long; leaflets ovate-elliptic or oblong, lanceolate or sometimes sub-orbicular, 3-9 × 2-8 cm, with a rounded or cordate base and subacute-mucronate apex, pubescent with hooked hairs; lateral leaflets smaller. Racemes terminal, simple, dense, 3-10 cm long, ca 2 cm broad, dull or shining brown, plumose; bracts rounded, cordate, cuspidate, densely ciliate, persistent; pedicels and calyx teeth plumose, lower calyx teeth thrice as long as the upper ones. Corolla pink to deep purple or blue. Pods glabrous or glabrescent, 2-jointed, black.

In sal forests in association with *Desmodium* and *Eriosema*. Balaghat, Bastar, Bilaspur, Hoshangabad, Mandla, Rajnandgaon, Seoni. *Fl. & Fr.* : July Sept.

Medicinally used in *Dashmulkarha*-an Ayurvedic preparations.

2. *Uraria lagopodioides* (L.) Desv. in DC., Prodr. 2: 234. 1825; Baker in Hook. f., *Fl. Brit. Ind.* 2: 156. 1876 (*lagopoides*). *Hedysarum lagopodioides* L., Sp. Pl. 1198. 1753.

Suberect or trailing perennials, 20-40 cm high, often woody at base with brown hairy or bristly branches. Leaves 1-3- or rarely all 1 or all 3-foliolate; petioles 1-8 cm long, hairy; stipules lanceolate-acuminate, 5-8 mm long, obscurely cordate at base; leaflets orbicular, ovate or obovate, obcordate, 2-10 × 2-7 cm, obtuse, emarginate or mucronate, glabrescent above, downy beneath and bristly on main nerves beneath. Racemes short peduncled or sessile, dense, 1.5-7.5 cm long; bracts long persistent, ciliated. Lower calyx segments three times as long as the upper ones, plumose. Corolla bluish-violet or purple, standard 5-7 mm long. Pods 2-, or less often, 1-jointed; joints grey or black, pubescent.

Amidst grasses at the edge of forests. Balaghat, Bastar, Bilaspur, Raigarh, Raipur, Rajnandgaon, Sidhi. *Fl. & Fr.* : Sept.-Jan.

3. *Uraria picta* (Jacq.) Desv. in Journ. Bot. 1: 123, t. 5.f. 19. 1813; Baker in Hook. f., *Fl. Brit. Ind.* 2: 155. 1876. *Hedysarum pictum* Jacq., Coll. 2: 262. 1789. -*Dabra*.

Robust erect perennial suffruticose herbs or undershrubs, 40-80 cm high, with pubescent cylindrical branches. Lower leaves 1-3-foliolate, upper ones 5-9-foliolate, leaf rachis 10-15 cm long; petioles 2.5-5 cm long; stipules lanceolate; leaflets sublinear, very gradually narrowed from a rounded base, 3-20 × 0.4-3 cm, excurved at margins, glabrous above, faintly pubescent below, variegated along the costa on the upper surface. Racemes cylindrical, 20-35 cm long, bristly. Flowers ca 15 mm long; pedicels 5-15 mm long,

clothed with short hooked bristles, abruptly recurved at tip. Calyx bilipped, ca 4 mm long; lobes cordate, acuminate, hirsute. Corolla violet or purple, slightly exserted, standard with 2 yellow spots. Pods 8-10 mm long, glabrous, 3-6-jointed, glabrescent, folded in one another; seeds shining white.

Growing as undergrowth of forest. Balaghat, Bastar, Bilaspur, Damoh, Hoshangabad, Mandla, Raigarh, Raipur, Rajnandgaon, Raisen, Sagar, Satna, Seoni, Shahdol, Sidhi, Surguja. *Fl. & Fr.* : Aug.-Jan.

Root sap mixed with mother's milk is used for *Churna* disease of the children.

4. *Uraria rufescens* (DC.) Schindl. in Fedde Report. 21: 14. 1925. *Desmodium rufescens* DC. in Ann. Sci. Nat. Paris 4: 101. 1825. *Doodia hamosa* Roxb., Fl. Ind. 3: 367. 1832. *Uraria hamosa* (Roxb.) Wight & Arn., Prodr. 222. 1834; Baker in Hook. f., Fl. Brit. Ind. 2: 156. 1876.

Straggling or diffuse perennial herbs or undershrubs, 1-2 m high; young parts clothed with long hairs and shorter hooked bristles. Leaves 1-3-foliolate; petioles up to 5 cm long; stipules semicordate, setaceous, acuminate, 6-10 mm long; leaflets elliptic-ovate or oblong, 5-15 × 2-8 cm, rounded or semi-cordate at base, obtuse, emarginate, mucronate at apex, glabrous above, downy beneath; lateral ones smaller. Racemes terminal or axillary, lax, elongate, 10-30 cm long, paniced. Rachis clothed with hooked brown hairs; bracts densely silky pubescent; pedicels 4-5 mm long. Flowers ca 6 mm across. Calyx teeth subequal, deltoid, cuspidate, hairy. Corolla pink or pale-purple, standard obovate or orbicular, 8-12 mm long. Pods clothed with short hooked and long straight hairs, 4-8-jointed, joints opaque.

In mixed forests. Balaghat, Bastar, Bilaspur, Hoshangabad, Mandla, Raigarh, Raipur, Surguja. *Fl. & Fr.*: Sept.-Dec.

59. VICIA L.

Slender annual or perennial herbs. Leaves even pinnate, terminating in twisted tendrils. Flowers often showy, solitary, sub-sessile, or in pedunculate axillary racemes. Calyx tube campanulate, often oblique, with subequal teeth. Corolla exserted; wings adnate at the middle to the shorter keel and to the staminal tube. Stamens diadelphous, 9+1, sheath of tube extremely oblique. Ovary stipitate, 2-many-ovuled; style filiform; stigma capitate. Pods oblong to linear, compressed; seeds usually globose.

About 150 species in N. temperate and South America; 3 in M.P.

- 1a. Stem erect; leaflets 2-3 pairs; rachis of leaf ending into a point or a short tendril; cultivated ...1. *V. faba*
- 1b. Stem prostrate or climbing; leaflets more than 3 pairs; rachis of leaf ending into a tendril; wild:
- 2a. Flowers in peduncled axillary racemes; pods 2-seeded ...2. *V. hirsuta*
- 2b. Flowers sessile, solitary; pods more than 2-seeded ...3. *V. sativa*

1. *Vicia faba* L., Sp. Pl. 737. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 179. 1876. -*Bakal, Bakla.*

Erect stout annual herbs, 30-60 cm tall. Leaves even pinnate, rachis ending into a point or a short tendril; leaflets 2-3 pairs, 3.5-10 × 1-3.5 cm, ovate to elliptic-lanceolate, mucronate, glabrous; stipules 1-1.7 cm long. Flowers 1-6, axillary, white, 2.5-3 cm long. Calyx 1-1.5 cm long, tube oblique. Corolla white with dark violet wings. Pods 2-4 × 0.4-1.2 cm, pubescent; seeds ovoid-oblong.

Cultivated for pods, used as vegetables. Sagar (*Bhattacharyya*, 1955). *Fl. & Fr.* : Feb.-March.

2. *Vicia hirsuta* (L.) S.F. Gray in Nat. Arr. Brit. Pl. 2: 614. 1821; Baker in Hook. f., Fl. Brit. Ind. 2: 177. 1876. *Ervum hirsutum* L., Sp. Pl. 738. 1753.

Prostrate or climbing annual herbs with numerous pubescent branches. Leaves pari-pinnate ending into trifid tendril; leaflets alternate or opposite, 5-8 pairs, linear, obtuse, truncate, mucronate, sparsely hairy; stipules semi-sagittate to lanceolate. Flowers in peduncled axillary racemes, bluish-pink; peduncles 4-6-flowered. Calyx tube campanulate; teeth sub-equal. Corolla longer than the calyx; standard broad; keel shorter than the wings. Stamens diadelphous. Style hairy throughout. Pods oblique to oblong or rhomboid, 6-9 × 2.5-4 mm, hairy; 2-seeded.

In cultivated fields. Bastar, Bhopal, Damoh, Mandla, Panna, Ratgarh, Raisen, Rewa, Sagar, Shivpuri, Sidhi, Surguja. *Fl. & Fr.* : Nov.-March.

3. *Vicia sativa* L., Sp. Pl. 736. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 178. 1876.

Slender, suberect or climbing, diffuse annual herbs, glabrous or sparsely hairy. Leaves pinnately compound; rachis terminating into 2-3-fid tendril; leaflets 4-6 pairs, linear to oblanceolate, acute, obtuse or emarginate, 10-30 × 2-8 mm; stipules obliquely lanceolate, deeply toothed. Flowers usually solitary, axillary, rarely 2 or 3, sessile, purplish-violet. Calyx 6-18 mm long, teeth, subequal, lanceolate-subulate. Corolla twice as long as the calyx. Style bearded on the lower side near the tip. Pods linear, 3.5-7 cm long, deciduously pubescent, 6-10-seeded.

In cultivated fields. Bastar, Bhopal, Bilaspur, Chhatarpur, Damoh, Raigarh, Raipur, Raisen, Rewa, Sagar, Shahdol, Shivpuri, Sidhi, Surguja. Fl. & Fr. : Dec.-April.

60. VIGNA Savi

Twining or erect herbs, or undershrubs. Leaves pinnately 3-foliolate, stipellate; stipules basifixed or peltate. Racemes axillary, peduncled, tubercled; bracts and bracteoles small. Calyx campanulate; upper lobes often connate. Corolla exserted, standard orbicular, often auricled at base; wings obovate, falcate, scarcely adnate to the incurved keel. Stamens diadelphous. Ovary sessile, many-ovuled; style filiform, bearded along the inner face below the oblique stigma. Pods straight or slightly incurved, terete or subcompressed; seeds reniform or sub-quadrate.

About 150-200 species mostly tropical African and Asian; 10 in M. P.

- 1a. Leaflets deeply lobed:
 - 2a. Leaflets all 3-lobed ...7. *V. trilobata*
 - 2b. Leaflets pinnately lobed ...1. *V. aconitifolia*
- 1b. Leaflets entire or sinuate:
 - 3a. Pods 0.8-1.2 cm broad ...2. *V. adenantha*
 - 3b. Pods up to 0.5 cm broad:
 - 4a. Stipules not appendaged below the point of attachment; pods covered with dark brown hairs ...10. *V. vexillata*
 - 4b. Stipules appendaged below the point of attachment; pods covered with black hairs or glabrous:
 - 5a. Pods with black hairs:
 - 6a. Pods 4-5 cm long; rim aril round the hilum of the seed distinctly raised; seeds dirty green in colour ...4. *V. mungo*
 - 6b. Pods 4-9 cm long; rim aril round the hilum of the seed less raised; seeds light green in colour:
 - 7a. Stem mostly erect; leaflets usually entire; fruits and seeds usually longer ...5. *V. radiata*
 - 7b. Stem twining or prostrate; leaflets frequently lobed; fruits and seeds usually smaller ...6. *V. sublobata*
 - 5b. Pods glabrous, subglabrous or minutely hairy:

- 8a. Fruits 10 cm or more long ...9. *V. unguiculata*
 8b. Fruits less than 10 cm long:
 9a. Stipules 4 mm or less long; flowers 5-6 mm long ...3. *V. dalzelliana*
 9b. Stipules 5 mm or more long; flowers 9-12 mm long ... 8. *V. umbellata*

1. *Vigna aconitifolia* (Jacq.) Marechal in Bull. Jard. Bot. Nat. Belg. 39: 160. 1869. *Phaseolus aconitifolius* Jacq., Obs. Bot. 3: 2. t. 52. 1768; Baker in Hook. f., Fl. Brit. Ind. 2: 202. 1876.

Prostrate, suberect, annual to perennial herbs, branches and all other parts clothed with creamish spreading hairs. Leaves pinnately 3-foliolate; petioles 3.5-8.5 cm long, hairy; leaflets palmately 3-lobed, 3-6 cm long, pubescent; stipules 5-9 mm long, linear-lanceolate, acuminate, ciliate. Racemes capitate, axillary; peduncles 1.5-6 cm long, hairy; bracts 3-4 mm long, pubescent. Calyx 2-3 mm long, sparsely pubescent. Corolla yellow, 4-7 mm long. Pods cylindrical, glabrous, 3-6 cm long, ca 4 mm broad, 5-8-seeded.

In wastelands. Indore (Rao & Sastry, 1964), Sagar (Bhattacharya, 1955), Seoni. Fl. & Fr.: Aug.-Dec. Seeds eaten as a famine food.

2. *Vigna adenantha* (G.F. Meyer) Marech, Masch. & Stain. in Taxon 27: 202. 1978. *Phaseolus adenanthus* G. F. Meyer, Prim. Fl. Esseq. 239. 1818; Baker in Hook. f., Fl. Brit. Ind. 2: 200. 1876. *P. rostratus* Wall., Pl. Asiat. Rar. t. 63. 1830. *P. alatus* Roxb., Fl. Ind. (ed. Carey) 3: 288. 1832.

Twining or trailing perennial glabrescent herbs. Leaves 3-foliolate; stipules lanceolate, ca 8 × 3 mm, reflexed; petioles 3-8 cm long; leaflets ovate, acute, entire, 6.5-10 × 1.5-5 cm. Racemes axillary, capitate, 6-10-flowered; peduncles 5-15 cm long. Calyx 6-8 mm long; teeth linear. Corolla red, 11-15 mm long. Pods 10-15 × 0.8-1.2 cm, recurved, glabrous, beaked, septate, 10-20-seeded.

Bastar (Arora, 1968), Raisen (Gupta, 1979).

3. *Vigna dalzelliana* (O. Kuntze) Verdc. in Kew Bull. 24: 558. 1970. *Phaseolus dalzellianus* O. Kuntze, Rev. Gen. 1: 202. 1891. *P. pauciflorus* Dalz. in Hook. J. Bot. 3: 209. 1851, non G. Don 1832 nec Benth. 1852; Baker in Hook. f., Fl. Brit. Ind. 2: 202. 1876. *P. dalzellii* Cooke, Fl. Pres. Bomb. 1: 376. 1903.

Twining or creeping herbs with glabrescent stems, often rooting at nodes. Leaves trifoliolate; petioles 1-4 cm long; stipules lanceolate; 2-3 mm long; leaflets oblique, ovate-rhomboid to ovate-deltoid, 3-3.5 × 1-1.5 cm, acuminate, entire or lobed. Racemes 2-4 cm long, capitate; flowers bracteolate. Calyx 2-3 mm long, glabrous or glabrescent. Corolla pale-yellow, 5-7 mm long. Pods 3-5 cm long, compressed, reflexed, beaked,

glabrous, 4-10-seeded.

On roadsides. Hoshangabad (Joseph, 1963). Fl. & Fr. : Sept.-Oct.

4. *Vigna mungo* (L.) Hepper in Kew Bull. 11: 128. 1956. *Phaseolus mungo* L., Mant. Pl. 1: 101. 1767; Baker in Hook. f., Fl. Brit. Ind. 2: 203. 1876, p.p. -Urd.

Much branched climbing or erect annual herbs, with 30-60 cm long straggling branches densely clothed with greyish to grey brown reflexed hairs. Leaves 3-foliolate; petioles 5-20 cm long; stipules peltate, 7-10 × 4-5 mm; leaflets ovate, rhomboid to ovate-deltoid or elliptic-ovate, acuminate, entire or slightly lobed, 5-8 × 4-6 cm. Racemes capitate, 4-8-flowered; peduncles 1.5-4 cm long. Calyx 2-3 mm long; teeth lanceolate. Corolla yellow, 9-13 mm long. Pods 3.5-6.5 cm long, covered with long spreading hairs, 6-12-seeded; the rim-aril distinctly raised around the hilum of the seeds which are dirty green in colour.

Commonly cultivated as a kharif crop for its seeds, cooked as a pulse. Bastar, Bilaspur, Chhindwara, Hoshangabad, Indore, Rewa, Sagar, Shivpuri. Fl. : Aug.-Sept. : Fr. : Oct.-Nov.

5. *Vigna radiata* (L.) Wilczek in Fl. Congo Belge et Ruanda-urundi, 6: 386. 1954; Verdc. in Kew Bull. 24: 558. 1970 (excl. vars. *glabra* and *sublobata*). *Phaseolus radiatus* L., Sp. Pl. 725. 1753. *P. mungo* L. var. *radiatus* (L.) Baker in Hook. f., Fl. Brit. Ind. 2: 203. 1876. -Moong.

Climbing or erect herbs, 30-45 cm long; stem and branches covered with brown or greyish-brown spreading hairs. Leaves 3-foliolate; petioles 5-21 cm long; stipules peltate, ovate, hairy, 5-7 × 3-5 mm; leaflets elliptic-ovate, glabrous or pilose, acute or acuminate at apex, cuneate or truncate at base, 5-15 × 3-10 cm, entire or faintly lobed; laterals oblique. Racemes capitate; peduncles 1.5-8 cm long, 4-8-flowered; flowers 1-1.5 cm long, bracteolate. Calyx 3-4 mm long, glabrous; teeth ciliate. Corolla yellow; keel curled upwards. Pods linear, cylindrical, bristly hairy, 4-10 cm long, 8-15-seeded.

Cultivated as a kharif crop for its seeds, used as pulse. Bastar, Bhopal, Chhindwara, Hoshangabad, Indore, Mandla, Jabalpur, Raisen, Sagar, Shahdol, Shivpuri. Fl. & Fr.: Sept.-Dec.

6. *Vigna sublobata* (Roxb.) Babu & Sharma in Bull. Bot. Surv. Ind. 27: 21. 1987. *Phaseolus sublobatus* Roxb., Fl. Ind. 3: 288. 1832. *P. setulosus* Dalz. in Hook. J. Bot. 2: 33. 1850. *P. sublobatus* Roxb. var. *setulosus* (Dalz.) Prain in J. Asiat. Soc. Beng. 66: 423. 1897. *Phaseolus sublobatus* Roxb. var. *grandiflora* Prain in J. Asiat. Soc. Beng. 66: 423. 1897. *P. trinervis* Wt. et Arn., Prodr. 245. 1834; Baker in Hook. f., Fl. Brit. Ind. 2: 203. 1876. *V. brachycarpa* Kurz in J. Asiat. Soc. Beng. 43: 185. 1874; Baker l.c. 206. *V. radiata* (L.) Wilczek var. *sublobata* (Roxb.) Verdc. in Kew Bull. 24: 559. 1970. -Jungli Moong.

Twining or scandent annual herbs; branches 10-50 cm long, clothed with ferruginous deflexed hairs. Leaves 3-foliolate; petioles hairy, 5-20 cm long; stipules falcate-lanceolate, 5-8 × 3-4 mm, hairy; leaflets ovate-deltoid, acuminate at apex, subcuneate or subtruncate at base. Racemes capitate; long peduncled, 2-6-flowered. Calyx lobes ovate, deltoid, ca 2 mm long, pubescent. Corolla yellow, 8-10 mm long. Pods 2.5-5 cm long, hairy, subcompressed, 4-10-seeded.

Hoshangabad, Indore, Mandla, Shahdol. *Fl. & Fr.* : Sept.-Dec.

7. *Vigna trilobata* (L.) Verdc. in *Taxon* 17: 172. 1968. *Dolichos trilobatus* L., *Mant. Pl.* 1: 101. 1767. *Phaseolus trilobatus* (L.) Schreb. in *Nov. Acta. Acad. Caes Leop. Carol. Nat. Curios.* 4: 133. 1770. *P. trilobus sensu* Baker in *Hook. f., Fl. Brit. Ind.* 2: 201. 1876. -*Mugam, Mungam.*

Trailing, twining, straggling or suberect annual or perennial herbs. Leaves 3-foliolate; petioles 3.5-12 cm long; stipules peltate, ovate-oblong, ciliate, 1-1.5 × 1 cm; leaflets palmately 3-lobed; the middle lobe bigger, oblong, broadly spatulate, obtuse; lateral lobes oblong, broadly spatulate, obtuse or subacute. Racemes capitate; peduncles 8-30 cm long, bracteate and bracteolate. Calyx 2.5-3 mm long, glabrous; teeth minute. Corolla yellow, 5-10 mm long. Pods cylindrical, 2.5-5 × 0.2-0.3 cm, glabrescent, 6-16-seeded.

In cultivated fields and roadsides. Balaghat, Bastar, Bhopal, Bilaspur, Damoh, Dhar, Gwalior, Hoshangabad, Indore, Jabalpur, Mandla, Narsimhapur, Panna, Raigarh, Raipur, Raisen, Rajnandgaon, Ratlam, Sagar, Satna, Seoni, Sidhi, Shivpuri, W. Nimar. *Fl. & Fr.* : Aug.-Dec.

Seeds often used as a famine food.

8. *Vigna umbellata* (Thunb.) Ohwi & Ohashi in *J. Jap. Bot.* 44: 31. 1968. *Dolichos umbellatus* Thunb. in *Trans. Linn. Soc.* 2: 339. 1794. *Phaseolus calcaratus* Roxb., *Fl. Ind.* 3: 289. 1832; Baker in *Hook. f., Fl. Brit. Ind.* 2: 203. 1876. *V. calcarata* (Roxb.) Kurz in *J. Asiat. Soc. Beng.* 45: 247. 1876. -*Sutri.*

Diffuse, twining or suberect herbs, stem and branches densely clothed with short deflexed hairs. Leaves pinnately 3-foliolate; stipules 5-12 mm long, peltate, lanceolate; petioles 2-15 cm long, pilose; leaflets ovate-deltoid, 4-12 × 2-8 cm, subcuneate or subtruncate at base, acuminate at apex, entire or faintly lobed, puberulous. Racemes peduncled, axillary, tubercled, 5-8 cm long, few-flowered; bracts 2-3 mm long; bracteole 3-3.5 mm long, linear. Calyx 3-4 mm long, pubescent. Corolla yellow, 8-13 mm long. Pods 4-9 × 0.3-0.5 cm, compressed, glabrous, 4-12-seeded.

On roadsides in moist places. Balaghat, Bilaspur, Dhar, Hoshangabad, Indore, Mandla, Panna, Raigarh, Rajnandgaon, Seoni, Sidhi, Surguja. *Fl. & Fr.* : Sept.-Nov.

Seeds used as a famine food.

9. *Vigna unguiculata* (L.) Walp., Rep. Bot. Syst. 1: 779. 1842; Verdc. in Kew Bull. 24: 542. 1970. *Dalichos unguiculatus* L., Sp. Pl. 725. 1753. *Vigna catjang* Baker in Hook. f., Fl. Brit. Ind. 2: 205. 1876, p.p. -*Lobia*-

Erect or twining glabrescent annual herbs. Leaves 3 foliolate; petioles 1.5-13 cm long; leaflets ovate-lanceolate, 5-16 × 1-12.5 cm, laterals oblique, acuminate or obtuse, glabrous or sparsely pubescent on both the surfaces; stipules 8-25 mm long. Racemes axillary, 2-12-flowered, long peduncled; bracts 3-5 mm long. Calyx 5-6 mm long, glabrous. Corolla white or purple; standard 12-30 mm long. Pods 6-30 cm long, glabrous or faintly pubescent, 9-30-seeded.

Cultivated for its pods, used as vegetables. Bilaspur, Raigarh, Sagar, (Bhattacharyya 1955). Fl. & Fr. : Sept.-Dec.

9.1. ssp. *cylindrica* (L.) Van Eseltine in Hedricks Veget. New York 1 (2): 11. 1931; Verdc. in Kew Bull. 24: 544. 1970. *Phaseolus cylindricus* L., Herb. Amb. 23. 1754; Baker in Hook. f., Fl. Brit. Ind. 2: 205. 1876, p.p. -*Lobia*.

Petiole 4-12 cm long; stipules 14 × 3-4 mm; leaflets ovate-deltoid, acute or acuminate; slightly lobed at base, 10-18 × 3.5 cm; laterals triangular subtruncate at base; terminal cuneate at base. Racemes capitate, peduncles 3-18 cm long; 4-6 (10) tubercled; pedicels 2 mm long. Calyx lobes ca 2 mm long. Corolla white or purple. Pods 7-15 cm long, ca 5 mm broad, glabrous, beaked, 10-15-seeded.

Cultivated for its pods, used as vegetable. Bilaspur, Raigarh. Fl. & Fr. : Sept.-Nov.

10. *Vigna vexillata* (L.) A. Rich., Hist. Fis. Polit. Nat. 1. Cuba (Spanish ed.) 11: 191. 1845; Baker in Hook. f., Fl. Brit. Ind. 2: 206. 1876. p.p. *Phaseolus vexillatus* L., Sp. Pl. 729. 1753. *Strophostylis capensis* E. Mey., Comm. Pl. Afr. Aust. 147. 1835. *V. capensis* (E. Mey.) Walp. in Linnæa 13: 533. 1839.

Prostrate or twining perennial herbs with a tuberous rootstock; branches glabrous or puberulous. Leaves 3-foliolate; stipules 3-5 mm long; petiole up to 10 cm long; leaflets ovate-lanceolate, acute or acuminate, subcurtate at base, 4-15 × 2.5-5 cm; laterals obliquely ovate-deltoid, adpressedly pubescent. Racemes axillary, subumbellate, 2-6-flowered; peduncles 4-10 cm long, rachis 1 cm long, 2-3-tubercled; flowers 2-3.5 cm long; bracts 7-8 mm long, linear. Calyx ca 15 mm long, glabrescent; teeth linear, ciliate. Corolla 2-2.5 cm long, yellow or purplish. Pods 4-15 cm long, subcompressed, brown hairy, 8-18-seeded.

On sal forest margins. Bastar (Saxena & Khotale, 1976), Hoshangabad (R.S. Rao, 1960), Rajnandgaon, Shahdol, (Saxena, 1970). Fl. & Fr. : Sept.-Dec.

Roots and pods sometimes eaten.

61. ZORNIA J.F. Gmelin

Annual or perennial herbs. Leaves palmately 2-4-foliolate; leaflets glandular punctate. Flowers small, in elongate racemes enclosed within pairs of leafy bracts. Calyx minute; teeth sub-equal. Corolla exserted; standard broad; keel acute, incurved. Stamens monadelphous. Ovary sessile, many-ovuled; style filiform; stigma capitate. Pods composed of 1 to several small flattened muricated 1-seeded joints.

About 80 pantropical species; one in M. P.

Zornia gibbosa Span. in *Linnaea* 15: 192. 1841. *Z. diphylla* auct. non (L.) Pers.; Baker in Hook. f., *Fl. Brit. Ind.* 2: 147. 1876.

Much branched prostrate herbs with thin wiry branches. Leaves palmately bifoliolate; leaflets linear-lanceolate, acute, glabrous, 1.2-2.5 cm long with black glands; stipules lanceolate, spurred. Flowers in 2.5-8 cm long, 3-12-flowered racemes; bracts leafy, 10-13 mm long, enclosing the flowers. Calyx minute; teeth unequal, ciliate. Corolla yellow with pink base, exserted; standard broad; keel acute, incurved. Stamens monadelphous. Pods 5-10 mm long, flat, 1-6-jointed, pubescent, densely prickly, enclosed within bracts.

In wasteland, on sandy-loam soil. Balaghat, Bastar, Bhind, Bhopal, Bilaspur, Chhindwara, Damoh, Dhar, Durg, E. Nimar, Gwalior, Hoshangabad, Indore, Jabalpur, Mandla, Narshimhapur, Panna, Raigarh, Raipur, Raisen, Rajnandgaon, Satna, Sagar, Seoni, Shahdol, Shivpuri, Sidhi, Surguja, Tikamgarh, W. Nimar. *Fl. & Fr.* : Aug.-March.

1.1. var. *zefonensis* Baker in Hook. f., *Fl. Brit. Ind.* 2: 148. 1876.

Differè in having ovate leaflets; pods exceeding bracts and joints twice as large, densely bristly.

Raigarh, Jashpur (Wood, 1902).

52. CAESALPINIACEAE

(A. N. Singh)

About 152 genera and about 2800 species mainly in tropics and sub-tropics of the world; 10 genera and 35 species in M.P.

1a. Petals absent:

2a. Calyx segments 4

...8. *Saraca*

2b. Calyx segments 5

...5. *Hardwickia*

1b. Petals present:

3a. Leaves unipinnate (paripinnate):

- 4a. Leaves simple, lobed ...1. *Bauhinia*
- 4b. Leaves compound:
 - 5a. Anthers opening by terminal pores, loculi attached at or near the base ...3. *Cassia*
 - 5b. Anthers opening longitudinally by slits, often attached near middle and more or less versatile ...9. *Tamarindus*
- 3b. Leaves bipinnate:
 - 6a. Calyx lobes or teeth imbricate:
 - 7a. Leaf rachis ending into a sharp spine like point; pinnae rhachilla flat and leaf like ...6. *Parkinsonia*
 - 7b. Leaf rachis not ending into spine like sharp points; pinnae rhachilla not as above:
 - 8a. Fruits indehiscent with prominent margins as if 2-winged ...7. *Peltophorum*
 - 8b. Fruits dehiscent, or if indehiscent then not even apparently winged ...2. *Caesalpinia*
 - 6b. Calyx lobes valvate:
 - 9a. Unarmed small to medium sized trees ...4. *Delonix*
 - 9b. Armed scandent shrubs ...10. *Wagatza*

1. BAUHINIA L.

Trees or shrubs, or climbers with circinate tendrils. Leaves alternate, simple, consisting of two lobes, palmately ribbed. Flowers showy, in simple or paniced, often corymbose, racemes. Calyx turbinate, cylindric or spathaceous with 5-teeth or lobes, imbricate. Petals 5, distinctly clawed, imbricate. Stamens 10, or reduced to 5 or 3; filaments filiform, style long, stigma peltate, subterminate or oblique. Pods oblong or linear, flattened, woody, dehiscent or indehiscent; seeds orbicular or ovate, compressed.

About 200 species in the tropics; 7 in M.P.

- 1a. Large climbers ...6. *B. vahlii*
- 1b. Trees or shrubs:
 - 2a. Flowers not showy, less than 3 cm long:
 - 3a. Leaves retuse at apex ...5. *B. semla*
 - 3b. Leaves deeply bilobed at apex ...2. *B. malabarica*
 - 2b. Flowers showy, more than 3 cm long:
 - 4a. Fertile stamens 10:
 - 5a. Leaves broader than long, lobes rounded at apex ...4. *B. racemosa*

- 5b. Leaves longer than broad, lobes acute or acuminate at apex ...1. *B. acuminata*
- 4b. Fertile stamens 3-5:
- 6a. Leaves cleft to about half way down; hypanthium shorter than the calyx; fertile stamens 3 ...3. *B. purpurea*
- 6b. Leaves cleft to about one-third way down; hypanthium equalling the calyx; fertile stamens 5 ...7. *B. variegata*

1. *Bauhinia acuminata* L., Sp. Pl. 375. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 276. 1878. -*Ahlad*.

Shrubs, 3-4 m high, with pubescent angular branches. Leaves 7.5-15 cm long, slightly longer than broad, united for about two-third way upwards, ending in obtuse lobes, cordate or truncate at base, glabrous above, pubescent below; stipules subulate. Flowers white, short peduncled in axillary or leaf opposed corymbose racemes. Calyx spathaceous, 5-toothed. Petals oblong, as long as the calyx limb. Stamens 10, fertile. Ovary stipitate. Pods 8-12.5 × 1.2-1.8 cm, beaked, tapering below. Seeds 5-8, flat.

Planted as an ornamental. Rewa. Fl. : April-July; Fr. : Dec.

2. *Bauhinia malabarica* Roxb., Fl. Ind. 2: 321. 1832; Baker in Hook. f., Fl. Brit. Ind. 2: 277. 1878. *Ptilostigma malabaricum* (Roxb.) Benth. in Miq., Pl. Jung. 261. 1852. -*Amlī, Amta, Astara, Raini, Sanpatta*.

Medium sized trees with bushy crown and greyish brown bark. Leaves broader than long, united for about 3/4 upwards, cordate to truncate at base, 3-10 cm broad; petiole swollen at both ends, rusty pubescent. Flowers dull white, ca 12 mm long, in sub-corymbose terminal or axillary racemes. Calyx brown tomentose, lobes subulate. Petals 10-15 mm oblong, spatulate, slightly exserted. Stamens 10, alternately long and short. Pods 15-35 × 2-2.5 cm, stalked, flat, straight or subfalcate, beaked; seeds 20-30, ovoid, globose, dark brown.

In mixed forests. Balaghat, Bastar, Bilaspur, Bhopal, Durg, Hoshangabad, Indore, Jabalpur, Mandla, Narsimhapur, Panna, Raigarh, Raisen, Raipur, Rajnandgaon, Seoni, Surguja. Fl. : Sept.-Nov. ; Fr. : Oct.-April.

3. *Bauhinia purpurea* L., Sp. Pl. 375. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 284. 1878. -*Koliar, Peidare*.

Medium sized trees with greyish to dark brown bark and pink-red blaze; young parts pubescent. Leaves 7.5-20 cm long, longer than broad, 9-11 nerved, cleft about halfway down into two acute or rounded lobes. Flowers rose-purple, in a few flowered terminal corymbose or paniculate tomentose

racemes. Calyx 2-2.5 cm long, oblanceolate with purple claws and mouth stipitate. Pods 15-25 × 1.5-2 cm, flat, slightly falcate; seeds 12-15 flattened, roundish, dark brown.

On roadsides and in mixed forests, also planted. Balaghat, Bastar, Bilaspur, Bhopal, Damoh, Gwalior, Indore, Jabalpur, Raigarh, Raipur, Rajnandgaon, Seoni, Sidhi, Surguja. Fl. : Oct.-Nov.; Fr. : Nov.-March.

Leaves eaten cooked.

4. *Bauhinia racemosa* Lamk., *Encycl.* 1: 390. 1785; Baker in Hook. f., *Fl. Brit. Ind.* 2: 276. 1878. *Piliostigma racemosa* (Lamk.) Benth. in Miq., *Pl. Jungh.* 262. 1852. *Kathool, Phalesa*.

Small trees with spreading crown; bark greyish black with vertical cracks. Leaves broader than long, 2.5 × 2.5-7.5 cm, divided one-third to half way down into two lobes, glabrous above, hairy below, usually cordate at base. Flowers white, in terminal or leaf opposed simple 5-10 cm long racemes. Calyx tube 6-8 mm long, spathaceous, reflexed. Petals about 1 cm long, oblanceolate, acute. Stamens 10, fertile; filaments hairy at base. Ovary hairy, stigma sessile. Pods 10-25 cm long, falcate; seeds 12-20, oblong, compressed, black.

In sal and mixed forests, and roadsides. Balaghat, Bastar, Bilaspur, Chhatarpur, Chhindwara, Damoh, Durg, East Nimar, Gwalior, Jabalpur, Hoshangabad, Indore, Mandla, Panna, Raigarh, Raipur, Rajnandgaon, Rewa, Sagar, Satna, Seoni, Shahdol, Shivpuri, Sidhi. Fl. & Fr. : April-Aug.

5. *Bauhinia semla* Wunderlin in *Taxon* 25: 362. 1976. *B. retusa* Buch.-Ham. ex Roxb., *Fl. Ind.* 2: 322. 1832 (*non* Poir. 1811); Baker in Hook. f., *Fl. Brit. Ind.* 2: 27. 1878. *B. emarginata* Roxb. ex G. Don, *Gen. Syst.* 2: 462. 1832 (*non* Mill. 1768). *Lasiobema retusum* (Roxb.) De Wit in *Reinwardtia* 3: 538. 1956. -*Sehra, Semla*.

Medium-sized trees with greyish to dark brown bark and pale pink blaze. Leaves 7.5-15 cm long, broader than long, apex entire or notched, base truncate or cordate. Flowers in lax terminal panicles, the lower branches are axillary, pedicellate. Calyx 5-7.5 mm long, pubescent, split into 2-3 segments. Petals 1-1.5 cm long, clawed, yellowish-white, 3-upper mottled with purple. Stamens 3. Ovary stipitate; style elongated. Pods flat, 12.5-15 × 3-4 cm; seeds 6-8, suborbicular, dark-brown.

In mixed forests. Balaghat, Bastar, Bilaspur, Chhindwara, Mandla, Raigarh, Raipur, Rajnandgaon, Jabalpur, Shahdol, Surguja. Fl. & Fr. : Sept.-Feb.

6. *Bauhinia vahlii* Wt. & Arn., *Prodr.* 297. 1834; Baker in Hook. f., *Fl. Brit. Ind.* 2: 279. 1878. *Phanera vahlii* (Wt. & Arn.) Benth. in Miq., *Pl. Jungh.* 263. 1852. -*Mahul, Mohlain, Maljhan*. Fig. 41.

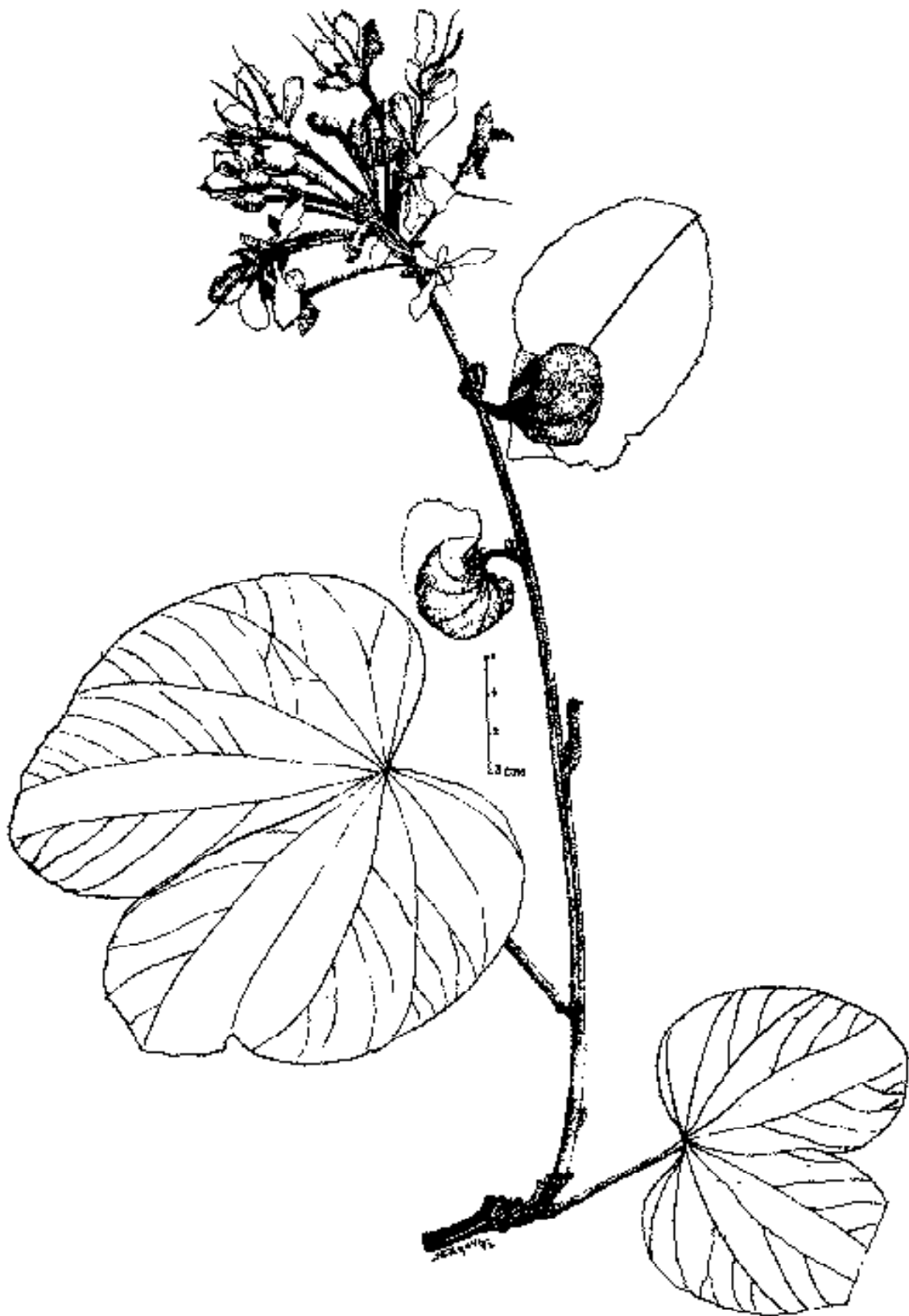


Fig. 41. *Bauhinia vahlii* Wight. & Arn.

Large woody climbers with circinate tendrils; branches brown tomentose. Leaves 10-40 cm long, broader than long, orbicular, cordate at base and lobed at apex, 11-13 nerved. Flowers white or buff, in long-peduncled terminal subcorymbose racemes. Calyx 3-5-lobed, densely pilose. Fertile stamens 3, staminodes 2-7. Ovary tomentose, stipitate. Pods woody, 20-30 × 4-7 cm, rusty tomentose; seeds 6-12, flat, dark brown.

In sal and mixed forests. Balaghat, Bastar, Bilaspur, Chhindwara, Hoshangabad, Mandla, Raigarh, Raipur, Rajnandgaon, Rewa, Sagar, Seoni, Sidhi, Surguja. *Fl.* : April-July; *Fr.* : Sept.-Jan.

Bark fibre used for rope making; leaves for plates & caps; seeds eaten roasted, also medicinal.

7. *Bauhinia variegata* L., Sp. Pl. 375. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 284. 1878. *Phanera variegata* (L.) Benth. in Miq., Pl. Jungh. 262. 1852. -*Dhondi, Kachnar.*

Small to medium-sized trees with hairy branches. Leaves 4.5-15 cm long, as broad as or broader than long, cleft one-fourth to one-third way down, 9-15-nerved, lobes obtuse, base cordate. Flowers in lax corymbose racemes, from leafless axils or terminating lateral branches; bracts and bracteoles deltoid. Calyx 2-2.7 cm long, pubescent, spathaceous, 5-toothed at apex. Petals 4-5 cm long, obovate-oblong, clawed, the uppermost darker with purple veins. Stamens 5 fertile; staminodes absent. Ovary pubescent. Pods 15-30 × 1.5-2.5 cm, flat, glabrous; seeds 10-15.

In mixed forests. Balaghat, Bastar, Bilaspur, Bhopal, Chhindwara, West Nimar, Indore, Jabalpur, Mandla, Raigarh, Sagar, Seoni, Shivpuri, Shahdol, Surguja. *Fl.* : Sept.-March; *Fr.* : Oct.-April.

2. CAESALPINIA L.

Trees, Shrubs or woody climbers, usually prickly. Leaves large, bipinnate. Flowers often showy, in lax racemes in the upper leaf axils, or in dense panicles at ends of branches. Bracts caducous. Calyx deeply cleft nearly to the base; lobes 5, imbricate, the lowest largest. Petals 5, orbicular, clawed, spreading, unequal, imbricate. Stamens 10, free; filaments villous or glandular at base. Ovary sessile, few ovuled; style filiform, stigma minute. Pods prickly or not, oblong, flattened or turgid; seeds ovate to orbicular.

About 60 species in tropics and sub-tropics; 5 in M.P.

1a. Scandent or climbing shrubs:

2a. Calyx rusty tomentose; pods covered with wiry prickles

...1. *C. bonduc*

- 2b. Calyx and pods not as above:
 - 3a. Calyx pubescent; pods 7-13 cm long ...3. *C. decapetala*
 - 3b. Calyx glabrous; pods 4-5 cm long ...4. *C. digyna*
- 1b. Trees or erect shrubs:
 - 4a. Pods flat, strap-shaped ...5. *C. pulcherrima*
 - 4b. Pods twisted ...2. *C. coriaria*

1. *Caesalpinia bonduc* (L.) Roxb., Fl. Ind. 2: 362. 1832. *Guilandina bonduc* L., Sp. Pl. 381. 1753. *C. crista* L., Sp. Pl. 380. 1753, p.p., L., Sp. Pl. ed. 2, 545. 1762. *C. bonducella* (L.) Fleming in As. Res. 11: 159. 1810; Baker in Hook. f., Fl. Brit. Ind. 2: 254. 1878.

Scandent or climbing shrubs, branches hairy armed with straight prickles. Leaves bipinnate, 30-45 cm long, rachis brown pubescent and bearing recurved spines; pinnae 5-10 pairs, opposite, 5-15 cm long; leaflets 10-24 pairs, opposite elliptic-oblong, mucronate; stipules pinnately compound, consisting of 3-5 ovate-rhomboid foliaceous lobes. flowers yellow, in pedunculate, supra axillary and terminal, 15-30 cm long racemes. Bracts about 1 cm long, lanceolate. Calyx rusty tomentose. Petals yellow, sometimes spotted with red. Filaments silky hairy. Pods 5-7.5 × 3.8-5 cm, covered with sharp wiry prickles; seeds 2, dark grey.

On forest edges and roadsides. Bastar, Bilaspur, Damoh, Indore, Jabalpur, Mandla, Rajnandgaon, Ratlam, Rewa, Sagar, Seoni, Shivpuri, Sidhi, Tikamgarh. Fl. : July-Sept.; Fr.: Sept.-Nov.

2. *Caesalpinia coriaria* (Jacq.) Willd., Sp. Pl. 2: 532. 1800. *Poinciana coriaria* Jacq., Select. Amer. 123, t. 175, f. 36. 1763.

Tall shrubs or small trees; branches unarmed. Leaves bipinnate, pari- or unipari-pinnate, 15 cm long; leaflets numerous, 6-7 mm long. Flowers yellow, in axillary and terminal dense panicles, ca 5 cm long. Petals spathaceous. Filaments hairy in the lower half. Pods 7.5 × 1.2 cm, twisted.

Cultivated in gardens as an ornamental. Raigarh. Fl.: Oct.

3. *Caesalpinia decapetala* (Roth) Alston in Trimen, Handb. Fl. Ceylon 6 (Suppl.) 89. 1931. *Reichardia decapetala* Roth, Nov. Pl. Sp. 212. 1821. *Caesalpinia septaria* Roxb., Fl. Ind. 2: 360. 1832; Baker in Hook. f., Fl. Brit. Ind. 2: 256. 1878. - *Chilati*, *Golchuna*.

Scandent or climbing prickly shrubs; branches hairy with hooked or straight prickles. Leaves bipinnate, 10-35 cm long; stipules semi-sagittate, caducous; rachis armed with recurved prickles; pinnae 5-10 pairs, opposite, 5-10 cm long; leaflets 8-12 pairs, opposite, oblong, obtuse. Flowers bright yellow, in pedunculate 30-40 cm long terminal or axillary racemes. Calyx

1-1.3 cm long, pubescent. Petals 10-15 mm, sub-orbicular. Stamens slightly exerted; filaments densely woolly in the lower half. Pods 7-13 × 2-2.5 cm, glabrous, beaked; seeds 4-8.

Betul, Bilaspur, Chhindwara, Damoh, Indore, Jabalpur, Mandla, Raipur, Raisen, Raigarh, Rajnandgaon, Sagar, Seoni, Shahdol, Surguja. *Fl. & Fr.*: Oct.-April.

4. *Caesalpinia digyna* Rottl. in Ges., Naturf. Fr. Neue. Schr. 4: 200. 1803; Baker in Hook. f., *Fl. Brit. Ind.* 2: 256. 1878.

Scandent or climbing shrubs with uniformly scattered hooked prickles on glabrous or pubescent branches. Leaves bipinnate, 15-30 cm long; pinnae 8-12 pairs, 3.8-6 cm long; leaflets 7-10 pairs, oblong, obtuse, sessile. Flowers bright yellow, in supra-axillary and terminal racemes; pedicels up to 3 cm long, slender, glabrous. Calyx glabrous. Stamens slightly exerted, woolly. Pods oblong, glabrous, fleshy, 4-5 cm long, constricted between seeds; seeds 2-4, dark brown, roundish.

Bilaspur. *Fl.* : Oct.-Dec.

5. *Caesalpinia pulcherrima* (L.) Swartz, Obs. 166. 1791; Baker in Hook. f., *Fl. Brit. Ind.* 2: 255. 1878. *Poinciana pulcherrima* L., Sp. Pl. 380. 1753. - *Gulturrah*.

Shrubs or small trees, sometimes with prickly branches. Leaves bipinnate, 10-45 cm long, pinnae 4-12 pairs, opposite, ca 8 cm long; leaflets 10-12 pairs, oblong, apiculate, mucronate, glabrous. Flowers orange or yellow, in terminal and axillary racemes; pedicels 7.5-10 cm long. Calyx glabrous. Petals 5, four sub-equal, the fifth with smaller blade and longer claw. Filaments bright red, much exerted. Pods flattened, 5-8 cm long, ca 1.7 cm broad; seeds 6-8.

Usually planted in the gardens as an ornamental. Bhopal, Chhatarpur, Gwalior, Hoshangabad, Jabalpur, Mandla, Raipur, Raisen, Rajnandgaon, Shivpuri. *Fl. & Fr.* : July-April.

3. CASSIA L.

Erect herbs, shrubs and trees. Leaves simple or paripinnate or reduced to phyllodes. Flowers usually large, showy, in axillary racemes or terminal panicles, or sub-solitary, axillary; bracts and bracteoles variable. Calyx tube short; lobes 5, imbricate. Petals 5, imbricate, sub-equal. Stamens 10, rarely all perfect, 3-5 often reduced to staminodes. Ovary sessile or stipitate, ovules numerous; style incurved; stigma terminal. Pods very variable, terete or flat, sometimes septate.

About 600 species in tropics and subtropics; 15 in M.P.

- 1a. Stamens 10, all antheriferous:
- 2a. Herbs; flowers solitary or paired ...6. *C. mimosoides*
- 2b. Tall shrubs or trees; flowers in lax or corymbose racemes:
- 3a. Pods strap shaped, dehiscent ...14. *C. surattensis*
- 3b. Pods terete or cylindrical, indehiscent:
- 4a. Leaflets 4-8 pairs ...4. *C. fistula*
- 4b. Leaflets more than 8 pairs:
- 5a. Sepals dark red, hairy ...5. *C. javanica*
- 5b. Sepals not as above:
- 6a. Bracts acuminate ...10. *C. renigera*
- 6b. Bracts cuspidate ...11. *C. roxburghii*
- 1b. Stamens only 5-7, antheriferous:
- 7a. Leaf rachis or petiole glandular:
- 8a. Herbs; leaflets 2 pairs; flowers reddish-yellow in terminal or leaf opposed racemes; pods 2.5 cm long ...1. *C. absus*
- 8b. Tall shrubs or trees; leaflets more than 2 pairs; flowers yellow, in spicate racemes or terminal panicles; pods more than 10 cm long :
- 9a. Stipules auricled, persistent: ...2. *C. alata*
- 9b. Stipules subulate, caducous ...12. *C. siamea*
- 7b. Leaf rachis or petiole glandular:
- 10a. Leaflets 3 pairs:
- 11a. Leaves with a single subulate gland between the lowest pair of leaflets ...7. *C. obtusifolia*
- 11b. Leaves with two subulate glands between two lower pair of leaflets ...15. *C. tora*
- 10b. Leaflets more than 3 pairs:
- 12a. Leaves stipulate:
- 13a. Stipules lanceolate, spinose at tip with a stipitate gland on the petiole; leaflets 10-25 pairs; flowers solitary or paired; pods 2-4.5 cm long ...9. *C. pumila*
- 13b. Stipules leafy, rotund to reniform, with a gland between each pair of leaflets; leaflets 8-12 pairs; flowers in axillary and terminal

- corymbose racemes; pods 7.5-12.5 cm long ...3. *C. auriculata*
- 12b. Leaves not stipulate:
- 14a. Petioles grooved, with a conical gland at base; leaflets 6-12 pairs; sepals pubescent; pods 6-10 cm long, subterete with inflated sutures ...13. *C. sophera*
- 14b. Petioles not grooved with a large gland at base; leaflets 3-5 pairs; sepals glabrous; pods 10-13 cm long, slightly falcate, sutures not inflated ...8. *C. occidentalis*

1. *Cassia absus* L., Sp. Pl. 376. 1753; Baker in Hook. *f.*, Fl. Brit. Ind. 2: 265. 1878. -*Chaksu*.

Erect viscous hairy herbs, 30-60 cm tall; stems and leaves clothed with bristly viscose hairs; stipules linear persistent. Leaflets two pairs, broadly elliptic or obovate, oblique, 2-3 × 1.2 cm, pubescent on both surfaces. Flowers reddish yellow, in 4-12 cm long terminal or leaf opposed racemes. Sepals 5, lanceolate, bristly, imbricate. Petals 5, broadly obovate, clawed, glabrous. Stamens 5 fertile, staminodes absent. Ovary strigose, sessile, many-ovuled; stigma shell shaped, incurved. Pods flat, hairy, 2.5-4 cm long, shortly beaked; seeds 4-8, black.

In wastelands. Balaghat, Bastar, Bhopal, Bilaspur, Damoh, Durg, Indore, Mandla, Panna, Raigarh, Raipur, Raisen, Rajnandgaon, Satna, Sagar, Seoni, Shahdol, Shivpuri, Surguja, Tikamgarh. *Fl. & Fr.* : Aug.-Nov.

2. *Cassia alata* L., Sp. Pl. 378. 1753; Baker in Hook. *f.*, Fl. Brit. Ind. 2: 264. 1878.

Tall shrubs with pubescent branches. Leaves sub-sessile, 30-60 cm long, with no glands but with persistent auricled stipules at base. Leaflets 8-14 pairs, 3-15 × 2-7 cm, oblong, obtuse, broadly rounded, unequal at base, glabrous above and downy beneath. Flowers bright yellow, in 15-30 cm long, spicate racemes; bracts 2-3 cm long, enclosing the bud, caducous. Sepals 1.5-2 cm long, 4-6 mm wide. Petals 1.5-2 cm long, ca 1 cm wide. Stamens 9-10, all perfect, subequal. Pods 10-20 cm long, straight, compressed with two longitudinal wings; seeds 40-55.

Commonly planted in gardens and parks as an ornamental. Bilaspur, Raigarh. *Fl.* : Oct.-Nov.

3. *Cassia auriculata* L., Sp. Pl. 379. 1753; Baker in Hook. *f.*, Fl. Brit. Ind. 2: 263. 1878. -*Amoli, Chhoti*.

Tall handsome shrubs or small trees, 2-4 m high, with hairy branches. Leaves almost sessile, 5-10 cm long; stipules leafy, rotund to reniform, long

apiculate on both sides; leaflets 8-12 pairs, 1.5-2.5 cm long, 5-12 mm wide, elliptic, obtuse, mucronate, with an erect linear gland between each pair of leaflets. Flowers yellow, in terminal and axillary corymbose racemes. Sepals 5, unequal. Petals 1.2-2 cm long, veined with orange. Stamens 10, 7 perfect and 3 reduced to staminodes. Pods 7.5-12.5 × 1.2-1.5 cm; pilose, flat, obtuse at each end; seeds 6-10.

Bastar, Gwalior, Hoshangabad, Indore, Shivpuri, W. Nimar. *Fl. & Fr.* : July-Dec.

4. *Cassia fistula* L., Sp. Pl. 377. 1753; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 261. 1878. - *Amaltas*, *Dadrughna*, *Dhan bahar*.

Medium-sized trees with spreading crown and leaflets 4-8 pairs, closely veined, ovate, ovate-lanceolate or ovate-oblong, acuminate or acute, 5-15 × 4-9 cm. Flowers yellow, 4-5 cm across, in 20-40 cm long pendulous lax racemes. Sepals 5, distinct. Petals 5, obovate, shortly clawed. Stamens 10, all perfect. Ovary slender, appressed hairy, stigma punctiform. Pods 30-60 cm long, cylindrical, pendulous, dark brown; seeds many.

In sal and mixed forests, and roadsides. Balaghat, Bastar, Bhopal, Bilaspur, Chhindwara, Durg, E. Nimar, Hoshangabad, Indore, Jabalpur, Khandwa, Mandla, Panna, Raigarh, Raipur, Raisen, Rajnandgaon, Sagar, Satna, Seoni, Shahdol, Shivpuri, Sidhi, Surguja. *Fl.* : April-May; *Fr.* : Sept.-Feb.

Fruit pulp medicinal.

5. *Cassia javanica* L., Sp. Pl. 379. 1753; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 267. 1878.

Small trees with grey or dark brown bark. Leaves 20-40 cm long; leaflets 16-20 pairs, 3-7 × 1.5-3.5 cm, oblong, obtuse, rounded to cuneate at base. Flowers pink, fading to white, in corymbose racemes, 3.5-5 cm across. Sepals dark red, hairy. Stamens 10, three longer than the rest, yellow. Pods 40-60 cm long, cylindrical, dark brown; seeds many.

Cultivated in parks and gardens as an ornamental plant. Bhopal. *Fl. & Fr.* : May-June

6. *Cassia mimosoides* L., Sp. Pl. 379. 1753; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 266. 1878.

Erect or diffuse perennial herbs or undershrubs; branches and leaf rachis clothed with a solitary sessile gland below the leaflets; leaflets 30-70 pairs, sessile, linear to obliquely oblong, sometime sensitive to touch. Flowers solitary or paired with slender pedicels arising from a pair of extra axillary bracts, yellow, 5-8 mm long. Sepals *ca* 5 mm long, tapering at both ends. Petals a little longer than sepals. Stamens 10, perfect, alternately long

and short. Pods 2.5-5 cm long, flat or linear, appressed hairy; seeds 15-25.

Along streams and roadside ditches. Balaghat, Bastar, Chhindwara, Damoh, Durg, Hoshangabad, Mandla, Raigarh, Raipur, Sagar, Shahdol, Surguja. *Fl. & Fr.* : April-Nov.

7. *Cassia obtusifolia* L., Sp. Pl. 377. 1753. *C. tora sensu* Baker in Hook. f., *Fl. Brit. Ind.* 2: 263. 1878, p.p. -*Chakunda*.

Erect herbs or undershrubs. Leaves 3-8 cm long, with a single subulate gland between the lowest pair of leaflets; leaflets 3 pairs, obovate, oblong, glabrous, 2.5-4 cm long. Flowers yellow in axillary sessile pairs of which one is abortive. Stamens 10, perfect, alternately long and short. Pods 15-30 cm long, tetragonous, slightly falcate, beaked; seeds many, oblong.

In wastelands. Bhopal, Bhind, Bilaspur, Durg, Gwalior, Indore, Morena, Panna, Satna, Sagar. *Fl. & Fr.* : Aug.-April.

8. *Cassia occidentalis* L., Sp. Pl. 377. 1753; Baker in Hook. f., *Fl. Brit. Ind.* 2: 262. 1878. - *Ban-Chironta*, *Bara-chakora*.

Erect subglabrous undershrubs, up to 2 m tall. Leaves 10-20 cm long, with a large gland at the base of the petiole; leaflets 3-5 pairs, ovate-oblong, acuminate, 2.5-8 × 1-3 cm. Flowers yellow to pale lilac, in short peduncled few-flowered axillary corymbose racemes forming a terminal panicle, 1.2 cm across. Sepals distinct, glabrous, oblong, obtuse, tinged with pink. Petals 1.3 cm long, unequal, obtuse, orange-veined. Stamens 10, 3 lower longer than 4 laterals; staminodes 3. Pods 10-13 cm long, slightly falcate, septate between seeds; seeds 15-30.

In wastelands. Bastar, Bhopal, Bilaspur, East Nimar, Hoshangabad, Indore, Mandla, Panna, Raigarh, Raipur, Rajnandgaon, Raisen, Ratlam, Rewa, Sagar, Satna, Sidhi, W. Nimar, Shivpuri. *Fl. & Fr.* : July-April.

9. *Cassia pumila* Lamk., *Encycl.* 1: 651. 1785. Baker in Hook. f., *Fl. Brit. Ind.* 2: 266. 1878.

Erect or sub-erect annual herbs with pubescent branches. Leaves 2.5-6 cm long, with a stipitate gland on the petiole; leaflets 10-25 -pairs, obliquely linear to linear-oblong, mucronate, midrib close to upper border, 5-13 × 1-3 mm. Flowers solitary or paired in the axil of leaves, yellow. Sepals lanceolate, acute, 5-6 mm long. Petals unequal, little longer than sepals, narrowly oblong to broadly orbicular, retuse. Stamens 5, perfect. Ovary appressed hairy; stigma truncate; style peltate. Pods 2-4.5 cm long, flat, pilose; seeds 6-16.

In wastelands. Balaghat, Bastar, Bhopal, Chhindwara, Damoh, Durg, E. Nimar, Hoshangabad, Indore, Mandla, Panna, Raigarh, Rajnandgaon, Raisen, Ratlam, Sagar, Satna, Seoni, Shahdol, Shivpuri, Sidhi, Tikamgarh,

West Nimar. *Fl. & Fr.* : July-Nov.

10. *Cassia renigera* Wall. ex Benth. in Trans. Linn. Soc. (Bot.) 27: 518. 1871; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 262. 1878.

Small deciduous trees with spreading and drooping and densely pubescent branches. Leaves 25-35 cm long; stipules reniform; leaflets 10-20 pairs, sessile, oblong, obtuse, 3.5-7 × 1.2-2.5 cm. Flowers pink, in racemes on leafless branches; bracts ovate, acuminate; pedicels 4-5 cm long. Sepals ovate, 4-5 mm long, silky. Petals 1.5-3.5 cm long, elliptic-oblong. Stamens 10, perfect, swollen at middle. Pods 25-45 × 2.5 cm, cylindrical, smooth, black.

Commonly planted in gardens. Bhopal. *Fl.* : May-Sept.

11. *Cassia roxburghii* DC., *Prodr.* 2: 489. 1825. *C. marginata* Roxb., *Fl. Ind.* 2: 338. 1832; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 262. 1878.

Small trees, 3-6 m high, with spreading and curving branches. Leaves 10-35 cm long; leaflets 8-20 pairs, oblong, emarginate, apiculate, densely yellow-pubescent when young, minutely pubescent when old, 1.5-4.5 × 1-2 cm. Flowers rose-red, in axillary and terminal corymbose racemes on young branches; bracts ovate-cuspidate. Sepals ovate, hairy. Petals oblong-obovate, hairy outside. Stamens 10, unequal, not swollen in the middle. Pods 20-30 cm long, cylindrical, often curved torulose.

Cultivated in gardens. Raisen. *Fl.* : Nov.-Feb. ; *Fr.* : March-Oct.

12. *Cassia siamea* Lamk., *Encycl.* 684. 1785; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 264. 1878.

Medium-sized evergreen trees with dark brown to black wood and pubescent branches. Leaves 10-30 cm long, without glands; leaflets 4-16 pairs, oblong to ovate-oblong, emarginate, mucronate, 3-7 cm long, 10-25 mm wide. Flowers bright yellow in 10 cm long terminal panicles of corymbose racemes; pedicels 2-4 cm long. Sepals elliptic ovate, hairy at margins. Petals 1-2 cm long, ovate, broadly elliptic or orbicular, upper petal clawed. Stamens 10, unequal. Pods 15-30 × 1-1.5 cm, strap-shaped, with transverse depressions between seeds; seeds 20-30.

Commonly planted on roadsides. Balaghat, Bastar, Bhopal, Dhar, Gwalior, Indore, Jabalpur, Raigarh, Rajnandgaon, Sagar, Seoni, Shivpuri, Surguja. *Fl. & Fr.* : Sept.-May.

13. *Cassia sophera* L., *Sp. Pl.* 379. 1753; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 262. 1878. -*Kasunda*, *Kath-sem*.

Erect shrubs with pubescent young parts. Leaves 14-20 cm long, rachis with conical glands at base, grooved; leaflets 6-12 pairs, lanceolate, acute

or acuminate, 3-9 × 1.5-2 cm. Flowers yellow, in axillary and terminal corymbose racemes. Sepals pubescent outside. Petals rarely exerted. Stamens 10, 6-7 perfect. Ovary hirsute. Pods 6-10 × 0.5-0.8 cm, subterete, with inflated sutures; seeds 30-40.

On edges of mixed forests. Bastar, Bhopal, Chhatarpur, Mandla, Raigarh, Sagar, Surguja. *Fl. & Fr.* : Nov.-Feb.

14. *Cassia surattensis* Burm. f., *Fl. Ind.* 97. 1768. *C. glauca* Lamk., *Encycl.* 1. 647. 1785; Baker in Hook. f., *Fl. Brit. Ind.* 2: 265. 1878.

Tall shrubs or small trees with glabrous cylindrical branches. Leaves 15-22 cm long with clavate glands between lower pair of leaflets; leaflets 4-6 pairs, 2.5-7.5 cm long, pale-green, elliptic, lanceolate, sub-acute at apex, truncate at base. Flowers yellow, in axillary corymbose racemes with ovate-acuminate reflexed bracts. Sepals orbicular, 3 outer smaller than inner two. Petals 1.5-2.7 cm long, oblong, obtuse, slightly clawed. Stamens 10, perfect, nearly equal. Pods 15-20 × 1.2-1.5 cm, straight, flat, thin.

Planted as hedge in gardens. Bhopal, Jabalpur, Surguja. *Fl.* : Nov.-Feb.

15. *Cassia tora* L., *Sp. Pl.* 376. 1753; Baker in Hook. f., *Fl. Brit. Ind.* 2: 263. 1878, *p.p.* - *Chakunda*, *Chekor*.

Erect foetid annual herbs or undershrubs, up to 1.2 m tall. Leaves 5-10 cm long; stipules 8-15 × 1 mm, linear, hairy, acute; leaflets 3 pairs, 0.5-5 × 0.5-2.5 cm, obovate or obovate-oblong, mucronate, base unequal, with two subulate glands between two lower pairs of leaflets. Flowers yellow, paired on short axillary peduncles. Sepals ovate. Petals 8-10 mm long, unequal. Stamens 7, perfect, unequal. Pods subterete or subtetragonal, slightly falcate, 10-20 cm long, ca 6 mm broad, stalk 1-1.5 cm long; seeds 20-30, rhomboid, with areole on both sides, 1.5-2.5 mm wide.

Common in wastelands. Balaghat, Bastar, Bilaspur, Chhindwara, Damoh, Durg, E. Nimar, Hoshangabad, Indore, Jabalpur, Mandla, Panna, Raipur, Raisen, Rewa, Sagar, Shivpuri, Tikamgarh. *Fl. & Fr.* : Aug. -April.

Leaves and seeds medicinal, young leaves eaten cooked.

4. DELONIX Raf.

Large deciduous unarmed trees. Leaves bipinnate, stipulate; leaflets numerous, small. Flower showy, orange or scarlet, in terminal corymbose racemes. Sepals 5, subequal, valvate. Petals 5, orbicular, imbricate, subequal or the uppermost different from others. Stamens 10, free, declinate, villous at base. ovary sessile, many-ovuled; stigma truncate, ciliolate. Pods woody, flat, straight; seeds transverse, oblong.

3 species in tropical Africa, Madagascar and Asia; 2 planted in M.P.

- 1a. Leaves 15-25 cm long; pinnae 5-8 pairs; leaflets 15-20 pairs; petals white, turning yellow; pods 12-20 cm long, 4- 8-seeded ...1. *D. elata*
- 1b. Leaves larger, up to 60 cm long; pinnae 11-18 pairs; leaflets 20-30 pairs; petals crimson red; pods 30-70 cm long, 20- 40-seeded ...2. *D. regia*

1. *Delonix elata* (L.) Gamble, Fl. Pres. Madras 1: 396. 1919. *Poinciana elata* L., Cent. Pl. 2: 16. 1756; Baker in Hook. f., Fl. Brit. Ind. 2: 260. 1878.

Medium-sized trees with greyish bark, 5-10 m tall. Leaves 15-25 cm long, bipinnate; pinnae 5-8 pairs, 4-6 cm long; leaflets 15-20 pairs, linear-oblong, 7-15 × 2-3 mm, membranous, sessile, obtuse. Flowers in corymbose terminal racemes. Calyx 2-3 cm long, silky pubescent. Petals white, turning yellow, 2.5 cm long, suborbicular, curled at margins, scarcely exerted. Stamens 5-10 cm long; filaments bright red, hairy. Pods 12-20 cm long, 5-25 mm broad; seeds 4-8.

Planted as an ornamental tree. Indore, Raipur. Fl. & Fr. : Dec. -Feb.

2. *Delonix regia* (Bojer ex Hook.) Rafin., Fl. Tellur 2: 92. 1836. *Poinciana regia* Bojer ex Hook. in Bot. Mag. 56: t. 2884. 1829; Baker in Hook. f., Fl. Brit. Ind. 2: 260. 1878. -*Gul mohar*.

Medium-sized handsome trees with spreading crown. Leaves feathery, bipinnate, up to 60 cm long; stipules pectinate; pinnae 11-18 pairs; leaflets 20-30 pairs, 6-10 mm long, oblong. Flowers in terminal or axillary corymbose racemes, ca 10 cm across. Calyx lobes 5, subequal, valvate. Petals 5, crimson, claw yellow, the upper petal white streaked with red and yellow, imbricate. Stamens 10, much exerted; filaments villous below. Ovary sessile. Pods long, flat, strap-shaped, woody, 30-75 × 5 cm; seeds 20-40, oblong, mottled.

Planted as an ornamental tree. Bastar, Bhopal, Durg, Indore, Jabalpur, Raipur, Rajnandgaon, Rewa, Sagar, Shivpuri. Fl. & Fr. : April -Aug.

5. **HARDWICKIA** Roxb.

Medium-sized unarmed deciduous trees. Leaves paripinnate with only two palmately nerved leaflets. Flowers minute, numerous in paniced raceme. Calyx rarely with any tube, disc sub-basal; sepal 5, rarely 4, oblong imbricate, petaloid. Corolla absent. Stamens twice the number of sepals, alternate, longer; filaments filiform. Ovary sessile, 2-ovuled; style filiform; stigma capitate. Pods samaroid, dry; seed solitary.

3 species in India and tropical Africa; one in M.P.

Hardwickia binata Roxb., Pl. Corom. 3: 6, t.209. 1819; Baker in Hook. f., Fl. Brit. Ind. 2: 270. 1878. -*Anjan*.

Large handsome trees with drooping branches. Leaves alternate, bifoliolate; leaflets only 2, 2.5-6.5 × 1.3 cm, sessile, entire, glaucous, obliquely ovate, obtuse. Flowers in terminal and axillary paniced racemes, pedicellate. Sepals oblong, obtuse, ca 5 mm long, whitish or yellowish green, petaloid. Stamens 10. Ovary oblong; stigma peltate. Pods strap-shaped; narrowed at both ends, 5-10 × 1.3-2.5 cm; seed one at the tip.

In dry deciduous forests. Bhopal, Gwalior, Hoshangabad, E. Nimar, Indore, Raipur. *Fl. & Fr.* : Oct.-April.

6. PARKINSONIA L.

Tall shrubs or small trees with sharp thorns which represent the abbreviated axis. Leaves bipinnate with a short spine-tipped rachis; pinnae 2-6, flattened, with numerous small leaflets; stipules prickly. Flowers yellow, in lax axillary racemes. Calyx tube short, disc sub-basal, sepals sub-valvate, lanceolate, subequal. Petals 5, the uppermost broader than the rest. Stamens 10, scarcely exerted, villous. Ovary stipitate, many-ovuled. Pods linear, unevenly turgid, moniliform.

3 species of which 2 are American and the other South African; one planted in M.P.

Parkinsonia aculeata L., Sp. Pl. 375. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 260. 1878. -*Bilayati Babool*.

Shrubs or small trees, up to 5 m high, armed; branches drooping. Leaves bipinnate, rachis short, ending into a spine; pinnae 2-6, about 15-35 cm long; leaflets 20-30 pairs, 3-5 mm long, linear-oblong. Flowers in axillary racemes, pedicellate, yellow. Calyx ca 7-8 mm long; segments distinct, oblong, obtuse. Petals ca 15 mm long, yellow, with short claw. Stamens 10, included, flattened, villous at base. Ovary silky hairy, many-ovuled. Pods 7.5-10 cm long, linear, 1-6 seeded, constricted between seeds.

Bhopal, Durg, Indore, Jabalpur, Rajnandgaon, Sagar, Shivpuri, W. Nimar. *Fl. & Fr.* : Sept.-April.

7. PELTOPHORUM (Vogel.) Benth.

Tall trees. Leaves evenly bipinnate; leaflets small, numerous. Flowers showy, yellow in axillary and terminal, paniced racemes. Calyx segments 5, imbricate with basal disc. Petals 5, oblong or roundish, imbricate. Stamens 10, free; filaments with a dense tuft of hairs at base. Ovary sessile; style filiform; stigma peltate. Pods oblong, flat with a firm broad wing along each suture.

About 15 species in tropics and subtropics including N. Australia; one planted in M.P.

Peltophorum pterocarpum (DC.) Baker ex K. Heyne in Nutt. Pl. Ned. Ind. ed. 2, 2: 755. 1927. *Inga pterocarpum* DC., Prodr. 2: 441. 1825. *P. ferrugineum* Benth., Fl. Austral. 2: 279. 1864; Baker in Hook. f., Fl. Brit. Ind. 2: 257. 1878.

Large beautiful evergreen trees with smooth grey bark; young branches reddish-brown, tomentose. Leaves bipinnate; rachis 15-30 cm long; pinnae 8-10 pairs; leaflets 10-15 pairs, 1.2-2 cm long, obliquely oblong, notched at the apex and unequal sided. Flowers yellow, in large erect terminal paniced racemes, rusty tomentose. Sepals coppery red, imbricate. Petals 5, roundish, wrinkled, with long ferruginous hairs on the back. Stamens 10, unequal, densely hairy at the base. Pods thin, 5-10 cm long, coppery red, flat, winged along both the sutures; seeds 1-3, brown.

Planted as an ornamental tree. Balaghat, Bhopal, Chhatarpur, Damoh, Dhar, Durg, Panna, Raigarh, Raipur, Rajnandgaon, Sagar. Fl. & Fr. : Aug.-May.

8. SARACA L.

Trees. Leaves paripinnate, leaflets few, coriaceous; stipules small caducous. Flowers in dense sessile corymbose axillary panicles with sub-petaloid reddish bracteoles. Sepals 4, petaloid, subequal, imbricate. Petals absent. Stamens 3-8, exserted with long filiform filaments. Ovary stipitate, many-ovuled. Pods flat, woody; seeds compressed or subterete.

About 25 species in tropical Asia; one species in M.P.; usually planted in gardens as an ornamental.

Saraca asoca (Roxb.) De Wilde in Blumea 15: 393. 1967. *Jonesia asoca* Roxb. in As. Res. 4: 355, t. 1. 1799. *S. indica auct. non L.*; Bedd., Fl. Sylv. 1: 57, t. 57. 1869; Baker in Hook. f., Fl. Brit. Ind. 2: 271. 1878. -*Ashoka*.

Small evergreen trees, up to 10 m high, with blackish bark and reddish-brown wood. Leaves paripinnate, ca 30 cm long; stipules intra-petiole, united, scarious; leaflets 4-6 pairs, 10-25 × 3-6 cm, oblong, lanceolate, glabrous, lateral nerves 8-12 pairs. Flowers orange to scarlet, 2.5-3 cm, in dense corymbose panicles; pedicels 7-15 mm long; bracts ovate, 1-6 × 1-3 mm. Calyx yellowish-orange to scarlet, petaloid, cylindric, 4-lobed; lobes 7-10 × 5-9 mm. Petals absent. Stamens 6-8, much exserted; filaments filiform, anthers purple. Pods 10-25 × 3-5 cm thick, tapering at both ends; seeds 4-8, ellipsoid-oblong.

Planted as an ornamental. Bhopal, Jabalpur, Raigarh, Sagar. Fl. : Dec.-May; Fr. : June-July.

9. TAMARINDUS L.

Monotypic genus.

Tamarindus indica L., Sp. Pl. 34. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 273. 1878. -*Amlika*, *Imli*.

Large evergreen trees with spreading crown and fissured dark grey rough bark. Leaves 5-15 cm long, paripinnate; stipules caducous, linear lanceolate; leaflets 10-20 pairs, opposite, linear-oblong, obtuse, 12-18 × 4-5 mm. Flowers yellow, in 10-15-flowered lax racemes. Calyx ca 12 mm long, turbinate, teeth lanceolate, the lowest two connate. Petals 3, 10-15 mm long, yellow, streaked with red, the lower two reduced to scales. Stamens 3, perfect, others reduced to setaceous staminodes. Ovary stipitate, many-ovuled, adnate to the calyx tube; style filiform, stigma capitate. Pods linear, 5-20 cm long, with crustaceous pericarp and pulpy mesocarp; seeds 3-10, brown.

Usually planted. Balaghat, Bastar, Bhopal, Bilaspur, Damoh, Indore, Jabalpur, Mandla, Raigarh, Raipur, Raisen, Sagar, Shahdol, Shivpuri, Sidhi, Surguja. Fl. : May; Fr. : Aug.

Fruit pulp sour, used as condiment, also medicinal

10. WAGATEA Dalz.

Climbing prickly shrubs. Leaves bipinnate. Flowers in long simple or paniced spikes. Calyx petaloid, hypanthium short, campanulate, lobes lanceolate, outer slightly larger. Uppermost petals slightly broader, equalling the sepals. Stamens 10, free, alternately long and short. Ovary stipitate, many-ovuled; style slightly clubbed at the tip; stigma oblique. Pods ligulate or oblong, sub-torulose, few-seeded, sutures thickened.

Monotypic, endemic to India.

Wagatea spicata Dalz. in Hooker's J. Bot. Kew Gard. Misc. 3: 90. 1831; Baker in Hook. f., Fl. Brit. Ind. 2: 261. 1878.

Robust prickly woody climbers. Leaves bipinnate; rachis 25-30 cm long; pinnae 4-6 pairs, 8-12 cm long; leaflets 5-7 pairs, obliquely oblong, sub-acute or rounded at apex, ca 4 × 2 cm. Racemes 40-50 cm long, sub-spicate, narrow; peduncles stout. Calyx red, campanulate, lobes lanceolate. Petals yellow, equalling the sepals. Pods ca 8 × 1.5 cm, thickened; seeds 2-4.

Raigarh. Fl. : Sept.; Fr. : Nov.

53. MIMOSACEAE

(A. N. Singh)

About 56 genera and 2800 species in tropics and sub-tropics throughout the world, abundant in Southern hemisphere; 13 genera and 37 species in M.P.

- 1a. Stamens indefinite:
 - 2a. Filaments free to the base ...1. *Acacia*
 - 2b. Filaments more or less connate at base:
 - 3a. Pods coiled ...10. *Pithecellobium*
 - 3b. Pods not coiled:
 - 4a. Flowers white or creamy; pods flat, not septate between seeds ...3. *Albizia*
 - 4b. Flowers pink-rose; pods fleshy, septate between seeds ...12. *Samanea*
- 1b. Stamens definite:
 - 5a. Anthers gland-tipped:
 - 6a. Inflorescence bicoloured ...4. *Dichrostachys*
 - 6b. Inflorescence not bicoloured:
 - 7a. Flowers in globose heads:
 - 8a. Herbs, aquatic or marshland ...8. *Neptunia*
 - 8b. Large trees ...9. *Parkia*
 - 7b. Flowers in elongated spikes:
 - 9a. Armed small trees ...11. *Prosopis*
 - 9b. Unarmed trees or climbers:
 - 10a. Pods falcate, seeds bright red ...2. *Aderanthera*
 - 10b. Pods and seeds not as above:
 - 11a. Leaves without tendrils; pods woody ...13. *Xylia*
 - 11b. Leaves with tendrils; pods torulose ...5. *Entada*
 - 5b. Anthers not gland-tipped:
 - 12a. Pods jointed ...7. *Mimosa*
 - 12b. Pods not jointed ...6. *Leucaena*

1. ACACIA Mill.

Erect or climbing, spinose or prickly, trees, shrubs or rarely herbs.

Leaves bipinnate with numerous small leaflets or the leaves reduced to phyllodes; petiolar glands often present. Flowers in cylindric spikes or globose heads; peduncle solitary, axillary or fasciculate or paniculate at the ends of branches. Calyx campanulate, toothed. Petals jointed in the lower half. Stamens indefinite, free or connate at base. Pods oblong, compressed, straight, membranous or woody.

About 800 species in tropics and subtropics of Africa and Australia; 17 in M.P.

- 1a. Flowers in elongated spikes:
 - 2a. Petioles modified into phyllodes ...1. *A. auriculiformis*
 - 2b. Petioles not modified into phyllodes:
 - 3a. Stipular spines three-nate ...14. *A. senegal*
 - 3b. Stipular spines paired:
 - 4a. Pinnae up to 4 pairs ...10. *A. lenticularis*
 - 4b. Pinnae more than 4 pairs:
 - 5a. Pods beaked at the apex ...2. *A. catechu*
 - 5b. Pods not beaked at the apex:
 - 6a. Corolla pale-yellow ...7. *A. ferruginea*
 - 6b. Corolla white:
 - 7a. Corolla as long as the calyx or slightly longer ...16. *A. surra*
 - 7b. Corolla about thrice as long as the calyx ...3. *A. chundra*
 - 1b. Flowers in globose heads:
 - 8a. Tall shrubs or medium-sized trees:
 - 9a. Pinnae two pairs ...5. *A. eburnea*
 - 9b. Pinnae more than two pairs:
 - 10a. Stipular spines absent ...4. *A. donaldi*
 - 10b. Stipular spines present:
 - 11a. Branches marked with grey or pale-brown dots ...6. *A. farnesiana*
 - 11b. Branches not as above:
 - 12a. Pods transversely or reticulately veined ...9. *A. jacquemontii*
 - 12b. Pods not as above:

- 13a. Bark blackish-grey to brown, young branches smooth and glabrous; pods constricted between seeds
...12. *A. nilotica* subsp. *indica*
- 13b. Bark yellowish, young branches velvet y; pods not constricted between seeds
...11. *A. leucophloea*
- 8b. Climbing or scandent shrubs:
- 14a. Young branches and leaf-rachis pubescent:
- 15a. Pods 10-15 cm long, smooth
...8. *A. intsia*
- 15b. Pods 7.5-10 cm long, rugose
...15. *A. sinuata*
- 14b. Young branches and leaf rachis glabrous:
- 16a. Pods 15-20 cm long, chocolate-brown, glabrous
...13. *A. pennata*
- 16b. Pods 8-15 cm long, velvety brown when young, glabrous on maturity
...17. *A. tortu*

1. *Acacia auriculiformis* A. Cunn. ex Benth. in Hook. f., Lond. J. Bot. 1: 377. 1842.

A medium sized tree in the teak forests; bark smooth white, stipular spines absent. Phyllodes curved, coriaceous, laterally compressed, falcate, 8-15 × 1-2 cm, with 4-6 principal nerves. Flowers in axillary, 4-6 cm long spikes, yellow. Calyx toothed. Pods woody, moniliform, brown, dehiscent, coiled at maturity.

An Australian plant usually cultivated as an ornamental. Bastar, Bhopal, Damoh, Durg, Raigarh, Raipur, Rajnandgaon, Satna. Fl. : Aug.-Sept.; Fr. : Jan.-May.

2. *Acacia catechu* (L.f.) Willd., Sp. Pl. 4: 1079. 1806; Baker in Hook. f., Fl. Brit. Ind. 2: 295. 1878. *Mimosa catechu* L.f., Suppl. 439. 1781. -*Khair*.

Medium-sized deciduous trees with hooked spines; bark dark grey to black, splitting irregularly and red inside. Leaves bipinnate; rachis about 15 cm long with a large gland at the base of the petiole; pinnac 7-30 pairs, 1.3-4 cm long, pubescent; leaflets 6- 50 pairs, linear, glabrous or pubescent. Flowers white in axillary pedunculate 2.5-10 cm long spikes. Calyx campanulate, toothed, pubescent. Corolla ovate-oblong. Pods 5-10 cm long, flat, brown, beaked. Seeds 3-10.

In dry deciduous forests. Balaghat, Bhopal, Chhindwara, East Nimar, Gwalior, Hoshangabad, Indore, Jabalpur, Mandla, Panna, Raigarh, Raipur, Rajnandgaon, Raisen, Sagar, Satna, Shivpuri, Sidhi. Fl. : July-Aug.; Fr. : Oct. Jan.

Kattha used in pan is extracted from its heart-wood.

3. *Acacia chundra* (Roxb. ex Rottl.) Willd., Sp. Pl. 4: 1078. 1806. *Mimosa chundra* Roxb. ex Rottl., Ges. Naturf. Freunde Berlin Neue Schriften 4: 207. 1803. *A. sundra* DC., Prodr. 2: 458. 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 295. 1878. - *Lal Khair*.

Erect small trees with dark brown branches; stipular spines in pairs and hooked. Leaves bipinnate, pinnae 15-20 pairs, rachis glabrous; leaflets 20-40 pairs, small, ligulate, glabrous. Flowers in axillary peduncled racemes. Calyx glabrous. Corolla 3 times as long as calyx. Pods flat, straight, strap-shaped.

In ravines. E. Nimar. Fl. & Fr. : July - Oct.

4. *Acacia donaldi* Haines, Descr. List of Trees, Shrubs and Econ. Herbs, S. Circle, C.P. 100-101. 1916. -*Chilchili*.

Small trees, rarely sub-scandent; branches with 5 lines of minute prickles, twigs finely pubescent, usually armed with short recurved prickles; stipular spines absent. Leaves bipinnate, rachis 10-18 cm long pubescent; pinnae 16-20 pairs, 4-9 cm long, rachilla pubescent; leaflets 25-40 pairs, 5-12 × 0.8-1.2 mm, mucronate, midrib oblique; stipules 3-4 mm long, linear, subulate, caducous. Flowers in globose heads in terminal panicles, yellow, ca 12 mm in diam.; peduncles 15-20 mm long. Calyx ca 3.5 mm long, lobes acute. Corolla 4.5-5 mm long, glabrous, lobes lanceolate, acute. Pods 8-18 × 2-2.5 cm, flat, turgid, cuncate at base, brown, 5-6-seeded.

In mixed forests. Bilaspur, Chhatarpur, Damoh, Durg, Jabalpur, Raipur, Sagar. Fl.: August; Fr.: Nov. -Jan.

5. *Acacia eburnea* (L. f.) Willd., Sp. Pl. 5(4): 1081. 1805; Baker in Hook. f., Fl. Brit. Ind. 2: 293. 1878. - *Mimosa eburnea* L. f., Suppl. 437. 1781. - *Deo-babool*, *Mormati*.

Tall shrubs with straight white stipular spines. Pinnae 2 pairs; leaflets 5-8 pairs, linear, acute, glabrous. Flowers in axillary pedunculate globose heads, bright yellow; peduncles hairy with involucre of connate bracts about the middle. Calyx campanulate, shortly toothed. Corolla almost twice the length of calyx. Pods distinctly stalked, 7.5-15 cm long, 6-9 mm broad, slightly curved, glabrous. Seeds 6-10.

Indore. Fl. & Fr. : April-Sept.

6. *Acacia farnesiana* (L.) Willd., Sp. Pl. 4: 1083, 1806; Baker in Hook. f., Fl. Brit. Ind. 2: 292. 1878. *Mimosa farnesiana* L., Sp. Pl. 521. 1753. - *Deo-babool*, *Bilayati Babool*, *Gandharri*.

Tall shrubs or small trees; branches marked with grey or pale brown dots; stipular spines in pairs, straight, 3-20 mm long. Leaf-rachis 25-55 mm long with 5-8 pairs of 10-25 mm long pinnae; leaflets 10-20 pairs, sessile,

linear, acute with oblique base, glabrous. Flowers in axillary peduncled globose heads, yellow; bracts whorled at or near the apex of the peduncle. Calyx 1.5-1.8 mm long, campanulate. Corolla ca 2.5 mm long. Pods 4.5-7.5 × 1.2 cm, curved, dark brown, turgid. Seeds many, in two rows.

Balaghat, Damoh, Indore, Jabalpur, Raigarh, Raipur, Rajnandgaon, Rewa, Raisen, Shivpuri. *Fl.* : Sept.-Feb.; *Fr.* : March.

7. *Acacia ferruginea* DC., Prodr. 2: 458. 1825; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 295. 1878. *Mimosa ferruginea* (DC.) Roxb., *Fl. Ind.* 2: 561. 1832 (non Rottler, 1803). -*Bara-Khair*, *Safed-Khair*.

Medium-sized trees; branches dark brown, glabrous; stipular spines short, hooked, in pairs, often suppressed. Pinnae 3-6 pairs, 5-8 cm long; leaflets 10-20 pairs, ligulate, oblong, 6-10 mm long. Flowers in 8-10 cm long dense spikes. Calyx campanulate, glabrous. Corolla yellowish, 2-3 times as long as calyx. Pods straight, strap-shaped, 8-10 cm long, ca 2 cm broad, dark brown.

Indore, Jabalpur. *Fl.*: March-April; *Fr.* : Nov.-Jan.

Wood used for making carts and agricultural implements; also yields gum.

8. *Acacia intsia* (L.) Willd. in DC., Prodr. 2: 404. 1825; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 297. 1878. *Mimosa intsia* L., *Sp. Pl.* 522. 1753.

Large climbing shrubs; branches with minute hooked stipular prickles. Pinnae 6-8 pairs, 5-8 cm long; leaflets 8-12 pairs, ligulate, minutely cuspidate. Flowers in paniced globose heads, yellow. Calyx broadly campanulate. Pods strap-shaped, glabrous, 10-15 cm long, 1.6-2 cm broad. Seeds 8-12.

Raigarh-Jashpur (Wood, 1902). *Fl. & Fr.*: Aug.-April.

9. *Acacia jacquemontii* Benth. in Hook., *Lond. J. Bot.* 1: 499. 1842; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 293. 1878.

Shrubs, up to 3 m tall; branches smooth, brown; stipular spines straight, paired, 7-18 mm long. Pinnae 2-8 pairs, 12-25 mm long. Flowers yellow, in axillary pedunculate fascicled globose heads. Calyx campanulate, 1-1.5 mm long, toothed. Corolla 2.5-3 mm long. Pods 3-7.5 × 0.8-1.5 cm, ovate-oblong, glabrous, reticulately veined, 5-6 seeded.

Indore. *Fl.* : Dec.-Feb.; *Fr.* : March-May.

10. *Acacia lenticularis* Buch.-Ham. ex Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 296. 1878. -*Kanta Siris*, *Kirangi*.

Medium-sized trees; branches grey, glabrous; spines in pairs, short,

hooked. Pinnae 2-4 pairs, 7.5-10 cm long; leaflets 6-8 pairs, sessile, ovate-oblong, glabrous. Flowers grey, in axillary pedunculate 7.5-10 cm long spikes. Calyx campanulate. Corolla twice as long as calyx. Pods 15-20 × 1 cm, strap-shaped, brown. Seeds 6-9.

Balaghat, Bilaspur, Fl. : May-June; Fr. : Dec.

11. *Acacia leucophloea* (Roxb.) Willd., Sp. Pl. 4: 1083. 1806; Baker in Hook. f., Fl. Brit. Ind. 2: 294. 1878. *Mimosa leucophloea* Roxb., Pl. Corom. 2: 27. t. 150. 1798. - *Reunja*, *Safed Kikar*.

Medium-sized deciduous trees with yellowish bark; young branches velvety pubescent; stipular spines paired, straight, 3-25 mm, or absent. Leaves bipinnate, 2.5-10 cm long; pinnae 5-15 pairs, 2-3 cm long; leaflets 10-30 pairs, linear-oblong, glabrous. Flowers in terminal leafless panicle heads; heads globose, pedunculate, white. Calyx campanulate. Corolla about 2.5 mm long, hairy outside. Pods linear, slightly curved, 8-20 × 0.6-0.8 cm, thick, tomentose. Seeds 10-20.

In wastelands and roadsides. Balaghat, Bastar, Bhand, Bhopal, Dhar, Durg, Gwalior, E. Nimar, Hoshangabad, Indore, Mandla, Morena, Panna, Raigarh, Raipur, Raisen, Rajnandgaon, Ratlam, Satna, Sagar, Seoni, Shivpuri, Sidhi, Tikamgarh. Fl. : May-Nov. ; Fr. : Nov.-March.

12. *Acacia nilotica* (L.) Willd. ex Delile subsp. *indica* (Benth.) Brenan in Kew Bull. 12: 84. 1957. *A. arabica* var. *indica* Benth., Lond. J. Bot. 1. 500. 1842. *A. nilotica* var. *indica* (Benth.) Hill in Bot. Mus. Leaflet. Harvard Univ. 8:9. 1940. *A. arabica* auct. non Willd.; Baker in Hook. f., Fl. Brit. Ind. 2: 293. 1878. - *Babool*.

Medium-sized trees with blackish-grey to brown fissured bark; stipular spines up to 5 cm long; smooth, whitish. Leaves bipinnate, 5-10 cm long; pinnae 2-10 pairs, 1.8-5 cm long, leaflets 7-25 pairs, glabrous. Flowers in axillary peduncled globose heads, bright-yellow. Calyx campanulate. Corolla twice the length of the calyx. Pods 7-15 cm long, persistently grey downy, constricted between the seeds; seeds 8-12.

In dry deciduous forests and roadsides. Balaghat, Bastar, Bilaspur, Bhand, Bhopal, Chhatarpur, Damoh, Durg, Gwalior, Hoshangabad, Indore, Mandla, Panna, Raigarh, Raipur, Rajnandgaon, Raisen, Satna, Sagar, Seoni, Shivpuri, Sidhi, Surguja. Fl. : Jan.- Dec.; Fr. : March-April.

Gum-arabic collected from it on commercial scale, also medicinal. Wood widely used in houses and for agricultural implements; bark and pods used for tanning.

13. *Acacia pennata* (L.) Willd., Sp. Pl. 4: 1090. 1806; Baker in Hook. f., Fl. Brit. Ind. 2: 297. 1878. *Mimosa pennata* L., Sp. Pl. 522. 1753. - *Alia*, *Chundria*.

Tall thorny climbers, prickly on the angles. Leaves about 10 cm long, bearing 8-15 pairs of ca 7.5 cm long pinnae; leaflets 40-50 pairs linear. Heads globose, 1-2 cm across, paniced; flowers white. Calyx sub-campanulate. Corolla slightly larger than the calyx. Pods strap-shaped, 15 x 2 cm, glabrous, chocolate-brown in colour, 8-12-seeded.

In mixed dry deciduous forests. Balaghat, Bastar, Bilaspur, Damoh, Hoshangabad, Indore, Mandla, Panna, Raigarh, Raipur, Raisen, Rewa, Sagar, Seoni, Sidhi. Fl.: April-Aug.; Fr.: June-Oct.

14. *Acacia senegal* (L.) Willd., Sp. Pl. 4: 1077. 1806; Baker in Hook. f., Fl. Brit. Ind. 2: 295. 1878. *Mimosa senegal* L., Sp. Pl. 521. 1753. -*Kumpla*.

Small prickly trees, 3-6 m tall, young branches pubescent; prickles usually in threes at the base of petiole. Leaves bipinnate, 2-3.5 cm long; pinnae 3-5 pairs, ca 2.5 cm long leaflets 8-15 pairs, ca 2.5 mm long, linear, obtuse, glabrous. Flowers in axillary peduncled spikes, white. Calyx campanulate. Corolla ca 4 mm long. Pods 5-7.5 x 1.7-2.5 cm, flat, grey, 5-6-seeded.

E. Nimar. Fl. & Fr. : July-Jan.

15. *Acacia sinuata* (Lour.) Merr., Trans. Amer. Philos. Soc. n.s. 24(2): 186. 1935. *Mimosa sinuata* Lour., Fl. Cochinch. 653. 1790. *M. concinna* Willd., Sp. Pl. 4: 1039. 1806. *A. concinna* (Willd.) DC., Prodr. 2: 464. 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 296. 1878. -*Shikakai*.

A large prickly climbing shrub; stipular spines abundant and scattered. Leaves bipinnate, rachis pubescent; pinnae 6-8 pairs, 5-7.5 cm long with a large gland at the base; leaflets 15-25 pairs, 8-12 mm long with oblique midrib. Heads globose, yellow, ca 12 mm, in much-branched, axillary panicles. Calyx campanulate, 2-3 mm long. Corolla 3-5 mm long. Pods straight, strap-shaped, rugose, 7.5-10 x 1.8 cm. Seeds 6-10.

Bastar, Jabalpur, Sagar. Fl. : March-May; Fr. : Dec. -Jan.

Pods used for washing hair and silk-garments.

16. *Acacia suma* (Roxb.) Kurz in Brand., For. Fl. 184. 1874; Baker in Hook. f., Fl. Brit. Ind. 2: 294. 1878. *Mimosa suma* Roxb., Fl. Ind. 2: 563. 1832.

Medium-sized trees with white bark; young branches hairy; spines in pairs, slightly hooked. Leaves bipinnate, about 15 cm long; pinnae 10-20 pairs, 3.5-5 cm long; leaflets 30-50 pairs, small, ligulate. Flowers in axillary peduncled 7.5-10 cm long spikes, white. Calyx ca 2.5 mm, toothed. Corolla white, as long as calyx or slightly longer. Pods 7-10 cm long, strap-shaped, 6-8-seeded.

Indore, Sidhi. Fl. : August.

17. *Acacia torta* (Roxb.) Craib in Kew Bull. 1915. 410. 1915. *Mimosa torta* Roxb., Fl. Ind. 2: 566. 1832. - *Alia, Chilati*.

A large climbing shrub; branches prickly, greyish and pubescent; prickles up to 2.5 mm long. Leaf-rachis 13-30 cm long with conical glands at the base of petiole and convex glands between the upper pairs of pinnae; pinnae 7-20 pairs, 5-10 cm long; leaflets 6-45 pairs, linear-oblong, 4-8 x 2-3 mm, pubescent. Heads large, terminal, pedunculate, paniced, ca 1 cm across, white. Calyx ca 2 mm long, pubescent. Corolla ca 3 mm long. Pods 8-15 cm long, strap-shaped, velvety brown when young, glabrous on maturity.

In mixed forests and wastelands. Balaghat, Bastar, Bilaspur, Chhindwara, Damoh, Durg, E. Nimar, Hoshangabad, Jabalpur, Raigarh, Raipur, Rajnandgaon, Satna, Seoni, Sidhi, Surguja. Fl. : April-Aug.; Fr. : Jan.-March.

2. ADENANTHERA L.

Unarmed trees. Leaves bipinnate. Leaflets many paired, small, alternate. Flowers in axillary, solitary or often spicate racemes, bisexual, pentamerous, white or yellowish. Sepals 5, connate, campanulate. Petals 5, distinct, valvate, lanceolate. Stamens 10, free, equalling the corolla; anthers glandular at the apex. Ovary sessile, many-ovuled; style filiform; stigma capitate. Pods flat, strap-shaped, falcate or spirally twisted. Seeds small, red or red and black.

About 12 species in tropical and sub-tropical Asia to N. Australia and Polynesia; one in M.P.

Adenantha pavonina L., Sp. Pl. 384. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 287. 1878. -*Rakta-Kanchan*.

Unarmed trees. Leaves bipinnate; pinnae 4-6 pairs, 10-20 cm long, shortly stalked; leaflets 6-9 pairs, alternate, obtuse-oblong, shortly stalked. Flowers small, in 5-15 cm long spicate racemes; axillary racemes simple, terminal paniced. Calyx campanulate. Petals valvate, connate at base. Pods 15-25 cm long, ca 12 mm broad, falcate. Seeds 10-12, bright scarlet.

Planted in gardens. Bhopal. Fl. : March-May; Fr. : July-Aug.

3. ALBIZIA Durazz.

Large trees. Leaves bipinnate; petiolar and jugal glands more or less conspicuous; stipules setaceous. Flowers in globose heads, sessile or pedicellate, pentamerous, bisexual. Calyx dentate or shortly lobed. Corolla campanulate, petals connate below the middle. Stamens usually indefinite, connate at base, exerted. Ovary shortly stalked or sessile; style filiform; stigma capitate. Pods large, thin, flat, strap-shaped.

About 25 species, palaeotropical; 4 in M.P.

- 1a. Leaflets less than 2 cm long and under 7 mm broad: ...1. *A. amara*
- 1b. Leaflets more than 2 cm long and above 7 mm broad.
 - 2a. Mid-vein central; calyx teeth not distinct ...3. *A. odoratissima*
 - 2b. Mid-vein not central; calyx teeth distinct:
 - 3a. Flowers pedicellate; pods pale straw coloured ...2. *A. lebbek*
 - 3b. Flowers sessile; pods brown ...4. *A. procera*

1. *Albizia amara* (Roxb.) Boivin, *Encycl.* 19, *Sicde* 2: 34. 1838; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 301. 1878. *Mimosa amara* Roxb., *Pl. Corom.* t. 122. 1799. - *Kaunthia*, *Seljhari*.

Medium-sized deciduous trees with smooth greenish bark; young branches and leaf-rachis densely pubescent. Leaves bipinnate, rachis 5-12 cm long; pinnae 4-15 pairs, 3-8 cm long; leaflets 15-30 pairs, linear. Flower heads 1-2 cm across, yellow, fragrant. Peduncles many and axillary. Calyx ca 1 mm long, funnel-shaped. Corolla ca 3 mm long. Pods stalked, 15-23 x 2-3 cm, greyish brown, 6-10-seeded.

In mixed forests. Bastar, Indore, Raipur (*Haines*, 1916), Shahdol, Shivpuri. *Fl.* : March-May; *Fr.* : Sept.

2. *Albizia lebbek* (L.) Benth. in Hook. *Lond. J. Bot.* 3: 87. 1844; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 298. 1878. *Mimosa lebbek* L., *Sp. Pl.* 516. 1753. -*Kala Siris*, *Siris*.

Large deciduous trees with dark grey bark and hairy young parts. Leaves bipinnate; rachis 7-20 cm long, with a large gland near the base of the petiole and one below the uppermost pinnae; pinnae 2-4 pairs, 7-12 cm long; leaflets 4-9 pairs, obliquely oblong with midrib nearer to the upper margin. Flowers sessile, in solitary or paniced heads, white, fragrant. Calyx campanulate, hairy. Corolla 7-8 mm long, pubescent outside. Pods 15-30 x 2-5 cm, pale straw coloured, 6-12-seeded.

In mixed forest and on roadsides. Bilaspur, Bhopal, Damoh, Durg, Gwalior, E. Nimar, Hoshangabad, Indore, Jabalpur, Panna, Raigarh, Raipur, Rajnandgaon, Raisen, Sagar, Shivpuri, Surguja. *Fl.* : March-July; *Fr.* : March-Oct.

3. *Albizia odoratissima* (L. *f.*) Benth. in Hook. *Lond. J. Bot.* 3: 88. 1844; Baker in Hook. *f.*, *Fl. Brit. Ind.* 2: 299. 1878. *Mimosa odoratissima* L. *f.*, *Suppl.* 437. 1781. - *Chichwa*, *Siris*.

Tall almost evergreen trees with greyish bark and brown hairy young parts. Leaves alternate, pubescent; rachis with a large black gland near the base and another between the uppermost pair of pinnae; pinnae 2-5 pairs,

8-15 cm long; leaflets 6-24 pairs, elliptic or obliquely oblong, with midrib towards the margin. Flowers pale yellow, sessile, in solitary or paniced heads. Calyx ca 1 mm long, densely pubescent. Corolla covered with grey hairs outside. Pods 10-30 × 1.3-3.5 cm, reddish-brown, 8-12-seeded.

In mixed deciduous forests. Balaghat, Bastar, Bilaspur, Bhopal, Chhatarpur, Damoh, Durg, Gwalior, Hoshangabad, Jabalpur, Mandla, Panna, Raigarh, Raipur, Rajnandgaon, Satna, Seoni, Shivpuri, Sidhi, Surguja. *Fl.* : April -May; *Fr.* : Oct.-June.

4. *Albizia procera* (Roxb.) Benth. in Hook. Lond. J. Bot. 3: 89. 1844; Baker in Hook. f., *Fl. Brit. Ind.* 2: 299. 1878. *Mimosa procera* Roxb., *Pl. Corom.* 2: 12, t. 121. 1798. -*Safed Siris*.

Large deciduous trees with greenish-white or brownish bark. Leaves alternate, bipinnate; rachis 30-45 cm long with a large gland near the base; pinnae 2-6 pairs, 12-15 cm long; leaflets 4-16 pairs, obliquely oblong. Flower heads white, fasciated or in axillary or terminal 10-30 cm long panicles. Calyx small, campanulate. Corolla twice the length of calyx. Pods 10-20 cm long, 10-25 mm broad, shortly stalked, 8-12-seeded.

In mixed forests and roadsides. Balaghat, Bilaspur, Damoh, Durg, Gwalior, Hoshangabad, Jabalpur, Mandla, Raipur, Rajnandgaon, Seoni, Sidhi. *Fl.* : Aug-Sept.; *Fr.* : Nov.-May.

4. *DICHOSTACHYS* (DC.) Wight & Arn.

Shrubs or small trees, armed or un-armed. Leaves bipinnate with small coriaceous leaflets; rachis glandular at the insertion of pinnae. Flowers in axillary solitary or clustered spikes, dimorphous, polygamous; bisexual and yellow in the upper half of spike, whereas neutre and white, rose or purplish with filiform staminodes in the lower half. Calyx funnel-shaped, 5-toothed. Petals connate at base, strap-shaped. Stamens 10, fertile in perfect flowers; anthers gland crusted. Ovary sessile or stipitate; style filiform; stigma capitate. Pods small, strap-shaped, twisted when mature.

About 5 species, palaeotropical; one in M.P.

Dichrostachys cinerea (L.) Wight & Arn., *Prodr.* 271. 1834; Baker in Hook. f., *Fl. Brit. Ind.* 2: 288. 1878. *Mimosa cinerea* L., *Sp. Pl.* 520. 1753. - *Bilatri*, *Sagun Kanti*.

A much branched thorny shrub; young branches hairy and terminating into spines. Leaves bipinnate, 2.5-6 cm long; rachis with a small stalked gland between each pair of pinnae; pinnae 8-19, 1-1.5 cm long; leaflets 12-25 pairs, obtuse with hairy margins. Flowers in dense cylindrical pedunculate axillary 2-5 cm long spikes; upper half of spike with bisexual yellow flowers and the lower half with neutral pink flowers. Calyx less

than 1 mm long, membranous. Corolla 2-2.5 mm long. Pods 5-10 mm long, dark brown, coiled; seeds 6-10.

In dry deciduous forests. Damoh, Hoshangabad, Seoni, Shivpuri. *Fl. & Fr.* : June-Jan.

5. ENTADA Adans.

Large, woody, unarmed climbers with tendrils. Leaves bipinnate. Flowers small, yellowish, polygamous, in spikes. Stamens 10, free, filaments filiform; anthers crowned with a gland. Style filiform; stigma concave, terminal. Pods woody, flat, composed of many discoid one seeded joints.

About 10 species, trop. African and trop. American; one in M.P.

Entada phaseoloides (L.) Merr. in Philip. J. Sci. 9. 86. 1914. *Lens phaseoloides* L., Herb. Amboin. 18. 1754. *Mimosa entada* L., Sp. Pl. 518. 1753. *Mimosa scandens* L., Sp. Pl. ed. 2: 1501. 1763. *Entada scandens* (L.) Benth. in Hook. Lond. J. Bot. 4: 332. 1841; Baker in Hook. f., Fl. Brit. Ind. 2: 287. 1878. -Dev Siadhi, Kille Tonda.

A large woody climber. Stem up to 150 m long, angled, much twisted. Leaves bipinnate, long-petioled; terminal pair of pinnae modified into deciduous tendrils; pinnae stalked, usually 2-pairs; leaflets 2-5 pairs, oblong or obovate, obtuse at base, bluntly short-acuminate at apex, 2.5-5 cm long, rigidly coriaceous; lateral nerves 7-9 pairs. Spikes peduncled, 15-35 cm long; flowers pale-yellow, 2-3 mm long, sessile or shortly pedicelled. Pods woody, 30-60 × 7-10 cm, breaking up into 1-seeded segments. Seeds lenticular, 4-5 cm in diam., glossy brown.

In damp valleys. Bilaspur. *Fl. & Fr.* : Jan.-Dec.

6. LEUCAENA Benth.

Unarmed shrubs or trees. Leaves bipinnate with setaceous stipules. Flowers sessile, usually perfect, in axillary, solitary or fascicled pedunculate heads. Calyx tubular-campanulate, 5-toothed. Petals 5, free, valvate. Stamens 10, exserted. Ovary stipitate, many-ovuled; style filiform; stigma terminal. Pods flat, strap-shaped, dehiscent. Seeds ovate, compressed, brown, glossy.

About 8-10 species distributed in Polynesia and Tropical America; one in M.P.

Leucaena leucocephala (Lamk.) de Wit in Taxon 10(2): 54. 1961. *Mimosa leucocephala* Lamk., Encycl. Meth. Bot. 1: 12. 1783. *Leucaena glauca* Benth. in Hook. Lond. J. Bot. 4. 416. 1842; Baker in Hook. f., Fl. Brit. Ind. 2: 290. 1878.

Tall shrubs or small trees, up to 6 m high. Leaves bipinnate, 10-20 cm long, ending in a soft bristle; pinnae 4-8 pairs, 5-10 cm long; leaflets 10-16 pairs, oblong, acute, sessile, 7-12 mm long, glaucous beneath. Flowers white, in globose heads, about 2.5 cm in diam.; heads solitary or 3 together. Calyx tubular-campanulate, villous. Petals valvate, spathulate, ca 1 cm long, pilose outside. Pods straight, strap-shaped, with acute apex, 15-20 × 1.5-2 cm. Seeds many.

Usually planted as an ornamental. Chhatarpur, Indore, Raigarh, Rajnandgaon. *Fl. & Fr.* : Aug.-Feb.

7. MIMOSA L.

Trees, shrubs or herbs, with or without prickles. Leaves bipinnate; leaflets small, often sensitive to touch, ligulate, caducous. Flowers small, in globose heads or cylindric spikes, mostly tetramerous. Calyx small, toothed. Petals connate at base. Stamens twice the number of petals, much-exserted. Ovary sessile or stalked, 2-many-ovuled; style filiform. Pods flat, membranous, jointed.

About 230-250 species mostly confined to Tropical America; 3 in M.P.

- 1a. Pinnae 1-2 pairs, digitately arranged; stamens as many as petals ...3. *M. pudica*
- 1b. Pinnae more than 2 pairs, pinnately arranged; stamens twice the number of petals.
 - 2a. Leaves up to 3 cm long; pinnae 3-6 pairs; leaflets 6-10 pairs; pods very prickly ...1. *M. hamata*
 - 2b. Leaves more than 3 cm long; pinnae 8-13 pairs; leaflets 16-20 pairs; pods rarely prickly ...2. *M. himalayana*

1. *Mimosa hamata* Willd., Sp. Pl. 4: 1033. 1806; Baker in Hook. f., Fl. Brit. Ind. 2: 291. 1878.

Much branched prickly shrubs; prickles 4-5 mm long, hooked. Leaves bipinnate; rachis 1.2-5 cm long; pinnae 3-6 pairs, 7-25 mm long, often prickly; leaflets 6-10 pairs, sessile, ovate, oblong, acute, hairy on both the sides. Flowers in solitary or paired, globose heads, pink, tetramerous; bracts linear, spathulate, pilose. Pods flat, falcate, 5-7.5 × 1 cm, velvety, prickly, 4-8-seeded.

On roadsides. E. Nimar, Hoshangabad, Raisen, Sagar, Shivpuri. *Fl.* : Feb.-Sept.; *Fr.* : Sept.-Dec.

2. *Mimosa himalayana* Gamble in Kew Bull. 1920: 4. 1920. *M. rubicaulis* sensu Baker in Hook. f., Fl. Brit. Ind. 2: 291. 1878, p p. (*non* Lamk., 1783).

Large straggling deciduous shrubs or small trees with ribbed densely hairy and prickly branches. Leaves bipinnate, 10-20 cm long, prickly; pinnae 8-13 pairs, 2-6 cm long; leaflets 16-20 pairs, linear-oblong, obtuse, hairy below. Flowers pink, fading white, in terminal panicles of globose peduncled heads. Pods flat, strap-shaped, 6-10 x 1-13 cm, occasionally with prickles on sutures, glabrous, with 4-10 one-seeded joints.

On roadsides and forest edges. Balāghat, Bastar, Bilāspur, Chhatarpur, Damoh, Gwalior, Hoshangabad, Jabalpur, Panna, Raigarh, Raipur, Rewa, Satna, Seoni, Shivpuri, Sidhi, Surguja, Tikamgarh. *Fl.* : Aug.-Sept.; *Fr.* : Oct.-Feb.

3. *Mimosa pudica* L., Sp. Pl. 518. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 291. 1878. -*Lajwanti*, *Sajjawati*.

Small woody herbs or low spreading under-shrubs with hairy and prickly branches; hairs glandular. Leaves bipinnate, sensitive to touch, ca 2.5 cm long; pinnae 1-2 pairs, 2.5-5 cm long, leaflets 10-20 pairs, linear, glabrous. Flower heads small, peduncled, globose, axillary, pink-purple. Calyx campanulate, slightly toothed; petals connate towards base. Pods 1.5-2.5 cm long, closely prickly on the sutures.

In forest openings. Balāghat, Bastar, Bhopal, Damoh, Durg, Mandla, Raigarh, Raipur, Seoni, Shivpuri. *Fl.* : Aug.-Sept.; *Fr.* : Sept.-March.

Leaves sensitive; the leaflets folding upwards on touching.

8. NEPTUNIA Lour.

Terrestrial or aquatic herbs, without prickles. Leaves bipinnate, stipules persistent; leaflets numerous, strap-shaped, sensitive. Flowers in axillary pedunculate heads, dimorphous, polygamous; lower parts of head with staminate flowers only. Calyx funnel-shaped, 5-toothed. Petals 5, connate at the base. Stamens of perfect flowers exerted; anthers glandular. Ovary stipitate, many-ovuled; style filiform; stigma club-shaped. Pods flattened, oblong, 2-valved.

About 8 species, pantropical; 2 in M.P.

- 1a. Aquatic herbs; stem prostrate with fibrous roots at nodes ...1. *N. oleracea*
- 1b. Terrestrial herbs; stem straight without fibrous roots at nodes ...2. *N. triquetra*

1. *Neptunia oleracea* Lour., Fl. Cochinch. 654. 1790; Baker in Hook. f., Fl. Brit. Ind. 2: 285. 1878. -*Lajalu*.

Free floating slender aquatic herbs with almost each node bearing leaves and peduncles and a large number of fibrous rootlets. Leaves

bipinnate; pinnae 2-3 pairs, 5-8 cm long; leaflets 8-15 pairs, linear, obtuse. Flower-heads axillary, long peduncled, dimorphic; peduncles 8-30 cm long; upper flowers hermaphrodite, lower ones sterile. Calyx small, campanulate. Corolla \approx 1 mm long. Staminodes strap-shaped, yellow. Pods 1.5- 2.5 cm long, oblique, oblong, beaked, 6-10-seeded.

In drains. Raipur. *Fl. & Fr.* : Sept.-April.

2. *Neptunia triquetra* Benth. in Hook., Lond. J. Bot. 4: 355. 1842; Baker in Hook. f., Fl. Brit. Ind. 2: 286. 1878.

Small diffuse perennial herbs with slender stem and angular branches. Leaves bipinnate; pinnae 1-3 pairs, 2-2.5 cm long; leaflets 14-30 pairs, small, linear-oblong. Flower heads small, globose, short or long peduncled, dimorphic, yellow; sterile flowers often absent. Calyx small, campanulate. Corolla strap-shaped, connate at base. Pods 1.5-2.5 cm long, oblique, oblong, minutely beaked, 4-8-seeded.

In moist places. Satna. *Fl. & Fr.* : Aug.

9. PARKIA R. Br.

Large trees, without prickles. Leaves bipinnate. Flowers in dense long-peduncled heads, each subtended by a ligulate bract. Calyx cylindrical, 5-toothed. Corolla tubular, segments sub-valvate. Stamens 10, exerted; filaments filiform, jointed in the lower part with each other and corolla tube; anthers eglandular. Ovary stipitate many-ovuled; style filiform; stigma capitate. Pods large, strap-shaped.

About 8 species in tropical America; 2 in M.P.

- 1a. Gland on petiole paired; pinnae 20-30 pairs and
leaflets on each pinna 75-100 pairs ...1. *P. biglandulosa*
- 1b. Gland on petiole solitary; pinnae 10-12 pairs and
leaflets on each pinna 50-60 pairs ...2. *P. roxburghii*

1. *Parkia biglandulosa* Wight & Arn., Prodr. 273. 1834; Baker in Hook. f., Fl. Brit. Ind. 2: 289. 1878.

Tall trees, unarmed. Leaves bipinnate, 30-50 cm long, feather-like; petioles with two glands; pinnae 20-30 pairs, 7.5-10 cm long; leaflets linear, 75-100 pairs to a pinna. Flowers in dense long-peduncled heads, subtended by a coriaceous, persistent bract; peduncles 10-25 cm long, rusty tomentose; heads dark brown, \approx 2.5 cm across. Calyx \approx 12 mm long, glabrous, teeth pilose. Corolla tubular, segments sub-valvate. Pods large, strap-shaped, pubescent when young. Seeds many.

Planted in gardens and parks. Bhopal, Raipur. *Fl.*: Jan.-April; *Fr.* : Sept.-Oct.

2. *Parkia roxburghii* G. Don, Gen. Syst. 2: 397. 1832; Baker in Hook f., Fl. Brit. Ind. 2: 289. 1878.

Tall trees, up to 20 m high, unarmed. Leaves bipinnate; rachis 30-40 cm long, glabrous, gland of petiole solitary; pinnac 10-12 pairs, 7.5-10 cm long; leaflets 50-60 pairs, linear, ligulate, 1-nerved. Peduncles 30-45 cm long. Flowers yellow, fragrant, in 5-8 cm long sub-clavate spikes; bracts of the clavate receptacle solitary under each corollet, spatulate with the apex broad and villous outside. Calyx ca 12 mm long, tube glabrous, lobes 5, unequal pilose. Filaments united to the middle. Pods flat, strap-shaped, 30 × 2.5-3.8 cm.

Planted in gardens. Bhopal.

10. PITHECELLOBIUM Mari.

Erect trees or shrubs with stipular or axillary spines. Leaves bipinnate with a gland at the joint of pinnac; leaflets 1-3 pairs. Flowers bisexual, pentamerous in globose paniculate heads. Sepals connate, 5-toothed. Petals 5, connate below the middle. Stamens indefinite, exerted. Ovary sessile or shortly stalked, many-ovuled; style filiform; stigma capitate. Pods strap-shaped, spirally twisted or circinate, dehiscent.

About 100 species in tropical and subtropical America; one in M.P.

Pithecellobium dulce (Roxb.) Benth. in Hook., Lond. J. Bot. 3: 199. 1844; Baker in Hook. f., Fl. Brit. Ind. 2: 302. 1878. *Mimosa dulcis* Roxb., Pl. Corom. 1. 67, t. 99. 1798. - *Jungli Jalebee*, *Canga Imli*.

Medium-sized evergreen trees; branches greyish; stipular spines persistent. Pinnac 2, rachis 1-2.5 cm long; leaflets two on each pinna, obliquely elliptic, 2-4.5 × 1-2 cm. Flowers greenish-white in panicled globose heads. Calyx 1-1.5 mm long, funnel-shaped, pilose. Corolla 3-4.5 mm long, petals united below the middle. Stamens monadelphous. Pods 10-12 cm long, turgid, spirally twisted, velvety pubescent. Seeds 6-8, black, enveloped in white fleshy edible aril.

Usually planted as hedge, also on roadsides. Bhopal, Damoh, Indore, Jabalpur, Mandla, Raigarh, Raipur, Rajnandgaon, Raisen, Sagar, Shivpuri. *Fl. & Fr.* : Jan.-April.

Seed-aril eaten raw.

11. PROSOPIS L.

Trees or shrubs with scattered prickles. Leaves bipinnate, pinnac 1-2 pairs. Flowers small in axillary cylindric spikes or globose heads. Calyx campanulate, 5-toothed. Petals 5, connate below the middle, ligulate. Stamens 10, free, anthers with or without a deciduous gland. Ovary

stipitate, many-ovuled. Pods linear, compressed or cylindrical, straight, falcate or torulose, septate between the seeds.

About 45 species, in tropical and sub-tropical regions; 2 in M.P.

- 1a. Pods cylindrical, torulose ...1. *P. cineraria*
 1b. Pods compressed, straight or falcate ...2. *P. juliflora*

1. *Prosopis cineraria* (L.) Druce in Rep. Bot. Exch. Club Soc. Brit. Isles 1913: 3. 422. 1914. *Mimosa cineraria* L., Sp. Pl. 517. 1753 (*cineria*). *Prosopis spicigera* L., Mant. Pl. 1710. 68. 1767; Baker in Hook. f., Fl. Brit. Ind. 2: 288. 1878. -*hand, Shami.*

Small trees with grey glabrous branches, armed with scattered prickles. Leaves bipinnate; rachis 3-5 cm long, glabrous; pinnae mostly 2-pairs, opposite, 2.5-8 cm long; leaflets 8-12 pairs, sessile, obliquely rounded and mucronate at apex. Flowers yellow, in short peduncled 7-11 cm long solitary or terminally paniced spikes. Calyx 0.5-1.5 mm, truncate, slightly 5-toothed. Corolla ca 3 mm long. Pods cylindrical, straight, torulose, 10-20 cm long. Seeds 10-18, dull brown.

In dry deciduous forests. Bhopal, Indore, Shivpuri. Fl. : Dec.-April; Fr. : March-June.

Pods eaten raw and cooked.

2. *Prosopis juliflora* (Swartz) DC., Prodr. 2: 447. 1825. *Mimosa juliflora* Swartz, Prodr. 85. 1788.

Large evergreen shrubs or small trees up to 5 m high; stipular spines straight, conical, solitary or paired, 3-9 mm long. Leaves bipinnate, 1-3 together; rachis 1-8 cm long, prolonged beyond the last pinnae as a soft bristle; pinnae 3-10 cm long; leaflets 10-25 pairs, 5-17 × 2-3 mm, elliptic-oblong, often mucronate. Flowers greenish-white in axillary pedunculate 6-10 cm long spikes. Calyx campanulate, 5-toothed, ca 1 mm long. Petals free, tomentose on the inner surface. Pods compressed, straight or falcate, 10-20 × 1 cm, light yellow. Seeds 10-18.

Mainly planted in wastelands though also spreading wild. Bhopal, Bhind, Chhatarpur, Damoh, Indore, Morena, Panna, Rajnandgaon, Raisen, Satna, Shahdol, Shivpuri. Fl. & Fr. : Feb.-Oct.

12. SAMANEA (Benth.) Merr.

Erect trees. Leaves bipinnate, leaflets opposite; stipules small lanceolate. Flower-heads globose, on solitary or sub-fasciculate peduncles.

Calyx campanulate, 5-toothed. Petals 5, connate in a campanulate corolla, teeth valvate; stamens indefinite; filaments exserted, jointed below. Ovary sessile, many-ovuled; style filiform; stigma terminal. Fruit a ligulate indehiscent lomentum, septate between the seeds.

About 20 species in tropical S. America and tropical Africa; one planted in M.P.

Samanea saman (Jacq.) Merr. in J. Wash. Acad. Sci. 6: 47. 1916. *Mimosa saman* Jacq., Fragm. 15, t. 19. 1809. - *Bilayati Siris*.

Large evergreen trees, up to 20 m high with greyish bark. Leaves bipinnate; rachis 20-30 cm long; pinnae 3-7 pairs, 15-20 cm long; leaflets 3-8 pairs, obliquely oblong, obovate, or rhomboid, obtuse, mid-vein central, terminal leaflets slightly larger. Flowers in long peduncled axillary heads, pink, pedicelled. Pods 10-25 cm long.

Commonly planted as an avenue tree along roadsides. Native of tropical America and West Indies; usually planted in gardens and along road sides. Bhopal, Durg, Sagar, Seoni. Fl. : March-April.

13. XYLIA Benth.

Large trees without prickles. Leaves bipinnate. Flowers in globose heads. Calyx cylindrical, 5-toothed. Petals 5, valvate, slightly connate at the base. Stamens 10, free, exserted; anthers with caducous glands. Ovary sessile, many-ovuled; style filiform. Pods large, woody, oblong-falcate, constricted between the seeds.

Monotypic genus in Peninsular India, Burma, Malaysia, Singapore and Philippines.

Xylia xylocarpa (Roxb.) Taub. in Bot. Central 47. 397. 1891. *Mimosa xylocarpa* Roxb., Pl. Corom. t. 100. 1798. *X. dolabriformis* Benth. in Hook. Lond. J. Bot. 4: 417. 1842; Baker in Hook. f., Fl. Brit. Ind. 2: 280. 1878. - *Suaba, Suriya*.

Large deciduous unarmed trees with brown tomentose branchlets. Leaves bipinnate, 5-12 cm long; pinnae one pair, 10-30 cm long; leaflets 2-5 pairs, opposite, ovate-oblong, 5-20 cm long. Flowers sessile, in dense globose peduncled heads, yellowish-white. Calyx tubular, 5-toothed. Petals ca 0.5 mm long, valvate, slightly connate at base. Pods large, woody, falcate, 10-15 x 3-7 cm, brown pubescent. Seeds 6-10.

In mixed forests. Balaghat, Durg, Raipur, Rajnandgaon. Fl. : April.

Wood used for posts.

54. ROSACEAE

(Anand Kumar)

About 100 genera and 2,000 species; cosmopolitan, abundant in north temperate zone; 4 genera and 4 species wild in M.P. *Eriobotrya japonica* (Thunb.) Lindl., *Prunus amygdalus* Batsch, *P. persica* (L.) Batsch, *Pyrus communis* L. and *P. malus* L. are often cultivated for their fruits; several varieties of roses are found in the gardens.

- 1a. Herbs; ovule 1 in each carpel ...1. *Potentilla*
- 1b. Trees or shrubs; ovules 2 in each carpel :
 - 2a. Carpels many ...4. *Rubus*
 - 2b. Carpel one :
 - 3a. Flowers ca 4 mm across; fruits 0.7 - 1 cm across ...2. *Prunus*
 - 3b. Flowers 2 - 3 cm across; fruits 2 - 4 cm across ...3. *Pyrus*

1. POTENTILLA L.

Annual or perennial herbs. Leaves digitately compound. Inflorescence usually cymose-paniculate. Calyx-tube concave, mostly hemispheric. Bracteoles, sepals and petals 5 (rarely 4). Petals obovate to rounded, usually not clawed, caducous. Stamens usually about 20 in 3 series (10 + 5 + 5); anthers more or less didymous; filaments filiform or subulate. Receptacle hemispheric or conical. Carpels usually many (rarely 10 or fewer); style attached near the apex of carpel, jointed with it and caducous. Seed pendulous.

About 500 species, nearly cosmopolitan, chiefly N. temperate and arctic region; one in M.P.

Potentilla supina L., Sp. Pl. 497. 1753; Hook. f., Fl. Brit. Ind. 2:359. 1878. - *Nakhchikni*.

Sub-erect or diffuse much branched annual herb. Leaves pinnately 3-9 foliolate; leaflets small, obovate, oblong or cuneate, 3-lobulate or incised-serrate. Flowers yellow, solitary, axillary, 6-7 mm across; pedicels 5-12 mm long, slender, pubescent. Bracteoles 5, oblong-elliptic, obtuse. Calyx ca 5 mm long, pubescent without; lobes 5, ovate-oblong, subacute. Petals 5, 3-4 mm long, oblong. Receptacle globose, villous. Achenes numerous, smooth.

Common in dried up stream-beds and along banks of ponds during winter. Bastar, Bhopal, Bilaspur, Chhatarpur, Damoh, Gwalior, Hoshangabad, Jabalpur, Mandla, Panna, Rewa, Sagar. Fl. & Fr.: Nov. March.

2. PRUNUS L.

Shrubs or trees, unarmed or spinescent. Leaves simple, alternate, entire or incised, usually glandular. Stipules small or large, linear or dissected, margin glandular, caducous or persistent, free or intrapetiolarly connate. Flowers solitary, fascicled or in racemes, bisexual. Bracts small, usually caducous. Hypanthia concave, tubular, campanulate or funnel shaped. Perianth biseriate, 5-merous. Stamens 10 to many, filaments free. Pistil 1, style erect. Ovary superior, ovules 2. Fruits juicy drupes, globose; to didymous, 1-seeded, endocarp woody.

About 430 species mostly in temperate America, Europe and Asia; a few species extend to the tropical Africa, Australia and Asia; one in M.P.

Prunus pygeioides Koeh. in Engl., Bot. Jahrb. 52: 297. 1915; Chhabi Ghora & Panigrahi in Fasc. Fl. India No. 18: 36. 1984. *Pygeum andersonii* Hook. f., Fl. Brit. Ind. 2: 320. 1878. *P. mooneyi* Raizada in Ind. For. 68: 421. 1942.

Trees, up to 6 m high; branches glabrous. Leaves 8-10 × 2.5-3 cm, ovate-oblong, glabrous, crenate with 1-3 glands below lowest teeth, apex acute. Petioles 0.7-1 cm long. Flowers dense, 4 mm across. Hypanthia ca 1.5 mm long. Pedicels 3-4 mm long. Sepals 1.5 × 1 mm, ciliate. Petals 1.5-2 × 1-1.5 mm, hairy. Stamens 15-26; filaments ca 2.5 mm long. Style ca 1.5 mm long. Drupes 6-9 × 7-10 mm, transversely ellipsoid, glabrous.

In damp ravines; rare. Bastar (*Raizada, l.c.*). Fl.: Nov.

3. PYRUS L.

Trees or shrubs, sometimes spinescent. Leaves simple, alternate, often serrate; stipules caducous. Racemes umbelliform. Flowers white or rarely rosy. Bracts subulate, caducous. Calyx-lobes 5, reflexed, persistent or caducous with the apex of the tube and stamens. Petals 5, sub-orbicular, shortly clawed. Disc lining the calyx-tube or thickened and spread over the apex of ovary. Stamens 30 (-20). Ovary inferior, 5(-2) locular; styles free, stigmas truncate; ovules 2 in each locule, ascending. Fruits fleshy, 5(-2)-locular, endocarp cartilaginous; seeds with cartilaginous and black testa.

About 30 species in temperate Eurasia; one in M.P.

Pyrus pashia Buch. Ham. ex D. Don, Prodr. 236. 1825; Hook. f., Fl. Brit. Ind. 2: 374. 1878; Saxena & Khotale in J. Bombay Nat. Hist. Soc. 73: 24. 1976. *Banghuiyan*.

Deciduous trees; young parts woolly; branches spinescent. Leaves 5-10 cm long, 3-lobed, ovate or ovate-lanceolate, margin crenulate, apex

acuminate or caudate. Inflorescence usually corymbose, woolly; pedicels 1-5 cm long. Flowers 2-3 cm in diam. Calyx-lobes ovate, acute, woolly without. Petals orbicular-ovovate. Stamens ca 30. Styles 3-5, free, more or less woolly at the base. Fruits 2-4 cm in diam., deep yellowish-brown, scurfy, covered with raised white spots.

In dense forests; rare. Bastar (*Saxena & Khotale, l.c.*). Fl. : Feb. - March, Fr. : Sept. - Dec.

4. RUBUS L.

Shrubs, often straggling. Leaves simple, alternate, lobed, 3-5-foliolate or imparipinnate; stipules adnate to the petiole. Flowers in axillary and terminal panicles or corymbs, rarely solitary, ebracteolate, white or red. Hypanthium widely campanulate. Calyx-lobes 5, persistent. Petals 5. Stamens many, inserted on the rim of hypanthium, anthers dorsifixed. Carpels many, rarely few inserted on the convex receptacle; style filiform, sub-terminal; stigma simple or capitellate; ovules 2 in each carpel, pendulous. Fruit an aggregate of fleshy drupelets on a dry receptacle.

About 250 species, nearly cosmopolitan, chiefly N. temperate and arctic regions; one in M.P.

Rubus ellipticus J.E. Sm. in Rees, *Cyclop.* 30 : n. 16. 1815; Hook. f., *Fl. Brit. Ind.* 2 : 336. 1878. *R. gowreephtul* Roxb., *Fl. Ind.* 2 : 517. 1832.

Prickly straggling shrubs. Leaves simple or 3-lobed on young stems and pinnately 3-foliolate later on; stipules linear; leaflets obovate, rigid, margins serrate, pubescent on under-surface. Flowers white in corymbose panicles; bracts linear. Calyx bristly towards the base; sepals 6-8 mm long, lanceolate, apex acuminate, tomentose. Petals as long as or exceeding the sepals. Ovary sparsely hairy. Drupelets orange coloured, globose, exposed.

On higher hill slopes; rare. Hoshangabad. Fl. & Fr. : Dec. - March.

55. VAHLIACEAE

(A. K. Tripathi)

Monotypic family. About 8 species in only one genus distributed in tropical and sub-tropical Asia and South Africa; one in M.P.

VAHLIA Thunb.

Annual or biennial, pubescent, often glandular, erect herbs. Leaves opposite, ovate to linear, entire, rarely always simple; stipules absent. Flowers axillary, subsessile or pedicelled, usually geminate, white or yellow. Sepals 5, connate in a hemispheric tube adnate to the ovary; lobes persistent,

ovate or lanceolate, valvate. Petals 5, epigynous, obovate-spathulate, shorter than calyx-lobes. Stamens 5, inserted on the margin of the epigynous disc; filaments free, subulate. Ovary inferior, 1-celled, with 2 pendulous ovules; styles 2 or 3, short or elongate; stigma capitellate. Capsule dehiscing apically between the styles; seeds numerous, minute, ellipsoid, smooth.

Vahlia digyna (Retz.) Kuntze, Rev. Gen. Pl. 227. 1891. *Oldenlandia digyna* Retz., Obs. 4 : 23. 1786. *Vahlia viscosa* Roxb., Fl. Ind. ed. Carey 2 : 89. 1832; Clarke in Hook. f., Fl. Brit. Ind. 2 : 399. 1878. *Bistella digyna* (Retz.) Bullock in Acta Bot. Neerl. 15 : 85. 1966.

Erect or diffuse glandular pubescent annual herbs, up to 15 cm high. Leaves opposite, subsessile, 8-35 mm long, ovate-lanceolate or linear. Flowers 1-2 in most of the upper axils of leaves, sub-sessile, white or pale yellow. Calyx glandular-pubescent, tube hemispherical, entirely adherent to the ovary. Capsules sub-globose, \approx 3 mm in diam; seeds ovoid-cylindric, straw-coloured.

In sandy river bed. Raipur. Fl. & Fr. : May.

56. CRASSULACEAE

(Anand Kumar)

About 35 genera and 1,500 species, cosmopolitan, chiefly in South Africa; one genus and 2 species, often planted as ornamental garden plants in M.P.

KALANCHOE Adans.

Erect or ascending, succulent perennial herbs, sometimes woody. Leaves simple, trifoliate or pinnately 5-foliate. Flowers terminal in corymbose or paniculate cymes, pedicelled. Calyx more or less deeply 5-lobed or 4-fid. Corolla gamophyllous, 4-lobed; lobes erect or recurved. Stamens 8, biseriate, inserted on the corolla-tube. Hypogynous scales 4. Carpels 4, attenuated into long subulate styles; ovules many. Follicles 4, membranous; seeds oblong-ellipsoid with 8-15 longitudinal ribs.

About 200 species, mainly in tropics of S. Africa to China and Java; 2 usually planted in M.P.

1a. Glandular-hairy herbs; calyx deeply 4-partite

...1. *K. lanceolata* var. *glandulosa*

1b. Glabrous herbs; calyx shortly 4-fid

...2. *K. pinnata*

1. *Kalanchoe lanceolata* (Forsk.) Pers. var. *glandulosa* (Hochst. ex A. Rich.) Cufod. in *Webbia* 19(2) : 730. 1965. *K. glandulosa* Hochst. ex A. Rich., Tent. Fl. Abyss. 1 : 312. 1847; Clarke in Hook. f., Fl. Brit. Ind. 2 : 414.

1878. *K. heterophylla* Prain, Bengal Pl. 340. 1963 (Repr. ed.); Oommachan, Fl. Bhopal 158. 1977.

Perennial, glandular-hairy herbs, up to 75 cm high. Lower leaves obovate, almost entire, more or less pubescent, amplexicaul; upper cauline leaves densely glandular-pubescent, lanceolate or oblanceolate, obtuse, amplexicaul. Flowers in dense paniculate glandular-pubescent cymes. Calyx up to 1 cm long, glandular-pubescent divided about half way down into 4 segments; segments triangular-ovate, acute or acuminate. Corolla yellow, 1-1.5 cm long, tube glandular-pubescent in the upper part, segments ovate-oblong, acuminate. Hypogynous scales narrow, linear, whitish, membranous. Carpels glabrous.

Planted as ornamental herb. Bhopal (Oommachan, 1977). Fl. : Oct. Jan.

2. *Kalanchoe pinnata* (Lamk.) Pers., Syn. 1 : 446. 1805; Bailey, Man. Cult. Pl. 467. 1949 (rev. ed.). *Cotyledon pinnatum* Lamk., Encycl. 2 : 141. 1786. *Bryophyllum calycinum* Salisb., Parad. Lond. t. 3. 1805; C.B. Clarke in Hook. f., Fl. Brit. Ind. 2 : 413. 1878. *B. pinnatum* (Lamk.) Oken, Alleg. Naturgesch 3 : 1966. 1841. - *Khatua*.

Herbs, up to 75 cm high, young stem often green with deep purple blotches. Leaves simple or compound, upper usually 3-5(-7) foliolate; leaflets 5-20 × 2.5-5 cm, ovate or elliptic, margin crenate or serrate. Flowers pendant in 10-40 cm long panicles; pedicels slender. Calyx 2-4 cm long, green with purple tinge; segments ovate-triangular. Corolla green in lower half, red in upper half; base swollen, constricted in the middle; lobes triangular. Anthers black, hastate. Hypogynous scales adhering at the base of ovaries, sub-rectangular, yellow. Ovaries ovoid-oblong, free or connate at the base, narrowed into 2.5-3.5 cm long styles.

Planted and found as escape on border of forests. Balaghat, Bilaspur, Chhatarpur, Mandla. Fl. : Oct. Feb.

57. DROSERACEAE

(R. C. Srivastava)

About 4 genera and 105 species; the genus *Drosera* is cosmopolitan, while the rest are of restricted distribution; one genus and 2 species in M.P.

DROSEREA L.

Terrestrial, marsh or sometimes aquatic, insectivorous herbs. Leaves alternate or in rosettes, stipulate or estipulate, provided with sessile or stalked, sticky glands. Inflorescence terminal or leaf-opposed, usually

circinnate helicoid cymes, bracteate or cbracteate. Flowers bisexual, regular. Calyx 5-lobed, imbricate, persistent. Petals as many as sepals, free, accrescent, usually persisting. Stamens as many as petals, free, alternating with them. Ovary superior, 1-locular; ovules many; styles 2-5, free or connate below; stigmas indistinct. Fruits many-seeded.

About 90 species, almost cosmopolitan; 2 in M.P.

- 1a. Leaves radical, all in a basal rosette, obovate or orbiculate, stipulate ...1. *D. burmannii*
 1b. Leaves all cauline, alternate, linear, estipulate ...2. *D. indica*

1. *Drosera burmannii* Vahl, Symb. Bot. 3 : 50. 1794; Clarke in Hook. f., Fl. Brit. Ind. 2 : 424. 1878.

Small herbs, about 15 cm tall. Leaves reddish, all in basal rosette, appressed to the soil, obovate or orbicular, 6-10 × 4-6 mm, stipulate, covered with glandular hairs. Stipules 3-parted, each segment with lanceolate, acute lobes. Scape terminal, circinnate, few to many-flowered. Flowers white. Pedicels erect, 1.5-4 mm long. Calyx 5-lobed; lobes elliptic, 2.5-3 mm long, acute. Petals 5, obovate, ca 4 mm long, white. Styles 5, split into very short lobes at apex. Capsules ca 1.5 mm long; seeds dark, very fine scrobiculate.

Balaghat, Bastar, Bilaspur, Hoshangabad, Raigarh, Sidhi, Surguja. Fl. & Fr. : Oct. - March.

2. *Drosera indica* L., Sp. Pl. 282. 1753; Clarke in Hook. f., Fl. Brit. Ind. 2 : 424. 1878.

Slender herbs about 20 cm high with glandular hairy slightly compressed stems. Leaves estipulate, all cauline, lower ones recurved, upper ones erect, filiform; petioles up to 15 mm; tentacles 20-30 × 0.5-3 mm. Stipules absent. Inflorescence lateral, mostly extra-axillary, spreading or arching, glandular hairy, 3-20-flowered; peduncle up to 5.5 cm long. Bracts minute, linear. Pedicels ca 0.75-2 cm long. Sepals lanceolate, acute, 3-5 mm long. Petals obovate, 0.75-1 cm long, pink to pale-purple. Anthers hastate. Styles 3, divided from base into 2 thickened simple ascendent arms. Capsules broadly oblong.

Balaghat, Bastar, Bhopal, Bilaspur, Rajnandgaon, Surguja. Fl. & Fr. : Sept. - Jan. (more during rains).

58. HALORAGACEAE

(Anand Kumar)

About 4 genera and 150 species, almost throughout the world; one genus and 2 species in M.P.

MYRIOPHYLLUM L.

Aquatic (sometimes terrestrial) glabrous herbs. Stem freely floating in aquatic forms. Leaves opposite or whorled, dimorphic, the floating ones usually linear-serrate, the submerged ones pectinately pinnatifid, rarely scaly or absent. Flowers minute in axils of upper leaves or in spikes, bisexual, often polygamous with the upper male and lower female or plant monoecious, rarely dioecious. Sepals in male minute, 4, rarely 2, sometimes absent; in female adnate to the ovary; lobes 0 or 4, minute. Petals in male 2 or 4, concave, sessile; in female usually absent. Stamens 2, 4 or 8. Ovary of 4 (-2) carpels; ovule solitary, pendulous; styles 4 or 2, short. Fruits usually more or less urceolate, dehiscing into 4 or 2 one-seeded mericarps; pericarp more or less tuberculate.

About 45 species, cosmopolitan, 2 in M.P.

- 1a. Flowers 3-5 together, pedicelled; mericarps dorsally rounded ...1. *M. oliganthum*
 1b. Flowers solitary, sessile; mericarps dorsally acute ...2. *M. tuberculatum*

1. *Myriophyllum oliganthum* (Wight & Arn.) F.v. Muell., *Fragm. Phyt. Aust.* 10 : 54. 1876; Meijden in *Blumea* 17 : 308. 1969. *Haloragis oligantha* Wight & Arn., *Prodr.* 338. 1838. *Myriophyllum intermedium*, *auct. non DC.*, 1828; C.B. Clarke in *Hook. f., Fl. Brit. Ind.* 2 : 433. 1878 (*excl. syn. M. variaefolium* Hook.f.).

Aquatic slender herbs, upper portion of stem floating on water surface. Lower leaves whorled, 1-3 × 0.1-0.25 cm, pectinately pinnatifid; upper ones alternate, 1-2 × 0.1-0.2 cm, linear, acute, margin entire or serrate. Flowers axillary; pedicels ca 2 mm long. Sepals minute. Petals 4, oblanceolate, concave. Stamens 4. Ovary 4-celled, each cell 1-ovulate. Fruit ca 1.5 × 1 mm, rounded, shallowly 4 sulcate, tuberculate.

In shallow water of streams and rivers. Raipur, Shahdol (Saxena, 1972), Surguja. *Fl. & Fr.* : March-May.

2. *Myriophyllum tuberculatum* Roxb., *Fl. Ind.* 1 : 471. 1820; Meijden in *Blumea* 17 : 308. 1969. *M. spathulatum* Blatt. and Hallb. in *J. Ind. Bot. Soc.* 2 : 44, t. 1. 1921.

Aquatic branched herbs. Lower leaves whorled, segmented; upper leaves alternate, 0.5-2 × 0.1-0.3 cm, entire. Flowers minute in middle and upper leaf-axils, mostly all bisexual, rarely upper ones are male and lower ones are female. Bracteoles rhomboid, serrate, acute. Sepals 4, minute, more or less orbicular, erect. Petals 4, elliptic, erect, recurved after anthesis. Stamens 4. Ovary 4-celled, each cell 1-ovulate; stigmas capitate.

Fruit 2.35 × 2.35 mm, quadrangular, indistinctly 4-sulcate, aculeate, tuberculate.

In lakes; rare. Bhopal (*Oomnathan, 1977*). Fl. & Fr. : April - May.

59. CALLITRICHACEAE

(Anand Kumar)

A monotypic family of about 25 species, cosmopolitan (except South Africa); one in M.P.

CALLITRICHE L.

Delicate annual or perennial herbs, submerged or floating, or creeping if growing in wet places. Leaves small, opposite, linear, elliptic, oblong or spatulate, entire, estipulate. Flowers minute, unisexual, axillary, solitary or rarely one male and one female from the same axil, often with 2 caducous, opposite, concave bracts. Calyx and corolla absent. Male flowers : stamen 1, filament thin, anther 2-celled. Female flowers : ovary sessile or sub-sessile, 4-lobed, 4-celled; ovule solitary in each cell, pendulous from the apex of locule; styles 2, free, often long, papillose. Fruit 4-lobed with longitudinally margined or winged lobes.

Callitriche stagnalis Scop., Fl. Carn. ed. 2, 2 : 251. 1772; C.B. Clarke in Hook. f., Fl. Brit. Ind. 2 : 434. 1878.

Submerged herbs, 15-35 cm long, rooting near the base or along the upper few nodes. Submerged leaves sessile, spatulate, upper leaves floating, spatulate, arranged in rosettes, up to 1 × 0.5 cm, glabrous. Bracts ca 1 mm long. Flowers sessile. Stamen 1-5 mm long. Ovary 4-locular, deeply furrowed, subglobose; styles 1-3 mm long, erect, linear; stigma brown. Fruits 2-5 mm long, deeply 4-lobed; seeds 4, minute, reniform.

Surguja. Fl. & Fr. : June - Aug.

60. RHIZOPHORACEAE

(Anand Kumar)

About 16 genera and 120 species, mostly palaeotropical; one species in M.P.

CARALLIA Roxb.

Trees or shrubs. Leaves opposite, petiolate, coriaceous, margin entire or serrulate; stipules interpetiolar, caducous. Flowers small, sessile, in 3-chotomously branched axillary cymes. Bracteoles minute. Calyx tube campanulate; lobes 5-8, erect, valvate. Petals 5-8, inserted on a crenulate disc, clawed, entire or bifid, serrate or lacerate at the apex. Stamens 10

16, inserted with petals on the disc; anthers oblong. Ovary semi-inferior, 3-5-celled; each cell 2-ovuled; style subulate; stigma 3-5-lobed. Fruit globose, 1-celled, coriaceous, 1-seeded, indehiscent; seed sub-reniform.

About 10 species in Madagascar, Indo-Malaysia and N. Australia; one in M.P.

Carallia brachiata (Lour.) Merr. in Philip. J. Sc. 15 : 249. 1919. *Diatoma brachiata* Lour., Fl. Cochinch. 296. 1790. *Carallia lucida* Roxb., Pl. Corom. 3 : 8, t. 211. 1811. *C. integerrima* DC., Prodr. 3 : 33. 1828; Henslow in Hook. f., Fl. Brit. Ind. 2 : 439. 1878.

Evergreen trees, up to 8 m high; bark dark grey. Leaves 5-10 × 2.5-5 cm, ovate-elliptic or obovate, apex subacute or obtuse, base acute or cuneate, coriaceous, thick. Flowers sessile, in axillary 3-chotomous cymes. Calyx tube 4-6 mm long; lobes 7, ovate-deltoid, acute. Petals 7, white or cream-coloured, sub-orbicular, lacerate. Stamens 14, one of each pair of filament opposite to a petal and the other opposite to a sepal. Stigma 4-5-lobed. Fruit red, 1-seeded; seed bright orange coloured.

Along stream-banks; rare. Bilaspur, Raigarh. Fl. & Fr.: Jan. May.

61. COMBRETACEAE

(Anand Kumar)

About 20 genera and 600 species in tropics and subtropics; 5 genera and 17 species in M.P.

- 1a. Flowers in globose heads ...1. *Anogeissus*
- 1b. Flowers in spikes, racemes or panicles :
 - 2a. Petals present :
 - 3a. Petals showy; part of the receptacle above the ovary
3.5-8 cm long; cultivated ...4. *Quisqualis*
 - 3b. Petals not showy; receptacle shorter than 1.5 cm;
wild ...3. *Combretum*
 - 2b. Petals absent :
 - 4a. Calyx-lobes accrescent, persistent ...2. *Calycopteris*
 - 4b. Calyx-lobes not accrescent, caducous ...5. *Terminalia*

1. ANOGEISSUS (DC.) Guill. & Perr.

Trees or shrubs. Leaves alternate or opposite, entire. Flowers in dense globose heads, each flower subtended by a small bract. Sepals 5, connate into a stalk-like tube (lower receptacle), expanded at the apex into a 5-lobed, campanulate cup (upper receptacle), adnate to the ovary at the

base. Petals absent. Stamens 5 + 5; inner ones opposite the lobes; outer epi-sepalous; filaments filiform, exserted; anthers versatile. Ovary inferior, 1-locular; ovules 2, pendulous, attached at the apex of the locule; style 1, filiform, exserted. Fruits 2-winged or 4-ribbed, packed into heads, the calyx-stalk persistent forming a beak. Seed 1, ovoid.

About 8 species in tropical Africa, Arabia and S.E. Asia; 4 in M.P.

- 1a. Calyx-cup completely pubescent outside ...4. *A. sericea*
- 1b. Calyx-cup glabrous, or pubescent only at the base :
 - 2a. Persistent calyx-stalk much shorter than the fruit ...3. *A. pendula*
 - 2b. Persistent calyx-stalk as long as or longer than the fruit :
 - 3a. Leaf apex obtuse; wings of fruits entire ...2. *A. latifolia*
 - 3b. Leaf-apex acute or acuminate; wings of fruits jagged at the apex ...1. *A. acuminata*

1. *Anogeissus acuminata* (Roxb. ex DC.) Guill. & Perr., Fl. Seneg. Tent. 7 : 280. 1832. *Conocarpus acuminata* Roxb. ex DC., Prodr. 3 : 16. 1828. *A. acuminata* (Roxb. ex DC.) Guill. & Perr. var. *lanceolata* Wall. ex Clarke in Hook. f., Fl. Brit. Ind. 2 : 451. 1878. *A. acuminata* (Roxb. ex DC.) Guill. & Perr. var. *typica* Clarke in Hook. f., Fl. Brit. Ind. 2 : 451. 1878.

Trees, up to 25 m high; branches drooping. Leaves opposite or sub-opposite, 2 - 6.5 × 1 - 3.5 cm, elliptic or lanceolate, glabrous or sparsely hairy above, more or less sericeous below, apex acute or acuminate, base cuneate; petiole 2 - 6 mm. Inflorescence axillary and terminal; peduncle 5 - 20 mm, tomentose. Flower heads 8 - 20 mm in diam. Flowers yellow or greenish-yellow. Calyx-stalk 4 - 6 mm long, villous; calyx-cup 1 mm long, glabrous without or tomentose only at the base. Filaments 3 - 4 mm long. Ovary tomentose at the apex, glabrous below; style 3 - 4 mm long. Fruits 3.5 - 4 × 4 - 6 mm, persistent calyx-stalk 3 - 5 mm long.

Along river-banks and in teak forests. Bastar, Guna, Gwalior, Hoshangabad, Jabalpur, Seoni. Fl. & Fr. : Feb. - April.

2. *Anogeissus latifolia* (Roxb. ex DC.) Wall. ex Guill. & Perr., Fl. Seneg. Tent. 7 : 280. 1832; Scott in Kew Bull. 33 : 560. 1979. *Conocarpus latifolia* Roxb. ex DC., Prodr. 3 : 16. 1828. *Anogeissus latifolia* var. *glabra* Clarke in Hook. f., Fl. Brit. Ind. 2 : 450. 1878. *A. latifolia* var. *villosa* Clarke in Hook. f., Fl. Brit. Ind. 2 : 450. 1878.—*Dhawda*, *Safed-dhawda*.

Trees, up to 25 m high; bark greyish-white, smooth. Leaves alternate or sub-opposite, 4.5 - 11 × 3 - 6.5 cm, elliptic or ovate-elliptic, glabrous, apex obtuse, base obtuse or truncate; petioles 6 - 13 mm. Inflorescence axillary and terminal; flower heads 2 - 5, racemose, 6 - 12 mm in diam.

Flowers yellow. Calyx-stalk 4-6 mm long, glabrous or sparsely hairy; calyx-cup 1-1.5 mm long, glabrous. Filaments ca 3 mm long. Ovary glabrous; style ca 3 mm long. Fruits 4-5 × 4.5-6 mm, glabrous; persistent calyx-stalk 4-6 mm long, curved.

In dry deciduous forests. Balaghat, Bastar, Bhopal, Bilaspur, Damoh, East Nimar, Guna, Hoshangabad, Indore, Jabalpur, Mandla, Narsimhapur, Panna, Raigarh, Raipur, Raisen, Rajnandgaon, Rewa, Sagar, Satna, Sconi, Shahdol, Shivpuri, Sidhi, Surguja, Tikamgarh. *Fl. & Fr.* : Aug. - March.

3. *Anogeissus pendula* Edgew. in J. As. Soc. Bengal 21 : 171. 1853; Clarke in Hook. f., *Fl. Brit. Ind.* 2 : 451. 1878. - *Kadai, Kardhai*.

Trees, up to 8 m high; branches pendulous. Leaves alternate and sub-opposite, 1.5-4 × 0.5-1.8 cm, elliptic or obovate; silky hairy when young, appressed short hairy or glabrous later on; apex obtuse, acute or sub-acuminate; base cuneate; petioles 1-3 mm. Inflorescence axillary and terminal; heads usually solitary, 8-15 mm in diam.; peduncles 1-3.5 cm long, sericeous. Flowers yellow. Calyx-stalk 2-4 mm long, villous; calyx-cup ca 1 mm long, glabrous, sometimes silky at the base. Filaments ca 3 mm long. Ovary villous near the apex, style 3 mm long. Fruits 5-6 × 6 mm, glabrous, except at the apex; wings narrow, jagged at the apex.

In scrub and dry deciduous forests. Gwalior, Hoshangabad, Indore (*Rao & Sastry, 1965*), Jabalpur, Panna, Raisen, Rewa, Sagar, Satna, Shivpuri, Tikamgarh, Vidisha. *Fl. & Fr.* : Aug. - March.

4. *Anogeissus sericea* Brandis in *Ind. For.* 25 : 287. 1899; Scott in *Kew Bull.* 33 : 558. 1979. *A. latifolia* (Roxb. ex DC.) Wall. ex Guill. & Perr. var. *parviflora* Clarke in Hook. f., *Fl. Brit. Ind.* 2 : 450. 1878.

A medium-sized tree; branches pendulous, silky pubescent. Leaves opposite or sub-opposite, 2.5-5 × 1.5-2.5 cm, elliptic, apex acute, sub-acuminate, obtuse or mucronulate, young leaves rusty-silky pubescent, mature leaves densely silky above and beneath with long hairs; petioles 2-4 mm. Inflorescence axillary and terminal; peduncle 1-3 cm long; heads globose, 1.2-2 cm in diam. Flowers yellow. Calyx stalk 4-5 mm, slender. Fruits ca 3.5 × 5 mm, pubescent at the apex, persistent calyx stalk 4-5 mm long, wings jagged the apex and sides.

In deciduous forests. 'Central Provinces' (*Clarke, l.c.*), Hoshangabad (*Scott, l.c.*), Indore (*Rao & Sastry, 1965*), Jabalpur. *Fl. & Fr.* : March - July.

2. CALYCOPTERIS Lamk.

Monotypic genus; found in India, Burma, Indo-China, Siam and the Malaya Peninsula; 1 species in M.P.

Calycopteris floribunda Lamk., *Encycl.* 2 : 485, t. 357. 1797; Clarke in Hook. f., *Fl. Brit. Ind.* 2 : 449. 1878. *Getonia floribunda* (Lamk.) Roxb., *Pl. Corom.* t. 87. 1798.

Scandent shrubs; young branches densely fulvous tomentose. Leaves opposite, 4.5 - 12.5 × 2.5 - 4 cm, ovate - elliptic, densely fulvous-pubescent above when young, glabrescent later on, apex acute to acuminate, base cuneate, rounded or sub-cordate; petioles 0.5 - 1 cm, fulvous-tomentose. Flowers yellowish-green, bisexual, in terminal leafy 10 - 30 cm long panicles. Lower part of the calyx-tube (or lower receptacle) ca 4.5 mm, adnate to the ovary, fulvous-villous; upper receptacle 3 - 4 mm, campanulate, fulvous-villous. Calyx-lobes 5, up to 2 mm long, elliptic or oblanceolate, fulvous-hairy. Petals absent. Stamens 5 + 5; filaments ca 2.5 mm, anthers versatile. Disc cupular. Ovary with 3-pendulous ovules, only 1 is fertile; style 4 - 5 mm long, subulate. Fruit 7 - 8 × 2 - 3 mm, ellipsoid, 5-ribbed, villous, crowned by 5 spreading, accrescent (1 - 1.5 cm long) calyx-lobes; seed solitary.

In dense moist deciduous forests; rare. Bastar. *Fl. & Fr.* : Feb. - April.

3. COMBRETUM Loefl.

Woody climbers or dwarf shrubs. Leaves opposite, verticillate or sometimes alternate, entire, often with small peltate scales beneath. Inflorescence spicate, simple or paniced. Flowers polygamo-dioecious; hypanthium constricted above the ovary. Calyx-lobes 4 - 5, deltoid to subulate. Petals 4 - 5, small, inserted between the calyx-lobes. Stamens 8 - 10, usually biseriate and exserted. Disc intra-staminal with or without a free margin, sometimes absent or reduced. Ovary 1-celled; ovules 2 - 6, pendulous; style subulate, usually exserted. Fruits 4 - 5-angled or winged, coriaceous, usually indehiscent, 1-seeded.

About 250 species, throughout the tropics (except Australia); 3 in M.P.

- | | |
|---|----------------------------|
| 1a. Dwarf undershrubs | ...2. <i>C. nanum</i> |
| 1b. Climbing shrubs or woody climbers : | |
| 2a. Flowers 4-merous; fruits 4-winged | ...1. <i>C. albidum</i> |
| 2b. Flowers 5-merous; fruits 5-winged | ...3. <i>C. roxburghii</i> |

1. *Combretum albidum* G. Don in *Trans. Linn. Soc. London* 15 : 429. 1827. *C. ovalifolium* Roxb., *Fl. Ind.* 2 : 226. 1832; Clarke in Hook. f., *Fl. Brit. Ind.* 2 : 458. 1878.

Scandent shrubs or lianas. Leaves opposite, 4.5 - 12 × 2.5 - 8.5 cm, elliptic or ovate-elliptic, apex acuminate rarely rounded, base acute; petiole 5 - 15 mm long. Flowers white, subsessile, in dense axillary and terminal, up to 35 cm long, paniced spikes. Bracts minute. Calyx tube constricted

above the ovary, then expanded into a cup shaped limb; calyx-lobes ca 1 mm long, ovate, acute. Petals ca 1.5 mm long, oblong, obtuse. Disc hairy. Stamens 4 + 4. Fruits 2 2.5 × 1 - 2 cm, pale golden-brown; wings thin, transversely striate; seeds 4- angled.

In deciduous forests. Bastar, Bhopal, Damoh, Guna, East Nimar, Hoshangabad, Indore, Jabalpur, Raipur, Raisen. Sagar, Seoni, Shahdol. *Fl. & Fr.* : Nov. - June.

2. *Combretum nanum* Buch.- Ham. ex D. Don, Prodr. Fl. Nep. 219. 1825; Clarke in Hook. f., Fl. Brit. Ind. 2 : 457. 1878.

Dwarf woody undershrubs; branches 5 - 40 cm long. Leaves opposite or alternate, 1 - 6.5 × 0.8 - 5 cm, coriaceous, obovate or oblanceolate, apex rounded or sub-acute; petiole up to 1 cm long. Flowers white, 4-merous, in dense sub-terminal 2.5 - 10 cm long racemes; pedicels 2 - 3.5 mm. Calyx-tube constricted above the ovary, then expanded into a funnel-shaped limb. Calyx lobes ca 1 mm long, ovate-deltoid, acute. Petals slightly exceeding the sepals, narrow, obovate. Disc and base of the calyx with long fulvous hairs. Filaments 4 - 5 mm long. Fruits bright red, 2.5 - 3.5 × 1.5 - 2.5 cm, 4-winged.

Among grasses in outskirts of the sal forests. Balaghat, Bastar, Bilaspur, Mandla, Raipur, Shahdol. *Fl. & Fr.* : Feb. - May.

3. *Combretum roxburghii* Spreng., Syst. 2 : 331. 1825. *C. decandrum* Roxb., Pl. Corom. t. 59. 1796 (*non* Jacq., 1760); Clarke in Hook. f., Fl. Brit. Ind. 2 : 452. 1878.- *Bellora, Medila*.

A large climbing shrub; young leaves and inflorescence silky hairy. Leaves opposite, 5 - 14 × 2.5 - 6 cm, elliptic or elliptic-oblong, apex acuminate, glabrous above, puberulous beneath; petiole 4 - 10 mm long. Flowers in terminal and axillary, 10 - 25 cm long panicles. Bracts large and conspicuous, creamy white. Calyx tube urceolate, densely villous; lobes minute, acuminate, hairy. Petals slightly longer than the calyx, ovate, acuminate, hairy. Stamens 5 + 5. Fruits 2 - 2.5 × 1 - 1.5 cm, oblong or elliptic.

In mixed deciduous forests especially along the streams, climbing on trees. Bastar, Bilaspur, East Nimar, Raigarh, Raipur, Rajnandgaon, Sidhi, Surguja. *Fl. & Fr.* : Oct. - April.

4. *QUISQUALIS* L.

Woody climbers. Leaves opposite or sub-opposite, entire; petiole bases forming thorns after the fall of the leaf. Flowers 5- merous, bisexual, in terminal or axillary, bracteate (sometimes branched) spikes. Receptacle (calyx-tube) divided into a lower part (lower receptacle) surrounding and

adnate to ovary and a tubular upper part (upper receptacle) terminating in the calyx-lobes. Calyx-lobes 5, triangular. Petals 5. Stamens 5 + 5, inserted inside and near the mouth of the upper receptacle. Style adnate to the inner wall of the upper receptacle; ovules 2-4. Fruits dry, oblong, narrowed at both ends, 5-angled; seed 1, longitudinally sulcate.

About 17 species mainly tropical; one planted in M.P.

Quisqualis indica L., Sp. Pl. ed. 2. 556. 1762; Clarke in Hook. f., Fl. Brit. Ind. 2 : 459. 1878.

Woody climbers; young shoots pubescent. Leaves opposite or sub-opposite, 5-13 × 2.5-6.5 cm, ovate-elliptic, or elliptic-oblongate, papyraceous, tomentose or glabrous, apex acuminate, base rounded or sub-cordate; petioles 0.5-2 cm, tomentose or glabrous. Flowers white turning to red or orange, showy, fragrant, in terminal and axillary up to 6 cm long spikes; bracts leafy. Calyx lobes 1-2 mm long, ovate, apex acute. Petals 1-2 × 0.3-0.6 cm, oblong or oblanceolate or obovate, rounded at the apex. Ovules 3-4. Fruits dark brown, 2.5-3.5 × 0.6-1.2 cm, ovate-elliptic.

Commonly planted in gardens and houses for its attractive flowers. Bhopal, Jabalpur, Mandla, Shivpuri. *Fl. & Fr.* : Throughout the year.

5. TERMINALIA L.

Trees. Leaves usually spiral, often forming pseudo-whorls at the ends of branchlets, usually petioled, entire, often punctate, usually with 2 glands on the petiole or near the base of midrib beneath. Inflorescence spicate, simple or branched. Flowers actinomorphic, 5-merous (rarely 4-merous), bisexual or polygamous; lower part of receptacle adnate to the ovary and often narrowed above it and an upper part often scarcely developed, expanding into a shallow cup terminating in the calyx-lobes. Calyx-lobes deltoid, ovate or triangular. Petals absent. Stamens 10, exserted. Disc intra-staminal. Ovary inferior, unilocular with 2 (-4) pendulous ovules; style simple, exserted. Fruit dry or fleshy, angular, entire or winged.

About 200 species distributed throughout the tropics; 8 in M.P.

1a. Leaves clustered at the ends of the branches :

2a. Leaves obovate; fruits 2-ridged when dry, glabrous ...4. *T. catappa*

2b. Leaves broadly elliptic; fruits faintly 5-ridged when dry, minutely brown tomentose ...3. *T. bellirica*

1b. Leaves not clustered at the ends of branches :

- 3a. Fruits more or less 5-ridged when dry :
- 4a. Spikes simple ...8. *T. gella*
- 4b. Spikes paniced ...5. *T. chebula*
- 3b. Fruits winged :
- 5a. Bark smooth; fruits with narrow hard wings ...2. *T. arjuna*
- 5b. Bark rough; fruits with broad thin papery wings :
- 6a. Fruits minutely yellowish-brown velvety ...6. *T. coriacea*
- 6b. Fruits glabrous :
- 7a. Leaves glabrous; panicles lax ...7. *T. crenulata*
- 7b. Leaves tomentose beneath; panicles dense ...1. *T. alata*

1. *Terminalia alata* Heyne ex Roth, Nov. Pl. Sp. 379. 1821. *T. tomentosa* (Roxb. ex DC.) Wight & Arn., Prodr. 314. 1834; Clarke in Hook. f., Fl., Brit. Ind. 2 : 447. 1878. *Pentaptera tomentosa* Roxb. ex DC., Prodr. 3 : 14. 1828.- *Saja*.

Trees, up to 25 m high; bark rough, fissured. Leaves sub-opposite or opposite, 5.5 - 16.5 × 3 - 7 cm, elliptic-oblong or ovate-oblong, coriaceous above, tomentose beneath, apex acute or sometimes rounded, base truncate-cordate or sub-acute, glands near the base of midrib stalked; petiole 5 - 14 cm long. Flowers greenish-yellow, bisexual in branched axillary up to 8 cm long and terminal up to 20 cm long panicles; pedicel ca 1 mm long, thick. Calyx villous; lobes ca 1.5 × 1 mm, ovate-triangular. Filaments ca 3 mm long. Fruits 3 - 4.5 × 3 - 4 cm; wings 5, with many horizontal veins.

Common in dry and moist deciduous forests. Balaghat, Bastar, Bilaspur, Damoh, Durg, East Nimar, Hoshangabad, Indore, Jabalpur, Mandla, Raigarh, Raipur, Raisen, Rewa, Satna, Seoni, Shahdol, Shivpuri, Sidhi, Surguja. *Fl.* : April - June; *Fr.* : Most parts of the year.

Wood is of timber value.

2. *Terminalia arjuna* (Roxb. ex DC.) Wight & Arn., Prodr. 314. 1834; Clarke in Hook. f., Fl. Brit. India 2 : 447. 1878. *Pentaptera arjuna* Roxb. ex DC., Prodr. 3 : 14. 1828.- *Arjun, Kahu, Koa*.

Trees up to 25 m high; bark grey, smooth. Leaves sub-opposite, 5 - 14 × 2 - 4.5 cm, oblong or elliptic-oblong, glabrous, often inequilateral, margin often crenulate, apex obtuse or sub-acute, base rounded or sometimes cordate; petioles 0.5 - 1.2 cm; glands usually 2. Flowers small, white. Fruits 2.3 - 3.5 cm long, fibrous-woody, glabrous with 5 hard wings, striated with numerous curved veins.

Along banks of streams and rivers, and in mixed forests. Balaghat, Bastar, Bhopal, Bilaspur, Chhatarpur, Chhindwara, Damoh, Durg, Hoshangabad, Indore, Jabalpur, Jhabua, Mandla, Raigarh, Raipur, Raisen, Rewa, Sagar, Satna, Seoni, Shahdol, Shivpuri, Sidhi, Surguja, Tikamgarh. *Fl.* : April - May; *Fr.* : Almost throughout the year.

3. *Terminalia bellirica* (Gaertn.) Roxb., Pl. Corom. t. 198. 1805 ('*bellerica*'); Clarke in Hook. f., Fl. Brit. Ind. 2 : 445. 1878. *Myrobalanus bellirica* Gaertn., Fruct. 2 : 90, t. 97, fig. a-d, 1791 ('*bellirica*'). - Baheda, Bahera.

Trees up to 20 m high; bark fissured, bluish-grey. Leaves alternate, 6 - 20 × 4 - 15 cm, broadly elliptic, inequilateral, glabrous, apex obtuse or sub-acute, base cuneate, glands absent; petiole 3.5 - 9 cm long. Flowers greenish-yellow, in simple 5 - 12.5 cm long terminal, clustered spikes; flowers male in upper part of the spike and bisexual in the lower part. Calyx pubescent without, densely villous within; lobes triangular-ovate, reflexed. Filaments 4.5 - 6 mm. Fruits ca 2.5 × 1.8 cm, ovoid.

In mixed and sal forests. Balaghat, Bhopal, Bilaspur, Damoh, Durg, Hoshangabad, Indore, Jabalpur, Mandla, Raigarh, Raipur, Raisen, Rewa, Rajnandgaon, Sagar, Satna, Shivpuri, Seoni, Shahdol, Sidhi, Surguja. *Fl.* : April - May; *Fr.* : Most parts of the year.

The fruit is well known commercial myrobalan called 'belleric myrobalan' and is one of the components of 'Triphala'.

4. *Terminalia catappa* L., Syst. Nat. ed. 12. 2 : 674. 1767; Clarke in Hook. f., Fl. Brit. Ind. 2 : 444. 1878. - Deshi Badam, Jangali Badam.

Trees, up to 15 m high; bark black, rough. Leaves spiral, 9.5 - 30 × 5 - 15 cm, obovate, chartaceous, glabrous, apex rounded or sub-acuminate, base sub-cordate with usually 2 - glands, leaves becoming red before falling; petiole 0.5 - 2 cm, rusty-tomentose. Flowers white, polygamous, in 8 - 15 cm long solitary axillary spikes; pedicels 1 - 4 mm. Calyx 1 - 1.5 × 1 mm, ovate, obtuse, sericeous or glabrous. Fruits 3 - 5.5 × 2 - 3.5 cm, ellipsoid, slightly compressed.

Planted for its edible fruits. Bhopal, Indore, Rajnandgaon. *Fl.* : Dec. - Jan.; *Fr.* : May - Sept.

5. *Terminalia chebula* Retz., Obs. Bot. 5 : 31. 1789; Bedd., Fl. Sylv. t. 27. 1869; Clarke in Hook. f., Fl. Brit. Ind. 2 : 446. 1878, p.p. - Harra.

Trees up to 18 m high; bark dark brown. Leaves alternate or sub-opposite, 5 - 14 × 3 - 7.5 cm, elliptic-oblong or ovate-elliptic, inequilateral, silky hairy when young, glabrous later on, apex acute or obtuse, base acute or rounded or sometimes cordate, glands 2; petioles 0.8 - 2.5 cm. Flowers creamy white, bisexual, in terminal 10 - 15 cm long panicles; pedicels ca 1

mm thick. Calyx glabrous without, hairy within; lobes ovate-deltoid. Filaments ca 3 mm long. Fruits ellipsoid, up to 3.5 × 2 cm.

In dry deciduous and sal forests. Balaghat, Bastar, Betul, Bilaspur, Chhindwara, Damoh, Durg, Hoshangabad, Jabalpur, Mandla, Rajnandgaon, Raipur, Raisen, Shahdol, Seoni, Sidhi, Surguja. Fl. : April - June; Fr. : Winter season.

Fruits are one of the ingredients of 'Triphala'.

6. *Terminalia coriacea* (Roxb.) Wight & Arn., Prodr. 315. 1834. *Pentaptera coriacea* Roxb., Fl. Ind. 2 : 438. 1832. *Terminalia tomentosa* (Roxb. ex DC.) Wight & Arn. var. *coriacea* (Roxb.) Clarke in Hook. f., Fl. Brit. Ind. 2 : 448. 1878.

Trees up to 25 m high; bark grey, deeply fissured; young branches, inflorescence and under surface of leaves yellowish-brown velvety. Leaves sub-opposite, 9 - 15 × 4 - 6.5 cm, ovate-elliptic-oblong, coriaceous, margin more or less crenate, apex obtuse or sub-acute, base unequally sub-acute or cordate, glands 1 or 2, sessile; petiole 7 - 13 mm long. Flowers cream coloured, in axillary up to 6 cm long or terminal up to 12 cm long panicles. Calyx brown tomentose; lobes triangular-ovate. Filaments 2 - 2.5 mm. Fruits up to 3.5 × 4 cm, 5-winged.

In dry deciduous forests. Hoshangabad, Vidisha. Fl. & Fr. : July - Sept.

7. *Terminalia crenulata* Roth, Nov. Pl. Sp. 380. 1821. *T. tomentosa* (Roxb. ex DC.) Wight & Arn. var. *crenulata* (Roth) Clarke in Hook. f., Fl. Brit. Ind. 2 : 448. 1878.— *Saj*.

Trees up to 20 m high; bark greyish-black. Leaves alternate or sub-opposite, 8 - 20 × 5 - 9 cm, broadly elliptic or elliptic-obovate, glabrous, margin entire or crenulate, apex acute or obtuse, base unequal, subacute or cordate, glands 2, stalked; petiole up to 2 cm long. Flowers pale yellow, in axillary up to 10 cm long and terminal up to 20 cm long rusty-tomentose panicles. Calyx glabrous without; lobes ca 1 mm long, ovate, obtuse. Fruits up to 3 × 3.5 cm; wings 5, horizontally veined.

In deciduous forests, also planted along the roadsides. Bhopal, Raisen (Oommachan, 1977). Fl. : April - May; Fr. : Most parts of the year.

8. *Terminalia gella* Dalz. in Hook., Journ. Bot. 3 : 227. 1851; Gamble, Fl. Pres. Madras 3 : 464. 1919.

Trees, up to 20 m high. Leaves not clustered, up to 23 × 12 cm, ovate or ovate-oblong, coriaceous, pubescent on either side, young ones tawny-woolly tomentose; petioles 1.5 - 2.5 cm long, glands 2 at the base of

lamina. Spikes axillary, solitary, densely tawny pubescent as are the branchlets, shorter than the leaves. Lower flowers bisexual, shortly pedicelled; the upper male, sessile. Calyx-lobes triangular, acute. Fruits ovoid, ellipsoid or rounded, faintly 5-ridged when dry, minutely brown tomentose, 1.8-2 cm in diam.

In hilly forests. Bastar (*Subramanayam & Henry, 1967*). Fl. & Fr. : March-Nov.

62. MYRTACEAE

(A. K. Mukherjee)

About 100 genera and 3,000 species, mainly in tropical areas of Australia and America; 4 genera and 9 species in M.P.

- 1a. Fruits dry, loculicidally splitting above :
 - 2a. Petals not calyptrate; flowers in proliferous spikes ...1. *Callistemon*
 - 2b. Petals calyptrate; flowers not in spikes ...2. *Eucalyptus*
- 1b. Fruits baccate :
 - 3a. Ovary more than two-celled; calyx closed in bud, lobes valvate ...3. *Psidium*
 - 3b. Ovary two-celled; calyx not closed in bud, lobes free...4. *Syzygium*

1. CALLISTEMON R. Br.

Trees or large shrubs with willowy foliage and often small bright red or crimson flowers conspicuous by being close together and sessile in a proliferous spike; the small dry fruits remaining for a long time clustered round the branches far below the terminal leaves. Hypanthium more or less globose or urceolate with deciduous dry sepals and caducous petals. Stamens very long, usually brightly coloured, free. Ovary 3-4-celled, pubescent on the top which is depressed round the style. Ovules numerous on peltate placentae. Capsules opening by loculicidal small slits at the top.

A genus with about 25 species distributed mainly in Australia and New Caledonia. Two horticultural species namely, *Callistemon viminalis* Cheel and *C. lanceolatus* DC. have been recorded from gardens of Madhya Pradesh. These are commonly known as bottle brush.

2. EUCALYPTUS L' Herit.

Trees, often gigantic in their native forests; sometimes flowering when quite small; secreting an aromatic gum or resin. Leaves coriaceous, at first often opposite, sessile and horizontal, in older trees they hang obliquely or vertically, petioled and of a different shape, studded with oil glands and

frequently glaucous. Flowers small, in heads or umbels, rarely solitary, axillary. Hypanthium continuous with the pedicel and often usually produced beyond the ovary as a truncate 'Calyx-tube' without sepals. Petals entirely fused into a calyptra. Stamens numerous. Ovary 3 - 6-celled with numerous axile ovules. Fruits usually hard and woody dehiscing loculicidally at the top; seeds numerous.

About 500 species mainly in Australia and Tasmania. Two species have been recorded from Madhya Pradesh. It is difficult to confirm the identity of *Eucalyptus* spp. grown in Madhya Pradesh as most of them are hybrid cultivars.

1a. Inflorescence a corymbose panicle, usually terminal

...1. *E. maculata*

1b. Inflorescence axillary, umbellate

...2. *E. umbellata*

1. *Eucalyptus maculata* Hook., Ic. Pl. 7 : 619, 1844; Haines, Bot. Bihar Orissa 365. 1922.

Tall handsome trees with smooth somewhat shining whitish or reddish-grey bark mottled with the remains of the older bark. Seedlings rough with red-brown hairs. Branchlets slightly angular. Leaves shining or not, alternate, linear-lanceolate, often somewhat falcate, secondary nerves crowded, rather spreading, prominent with marginal nerve very close to edge, oil-dots not prominent. Flowers in short panicles, sometimes 2-3-nate on the panicle or solitary; pedicels shorter than calyx. Calyx-tube short, lid double, inner transparent shining, outer hemispheric, pointed. Anthers oval-clavate. Fruits globose or sub-clavate, rim narrow, 2-4-valved.

Planted along road sides. Bilaspur. Fl. & Fr. : Almost throughout the year.

2. *Eucalyptus umbellata* Dum., Cours. Bot. Cult. ed. 2, 7 : 279. 1814; Anonymous, Wealth of India 3 : 216. 1952. *Eucalyptus tereticornis* Haines, Bot. Bihar Orissa 366. 1922 (non J.E. Sm. 1795).

Tall trees with smooth ashy grey or white bark and slender branches. Leaves alternate, lanceolate-falcate; secondary nerves prominent; oil-dots scanty or obscure. Umbels short-peduncled, 4-8 fid, lateral or supra-axillary or solitary. Calyx-tube semi-globose, lid often much elongated in a gradually tapering cone. Fruits sub-globose, top more protruding. The seedlings have opposite and almost oval leaves.

Planted along road sides and in forests. Bilaspur, Balaghat, Chhatarpur, Indore, Narsimhapur, Raigarh, Raipur, Rajnandgaon, Satna, Sidhi, Shivpuri, Surguja. Fl. & Fr. : Almost throughout the year.

3. PSIDIUM L.

Small trees or shrubs. Leaves opposite, entire, not dotted. Flowers large, white on one to few-flowered axillary peduncles. Calyx urceolate or obovate, limb undivided in aestivation, separating valvately into 4 - 5 lobes when in flower. Petals 4 or 5, free. Stamens many, inserted in several series on a wide disc. Ovary many-celled, with numerous ovules in each cell; style subulate; stigma peltate or capitate. Fruits globose, ovoid or pyriform berries, usually crowned by the calyx-limb; seeds many, subreniform, testa hard; embryo curved with short cotyledons and long radicle.

About 140 species mainly in tropical America and West Indies; one species cultivated in M.P.

Psidium guajava L., Sp. Pl. 470. 1753; Duthie in Hook. f., Fl. Brit. Ind. 2 : 469. 1878.-Amrud.

Small trees or large shrubs; bark greyish-black, rough, longitudinally fissured, peeling off in irregular flakes. Leaves opposite, oblong or elliptic-oblong or obovate, coriaceous, entire, softly hairy beneath. Flowers white or creamy white, 2.5 - 4 cm across. Berries 6 - 10 cm across, globose, ovoid or pyriform, fleshy, dark green when fresh and sulphur-yellow or rosy-purple on ripening with white or rosy-purple pulp; seeds minute, ellipsoid, smooth, hard, pale-brown.

Cultivated for its edible fruits, almost in all districts. Fl. & Fr. : Almost throughout the year, mainly in rainy and cold seasons.

4. SYZYGIUM R. Br. ex Gaertn.

Trees or shrubs. Leaves opposite, rarely alternate, entire, glabrous, often pellucid-dotted. Flowers small, in terminal axillary or lateral cymes, usually corymbose, bracteoles small, deciduous or absent. Calyx tube turbinate or funnel-shaped, the limb 4-rarely 5-lobed, thickened; staminal disc absent. Petals 4 - 5, rounded, concave, usually falling off as a calyptrate lid, sometimes singly. Stamens very numerous, free, bent inwards at the middle when in bud. Ovary 2-celled, with several ovules in each cell; style and stigma simple. Fruits 1-celled, 1-or few-seeded berry, globose pyriform or oblong, crowned with calyx-limbs; seeds globose.

About 500 species, palaeotropical; 4 in M.P.

- 1a. Stamens inserted on a thickened disc; petals usually not calyptrate; flowers large ...3. *S. jambos*
 1b. Stamens not inserted on a thickened disc; petals usually calyptrate; flowers small :

- 2a. Secondary nerves 8 - 15, distinct and raised beneath ... 4. *S. nervosum*
- 2b. Secondary nerves numerous and very fine, close and not raised beneath :
- 3a. Leaves oblong or elliptic-oblong; 3.5 - 9.5 cm broad ... 1. *S. cumini*
- 3b. Leaves oblong or lanceolate, 1 - 4.5 cm broad ... 2. *S. heyneanum*

1. *Syzygium cumini* (L.) Skeels, U.S.D.A. Bur. Pl. Industr. Bull. 248 : 25. 1912. *Myrtus cumini* L., Sp. Pl. 471. 1753. *Eugenia jambolana* Lamk., Encycl. 3 : 198. 1789; Duthie in Hook. f., Fl. Brit. Ind. 2 : 499. 1879.- *Jamun*.

Large glabrous evergreen trees with ash-brown smooth bark. Leaves oblong or elliptic-oblong, 10 - 15 cm long; acute or acuminate, shining, with numerous close spreading secondary nerves and intermediate nearly as strong. Flowers pale green white, sessile, mostly in threes in trichotomous panicles with terete branches. Hypanthium turbinate, 0.3 - 0.5 cm long. Petals calyptrate. Berries ellipsoid or oblong, often curved; seeds nearly always solitary with thick, rounded, fleshy cotyledons closely appressed on their inner faces.

Growing in sal forest margins, along road sides, streams and rivers. Balaghat, Bilaspur, Damoh, Durg, Hoshangabad, Mandla, Raigarh, Raipur, Rajnandgaon, Shahdol, Seoni, Sidhi, Shivpuri, Surguja. Fl. : Feb. - May; Fr. : June - Aug.

2. *Syzygium heyneanum* Wall. ex Wight & Arn., Prodr. 1 : 329. 1834. *Eugenia heyneana sensu* Duthie in Hook. f., Fl. Brit. Ind. 2 : 500. 1879.

Shrubs or small bushy trees 2 - 5 m tall with smooth ash-coloured bark. Leaves narrowly oblong-elliptic or lanceolate, 7 - 14 × 1.25 - 2.5 cm, acuminate, glabrous, with evident glands. Cymes usually long-peduncled, 5 - 7.5 cm long with brachiate branches, from leafless wood. Flowers white, sub-sessile, usually several in a head. Sepals small. Berries oblong, 1-1.5 cm long, crowned by the calyx tube, pale purple when ripe.

Growing along the margins of streams and rivers. Hoshangabad, Raipur, Rewa, Seoni, Shivpuri, Sidhi, Surguja. Fl. : March - May; Fr. : June - Aug.

3. *Syzygium jambos* (L.) Alston in Trimen, Handb. Fl. Ceylon 6 : 116. 1931. *Eugenia jambos* L., Sp. Pl. 175, 470. 1753; Duthie in Hook. f., Fl. Brit. Ind. 2 : 474. 1878.- *Gulab-jamun*.

Small trees. Leaves lanceolate, 12 - 20 cm long, narrowed into a short petiole; secondary nerves rather distant, joined by a prominent looping intramarginal one. Flowers 7 - 10 cm across, in short racemose cymes.

Sepals rounded. Stamens long, numerous. Fruits globose, white, 2.5 - 5 cm long; seeds 1 - 2, grey, loose in the large cavity of the succulent pericarp.

Cultivated near habitations. Bilaspur, Surguja. Fl. : March - April; Fr. : May - July.

4. *Syzygium nervosum* DC., Prodr. 3 : 260. 1828; Panigr. and Mishra in Taxon 34 : 299. 1985. *Eugenia operculatum* Roxb., Fl. Ind. 2(2) : 486. 1832; Duthie in Hook. f., Fl. Brit. Ind. 2 : 498. 1879.

Large trees with spreading branches; bark grey-brown; twigs whitish. Leaves pinkish when young, yellow-brown when old, 6 - 12 × 3 - 5 cm, elliptic-obovate, acuminate, chartaceous, with undulate margins; nerves 7 - 15 pairs, prominent on undersurface; intramarginal nerve prominently looped; petioles 0.8 - 1.1 cm long. Cymes 5 - 8 cm long, lax. Flowers 1 - 1.2 cm across. Calyx campanulate, calyptrate. Petals 2 - 4 × 3 mm, oblong. Stamens 5 - 7 mm long. Fruits ellipsoid, purple, succulent, crowned with calyx ring and persistent style remnant.

Growing along the sides of streams and nalas. Bilaspur, Surguja. Fl. : March - May; Fr. : June - July.

63. LECYTHIDACEAE

(A. K. Mukherjee)

About 15 genera and 325 species, mainly in tropical America; 2 genera and 2 species in M.P.

- | | |
|---------------------------------------|---------------------------|
| 1a. Flowers in long pendulous racemes | ...1. <i>Barringtonia</i> |
| 1b. Flowers in short spikes | ...2. <i>Careya</i> |

1. BARRINGTONIA J.R. & G. Forst.

Shrubs or trees. Leaves usually large, stipulate, spirally arranged; leaf scars distinct on twigs. Flowers in terminal or lateral long pendulous racemes. Calyx segments 2 or 4, adnate to the ovary. Petals 4 or 5, adnate to the staminal tube. Stamens numerous, connate at the base into a thick tube; filaments very long, inner whorls reduced to bristle-like staminodes; anthers 2-celled, basifixed, dehiscent laterally. Ovary 2 - 4 celled with many ovules in each cell; style long, simple. Fruits fibrous or leathery, 1-celled, indehiscent; seed 1, large.

About 39 species in East Africa, East and South-East Asia, Pacific Islands and Australia; one in M.P.

Barringtonia acutangula (L.) Gaertn., Fruct. 2 : 97, pl. 101. 1791; Clarke in Hook. f., Fl. Brit. Ind. 2 : 508. 1879. *Eugenia acutangula* L., Sp. Pl. 471. 1753.

Small trees, up to 20 m high. Leaves elliptic, 6-15 × 2-6 cm, subsessile, tapering to base, acute or acuminate at the apex, glabrous or slightly hairy beneath. Racemes terminal, pendulous, up to 50 cm long, densely flowered. Flowers 2-3 cm across. Sepals 4, free, semicircular. Petals 4 or 5. Stamens numerous in 3 whorls, inner one staminodal. Ovary usually 2-celled. Fruits ovoid, 2-6 × 1-2.5 cm, bluntly quadrangular.

Growing along the banks of rivers and streams. Satna. Fl. : July-Aug.; Fr. : Oct. - Nov.

2. CAREYA Roxb.

Trees up to 20 m tall. Leaves spirally arranged, crowded at the tips of the twigs. Flowers in crowded erect spikes. Calyx tube adnate to ovary and not produced beyond it; segments usually 4, imbricate. Petals 4 or 5, imbricate. Stamens numerous in many whorls, connate at the base. Ovary inferior, usually 4-celled, with numerous ovules in 2 rows; style long, simple. Fruits globose, large, fleshy, indehiscent, with numerous seeds embedded in fleshy pulp.

About 4 species in Indo-Malaysian region; one in M.P.

Careya arborea Roxb., Pl. Corom. 3 : 14, pl. 218. 1819; Clarke in Hook. f., Fl. Brit. Ind. 2 : 511. 1879.

Deciduous trees, up to 20 m tall. Leaves usually sessile, broadly ovate, 15-30 × 5-15 cm, tapering to base, obtuse or rounded at apex, denticulate or crenate, thick, smooth and shining on both sides, pale green. Flowers large, ca 10 cm across, yellowish white, sessile, crowded on very thick, swollen terminal spikes, each with a central oval bract and two lateral linear ones. Calyx tube about campanulate, 2-3 cm, glabrous; segments rounded, stiff, erect. Petals ovate, 5-7 cm long, obtuse or acute, margins often revolute. Filaments about as long as petals, spreading. Fruits globular, ca 8 cm, green, crowned with persistent calyx segments and style, solid with many seeds embedded in fleshy pulp.

Growing on hill slopes and along the sides of streams. Balaghat, Bastar, Bilaspur, Durg, Mandla, Raigarh, Raipur, Rajnandgaon, Seoni, Sidhi. Fl. : March - May; Fr. : May - July.

64. MELASTOMATACEAE

(K. K. Khanna)

About 240 genera and 3000 species in tropical and subtropical regions; 4 genera and 6 species in M.P.

- 1a. Flowers 3-merous; stamens 3, as many as petals; ovary 3-celled; fruit a capsule, dehiscing by valves ...4. *Sonerila*

- 1b. Flowers 4-5-merous; stamens 8-10, twice the number of petals; ovary either 1-celled or 4-5-celled; fruit a berry, or if capsule then dehiscent by pores :
- 2a. Hypanthium glabrous; ovary 1-celled, apically glabrous ...2. *Memecylon*
- 2b. Hypanthium pubescent or scaly; ovary 4-5-celled, apically pubescent :
- 3a. Stamens unequal, connective of longer stamens strongly produced below and tubercled; fruit a berry, irregularly transversely rupturing ...1. *Melastoma*
- 3b. Stamens equal, connective not produced below; fruit a capsule, dehiscent by apical pores ...3. *Osteckia*

1. MELASTOMA L.

Erect shrubs or small trees. Stem and branches scaly. Leaves opposite, entire, oblong to lanceolate, 3-7-nerved from the base. Flowers purple, showy, solitary or in terminal fascicles or panicles, 5 (4-6)-merous. Hypanthium scaly or hairy, campanulate. Calyx caducous; lobes alternating with as many denticles. Petals 5, obovate. Stamens 10, glabrous, unequal; connective of longer stamens strongly produced below the anther cells and tubercled; connective of shorter stamens not strongly produced. Ovary half-inferior, apically pubescent, 5-celled, with many ovules in axile placenta; style glabrous, filiform. Fruit a berry, with a fleshy pericarp, irregularly transversely rupturing; seeds punctate.

About 75 species in S.E. Asia extending to N. Australia and Polynesia; one in M.P.

Melastoma malabathricum L., Sp. Pl. 390, 1753. ('*malabathrica*'); Clarke in Hook. f., Fl. Brit. Ind. 2 : 523, 1879.

Branched shrubs, up to 3 m tall. Leaves elliptic-lanceolate, 5-9 × 1.5-3 cm., scaly on both the surfaces, acute. Flowers bracteate. Bracts large, lanceolate, scaly outside. Hypanthium stout, scaly; scales linear, 1-5 mm long. Calyx lobes ovate, acute. Denticles cylindric. Petals large, pinkish violet, broadly obovate. Larger stamens purple, smaller ones yellow.

Balaghat, Bastar, Bilaspur, Hoshangabad, Raigarh, Surguja. *Fl. & Fr.*: Throughout the year.

2. MEMECYLON L.

Erect shrubs or trees. Leaves opposite, coriaceous, 1-nerved, indistinctly pinnately veined, ovate to lanceolate, entire. Flowers in axillary or rarely terminal panicles, umbels, cymes or fascicles, 4-merous, ebracteate,

blue. Hypanthium glabrous. Calyx 4-toothed or truncate. Petals 4, glabrous, blue or white. Stamens 8, equal; connective not produced but 2-horned below. Ovary apically glabrous, 1-celled with a free central placenta, half-inferior; ovules 2-numerous; style glabrous, filiform. Fruit a berry, globose, 1 - 2 - seeded.

About 300 species mostly in S.E. Asia extending up to Polynesia, Australia and Africa; one in M.P.

Memecylon umbellatum Burm. f., Fl. Ind. 87. 1768 var. *contractum* (Haines) Verma in Fl. Raipur, Durg and Rajnandgaon 148. 1985. *Memecylon edule* Roxb., Pl. Corom. 1 : 59. t. 82. 1795. var. *contractum* Haines in Ind. For. 40 : 270. 1914.

Large shrubs or trees; branchlets terete or quadrangular. Leaves coriaceous, ovate-lanceolate, 3-6 cm long, acuminate, cuneate, petiolate, black-dotted beneath. Flowers in peduncled cymes. Petals blue, acute. Berries globose, ca 6 mm diam., deep-purple to black.

Raipur. Fl. : Dec. April; Fr. : March Aug.

3. OSBECKIA L.

Erect annual or perennial herbs or shrubs; branches quadrangular. Leaves opposite, decussate, shortly petiolate, entire, basally 3 - 5-nerved. Flowers in terminal fascicles or cymes, rarely solitary, 4 - 5-merous. Hypanthium campanulate, pubescent. Calyx triangular, bristly, alternating with pectinate appendages. Petals 4 - 5, obovate, ciliate, red-purple. Stamens 8 - 10, equal, connective not produced, ventrally appendiculate. Ovary adnate to calyx, semi-inferior, bristly at the apex, 4 - 5-celled; ovules axile; style curved. Fruit a capsule, dehiscent by 4 - 5 apical pores; seeds minutely tubercled.

About 100 species in tropical Africa, Asia and Australia; 3 in M.P.

- 1a. Plants up to 25 cm high; anthers not beaked; capsules bristly at the top ...2. *O. muralis*
- 1b. Plants 0.5 to 2 m high; anthers beaked; capsules not bristly at the top :
 - 2a. Leaves large, up to 14 × 3.5 cm; flowers in open panicle; capsules 9 - 12 mm long ...3. *O. rostrata* var. *sexangulata*
 - 2b. Leaves small, up to 5 × 1.3 cm; flowers capitate; capsules 5 - 7 mm long ...1. *O. chinensis*

1. *Osbeckia chinensis* L., Sp. Pl. 345. 1753; Clarke in Hook. f., Fl. Brit. Ind. 2 : 515. 1879.

Herbs, up to 0.5 m high; branchlets appressed-hirsute. Leaves oblong-lanceolate, 2.5–5 × 0.4–1.3 cm, appressed-hirsute, entire, base obtuse, apex acute; petioles ca 2 mm long. Cymes terminal. Flowers 4-merous, surrounded by involucre of cauline leaves; bracts ovate-lanceolate. Hypanthium densely covered with pectinate scales. Calyx-tube urceolate; lobes 4, ciliate. Petals 4, pink, obovate. Stamens 8. Ovary 4-celled, globose. Capsule 3–4 mm.

Balaghat, Bilaspur, Raigarh, Sidhi. *Fl. & Fr.* : Jan.–March.

2. *Osbeckia muralis* Naud. in Ann. Sci. Nat. Bot. ser. 3, 14 : 56. 1850; Hansen in Ginkgoana 4 : 41. 1977. *O. truncata* D. Don ex Wt. & Arn., Prodr. 322. 1834, *p.p. nom. confus.*; Clarke in Hook. *f.*, Fl. Brit. Ind. 2 : 514. 1878. *O. zeylanica* Steud. ex Naud. in Ann. Sci. Nat. Bot. ser. 3, 14 : 56. 1850.

Erect annual herbs, up to 25 cm high. Leaves ovate, hirsute on both surfaces, 3-nerved from the base; stipules ciliate. Flowers 4-merous, pink, solitary, axillary. Calyx-lobes ovate, glabrous. Petals mauve-coloured. Stamens 4, short. Capsule ovoid, bristly at top.

Hoshangabad. *Fl. & Fr.* : Aug.–Dec.

3. *Osbeckia rostrata* D. Don, Prodr. Fl. Nep. 221. 1825. var. *sexangulata* Haines, Bot. Bihar and Orissa pt. 3 : 370. 1922.

Erect stout herbs. Stem 6-angled, strigosely hirsute with bulbous based hairs. Leaves opposite, lanceolate, setosely hairy on both surfaces, 7–14 × 1.8–3.5 cm, with 3 strong nerves from the base; petioles densely strigose. Flowers in terminal panicles, rose-purple. Hypanthium glabrous or thinly setose. Fruits flask- or bottle-shaped, ca 1 cm long; seeds orange-yellow.

Raigarh, Sidhi, Surguja. *Fl.* : Aug.–Sept.; *Fr.* : Oct.–Dec.

4. SONERILA Roxb.

Herbs. Leaves opposite, palmately veined, membranous, crenate-serrate. Flowers solitary or in scorpioid cyme, trimerous. Hypanthium campanulate. Calyx triangular, caducous. Petals 3, ovate or obovate. Stamens 3, equal; anthers oblong-linear; connective not produced below. Ovary 3-celled, inferior; style glabrous, filiform; stigma minute or capitate. Fruit a capsule, trigonous, apically 3-valved; seeds cuneate.

About 175 species in the warmer parts of Asia; one in M.P.

Sonerila tenera Royle, Ill. 215. t. 45. f. 2. 1834; Clarke in Hook. *f.*, Fl. Brit. Ind. 2 : 530. 1878.

Annual slender herbs, ca 5 cm high; branches almost prostrate. Stem glandular-pilose, succulent. Leaves opposite, ovate-elliptic, 7-25 × 5-15 mm, cuneate at base, sparsely hairy, 3-nerved from the base. Flowers pink-purple, in terminal raceme. Calyx-lobes 3, ovate; tube sparsely hairy. Petals 3, ovate. Stamens 3; anthers yellow. Ovary glabrous. Capsule trigonous, glabrous, opening by valves.

Balaghat, Bilaspur, Hoshangabad, Raigarh, Sidhi. Fl. & Fr. : Sept. Nov.

65. LYTHRACEAE

(R.C. Srivastava)

About 25 genera and 550 species, cosmopolitan; 6 genera and 16 species in M.P.

- 1a. Trees or shrubs; flowers and fruits more than 5 mm long:
 - 2a. Hypanthium tubular, almost oblique at mouth; petals subulate; fruits included within the hypanthium ...6. *Woodfordia*
 - 2b. Hypanthium cupular, truncate at mouth; petals obovate or spatulate; fruits exerted from the hypanthium:
 - 3a. Sepals and petals 4; stamens 8; fruits dehiscent irregularly ...3. *Lawsonia*
 - 3b. Sepals and petals 3 or in multiples of 3; stamens several; fruits dehiscent by valves ...2. *Lagerstroemia*
- 1b. Herbs; flowers and fruits less than 3 mm long:
 - 4a. Flowers solitary or in spicate or racemose inflorescences ...5. *Rotala*
 - 4b. Flowers in axillary cymose inflorescences:
 - 5a. Stamens inserted at the base of calyx tube; calyx lobes incurved at anthesis; sepals hollowed on one side ...4. *Nesaea*
 - 5b. Stamens inserted on the rim or the middle of calyx tube; calyx lobes erect at anthesis; sepals not hollowed on one side ...1. *Ammannia*

1. AMMANNIA L.

Annual or perennial herbs. Leaves decussate, chartaceous, sessile. Cymes axillary, dense or lax, subsessile or pedunculate. Flowers 4(-5) merous. Calyx-tube angular or campanulate, ribbed; lobes 4, triangular, erect; petals 4, suborbicular, rarely absent. Stamens 4 or 5; anthers ovoid.

Ovary 4(-5)-celled; ovules on free-central placentae; style short erect. Capsules equalling or exceeding the membranous or thick hypanthium, irregularly circumscissile; seeds ovoid, minute.

A cosmopolitan genus with ca 30 species; 2 in M.P.

- 1a. Petals absent; cymes subsessile, compact ...1. *A. baccifera*
 1b. Petals 4; cymes pedunculate, lax ...2. *A. multiflora*

1. *Ammannia baccifera* L., Sp. Pl. 120. 1753; Clarke in Hook. f., Fl. Brit. Ind. 2 : 569. 1879.

Erect herbs, up to 70 cm high. Leaves oblong-elliptic or oblanceolate, 25-56 × 4-7 mm, cuneate at base, acute at apex, margin entire. Cymes dichasial, subsessile; pedicel ca 2 mm long at anthesis. Flowers tetra- or penta-merous. Calyx tube campanulate; lobes 4(-5). Petals absent. Stamens 4(-5); filaments ca 0.5 mm long. Ovary 4(-5)-celled; style up to 0.5 mm long. Capsules ca 1.5 mm across; seeds ca 20, turgid.

Balaghat, Bilaspur, Damoh, Durg, Gwalior, Hoshangabad, Indore, Jabalpur, Mandla, Morena, Narsimhapur, Raigarh, Rajnandgaon, Raipur, Rewa, Sagar, Satna, Seoni, Sidhi, Surguja. Fl. & Fr. : Nov. - April.

Leaves are bitter, appetiser, laxative and aphrodisiac.

1.1. ssp. *aegyptiaca* (Willd.) Koehne in Engl. Bot. Jahrb. Syst. 1 : 260. 1880. *A. aegyptiaca* Willd., Enum. Hort. Berol. 167. 1809. *A. salicifolia* Hiern in Oliv., Fl. Trop. Afr. 2 : 478. 1871., excl. syn., (*non* Monti ex Bl. 1767); Clarke in Hook. f., l.c. 569.

Similar to ssp. *baccifera* but stouter, more profusely branched, almost shrubby. Leaf bases subcordate. Flowers subsessile at anthesis.

Bilaspur, Hoshangabad. Fl. & Fr. : Nov. - April.

2. *Ammannia multiflora* Roxb., Fl. Ind. 1 : 447. 1820; Clarke in Hook. f., Fl. Brit. Ind. 2 : 569. 1879.- *Dadmani*.

Herbs, ca 30 cm tall. Leaves oblanceolate or elliptic, 11-18 × 2-4 mm, auriculate at base, obtuse at apex, margin entire, chartaceous. Cymes simple or dichasial, lax; peduncles up to 6 mm long; pedicels ca 1.5 mm long. Calyx-tubes campanulate; lobes 4, up to 0.5 mm long, horned. Petals 4, ovate-suborbicular, ca 0.8 mm long. Stamens 4; filaments ca 1 mm long. Ovary ca 0.8 mm long, 4-celled; style ca 0.5 mm. Capsules ca 1.5 mm broad; seeds less than 70, turgid.

Balaghat, Bastar, Hoshangabad, Indore, Mandla, Panna, Raipur, Sagar, Satna, Sidhi, Surguja. Fl. & Fr. : Nov. - Feb.

2. LAGERSTROEMIA L.

Trees, rarely shrubs. Panicles terminal and axillary. Flowers showy. Anthers versatile. Ovary 3-6-celled. Capsules more or less adnate to the base of the calyx; seeds numerous, compressed and winged at apex.

About 50 species, from Indo-Malaya to Australia; 3 in M.P.

1a. Flowers more than 4 cm across; calyx-tube ridged ...3. *L. reginae*

1b. Flowers less than 3 cm across; calyx-tube not ridged :

2a. Leaves glaucous beneath; flowers less than 1 cm across; fruits more than 1.5 cm long ...2. *L. parviflora*

2b. Leaves pale green and pubescent beneath; flowers more than 1.5 cm across; fruits less than 1 cm long ...1. *L. indica*

1. *Lagerstroemia indica* L., Syst. ed. 10 : 1076. 1759; Hook. f., Fl. Brit. Ind. 2 : 575. 1879.

Shrubs with brown smooth bark. Leaves subsessile, elliptic-oblong, 3-10 × 2-4 cm, glabrous. Panicles subpyramidal, 5-20 cm long. Calyx superficially ridged or smooth with age. Petals white, lilac or rose-coloured, suborbicular, margins crisped; limb ca 10 mm long; claw ca 7 mm long. Fruits obconic, up to 1 cm across.

Balaghat, Raipur, Surguja. Fl. & Fr. : June-Dec.

Commonly planted as ornamentals.

2. *Lagerstroemia parviflora* Roxb., Pl. Corom. 1 : 47, t. 66. 1795; Clarke in Hook. f., Fl. Brit. Ind. 2 : 575. 1879.- *Lendia, Senha*.

Shrubs or small trees with ash-coloured smooth bark, young parts pubescent. Leaves elliptic-oblong or ovate-lanceolate, 3-10 × 2-5 cm, acute or acuminate, pubescent beneath when young, coriaceous. Flowers fragrant, in few- or many-flowered axillary or terminal panicles, up to 20 cm long. Calyx not ribbed; tube sub-hemispherical; teeth 6, acute. Petals 6, white, claw ca 2 mm long, limb ca 3 mm long, rotundate. Stamens several, 6 outermost ones with longer filaments. Capsules ellipsoid or ovoid, up to 4 cm long, lower portion immersed in the accrescent woody calyx; seeds with terminal wings.

Almost throughout the state. Fl. & Fr. : April-Oct.

Wood is used for making agricultural instruments and also as timber.

3. *Lagerstroemia reginae* Roxb., Pl. Corom. 1 : 46, t. 65. 1795; Furtado & Srisuko in Gard. Bull. Singapore 24 : 261. 1969. *L. speciosa* auct. p.p., non (L.) Pers. *L. flos-reginae* auct. p.p., non Retz. *L. flos-reginae* var.

angusta Clarke in Hook. f., Fl. Brit. Ind. 2 : 577. 1879.

Trees. Leaves elliptic-oblong, 9.5–22 × 4–7 cm; petioles short. Panicles subcylindrical, 10–40 cm long. Flower buds 8–14 × 7–10 mm, generally grey. Calyx lobes thickened on the margins, spreading in fruit. Petals mauve-purple, limb suborbicular, undulate, ca 3 cm across; claw ca 3 mm long. Stamens all equal, shorter than style. Capsules woody, ellipsoid or subglobose, minutely apiculate.

Balaghat, Hoshangabad, Raigarh, Raipur. Fl. & Fr. : June–Jan.

3. LAWSONIA L.

Large shrubs with terete often thorny branches. Leaves opposite. Flowers rather small, in terminal paniced cymes. Hypanthium short, cupular. Sepals 4, ovate. Petals 4, obovate, wrinkled. Stamens 4 or 8. Ovary 4-celled. Fruits dry coriaceous exserted from the hypanthium, globose, irregularly breaking up. Seeds many, angular, smooth.

A monotypic palaeotropical genus.

Lawsonia inermis L., Sp. Pl. 349. 1753. *L. alba* Lamk., Ill. t. 296. f. 2. 1792; Hook. f., Fl. Brit. Ind. 2 : 573. 1879.- *Mehandi*.

Shrubs, up to ca 3 m tall, with some branchlets spinous at tip. Leaves opposite, lanceolate or oblanceolate, 2–3 cm long, apex acute, subsessile; petioles short. Flowers ca 5 mm across, cream-coloured, fragrant, in terminal paniced cymes. Sepals persistent. Petals 4, yellowish, orbicular or obovate, ca 4 mm, crumpled. Stamens 8, inserted in pairs on the rim of calyx tube; anthers oblong, ca 1 mm long. Ovary 4-celled. Style ca 5 mm long, erect. Fruits depressed globose, ca 5 mm across, red, tipped with persistent style.

Almost throughout the state; usually planted as hedge. Fl. & Fr. : April–Aug.

Leaves crushed and applied on palms by ladies to produce semi-permanent reddish designs.

4. NESAEA Commerson ex H.B.K.

Herbs. Leaves decussate, sessile. Cymes dichasial, axillary, sometimes flower solitary; bracteoles 2, prominent, linear, almost equal to calyx-tube. Calyx tube campanulate, glabrous, ribbed; lobes 4, keeled, inflexed; appendages erect, ciliate. Petals 4 or 0, obovate, sub-orbicular. Stamens 4, inserted at the base of the calyx-tube. Ovary sessile, ca 4-celled. Ovules several per cell on axile placentae; style short; stigma capitate. Capsule globose; seeds many, compressed, hollow within.

About 5 species in tropical S. Africa, Madagascar, Sri Lanka, Australia and S. America; one in M.P.

Nesaea brevipes Koehne in Bot. Jahrb. Syst. 3 : 326. 1882. *Ammannia cordata* Wight. & Arn., Prodr. 304. 1834; Hiern in Hook. f., Fl. Brit. Ind. 2 : 570. 1879 (non *N. cordata* Hiern, 1871).

Herbs, ca 30 cm tall, branchlets glabrous. Leaves oblong or elliptic-oblongate, 2-3.5 × 0.8-1 cm, chartaceous, glabrous, base sub-amplexicaule or cordate, margin entire, apex obtuse or sub-acute; petiole short. Cymes dichasial, axillary. Flowers subsessile. Calyx-tube ribbed, ca 2 mm; lobes 4; up to 1.5 mm long, pinkish; appendages 4, ciliate. Petals absent. Stamens 4, filaments up to 2 mm long; anthers up to 0.5 mm long. Ovary ca 1 mm long, 4-celled; style ca 0.5 mm. Capsules 1.5-2 mm long; seeds 35-40, ovoid, ca 0.2 mm long.

Bastar. Fl. & Fr. : Dec. Feb.

5. ROTALA L.

Annual or perennial herbs. Stem erect or creeping. Leaves decussate or whorled, chartaceous, subsessile. Inflorescence axillary, or spiciform racemes/spikes or flowers solitary, sub-sessile; bracteoles 2, minute or equal to or exceeding the calyx tube. Flowers (3-4) 5(-6)-merous. Calyx-tube campanulate at anthesis, globose to cup or urn-shaped in fruit, smooth; lobes 3-5(-6), erect, alternating with calyx appendages or folds. Petals 3-5(-6), showy or minute. Stamens 3-5(-6), exerted or not. Ovary 2-4-celled; ovules many per cell on free central placentae; style short, sometimes elongate. Capsules dehiscent by 2-4 valves, equal to or exceeding calyx-tube; seeds hairy, mucilaginous when wet, smooth when dry.

About 50 species in tropics and subtropics; 8 in M.P.

1a. Leaves in whorls of 4-10; flowers 3-merous ...8. *R. verticillaris*

1b. Leaves decussate; flowers 4-5(-6) merous :

2a. Flowers 5-merous (rarely 4 or 6):

3a. Bracteoles shorter than the calyx; petals narrow, elliptic; flowering branchlets effuse, elongate; calyx lobes shallowly triangular ...5. *R. rosea*

3b. Bracteoles exceeding the calyx; petals obovate; flowering branches compact, short; calyx-lobes sharply triangular :

4a. Calyx with linear-subulate accessory lobes; fruits ca 1.5 mm long; leaves up to 30 mm long, never whorled ...1. *R. densiflora*

- 4b. Calyx without such accessory lobes; fruits ca 1 mm long; leaves less than 15 mm long, sometimes 3-4 whorled ...4. *R. mexicana*
- 2b. Flowers 4-merous :
- 5a. Calyx appendages linear; leaves cordate ...2. *R. illecebroides*
- 5b. Calyx-appendages absent; leaves not cordate :
- 6a. Flowers solitary and in axillary spikes; petals linear, persistent; stamens inserted above the middle of calyx-tube ...3. *R. indica*
- 6b. Flowers in dense spiciform racemes; petals obovate, deciduous; stamens inserted at the base of the calyx-tube:
- 7a. Capsules 4-valved; leaves suborbicular ...6. *R. rotundifolia*
- 7b. Capsules 2-valved; leaves ovate or elliptic ...7. *R. serpyllifolia*

1. *Rotala densiflora* (Roth ex Roem. & Schult.) Koehne in Bot. Jahrb. 1 : 164. 1880. *Ammannia densiflora* Roth ex Roem. & Schult., Syst. 3 : 304. 1818. *A. pentandra sensu* Clarke in Hook. f., Fl. Brit. Ind. 2 : 568. 1879, p.p. non Roxb.

Erect or ascending herbs, up to 30 cm tall; branches quadrangular, pinkish at base. Leaves oblong or oblong-lanceolate, with rather cordate decurrent bases. Floral leaves smaller than the cauline ones. Flowers solitary or in dense leafy spikes, pink; spikes up to 4 cm long. Petals equal to or longer than the sepals. Styles ca 0.5 mm long. Capsules 3-valved.

Balaghat, Bastar, Damoh, Rajnandgaon, Raipur, Surguja. Fl. & Fr. : Sept. May.

2. *Rotala illecebroides* (Clarke) Koehne in Bot. Jahrb. Syst. 1 : 167. 1880. *Ammannia pentandra* var. *illecebroides* Clarke in Hook. f., Fl. Brit. Ind. 2 : 569. 1879. *R. fysonii* Blatt. & Halb. in J. Bombay Nat. Hist. Soc. 25: 709. 1918.

Filiform herbs, ca 10 cm tall. Leaves sessile, decussate, sub-amplexicaule, 2.5-3.5 x 1.2-3 mm, acute, entire. Flowers solitary, axillary, tetramerous, purplish. Calyx tube ca 1 mm long; appendages 4, linear, 1 mm; lobes 4, ca 1 mm long, apiculate. Petals 4, linear, ca 0.5 mm long. Stamens 4; filaments 0.5 mm, inserted above the middle of the calyx tube, anthers ovoid. Ovary 3-4-lobed; stigma subsessile. Capsules globose, 0.5 mm, included within the calyx tube, 4-valved, red.

Raipur. Fl. & Fr. : Oct.

3. *Rotala indica* (Willd.) Koehne in Bot. Jahrb. 1 : 172. 1880. *Peplis indica* Willd., Sp. Pl. 2 : 244. 1799. *Ammannia peploides* Spreng., Syst. 1 : 444. 1824; Clarke in Hook. f., Fl. Brit. Ind. 2 : 566. 1879.

Creeping or ascending herbs; branches quadrangular, fleshy. Leaves opposite, oblong or spatulate, 5-13 × 3-7 mm. Flowers solitary or in about 4 cm long leafy spikes. Calyx without accessory lobes; tube 1.5 mm long, appendages absent; lobes 4, lanceolate. Petals 4, white or reddish, obovate, 0.5 mm long. Filaments ca 1 mm, inserted above middle of calyx tube. Capsules ellipsoid, 1.5 mm long, 2-valved, red.

Almost throughout the state. Fl. & Fr. : Oct. - Feb.

4. *Rotala mexicana* Cham. & Schlecht. in Linnaea 5 : 567. 1830. *Ammannia pygmaea* Kurz in Seem, J. Bot. 5 : 376. 1867; Clarke in Hook. f., Fl. Brit. Ind. 2 : 568. 1879. *R. pygmaea* (Kurz) Rajag. & Ramayya in Kew Bull. 23 : 33. 1979.

Filiform herbs, ca 10 cm tall. Leaves 3-4-whorled or opposite, linear, ca 1 mm broad. Flowers solitary, axillary. Calyx ca 1 mm long. Petals 0. Fruits ca 1 mm long, 3-valved.

Balaghat, Bilaspur, Raigarh, Raipur, Satna. Fl. & Fr. : Sept. - Nov.

5. *Rotala rosea* (Poir.) C.D. Cook in Boissiera 29 : 86. 1979. *Ammannia rosea* Poir. in Lamk., Encycl. (Suppl. 2) 329. 1810. *A. pentandra* Roxb., Fl. Ind. 1 : 427. 1832.

Erect herbs sometimes creeping at base. Leaves lanceolate-elliptic, 5-25 × 2-5 mm, cuneate at base, obtuse at apex. Flowers solitary, ca 2.5 mm across. Calyx tube 1.5 mm long. Petals 5 (-4), elliptic, ca 0.5 mm long, pink. Capsules globose, ca 1.5 mm across, exceeding the calyx-tube.

Bastar, Bilaspur Raigarh, Sagar, Sconi. Fl. & Fr. : Nov. - April.

6. *Rotala rotundifolia* (Roxb.) Koehne in Bot. Jahrb. 1 : 175. 1880. *Ammannia rotundifolia* Roxb., Fl. Ind. 1 : 446. 1820; Clarke in Hook. f., Fl. Brit. Ind. 2 : 566. 1879, p.p.

Slender herbs with a creeping stem and several erect branches. Leaves sessile, broadly elliptic or suborbicular, 5-9 mm long. Flowers tetramerous, in terminal spikes, spikes up to 2 cm long. Calyx-tube campanulate, ca 1.5 mm long, appendages absent; lobes 4, ca 1 mm long. Petals 4, pink, ovoid, suborbicular, ca 1.5 mm. Stamens 4; filaments 1.5 mm, inserted at the base of calyx tube. Capsules 4-valved, seeds 15-20.

Balaghat, Bastar, Bilaspur, Hoshangabad, Mandla, Rewa, Raigarh, Sagar, Shivpuri, Sidhi, Surguja. Fl. & Fr. : Nov. - April.

7. *Rotala serpyllifolia* (Roth) Bremek. in Acta Bot. Neerland. 3(1) : 149. 1954. *Micranthus serpyllifolius* Roth, Nov. Pl. Sp. 282. 1821. *Ameletia tenuis* Wt., Pl. Ind. Or. t. 257. 1840. *Ammannia tenuis* (Wt.) Clarke in Hook. f., Fl. Brit. Ind. 2 : 567. 1879.

Minute annual herbs; stems wiry, reddish-brown. Leaves broadly ovate or elliptic, obtuse or acute. Flowers red, in dense terminal spicate racemes. Calyx tube campanulate; teeth acute. Petals 4, obovate. Capsules ellipsoid.

Balaghat, Bilaspur, Damoh, Hoshangabad, Mandla, Narsimhapur, Sagar, Seoni, Sidhi, Surguja. Fl. & Fr. : Nov. Feb.

8. *Rotala verticillaris* L., Mant. Pl. 175. 1771, p.p. *Ammannia rotala* F. Muell., Fragm. 3 : 108. 1863; Clarke in Hook. f., Fl. Brit. Ind. 2 : 567. 1879.

Erect herbs, up to 8 cm tall. Stem reddish. Leaves in whorls of 4-10, linear-lanceolate, 3-10 × 1 mm, attenuate at base, acute at apex, margin entire. Flowers solitary, ca 1.5 mm across. Calyx tube sub-urceolate, 2 mm long; lobes 3, ca 1 mm long, rose-coloured. Stamens 3; filaments ca 0.4 mm, inserted above the middle of calyx tube; anthers ovoid. Ovary ca 1.5 mm; stigma sessile. Capsules exceeding calyx tube; seeds ca 45, ovoid, compressed, ca 0.2 mm.

Bastar (*Subramanayam and Henry*, 1966). Fl. & Fr. : Dec. Feb.

6. WOODFORDIA Salisb.

Shrubs. Leaves decussate, more or less coriaceous, black-punctate beneath. Flowers in paniculate cymes, on axillary peduncles, rarely solitary. Calyx tubular, teeth 6. Petals 6, minute or absent. Stamens 12, inserted near the bottom, alternating ones longer; filaments filiform; anthers broadly ovate or sub-rotund. Ovary sessile; style filiform, stigma punctiform. Capsule covered by calyx; seeds small, narrowly cuneate-obovoid.

A monotypic genus distributed in India, Sri Lanka, China, Sumatra.

Woodfordia fruticosa (L.) Kurz in J. Asiat. Soc. Beng. 40 : 56. 1871. *Lythrum fruticosum* L., Syst. ed. 10 : 1045. 1759. *W. floribunda* Salisb., Parad. Lond. t. 42. 1806; Clarke in Hook. f., Fl. Brit. Ind. 2 : 872. 1879.- Dhanwai, Dhao, Dharu-Dhao.

Shrubs, ca 1 m tall, much branched. Bark pale-brown, peeling off in fibres, young parts with small black glands. Leaves sessile, linear-lanceolate, 3-10 cm long. Flowers in fascicled axillary racemes. Calyx tube ca 1 cm long, red. Petals small, red. Stamens much exerted; filaments filiform, red; ovary 2-celled. Fruits ellipsoid, ca 1 cm long, enclosed by persistent calyx-tube.

Almost throughout the State. *Fl. & Fr.* : Jan. - May.

Leaves are used as tanning material and flowers as a dye.

66. PUNICACEAE

(R.C. Srivastava)

One genus and two species, in S.E. Europe to the Himalayas and Socotra; one species in M.P.

PUNICA L.

Shrubs or small trees. Leaves opposite, alternate or fascicled, exstipulate. Flowers terminal and subterminal, sessile or sub-sessile, actinomorphic. Calyx coriaceous, coloured; tube campanulate-urceolate, adnate to ovary and produced over it; lobes ovate-triangular, persistent. Petals imbricate and strongly crumpled in bud, obovate, deciduous. Stamens numerous, inserted on the annular thickening of calyx, deciduous; filaments incurved in bud; anthers dorsifixed, 2-celled. Ovary entirely inferior or free at top; ovules numerous; style 1, robust, with a thickened base; stigma capitate. Berries large, subglobose, crowned by unaltered calyx-segments, thick-walled, bursting irregularly; seeds numerous, outer layer of testa thick, fleshy or juicy.

A genus with 2 species, one (*P. protopunica* Balf. f.) confined to Socotra, and the other (*P. granatum* L.) is cultivated in S. Europe, N. Africa, the Orient, tropical Asia, Malaysia and China.

Punica granatum L., Sp. Pl. 472. 1753; Clarke in Hook. f., Fl. Brit. Ind. 2: 581. 1879.- *Anar*.

Shrubs or small crooked trees, up to 5 m tall, branched from near the base; branches often ending in a spine. Leaves opposite, oblong-lanceolate, 1.9 × 0.5-2.5 cm. Flowers 1-5, at the top of the branchlets. Calyx 2-3 cm long, red or pale-yellow; segments erecto-patent or slightly recurved, thick, at the apex on the back with a yellowish-green gland, along the margin densely and shortly papillose, 7-12 mm long. Petals erecto-patent or patent, with a rounded or very obtuse apex, 1.5 × 1-2 cm, flame red or white and then turning brown when fading. Stamens 5-10 mm long. Style 8-12 mm. Berries 5-12 cm in diam., variable in colour; red pink or yellowish white.

Planted for its juicy seeds. Chhatarpur, Damoh, Raipur, Sidhi, Surguja. *Fl.*: March-May; *Fr.*: May-Jan.

67. ONAGRACEAE

(A. K. Tripathi)

About 18 genera and 640 species, cosmopolitan, mainly centred in South-West and North America; one genus and 5 species in M.P.

LUDWIGIA L.

Perennial or annual herbs. Leaves alternate or opposite, entire; stipules absent or reduced, deltoid. Flowers usually solitary, axillary; peduncles when present 2-bracteate at the apex. Calyx-tube scarcely produced above ovary; lobes 3-5, acute, persistent or tardily deciduous. Petals as many as the sepals or absent, inserted beneath the margin of an epigynous disc, spreading, with contorted aestivation. Stamens as many as or twice as many as the sepals, inserted with the petals; filaments short. Ovary inferior, cells as many as the sepals, rarely more; placentation axile. Capsules 4-5-valved, dehiscing irregularly or by a terminal pore; seeds numerous, free or embedded in powdery or woody endocarp.

About 75 species distributed throughout world; 5 in M.P.

- 1a. Aquatic plants with creeping or floating stems, with aerophores; petals 5, white ...1. *L. adscendens*
- 1b. More or less erect herbs of marshy or wet places, without aerophores; petals 4, yellow :
 - 2a. Seeds dimorphic; pollen grains shed singly ...2. *L. hyssopifolia*
 - 2b. Seeds not dimorphic; pollen grains shed in tetrads :
 - 3a. Seeds uniseriate in each cell ...5. *L. prostrata*
 - 3b. Seeds pluriseriate in each cell :
 - 4a. Stamens 8, twice as many as sepals and petals; seeds spherical ...3. *L. octovalvis*
 - 4b. Stamens 4, as many as sepals and petals; seeds oval ...4. *L. perennis*

1. *Ludwigia adscendens* (L.) Hara in J. Jap. Bot. 28. 290. 1953. *Jussiaea repens* L., Sp. Pl. 1 : 388. 1753; Clarke in Hook. f., Fl. Brit. Ind. 2 : 587. 1879 (non *Ludwigia repens* Forst., 1771). *J. adscendens* L., Mant. Pl. 1 : 69. 1767.

Aquatic or semi-aquatic herbs with a creeping stem rooting at the nodes, usually with pseudo-pneumatophores. Leaves alternate, elliptic-oblong, 1-7 × 1-2.5 cm, glabrous, rounded at the apex, narrowed at base; petioles 6-16 mm long, sparsely pubescent; bracteoles deltoid. Flowers solitary, axillary, pentamerous. Sepals 5, deltoid-acuminate, 5-10

$\times 2 - 3.2$ mm. Petals 5, white, obovate, $9 - 18 \times 6 - 10$ mm. Capsules terete, sparsely pubescent or glabrous, thick-walled, irregularly dehiscent, $12 - 27 \times 3 - 4$ mm, 10-ribbed; seeds uniseriate in each cell, pale brown.

Occasional along margins of tanks, streams and lakes. Bastar, Bilaspur, Damoh, Durg, Jabalpur, Raipur, Rajnandgaon, Rewa, Sagar, Shahdol, Surguja. *Fl. & Fr.* : Jan. - June.

2. *Ludwigia hyssopifolia* (G. Don) Exell, *Garcia de Orta* 5 : 471. 1957; Raven in Steenis, *Fl. Males*, 1, 8 : 104. 1977. *Jussiaea hyssopifolia* G. Don, *Syst.* 2 : 693. 1832. *J. fissendocarpa* Haines in *J. As. Soc. Bengal* n.s. 15 : 314. 1919. *Fissendocarpa linifolia* (Vahl) Bennet in *J. Bomb. Nat. Hist. Soc.* 67 : 126. 1970. *Ludwigia linifolia* (Vahl) Rolla Rao in *Fl. Goa, Diu, Daman, Dadra & Nagarhaveli* 1 : 179. 1985. *Jussiaea linifolia* Vahl, *Ecolog. Am.* 2 : 32. 1798 (non *Ludwigia linifolia* Poir., 1813).

Annual much branched herbs, up to 3 m high; stems narrowly winged. Leaves elliptic to lanceolate, acute, $1 - 9 \times 0.2 - 3$ cm; lateral nerves 11 - 17 pairs; petioles 3 - 18 mm. Sepals 4, lanceolate, $2 - 4 \times 0.7 - 1.2$ mm. Petals yellow, elliptic, $2 - 3 \times 1 - 2$ mm. Stamens 8, pale greenish-yellow, epipetalous ones shorter. Pollen grains shed singly. Style pale greenish-yellow, 1 - 1.5 mm. Capsule thin-walled, linear, terete, not inflated, up to 3 cm long. Seeds dimorphic; lower seeds uniseriate in each cell of the capsule, brown, oblong, embedded in a cube of relatively hard endocarp; upper seeds free, pluriseriate, ovoid, pale brown, shorter than lower seeds.

Balaghat, Bilaspur, Damoh, Mandla, Panna, Raigarh, Raipur, Rajnandgaon, Satna, Seoni. *Fl. & Fr.* : Throughout the year.

On the basis of its dimorphous seeds Bennet (1970) has raised this species to the level of a new genus, *Fissendocarpa* (Haines) Bennet. Except the dimorphic nature of its seeds, all the other characters are also found in other species of *Ludwigia*. Therefore, it does not seem to be justifiable to separate it as a genus distinct from *Ludwigia*.

3. *Ludwigia octovalvis* (Jacq.) Raven in *Kew Bull.* 15 : 476. 1962 et in *Reinwardtia* 6 : 362, f. 3. 1963, incl. ssp. *brevisepala* (Brenan) Raven and ssp. *sessiliflora* (Mich.) Raven in Steenis, *Fl. Males*, 1, 8 : 101. 1977. *Jussiaea suffruticosa* L., *Sp. Pl.* 1 : 388. 1753; Clarke in Hook. *f.*, *Fl. Brit. Ind.* 2 : 587. 1879. *Oenothera octovalvis* Jacq., *Enum. Syst. Pl.* 19. 1760.

Much branched herbs or undershrubs, up to 3 m high. Leaves lanceolate or linear-lanceolate, $2 - 14 \times 0.5 - 4$ cm; lateral nerves 11 - 20 pairs; petioles up to 1 cm long. Flowers solitary, axillary. Sepals 4, ovate or lanceolate, $6 - 15 \times 1 - 7.5$ mm. Petals 4, yellow, obovate or cuneate, $17 \times 2 - 17$ mm. Stamens 8, epipetalous one shortest; filaments 1 - 4 mm long;

anthers 0.5 - 4 mm long; pollen shed in tetrads. Capsules thin-walled, terete, pale brown with 8 darker ribs, 17 - 45 × 2 - 8 mm; seeds pluriseriate in each cell, free, brown.

Common near streams, cultivated fields, rivers and ponds. Balaghat, Bastar, Bilaspur, Durg, Hoshangabad, Jabalpur, Mandla, Narsimhapur, Raigarh, Raipur, Rajnandgaon, Satna, Sagar, Seoni, Shahdol, Sidhi, Surguja. *Fl. & Fr.* : Throughout the year.

4. *Ludwigia perennis* L., Sp. Pl. 1 : 119. 1753; (excl. '*foliis oppositis*'). *L. parviflora* Roxb., Fl. Ind. 1 : 440. 1820; Clarke in Hook. f., Fl. Brit. Ind. 2 : 588. 1879. *Jussiaea perennis* (L.) Brenan in Kew Bull. 8 : 163. 1953.

Erect or decumbent annual herbs, more than 1 m high. Leaves elliptic-lanceolate, 1 - 8 × 0.3 - 2.5 cm; nerves 6 - 12 pairs; petiole 2 - 15 mm long. Flowers yellow, axillary, solitary or paired. Sepals 4, rarely 5, deltoid, 2 - 3.5 × 0.7 - 1.8 mm. Petals elliptic, 1 - 3 × 0.7 - 2 mm. Stamens as many as calyx-lobes, or rarely more; filaments 0.3 - 0.7 mm; pollen shed in tetrads. Capsules thin-walled, oblong, 4-angled, up to 2 cm long, terete, pale brown. Seeds pluri-seriate in each cells, free, brown, ellipsoid-rounded.

In moist places, cultivated fields and river banks. Balaghat, Bastar, Bilaspur, Mandla, Panna, Raigarh, Raipur, Rewa, Satna, Shivpuri, Sidhi, Surguja, Tikamgarh. *Fl. & Fr.* : Aug. - May.

5. *Ludwigia prostrata* Roxb., Fl. Ind. 1 : 441. 1820; Clarke in Hook. f., Fl. Brit. Ind. 2 : 588. 1879.

Annual herbs, up to 60 cm high. Leaves elliptic, 1 - 13 × 0.3 - 2.7 cm; petioles 4 - 25 mm long. Sepals 4, deltoid, 1.3 - 2.5 × 0.7 - 1.1 mm, glabrous. Petals yellow, narrowly spatulate, 1.3 - 2.2 × 0.4 - 0.9 mm. Stamens 4; filaments 0.8 - 1.2 mm; anthers 0.4 - 0.5 mm wide, broader than long; pollen shed in tetrads. Capsule thin-walled, glabrous, slightly 4-angled, pale brown, 12 - 22 × 0.8 - 1 mm. Seeds uniseriate in each cell, free, pale brown, ovoid.

Surguja. *Fl. & Fr.* : Nov. - April

68. TRAPACEAE

(A. K. Tripathi)

A family of only one genus and one (polymorphic), three or up to about 30 species almost throughout the old World, and naturalized in North America and Australia; one species in M.P.

TRAPA L.

Aquatic herbs; stems rooted in mud. Leaves dimorphic; submerged ones opposite, linear, pinnatipartite; floating ones alternate, rosulate, rhomboid, toothed; petioles spongy; stipules 4 - 8. Flowers bisexual, inconspicuous, solitary, axillary. Sepals 4, connate in a short tube, adnate to the lower part of the ovary and develop into two, three or four hard horns or spines in fruit. Petals 4, small, on the margin of the epigynous cup-shaped disc. Stamens 4. Carpels 2, connate in a half-inferior 2-celled ovary, each with a single pendulous anatropous ovule on an axile placenta; style subulate; stigma capitate. Fruit a large, woody, obovoid, bony nut, with 4 prominent angles, 2 or all of which are spinescent; seed solitary, inverted, without endosperm.

Trapa natans L., Sp. Pl. 1 : 120 1753. var. *bispinosa* (Roxb.) Makino in Inuma, Somoku-Dzusetsu ed. 3, 1 : 137. 1907; Sant. & Wagh in Bull. Bot. Surv. Ind. 5 : 109. 1963. *T. bispinosa* Roxb., Pl. Corom. t. 234. 1815; Clarke in Hook. f., Fl. Brit. Ind. 2 : 590. 1879, p.p. -Singhara.

Floating annual herbs; stems long, flexuous. Floating leaves in rosette, crowded in the upper part of stem; lamina rhomboid, crenate-toothed on upper margins, 1.5 - 5.5 × 1.5 - 7.0 cm, glabrous, glossy dark green and mottled brown above, villous hairy and reddish-purple beneath; petiole inflated; submerged leaves finely dissected into root-like inner segments. Flowers solitary, axillary, white or purple, pedicels incurved during flowering, afterwards bending down beneath water. Calyx pubescent; lobes lanceolate, acute. Petals obovate, crenulate on margins. Stamens 4. Drupes top-shaped, 2-horned, 1-seeded, 2.5 - 3.5 cm across, dark brown, ripening under water.

Common in lakes, ponds and tanks, sometimes cultivated. Almost throughout M.P. *Fl. & Fr.* : Aug. Dec.

Fruits called the water chestnuts contain much starch and fat and eaten raw or cooked.

69. TURNERACEAE

(A. K. Tripathi)

About 8 genera and 100 species, in tropics and subtropics; one in M.P.

TURNERA L.

Herbs, shrubs or small trees. Leaves alternate, entire, serrate or pinnately lobed. Flowers axillary, solitary, bisexual; peduncle sometimes adnate to petiole; bracteoles 2, apical. Sepals 5, connate below; lobes oblong

or linear, imbricate. Petals 5, inserted in calyx throat. Stamens 5, in the middle or at the mouth of tube, or sometimes quite hypogynous. Ovary one-celled, superior; ovules many, parietal; styles 3; stigmas flabellately 3-5 or more-fid. Capsules ovoid or oblong. Seeds numerous, with a membranous aril; albumen fleshy.

About 50 species, mainly neotropical; one in M.P.

Turnera ulmifolia L., Sp. Pl. 271. 1753; Backer in Steenis, Fl. Males. I, 4(3) : 237. 1951; Brizicky in J. Arn. Arb. 42 : 288. 1961. *T. ulmifolia* var. *angustifolia* Willd. ex Urb., Mon. Turn. 141. 1883.

A stiff branched undershrub, up to 1 m tall. Leaves lanceolate or ovate-lanceolate, hairy, dentate-serrate, 7 - 15 × 1.5 - 4 cm, lateral nerves slender, 9 - 10 pairs; petioles 5 - 15 mm long. Flowers solitary in terminal axils, bright yellow. Calyx densely appressed-pubescent, indistinctly gland-dotted; tube 5 - 7 mm long; lobes lanceolate, acuminate, up to 2 cm long. Petals obovate, clawed, 2 - 3 × 11 - 15 mm. Ovary ovoid with 6 small apical tubercles, 3 minute style-scars, densely white hairy with glabrous green top; styles ca 25 mm long. Capsules ovoid, thick-walled, 3-valved. Seeds cylindric-clavate, brown, ca 2.5 mm long.

Balaghat, Bilaspur, Chhattarpur, Damoh, Mandla, Seoni. Fl. & Fr. : Sept. - Dec.

Ornamental; cultivated in gardens and green houses.

70. PASSIFLORACEAE

(R. C. Srivastava)

About 12 genera and 600 species in tropical and warm temperate parts of the world; one genus and 2 species in M.P.

PASSIFLORA L.

Tendrils climbers. Leaves alternate, palmately lobed, margin mostly glandular-dentate; stipules small or large. Flowers bisexual, solitary; bracts and bracteoles often large. Calyx-tube saucer-shaped to cylindrical; lobes 5. Petals 5, inserted on the throat of calyx-tube. Corona extra-staminal, with several rows of filiform segments and a shallow cup surrounding the gynandrophore. Stamens 5, or gynandrophore. Ovary 1-celled with many ovules; styles usually 3; stigma capitate. Berry fleshy, indehiscent.

About 500 species chiefly found in America, a few in Asia and Australia and one in Madagascar; 2 introduced in gardens of M.P.

3a. Involucral bracts entire; leaves glabrous; berries 3.5 - 6 cm across

...1. *P. edulis*

- 1b. Involucral bracts finely divided; leaves with gland tipped pubescence; berries ca 3 cm across ...2. *P. foetida*

1. *Passiflora edulis* Sims in Curtis, Bot. Mag. t. 1989. 1818. English names: *Edible Passion Flower*; *Purple Grandilla*.

Woody climbers. Leaves alternate, ovate-cordate, ca 9 × 9 cm, 3-lobed up to half the length or more, coarsely serrate, terminal lobes obovate or elliptic; stipules linear, small. Flowers ca 6.5 cm across, solitary, terminal or axillary, on up to 3 cm long peduncles. Calyx saucer-shaped, lobes oblong, awned below the apex. Petals oblong, ca 1 cm long, white or purplish. Corona-lobes filiform, in several series, white above, violet or purple below, outer spreading. Stamens 5; filaments inserted on gynophore. Ovary ellipsoid, surmounted by 3 club-shaped styles and stigmas. Fruits globular oblong, thickly purple-dotted.

Bhopal, Dhar, Hoshangabad. *Fl. & Fr.* : March May.

2. *Passiflora foetida* L., Sp. Pl. 959. 1753. - English name: *Stinking Passion Flower*.

Spreading vines with densely stiff-hispid branchlets. Leaves usually 3(-5)-lobed to about half way down, suborbicular-ovate, cordate, acute, 5 10 × 4 9 cm, chartaceous, appressed glandular-pubescent, margin subentire to ciliate; petioles up to 15 mm long; stipules subreniform, 5 10 mm long, deeply cleft into glandular processes. Flowers up to 4 cm across, solitary, axillary; peduncle 3 4 cm long; bracts and bracteoles 2 3 cm long, deeply pinnatisect, glandular-pubescent. Calyx-tube saucer shaped; lobes ovate-lanceolate, up to 15 mm long, apically spurred. Petals slightly shorter than the calyx-lobes. Outer coronal hairs up to 1 cm and inner ones up to 2 mm long. Disc prominent, annular. Androgynophore 4 6 mm long; filaments up to 5 mm long, flat. Ovary globose, stiff-pilose; styles up to 4 mm long. Berry globose, 2 3 cm across; seeds ellipsoid, ca 5 × 7 mm, deeply pitted, apex 3-dentate.

Bhopal (Oommachan, 1977). *Fl.* : Nov. May; *Fr.* : Feb.

71. CARICACEAE

(R. C. Srivastava)

About 5 genera and 65 species mainly in tropical America, Africa and Asia; one genus and one species in M.P.

CARICA L.

Trees or shrubs with a spongy unbranched stem, leafy at apex. Leaves alternate, large, sub-peltately spreading, long petiolate, palmately 7 9-lobed, rarely oblong. Racemes axillary. Flowers unisexual (rarely

bisexual). Male flowers : calyx small, 5-lobed; corolla-tube slender, elongated; stamens 10, inserted in throat, alternate and opposite to corolla lobes; anthers 2-locular, introse. Female flowers : calyx as in male; petals 5, linear-oblong, deciduous; staminodes present; ovary sessile, 1-locular or 5-locular with spurious septae; style none or very short; stigmas 5, dilated or linear, simple or lobed. Berry fleshy, grooved, pulpy inside; seeds many, ovoid, arillate, testa smooth, rugose or echinate with fleshy endosperms.

About 50 species in tropical and sub-tropical America; one cultivated in M.P.

Carica papaya L., Sp. Pl. 1036. 1753; Hook. f., Fl. Brit. Ind. 2 : 599. 1879. *Papita*.

Plants with soft stem, 3 - 5 m tall. Leaves palmatifid; lobes again variously divided; petioles long, hollow. Flowers greenish-white or creamy yellow. Male flowers in long drooping panicles. Stamens 10, 2-seriate, alternatively shorter. Female flowers in short clusters, with staminodes. Ovary free, 1 or 5-celled, with short style palmately 3 - 5-lobed; ovules many, attached in 2 rows to parietal placentas. Fruits succulent, 1-celled, oblong, orange-yellow when ripe; seeds black.

Commonly cultivated, almost throughout M.P. *Fl. & Fr.* : Almost throughout the year.

Fruits are edible. *Papain*, an enzyme is obtained from the latex of unripe fruits.

72. CUCURBITACEAE

(R. C. Srivastava)

About 110 genera and 640 species mainly in the warmer parts of the world; 14 genera and 26 species in M.P.

- 1a. Anther cells flexuous or conduplicate :
- 2a. Corolla rotate, or if campanulate, then 5-partite to the base :
- 3a. Corolla lobes fimbriate margined :
 - 4a. Ovules 12; seeds 6, each with 1 abortive seed attached to its side; calyx-tube 7 - 10 cm long ...9. *Hodgsonia*
 - 4b. Ovules and seeds many; calyx-tube less than 7 cm long ...14. *Trichosanthes*
- 3b. Corolla lobes entire margined :

- 5a. Calyx-tube of male flower elongate; stamens inserted within and included in the calyx-tube or nearly so ...10. *Lagenaria*
- 5b. Calyx-tube of male flowers short:
- 6a. Stamens inserted at the mouth of the calyx-tube; filaments exerted; anthers free :
- 7a. Fruits dry, fibrous ...11. *Luffa*
- 7b. Fruits soft, endocarp fleshy ...1. *Benincasa*
- 6b. Stamens inserted below the mouth of the calyx-tube; anthers more or less cohering :
- 8a. Calyx with 2 - 3 scales at its base; male flowers with large enveloping bracts ...13. *Momordica*
- 8b. Calyx without scales at base; bracts absent :
- 9a. Connectives produced beyond anther locule; tendrils simple ...7. *Cucumis*
- 9b. Connectives not produced beyond anther cells; tendrils 2 -3-fid ...4. *Citrullus*
- 2b. Corolla campanulate, divided less than half way down:
- 10a. Flowers white; tendrils simple ...5. *Coccinia*
- 10b. Flowers yellow; tendrils branched ...6. *Cucurbita*
- 1b. Anther cells straight or curved, not conduplicate :
- 11a. Flowers 5 - 10 mm long, greenish-yellow :
- 12a. Seeds with prominent central projections on both sides, margins strongly belted without a partition wall ... 3. *Bryonopsis*
- 12b. Seeds without projections on surface, margins belted with a partition wall ...8. *Diplocyclos*
- 11b. Flowers less than 4.5 mm long, dull yellow :
- 13a. Bracts not ciliated, if any ...12. *Melothria*
- 13 b. Bracts ciliated, resembling stipules at leaf base ...2. *Blastaria*

1. BENINCASA Savi

Climbing annuals, monoecious or sub-hermaphrodite. Leaves palmately 5-lobed; petioles hairy; tendrils 2 - 3 fid. Flowers large, yellow, axillary, solitary. Calyx-tube broadly campanulate, lobes 5, sub-foliaceous, entire, lanceolate or 3 - 5-lobed, reflexed. Corolla rotate, often 5-partite, lobes obovate, entire. Stamens 3, free, inserted at the calyx-tube; filaments

short; anthers exerted, thick, loculi sigmoid- flexuose, connective tri-lobed. Nectaries inside the calyx-tube semiglobose, thick. Staminodes 3 in female flowers; ovary triplacentiferous; style thick; stigmas 3, large undulate. Fruits baccate, thick, hispid, glaucous, many-seeded, indehiscent; seeds ovoid-oblong, compressed.

Monotypic, in tropical and subtropical regions.

Benincasa hispida (Thunb.) Cogn. in DC., Monog. Phan. 3 : 513. 1881. *Cucurbita hispida* Thunb., Fl. Jap. 322. 1784. *Benincasa cerifera* Savi in Bibl. Ital. 9 : 158. 1818; Clarke in Hook. f., Fl. Brit. Ind. 2 : 616. 1879. -*Gol kaddu*.

Annual branched climbers. Leaves 10-25 cm in diam., reniform to rounded, deeply cordate, 5-7-lobed, scabrous above, shortly hispid beneath, margin sinuate, dentate; petioles hirsute, 5-20 cm long; tendrils slender. Male peduncles 5-15 cm long; female peduncles 2-4 cm long. Calyx-tube densely villose, 12-15 mm broad, lobes lanceolate, 8-12 x 3-5 mm. Petals spreading, obtuse, mucronate, 3-5 cm long. Filaments hispid, 2-3 mm long; anthers subtrilobate. Ovary ovoid or cylindrical, softly hairy; style 2-3 mm long. Fruits fleshy, hairy when young, waxy bloom when mature; seeds compressed, ovoid, yellowish-white, distinctly marginate, 10-11 x 5-7 mm.

Cultivated for fruits almost throughout the state. *Fl. & Fr.* : June-Oct.

Fruits are used as vegetable. 'Petha' is the common sweet-meat prepared by boiling the pulp in sugar syrup. Fruits also medicinal.

2. BLASTANIA Kotschy and Peyr.

Prostrate or scandent, scabrous, annual monoecious herbs. Leaves digitately 3-5-lobed; tendrils simple. Male flowers in racemes; calyx-tube short, campanulate, lobes 5, subulate; corolla 5-partite; stamens 3, inserted at the calyx-tube, free; filaments very short, anthers small, one unilocular, others bilocular; pistillode absent. Female flowers solitary, shortly pedunculate; calyx and corolla as in male ones; staminodes absent; ovary ovoid, disc absent, style columnar, short, stigma 2 (rarely 3). Fruits fleshy, globose or obliquely sub-quadrate, 1-3-seeded; seeds ovoid, compressed or boat-shaped, acute or obtusely circumcinctus, testa smooth.

Two species in tropical Africa and India; one in M.P.

Blastania garcinii (Burm.f.) Cogn. in DC., Monog. Phan. 3 : 629. 1881. *Sicyos garcinii* Burm. f., Fl. Ind. 211. 1768. *Ctenolepis garcinii* (Burm. f.) Naud. in Ann. Sc. Nat. Ser. 5, 6 : 13. 1867; Clarke in Hook. f., Fl. Brit. Ind. 2 : 629. 1879.

Annual herbs with subfiliform branches. Leaves 2.5–5 cm in diam., 5-lobed, membranous, villous on both surfaces; lobes subequal, obovate, acute, denticulate; petioles slender, 1.5–3 cm long; tendrils capillary. Peduncles capillary, 0.5–1 cm long, 3–4-flowered. Flowers white, 1–1.5 mm broad. Fruits obreniform, reddish, smooth, 4–6 × 0.7–1 cm, 1–2-seeded. Seeds dark grey, oblong, smooth, 6–8 × 3–4 mm.

Damoh, Indore, Seoni. *Fl. & Fr.* : Aug.–Dec.

Roots and fruits medicinal.

3. BRYONOPSIS Arn.

Herbs, monoecious. Leaves deeply palmately 5-lobed. Tendrils bifid. Flowers greenish-yellow, fasciculate. Male flowers : calyx-tube and corolla lobes reflexed; stamens 3, free, inserted in calyx-tube, anthers ovate, one unilocular, others bilocular. Female flowers : perianth as in male ones, staminodes 3; ovary globose or ovoid, style slender, base naked, stigma 3, papillose, deeply bilobed. Fruits baccate, pulpy, few-seeded; seeds with strongly belted margins, slightly scobriculate at the middle.

A monotypic genus found in India, Burma, Sri Lanka, Malaysia, China, Africa and Australia.

Bryonopsis laciniosa (L.) Naud., *Ann. Sc. Nat.* 4. Ser. 12 : 141. 1859.
Bryonia laciniosa L., *Sp. Pl.* 1013. 1753; Clarke in Hook. *f.*, *Fl. Brit. Ind.* 2 : 622. 1879. -*Gargu-naru*.

Annual slender herbs. Leaves 8–12 cm in diam., palmately 5-lobed, scabrous above, smooth beneath, margin denticulate, undulate or sub-crenulate. Peduncle (in male flowers) 5–15 mm long; calyx-tube 2–4 × 3–6 mm, lobes spreading, ca 1 mm long; corolla greenish yellow, shortly papillose, 4–10 mm broad, lobes ovate, acute; filaments 1–1.5 mm long, anthers ca 2 mm long. Female flowers fasciculate, ovary globose. Fruits spherical, yellowish-green, 6-striped, 12–17 mm thick; seeds ca 5 × 3 mm grey, belted, attenuate with raised projections on both faces.

Bilaspur, Damoh, Jabalpur, Sagar. *Fl. & Fr.* : April–Dec.

4. CITRULLUS Schrad. (*nom. cons.*)

Herbs, monoecious or dioecious. Leaves round or triangular, ovate, 3–5-lobed; tendrils 2–3 fid, sometimes simple. Flowers solitary, rarely fasciculate. Male flowers : calyx-tube broadly campanulate, deeply 5-partite, lobes ovate-oblong, obtuse; stamens 3, inserted at the base of the calyx-tube, filaments free, short, anthers almost free, subtrilobed, one anther 1-locular, others bilocular; pistillode glanduliform. Female flowers : calyx as in male; staminodes 3, setiform or ligulate; ovary ovoid, style short,

columnar; stigmas 3, thick, reniform, sub-trilobed. Fruits globose or oblong, fleshy or dry, indchiscent, many-seeded; seeds oblong, compressed, smooth.

Four species in Western Asia, Eastern Mediterranean region and tropical Africa; one in M.P.

Citrullus lanatus (Thunb.) Matsumura & Nakai in Cat. Sem. Hort. Bot. Univ. Imp. Tokyo 1920: 38. 1920; Hara in Taxon 18 : 346. 1969. *Momordica lanata* Thunb., Prodr. Fl. Cap. 13. 1794 et Fl. Cap. 36. 1807. *Citrullus vulgaris* Schrad. ex Eckl. and Zeyher, Enum. Pl. Afr. Austr. 279. 1834; Clarke in Hook. f., Fl. Brit. Ind. 2 : 621. 1879. -*Tarbuz* (Hindi); *Water Melon* (English).

Annual herbs with angular villose stems. Leaves 8-20 × 5-15 cm, triangular-ovate, cordate, trifid, lobes pinnatifid, terminal lobe acute, others round; tendrils bifid. Male flowers : peduncles elongate, villous, 1-3 cm long; calyx-tube broadly campanulate, villous ; corolla greenish, villous, lobes ovate-oblong, obtuse, 10-15 × 3-4 mm. Female flowers : peduncles 2-6 cm long; calyx and corolla as in male flowers; ovary oblong, style 4-5 mm long. Fruits large, ca 25 cm in diam., sub-globose or ellipsoid, smooth, green or variegated; seeds black, red or variable.

Frequently cultivated. *Fl. & Fr.* : April - July.

Pulp is edible. Several cultivated forms are available which vary in size, shape, colour and sweetness of the pulp. Fruit-juice and seeds medicinal.

5. COCCINIA Wight & Arn.

Herbs dioecious or rarely monoecious; roots often tuberous; stems glabrous or scabrous. Leaves angular or lobed; tendrils simple or bifid. Flowers white. Male flowers solitary or racemose or subcorymbose; calyx-tube short campanulate or turbinate, 5-toothed; corolla campanulate; shortly or acutely 5-lobed; stamens 3, inserted at the base of calyx-tube, filaments connate into a central column, rarely free; anthers connate or coherent, one unilocular, others bilocular or all three occasionally bilocular; loculi sigmoid-flexuose, pistillode absent. Female flowers solitary; calyx and corolla as in male; staminodes 3, oblong or subulate; ovary ovoid, oblong or linear, style slender; stigma trilobed or tripartite. Fruits ovoid or oblong, baccate, indchiscent, many-seeded; seeds ovate, compressed, marginate, finely scorbiculate or smooth.

About 13 species, mostly confined to tropical Africa; one in M.P.

Coccinia grandis (L.) Voigt, Hort. Suburb. Cak. 59. 1845; Chakravarty in Fasc. Fl. Ind. 11 : 24. 1982. *Coccinia cordifolia sensu* Cogn. in DC., Mon. Phan. 3 : 529. 1881, excl. basionym. *Bryonia grandis* L., Mant. Pl. 1 : 126.

1767. *C. medica* Wight & Arn., Prodr. 347. 1834. *Cephalandra indica* Naud. in Ann. Sci. Nat. (ser. 5) 5 : 16. 1886; Clarke in Hook. f., Fl. Brit. Ind. 2 : 621. 1879. -*Kundru*.

Perennial twiners; roots tuberous; stem smooth or scabrous, grooved or angled. Leaves palmately 5-nerved from a cordate base, 3-5-lobed, shining, margins glandular-tipped. Flowers white. Male flowers : peduncles 1-flowered; calyx-tube glabrous, broadly campanulate, 5-lobed, lobes linear-oblong, reflexed; corolla 5-fid, pubescent inside; segments triangular acute; stamens 3, filaments connate. Female flowers solitary; calyx and corolla as in male ones; staminodes 3, subulate; ovary fusiform, glabrous slightly ribbed. Fruits fusiform-ellipsoid, slightly beaked, young marked with white streaks, bright scarlet when ripe; seeds embedded in red pulp, yellowish-grey.

Bhopal, Chhindwara, Jabalpur, Raigarh. Fl. & Fr. : July Dec. and March May.

6. CUCUMIS L.

Climbing or trailing, scabrous, annual or perennial herbs, monoecious, rarely dioecious. Leaves angular, dentate, palmately 3-7-lobed, rarely dissected; tendrils simple. Flowers yellow, small. Male flowers in fascicles, rarely solitary; calyx-tube campanulate or turbinate, lobes 5, subulate, remote; corolla rotate or subcampanulate, 5-partite, lobes oblong-ovate, acute; stamens 3, free, inserted at the calyx tube, filaments short (rarely absent); anthers oblong, one 1-locular, the other two 2-locular; loculi linear, flexuose or curved, rarely erect; connective produced, papillose, sometimes bilobed or bifid; nectary pulviniform, semi-globose, entire or 3-lobed; pistillode short. Female flowers solitary, rarely fasciculate; calyx and corolla as in male; staminodes 3, setiform or ligulate. Ovary globose or sub-cylindric, style short, undivided.

About 25 species, cosmopolitan; 5 in M.P.

- 1a. Fruits smooth or pubescent
 - 2a. Leaves deeply 5-7 lobed; perennials ...1. *C. callosus*
 - 2b. Leaves angular or lobed; annuals :
 - 3a. Ovary softly hairy; young fruits not tuberculate ...2. *C. melo*
 - 3b. Ovary hispidulous; young fruits tuberculate ...4. *C. sativus*
- 1b. Fruits setose (bristly) or echinate :
 - 4a. Fruits echinate ...3. *C. prophetarum*
 - 4b. Fruits setose (bristly) ...5. *C. setosus*

1. *Cucumis callosus* (Rottl.) Cogn. in Engl., Pflanzenr. 99 : 129. 1924. *Bryonia callosa* Rottl., Neue. Schrift. Ges. Nat. Freunde Zu Berlin 4 : 210. 1803. *C. trigonus* Roxb., Fl. Ind. 2 : 722. 1824; Clarke in Hook. f., Fl. Brit. Ind. 2 : 619. 1879. -*Ban kachria*.

Perennial monoecious plants with slender angular rough stems. Leaves sub-orbicular, 3 - 6 cm long, cordate at base, palmately 5 - 7-lobed; lobes rounded or ovate-oblong, dentate or lobulate, rounded at apices. Male flowers solitary; peduncles 5 - 10 mm long; calyx-tube narrow, campanulate, ca 3 mm long, lobes subulate; corolla yellow, 6 - 7 mm long, lobes ovate, oblong, acute; staminal filaments short, anthers ca 2 mm long, appendage of the connective shorter than anthers; pistillode ca 1 mm long. Female peduncles 2 - 3 cm long; ovary densely hairy, style 1.5 - 2 mm long, stigmas cohering, ca 2.5 mm long. Fruits obovoid; seeds oblong, ca 5 × 2 mm white.

Balaghat, Bastar, Betul, Raigarh, Raipur, Satna, Sidhi. Fl. : June - Aug.; Fr. : July - Oct.

2. *Cucumis melo* L., Sp. Pl. 1011. 1753; Clarke in Hook. f., Fl. Brit. Ind. 2 : 620. 1879. *C. melo* var. *culta* Kurz in J. As. Soc. Beng. 46(2) : 102. 1877. -*Kharbuza*.

Robust prostrate annuals. Leaves 8 - 15 cm long, almost equally broad, 5-angular or moderately 3 - 7-lobed; lobes obtuse, sub-orbicular, denticulate, base cordate, villose or subhirsute. Male flowers fasciculate; peduncles slender, 5 - 30 cm long; calyx-tube narrow, campanulate, villose, 6 - 8 mm long; lobes subulate, erect or spreading; corolla ca 2 cm long, lobes ovate-oblong, acute; staminal filaments very short; anthers 3 - 4 mm long, appendage of connective shorter than anthers; pistillode ca 1 mm long. Female flowers : peduncles 1 - 2 cm long; ovary softly hairy, style 1 - 2 mm long, stigma connivent, ca 2 mm long. Fruits polymorphous; seeds oblong, 10 - 12 × 5 - 6 mm, white, obtuse at apex, base subacute.

Cultivated for its edible fruits. Fl. : May - July; Fr. : July - Oct.

Seeds and pulp are considered diuretic and useful in chronic eczema.

2.1. var. *agrestis* Naud., Ann. Sci. Nat. 4, ser. 11 : 73. 1859. *C. pubescens* Willd., Sp. Pl. 614. 1805.

Slender wild annuals with smaller leaves and oblong or turbinate fruits. Fruits are much smaller as compared to var. *melo* and inedible.

Hoshangabad, Sidhi. Fl. : June - Aug.; Fr. : July - Sept.

3. *Cucumis prophetarum* L., Cent. Pl. 33. 1755; Clarke in Hook. f., Fl. Brit. Ind. 2 : 619. 1879.

Perennials; stems brittle, angular, sulcate, whitish on drying. Leaves sub-orbicular, 2-4 cm long, almost equally broad, scabrous, rigid, 3-5-lobed, base truncate, margin crisped, lobes sub-obtuse, dentate or lobulate; petioles 2-4 cm long, hirsute; tendrils filiform. Male flowers solitary or fasciculate: peduncles filiform, villose-hirsute, 1-5 mm long; calyx-tube subcylindric, ca 4 × 2 mm, lobes linear, ca 3 mm long; corolla 3-4 mm long, lobes ovate-oblong; filaments filiform, 1 mm long, anthers oblong, ca 2.5 mm long, connective appendix glabrous, ca 0.7 mm long, apex glandular. Female flowers: peduncles 2-3 cm long; ovary muriculate. Fruits 3-4 cm long ochinate, striped green and white.

Raipur. Fl. : April - May; Fr. : Aug. - Oct.

4. *Cucumis sativus* L., Sp. Pl. 1012. 1753; Clarke in Hook. f., Fl. Brit. Ind. 2 : 620. 1879. -*Kheera*.

Hispid trailing annual herbs; stems angled, scabrous. Leaves angular or slightly 3-5-lobed, cordate, hispid, lobes triangular, acute or acuminate, dentate. Flowers yellow. Male flowers clustered, hypanthium tubular or campanulate with long white hairs; sepals linear, spreading; filaments short, anthers cohering, connective crested. Female flowers solitary, hypanthium ureceolate with oblanceolate sepals, hairy. Young ovary muricate with rigid prickles. Fruits oblong, cylindrical, yellowish-green; seeds numerous, white.

Bhopal, Chhindwara. Mostly cultivated for its fruits. Fl. & Fr. : May - Sept.

Wild bitter form is medicinally useful.

5. *Cucumis setosus* Cogn. in DC., Monog. Phan. 3 : 491. 1881.

Annual slender climbers, monoecious. Leaves 4-6 cm long and almost equally broad, membranous, ovate-triangular, undivided or slightly trilobed, lobes triangular, acute, margin denticulate; tendrils sparsely villose-hirsute. Male flowers fasciculate or sub-solitary; peduncles filiform, sparsely villose, 5-12 mm long; calyx-tube narrowly campanulate, villose-hispid, ca 3 mm long, apex ca 2 mm broad, lobes subulate, erect; corolla sparsely villose, lobes 4 × 2 mm broad, oblong, obtuse; staminal filament ca 0.5 mm long, anther oblong, ciliate, ca 1.5 mm long, connective appendix compressed, sparsely papillose, ca 3 mm long; ovary oblong, villose. Fruits oblong, ca 23 × 11 mm, sparsely long setose; seeds ca 4 × 2 mm, stramineous, smooth.

Bilaspur, Raigarh. Fl. : Sept.; Fr. : Oct.

7. CUCURBITA L.

Monoecious, annual or perennial herbs. Stems angular or grooved, scabrous. Leaves lobed, base cordate; tendrils two to many-fid. Flowers large, yellow. Male flowers solitary or fasciculate; calyx-tube campanulate, 5-lobed, tip recurved; stamens 3, inserted in the calyx-tube, filaments free, anthers linear, connate in a column, one unilocular, others bilocular; loculi elongate, sigmoid-flexuose, connective not produced, pistillode absent. Female flower solitary, shortly pedunculate; calyx and corolla as in male; staminodes 3, short, triangular; ovary oblong, 3-5-placentiferous, style short, thick, stigma 3-5-lobed or bifurcate, papillose, ovules many. Fruits fleshy, many-seeded, indehiscent; seeds ovate or oblong, smooth.

About 21 species, cosmopolitan; 3 in M.P.

- 1a. Leaves herbaceous; calyx usually foliaceous ... 2. *C. moschata*
 1b. Leaves chartaceous; calyx not foliaceous :
 2a. Leaves with rounded lobes; peduncle terete; corolla lobes recurved ... 1. *C. maxima*
 2b. Leaves with acute lobes; peduncle 5-angular; corolla lobes erect ... 3. *C. pepo*

1. *Cucurbita maxima* Duch. ex Lamk., Encycl. 2 : 151. 1786; Clarke in Hook. f., Fl. Brit. Ind. 2 : 622. 1879. *Kaddu, Lal kumra.*

Prostrate annual herbs. Leaves ca 15 × 20 cm, 5-6-lobed, lobes acute or rarely obtuse, often with whitish blotches on upper surface; tendrils many-fid. Male flowers solitary; calyx-tube 5-6 mm long, lobes 3, linear, very often leafy; corolla 8 × 6 cm, campanulate, lobes acute, reflexed, pale yellow; stamens 3, filaments swollen at base, glanduliform, 5-8 mm long, anthers ca 15 mm long. Female flowers solitary, large; calyx-lobes ca 25 mm long; angled. Fruits variable in shape and size, usually oblong and constricted at the middle; seeds 12-13 × 7-8 mm, distinctly marginate, yellow.

Widely cultivated. Bhopal. Fl. : March - June; Fr. : May - Aug.

2. *Cucurbita moschata* (Duch. ex Lamk.) Duch. ex Poit., Dict. Sci. Nat. 8 : 234. 1818; Clarke in Hook. f., Fl. Brit. Ind. 2 : 622. 1879. *C. pepo* var. *moschata* Duch. ex Lamk., Encycl. 2 : 152. 1786. -*Meetha kaddu, Sitaphal, Daddu.*

Prostrate annual herbs. Leaves 16 × 24 cm, 5-6-lobed, lobes acute or rarely obtuse, often with whitish blotches on the upper surface; petioles 8-19 cm long, with pungent hairs; tendrils many-fid. Male flower solitary; calyx-tube 5-6 mm long, lobes 3, linear, very often leafy; corolla 8 × 6

mm, campanulate, lobes acute, reflexed, pale yellow; stamens 3, filaments swollen at base, glanduliform, 5 - 8 mm long, anthers ca 15 mm long. Female flowers solitary, large; calyx-lobes 25 - 28 mm long; corolla as in male. Fruiting peduncles stout, 5 - 7 cm long, angled. Fruits various, usually oblong and constricted at middle; seeds ca 12 - 13 × 7 - 8 mm, distinctly marginate, yellow.

Cultivated for fruits. Fl. : March - June; Fr. : Oct. - Dec.

The yellow pulp of the fruit is cooked and eaten as vegetable.

3. *Cucurbita pepo* L., Sp. Pl. 1010. 1753; Clarke in Hook. f., Fl. Brit. Ind. 2 : 622. 1879. -*Kadmaiah kumra*, *Keala*.

Annuals with angular sulcate stems. Petioles 6 - 9 cm long with rigid pungent hairs below. Leaves 8 - 10 × 9 - 10 cm, 5-lobed, lobes obtuse or acute; sinus obtuse, ca 7 cm broad and ca 2 cm deep, margin dentate, base cordate, upper surface scabrous, lower with glandular club-shaped hairs; tendrils branched. Male flowers ca 5 cm long, peduncles 4 - 6 cm long, 5-angular; calyx-tube obscurely 5-angled; corolla 5 × 3 cm, campanulate, lobes erect, acute, yellow; stamens 3, filaments swollen below, ca 15 mm long, anthers conical, ca 9 mm long. Fruits variable, small or large, pulp fibrous; seeds whitish-yellow, 8 - 22 mm long, broadly or narrowly ovate, marginate.

Cultivated. Fl. & Fr. : Rainy season.

8. DIPLOCYCLOS (Endl.) Post. & Kuntze

Glabrous herbs, monoecious. Leaves palmately 3 - 5-lobed; tendrils bifid. Flowers small, yellowish, male and female together in axillary fascicles. Male flowers : calyx-tube broadly campanulate, lobes 5, narrow, short; corolla campanulate, 5-partite; stamens 3, free, inserted in the calyx tube, one anther 1-locular, others 2-locular. Female flowers: calyx, corolla similar to male; staminodes 3, small; ovary 3- placentiferous, style slender, stigmas 3, bilobed. Fruits small baccate, globose or ovoid, vertically lined or variegated; seeds ovoid, attenuate at base, conspicuously belted with a partition wall, central portion surrounded by belt, somewhat raised on both sides.

About 3 species in Tropical Africa and Indo-Malaya; one in M.P.

Diplocyclos palmatus (L.) Jeffrey in Kew Bull. 15 : 352. 1962. *Bryonia palmata* L., Sp. Pl. 1 : 1012. 1753, *excl. syn.* - *Ban-kakra*.

Herbaceous climbers. Leaves 3-lobed, lobes obtuse, margins entire (rarely dentate), base broadly sinuate, upper surface punctate; petioles 2 - 3 cm long; tendrils bifurcate. Flowers small fasciculate. Male flowers :

calyx-tube broadly campanulate, with a nectar within, 5-lobed, short; corolla campanulate, 5-partite; stamens 3, anther loculi linear, slightly flexuous. Female flowers : calyx and corolla as in male, staminodes 3, ovary with 3-placentas; stigmas 3, bilobed. Fruit baccate, globose or ovoid, 10 - 15 mm across, conspicuously belted with a partition wall slightly raised all round the belt and the central portion surrounded by the belt somewhat raised on both the sides.

Balaghat, Hoshangabad, Morena, Sidhi, Raipur. *Fl. & Fr.* : Dec. Jan.

9. HODGSONIA Hook. f. & Thoms.

Large climbers, dioecious. Male flowers in racemes; calyx-tube elongate, slender, mouth slightly campanulate; corolla rotate, 5-partite, connate at base, segments obtuse, truncate, long-fimbriate; stamens 3, filaments inconspicuous; anthers conduplicate. Female flowers solitary; calyx and corolla similar to male ones; ovary globose, one-locular, style long, stigma 3-lobed, lobes 2-fid, exserted. Fruit large, depressed, 12-grooved; perfect seeds 6, hairy flat, ellipsoid, rudimentary seed attached to its side.

An Indo-Malayan genus with only 2 species; one in M.P.

Hodgsonia macrocarpa (Bl.) Cogn. in DC., Monogr. Phan. 3 : 349. 1881. *Trichosanthes macrocarpa* Bl., Bijdr. 935. 1826. *H. heteractita* Hook. f. & Thoms. in Proc. Linn. Soc. 2 : 257. 1853; Clarke in Hook. f., Fl. Brit. Ind. 2 : 606. 1879.

Robust climbers, up to 30 m long; stem angular, glabrous. Leaves 16 - 19 cm long, equally broad, deeply 3 - 5-lobed; lobes acuminate, glabrous, truncate or emarginate at base; petioles 5 - 7 cm long; tendrils robust, usually bifid. Male flowers : peduncles 15 - 30 cm long, generally thick, striate, pedicels 5 - 10 mm long, bracts fleshy, oblong-lanceolate; calyx-tube 8 - 10 × 7 - 9 cm; corolla ca 5 cm long, lobes 3-nerved, yellow outside, white inside, fimbriate; fringes up to 15 cm long. Female flowers : peduncles thick, short. Fruits 7 - 11 × 10 - 15 cm, reddish-brown, tomentose; seeds 3 - 7 × 3 cm, 10 - 15 mm thick.

Ratlam, Satna. *Fl.* : Feb. March; *Fr.* : July - Sept.

Oil obtained from seeds is medicinal.

10. LAGENARIA Ser.

Annual scandent softly pubescent herbs, monoecious. Leaves suborbicular-cordate, petiole apex biglandular; tendrils bifid. Flowers solitary, large, white, male flowers long peduncled; calyx tube narrow, campanulate or infundibuliform, sepals small; petals 5, free,

oblong-obovate, retuse; stamens 3, inserted at the calyx tube, filaments free; anthers included, sigmoid flexuous, one 1-locular, other two 2-locular. Connective narrow or dilated, not produced, papillose. Female Flowers : calyx-tube cup-shaped, calyx and corolla like male ones; staminodes 3; ovary ovoid or cylindrical, triplacentiferous, style thick, short, stigmas 3, bilobed, thick. Fruits indehiscent; seeds fleshy, many, obovate, compressed.

About 8 species cultivated in tropical countries; one cultivated in M.P.

Lagenaria siceraria (Molina) Standl. in Publ. Field. Mus. Nat. Hist. Chicago, Bot. Ser. 3 : 435. 1930. *Cucurbita siceraria* Molina, Sagg. Stora Nat. Chile 133. 1782. *L. vulgaris* Scr. in Mem. Soc. Phys. Geneve 3(i) : 25, t. 2. 1825; Clarke in Hook. f., Fl. Brit. Ind. 3 : 613. 1879. *Cucurbita lagenaria* L., Sp. Pl. 1010. 1753. *Lauki*.

Softly pubescent trailing or climbing herbs, monoecious or dioecious, stems pentagonous; tendrils bifid. Leaves ovate or orbicular, cordate, dentate, 3-5-lobed or-angled, 10-40 cm long, equally broad, acute or shortly acuminate at apex. Flowers large, solitary, white, male with longer peduncle than female ones. Male flowers : calyx-tube 2-3 cm long, sepals narrow; petals 3-4 × 2-3 cm, tomentose, more or less emarginate at apices; staminal filaments 3-4 mm long, anthers glossy, 8-10 mm long. Female flowers : calyx-tube 2-3 mm long, ovary long, villose. Fruits variable in shape and size, yellowish-green; seeds obovate-oblong or triangular, 7-18 mm long, white apex truncate or bidentate, rarely round.

Bastar, Bhopal, Bilaspur, Chhindwara, Mandla, Morena, Raigarh, Raipur, Sidhi. *Fl. & Fr.* : July-Feb.

Cultivated. Fruits used as vegetable. Dried fruit-shells used as bottles, bowels, pipes, blowing horns, snuff boxes and also as musical instrument. Fruit pulp is medicinal.

11. LUFFA Mill.

Scandent annual herbs, monoecious. Leaves sometimes gland-dotted; tendrils bi- or multi-fid; probracts at leaf-axils often scaly or glandular. Male flowers in racemes; peduncles long; flowers usually yellow; calyx-tube campanulate or turbinate, lobes 5; petals 5, free, spreading; stamens 3, rarely 4 or 5, inserted at the calyx-tube, anthers exerted, one 1-locular, others 2-locular or all unilocular, locules linear, sigmoid-flexuose, connective dilated; pistillode glanduliform or absent. Female flower solitary; calyx-tube shortly produced above the ovary; staminodes 3 (rarely 4-5); ovary elongate, sulcate, 3-placentiferous, style columnar, stigmas 3, bilobed, ovules many. Fruits dry, oblong or cylindrical, fibrous inside, trilocular; seeds many, oblong, compressed.

Cosmopolitan, about 9 species; 3 in M.P.

- 1a. Stamens 5; fruits smooth ...2. *L. cylindrica*
 1b. Stamens 3; fruits not smooth :
 2a. Fruits ovoid, not angled ...3. *L. echinata*
 2b. Fruits elongate, 10 - angled ...1. *L. acutangula*

1. *Luffa acutangula* (L.) Roxb., Fl. Ind. 3 : 713. 1832; Clarke in Hook. f., Fl. Brit. Ind. 2 : 615. 1879. *Cucumis acutangula* L., Sp. Pl. 1 : 1011. 1753. *Kali-torui*, *Tori*.

Climbers. Leaves up to 20 cm long and almost equally broad, palmately 5 - 7- angled or sublobate; tendrils often trifid. Flowers pale yellow, male and female ones in the same axil. Male flowers : peduncles 10 - 15 cm long, 17 - 20-flowered at the apex; pedicels 1 - 4 cm long; probract 3 - 7 × 2 - 4 mm, fleshy, green, ovate with 3 - 10 glistening glands on upper surface; calyx-tube campanulate, pentagonous, lobes lanceolate, carinate; petals obcordate, ca 2 × 2 cm; stamens 3, one unilocular, two bilocular, filaments bearded at base. Female flowers : peduncles up to 8 cm long, ovary 10 - angular, apex constricted. Fruits clavate-oblong, 15 - 25 × 6 - 8 cm, acutely 10-angled, apex obtuse or slightly acute; seeds ovate, ca 11 × 7 mm, compressed, black.

Bhopal, Raigarh, Tikamgarh. Cultivated. Fl. : June - Sept.; Fr. : July - Oct.

Tender fruits eaten as vegetable. Leaves and seeds also medicinal.

Several horticultural varieties have been produced.

1.1. var. *amara* (Roxb.) Clarke in Hook. f., Fl. Brit. Ind. 2 : 615. 1879. *Luffa amara* Roxb., Fl. Ind. 3 : 715. 1832. - *Karui-taroi*.

Differs from var. *acutangula* in fruits which are smaller, 5 - 6 × 3 - 3.5 cm, obovoid, conical at both ends and bitter.

Bhopal, Sidhi. Fl. : June - July; Fr. : Aug. - Oct.

2. *Luffa cylindrica* (L.) M. Roem., Syn. Pepon. 63. 1846. *Momordica cylindrica* L., Sp. Pl. 1009. 1753. *Luffa aegyptiaca* Mill., Gard. Dict. ed. 8, 4 : 500. 1768. *L. clavata* et *L. racemosa* Roxb., Fl. Ind. 3 : 714 - 715. 1832. - *Ghia torui*, *Nenua*.

Climbers. Leaves up to 20 cm long, almost equally broad, palmately 5-lobed; tendrils trifid. Probract 3 - 7 × 2 - 4 mm, fleshy, ovate with 3 - 7 glistening glands on the upper surface. Flowers bright yellow, male and female flowers often in same axils. Male flowers : peduncles up to 15 cm long, 15 - 20-flowered; pedicels 1 - 2 cm long; calyx- tube short, broadly

campanulate, lobes oblong-cuneiform, ca 2×1 cm; stamens 3 or 5, one unilocular, the other two 2-locular, or 5 unilocular, filaments shortly villose at base. Female flowers : peduncles up to 10 cm long ; ovary cylindric, softly hairy. Fruits fusiform, up to 50 cm long, and up to 8 cm wide, not angular, obtuse, strongly fibrous inside; seeds ovate, ca 12×8 mm, smooth, black.

Bhopal, Bilaspur, Sidhi. Cultivated. Fl. & Fr. : June-Dec.

Fruits used as vegetable; seeds cathartic.

3. *Luffa echinata* Roxb., Fl. Ind. 3 : 716. 1832; Clarke in Hook. f., Fl. Brit. Ind. 2 : 615. 1879.

Plants dioecious; stems sulcate. Leaves reniform-suborbicular, $4-9 \times 5-10$ cm, 5-angled or deeply lobed, apex round, scabrous on both surfaces; tendrils bifid. Flowers white. Male flowers : peduncles $7-15$ cm long, 5-12-flowered; pedicels $5-10$ mm long; calyx-tube subrotate, long villose, $3-4$ mm broad, lobes $5-6$ mm long, triangular; petals ovate, ca 10 mm long; stamens 3, one unilocular, two bilocular, anthers entire, filaments $3-9$ mm long. Female flowers : peduncles $1-3$ cm long. Fruits $4-7$ mm long, ashy, ovoid, base dilated, densely covered with bristles; seeds ovate, ca 4×3 mm, emarginate, black.

Sagar, Raipur. Fl. : Sept. - Nov.; Fr. : Oct. - Jan.

12. MELOTHRIA L.

Scandent annual herbs, monoecious or rarely dioecious. Leaves entire or somewhat lobed; tendrils simple. Flowers small, yellow or white. Male flowers racemose or corymbose, rarely fasciculate or solitary; calyx-tube campanulate, lobes dentiform; corolla deeply 5-partite; stamens 3, filaments free, anthers oblong or suborbicular, one unilocular, others bilocular, sometimes all bilocular, loculi erect, rarely curved; pistillode globose or annular, rarely trilobed. Female flowers solitary or fasciculate or subumbellate; calyx and corolla as in male; staminodes 3; ovary triplacentiferous, style short, surrounded by an annular disc; stigmas 3. Fruits short, baccate; seeds ovoid or globose, compressed, marginate, smooth.

Cosmopolitan with about 88 species; 3 in M.P.

- | | |
|-------------------------|-------------------------------|
| 1a. Plants dioecious | ...1. <i>M. heterophylla</i> |
| 1b. Plants monoecious : | |
| 2a. Seeds smooth | ...2. <i>M. leiosperma</i> |
| 2b. Seeds scorbiculate | ...3. <i>M. maderaspatana</i> |

1. *Melothria heterophylla* (Lour.) Cogn. in DC., Monogr. Phan. 3 : 618. 1881. *Solena heterophylla* Lour., Fl. Cochinch. 1 : 514. 1790. *Zehneria umbellata* Thw., Enum. Pl. Zeyl. 125. 1853; Clarke in Hook. f., Fl. Brit. Ind. 2 : 625. 1879, p.p. —*Ban-kumhri*.

Scandent herbs. Leaves ovate, suborbicular, oblong or narrowly lanceolate, 6–20 cm long, coriaceous, undivided or variously lobed, often acute or acuminate; tendrils glabrous. Male flowers : peduncles slender, 2–50 mm long, few to many-flowered, pedicels filiform, 2–8 cm long; calyx tube campanulate, ca 5 × 3 mm, glabrous, lobes subulate; corolla ca 1.5 mm long, acute, lobes spreading; staminal filament ca 3 mm long, slender, glabrous, anthers suborbicular, ca 1 mm long. Female flowers solitary or with axillary male flowers, peduncles 5–10 mm long. Fruits oblong, ca 4 × 2 cm, brown; seeds many, 5–7 × 4–5 mm, turgid, smooth.

Balaghat, Bilaspur, Chhindwara, Hoshangabad, Rajnandgaon, Seoni, Shivpuri, Surguja. *Fl. & Fr.* : July–Oct.

Roots medicinal.

2. *Melothria leiosperma* (Wight & Arn.) Cogn. in DC. Monogr. Phan. 3 : 622. 1881. *Bryonia leiosperma* Wight & Arn., Prodr. 1 : 345. 1834. *Mukia leiosperma* Wight & Arn. in Ann. & Mag. Nat. Hist. 8 : 268. 1842; Clarke in Hook. f., Fl. Brit. Ind. 2 : 623. 1879.

Stems robust, angular-sulcate, villose. Leaves ovate-cordate, 6–8 × 4–6 cm, subcoriaceous, entire, angular or shortly lobed, acute, denticulate, densely villose; tendrils robust. Flowers (male and female both) fasciculate; calyx-tube ca 3 × 2.5 mm, lobes 3–4 mm long, erect, spreading. Corolla ca 4 mm long, puberulous. Anthers oblong, ca 2 mm long, ciliate, shortly appendiculate. Fruits globose, 10–12 mm across, glabrous, smooth; seeds ovoid, ca 6 × 4 mm, smooth, turgid, ashy, distinctly marginate.

Hoshangabad. *Fl. & Fr.* : July–Sept.

3. *Melothria maderaspatana* (L.) Cogn. in DC., Monogr. Phan. 3 : 623. 1881. *Cucumis maderaspatana* L., Sp. Pl. 1012. 1753. *Bryonia scabrella* L. f., Suppl. 424. 1781. *Mukia scabrella* (L. f.) Arn. in Hook. J. Bot. 3 : 276. 1841; Clarke in Hook. f., Fl. Brit. Ind. 2 : 623. 1879, excl. syn. —*Bilarii*.

Annuals with scandent sulcate stems. Leaves ovate, 5–12 × 3–10 cm, entire, angular or 3–5-lobed, acute, scabrous above; tendrils slender, elongate. Male flowers : pedicels short; calyx-tube ca 2 × 1.5 mm, villose-hirsute, acute at base, lobes 1–1.5 mm long, erect, subulate; corolla 2–4 mm long, yellow, lobes ovate-oblong, rounded at apex; staminal filaments ca 0.5 mm long, pilose, anthers oblong-ciliate, distinctly appendiculate, ca 1 mm long. Female flowers subsessile, solitary or

sub-fasciculate. Fruits globose, brownish-yellow, juicy; seeds ovoid-oblong, prominently suborbiculate, ca 4×2.5 mm, prominently suborbiculate.

Common throughout M.P. Fl. : July - Oct.; Fr. : Sept. - Dec.

13. MOMORDICA L.

Scandent or prostrate herbs; monoecious or dioecious. Leaves entire, lobed or pedately compound; tendrils simple or bifid. Flowers yellow or white. Male flowers : calyx-tube short, campanulate or cupulate or shortly infundibuliform; lobes 5, round, ovate or lanceolate; corolla rotate or broadly campanulate, 5-partite; stamens 3, inserted at mouth of calyx-tube, filaments free; anthers coherent first, ultimately free, one unilocular, others bilocular; pistillode absent or glanduliform. Female flowers solitary, calyx and corolla as in male; staminodes absent or glandular; ovary oblong or fusiform, triplacentiferous; style slender; stigmas 3, entire or bifid. Fruits oblong, fusiform or cylindrical, baccate, indehiscent or trivalved, muricate or echinate; seeds turgid or complanate.

About 60 species, cosmopolitan; 2 in M.P.

- 1a. Plants monoecious ...1. *M. charantia*
 1b. Plants dioecious ...2. *M. dioica*

1. *Momordica charantia* L., Sp. Pl. 1009. 1753; Clarke in Hook. f., Fl. Brit. Ind. 2 : 616. 1879. -Karela.

Plants monoecious; stems branched, puberulous. Leaves prominently nerved, up to 12 cm long and almost equally broad, reniform or suborbicular, glabrous; lobes ovate-oblong; tendrils simple, slender, pubescent. Male flowers solitary, peduncles slender; corolla up to 2×1 mm, yellow; segments obovate, obtuse or emarginate. Female flowers : ovary fusiform, rostrate, muricate. Fruits oblong, 8 - 20 cm long, muricate-tuberculate, trivalved, dehiscent at apex, tapering at both ends; seeds compressed, ca 12×8 mm, subtridentate at both ends, sculptured.

Commonly cultivated. Fl. & Fr. : July - Oct.

Fruits eaten as vegetable; its juice is considered beneficial for diabetic patients.

var. *muricata* (Willd.) Chakravarty in Fasc. Fl. Ind. 11 : 92. 1982.
Momordica muricata Willd., Sp. Pl. 4 : 602. 1805.

Similar to var. *charantia* except for faintly nerved leaves and smaller fruits not tapering at both ends.

Bhopal. Fl. & Fr. : May - Oct.

2. *Momordica dioica* Roxb. ex Willd., Sp. Pl. 4 : 605. 1805; Clarke in Hook. f., Fl. Brit. Ind. 2 : 617. 1879, excl. syn. - *Jangli karela*, *Kartoli*, *Kachri*, *Kaksa*.

Perennial dioecious climbers, with tuberous roots; stems slender. Leaves ovate, up to 10 × 8 cm, entire or variously lobed, undulate or minutely denticulate, mucronate; tendrils filiform, simple. Male flowers solitary, peduncles slender, up to 12 cm long; sepals lanceolate-linear, ca 6 × 1.5 mm, acute, densely villose; corolla ca 2 cm, yellow, lobes oblong, obtuse. Female flowers : peduncles ebracteate, up to 2 cm long; ovary ovoid, oblong. Fruits ovoid, up to 5 × 3 cm; seeds broadly ovoid, ca 7 × 6 mm, pale yellow, emarginate.

Common throughout M.P. Fl. & Fr. : June - Oct.

Tubers useful in bleeding piles, also used as expectorant. Roots as sedative in fever.

14. TRICHOSANTHES L.

Scandent herbs, dioecious, less frequently monoecious. Leaves entire or 3 - 9-lobed, denticulate; tendrils simple or 2 - 5-fid. Flowers white. Male flowers usually racemose, often bracteate; calyx-tube cylindric, dilated above, 5-lobed; corolla 5-lobed, lobes oblong, fimbriate; stamens 3, inserted in the calyx-tube, filaments very short, anthers almost included, connate, one 1-locular, two 2-locular, loculi conduplicate. Female flowers solitary, calyx and corolla as in male; staminodes absent; ovary ovoid or fusiform, 1-locular. Fruits fleshy, globose, ovoid or fusiform, indehiscent, glabrous; seeds packed in pulp, ellipsoid, sometimes angular.

An Indo-Malayan genus with about 44 species; 4 in M.P.

1a. Male racemes minutely bracteate or ebracteate :

2a. Fruits elongated, up to 1.5 m long, twisted with white stripes ...1. *T. anguina*

2b. Fruits ovoid, conical, 5 - 6 cm long, not striped ...4. *T. cucumerina*

1b. Male racemes with large bracts :

3a. Calyx lobes entire ...3. *T. cordata*

3b. Calyx lobes dentate or laciniate ...2. *T. bracteata*

1. *Trichosanthes anguina* L., Sp. Pl. 1008. 1753; Clarke in Hook. f., Fl. Brit. Ind. 2 : 610. 1879. *Cucumis anguina* L., Syst. ed. 10. 1279. 1759. - *Chichinda* (Hindi), *Snake Gourd* (English).

Monoecious annuals; stems slender, puberulous. Leaves orbicular-reniform, 11 - 14 × 11 - 17 cm, distantly denticulate, deeply 5-lobed; tendrils 2 - 3-fid. Male flowers : peduncles 10 - 25 cm long, 8 - 15-flowered; pedicels

6 - 10 cm long; Calyx-tube 25 - 30 cm long, subcylindric, teeth ca 2 mm long, reflexed; petals oblong, ca 9 × 3 mm; staminal filaments ca 2 mm long, anthers ovoid, pistillode 15 - 17 mm long. Female flowers solitary; peduncles 5 - 50 mm long; ovary fusiform. Fruits up to 1.5 m long, often twisted, smooth, often with 7 - 8 white longitudinal stripes; seeds oblong, 14 - 17 × 7 - 9 mm, finely rugulose.

Commonly cultivated. *Fl. & Fr.* : May - Aug.

Fruits eaten as a vegetable; seeds considered medicinal.

2. *Trichosanthes bracteata* (Lamk.) Voigt., Hort. Suburb. Calc. 58. 1845. *Modecca bracteata* Lamk., Encycl. Meth. Bot. 4 : 210. 1767. *T. palmata* Roxb., Fl. Ind. 3 : 704. 1832; Clarke in Hook. f., Fl. Brit. Ind. 2 : 606. 1879. -Indrayan.

Stems robust, branched, sulcate. Leaves membranous, variable in size, broadly ovate, subentire or often deeply palmately 3 - 5-lobed, denticulate; petioles 3 - 10 cm long; tendrils robust, 3- fid. Male flowers : peduncles 10 - 20 cm long, sulcate, 5 - 10- flowered; pedicels thick, very short; calyx tube, 4 - 5 cm long, striate, lobes 12 - 14 × 3 - 4 mm; staminal filaments 1 - 2 mm long, villose, anthers head ca 11 mm long. Female flowers axillary, solitary; fruiting peduncles 2 - 3 cm thick, red with 10 longitudinal orange streaks; seeds ca 12 × 6 mm, ovate-oblong, emarginate, whitish.

Fl. : July - Sept.; *Fr.* : Nov. - Dec.

Mandla, Morena, Satna, Sidhi, Surguja. *Fl.* : July - Sept.; *Fr.* : Nov. - Dec.

Roots and fruits medicinal.

3. *Trichosanthes cordata* Roxb., Fl. Ind. 3 : 703. 1832; Clarke in Hook. f., Fl. Brit. Ind. 2 : 608. 1879. *T. microsiphon* Kurz in J. As. Soc. Beng. 2 : 308. 1872.

Plants dioecious; roots tuberous; stems robust. Leaves broadly ovate, cordate, 14- 19 × 10 - 11 cm, tendrils robust, sulcate, puberulous. Male flowers : peduncles 12 - 20 cm long, striate, 4 - 8-flowered; pedicels 1 - 2 mm long, thick; calyx-tube ca 5 × 7 cm, attenuate, villose, lobes erect, flexuose; petals papillose; staminal filament ca 1 mm long, glabrous, anthers ca 14 × 3 mm. Female flowers sessile; ovary oblong; fruiting peduncles 1 - 2 cm long, robust. Fruits globose, red, smooth; seeds ca 10 × 14 mm, transversely broad, belted at the middle with raised margins.

Satna, Sidhi. *Fl.* : June - Sept.; *Fr.* : Sept. - Dec.

4. *Trichosanthes cucumerina* L., Sp. Pl. 1008. 1753; Clarke in Hook. f., Fl. Brit. Ind. 2 : 609. 1879. *Jangali chichinda*.

Climbers; stems slender. Leaves orbicular, reniform, or broadly ovate, 8-10 × 8-11 cm, distantly denticulate, deeply 5-7-lobed; tendrils 2-3 fid. Male flowers: peduncles in pairs, one 1-flowered, the other with 8-15 flowers in racemes; pedicels 1-2 cm long; calyx-tube dilated at apex, attenuate, ca 15 mm long, lobes ca 1.5 mm long; staminal filaments ca 1.5 mm long, anthers oblong, ca 3 × 1.5 mm. Female flowers: peduncles 3-12 mm long; ovary oblong, style 16-18 mm long, filiform. Fruits ovoid, conical, ca 6 × 4 cm, 8-10-seeded; seeds ovate-oblong, ca 11 × 6 mm, compressed, undulate, truncate, base attenuate.

Balaghat, Bhopal, Bilaspur, Durg, Hoshangabad, Indore, Panna, Raigarh, Raipur, Rajnandgaon, Sidhi, Tikamgarh. Fl. : June - Aug.; Fr. : Sept. - Oct.

Fruits cooked as vegetable. Roots, leaves and seeds medicinal.

73. BEGONIACEAE

(Anand Kumar)

About 5 genera and 930 species, in all moist tropical countries except Australia; one genus and 2 species in M.P.

BEGONIA L.

Acaulescent or caulescent succulent herbs or undershrubs, often tuberous. Leaves alternate, crenate-serrate, more or less inequilateral; stipules 2, caducous. Flowers unisexual, monoecious, in axillary cymes, regular or irregular. Staminate flowers: tepals 2 or 2 + 2, outer ones often petaloid; stamens many, filaments free or connate below, anthers 2-celled, poricidal or dehiscent longitudinally. Pistillate flowers: tepals 2-6; ovary inferior, 1-3 (-6)-locular, ovules many on axile placenta; styles 2-6; stigmas thick, spreading or twisted. Fruit a loculicidal capsule, usually loculicidally dehiscent; seeds many, minute, testa reticulate.

About 900 species in tropics and subtropics; 2 in M.P.

- 1a. Acaulescent herbs; tepals 4 in male and 5 in female flowers ...2. *B. picta*
 1b. Caulescent undershrubs; tepals 2 in male as well as in female flowers ...1. *B. malabarica*

1. *Begonia malabarica* Lamk., Encycl. 1 : 393. 1785; Clarke in Hook. f., Fl. Brit. Ind. 2 : 655. 1879. *Diploclinium lindleyanum* Wight, Ic. t. 1817. 1852.

Branched perennial undershrubs up to 1.5 m high. Leaves cauline, 6-15 × 4-6.5 cm, ovate-cordate, stiff pubescent, acuminate, base oblique; petioles 3-8 cm long. Flowers in terminal or lateral dichasia! cymes.

Tepals orbicular-lunate, pink or white. Filaments unequal. Ovary ovoid, 3-celled, 3-winged; ovules many; styles 3; stigmas many-branched. Capsules 1.5 - 2 cm, wings equal; seeds oblong, pitted.

Among grasses at high elevations; rare. Hoshangabad. *Fl. & Fr.* : Jan. April.

2. *Begonia picta* Sm., *Exot. Bot.* 2 : 81, t. 101, 1805; Clarke in Hook. *f.*, *Fl. Brit. Ind.* 2 : 638, 1879.

Herbs up to 20 cm high, with short tuber. Leaves few (1-3), 5 - 13 x 3 - 10 cm, ovate, cordate, serrate, acuminate or sub-acuminate, pilose on upper surface and on nerves on under surface; petioles 3 - 15 cm long, pilose. Flowers few in paniced cymes. Tepals in male flowers 2 + 2, scarlet or pink; outer tepals sub-orbicular to broadly ovate, obtuse; inner tepals oblong, light pink, smaller. Tepals in female flowers 5, pink, ovate-oblong. Ovary 3-locular; styles 3; stigmas branched, twisted. Capsules 0.6 - 2 cm long, 3-angled, 3-winged; wings unequal, pubescent; seeds ovoid.

Amidst rock boulders in moist shaded places in the forests, also planted in gardens. Balaghat, Bastar, Bhopal, Bilaspur, Chhindwara, Hoshangabad, Raigarh, Raipur, Rajnandgaon, Surguja. *Fl. & Fr.* : July Dec.

74. CACTACEAE

(A. K. Mukherjee)

About 50 - 150 genera and 2,000 species chiefly in the drier regions of tropical America, extending to British Columbia and Patagonia; one genus and 2 species in M.P.

OPUNTIA Mill.

Succulent shrubs, with flattened fleshy jointed branches; areoles spiny; spines solitary or clustered; glochids usually numerous, borne above the spines. Leaves small, terete, caducous. Flowers solitary; perianth spreading, slightly grading into sepals and petals; stamens numerous, much shorter than the petals; ovary areolate, longer than perianth; style one, thick; stigma shortly lobed. Fruits pear-shaped berries.

About 250 species mainly in America and Galapagos; 2 in M.P.

- 1a. Spines 3 - 7 per areole, translucent yellow mottled brown. ...1. *O. elatior*
- 1b. Spines 1 or 3 per areole, greyish with a translucent tip ...2. *O. vulgaris*

1. *Opuntia elatior* Mill., Gard. Dict. ed. 8. n. 4. 1768. *Opuntia dillenii* auct. [non (Ker-Gawler) How. 1819]; Hook. f., Fl. Brit. Ind. 2 : 657. 1879, p.p.-Nagphani.

Erect branched succulent shrubs; branches compressed, ovate-oblong. Areoles with 3-7 strong divaricate translucent yellow mottled brown spines. Flowers yellow, soon becoming tinged with purple or outer tepals red and inner dirty yellow; perianth somewhat campanulate; stamens purple; pistil shorter than filaments; hypanthium with tufts of bristles and a few spines. Fruits red, marked with areoles, but bristles and spines deciduous, top depressed.

In waste places, along road sides and as hedges around cultivated fields.

Bilaspur, Chhat arpur, Damoh, Hoshangabad, Mandla, Raigarh, Seoni, Shivpuri, Sidhi. Fl. & Fr. : March-Sept.

2. *Opuntia vulgaris* Mill., Gard. Dict. ed. 8. n. 1. 1768. *Opuntia monacantha* (Willd.) How., Suppl. Pl. Succ. 81. 1819. *Cactus monacanthos* Willd., Enum. Pl. Berol. Suppl. 33. 1813. *Opuntia dillenii* auct., non (Ker-Gawler) How., 1819; Hook. f., Fl. Brit. Ind. 2 : 657. 1879, p.p.

Large succulent jointed shrubs with erect branches and with limbs much compressed, obovate to oblanceolate, usually decreasing in size from below upwards, bright green. Areoles bearing 1-3 spines, of which at least one is often over 2.5 to 5 cm long, often greyish with a translucent tip. Flowers yellow or only reddish outside; perianth spreading rotate; outer tepals smaller, obcordate, inner oblong; stamens yellow, short; pistil longer than the filaments. Fruits green, nearly smooth.

In waste places, and as hedges. Mandla, Rajnandgaon, Surguja. Fl. & Fr. : April-July and Jan.-Feb.

75. AIZOACEAE

(A.K. Tripathi)

About 115 genera and 1050 species, mainly centered in S. Africa, extending to tropical Africa, Asia, Australia and S. America; one genus and 2 species in M.P.

TRIANTHEMA L.

Diffusely branched prostrate herbs, glabrous, pubescent or papillose. Leaves opposite, unequal, entire; stipules absent; petioles dilated, with numerous stipuliform margins. Flowers small, axillary, solitary, cymose or paniced. Calyx-tube short or long; lobes 5, coloured within, mucronate. Petals absent. Stamens 5-10 or many inserted near the top of the calyx

tube. Ovary free, 1 - 2- celled, often truncate at apex; ovules 1 or many, basal; styles 1 or 2, subulate. Capsule 1 - 2- celled, membranaceous below, with a hard thick cap which is detached by a circumscissile dehiscence and carries away one or more seeds; seeds 1 or many, sub-reniform; embryo annular.

About 15 species, widely spread in tropical and subtropical regions of both hemisphere; 2 in M.P.

- 1a. Stamens 10 or more ...1. *T. portulacastrum*
 1b. Stamens 5 ...2. *T. triquetra*

1. *Trianthema portulacastrum* L., Sp. Pl. 223. 1753. *T. monogyna* L., Mant. Pl. 1 : 69. 1767; Clarke in Hook. f., Fl. Brit. Ind. 2 : 660. 1879. *T. obcordata* Roxb., Fl. Ind. ed. Carey, 2 : 445. 1832.

Prostrate glabrous or puberulus more or less succulent herbs, branches forked, up to 60 cm or more long. Leaves opposite or subopposite, in unequal pairs, linear or broadly obovate, apiculate, cuneate at base, 2.5 - 3 × 2.4 - 3 cm; petioles 5 - 10 mm long, dilated into a sheath at the base. Flowers sessile, in pouch like petiolar sheaths, pinkish white. Calyx-tube scarious; lobes 5, cuspidate, slightly petaloid. Stamens 10 or more; anthers pink or white. Ovary truncate, 1- celled; style 1. Capsule small, almost concealed in the petiolar pouch, truncate, slightly concave, with 2 spreading teeth, carrying away at least one seed, the lower part 3 - 5-seeded; seeds reniform muriculate, dull-black.

Raipur. Fl. & Fr. : August.

2. *Trianthema triquetra* Rottl. ex Willd. in Neue Schr. Naturf. Freunde Berlin 4 : 181. 1803. *T. crystallina* (auct. div. non Vahl) Roxb., Fl. Ind. ed. Carey, 2 : 444. 1832; Clarke in Hook. f., Fl. Brit. Ind. 2 : 660. 1879.

Prostrate annual or perennial herbs, papillose or glabrous. Leaves linear or linear-lanceolate, sub-fleshy, glabrous, 3 - 7 mm long; petiole very short or obscure. Flowers axillary, sessile, solitary or clustered in the axils, pink or white. Stamens 5; anthers purplish. Ovary with an obconical base; style 1, excentric, very short. Capsule enclosed by the calyx-tube, the operculum on the chamber one-seeded; seeds sub-horizontal, orbicular, concavo-convex, brownish-black, faintly reticulate, ribbed, ca 1 mm across.

Gwalior. Fl. & Fr. : Nov.

76. MOLLUGINACEAE

(A.K. Tripathi)

About 15 genera and 150 species, mostly in the tropics and subtropics; 2 genera and 5 species in M.P.

- 1a. Flowers in axillary fascicles; seeds appendaged with a slender white thread curved round them ...1. *Glinus*
 1b. Flowers in terminal cymes; seeds not appendaged ...2. *Mollugo*

1. GLINUS L.

Tomentose or glabrous diffusely branched herbs. Leaves alternate or falsely whorled, oblong, ovate, obovate or spatulate, entire or obscurely dentate. Flowers small, pedicelled or subsessile. Sepals 5. Petals absent. Stamens 3 or more; filaments filiform. Ovary ovoid or sub-globose, 3 - 5-celled; styles erect, spreading or recurved, linear or oblong-elliptic, persistent. Capsules 3 - 5-valved; seeds very numerous with an appendage of a short bristle.

About 12 species in tropical and sub-tropical regions; 2 in M.P.

- 1a. Stellate hairy herbs; sepals hairy ...1. *G. lotoides*
 1b. Glabrous herbs; sepals glabrous ...2. *G. oppositifolius*

1. *Glinus lotoides* L., Sp. Pl. 463. 1753. *G. dictamnoides* L., Mant. Pl. 2 : 243. 1771. *Mollugo hirta* Thunb., Prodr. Fl. Cap. 1 : 24. 1794; Clarke in Hook. f., Fl. Brit. Ind. 2 : 662. 1879. *Pharnaceum pentagynum* Roxb., Fl. Ind. ed. Carey, 2 : 103. 1832.

Prostrate or ascending much branched pubescent annual herbs, greyish green or pinkish with age, 10 - 80 cm long. Leaves opposite or falsely whorled, obovate-rotundate, obtuse or apiculate, cuneate at the base, sometimes undulate at the margin, 1 - 4 × 0.5 - 2 cm. Flowers fascicled, subsessile, 1 - 6 together. Sepals acute, 6 - 10 mm long, outside with many white hairs, often densely woolly. Stamens 5 - many. Styles 5. Capsules ovoid, 5-valved, shorter than sepals; seeds small, tuberculate, brown or black, strophiolate, very numerous, up to 0.8 mm long.

Balaghat, Bastar, Bilaspur, Damoh, Hoshangabad, Indore, Mandla, Morena, Panna, Raigarh, Raipur, Rewa, Seoni, Shivpuri, Surguja. Fl. & Fr. : Throughout the year.

2. *Glinus oppositifolius* (L.) A. DC. in Bull. Herb. Boiss. ser. 2, 1 : 552. 1901. *Mollugo oppositifolia* L., Sp. Pl. 89. 1753. *M. spargula* L., Syst. ed. 10. 881. 1759. *M. verticillata* Roxb., Fl. Ind. 1 : 360. 1832 (non L.). *M. erecta* Burm. f., Fl. Ind. 32. 1768. *Pharnaceum mollugo* (L.) Roxb., Fl. Ind. ed. Carey 2 : 102. 1832.

Erect or ascending much branched annual herbs, 5 - 50 cm long, sometimes prostrate. Leaves opposite or in false whorls, 5 - 30 × 3 - 12 mm, spatulate-oblongate or oblong-obovate; shortly petioled or subsessile. Flowers white, in axillary fascicles; pedicels slender, 3 - 15 mm

long. Sepals obtuse, 3-5 mm long. Stamens 5 or 3. Capsules ellipsoid, shorter than sepals, 3-4-valved, ca 3 mm long; seeds numerous, subreniform.

Balaghat, Bilaspur, Damoh, Mandla, Raipur, Sidhi. Fl. & Fr. : Throughout the year.

2. MOLLUGO L.

Erect slender glabrous herbs, often dichotomously branched. Leaves alternate or falsely whorled or all radical, linear-lanceolate, entire. Flowers small, sessile or pedicelled, clustered or in cymes or racemes, greenish; bracts inconspicuous; pedicels persistent. Sepals 5, persistent. Petals absent. Stamens 3-5, rarely many, free; filaments filiform, rarely dilated in the middle. Ovary ovoid or broadly ellipsoid, 3-5-celled; styles 3-5, linear or very small; ovules many, axile. Capsule membranaceous, sheathed by dry sepals, 3-5-celled, dehiscing dorsally. Seeds several in each cell, rarely 1, reniform, appendaged or not at the hilum; embryo annular.

About 20 species, in tropical and sub-tropical parts of the world and N. America; 3 in M.P.

1a. Leaves radical, in a solitary basal whorl ...2. *M. nudicaulis*

1b. Leaves both cauline and radical, in two to several whorls at the nodes :

2a. Flowers in axillary clusters; seeds smooth ...1. *M. cerviana*

2b. Flowers in racemes; seeds tuberculate ...3. *M. pentaphylla*

1. *Mollugo cerviana* (L.) Seringe in DC., Prodr. 1 : 392. 1824; Clarke in Hook. f., Fl. Brit. Ind. 2 : 663. 1879. *Pharnaceum cerviana* L., Sp. Pl. 272. 1753.

Slender erect filiform glabrous annuals, up to 20 cm high. Leaves both radical and cauline; radical leaves sessile, narrowed at base, 5-15 mm long, spatulate or narrowly linear; cauline leaves sub-sessile or very shortly petioled, linear, often 4-8 in a whorl. Peduncles subumbellate or solitary at the tips of the branches, rather long, thin, stiff. Flowers white, in terminal and axillary trichotomous umbellate cymes; pedicels erect or patent, filiform. Sepals ovate-oblong. Stamens 5. Styles very small. Capsule broadly ellipsoid; seeds reniform-suborbicular, smooth, blackish-brown, irregularly reticulately ribbed.

Raipur, Sharma (Herb. Sci. Coll. Raipur). Fl. & Fr. : May-July.

2. *Mollugo nudicaulis* Lamk., Encycl. Meth. Bot. 4 : 234. 1767; Clarke in Hook. f., Fl. Brit. Ind. 2 : 664. 1879.

Erect or diffuse annual herbs, up to 30 cm high. Leaves obovate or oblanceolate, obtuse, 0.5-5 × 0.3-1.2 cm, glabrous. Flowers white, in profusely branched cymes, ca 1.5 mm long. Sepals scarious-margined. Capsules ellipsoid or nearly globose, brown, many-seeded, ca 2 mm long. Seeds minute, shining reddish-black, reniform, densely reticulate.

Durg, Raipur. *Fl. & Fr.* : March-June.

3. *Mollugo pentaphylla* L., Sp. Pl. 89. 1753. *M. pentaphylla* var. *stricta* (L.) Hochr. in Candollea 2 : 356. 1925. *M. stricta* L., Sp. Pl. ed. 2 : 131. 1762; Clarke in Hook. f., Fl. Brit. Ind. 2 : 663. 1879.

Erect or prostrate profusely branched annual glabrous herbs, up to 25 cm high. Leaves in false whorls of 3-9; lower ones rosulate, spatulate, distinctly petioled, fugacious; upper linear-lanceolate, 1-4 × 0.2-1.0 cm, shortly petioled or sessile. Flowers white or pale, in terminal or leaf opposed peduncled lax cymes with often long racemose ultimate branches; bracts small, persistent; pedicels erecto-patent, thin, 1.5-6 mm long, persistent. Sepals ovate-oblong, 1-2 mm long. Stamens 3; filaments short filiform. Styles 3. Capsule ellipsoid, 3-lobed, ca 2 mm long. Seeds reniform, brownish-black, tubercled.

Balaghat, Betul, Bilaspur, Damoh, Durg, Hoshangabad, Indore, Mandla, Narsimhapur, Raipur, Rajnandgaon, Rewa, Satna, Sagar, Seoni, Shivpuri, Sidhi, Tikamgarh. *Fl. & Fr.* : Throughout the year.

77. APIACEAE

(K.K. Khanna)

About 275 genera and 3000 species, cosmopolitan but mostly in north temperate regions; 15 genera and 20 species in M.P.

1a. Umbels simple :

2a. Leaf bases sheathing; mericarps with 7-9 ridges;
pericarp thick ...3. *Centella*

2b. Leaf bases not sheathing; mericarps with 3 ridges;
pericarp thin ...8. *Hydrocotyle*

1b. Umbels compound or decomposed :

3a. Flowers and fruits in sessile or subsessile dense heads
or head like umbellules; fruits with ridges not
prominent; with uncinat hairs ...13. *Sanicula*

3b. Flowers and fruits pedicellate; fruits with primary or
secondary ridges prominent or not prominent,
glabrous, pubescent to villous, hispid or spiny :

- 4a. Leaves simple with entire margins, linear to lanceolate or broadly ovate ...2. *Bupleurum*
- 4b. Leaves simple or compound, variously lobed or divided when simple :
- 5a. Marshy plants; fruits with corky ridges; calyx teeth prominent ...9. *Oenanthe*
- 5b. Plants not marshy; fruits with ridges corky or not corky; calyx teeth prominent or not prominent :
- 6a. Fruits elliptic or oblong :
- 7a. Umbels resembling heads; leaf segments spiny ...12. *Pycnocycla*
- 7b. Umbels not resembling heads; leaves not spiny :
- 8a. Involucre of bracts absent; petals yellow ...6. *Foeniculum*
- 8b. Involucre of bracts present; petals white, yellow or pink:
- 9a. Fruits setulose or villous ...5. *Cuminum*
- 9b. Fruits not villous :
- 10a. Ultimate segments of leaves linear or lanceolate; fruits oblong ...10. *Peucedanum*
- 10b. Ultimate segments of leaves broad, not linear; fruits elliptic ...7. *Heracleum*
- 6b. Fruits ovoid or subglobose :
- 11a. Vittae obscure; fruit ridges not prominent ...4. *Coriandrum*
- 11b. Vittae evident; fruit ridges prominent :
- 12a. Lateral ridges on fruits winged ...1. *Anethum*
- 12b. Lateral ridges on fruits not winged :
- 13a. Fruits neither constricted at the commissure nor laterally compressed ...14. *Seseli*
- 13b. Fruits constricted at the commissure, laterally compressed :
- 14a. Stems and leaves glabrous; fruits pubescent, hispid or muricate; furrows 1 vittate ...15. *Trachyspermum*
- 14b. Stems and leaves hairy; fruits glabrous or pubescent; furrows 2 4-vittate ...11. *Pimpinella*

1. ANETHUM L.

Annual glaucous herbs. Leaves petiolate, 3-4-pinnate; ultimate segments filiform; leaf bases sheathing. Umbels compound; bracts and bracteoles absent. Calyx-teeth obsolete. Petals yellow. Stylopodium conical. Fruits ovoid, dorsally flattened; lateral ridges broader and narrowly winged; furrows 1-vittate.

About 4 species in Europe, North Africa and West Asia; one in M.P.

Anethum graveolens L., Sp. Pl. 263. 1753. *Peucedanum graveolens* (L.) Benth. and Hook. f., Gen. Pl. I. 919. 1867; Clarke in Hook. f., Fl. Brit. Ind. 2 : 709. 1879. *Anethum sowa* Roxb. ex Flem. in Asiat. Res. 11 : 156. 1810.-*Sowa*.

A slender erect scented glabrous branched herb; stem green, striated. Leaves 3-4-pinnate; ultimate segments filiform, entire. Pedicels slender. Flowers yellow. Petals bifid, obovate. Ovary glabrous; style small. Fruit 3-4 mm long; dorsal and intermediate ridges distinct; vittae large.

Chhatarpur, Surguja. Fl. & Fr. : Jan. March.

The plant is often cultivated for vegetable. Fruit is used in medicine as an aromatic stimulant and carminative. Fruits and seeds are used as spices in curries.

2. BUPLEURUM L.

Annual or perennial herbs, erect or spreading. Leaves alternate, simple, entire, linear, lanceolate or ovate; basal leaves with sheathing petioles; cauline leaves usually sessile and clasping. Umbel compound; involucre bracts foliaceous or absent; involucels few or absent. Flowers yellow or yellowish white. Sepals absent. Petals apices inflexed. Stylopodium depressed to conical. Fruits ovoid or ellipsoid, glabrous or roughened, winged or without wings; furrows 1-4-vittate.

About 150 species in Europe, Asia, Africa and North America; 2 in M.P.

- 1a. Cauline leaves broadly oblong; bracts elliptic, foliaceous ...1. *B. plantaginifolium*
 1b. Cauline leaves linear or linear-oblong; bracts lanceolate, not foliaceous ...2. *B. ramosissimum* var. *wightii*

1. *Bupleurum plantaginifolium* Wight, Icon. 1 (15) : t. 281. 1840; Clarke in Hook. f., Fl. Brit. Ind. 2 : 674. 1879.

Shrubs up to 2 m tall; stem marked with fallen leaf-scars. Leaves broadly oblong; cauline leaves shorter and broader. Bracts foliaceous, elliptic; bracteoles 4-5; flowers yellow. Fruits pentagonal, with thick ridges.

Hoshangabad. Fl. & Fr. : July-Dec.

2. *Bupleurum ramosissimum* Wight & Arn. var. *wightii* (P.K. Mukh.) Bennet in J. Econ. Tax. Bot. 5 : 972. 1984. *Bupleurum wightii* P.K. Mukh. in Ind. For. 95 : 567. 1969. *Bupleurum mucronatum* Wight & Arn., Prodr. 1 : 370. 1834 (non Brouss. ex Spreng. 1820); Clarke in Hook. f., Fl. Brit. Ind. 2 : 676. 1879. Fig. 42.

Perennial slender herbs. Leaves entire, linear or oblong, mucronate, amplexicaul. Involucral bracts 3-6, lanceolate; involucel bracteoles 4-5; rays 3-6. Petals yellow. Styles filiform. Fruits ellipsoid, broad, shiny; ridges prominent.

Balaghat, Bastar, Bilaspur, Hoshangabad, Surguja. Fl. & Fr. : July-Aug.

3. CENTELLA L.

Annual or perennial prostrate herbs growing in moist places and rooting at nodes. Leaves simple, petiolate; leaf bases sheathing. Inflorescence a simple umbel; involucre of 2 bracts. Petals entire. Fruit ovate to orbicular with prominent primary ridges and secondary with reticulate markings.

About 40 species in moist tropical and temperate regions; one in M.P.

Centella asiatica (L.) Urban in Mart. Fl. Bras. 11 : 287, t. 78, f. 1. 1879. *Hydrocotyle asiatica* L., Sp. Pl. 234. 1753; Clarke in Hook. f., Fl. Brit. Ind. 2 : 669. 1879. *Brahmi*, *Brahmamanduki*.

Trailing herbs, rooting at the nodes; young parts finely pubescent. Leaves long-petiolate, reniform, crenate or dentate, deeply cordate, stipulate. Umbels several at a node with 2 involucral bracts, each 3-5-flowered. Flowers pink or deep red, sessile. Petals ovate, acute, pink. Fruits ovate to orbicular; primary ridges prominent; vittae absent.

Balaghat, Bastar, Bilaspur, Hoshangabad, Indore, Raigarh, Raipur, Rajnandgaon, Sidhi, Surguja. Fl. & Fr. : May-Jan.

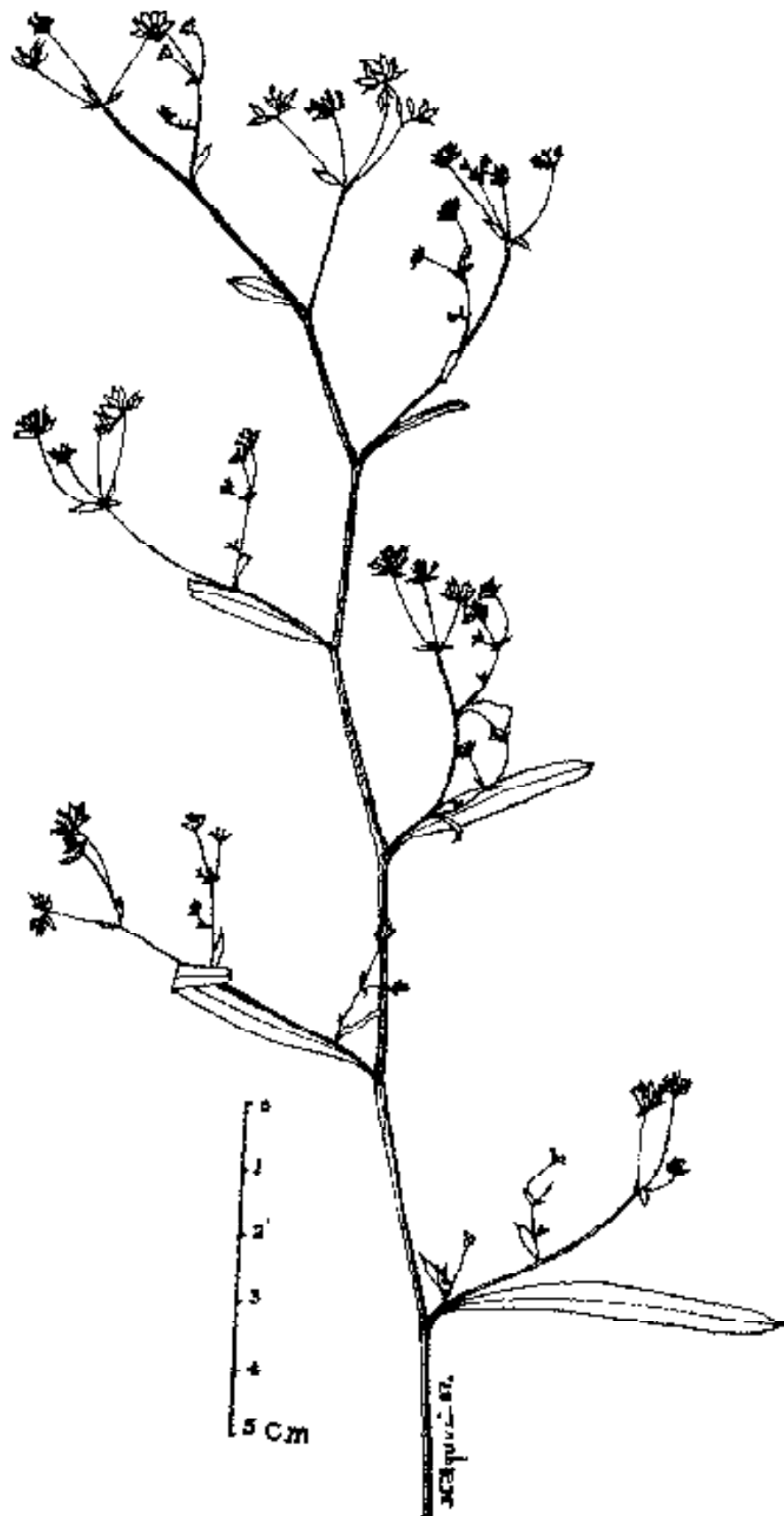


Fig. 42. *Bupleurum ramosissimum* var. *wightii* (P.K. Mukh.) Bennet

Plants medicinal.

4. CORIANDRUM L.

Annual branched herbs; tap root slender. Leaves decompose, 1-3-pinnate. Umbels compound; involucre of small linear bracts, or absent; involucl of few linear bracteoles. Flowers white to light purple. Calyx-teeth small. Petals obovate, emarginate. Fruits subglobose or broadly ovoid, glabrous; ridges not prominent; vittae obscure.

A Mediterranean genus of about 3 species; one in M.P.

Coriandrum sativum L., Sp. Pl. 256. 1753; Clarke in Hook. f., Fl. Brit. Ind. 2 : 717. 1879. *Dhania*.

A slender branched glabrous herb, with a strong smell; stems up to 75 cm high. Basal leaves ternately lobed, segments ovate, margin toothed; upper leaves pinnately dissected, segments linear. Compound umbels terminal or seemingly lateral; rays 3-6; involucre 1 or absent; involucl 3-5, filiform. Inner flowers actinomorphic and outer ones zygomorphic. Calyx teeth prominent, unequal. Petals purplish white, emarginate. Fruits subglobose, ribbed, ca 4 mm long; vittae solitary, obscure.

Bilaspur, Chhatarpur, Sidhi, Surguja. *Fl. & Fr.* : Dec. April.

Widely cultivated. The leaves and fruits are used as spices. The fruits are also used in digestive ailments.

5. CUMINUM L.

Annual herbs, glabrous except the fruits. Leaves compound, 2-3-pinnate; segments linear, filiform. Involucre of 5-6 linear bracts; involucl of linear bracteoles; rays 3-6. Flowers white to rose-coloured. Calyx-teeth unequal, subulate. Petals white or rose-coloured. Fruits oblong, setulose or villous; secondary ridges equal to or more prominent than the primary ridges.

About 5 species distributed from Mediterranean region to Central Asia; one in M.P.

Cuminum cyminum L., Sp. Pl. 254. 1753; Clarke in Hook. f., Fl. Brit. Ind. 2 : 718. 1879.- *Jeera*

Annual glabrous erect herbs; stems slender up to 50 cm high, branched, striate. Leaves 2-3-pinnate; ultimate segments filiform. Inflorescence rays 3-6; involucre of 5-6 linear entire bracts; involucl of long linear bracteoles. Umbels compound. Calyx teeth small, unequal. Petals oblong or obovate, unequal, white to reddish. Fruits oblong, 5-6 mm long, narrowed at the tip; vittae solitary under the secondary

ridges; seeds dorsally compressed.

Bilaspur. *Fl. & Fr.* : Jan. March.

Widely cultivated. The fruits are aromatic and are used as spices as well as for digestive ailments.

6. FOENICULUM Mill.

Perennial herbs. Leaves compound, much dissected, 3-4-pinnate; segments linear, filiform. Flowers in compound umbels; bracts and bracteoles absent. Calyx obsolete. Petals yellow. Fruits elliptic to oblong; stylopodium conical; ridges distinct; furrows 1-vittate.

About 5 species distributed in Mediterranean and Europe; one in M.P.

Foeniculum vulgare Mill., *Gard. Dict.* ed. 8, I. 1785; Clarke in Hook. *f.*, *Fl. Brit. Ind.* 2 : 695. 1879.- *Saunf.*

Perennial glaucous herbs, with aromatic smell, up to 2 m tall; stems striate. Leaves 3-4-pinnate; segments filiform; leaf bases sheathing. Umbels compound, terminal; involucre and involucels absent; rays 5-30. Calyx absent. Petals yellow. Fruits oblong to ovoid, 3-5 mm long, glabrous, not winged.

Bilaspur. *Fl. & Fr.* : Dec. March.

Often cultivated for fresh leaves and fruits. The leaves are used as vegetables and the fruits as spices and carminative.

7. HERACLEUM L.

Biennial or perennial herbs, pubescent, rarely glabrous. Leaves simple or compound, broadly lobed or 3-pinnate; segments broad. Umbels compound with many rays; involucre of a few bracts or absent; involucels many, linear or lanceolate. Calyx-teeth obsolete. Petals white, rarely yellow, obovate, emarginate. Fruits elliptic, strongly compressed dorsally; dorsal and intermediate ridges prominent, not winged; lateral ridges winged; furrows 1-vittate.

About 70 species in temperate regions particularly in Europe and Asia; one in M.P.

Heracleum nepalense D. Don, *Prodr.* 185. 1825; Clarke in Hook. *f.*, *Fl. Brit. Ind.* 2 : 714. 1879.

Plants up to 75 cm, sparingly pubescent. Upper leaves acutely 3-lobed; lower leaves pinnate; segments deeply lobed, serrate. Bracts 3-5, linear; bracteoles 0-6, linear. Calyx-teeth small, linear. Petals white. Fruits obovate; dorsal and intermediate ridges hardly excurrent; wing broad, with a small marginal vitta.

Bilaspur. *Fl. & Fr.* : July Oct.

8. HYDROCOTYLE L.

Perennial prostrate herbs growing in moist places. Leaves simple, orbicular or reniform, crenate; stipules scarious. Inflorescence a simple umbel; involucre bracts small or absent. Flowers white or purple. Calyx-teeth minute. Petals entire, acute, valvate. Fruits small, laterally compressed, ellipsoid to orbicular, with 3 primary ridges; secondary ridges and vittae absent.

About 100 species in tropical and temperate regions; one in M.P.

Hydrocotyle sibthorpioides Lamk., *Encycl.* 3 : 153. 1789. *Hydrocotyle rotundifolia* Roxb., *Fl. Ind.* 2 : 38. 1824; Clarke in Hook. *f.*, *Fl. Brit. Ind.* 2 : 668. 1879.

Perennial herbs; stems slender, creeping with ascending branches. Leaves orbicular, cordate, 0.6–2.5 cm across, petiolate, undersurface pubescent. Peduncle solitary, very short; umbels 8–10-flowered. Flowers subsessile, pink, small. Petals lanceolate. Fruits orbicular, yellow to dark brown when ripe.

Balaghat, Bilaspur, Hoshangabad, Rajnandgaon, Sidhi, Surguja. *Fl. & Fr.* : March Nov.

9. OENANTHE L.

Marshy glabrous herbs. Roots fusiform, tuberous. Leaves 1–3-pinnate; segments large, linear to ovate; leaf bases sheathing. Bracts few or absent; bracteoles linear; umbels compound. Calyx-teeth small. Petals emarginate, white. Fruits glabrous, globose or ovoid; ridges corky, subequal, furrows univittate.

About 40 species in Europe, Asia, South Africa, North and South America and Tropical Australia; one in M.P.

Oenanthe javanica (Bl.) DC., *Prodr.* 4 : 138. 1830. *Sium javanicum* Bl., *Bijdr. Fl. Ned. Ind.* 15 : 881. 1826. *Oenanthe stolonifera* DC., *Prodr.* 4 : 138. 1830; Clarke in Hook. *f.*, *Fl. Brit. Ind.* 2 : 696. 1879. *Oenanthe thomsonii* Clarke in Hook. *f.*, *Fl. Brit. Ind.* 2 : 697. 1879.

Perennial glabrous herbs, up to 1 m tall, erect or ascending; stem creeping, rooting at the nodes. Lower leaves 4–5-pinnate; leaflets ovate, serrate; upper leaves ternate. Umbels terminal; rays 20. Calyx teeth acute. Petals white. Fruits oblong, 2 × 1 mm; dorsal ridges obtuse, swollen; lateral corky.

Bilaspur. *Fl. & Fr.* : May Oct.

10. PEUCEDANUM L.

Perennial herbs. Leaves 1-3-pinnate; ultimate segments lanceolate or ovate or linear. Umbels compound with many rays. Flowers yellow or white, rarely pink; bracts present; bracteoles present or absent. Petals 5, obovate. Stamens 5. Carpels 2. Fruits dorsally compressed, oblong; lateral ridges winged; furrows 1-vittate; seeds dorsally compressed.

About 120 species in South East Europe, Asia and Africa; one in M.P.

Peucedanum nagpurensis (Clarke) Prain, Bengal Fl. 1 : 540. 1903; *ibid.* repr. ed. 394. 1963. *P. glaucum* var. *nagpurensis* Clarke in Hook. f., Fl. Brit. Ind. 2 : 710. 1879. *Tejraj.*

Erect perennial herbs. Leaves 1-3-pinnate; ultimate segments lanceolate or ovate. Umbels compound with 12-16 rays; bracts absent; bracteoles 4-7. Fruits truncate, emarginate at the narrowed base.

Balaghat, Bilaspur, Raipur. Fl. & Fr. : Oct.-Jan.

11. PIMPINELLA L.

Annual or perennial herbs. Leaves simple or compound, trilobed or 1-3-pinnate. Flowers in compound umbel, bisexual, terminal and lateral; bracts absent or few; bracteoles small, linear, sometimes absent. Calyx-teeth small or obsolete. Petals white, yellow or rose-coloured, with long inflexed points. Fruits ovoid or broader than long, laterally compressed, narrowed at the apex, glabrous or pubescent; vittae 2-4 in each furrow; inner face of seed flat or nearly so.

About 150 species mainly in Africa, Europe, Asia and parts of South America; 4 in M.P.

- 1a. Involucral bracts 6, linear ...1. *P. bracteata*
- 1b. Involucral bracts absent or solitary :
 - 2a. Fruits glabrous ...3. *P. heyneana*
 - 2b. Fruits papillose or pubescent :
 - 3a. Fruits papillose; bracts solitary; rays 8-13 ...4. *P. wallichiana*
 - 3b. Fruits pubescent; bracts absent; rays 6-12 ...2. *P. diversifolia*

1. *Pimpinella bracteata* Haines in J. Asiat. Soc. Beng. 15 : 314. 1920 & in Bot. Bihar and Orissa 2 : 427. 1922.

Stout undershrubs, up to ca 1 m high. Leaves 3-5-foliolate; first year leaves radical, 3-foliolate; leaflets ovate-lanceolate; lower leaflets ovate; upper leaflets lanceolate and uppermost leaflets pinnatifid, with linear-lanceolate lobes ending in sub-spinulose tips. Umbel with 6 linear

bracts; bracteoles 3-5. Fruits glabrescent, minutely papillose.

Hoshangabad, Surguja. *Fl. & Fr.* : Oct. Jan.

2. *Pimpinella diversifolia* DC., Prodr. 4 : 122. 1830; Clarke in Hook. *f.*, Fl. Brit. Ind. 2 : 688. 1879.

Perennial erect stout pubescent herbs, up to 1.5 m high. Basal leaves sometimes undivided, ovate, cordate, serrate; cauline or upper leaves pinnate; leaflets lanceolate-ovate, 3-5, serrate or lacinate. Involucral bracts absent; involucre of 4-6 linear bracteoles or absent; flowers 8-16 in 6-12-rayed umbels. Petals white, outer larger. Fruits ovoid, pubescent, greenish; ridges not prominent; furrows 2-3-vittate.

Balaghat, Bilaspur, Hoshangabad, Raigarh, Rajnandgaon. *Fl. & Fr.* : July Oct.

3. *Pimpinella heyneana* (DC.) Wall. ex Kurz in J. Asiat. Soc. Bengal 46 : 115. 1877; Clarke in Hook. *f.*, Fl. Brit. Ind. 2 : 684. 1879. *Helosciadium heyneanum* DC., Prodr. 4 : 106. 1830.

Perennial herbs with fusiform roots, 40-80 cm high. Leaves trifoliolate; leaflets serrate, ovate, glabrous, cuneate, up to 5 cm long; ultimate segments of the upper cauline leaves often much narrower. Flowers white to pink, bisexual, minute, in 6-20-rayed umbels, ebracteate; bracteoles 0-2, linear. Style short. Fruits subglobose, didymous, glabrous; ridges slender.

Balaghat, Bastar, Bilaspur, Hoshangabad, Mandla, Narsimhapur, Raigarh, Raipur, Seoni, Surguja. *Fl. & Fr.* : Aug. Dec.

4. *Pimpinella wallichiana* (Hoenck.) Gandhi in Saldanha and Nicolson, Fl. Hassan Dist. 417. 1976. *Helosciadium wallichianum* Hoenck., Bot. Zeit. 7 : 775. 1849. *Pimpinella monoica* Dalz. in Hook. Journ. Bot. 3 : 212. 1851; Clarke in Hook. *f.*, Fl. Brit. Ind. 2 : 687. 1879.

Tall perennial herbs, up to 1 m high. Radical leaves when present simple; lower cauline leaves 3-foliolate; leaflets ovate, simple, up to 7 x 4 cm; upper cauline leaves segmented. Inflorescence rays 8-13; bracts 0-1; bracteoles 0-3. Flowers white. Fruits compressed, ovoid, papillose.

Balaghat, Bastar, Bilaspur, Hoshangabad, Jabalpur, Raigarh, Raipur, Rajnandgaon, Seoni. *Fl. & Fr.* : Aug. Jan.

12. PYCNOCYCLA Lindl.

Perennial herbs; stem rush-like, few-leaved. Leaves pinnately dissected. Umbels composite or short-rayed; central flower in the umbellule, perfect, sessile; hypanthium hairy. Sepals small, often unequal.

Petals hairy, obovate. Fruits hairy, oblong, lanceolate; primary ridges obtuse; vittae 1-3, scattered; inner seed face deeply grooved.

About 10 species in North Africa, Afghanistan, Pakistan and India; one in M.P.

Pycnocycla glauca Lindl. in Royle, III. Bot. Himal. 232, t. 51. 1835; Clarke in Hook. f., Fl. Brit. Ind. 2 : 694. 1879. Fig. 43.

Perennial herbs up to 30 cm high; stem rush-like. Ultimate segments of leaves filiform, subterete. Umbels resembling a head, terminal on long pubescent peduncles. Flowers white or purple, surrounded by 7-8 males or neuters.

Bilaspur, Hoshangabad. Fl. & Fr. : May - Nov.

13. SANICULA L.

Erect herbs. Leaves long petiolate or sessile, palmately 3-5-lobed; lobes mucronate, serrate. Umbels irregularly compound; bracts sessile, leaf-like. Flowers mostly unisexual, very small. Calyx-lobes prominent, lanceolate. Petals white. Fruits oblong to ovoid, not compressed, with uncinat bristles (prickles); vittae few to many.

About 40 species mainly in the subtropics and temperate regions; one in M.P.

Sanicula elata Ham. ex D. Don, Prodr. 183. 1825. *Sanicula europaea auct. non L.*, 1753; Clarke in Hook. f., Fl. Brit. Ind. 2 : 670. 1879.

Large herbs up to 1 m tall; stems dichotomously branched in the upper part. Lower leaves sessile, palmately 3-5-lobed, glabrous, serrate. Umbels usually dichotomously branched; bracts 2-3-lobed; male flowers 3-8 in an umbellule, pedicellate; perfect bisexual flowers 3-4 in an umbellule, sessile. Fruits ovoid, ca 3 mm long, densely covered with hooked bristles.

Hoshangabad. Fl. & Fr. : July - Oct.

14. SESELI L.

Annual herbs, sometimes perennial. Leaves compound, 1-3-pinnate. Inflorescence a compound umbel; rays many; bracts few or absent, linear; bracteoles many, linear. Calyx-teeth prominent. Petals usually white. Fruits glabrous or pubescent or hispid, subglobose, dorsally compressed; ridges thin or thick; furrows 1-3-vittate.

About 80 species in Europe and Asia; one in M.P.

Seseli diffusum (Roxb. ex Sm.) Sant. and Wagh in Bull. Bot. Surv.

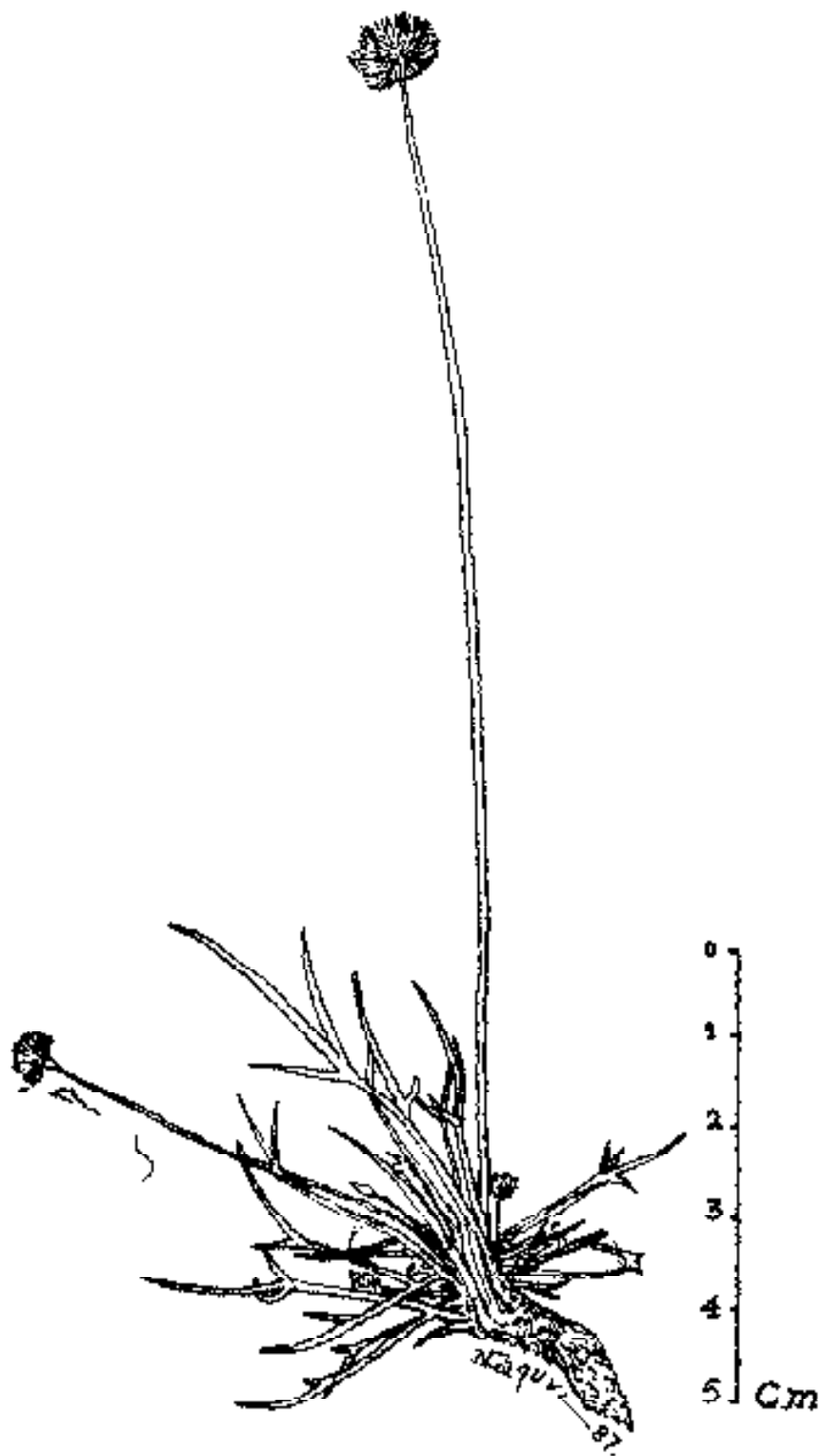


Fig. 43. *Pycnocyola glauca* Lindl.

Ind. 5 : 108. 1963. *Ligusticum diffusum* Roxb. ex Sm. in Rees, Cyclop. 21 : 11. 1812. *Seseli indicum* Wt. and Arn., Prodr. 371. 1834; Clarke in Hook. f., Fl. Brit. Ind. 2 : 693. 1879.

Annual pubescent herbs, 10–20 cm tall. Leaves bipinnate, segments ovate, pubescent, apiculate. Bracts 5, linear, minutely pubescent; bracteoles 5–8, linear; rays 10–15; flowers white or pink. Calyx absent or teeth minute. Petals 5, white, unequal with median folds. Stamens 5. Ovary bilocular, with single ovule in each locule. Fruits hispid, ca 2 mm long, subglobose; ridges thick, obtuse.

Durg. Fl. & Fr. : April–June.

15. TRACHYSPERMUM Link

Annual or perennial herbs; stems erect, glabrous. Leaves much divided; ultimate segments narrow filiform to ovate, glabrous, petiolate. Umbels compound, terminal or lateral; involucre of 2–6 bracts; involucl of 3–8 bracteoles. Calyx-teeth obsolete. Petals white. Fruits narrowly ovoid, slightly compressed laterally, pubescent, hispid or muricate; ribs filiform; furrows 1-vittate.

About 20 species distributed from Middle East to Central Asia, North East Africa, Pakistan, India, Ceylon and West China; 2 in M.P.

- 1a. Leaves 2–3-pinnate, ultimate segments linear, ca 1 mm broad; bracts 5–8; rays 10 ...1. *T. ammi*
 1b. Leaves 1–2-pinnate, ultimate segments ovate, deeply cleft into oblanceolate lobes, ca 2 mm broad; bracts 3–6; rays 3–6 ...2. *T. stictocarpum*

1. *Trachyspermum ammi* (L.) Sprague in Kew Bull. 1929: 228. 1929. *Sison ammi* L., Sp. Pl. 252. 1753. *Ammi copticum* L., Mant. Pl. 1 : 56. 1767. *Carum copticum* (L.) Hiern, Fl. Trop. Afr. 3 : 12. 1871; Clarke in Hook. f., Fl. Brit. Ind. 2 : 682. 1879. *Ajwain*.

Annual erect 15–50 cm tall branched herbs. Stem glabrous. Leaves 2–3-pinnate; ultimate segments linear. Inflorescence an axillary or terminal compound umbel; involucre of 5–8 linear bracts; rays about 10. Flowers white. Pedicel in fruits twice as long as the fruit; fruits ovoid, ca 2 mm long or less, muricate.

Damoh, Hoshangabad. Fl. & Fr. : Nov.–March.

The plant is cultivated for seeds which has medicinal importance. Seeds are also used as a spice. Also found occasionally as an escape.

2. *Trachyspermum stictocarpum* (Clarke) Wolff in Engler, Pflanz. 90: 89. 1927. *Carum stictocarpum* Clarke in Hook. f., Fl. Brit. Ind. 2 : 681.

1879.

Annual much branched herbs, up to 50 cm high. Leaves alternate, ternate, 1-2-pinnate; leaflets ovate, deeply cleft into oblanceolate-oblong lobes; petioles sheathing. Involucre of 3-6 linear to lanceolate bracts; pedicels filiform; rays 3-6. Calyx minute or absent. Petals white or sometimes pinkish. Fruits ovoid, minutely puberulo-punctate, 1-1.5 mm long.

Hoshangabad. Fl. & Fr. : Dec. Feb.

2.1 var. *hebecarpum* (Clarke) Wolff in Engler, Pflanz. 90 : 89. 1927; Babu, Herb. Fl. Dehradun 218. 1977. *Carum stictocarpum* Clarke var. *hebecarpa* Clarke in Hook. f., Fl. Brit. Ind. 2 : 681. 1879.

Erect herbs with much branched stems. Fruits densely hispid, 1.5-2 mm long.

Hoshangabad. Fl. & Fr. : Dec. Feb.

78. CORNACEAE

(R.C. Srivastava)

About 20 genera and 125 species in temperate and tropical regions of the world; one species in M.P.

ALANGIUM Lamk.

Trees or shrubs. Leaves alternate, exstipulate. Flowers in corymbose cymes; bracts deciduous; pedicels jointed. Calyx 5-10-toothed. Petals 5-10, recurved at length, valvate. Anthers long and narrow. Disc pulvinate. Ovary 1-2-celled; ovule solitary, pendulous; stigma clavate or capitate. Drupes urceolate at apex, 1-2-seeded.

About 30 species in tropics and subtropics, mostly in Asia; one in M.P.

Alangium salvifolium (L. f.) Wang. in Engl. Pflanzenr. IV. 220b. 41 : 9. 1910. *Grewia salvifolia* L. f., Suppl. Pl. 409. 1781. *A. salvifolium* ssp. *decapetalum* (Lamk.) Wang. in Engl. Pflanzenr. IV. 220b. 41 : 11. 1910. *A. decapetalum* Lamk., Encycl. 1 : 174. 1783. *A. lamarckii* Thw., Enum. Pl. Zeyl. 133. 1859; Hook. f., Fl. Brit. Ind. 2 : 741. 1879, p.p.

Trees. Leaves oblong-lanceolate, ovate or elliptic, 6-12 × 2-2.2 cm, chartaceous, 3-5 nerved at base, glossy above, glabrescent or puberulous beneath, base oblique, apex attenuate or sub-acute, slightly retuse; petiole tomentose. Flowers white, fragrant, in up to 2.5 cm long and ca 1.5 cm across irregular axillary cymes or clusters; bracts ovate, 1 mm, deciduous. Calyx-tube cupular, 2.5 mm, adnate to ovary, tomentose; lobes ca 10, triangular ovate, 0.5 mm long, subequal. Petals 10, white, linear-oblong,

2.5 × 0.2 cm, tomentose, reflexed. Stamens ca 20; filaments with a fleshy and villous base, subconnate. Stigma capitate. Berry globose, up to 2 × 1 cm, crowded by calyx-lobes; seed solitary, ovoid, 10 × 5 mm.

Bastar, Bilaspur, Damoh, Durg, Mandla, Raigarh, Raipur. Fl. & Fr. : March-June.

79. RUBIACEAE

(K.K. Khanna)

About 500 genera and 6000 species in tropical and subtropical regions, extending up to temperate zones; 25 genera and 52 species in M.P.

1a. Herbs :

2a. Ovule solitary in each locule :

3a. Stipules foliaceous giving the appearance of 4 leaves in a whorl ...21. *Rubia*

3b. Stipules not foliaceous :

4a. Inflorescence a paniced cyme ...12. *Knoxia*

4b. Inflorescence a cluster of flowers ...22. *Spermacoce*

2b. Ovules few to many in each locule :

5a. Prostrate herbs forming dense cushions; flowers always pentamerous ...6. *Dentella*

5b. Erect or diffuse herbs, never forming cushion; flowers usually tetramerous, rarely pentamerous :

6a. Anthers connate into a tube; stigma capitate ...2. *Argostemma*

6b. Anthers free; stigma bilobed :

7a. Seeds shell-shaped ...17. *Neanotis*

7b. Seeds angular or globose :

8a. Calyx-teeth erect, contiguous ...9. *Hedyotis*

8b. Calyx-teeth spreading, not contiguous :

9a. Corolla divided halfway or less than halfway down; stigma overtopped by anthers ...13. *Kohautia*

9b. Corolla divided more than halfway down; stigma not overtopped by anthers :

10a. Leaves ovate-oblong; capsule 4-angled; seeds globose ...24. *Thecagonum*

- 10b. Leaves elliptic, linear or lanceolate; capsule terete;
seeds angular ...19. *Oldenlandia*
- 1b. Shrubs or trees :
- 11a. Flowers in globose heads :
- 12a. Ovules solitary in each locule ...16. *Morinda*
- 12b. Ovules many in each locule :
- 13a. Receptacle glabrous; flowers ebracteolate; upper
part of fruit-let contains 4 hollow white
cartilaginous hyaline structures; seeds not
winged ...1. *Anthocephalus*
- 13b. Receptacle hairy; interfloral bracteoles present;
cartilaginous structures absent; seeds shortly
winged at both ends:
- 14a. Stigma mitriform to elongate-clavate ...15. *Mitragyna*
- 14b. Stigma ovoid to globose :
- 15a. Large trees; flowering head lateral, 2 - 4;
interfloral bracteoles spatulate; calyx-
lobes oblong ...8. *Haldinia*
- 15b. Shrubs or trees; flowering head terminal, 1
- 3; interfloral bracteoles present or absent,
if present then conical, glabrous, shiny;
calyx-lobes attenuate into a filiform shaft
...18. *Neonauclea*
- 11b. Flowers solitary or in fascicle, panicle or corymbose
cyme :
- 16a. Fruit a capsule :
- 17a. Trees; seeds winged all around ...10. *Hymenodictyon*
- 17b. Shrubs or small trees; seeds not winged :
- 18a. Flowers in capituliform inflorescence
arranged in paniculiform cymes; corolla
valvate in bud; ovary initially 5, later 1-celled;
ovules 5 ...23. *Spermadietyon*
- 18b. Flowers in dense thyrsoid or paniced cyme
or many-flowered corymbs; corolla imbricate
in bud; ovary 2-celled with many ovules
...25. *Wendlandia*
- 16b. Fruit a drupe or a berry :

- 19a. Stipules intrapetiolar, connate in a cup; ovary unilocular ...7. *Gardenia*
- 19b. Stipules interpetiolar; ovary 2-6-locular :
- 20a. Flowers solitary or in an umbel or fascicle on brachyblasts; ovules many per cell ...4. *Catunaregam*
- 20b. Flowers solitary or in axillary fascicle or corymbose cyme; ovule solitary per cell :
- 21a. Plants unarmed; flowers 4-merous; fruit a berry ...11. *Ixora*
- 21b. Plants armed or unarmed; flowers 4-8-merous; fruit a drupe :
- 22a. Usually armed; ovary 4-6-locular ...14. *Meyna*
- 22b. Usually unarmed; ovary 2-locular :
- 23a. Corolla valvate in bud ...3. *Canthium*
- 23b. Corolla twisted or imbricate in bud :
- 24a. Flowers 4-merous, in corymbs or panicles...20. *Pavetta*
- 24b. Flowers 5-8-merous, solitary or in axillary fascicles ...5. *Coffea*

1. ANTHOCEPHALUS A. Rich. emend. Haviland

Trees. Leaves opposite, coriaceous, penninerved, entire; stipules interpetiolar, caducous, acuminate. Flowers in terminal globose heads, pentamerous, bisexual. Calyx-tube strongly coherent; limb tubular; lobes oblong or spatulate, persistent. Corolla tubular or infundibuliform; lobes imbricate in bud. Stamens inserted in throat; filaments glabrous, minute. Ovary 2-celled in lower part, 4-celled in upper part; ovules numerous per cell; style filiform; stigma fusiform. Fruits capsular, close together in a head; seeds numerous, small, cylindrical.

About 3 species in Indo-Malaysian region; one in M.P.

Anthocephalus chinensis (Lamk.) A. Rich. ex Walp., Repert 2 : 491. 1843; Bakh. f. in Taxon 19 : 469. 1970. *Cephalanthus chinensis* Lamk., Encycl. 1 : 678. 1785. *Nauclea cadamba* Roxb., Fl. Ind. 2 : 121. 1824. *Anthocephalus cadamba* (Roxb.) Miq., Fl. Ind. Bat. 2 : 135. 1856; Hook. f., Fl. Brit. Ind. 3 : 23. 1880. *A. indicus* A. Rich. in Mem. Soc. Hist. Nat. Paris 5 : 238. 1834.—*Kadam*.

Large deciduous trees, up to 10 m high. Leaves 12-25 × 5-10 cm, ovate or elliptic-oblong, coriaceous, acute, pubescent beneath, subcordate at base; stipules caducous, lanceolate. Inflorescence a solitary terminal head. Flowers small, pentamerous, orange, united by the confluent calyx tube. Calyx segments oblanceolate. Corolla funnel-shaped, ca 7

mm long. Stamens 5. Ovary 4-celled above, 2-celled below; stigma white. Pseudocarp large, fleshy, ca 5-6 cm diam.; seeds minute, angular.

Bilaspur, Mandla, Raipur, Rewa, Satna, Surguja. Fl. : May-July; Fr. : Persisting till next year.

2. ARGOSTEMMA Wall.

Erect or ascending herbs. Leaves opposite, sometimes pseudoverticillate, subsessile; stipules inter-petiole, small. Flowers terminal, solitary or in fascicles, umbels or cymes, 4-5-merous, white. Calyx-tube campanulate; lobes ovate. Corolla salver-shaped or campanulate; lobes ovate. Stamens inserted at the base of corolla tube; anthers erect, exerted. Ovary 2-celled with numerous axile ovules; style filiform; stigma capitate. Fruit a capsule, crowned with persistent calyx limbs; seeds angled or compressed.

About 100 species in tropical Asia and Africa; two in M.P.

- | | |
|-------------------------|------------------------------|
| 1a. Flowers tetramerous | ...1. <i>A. courtallense</i> |
| 1b. Flowers pentamerous | ...2. <i>A. sarmentosum</i> |

1. *Argostemma courtallense* Arn. in Ann. Nat. Hist. 3 : 22. 1839; Hook. f., Fl. Brit. Ind. 3 : 42. 1880.

Sparsely pubescent herbs with tuberous roots. Leaves subsessile, in whorls of 4, ovate or elliptic-ovate, subacute, cuneate, 7 × 5 cm, leaf pairs often unequal. Umbels terminal, simple, usually trifid. Flowers tetramerous. Calyx teeth acute. Corolla white. Anthers 4, free.

Hoshangabad, Raigarh. Fl. & Fr. : July-Sept.

2. *Argostemma sarmentosum* Wall. in Roxb., Fl. Ind. 2 : 324. 1824; Hook. f., Fl. Brit. Ind. 3 : 42. 1880.

Small fleshy perennial herbs. Stem erect; runners arising from the axil of basal leaves. Leaves small, sessile or shortly petiolate, opposite or whorled, unequal in pairs or whorls, ovate-elliptic to oblong or obovate, obtuse, sparingly pubescent; stipules small, entire. Flowers in peduncled terminal umbels of 1-3 flowers, white. Calyx pubescent; lobes 5, ovate. Corolla rotate, 5-lobed, white with a greenish centre. Stamens 4; filaments short, free. Ovary 2-celled with many ovules; stigma capitate. Fruits 2-celled.

Bilaspur, Hoshangabad. Fl. & Fr. : Aug.-Nov.

3. CANTHIUM Lamk.

Armed or unarmed shrubs or trees. Leaves opposite; stipules interpetiole, connate. Flowers axillary, fascicled or in cymes, rarely

solitary, pedicellate, bisexual or unisexual. Calyx-tube short, 4-5-dentate. Corolla greenish or white, funnel-shaped or campanulate; tube in throat with ring of deflexed hairs within; lobes 4-5, spreading or reflexed. Stamens 4-5, inserted on throat. Disc annular. Ovary 2-celled; ovule solitary in each cell; style short; stigma large. Fruit a drupe, subglobose or didymous; pyrenes 2; seeds oblong.

About 200 species in tropical regions; two in M.P.

- 1a. Plants armed; leaves up to 9 × 3 cm; fruits rugose
...1. *C. angustifolium*
- 1b. Plants unarmed; leaves up to 14 × 8 cm; fruits not rugose
...2. *C. dicoccum*

1. *Canthium angustifolium* Roxb., Fl. Ind. 2 : 169. 1824; Hook. f., Fl. Brit. Ind. 3 : 135. 1880. *Plectronia rheedei* var. *angustifolia* (Roxb.) Gamble, Fl. Pres. Madras 2 : 625. 1921.

Subscandent armed shrubs; spines stout, opposite, usually ca 15 mm long. Leaves ovate-lanceolate, long acuminate, glabrous, glossy, up to 9 × 3 cm. Flowers white or yellow, in axillary fascicles, pentamerous. Calyx turbinate. Corolla-lobes lanceolate, reflexed. Fruits globose, rugose, ca 1 cm in diam.

Bilaspur. Fl. & Fr. : March - Aug.

2. *Canthium dicoccum* (Gaertn.) Teysm. & Binn., Cat. Hort. Bogor. 113. 1866. *Psydrax dicoccos* Gaertn., Fruct. 1 : 125. t. 26. 1788. *Plectronia dicocca* (Gaertn.) Merr., Enum. Philip. Fl. Pl. 3 : 536. 1923. *Canthium didymum* Gaertn. f., Fruct. 3 : 94. t. 196. 1806; Hook. f., Fl. Brit. Ind. 3 : 132. 1880.

Shrubs or small trees. Leaves elliptic, ovate-lanceolate, entire, acuminate, coriaceous, glabrous, shining, 9-14 × 3.5-8 cm, petiolate; stipules persistent. Flowers pale greenish, fragrant, in axillary umbellate cyme. Calyx-lobes small, truncate. Corolla campanulate, cucullate, hairy within. Stamens at the mouth of corolla; filaments short. Fruits globose, slightly flattened, ca 5 × 8 mm; seeds oblong.

Bilaspur, Raigarh, Surguja. Fl. & Fr. : Oct. - March.

4. CATUNAREGAM Wolf.

Armed or unarmed shrubs, or small trees. Leaves elliptic-obovate or elliptic-lanceolate, entire; stipules interpetiolar, caducous. Inflorescence an umbel or fascicle, on apex of brachyblasts. Flowers 5-8-merous. Calyx shortly lobed. Corolla campanulate; lobes contorted, longer than tube. Anthers exserted. Ovary 2-locular with many axile ovules. Fruit a berry.

About 6 species in tropical Africa and Asia; two in M.P.

- 1a. Spines terminal; leaves 10 - 20 cm long; fruits 3.5 - 5.5 cm long ...1. *C. nilotica*
 1b. Spines axillary; leaves 3 - 8 cm long; fruits 2 - 3 cm long ...2. *C. spinosa*

1. *Catunaregam nilotica* (Stapf) Tirvengadam in Taxon 27 : 515. 1978. *Randia nilotica* Stapf in J. Linn. Soc. 37 : 519. 1906. *Xeromphis uliginosa* (Retz.) Maheshw. in Bull. Bot. Surv. Ind. 3 : 92. 1961. *Gardenia uliginosa* Retz., Obs. Bot. 2 : 14. 1781. *Randia uliginosa* DC., Prodr. 4 : 386. 1830; Hook. f., Fl. Brit. Ind. 3 : 110. 1880. *Kala-phetra, Pindalu, Thelka.*

Armed small trees; spines terminal at the end of brachyblasts. Leaves on short branchlets, elliptic-lanceolate or oblanceolate, 7 × 15 cm. Flowers solitary, white. Calyx toothed. Fruits oblong-globose, smooth, young ones green, mature yellow; seeds blackish.

Balaghat, Bastar, Bilaspur, Damoh, Durg, Hoshangabad, Jabalpur, Raigarh, Rajnandgaon, Satna, Seoni. *Fl. & Fr.* : April-May.

2. *Catunaregam spinosa* (Thunb.) Tirvengadam in Taxon 27 : 515. 1978 et in Bull. Mus. Hist. Nat. (Paris) Ser. 3, 35 : 13. 1978. *Gardenia spinosa* Thunb., Diss. Gard. 7 : 16, t. 2, f. 4. 1780. *G. dumetorum* Retz., Obs. Bot. 2 : 14. 1781. *Randia dumetorum* (Retz.) Poir. in Lamk., Encycl. Suppl. 2 : 829. 1812; Hook. f., Fl. Brit. Ind. 3 : 110. 1880. *R. spinosa* (Retz.) Poir., *l.c.* *Xeromphis spinosa* (Thunb.) Keay in Bull. Jard. Bot. Etat 28 : 37. 1958. *Mainphal, Manhar, Manihar, Manjh.*

Armed shrubs or small trees; spines axillary. Leaves mostly fascicled on branchlets, obovate or oblanceolate, subcoriaceous, glabrescent or pubescent; stipules ovate. Flowers solitary or 2 - 3 - fascicled, creamy white, fragrant. Calyx campanulate. Corolla covered with appressed silky hairs. Fruits globose, fleshy.

Bastar, Bilaspur, Damoh, Hoshangabad, Raigarh, Raipur, Rajnandgaon, Satna, Shivpuri, Sidhi, Surguja. *Fl.* : May - June; *Fr.* : Oct. - Jan.

5. COFFEA L.

Shrubs or small trees. Branchlets terete. Leaves opposite, rarely ternate, penninerved; stipules interpetiolar, broad. Flowers in solitary or in axillary fascicles, bisexual; bracteoles connate in a single or double calyculus (cup), often glandular within. Calyx-tube glabrous, short, persistent; limb irregularly few or many - toothed. Corolla trumpet-shaped; tube long or short, slender; lobes 5, contorted in bud. Stamens 5; anthers attached to the throat of corolla-tube; disc annular,

glabrous. Ovary 2-celled; ovules solitary in each cell; style filiform; stigma 2-branched. Fruit a drupe with 2 plano-convex or ventrally concave cartilaginous pyrenes; seeds concave or grooved ventrally, albumen horny.

About 40 species distributed in the tropics; 2 in M.P.

- 1a. Inflorescence many - flowered; stipules cuspidate ...1. *C. arabica*
 1b. Inflorescence one to three - flowered; stipules
 spinescent. ...2. *C. benghalensis*

1. *Coffea arabica* L., Sp. Pl. 172. 1753; Hook. f., Fl. Brit. Ind. 3 : 153. 1880.

Shrubs or small trees. Leaves glabrous, ovate-oblong, shining, 13 - 17 × 3 - 6.5 cm, shortly acuminate, base narrowed to a short petiole; stipules broadly lanceolate, cuspidate. Flowers many in fascicles, subtended by foliaceous bracts. Calyx truncate. Corolla funnel-shaped; tube slender; lobes oblong. Drupe purple, oblong with 2 pyrenes.

Planted in gardens and forest nurseries. Hoshangabad, Rajnandgaon. Fl. & Fr. : March - Dec.

Seeds used as beverage, the well-known coffee.

2. *Coffea benghalensis* Heyne ex Roem. & Schult., Syst. Veg. 5 : 200. 1819. *Coffea benghalensis* Roxb., Fl. Ind. 2 : 194. 1824, ed. 2. 1 : 540. 1832; Hook. f., Fl. Brit. Ind. 3 : 153. 1880.

Shrubs with slender branches, 1.5 - 2 m high. Leaves glabrous, broadly ovate-oblong or rhomboid, membranous, 5 - 10 × 3 - 6 cm, acuminate at apex; petiole up to 4 cm long; stipules spinescent. Inflorescence 1 - 3-flowered, axillary. Flowers white. Calyx truncate or obscurely 5-toothed. Corolla salver-shaped; tube short. Stamens 4 - 5. Stigmas lanceolate. Drupe black, sub-globose, 10 - 12 mm long; seeds grooved.

Raigarh, Raipur. Fl. & Fr. : March - Nov.

6. DENTELLA J. R. & G. Forst.

Prostrate much branched herbs, often forming dense cushions. Leaves opposite; stipules interpetiolar, slightly adnate on both sides to the petiole. Flowers bisexual, 5-merous, solitary, axillary, sessile. Calyx deeply divided, persistent. Corolla funnel-shaped; tube hairy inside; lobes valvate, much shorter than the tube, few toothed. Stamens 5, inserted at the middle of the corolla-tube, sessile. Ovary 2-locular; each locule with many ovules; style short. Fruits dry, indehiscent, 2-celled; seeds minute, angular, reticulate.

About 10 species in S.E. Asia and Australia; 2 in M.P.

- 1a. Capsules covered with thick hyaline blunt setae ...1. *D. repens*
 1b. Capsules glabrous ...2. *D. serpyllifolia*

1. *Dentella repens* (L.) J. R. & C. Forst., Char. Gen. Plant. Ins. Mar. Austr. 26, t. 13. 1776; Hook. f., Fl. Brit. Ind. 3 : 42. 1880, p.p. *Oldenlandia repens* L., Mant. Pl. 1 : 40. 1767 (non Burm. f.).

Annual, prostrate branched herbs. Leaves opposite, sessile or subsessile, 3 - 10 × 2 - 3 mm, entire, obovate-oblongate or oblong-elliptic, glabrous or sparsely hairy; stipules minute, connate. Flowers axillary and in the forks of branches, small, solitary. Calyx persistent; limb tubular, sparsely covered with hyaline setae, 5-toothed. Corolla infundibuliform, white or whitish mauve. Capsules globose, dry, densely covered with hollow thick hyaline trichomes (setae), ca 3 mm diam.; seeds rugose, finely echinulate.

Balaghat, Bastar, Bilaspur, Damoh, Durg, Raigarh, Raipur, Rajnandgaon, Shahdol, Shivpuri. Fl. & Fr. : Jan. June.

2. *Dentella serpyllifolia* Wall. ex Craib in Fl. Siam. Enum. 2 : 27. 1932; Airy-shaw in Kew Bull. 1932: 289. 1932; Subram. and Sharma in Bull. Bot. Surv. India 10 : 389. f. 7-11. 1968. *D. repens sensu* Hook. f., Fl. Brit. Ind. 3 : 42. 1880, p.p., non Forst., 1776.

Annual, small prostrate dichotomously branched herbs. Leaves opposite, sessile or subsessile, oblong-elliptic or obovate-oblongate, entire, glabrous, 4 - 9 × 1.5 - 3 mm; stipules small, connate. Flowers solitary, axillary and in forks of branches. Calyx persistent; limb tubular, glabrous. Corolla white or purple, infundibuliform. Capsules oblong-obovoid or obliquely ellipsoid, dry, indehiscent, glabrous; seeds numerous, minute, reticulate.

Raipur, Sidhi. Fl. & Fr. : April - Oct.

7. GARDENIA J. Ellis

Armed or unarmed shrubs or trees. Leaves opposite, rarely ternate, coriaceous; stipules intrapetiolar, often connate into a cup. Flowers terminal or axillary, solitary or in fascicles or cymes, white, changing to yellow. Calyx truncate or lobed. Corolla-tube long or short; lobes 5, contracted. Stamens 5, inserted in the throat of corolla; filaments short or absent. Ovary unilocular, with many ovules on 2 - 6 parietal placentae. Fruits large ovoid or globose berry, coriaceous or fleshy; seeds compressed.

About 250 species in tropical or subtropical regions; 4 in M.P.

- 1a. Plants armed; leaf base attenuate; calyx-teeth small ...4. *G. turgida*
 1b. Plants unarmed; leaf base never attenuate; calyx-teeth large :
 2a. Leaves very large, up to 25 × 18 cm, obovate-orbicular; lateral nerves not close ...2. *G. latifolia*
 2b. Leaves not large, up to 15 × 8 cm, elliptic-ovate or obovate; lateral nerves close :
 3a. Flowers and fruits sessile; calyx-teeth triangular, usually 1 - 2 mm long ...1. *G. gummifera*
 3b. Flowers and fruits pedicellate; calyx-teeth lanceolate, usually 7 - 10 mm long ...3. *G. resinifera*

1. **Gardenia gummifera** L. f., Suppl. Pl. 164. 1781; Hook. f., Fl. Brit. Ind. 3 : 116. 1880.- *Chhote kurra*.

Small trees, up to 3 m high. Leaves obovate-oblong or elliptic-oblong, sessile, glabrous, acute at base, 4-10 × 2-6 cm, main nerves 15-18 pairs; stipules ochrea-like. Flowers white, scented, on short peduncle or sessile. Calyx-teeth triangular, pubescent. Corolla-tube up to 6 cm long, pubescent outside. Stamens epipetalous. Stigmas clavate. Fruits oblong, 2 × 3 cm, with numerous ribs.

Balaghat, Bastar, Bilaspur, Durg, Raigarh, Raipur, Seoni, Surguja. Fl. & Fr. : March-Aug.

2. **Gardenia latifolia** Ait. in Hort. Kew. 1 : 294. 1789; Hook. f., Fl. Brit. Ind. 3 : 116. 1880.- *Safed panpra*.

Shrubs or trees, 5-10 m high; young parts with yellow resinous exudation. Leaves obovate-orbicular, 10-24 × 10-17 cm, subacute, main nerves 10-20 pairs. Flowers solitary, white, subsessile, villous outside, ca 6 cm long. Calyx 2-2.5 cm long; lobes 5-9, lanceolate, deeply divided, densely pubescent. Corolla lobes obovate-oblong; tube 5-6 cm long. Stamens 9, epipetalous. Fruits globose or oblong, with persistent calyx, 4 × 3 cm, smooth.

Balaghat, Bastar, Bilaspur, Chhatarpur, Damoh, Durg, Hoshangabad, Mandla, Panna, Raigarh, Raipur, Rajnandgaon, Sagar, Satna, Seoni, Shahdol, Sidhi, Surguja. Fl. & Fr. : March-Dec.

3. **Gardenia resinifera** Roth, Nov. Pl. Sp. 150. 1821. *G. lucida* Roxb., Fl. Ind. 2 : 553. 1824; Hook. f., Fl. Brit. Ind. 3 : 115. 1880.- *Dikamali*.

Shrubs or small trees, up to 3 m high. Gum exuding from apical buds. Leaves elliptic-ovate, 5-17 × 3-8.5 cm, obtuse, main nerves 20

30 pairs; stipules ovate, connate. Flowers solitary, axillary, fragrant, white. Calyx ca 1.5 cm long, pubescent; lobes lanceolate, acuminate. Corolla-tube 5 cm long; lobes 5, oblong. Stamens 5, epipetalous. Style fusiform. Fruits oval or oblong, 2.5 × 1.5 cm with persistent calyx, brownish black, not ribbed; seeds flat, reddish.

Balaghat, Bastar, Bilaspur, Durg, Raigarh, Raipur, Rajnandgaon, Seoni, Surguja. *Fl. & Fr.* : March - Nov.

4. *Gardenia turgida* Roxb., *Fl. Ind.* 2 : 557. 1824; Hook. f., *Fl. Brit. Ind.* 3 : 118. 1880. *Safed phetra*.

Armed small trees up to 4 m high; spines opposite. Leaves ovate-oblong, 5-11 × 3-6 cm, tomentose beneath; stipules ovate, deciduous. Flowers axillary. Male flowers in 3-4-flowered fascicles; female flower solitary, greenish white, turning yellow. Calyx campanulate; teeth small. Corolla tubular; lobes obovate. Stigma club-shaped. Fruits globose, 5 × 4 cm, brown; seeds triangular, red.

Bastar, Bilaspur, Durg, Mandla, Narsimhapur, Panna, Raigarh, Raipur, Seoni. *Fl. & Fr.* : March - Nov.

8. HALDINIA Ridsd.

Large trees; terminal vegetative bud flattened. Leaves opposite, subcoriaceous, broadly ovate; stipules ovate-oblong, entire, appressed. Flowers in lateral heads. Flowering axis solitary, unbranched. Flowers pentamerous, subsessile on the receptacle; receptacle hairy; hypanthia mutually free. Calyx-tube short; lobes oblong, persistent. Corolla lobes valvate or imbricate in bud. Stamens inserted in the upper part of the tube; filaments short. Ovary 2-locular; ovules numerous. Fruit a head of loose dehiscent fruitlets with a hard endocarp; seeds ovoid, shortly winged.

A monotypic genus distributed in Asia.

Haldinia cordifolia (Roxb.) Ridsd. in *Blumea* 24 : 361. 1978. *Nauclea cordifolia* Roxb., *Pl. Corom.* 1 : 40. 1796. *Adina cordifolia* (Roxb.) Hook. f. ex Brandis, *For. Fl.* 263. t. 33. 1874; Hook. f., *Fl. Brit. Ind.* 3 : 24. 1880.- *Haldu*.

Fig. 44.

Trees, up to 20 m high; branches pubescent when young. Leaves orbicular, abruptly acuminate, cordate at base, glabrescent above, pubescent beneath, 14 × 12 cm; petioles up to 8 cm long; stipules deciduous. Flowers in globose heads of 2 cm diam., white or yellowish green. Heads 1-3-fascicled, lateral (axillary); peduncles up to 6 cm long. Calyx pubescent. Corolla brownish yellow. Capsule ca 4 mm long; seeds winged.

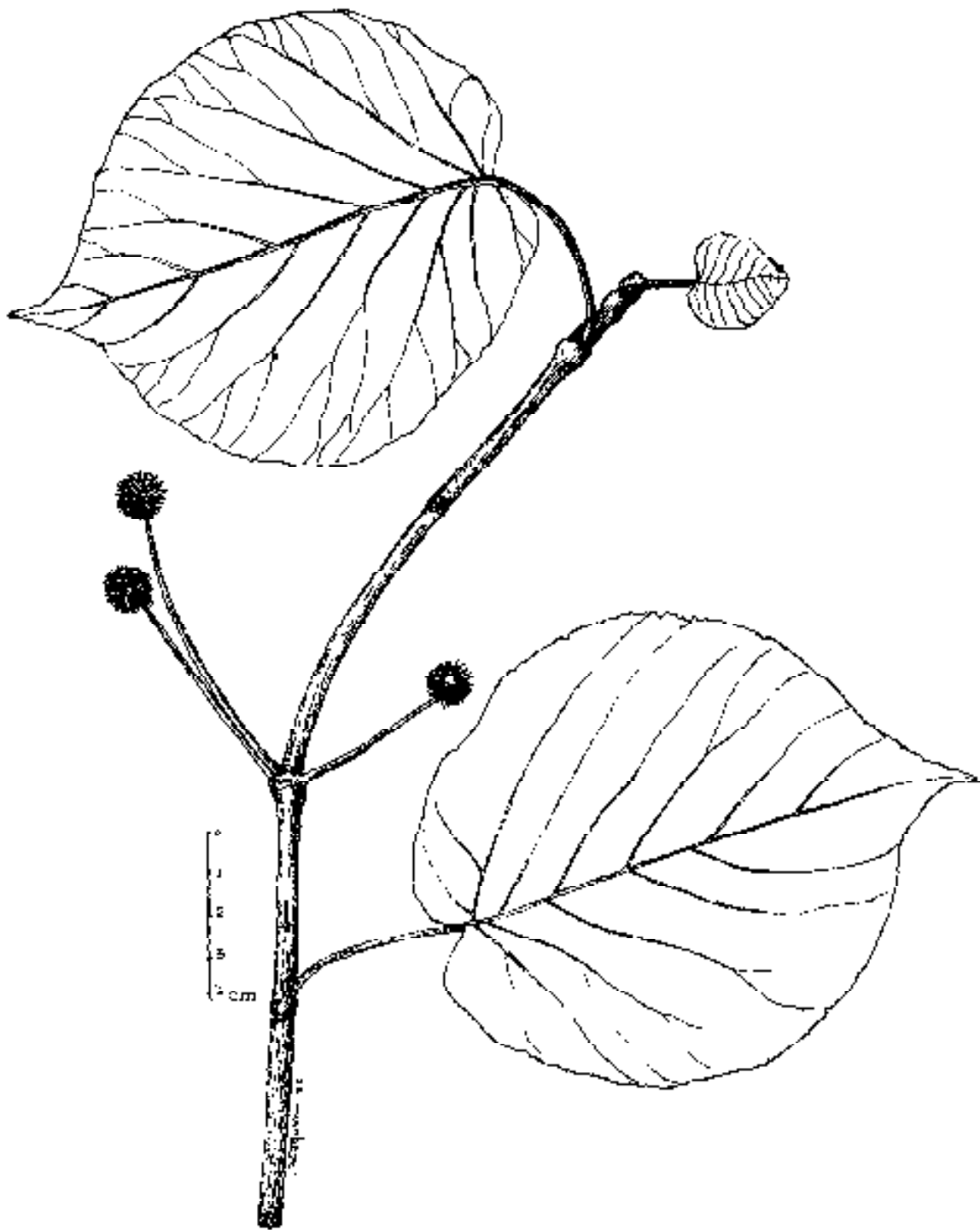


Fig. 44. *Haldinia cordifolia* (Roxb.) Ridsd.

Balaghat, Bastar, Betul, Bilaspur, Chhatarpur, Damoh, Durg, Gwalior, Indore, Mandla, Panna, Raigarh, Raipur, Rajnandgaon, Satna, Seoni, Shahdol, Sidhi, Surguja. Fl.: Aug.- Nov. ; Fr.: Jan.- June.

9. HEDYOTIS L.

Herbs or shrubs, rarely climbing. Leaves opposite, entire, stipulate; stipules interpetiolar, sometimes connate with the petiole. Flowers white, pink or blue, bisexual, in axillary or terminal paniculate cymes, rarely solitary. Calyx turbinate or ovoid. Corolla campanulate; lobes 4-5, valvate. Stamens 4-5, inserted on the corolla-tube. Ovary 2-celled; ovules many per cell; style filiform; stigma 2, linear. Fruit a capsule, usually crowned by calyx-limb, dehiscent septically or loculicidally.

About 450 species in tropical and subtropical regions; 3 in M.P.

- 1a. Plants small, up to 20 cm high; leaves linear, less than 3 cm long and 0.5 cm broad ...2. *H. pinifolia*
- 1b. Plants large, up to 1 m high; leaves elliptic, oblong or lanceolate, more than 3 cm long and 0.5 cm broad:
- 2a. Fruits apparently indehiscent, hard ...1. *H. auricularia*
- 2b. Fruits loculicidally dehiscent ...3. *H. verticillata*

1. *Hedyotis auricularia* L., Sp. Pl. 101. 1753; Hook. f., Fl. Brit. Ind. 3: 58. 1880. *Oldenlandia auricularia* (L.) F. v. Muell., Census 74. 1882. *Exallage auricularia* (L.) Bremek. in Verh. Kon. Ned. Akad. Wet. Afd. Nat. Sect. II, 48 (2) : 142. 1952; Sant. & Merch. in Bull. Bot. Surv. Ind. 3 (2) : 108. 1961.

Herbs, creeping or prostrate. Leaves ovate or lanceolate, subsessile, penninerved, acute, glabrous or pubescent, 2-5 x 0.8-1.8 cm; stipular sheath membranous. Flowers in axillary subsessile cymes, white or greenish yellow. Calyx-teeth 4, hirsute. Corolla campanulate; lobes 4, with a tuft of hairs at the apex. Stamens 4. Ovary 2-locular, with numerous ovules. Capsule globose, indehiscent, with persistent calyx-teeth.

Bastar. Fl. & Fr. : March - April.

2. *Hedyotis pinifolia* Wall. ex G. Don, Gen. Syst. 3. 525. 1837; Hook. f., Fl. Brit. Ind. 3 : 60. 1880. *Oldenlandia pinifolia* K. Schum. in E. & P. Pflanzenfam. 4. 4: 25. 1891.

Erect branched annual herbs, up to 20 cm high. Leaves linear, 1-3 x 0.1-2 cm, subsessile, acute with revolute margin; stipules segmented, segments 4-6. Flowers in axillary and terminal 2-4 flowered clusters, rarely solitary. Calyx segments lanceolate-linear; tube with bristles. Corolla white, divided halfway down. Capsule ovoid, with bristles.

Balaghat, Bastar, Raigarh, Sidhi, Surguja. Fl. & Fr. : Aug. - Nov.

3. *Hedyotis verticillata* (L.) Lamk., Tab. Encycl. 1 : 271. 1792. *Oldenlandia verticillata* L., Mant. Pl. 1: 40. 1767. *Hedyotis hispida* Retz., Obs. 4 : 23. 1786; Hook. f., Fl. Brit. Ind. 3 : 60. 1880.

Herbs, prostrate or creeping. Stem terete. Leaves sessile, linear-lanceolate or oblong, margin revolute, 3.5 - 5 x 0.5 - 1.0 cm, hispid beneath along the midrib and on the margin; stipules long ciliate. Flowers 2 - 6 in axillary clusters, rarely solitary. Calyx densely hispid, shortly tubular. Corolla white. Capsule ovoid, with long bristles.

Bilaspur. Fl. & Fr.: Oct. - Nov.

10. HYMENODICTYON Wall.

Trees. Leaves opposite, penninerved; stipules interpetiolar, deciduous. Inflorescence a paniced cyme or raceme. Flowers small, bisexual. Bracts 1 - 2, white or coloured, foliaceous, persistent. Calyx lobes 5 - 6, ovate, minute, caducous. Corolla lobes 5, trumpet - shaped, valvate, short. Stamens 5, inserted in the middle of corolla-tube; filaments short. Ovary 2-locular; ovules many per locule. Fruit a capsule, loculicidally 2 - valved; seeds flat, many, winged all around.

About 20 species in tropical Asia and Africa; one in M.P.

Hymenodictyon orixense (Roxb.) Mabb. in Taxon 31 : 66. 1982. *Cinchona orixensis* Roxb., Bot. Descr. Sweietenia 21. 1793 et in Med. Facts Obs. 6 : 152. 1795. *H. excelsum* (Roxb.) Wall. in Roxb., Fl. Ind. 2 : 149. 1824; Hook. f., Fl. Brit. Ind. 3 : 35. 1880. *C. excelsa* Roxb., Pl. Corom. 2. t. 106. 1798. - *Bhenrmal, Bhaulan*.

Deciduous trees, ca 15 m high. Leaves ovate-elliptic, pubescent, acuminate, 10 - 15 x 7 - 10 cm. Panicles terminal, dense - flowered. Flowers small, greenish white, fragrant. Bract solitary, foliaceous. Calyx minute, pubescent. Corolla pubescent outside. Style very long. Capsules ellipsoid, on recurved pedicels, reddish brown, ca 2 cm long; seeds winged.

Bilaspur, Chhatarpur, Hoshangabad, Indore, Morena, Panna, Raigarh, Raipur, Seoni, Sidhi, Surguja. Fl. & Fr.: July - Feb.

11. IXORA L.

Shrubs or small trees. Leaves opposite, decussate, rarely ternate, coriaceous, elliptic-oblong; stipules interpetiolar. Flowers in dense or lax terminal corymbose cymes, tetramerous, pedicellate. Bracts coriaceous, leaf-like; bracteoles 2. Calyx cupular; tube ovoid, small; teeth persistent. Corolla salver-shaped; tube slender, long; lobes shorter than the tube, spreading. Stamens 4, between the lobes, on the mouth of corolla; filaments short or absent. Ovary 2-celled; ovule 1 per cell; style filiform, as long as

corolla-tube; stigma bifid. Fruits globose or didymous, drupaceous berry, with 1-2 pyrenes; seeds peltate.

About 400 species in the tropical regions; 3 in M.P.

1a. Leaves up to 14 cm long; flowers white:

2a. Peduncle 3-5 cm long; calyx-teeth small, 0.5 mm long;
corolla tube 5-8 mm long ...3. *I. pavetta*

2b. Flowers sessile or on up to 1 cm long peduncle; calyx
lobes large, 1.5-2 mm long; corolla-tube 25-30 mm
long ...2. *I. cuneifolia*

1b. Leaves up to 7 cm long; flowers scarlet red ... 1. *I. coccinea*

1. *Ixora coccinea* L., Sp. Pl. 110. 1753; Hook. f., Fl. Brit. Ind. 3 : 145. 1880.

Shrubs, up to 4 m high. Leaves opposite, elliptic-ovate to oblong, sessile or subsessile, coriaceous, cordate at base, rounded or apiculate at apex, 4-7 x 3-4 cm; stipules triangular, awned. Flowers in sessile or shortly pedunculate corymbose cymes, scarlet. Calyx urceolate, 4-lobed; lobes triangular, acute. Corolla scarlet or deep red; tube up to 3.5 cm long; lobes broadly ovate. Stamens 4, alternate with corolla lobes. Ovary 2-celled; ovules solitary in each cell. Fruits globose, fleshy.

Chhatarpur. Planted. Fl. & Fr. : Feb.- April.

2. *Ixora cuneifolia* Roxb., Fl. Ind. 1 : 380. 1820; Hook. f., Fl. Brit. Ind. 3 : 144. 1880.

Shrubs. Leaves coriaceous, lanceolate, oblong or elliptic-lanceolate, sometimes puberulous beneath, 8-13 x 4-4.5 cm; stipules with short filiform cusps. Flowers white, in sessile or shortly pedicellate cymes. Calyx pubescent. Corolla glabrous; tube 2.5-3.0 cm. Fruits red, like a pea.

Mandla. Fl. & Fr. : April-June.

3. *Ixora pavetta* Andrews in Bot. Rep. t. 78. 1799; Matthew & Rani, Fl. Tamilnadu Carnatic 712. 1983. *I. arborea* Roxb. ex J. E. Smith in Rees, Cyclop. 19 : 5. 1811. *I. parviflora* Vahl, Symb. 3 : 11. L. 52. 1794 (non Lamk.); Hook. f., Fl. Brit. Ind. 3 : 142. 1880.

Shrubs or small trees, up to 5 m high. Leaves elliptic-oblong, coriaceous, rounded or cordate at base, apex obtuse to acute, 6-14.5 x 3-5 cm. Flowers white, in terminal pedicellate branched cymes, bracteate and bracteolate; pedicel 3-5 cm long, reddish. Calyx 4-toothed; teeth minute. Corolla lobes 4, obtuse; tube 0.8 cm long. Style filiform, hairy. Fruits globose, red, 5-7 mm in diameter; seeds flattened.

Balaghat, Bastar, Bilaspur, Damoh, Durg, Hoshangabad, Mandla, Narshimhapur, Panna, Raigarh, Raipur, Rajnandgaon, Seoni, Sidhi. *Fl.*: Jan. April; *Fr.*: May June.

12. KNOXIA L.

Herbs. Leaves opposite, penninerved; stipules interpetiolar, divided into lobes or subulately fimbriate. Inflorescence a terminal paniced cyme. Flowers tetramerous, bisexual, subsessile. Calyx lobes subulate, minute; limb persistent. Corolla funnel-shaped, valvate; throat pubescent. Stamens 4, inserted below the throat of corolla; filaments short. Ovary 2-locular, with a solitary ovule in each locule. Fruit of two 1-seeded indehiscent mericarps; seeds compressed.

About 15 species in India, Malaysia, Java and Australia; one in M.P.

Knoxia sumatrensis (Retz.) DC., *Prodr.* 4 : 569. 1830. *Spermacoce sumatrensis* Retz., *Obs. Bot.* 4 : 23. 1786. *Knoxia corymbosa* auct. pl. non Willd.; Hook. f., *Fl. Brit. Ind.* 3 : 128. 1880.

Slender annual erect herbs. Stems 4-angled. Leaves elliptic-lanceolate to oblong, acuminate, grey pubescent, 7-12 x 1.5-2.5 cm, base narrowed to a short petiole; stipules connate to a sheath. Flowers greyish white or blue, in axillary and terminal corymbose cymes. Calyx lobes 4. Corolla lobes 4, throat villous. Fruits white or ultimately black, small, of 2 mericarps separating from the persistent columella; seeds granulate.

Balaghat, Bastar, Bilaspur, Durg, Mandla, Narsimhapur, Raigarh, Raipur, Rajnandgaon, Seoni, Sidhi, Surguja. *Fl. & Fr.*: Aug.-Jan.

13. KOHAUTIA Cham. & Schl.

Annual or perennial herbs. Leaves sessile, opposite or whorled, linear to oblong, glabrous, stipulate. Inflorescence a terminal panicle, sometimes flowers fascicled. Calyx 4-lobed; lobes subulate. Corolla lobed up to halfway down; lobes oblong. Stigma overtopped by anthers. Ovary 2-locular; ovules numerous, immersed in fleshy peltate placenta. Fruits capsules, obovoid, green; seeds numerous, angular.

About 50 species in tropical South Africa and Asia; 2 in M.P.

- 1a. Leaves whorled; flowers 1-few-fascicled; corolla-tube 2-3 mm long1. *K. aspera*
 1b. Leaves opposite; flowers not fascicled; corolla-tube 7-9 mm long2. *K. gracilis*

1. *Kohautia aspera* (Roth) Bremek., *Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect.* 11, 48 (2): 113. 1952. *Hedyotis aspera* Heyne ex Roth, *Nov. Pl.* Sp. 94. 1821. *Oldenlandia aspera* (Roth) DC., *Prodr.*

4 : 428. 1830; Hook. *f.*, Fl. Brit. Ind. 3 : 68. 1880.

Erect herbs, up to 30 cm high. Leaves whorled, linear-lanceolate, 5 x 0.6 cm, glabrous, acute; stipules segmented. Flowers in terminal cymose or corymbiform panicles, 1-few-fascicled. Calyx lobes subulate. Corolla pink or violet. Fruits oblong or obovoid.

Indore. Fl. & Fr. : Nov. Dec.

2. *Kohautia gracilis* (Wall.) DC., Prodr. 4 : 430. 1830. *Hedyotis gracilis* Wall. in Roxb., Fl. Ind. 1 : 371. 1820. *Oldenlandia gracilis* (Wall.) Hook. *f.*, Fl. Brit. Ind. 3 : 68. 1880.

Erect simple or sparingly branched annual or perennial herbs, up to 30 cm high. Leaves opposite, linear to narrowly oblong, 15 - 30 x 1 - 2 mm, glabrous, acute, with revolute margins; stipule segments 2 - 4, 1 - 2 mm long. Flowers in terminal cymose corymbiform panicles. Calyx lobes subulate. Corolla blue; lobes oblong, obtuse. Fruits oblong to globose, green.

Balaghat, Bilaspur, Hoshangabad, Mandla, Raipur. Fl. & Fr. : May June.

14. MEYNA Roxb. ex Link

Erect shrubs or small trees, usually thorny. Leaves opposite or ternate; stipules interpetiolar, connate at base into a ring. Inflorescence a cyme, fascicle or panicle. Flowers unisexual or bisexual, 4 - 6-merous, pedicellate. Calyx 4 - 5-toothed; tube small. Corolla urceolate, green, hairy within, valvate in bud. Stamens inserted in throat; filaments short. Ovary 4 - 6-locular, with a solitary pendulous ovule in each locule. Fruit a drupe of 3 - 5 one-seeded pyrenes.

About 11 species distributed from tropical Africa to S.E. Asia; 2 in M.P.

- 1a. Armed; leaves glabrous or sparsely pilose; corolla glabrous outside ...1. *M. spinosa*
- 1b. Unarmed; leaves thickly pubescent; corolla hairy outside ...2. *M. velutina*

1. *Meyna spinosa* Roxb. ex Link in Jahrb. Gewachsk 1 (3) : 32. 1820; Robyns in Bull. Jard. Bot. Brux. 11 : 230. 1928. *Vangueria spinosa* Roxb., Fl. Ind. 2 : 172. 1824; Hook. *f.*, Fl. Brit. Ind. 3 : 136. 1880, *p.p.*

Armed small trees; spines opposite, 1 - 2 cm long. Leaves opposite, sometimes ternate, ovate-elliptic, glabrous or sparsely pilose, acute or shortly acuminate, 3 - 8 x 2 - 5 cm; petiole up to 1 cm long; stipules connate, cuspidate with bristles. Flowers small, greenish white, in short peduncled (0.3 cm) axillary cymes. Calyx 5-toothed. Corolla 5-lobed; tube

short. Ovary 5-locular with a solitary ovule in each locule; stigma 5-lobed. Fruit a fleshy drupe, ovoid.

Bilaspur. *Fl. & Fr.* : July Aug.

2. *Meyna velutina* Robyns in Bull. Jard. Bot. Brux, 11: 237. 1928.

Unarmed erect shrubs, up to 3 m high; branches spreading. Leaves opposite, elliptic to ovate, apex acuminate, base obtuse, thickly pubescent on both surfaces, 3.5 - 6.5 × 2.5 - 4.0 cm; petiole thickly pubescent; stipules connate, cuspidate, with bristles. Flowers in axillary fasciculate cyme. Peduncle up to 0.5 cm long. Calyx 5-toothed. Corolla 5-lobed, hairy outside. Ovary 5-locular. Fruit oval, a drupe.

Bilaspur. *Fl. & Fr.* : April May.

15. MITRAGYNA Korth.

Trees or shrubs; branchlets terete. Leaves opposite, penninerved, petiolate; stipules interpetiolar, large, caducous. Inflorescence a globose axillary or terminal pedunculate head; receptacle hirsute. Bracts 2, small, membranous, caducous; bracteoles many. Calyx-tube short, obconical, truncate or 5-toothed. Corolla funnel-shaped; tube long; lobes 5, valvate. Stamens 5, on the throat of the corolla; filaments short, filiform; anthers oblong. Ovary 2-celled; ovules 2 per cell; style filiform; stigma mitriform. Fruit a globose head of capsules, each with 2 follicular cocci, many-seeded; seeds flattened, winged.

About 12 species in tropical Africa and Asia; one in M.P.

Mitragyna parvifolia (Roxb.) Korth., Obs. Naocl. Ind. 19. 1839. *Nauclea parvifolia* Roxb., Pl. Corom. 1 : 40, t. 52. 1796. *Stephegyne parvifolia* Korth., Verh. Nat. Gesch. Bot. Nederl. 161. 1840; Hook. f., Fl. Brit. Ind. 3 : 25. 1880.-
Mundi. Fig. 45.

Large branched trees, up to 18 m high. Leaves broadly ovate or suborbicular, 5 - 9 cm long, acute or obtuse, glabrous; stipules oblong, deciduous. Flower heads globose, usually solitary, creamy white, ca 2 cm across, shortly peduncled. Capsules in globose head, black, persistent.

Balaghat, Bastar, Bhopal, Bilaspur, Chhatarpur, Damoh, Durg, Hoshangabad, Indore, Jabalpur, Mandla, Morena, Narsimhapur, Panna, Raigarh, Raipur, Rajnandgaon, Rewa, Sagar, Satna, Seoni, Shahdol, Shivpuri, Sidhi, Surguja, Tikamgarh. *Fl.* : Aug. ; *Fr.* : Sept. Jan.

16. MORINDA L.

Shrubs or trees. Leaves opposite, decussate, elliptic, oblong or obovate, petiolate; stipules interpetiolar. Flowers in peduncled simple paniced

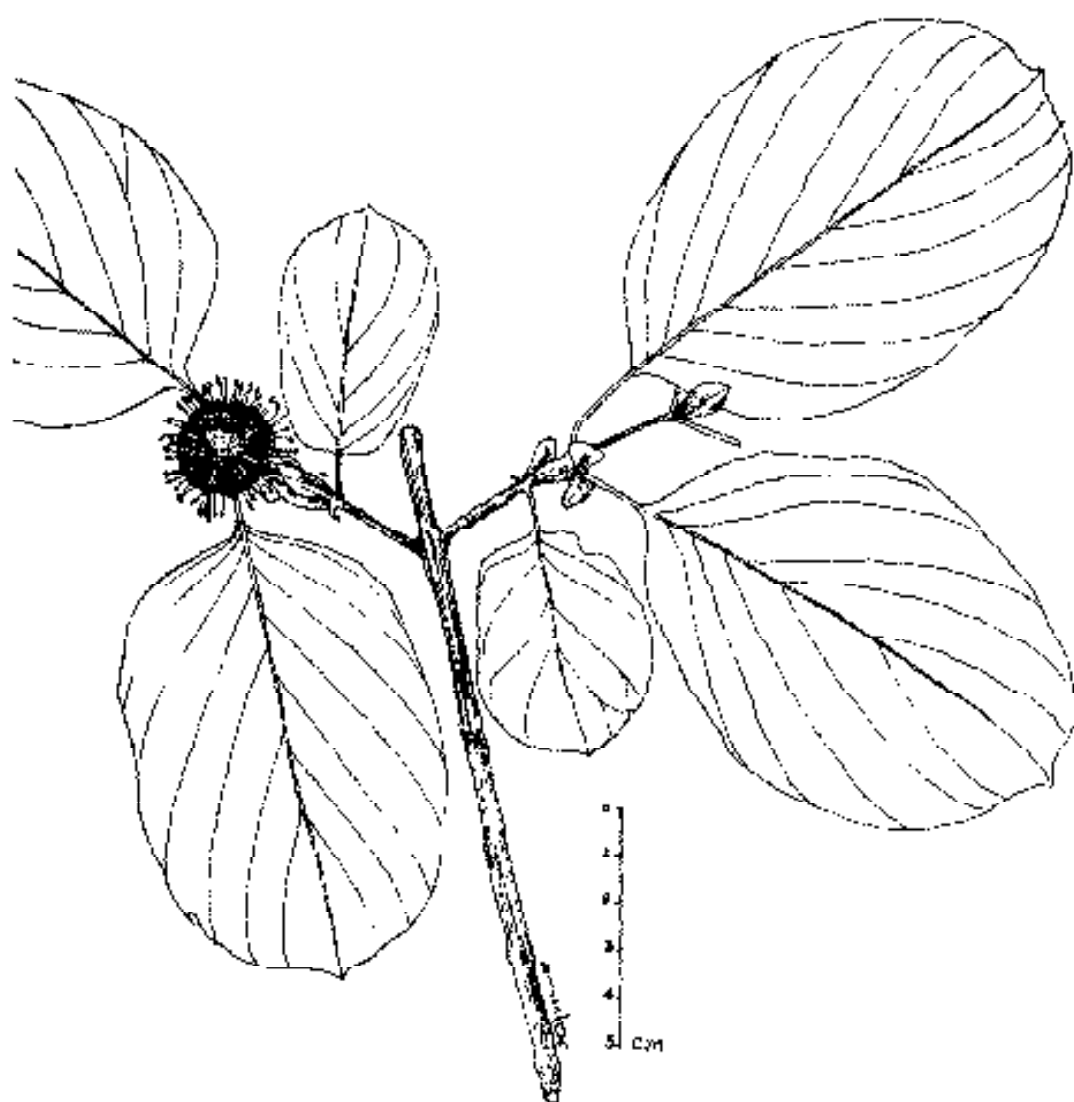


Fig. 45. *Mitragyna parvifolia* (Roxb.) Korth.

globose heads; heads terminal or axillary, ebracteate, unisexual or bisexual, 4-6-merous. Calyx-tubes cohering; limb short, truncate. Corolla funnel-shaped, valvate; tube cylindric. Stamens inserted in throat or slightly below throat. Ovary 2-celled (sometimes incompletely 4-celled), with a solitary ovule in each cell; stigma hairy. Fruit a fleshy syncarp of 1-seeded pyrenes.

About 80 species in tropical regions; 2 in M.P.

1a. Plants erect; heads simple; flowers pentamerous ...1. *M. pubescens*

1b. Plants straggling; heads umbellate; flowers tetramerous

...2. *M. umbellata*

1. *Morinda pubescens* Sm. in Rees, Cyclop. 24. n. 3. 1813; Verdcourt in Kew Bull. 37 : 543. 1983; *M. tinctoria* Roxb., Fl. Ind. 1 : 543. 1820; Hook. f., Fl. Brit. Ind. 3 : 156. 1880. *M. tomentosa* Heyne ex Roth, Nov. Pl. Sp. 147. 1821. *M. coreia* Buch.-Ham. in Trans. Linn. Soc. London 13 : 537. 1822.

Small trees. Leaves elliptic-ovate, acuminate, acute, tomentose beneath, 8-20 × 4-11 cm; stipules ovate. Flowers white, pentamerous, in terminal axillary or leaf-opposed pedunculate globose heads. Calyx 3 mm long, truncate. Corolla 15 mm long, glabrous within; lobes 5, oblong. Stamens 5. Fruits globose, 2-3 cm across; pyrene stony; seeds oblong.

Balaghat, Indore, Morena, Satna, Sconi. Fl. & Fr. : March-Aug.

2. *Morinda umbellata* L., Sp. Pl. 176. 1753; Hook. f., Fl. Brit. Ind. 3 : 157. 1880.

Straggling shrubs. Leaves variable, elliptic-lanceolate or obovate, pubescent beneath, abruptly acuminate at apex, attenuate at base, 6.5-11 × 2-3.5 cm. Flowers greenish white, in terminal umbellate heads. Calyx ca 1 mm long. Corolla-tube ca 1 mm long, villous within; lobes 4, recurved. Stamens 4. Fruits ca 1 mm long, irregularly lobed, green; seeds oblong.

Bastar. Fl. & Fr. : June-Sept.

17. NEANOTIS Lewis

Pubescent herbs. Leaves opposite, penninerved; stipules interpetiolar, entire or divided into narrow lobes. Flowers in terminal or axillary cymes or fascicles, 4-merous. Bracts and bracteoles small. Calyx-tube slightly compressed; lobes well separated, persistent. Corolla funnel-shaped; lobes recurved. Stamens at the apex of tube; filaments short or absent. Ovary 2-locular; ovules few in each locule; style filiform. Fruit a capsule, indehiscent or loculicidally dehiscent at apex; seeds reticulately ribbed.

About 28 species confined to Asia and Australia; 3 in M.P.

- 1a. Annuals; cymes few-flowered; capsules not collected in heads ...1. *N. calycina*
- 1b. Perennials; cymes many-flowered; capsules more or less in heads:
- 2a. Stem diffusely branched; each cell of capsule 1 3-seeded ...2. *N. decipiens*
- 2b. Stem dichotomously branched; each cell of capsule many-seeded ...3. *N. ingrata*

1. *Neanotis calycina* (Hook. f.) Lewis in Ann. Miss. Bot. Gard. 53: 37. 1966. *Anotis calycina* Hook. f., Fl. Brit. Ind. 3 : 73. 1880.

Annual erect glabrous herbs. Stem 4-angled. Leaves small, membranous, ovate-lanceolate, sparsely pubescent. Flowers in few-flowered cymes. Cymes axillary or terminal. Corolla short, purple. Capsules truncate, sessile, didymous, each cell many-seeded; seeds peltate, reticulate.

Hoshangabad. Fl. & Fr. : Aug. - Nov.

2. *Neanotis decipiens* (Hook. f.) Lewis in Ann. Miss. Bot. Gard. 53 : 37. 1966. *Anotis decipiens* Hook. f., Fl. Brit. Ind. 3 : 72. 1880.

Perennial slender diffusely branched herbs. Leaves sparsely pilose, ovate, acuminate, 2 - 5.5 × 0.7 - 1.5 cm. Cymes terminal and axillary, many-flowered. Flowers violet. Corolla funnel-shaped, longer than the calyx-tube. Capsules subglobose, small, didymous, each cell 1 - 3-seeded.

Mandla. Fl. & Fr. : July - Sept.

3. *Neanotis ingrata* (Wall. ex Hook. f.) Lewis in Ann. Miss. Bot. Gard. 53: 39. 1966. *Anotis ingrata* Wall. ex Hook. f., Fl. Brit. Ind. 3: 71. 1880.

Small perennial dichotomously branched herbs, sometimes straggling. Stem 4-angled, hairy; branches glabrous or hairy at nodes. Leaves petiolate, ovate-lanceolate, acuminate, membranous, 2 - 4.5 × 0.6 - 1.7 cm, puberulous above and beneath. Cymes terminal and subterminal. Flowers white to purple, crowded, shortly pedicellate. Calyx-teeth large. Corolla lobes oblong, glabrous or hairy. Capsules hemispherical, slightly compressed, glabrous or hairy, cell many-seeded.

Betul, Indore. Fl. & Fr. : July - Sept.

18. NEONAUCLEA Merr.

Trees or shrubs; terminal vegetative bud strongly flattened. Leaves opposite, pinnately nerved; stipules adpressed, ovate to elliptic, deciduous or semi-persistent. Flowering heads terminal, generally 1-3. Flowers

pentamerous, subsessile on the receptacle; receptacle usually hairy. Hypanthia mutually free. Calyx-tube short; lobes with a deciduous apical portion. Corolla salver-shaped; lobes imbricate in bud. Stamens inserted in the upper part of the tube; filaments short. Ovary 2-locular with numerous pendulous ovules; style exerted; stigma globose. Fruit a head of loose, dehiscent fruitlets, with a hard endocarp; seeds ellipsoidal, shortly winged at both ends.

About four species in Asia; one in M.P.

Neonauclea purpurea (Roxb.) Merr., Int. Rumph. 483. 1917. *Nauclea purpurea* Roxb., Pl. Corom. 1 : 41, t. 54. 1795.

Shrubs up to 3 m high. Leaves elliptic to elliptic-oblong, coriaceous, glabrous, 8-20 × 5-10 cm, apex acute, base obtuse; petiole 1-2 cm long, glabrous; stipules obovate, deciduous or semi-persistent. Flowering head solitary, terminal, 8-10 mm across. Flowers purple. Corolla 6-8 mm long, glabrous outside; lobes oblong. Style 7-9 mm long. Fruiting head 1-2.5 cm diam.; fruitlets 5-7 mm long with a few scattered hairs.

Bastar. Fl. & Fr. : Feb. April.

19. OLDENLANDIA L.

Herbs, usually glabrous. Leaves opposite or whorled, ovate, linear or lanceolate; stipules interpetiolar, connate into a bristly sheath. Flowers solitary, in cyme or fascicled, 4-5-merous. Calyx-tube turbinate; lobes persistent, distant in fruits. Corolla rotate; tube short or long; lobes 4 (rarely 5), valvate. Stamens 4 (rarely 5), inserted in the throat of corolla; anthers included or exerted. Ovary 2-locular; each locule with numerous ovules in axile placentation; style filiform. Fruit a capsule, loculicidal or septicial; seeds angled, globose or ellipsoid, minute.

About 300 species mainly in warmer parts of the world; 7 in M.P.

- 1a. Stipules truncate; corolla-tube long, far longer than the sepals ...1. *O. affinis*
- 1b. Stipules absent or otherwise; corolla-tube short or only slightly exceeding the sepals:
 - 2a. Leaves elliptic-oblong ...5. *O. pumila*
 - 2b. Leaves linear-lanceolate:
 - 3a. Flowers in umbels ...7. *O. umbellata*
 - 3b. Flowers not in umbels:
 - 4a. Peduncles from the upper axils and in terminal leafless panicles ...6. *O. pusilla*

4b. Peduncles axillary from the lower or all the axils, never in leafless panicles:

5a. Erect herbs; branches tetragonous, angled ...4. *O. herbacea*

5b. Sub-erect or diffuse herbs; branches not angled:

6a. Flowers sessile, solitary ...3. *O. diffusa*

6b. Flowers pedicellate, 2-3-together ...2. *O. corymbosa*

1. *Oldenlandia affinis* (Roem. & Schult.) DC., Prodr. 4 : 428. 1830. *Hedyotis affinis* Roem. & Schult., Syst. 3 : 194. 1819. *H. dichotoma* Koen. ex Roth, Nov. Pl. Sp. 23. 1821. *O. dichotoma* (Koen. ex Roth) Hook. f., Fl. Brit. Ind. 3 : 67. 1880.

Annual, slender erect herbs, up to 30 cm high; stem glabrous, terete. Leaves linear-lanceolate, sub-sessile, up to 5 × 0.5 cm; stipules small, truncate. Flowers in terminal or axillary paniced cymes, small, white or blue. Calyx-teeth subulate. Corolla funnel-shaped. Capsules globose; seeds minute, reticulate.

Balaghat, Bilaspur, Durg, Hoshangabad, Narsimhapur, Panna, Rajnandgaon, Sidhi, Surguja. *Fl. & Fr.* Sept. Dec.

2. *Oldenlandia corymbosa* L., Sp. Pl. 119. 1753; Hook. f., Fl. Brit. Ind. 3 : 64. 1880. *Hedyotis corymbosa* Lamk., Encycl. 1 : 272. 1792.- *Dhaman-paper*.

Slender annual herbs, up to 30 cm high, profusely branched, diffused, scarcely scaberulous. Leaves elliptic, 2-3 × 0.3-0.7 cm, glabrous, acute, margins recurved; stipules membranous. Flowers small, white, in 3-5-flowered peduncled axillary cymes, rarely solitary. Calyx small; lobes ovate. Corolla-lobes acute. Style filiform. Capsules globose, greyish white, with persistent calyx; seeds minute, black, angled, reticulate.

Balaghat, Bastar, Bilaspur, Chhatarpur, Damoh, Gwalior, Hoshangabad, Jabalpur, Mandla, Narsimhapur, Panna, Raigarh, Raipur, Rajnandgaon, Ratlam, Sagar, Seoni, Shivpuri, Sidhi, Surguja. *Fl. & Fr.* : Sept.-April.

2.1. var. *linearis* (DC.) Verdc. in Kew Bull. 30: 296. 1975. *Oldenlandia linearis* DC., Prodr. 4 : 425. 1830.

Plants mostly strict erect. Leaf-blades usually linear, 1-1.5 mm wide. Inflorescence 1-3-flowered.

Bastar, Bilaspur, Chhatarpur, Damoh, Dhar, Gwalior, Hoshangabad, Jabalpur, Narsimhapur, Panna, Raigarh, Raipur, Rajnandgaon, Seoni, Sidhi. *Fl. & Fr.*: Sept.-March.

3. *Oldenlandia diffusa* (Willd.) Roxb., Hort. Beng. 11. 1814. (*nom. valid*) et Fl. Ind. 1 : 423. 1820; Hook. f., Fl. Brit. Ind. 3 : 65. 1880. *Hedyotis*

diffusa Willd., Sp. Pl. 1 : 566. 1798.

Annual herbs, usually branched from the base, with prostrate stems. Leaves linear-lanceolate, 10 - 25 × 1 - 2 mm; margin revolute; base narrowed. Flowers axillary, usually solitary or 2-3 together, white. Calyx-lobes ovate, acute, subequal. Corolla lobes ovate, acute. Fruits glabrous, didymous, ca 3 mm long.

Bilaspur, Hoshangabad, Surguja. *Fl. & Fr.* : July - Oct.

4. *Oldenlandia herbacea* (L.) Roxb., Fl. Ind. 1 : 445. 1820. *Hedyotis herbacea* L., Sp. Pl. 102. 1753. *O. heyneii* G. Don, Gen. Syst. 3 : 531. 1834; Hook. f., Fl. Brit. Ind. 3 : 65. 1880.

Erect slender herbs, up to 30 cm high; branches tetragonous, winged. Leaves linear-lanceolate, glabrous, up to 3 × 0.3 cm. Flowers white or purple, on axillary 2- 4-flowered peduncles. Capsules ovoid, glabrous; valves protruding beyond the sepals; seeds ellipsoid.

Bastar, Hoshangabad, Raigarh, Seoni, Sidhi. *Fl. & Fr.* : Oct.- Dec.

5. *Oldenlandia pumila* (L.f.) DC., Prodr. 4 : 425. 1830. *Hedyotis pumila* L. f., Suppl. Pl. 119. 1781. *O. crystallina* Roxb., Fl. Ind. 1 : 443. 1820; Hook. f., Fl. Brit. Ind. 3 : 65. 1880.

Annual, small diffused herbs, up to 20 cm high; stem quadrangular. Leaves opposite, sessile or shortly petiolate, elliptic-oblong, acute or subacute, 7 - 9 × 1.5 - 3 mm; stipules with a few bristles. Flowers axillary, usually solitary, rarely 2- 3-flowered cyme. Corolla white; tube pilose inside. Capsule ca 3 mm long, glabrous, ovoid, calyx-lobes on fruit close together.

Satna. *Fl. & Fr.* : Dec. - Feb.

6. *Oldenlandia pusilla* Rottl. in Verh., Ges. Naturf. Fr. Neue. Schr. 4: 216. 1803. *O. brachiata* Hook. f., Fl. Brit. Ind. 3 : 66. 1880.

Annual, slender small herbs, up to 10 cm high; stem 4-angled. Leaves linear, needle like, ca 2 × 0.1 cm, glabrous. Flowers white, small, peduncled; peduncles in lower axils solitary while in upper and terminal many-flowered. Capsule small, globose, green.

Balaghat, Durg. *Fl. & Fr.* : Sept.

7. *Oldenlandia umbellata* L., Sp. Pl. 119. 1753; Hook. f., Fl. Brit. Ind. 3 : 66. 1880. *Hedyotis umbellata* (L.) Lamk., Encycl. 1 : 272. 1789.

Annual, erect or decumbent herbs. Leaves linear-ovate, sessile, 1 - 3 × 0.1 - 0.4 cm, margins recurved; stipules 3- 5, long bristly. Flowers white, in axillary umbellate cymes, shortly pedicellate. Calyx-lobes acute, persistent. Corolla pubescent near the throat. Capsules globose, loculicidal, ca 3 mm

in diam., crowned by persistent calyx; seeds small, reticulate.

Bastar. *Fl. & Fr.* : April - Sept.

20. PAVETTA L.

Shrubs or small trees; branchlets quadrangular, glabrescent or tomentose. Leaves opposite, decussate, subcoriaceous; stipules interpetiolar, connate at base into a short sheath. Flowers in terminal or axillary corymbs or panicles, tetramerous, bisexual. Bracts and bracteoles membranous. Calyx 4-dentate, truncate. Corolla salver-form; lobes contorted. Stamens inserted in throat of corolla-tube; filaments short. Ovary 2-locular; ovule solitary per locule; style filiform, exserted; stigma fusiform. Fruit a drupe, globose or 2-lobed, 1-pyrenous, 2-seeded, black.

About 400 species in tropical regions of the old world; 2 in M.P.

- 1a. Leaves obovate; lowest internode of peduncle much longer than all others ...1.*P. crassicaulis*
 1b. Leaves elliptic; peduncles not as above ...2.*P. tomentosa*

1. *Pavetta crassicaulis* Bremek. in Fedde Repert. 37: 112. 1934 & 47: 25. 1939. *P. indica* auct. non L.; Hook. f., *Fl. Brit. Ind.* 3 : 150. 1880.

Small trees, up to 4 m high. Leaves opposite, obovate, coriaceous, glabrous or puberulous above, tomentose beneath, 7-16 × 2.5-8.5 cm; petiole 1-2.5 cm long. Flowers white, in much branched terminal cymes, lowest internode of peduncle much longer than all others together. Fruits small, globose, up to 6 mm across.

Bilaspur, Raigarh. *Fl.* : April-May; *Fr.* : Oct.-Nov.

2. *Pavetta tomentosa* Roxb. ex J.E. Smith in Rees, *Cyclop.* 26 : 2. 1819. *P. indica* var. *tomentosa* (Roxb. ex J.E. Smith) Hook. f., *Fl. Brit. Ind.* 3 : 150. 1880.

Shrubs or small trees, up to 3 m high. Leaves elliptic to lanceolate, glabrous or puberulous above, tomentose beneath, apex and base acute, 7-21 × 3.5-10.5 cm; petiole ca 2 cm long. Cymes terminal, much branched. Flowers white. Corolla-tube ca 1 cm long, pilose within; lobes oblong. Fruits green, globose, ca 0.5 cm across.

Balaghat, Bastar, Bilaspur, Mandla, Raigarh, Raipur, Rajnandgaon, Seoni, Sidhi, Surguja. *Fl.*: May; *Fr.*: Aug.-Jan.

21. RUBIA L.

Erect or climbing herbs, scabrid, hispid or prickly. Stem slender. Leaves opposite or in whorl; stipules foliaceous, petiolate, opposite. Inflorescence a terminal or axillary cyme. Flowers 4-6-merous. Calyx-lobes

absent. Corolla rotate; tube short; lobes valvate. Stamens generally 5, epipetalous. Disc annular, around the basal portion of style. Ovary 2-locular, with solitary basal ovule per locule. Stigma capitate. Fruit a berry, globose or didymous.

About 80 species in the tropical and temperate regions; one in M.P.

Rubia manjith Roxb. ex Fleming in As. Res. 11 : 177. 1810; Hara in Enum. Fl. Pl. E. Nepal 2 : 207. 1979. *R. cordifolia* auct. non L.; D. Don, Prodr. 133. 1825; Hook. f., Fl. Brit. Ind. 3 : 202. 1881; Deb. & Malick in Bull. Bot. Surv. India 10 : 6. 1968. *R. munjista* Roxb., Fl. Ind. 1 : 383. 1820. *R. cordifolia* L. var. *munjista* (Roxb.) Miq. in Ann. Mus. Lugd. Bat. 3 : 111. 1867, *quoad syn.*

Stiff climbing herbs, sometimes prickly or hispid; stem angular. Leaves simple, ovate or ovate-lanceolate, cordate or rounded at base, with minute bristles along the margin, glabrous or hairy, 4.9 × 1.5-4.5 cm; petiole 5-8 cm long; stipules modified to leaves or absent. Flowers white in axillary or terminal cyme. Calyx enclosing the ovary and adhering to it. Corolla lobes lanceolate, acute. Stamens 5, epipetalous. Fruits globose, deep purple, 3-4 mm in diam.

Bastar, Bilaspur, Raigarh, Surguja. Fl. : Feb.- Dec.; Fr.: March- Jan.

22. SPERMACOCE L.

Annual or perennial herbs; branches usually tetragonous. Leaves opposite, shortly petiolate; stipules connate with petiole forming a sheath, divided into narrow lobes or with marginal hairs. Flowers bisexual, in axillary or terminal clusters, rarely solitary. Calyx lobes 2-4, often with intermediate teeth or bristles. Corolla funnel-shaped or urceolate; lobes 4, valvate in bud. Stamens 4, on the throat of corolla. Ovary 2-celled, with solitary ovule in each cell; style filiform with two short arms. Fruits dry, dehiscent with 2 valves, membranous; septum sometimes remaining; seeds oblong, ventrally grooved.

About 150 species in the warmer regions; 2 in M.P.

- 1a. Prostrate or decumbent herbs; leaves elliptic to obovate or oblong; only one carpel dehiscent ventrally ...1. *S. hispida*
- 1b. Erect herbs; leaves linear-lanceolate; both carpels, dehiscent ventrally ...2. *S. pusilla*

1. *Spermacoce hispida* L., Sp. Pl. 102. 1753; Hook. f., Fl. Brit. Ind. 3 : 200. 1881. *S. articularis* L. f., Suppl. 119. 1781. *Borreria hispida* (L.) K. Schum. in Engler Pflanzenfam. 4 (4) : 144. 1891; non Schum., 1888. *B. articularis* (L.f.) F.N. Will. in Bull. Herb. Boiss. ser. II, 5: 956. 1905.

Prostrate or procumbent herbs; branches quadrangular, hispid, up to 20 cm long. Leaves obovate or lanceolate-oblong, sessile or subsessile, coriaceous, 0.5-3.0 × 0.4-1.5 cm; stipules cupular, bristly. Flowers 4-6, clustered on reduced axillary branches, whitish purple. Calyx-tube small; teeth linear-lanceolate. Corolla lobes 4, valvate. Capsule hispid, obovoid, ca 4 × 2 mm; seeds brown.

Balaghat, Bastar, Bilaspur, Damoh, Durg, Hoshangabad, Indore, Jabalpur, Mandla, Narsimhapur, Panna, Raigarh, Raipur, Rajnandgaon, Satna, Seoni, Shahdol, Sidhi, Surguja, Tikamgarh. *Fl. & Fr.* : Aug. April.

2. *Spermacoce pusilla* Wall. in Roxb., *Fl. Ind.* 1: 379. 1820. *Borreria pusilla* (Wall.) DC., *Prodr.* 4: 543. 1830. *B. stricta* auct. mult. non (l.f.) K. Schum. nec. G.F.W. Mey. *Spermacoce stricta* auct. non l.f.; Hook. f., *Fl. Brit. Ind.* 3: 200. 1881.

Erect annual herbs up to 50 cm high. Leaves whorled, linear-lanceolate or rarely oblong, 2-4 × 0.3-0.8 cm, glabrous or scabrid; stipules membranous, bristly. Flowers white, in dense axillary or terminal clusters, subtended by 2 pairs of leaves; bracts filiform. Calyx linear, pubescent. Corolla campanulate, ca 3 mm long. Stamens 3-4, epipetalous. Capsules obovoid, pubescent; seeds black.

Balaghat, Bilaspur, Damoh, Dhar, Indore, Mandla, Panna, Raigarh, Raipur, Rajnandgaon, Satna, Seoni, Shivpuri, Surguja, Tikamgarh. *Fl. & Fr.* : Sept. Nov.

23. SPERMADICTYON Roxb.

Unarmed erect shrubs. Leaves opposite; stipules interpetiolar, small, persistent. Flowers small, 4-5-merous, bisexual, blue or violet, in terminal capituliform inflorescence arranged in paniculiform cymes. Calyx persistent, subulate, often glandular. Corolla funnel-shaped; tube slender; lobe short, valvate in bud. Stamens inserted in throat. Ovary at first 5, later 1-celled; ovules 5, erect; stigma 5. Fruit a capsule, 1-celled, 5-valved at the top.

About 5 species, chiefly in Asia; one in M.P.

Spermadictyon suaveolens Roxb., *Pl. Corom.* 3: 32, t. 236. 1815. *Hamiltonia suaveolens* Roxb., *Fl. Ind.* 2: 223. 1824; Hook. f., *Fl. Brit. Ind.* 3: 197. 1880. -Mahabal.

Erect shrubs, up to 2 m high. Leaves elliptic-lanceolate, acute or acuminate, pubescent beneath, 6-19 × 3-7.5 cm; petiole 1-2 cm long. Flowers blue or violet, fragrant, capitate, on the branches of a large panicle. Bracts and bracteoles glandular hairy. Calyx lobes linear-lanceolate, pubescent. Corolla-tube ca 1.5 cm long, pubescent outside. Capsule

ellipsoid, 1-celled, 5-valved at the top; seeds 5.

Balaghat, Bastar, Bilaspur, Hoshangabad, Pachmarhi, Raigarh, Satna, Seoni, Surguja. *Fl. & Fr.* : Sept. Dec.

24. THECAGONUM Babu

Herbs. Leaves broadly ovate-oblong, stipulate. Inflorescence a many-flowered corymbose panicle or cyme. Flowers long peduncled, small, white. Calyx lobes triangular. Corolla rotate, villous at the throat; lobes 4, oblong. Stamens 4. Ovary 2-locular with many ovules in axile placentation. Fruit a capsule, hemispherical, 4-angled; seeds globose or subglobose.

About 4 species in India and S.E. Asia; one in M.P.

Thecagonum ovatifolium (Cav.) Babu in Bull. Bot. Surv. India 11 : 214. 1969. *Hedyotis ovatifolia* Cav., Descr. Pl. Ic. 6 : 52. 1802. *Gonothecca ovatifolia* (Cav.) Santap. & Wagh in Bull. Bot. Surv. Ind. 5 : 107. 1963. *Oldenlandia nudicaulis* Roth, Nov. Pl. Sp. 95. 1821; Hook. f., Fl. Brit. Ind. 3 : 70. 1880. *Hedyotis nudicaulis* (Roth) Wight & Arn., Prodr. 416. 1834.

Small erect annual herbs, up to 20 cm high. Leaves ovate-oblong, glabrous or pubescent beneath, subsessile or on short petiole, 1.5 - 7 × 0.9 - 3 cm. Flowers small, pinkish white, peduncled in dichotomously branched cyme. Corolla white, divided more than half-way down. Capsule hemispherical, 4-angled, crowned with subulate calyx lobes; seeds ovoid-globose, dark brown, pitted..

Balaghat, Bilaspur, Durg, Hoshangabad, Mandla, Raigarh, Raipur, Rajnandgaon, Seoni, Sidhi. *Fl. & Fr.* : July Dec.

25. WENDLANDIA Bartl. ex DC.

Shrubs or small trees. Leaves opposite, penni-nerved; stipules interpetiolar, triangular, pointed or cuspidate. Flowers small, rosy or white, in dense terminal thyrsoid or paniced cymes or many-flowered corymbs, bisexual, heteromorphous; bracts and bractcoles numerous, narrow. Calyx-tube globose, with 4-5 subequal pubescent lobes. Corolla funnel-shaped; tube cylindrical; lobes 4-5, glabrous, imbricate. Stamens 4-5, alternating with corolla lobes and adnate to the tube. Ovary 2-celled with many ovules; style filiform. Capsule small, globose, 2-locular; seeds numerous, compressed, sometimes narrowly winged.

About 70 species in tropical Asia; 3 in M.P.

- 1a. Calyx glabrous with very short teeth ...1. *W. coriacea*
 1b. Calyx hairy with well defined teeth:

- 2a. Corolla-tube shorter than the lobes; anthers much exerted, nearly as large as corolla lobes ...2. *W. heynei*
- 2b. Corolla-tube much longer than the lobes; anthers shortly exerted, small ...3. *W. tinctoria*

1. *Wendlandia coriacea* DC., Prodr. 4 : 412. 1830; Hook. f., Fl. Brit. Ind. 3 : 39. 1880. *Rondeletia coriacea* Wall. in Roxb., Fl. Ind. 2 : 142. 1824.

A shrub or a small tree; stem and leaves glabrous. Leaves opposite, petiolate, narrowly lanceolate, glabrous, 10 - 13 × 3.5 - 5 cm, apex acuminate, base attenuate; stipules small, erect. Flowers white, in dense panicle. Calyx glabrous with very short teeth, triangular. Corolla 5, fused into a tube. Stamens 5. Fruit small, globose.

Bastar. Fl. & Fr. : Feb. April.

2. *Wendlandia heynei* (R. & S.) Sant. & Merch. in Bull. Bot. Surv. Ind. 3: 110. 1961. *Rondeletia heynei* R. & S., Syst. 5 : 234. 1819. *R. exserta* Roxb., Fl. Ind. 2 : 135. 1824. *Wendlandia exserta* DC., Prodr. 4 : 411. 1830; Hook. f., Fl. Brit. Ind. 3 : 37. 1880. *Chatpati, Titwan.*

Trees, up to 12 m high. Leaves opposite, oblong, ovate or ovate-lanceolate, pubescent, acuminate; stipules persistent, ovate, recurved. Flowers in tomentose panicle, fragrant, white. Corolla funnel-shaped, reflexed. Anthers exerted. Ovary 2-celled. Capsule globose, tomentose, crowned by the erect hairy sepals, many-seeded.

Balaghat, Bastar, Bilaspur, Durg, Hoshangabad, Mandla, Narsimhapur, Raigarh, Rajnandgaon, Seoni, Surguja. Fl. & Fr. : March July.

3. *Wendlandia tinctoria* (Roxb.) DC., Prodr. 4 : 411. 1830; Hook. f., Fl. Brit. Ind. 3 : 38. 1880. *Rondeletia tinctoria* Roxb., Fl. Ind. 1 : 522. 1820 (non Blume, 1826).

Small trees; branches spreading. Leaves obovate, elliptic-ovate, glabrous above, sparsely hairy beneath, abruptly acuminate, acute at base, ca 7 × 15 cm; stipules broadly ovate, cuspidate. Flowers small, white, sessile, in pubescent panicles. Calyx-teeth oblong-ovate, hairy, persistent in fruit. Corolla slender, hairy within; lobes recurved, shorter than tube. Stamens epipetalous. Style glabrous; stigma oblong. Capsule globose, minute, reddish-brown.

Bastar, Bilaspur, Hoshangabad, Jabalpur, Mandla, Raigarh, Seoni, Surguja. Fl. & Fr. : Jan. May.

80. ASTERACEAE

(Compositae)

(B.K. Shukla)

About 700 genera and 13,500 species, cosmopolitan; 62 genera and 104 species in M.P.

- 1a. Heads unisexual, of two kinds; male capitula smaller, spherical, terminal and ovoid; female capitula covered with hooked bristles ...61. *Xanthium*
- 1b. Heads of one kind only :
- 2a. Florets all ligulate, 5-toothed or-lobed at apex; sap usually milky:
- 3a. Setae of pappus dimorphic, consisting of fine hairs and finer down:
- 4a. Achenes compressed, narrowed at both ends; heads 5 - 10 mm in diam.; involucrel bracts without or with narrow scarious margins; leaves mostly cauline ...53. *Sonchus*
- 4b. Achenes angular, narrowed and subrostrate at the apex; heads 2-3 mm in diam.; involucrel bracts with broad scarious margins; leaves all rosulate ...43. *Launaea*
- 3b. Setae of pappus uniformly consisting of fine hairs:
- 5a. Stems somewhat densely leafy; achenes compressed, minutely tuberculate, distinctly rostrate ...40. *Lactuca*
- 5b. Stems with a few leaves; achenes terete or angular, finely speculate, erostrate ...62. *Youngia*
- 2b. Florets either all tubular, 3-5 - lobed or outer ones ligulate, entire or 2-3-lobed at the apex; sap not milky:
- 6a. Female and bisexual florets both tubular, 3-5-lobed; heads discoid or disciform:
- 7a. Involucrel bracts spinescent:
- 8a. Plants straggling or diffuse; leaf margins spinulose; pappus hairs not feathery ...44. *Oligochaeta*
- 8b. Plants erect; leaf margins not spinulose; pappus hairs feathery ...19. *Dicoma*

- 7b. Involucral bracts not spinescent :
- 9a. Pappus absent :
- 10a. Leaves opposite; anther bases obtuse; achenes oblong, compressed, 8-10-ribbed ...28. *Flaveria*
- 10b. Leaves alternate; anther bases sagittate; achenes terete or angled, not ribbed ...54. *Sphaeranthus*
- 9b. Pappus present:
- 11a. Pappus many-seriate:
- 12a. Pappus hairs sub-paleaceous; filaments hairy; achenes 20-ribbed ...33. *Goniocaulon*
- 12b. Pappus hairs rigid, rough or feathery; filaments glabrous; achenes 1-3-ribbed ...39. *Jurinea*
- 11b. Pappus 1-2-seriate:
- 13a. Heads consisting of one or several florets and aggregated into glomerules or compound heads, surrounded by a common whorl of bracts:
- 14a. Heads sessile, in the axils of dilated leaf sheaths ...10. *Caesulia*
- 14b. Heads with peduncles, not in the axils of dilated leaf-sheaths:
- 15a. Glomerules of 1-flowered heads; involucral bracts connate into a tubular pseudocalyx ...41. *Lagascea*
- 15b. Glomerules of 4-25-flowered heads; involucral bracts free:
- 16a. Shrubs or under- shrubs; heads 5- or more flowered; corolla lobes not secund; glomerules not surrounded by crenate bracts ...7. *Blepharispernum*
- 16b. Herbs; heads 4-flowered; corolla lobes secund; glomerules surrounded by three large crenate bracts ...22. *Elephantopus*
- 13b. Heads separate though sometimes in tight sessile clusters but not surrounded by a common whorl of bracts:
- 17a. Florets all bisexual ; heads homogamous:
- 18a. Plants armed:

- 19a. Heads 1-flowered, crowded in involucre globose clusters with several scattered spines within each cluster; achenes elongate, villous ...20. *Echinops*
- 19b. Heads many-flowered, separate, not spinous as above; achenes obovoid, smooth ...11. *Carthamus*
- 18b. Plants unarmed:
- 20a. Involucral bracts uniseriate:
- 21a. Involucres ecalyculate; pappus scabridulous ... 23. *Emilia*
- 21b. Involucres with small calyculae; pappus smooth:
- 22a. Style arms with a short or long awn-shaped appendage; heads in terminal racemes; flowers brick red ... 16. *Crussocephalum*
- 22b. Style arms not appendaged; heads in corymbose panicles; flowers yellow ... 50. *Senecio*
- 20b. Involucral bracts multiseriate:
- 23a. Anthers with an apical appendage:
- 24a. Pappus of scales ... 3. *Ageratum*
- 24b. Pappus of hairs ... 27. *Eupatorium*
- 23b. Anthers without an apical appendage :
- 25a. Style arms clavate; pappus of 3-4 thick clavate, sticky hairs ... 2. *Adenostemma*
- 25b. Style arms subulate; pappus of copious hairs:
- 26a. Heads with foliaceous bracts at base; outer involucre bracts herbaceous with foliaceous tips; pappus hairs 1-seriate ... 47. *Phyllocephalum*
- 26b. Heads without foliaceous bracts; outer involucre bracts without foliaceous tips; pappus 2-seriate ... 59. *Vernonia*
- 17b. Florets dissimilar, marginal ones narrowly tubular or filiform, female, inner ones tubular, bisexual; heads heterogamous:
- 27a. Achenes completely epappose:
- 28a. Heads solitary; corolla of bisexual florets 4-lobed; weak, prostrate or decumbent herbs ... 12. *Centipeda*
- 28b. Heads in panicles; corolla of bisexual florets 5-lobed; erect tall herbs ...4. *Artemisia*

- 27b. Achenes at least those of bisexual florets bearing pappus:
- 29a. Heads terminal, solitary:
- 30a. Pappus double seriate, outer row consisting of scales, inner row hairy ... 48. *Fulicaria*
- 30b. Pappus single seriate, tubular with fimbriate mouth ... 34. *Grangea*
- 29b. Heads paniced:
- 31a. Achenes of bisexual florets bearing two short weak bristles; female floret achenes epappose ... 18. *Dichrocephala*
- 31b. Achenes of bisexual and female florets both bearing pappus of numerous bristles or hairs:
- 32a. Involucral bracts scarious; plants more or less covered with whitish araneose tomentum:
- 33a. Female florets numerous; bisexual florets few; achenes glandular; plants annual ... 32. *Gnaphalium*
- 33b. Female florets fewer than bisexual florets; achenes not glandular; plants perennial ... 37. *Helichrysum*
- 32b. Involucral bracts herbaceous, plants not tomentose as above:
- 34a. Involucral bracts uniseriate, with a few small calyculate bracts at the base ... 25. *Erechtites*
- 34b. Involucral bracts several-seriate, calyculate bracts absent:
- 35a. Stems winged with decurrent leaf-bases ... 42. *Laggera*
- 35b. Stems not winged:
- 36a. Corollas of female florets very short (ca 0.5 mm long) ... 14. *Conyza*
- 36b. Corollas of female florets longer, almost as long as those of bisexual florets:
- 37a. Anther-cells with a basal filiform appendage ... 8. *Blumea*
- 37b. Anther-cells without a basal filiform appendage ... 9. *Blumeopsis*

- 6b. Female florets ligulate; ligules sometimes very short; bisexual disc florets tubular, 4-5-lobed; heads radiate:
- 38a. Receptacle naked, without paleae:
- 39a. Ray florets white, blue or purple:
- 40a. Pappus present ... 26. *Erigeron*
- 40b. Pappus absent ... 17. *Cyathocline*
- 39b. Ray florets yellow, orange or red:
- 41a. Anthers blunt at base; leaves narrowed at the base; heads in racemose panicles ... 52. *Solidago*
- 41b. Anthers sagittate at base; leaves cordate-auriculate at the base; heads solitary, terminal ... 46. *Pentanema*
- 38b. Receptacle paleaceous:
- 42a. Involucral bracts 4-5, foliaceous:
- 43a. Involucral bracts 4, eglandular; heads terminal or axillary, solitary ... 24. *Enhydra*
- 43b. Involucral bracts 5, glandular; heads in lax panicles ... 51. *Sigesbeckia*
- 42b. Involucral bracts few to many, not foliaceous:
- 44a. Heads sub-sessile in the axils of leaves; achenes covered with hooked spines ... 1. *Acanthospermum*
- 44b. Heads distinctly pedunculate; achenes not spinous:
- 45a. Mature achenes, at least those of the disc florets bearing a pappus of bristles or scales:
- 46a. Pappus of bristles or awns:
- 47a. Bristles retrorsely bearded:
- 48a. Apex of achene narrowed into a thin rostrum ... 15. *Cosmos*
- 48b. Apex of achenes truncate; not narrowed into a rostrum:
- 49a. Small herbs; leaves basal, rosulate; style branches with long villous appendages; pappus bristles divergent ... 31. *Glossogyne*

- 49b. Medium-sized or tall herbs; leaves mostly cauline; style branches subulate; pappus bristles erect ... 5. *Bidens*
- 47b. Bristles without retrorse herbs:
- 50a. Ray florets white or cream coloured:
- 51a. Leaves alternate; heads many in panicles; pappus reflexed ... 45. *Parthenium*
- 51b. Leaves opposite; heads terminal, solitary; pappus not reflexed:
- 52a. Decumbent herbs; receptacular paleae linear-lanceolate; pappus bristles numerous, 4-6 mm long, plumose ... 58. *Tridax*
- 52b. Erect herbs, receptacular paleae oblong, fimbriate at the apex; pappus bristles 2-4, ca 1 mm long, smooth ... 6. *Blainvilllea*
- 50b. Ray florets yellow:
- 53a. Heads subsessile in leaf axils; achenes dorsally compressed, margins lacerate ... 56. *Synedrella*
- 53b. Heads pedunculate; achenes laterally compressed, margins entire:
- 54a. Achenes eciliate; narrowed to a short uneven cup at the apex ... 60. *Wedelia*
- 54b. Achenes ciliate, with two bristles or awns at apex:
- 55a. Leaves alternate, pinnatisect; anther-bases obtuse; pappus of 2 smooth stiff awn ... 30. *Glossocardia*
- 55b. Leaves opposite, simple; anther-bases truncate; pappus of 2 weak bristles ... 55. *Spilanthes*
- 46b. Pappus of more or less flattened scales :
- 56a. Ray florets white:
- 57a. Prostrate herbs; disc florets 4-lobed; pappus scales 2, entire ... 21. *Eclipta*
- 57b. Erect herbs; disc florets 5-lobed; pappus scales 10, fimbriate ... 29. *Galinsoga*
- 56b. Ray florets yellow :
- 58a. Tall robust herbs or undershrubs; pappus scales somewhat coherent, 1 or 2 of them longer and aristate:

- 59a. Peduncles hollow; pappus scales persistent ... 57. *Tithonia*
 59b. Peduncles solid; pappus scales deciduous ... 36. *Helianthus*
 58b. Small herbs; pappus scales absent or more than 2:
 60a. Pappus copious of setose hairs; involucre bracts
 uniseriate ... 38. *Hymenatherum*
 60b. Pappus absent or of a short ring of scales;
 involucre bracts biseriate ... 49. *Sclerocarpus*
 45b. Mature achenes epappose:
 61a. Leaves opposite; outer involucre bracts foliaceous;
 achenes glabrous ... 35. *Guizotia*
 61b. Leaves alternate; outer involucre bracts not
 foliaceous; achenes pubescent ... 13. *Chrysanthellum*

1. ACANTHOSPERMUM Schrank.

Dichotomously branched herbs. Leaves opposite, simple or pinnatifid. Heads small, sub-sessile at the forks of branches, heterogamous, radiate. Involucre bracts 2-seriate, outer bracts foliaceous, inner ones completely enveloping the ray achenes. Ray florets ligulate, yellow; disc florets yellowish with cylindrical basal tube, 5-lobed above. Anther bases rounded. Style of bisexual flowers undivided, puberulous. Receptacle convex; palea membranous, concave. Achenes of ray florets fertile, enveloped in toughened inner bracts, trigonous, slightly compressed, echinate with straight or usually uncinatate prickles, those at apex of fruit usually longer and stouter; achenes of disc florets sterile. Pappus absent.

About 8 species, native to South America, introduced into tropical Africa and Asia; one in M.P.

Acanthospermum hispidum DC., Prodr. 5: 522. 1836.

Annual, erect, much-branched hispid-pilose herbs, 30-60 cm high. Leaves sessile, obovate or spatulate, obtuse at apex, 4-8 × 1.5-3 cm, crenate-serrate, pubescent on both surfaces. Heads ca 4.5 mm in diam. on 5-8 mm long peduncles. Involucre bracts 2-seriate; outer bracts ca 3.5 mm long, elliptic or ovate; inner bracts ca 3 mm long, linear. Ray florets ca 1.5 mm long, ligulate; disc florets ca 2 mm long, tubular, 5-lobed. Achenes ca 1 cm long, compressed, 5-10 together with lateral hooked spinules and 2 large straight spines present; pappus absent.

Common on open lands and roadsides. Balaghat, Bilaspur, Damoh, Durg, Indore, Raigarh, Raipur, Rajnandgaon, Sidhi. Fl. & Fr. : July - Nov.

2. ADENOSTEMMA J. & C. Forst.

Erect or decumbent annual or perennial, glabrous or glandular pubescent herbs. Leaves opposite or the upper ones alternate, petiolate or sessile. Heads terminal on the branches of lax corymbs, medium-sized, homogamous. Involucre bracts 2-seriate, herbaceous, subequal. Florets 20-40, hermaphrodite; corolla tubular, glandular and puberulent, 3-5-lobed. Anthers gland tipped, obtuse or sub cordate at the base. Style branches clavate, sometimes much exerted. Receptacle flat or convex, naked, alveolate. Achenes obovoid, 3-5 angular, smooth or glandular-tuberculate, stipitate, borne on minute callose stalks; pappus of 3-4 thick, clavate, gland-tipped bristles attached to apical ring of achene.

About 30 species in China, Malaya, India, Tropical America, South Africa and Australia; 2 in M.P.

- 1a. Leaves elliptic-lanceolate, 10-15 mm broad; capitula ca 3 mm in diam.; achenes sparsely verrucose ... 1. *A. angustifolium*
 1b. Leaves ovate, more than 15 mm broad; capitula ca 5 mm in diam.; achenes distinctly verrucose ... 2. *A. lavenia*

1. *Adenostemma angustifolium* Arn. in Nova Acta Phys. Med. Acad. Cases. Leop. Carol. Nat. Cur. 18 : 347. 1836. *A. viscosum* Forst. var. *typica* Hook. f., Fl. Brit. Ind. 3 : 242. 1881, *quoad* syn. *A. viscosum* var. *angustifolium* Edgw. ex Clarke, Comp. Ind. 29.1876.

Annual erect glabrous herbs, 20-35 cm high. Leaves elliptic-lanceolate, attenuate at the base, acuminate at apex, 4-7 × 0.6-1.5 cm, shallowly serrate, glabrous. Heads ca 5 mm in diam., in terminal corymbs. Involucral bracts 2-seriate; outer bracts ca 3.5 mm long, linear, obtuse at apex, herbaceous; inner bracts ca 3.5 mm long, linear. Corolla ca 3.5 mm long, 5-lobed, pubescent in the upper part. Achenes ca 3 mm long, sparsely verrucose, brown; pappus absent.

Common in moist shady places. Bilaspur, Sama. Fl. & Fr. : Jan. - Feb.

2. *Adenostemma lavenia* (L.) Kuntze, Rev. Gen. Pl. 1 : 304. 1891; Koster in Blumea 1 : 470. 1935. *Verbesina lavenia* L., Sp. Pl. 902. 1753. *Adenostemma viscosum* Forst., Char. Gen. 90. 1776; Hook. f., Fl. Brit. Ind. 3 : 242. 1881.

Annual or perennial erect herbs, 30-80 cm high. Leaves petiolate, ovate, cuneate at base, acuminate at apex, 5-15 × 1.3-8 cm, serrate-dentate, 3-nerved from base, glabrous. Heads ca 5 mm in diam., in corymbose panicles. Peduncles glandular pubescent. Involucral bracts biseriate; outer bracts ca 4 mm long, linear-spathulate, herbaceous; inner bracts ca 5 mm long, acute with ciliate margins. Corolla 3-4 mm long, tubular, glandular

at base, pubescent in upper part. Achenes 4 - 5 mm long, glandular-tuberculate; pappus bristles ca 0.5 mm long.

Common in moist shady forest. Balaghat, Surguja. *Fl. & Fr.* : Nov.-Dec.

3. AGERATUM L.

Erect aromatic herbs. Leaves opposite, ovate, petiolate, dentate. Heads small, in dense terminal corymbs, homogamous. Involucres campanulate; bracts 2 - 3-seriate, subequal, linear or oblong-lanceolate. Corolla tubular, 5-lobed. Anthers acutely appendiculate at the apex, obtuse at the base. Style branches elongate, exerted, obtuse at the tip. Receptacle naked, convex. Achenes oblong, 4 - 5-ribbed; pappus of about 5 aristate scales broadening somewhat at the base.

About 60 species in tropical America and all warm countries; 2 in M. P.

- 1a. Involucral bracts oblong-lanceolate, somewhat abruptly acuminate, margins often dentate or crose, eglandular pubescent; corolla less than 2 mm long

... 1. *A. conyzoides*

- 1b. Involucral bracts linear-lanceolate, gradually acuminate, entire-margined, glandular pubescent; corolla over 2 mm long

... 2. *A. houstonianum*

1. *Ageratum conyzoides* L., *Sp. Pl.* 1 : 839. 1753; *Hook. f., Fl. Brit. Ind.* 3 : 343. 1881.

Annual erect herbs, 40 - 80 cm high. Leaves subrhomboid-ovate, broadly ovate, subacute at apex, 5 - 8 × 2.5 - 5.5 cm, crenate, sparsely pilose on both surfaces. Heads 4 - 4.5 mm in diam., in corymbs. Involucral bracts eximbricate, 2-seriate; outer bracts ca 4 mm long, oblong-lanceolate, 2-ribbed; inner bracts ca 3 mm long, lanceolate with scarious margins. Corolla ca 1.7 mm long, white or blue, hairy along the angles; pappus scales 5, ca 1.5 mm long, lanceolate.

Common weed of moist places along the irrigation channels and streams.

Balaghat, Bilaspur, Hoshangabad, Raipur, Sidhi. *Fl. & Fr.* : Sept. March.

2. *Ageratum houstonianum* Mill., *Gard. Dict.* ed. 8. n. 2. 1768; *Koster in Blumea* 1 : 490. 1935.

Annual, erect or decumbent, glandular hirsute herbs, 40 - 100 cm high. Leaves ovate or broadly ovate, acute at apex, truncate or cordate at base,

2-10 × 1.5-5 cm, sharply serrate at margins, whitish hirsute on both surfaces. Heads ca 5 mm in diam., in dense corymbs. Involucral bracts 2-seriate; outer bracts ca 4.5 mm long, linear-lanceolate, acuminate, margins entire, glandular-pubescent; inner bracts ca 4 mm long, linear-lanceolate. Corolla 2.5-3 mm long, white, blue or mauve, 5 lobed. Achenes ca 1.75 mm long, linear-oblong, black, scabrous on the ribs; pappus scales 5, ca 2.5 mm long, lanceolate, acuminate.

In moist waste places. Rare-Chhatarpur, Fl. & Fr. : Nov. - Dec.

4. ARTEMISIA L.

Erect aromatic annual or perennial herbs. Leaves alternate, sessile, entire, lobed to pinnatisect pinnately veined. Heads solitary or fascicled in racemes or panicles, heterogamous. Involucres campanulate or ovoid; bracts 2-3-seriate, outer shorter, usually scarious along margin. Receptacle convex, naked; marginal florets female, tubular, 2-3-lobed at the apex; disc florets tubular-campanulate, 5-lobed. Anthers with acuminate apical appendages and obtuse bases. Style branches truncate. Achenes linear-oblong, 2-costate, epappose.

About 400 species in Northern Temperate regions, South America, western United State and Russian steppes, India; 2 in M.P.

1a. Leaves pubescent or glabrous beneath; lobes less than 8 mm broad; involucre glabrous; disc florets sterile... 1. *A. japonica*

1b. Leaves densely white woolly beneath; lobes more than 10 mm broad; involucre pubescent; disc florets fertile
... 2. *A. nilagirica*

1. *Artemisia japonica* Thunb., Fl. Jap. 310. 1784. *A. parviflora* Buch.-Ham. ex D. Don, Prodr. 181. 1825; Hook. f., Fl. Brit. Ind. 3: 322. 1881.

Perennial erect undershrubs, 60-200 cm high; stem ribbed, glabrous, except young parts. Leaves sessile, spatulate-cuneate, toothed or lobed at apex, 1.5-4 × 0.5-2 cm, appressed hairy on both surfaces, uppermost leaves linear-lanceolate. Heads ca 1.75 mm in diam., axillary, short peduncled, mostly solitary. Involucral bracts 2-3-seriate, ovate-rounded, glabrous. Ray florets ca 1.5 mm long, 2-3-lobed; disc florets ca 0.2 mm long, 5-lobed. Achenes ca 0.5 mm long, ellipsoid brown.

On rocky slopes; Hoshangabad, Surguja. rare. Fl. & Fr. : Nov. - Feb.

2. *Artemisia nilagirica* (Clarke) Pampan., Nuov. Giorn. Bot. Ital. n.s. 33: 452. 1926. *A. vulgaris* L. var. *nilagirica* Clarke, Comp. Ind. 162. 1876. *A. vulgaris* auct. (non L.); Thw., Enum. Pl. Zeyl. 165. 1860; Hook. f., Fl. Brit. Ind. 3 : 325. 1881.

Perennial, erect or ascending aromatic herbs or undershrubs, 60- 200 cm high. Leaves 8-10 cm long, deeply pinnatisect, finely pubescent above, white tomentose beneath, uppermost leaves trifid or simple, lanceolate. Heads \approx 1.5 mm in diam., pendulous; solitary or 2-3 together. Involucral bracts 2-seriate: outer bracts \approx 1.5 mm long, lanceolate, sparsely lanate; inner bracts \approx 1 mm long, ovate, with scarious margins. Ray florets \approx 1.3 mm long, 2-3-lobed; disc florets \approx 2 mm long, 5-lobed. Achenes \approx 0.8 mm long, oblong-ellipsoid, brown; pappus absent.

Balaghat, Hoshangabad, Rajnandgaon. Common in mixed forests. Fl. & Fr. : Oct. - Sept.

5. BIDENS L.

Diffuse or erect annual or perennial herbs. Leaves opposite, ternately or biternately divided. Heads medium-sized, pedunculate, solitary and axillary or more commonly numerous and corymbose, heterogamous, radiate, or homogamous, discoid. Involucral bracts campanulate, 2-seriate, shortly connate at the base, outer ones foliaceous. Ray florets white or yellow, absent; disc florets yellow, 5-lobed. Anthers with acute ovate appendages at the apex. Style -arms hairy. Achenes oblong or linear, tetragonous, somewhat attenuate at the apex; pappus of 2-4 stiff retroseely barbed bristles.

About 230 species in Tropical America, Africa, India, S.E. Asia, Australia and New Zealand; 2 in M.P.

- 1a. Leaves with 3-5 deeply dentate or pinnatifid leaflets;
ray florets generally 3 ... 1. *B. biternata*
- 1b. Leaves ternate; leaflets simple with serrate margins;
ray florets 4-7 ... 2. *B. pilosa* var. *minor*

1. *Bidens biternata* (Lour.) Merr. & Sherff. in Bot. Gaz. 88 : 293. 1929. *Coreopsis biternata* Lour., Fl. Cochinch. ed. 1. 508. 1790. *Bidens pilosa* auct. (non L.) Hook. f., Fl. Brit. Ind. 3 : 309. 1881, p.p.

Annual erect herbs, 10-70 cm high; stem angular, sparsely pubescent when young. Leaves bipinnatifid, compound on 1-2 cm long lateral leaves, ovate, acute at apex, 1.4-3 \times 0.4-2 cm, dentate or pinnatifid at margins; terminal leaves elliptic, with 3-5 pinnatifid lobes on each side, 1.5-6 \times 1-2.5 cm. Heads \approx 6 mm in diam., on dichotomously branched peduncles. Involucral bracts 2-seriate; outer bracts \approx 5 mm long, linear-oblanccolate, ciliate at the margins; inner bracts \approx 6 mm long, ovate-lanceolate, glabrous. Ray-florets \approx 4 mm long, ligule yellow; disc-florets \approx 3.5 mm long, 5-lobed. Achenes 7-15 mm long, tetragonous, black; pappus bristles 3.5-4 mm long, retroseely barbed, yellow.

Common along roadsides or in shaded embankment areas. Balaghat, Damoh, Durg, Hoshangabad, Satna, Surguja. *Fl. & Fr.*: Jan. Feb.

2. *Bidens pilosa* L. var. *minor* (Blume) Sherff in Bot. Gaz. 70: 387. 1925. *B. sundaica* var. *minor* Blume, Bijdr. 914. 1826.

Annual erect much branched herbs, 15 - 100 cm high. Leaves opposite; lateral leaflets ovate-oblong, 2 - 6 × 1 - 3 cm, serrate; terminal leaflets ovate-lanceolate, acuminate, 6 - 10 × 3 - 5 cm, glabrous. Heads ca 7 mm in diam. in terminal panicles. Involucral bracts biseriate; outer bracts ca 3 mm long, spatulate, ciliate at margins; inner bracts ca 5 mm long, oblong-lanceolate, yellow. Ray-florets ca 6 mm long, white; disc-florets 3 - 5 mm long, yellowish. Achenes 7 - 8 mm long, black, hairy on the angles; pappus bristles 2 - 4, straw-coloured, 2 - 3 mm long.

Common along banks of streams or edges of cultivated fields. Bilaspur, Raigarh, Surguja. *Fl. & Fr.*: Aug. Dec.

6. BLAINVILLEA Cass.

Erect annual herbs. Leaves simple, opposite or the upper ones alternate, petiolate, dentate. Heads small, at the apex of dichotomous branches, heterogamous. Involucre campanulate, bracts 1 - 2-seriate, outer ones herbaceous, sub-equal, inner ones merging with palcae. Ray-florets few, small; ligule 2 - 3 lobed. Disc-florets tubular-campanulate, 5-lobed. Anthers obtuse at base. Achenes in female florets trigonous, hairy; in bisexual florets usually laterally compressed; pappus of 2 - 5 weak unequal bristles, sometimes with small intermediate scales.

About 10 pantropical species; one in M.P.

Blainvillea acmella (L.) Philipson in Blumea 6: 350. 1950. *Verbesina acmella* L., Sp. Pl. 901. 1753. *Blainvillea latifolia* (L.f.) DC. ex Wight, Contr. Bot. Ind. 17. 1834; Hook. f., Fl. Brit. Ind. 3: 305. 1881.

Annual erect simple or sparingly branched herbs, 15 - 100 cm high; stem grooved, pilose. Leaves ovate-lanceolate or rhomboid-ovate, acuminate, 6 - 15 × 3 - 7 cm, serrate, pubescent on both surfaces. Heads 5 - 6 mm across; involucral bracts 2-seriate; outer bracts 4 - 5 mm long, herbaceous, ovate, oblong, hairy outside; inner bracts paleaceous, small. Ray-florets 4 - 5 mm long, 2-dentate, white; disc florets ca 3 mm long, with 5-dentate corollas. Achenes ca 4 mm long, obovoid, cuneate, transversely rugose. Disc achenes laterally compressed, truncate at the apex; pappus absent; setae 2 - 5, up to 1 mm long.

Usually on roadsides and waste land. Balaghat, Damoh, Durg, Mandla, Hoshangabad, Satna, Surguja. *Fl. & Fr.*: Aug. Nov.

7. BLEPHARISPERMUM A.P. DC.

Erect glabrous perennial shrubs. Leaves ovate, alternate, entire. Heads small, laterally compressed, heterogamous, discoid, aggregated into spherical glomerules; bracts few, stiff with scarious margins. Female florets usually 2; corollas filiform, 2-3 dentate at the apex; bisexual florets with tubular 5-lobed corollas; receptacles paleaceous. Anthers bases caudate. Style branches of female flowers linear, spreading, those of bisexual florets papillose. Achenes of female flowers fertile, compressed, margins strongly ciliate; pappus of 2-3 long hairs.

About 3 species in India and Africa; one in M.P.

Blepharispermum subsessile DC. in Wight, *Contrib.* 12. 1834; Hook. f. *Fl. Brit. Ind.* 3: 276. 1881.

Shrubs, up to 1.5 m tall. Leaves subsessile, ovate or elliptic, obtuse or subacute, 5-9 × 2-3.5 cm, coriaceous, finely reticulate. Heads solitary, shortly pedunculate, 2-3.5 cm in diam. with leafy bracts at the base. Ray florets 2; corolla 3-4-toothed; disc florets 3-8; corolla 5-fid. Achenes of ray florets ca 5 mm long, compressed, obovoid and a few bristles as pappus; achenes of disc florets ca 3.5 mm long, compressed, obovoid, villous, hairy; pappus as in ray florets.

Grows as undergrowth in sal forest area. Rare. Bastar, Raigarh. *Fl. & Fr.*: Aug. Sept.

8. BLUMEA DC.

Annual or perennial, erect or prostrate and ascending herbs, undershrubs or shrubs. Leaves alternate or the two uppermost subopposite, simple, entire or lobed, sessile or shortly petiolate. Heads heterogamous, disciform, either solitary or in lax or compact panicles. Involucre campanulate or urceolate; bracts multiseriate, graduated in length, imbricate, linear or oblong. Florets numerous, outer ones female, central ones bisexual. Female corollas filiform, 2-4-lobed, bisexual corollas narrowly tubular, 4-5-lobed, papillate or pubescent. Anther bases sagittate with long or short caudicles. Style branches filiform, obtuse at the apex. Receptacle naked, flat or convex, glabrous or pubescent. Achenes oblong, 5-10-ribbed. Pappus uniseriate; hairs slender, reddish or white.

About 50 species in tropical South Africa, India, up to East Asia, Australia and Pacific Islands; 13 in M.P.

- 1a. Prostrate or procumbent herbs ... 12. *B. oxyodonta*
- 1b. Erect herbs or undershrubs :
- 2a. Uppermost two leaves sub-opposite ... 1. *B. bifoliata*
- 2b. All leaves alternate :
- 3a. Plants densely white woolly :
- 4a. Leaves serrate-dentate; outer involucre bracts oblong-lanceolate; corolla of bisexual florets only hairy on the lobes ... 5. *B. hieraciifolia*
- 4b. Leaves spiny-toothed; outer involucre bracts linear; corolla of bisexual florets hairy on the tubes as well as lobes ... 8. *B. malcolmii*
- 3b. Plants glabrous or variously pubescent, not woolly:
- 5a. Leaves sessile or sub-sessile :
- 6a. Achenes not ribbed; receptacles glabrous; upper leaves auriculate at the base ... 11. *B. obliqua*
- 6b. Achenes ribbed; receptacles densely pilose; upper leaves rounded at the base :
- 7a. Leaves broadly oblanceolate; heads in pyramidal panicles ... 7. *B. lanceolaria*
- 7b. Leaves oblong-linear; heads in narrow compact panicles ... 2. *B. clarkei*
- 5b. Leaves petiolate :
- 8a. Corolla of female florets pubescent ... 3. *B. eriantha*
- 8b. Corolla of female florets glabrous :
- 9a. Heads sessile in interruptedly spicate glomerules ... 4. *B. fistulosa*
- 9b. Heads subsessile to pedunculate in compact or lax panicles :
- 10a. Achenes terete or sub-angulate:
- 11a. Leaves usually not lobed; heads in narrow spiciform panicles; corolla purple ... 10. *B. mollis*
- 11b. Leaves often runcinately lobed; heads in corymbose panicles; corolla yellow ... 6. *B. lacera*
- 10b. Achenes distinctly ribbed:
- 12a. Stem without glands ... 13. *B. virens*
- 12b. Stem with stalked glands ... 9. *B. membranacea*

1. *Blumea bifoliata* (L.) DC. in Wight, Contrib. 14. 1834; Hook. f., Fl. Brit. Ind. 3: 261. 1881. *Conyza bifoliata* L., Sp. Pl. ed. 2. 1207. 1763.

Annual or biennial herbs, 5 - 60 cm high, woody at base; stem covered with villous hairs and stipitate glands. Leaves 1 - 6 × 0.4 - 2.3 cm, the lower ones alternate, oblanceolate, upper ones sub-opposite, ovate-elliptic, acute or apiculate, margins entire or distantly serrate, villous and stipitate glandular on both surfaces. Heads ca 6 mm in diam., terminal and axillary; peduncles 1 - 3 mm long. Involucral bracts many-seriate; outer bracts ca 2 mm long, linear, herbaceous, pubescent outside; inner bracts ca 6 mm long, linear-lanceolate, with scarious margins. Ray-florets ca 3 mm long, filiform, 2 - 3-lobed, sparsely pubescent on the lobes; disc-florets ca 3.5 mm long, tubular, 5-lobed. Achenes ca 0.5 mm long, oblong elliptic, puberulous; pappus ca 3 mm, long, yellowish-white.

Common, grows on damp forest floor and along roadsides and dry areas. Bilaspur, Raipur, Sidhi. Fl. & Fr.: Jan. - March.

2. *Blumea clarkei* Hook. f., Fl. Brit. Ind. 3: 267. 1881; Randeria in *Blumea* 10: 252. 1960. *B. malabarica* Hook. f., Fl. Brit. Ind. 3: 267. 1881. Fig.46.

Perennial erect herbs, 60 - 150 cm high; young parts velutinous. Leaves subsessile, oblong-lanceolate, linear, distantly serrate or dentate, 4 - 15 × 0.7 - 6 cm, pubescent above, velutinous beneath. Heads 8 - 10 mm diam., in terminal compact panicles. Involucral bracts many-seriate; outer bracts ca 1.5 mm long, lanceolate, hairy outside; inner bracts ca 10 mm long, linear-lanceolate, acute. Ray-florets 5 - 6 mm long, filiform, 2 - 3-lobed, glabrous; disc-florets ca 6 mm long, tubular, 5-lobed, lobes pubescent. Achenes ca 1 mm long, oblong, ribbed, sparsely pubescent; pappus 5 - 6 mm long, pure white.

On moist hilly slopes. Rare. Bastar. Fl. & Fr.: Feb. - March.

3. *Blumea erlantha* DC. in Wight, Contrib. Bot. Ind. 15. 1834; Hook. f., Fl. Brit. Ind. 3: 266. 1881.

Perennial erect herbs, 15 - 100 cm high; stem often dichotomously branched, terete, pubescent. Leaves obovate, apiculate, lower shortly petioled, upper sessile, irregularly closely spinulose-serrate, 2 - 10 × 0.6 - 4.3 cm, silky - pilose on both surfaces. Heads ca 5 mm in diam., in axillary and terminal cymes; peduncles 2 - 4 cm long, glandular hairy. Involucral bracts many-seriate; outer bracts 1 - 2 mm long, linear, acute, herbaceous, hairy outside; inner bracts ca 6 mm long, filiform, 2 - 3-lobed, pubescent; disc-florets ca 3.5 mm long, tubular, 5-lobed, densely pubescent outside. Achenes ca 0.75 mm long, obscurely angled, sparsely pilose; pappus ca 3mm long, white.



Fig. 46. *Blumea clarkei* Hook.f.

Common in open field and dry areas. Balaghat, Bastar, Bilaspur, Durg, Hoshangabad, Raigarh. *Fl. & Fr.*: Jan. March.

4. *Blumea fistulosa* (Roxb.) Kurz in J. Asist. Soc. Bengal 47 (2): 187. 1877. *Conyza fistulosa* Roxb., Fl. Ind. 3: 429. 1832. *B. glomerata* DC. in Wight, Contrib. Bot. Ind. 15. 1834; Hook.f., Fl. Brit. Ind. 3: 262. 1881, p.p. *Blumea nodiflora* Hook. f., Fl. Brit. Ind. 3: 262. 1881.

Annual erect herbs, 30 - 80 cm high; stem puberulous to densely velutinous at the apex. Leaves sessile or lower ones petioled, oblong-lanceolate to broadly oblanceolate, 3 - 15 × 0.5 - 6 cm, coarsely serrate-dentate or incised, tomentose-puberulous on both surfaces. Heads 4 - 5 mm in diam., sessile, in compact globose clusters arranged in interrupted spicate panicles. Involucral bracts 2- 3- seriate; outer bracts ca 1.5 mm long, linear, acute, pubescent outside; inner bracts ca 5 mm long, linear, with scarious margins, reflexed at maturity. Ray-florets ca 3.5 mm long, filiform, 2 - 3-lobed, glabrous. Disc-florets 3.5 - 4 mm long, tubular, 5-lobed, pubescent on lobes. Achenes ca 0.5 mm long, oblong, brown, 4-angled, puberulous; pappus ca 3.5 mm long, white.

Common along the forest roads, on hilly and rocky soils. Balaghat, Bastar, Bilaspur, Hoshangabad, Raigarh, Raipur, Sidhi, Seoni, Surguja. *Fl. & Fr.*: Dec. Feb.

5. *Blumea hieraciifolia* (D. Don) DC. var. *macrostachya* (DC.) Hook. f., Fl. Brit. Ind. 3: 263. 1881. *B. macrostachya* DC., Prodr. 5: 442. 1836. *B. hieraciifolia* (D. Don) DC. var. *evolutior* Clarke, Comp. Ind. 83. 1876.

Annual erect herbs, 20-50 cm tall; stem densely silky woolly. Leaves cauline, obovate-spathulate, acute or acuminate-dentate, 2 - 5 × 0.3 - 5 cm, pubescent on upper surface, densely cottony tomentose beneath. Heads ca 8 mm in diam., in pedunculate clusters. Involucral bracts many- seriate, outer bracts ca 4 mm long, oblong-lanceolate, acute, woolly purple-tipped. Ray-florets ca 4 mm long, filiform, 3-4-lobed, glabrous; disc-florets ca 4.5 mm, 5-lobed, pubescent on lobes. Achenes ca 1.25 mm long, oblong, 10-ribbed, sparsely pubescent, pappus ca 3.5 mm long, white.

On dried stream beds, and shaded places.; Rare. Bastar, Hoshangabad, Rajnandgaon. *Fl. & Fr.*: Jan-April.

6. *Blumea lacera* (Burm.) f. DC. in Wight, Contrib. Bot. Ind. 14. 1834; Hook.f., Fl. Brit. Ind. 3: 263. 1881. *Conyza lacera* Burm., f. Fl. Ind. 80, t. 59, f. 1. 1768.

Annual erect herbs, 30 - 80 cm high; stem densely glandular-pubescent. Leaves elliptic-oblong or oblanceolate, entire or lyrate-ly lobed, acute or obtuse, irregularly serrate-dentate, 3 - 13 × 1.2

5 cm, glandular pubescent on both surfaces. Heads ca 3.5 mm in diam., in axillary and terminal lax panicles. Receptacle glabrous. Involucral bracts 3

4-seriate; outer bracts ca 2 mm long, linear-lanceolate, herbaceous, glandular hairy outside; inner bracts ca 6 mm long, linear-acuminate, subscarious, finely ciliate at apex. Ray florets ca 3 mm long, filiform, 2-3-lobed, glabrous; disc florets ca 3.5 mm long, tubular, 5-lobed, pubescent at lobes. Achenes ca 0.5 mm long, linear, 5-ribbed, sparsely puberulous; pappus ca 4 mm long, white.

Common along the roadsides, open field and edges, on moist shaded places. Bastar, Bilaspur, Hoshangabad, Raigarh, Sagar, Sconi, Sidhi, Surguja. *Fl. & Fr.*: Nov. - Jan.

6.1. var. *blumei* DC., Prodr. 5: 436. 1836; Koster in *Blumea* 20 :223. 1972. *B. laciniata* (Roxb.) DC.; Prodr. 5: 436. 1836; Hook.f., *Fl. Brit. Ind.* 3: 264. 1881. *Conyza laciniata* Roxb., *Fl. Ind.* 3: 428. 1832.

Leaves lyrate-lyobed, 4-20 × 1-5 cm. Heads 6-8 mm in diam., in terminal, dense to lax panicles. Receptacles pilose. Ray-florets 5-lobed. Achenes ca 1 mm long.

Common in moist waste places. Bilaspur, Raipur, Satna. *Fl. & Fr.*: Jan. - Feb.

7. *Blumea lanceolaria* (Roxb.) Druce., Rep. Bot. Exch. Club. Brit. Isles 4: 609. 1917. *Conyza lanceolaria* Roxb., *Fl. Ind.* 3: 432. 1832. *Blumea myriocephala* DC., Prodr. 5: 445. 1836; Hook. f., *Fl. Brit. Ind.* 3: 369. 1881.

Annual or perennial herbs or undershrubs, 0.5-2 m high; stem woody at base, hollow, younger parts glabrate or puberulous. Leaves oblanceolate, acute to rounded, minutely serrate-dentate, 6-30 × 0.8-8 cm, pubescent beneath. Heads ca 7 mm in diam., in terminal pyramidal panicles. Involucral bracts many-seriate, outer bracts ca 2 mm long, ovate-lanceolate, with scarious margins, pubescent on the back. Ray-florets ca 5 mm long, filiform, 2-3-lobed, glabrous; disc-florets ca 5 mm long, tubular, 5-lobed, pubescent on lobes. Achenes ca 1 mm long, oblong, pubescent, ribbed; pappus ca 4 mm long, yellowish-red.

In moist shaded places along the bank of streams; Rare. Hoshangabad. *Fl. & Fr.*: Feb. - April.

8. *Blumea malcolmi* (Clarke) Hook. f. *Fl. Brit. Ind.* 3: 266. 1881. *Pluchea malcolmi* Clarke, *Comp. Ind.* 95. 1876. *P. lanuginosa* Hook.f., *Fl. Brit. Ind.* 3: 266. 1881. *B. lanuginosa* (Hook.f.) Cooke, *Fl. Pres. Bombay* 2: 23. 1908.

Annual erect stout herbs, densely clothed with white silky hairs, 10-60 cm high. Leaves sessile, obovate or oblanceolate, 1.6-10.5 × 0.8-4 cm, closely irregularly spinulose-serrate, densely woolly on both surfaces.

Heads ca 8 mm in diam., on 1-2 cm long peduncles. Involucral bracts many-seriate; outer bracts ca 2 mm long, linear, acute, densely woolly on the dorsal surface, inner bracts ca 7 mm long, linear, acute, entirely reflexed at maturity. Ray-florets ca 3.5 mm long, filiform, 2-3-lobed, densely pubescent; disc-florets ca 4.5 mm long, tubular, 5-lobed, lobes outside pubescent. Achenes ca 0.7 mm long, obscurely angled, pubescent; pappus ca 4 mm long, white.

On hill slopes. Rare. Mandla. Fl. & Fr.: Nov. April.

9. *Blumea membranacea* Wall. ex DC., Prodr. 5: 440. 1836. *Conyza membranacea* Wall Cat. 3019, nom. nud. *B. membranacea* var. *gardeneri* Hook. f., Fl. Brit. Ind. 3: 265. 1881.

Annual erect herbs, 50-125 cm high; stem pilose with stipitate glands on younger parts. Leaves oblanceolate to obovate-lanceolate, 2-20 x 1-6.3 cm, serrate-dentate, sparsely pilose on both surfaces, lower ones lyrate-pinnatifid, with terminal elliptic lobes. Heads ca 5 mm in diam., in terminal and axillary panicles. Involucral bracts 5-6-seriate, ca 2 mm long, lanceolate-acuminate, purplish, puberulous; inner bracts ca 6.5 mm long, linear-acuminate, subscarious at the margins. Ray-florets ca 4 mm long, filiform, 2-3-lobed, glabrous; disc-florets ca 5.5 mm long, tubular, 5-lobed, puberulous. Achenes ca 1 mm long, linear-oblong, 5-ribbed, pubescent; pappus ca 5 mm long, white.

Common as undergrowth within teak forests. Bilaspur, Hoshangabad, Raipur, Rewa, Surguja. Fl. & Fr.: Jan. Feb.

9.1 var. *jacquemontii* (Hook. f.) Randeria in *Blumea* 10: 271. 1960. *B. jacquemontii* Hook. f., Fl. Brit. Ind. 3: 265. 1881. *B. kingii* Clarke ex Hook. f., l.c. *B. obovata* Clarke, Comp. Ind. 7. 1876; non DC.

Plants strigose and robust. Heads 7-8 mm in diam. Involucral bracts rigid.

Common in shady and hilly places. Bilaspur, Damoh, Raigarh, Shahdol, Surguja. Fl. & Fr.: Feb. March.

10. *Blumea mollis* (D. Don) Merr. in Philipp. J. Sci. 5: 395. 1910. *Erigeron molle* D. Don, Prodr. Fl. Nep. 172. 1825. *Blumea wightiana* DC. in Wight, Contrib. Bot. Ind. 14. 1834. *B. neilgherriensis* Hook. f., Fl. Brit. Ind. 3: 261. 1881.

Annual erect herbs, 30-100 cm high; stem softly pilose hairy. Leaves ovate or oblanceolate, acute or obtuse, closely serrate, 2-8 x 0.75-3 cm, white pilose hairy on both surfaces. Heads 2-3 mm in diam., in terminal or axillary panicles. Involucral bracts 3-seriate; outer bracts ca 2 mm long, linear, glandular hairy outside; inner bracts ca 5 mm long, linear with

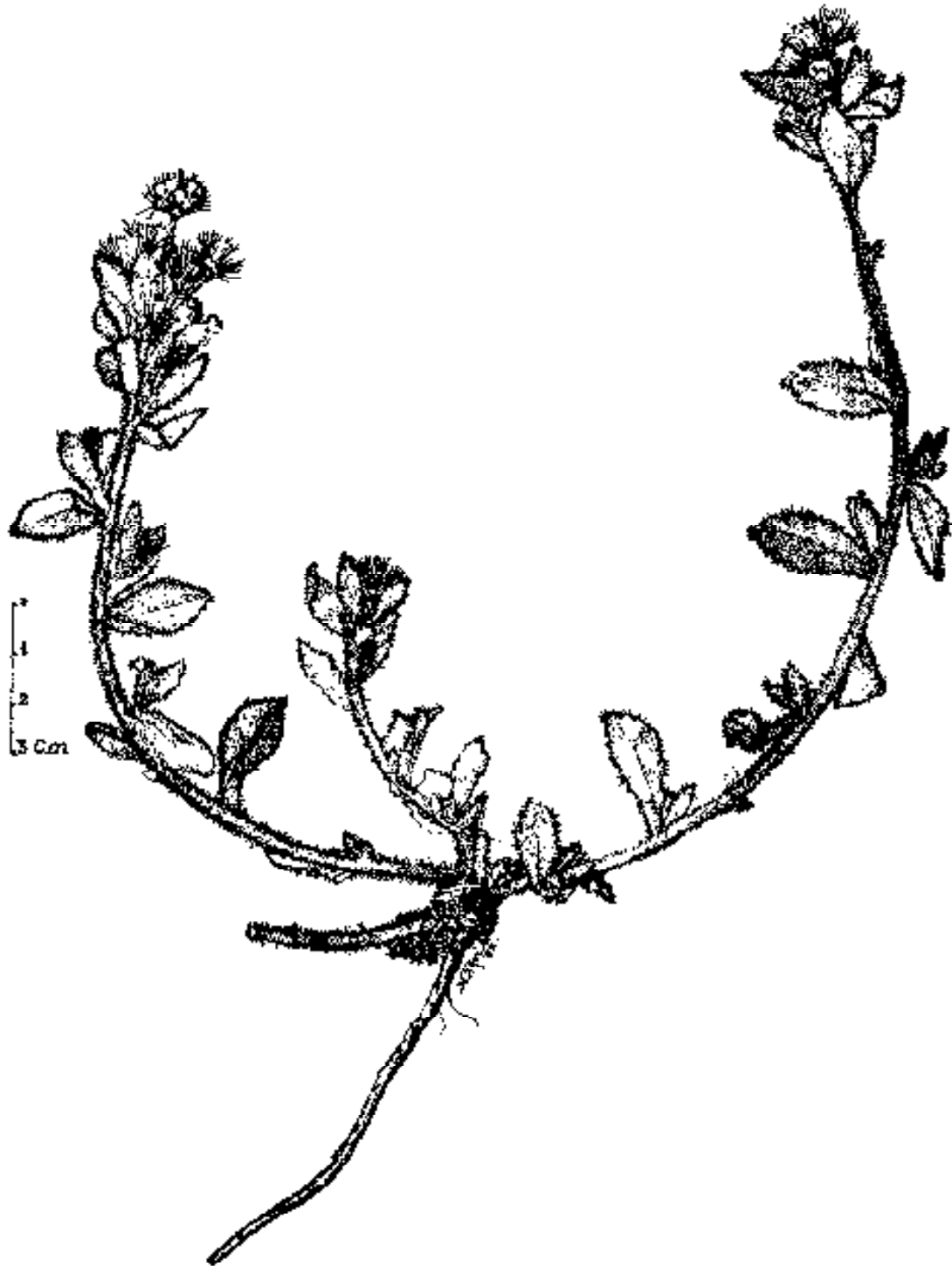


Fig. 47. *Blumea obliqua* (L.) Druce

scarious margins. Ray florets 2 - 2.5 mm long, tubular, glabrous; disc florets 3 - 4 mm long, 5-lobed, papillate at lobes. Achenes ca 0.5 mm long, linear, angular, pubescent; pappus ca 3 mm long, white.

Common on roadsides and hill slopes. Bastar, Bilaspur, Hoshangabad, Jabalpur, Raipur, Rewa, Surguja. *Fl. & Fr.* : Jan. - Feb.

11. *Blumea obliqua* (L.) Druce, Rep. Bot. Exch. Club. Br. Isles, 4: 609. 1917. *Erigeron obliquum* Pl. Mant. 2: 573. 1771. *Blumea amplexens* var. *arenaria* Hook. f., Fl. Brit. Ind. 3: 260. 1881 Fig. 47

Annual erect much-branched herbs, 30-45 cm high. Leaves 0.5 - 5 × 0.3 - 2.5 cm; lower leaves oblong-lanceolate or oblanceolate-spathulate, obtuse or subacute, upper leaves ovate-oblong, auriculate at base, entire or coarsely dentate at margins, densely pubescent on both surfaces. Heads ca 6 mm in diam., on 1 - 5 cm long peduncles, solitary, axillary on the upper leaves. Involucral bracts 4- seriate; outer bracts ca 6 mm long, linear-lanceolate, purplish tinged, reflected at maturity. Ray-florets ca 3 mm long, 2 - 3- lobed, glabrous; disc-florets ca 4 mm long, tubular, 5-lobed; lobes white pubescent. Achenes ca 0.5 mm long, yellowish-white.

On dry sandy or clayey soils. Rare. Durg, Hoshangabad. *Fl. & Fr.* : Feb. - March.

12. *Blumea oxydonta* DC., in Wight, Contrib. Bot. Ind. 15. 1834; Hook. f., Fl. Brit. Ind. 3: 266. 1881. *Conyza oxydonta* Wall., Cat. no. 3015. Comp. no. 125. 1831, *nom. nud.*

Annual prostrate or procumbent herbs, 6 - 40 cm high, with a deep tap root. Leaves often crowded at the base, obovate to obovate-oblong, serrate-dentate, 0.7 - 7 × 0.3 - 1.5 cm, white silky hairy on both surfaces. Heads ca 4 mm in diam., in terminal or axillary corymbs. Involucral bracts biseriate; outer bracts ca 1.5 mm long, linear, acute, densely villous on the back; inner bracts ca 5 mm long, linear with scarious margins. Ray-florets ca 4 mm long, tubular, 5-lobed, pubescent on the lobes. Achenes ca 0.5 mm long, oblong, brown, pubescent; pappus ca 3.5 mm long, white, deciduous.

Common in waste places and dry streams beds. Balaghat, Bastar, Bilaspur, Damoh, Hoshangabad, Raipur, Surguja. *Fl. & Fr.*: Jan. - March.

13. *Blumea virens* DC. in Wight, Contrib. 14. 1834; Hook. f., Fl. Brit. Ind. 3: 264. 1881. *Conyza virens* Wall. Cat. no. 3037. Comp. no. 147. 1831, *nom. nud.*

Annual erect herbs, 30 - 80 cm high, stems glabrous or rarely pilose. Leaves 3 - 15 × 1 - 4.3 cm; lower leaves lyrate-lobed with 1 - 2 pairs of

lobes, lateral lobes triangular-oblong, terminal lobes elliptic-ovate; upper leaves oblanceolate, with acute or acuminate apex, and irregularly serrate-dentate margins, glabrate or sparingly pilose on both surfaces. Heads 3-4 mm in diam., in lax terminal panicles. Involucral bracts 4-5-seriate; outer bracts ca 2 mm long, linear, acute, glabrous or sparsely pubescent outside; inner bracts ca 7 mm long, lanceolate, with scarious margins. Ray-florets ca 4.5 mm long, filiform, 2-3-lobed, glabrous; with pubescent lobes. Achenes ca 1 mm long, linear-elliptic, 8-ribbed, pubescent; pappus 3-4 mm long, white.

9. BLUMEOPSIS Gagnep.

Annual erect herbs. Leaves mostly in rosettes, sub-sessile, upper ones lanceolate-oblong. Heads in compound corymbose panicles. Involucral bracts many-seriate. Outer florets female, many; disc-florets fewer. Anthers not tailed. Style arms stigmatose. Achenes angled or ribbed, glabrous; pappus white.

A monotypic genus distributed from India to Hainan, Nicobar, Island, Malaya Peninsula and Sumatra.

Blumeopsis flava (DC.) Gagnep. in Bull. Mus. Hist. Nat. Paris. 26: 76. 1920. *Blumea flava* DC., Prodr. 5: 439. 1836. *Laggera flava* (DC.) Benth. in Benth. & Hook.f., Gen. Pl. 2: 290. 1873; Hook.f., Fl. Brit. Ind. 3: 270. 1881.

Annual erect slender herbs, 5-70 cm high. Leaves mostly in rosettes, 4-6 x 1.8-3 cm, sub-sessile, obovate-rounded, spinulose-dentate, glabrous, upper ones lanceolate-oblong. Heads yellow, ca 3 mm across, on 0.5-1 cm long peduncles, in compound corymbose panicles. Involucral bracts ca 3 mm long, ovate-lanceolate, acuminate. Ray-florets ca 2.5 mm long; disc-florets ca 3.5 mm long, lobes hairy. Achenes ca 0.8 mm long, glabrous; pappus hairs white.

Common in shady places and along bank of streams. Balaghat, Bastar, Bilaspur, Raigarh, Surguja. Fl. & Fr.: Feb. - March.

10. CAESULIA Roxb.

Annual glabrous herbs. Leaves alternate, remotely serrulate. Heads axillary, sessile. Involucral bracts 2, opposite, orbicular or ovate, keeled or winged. Flowers all fertile. Corolla tubular; the limb narrowly campanulate, deeply 5-fid. Anther-bases sagittate. Style arms short, linear-cuneate, sub-truncate. Achenes flat, obovoid, notched, winged on each side, sparsely hairy; pappus of 2 ovate scales.

Only one species endemic to India.

Caesulia axillaris Roxb., Pl. Corom. 1: 64. 1798; Hook.f., Fl. Brit. Ind. 3: 291. 1881.

Annual erect or decumbent-ascending glabrous herbs, 15 - 30 cm high. Leaves semi-amplexicaul, dilated and sheathing at base, linear-lanceolate, remotely denticulate, 4 - 10 × 0.4 - 1 cm, glabrous. Heads 2 - 3 united to form a compound head. Involucral bracts 2 - 3; outer bracts ca 5 mm long, broadly ovate-orbicular, crenulate or denticulate at apex; inner bracts ca 4 mm long, linear-lanceolate. Corolla ca 1.5 mm long, tubular, campanulate, 5-fid. Achenes ca 3 mm long, dark brown-ribbed, winged, shortly hairy at the top with 2 pappus scales.

A common weed in cultivated fields, also found in moist places. Damoh, Hoshangabad, Satna, Seoni. *Fl. & Fr.* : Sept. - Nov.

11. CARTHAMUS L.

Annual erect herbs. Leaves alternate, spiny dentate-lobed. Heads terminal, solitary or corymbose, rather large, homogamous. Involucral bracts many-seriate, imbricate, outer ones leafy green, aciculary dentate, upper parts with an acicular top, inner ones entirely pale, entire with an acicular top. Corolla tubular, limb deeply 5 - partite; anthers with a sagittate base and an obtuse apex, basal auricles pairwise connate. Style arms connate up to shortly below the rounded apex. Achenes obovoid, with an excentric scar of insertion, 4-angular or compressed, glabrous; pappus consisting of scales, or absent.

About 13 species in Mediterranean, Africa and Asia; one in M.P.

Carthamus oxycantha Bieb., *Fl. Tour. Cauc.* 283, 1808; Hook. f., *Fl. Brit. Ind.* 3: 386, 1881.

Annual erect herbs, up to 70 cm high; stems and branches puberulus white. Leaves oblong-lanceolate, 2 - 5 cm long; lower shortly spinulose-toothed at margins, upper half amplexicaul, very spinous. Heads ca 5 cm in diam. Involucral bracts many-seriate; outer bracts 3 - 3.5 cm long, lanceolate with spiny tips. Corolla ca 7 mm long, orange yellow. Achenes ca 6 mm long, obovoid, 4-angled, compressed, truncate at apex, white; pappus absent.

Cultivated for vegetable oil; sometimes in fallow fields. Bilaspur, Seoni, *Fl. & Fr.*: Jan. - Feb.

12. CENTIPEDA Lour.

Annual herbs. Leaves alternate, oblanceolate or spatulate, entire or toothed. Heads solitary in the leafy axils, heterogamous. Involucral bracts 2-seriate, subequal. Female florets numerous, shortly tubular, 2 - 3-lobed at the apex; bisexual florets fewer, limb campanulate, 4-lobed. Anther bases minutely sagittate. Style branches of bisexual flowers very short. Achenes 4 - 5-angled, puberulent on the ribs; pappus a minute spongy pale-coloured

corona, obscurely toothed at the margin.

About 6 species in Madagascar, Afghanistan, East Asia, Indo-Malesia, Australia, New Zealand, Polynesia and Chile; one in M.P.

Centipeda minima (L.) A. Br. & Aschers. Ind. Sem. Hor. Brol. App. 1867: 6. 1867. *Artemisia minima* L., Sp. Pl. 848. 1753. *C. orbicularis* Lour., Fl. Cochinch. 493. 1790; Hook.f., Fl. Brit. Ind. 3: 317. 1881.

Annual prostrate hairy herbs, 30 - 30 cm high, with branches radiating from the rootstock. Leaves subsessile, 1 - 1.2 cm long, obovate-spathulate, toothed. Heads 2.5 - 4 mm in diam., solitary discoid, globose, yellow. Involucral bracts 1 - 2-seriate, small, oblong-obtuse with scarious margins. Ray-florets ca 0.3 mm long, many-seriate, with minute tubular corolla and 2 - 3-dentate ligule; disc-florets ca .5 mm long, bisexual, campanulate 4-fid. Achenes ca 1 mm long, 4-angled, hairy on angles; pappus absent.

Common in moist places. Bilaspur, Damoh, Mandla, Raigarh, Raipur, Rajnandgaon, Seoni, Sidhi, Surguja. Fl. & Fr.: Nov. - Feb.

13. CHRYSANTHELLUM Rich.

Annual glabrous herbs. Leaves alternate, pinnatifid, toothed. Heads terminal and axillary, heterogamous. Involucral bracts 1 - 2-seriate. Ray-florets 1-seriate, ligule spreading, entire or 2-toothed, yellow. Disc-florets fertile, tube short, limb campanulate, 5-fid. Anther-bases obtuse, entire. Style-arms slender, tips long subulate. Achenes linear-oblong, dorsally compressed, smooth or the outer tubercled externally, outer thick with obtuse margins, inner flat, 2-winged; pappus a minute corona.

Three species in tropical Asia, Africa and America; one in M.P.

Chrysanthellum americanum (L.) Vatke in Abh. Nat. ver. Brem 9: 122. 1887. *Artemisia americana* L., Sp. Pl. 895. 1753. *C. indicum* DC., Prodr. 5: 831. 1836; Hook.f., Fl. Brit. Ind. 3: 310. 1881.

Annual small diffuse to procumbent herbs, 6 - 20 cm high. Stems quadrangular, grooved. Leaves alternate, pinnatifid; petioles 5 - 15 mm long, dilated and sheathing at base, segment lobes oblong or cuneiform, obtusely lobed or cut. Heads ca 4 mm diam., terminal, solitary, peduncled. Involucral bracts biseriate; outer ca 2.5 mm long, obtuse, with membranous margins; inner ones ca 2 mm long, obtuse, membranous. Ray-florets ca 3 mm long, ligulate, 2-toothed; disc-florets ca 3 mm long, tubular, 5-fid. Achenes 2 - 3 mm long, oblong, cuneate, outer margin thick, obtuse, inner flat with winged margins.

Common in open grassy field and rocky slopes, on alluvial soil. Balaghat, Bilaspur, Damoh, Raigarh, Rajnandgaon, Sidhi, Surguja. Fl. & Fr.: Aug. - Nov.

14. CONYZA Less.

Erect herbs or shrubs. Leaves alternate, crenate-serrate, pinnately veined. Heads axillary or terminal, usually many, peduncled, heterogamous, discoid, mostly corymbose. Involucral bracts multi-seriate, linear-lanceolate. Receptacle areolate, glabrous or hairy. Outer florets female, many, corolla-tube filiform but not ligulate. Anthers entire below or faintly 2-lobed, base obtuse or acute. Style arms in female much longer than in bisexual florets. Achenes usually laterally compressed, glabrous or minutely hairy or papillate; pappus hairs 1-2-seriate, denticulate, deciduous.

About 60 species in temperate and subtropical regions; 6 in M.P.

1a. Inflorescence in open leafy panicles :

- 2a. Ray florets with a distinct ligule, ca 0.5 mm long; receptacle 1 - 1.5 mm in diam.; upper leaves linear, glabrous ... 2. *C. canadensis*
- 2b. Ray florets without a distinct ligule; receptacle 2 - 2.5 mm in diam.; upper leaves narrow but not linear, mostly pubescent ... 1. *C. bonariensis*

1b. Inflorescence in close corymbs:

- 3a. Heads ca 3 mm in diam.:
- 4a. Leaves fastigiately arranged; achenes hairy ... 6. *C. stricta*
- 4b. Leaves not fastigiate; achenes glabrous ... 4. *C. leucantha*
- 3a. Heads more than 4 mm in diam.:
- 5a. Pappus ca 2 mm long, white; leaves sharply toothed at margins ... 5. *C. semipinnatifida*
- 5b. Pappus ca 3.5 mm long, reddish brown; leaves serrate at margins ... 3. *C. japonica*

1. *Conyza bonariensis* (L.) Cronq. in Bull. Torrey Bot. Club 70: 632. 1943. *Erigeron bonariensis* L., Sp. Pl. 863. 1753. *E. linifolius* Willd., Sp. Pl. 3: 1955. 1803; Hook.f., Fl. Brit. Ind. 3: 254. 1881.

Annual erect branched or simple-stemmed herbs, 30-150 cm high. Leaves narrowly oblanceolate, cuneate at base, acute at apex, coarsely serrate - dentate at margins, 1-9 x 0.3-1.5 cm, pubescent on both surfaces; upper leaves linear-lanceolate with entire margins. Heads ca 4.5 mm in diam., in long leafy panicles; involucral bracts many-seriate, ca 4 mm long, linear, densely pubescent. Ray florets 3-4 mm long, ligulate; disc florets ca 3 mm long, tubular, 5-lobed. Achenes ca 1.25 mm long, sub-glabrous; pappus 3-4 mm long, brownish.

On open grassy fields. Rare. Bhopal, Jabalpur. Fl. & Fr.: Jan. Feb.

2. *Conyza canadensis* (L.) Cronq. in Bull. Torrey Bot. Club. 70: 632. 1943. *E. canadensis* L., Sp. Pl. 863. 1753; Hook. f., Fl. Brit. Ind. 3: 254. 1881.

Annual erect herbs, 30 - 70 cm high. Leaves linear or linear-lanceolate, 2 - 4 × 0.5 - 1.5 cm, entire or toothed, thinly hairy above. Heads ca 3 mm in diam., in leafy panicles. Involucral bracts 2 - 3-seriate; outer bracts linear, acute, ca 1.5 mm long; inner bracts linear, acute with scarious margins, ca 3 mm long, glabrous. Ray florets ca 3 mm long, filiform; disc florets ca 2.5 mm long, tubular, 5-fid. Achenes ca 1 mm long, glabrous; pappus ca 2.2 mm long, dirty white.

On hill-side. Rare. Raigarh, Surguja. Fl. & Fr.: Dec. Jan.

3. *Conyza japonica* (Thunb.) Less., Syn. Comp. 204. 1832; Hook. f., Fl. Brit. Ind. 3: 258. 1881. *Erigeron japonicus* Thunb., Fl. Jan. 312. 1784.

Annual or perennial erect villous herbs, 50 - 150 cm high. Lower leaves sessile in rosettes, cauline ones cuncate at base, serrate or crenate, obtuse or acute at apex, 1 - 5 × 0.5 - 2 cm. Heads ca 6 mm in diam., densely glomerate in few-branched terminal panicles. Involucral bracts 2 - 3-seriate; outer bracts ca 2 mm long, linear-lanceolate, pubescent; inner bracts ca 4.5 mm long, linear, lanceolate, with scarious margins. Ray florets ca 1.3 mm long, filiform; disc florets ca 3 mm long, 5-fid, tubular. Achenes ca 1 mm long, thinly hairy; pappus ca 3.5 mm long, reddish brown.

Along streams. Rare. Bilaspur. Fl. & Fr.: Feb. March.

4. *Conyza leucantha* (D. Don) Ludlow & Raven in Kew Bull. 17: 71. 1963. *Erigeron leucanthum* D. Don, Prodr. Fl. Nep. 171. 1825. *Conyza viscidula* DC., Prodr. 5: 383. 1836; Hook. f., Fl. Brit. Ind. 3: 258. 1881. Fig. 48.

Perennial erect stout viscid-pubescent herbs, 30 - 150 cm high. Leaves subsessile, elliptic-lanceolate, entire or serrate, acute at both ends, 5 - 12 × 1 - 4 cm. Heads ca 3 mm in diam., in axillary corymbose panicles. Involucral bracts many-seriate; outer bracts ca 4 mm long, linear-lanceolate, glandular-puberulous above, inner bracts ca 4 mm long, linear-lanceolate, with scarious margins. Ray florets ca 1 mm long, tubular; disc florets ca 0.5 mm long, obovate, glabrous; pappus ca 4 mm long, reddish-brown, deciduous.

Common as undergrowth in sal forests. Bastar, Bilaspur, Hoshangabad, Raipur. Fl. & Fr.: Jan. Feb.

5. *Conyza semipinnatifida* DC., Prodr. 5: 382. 1836; Hook. f., Fl. Brit. Ind. 3: 257. 1881.

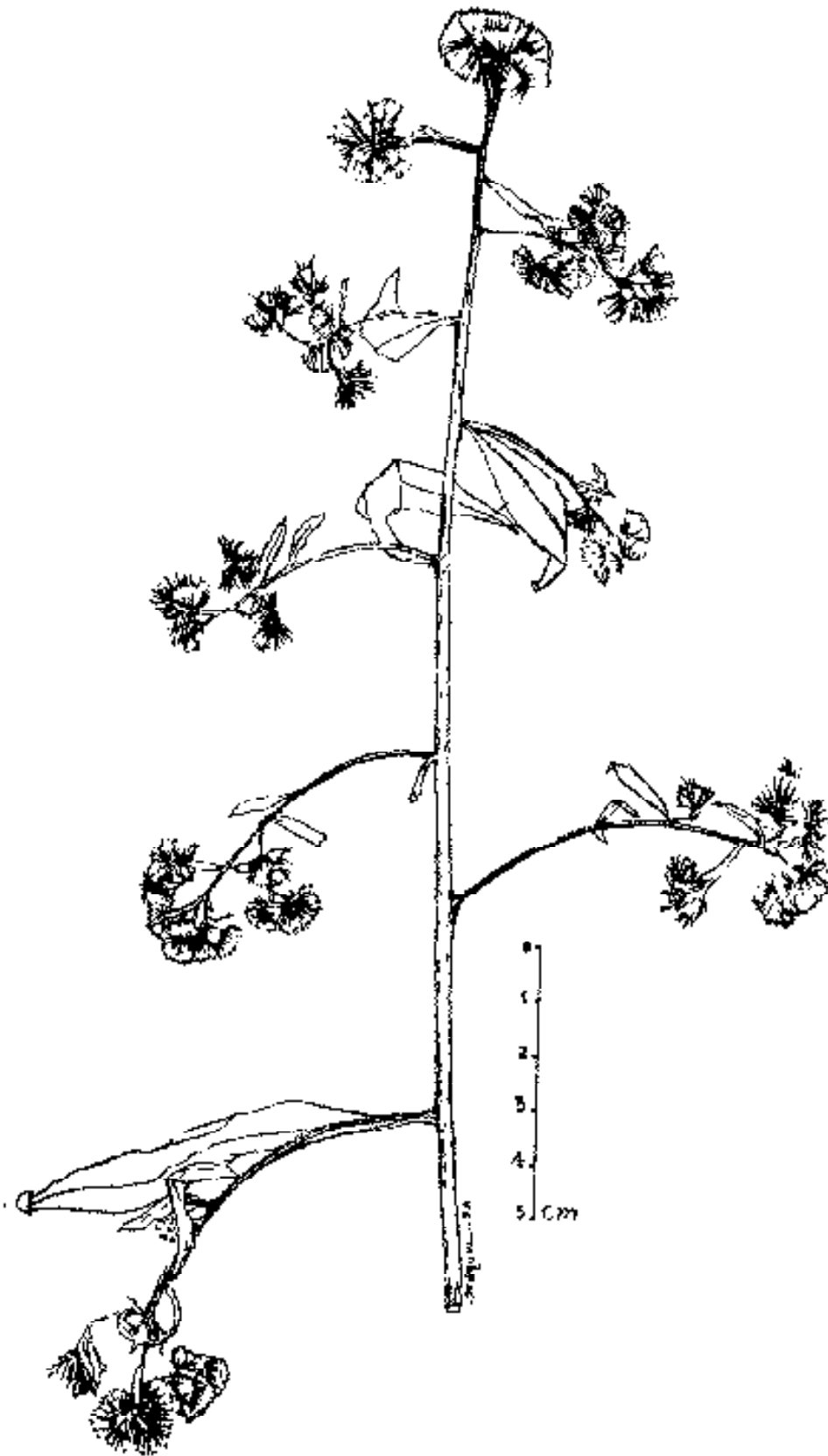


Fig. 48. *Conyza leucantha* (D. Don) Ludlow & Raven

Annual erect hairy herbs, 30 - 70 cm high. Leaves obovate-spathulate or oblanceolate, sharply toothed at margins, 2 - 4 x 1 - 1.5 cm, hairy on both surfaces. Heads ca 5 mm in diam., arranged in corymbose panicles. Involucral bracts 2 - 3-seriate; outer bracts linear, ca 1 mm long, pubescent outside; inner bracts ca 2 mm long, linear-lanceolate, acute, scarious at margins. Ray florets ca 3 mm long, tubular, 5-fid. Achenes ca 0.8 mm long, compressed, obovate, pubescent; pappus ca 2 mm long, white, feathery.

As undergrowth in forest. Rare. Sidhi. *Fl. & Fr.*: Dec. Jan.

6. *Conyza stricta* Willd., *Sp. Pl.* 3: 1922. 1803; Hook. *f.*, *Fl. Brit. Ind.* 3: 258. 1881.

Annual erect viscid-pubescent herbs, 15 - 100 cm high; stems ribbed, glandular-villous. Leaves in lower part oblanceolate-spathulate, serrate-dentate, apiculate, glandular hairy on both surfaces, upper leaves linear. Heads ca 3 mm in diam., in corymbose panicles. Involucral bracts 2-seriate; outer bracts linear, acute, ca 1.8 mm long, glandular hairy; inner bracts linear-lanceolate, ca 2.5 mm long. Ray florets ca 1.5 mm long, ligulate, bidentate; disc florets ca 2 mm long, tubular, 5-fid, hairy. Achenes ca 0.5 mm long; pappus ca 2 mm long, white.

On dry hill slopes. Bastar, Hoshangabad, Raigarh, Sidhi, Surguja. *Fl. & Fr.*: Dec. Jan.

15. COSMOS Cav.

Annual erect herbs. Leaves opposite, lower leaves 2 - 4-pinnatisect, upper ones less strongly divided. Heads usually solitary, pedunculate, radiate, heterogamous. Involucral bracts 2-seriate, outer bracts linear-lanceolate, inner ones oblong-lanceolate. Outer florets few, female, ligulate, 2 - 3-dentate. Corolla of disc florets tubular, 5-dentate, yellow. Anthers obtuse at base. Style arms short in female florets, longer and densely pilose in bisexual. Achenes fusiform or linear, furrowed, with retrorsely barbellate awns.

About 25 species in tropics and subtropics, several species are grown as ornamentals. One species in M.P.

Cosmos sulphurens Cav., *Icon. Descr. Pl.* 1: 56. 1791; Hook. *f.*, *Fl. Brit. Ind.* 3: 310. 1881; Sherff. in *Field Mus. Nat. Hist. Bot. Ser.* 7: 401. 1932.

Annual erect much branched herbs, 30 - 80 cm high; stems grooved, glabrescent or glabrous. Leaves opposite, 2 - 3-pinnatipartite or pinnate; leaflets or segments lanceolate-oblong, obtuse, apiculate, entire, glabrescent or glabrous. Heads 5 - 8 cm diam., solitary, combined into corymbs. Involucral bracts 2-seriate; outer bracts 4 - 5 mm long, linear-lanceolate, acute; inner bracts oblong-lanceolate. Ray florets with 2 - 3-dentate golden

yellow ca 2 cm long ligules; disc florets yellow, ca 1.5 cm long. Achenes fusiform, 4-angular, hispidulous, ca 1.5 cm long, beaked with 2-4 apical, retrorsely bristly awns; pappus absent.

Common in mixed dry deciduous forest along river banks. Balaghat, Bilaspur, Damoh, Mandla, Raigarh. *Fl. & Fr.*: Sept. Dec.

16. CRASSOCEPHALUM Moench.

Annual erect herbs. Leaves alternate, crenate-serrate, pinnately veined. Heads terminal, in corymbs, at first nodding, afterwards erect. Involucral bracts 1-2-seriate, pellucid-dotted, outer shorter. Receptacle flat, naked alveolate. Corolla-tube long, gradually widening into a short limb. Anthers with an entire or shallowly incised base and an acute apex. Style arms long, truncate, papillose at top tipped by a subulate appendage. Achenes ribbed; pappus hairs numerous, silky, denticulate, white, deciduous.

One species in M.P.

Crassocephalum crepidioides (Benth.) S. Moore in J. Bot. 50: 211. 1912; van Steenis in J. Indian Bot. Soc. 46: 463-469. 1967. *Gynura crepidioides* Benth. in Hook., Niger Fl. 438. 1849.

Annual robust herbs, 30-60 cm high. Leaves 5-10 × 1-4 cm, elliptic-oblongate, lyrate-lobed, with 1-2 pairs of oblong acute lateral segments, acute or acuminate at apex, puberulous on both surfaces; petioles up to 3 cm long or attenuate at the base. Heads ca 1 cm diam., in pendulous racemes, pink or dark orange. Involucre cylindrical or urceolate; bracts linear-lanceolate, 8-10 mm long, scarious, puberulous. Achenes ca 2 mm long, oblong, puberulous on the ribs; pappus white, up to 12 mm long.

On bank of streams and rivers. Bastar, Bilaspur, Raipur. *Fl. & Fr.*: Dec. Jan.

17. CYATHOCLINE Cass.

Annual aromatic glandular herbs. Leaves alternate, amplexicaul at base, pinnatisect. Heads few, in corymbs, peduncled, radiate. Involucral bracts biseriate, herbaceous. Outer florets many, filiform, female, ligule 2-lobed; inner florets few. Anthers obtuse at base. Style arms papillose. Achenes ovoid, glabrous; pappus absent.

Three species distributed from India to Burma; one in M.P.

Cyathocline purpurea (Ham. ex D. Don) O. Ktze, Rev. Gen. Pl. 1: 333. 1891. *Tanacetum purpureum* Ham. ex D. Don, Prodr. Fl. Nep. 181. 1825. *Cyathocline lyrata* Cass. in Ann. Sci. Nat. ser. 1, 17: 420. 1829; Hook.f., Fl. Brit. Ind. 3: 246. 1881.

Annual erect aromatic glandular hairy herbs, 30 - 60 cm high. Leaves sessile, 3 - 8 cm long, pinnatipartite; segments toothed, pubescent on both surfaces. Heads yellow, 4 - 5 mm across, long peduncled, in terminal corymbose panicles. Involucral bracts 2-seriate; outer bracts ca 2.5 mm long, linear-lanceolate, acute, pilose outside; inner bracts ca 2 mm long, lanceolate with scarious margins. Ray florets ca 4 mm long, 2-toothed; disc florets ca 3.5 mm long, tubular, 5-lobed, with ciliate teeth, bisexual or sterile. Achenes ca 3 mm long, oblong, smooth; pappus absent.

Common on damp soil or along banks of streams, river and tanks. Balaghat, Damoh, Durg, Raipur, Raigarh, Satna, Sconi, Sidhi, Surguja. Fl. & Fr.: Throughout the year.

18. DICHROCEPHALA DC.

Annual erect herbs. Leaves alternate, short-petioled, crenate, pinnately veined. Heads few to many, peduncled, discoid, heterogamous, in axillary or terminal short panicles. Involucral bracts 2-seriate, slightly unequal; outer florets many-seriate, female; inner florets bisexual, few; corolla tubular in both, in female 2 - 3-lobed, in bisexual 4-lobed. Anther obtuse at base. Style arms flat, short. Achenes obovoid, slightly compressed, glabrous; pappus of 4 short awns in bisexual florets, absent in female.

About 10 species in warmer parts of Africa, Madagascar, India, China and Java; one in M.P.

Dichrocephala integrifolia (L.f.) O. Ktze., Rev. Gen. 1: 333. 1891. *Hippia integrifolia* L.f., Suppl. 389. 1781. *D. latifolia* DC. in Wight, Contrib. Bot. Ind. 11. 1834; Hook.f., Fl. Brit. Ind. 3: 245. 1881.

Annual erect much branched herbs, up to 45 cm high. Leaves alternate, obovate or broadly ovate or more usually lyrate pinnatisect, coarsely serrate-dentate, 2.5 - 5 × 0.4 - 1.5 cm. Heads 3-4 mm across, in panicles. Involucral bracts 2-seriate, ca 1 mm long, lanceolate. Ray florets ca 0.5 mm long, 2-lobed, yellow; disc florets ca 1 mm long, 4-lobed, greenish yellow. Pappus bristles 2 - 3 in disc florets only.

On sandy alluvial soils. Rare. Bilaspur. Fl. & Fr.: Aug. - Oct.

19. DICOMA Cass.

Annual or perennial herbs or undershrubs. Leaves alternate, entire. Heads solitary, sessile, homogamous or heterogamous, discoid. Involucral bracts many-seriate, outer shorter, inner ones longer, broader, scarious along margins, all ending in long scabrid spines. Outer florets sometimes female. Corolla tubular, 2 - 3-lobed. Anthers with a bearded tail at base. Style arms obtuse. Achenes 10-ribbed, densely silky villous, tipped by many feather pappus hairs; outer pappus hairs sometimes scaly.

About 6 species in tropical Africa and India; one in M.P.

Dicoma tomentosa Cass. in Bull. Soc. Philom. 47. 1818; Hook.f., Fl. Brit. Ind. 3: 387. 1881.

Annual erect much branched herbs, 18 - 45 cm high; branches clothed with white woolly tomentum. Leaves sessile, 2.5 × 0.3 - 0.6 cm, linear or linear-obovate, apiculate, tomentose on both surfaces. Heads ca 8 mm in diam., subsessile, solitary, leaf-opposed and terminal. Involucral bracts many-seriate, terminal with spines; outer bracts linear-lanceolate, ca 3 mm long; inner bracts ovate-lanceolate, acuminate, ca 12 mm long. Corolla ca 1 cm long, tubular, 5-lobed, white. Achenes ca 2.5 mm long, turbinate, densely clothed with long silky hairs; pappus ca 6 mm long, brown.

In drier regions of the state. Rare. Gwalior. Fl. & Fr.: Nov. - Dec.

20. ECHINOPS L.

Annual prostrate herbs. Leaves alternate, amplexicaul at base, pinnatisect spinous along margin, strongly 1-nerved. Heads densely bearded below, 1-flowered (discoid), collected into terminal compound heads. Involucral bracts many-seriate, the outer shorter, the middle often spinous, the inner longer. Anthers usually with a fimbriate tail. Style arms recurved, flat, glabrous. Achenes 5-angled, elongate, glabrous, tipped by short bristly deciduous free or connate pappus hairs.

About 100 species in Eastern Europe, Africa and Asia; one in M.P.

Echinops echinatus Roxb., Fl. Ind. ed. 2. 3: 447. 1832; Hook.f., Fl. Brit. Ind. 3: 358. 1881.

Annual prostrate or procumbent-ascending herbs, 30 - 70 cm high. Leaves sessile, oblong, 7 - 12 cm long, pinnatifid; lobes triangular, spinose; spines 2 - 3 cm long, pale, scabrous above, white arachnoid beneath. Heads compound, forming a spherical ball, 3 - 4 cm in diam., having single bisexual white floret. Involucre surrounded by strong white bristles, resembling pappus; bracts ca 15 mm long, 3-cuspidate, sharp-spinose; inner bracts 6 - 7 mm long, connate; corolla ca 15 mm long, white, tubular, 5-lobed. Achenes ca 4 mm long, obconic, densely villous; pappus bristly deciduous.

Common in dry wasteland, ridges and boundaries of cultivated fields. Bilaspur, Damoh, Durg, Raipur, Shivpuri, Sidhi. Fl. & Fr.: March - May.

21. ECLIPTA L.

Erect or prostrate herbs. Leaves opposite, simple subentire. Heads small, 1 - 2 short peduncles in axil of upper leaves, heterogamous, radiate. Involucral bracts 2 - seriate, herbaceous. Ray florets numerous, 2-seriate;

disc florets fewer, tubular, limb campanulate, 4-lobed at the apex. Anther obtuse, sagittate at base. Style branched, linear, subobtusate. Achenes oblong or obovate, triquetrous or compressed with one central rib on each side, tuberculate, margins thinner, smooth, truncate at the apex; pappus of 2 minute weak scales.

About 4 species in warmer parts of America, Africa, Asia and Australia; one in M.P.

Eclipta prostrata (L.) L., Mant. Pl. 2: 206. 1771; Koyama in Taxon 30: 505. 1981. *E. alba* (L.) Hassk., Pl. Java Kar. 528. 1848; Hook. f., Fl. Brit. Ind. 3: 304. 1881. *Verbesina alba* L., Sp. Pl. 902. 1753. *V. prostrata* L., Sp. Pl. 902. 1753.

Annual or perennial, prostrate, decumbent-ascending or erect hairy herbs, 20-30 cm high. Leaves opposite, sessile, elliptic-lanceolate, mucronulate, cuneate at base, 2-5 × 1-1.5 cm, appressed pilose on both surfaces. Heads 3-5 mm in diam., terminal and axillary, solitary, on 4-7 cm long peduncles. Involucral bracts 2-seriate; outer bracts ca 5 mm long, ovate-lanceolate, appressed pubescent; inner bracts ca 4 mm long, oblong-ovate. Ray florets ca 2 mm long, ligulate, bidentate, white; disc florets ca 1.75 mm long, tubular, 4-5-lobed. Achenes 3-3.5 mm long, 3-angled in female and 4-angled in bisexual florets; pappus absent, only scales present.

Common in moist waste places. Bastar, Bilaspur, Durg, Hoshangabad, Damoh, Raipur. Fl. & Fr.: Major part of the year.

22. ELEPHANTOPUS L.

Perennial stiff herbs. Leaves usually basal, rosulate, oblanceolate, alternate above. Glomerules surrounded by leaf-like bracts and containing several homogamous few-flowered heads. Involucral bracts 2-seriate, oblong, acute, leafy. Corolla tubular; limb deeply cleft into 5 secund lobes. Anther lobes auricled at base. Achenes 10-ribbed pubescent; pappus setae 5-6, stiff, uni-seriate.

About 32 species in tropics; one in M.P.

Elephantopus scaber L., Sp. Pl. 814. 1753; Hook. f., Fl. Brit. Ind. 3: 242. 1881.

Annual erect dichotomously branched herbs, 20-30 cm high. Leaves mostly radical, 10-15 × 3.5-5 cm, ovate-oblong or oblanceolate, coarsely serrate or dentate, cauline leaves small, amplexicaul. Heads numerous, 2-2.5 cm in diam. Involucral bracts 2-seriate; outer bracts broadly ovate-cordate, 1-2 cm long, leaf-like, 1-nerved; inner bracts 3-nerved, twice in length to outer ones. Corolla tubular, ca 7 mm long, violet, deeply 5-cleft.

Achenes ca 5 mm long, 10-ribbed, hairy; pappus 1-seriate, 4-5-bristled.

Common in mixed dry deciduous forests. Bastar, Damoh, Rajnandgaon, Raipur, Satna, Sagar, Sidhi, Surguja. *Fl. & Fr.*: Jan.- March.

23. EMILIA Cass.

Annual or perennial herbs. Leaves alternate, entire to lyrate-lobed. Heads solitary or few, corymbose, peduncled, discoid. Involucral bracts campanulate uniseriate. Anthers obtuse below, prolonged above the style-arms, glabrous, appendages penicillate. Achenes narrowly oblong, with 5 open to almost closed internally puberulent grooves, outer achenes fertile and inner ones usually sterile. Pappus abundant, capillary, minutely scabridulous, caducous.

About 30 species, palaeotropical; one in M.P.

Emilia sonchifolia (L.) DC. in Wight, *Contrib. Bot. Ind.* 24. 1834; Hook. *f.*, *Fl. Brit. Ind.* 3: 336. 1881. *Cacalia sonchifolia* L., *Sp. Pl.* 835. 1753.

Annual erect branched glaucescent herbs, 20-40 cm high; stems often decumbent-ascending. Leaves sessile; lower leaves 6-10 cm long, lyrate or with narrow base and triangular to orbicular terminal lobes; upper leaves smaller, lanceolate, amplexicaul with lyrate auricles. Heads 7-9 mm long, on 3.5-5 cm long peduncles, combined into corymbs. Involucral bracts 7-9 mm long, lanceolate, acute. Corolla purple, ca 1 cm long. Achenes 3-4 mm long, with 5 hairy ribs, alternating with faint glabrous ribs. Pappus 7-8 mm long, white.

Common along river banks; on sandy soil. Bilaspur, Damoh, Hoshangabad, Raigarh, Raipur, Sidhi. *Fl. & Fr.*: Feb.- March.

24. ENHYDRA Lour.

Annual or perennial herbs. Leaves opposite, sessile. Heads terminal, seemingly axillary, solitary, heterogamous. Involucral bracts 4-decussate, the 2 outer ones leafy, largest. Marginal florets numerous; corolla-tube with 2-4 dentate ligule; disc florets more or less numerous or sometimes sterile; corolla campanulate with 5-dentate limb. Anthers with an entire base and obtuse apex.

About 10 species in warmer parts of the globe; one in M.P.

Enhydra fluctuans Lour., *Fl. Cochinch.* 511. 1790; Hook. *f.*, *Fl. Brit. Ind.* 3:304. 1881.

Annual prostrate or erect-ascending herbs, 15-30 cm high, rooting at nodes. Leaves opposite, sessile, linear-oblong, acute or obtuse, entire or subcrenate, 1.2-3.7×0.5-0.7 cm, glabrous. Heads ca 8 mm in diam., axillary

and terminal, sessile, pale white. Involucral bracts 4, foliaceous; outer bracts oblong, rounded at apex, ca 6 mm long. Ray florets ca 2 mm long, ligulate 3-4-toothed; disc florets ca 2 mm long, tubular; limb campanulate, 5-fid. Achenes ca 1.5 mm long, oblong, brown; pappus absent; palea ca 2 mm long, glandular at apex.

In moist ditches. Rare. Bilaspur, Raigarh. *Fl. & Fr.*: Nov.-Dec.

25. ERECHTITES Raf.

Annual erect herbs, generally branched above. Leaves alternate, lyrate divided or subentire. Heads in terminal corymbose panicles, heterogamous, disciform. Involucre urceolate-campanulate, 1-seriate with a few outer calyculate bracts. Marginal florets female, filiform 3-5-dentate; disc florets tubular, filiform, with a funnel-shaped 4-5-dentate limb. Anther-bases obtuse, apices with short linear appendages. Achenes subcylindric 10-ribbed; pappus hairs numerous.

Native of Tropical America, introduced from Brazil and now rapidly naturalised in India; one in M.P.

Erechtites valerianifolia (Wolf) DC., *Prod.* 6: 294. 1838; Backer & Bakh. f., *Fl. Java* 2: 424. 1965. *Senecio valerianifolia* Wolf, *Ind. Sem. Hort. Berol.* 1825.

Annual erect or decumbent herbs, 50-150 cm high. Lower leaves 10-22x4-4.5 cm, ovate-lanceolate, irregularly incised-dentate; petiole 4.5 cm long; upper and middle leaves pinnatisect, acuminate at apex, sharply serrate at margins. Heads ca 4 mm in diam.; involucral bracts 1-seriate, 8-9 mm long, linear, with scarious margins. Ray florets ca 7 mm long, filiform, 4-5-lobed; disc florets ca 8 mm long, 5-lobed. Achenes ca 3 mm long, finely and sparsely puberulous; pappus ca 7 mm long, white and pink, deciduous.

On roadsides. Bastar. *Fl. & Fr.*: Dec.-Feb.

26. ERIGERON L.

Annual erect or ascending herbs. Leaves alternate, entire, dentate, pinnately veined. Heads 1-many, axillary or terminal, usually in panicles, peduncled, radiate. Involucral bracts 2-many-seriate, lanceolate-acute, scarious along margin, usually pubescent. Outer florets many, female; disc florets tubular, 5-lobed, bisexual. Anthers not tailed below. Style arms hairy. Achenes ellipsoid, usually angled, sparsely hairy; pappus hairs denticulate, 1-2-seriate.

About 200 species, cosmopolitan; one in M.P.

Erigeron asteroides Roxb., *Fl. Ind. Careyed.* 3: 432. 1832; Hook. f., *Fl. Brit. Ind.* 3: 254. 1881.

Annual erect ascending herbs, 20-40 cm high, patently glandular hairy throughout. Leaves basal, shortly petioled; cauline ones obovate-oblong, semi-amplexicaul, dentate-lobulate, 2-5 cm long, hairy on both surfaces. Heads *ca* 12 mm in diam., solitary or in subcorymbs. Involucral bracts 2-3-seriate; outer bracts linear, *ca* 1.5 mm long; inner bracts linear with scarious margins, *ca* 4 mm long, 5-fid, yellow. Achenes *ca* 0.5 mm long, obovoid, flattened or compressed, glabrous; pappus *ca* 4.5 mm long, white.

Common in open places in forest areas. Bilaspur, Raipur, Rewa. *Fl. & Fr.*: Aug.- Feb.

27. EUPATORIUM L.

Annual or perennial herbs. Leaves opposite, dentate, somewhat distinctly 3-nerved. Heads in corymbs, homogamous. Involucral bracts 1-many-seriate, imbricate. Florets many, tubular, campanulate, 5-lobed. Anther bases obtuse. Style branched, elongate, exserted, obtuse at the apex. Achenes oblong, 4-5-angled; pappus capillary, with uniseriate hairs, numerous, scabrous or finely barbellate.

About 1200 species, cosmopolitan; some species are ornamental. One species in M.P.

Eupatorium riparium Regal, *Gartenflora* 15: 324.t. 525. 1866. Koster in *Blumea* 1: 503. 1935.

Annual or perennial, decumbent to ascending herbs, 30-60 cm high. Leaves petioled, up to 2 cm, elliptic-lanceolate, narrowed and entire at base, sparsely serrate-dentate above, 4-6 × 0.5-3 cm, glabrous. Heads *ca* 5 mm in diam., in corymbose panicles; involucral bracts *ca* 4 mm long, linear-lanceolate, subacute, hairy; inner bracts *ca* 4 mm long, linear-lanceolate, with scarious margins. Corolla *ca* 3.5 mm long; lobes glandular hairy. Achenes *ca* 2.5 mm long, black, hairy on ribs; pappus *ca* 3 mm long, white.

In moist shady places. Rare. *Fl. & Fr.*: Jan.- Feb.

28. FLAVERIA A. Juss.

Annual herbs. Leaves opposite, sessile, entire. Heads usually 1-flowered, mostly collected into dense cymes subtended by floral leaves, discoid or radiate. Involucral bracts 2-4, foliaceous. Ray florets tubular, 3-toothed; disc florets 5-lobed. Anther obtuse. Style arms slender, truncate. Achenes ribbed, glabrous; pappus absent.

About 14 species, mainly in tropical America; one in M.P.

Flaveria trinervia (Spreng.) C. Mohr. in *Contr. U.S. Nat. Herb.* 6: 180. 1901. *Oedera trinervia* Spreng., *Bot. Gart. Halle* 63. 1800. *Flaveria australasica* Hook. in *Mitch. J. Exped. Trop. Austral.* 118. 1848.

Annual erect dichotomously branched glabrous herbs, 15-35 cm high. Leaves opposite, 2-5 × 0.8-1.5 cm, elliptic-lanceolate or broadly elliptic-oblongate, serrate, acute, 3-nerved from base. Heads 1-3 cm in diam., sessile, fasciculated in terminal subglobose cymes. Involucral bracts 4, foliaceous, 1.5-2 cm long, linear-lanceolate. Ray-florets ca 2 mm long, tubular, glandular hairy outside, 3-toothed; disc-florets ca 4 mm long, glandular hairy outside, 5-lobed. Achenes ca 2.5 mm long, compressed, 10-12-ribbed, brownish-black; pappus absent.

In shady places, along road-sides and as undergrowth in forests. Rare. Seoni. Fl. & Fr.: Jan.-Feb.

29. GALINSOGA Ruiz & Pav.

Annual herbs. Leaves opposite, sessile, crenate, palmately veined. Heads terminal and axillary, radiate heterogamous. Involucral bracts 2-seriate, scarious along margin. Outer florets few, female, 3-dentate. Anthers sagittate below. Style arms slender. Achenes angular, outer dorsally compressed, obovate, striate; pappus few, scarious, fimbriate, scalelike in disc florets, none in female.

About 4 species from Mexico to Argentina; one in M.P.

Galinsoga parviflora Cav., Ic. Descr. Pl. 3: 41, t. 281. 1796; Hook.f., Fl. Brit. Ind. 3: 311. 1881.

Annual erect weak herbs, 15-50 cm high. Leaves opposite, 1.5-5 × 0.5-3 cm, ovate or oblong-ovate, acute or cuneate at base, obtuse or acute, shallowly serrate, thinly hairy on both surfaces. Heads ca 6 mm in diam., terminal and axillary panicle. Involucral bracts 2-seriate, 2-4 mm long, ovate, obtuse. Ray florets ca 5 mm long, 3-dentate, white; disc florets ca 3 mm long, 5-lobed, hairy, pale yellow. Achenes ca 2 mm long, ovate, angular; pappus scale ca 2 mm long, ciliate; palea oblong-spathulate, mostly with 2 lateral, acute lobes.

As weeds or along streams, in muddy places. Hoshangabad, Surguja. Fl. & Fr.: Feb.-March.

30. GLOSSOCARDIA Cass.

Annual herbs. Leaves radical, pinnatisect; pinnules linear. Heads solitary peduncled, radiate. Involucral bracts few, outer shorter, inner oblong, scarious along margin. Ray florets few, female, with 4-lobed corolla. Anthers acute below. Style arms linear, papillose. Achenes laterally compressed, densely hairy along margin, tipped laterally by 2 smooth awns.

Only 2 species in W. & C. India ; one in M.P.

Glossocardia bosvallea (L.f.) DC. in Wight, *Contrib. Bot. Ind.* 19, 1834. *Verbesina bosvallea* L. f., *Suppl.* 379, 1781. *G. linearifolia* Cass. in *Dict. Sc. Nat.* 5: 19, 1821; Hook. f., *Fl. Brit. Ind.* 3: 308, 1861.

Annual, diffuse erect or prostrate herbs, 10-30 cm high, sometimes woody at the base; stem and branches grooved. Leaves alternate pinnatisect; segments 1-5 cm long, linear apiculate. Heads ca 5 mm in diam., terminal or axillary. Involucral bracts 2-seriate; outer involucral bracts ca 4 mm long, ovate-lanceolate with scarious margins. Ray florets ca 4 mm long, ligulate, 2-dentate; disc florets ca 3 mm long, 4-lobed. Achenes 8-9 mm long, narrowly oblong, patently hairy on the edges; pappus consisting of small stiff awns.

Common in dry places or on open rocky soils. Bilaspur, Durg, Hoshangabad, Mandla, Raigarh, Tikamgarh. *Fl. & Fr.*: Sept.-Oct.

31. GLOSSOGYNE Cass.

Perennial glabrous herbs, with thick woody rootstock. Leaves mostly basal, pinnatisect with narrow segments. Heads solitary, terminal, heterogamous, radiate. Involucral bracts 2-3-seriate. Ray florets few, ligulate, 3-lobed; disc florets 4-5-lobed. Anthers bases obtuse, apices acute. Style branches with long linear appendages. Achenes dorsally compressed, linear or ovate-oblong, bearing two retrorsely barbed awns at the apex.

About 8 species, cosmopolitan; one in M.P.

Glossogyne bidens (Retz.) Alston in Trimen., *Handb. Fl. Ceylon*, *Suppl.* 6: 168, 1931. *Zinnia bidens* Retz., *Obs. Bot.* 5: 28, 1788. *Glossogyne pinnatifida* DC. in Wight *Contrib. Bot. Ind.* 19, 1834; Hook. f., *Fl. Brit. Ind.* 3: 310, 1861.

Perennial herbs, 15-50 cm high. Basal leaves pinnatisect, segments 3-7, linear-lanceolate, 0.5-3 cm long, petiolate; petioles 2-7.5 cm long; cauline leaves scale-like. Heads 4-5 mm in diam., campanulate. Involucral bracts 2-3-seriate, 3-4 mm long, linear-oblong, obtuse or acute. Ray florets ca 2 mm long, 3-lobed; disc florets ca 2.5 mm long, 4-lobed. Achenes ca 7 mm long, linear-oblong, dark brown, 5-ribbed on both surfaces; awns 2-3 mm long, divergent; palea ca 4 mm long.

In dry regions on gravelly soils. Bilaspur, Durg, Raipur, Satna, Surguja. *Fl. & Fr.*: Jan.-April.

32. GNAPHALIUM L.

Annual densely white tomentose herbs. Leaves alternate, entire. Heads of few to many corymbose-spicate, clusters, radiate or discoid. Involucral bracts many-seriate, imbricate; outer florets female, numerous; ligule

filiform, 2-3-fid; bisexual florets few. Anthers obtuse below. Style arms capitate. Achenes often angular, glabrous, sometimes angular; pappus usually 1-seriate, deciduous.

About 200 species, cosmopolitan; 4 in M.P.

- 1a. Heads in corymbose leafless clusters ...1.*G. affine*
- 1b. Heads in leafy spikes or in rounded leafy axillary or terminal clusters:
 - 2a. Heads in rounded leafy axillary or terminal clusters; leaves under 12 mm long ...4.*G. pulvinatum*
 - 2b. Heads spicate; leaves over 12 mm long:
 - 3a. Pappus hairs coherent at the base ...2.*G. pensylvanicum*
 - 3b. Pappus hairs free at the base ...3.*G. polycaulon*

1. *Gnaphalium affine* D. Don, Prodr. Fl. Nep. 173. 1825; *G. multiceps* DC., Prodr. 6: 222. 1838. *G. luteo-album* L. var. *multiceps* (DC.) Hook. f., Fl. Brit. Ind. 3: 288. 1881. *G. luteo-album* L. ssp. *affine* (D. Don) Koster in Blumea 4: 484. 1941.

Annual erect or ascending densely woolly herbs, 10-60 cm high. Leaves sessile, 0.8-6 × 0.2-1 cm, oblong-spathulate, obtuse. Heads ca 3 mm in diam., in dense or branched terminal corymbs. Involucral bracts 3-seriate; outer bracts ca 2.5 mm long, ovate or oblong; inner bracts ca 1 mm long. Ray-florets ca 2 mm long, filiform, 3-4-fid; disc-florets ca 2 mm long tubular, 5-lobed. Achenes 0.5 mm long, oblong, brown; pappus ca 2 mm long, yellowish, deciduous.

Common on dry streams or waste places. Bilaspur, Damoh, Hoshangabad, Narsimhapur, Raigarh, Sagar. Fl. & Fr.: March-April.

2. *Gnaphalium pensylvanicum* Willd., Enum. Hort. Berol. 867. 1809. *G. purpureum* (auct. non L.) Hook. f., Fl. Brit. Ind. 3: 289. 1881.

Annual erect greyish tomentose herbs, 10-35 cm high. Leaves 2-6 × 0.5-2.2 cm, obovate-spathulate, rounded or sub-obtuse at base, apiculate at apex, sparsely lanate above. Heads ca 3 mm in diam., in axillary clusters, greenish-white. Involucral bracts 2-3-seriate; outer bracts 2-2.5 mm long, ovate-lanceolate, scarious, lanate; inner bracts ca 3 mm long, oblong-lanceolate. Ray florets ca 2 mm long, filiform, 3-4-fid; disc florets ca 2 mm long, tubular, 5-lobed. Achenes ca 0.6 mm long, elliptic, minutely glandular; pappus ca 2 mm long, white, connate at base, deciduous.

In moist waste places. Rare. Fl. & Fr.: March-April.

3. *Gnaphalium polycaulon* Pers., Syn. Pl. 2: 421. 1807; Grierson in Notes Roy. Bot. Gard. Edinb. 31: 135-138. 1971. *G. indicum* (auct. pl. non L.,

1753). Hook. f., Fl. Brit Ind. 3: 289. 1881.

Annual erect or decumbent-ascending appressed woolly herbs, 10-20 cm high; stems branched or simple. Leaves semi-amplexicaul, 1.5-3×0.4-0.7 cm, linear-obovate or linear, spatulate, woolly on both surfaces. Heads ca 3 mm in diam., golden yellow in leafy spikes. Involucral bracts ca 1.2 mm long, lanceolate; inner ones ca 2.2 mm long, subacute, glabrous. Ray florets 1.5 mm long, filiform 3-4-fid; disc florets ca 1.5 mm long.

Common in waste places, along streams. Bhopal, Damoh, Panna, Raigarh, Sidhi, Surguja. Fl. & Fr.: March-April.

4. *Gnaphalium pulvinatum* Delile, Descr. del. Egypte 266. 1812; Hook. f., Fl. Brit. Ind. 3: 389. 1881.

Annual prostrate woolly herbs, 10-25 cm high; branches spreading from the rootstock. Leaves 5-12×2-6 mm, spatulate, mucronate, attenuate at base. Heads ca 2 mm in diam., immersed in wool, in the axil of crowded terminal leaves. Involucral bracts 2-3-seriate; outer bracts ca 2.5 mm long, linear-lanceolate, scarious-margined. Ray florets ca 3 mm long, filiform, 3-4-fid, acuminate; disc florets ca 2 mm long, tubular, 5-lobed. Achenes ca 0.5 mm long, oblong, minutely pillose.

Common in wastelands. Bhopal, Damoh, Narsimhapur, Sagar. Fl. & Fr.: March-April.

33. GONIOCAULON Cass.

Annual erect glabrous herbs with angled branched stem. Leaves alternate, narrow-toothed. Heads narrow, fascicled and corymbose, homogamous. Involucral bracts many-seriate, imbricate. Corolla-tube slender; limb long, cylindrical, 5-fid to the middle. Anther bases sagittate, connate, tails short. Style-arms filiform. Achenes glabrous, oblong, subterete, with about 20 ribs; pappus paleaceous, the scale multiseriate.

Monotypic, Indo-Malayan in distribution.

Goniocaulon indicum (Klein ex Willd.) Clarke, Comp. Ind 236. 1876; Jeffrey in Kew Bull. 22: 134. 1968. *G. glabrum* Cass. in Bull. Soc. Phil. 34: 1817; Hook. f., Fl. Brit. Ind. 3: 377. 1881. *Serratula indica* Klein ex Willd., Sp. Pl. 3: 1642. 1804. *Amberboa indica* DC., Prodr. 5: 558. 1836.

Annual erect herbs, 30-100 cm high; stem 4-8-angled. Leaves 4-12×2-3 cm, amplexicaul, linear-oblong or obovate-oblong, obtuse, toothed or serrate, with black dots on both surfaces. Heads ca 8 mm in diam., in fascicle, on compound corymbs. Involucral bracts many-seriate, lanceolate, acute; outer bracts smaller and inner ones larger; corolla ca 12 mm long. Achenes ca 6 mm long, 5-fid, rose-purple, closely ribbed, glabrous,

yellowish; pappus scale many-seriate, unequal, light yellow.

Common on roadsides. Chhindwara, Gwalior, Raipur, Seoni. *Fl. & Fr.*: Nov.-Dec.

34. GRANGEA Adans.

Annual prostrate and ascending herbs. Leaves alternate, sessile, pinnatifid. Heads usually solitary, axillary and terminal, peduncled, globose, radiate, heterogamous. Involucral bracts 2-3-seriate, elliptic-oblong, ciliate along margin. Outer florets female, 2-3-seriate, ligulate, filiform, 2-lobed, bisexual; disc florets tubular-campanulate, 4-5-lobed. Anthers bases obtuse. Style with short triangular appendages. Achenes compressed, glandular, turbinate, truncate at tip; pappus cupulate, fimbriate at the margin.

About four species throughout the world; one in M.P.

Grangea maderaspatana (L.) Poir. in Lamk., *Encycl. Suppl.* 2: 825, 1812; Hook.f., *Fl. Brit. Ind.* 3: 247, 1881. *Artemisia maderaspatana* L., *Sp. Pl.* 849, 1753.

Annual prostrate tufted leafy herbs; branches 5-15 cm long, forming circular patches. Leaves alternate, sessile, 2-7 cm long, pinnatifid; lobes opposite, rounded, hairy. Heads 5-6 mm across, solitary, on 2-3 cm long peduncle. Involucral bracts 2-3-seriate, 4-5 mm long, elliptic-oblong, with ciliate margins. Ray florets ca 2 mm long, tubular, 4-5-lobed. Achenes 1-1.5 mm long, compressed, glandular-turbinate, truncate at tip with 2 hairy tubular pappus.

Common on dry river beds and around tank and ditches. Balaghat, Bilaspur, Damoh, Durg, Gwalior, Raigarh, Raipur, Shahdol. *Fl. & Fr.*: Feb.-March.

35. GUIZOTIA Cass.

Annual herbs. Leaves opposite, sessile, subentire, pinnately veined. Heads solitary, peduncled, radiate. Involucral bracts 2-seriate, outer foliaceous, inner smaller, enclosing florets. Corolla of marginal flower ligulate, ligule 3-dentate. Disc florets campanulate, 5-lobed. Anthers shortly sagittate or entire at base, acute at tip. Style arms short. Achenes angled, compressed, glabrous; pappus absent.

About 3 species distributed throughout the world; one in M.P.

Guizotia abyssinica (L.f.) Cass. in Cuvier, *Dict. Sci. Nat.* 5: 237 & 248, 1829; Hook.f., *Fl. Brit. Ind.* 3: 308, 1881. *Polymnia abyssinica* L.f., *Suppl. Pl.* 383, 1781.

Annual erect leafy herbs, 15 - 100 cm high. Leaves opposite, sessile, 3 - 13 x 4 - 6 cm, linear or lanceolate-oblong, obtuse, serrate, glabrous. Heads 0.5 - 2 cm in diam. Involucral bracts biseriate; outer involucral bracts ca 15 mm long, broadly elliptic or ovate, obtuse, green; inner ones ca 1 cm long, like palea. Ray florets 1 - 1.5 cm long, ligulate, 3-toothed, yellow; disc florets 4 - 7 mm long, campanulate, 5-fid. Achenes 3 - 5 mm long, black, 4-angled, glabrous, tip rounded; pappus absent.

Commonly cultivated for edible oil, but often found as escape. Bastar, Bilaspur, Mandla, Raigarh, Raipur, Sidhi, Surguja. *Fl. & Fr.*: Jan. - Feb.

36. HELIANTHUS L.

Annual erect herbs. Leaves alternate, ovate or ovate-oblong. Heads solitary or in racemes, corymbs or panicles, large, heterogamous, radiate. Involucral bracts 3 - 6-seriate, acute, often patent; marginal florets numerous, 1-seriate, neutral; disc florets numerous, bisexual, tubular, 5-lobed. Anthers with an entire or shortly sagittate base and a subacute apex. Style arms with a hairy, acute appendage. Achenes oblong or obovoid, glabrous; pappus consisting of 2 caducous scales.

About 110 species, cosmopolitan, several species are ornamentals; 2-3 species cultivated for oil seeds. One in M. P.

Helianthus annuus L., Sp. Pl. 904, 1753.

Annual erect simple or rarely sparingly branched robust herbs, 70 - 130 cm high. Leaves alternate, ovate or ovate-oblong, 7 - 15 x 3.5 - 8 cm, serrate or hispid on both surfaces. Heads 5 - 30 cm in diam., nodding; involucral bracts 3 - 6-seriate, ovate or oblong. Ray florets 2 - 8 mm long, yellow; disc florets 7 - 10 mm long, 5-lobed, yellow or brown. Achenes 6 - 15 mm long, oblong, yellowish or black; pappus scales 2 - 6 mm long.

Cultivated for ornamental purposes in garden and parks throughout the state, and now for extraction of edible oil. *Fl. & Fr.*: Dec. - Feb.

37. HELICHRYSUM Mill.

Herbs or undershrubs, usually densely white tomentose, sometimes merely pubescent. Leaves alternate, entire-margined. Heads small, numerous, in dense corymbs, heterogamous, disciform. Involucre bracts imbricate, scarious, yellow. Female florets marginal, filiform, 3-lobed. Hermaphrodite florets tubular, 5-lobed. Anther bases caudate. Achenes oblong, obscurely 4 - 5-angled; pappus 1-seriate.

About 260 species, cosmopolitan; one in M.P.

Helichrysum buddleoides DC. var. *hookerianum* (Wight & Arn.) Hook.f., *Fl. Brit. Ind.* 3: 291, 1881. *Helichrysum hookerianum* Wight & Arn. in

DC., Prodr. 6: 201. 1837; Clarke, Comp. Ind. 166. 1876.

Annual or perennial erect undershrubs, 1.5–2 m high; stem cylindrical, densely covered with white or pale brown cottony tomentum. Leaves alternate, oblong-lanceolate, 4–6.5 × 1.5 cm, margins recurved, 3–5-nerved at base, glabrous above, white tomentose beneath. Heads ca 3 mm diam., in terminal corymbs; involucrel bracts 4-seriate; outer bracts ca 3 mm long, oblanceolate or spatulate, obtuse; inner bracts ca 3 mm long, oblanceolate, scarious at margins; ray florets ca 2 mm long, filiform, 3-lobed; disc florets ca 2.3 mm long, tubular, 5-lobed. Achenes ca 0.5 mm long, oblong, minutely puberulous; pappus white, ca 2 mm long.

On rocky slopes. Rare. Bhopal (Oomnathan, 1977). Fl. & Fr.: Oct.–Dec.

38. HYMENATHERUM Cass.

Annual erect herbs. Leaves sessile, pinnatisect. Heads solitary; involucrel bracts uni-seriate, lanceolate, oblong, margins ciliate. Ray florets ligulate, 3-notched at apex; disc florets 5-lobed. Anther bases sagittate. Achenes oblong, angled, ribbed; pappus uniseriate, setose, hairs unequal.

Monotypic, tropical American, introduced in M.P.

Hymenatherum tenuifolium Cass., Dict. 22: 313. 1821. Fig. 49.

Annual erect herbs, 10–30 cm high; stem sub-quadrangular. Leaves sessile, 2–5 cm long, pinnatisect; lobes filiform, glabrous. Heads ca 6 mm in diam., solitary. Involucrel bracts uni-seriate, 6–7 mm long, lanceolate, oblong, margin ciliate. Ray florets ligulate, 6–9 mm long, 3-notched at the apex; disc florets 2–3 mm long, 5-lobed. Achenes 3–4 mm long, oblong, angled, ribbed, black, hispidly hairy; pappus ca 3 mm long, uniseriate, setose with unequal hairs.

In open lands. Rare. Shivpuri. Fl. & Fr.: Aug.–Sept.

39. JURINEA Cass.

Annual herbs. Leaves entire, toothed or pinnatifid, rarely armed, more or less tomentose. Heads homogamous; involucrel bracts multiseriate, imbricate; innermost narrow, erect; outer shorter; all flowers bisexual, tubular, 5-fid. Anther bases sagittate, auricles usually connate; tails elongate. Achenes glabrous, 4–5-angled, pappus multiseriate, unequal, feathery.

About 40 species, cosmopolitan; one in M.P.

Jurinea ceratocarpa Benth. in Gen. Pl. 2: 474. 1873; Hook. f., Fl. Brit. Ind. 3: 378. 1881.

Annual erect branched scaberulous herbs, 20–100 cm high. Lower leaves radical, 5–12 × 2–5 cm, linear-oblong or lanceolate, entire or

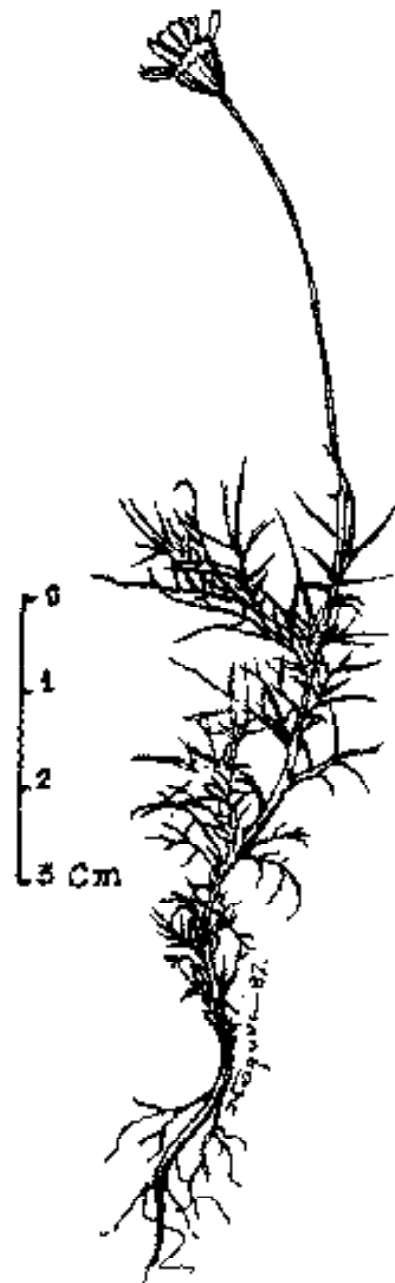


Fig. 49. *Hymenatherum tenuifolium* Cass.

pinnatifid; upper leaves sessile, base auricled, hairy above, white tomentose beneath. Heads 1.5 - 2.5 cm in diam., pedicelled. Involucral bracts many-seriate; outer bracts 1 - 2.5 mm long, linear; inner ones 5-10 mm long, lanceolate, acuminate. Corolla \approx 1.3 mm long, slender; tube 5-fid up to middle. Achenes \approx 6 mm long, glabrous, 4-5-angled, ending with erect spines; pappus \approx 1 cm long, unequal, feathery, white.

On slopes, in dry places. Rare. Bilaspur. *Fl. & Fr.*: March - April.

40. LACTUCA L.

Annual erect herbs with white milky juice. Leaves in a radical rosette or alternate. Heads numerous in terminal panicles; flowers homogamous. Involucral bracts few-seriate, imbricate, herbaceous, with scarious margins. Flowers bisexual. Corolla ligulate, 5-dentate. Anthers with a sagittate base and acute basal auricles, obtuse at the apex. Achenes ellipsoid, oblong or linear, compressed on both sides with 1 or more prominent ribs; pappus hair numerous, many-seriate.

About 100 species, cosmopolitan; one in M.P.

Lactuca remotiflora DC. in Wight. *Contrib. Bot. Ind.* 26. 1834; Hook. *f.*, *Fl. Brit. Ind.* 3: 403. 1881.

Annual slender herbs, 10 - 40 cm tall. Leaves radical, 4 - 10 \times 2.3 - 4.5 cm, obovate or oblong, spathulate, margins finely sinuate-toothed, glabrous. Heads \approx 5 mm in diam., in racemes. Involucral bracts many-seriate; outer bracts \approx 3 mm long, ovate, acute, scarious; inner ones \approx 1 cm long, linear-oblong, sub-obtuse with scarious margins. Corollas \approx 1 cm long, 5-toothed, yellow. Achenes \approx 2 mm long, compressed, ribbed, black, muriculate; pappus \approx 6 mm long, silvery white.

On old walls. Rare. Gwalior. *Fl. & Fr.*: Dec. - Feb.

41. LAGASCEA Cav.

Annual herbs. Leaves generally opposite, petiolate, crenate, palmately veined. Heads 1-flowered, discoid, clustered into compound heads. Involucral bracts 5-connate. Flowers all bisexual, tubular, infundibuliform above, limb 5-lobed. Anthers with oblong-obtuse appendages at the apex, sagittate caudate at the base. Achenes narrowly obovoid or fusiform, somewhat compressed; pappus minutely coroniform or absent.

About 7 species in tropical America; one in M.P.

Lagascea mollis Cav., *Anales Ci. Nat.* 6: 333, t. 44. 1803; Hook. *f.*, *Fl. Brit. Ind.* 3: 302. 1881.

Annual erect branched herbs, 30 - 75 cm high; stems grooved, glabrous at base. Leaves opposite, 1.5 - 5 \times 1 - 2.5 cm, ovate, grey pubescent, base

rounded, apex acuminate. Heads leafy, in terminal and axillary clusters, densely pubescent. Involucral bracts 4-5 mm long, lanceolate, acute, connate at base, densely silky hairy. Corolla tubular, white, 5-lobed. Achenes ca 3 mm long, compressed, cuneate, 3-angled, top rounded; pappus cup-like, fimbriate, 4-lobed.

Common weed of moist waste places and in cultivated field. Balaghat, Bhopal, Damoh, Raipur, Rajnandgaon, Seoni, Shahdol. *Fl. & Fr.*: Oct. - Dec.

42. LAGGERA Schultz-Bip. ex Hochst.

Annual or perennial erect herbs; stem often winged. Leaves alternate, dentate, pinnately veined. Heads usually in short panicles or sometimes solitary, radiate. Involucral bracts many-seriate, the outer short. Outer florets female, many; disc florets fewer. Anthers not tailed. Achenes angled or ribbed, glabrous; pappus 1-seriate, caducous.

About 20 species in tropical Africa, Arabia, India; 3 in M.P.

- 1a. Stems not winged; heads on long peduncles ... 2. *L. aurita*
- 1b. Stems winged; heads on short peduncles:
 - 2a. Stem wings entire and continuous; anther-bases sagittate ... 1. *L. alata*
 - 2b. Stem wings deeply lobed or toothed, often discontinuous; anther-bases obtuse ... 3. *L. crispa*

1. *Laggera alata* (D. Don) Schultz-Bip. ex Oliver in Trans. Linn. Soc. London 29: 94. 1873; Hook. f., Fl. Brit. Ind. 3: 271. 1881. *Erigeron alatum* D. Don, Prodr. Fl. Nep. 171. 1825.

Annual erect herbs, up to 1 m high; stems broadly winged, clothed with viscous or glandular pubescence. Leaves sessile, 3-8 x 0.7-3 cm, oblong-lanceolate, decurrent on to wings of stems, dentate-glandular. Heads ca 7 mm in diam., in racemose panicles. Involucral bracts many-seriate; outer bracts ca 5 mm long, lanceolate, acute, glandular-pubescent, often recurved; inner ones ca 8 mm long, linear, acuminate, straight, scarious, sub-glabrous. Ray florets ca 5 mm long, filiform, toothed; disc florets ca 4 mm long, 5-toothed. Achenes ca 1 mm long, cylindrical, ribbed, hairy; pappus ca 8 mm long, white.

Common in mixed deciduous forests and on hill slopes. Bilaspur, Hoshangabad, Raigarh, Raipur, Surguja. *Fl. & Fr.*: Jan. - Feb.

2. *Laggera aurita* Schultz-Bip. ex Schw. Beitr. Fl. Aethiop. 151. 1867; Hook. f., Fl. Brit. Ind. 3: 271. 1881.

Annual erect herbs, 30-90 cm high; stems viscous hairy, woody at base. Leaves 2-5 cm long, obovate or oblanceolate, toothed, lobed or half

pinnatifid, viscous, hairy on both surfaces. Heads ca 1 mm in diam., in corymbose or diffuse panicles. Involucral bracts many-seriate; outer bracts ca 4 mm long, herbaceous, silky hairy; inner bracts ca 6 mm long, linear, scarious, acute. Ray florets ca 5 mm long, filiform, minutely toothed; disc florets ca 4 mm long, 5-lobed. Achenes ca 1 mm long, cylindrical, obscurely ribbed, thinly hairy; pappus ca 4 mm long, white.

On roadsides. Rarc. Surguja. Fl. & Fr.: Feb. March.

3. *Laggera crispa* (Vahl) Hepper & Wood in Kew Bull. 38: 83. 1983. *Conyza crispa* Vahl, Symb. Bot. 1: 71. 1790. *L. pterodonta* (DC.) Schultz-Bip. ex Oliver in Trans. Linn. Soc. London 29: 94. 1873; Hook.f., Fl. Brit. Ind. 3: 271. 1881. *Blumea pterodonta* DC. in Wt., Contrib. Bot. Ind. 16. 1834.

Annual or perennial erect much-branched viscid herbs, 50–150 cm high; stems winged, toothed. Leaves 2–15 × 0.3–5 cm, obovate or oblong, subacute and apiculate at apex, serrate-dentate at margins; lower leaves often lyrate-pinnatifid. Heads ca 6 mm in diam., in terminal leafy corymbiform panicles, on 1.5–5 cm long peduncles. Involucral bracts 3–4-seriate; outer bracts ca 5 mm long, linear, with purplish tips. Ray-florets ca 7 mm long, filiform, 2–3-lobed; disc-florets ca 5 mm long, tubular, 5-lobed; lobes glandular hairy. Achenes ca 1.2 mm long, ribbed; pappus ca 5 mm long, white.

In moist deciduous forest; rare. Shahdol. Fl. & Fr.: Jan. March.

43. LAUNAEA Cass.

Annual or perennial herbs; stems erect or prostrate and stoloniferous. Leaves alternate or rosulate, oblanceolate and sinuate-dentate or runcinate-pinnatifid, margins sub-spinulous. Heads solitary or few on short peduncled or in sessile axillary group in branched spike-like inflorescences. Involucral bracts multiseriate, outer ones shorter than the inner ones, with narrow scarious margins. Flowers ligulate; ligule 5-toothed at apex. Anther bases shortly fimbriate-caudate. Achenes narrow, 4–5-angular, truncate or tapering and rostrate at the apex. Pappus about as long as the involucre, 1-seriate, deciduous.

About 40 species from Mediterranean to East Asia, tropical and South Africa; 3 in M.P.

- 1a. Achenes with a contracted top; leaves entire or remotely denticulate ... 1. *L. acaulis*
- 1b. Achenes with a truncate apex not contracted at the top; leaves lyrate-pinnatifid:
 - 2a. Flowering branches dichotomously branched; achenes ca 7 mm long ... 3. *L. residifolia*

- 2h. Flowering branches not dichotomously branched;
 achenes ca 3 mm long ... 2. *L. procumbens*

1. *Launaea acaulis* (Roxb.) Babt. ex Ker. in Craib, Fl. Siam. Enum. 2: 299. 1936. *Prenanthes acaulis* Roxb., Fl. Ind. 3: 403. 1832. *Crepis acaulis* (Roxb.) Hook. f., Fl. Brit. Ind. 3: 396. 1881.

Perennial dwarf herbs, 8-10 cm high. Leaves radical, 2-8 × 0.5-0.8 cm, narrowly obovate-spathular or lanceolate-linear, obtuse or acute, entire or sinuate-toothed at margins, glabrous. Heads ca 5 mm in diam., in dichotomously branched panicles. Involucral bracts 2-seriate; outer bracts ca 2 mm long; inner ones ca 1.3 mm long, linear-lanceolate, glabrous. Corolla ca 17 mm long, 5-toothed, yellow. Achenes ca 5 mm long, beaked, ribbed, glabrous; pappus ca 8 mm long, soft silvery white.

On moist sandy alluvium soils. Bilaspur, Raigarh, Surguja. Fl. & Fr.: Jan.-Feb.

2. *Launaea procumbens* (Roxb.) Ramayya & Rajagopal in Kew Bull. 23: 465. 1969. *Prenanthes procumbens* Roxb., Fl. Ind. ed. 2. 3: 404. 1832. *L. nudicaulis* Hook. f., Fl. Brit. Ind. 3: 416. 1881 (non Less., 1832).

Annual much branched glabrous herbs, 20-40 cm high; stems naked or leaf-bearing. Leaves in basal rosette, 4-20 cm, pinnatifid, obovate-oblong or spatulate, dentate, teeth cartilaginous. Heads 12-18 mm long, cylindrical, remotely sub-racemose along the branches. Involucral bracts 3-seriate; outer bracts small, ovate; inner ones 10-12 mm long, linear-oblong with scarious margins. Corolla ca 12 mm long, ligulate, 5-toothed. Achenes 2.5-3 mm long, compressed, thick, 4-ribbed, rugulose; pappus hairs with a fibrous disc.

Common Weeds of waste places and cultivated lands. Damoh, Gwalior, Rewa, Satna. Fl. & Fr.: Dec.-Feb.

3. *Launaea residifolia* (L.) Kuntze, Rev. Gen. Pl. 1: 351. 1891; Bhandari, Fl. Indian Desert 205. 1978. *Scouzonera residifolia* L., Sp. Pl. 1113. 1753. *L. chondrioides* Hook. f., Fl. Brit. India 3: 415. 1881.

Annual or perennial erect glabrous herbs, 20-60 cm high. Radical leaves rosulate, runcinate-pinnatifid, 6-13 cm long; lobes many, unequal, irregularly toothed. Flowering branches dichotomously branched; heads ca 15 mm long, terminal, ovoid. Involucral bracts glabrous, 3-4-seriate; outer bracts ca 2.5 mm long, ovate, acute; inner ones ca 1 cm long, linear-lanceolate, acute, membranous. Corolla ca 15 mm long, ligulate, 5-toothed at apex. Achenes ca 7 mm long, narrowly oblong, truncate at both ends, strongly ribbed, ribs slightly hairy; pappus ca 8 mm long, soft white, outer hairs smaller than the inner ones.

On sandy soils and also as weeds. Rare. Raisen. Fl. & Fr.: Nov. Dec.

44. OLIGOCHAETA (DC.) C. Koch

Annual erect or divaricately diffuse herbs. Leaves alternate, toothed or remotely pinnatifid. Heads heterogamous. Involucral bracts many-seriate, imbricate, the innermost narrow, acute, sometimes coloured, mucronate or terminated by an awn or a simple spreading spine. Outer florets 1-seriate, neuter; disc florets bisexual, 5-fid. Anther bases sagittate, the auricles connate, shortly tailed. Achenes obovoid or oblong, sub-terete or angled, ribbed; pappus paleaceous, many-seriate.

About 5 species distributed from South Europe, North Africa, West India and India; one in M.P.

Oligochaeta ramosa (Roxb.) Wagenitz in Veroff., Geobot. Inst. Rubel. Zurich 37: 323. 1962. *Cardus ramosus* Roxb., Fl. Ind. ed. 2. 3: 407. 1832. *Voluntrella divaricata* Benth. in Benth. & Hook f., Gen. Pl. 2: 476. 1873, p.p. Hook. f., Fl. Brit. Ind. 3: 383. 1881.

Annual procumbent or straggling dichotomously branched herbs, 30-60 cm tall; branches longitudinally straight, angular-scabrid. Leaves 2-4 cm long, oblong or obovate, toothed, usually pinnatifid. Heads 12-25 mm long, ovoid. Involucral bracts many-seriate, spinescent at tip. Corolla purplish. Achenes 4-5 mm long, dull brown, acutely angled; pappus hairs numerous, unequal, silvery brown.

Common on well drained soils of waste places. Bilaspur, Damoh, Indore, Raipur, Rajnandgaon, Rewa. Fl. & Fr.: Oct. April.

45. PARTHENIUM L.

Annual erect herbs. Leaves alternate, sessile, bipinnatifid. Heads many, peduncled, in panicles. Involucral bracts 2-seriate; outer florets 5, female; inner few, male. Corolla in female on obovate, entire ligule; in male tubular, 5-lobed. Anthers obtuse below. Achenes dorsally compressed, narrowed below; pappus of 2 lateral reflexed awns.

About 15 species, tropical and subtropical America; one spreading throughout India.

Parthenium hysterophorus L., Sp. Pl. 988. 1753; Rao in J. Bombay Nat. Hist. Soc. 54: 218. 1956.

Annual erect diffusely branched herbs, 50-100 cm high; stems longitudinally grooved, covered with white hairs. Leaves deeply 1-2 pinnately dissected, 2-10 × 3-5 cm. Heads ca 5 mm in diam. Involucral bracts 2-seriate; outer bracts ca 3.5 mm long, herbaceous; inner bracts ca 3 mm long, thinner, subtending. Ray florets ca 4 mm long, urcculate with

indistinct lobes, membranous; disc florets ca 3.5 mm long, infundibuliform, 5-lobed. Achenes ca 2 mm long, obovate, black-crowned with remnant of corolla appendage and style.

Common on waste and moist places. Damoh, Raigarh, Raipur, Rajnandgaon. Fl. & Fr.: Sept.- Oct.

Causes allergic symptoms like eczema, rashes and asthma in human being and harmful to cattle.

46. PENTANEMA Cass.

Annual or perennial herbs. Leaves alternate, entire or toothed. Heads solitary, terminal or on leaf-opposed peduncles, heterogamous. Involucral bracts many-seriate, narrow with scarious margins. Ray florets female, 1 2-seriate, 2 3-toothed; disc florets bisexual, 5-toothed. Anther bases sagittate, tails slender. Achenes small, hardly ribbed, tip rounded; pappus hairs in ray florets few or absent, in disc florets few to many.

Two species in M.P.

- | | |
|--|-------------------------|
| 1a. Leaves petioled; involucral bracts squarrose; ray florets pappus | ... 1. <i>P. cernua</i> |
| 1b. Leaves sessile; involucral bracts erect; ray florets epappose | ... 2. <i>P. indica</i> |

1. *Pentanema cernua* (Dalz.) Ling in Acta Phytotax. Sin. 10: 180 1965. *Vicoa cernuus* Dalz. & Gibs., Bombay Fl. 126. 1861; Hook. f., Fl. Brit. Ind. 3: 297. 1881.

Annual erect herbs, 10 35 cm high. Leaves petioled, 1.5 4 × 0.7 1.5 cm, elliptic-lanceolate, acuminate, serrate, sparsely hairy on both surfaces, upper leaves sessile with small auricles at base. Heads 0.7 1.3 cm in diam., drooping, often with a small foliaceous bract above the middle. Involucral bracts ca 5 mm long, slender, setaceous, with long filiform tips, outer squarrose hairy. Ray florets ca 7 mm long, linear, shortly 3-toothed at apex; disc florets ca 5 mm long, oblong, sparsely hairy; pappus 3 4 mm long, white.

In shaded and slopy places. Rare. Bastar. Fl. & Fr.: Jan. Feb.

2. *Pentanema indica* (L.) Ling in Act Phytotax. Sin. 10: 179. 1965. *Inula indica* L., Sp. Pl. ed. 2. 1236. 1763. *Vicoa indica* (L.) DC. in Wt. Contrib. Bot. Ind. 10. 1834; Bhandari, Fl. Indian Desert. 213. 1978. *V. auriculata* Cass., Ann. Sci. Nat. Ser. 1, 17; 418. 1929; Hook. f., Fl. Brit. Ind. 3: 297. 1881.

Annual suffruticose herbs, 30 60 cm high; stems reddish brown, hairy. Leaves sessile, 2 5 × 0.5 - 0.6 cm, ovate-lanceolate, acute, cordate-hastate at base, scabrid on margin, pubescent on both surfaces.

Heads 1.3 - 1.5 cm across, usually solitary. Involucral bracts 3 - 4- seriate, 2 - 4 mm long, linear-lanceolate, acute, pubescent outside. Ray-florets 4 - 5 mm long, 3-dentate, bright yellow; disc-florets with infundibuliform 5-dentate corollas. Achenes ca 1 mm long, thinly hairy in disc-florets, glabrous in ray florets; pappus hairs white.

Common in open grassland and moist shaded places. Damoh, Raigarh, Shahdol, Rajnandgaon, Seoni, Surguja.

47. PHYLLOCEPHALUM B1.

Annual herbs. Leaves alternate, serrate, pinnately veined. Heads axillary or terminal, solitary, few to many in corymbs or sometimes in sessile, clusters. Involucral bracts multi-seriate, outer herbaceous, inner scarious. Corolla tubular, tube thin, 5-fid. Anthers obtusely auricled, Style-arms rather long, acute, hairy. Achenes ribbed, hairy or glabrous; pappus 1-seriate, scabrid.

About 20 species in the tropics; one in M.P.

Phyllocephalum indicum (Less.) Kirkman in *Rhodora* 83: 12. 1981. *Ampherephis indica* Less. in *Linnaea* 6: 686. 1831. *Centratherum reticulatum* Benth.; in Benth. & Hook. f., *Gen. Pl.* 2: 225. 1873; Hook. f., *Fl. Brit. Ind.* 3: 227. 1881. *Centratherum indicum* (Less.) Fischer in *Kew Bull.* 1940: 40. 1940.

Annual erect branched herbs, up to 1 m high. Leaves sessile, ovate or oblong, toothed at margins, 5 - 10 × 2.5 - 4.8 cm, scabrid above, dirty white beneath. Heads ca 1.8 cm in diam., sub-solitary. Involucral bracts large, often leafy; outer bracts 2 - 3 cm long, lanceolate or oblong, elliptic-acute; inner bracts ca 6 cm long, broad acute pubescent. Corolla violet, ca 1.5 cm long, 5-lobed. Achenes ca 2 mm long, obtuse, ribbed; pappus 3 - 4 mm long, yellowish, scabrid.

On roadside. Rare. Hoshangabad. *Fl. & Fr.*: Oct. - Nov.

48. PULICARIA Gaertn.

Annual or perennial herbs. Leaves alternate, serrate-dentate, usually amplexicaul below. Heads mostly solitary, peduncled, terminal, usually radiate, rarely discoid. Involucral bracts 2 - 3- seriate, narrow. Ray-florets male, 1 - 2- seriate. Disc-florets slender, bisexual, 5-fid. Anther-bases sagittate with minute auricles. Achenes terete or ribbed; pappus biseriate, outer shorter, the inner elongate, dentate, deciduous.

About 24 species in Europe, Asia and Africa; 4 in M.P.

- 1a. Stems cottony-tomentose; achenes glabrous ... 2. *P. crispata*
 1b. Stems not cottony tomentose; achenes sparsely hairy:

2a. Ray florets tubular; achenes less than 1 mm long ... 3. *P. foliolosa*

2b. Ray florets ligulate; achenes more than 1 mm long:

3a. Plants 7 - 30 mm tall; peduncles not thickened above

... 1. *P. angustifolia*

3b. Plants 20 - 70 cm tall; peduncles thickened above. 4. *P. wightiana*

1. *Pulicaria angustifolia* DC., Prodr. 5:479. 1836; Hook. f., Fl. Brit. Ind. 3: 299. 1881.

Annual erect herbs, 7 - 30 cm high, woody at base. Leaves sessile, 1.3 × 0.3 - 1 cm, linear-oblong or obovate, entire or serrulate, obtuse, hairy on both surfaces. Heads ca 12 mm in diam., on hairy peduncle. Involucral bracts biseriate; outer bracts ca 2 mm long, linear, oblong, green, pubescent; inner ones ca 3 mm long, scarious, acute at apex. Ray-florets ca 7 mm long, ligulate, yellow; disc-florets ca 5 mm long, 5-dentate. Achene ca 1.5 mm long, scarcely quadrangular, with a few scattered hairs; pappus 2-seriate, outer row a setulose-laciniate cup; inner row of white barbellate hairs.

Common on black clayey soil. Raipur, Sidhi, Tikamgarh. Fl. & Fr.: Aug. - Nov.

2. *Pulicaria crispa* (Cass.) Benth. & Hook. f., Gen. Pl. 2 : 336. 1867; Hook. f., Fl. Brit. Ind. 3 : 299. 1881. *Francoeuria crispa* Cass. in Dict. Sci. Nat. 38 : 374. 1825.

Annual or perennial erect branched whitish woolly herbs, 30 - 70 cm high, woody at base. Leaves sessile, 1.8 - 3.7 × 0.3 - 1 cm, obovate-oblong, obtuse, margins crisped or recurved, toothed; upper most leaves linear or lanceolate, woolly on both surfaces. Heads ca 12 mm in diam., in branched panicles. Involucral bracts many-seriate; outer bracts ca 2 mm long, linear, acute, glandular hairy; inner bracts ca 4 mm long, linear, acute, scarious. Ray-florets ca 3 mm long, ligulate; disc-florets 3 - 5-dentate. Achenes ca 0.5 mm long, terete, glabrous; pappus ca 2.3 mm long, white, sub-plumosely scabrid above.

Common in open waste places. Shahdol. Fl. & Fr.: Nov. - Dec.

3. *Pulicaria foliolosa* DC., Prodr. 5 : 480. 1836; Hook. f., Fl. Brit. Ind. 3: 298. 1881. Fig. 50.

Annual erect much branched herbs, 20 - 40 cm high; stems and branches pubescent. Leaves 2 - 8 × 0.6 - 2 cm, linear-oblong or oblanceolate, obtuse at apex, hairy on both surfaces. Heads ca 7 mm in diam., glandular-woolly. Involucral bracts 2 - 3-seriate, unequal, setaceous, hairy. Ray-florets ca 3 mm long, filiform, tubular, 3-toothed; disc-florets ca 5 mm



Fig. 50. *Pulicaria foliolosa* DC.

long, tubular, 5-fid. Achenes *ca* 0.7 mm long, oblong, terete, sparsely hairy; pappus 1 - 2.5 mm long, biseriate, outer minute toothed, inner longer, slender, white.

Common in moist waste places. Bilaspur, Damoh, Hoshangabad, Rajnandgaon. *Fl. & Fr.*: Feb. - March.

4. *Pulicaria wightiana* (DC.) Clarke, *Comp. Ind.* 128. 1876; Hook. *f.*, *Fl. Brit. Ind.* 3: 298. 1881. *Poloa wightiana* DC. in Guill. *Arch. Bot. (Paris)* 2: 514. 1833.

Annual erect branched herbs, 20 - 70 cm high. Leaves sessile, 2 - 6 × 0.3 - 0.5 cm, oblong, entire or serrate, pubescent on both surfaces. Heads *ca* 2 cm in diam., on hairy peduncle. Involucral bracts many-seriate; outer bracts *ca* 6 mm long, linear, oblong, herbaceous, pubescent above; inner ones *ca* 1 cm long, linear-lanceolate, acute, scarious. Ray-florets *ca* 2 cm long, ligulate, 3-toothed at apex; disc-florets *ca* 1.5 cm. Achenes *ca* 1.5 mm long, oblong, terete, somewhat quadrangular, sparsely pubescent; outer row of pappus setulose, cup lacinate; inner row of barbellate hairs.

On dry hill slopes. Rare. Hoshangabad. *Fl. & Fr.*: Nov. - Dec.

49. SCLEROCARPUS Jacq.

Annual or perennial branched herbs. Leaves alternate or the lower opposite. Heads terminal, heterogamous. Involucral bracts few, 2-seriate, herbaceous. Ray-florets ligulate; disc-florets bisexual, 3 - 5-fid. Anther-bases subentire. Achenes obovoid sub-compressed, glabrous, narrowed below, enclosed in the rugose, often beaked, paleae.

About 15 species from Southern United States and tropical Africa; one in M.P.

Sclerocarpus africanus Jacq. *ex Murr.*, *Syst. Veg.* ed. 14. 783. 1784; Hook. *f.*, *Fl. Brit. Ind.* 3: 305. 1881.

Annual erect herbs, 30 - 70 cm high; stems hispid. Leaves 3 - 6 × 1.3 - 2.5 cm, ovate, acute, crenate-serrate, scabrid on both surfaces; petioles *ca* 1.3 cm long. Heads *ca* 1 cm in diam., terminal, subsessile. Involucral bracts 2-seriate, *ca* 8 mm long, ovate, scabrid above, glabrous beneath. Ray florets 3, sterile, 1-seriate, ligule spreading; disc-florets *ca* 7 mm long, tubular, 3-5-fid, hairy. Achenes *ca* 8 mm long, obovoid, sub-compressed, smooth; pappus absent; palea boat-shaped, ribbed.

In grassland and river bank. Rare. Hoshangabad, Indore, Tikamgarh. *Fl. & Fr.*: Sept. - Oct.

50. *SENECIO* L.

Annual or perennial herbs, shrubs or climbers. Leaves alternate, simple, entire, or toothed or pinnatifid. Heads many, corymbose or paniculate, peduncled, radiate, rarely discoid. Involucral bracts 1-2-seriate, outer shorter. Ray florets several, yellow. Disc-florets tubular, 5-lobed. Anthers oblong, obtuse at the apex, minutely sagittate or caudate at base. Achenes ribbed, fusiform; pappus 1-seriate, deciduous, often absent in female, denticulate in bisexual florets.

About 3000 species distributed throughout the world; 4 in M.P.

- 1a. Climbing herbs or undershrubs ... 1. *S. corymbosus*
 1b. Erect herbs:
 2a. Achenes ca 1.2 mm long, glandular hairy ... 3. *S. nudicaulis*
 2b. Achenes more than ca 1.5 mm long, eglandular, hairy:
 3a. Lower surface of leaves cottony-tomentose; achenes
 hairy; pappus white ... 2. *S. edgeworthii*
 3b. Lower surface of leaves hairy; achenes glabrous;
 pappus reddish-white ... 4. *S. wightii*

1. *Senecio corymbosus* Wall. ex DC. in Wight, Contrib. Bot. Ind. 22. 1834; Hook. f., Fl. Brit. Ind. 3:351. 1881.

Perennial climbers, attaining about 6 m length. Leaves 3-8 × 2.5-6.5 cm, broadly ovate, cordate at base, acute or acuminate at apex, denticular at margins, glabrous above, tomentose beneath; petioles 2-4 cm long. Heads axillary, corymbose, discoid, 7-15-flowered. Involucral bracts 6-8, somewhat araneose at base, 5-7 mm long. Corolla 6-8 mm long, yellow. Achenes ca 3 mm long, glabrous, 5-ribbed; pappus white, 6-7 mm long.

Along bank of streams. Rare. Bastar. Fl. & Fr.: Oct.

2. *Senecio edgeworthii* Hook. f., Fl. Brit. Ind. 3: 345. 1881.

Annual erect herbs, up to 40 cm high; stems terete or obtusely angled. Leaves 2-4 × 1.5-2.3 cm, ovate or rhomboid, obtuse or subacute, sinuate-dentate, rough above, white pubescent beneath; petiole 8-15 mm long. Heads laxly corymbose, yellow, bracteolate. Involucral bracts ca 5 mm long, linear-lanceolate, acute, woolly at base. Ray-florets 12-14, sterile, ligulate, obscurely 3-toothed at apex; disc-florets truncate, pecticillate. Achenes ca 2 mm long, oblong, ribbed; pappus ca 2.5 mm long, white.

In forest undergrowth. Rare. Hoshangabad. Fl. & Fr.: Oct. - Nov.

3. *Senecio nudicaulis* Buch.-Ham. ex D. Don, Prodr. Fl. Nep. 179. 1825; Hook. f., Fl. Brit. Ind. 3: 340. 1881. Fig. 51.

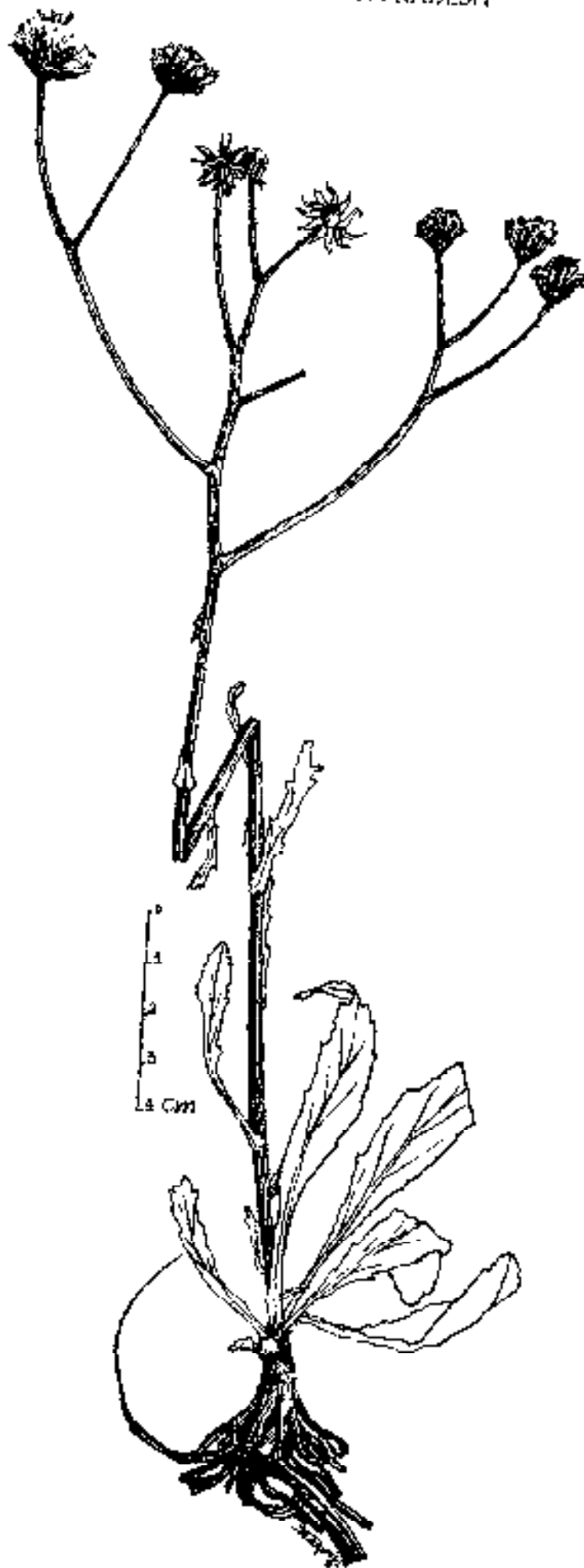


Fig. 51. *Senecio indicaulis* Buch. - Ham. ex D. Don

Annual or perennial herbs, 30-40 cm high, with thick fleshy roots. Basal leaves rosette, oblanceolate-spathulate; cauline leaves, lanceolate or oblong, obtuse, with a semi-amplexicaul base. Heads yellow, ca 2 cm across, on 1-2 cm long bracteate peduncles, arranged in corymbiform panicles. Involucral bracts ca 6 mm long, lanceolate, acute, with scarious margins; marginal florets 10-12, with ca 1 cm long ligules; disc-florets ca 6 mm long. Achenes ca 1.2 mm long, glandular hairy; pappus hairs white.

On roadsides. Bilaspur, Surguja. *Fl. & Fr.*: Feb. - March.

4. *Senecio wightii* (DC.) Benth. ex Clarke, *Comp. Ind.* 197. 1876. *Doronicum wightii* DC. in Wight, *Contrib. Bot. Ind.* 23. 1834. *Senecio saxatilis* DC., *Prodr.* 6: 367. 1838; Hook. f., *Fl. Brit. Ind.* 3: 344. 1881.

Annual erect hirsute herbs, 30-70 cm high. Leaves sessile, amplexicaul at base, 5-10 x 0.5-1 cm, ovate-lanceolate or elliptic-oblong, acute or acuminate, 1-nerved, serrate-dentate, acute or acuminate, 1-nerved, serrate-dentate, hairy on both surfaces. Heads ca 6 mm across, with 2-6 cm long peduncles, sub-corymbose. Involucral bracts ca 5 mm long, oblong-lanceolate, acuminate. Ray-florets 8-12, ca 1 cm long; disc-florets ca 5 mm long, 4-dentate, yellow. Achenes ca 5 mm long, linear, slender, ribbed, glabrous; pappus ca 6 mm long, white or reddish.

On dried stream beds. Hoshangabad, Narsimhapur. *Fl. & Fr.*: Feb. - March.

51. SIGESBECKIA L.

Annual erect herbs. Leaves simple, opposite. Heads few to many, in corymbose panicles, heterogamous. Involucral bracts 2-seriate, the outer cylindrical and clavate-glandular, the inner enclosing ray-florets. Ray-florets few, with short basal tubes; disc-florets 5-lobed, tubular. Anther-bases sagittate, apical appendages ovate. Achenes obovoid, tetragonous, curved, rounded at the apex; pappus absent.

About 60 species in tropical America, Africa, Malaya Peninsula; one in M.P.

Sigesbeckia orientalis L., *Sp. Pl.* 900. 1753; Hook. f., *Fl. Brit. Ind.* 3: 304. 1881.

Annual erect branched herbs, up to 1 m high. Leaves opposite, 5-10 x 3-7 cm, ovate-triangular or rhomboid with cuneate base, obtuse or acute at apex, margins irregularly serrate-dentate, pubescent on both surfaces; petioles 0.5-3 cm long. Heads 4-5 mm in diam. Involucral bracts 2-seriate; outer bracts 5, 5-15 mm long, spatulate, obtuse, glandular hairy on the back, glandular-viscid within; inner ones 5-7, ca 5 mm long, broadly ovate, glabrous within. Ray-florets 5, ca 2.5 mm long, yellow, 3-dentate; disc-florets

5-10, yellow, ca 1.7 mm long, glandular at base. Achenes ca 3 mm long, dark brown; pappus absent paleae ca 4.5 mm long, broadly elliptic-ovate, obtuse, glandular hairy.

Common in forest undergrowth and along streams. Bilaspur, Mandla, Rajnandgaon, Surguja. *Fl. & Fr.*: Oct. - Nov.

52. SOLIDAGO L.

Annual herbs. Leaves sessile, alternate, lanceolate. Heads unilateral, recurved, in axillary racemes, forming a pyramidal panicle. Involucral bracts 2-seriate, imbricate. Ray-florets ligulate, female; disc-florets hermaphrodite, 5-lobed. Anthers linear-sagittate. Achenes angled or ribbed; pappus in 1-2 rows, white.

About 100 species in North America, Brazil and Europe; one species cultivated in gardens and parks in Madhya Pradesh.

Solidago canadensis L., *Sp. Pl.* 878. 1753.

Annual erect woolly shrubs, 30-60 cm high. Leaves sessile, 3-10 x 0.6-1.5 cm, lanceolate, scabrid hairy above, pubescent below. Heads 3-5 mm in diam., in dense unilateral recurved axillary racemes, forming a pyramidal panicle. Involucral bracts 2-seriate; outer bracts ca 2 mm long, linear, obtuse; inner bracts ca 1.5 mm long, linear with scarious margins. Ray-florets ca 1 mm long, ligulate; disc-florets ca 1.5 mm long, funnel-shaped, 5-lobed. Achenes ca 1 mm long, oblong, ribbed, pubescent; pappus ca 3 mm long, white.

Grown as a hedge plant and often cultivated in gardens and park. Raigarh. *Fl. & Fr.*: Oct. - Dec.

53. SONCHUS L.

Annual or perennial laticiferous herbs. Leaves cauline and rosulate, alternate, those above sessile and amplexicaul, serrate-dentate, sometimes deeply incised, pinnately veined. Heads ligulate, peduncled, collected into sparse panicles, corymbs or umbels. Involucral bracts campanulate, many-seriate, herbaceous. Corolla 5-dentate. Anthers sagittate below. Achenes oblong, narrowed at ends, ribbed, muricate-rugose; pappus 1-seriate, deciduous, silky.

About 50 species in Eurasia and tropical Africa; 4 in M.P.

- 1a. Achenes strongly compressed, narrowly winged, smooth, 3-ribbed ... 1. *S. asper*
- 1b. Achenes not compressed or slightly compressed, not winged, wrinkled, 3-5 ribbed:

- 2a. Corolla-tube somewhat equal to ligule; leaves usually runcinate with acute auricles ... 3. *S. oleraceus*
- 2b. Corolla-tube twice as long as the ligule; leaf margins dentate or denticulate; auricles rounded:
- 3a. Leaves pinnatifid at base, usually 3 - 4-lobed; peduncles and heads covered with simple hairs ... 2. *S. brachyotus*
- 3b. Leaves entire; peduncles and heads with glandular hairs ... 4. *S. wightianus*

1. *Sonchus asper* (L.) Hill, Brit. Herbs. 1 : 47, t. 2. 1756; Hook. f., Fl. Brit. Ind. 3 : 414. 1881. *S. oleraceus* var. *asper* L., Sp. Pl. 794. 1753.

Annual herbs, 15 - 70 cm high. Lower leaves oblanceolate or spatulate, lobed or undivided; middle leaves often runcinate-pinnatifid, sometimes entire; basal leaves up to 22 cm long, dentate or subspinose at margins, auricles well-developed. Heads ca 15 mm in diam., glandular peduncle. Involucral bracts many seriate, 3 - 12 mm long, ovate-lanceolate, glabrous. Corolla ca 8 mm long, pubescent, 5-fid. Achenes 2.5 - 3 mm long, obovate, narrowly winged, 3-ribbed on each side, brown; pappus ca 8 mm long, silky white.

On roadsides. Raigarh, Sidhi, Surguja. Fl. & Fr.: Dec. - April.

2. *Sonchus brachyotus* DC., Prodr. 7: 186. 1838. *S. arvensis* (auct. pl. non L., 1753); Hook. f., Fl. Brit. Ind. 3: 414. 1881.

Perennial erect herbs, 10 - 100 cm high; with thick tap roots. Leaves basal in rosette; middle leaves oblong or spatulate-oblong, entire or lyrate pinnati-lobed with amplexicaul bases; auricles well developed, acutely dentate at margins; upper leaves linear. Heads ca 15 mm in diam., on glandular-hispid peduncles. Involucral bracts many-seriate, 5 - 10 mm long, lanceolate, acute, clothed with gland-bristles. Corolla ca 15 mm long, 5-fid, bright yellow. Achenes ca 3 mm long, linear-oblong, transversely rugose, 5-ribbed, brown; pappus ca 1 cm long, silky white.

Common on roadsides and moist waste places. Balaghat, Hoshangabad, Raigarh, Surguja. Fl. & Fr.: Dec. - April.

3. *Sonchus oleraceus* L., Sp. Pl. 794. 1753; Hook. f., Fl. Brit. Ind. 3: 414. 1881.

Annual erect branched herbs, 20 - 70 cm high. Leaves cauline, sessile, amplexicaul, 10 - 20 × 4 - 8 cm, ovate-oblong, with acute auricles, margins runcinate; upper leaves lanceolate. Heads ca 1 cm in diam., in open panicles; peduncles glandular or eglandular-hairy. Involucral bracts many-seriate, 4 - 12 mm long, lanceolate, glabrous. Achenes ca 3 mm long, compressed,

rugose, 3-ribbed, minutely muricate between the ribs; pappus ca 6 mm long, silky white.

Common in moist places. Bilaspur, Damoh, Jabalpur, Raigarh, Seoni. Fl. & Fr.: Feb. March.

4. *Sonchus wightianus* DC., Prodr. 7: 187. 1838. *S. arvensis* auct. (non L.), *sensu* Hook. f., Fl. Brit. Ind. 3: 414. 1881.

Perennial erect herbs, 30–100 cm high, with creeping rootstock. Leaves 5–25 × 0.2–6 cm, linear-oblongate; lower leaves entire or pinnatifid with 4–5 pairs of lobes; middle and upper leaves lanceolate, acuminate, margins denticulate. Heads ca 2 cm in diam., corymbose, peduncle glandular-hairy. Involucral bracts many-seriate, 4–12 mm long, linear, with scarious margins, glandular setose and clothed above. Corolla ca 7 mm long, sparsely pubescent. Achenes ca 2.5 mm long, narrowly ellipsoid, tetragonous, transversely rugose; pappus ca 7 mm long, silky white.

On sandy alluvial soil, along rivers. Bilaspur, Raigarh. Fl. & Fr.: Jan. April.

54. SPHAERANTHUS L.

Annual erect branching herbs. Leaves alternate, decurrent, toothed, pinnately veined. Heads discoid, clustered into compound heads on a winged peduncle. Involucral bracts many-seriate; marginal flowers female, tubular, 2–4-lobed; inner florets 1–7, bisexual, tubular, 5-lobed. Anther bases sagittate. Achenes oblong angular often glandular; pappus absent.

About 40 species in Africa, Madagascar, Iraq to Persia and South East Asia; one in M.P.

Sphaeranthus indicus L., Sp. Pl. 927. 1753; Hook. f., Fl. Brit. Ind. 3: 275. 1881.

Annual, procumbent-ascending tomentose aromatic herbs, 30–60 cm high; stems narrowly winged, wing toothed. Leaves sessile, 2.5–5 × 1.5–2 cm, obovate-oblong, acute to rounded at tip, mucronate, margins dentate, glandular-villous on both surfaces. Heads ca 13 mm in diam., globose or ellipsoid, purplish. Involucral bracts 2-seriate; outer bracts ca 3 mm long, linear, apiculate, ciliate and glandular; inner bracts ca 3 mm long, linear-oblongate, acuminate. Ray-florets ca 1.5 mm long, 2-toothed; disc florets 2–2.5 mm long, 5-lobed. Achenes ca 1 mm long, glandular hairy; pappus absent.

Common in dry open forest. Balaghat, Damoh, Hoshangabad, Durg, Raigarh, Raipur, Surguja. Fl. & Fr.: Nov. March.

55. SPILANTHES Jacq.

Annual erect or decumbent herbs. Leaves opposite, petiolate, crenate or subentire, palmately veined. Heads discoid, sometimes radiate, peduncled, solitary or collected into panicles, axillary or terminal. Involucral bracts 1-2-seriate. Ray florets few, female, with 2-3-dentate ligules. Disc florets tubular, 3-5-lobed, bisexual. Anthers acute below. Achenes dorsally compressed, sometimes trigonous, glabrous or hairy; pappus absent.

About 60 species in tropical America, Africa, Malaya, Borneo and North Australia; 2 in M.P.

- 1a. Heads solitary, terminal; achenes glabrous ... 1. *S. calva*
 1b. Heads in axillary and terminal panicles; achenes hairy
 along margins ... 2. *S. paniculata*

1. *Spilanthes calva* DC. in Wight, Contrib. Bot. Ind. 19. 1834; Koster & Philipson in Blumea 6: 354. 1950. *S. acmella* auct. non (L.) Murr; Hook. f., Fl. Brit. Ind. 3: 307. 1881. excl. var. *oleracea* et *paniculata*. *S. acmella* var. *calva* (DC.) Clarke in Comp. Ind. 138. 1876; Hook. f., Fl. Brit. Ind. 3: 307. 1881.

Annual erect or ascending herbs, 15-40 cm high. Leaves opposite, petioled, 2-5 × 1-2.5 cm, ovate, acute, subcrenate at margins, sparsely pubescent on both surfaces. Heads ca 1 cm in diam., ovoid, usually solitary. Involucral bracts 3.5-4.5 mm long, ovate, acute, sometimes elliptic, glabrous. Ray-florets absent; disc-florets ca 2 mm long, 4-5-lobed, yellow. Achenes ca 2 mm long, narrowly obovate, dark brown, glabrous, ciliate; paleae ca 3 mm long, enfolding achenes; pappus absent.

Common near dried tanks or streams and in waste places. Jabalpur, Raigarh, Seoni. Fl. & Fr.: Nov.-Dec.

2. *Spilanthes paniculata* Wall. ex DC., Prodr. 5: 625. 1836. *S. acmella* (non (L.) Murr.); Hook. f., Fl. Brit. Ind. 3: 307. 1881. (excl. var. *oleracea* and *calva*)

Annual erect or ascending stout herbs, 20-50 cm high. Leaves opposite, petiolate, 1-7 × 0.5-5 cm, broadly ovate, narrowed at base, acute or obtuse at apex. Heads 6-8 mm in diam., in axillary and terminal panicles. Involucral bracts 2-seriate, 3-5 mm long, oblong-elliptic, obtuse or subacute. Ray-florets few, inconspicuous, 4-5 mm long, 2-3-dentate; disc-florets ca 3 mm long, campanulate, 5-lobed. Achenes ca 2 mm long, dorsally compressed, ciliate along the margins, black; pappus of 2-3 weak strigose awns.

Common in mixed forests and open waste places. Balaghat, Damoh, Hoshangabad, Narsimhapur, Seoni, Surguja. *Fl. & Fr.*: March - April.

56. SYNEDRELLA Gaertn.

Annual branched herbs. Leaves opposite, simple, crenate. Heads few to many, sessile, axillary, radiate. Involucral bracts few, outer ones foliaceous, inner ones membranous. Outer florets few, female, ligulate, 2-3-dentate. Disc florets tubular, 4-lobed. Anther bases sagittate, apical appendages minute, rounded. Achenes of ray-florets dorsally compressed, 2-alate; wings lacerate; disc achenes compressed or triquetrous, unwinged; pappus of 2-3 rigid awns.

About 150 species in tropical America, Africa, Madagascar and India; one in M.P.

Synedrella nodiflora (L.) Gaertn., *Fruct.* 2: 456, t. 171, f. 7. 1791; Hook. f., *Fl. Brit. Ind.* 3: 308. 1881. *Verbesina nodiflora* L., *Cent. Pl.* 28. 1755.

Annual erect dichotomously branched herbs, 30-90 cm high. Leaves opposite, petioled, 3-8.5 × 1-5 cm, ovate-lanceolate, margins serrate-dentate, appressed-pilose on both surfaces. Heads ca 5 mm in diam., sessile, axillary. Involucral bracts 2-3-seriate; outer bracts ca 12 mm long, elliptic-ovate; inner ones 6-7 mm long, linear-lanceolate, shining. Ray-florets ca 5 mm long, 2-3-dentate; disc-florets yellow, ca 4 mm long, 4-lobed. Ray achenes ca 4 mm long, puberulous; pappus awns of ray achenes 1.5-2 mm long, and of disc achenes 3-4.5 mm long; paleae ca 6 mm long, lanceolate.

In sandy places. Hoshangabad, Satna. *Fl. & Fr.*: Nov. - Dec.

57. TITHONIA Desf. ex Juss.

Annual or perennial herbs, undershrubs or shrubs. Leaves alternate, usually deeply lobed; lobes crenate, glandular. Heads solitary with an apically thickened peduncle, radiate. Involucral bracts biseriate, thin, glabrous. Ray-florets ligulate, female; disc-florets tubular, 5-toothed. Anthers with entire bases. Achenes oblong, dorsally compressed, hairy; pappus of 2 aristae with numerous intervening persisting scales.

About 10 species in Mexico, Central America and West Indies. One species naturalised in India.

Tithonia diversifolia (Hemsl.) A. Gray in *Proc. Amer. Acad. Arts* 19: 5. 1883; Blake in *Contr. U.S. Natl. Herbs.* 20: 434. 1921. *Mirasolia diversifolia* Hemsl., *Biol. Centr. Amer.* 2: 168, t. 47. 1881.

Annual erect herbs, 1-2 m high; stems striate, glabrescent. Leaves alternate, 5-10 × 2-10 cm, ovate-rhomboid, or 3-5-lobed; lobes

lanceolate-oblong, crenate-serrate, sub-trinerved at base, hispidly hairy above, softly pubescent beneath; petioles 2-10 cm long. Heads ca 1.5 cm in diam., on fistular peduncles. Involucral bracts 3-4-seriate; outer bracts 7-10 mm long, ovate-lanceolate, acute; inner bracts 2-2.5 cm long, obovate-cuneate, obtuse. Ray-florets 4-6 cm long; ligule elliptic, 2-3 lobed. Achenes ca 5.5 mm long, hairy; pappus bristles 2, hairy; palcae ca 12 mm long, oblong, 3-dentate at apex.

On river banks. Rare. Mandla. *Fl. & Fr.*: Nov. - Jan.

58. TRIDAX L.

Annual or perennial herbs. Leaves opposite, short-petioled, palmately veined. Heads solitary, pedunculata, terminal, radiate. Involucral bracts 2-3-seriate, the outer herbaceous, inner scarious. Ray-florets female, 2-lobed; disc-florets tubular, 5-lobed. Anthers shortly acute below. Achenes turbinate, silky-villose; pappus bristles plumose.

About 26 species from Mexico to tropical South Africa. One species naturalised in India.

Tridax procumbens L., Sp. Pl. 900. 1753; Hook. f., Fl. Brit. Ind. 3: 311. 1881.

Annual procumbent ascending hispid herb 15-40 cm high; branching at the base. Leaves 1-6 × 0.5-4 cm, ovate-lanceolate, serrate-dentate, acute, cuneate at base; petioles 5-15 mm long. Heads 7-10 mm diam., solitary. Involucral bracts 2-3-seriate; outer bracts 3.5-6 mm long, lanceolate-acuminate, hairy; inner bracts 5-6 mm long, oblong, membranous. Ray-florets yellow; corolla 2-4 mm long; disc-florets bright yellow, 3.5-6.5 mm long, 5-lobed. Achenes 1.5-2.5 mm long, narrowly-obconical, obscurely angular, brown, beak densely pilose; pappus unequal, 3.5-6 mm long.

Common in waste moist places. Balaghat, Durg, Hoshangabad, Raipur, Rajnandgaon, Surguja, Satna. *Fl. & Fr.*: Almost throughout the year.

59. VERNONIA Schreb.

Annual or perennial herbs, shrubs or trees. Leaves alternate, entire, crenate or serrate, often gland-dotted beneath, pinnately veined. Heads homogamous, few to many-flowered, in axillary or terminal peduncled panicles. Involucral bracts many-seriate, imbricate, campanulate, 5-lobed, white or purplish. Anthers sagittate below. Achenes angled or ribbed, hairy or glabrous; pappus usually biseriate, the inner longer, dentate and often caducous.

About 1000 species in America, Africa, Asia and Australia; six in M.P.

- 1a. Heads 3 - 6 mm long:
 - 2a. Achenes hairy; pappus biseriate ... 3. *V. cinerea*
 - 2b. Achenes glabrous; pappus uniseriate ... 4. *V. divergens*
- 1b. Heads 10 - 13 mm long :
 - 3a. Achenes glandular between ribs and hairy:
 - 4a. Outer involucrel bracts linear-spathulate; achenes 4 - 5 mm long, 10 - ribbed ... 1. *V. anthelmintica*
 - 4b. Outer involucrel bracts lanceolate; achenes 1.5 - 2 mm long, 5-ribbed ... 5. *V. setigera*
 - 3b. Achenes eglandular, only hairy:
 - 5a. Heads solitary or axillary; leaves acute at apex ... 6. *V. squarrosa*
 - 5b. Heads in corymbs; leaves acuminate at apex ... 2. *V. aspera*

1. *Vernonia anthelmintica* (L.) Willd., Sp. Pl. 3: 1634. 1803; Hook. f., Fl. Brit. Ind. 3: 236. 1881. *Conyza anthelmintica* L., Sp. Pl. ed. 2. 1207. 1763.

Annual erect herbs, 50 - 150 cm high. Leaves coriaceous, 5 - 10 × 2 - 4.5 cm, elliptic or oblanceolate, acute or acuminate, serrate, pubescent on both surfaces. Heads ca 15 mm in diam., subcorymbose. Involucrel bracts biseriate; outer bracts 8 - 11 mm long, oblanceolate, herbaceous; inner bract 10-13 mm long, tipped with purple. Corolla 8 - 9 mm long, 5-fid, mauve-coloured. Achenes 4 - 5 mm long, oblong-cylindric, black, 10-ribbed, pubescent on ribs, glandular between grooves; pappus 6 - 7 mm long, tawny white; outer smaller than inner.

On roadsides. Raipur, Rajnandgaon. Fl. & Fr.: Oct. - Nov.

2. *Vernonia aspera* Buch. - Ham. in Trans. Linn. Soc. 14: 219. 1824. *V. pyramidale* (D. Don) Mitra in Ind. For. 99: 100. 1973. *Eupatorium pyramidale* D. Don, Prodr. 170. 1825. *Vernonia roxburghii* Less. in Linnaea 1831: 674. 1831; Hook. f., Fl. Brit. Ind. 3: 232. 1881.

Perennial erect herbs or undershrubs, 50 - 150 cm high. Leaves sessile or petioled, subcoriaceous, 4 - 11 × 2.5 - 4.5 cm, elliptic or obovate lanceolate, acuminate, serrate. Heads ca 12 mm in diam., in corymbose panicles. Involucrel bracts many-seriate; outer bracts 1 - 2 mm long, subulate; inner bracts 7 - 8 mm long, linear, apiculate. Corolla ca 12mm long, tubular, 5-fid, glabrous. Achenes ca 3 mm long, hairy between the ribs; pappus ca 7 mm long, dirty white.

*Common on roadsides. Bilaspur, Raigarh, Raipur, Sidhi, Surguja. Fl. & Fr.: Jan. - Feb.

3. *Vernonia cinerea* (L.) Less. in *Linnaea* 4 (1): 291. 1829; Hook. f., *Fl. Brit. Ind.* 3: 233. 1881. *Coryza cinerea* L., *Sp. Pl.* 862. 1753.

Annual erect or decumbent herbs or undershrubs, 15–70 cm high. Leaves petioled, 2–8 × 1–4 cm, ovate, sub-spathulate-lanceolate or elliptic, obtuse or acute, attenuate at base, pubescent on both surfaces. Heads 2–3 mm in diam., in terminal corymbs. Involucral bracts many-seriate; outer bracts ca 1.5 mm long, narrowly lanceolate; inner bracts 3–4 mm long, oblong-lanceolate, acute or apiculate with white tinged tip. Corolla 4–5 mm long, 5-fid, bluish mauve or white. Achenes ca 1.5 mm long, obscurely 4–5-angled, finely white puberulous; pappus 4–5 mm long, white.

1a. Leaves fulvous-pubescent or grey puberulous beneath:

2a. Leaves rhomboid-elliptic or ovate, flat at margins ... var. *cinerea*

2b. Leaves linear-lanceolate or elliptic, recurved at margins

... var. *linifolia*

1b. Leaves densely villous beneath

... var. *montana*

3.1. var. *cinerea* Very common throughout the state, on roadsides and in waste places. Bilaspur, Damoh, Raigarh, Raipur, Satna, Sidhi, Tikamgarh. *Fl. & Fr.*: Throughout the year.

3.2. var. *linifolia* (Bl.) Koster in *Blumea* 1: 414. 1935. *Vernonia linifolia* Bl., *Bijdr.* 893. 1826.

In the forests, on grassy fields. Rare. Balaghat, Bilaspur, Seoni. *Fl. & Fr.*: Feb.–March.

3.3. var. *montana* Clarke, *Comp. Ind.* 21. 1876.

On swampy soil in mixed forests. Rare. Bastar, Sidhi. *Fl. & Fr.*: Feb.–March.

4. *Vernonia divergens* (Roxb.) Edgew. in *J. Asiat. Soc. Bengal* 21: 172. 1853; Hook. f., *Fl. Brit. Ind.* 3: 234. 1881. *Eupatorium divergens* Roxb., *Fl. Ind. ed. Carrey.* 3: 415. 1832.

Perennial erect undershrubs, 1–1.5 m high. Leaves 6–15 × 2.5–6 cm, elliptic-ovate or lanceolate, acute, serrate; petiole ca 1 cm long. Heads ca 2.5 mm in diam., in corymbose panicles; involucral bracts numerous, imbricate; outer bracts ca 1 mm long, ovate; inner bracts ca 3 mm long, oblong, obtuse, scarious. Corolla ca 5–6 mm long, tubular, glabrous, 5-fid, purple. Achenes ca 2.5 mm long, truncate at both ends, 10-ribbed, minutely hairy; pappus ca 6 mm long, pale, reddish or dirty white.

Common in shaded places and stream bank. Balaghat, Bastar, Bilaspur, Rajnandgaon, Sidhi, Seoni, Surguja. *Fl. & Fr.*: Jan.–Feb.

5. *Vernonia setigera* Arn. in Nova Acta Phys.-Med. Acad. Caes. Leop. Carol. Nat. Cur. 18: 345. 1836; Hook. f., Fl. Brit. Ind. 3: 235. 1881.

Annual erect stout or slender shrubs or undershrubs, 1–1.3 m high. Leaves 4–10 × 1–5 cm, ovate, acute or acuminate, sharply serrate, pubescent on both surfaces, black when dry. Heads ca 2.5 mm in diam., campanulate, numerous in dense corymbs. Involucral bracts numerous, imbricate; outer bracts ca 1 mm long, lanceolate, pubescent; inner bracts abruptly acuminate, setose. Corolla 5–6 mm long, glandular or glabrous, 5-fid. Achenes 1.5–2 mm long, 5-ribbed, glandular within ribs; pappus 5–6 mm long, dirty white.

In forests, on slopes. Rare. Hoshangabad. Fl. & Fr.: Jan.–Feb.

6. *Vernonia squarrosa* (D. Don) Less. in Linnaea 6: 627. 1831. *Acilepis squarrosa* D. Don, Prodr. 169. 1825. *V. teres* Wall. ex DC., Prodr. 5: 15. 1836; Hook. f., Fl. Brit. Ind. 3: 229. 1881.

Perennial erect leafy herbs or undershrubs, 30–120 cm high. Leaves subsessile, 4–12 × 1.7–4.2 cm, obovate or elliptic-lanceolate, acute, sub-serrate, scabrid on both surfaces. Heads ca 2 cm in diam., solitary or axillary. Involucral bracts many-seriate; outer bracts ca 2 mm long, subulate-lanceolate, woolly outsides; inner bracts 8–10 mm long, linear, obtuse. Corolla ca 12 mm long, tubular, 5-fid, glabrous. Achenes ca 3 mm long, ribbed, silky hairy; pappus ca 8 mm long, dirty white or yellowish, outer hairs few, shorter than inner.

As an undergrowth in sal forests. Rare. Surguja. Fl. & Fr.: Jan.–Feb.

60. WEDELIA Jacq.

Annual erect scabrid herbs. Leaves simple, opposite, entire. Heads solitary terminal, peduncled, heterogamous, radiate. Involucral bracts 1–2 seriate. Ray florets ligulate, 2–3-dentate. Disc florets tubular, campanulate, 5-lobed. Anther-bases sagittate, apical appendage ovate. Achenes of ray and disc florets cuneate-obovate, triquetrous or laterally compressed, truncate or rounded at the apex; pappus none or cup-like or consisting of 1–2 weak awns.

About 70 species in the tropical and sub-tropical regions; one in M.P.

Wedelia urticaefolia DC. var. *wightii* DC. in Wight, Contrib. Bot. Ind. 18. 1834; Hook. f., Fl. Brit. Ind. 3: 306. 1881. Fig. 52.

Annual erect herbs, 30–50 cm high; stems terete, slightly grooved, pubescent or scabrid. Leaves opposite, 7–14 × 3–5 cm, ovate, acuminate, sharply serrate, strigosely hispid on both surfaces, base rounded; petioles 5–15 mm long. Heads ca 15 mm in diam., solitary or 2–3 together. Outer

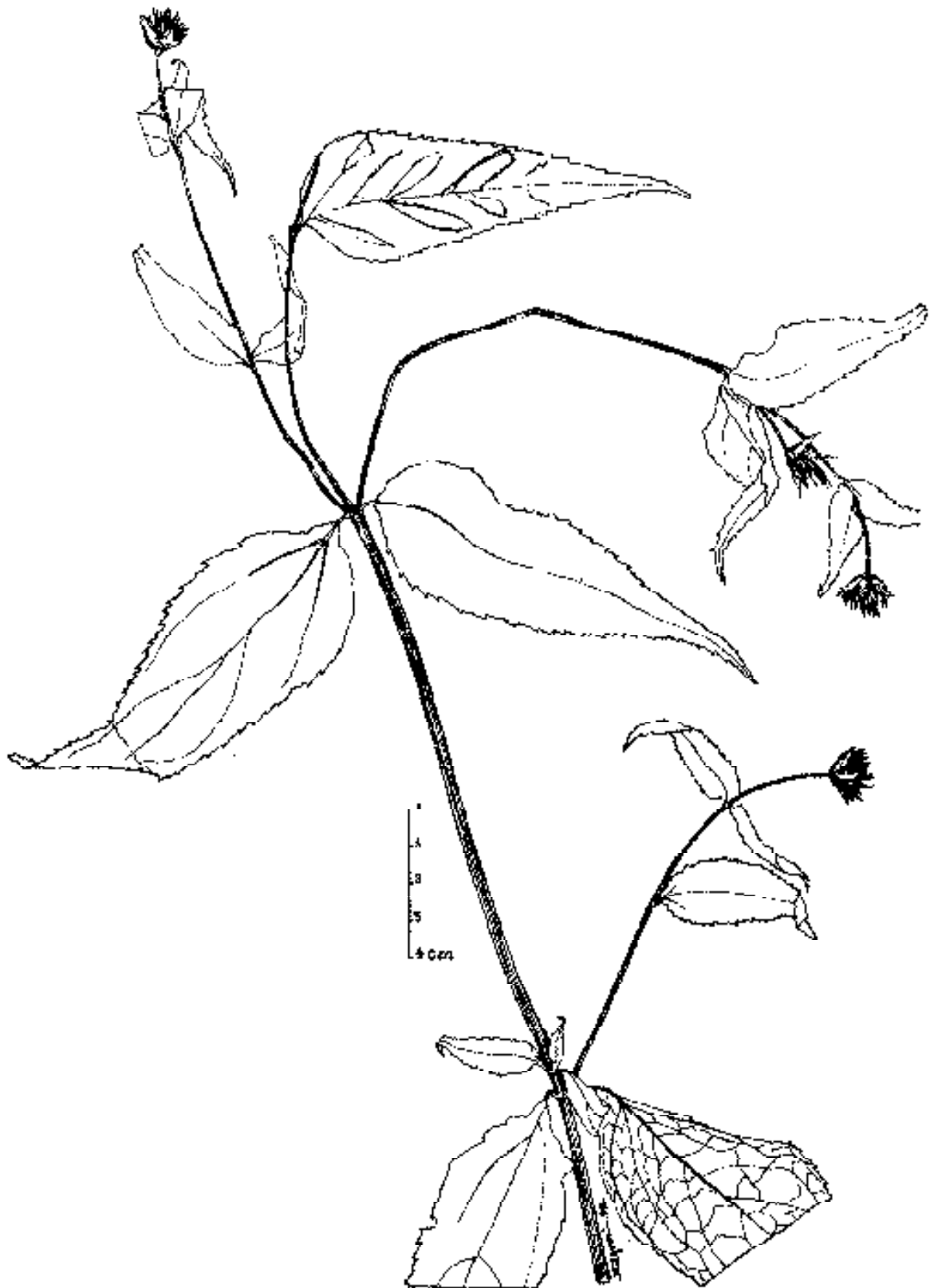


Fig. 52. *Wedelia urticaefolia* DC. var. *wightii* DC.

involucral bracts 8 - 9 mm long, ovate-oblong, acuminate, hairy. Ray florets 1.5-1.8 cm long, ligulate, entire or 2-toothed; disc florets ca 8 mm long, tubular, 5-toothed. Achenes ca 3 mm long, elongate, cuneate, triquetrous,

In waste places. Rare. Raipur, Rajnandgaon. *Fl. & Fr.*: Sept. Oct.

61. XANTHIUM L.

Annual herbs. Leaves alternate, petiolate, lobed, crenate, palmately veined. Heads monoecious, discoid with the functionally male heads in the upper axils and female heads in lower axils. Male head with 1-seriate bracts and many florets, appearing bisexual but achenes sterile, enclosed within palea. Female heads globose, with 2 florets, bracts all connate forming an indurate involucre which is tipped by 2 spinescent hook and covered by hooked spines. Corolla absent. Achenes 2, enclosed within the hardened spinescent involucre; pappus absent.

About 30 species, cosmopolitan; one in M.P.

Xanthium indicum Koen. in Roxb., *Fl. Ind.* Grierson in Dassan. & Fosb., *Rev. Handl. Fl. Ceylon* 1: 209. 1980. ed. 2, 3: 601. 1832. *X. strumarium* L., *Sp. Pl.* 987. 1753; Hook.f., *Fl. Brit. Ind.* 3: 303. 1881.

Annual erect herbs, 0.7 - 1.5 m high. Leaves ovate-triangular, palmately 3 - 5-lobed or-angled, dentate, cuneate, and 3-nerved at base, coarsely hispidulous on both surfaces. Heads monoecious. Male heads with involucral bracts 1-seriate, ciliate; corolla rough, ca 2.5 mm long. Female heads with larger connate involucral bracts; corolla absent. Achenes 1.3 - 1.5 mm long, ovoid or elliptic, enclosed in hardened spinescent involucre of brown colour; pappus absent.

Common weed of waysides and waste lands, showing gregarious growth in low lying areas. Balaghat, Bilaspur, Damoh, Gwalior, Hoshangabad, Panna, Raigarh, Raipur, Surguja. *Fl. & Fr.*: Oct. Dec.

62. YOUNGIA Cass.

Annual or perennial herbs. Leaves sub-pinnatifid or lyrate-pinnatifid. Heads in cymose or corymbiform panicles. Involucral bracts 2-seriate; inner bracts subequal; outer bracts few, short. Florets ligulate, 5-toothed at the apex. Anthers commonly green, caudate, acuminate at the base. Achenes fusiform, 11 - 14-ribbed; pappus uniseriate, united at the base.

About 40 species in temperate and tropical Asia; one in M.P.

Youngia japonica (L.) DC., Prodr. 7: 194. 1838. *Prenanthes japonica* L., Mant. Pl. 107. 1767. *Crepis japonica* Benth., Fl. Hongk. 194. 1861; Hook. f., Fl. Brit. Ind. 3: 395. 1881.

Annual erect herbs, 30–60 cm high. Leaves mostly radical, 6–18 × 3–4 cm, oblanceolate or lyrate, pinnatifid; lateral segments somewhat irregular, glabrous on both surfaces; cauline leaves smaller. Heads ca 2 mm in diam., in corymbose cymes. Involucral bracts 2-seriate; outer bracts ca 1 mm long, linear; inner ones ca 2.5 mm long, linear-lanceolate, glabrous. Corolla ca 6 mm long, 5-toothed, orange yellow. Achenes 1.5–2 mm long, compressed, ribbed; pappus ca 3.5 mm long, uniseriate, soft, white.

On roadsides and wastelands. Rare. Bilaspur, Raigarh. Fl. & Fr.: March–April.

81. STYLIDIACEAE

(A. K. Tripathi)

A family of about 6 genera and 150 species of subtropical and temperate regions, mainly confined to Australia; one in M.P.

STYLIDIUM Sw. ex Willd.

Herbs. Lower leaves spirally arranged, higher ones opposite. Flowers solitary or in more-flowered inflorescences, each in the axil of a leaf or a bract, sessile. Corolla irregularly 5-lobed; lobes 4, suberect in pairs and 1 smaller recurved. Column of stamens elongate, apex at first deflexed, elastically reflexed when irritated; stigma 1. Capsule linear.

About 136 species distributed in East Asia, Australia and New Zealand; one in M.P.

Stylidium tenellum Sw. in Mag. Ges. Naturf. Fr. Berlin 1: 51. t. 2. f. 3. 1807 (non R. Br. 1810); Clarke in Hook. f., Fl. Brit. Ind. 3: 420. 1881.

An erect, annual herb, up to 20 cm high. Stems simple or dichotomously branched, glabrous. Leaves scattered, sessile, oblong or oblong-obovate, obtuse, entire, 3-nerved, 3–5 × 0.8–2 mm, lower ones in a rosette, upper ones smaller, passing gradually into linear bracts. Flowers sessile, 2–3 in cymes. Calyx brown, 1.2–1.5 mm long, sparsely glandular-hairy, 2-lipped, upper lip 2-lobed, the lower 3-lobed. Corolla white, rosy or purplish, 2–3 mm long, with 0.8–1 mm tube; lower 3 lobes minute; upper 2 spatulate, emarginate. Stamens 2; staminal column 3 mm long. Capsule linear, valves united at the top and base, patent gland-hairy, 10–15 mm long.

In moist or swampy places. Balaghat, Hoshangabad, Rajnandgaon. Fl. & Fr.: Sept.–March.

82. CAMPANULACEAE

(A. K. Mukherjee)

A family with about 60-70 genera and nearly 2,000 species in temperate and subtropical regions and also on tropical mountains; 3 genera and 7 species in M.P.

- 1a. Corolla bi-lipped; anthers connate ... 2. *Lobelia*
 1b. Corolla regular; anthers free or somewhat connate:
 2a. Capsule dehiscent loculicidally with 2-3 apical valves ... 3. *Wahlenbergia*
 2b. Capsules dehiscent by lateral pores or by 3 basal valves ... 1. *Campanula*

1. CAMPANULA L.

Annual or perennial herbs. Radical leaves subrosulate; cauline ones alternate. Flowers blue, purple or white, sub-solitary, paniced, spicate or subcapitate, lower often axillary. Calyx deeply 5-lobed, persistent. Corolla campanulate, 5-lobed or 5-fid. Stamens 5, free; filaments dilated at the base. Ovary 3-celled; stigma shortly 3-5-lobed. Capsules truncate, dehiscent by small valves at the base or sides. Seeds numerous, ellipsoid or compressed.

About 300 species mainly in the North temperate regions especially in the Mediterranean and on tropical mountains; 2 in M.P.

- 1a. Flowers 5-6 mm long; calyx lobes linear-lanceolate; annual ... 1. *C. benthamii*
 1b. Flowers up to 15 mm long; calyx lobes lanceolate; perennial ... 2. *C. colorata*

1. *Campanula benthamii* Wall. ex DC., Prodr. 7: 473. 1839; Kitamura, Fl. Afgh. 377. 1960. *C. canescens* Wall. ex DC., Mon. Camp. 292. 1830; DC., Prodr. 7: 473. 1839 (non Roth, 1827) Clarke in Hook. f., Fl. Brit. Ind. 3: 439. 1881. *C. wallichii* Babu in Journ. Bombay Nat. Hist. Soc. 65: 808. 1969.

Multicauline erect annual herbs. Stems patentely hispid-hairy. Basal leaves in a rosette, narrowed into a short petiole, obovate-spathulate; higher ones sessile, linear-lanceolate or oblong, subacute; all leaves subentire-crenulate, hispidly pubescent. Flowers lilac or grey-purple, dimorphic, usually subspicate on the branches of narrow panicles, becoming more diffuse with elongated pedicels in fruit. Corolla hairy outside, divided less than halfway down. Capsules hemispheric, hispidly hairy.

On moist forest floors, hill slopes, and along streams. Bilaspur, Hoshangabad, Narsimhapur, Raipur, Sagar, Seoni, Sidhi, Surguja. *Fl. & Fr.*: Nov.- April.

2. *Campanula colorata* Wall. in Roxb., *Fl. Ind.* 2: 101. 1824; Clarke in Hook. f., *Fl. Brit. Ind.* 3: 440. 1881; Kitamura, *Fauna & Fl. Nep. Himal.* 239. 1955. *Campanula ramulosa* Wall. in Roxb., *Fl. Ind.* 2: 101. 1824.

Ascending or straggling multicauline suberect perennial herbs. Stems flexuous, patent-hairy. Leaves oblanceolate-spathulate to oblong, tapering at base into a short petiole, acute or obtuse, irregularly coarsely serrate-dentate, pilose. Flowers in subsecund racemes, combined into a panicle. Calyx-lobes lanceolate, acute, subentire, pilose. Corolla pale-purple or lilac, hairy outside, divided half-way down; lobes obovate, obtuse. Capsules hemispheric, hairy. Sterile flowers with small calyx-teeth and without corolla and stamens.

On forest floor, hill slopes, and along water courses. Bilaspur, Hoshangabad, Narsimhapur, Raigarh, Sagar, Seoni, Sidhi, Surguja. *Fl. & Fr.*: Jan. April.

2. LOBELIA L.

About 200-300 species, cosmopolitan but mostly in tropical and subtropical regions, especially of America; 3 in M.P.

- 1a. Stems terete or ribbed, not angled; leaves lanceolate or elliptic-lanceolate; rather coarse plants up to 3.5 m high ... 3. *L. nicotianifolia*
- 1b. Stems 2-3-angled, sometimes winged along the edges; leaves generally ovate; rather delicate annual herbs:
 - 2a. Calyx lobes entire; all anthers bearded at their apices; seeds trigonous. ... 1. *L. alsinoides*
 - 2b. Calyx lobes sparsely denticulate; only the two anterior anthers bearded at their apices; seeds ellipsoid ... 2. *L. heyneana*

1. *Lobelia alsinoides* Lamk., *Encycl.* 3: 588. 1791. *Lobelia trigona* Roxb., *Fl. Ind.* 2: 111. 1824; Clarke in Hook. f., *Fl. Brit. Ind.* 3: 423. 1881.

Erect annual herbs, 5-15 cm tall. Stems sharply triangular-ate, glabrous. Leaves sessile or narrowed into a short petiole, ovate-rounded to cordate, obtuse, crenate, glabrous. Flowers axillary, solitary on 1.5-2 cm long pedicels forming a lax leafy terminal raceme. Calyx-lobes triangular-subulate. Corolla blue or violet, hairy within; lobes

ovate-lanceolate, obtuse. Anterior filaments twice as broad as anthers; anthers bearded at apex. Capsules hemispherical. Seeds trigonous, brown.

On moist forest floor, open fields, and dry river beds. Bastar, Betul, Bilaspur, Jabalpur, Morena, Raigarh, Raipur, Rajnandgaon, Sagar, Satna, Seoni, Shivpuri, Sidhi, Surguja. *Fl. & Fr.*: Sept. April.

2. *Lobelia heyneana* Roem. & Schult., Syst. Veg. 5: 50. 1819 (non Spreng., 1825). *L. zeylanica* (non L.) Moon., Cat. 14. 1824 nomen; Clarke in Hook.f., Fl. Brit. Ind. 3: 425. 1881 (incl. var. *walkeri*).

Erect or ascending annual herbs, rarely creeping below. Stems acutely trigonous-alate, glabrous. Leaves ovate-oblong, usually narrowed into a petiole, acutely dentate-serrate, apex acute. Flowers axillary, often forming a lax terminal raceme. Calyx-lobes elliptic-lanceolate. Corolla pale-purple or lilac. Two anterior anthers bearded at apex. Capsules obconical.

In moist places, on embankments of paddy field and streams. Bilaspur, Indore, Raigarh, Raipur, Sidhi, Surguja. *Fl. & Fr.*: Nov. Jan.

3. *Lobelia nicotianifolia* Roth ex Roem. & Schult., Syst. Veg. 5: 47. 1819. ('*nicotianaeifolia*'); Wall. in Roxb., Fl. Ind. 2: 110. 1824; Clarke in Hook.f., Fl. Brit. Ind. 3: 427. 1881.

Erect biennial or perennial herbs or undershrubs, up to 3.5 m high. Stems stout, angular above. Leaves spirally arranged, sessile, oblong-lanceolate to elliptic-lanceolate, acute, crenate-serrulate. Racemes terminal, leafy, usually lax. Calyx broadly campanulate, strongly 10-nerved, puberulous; lobes lanceolate, unequal, distantly serrulate. Corolla white; tube curved; upper lip indistinct; lower lip 5-lobed. Filaments dilated at base. Style branches ringed with villous collecting hairs. Capsules broadly cupular campanulate, or depressed globose. Seeds ovoid to ovoid rhomboid, sub-trigonous, pale brown.

On moist areas and along streams. Hoshangabad. *Fl. & Fr.*: July - Dec.

3. WAHLENBERGIA Schrad. ex Roth

Erect or ascending annual or perennial herbs. Leaves cauline, mostly sessile, alternate, rarely opposite, linear, elliptic or spatulate. Flowers solitary, axillary or in sparsely flowered terminal or axillary panicles, distinctly protandrous, mostly blue or white. Calyx persistent, shorter than corolla; tube turbinate or obconic-oblong; lobes 5 or rarely 3-4. Corolla campanulate; usually 5-lobed to about the middle of tube, rarely 3-4 fid. Stamens 5, free, included; filaments broadened at base, ciliate; anther cells linear. Ovary 2-5 locular, with numerous ovules in each locule; stigma 2-5-fid, with recurved branches. Capsules loculicidal by 2-5 valves, dehiscing above calyx-lobes.

About 150 species, cosmopolitan, chiefly in southern hemisphere; 2 in M.P.

- 1a. Petals narrow, almost free; capsules with as many length-wise nerves as there are calyx lobes ... 1. *W. erecta*
- 1b. Corolla with a distinct tube, much longer than the calyx lobes; capsules with twice as many lengthwise nerves as there are calyx lobes ... 2. *W. marginata*

1. *Wahlenbergia erecta* (Roth ex Roem. & Schult.) Tyrr in Fl. Males. Ser. 1, 6: 113. 1960. *Dentella erecta* Roth ex Roem. & Schult., Syst. Veg. 5: 25. 1819. ex descr. *Cephalostigma schimperii* Hochest. ex Rich., Tent. Fl. Abyss. 2: 2. 1851; Clarke in Hook. f., Fl. Brit. Ind. 3: 428. 1881. *Cephalostigma erectum* (Roth ex Roem. & Schult.) Vatke in Linnæa 38: 699. 1874, quad specim., pp.

Erect annual herbs, 10–35 cm tall. Stems flexuose, angular, patently more or less hispid-hairy. Leaves 0.5–2.0 cm long, spirally arranged, sessile, oblong or elliptic, acute, margin thickened, undulate, shallowly and remotely dentate. Flowers axillary and terminal. Pedicels 5–10 mm, filiform, hairy. Calyx lobes 5, linear to narrow-triangular, sparsely patently hairy. Corolla 5-partite; segments linear, as long as the calyx lobes. Stamens 5; filaments membranous, broad at the base, 3-lobed, the side lobes smaller, the middle lobe bearing the anther. Style thickened below the apex, with 3 short stigmatic lobes. Fruits obconic to bell-shaped, 5-nerved, 3-valved; seeds numerous, compressed-ellipsoid, brown.

On moist forest floor, hill slopes and along streams. Bilaspur, Raigarh, Sidhi, Surguja. Fl. & Fr.: Nov.–Feb.

2. *Wahlenbergia marginata* (Thunb.) DC., Mon. Camp. 143. 1830. *Campanula marginata* Thunb., Fl. Jap. 89. 1784. *Wahlenbergia gracilis* DC., Mon. Camp. 142. 1830; Clarke in Hook. f., Fl. Brit. Ind. 3: 429. 1882.

Erect or decumbent perennial herbs, 10–50 cm tall. Leaves linear to elliptic, the lower ones usually broadest, decreasing in size upwards, margin often thickened or undulate. Inflorescence subpanicled at the terminal portion. Calyx lobes 3–5, linear-lanceolate, entire or sometimes sparsely dentate, usually as long as the corolla-tube, sometimes shorter or up to twice as long. Corolla 3–5-lobed, ovate or elliptic, acute or acuminate. Anthers narrow; basal part of the filaments somewhat pentagonal or obtuse, abruptly narrowed to the filiform upper portion. Ovary 2–3-celled; stigma 2–3-lobed. Fruits obconical to bell-shaped, 2–3-valved; seeds ellipsoid, compressed, subenticular, smooth.

On moist forest floor, along the banks of rivers and streams. Balaghat, Bilaspur, Chhatarpur, Damoh, Raigarh, Rajnandgaon, Sagar, Seoni, Shahdol, Sidhi, Surguja. Fl. & Fr.: Dec.–April.

83. PLUMBAGINACEAE

(Anand Kumar)

Cosmopolitan, about 19 genera and 775 species; 2 genera and 3 species in M.P.

- | | |
|----------------------|---------------------------|
| 1a. Calyx eglandular | ... 1. <i>Dyerophytum</i> |
| 1b. Calyx glandular | ... 2. <i>Plumbago</i> |

1. DYEROPHYTUM O. Kuntze

Shrubs or undershrubs, more or less scaly. Leaves simple, alternate. Flowers in terminal sub-paniculate spikes; pedicels very short. Calyx eglandular, deeply 5-fid, 5-ribbed with 5 broad membranous transversely undulate wings between the ribs on the calyx-tube. Corolla infundibuliform; tube long, slender; limb campanulate, 5-lobed. Stamens free, dilated at the base. Ovary oblong-fusiform, more or less 5-gonous; style filiform, 5-branched. Capsule included in the calyx, circumscissile at the base and splitting into 5 valves from the base towards the apex.

Only 3 species in South Africa, Socotra, Arabia and India; one in M.P.

Dyerophytum indicum (Gibs. ex Wight) O. Kuntze, Rev. Gen. Pl. 3: 394. 1891. *Vogelia indica* Gibs. ex Wight, Ic. t. 1075. 1846 & in Calc. J. Nat. Hist. 7: 17. 1847; Clarke in Hook. f., Fl. Brit. Ind. 3: 481. 1882.

Bushy glaucous undershrubs, up to 3 m high; stem and branches scurfy. Leaves pale glaucous green, coriaceous, covered with scurfy scales; lower ones up to 14 × 8 cm, ovate, sub-obtuse, margin undulate; upper up to 6 × 5 cm, elliptic-sub-orbicular, obtuse. Flowers in dense paniculate spikes. Calyx 1–1.5 cm long, tubular, 5-ribbed, the tube winged between the ribs; wings transversely undulate. Corolla-tube 2–2.5 cm, cylindric; lobes 4–6 mm, obovate-oblong, emarginate, apiculate. Stamens included. Style densely hairy at the base; branches short, linear. Capsules 6–8 mm long; seeds ca 4 mm long, smooth, pyriform.

In open places along roadsides. Rare. Indore. Fl.: Dec.

2. PLUMBAGO L.

Perennial herbs or undershrubs, often straggling. Leaves alternate, amplexicaul, membranous. Flowers in terminal racemes or spikes. Calyx tubular, 5-toothed, covered outside with sessile or stalked glands. Corolla hypocrateriform; tube long, slender; lobes spreading. Stamens free, dilated at the base. Ovary oblong; style short, 5-branched. Capsules included in the persistent calyx, circumscissile near the base, caducous part often splitting towards the apex into 5-valves.

About 12 species distributed in the tropics; 2 in M.P.

- 1a. Calyx finely pubescent and glandular except at the base; corolla blue ... 1. *P. capensis*
 1b. Calyx glandular hairy throughout; corolla white (sometimes pale blue) ... 2. *P. zeylanica*

1. *Plumbago capensis* Thunb., Prodr. Pl. Cap. 33. 1794; Oommachan, Fl. Bhopal 230. 1977. - *Kala-chirchitta*.

Diffuse scandent shrubs. Leaves 2-6.5 cm long, elliptic or elliptic-spathulate or elliptic-ovate, apex obtuse or mucronulate, tapering into a short petiole. Flowers in compact panicle. Bracts ovate, mucronate. Calyx 0.6-1 cm long, tubular, 5-fid. Corolla tube ca 2 cm long, 5-lobed. Capsule included, 5-valved.

Planted for showy flowers; native of South Africa. Bhopal (Oommachan, 1977). Fl.: July-Oct.

2. *Plumbago zeylanica* L., Sp. Pl. 151. 1753; Clarke in Hook.f., Fl. Brit. Ind. 3: 480. 1882. - *Chitra, Chitrak, Chtrchitta*.

Straggling shrubs; branches striated. Leaves 7.5 × 3 cm, ovate, acute, abruptly attenuated into a petiole; petiole 1-2 cm long with dilated amplexicaul base. Flowers in dense 10-35 cm long branched spikes; rachis pubescent or glandular. Calyx 1-1.5 cm, tubular, glandular, limb 5-fid, teeth very short. Corolla tube 1.5-2.5 cm; lobes obovate, 6-7 mm long. Anthers bluish-purple. Capsules oblong, acute with 5 furrows; calyx patent and recurved.

Along roadsides and in forest undergrowth; often planted in gardens. Balaghat, Bastar, Bilaspur, Damoh, Guna, Gwalior, Hoshangabad, Indore, Mandla, Rajmandgaon, Rewa, Sagar, Seoni, Shahdol, Surguja, Tikamgarh. Fl.: Aug.-Sept.

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