

FLORA OF BANSWARA
RAJASTHAN

V. SINGH

BOTANICAL SURVEY OF INDIA
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Series 3
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V. Singh



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FOREWORD

The Botanical Survey of India has started publishing the Flora of India under four series.

Series 1 is the National Flora of India, which is being brought out in form of fascicles dealing with various families, tribes or large genera. Eleven fascicles had been brought out till the end of 1982. The work is being intensified and many manuscripts are in press and under editing or preparation.

Series 2 will deal with census of plants of different States or large regions.

Series 3 will deal with floras of districts or such other smaller regions.

Series 4 will have special publications, such as monographs on cryptogams or works which would not be covered under series 1-3.

This Flora of Banswara District, therefore, is a volume in Series 3.

The district of Banswara is situated in southern part of Rajasthan in Western India and borders the States of Madhya Pradesh and Gujarat. The flora has elements of the desert, Deccan peninsula as also of the semi-arid tracts of Gujarat; it is phyto-geographically interesting.

There are two recent large floras available now on western and eastern parts of the State of Rajasthan, but, hardly any detailed work exists on a district or smaller region. The flora of Banswara by Dr. Singh, therefore, should not only serve the purpose of identification and other applications of a local flora for the district of Banswara, but for several other districts in Rajasthan and neighbouring States.

The Botanical Survey has been undertaking work on district or local floras in a small manner for last several years; it has recently been intensified and in addition to the scientists of the Botanical Survey of India, a number of botanists in educational institutions of the country have been involved.

It is hoped that a number of district floras will appear during the current year, and the years to come. They should be useful for students and teachers of botany and officials of the forest and agriculture departments, and also for persons concerned with utilisation and conservation of plant resources.

Dr. Singh will welcome useful suggestions on this flora and will try to incorporate them in future editions.

S. K. Jain

Howrah
19-9-1983

Director
Botanical Survey of India

CONTENTS

	<i>Page</i>
Introduction	1
Previous work and present study	2
Material and methods	2
Topography and general features	3
Geology and soils	4
Climate	5
General aspects of vegetation	6
Economic and medicinal plants	15
Floristic analysis	20
Phytogeographical analysis	21
Plan of the flora	22
Key to the families	25
Enumeration of the species (Annonaceae to Poaceae)	34
Selected bibliography	289
Index to the botanical names	293
Corrigenda	311

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BANSWARA DISTRICT



INTRODUCTION

Rajasthan is the third largest State of India, occupying an area of about 348861 sq. km. i.e. nearly 11 per cent of the total area of India. It forms the eastern extremity of the great arid and semi-arid belt of the world. A striking geological feature of Rajasthan is the presence of Aravalli range which divides the State into eastern and western regions. The western two-third part of the State is unproductive, barren and desert, while the eastern one-third is rich in vegetation and is more fertile. Since the publication of King's (1878) "Sketch of the flora of Rajputana" and Blatter and Hallberg's (1918-21) "The Flora of the Indian Desert", the aridity and other factors influencing the vegetation have attracted the attention of the whole nation and also of the UNESCO. As a result of this, in the last 25 years a large number of lists of plants and accounts on the vegetation of desertic zone have been published (Das and Sarup, 1951; Sarup, 1952, 54, 57, 58a, 58b; Joshi, 1956; Sarup & Vyas, 1957, 58; Tandon, 1958; Sarup & Puri, 1960; Roilla & Kanodia, 1962 etc.) Many symposia (1952, 1964, 1968, 1973, 1976, 1978) have also been organised to discuss the problems of desert and its floral elements. More recently, Puri *et al.* (1964) and Bhandari (1978) have further contributed to our knowledge of the flora of the Rajasthan desert.

The second place which attracted the attention of our botanists after Macadam's (1890) work, is Mount Abu—the highest peak of Aravalli (Sutaria, 1941; Raizada, 1954; Jain, 1962, 67; Gupta & Saxena, 1968 etc.). Since the publication of Duthie's (1903-29) "Flora of Upper Gangetic Plain", the eastern and south-eastern parts of the State have also attracted the attention of some workers during recent years (Vyas, 1967; Ramdeo, 1969; Majumdar, 1973, 79a, 79b; Sharma & Tiagi, 1979; Maheshwari and Singh, 1974, 79 etc.). But, the southern part of the State has been neglected and the only publication available is Kanodia's (1963) account on the vegetation of Banswara district. The southern part of Rajasthan is an extensive plateau and is important geographically since it is close to Madhya Pradesh and Gujarat. Considering the paucity of botanical literature on the vegetation of southern part of the State, the Banswara district has been selected to conduct an intensive botanical exploration with a view to study the floristics and plant-life and prepare a modern flora of the district for the purpose of elucidating the present status of the flora and floral composition. Besides providing the taxonomic data in the present work, local names and economic uses of the plants have also been given with the hope that the present work will not only be useful to the workers engaged in the economic development of the rural areas, but also the industrialists and layman to look more critically

into the plant-wealth of the district.

Banswara district is situated in the southern part of Rajasthan between $23^{\circ}11'$ and $23^{\circ}56'$ N. latitudes and $70^{\circ}00'$ and $74^{\circ}47'$ E. longitudes. The district comprises the territories of the former Banswara State and chiefship of Kushalgarh. It is 93 km in length from north to south and 83 km in breadth from east to west, occupying an area of about 5041 sq. km at the height of about 350 metres above mean sea level. It is bounded by Udaipur and Chittorgarh districts in the north and north-east respectively, by Dungarpur district in the west, by Madhya Pradesh in the east and south-east and by Gujarat State in the south-west. The administrative units of the district are connected by roads. There is no railway line in the district. The population is predominantly (94 per cent) rural and tribal. The principal local language is Bagdi—a dialect of Rajasthan. There are no large scale industries and important trade centres. The economy is mainly agriculture and pastoral. The absence of infra-structure facilities, skilled workers and poor demand of industrial products are mainly responsible for backwardness of the district.

PREVIOUS WORK AND PRESENT STUDY

The earliest recorded information on botanical exploration of Rajasthan is about Jacquemont's journey in 1832 from Delhi to Bombay, via Ajmer and Neemuch. Since then, the vegetation, ecological features and geographical position of the State have attracted the attention of the whole nation and also of the UNESCO. The studies on the flora of Rajasthan have been recently reviewed in detail by Jain (1972), Bhandari (1978), Majumdar (1979b), Shetty and Pandey (1979). A perusal of literature revealed that out of twenty-six districts of Rajasthan eleven viz. Banswara, Bharatpur, Bhilwara, Chittorgarh, Dungarpur, Jalour, Nagaur, Pali, Sawaimadhopur, Sikar and Tonk have not been fully explored. The Arid Zone Circle of Botanical Survey of India, which has recently been established (1972) at Jodhpur, is engaged in the botanical exploration of the under explored and unexplored areas of the State. The present work is a part of the same and it is hoped that it will prove a valuable contribution to our knowledge of plants of Banswara district after Kanodia's brief vegetational account published in 1963.

MATERIAL AND METHODS

The results presented in this flora are based on intensive and extensive explorations and exhaustive study of the plants of Banswara district by the author spread over more than three years (1976-1980) and on the study of the specimens of earlier collectors (Kanodia, Majumdar and Verma)

deposited in the herbaria of Western Circle (BSI) and Central Circle (BSA) of Botanical Survey of India located at Pune and Allahabad respectively. This project was started by the author in early 1976. Many excursions were undertaken to cover the entire region in different seasons so as to collect most of the plants in flowering and fruiting stages and also to note the seasonal changes in vegetation. During the field work, observations on habit, habitat, abundance, ecological features and macroscopic characters of the species such as height, colour of the flower etc., were recorded. The underground parts of some plants, particularly the herbaceous ones, were carefully uprooted, and studied. Further, the local names and local uses of the plants were also ascertained. To present a full account of the vegetation of the district, well established cultivated plants were also studied and included in the present flora.

The specimens were identified with the help of available literature and comparison with authentic specimens. The nomenclature of all the taxa are brought up-to-date in accordance with the International Code of Botanical Nomenclature (ed. 1978). Two herbarium sheets of each taxon, collected by the author, have been deposited in the herbarium of Arid Zone Circle, BSI, Jodhpur (BSJO) and one sheet in the Central National Herbarium, Howrah (CAL).

TOPOGRAPHY AND GENERAL FEATURES

Banswara district is quadrangular in shape with a number of natural and artificial features such as hills, rivers, tanks, ponds, undulating plain etc. The hills, scattered in the north-east and southern part of the district, belong to Aravalli system. Their elevation hardly exceeds 610 m above m.s.l. and they are composed of quartizite-schists formations. The top of the hills is usually flat. The gentle slopes show better soil formation in comparison to the steep slopes which bear conspicuous boulders of rocks and seem dry and bare of soil. The hilly plateau in the eastern and southern parts of the district are rather unproductive, rocky, having river bluffs, interfluves and ravines. The central and western portions of the district are undulating in nature varying in altitude from 140 to 200 m above m.s.l. They represent a rather homogenous topography characterized by hard rocks covered with upper thick fertile layer of soil which is used for cultivation.

The district has five rivers viz. Mahi, Anas, Haran, Eru and Chap. The first two rivers are perennial, but due to high banks and stony beds their water cannot be easily used for irrigation. The river Mahi flows through the district from east at first in northerly direction and then in westerly and south-westerly direction forming a natural boundary between Dungarpur and Banswara districts. The Anas, entering the district from Madhya Pradesh, flows first towards north and then towards west till it falls into the Mahi. Its

principal affluent is the Haran stream. The Eru enters in district in the north-east near Semlia village from Chittorgarh district. After receiving all the drainage of the hills and following a south-westerly course, it joins the Mahi. Its main tributaries are Ponan and Pundia. The Chap, originating in the hills near Kalingera village, flows in the north and then in the west, eventually falling into Mahi, not far from Garhi village. It is fed by Nagli, Kagdi and Kalol streams.

The district is also rich in tanks. Out of more than two hundred fifty tanks, scattered all over the district, about fifty are under the Irrigation Department and are being utilized for irrigation purposes. Patela, Surwania, Makanpura, Mimkhor, Bhatiya, Delwara, Arai, Bhagora, Metwala, Asan and Ramore tanks are the larger ones having capacity of more than one thousand cubic metres. These tanks are periodically subjected to cleaning by way of weed removal and maintain only sparse vegetation. The other deep water tanks, which are important from vegetation point of view, are located near Lamero, Loharia, Karonia, Kalingera, Lasara, Talwara etc. There is no natural lake in the district.

In addition to the vast stretches of fresh water in the shape of permanent tanks, the area abounds in large number of temporary ponds, ditches and low-lying areas which are located along the roads and near habitations. At certain places, the marshes turn into lagoons due to deep stationary water. Such habitats are characterised by the growth of some members of Cyperaceae in association with *Typha angustata* Bory & Chaub.

GEOLOGY AND SOILS

The geological antiquity of the district belongs to (i) Archaean age, representing granite gneiss complex, (ii) Aravalli system, consisting of quartzite-schists formation and (iii) the Deccan trap of the Eocene period which comprises the complex series of metamorphosed sedimentary and igneous rocks. The Deccan trap is generally massive, fine-grained and almost non-vesicular. It weathers into rounded dark boulders and gravels and yields a black, highly fertile soil. The higher slopes and hilly plateau in most cases are lateritic.

The Aravalli series of rocks are met with in the tracts occupied by Garhi, Shergarh and parts of Ghatol. This system is represented by a basal quartzite formation often conglomeratic, an impure carbonate unit and an argillaceous formation consisting of slaty, phyllitic and micaceous schistose types. Lime-stones are nowhere extensively developed.

The composite gneissic complex of the Archaean era represents the oldest formation of the area. Granites are more common in this area than the acid gneisses. Massive homogenous granites occur in the Mahi valley in the eastern part of the district, while near the town of Banswara gneissic

forms prevail.

The soils of Banswara district are mainly of two types. In the west, north-west and north-eastern parts of the district, particularly in the Mahi catchment area, the soils are mainly red loam (Bhuri). These soils are reddish coloured, medium-textured, non-calcareous and well drained. They sometimes degenerate into a kind of gravel and are not much fertile. In the south-west, southern and eastern parts of the district, formed particularly over Deccan trap, are black soils (Kali). These are medium to heavy textured, grey to dark greyish brown in colour and moderately drained. They are extremely fertile and best soils of the area. In the eastern forest-clad tract, both types of soils, i.e. black and red are found much intermingled in varying proportions (Berangi). The soils on the top and slopes of the hills are shallow, with gravelly material very near to the surface. They are light-textured, fairly drained, poor in carbonate and chlorides and rich in nitrates. The river beds and flood plains are characterized by well drained soils which are sandy loam to clay-loam in texture, rich in carbonates and chlorides and poor in nitrate contents, humus and porosity. Humus content is maximum in winter season. Chloride contents does not show any marked difference at different depths and seasons. Water soluble salts increase with the depth and are maximum in rainy season. pH value varies from 6.5—7.5 and does not show any marked change in different seasons and depths, hence, the soils in general are alkaline in nature. The presence of exchangeable bases in profusion is a redeeming feature in almost all the soil types.

CLIMATE

The climate of the district, which lies in subtropical region, is almost semi-arid but milder than that in the desert regions further north and north-west. It is markedly periodic and is characterized by a dry and increasing hot season from March to June with high temperatures, low humidity and low-rainfall, a dry and cold winter season from October to March with low-rainfall, low humidity and low temperatures, and a warm monsoon period from Mid-June to September with high humidity, low temperature and high rainfall.

Temperature :

The mean annual maximum temperature is about 33°C; however, the maximum temperature sometimes reaches upto 42°C in the month of May and June which is the hottest period of the year. Generally, the temperature starts rising by middle of March, reaches the climax by the middle of June and then drops slightly during the rainy season. Further fall in the temperature starts from October and comes to the lowest in the month of January i.e. as low as 4°C. The mean minimum annual temperature is about 15°C.

There are much fluctuations in the temperatures from January to December of a year and between maximum and minimum temperatures. However, the variations in mean annual minimum and maximum temperatures, individually, are not considerable.

Rainfall :

The rainfall is generally low, erratic and monsoonic type. The variations in annual rainfall and number of rainy days from year to year are appreciable. The average annual rainfall for the last ten years is about 922 mm, of which 95 per cent occurs from June to September. The month of July is the雨iest. The remaining five per cent of annual rainfall occurs in the form of local showers during winter season. The months of April, November and December are almost dry. On an average, there are about 40 rainy days in a year.

Relative Humidity :

The relative humidity is minimum in summer season, particularly in April and May (26-30%). The maximum humidity is noted during rainy season, particularly from middle of July to mid August (90%). During the coldest months of winter season, i.e. mid December to January, the relative humidity varies from 75 to 80 per cent. It is interesting to note that the variations in relative humidity during winter and rainy seasons are negligible.

Wind:

The winds are generally light in the post monsoon and winter months, i.e. about 1.5 km/minute. They are moderate and sometimes strong (10 km/minute) during summer and rainy seasons. The annual mean wind velocity is about 5 km/minute. Thunder storms, squalls and dust storms are common between March and June. From April to September, the winds are predominantly from south-west to west. Light easterly or north easterly winds begin to blow from October and continue in the winter months. Westerly winds appear by April and easterlies and north-easterlies become less frequent.

Hail storms are very rare and they generally occur from January to March. Fogs are comparatively more frequent, usually occurring between December to February. In October and to a lesser extent in the monsoon months, the area is affected by depressions and cyclonic storms causing widespread rain.

GENERAL ASPECTS OF VEGETATION

The vegetation presents a very open appearance excepting the forests. The permanent vegetation, occurring throughout the year, is xerophytic in

character. The onset of winter results in the defoliation of most of the trees. As the days warm up, new foliage appears and is followed by flowering and fruiting. The temporary vegetation, consisting of annuals and biennials, on the other hand, shows an abrupt change with change of season. In the following pages biota of forests, wastelands, grasslands, weed and alliens, aquatic and marshland habitats and exotic flora are discussed in details.

1. Forests:

The forests, occupying about 15 per cent of the total area of the district, are mostly confined to the Aravalli hills and undulating terrain, particularly in the eastern and southern parts of the district. They have been divided into six forest ranges and to facilitate docking, the ranges have been further divided into forest blocks and compartments as under:

1. Banswara range: The important forest blocks under this range are Anand Sagar, Chhatripada, Lalpura, Fatehpura, Naya Gaon, Bhapor, Khora, Bari Ghata and Sarwan Devi.
2. Dungra range: Dungra, Sajjangarh and Kalingra are the important forest blocks under this range.
3. Ghatol range: Ghatol, Dapia Bowji, Wadita hillage, Rowal hindwela, Puna pathar and Hura bowji are the important forest blocks under this range.
4. Garhi range: Lohariya is the main forest block under this range.
5. Kushalgarh range: Kotharia, Galdhar, Bagaycha, Bhanwarkot are the chief forest blocks.
6. Bagidora range : Shergarh and Sallopat forest blocks fall under this range.

Further, it is interesting to note that 59 per cent of the forests come under Ghatol range, 20 per cent in Kushalgarh range, 10.5 per cent in Banswara range and the remaining 10.5 per cent forms Bagidora, Dungra and Garhi ranges.

The forests are mainly of dry deciduous type, falling under the category 4-B type E-1 in the Champion's classification of Indian forest types (1968). The crop consists mainly of *Tectona grandis* (Teak). The vegetation in most of the forest blocks is almost similar due to identical topography, soil moisture, soil nature, exposure etc. The altitude also does not have much effect on the zonation of vegetation except that on higher slopes teak is generally replaced by miscellaneous species like *Bauhinia racemosa*, *Boswellia serrata*, *Dalbergia latifolia*, *Lannea coromandelica*, *Phyllanthus emblica*, *Sterculia urens* etc.

The vegetation is more rich on the gentle slopes of the hills and in flat terrain due to better soil formation and water holding capacity. The common trees associates of *Tectona grandis* are *Adina cordifolia*, *Aegle marmelos*, *Albizia odoratissima*, *Anogeissus latifolius*, *Bauhinia racemosa*, *Boswellia*

serrata, *Cassia fistula*, *Dalbergia latifolia*, *Diospyros melanoxylon*, *Flacourzia indica*, *Hymenodictyon excelsum*, *Legerstroemia parviflora*, *Lannea coromandelica*, *Madhuca longifolia*, *Mitragyna parvifolia*, *Phyllanthus emblica*, *Sterculia urens*, *Terminalia arjuna*, *T. bellirica*, *Wrightia tinctoria* etc., which are scattered in an indefinite complex. *Dendrocalamus strictus* is also common. *Aerides crispum* is the only epiphyte found in this district.

The steep slopes which are excessively stony with conspicuous boulders of rocks, support mainly *Euphorbia nerifolia* and *E. nivulia*.

On the outskirts of forests, the vegetation is greatly disturbed. The dry teak forests have been reduced to dry deciduous scrubs with many stemmed crooked branched teak stocks amidst *Acacia chundra*, *A. leucophloea*, *Butea monosperma*, *Holarhena antidysenterica*, *Salvadora persica* etc. At certain places, as in Sarwan Devi block, *Boswallia serrata* dominates the vegetation and teak, wherever it occurs in association, is generally stunted. *Dendrocalamus strictus* is usually absent in such blocks. Along the rivers, particularly Mahi and Anas, the dry deciduous riverian forests dominated by *Terminalia crenulata* are also noted. Further, *Dendrocalamus strictus* does not form dense brakes in any forest block and no association of *Anogeissus pendula* and *Acacia leucophloea* could be observed in this district as mentioned by Champion (1936) and Champion and Seth (1968).

The tree canopy in the forests is considerably open and provides sufficient space for the growth of shrubby and herbaceous flora. The common shrubs and undershrubs met with in the forests are *Azanza lampas*, *Barleria cristata*, *B. prattensis*, *B. prionitis*, *Grewia flavescens*, *G. tiliifolia*, *Helicteres isora*, *Hibiscus caesius*, *H. vitifolius*, *Lantana indica*, *Leea edgeworthii*, *Malhania futteyporensis* and *Nyctanthes arbor-tristis*. The last mentioned species is so abundant at certain places (Lohariya, Anand Sagar forest blocks) that even movement becomes very difficult.

On the outskirts of the forests, where the tree canopy is more open, a large number of shrubs and undershrubs like *Adhatoda zeylanica*, *Abutilon indicum*, *Capparis sepiaria*, *Cassia auriculata*, *C. occidentalis*, *Lantana camara*, *Sida alba*, *S. ovata*, *Triumfetta pentandra*, *T. rotundifolia* etc. grow in abundance.

The notable climbers in the forests are *Aristolochia indica*, *Asparagus racemosus*, *Cryptolepis buchananii*, *Dioscorea bulbifera*, *D. hispida*, *Gloriosa superba*, *Gymnema sylvestre*, *Holostemma annulare*, *Tylophora hirsuta*, *Wattakaka volubilis* etc. The species like *Abrus precatorius*, *Cissampelos pareira*, *Ipomoea sepiaria*, *Mucuna pruriens* etc. are more common towards the outskirts of the forests.

The herbaceous vegetation (ground cover) is fairly dense during rainy season. The common species are *Acanthospermum hispidum*, *Achyranthes aspera*, *Bidens biternata*, *Blainvillea acmella*, *Borreria pusilla*, *Cassia absus*, *C. pumila*, *C. tora*, *Clitoria biflora*, *Curculigo orchoides*, *Curcuma pseudo-*

montana, *Desmodium dichotomum*, *D. gangeticum*, *D. procumbens*, *D. velutinum*, *Hibiscus lobatus*, *Neuracanthus sphaerostachyus*, *Polygala arvensis*, *Phyllanthus virgatus*, *Sclerocarpus africanus*, *Uraria picta*, *Zornia gibbosa* and grasses like *Arthraxon lancifolius*, *Chrysopogon hakeleii*, *Dichanthium caricosum*, *Eragrostis unioloides*, *Heteropogon contortus*, *Oplismenus compositus*, *Panicum walense*, *Pennisetum hordeoides* etc. The details regarding the grasses have been discussed in the chapter on "Grasslands".

During winter and summer season, only few shade loving herbaceous species like *Ageratum conyzoides*, *Biophytum sensitivum*, *Blumea eriantha*, *Canscora diffusa*, *Hoppea dichotoma*, *Lindernia ciliata*, *Oxalis corniculata* etc. may be noted along the water courses in the forests.

2. Wasteland Vegetation :

The area falling outside the range of the forests and cultivated land has been termed as "wasteland" in the present work. This occupies 45 per cent of the total area and presents a very characteristic dry deciduous scrub vegetation containing sparse and discontinuous tree layer with plenty of vacant spaces between them. The most common tree species are: *Acacia leucophloea*, *A. nilotica* subsp. *indica*, *Aegle marmelos*, *Azadirachta indica*, *Balanites aegyptiaca*, *Butea monosperma*, *Cordia dichotoma*, *Dolichandrone falcata*, *Ficus benghalensis*, *F. religiosa*, *Madhuca longifolia*, *Mangifera indica*, *Phoenix sylvestris*, *Pithecellobium dulce*, *Prosopis chilensis*, *P. cineraria*, *Salvadora persica*, *Ziziphus mauritiana* etc.

It is interesting to note that the progressive regeneration of most of the trees, both by seeds and coppice, is negligible due to great biotic pressure on them. *Prosopis chilensis* is the only species which shows highest survival percentage under adverse climatic and biotic conditions and, thus, suggests the possibility of it being used for afforestation in this area. The wasteland habitats are more favourable for shrubs and undershrubs which form a comparatively dense layer in this area. The most common shrubs growing in clumps with trees and in vacant spaces are: *Abutilon indicum*, *Acacia farnesiana*, *A. jacquemontii*, *Adhatoda zeylanica*, *Calotropis procera*, *Capparis decidua*, *C. sepiaria*, *C. zeylanica*, *Clerodendrum phlomidis*, *Dichrostachys cinerea*, *Ficus palmata*, *Kirganelia reticulata*, *Lantana camara*, *Leptadenia pyrotechnica*, *Mimosa hamata*, *Opuntia elatior*, *Solanum incanum* and *Ziziphus nummularia* which is very gregarious at certain places.

A large number of undershrubs also grow in the wastelands ; the most common ones are : *Cassia auriculata*, *C. occidentalis*, *Desmodium gangeticum*, *Malvastrum coromandelianum*, *Pavonia zeylanica*, *Pupalia lappacea*, *Sida alba*, *S. cordifolia*, *S. ovata*, *Triumfetta pentandra*, *T. rotundifolia*, *Urena lobata*, *Xanthium strumarium* etc. There are no epiphytes here. However, some climbers like *Abrus precatorius*, *Argyreia sericea*, *Cissampelos pareira*, *Cocculus hirsutus*, *Cryptostegia grandiflora*, *Leptadenia reticulata*, *Marsdenia tenacissima*,

Mucuna pruriens, *Pergularia daemia*, *Rivea hypocrateriformis*, *Teramnus labialis*, *Wattakaka volubilis* etc. do occur among the trees and shrubs.

Besides these, a large number of annual and perennials ranging from psammophytic and semi-xerophytic to aquatic and amphibious herbs are encountered in the wastelands. With the advent of winter season, a considerable number of compositaceous meadow herbs, in association with *Acalypha ciliata*, *Achyranthes aspera*, *Argemone mexicana*, *Leucas cephalotus*, *Nepeta hindostana*, *Solanum nigrum* etc. come into bloom. The most common compositaceous herbs are : *Ageratum conyzoides*, *Echinops echinatus*, *Eclipta alba*, *Gnaphalium polycaulon*, *Lagascea mollis*, *Launaea procumbens*, *Pulicaria angustifolia*, *Sonchus oleraceus* and *Sphaeranthus indicus* which forms dense mats in black cotton soils at certain places.

The decreasing moisture contents, increasing temperature and high velocity winds during March and April result in the disappearance of most meadow herbs excepting those growing in somewhat moist habitats. The dry meadow herbs appearing during the summer months are very few e.g. *Alhagi pseudalhagi*, *Chrozophora rotteieri*, *Solanum surattense*, *Tridax procumbens* and *Dipcadi serotinum* which possesses underground bulbs and becomes visible above the ground only during the summers.

During rainy season, the area gives glorious appearance of a green carpet of semi-xerophytic and meadow herbs which help in increasing humus content of the soil and extend the vegetation to the barren areas. The life cycle of most of the herbs comes to a close before the winter sets in. The rainy season herbs are dominated by leguminous plants like *Alysicarpus monilifer*, *A. tetragonolobus*, *Cassia pumila*, *C. tora*, *Crotalaria linifolia*, *C. medicaginea*, *C. prostrata*, *Indigofera cordifolia*, *I. linifolia*, *I. linnaei*, *I. trita*, *Psoralea corylifolia*, *Tephrosia villosa*, *Vigna trilobata* etc. The other common associated species include *Aristolochia bracteolata*, *Borreria articularis*, *Cleome simplicifolia*, *C. viscosa*, *Convolvulus prostratus*, *Evolvulus alsinoides*, *Glossocardia bosvallea*, *Merremia tridentata*, *Polygala eriopetra*, *Tridax procumbens* and several grasses among which the species of *Aristida*, *Cenchrus*, *Chloris*, *Eragrostis*, *Tragus*, *Urochloa* etc. are more common.

On the boundaries of fields, gardens and orchards *Antigonon leptopus*, *Canavalia ensiformis*, *Cardiospermum halicacabum*, *Coccinia grandis*, *Delonix elata*, *Dioscorea bulbifera*, *Euphorbia neriifolia*, *E. nivulia*, *Jatropha curcas*, *Momordica dioica*, *Mukta maderaspatana* etc., besides providing protection, beauty and reducing wind velocity also act as an obstacle in the path of moving sand particles and trap them.

A few sciophytic, humus and shade-loving herbs fairly distributed in the gardens, orchards and other similar habitats are : *Baliospermum montanum*, *Biophytum sensitivum*, *Chenopodium album*, *Corchorus olitorius*, *Euphorbia hirta*, *Heliotropium strigosum*, *Hybanthus enneaspermus*, *Lindernia crustacea*, *Oldenlandia corymbosa*, *Oxalis corniculata*, *Phyllanthus fraternus*, *Physalis*

minima, *Solanum nigrum*, *Trianthema portulacastrum* etc.

The parks and play grounds are the most suitable localities for many grasses which form dense mantle and act as an efficient soil-binder. The chief components are *Bothriochloa pertusa*, *Cynodon dactylon*, *Dichanthium annulatum*, *Imperata cylindrica*, *Iseilema laxum*, *Tragus roxburghii* etc. These habitats are frequently subjected to moving and except for some procumbent, spreading herbs, nothing is allowed to come up.

The unproductive corners of cultivated fields, which escape ploughing and have lower percentage of nitrates, humus and low water holding capacity, are most suitable for the growth of lime-loving species like *Chenopodium album*, *Desmostachya bipinnata*, *Echinop echinatus*, *Euphorbia hirta*, *Perotis indica*, *Saccharum spontaneum*, *Vetiveria zizanioides* etc.

Inhabiting semi-demolished walls of ancient buildings and monuments, there are well recognizable associations of meadow herbs like *Bidens biternata*, *Euphorbia hirta*, *Glossocardia bosvallea*, *Haplanthodes verticillata*, *Indoneesiella echioides*, *Lindenbergia indica*, *Tridax procumbens* etc. The seedlings of *Ficus benghalensis* and *F. religiosa* cause damage to the buildings by sending their roots deep down into the walls. *Aerides crispum* is the only epiphyte in this area and *Utricularia exoleta* and *U. stellaris* are the only representatives of insectivorous plants. *Buchnera hispida*, *Dendrophthoe falcata* and *Striga gesnerioides* are the common parasites of the area.

The floristic composition of wastelands i.e. the presence of sparse ground cover during winter and summer, the presence of an abundant ground cover during rainy season, distantly scattered deciduous trees and comparatively dense growth of xerophytic shrubs suggest semi-arid climate in the area.

3. Grasslands :

The grasslands, managed for grass production and subsequent grazing and to check the exposure of soil to the action of rain and high velocity winds, are few. They are usually managed on the outskirts of the forests, more or less naked hillocks and in the degraded forests. The grasslands of such habitats are dominated by tall grasses like *Aristida adscensionis*, *Bothriochloa pertusa*, *Cenchrus ciliaris*, *Chloris barbata*, *Cymbopogon martinii*, *Dichanthium caricosum*, *Digitaria adscendens*, *Dinebra retroflexa*, *Eragrostis unioloides*, *Heteropogon contortus*, *Iseilema laxum*, *Pennisetum hordeoides*, *Sehima nervosum*, *Themeda quadrivalvis*, *Tripogon jacquemontii* etc.

Besides, many-stemmed crooked branched *Bauhinia racemosa*, *Dichrostachys cinerea*, *Mimosa hamata*, *Tectona grandis*, *Ziziphus mauritiana* etc. which are sparsely distributed in the grasslands, some weed species like *Alysicarpus tetragonolobus*, *Celosia argentea*, *Cleome simplicifolia*, *Crotalaria hirsuta*, *Ipomoea sindica*, *Cyperus rotundus* etc. also compete with grasses in several ways and are harmful to the grasslands.

Another category of grasslands occupy large, open, undulating rocky terrain (wastelands). These grasslands have deteriorated for want of protection against grazing and also due to the spread of undesirable thorny bushes and a number of weeds. The most common grass species are : *Alloteropsis cimicina*, species of *Aristida*, *Cenchrus ciliaris*, *Chloris montana*, *Cynodon dactylon*, *Dactyloctenium aegyptium*, species of *Eragrostis*, *Hackelochloa granularis*, *Melanocenchrus jacquemontii*, *Setaria tomentosa*, *Sporobolus tenuissimus*, *Tetrapogon villosus*, *Tragus roxburghii*, *Tripogon purpurascens*, *Urochloa panicoides* etc. which grow on rather thin layer of soil.

Besides these, many characteristic long-stemmed species of first catagory also form distant patches. The study revealed that the scope for the development of good pasture lands along the suitable gentle slopes of hills, on the outskirts of forests and in the wastelands is very bright if the work is done under proper scientific management.

4. Weeds and alliens :

About forty five per cent of the total area of the district is under cultivation and a number of weeds grow with the crops. Most of the weed species are well equipped for dissemination by wind, water, man and animals. The phenological observations revealed that the seedlings of winter weeds come up in the fields a few days later than the crop seedlings and the vegetative phase in most of the weeds extends upto mid-December, after which plants are seen in flowering which is quickly followed by fruiting and by the end of March seed-setting is completed in most of the weed species. The highest weed density may be noted during the months of January and February. The typical weeds associated with the winter season (Rabi) crops are : *Ageratum conyzoides*, *Anagallis arvensis*, *Asphodelus tenuifolius*, *Chenopodium album*, *Cynodon dactylon*, *Euphorbia dracunculoides*, *Fumaria indica*, *Lepidium sativum*, *Lathyrus aphaca*, *Melilotus alba*, *M. indicus*, *Oxalis corniculata*, *Polypogon monspeliensis*, *Striga angustifolia* etc.

The Rabi crop weeds are usually not represented in the weed flora of 'Zayad' crops because the conditions favouring seed-germination are not available during summer months. This indicates that weeds have certain periodicity in germination which seems to be responsible for the occurrence of a particular weed community during a crop season. The typical weeds associated with the summer (Zayad) crops are *Alhagi pseudalhagi*, *Gomphrena celosioides*, *Solanum nigrum*, *S. surattense*, *Tribulus terrestris*, *Ziziphus nummularia* etc.

The paucity in the number of summer weeds is due to unfavourable climate and soil conditions. Some winter season weeds like *Euphorbia dracunculoides*, *Cynodon daetylon*, *Cyperus rotundus* which have lower susceptibility to receding soil moisture and to the rise of temperature, give

considerable cover during early summers.

The density and frequency of rainy season weeds is higher as compared to winter and summer season weeds due to high moisture contents during this period. The common weeds of rainy season (Kharif) are : *Aerva lanata*, *Alysicarpus longifolius*, *Ammannia baccifera*, *Caesulia axillaris*, *Celosia argentea*, *Commelina benghalensis*, *Corchorus aestuans*, *C. olitorius*, *C. trilocularis*, *Cyperus rotundus*, *Digera muricata*, *Eclipta alba*, *Euphorbia hirta*, *Lauaea procumbens*, *Leucas cephalotus*, *L. nutans*, *Oldenlandia corymbosa*, *Oxalis corniculata*, *Trianthema portulacastrum*, *Vernonia cinerea*, *Vicoa indica* etc.

It is interesting to note that majority of weeds are annual and therophytes excepting *Cynodon dactylon*, *Cyperus rotundus*, *Oxalis corniculata*, *Ziziphus nummularia*, which propagate by means of seeds as well as rootstocks. Some weeds like *Ageratum conyzoides*, *Eclipta alba*, *Oxalis corniculata* etc. show wide range of adaptability.

5. Aquatic and Marshland Vegetation :

The area maintains variable habitats for the growth of aquatic and marshland plants. The rivers like Mahi, Anas, Haran, Eru and Chap, passing through hilly and tectonic terrain, are characterised by their rocky bottom and banks. The hydrophytes grow only where a considerable amount of sand accumulates. The artificial tanks, which are used for irrigation, are under great biotic pressure and maintain a very sparse vegetation. The natural deep water tanks like Lamero, Loharia, Karonia, Kalingera, Lasara, Talwara tank etc. and shallow ponds and low-lying areas, including paddy-fields, represent a variable emporium for many aquatic and amphibious plants.

On the basis of their contact with soil, water and air, the hydrophytes of the area may be grouped into following life-forms :

A. FREE-FLOATING : The species like *Pistia stratiotes*, *Utricularia stellaris* etc. come in this group.

B. ATTACHED WITH FLOATING LEAVES AND/OR SHOOTS : The species like *Ipomoea aquatica*, *Nymphaea nouchali*, *N. pubescens*, *Nymphoides cristata*, *Potamogeton nodosus* fall in this category.

C. SUSPENDED SUBMERGED : The species like *Hydrilla verticillata*, *Najas minor*, *Nechamandra alternifolia*, *Potamogeton pectinatus*, *Zannichellia palustris* etc. come in this category.

D. ATTACHED SUBMERGED : The species like *Ottelia alismoides*, *Potamogeton crispus*, *Vallisneria spiralis* etc. fall in the group.

E. AQUATIC AND/OR AMPHIBIOUS EMERGENT : The species like *Aeschynomene indica*, *Hydroclea zeylanica*, *Limnophila indica*, *Polygonum glabrum*, *Sagittaria sagittifolia*, *Typha angustata* etc. constitute to this group of hydrophytes.

F. MARSHLAND : The species like *Ammannia baccifera*, *Caesulia axillaris*, *Hygrophila auriculata*, *Phyla nodiflora*, most of the sedges and few grasses

like *Coix lacryma-jobi*, *Hemarthria compressa*, *Paspalidium flavidum* etc. are the chief components of this life-form.

The area, apparently unsuitable for the growth of luxuriant vegetation, is rich in marshland species. The paucity of aquatic species may be due to the rocky bottom and wide amplitude of water level in puddles and reservoirs. Most of the aquatic and marshland species grow in a number of associations excepting *Pistia stratiotes* and *Typha angustata* which often form pure stands at certain places.

6. Exotic flora/Cultivated plants :

A. CULTIVATED CROPS : About 45 per cent of the total area of the district is under cultivation. Three main seasonal crops, namely Rabi crop-during winter season, Zayad crop-during summer season and Kharif crop-during rainy season, are cultivated on commercial scale.

The food crops of winter season include the cereals, mainly *Triticum aestivum* and few pulses like *Cicer arietinum* and *Pisum sativum*. The important vegetables of winter season are *Brassica campestris* var. *rapa*, *B. oleracea* var. *botrytis*, *B. oleracea* var. *capitata*, *Daucus carota*, *Lycopersicon esculentum*, *Solanum tuberosum*, *Trigonella foenum-graecum* etc. The condimental crops mainly include *Coriandrum sativum* and *Foeniculum vulgare*.

Besides these, the main oil yielding crop cultivated during winter season is *Brassica campestris* var. *sarson*. *Saccharum officinarum* and *Nicotiana tabacum* are the cash crops of winter season. *Medicago sativa* and *Trifolium alexandrinum* are the important fodder crops of winter season.

During summer season, when the soil and climate are dry, a few members of *Cucurbitaceae* are cultivated for their fruits and for vegetables. The most common ones are : *Citrullus fistulosus*, *C. lanatus*, *Cucumis melo*, *C. sativus*, *Cucurbita moschata*, *Lagenaria siceraria*, *Luffa cylindrica*, *Momordica charantia* etc.

The food crops of rainy season include the cereals like *Echinochloa frumentacea*, *Oryza sativa*, *Pennisetum typhoides*, *Setaria italica*, *Sorghum saccharatum*, *Zea mays* etc. and pulses like *Cajanus cajan* and *Vigna radiata*.

The important vegetables of rainy season are : *Abelmoschus esculentus*, *Capsicum annuum*, *Lablab purpureus*, *Cucumis melo* var. *cultus*, *Solanum melongena* etc. *Cyamopsis tetragonoloba*, besides providing edible pods, is the main fodder crop of the season.

The oil-yielding plants of rainy season are : *Arachis hypogaea*, *Gossypium herbaceum* var. *acerifolium* and *Sesamum indicum*. The fibre-yielding plants include : *Crotalaria juncea*, *Gossypium herbaceum* var. *acerifolium* and *Hibiscus cannabinus*.

B. ORCHARDS AND GARDENS : Orchards and gardens are scattered throughout the area, particularly near Banswara, Kushalgarh and Ghatol. Most of the orchards produce summer and rainy season fruits ; the common

ones are : *Aegle marmelos*, *Annona reticulata*, *A. squamosa*, *Citrus medica*, *Mangifera indica*, *Psidium guajava*, *Syzygium cumini* etc.

The fruits produced during winter season are few, like *Manilkara achras*, *M. hexandra*, *Mimusops elengi*, *Phyllanthus emblica* and *Ziziphus mauritiana* etc.

C. ORNAMENTAL AND AVENUE PLANTS : Much of the greenery of the area is provided by a large number of avenue and ornamental trees, shrubs and climbers which have been planted along the roads, canals and in the gardens and parks. The common trees of this type are : *Acacia pinnata*, *Adansonia digitata*, *Ailanthus excelsa*, *Albizia lebbeck*, *Bombax ceiba*, *Cassia fistula*, *C. siamea*, *Crataeva nurvala*, *Delonix regia*, *Eucalyptus tereticornis*, *Gardenia resinifera*, *Melia azedarach*, *Morinda tomentosa*, *Moringa oleifera*, *Pithecellobium dulce*, *Polyalthia longifolia*, *Sapindus laurifolius* etc.

The common shrubs planted/cultivated for ornamental effect and as a screen for privacy are : *Clerodendrum inerme*, *Dodonaea viscosa*, *Euphorbia pulcherima*, *Hibiscus rosa-sinensis*, *H. schizopetalus*, *Lagerstroemia indica*, *Lowsonia inermis*, *Murraya paniculata*, *Nerium indicum*, *Tabernaemontana divaricata*, *Thevetia peruviana* etc.

The common climbers, grown in the gardens, along the walls and pergolas or as twiners around pillars are : *Antigonon leptopus*, *Bougainvillea spectabilis*, *Clitoria ternatea*, *Combretum ovalifolium*, *Jasminum grandiflorum* etc.

Besides these, a large number of seasonal herbs, particularly compositaceous, are cultivated in the gardens and parks for their decorative flowers. It is interesting to note that most of the cultigens are introductions from Madagascar, South Africa, South America, Java, Malaya, Burma, China, Japan, Australia, Brazil etc.

ECONOMIC AND MEDICINAL PLANTS

The flora and plant life of Rajasthan have been studied in greater details in the present century, yet, there is no comprehensive up-to-date published work on the useful and medicinal plants of the State. Recently, in October, 1968 and November 1976, the University Grants Commission, New Delhi organised a symposium in the University of Jodhpur on "Natural Resources of Rajasthan", wherein Gupta and Saxena (1977), Khalsa and Chatterji (1977), Rao and Shiva (1977) and Srivastava (1977) made a preliminary attempt to deal with this aspect. The other notable contributions in the field of economic plants of Rajasthan are those of King (1869-70), Singh (1964), Bhandari (1974) and Singh and Shetty (1977). The present author undertook the botanical exploration of Banswara district with special reference to the economic and medicinal plants to find out the scope for new industries which could be encouraged in the area on the basis of available plant resources.

The results obtained are summarized below :

Tannin :

The chief source of tannin is outer bark; the notable tannin yielding species are : *Acacia chundra*, *A. leucophloea*, *A. nilotica* subsp. *indica*, *Albizia lebbeck*, *A. odoratissima*, *Cassia auriculata*, *C. fistula*, *Ficus religiosa*, *Hymenodictyon excelsum*, *Lannea coromandelica*, *Madhuca longifolia*, *Tamarindus indica*, *Terminalia arjuna* and *Ziziphus mauritiana*. A considerably high percentage of tannin is also found in the endodermis, phloem paranchyma and in the walls, lumina and pit cavities of dead cells of the wood of *Acacia chundra* and *Tamarindus indica*. The young fruits of *Acacia nilotica* subsp. *indica*, *Aegle marmelos* and *Ziziphus mauritiana* bear tannin in the epidermal cells and fleshy tissues. The epidermal and hypodermal cells of the leaves of *Acacia nilotica* subsp. *indica*, *Adhatoda zeylanica*, *Anogeissus latifolius* and *Wrightia tinctoria* contain high percentage of tannin.

Dye :

The most common dye-yielding species are : *Abrus precatorius* (superficial layers of seed coat), *Achyranthes aspera* (ash of the plant), *Butea monosperma* (flowers), *Kirganelia reticulata* (mature fruits) *Phyllanthus fraternus* (stem and leaves).

Gum and resin :

The species containing gum of commercial value are : *Acacia chundra*, *A. nilotica* subsp. *indica*, *Aegle marmelos*, *Ailanthus excelsa*, *Anogeissus latifolius*, *Boswellia serrata*, *Butea monosperma*, *Lannea coromandelica*, *Moringa concanensis* and *Sterculia urens*. Further, the gum of *Prosopis cineraria* is edible and used in the preparation of sweet meats.

Resin, the oxidation products of various essential oils, are found in the resin-ducts of *Boswellia serrata*. They normally ooze out through the bark alone or in combination with gum and harden on exposure to air.

Fibre :

The floss fibre or lint, which are the hairy outgrowths of seeds etc., may be obtained from *Bombax ceiba*, *Calotropis procera*, *Cryptolepis buchananii*, *Cryptostegia grandiflora* etc.

The common bast fibre yielding species are : *Abutilon indicum*, *Acacia leucophloea*, *A. nilotica* subsp. *indica*, *Aeschynomene indica*, *Annona squamosa*, *Bauhinia racemosa*, *Butea monosperma*, *Cassia auriculata*, *Corchorus olitorius*, *Cordia dichotoma*, *C. macleodii*, *Purgularia daemia*, *Ficus benghalensis*, *F. religiosa*, *Leptadenia pyrotechnica*, *Luffa acutangula*, *Melochia corchorifolia*, *Moringa oleifera*, *Pavonia zeylanica*, *Phoenix sylvestris*, *Sida rhombifolia* and *S. ovata*.

Besides these, the grasses like *Desmostachya bipinnata* and *Saccharum spontaneum* are also used by the local people for making ropes.

Timber :

The area is rich in tree species and the exploitation of local timber would be comparatively more cheaper and helpful in economic development of the area. The most common tree species are : *Acacia leucophloea*, *A. nilotica* subsp. *indica*, *Adina cordifolia*, *Aegle marmelos*, *Albizia lebbeck*, *A. odoratissima*, *Anogeissus latifolius*, *Azadirachta indica*, *Bambusa* sp., *Bauhinia racemosa*, *Boswellia serrata*, *Butea monosperma*, *Cassia fistula*, *Cordia dichotoma*, *Dalbergia latifolia*, *D. sissoo*, *Dendrocalamus strictus*, *Diospyros malanoxyylon*, *Ficus benghalensis*, *Lannea coromandelica*, *Lagerstroemia parviflora*, *Madhuca longifolia*, *Mangifera indica*, *Mitrunga parvifolia*, *Phoenix sylvestris*, *Sterculia urens*, *Tamarindus indica*, *Tectona grandis*, *Terminalia arjuna*, *T. bellirica*, *Wrightia tinctoria* etc.

Besides these, *Ailanthus excelsa*, *Bombax ceiba*, *Ficus religiosa*, *Hymenodictyon excelsum* and *Sterculia urens* are the plants which may be used in soft wood industries.

Non edible oil :

The indigenous species, which possess considerably high percentage of non edible oil are : *Argemone mexicana*, *Azadirachta indica*, *Cleome viscosa*, *Dalbergia latifolia*, *Euphorbia dracunculoides*, *Jatropha curcas*, *Moringa congensis*, *Ricinus communis*, *Tamarindus indica*, *Tectona grandis* etc.

The volatile or essential oils of a strong aromatic odor may be distilled or extracted from *Ageratum conyzoides*, *Cyperus rotundus*, *Vetiveria zizanioides*, *Vitex negundo* etc. They are extensively used in perfumery and soap industries.

Spirit, country liquor and other beverages :

The alcoholic distillation is prohibited in the area. However, the local people distill the spirituous liquors on large scale from the fleshy corolla of *Madhuca longifolia*, which is locally called as 'Mahuri'. This tree is so fairly distributed in the forests and wastelands that a small industry may run independently in this area. Beside this, *Acacia nilotica* subsp. *indica* (Bark), *Cordia dichotoma* (Fruits), *Imperata cylindrica* (rhizome and roots), *Phoenix sylvestris* (fruits) and *Ziziphus nummularia* (root-bark) may provide enough raw material for the industry. The root-bark of *Acacia leucophloea* and *A. nilotica* subsp. *indica* is used to flavour the local spirits. The stem-bark of *A. leucophloea* and fruits of *Phyllanthus emblica* are commonly used to increase the narcotic properties of spirits by arresting the secondary fermentation.

The seeds of *Cassia obtusifolia*, *C. tora* and *C. occidentalis* may be used

as a substitute for Coffee (non alcoholic beverage) on commercial scale like in Africa, Abyssinia, England, Malaysia and some parts of India as Bombay, Assam and Goa. The leaves of *Diospyros melanoxylon* are used for making 'Biris' on commercial scale.

Paper :

The cellulose is the basic constituent for the paper. The various raw-materials present in the district are rich in lignin and other non-cellulose components. Besides *Bambusa* species, the pulp obtained from the wood of *Adina cordifolia*, *Anogeissus latifolius*, *Bombax ceiba*, *Boswellia serrata*, *Cordia dichotoma*, *Dalbergia sissoo*, *Diospyros melanoxylon*, *Ficus benghalensis*, *Lagerstroemia parviflora*, *Lannea coromandelica*, *Phoenix sylvestris*, *Phyllanthus emblica*, *Ziziphus xylopyrus* etc. may also be used as raw material in paper industry.

Among the grasses, *Imperata cylindrica*, *Saccharum spontaneum*, *Erianthus benghalensis* etc. are more common which may provide enough raw material to the industry.

Rubber :

The latex from the lower parts of the stem of *Cryptostegia grandiflora* and *Wrightia tinctoria* may be used for manufacturing rubber.

Mucilage :

The mucilaginous substances are chiefly used in the medicines. The chief source of the mucilage are the algae which are abundant in the area. Among the angiosperms, the seeds of *Abutilon indicum*, *Lepidium sativum*, *Orthosiphon pallidus*, *Ocimum americanum* and fruits of the species of *Corchorus* and *Ziziphus mauritiana* contain considerable amount of mucilage and are used by the local vaids to obtain the mucilage.

Detergent and soap substitutes :

Due to their cheapness and reputed properties, the fruits of *Acacia nilotica* subsp. *indica*, *Balanites aegyptiaca*, *Phyllanthus emblica* and *Sapindus laurifolius* are commonly used for washing the clothes and hairs by the local people.

Cement :

The seeds of *Tamarindus indica* and fruits of *Typha angustata* are locally used as cement for uniting two bodies.

Medicinal and poisonous plants :

Due to the constant association with the forest environment, the tribals have accrued considerable knowledge of plants and their utility, especially

for medicinal purposes. The uses of many of the medicinal plants employed by the tribal people are, however, not known outside their restricted community. In the following account, the information on the medicinal uses which was obtained from the local inhabitants, vaidas and forest officials are dealt.

1. ABDOMINAL PAIN AND DISORDER/CONSTIPATION : *Aegle marmelos* (pulp of fruits), *Annona squamosa* (root), *Cassia fistula* (pulp of fruits), *Helicteres isora* (fruit), *Plumbago zeylanica* (root), *Terminalia bellirica* (fruit) etc.
2. ANTIDOTE AGAINST SNAKE AND SCORPION : *Calotropis procera* (latex), *Cassia fistula* (fruit), *Cucurbita moschata* (pedicel and thalamus of fruit), *Enicostema hyssopifolium* (decoction of plant), *Ficus benghalensis* (bark), *Hoppea dichotoma* (plant), *Melochia corchorifolia* (plant), *Polycarpaea corymbosa* (plant) etc.
3. ASTHMA : *Abelmoschus ficulneus* (seed), *Acacia nilotica* (bark), *Achyranthes aspera* (seed), *Calotropis procera* (root), *Cassia auriculata* (seed), *Evolvulus alsinoides* (plant smoked), *Helicteres isora* (root), *Sida rhombifolia* (root), *Solanum surattense* (boiled fruit), *Tribulus terrestris* (fruit) etc.
4. COUGH AND COLD : *Adhatoda zeylanica* (leaf and root), *Barleria prionitis* (decoction of plant), *Cassia occidentalis* (root and seed), *Datura metel* (seed), *Ocimum americanum* (root and leaf), *Sphaeranthus indicus* (plant) etc.
5. CUTS AND WOUNDS : *Cissampelos pareira* (leaf), *Desmodium triflorum* (leaf), *Sida cordata* (leaf), *Terminalia arjuna* (bark), *Tridax procumbens* (paste of plant) etc.
6. DIARRHOEA AND DYSENTERY : *Acacia nilotica* (flower, pod and gum-resin), *Aegle marmelos* (fruit), *Bauhinia racemosa* (bark), *Celosia argentea* (seed), *Cyperus rotundus* (rhizome), *Desmodium triflorum* (leaf), *Holarrhena antidysenterica* (bark and seed), *Limnophila indica* (plant), *Mukia maderaspatana* (seed), *Woodfordia fruticosa* (flower and fruit) etc.
7. FEVER : *Ammannia baccifera* (plant), *Cardiospermum halicacabum* (plant), *Cissampelos pareira* (root), *Enicostema hyssopifolium* (plant), *Oldenlandia corymbosa* (plant), *Oxalis corniculata* (plant), *Phyla nodiflora* (plant), *Polygonum glabrum* (plant), *Solanum nigrum* (plant) etc.
8. HEART AND BLOOD DISEASES : *Aerva lanata* (plant), *Alangium salvifolium* (bark), *Celosia argentea* (seed), *Portulaca quadrifida* (leaf), *Sida rhombifolia* (root), *Tephrosia purpurea* (plant), *Terminalia arjuna* (bark) etc.
9. JAUNDICE AND LIVER DISEASES : *Cyperus triceps* (root), *Eclipta alba* (plant), *Hygrophila auriculata* (root, stem & leaf), *Oldenlandia corymbosa* (plant), *Solanum nigrum* (plant) etc.
10. NERVOUS DISEASES : *Cardiospermum halicacabum* (plant), *Grangea maderaspatana* (leaf), *Ipomoea aquatica* plant etc.

Some plants, including many medicinal ones, contain poisonous principles like alkaloids, glucoides, toxalbumins etc. which are useful and beneficial in small amounts, may cause serious disorders and even death of man and live-

stock if taken in higher dose. It is, therefore, suggested that nobody should, of his own self, try to use any plant mentioned here or elsewhere. The notable poisonous or otherwise harmful plant species from Banswara district are: *Argemone mexicana*, *Abrus precatorius*, *Calotropis procera*, *Cynodon dactylon*, *Datura* sp., *Dioscorea hispida*, *Diospyros montana*, *Jatropha curcas*, *Lantana camara*, *Mucuna pruriens*, *Mukia maderaspatana*, *Nerium indicum*, *Prosopis chilensis*, *Ricinus communis*, *Sorghum halepense*, *Tribulus terrestris*, *Trichosanthes bracteata* etc.

Plants of horticultural importance :

Few indigenous plants were noted which bear beautiful flowers and/or foliage and may be introduced in the gardens for horticultural purposes. Such notable species are : *Cassia auriculata*, *Centratherum phyllocaeruleum*, *Crinum defixum*, *Curcuma pseudomontana*, *Dioscorea hispida*, *Erythrina suberosa*, *Gloriosa superba*, *Lantana camara*, *Leonotis nepetifolia*, *Nymphaea* species, *Nymphoides* species, *Plesmonium margaritiferum*, *Sophia delphinifolia* and *Woodfordia fruticosa*.

Plants of botanical value :

The following eighteen species collected from Banswara are new records for Rajasthan, since they are not collected/reported so far from other districts. These species are: *Abutilon crinitus*, *Anagallis pumila*, *Canscora decussata*, *Chrysopogon hakeleii*, *Combretum ovalifolium*, *Cyperus meeboldii*, *Dioscorea pentaphylla*, *Eriocaulon polycephalum*, *Euphorbia acaulis*, *Knoxia sumatrensis*, *Leea edgeworthii*, *Mitrula petiolata*, *Neodistimon indicum*, *Rungia elegans* and *R. linifolia*. Further, it is interesting to note that most of them are natives of peninsular India.

Bambusa arundinacea and *Dendrocalamus strictus*, which once grew in abundance in the district, are under great biotic pressure and have disappeared considerably from the forest biota. There are no other endangered, rare or endemic species in the district.

FLORISTIC ANALYSIS

From Banswara district of Rajasthan a total number of 619 indigenous species belonging to 368 genera and 106 families are enumerated in the percentage and ratio tabulated below :

TABLE I

	No.	Dicotyledons % of total	No.	Monocotyledons % of total	Grand total
Families	88	83.0	18	17.0	106
Genera	281	76.3	87	23.7	368
Species	452	73.0	167	27.0	619

The ratio of species belonging to Monocotyledons to Dicotyledons is 1:2.7, of genera 1:3.2 and of families 1:4.3. It is interesting to note that the proportion of genera to species in the whole of India is 1:7, in the Gangetic Plain it is 1:2.2, while in the area of present study it is 1:1.6. This shows the small proportion of species to the number of genera in this area. Further, it conforms to the general rule that, within the same floral region, the smaller the flora the smaller the species—genus ratio.

The monocotyledons are very poorly represented in this area. Of the 167 species, 127 species belong to Cyperaceae (30) and Gramineae (97), while the remaining 40 species belong to 16 other families. The families represented by one genus and single species are : Alismataceae, Amaryllidaceae, Arecaceae, Hypoxidaceae, Najadaceae, Typhaceae and Zannichelliaceae.

Among the Dicotyledons, the class Polypetalae is dominant and is represented by 210 species belonging to 122 genera and 49 families. The families represented by single genus and single species are : Aizoaceae, Alangiaceae, Annonaceae, Balanitaceae, Balsaminaceae, Bombacaceae, Burseraceae, Cactaceae, Celastraceae, Elatinaceae, Flacourtiaceae, Fumariaceae, Meliaceae, Moringaceae, Myrtaceae, Onagraceae, Papaveraceae, Rosaceae, Rutaceae, Sapindaceae, Simaroubaceae, Tamaricaceae, Trapaceae, Violaceae and Zygophyllaceae. The largest family of this group is Papilionaceae which is represented by 68 species belonging to 31 genera.

The class Gamopetalae finds the second place and it is represented by 28 families containing 129 genera and 181 species. The families represented by single genus and single species are: Bignoniaceae, Cuscutaceae, Hydrophyllaceae, Martyniaceae, Oleaceae, Plumbaginaceae, Salvadoraceae and Spigeliaceae. The largest family of this group is Asteraceae containing 25 genera and 30 species.

Monochlamydeae is represented by 11 families, 30 genera and 61 species. The families represented by single genus and single species are : Casuarinaceae, Loranthaceae, Nyctaginaceae, Ulmaceae and Urticaceae. The largest family of this group is Euphorbiaceae containing 25 species belonging to 10 genera.

Out of 619 species, 81 species are trees, 90 species shrubs or shrubby climbers and 448 species are herbs or herbaceous climbers. About 75 species are cultivated in the area for various purposes. The flora is characterized by the complete absence of Guttiferales, Olacales, Ericales, Multiovulatae aquaticaee, Micrembrayae and Dephniales.

PHYTogeOGRAPHICAL ANALYSIS

The vegetation of Banswara district consists mainly seven elements, namely (1) Perso-Arabian (Western), (ii) Indo-Malayam(Eastern), (iii) Indian

element, (iv) General element consisting of pantropical and pleuriregional species, (v) European, (vi) American and (vii) Australian in the following percentage and ratio.

TABLE-II

Phytogeographical regions	Number of species	Percentage %	Ratio of Eastern to Western element
Perso-Arabian (Western)	79	12.7	1:2
Indo-Malayan (Eastern)	40	6.4	—
Indian	198	31.9	—
General (Cosmopolitan)	250	40.3	—
American	32	5.1	—
European	13	2.1	—
Australian	7	1.1	—

The analysis revealed that the General element predominates over other elements (40.3%) and the Indian element find the second place (31.9%). The Australian (1.1%), European (2.1%) and American element (5.1%) are very poorly represented in comparison to Perso-Arabian (12.7%) and Indo-Malayan elements (6.4%).

A comparison of the flora of this district with other hilly regions of Eastern Rajasthan (Vyas, 1967; Ramdeo, 1969; Singh, 1973, 76, 77, 79; Majumdar, 1973, 79a; Sharma and Taigi, 1979) shows striking resemblances, as the Perso-Arabian element dominates the Indo-Malayan, altitude does not have any effect on the zonation of vegetation. A comparison with the flora of Western Rajasthan (Blatter & Hallberg, 1918-21; Bhandari, 1978) revealed that mostly those species which have wide distribution in India from sea level to about 1000 m are common in both regions.

PLAN OF THE FLORA

In the present work, the vascular plants, particularly angiosperms of Banswara district have been included. The families are arranged according to Bentham and Hooker's classification (1862-83) except in a few cases in which Hutchinson's (1959) concept regarding splitting of the families is followed. The names of the families are without the names of the authors and description. In case of genera, the names are followed by the names of authors, but without description.

Keys :

Dichotomous keys, based mostly on macroscopic characters, for the

identification of the indigenous taxa from the rank of family to infra-specific level are given.

Nomenclature :

Attempts have been made to adopt the latest correct name according to ICBN (ed. 1978). The references to the latest monographs and taxonomic revisions, if any, follow the adopted name. The basionym, if any, is given to indicate the source of valid combination as an indirect reference. The important synonyms are given to connect the valid name with the names accepted in the "Flora of British India" and "Flora of Upper Gangetic Plains". No references, synonyms, basionym, description etc. are given to the generic names, which bear authors names alone. However, the conserved generic names have been marked as "*nom. cons*".

Local names :

The local names in Bagdi, a dialect of Rajasthan, have been given in inverted commas after citation. In cases where the local people call the same plant by different names, at the most three authentic local names have been given.

Description :

Brief descriptions of the species and infra-specific taxa, based on the specimens studies, have been given. The characters used in the keys do not reflect in the descriptions. For the plants recorded in the literature but somehow could not be collected or seen in any herbarium by the author, the descriptions are based on the regional floras cited or on some other authentic literature.

Flowering and fruiting time :

Special efforts were made to record the correct flowering and fruiting time for the plants growing in this district. When flowering and fruiting stages are quite distinguishable in the life-cycle of a taxon, they are given independently.

Illustrations :

To render easy determination of the plants, references to good illustrations published in standard literature have been given. A district map showing forest ranges and other important localities surveyed has been included.

Distribution :

The data about frequency, relative abundance, habitat, associations, variations depending on altitude or habitat etc. and the exact locality of occurrence, interspaced from the above by a semicolon, have been mention-

ed. The field numbers of the specimens deposited in other herbaria and incorporated in this flora are indicated along with the collector's name and abbreviated name of herbarium in parantheses at the end of distributional data. The author has not cited the field numbers collected by him. However, the first and second localities mentioned in this work belong to the authors collections.

Notes :

In the end, remarks on taxonomic affinities, identity of taxa and nomenclatural notes, wherever necessary, have been given.

Cultigens :

The well established cultivated species, along with their valid names, important synonyms, primary diagnostic characters, local names and usefulness, have been alphabetically arranged at the end of respective families. The cultigens are not included in the keys and floristic analysis of the flora.

Abbreviations :

The abbreviations of serials and floras used are in conformity with the common usage in botanical taxonomy, and are cited in accordance with the recommendations made by the International Code of the Botanical Nomenclature (ed. 1978). The abbreviations of various herbaria are adopted from Index Herbariorum (ed. 1974).

KEY TO THE FAMILIES

- 1a. Vascular bundles of the stem open and arranged in rings.
Leaves with reticulate venation. Seeds with 2 cotyledons:
- 2a. Perianth biserrate or multiseriate, differentiated into calyx and corolla :
- 3a. Petals free, polypetalous :
- 4a. Flowers unisexual or polygamous :
- 5a. Ovary inferior.
- 5b. Ovary superior:
- 6a. Gynoecium with 1-many, unilocular ovaries:
- 7a. Leaves scale like, appressed and reduced. Carpels 3-5, syncarpous. Fruit a capsule.
- 7b. Leaves normal, well developed. Carpels 1-many, apocarpous. Fruit never a capsule:
- 8a. Fruit drupaceous:
- 9a. Scandent or twining shrubs. Flowers unisexual.
- 9b. Trees. Flowers polygamous.
- 8b. Fruit never drupaceous:
- 10a. Carpel 1. Fruit a legume.
- 10b. Carpels 4-6. Fruit a follicle.
- 6b. Gynoecium with 1, two-many locular ovary:
- 11a. Stamens 1-5:
- 12a. Stamens inserted on the margins of disk. Style one, thick.
- 12b. Stamens alternating with the lobes of disk (Disk intrastaminal). Style 3, entire or branched.
- 11b. Stamens 6-many:
- 13a. Leaves pinnately 2-many foliolate:
- 14a. Trees or shrubs. Disk annular, basal, 10-lobed. Fruit an indehiscent drupe or samara:
- 15a. Leaflets more than 2. Ovary deeply divided. Fruit samaroid.
- 15b. Leaflets 2. Ovary entire. Fruit a drupe.
- 14b. Twining herbs. Disk unilateral, of 2 glands opposite the lower petals. Fruit an inflated, membranous, 3-valved, dehiscent capsule.
- 13b. Leaves simple, entire or palmately lobed.
- 4b. Flowers bisexual:
- 16a. Carpels 1-many, apocarpous:
- 17a. Stamens 1 or 2-adelphous:
- 18a. Flowers actinomorphic. Calyx and corolla valvate in bud. Corolla not papilionaceous:
- 19a. Fruit a legume.
- 19b. Fruit a capsule.
- 18b. Flowers zygomorphic. Calyx and corolla imbricate in bud. Corolla papilionaceous.
- 17b. Stamens free:
- 20a. Corolla zygomorphic, caesalpiniaceous.
- COMBRETACEAE 39
- TAMARICACEAE 14
- MENISPERMACEAE 2
- ANACARDIACEAE 33
- MIMOSACEAE 37
- STERCULIACEAE 18
- CELASTRACEAE 28
- EUPHORBIACEAE 84
- SIMAROUBACEAE 24
- BALANITACEAE 25
- SAPINDACEAE 32
- EUPHORBIACEAE 84
- MIMOSACEAE 37
- STERCULIACEAE 18
- FABACEAE 35
- CAESALPINIACEAE 36

- 20b. Corolla actinomorphic, not caesalpinaceous:
 21a. Petals imbricate:
 22a. Trees, with resin passages in the stem. Gynoecium of 1 carpel. Fruit a drupe.
 22b. Herbs, without resin passages. Gynoecium of many free carpels. Fruit an achene.
- 21b. Petals valvate:
 23a. Ovary superior, Fruit a legume.
 23b. Ovary inferior. Fruit coriaceous or drupaceous, not a legume.
- 16b. Carpels 2-many, syncarpous:
 24a. Ovary 1-celled:
 25a. Placentation parietal:
 26a. Stamens 2-6:
 27a. Trees. Inflorescence a panicle.
 27b. Herbs. Inflorescence racemose (raceme or corymb) or the flowers are axillary solitary:
 28a. Flowers irregular, with gibbous or spurred outer petals:
 29a. Sepals 2. Stamens 6, in two bundles.
 29b. Sepals 5. Stamens 5, free.
 28b. Flowers regular. Petals normal, cruciform.
 26b. Stamens more than 6:
 30a. Stem spiny, succulent, flattened, jointed (modified into phylloclades). Ovary inferior.
 30b. Stem normal, not phylloclade, however, may have stipular spines. Ovary superior:
 31a. Stipular spines present. Fruit an indehiscent berry.
 31b. Stipules, if any, not spiny. Fruit a dehiscent capsule:
 32a. Capsules 2-valved.
 32b. Capsules 3 to 5-valved:
 33a. Herbs. Leaves simple, spinous-dentate. Sepals 2-3. Capsules oblong to elliptic, upto 7 cm long, prickly.
 33b. Trees. Leaves 2 to 3-pinnate, glabrous. Sepals 5. Capsules smooth, cylindric, 15-50 cm long.
- 25b. Placentation free central, axile, basal or apical, never parietal:
 34a. Succulent herbs. Sepals or calyx-lobes 2.
 34b. Plants, even if herbs, not succulent. Sepals or calyx-lobes more than two:
 35a. Ovary superior. Placentation free central at least in upper region of the ovary; in lower region it may be axile due to the formation of septa:
 36a. Corolla caryophyllaceous. Stamens arising directly from the receptacle. Styles 2-5. Embryo curved.
 36b. Corolla not caryophyllaceous. Stamens
- ANACARDIACEAE 33
ROSACEAE 38
MIMOSACEAE 37
COMBRETACEAE 39
MORINGACEAE 34
FUMARIACEAE 5
VIOLACEAE 9
BRASSICACEAE 6
CACTACEAE 45
CAPPARACEAE 8
CLEOMACEAE 7
PAPAVERACEAE 4
MORINGACEAE 34
PORTULACACEAE 13
CARYOPHYLLACEAE 12

arising from the calyx-tube. Style 1. Embryo straight.	
35b. Ovary inferior. Placenta basal or apical: 37a. Calyx-lobes 4. Placenta basal, 37b. Calyx-lobes 5-10. Placenta apical.	LYTHRACEAE 41
24b. Ovary 2 to many-celled: 38a. Pods dehiscent, liberating the seeds; 39a. Flowers zygomorphic: 40a. Capsules 2-celled, 2-valved and 2-seeded. Seeds strophiolate. 40b. Capsules 5-celled, 5-valved, many-seeded. Seeds estrophiolate.	MYRTACEAE 40 ALANGIACEAE 49
39b. Flowers actinomorphic: 41a. Ovary inferior or semi-inferior.	POLYGALACEAE 11
41b. Ovary superior: 42a. Corolla cruciform. Placenta parietal. 42b. Corolla not cruciform. Placenta axile, basal or apical: 43a. Stamens free, distinct: 44a. Leaves alternate: 45a. Leaves simple. Sepals valvate. 45b. Leaves compound. Sepals imbricate: 46a. Styles 5, distinct from the base. 46b. Style 1, often branched at apex or with lobed stigma: 47a. Ovules 2 in each cell of the ovary. 47b. Ovule 1 in each cell of the ovary.	ONAGRACEAE 42 BRASSICACEAE 6
44b. Leaves opposite or whorled: 48a. Leaves simple: 49a. Stipules present. Sepals imbricate. 49b. Stipules absent. Sepals valvate. 48b. Leaves pinnately or digitately com- pound.	TILIACEAE 19 OXALIDACEAE 21
43b. Stamens united, at least at the base: 50a. Anthers 1-celled: 51a. Trunk or stem unarmed. Stamens 1-adelphous. Pollens rough. Pericarp of fruits normal, not as below. 51b. Trunk armed with spines. Stamens poly-adelphous. Pollens smooth. Pericarp of fruits pithy or woolly.	BURSERACEAE 26 SAPINDACEAE 32
50b. Anthers 2-celled: 52a. Stamens distinctly 1-adelphous. 52b. Stamens slightly connate at the base only.	ELATINACEAE 15 LYTHRACEAE 41
38b. Pods indehiscent, not liberating the seeds, often separating into mericarps, cocci or carpels: 53a. Ovary inferior or semi-inferior: 54a. Fruit 1-seeded: 55a. Aquatic herbs. Fruits with 2 spines. 55b. Terrestrial trees. Fruits smooth.	OXALIDACEAE 21
54b. Fruit 2 to many-seeded.	MALVACEAE 16
	BOMBACACEAE 17
	STERCULIACEAE 18
	TILIACEAE 19
	TRAPACEAE 43
	MYRTACEAE 40
	APIACEAE 48

- 53b. Ovary superior:
- 56a. Aquatic herbs, with peltate leaves. Carpels embedded in the torus and forming a compound, many-celled ball resembling a syncarpous ovary.
- 56b. Plants terrestrial. Leaves not peltate. Carpels truly syncarpous or very close to one another resembling syncarpous ovary, never embedded in the torus;
- 57a. Stamens 1-adelphous:
- 58a. Anthers 1-celled.
- 58b. Anthers 2-celled:
- 59a. Leaves pinnately compound. Hypogynous disk present.
- 59b. Leaves simple. Hypogynous disk absent.
- 57b. Stamens free, distinct:
- 60a. Placentation parietal.
- 60b. Placentation axile or basal:
- 61a. Leaves simple:
- 62a. Leaves exstipulate. Petals 6, in two series of 3 each.
- 62b. Leaves stipulate. Petals 4 or 5, in one series:
- 63a. Tendril bearing plants. Fruits a berry.
- 63b. Tendrils absent. Fruit not berry:
- 64a. Stipules normal or absent. Stamens arising directly from the receptacle. True hypogynous disk absent.
- 64b. Stipules modified into spines. Stamens arising from the hypogynous disk, not directly from receptacle.
- 61b. Leaves compound:
- 65a. Leaves opposite.
- 65b. Leaves alternate:
- 66a. Leaflets 3, gland-dotted.
- 66b. Leaflets 2 or more than 3, not gland-dotted:
- 67a. Stamens as many as and opposite the petals.
- 67b. Stamens twice as many as petals or as many as and alternate with petals or lesser than the number of petals:
- 68a. Styles 2-5, free throughout or atleast at the base or connate by stigmas only:
- 69a. Leaflets more than 2. Fruit samaroid.
- NYMPHAEACEAE 3
- MALVACEAE 16
- MELIACEAE 27
- STERCULIACEAE 18
- CAPPARACEAE 8
- ANNONACEAE 1
- VITACEAE 30
- TILIACEAE 19
- RHAMNACEAE 29
- ZYGOPHYLLACEAE 20
- RUTACEAE 23
- VITACEAE 30
- SIMAROUBACEAE 24

- BALANITACEAE 25
- SAPINDACEAE 32
- 3b.** Petals united variously, usually forming a short or long tube:
- 70a. Ovary inferior:
- 71a. Plants climbing with the help of tendrils. Stem with bicollateral vascular bundles.
 - 71b. Plants not climbers, or if climbers than without tendrils. Stem with collateral vascular bundles:
 - 72a. Stem flattened, phylloclade. Leaves reduced to spines.
 - 72b. Stem normal, with well developed, normal leaves:
 - 73a. Leaves exstipulate. Calyx modified into pappus. Anthers connate. Ovary 1-celled. Achene 1-seeded.
 - 73b. Leaves stipulate. Calyx normal, not modified into pappus etc. Anthers free. Ovary 2 to 10-celled. Fruit berry, capsule, drupe or of dehiscent or indehiscent cocci, always more than 1-seeded.
- 70b. Ovary superior:
- 74a. Gynoecium consists 2, distinct (apocarpous) ovaries, 2 distinct or united styles and a united stigma:
 - 75a. Pollens in pollinia. Styles 2, distinct in lower region, united in stigmatic region and bearing a single stigma. Anthers united with stigma to form a gynostegium:
 - 76a. Pollen masses granular. Pollen carrier spatulate.
 - 76b. Pollen masses waxy. Pollen carrier slender.
 - 75b. Pollens distinct, not in pollinia. Styles 2, united from the base and bearing a single stigma. Gynostegium absent.
- 74b. Gynoecium consists 1, apocarpous or syncarpous ovary, united or distinct or branched styles and entire or lobed stigma(s):
- 77a. Ovary 1-celled:
- 78a. Flowers unisexual.
 - 78b. Flowers 2-sexual:
 - 79a. Style solitary, with entire or lobed stigma:
 - 80a. Fruits woody, bettle-shaped, 2-horned.
 - 80b. Fruits not as above:
 - 81a. Corolla papilionaceous, with descending imbricate aestivation. Fruit a legume.
 - 81b. Corolla not papilionaceous. Aestivation if imbricate then ascending. Fruit not a legume:
 - 82a. Plants insectivorous. Leaf-segments modified into bladders. Stamens 2.
 - 82b. Plants not insectivorous, Leaves normal. Stamens more than 2:
 - 83a. Fruit 1-seeded.
 - 83b. Fruit usually many-seeded:

CUCURBITACEAE 44

CACTACEAE 45

ASTERACEAE 51

RUBIACEAE 50

PERIPLOCACEAE 60

ASCLEPIADACEAE 59

APOCYNACEAE 58

MENISPERMACAE 2

MARTYNIACEAE 74

FABACEAE 35

LENTIBULARIACEAE 71

SALVADORACEAE 57

84a. Stamens opposite the corolla-lobes. Placentation free-central.	PRIMULACEAE 53
84b. Stamens alternating with the corolla-lobes. Placentation parietal:	
85a. Aquatic herbs, with floating, alternate leaves. Corolla-lobes induplicate-valvate in bud.	MENYANTHACEAE 63
85b. Terrestrial herbs, with opposite leaves. Corolla-lobes contorted in bud.	GENTIANACEAE 62
79b. Styles 5, distinct. Stigmas simple, as many as styles.	PLUMBAGINACEAE 52
77b. Ovary more than 1-celled:	
86a. Corolla uniserial. Stamens less than the corolla-lobes:	
87a. Corolla actinomorphic.	OLEACEAE 56
87b. Corolla zygomorphic:	
88a. Mature ovary separating into 1-seeded nutlets. Style gynobasic.	LAMIACEAE 77
88b. Mature ovary not separating into nutlets, dehiscing variously or indehiscent. Style terminal:	
89a. Seeds prominently winged.	BIGNONIACEAE 72
89b. Seeds not winged:	
90a. Seeds attached on upcurved processes (retinaculae).	ACANTHACEAE 75
90b. Seeds without retinaculae:	
91a. Flowers with extra-floral glands at the base of pedicels.	PEDALIACEAE 73
91b. Flowers without extra-floral glands:	
92a. Each cell of ovary 1 to 2-ovuled. Fruits indehiscent.	VERBENACEAE 76
92b. Each cell of ovary more than 2-ovuled. Fruits dehiscent.	SCROPHULARIACEAE 70
86b. Corolla uniserial with stamens as many as corolla-lobes or more, or multiseriate with stamens as many as the petals of one series or more:	
93a. Flowers unisexual.	EBENACEAE 55
93b. Flowers bisexual:	
94a. Stamens free from petals.	OXALIDACEAE 21
94b. Stamens epipetalous:	
95a. Plants stem-parasites, with yellow leafless, much-branched, climbing stem.	CUSCUTACEAE 68
95b. Plants usually autophytes or root-parasites, in latter case, the stem is normal, not as above:	
96a. Carpels placed obliquely. Placenta swollen.	SOLANACEAE 69
96b. Carpels not placed obliquely. Placenta not swollen:	
97a. Fruit a capsule, dehiscing in various	

- ways:
- 98a. Leaves alternate:
- 99a. Plants climbers, twiners or creepers, rarely erect shrubs. Vascular bundles in stem bicollateral. Seeds 1-4 in each cell. CONVOLVULACEAE 67
- 99b. Plants erect or decumbent herbs. Vascular bundles in stem collateral. Seeds more than 4 in each cell. HYDROPHYLLOIDAE 64
- 98b. Leaves opposite:
- 100a. Capsules compressed contrary to the septum. Carpels first separating and then dehiscing along the inner face. SPIGELEIACEAE 61
- 100b. Capsules globose, not compressed, septicidally 2-valved. GENTIANACEAE 62
- 97b. Fruit a fleshy or dry and hard berry, drupe or nut dividing into 2-4 nutlets:
- 101a. Plants with milky juice. Stamens opposite the petals. SAPOTACEAE 54
- 101b. Plants with watery juice. Stamens alternating with petals:
- 102a. Stamens free, distinct: EHRETIACEAE 66
- 103a. Trees. Fruit a drupe.
- 103b. Erect, prostrate or twining herbs or shrubs. Fruit a nut of 2-4 nutlets or a dry hard berry:
- 104a. Ovary 4-lobed outside. Style usually gynobasic or rarely subterminal. Fruit a nut of 2-4 nutlets. BORAGINACEAE 65
- 104b. Ovary not lobed outside. Style terminal. Fruit a dry, hard berry.
- 102b. Stamens united at the base into a 5-lobed staminal tube. CONVOLVULACEAE 67
- 2b. Perianth unisexual or absent, not differentiated into calyx and corolla:
- 105a. Ovary 1-celled at maturity:
- 106a. Ovary inferior:
- 107a. Plants facultative stem-parasites. Seeds without seed-coat. LORANTHACEAE 83
- 107b. Plants autophytes. Seeds with a distinct seed-coat. COMBRETACEAE 39
- 106b. Ovary superior:
- 108a. Stipules ochreate. POLYGONACEAE 81
- 108b. Stipules absent, if present then not ochreate:
- 109a. Fruits prominently winged. ULMACEAE 85
- 109b. Fruits not winged:
- 110a. Placentation basal or free-central by abortion of septa:~
- 111a. Ovary 1-carpelled:

- 112a. Flowers 2-sexual. NYCTAGINACEAE 78
- 112b. Flowers 1-sexual. URTICACEAE 87
- 111b. Ovary 2 to 5-carpelled:
 - 113a. Fruit dehiscing irregularly, by valves or circumscissile: AIZOACEAE 46
 - 114a. Tepals green, herbaceous: LYTHRACEAE 41
 - 115a. Prostrate terrestrial herbs. Leaves sub-equal in each pair. Petiole dilated at base into stipuliform margins. AMARANTHACEAE 79
 - 115b. Erect herbs in wet and marshy habitats. Leaves equal sized in each pair. Petiole not dilated as above. AMARANTHACEAE 79
 - 114b. Tepals scarious. CHENOPODIACEAE 80
 - 113b. Fruit an indehiscent nut or utricle:
 - 116a. Bracts and tepals scarious. CASUARINACEAE 88
 - 116b. Bracts absent, if present then herbaceous. Tepals green, not scarious. MORACEAE 86
 - 110b. Placentation apical or parietal:
 - 117a. Leaves reduced, scale-like. Perianth absent. Ovary 2-carpelled. STERCULIACEAE 18
 - 117b. Leaves well developed. Perianth present. Ovary 1-carpelled or so due to the abortion of second carpel. ARISTOLOCHIACEAE 82
 - 105b. Ovary 2 to many-celled at maturity:
 - 118a. Carpels subdistinct (semi-apocarpous). Fruit a follicle. EUPHORBIACEAE 84
 - 118b. Carpels completely united (syncarpous). Fruit not follicular:
 - 119a. Perianth zygomorphic. Ovary inferior. EUPHORBIACEAE 84
 - 119b. Perianth actinomorphic. Ovary superior:
 - 120a. Fruit indehiscent, drupe or berry, neither separating into cocci nor liberating the seeds: FLACOURTIACEAE 10
 - 121a. Stipules small. Styles 3, entire or divided.
 - 121b. Stipules absent. Styles 5, entire.
 - 120b. Fruit a dehiscent capsule liberating the seeds or regma separating into cocci:
 - 122a. Flowers unisexual. EUPHORBIACEAE 84
 - 122b. Flowers bisexual:
 - 123a. Perianth gamophyllous. Stamens inserted on the calyx-tube:
 - 124a. Leaves subequal at each node. Flowers concealed in petiolar pouch. Capsules truncate or slightly concave at the tip with 2 spreading teeth. AIZOACEAE 46
 - 124b. Leaves equal-sized at each node. Petiole not forming the pouch. Capsules rounded at the tip, without teeth.
 - 123a. Perianth polyphyllous. Stamens hypogynous. LYTHRACEAE 41
 - 1b. Vascular bundles of stem scattered and closed. Leaves with parallel venation. Seeds with 1 cotyledon:
 - 125a. Perianth absent or modified into hairs, bristles or scales:
 - 126a. Inflorescence a fleshy spadix. ARACEAE 99
 - 126b. Inflorescence not spadix:

- 127a. Flowers not enclosed or subtended by glumes, but surrounded by thread-like or spathulate forked scales, arranged in spikes. TYPHACEAE 98
- 127b. Flowers in the axils of glumes or between two glumes, united in spikelets and latter arranged variously:
- 128a. Leaf-sheaths not splitting (closed). Fruit an achene. CYPERACEAE 105
- 128b. Leaf-sheaths splitting (open). Fruit a caryopsis. POACEAE 106
- 125b. Perianth present in bisexual flowers and also atleast in one sex when flowers are unisexual, differentiated into calyx and corolla or not:
- 129a. Ovary inferior:
- 130a. Ovary 1-celled:
- 131a. Stamens 1 or 2. ORCHIDACEAE 90
- 131b. Stamens 3-15. HYDROCHARITACEAE 89
- 130b. Ovary more than 1-celled, usually 3-celled:
- 132a. Fertile stamen 1. ZINGIBERACEAE 91
- 132b. Fertile stamens more than 1:
- 133a. Dioecious twiners, with caulin leaves. Flowers unisexual. DIOSCOREACEAE 94
- 133b. Plants not twiners, with basal or radical leaves. Flowers bisexual:
- 134a. Flowers in umbels which are sometimes reduced to a single flower, subtended by 1 or more spathaceous bracts. AMARYLLIDACEAE 92
- 134b. Flowers in cymes, racemes or panicles. Bracts, if any, not spathaceous. HYPOXIDACEAE 93
- 129b. Ovary superior:
- 135a. Carpels distinct, forming apocarpous gynoecium:
- 136a. Flowers bisexual. POTAMOGETONACEAE 101
- 136b. Flowers unisexual:
- 137a. Stamen solitary:
- 138a. Male flowers without perianth. Female flowers with a cupular hyaline perianth. ZANNICHELLIACEAE 102
- 138b. Male flowers with double perianth, the outer tubular or inflated, the inner hyaline. Female flowers without perianth. NAJADACEAE 103
- 137b. Stamens more than 1, usually 6 to many:
- 139a. Trees or shrubs, with pinnately or palmately divided to compound leaves. Inflorescence a spadix. ARECACEAE 97
- 139b. Aquatic or marshy herbs, with simple, entire leaves. Flowers in umbellate or paniculate whorls. ALISMATACEAE 100
- 135b. Carpels united, forming a sycarpous gynoecium:
- 140a. Flowers unisexual. ERIOCAULACEAE 104
- 140b. Flowers bisexual:
- 141a. Perianth-segments all alike. LILIACEAE 95
- 141b. Perianth distinguished into an outer calyx and inner corolla. COMMELINACEAE 96

1. ANNONACEAE

ANNONA L.

Annona squamosa L. Sp. Pl. 537. 1753; Hook. f. & Thoms. in Hook. f. Fl. Brit. India 1 : 78. 1872; Duthie, Fl. Gangetic Plain 1 : 23. 1903. 'Sitaphal' (Hindi).

Large shrubs or small trees. Leaves oblong, elliptic or ovate-lanceolate, $7-15 \times 2-4$ cm. Flowers greenish-yellow, solitary, leaf-opposed or on short branchlets. Petals thick, 3-angular, valvate. Stamens many. Syncarps fleshy, globose or cordate-ovoid, 5-10 cm in diam., tubercled, greenish-yellow when ripe. Seeds oblong, brown, smooth, with a swelling at the hilum.

Fl. : March-May; *Fr.* : June-October.

Native of Tropical America and West Indies; naturalized in the forests and cultivated in the gardens for its edible fruits; Shergarh, Banswara (*Verma* 210, BSA).

A. reticulata L.—Small trees, with oblong-lanceolate leaves and cordate, subglobose, smooth fruits. Native of tropical America; cultivated in the gardens for its edible fruits. 'Ramphal' (Hindi).

Polyalthia longifolia (Sonnerat) Thw. (*Uvaria longifolia* Sonnerat)—Evergreen avenue tree, with slender stem, lanceolate leaves, yellowish-green flowers and ovoid fruits. Planted in the gardens and along the roads. 'Ashok' (Hindi).

2. MENISPERMACEAE

- | | |
|---|----------------------|
| 1a. Petals 4 in male flowers, 1 in female flowers. Pistil solitary. | <i>Cissampelos</i> 1 |
| 1b. Petals 6 in the flowers of both sexes. Pistils 3-6: | |
| 2a. Seeds horse shoe-shaped. | <i>Coeculus</i> 2 |
| 2b. Seeds oblong or globose. | <i>Tinospora</i> 3 |

1. CISSAMPELOS L.

Cissampelos pareira L. var. *hirsuta* (Ham. ex DC.) Forman in Kew Bull. 22 : 356. 1968. *C. hirsuta* Ham. ex DC. Syst. Nat. 1 : 535. 1817. *C. pareira* auct. non L. 1753; *sensu* Hook. f. & Thoms. in Hook. f. Fl. Brit. India 1 : 103. 1872; Duthie, Fl. Gangetic Plain 1 : 30. 1903; Mahesh. Illus. Fl. Delhi f. 2. 1966. 'Heir' (Hindi).

Twining, dioecious shrubs, with hirsute or tomentose branches. Leaves suborbicular-reniform, peltate, $3-8 \times 4-9$ cm, truncate or cordate-based, 5 to 6-nerved. Male flowers in axillary, pedunculate cymes. Bracts linear-subulate. Sepals 4, obovate-spathulate. Petals connate at base. Stamens connate.

Female flowers in pendulous, 6-15 cm long racemes, with leaf-like bracts. Drupes subglobose, about 5 mm in diam., hirsute, red when ripe.

Fl. & Fr. : June to November.

Common in wastelands and on the fringes of forests. Pendulous, bracteate female racemes make the plant more elegant; Kotharia forest.

2. COCCULUS DC. *nom. cons.*

Cocculus hirsutus (L.) Diels in Engl. Pfreich. 46 : 236. 1910. *Menispermum hirsutum* L. Sp. Pl. 341. 1753. *Cocculus villosus* DC. Syst. Nat. I : 525. 1817; Hook. f. & Thoms. in Hook. f. Fl. Brit. India 1 : 101. 1872; Duthie, Fl. Gangetic Plain 1 : 28. 1903. *C. macrocarpus* Wt. & Arn. Prodr. 13. 1834; Hook. f. & Thoms. l.c. 1 : 101. 1872. 'Bajar-bel' (Hindi).

Twining, hirsute, dioecious undershrubs. Leaves ovate-oblong, lanceolate or deltoid, villous. Male flowers in axillary cymose panicles. Stamens free. Female flowers in axillary clusters or racemes. Sepals 6, 2-seriate. Petals obovate, emarginate, embracing the stamens in males. Fruits globose, dark purple, about 2 cm in diameter, rugose.

Fl. & Fr. : September-January.

Common on the fringes of forests and in wastelands; Bari-ghata forest, Kushalgarh (Kanodia 75727, BSI).

3. TINOSPORA Miers

Tinospora cordifolia (Willd.) Miers in Ann. & Mag. nat. Hist. ser. 2. 7 : 38. 1851; Hook. f. & Thoms. in Hook. f. Fl. Brit. India 1 : 97. 1872; Duthie, Fl. Gangetic Plain 1 : 26. 1903. *Menispermum cordifolium* Willd. Sp. Pl. 4 : 826. 1806. 'Neem-Gilol' (Hindi).

Succulent, trailing shrubs, with lenticelled stem, papery, easily separable bark and many aerial roots. Leaves ovate-cordate, 6-10×7-10 cm, acuminate, glabrous, 5 to 7-nerved at the base. Male flowers fascicled in the axils of lanceolate bracts. Sepals 6, 2-seriate. Filaments free. Female flowers solitary. Berries globose. Seeds oblong or globose.

Fl. & Fr. : July-March.

Rare, along boundaries of fields and gardens; Talwara.

Notes : Leaves are very short lived, appear during the rainy season and fall in October. The aphyllous stem bears aerial roots and flowers.

3. NYMPHAEACEAE

NYMPHAEA L. *nom. cons.*

- 1a. Leaves sharply sinuate-dentate. Anthers not appendaged.
Stigmatic rays with clavate appendages.

N. pubescens 2

1b. Leaves entire or bluntly dentate. Anthers appendaged. Stigmatic rays without appendages.

N. nouchali 1

1. ***Nymphaea nouchali*** Burm. f. Fl. Ind. 120. 1768. *N. stellata* Willd. Sp. Pl. 2 : 1153. 1799; Hook. f. & Thoms. in Hook. f. Fl. Brit. India 1 : 114. 1872; Duthie, Fl. Gangetic Plain 1 : 34. 1903; Subram. Aquatic Ang. 6. f. 1. 1962. 'Pappaphool' (Hindi).

Aquatic herbs, with short, ovoid root-stocks. Leaves orbicular, or when young elliptic-sagittate, peltate, 10-15 cm in diam., glabrous; sinus 5-7 cm deep. Flowers white or violet, 8-15 cm in diam., solitary. Sepals not ribbed. Stigmatic rays 10-30. Seeds longitudinally striated.

Fl. & Fr. : August-February.

Native of South-East Asia. Rare, in tanks and ponds in association with *N. pubescens* Willd. It is a day-flowering species; 22 km from Banswara on Kushalgarh road, Lodha tank (*Kanodia* 51129, BSI).

2. ***N. pubescens*** Willd. Sp. Pl. 2 : 1154. 1799. *N. lotus* non L. var. *pubescens* (Willd.) Hook. f. & Thoms. Fl. Ind. 241. 1855. *N. lotus* auct. plur. non L. 1753; Hook. f. & Thoms. in Hook. f. Fl. Brit. India 1 : 114. 1872; Duthie, Fl. Gangetic Plain 1 : 33. 1903. *N. nouchali* auct. plur. non Burm. f. 1768; Subram. Aquatic Ang. 6. f. 2. 1962. 'Kamal' (Hindi).

Aquatic herbs, with erect root-stocks. Leaves hairy beneath. Flowers white or red, 8-15 cm in diam., solitary. Sepals 5 to 10-ribbed. Stigmatic rays 10-20. Fruits fleshy, globose, about 3 cm in diam. Seeds ovoid, with white aril.

Fl. & Fr. : August-March.

Native of Central Africa; common in ponds, tanks, ditches and rivers. It is a night flowering species; 22 km from Banswara on Kushalgarh road.

4. PAPAVERACEAE

ARGEMONE L.

Argemone mexicana L. Sp. Pl. 508. 1753; Hook. f. & Thoms. in Hook. f. Fl. Brit. India 1 : 117. 1872; Duthie, Fl. Gangetic Plain 1 : 36. 1903, *pro parte*; Ownbey in Mem. Torr. Bot. Club 21 : 29. 1958. 'Pili-dhaturi' (Hindi).

Erect, prickly herbs, upto 1 m high, with yellow or white latex. Leaves sinuate-pinnatifid, 4-18 × 2.5-6.0 cm, inciso-dentate, spiny on the margins. Flowers bright yellow, terminal, solitary. Stigma disc-like. Capsules oblong, 3 to 6-valved, loculicidal, prickly. Seeds black, scrobiculate.

Fl. & Fr. : Almost throughout the year, profuse from September to January.

Native of West Indies, Central Africa and Florida; naturalized in wastelands, on the edge of drying ponds and in cultivated fields; Sunai,

Banswara (*Kanodia* 51141, BSI).

5. FUMARIACEAE

FUMARIA L.

Fumaria indica (Haussk). Pugsley in Journ. Linn. Soc. 44 : 313. 1919; Mahesh. Illus. Fl. Delhi f. 4. 1966. *F. vaillantii* Loisel. var. *indica* Haussk. in Flora 56 : 443. 1873. *F. parviflora* Lam. subsp. *vaillantii* Hook. f. & Thoms. Fl. Ind. 1 : 258. 1855 & in Hook. f. Fl. Brit. India 1 : 128. 1872, non *F. vaillantii* Loisel. 1809; Duthie, Fl. Gangetic Plain 1 : 37. 1903. 'Pitpapra' (Hindi).

Annual herbs, upto 60 cm high. Leaves 2 to 3-pinnatisect; segments linear-ob lanceolate, apiculate. Flowers purplish-red, spurred, in terminal or leaf-opposed, bracteate racemes. Sepals incised-dentate. Nuts subglobose, 2-3 mm in diam., indehiscent, rugose when dry.

Fl. & Fr. : January-April.

Common weed of cultivated fields and garden-beds; Kushalgarh.

6. BRASSICACEAE (CRUCIFERAE *nom. alt.*)

- 1a. Fruit a siliqua. Seeds 1 to 2-seriate in each cell.
1b. Fruit a silicula. Seeds solitary in each cell.

Rorippa 2
Lepidium 1

1. LEPIDIUM L.

Lepidium sativum L. Sp. Pl. 644. 1753; Hook. f. & Anders. in Hook. f. Fl. Brit. India 1: 159. 1872; Duthie, Fl. Gangetic Plain 1: 48. 1903; Thell. Die Gatt. Lepidium 12. 1906.

Erect, annual, glabrous herbs, upto 60 cm high. Lower leaves 1 to 2-pinnate, long-petioled; upper ones sessile, pinnatifid or entire, 2-4 x 0.2-0.8 cm. Flowers white, in terminal and axillary, 10-50 cm long racemes. Stamens 6. Siliques ovate, oblong or suborbicular, 4-6 x 3-5 mm, retuse at the apex, laterally compressed; valves boat-shaped, winged at the top; cotyledons incumbent.

Fl. & Fr. : January-March.

Native of Mediterranean region; common weed in the crops of winter season; Loharia.

2. RORIPPA Scop.

Rorippa indica (L.) Hiern, Cat. Afr. Pl. Welw. 26. 1896; Bailey in Rhodora 18: 155. 1916. *Sisymbrium indicum* L. Mant. 1 : 93. 1767. *Nasturtium*

indicum (L.) DC. Syst. Nat. 2 : 199. 1818; Hook. f. & Anders. in Hook. f. Fl. Brit. India 1: 134. 1872, *pro parte*; Duthie, Fl. Gangetic Plain 1: 39. 1903. *N. montanum* Wall. ex Hook. f. & Th. in Journ. Linn. Soc. 5 : 139. 1861; Hook. f. & Anders. I.c. 1; 134. 1872; Duthie, I.c. 1 : 40. 1903.

Erect, hairy or glabrous herbs, upto 50 cm high. Lower leaves petiolate, lyrate-pinnatifid; upper ones ovate-lanceolate, sessile, sinuate-dentate, acute. Flowers white or yellow, in axillary racemes. Sepals upto 3 mm long, outer larger than the inner, obtuse. Petals ob lanceolate-cuneate, not clawed. Siliques turgid, not beaked. Seeds turgid, subreniform, granulate.

Fl. & Fr. : July-October.

Rare, weed of cultivated fields and nearby localities; Ghatol (*Majumdar* 10217, BSA).

Brassica campestris L. var. **rapa** (L.) Hartm. (*B. rapa* L.).—Annual herbs, with napiform roots, dull yellow or white flowers and beaked siliques. Cultivated during winter season for its edible fleshy roots. 'Shalgam' (Hindi).

B. campestris L. var. **sarson** Prain—Annual herbs, with tap root and yellow flowers. Cultivated throughout the area for the oil obtained from the seeds. 'Sarso' (Hindi).

B. oleracea L. var. **botrytis** L.—Rachis of young inflorescence and pedicels thickened into a dense, fleshy, white, edible mass. Native of W. Europe; cultivated during winter season. 'Phool gobhi' (Hindi).

B. oleracea L. var. **capitata** L.—Leaves congested into a subglobose or ellipsoid bud which is cooked as vegetable. Native of Europe and Asia; cultivated during winter season. 'Karamkulla, Pat-gobhi' (Hindi).

Raphanus sativus L.—Roots fusiform. Flowers white or pinkish, in corymbs elongating into racemes. Native of Europe and Temperate Asia; cultivated for its edible roots during winter season. 'Mooli' (Hindi).

7. CLEOMACEAE

CLEOME L.

1a. Leaves simple. Fruits glabrous.

C. simplicifolia 1

1b. Leaves 3 to 7-foliate. Fruits glandular pubescent.

C. viscosa 2

1. **Cleome simplicifolia** (Camb.) Hook. f. & Thoms. in Hook. f. Fl. Brit. India 1: 169. 1872; Duthie, Fl. Gangetic Plain 1 : 49. 1903. *Polanisia simplicifolia* Camb. in Jacq. Voy. Inde 20. t. 20. 1841. *P. burttorensis* Muir in Wight, Icon. 3(4) : 5. t. 1072. 1846.

Annual herbs, 20-60 cm high, clothed with white, stiff, glandular-based hairs. Leaves obovate-oblong or lanceolate, 3-8 x 0.5-2.5 cm, strigose. Flowers violaceous or purple, axillary, solitary, passing into racemes. Stamens

10-12. Ovary sessile. Siliques 1.5-5.0 cm long, many-ribbed, beaked, slightly torulose. Seeds yellowish brown, smooth.

Fl. & Fr. : July-October.

Rare, a wasteland ruderal, often abundant in the grasslands; Kotharia forest, Lodha (*Kanodia* 75317, BSI), Kushalgarh (*Kanodia* 75679, BSI).

2. *C. viscosa* L. Sp. Pl. 672. 1753; Hook. f. & Thoms. in Hook. f. Fl. Brit. India 1: 170. 1872; Duthie, Fl. Gangetic Plain 1: 50. 1903; Iltis in Brittonia 12: 281. 1960; Jacobs in Fl. Males. 6: 103. 1960; Mahesh. Illus. Fl. Delhi f. 9. 1966. *C. icosandra* L. l.c. 672. 1753. ‘*Pili-Hulhul, Jangli-Ashar*’ (Hindi).

Annual herbs, upto 1 m high, clothed with viscid-glandular hairs. Leaflets 3-7, elliptic, oblong or obovate. Flowers yellow, axillary, solitary, passing upwards into lax, bracteate corymbose racemes. Stamens 20-25. Ovary sessile. Siliques cylindric, 4-6 cm long, viscid, many-ribbed, beaked. Seeds subglobose, pitted in the centre, transversely ribbed, brown.

Fl. & Fr. : June-September.

Common weed in wastelands and open forests; Deoda, Banswara (*Majumdar* 10253, BSA), Anand Sagar (*Kanodia* 75257, BSI).

8. CAPPARACEAE (CAPPARIDACEAE)

CAPPARIS L.

- | | |
|---|-----------------------|
| 1a. Leaves absent or on the young shoots only, deciduous. | <i>C. decidua</i> 1 |
| 1b. Leaves normal, persistent: | |
| 2a. Leaves without a callus tip. Flowers greenish-yellow, in umbels. | <i>C. sepiaria</i> 2 |
| 2b. Leaves with recurved callus tip. Flowers white or pink, solitary, supra-axillary. | <i>C. zeylanica</i> 3 |

I. *Capparis decidua* (Forsk.) Edgew. in Journ. Linn. Soc. Bot. 6: 184. 1862; Jacobs in Blumea 12: 424. 1965; Mahesh. Illus. Fl. Delhi f. 12. 1966. *Sodada decidua* Forsk. Fl. Aegypt.-Arab. 81. 1775. *Capparis aphylla* Roth, Nov. Sp. Pl. Ind. Or. 238. 1821; Hook. f. & Thoms. in Hook. f. Fl. Brit. India 1: 174. 1872; Duthie, Fl. Gangetic Plain 1: 53. 1903. ‘*Kair*’ (Hindi).

Much-branched, leafless shrubs, upto 2 m high. Stipular spines straight. Flowers red, in corymbs. Gynophore 1.5-2.0 cm long. Berries globose, 1-2 cm in diam., glabrous, with white latex, reddish when ripe.

Fl. & Fr. : November-March.

Occasional, in dry wastelands; Banswara.

2. *C. sepiaria* L. Syst. Nat. ed. 10. 2: 1071. 1759 & Sp. Pl. ed. 2. 720. 1762; Hook. f. & Thoms. in Hook. f. Fl. Brit. India 1: 177. 1872; Duthie, Fl. Gangetic Plain 1: 53. 1903; Jacobs in Blumea 12: 489. 1965; Mahesh. Illus.

Fl. Delhi f. 13. 1966. *C. incanescens* DC. Prodr. 1: 247. 1824. *C. sepiaria* L. var. *incanescens* (DC.) Hook. f. & Thoms. l.c. 1: 177. 1872. *C. glauca* Wall. ex Hook. f. & Thoms. l.c. 1: 180. 1872. 'Jal, Chhail' (Hindi).

var. *sepiaria*.

Woody, straggling shrubs, 1-2 m high. Leaves ovate, elliptic, 3-5 x 2-3 cm, entire, retuse, Stipular spines hooked. Umbels axillary and terminal. Berries globose, smooth, black when ripe. Gynophore upto 8 mm long.

Fl. & Fr.: November-May.

Common on the edges of fields, in wastelands and forests; Loharia forest, Banswara (*Kanodia* 51092, BSI).

3. *C. zeylanica* L. Sp. Pl. ed. 2. 720. 1762; Jacobs in Blumea 12: 505. 1965; Hook. f. & Thoms. Fl. Brit. India 1: 174. 1872. *C. horrida* L. f. Suppl. Pl. 264. 1781; Wight, Icon. 1: t. 173. 1839; Hook. f. & Thoms. in Hook. f. l. c. 1: 178. 1872; Duthie, Fl. Gangetic Plain 1: 53. 1903. 'Gitoran, Kantan' (Hindi).

Climbing shrubs, 2-4 m high. Leaves ovate or oblong, 3-5 x 2-3 cm, entire. Stipular spines hooked. Flowers 2-6 serial. Sepals 1.0-1.5 cm long, tomentose. Petals densely hairy inside. Berries subglobose, 4-5 x 3-4 cm, reddish-brown, with fatty pulp and woody pericarp. Seeds subglobose.

Fl. & Fr.: November-April.

Common among bushes and shrubs in wastelands; Banswara.

Crateva nurvala Buch.-Ham. (*C. religiosa* non Forst. var. *nurvala* (Buch.-Ham.) Hook. f. & Thoms.—Trees, with 3-foliate leaves, yellow flowers and globose, ovoid or ovoid,brown -tomentose berries. Planted in the gardens. 'Barna' (Hindi).

9. VIOLACEAE

HYBANTHUS Jacq. nom. cons.

Hybanthus enneaspermus (L.) Muell. Fragm. 10: 81. 1876 & Census Austr. Pl. 1: 11. 1882 & 1889; Tannant in Kew Bull. 16(3): 431. 1963. *Viola enneasperma* L. Sp. Pl. 937. 1753. *V. suffruticosa* L. l.c. 937. 1753. *Ionidium heterophyllum* Vent. Jard. Malm. t. 27. 1803; Duthie, Fl. Gangetic Plain 1: 56. 1903. *I. suffruticosum* (L.) Roem. & Schult. Syst. Veg. 5: 394. 1819; Wight Icon. 1: t. 308. 1840; Hook. f. & Thoms. in Hook. f. Fl. Brit. India 1: 185. 1872. 'Ratanpurus' (Hindi).

Erect, annual herbs, 15-30 cm high. Leaves subsessile, linear-lanceolate, 2-5 x 0.2-1.0 cm, serrulate. Stipules subulate, gland-tipped. Flowers pinkish-purple, solitary, axillary. Sepals not produced below their insertion. Lower petal spurred at the base. Two anthers spurred on the back. Capsules sub-globose, smooth. Seeds striated.

Fl. & Fr.: August-November.

Sparingly distributed in the wastelands in wet habitats; Paloda.

10. FLACOURTIACEAE

FLACOURTIA Commers. ex L' Herit.

Flacourtia indica (Burm.f.) Merr. Inter. Rump. Herb. Amb. 377. 1917.
Gmelina indica Burm. f. Fl. Ind. 132. t. 39. f. 5. 1768. *Flacourtia ramontchi* L' Herit. Stirp. Nov. 3: 59. t. 30 & 30 B. 1785; Hook. f. & Thoms. in Hook. f. Fl. Brit. India 1: 193. 1872, incl. vars.; Duthie, Fl. Gangetic Plain 1: 59. 1903, incl. vars. *F. sepiaria* Roxb. Cor. Pl. 1: 48. t. 68. 1796; Hook. f. & Thoms. l.c. 1: 194. 1872; Duthie, l.c. 1: 59. 1903. 'Kankair' (Hindi).

Dioecious trees, 4-8 m high, armed with spines. Leaves elliptic, ovate or oblong, 1.5-8.5 x 1.5-6.0 cm, crenate-serrate; midrib glabrous. Flowers unisexual, greenish-yellow, clustered in short, axillary racemes. Tepals 4, united below. Stigmas 5-11. Berries globose, reddish-purple when ripe.

Fl. & Fr. : January-June.

Frequent in the forests; Kotharia forest, Banswara (*Kanodia* 75356, BSI).

11. POLYGALACEAE

POLYGALA L.

- | | |
|---|-----------------------|
| 1a. Wing sepals about 5 mm broad, acute or acuminate. Capsules narrowly margined. | <i>P. arvensis</i> 1 |
| 1b. Wing sepals about 2 mm wide, obtuse. Capsules not margined. | <i>P. erioptera</i> 2 |

1. **Polygala arvensis** Willd. Sp. Pl. ed. 3. 2 : 876. 1802; Burtt in Notes Roy. Bot. Gard. Edinb. 32: 404. 1973. *P. chinensis* auct. plur. non L. 1753; Bennett in Hook. f. Fl. Brit. India 1: 204. 1872, excl. var. *brachystachya* (Bl.) Bennett; Duthie, Fl. Gangetic Plain 1: 62. 1903; Mahesh. Illus. Fl. Delhi f. 16. 1966. 'Golbel' (Hindi).

Erect or prostrate herbs. Leaves obovate, oblanceolate or elliptic, 1.0-4.5 x 0.6-1.5 cm, ciliate, mucronate. Flowers greenish-yellow, axillary, solitary or in racemes shorter than leaves. Sepals persistent. Lower petal largest, keeled, with a dorsal crest of few subulate teeth. Capsules broadly oblong, ciliate, emarginate. Seeds pubescent, strophiolate, with three basal appendages.

Fl. & Fr. : August-October.

Common weed in wastelands, gardens, lawns, parks and often on the hills. This is a polymorphic taxon; Pipalkhund.

2. *P. eriopetra* DC. Prodr. 1 : 326. 1824; Bennett in Hook. f. Fl. Brit. India 1 : 203. 1872; Duthie, Fl. Gangetic Plain 1 : 62. 1903; Mukerj. in Bull. Bot. Soc. Beng. 12: 47. 1960. 'Sarbhagolia' (Hindi).

var. eriopetra

Erect herbs, 10-50 cm high. Leaves linear to elliptic-oblong, 1-4 x 0.3-1.0 cm, entire. Flowers yellow, in axillary or extra-axillary racemas shorter than leaves. Lower petal falcate, 3-angular, keeled. Capsules oblong, emarginate at the apex, glabrous or pubescent. Seeds 2, oblong, hairy, strophiolate with three basal appendages.

Fl. & Fr. : July to January.

Common weed in wastelands and forests; Ghatol, Jolana (*Kanodia* 75616, BSI), Anand Sagar (*Kanodia* 75255, BSI).

12. CARYOPHYLLACEAE

- | | |
|--|----------------------|
| 1a. Stipules fimbriate. Stamens 5. Style solitary, 3-fid at the apex. | <i>Polycarpaea</i> 1 |
| 1b. Stipules not fimbriate. Stamens 8-10. Styles 3 or 5, free to the base. | <i>Spergula</i> 2 |

I. POLYCARPAEA Lam. *nom. cons.*

***Polycarpaea corymbosa* (L.) Lam.** Tabl. Encycl. 2: 129. 1797; Wight, Icon. 2(4): 6. t. 712. 1843; Edgew. & Hook. f. in Fl. Brit. India 1: 245. 1874; Duthie, Fl. Gangetic Plain 1 : 68. 1903. *Achyranthes corymbosa* L. Sp. Pl. 205. 1753. 'Dholphuli' (Hindi).

Hoary-pubescent, annual herbs, 15-30 cm high. Leaves in pseudo-whorls, linear-lanceolate, 1.2-3.0 cm long. Stipules scarious, lanceolate, 2-6 mm long. Flowers white, crowded in much branched cymes, forming flat-topped silvery heads. Sepals scarious, not keeled. Petals enclosed in the calyx. Capsules ovoid, 3-valved, many-seeded.

Fl. & Fr. : August- November.

Common weed in cultivated fields and wastelands; Lasara, Jolana (*Kanodia* 75582, BSI).

2. SPERGULA L.

***Spergula fallax* (Lowe) Krause** in Sturm, Deutschl. Fl. ed 2, 2: 19. 1901; Milne-Redhead in Kew Bull. 1950: 338. 1950; Burtt & Lewis in Kew Bull. 1952 : 349. 1952. *Spergularia fallax* Lowe in Hook. f. Kew Journ. Bot. 8 : 289. 1856. *Spergula pentandra* sensu Edgew. & Hook. f. in Fl. Brit. India 1 : 243. 1874, *pro parte*, non L. 1753; Duthie, Fl. Gangetic Plain 1 : 67. 1903. 'Khandidal' (Hindi).

Diffuse herbs, upto 40 cm high. Leaves in pseudo-whorls, linear-subulate, 2.0-3.5 cm long, fleshy, not channelled beneath. Stipules scarious, entire.

Flowers white, in panicled cymes. Styles 3. Capsules subglobose, 3-valved. Seeds black, shining, winged.

Fl. & Fr.: December-March.

Common weed in cultivated fields. Closely allied to *S. arvensis* L. and *S. petandra* L. which bear 5 styles and 5-valved capsules. Leaves of latter are not channelled beneath as occur in *S. arvensis* L.; Ghatol, Paralka-pul (Majumdar 16318, BSA).

13. PORTULACACEAE

PORTULACA L.

- 1a. Nodes without appendages. Flowers clustered at the end of branches. Calyx-lobes carinate-alate. *P. oleracea* 1
- 1b. Nodes with a ring of hairs. Flowers solitary, terminal. Calyx-lobes not alate. *P. quadrifida* 2

1. *Portulaca oleracea* L. Sp. Pl. 445. 1753; Dyer in Hook. f. Fl. Brit. India I: 246. 1874; Duthie, Fl. Gangetic Plain 1: 69. 1903. 'Noonkha' (Hindi).

Decumbent, succulent herbs. Leaves obovate-cuneate or oblong, 1.5–2.5 x 0.2–1.5 cm. Flowers yellow, subtended by a whorl of leaves. Calyx-tube glabrous. Petals 5-6, retuse. Stamens 8-12. Ovary half inferior. Fruits ovoid, operculate. Seeds brown, muricate, reniform.

Fl. & Fr.: August-November.

Native of S. Russia and Greece; naturalized in wastelands in wet habitats; Ghatol, Jolana (*Kanodia* 13, BSI).

2. *P. quadrifida* L. Mant. I: 73. 1767; Dyer in Hook. f. Fl. Brit. India I : 247. 1874; Duthie, Fl. Gangetic plain 1 : 70. 1903. 'Noonkha' (Hindi).

Creeping, succulent, annual herbs. Leaves opposite, ovate-lanceolate or oblong, 1.0 x 0.5 cm. Receptacle cup-shaped, with a whorl of 4 or 5 leaves and a ring of hairs. Petals 4. Ovary half inferior. Capsules circumsciss. Seeds spirally coiled, muricate, black.

Fl. & Fr.: Most part of the year.

Common in wastelands; Pipalkhund, Banswara (*Kanodia* 51023, BSI).

Talinum paniculatum (Jacq.) Gaertn. (*Portulaca paniculata* Jacq., *P. patens* L.)—Fleshy perennial herbs, with ovate-elliptic to obovate leaves and pinkish or reddish-purple flowers in long peduncled cymes. Native of America; cultivated ornamentals in the gardens, often found as an escape.

14. TAMARICACEAE

TAMARIX L.

Tamarix dioica Roxb. ex Roth, Nov. Pl. Sp. Ind. Or. 185. 1821; Dyer in

Hook. f. Fl. Brit. India 1: 249. 1874; Duthie, Fl. Gangetic Plain 1: 71. 1903; Mahesh. Illus. Fl. Delhi f. 21. 1966. 'Jhau' (Hindi).

Dioecious trees or shrubs, with drooping ultimate branches. Leaves scaly, sheathing, obliquely truncate, abruptly acuminate. Flowers pink, in dense, peduncled, bracteate spikes borne in terminal panicles. Sepals elliptic-obovate, with strong midrib. Petals elliptic-oblong. Stamens 5, inserted in the notches of 5-lobed disc. Styles 3, as long as ovary. Capsules oblong.

Fl. & Fr.: August-October.

Rare, in river-beds and ponds; Banswara (*Kanodia* 20, BSI).

15. ELATINACEAE

BERGIA L.

Bergia ammannioides Roxb. ex Roth, Nov. Pl. Sp. 219. 1821; Dyer in Hook. f. Fl. Brit. India 1: 251. 1874; Duthie, Fl. Gangetic Plain 1: 73. 1903; Mahesh. Illus. Fl. Delhi f. 22. 1966. *Lechea verticillata* Willd. Sp. Pl. 1: 495. 1797, non *Bergia verticillata* Willd. 1799.

Annual, glandular-pubescent herbs, 10-50 cm high. Leaves sessile, obovate-oblong, elliptic-oblong or lanceolate, 0.8—3.5 x 0.2—1.0 cm, distantly serrate, gland-ciliate. Flowers reddish, in few to many-flowered, axillary fascicles. Stamens 5. Capsules ovoid, 2 mm long. Seeds many, brown, reticulate.

Fl. & Fr.: August-October.

Rare, marshy habitats. Often mistaken for *Ammannia baccifera* L. due to identical habit; Looda (*Majumdar* 10268, BSA), Banswara (*Kanodia* 51100, BSI).

16. MALVACEAE

1a. Fruit a schizocarp; the ripe carpels separating from the axis:

2a. Style-branches as many as carpels:

3a. Bracteoles absent:

4a. Carpels 1-seeded.

Sida 7

4b. Carpels 2 to many-seeded.

Abutilon 2

3b. Bracteoles three.

Malvastrum 5

2b. Style-branches twice as many as carpels:

5a. Bracteoles 4-5. Carpels opposite the petals.

Urena 9

5b. Bracteoles more than 5. Carpels opposite the sepals.

Pavonia 6

1b. Fruit a capsule, dehiscing loculicidally or septicidally:

6a. Style unbranched or stigmas connate:

7a. Midrib of leaves with a glandular pore at the base.

Azanza 3

7b. Midrib of leaves eglandular.

Thespesia 8

6b. Style branched in upper region. Stigmas distinct:

- 8a. Calyx spathaceous, falling off together with corolla. *Abelmoschus* 1
 8b. Calyx not spathaceous, subpersistent. *Hibiscus* 4

I. ABELMOSCHUS Medik.

- 1a. Capsules not exceeding the calyx. *A. crinitus* 1
 1b. Capsules exceeding the calyx:
 2a. Bracteoles 4-6. Flowers white or pale. *A. ficulneus* 2
 2b. Bracteoles 7-10. Flowers bright yellow. *A. moschatus* 3

1. *Abelmoschus crinitus* Wall. Pl. As. Rar. 1 : 39. t. 44. 1830; Borssum in Blumea 14(1): 103. 1966. *Hibiscus cancellatus* Roxb. Fl. Ind. 3: 201. 1832, non L. f. 1781; Mast. in Hook. f. Fl. Brit. India 1: 342. 1874; Duthie, Fl. Gangetic plain 1: 92. 1903. 'Jangli Bhindi' (Hindi).

Erect, hispid herbs, 50-150 cm high. Leaves orbicular to transversely elliptic, 10-17 cm in diam., 5 to 7-palmilobed, cordate at the base, coarsely dentate to serrate-margined. Flowers yellow with purple centre, axillary, solitary or often in short racemes. Bracteoles 10-16, linear to filiform. Capsules ovoid, shortly acuminate, hirsute. Seeds globular to reniform, with concentric ribs.

Fl & Fr.: August-October.

Common on the fringes of forests, in grasslands and neglected corners of nurseries; Bagaycha forest, Kushalgarh.

2. *A. ficulneus* (L.) Wt. & Arn. ex Wight, Cat. 14. 1833 & Prod. 53. 1834; Wight, Icon. 1: t. 154. 1839; Borssum in Blumea 14(1): 101. 1966. *Hibiscus ficulneus* L. Sp. Pl. 695. 1753; Mast. in Hook. f. Fl. Brit. India 1: 340. 1874; Duthie, Fl. Gangetic Plain 1: 91. 1903. 'Mal Bhindi' (Hindi).

Perennial, hispid herbs, upto 1.5 m high. Leaves variable, cordate-orbicular to reniform or angled, 4-12 cm in diam., coarsely crenate. Flowers white or light-yellow with purple centre, axillary, solitary or in leafless racemes. Capsules 5-angled, oblong-cylindric. Seeds black, pubescent or minutely stellately hairy,

Fl. & Fr.: Most part of the year.

Common in forests and wastelands; Khora forest, Bagaycha.

3. *A. moschatus* Medic. Malv. 46. 1787; Wight, Icon. 2(1): 8. t. 399. 1840; Borssum in Blumea 14 (1): 90. 1966. *Hibiscus abelmoschus* L. Sp. Pl. 696. 1753; Mast. in Hook. f. Fl. Brit. India 1: 342. 1874; Duthie, Fl. Gangetic Plain 1 : 92. 1903.

Hispidly hairy, annual herbs or undershrubs. Leaves orbicular-elliptic, 3 to 7-palmatilobed to partite, cordate-based, upper ones ovate-obovate or spatulate to oblong. Stipules filiform. Flowers yellow with purple centre, axillary, solitary, passing into terminal racemes. Bracteoles filiform to lanceolate or oblong, appressed to the fruit. Capsules ovoid, 5 to 8 cm long, hispid. Seeds globose, glabrous.

Fl. & Fr. : August-November.

Often met with in scrub or deciduous forests in plains; Anand Sagar forest (*Kanodia* 75192, BSI).

2. ABUTILON Mill.

1a. Carpels upto 10, with spreading awns.

A. ramosum 2

1b. Carpels more than 10, with short erect mucro.

A. indicum 1

1. **Abutilon indicum** (L.) Sweet, Hort. Brit. 54. 1826; Wight, Icon. 1: t. 12. 1838; Mast in Hook. f. Fl. Brit. India 1: 326. 1874; Duthie, Fl. Gangetic Plain 1: 83. 1903; Borssum in Blumea 14(1): 170. 1966. *Sida indica* L. Cent. Pl. 2: 26. 1756. 'Jhili' (Hindi).

subsp. indicum

Shrubs, upto 2 m high, clothed with white, powdery pubescence. Leaves ovate-cordate, 2.5-15.0 x 1.5-10.0 cm, crenate-toothed, acute or acuminate, 6 to 9-nerved at the base. Flowers yellow, solitary, axillary. Calyx-lobes apiculate or acuminate. Fruits 1.5 x 2.0 cm; carpels 12-25, with a distinct mucro. Seeds reniform-triangular, black, glabrous.

Fl. & Fr. : August-December.

Common in wastelands, gardens and neglected corners of fields; Talwara, Ghatol, Parla-ka-Pul (*Majumdar & Mishra* 10308, BSA), Jolana (*Kanodia* Acc. No. 30879, BSI).

2. **A. ramosum** (Cav.) Guill. & Perr. in Guill. *et al.* Fl. Seneg. Tent. 1: 68. 1831; Mast. in Hook. f. Fl. Brit. India 1: 328. 1874; Duthie, Fl. Gangetic Plain 1: 83. 1903. *Sida ramosa* Cav. Diss. 1: 28. t. 6. f. 1. 1785.

Shrubs, upto 2 m high. Leaves cordate-ovate, subtrilobate, 5-10 x 4-7 cm, crenate-serrate, acuminate or 3-cuspidate. Flowers yellow; peduncles axillary, solitary, bearing two flowers at the apex. Fruits 1.0—1.5 cm long. Seeds 3, tubercled.

Fl. & Fr. : August-January.

Often found in wastelands among the bushes; Bodigama (*Kanodia* 51155, BSI).

3. AZANZA Alef.

Azanza lampas (Cav.) Alef. in Bot. Zeit. 19: 298. 1861. *Hibiscus lampas* Cav. Diss. 3: 154. t. 56. f. 2. 1787; Wight, Icon. 1: t. 5. 1838. *Thespisia macrophylla* auct. plur. non Bl. 1825; Duthie, Fl. Gangetic Plain 1: 93. 1903. *T. lampas* (Cav.) Dalz. & Gib. Bomb. Fl. 19. 1861; Mast. in Hook. f. Fl. Brit. India 1. 345. 1874; Borssum in Blumea 14(1): 116. 1966. 'Ban Kapas' (Hindi).

Deciduous shrubs, upto 1 m high. Leaves palmately 3-lobed, 6-15 x

6-15 cm, strigose and gland-dotted, with a glandular pit on the midrib beneath. Flowers yellow, borne on 3-flowered axillary or terminal peduncles. Capsules ovoid, pointed, about 2.5 cm long, 3 to 5-valved. Seeds finely pubescent, hairy around the hilum.

Fl. & Fr.: August-April.

Common in forests; Puna Pathar forest, Hura Bowji forest, Bijlia hills (Kanodia 75690, BSI).

4. *HIBISCUS* L. *nom. cons.*

1a. Bracteoles absent.	<i>H. lobatus</i> 2
1b. Bracteoles present:	
2a. Bracteoles spine-like, prickly, longer than calyx.	<i>H. caesius</i> 1
2b. Bracteoles linear to spatulate, neither spine-like nor prickly, shorter than calyx:	
3a. Capsules 5-angled or winged.	<i>H. vitifolius</i> 5
3b. Capsules neither angled nor winged:	
4a. Scabrid herbs. Flowers white or pink. Seeds cottony.	<i>H. ovalifolius</i> 3
4b. Tomentose undershrubs or herbs. Flowers yellow with purple centre. Seeds pubescent.	<i>H. panduriformis</i> 4

1. *Hibiscus caesius* Garcke in Oester. Bot. Zeit. 7: 850. 1849; Rakshit & Kundu in Bull. Bot. Surv. Ind. 12 : 173. 1972. *H. gibsonii* Stocks ex Harv. in Harv. & Sond. Fl. Cap. 2 : 587. 1859; Mast. in Hook. f. Fl. Brit. India 1 : 339. 1874; Duthie, Fl. Gangetic Plain 1 : 91. 1903 'Okda' (Hindi).

Annual, hairy or prickly herbs, upto 1.5 m high. Leaves deeply palmately 3 to 5-lobed; lobes 2-10 cm long, serrate, sparsely stellate hairy beneath. Flowers yellow with purple centre, axillary, solitary. Bracteoles 7-10, needle-like, spine-tipped, spreading, connate at the base. Capsules subglobose, pointed, hairy. Seeds subtrigonous, black, pilose.

Fl. & Fr.: August-January.

Common in the forests; Loharia forest, Banswara (Majumdar 10295, BSA).

2. *H. lobatus* L. f. Suppl. 309. 1781; Borssum in Blumea 14(1) : 77. 1966; Rakshit & Kundu in Bull. Bot. Surv. Ind. 12: 169. 1972. *Solandra labata* Murr. in Comm. Soc. Reg. Sci. Goetting. 6 : 20. t. 1. 1785. *Hibiscus solandra* L' Herit. Stirp. Nov. 1 : 103. t. 49. 1788; Mast. in Hook. f. Fl. Brit. India 1: 336. 1874; Duthie Fl. Gangetic Plain 1: 89. 1903.

Erect, annual herbs, 30-80 cm high. Leaves orbicular-ovate, upper ones palmately 3 to 5-lobed, coarsely crenate. Flowers white, solitary, axillary or in terminal racemes. Staminal tube included, antheriferous in upper half. Capsules ovoid or globose, pilose at the top, beaked, longer than calyx. Seeds blackish, muricate.

Fl. & Fr.: August-November.

Common in forests in shady habitats; Puna Pathar forest, Hura Bowji forest, Banswara (*Kanodia* 75154, BSI).

3. *H. ovalifolius* (Forsk.) Vahl, Symb. Bot. 1: 50. 1790. *Urena ovalifolia* Forsk. Fl. Aegypt.-Arab. 124. 1775. *Hibiscus micranthus* L. f. Suppl. 308. 1781; Mast. in Hook. f. Fl. Brit. India 1: 335. 1874; Duthie, Fl. Gangetic Plain 1: 89. 1903; Mahesh. Illus. Fl. Delhi f. 29. 1966; Rakshit & Kundu in Bull. Bot. Surv. Ind. 12: 171. 1972. 'Chiramulti' (Hindi).

Perennial herbs or undershrubs, upto 1 m high. Leaves ovate-lanceolate, rhomboid or oblong-elliptic, 2.5-4.5 x 1.0-3.0 cm, serrate. Flowers solitary, axillary, passing into terminal racemes. Bracteoles 6-8, linear, filiform, free. Fruits globose, glabrous. Seeds subreniform, with acute angles, black.

Fl. & Fr.: July-December.

Common in the forests; Shergarh forest.

4. *H. panduriformis* Burm. f. Fl. Ind. 151. t. 47. f. 2. 1768; Mast. in Hook. f. Fl. Brit. India 1: 338. 1874; Duthie, Fl. Gangetic Plain 1: 90. 1903; Borssum in Blumea 14(1): 79. 1966; Rakshit & Kundu in Bull. Bot. Surv. Ind. 12: 172. 1972.

Erect, woody herbs, 1-3 m high, clothed with white tomentum. Leaves ovate or ovate-cordate, lower ones 3 to many-angled, 4-9 x 2-6 cm, crenate-dentate, acute. Flowers axillary, solitary, passing into terminal racemes. Bracteoles 8-10, linear-spathulate, 1-3 cm long. Capsules globose, hairy, enclosed in inflated calyx. Seeds pubescent, brownish-black.

Fl. & Fr. : September-December.

Rare along the roads in wastelands; Sagrod, Barodia.

5. *H. vitifolius* L. Sp. Pl. 696. 1753; Mast. in Hook. f. Fl. Brit. India 1: 338. 1874; Duthie, Fl. Gangetic Plain 1: 90. 1903; Borssum in Blumea 14(1): 82. 1966; Rakshit & Kundu in Bull. Bot. Surv. Ind. 12: 166. 1972. 'Ban Okhra' (Hindi).

Perennial, hispidly hairy herbs, about 1 m high. Leaves cordate-ovate, palmately 3 to 5-angled to-lobed, 4-15 x 2.5-15.0 cm, crenate-serrate, abruptly acuminate, tomentose beneath. Flowers yellow, with purple centre, axillary, solitary or in terminal cymose clusters. Bracteoles 5-8, free, linear, setaceous. Capsules shorter than calyx, hairy, beaked. Seeds tubercled.

Fl. & Fr. : August-November.

Common in the forests; Shergarh forest, Anand Sagar (*Kanodia* 75285, BSI).

5. MALVASTRUM, A Gray *nom. cons.*

Malvastrum coromandelianum (L.) Garcke in Bonplandia 5: 295. 1857; Mahesh. Illus. Fl. Delhi f. 26. 1966; Borssum in Blumea 14(1): 152. 1966. *Malva coromandeliana* L. Sp. Pl. 687. 1753. *M. tricuspidata* R. Br. in W. Ait.

Hort. Kew. ed. 2. 4. : 210. 1812. *Malvastrum tricuspidatum* (R. Br.) A. Gray, Pl. Wright I : 16. 1852; Mast. in Hook. f. Fl. Brit. India I : 321. 1874; Duthie, Fl. Gangetic Plain 1 : 79. 1903. 'Baryara' (Hindi).

Herbs or undershrubs. Leaves ovate-lanceolate or oblong, 3-8 x 1.5-5.5 cm, crenate-serrate, simple or stellate hairy. Flowers yellow, axillary, solitary or 2 to 3-together. Carpels 5-12, reniform, 1-seeded, ciliate, with 3 spines on the margins, enclosed in the calyx. Stigmas capitate.

Fl. & Fr. : Most part of the year.

Native of S. America; naturalized in wastelands and gardens in shady habitats; Kushalgarh.

6. PAVONIA Cav. *nom. cons.*

Pavonia zeylanica (L.) Cav. Diss. 3 : 134. t. 48. f. 2. 1787; Mast. in Hook. f. Fl. Brit. India I : 331. 1874; Mahesh. Illus. Fl. Delhi f. 28. 1966; Raizada, Suppl. Duthie, Fl. Gangetic Plain 32. 1976. *Hibiscus zeylanicus* L. Sp. Pl. 697. 1753.

Glandular-pubescent undershrubs, upto 1 m high. Leaves 1-2 cm in diam., dentate, often 3 to 5-lobed. Flowers pink, axillary, solitary. Epicalyx-segments 6-10, linear, setaceous. Carpels 5, 3-angled, wedge-shaped, keeled on the edges, rounded on the back, pubescent or glabrous. Seeds brown, glabrous or rarely pubescent.

Fl. & Fr. : August-November.

Occasional, in the wastelands along the roads; Banswara, Parsolia (*Kanodia* 75583, BSI).

7. SIDA L.

1a. Petioles spiny at the base.	<i>S. spinosa</i> 5
1b. Petioles not spiny:	
2a. Mericarps awnless, muticous:	
3a. Styles and mericarps 7-8.	<i>S. ovata</i> 3
3b. Styles and mericarps 5.	<i>S. cordata</i> 1
2b. Mericarps awned:	
4a. Pedicels jointed below the middle. Mericarps 1-awned; awns less than half the length of mericarps.	<i>S. rhombifolia</i> subsp. <i>rhombifolia</i> 4
4b. Pedicels jointed above the middle. Mericarps 2-awned; awns as long as the mericarps.	<i>S. cordifolia</i> 2

1. *Sida cordata* (Burm. f.) Borssum in Blumea 14(1) : 182. 1966. *Melochia cordata* Burm. f. Fl. Ind. 143. 1768. *Sida veronicifolia* Lam. Encycl. 1 : 5. 1783; Duthie, Fl. Gangetic Plain 1 : 80. 1903. *S. humilis* Willd. var. *veronicifolia* (Lam.) Mast. in Hook. f. Fl. Brit. India I : 322. 1874. *S. beddomei* Jacob in Journ. Bomb. nat. Hist. Soc. 47 : 50. 1947. 'Dhamni' (Hindi).

Prostrate or trailing, hairy herbs. Leaves ovate-cordate, 1-6 x 1-5 cm, serrate, acuminate, stellate hairy. Flowers yellow, axillary, solitary, often forming subumbellate corymbs upwards. Pedicels jointed above the middle. Calyx divided half way down; lobes acuminate. Fruits 5-lobed, membranous, glabrous. Seeds brown, smooth.

Fl. & Fr. : Most part of the year.

Common in protected wastelands and on the fringes of forests; Jua fall, Loharia forest, Banswara (*Verma* 242, BSA).

2. *S. cordifolia* L. Sp. Pl. 684. 1753; Mast. in Hook. f. Fl. Brit. India 1 : 324. 1874; Duthie, Fl. Gangetic Plain 1 : 82. 1903; Borssum in Blumea 14(1) : 199. 1966.

Shrubs, below 1 m in height, clothed with stellate and spreading hairs. Leaves cordate-ovate or oblong, 2.5-5.0 x 1.5-3.5 cm, crenate-serrate. Flowers white or pale-yellow, axillary, solitary or 2 to 3-together, often forming corymbs upwards. Mericarps 2-awned; awns retrorsely scabrid-hairy, longer than calyx.

Fl. & Fr. : August-November.

Rare, among bushes in wastelands; Lasara, Parsolia (*Kanodia* 75587, BSI).

3. *S. ovata* Forsk. Fl. Aegypt.-Arab. 106, 124. 1775. *S. grewioides* Guill. & Perr. in Guill. et al. Fl. Senegamb. Tent. 1 : 71. 1831; Mast. in Hook. f. Fl. Brit. India 1 : 323. 1874; Duthle, Fl. Gangetic Plain 1 : 81. 1903. 'Dabi' (Hindi).

Stellate-tomentose undershrubs. Leaves oblong or ovate-oblong, 1.5-4.0 x 1.0-3.0 cm, crenate-serrate. Flowers pale yellow or white, axillary, solitary or paired. Mericarps 2-awned; awns one-third the length of carpels. Fruits globose, not exceeding the calyx when ripe, reticulated. Seeds black, smooth.

Fl. & Fr. : August-February.

Common in wastelands; Shergarh.

4. *S. rhombifolia* L. Sp. Pl. 684. 1753; emend. Mast. in Hook. f. Fl. Brit. India 1 : 323. 1874; Duthie, Fl. Gangetic Plain 1 : 81. 1903; Borssum in Blumea 14 (1) : 195. 1966. *S. rhomboidea* Roxb. ex Flem. Asiat. Res. 6 : 178. 1810. *S. rhombifolia* L. var. *rhomboidea* (Roxb. ex Flem.) Mast. l.c. 1 : 324. 1874.

subsp. *rhombifolia*

Annual or perennial, woody, erect herbs or undershrubs. Leaves oblong-rhomboid or rhomboid-lanceolate, 2.5-8.0 x 1-6 cm, crenate-serrate in upper half. Flowers yellow, 1.5-1.7 cm long, axillary, solitary or clustered at the end of branches. Pedicels longer than petioles. Calyx 10-ribbed. Mericarps 1-awned, not retrorsely bristly, shorter than calyx.

Fl. & Fr. : September-February.

Common in wastelands and outskirts of forests; Bagaycha forest,

Vajupura (*Kanodia* 75536, BSI).

S. spinosa L. Sp. Pl. 683. 1753; Mast. in Hook. f. Fl. Brit. India 1 : 323. 1874; Duthie, Fl. Gangetic Plain 1 : 80. 1903; Mahesh. Illus. Fl. Delhi f. 23. 1966. 'Bariara' (Hindi).

Much-branched shrubs, clothed with stellate hairs. Leaves lanceolate or oblong-elliptic, 1.5-3.5 x 0.8-1.8 cm, serrate. Flowers white, axillary, solitary or 2 to 3-together. Pedicels jointed above the middle. Calyx 10-ribbed; lobes 3-nerved. Fruits globose, 5-lobed, hairy in the upper half, membranous in the lower half. Arista of mericarps not retrorsely ciliate.

Fl. & Fr. : August to November, often in March-April.

Common in wastelands and gardens in shady habitats; Talwara.

8. THESPESIA Soland. ex Corr. *nom. cons.*

Thespesia populnea (L.) Soland. ex Corr. in Ann. Mus. Hist. Nat. Paris 9 : 290. t. 8. f. 1. 1807; Wight, Icon. 1 : t. 8. 1838; Mast. in Hook. f. Fl. Brit. India 1 : 345. 1874; Duthie, Fl. Gangetic Plain 1 : 93. 1903; Borssum in Blumea 14(1) : 106. 1966. *Hibiscus populneus* L. Sp. Pl. 694. 1753. 'Paras Pipal' (Hindi).

Trees or shrubs, 4-6 m high. Leaves ovate-cordate, 8-13 x 5-11 cm, acuminate, peltate-scaly beneath, glandular between the veins. Flowers yellow to pink, axillary, solitary and in corymbs towards the end of branches. Calyx-cup truncate; teeth small. Capsules globose, 2.0-2.5 cm in diam., peltate-scaly, 5-valved, with persistent calyx at the base.

Fl. & Fr. : October-January.

Frequent in wastelands near habitations, also planted along the roads; Danpur.

9. URENA L.

Urena lobata L. subsp. *sinuata* var. *sinuata* (L.) Borssum in Blumea 14 (1) : 142. 1966. *U. sinuata* L. Sp. Pl. 692. 1753; Mast. in Hook. f. Fl. Brit. India 1 : 329. 1874. 'Bachita' (Hindi).

Woody, perennial herbs, with pubescent or tomentose branches. Leaves broadly obovate to lanceolate or rhomboid, entire to angled or deeply palmately many-lobed, 3-8 x 1.5-10.0 cm. Flowers pink, axillary, solitary or 2 to 3-together. Bracteoles linear-lanceolate, reflexed. Fruits 4 to 5-carpedled, echinate on the back, stellate hairy.

Fl. & Fr. : September-January.

Common in wastelands and open forests; Anand Sagar forest.

Abelmoschus esculentus (L.) Moench (*Hibiscus esculentus* L.)-Herbs. Bracteoles equaling the calyx in length. Flowers with purple centre. Native of Tropical Africa; cultivated for its fruits eaten as vegetable. 'Bhindi' (Hindi).

Gossypium herbaceum L. var. *acerifolium* (Guill. & Perr.) Cheval. (*G. punctatum* var. *acerifolium* Guill. & Perr.)-Tomentose shrubs, with palmately-lobed leaves, yellow flowers and seeds clothed with white cotton. 'Kapas' (Hindi).

Hibiscus cannabinus L.-Bristly herbs, with palmately 3 to 7-lobed leaves, yellow flowers and 5-valved capsules. Native of Africa; cultivated for its silky fibres obtained from the stem. 'Sun' (Hindi).

H. rosa-sinensis L.-Shrubs, with ovate leaves and pink or red flowers. Native of China; cultivated in the gardens for ornamental purposes. 'Gurhal' (Hindi).

H. schizopetalus (Mast.) Hook. f. (*H. rosa-sinensis* L. var. *schizopetalus* Mast.)-Shrubs, with drooping, deeply laciniate-petal bearing red flowers. Native of T. Africa; cultivated in the gardens for ornamental purposes. 'Gurhal' (Hindi).

17. BOMBACACEAE

BOMBAX L.

Bombax ceiba L. Sp. Pl. 511. 1753. *B. malabaricum* DC. Prodr. 1 : 479. 1824; Mast. in Hook. f. Fl. Brit. India 1 : 349. 1874; Duthie, Fl. Gangetic Plain 1 : 98. 1903. *Salmalia malabarica* (DC.) Schott & Endl. Melet. Bot. 35. 1832.

Deciduous trees, 20-30 m high. Bark covered with short, conical prickles. Petioles pulvinate. Leaves 3 to 7-foliolate; leaflets elliptic or lanceolate, 4-15 x 3-8 cm, acuminate. Flowers red, 5-7 cm long, crowded near the end of branches. Stamens less than 80. Capsules ovoid, velvety, 9-12 cm long, 5-valved. Seeds ovoid, packed in white cotton.

Fl. & Fr. : February-May.

It is a fast growing tree, planted in gardens, parks and naturalized in the forests; Banswara.

Adansonia digitata L.-Large, deciduous trees, with 2-5, digitate leaflets, large pendulous flowers and oblong, 10-20 x 5-10 cm, woody, tomentose fruits. Native of Tropical Africa; planted in the gardens and along the roads.

18. STERCULIACEAE

1a. Anthers 5:

2a. Style solitary, unbranched. Capsules 2-valved; cells 1-seeded.

Waltheria 6

2b. Styles 5 or 5-fid. Capsules 5-valved; cells 1 to many-seeded:

3a. Glabrous herbs. Flowers pink or white. Calyx-tube truncate, with 5 small teeth.	<i>Melochia</i> 4
3b. Tomentose shrubs or undershrubs. Flowers orange-yellow. Calyx-tube deeply 5-partite.	<i>Melhania</i> 3
1b. Anthers 6 to many:	
4a. Flowers unisexual or plants polygamous. Petals absent.	<i>Sterculia</i> 5
4b. Flowers hermaphrodite. Petals present:	
5a. Staminal-tube antheriferous at the apex only. Staminodes present, alternating with the anthers.	<i>Helicteres</i> 2
5b. Staminal-tube antheriferous for its whole length. Staminodes absent.	<i>Eriolaena</i> 1

1. ERIOLAENA DC.

Eriolaena hookeriana Wt. & Arn. Prodr. 1 : 70. 1834; Mast. in Hook. f. Fl. Brit. India 1 : 370. 1874; Duthie, Fl. Gangetic Plain 1 : 104. 1903. '*Buti*' (Hindi).

Shrubs or small trees, young shoots stellate hairy. Leaves ovate-cordate, 3.5-15.0 cm in diam., serrate, acuminate. Flowers yellow, on axillary, 1 to few-flowered peduncles. Invol-bracts 3-5, multi-pinnatisect. Calyx spathaceous in bud. Fruits hard, woody, ovate, 10-valved, with wrinkled epicarp, densely pubescent.

Fl. & Fr. : March-May.

Rare, in the forests; Kotharia forest.

2. HELICTERES L.

Helicteres isora L. Sp. Pl. 963. 1753; Wight, Icon. 1 : t. 180. 1839; Mast. in Hook. f. Fl. Brit. India 1 : 365. 1874; Duthie, Fl. Gangetic Plain 1 : 102. 1903. '*Marorphali, Amlí*' (Hindi).

Large, tomentose shrubs or small trees. Leaves bifarious, broadly ovate to orbicular, 6-18 x 4-15 cm, crenate-serrate. Flowers red, solitary or in few-flowered axillary cymes. Corolla 2-lipped, glandular within; petals dissimilar, clawed. Anther-cells divaricate. Capsules 5-7 cm long, woody, beaked, made up of 5, spirally twisted follicles. Seeds angular, wrinkled due to loose testa.

Fl. & Fr. : August-November.

Common in forests; Hura Bowji forest, Puna Pathar forest, Banswara (*Kanodia* 75218, BSI).

3. MELHANIA Forsk.

Melhania futteyporensis Munro ex Mast. in Hook. f. Fl. Brit. India 1 : 373. 1874; Duthie, Fl. Gangetic Plain 1 : 106. 1903. *M. tomentosa* Stocks ex Mast. I.c. 1 : 373. 1874; Duthie, I.c. 1 : 106. 1903.

var. *futteyporensis*

Tomentose shrubs, up to 1 m high. Leaves ovate-oblong, 4-15 x 2-8 cm, crenate-serrate, acute or acuminate. Flowers in terminal few-flowered cymes. Invol-bracts ovate, acuminate, shorter or equalling the calyx. Petals 5, withering around the ovary. Capsules oblong, villous, shorter than sepals. Seeds angled, muriculate.

Fl. & Fr. : August-November.

Common in wastelands, forests and on the hill-slopes; Loharia forest.

4. MELOCHIA L.

***Melochia corchorifolia* L.** Sp. Pl. 675. 1753; Mast. in Hook. f. Fl. Brit. India 1 : 374. 1874; Duthie, Fl. Gangetic Plain 1 : 107. 1903; Robyns in Ann. Miss. Bot. Gard. 51 : 83. 1964; Mahesh Illus. Fl. Delhi f. 30. 1966.

Annual herbs, 30-70 cm high. Leaves ovate-oblong, 2-7 x 1.5-3.5 cm, serrate. Flowers densely crowded in terminal and axillary clusters. Invol-bracts lanceolate-subulate. Calyx-lobes triangular, acute, ciliate, hairy. Petals marcescent, not clawed. Filaments united half way up. Capsules globose, hispid, 5-celled. Seeds 3-angular, smooth.

Fl. & Fr. : August-October.

Common in open wet habitats and moist thickets in the forests; Sher-garh forest, Banswara (*Kanodia* 75194, BSI).

5. STERCULIA L.

***Sterculia urens* Roxb.** Pl. Cor. 1 : 25. t. 24. 1795; Mast. in Hook. f. Fl. Brit. India 1 : 355. 1874; Duthie, Fl. Gangetic Plain 1 : 100. 1903. 'Kharu, Kerai, Karangli' (Hindi).

Soft-wooded trees, with papery bark. Leaves crowded at the end of branches, suborbicular, palmately 5-lobed, 20-30 cm in diam., tomentose beneath. Flowers olive-yellow, in terminal, glandular-pubescent panicles. Follicles woody, fusiform, 1-seeded, clothed with stinging bristly-hairs. Seeds oblong, dark brown.

Fl. & Fr. : February-May.

Rate, at the top of hills in the mixed deciduous forests; Loharia forest, Kalinjra (*Kanodia* 75666, BSI).

6. WALTHERIA L.

***Waltheria indica* L.** Sp. Pl. 673. 1753, excl. syn. Hort. Cliff, *pro parte quoad descrip. et spec.*; Mast. in Hook. f. Fl. Brit. India 1 : 374. 1874; Duthie, Fl. Gangetic Plain 1 : 107. 1903; Robyns in Ann. Miss. Bot. Gard. 51 : 74. 1964. *W. americana* L. Sp. Pl. 673. 1753. *W. angustifolia* L. Syst.

Nat. ed. 10. 1140. 1759.

Woody herbs or undershrubs, clothed with white tomentum. Leaves ovate-lanceolate or oblong-elliptic, 2-10 x 1-7 cm, crenate-serrate. Flowers yellow, sessile, in axillary and terminal clusters. Calyx campanulate, 10-ribbed, 5-lobed. Petals clawed, without appendages. Filaments connate at the base only. Ovary 1-celled. Capsules ovoid, pilose at the top, enclosed in the calyx. Seeds ovate, black, glabrous.

Fl. & Fr. : August-November.

Common in wastelands in dry thickets and open forests. Lasara, Shyam-pura (*Kanodia* 75396, BSI).

19. TILIACEAE

- | | |
|---|---------------------|
| 1a. Fruits spiny or bristly, | <i>Triumfetta</i> 3 |
| 1b. Fruits neither spiny nor bristly: | |
| 2a. Petals glandular at the base. Fruit a drupe, indehiscent. | <i>Grewia</i> 2 |
| 2b. Petals eglandular. Fruit a capsule, dehiscent. | <i>Corchorus</i> 1 |

I. CORCHORUS L.

- | | |
|--|--------------------------|
| 1a. Capsules ending in 3, 2-fid radiating points (beak): | |
| 2a. Capsules distinctly winged. Stamens 15 or more. | <i>C. aestuans</i> 1 |
| 2b. Capsules not winged. Stamens 10. | <i>C. tridens</i> 3 |
| 1b. Capsules with a straight, undivided beak: | |
| 3a. Capsules 3 or 4-valved, 3 to 4-angled, scabrous or aculeate. | <i>C. trilocularis</i> 4 |
| 3b. Capsules 5-valved, 10-ribbed, glabrous. | <i>C. olitorius</i> 2 |

1. ***Corchorus aestuans* L.** Syst. Nat. ed. 10. 1079. 1759. *C. acutangulus* Lam. Encycl. Meth. Bot. 2 : 104. 1786; Wight, Icon. 3(1) : 1. t. 739. 1844; Mast. in Hook. f. Fl. Brit. India 1 : 398. 1874; Duthie, Fl. Gangetic Plain 1 : 121. 1903. 'Hade-ka-Khet' (Hindi).

Annual, glabrous herbs, 40-75 cm high. Leaves ovate or ovate-lanceolate, 3-9 x 1.5-5.0 cm, serrate, the lower serratures produced into filiform appendages. Flowers yellow, 2 to 3-together in leaf-opposed fascicles. Capsules cylindric, 3-celled, 2.0-3.5 cm long, with 6 to 10, serrate, broad-winged angles.

Fl. & Fr. : August-October.

Common weed in wastelands and cultivated fields; Lasara.

2. ***C. olitorius* L.** Sp. Pl. 529. 1753; Mast. in Hook. f. Fl. Brit. India 1 : 397. 1874; Duthie, Fl. Gangetic Plain 1 : 120. 1903; Chakravarty in Bull. Bot. Soc. Beng. 5 : 77. 1952; Mahesh. Illus. Fl. Delhi f. 33. 1966. *C. quinquelocularis* Moench, Meth. 248. 1794. 'Chamghas, Rajaan' (Hindi).

Annual herbs. Leaves ovate-lanceolate, serrate, lower serratures produced into filiform appendages. Flowers yellow, leaf-opposed, solitary or 2-together, on short pedicels. Stamens many. Capsules cylindric, 3-7 cm

long; beak shortly 5-dentate; valves transversely compressed between the seeds. Seeds 3-gonous, black.

Fl. & Fr. : August-October.

Common weed in wastelands and cultivated fields; Lasara, Kalinjra (*Kanodia* 75654 BSI).

3. *C. tridens* L. Mant. App. 566. 1771; Mast. in Hook. f. Fl. Brit. India 1 : 398. 1874; Duthie, Fl. Gangetic Plain 1 : 121. 1903; Chakravarty in Bull. Bot. Soc. Beng. 5 : 81. 1952; Mahesh. Illus. Fl. Delhi f. 36. 1966. *C. trilocularis* Burm. f. Fl. Ind. 123. t. 37. f. 2. 1768, non L. 1753.

Erect or suberect, annual herbs, with terete or angular branches. Leaves ovate-lanceolate, 7-12 x 2.0-3.5 cm, serrate, basal serratures produced into filiform appendages. Flowers yellow, in leaf-opposed, 1 to 4-flowered corymbose, more or less sessile cymes. Calyx-lobes apiculate. Pollens ovoid, yellow. Capsules 2-3 x 0.2 cm, 2 to 3-valved; valves pitted on the inner surface.

Fl. & Fr. : August-December.

Occasional, found in the fields and sandy river-beds; Asirgarh, Anas River (*Kanodia* 75631, BSI).

4. *C. trilocularis* L. Mant. 77. 1767; Mast. in Hook. f. Fl. Brit. India 1 : 397. 1874; Duthie, Fl. Gangetic Plain 1 : 120. 1903; Chakravarty in Bull. Bot. Soc. Beng. 5 : 78. 1952; Mahesh. Illus. Fl. Delhi f. 34. 1966. *C. aestuans* Forsk. Fl. Aegypt.-Arab. 101. 1775, non L. 1759. 'Kagli Tambakhu, Karak' (Hindi).

Erect, annual herbs. Leaves elliptic-oblong, 3-10 x 1.5-4.0 cm, serrate, with basal serratures produced into filiform appendages. Flowers yellow, 1 to 3-together in leaf-opposed fascicles. Stamens 15-20. Capsules upto 8 cm long, acute or shortly beaked, scabrous or aculeate.

Fl. & Fr. : July-November.

Frequent weed in cultivated fields and wastelands; Lasara, Parla-ka-Pul (*Majumdar & Mishra* 10306, BSA), (*Verma* 244, BSA).

2. GREWIA L.

- | | |
|---|------------------------|
| 1a. Leaves 4 to 6-nerved. Drupes fleshy, without a distinct rind. | <i>G. villosa</i> 2 |
| 1b. Leaves 3-nerved. Drupes dry, with a distinct rind. | <i>G. flavescens</i> 1 |

1. *Grewia flavescens* Juss. in Ann. Mus. Hist. Nat. Par. 4 : 91. 1804; Blatter in Journ. Bomb. nat. Hist. Soc. 34 : 888. 1931. *G. pilosa* Wt. & Arn. *italior*, non Lam. 1789; Mast. in Hook. f. Fl. Brit. India 1 : 388. 1874, *pro parte*; Duthie, Fl. Gangetic Plain 1 : 112. 1903. *G. carpinifolia* auct. plur. non Juss. 1804; Mast. l.c. 1 : 387. 1874. 'Chaperandhavi' (Hindi).

Shrubs, clothed with stellate hairs. Leaves ovate-oblong or lanceolate, 6-12 x 2.5-4.5 cm, serrate, rounded at the base. Flowers yellow, in axillary

cymes; peduncles 1 to 3-together, hispid. Buds oblong, tomentose. Drupes 1 to 4-lobed, stellate hairy, brown; nuts 1 to 3-celled, pitted.

Fl. & Fr. : July-November.

Abundant in the forests; Anand Sagar forest, Puna Pathar forest, Hura Bowji forest, Ghatol (*Kanodia* 75412, BSI).

2. *G. tiliifolia* Vahl, Symb. Bot. 1 : 35. 1790; Bedd. Fl. Sylv. 1 : 108. pl. 108. 1871; Mast. in Hook. f. Fl. Brit. India 1 : 386. 1874, *pro parte*; Duthie, Fl. Gangetic Plain 1 : 114. 1903. *Microcos lateriflora* L. Sp. Pl. 514. 1753, non *Grewia lateriflora* G. Don, 1831. *G. arborea* Roxb. ex Rottl. in Neue Schr. Ges. Nat. Freund. 4 : 205. 1803. 'Juhana, Damni' (Hindi).

Large shrubs or small trees. Leaves ovate, 6-15 x 4-15 cm, crenate-serrate, acute or acuminate, cordate and oblique at base. Stipules auricled at the base, deciduous. Flowers yellow, in axillary, pedunculate cymes. Sepals lanceolate, hairy outside. Drupes globose, entire or 2-lobed, fleshy when young, wrinkled when dry; stones 1 to 2-celled.

Fl. & Fr. : May-October.

Common in forests, chiefly on the hill-slopes; Loharia forest.

3. TRIUMFETTA L.

- | | |
|---|--------------------------|
| 1a. Stamens 5-10. Fruits oblong. | <i>T. pentandra</i> 1 |
| 1b. Stamens 15-25. Fruits globose or ovoid. | <i>T. rotundifolia</i> 2 |

1. *Triumfetta pentandra* A. Rich. in Guill. & Perr. Fl. Seneg. Tern. 93, t. 19. 1831. *T. neglecta* Wt. & Arn. Prodri. 1 : 75. 1834; Mast. in Hook. f. Fl. Brit. India 1 : 396. 1874; Duthie, Fl. Gangetic Plain 1 : 119. 1903. 'Mandli' (Hindi).

Stout, annual herbs, upto 80 cm high. Leaves rounded, 3 to 5-palmatislobed, serrate, thinly hairy; upper leaves rhomboid. Flowers yellow, in extra-axillary cymose clusters combind to form interrupted racemes. Sepals linear. Fruits pubescent; spines hooked, ciliate on upper edges.

Fl. & Fr. : July-November.

Common in wastelands, open forests and along the roads; Puna Pathar forest, Ghatol (*Kanodia* 75475, BSI).

2. *T. rotundifolia* Lam. Tab. Encycl. Meth. Bot. 3 : 421. 1792; Mast. in Hook. f. Fl. Brit. India 1 : 395. 1874; Duthie, Fl. Gangetic Plain 1 : 118. 1903. 'Mandli, Lapti' (Hindi).

Undershrubs, upto 1 m high. Leaves roundish, coarsely toothed, 2-5 cm in diameter. Flowers yellow, in cymes forming interrupted terminal racemes. Capsules tomentose, clothed with hooked, pubescent spines.

Fl. & Fr. : July-November.

Common in wastelands, open forests and along the roads; Banswara, Loharia forest.

20. ZYGOPHYLLACEAE

TRIBULUS L.

Tribulus terrestris L. Sp. Pl. 387. 1753; Edgew. & Hook. f. in Fl. Brit. India 1 : 423. 1874; Duthie, Fl. Gangetic Plain 1 : 127. 1903. *T. lanuginosus* L. I.c. 387. 1753; Wight, Icon. 1 : t. 98. 1838. 'Bhaukeri, Ghogru' (Hindi).

Prostrate or procumbent herbs, clothed with silky hairs. Leaves in unequal pairs; leaflets 4-7 pairs, elliptic-oblong, 0.8-2.0 x 0.3-0.8 cm. Flowers yellow, axillary, solitary. Stamens 10. Fruits of 4 or 5 cocci, each with 2 long and 2 short spines, hairy, muricate. Disc of 10 erect scales in two rows on inner and outer sides of stamens opposite the sepals. Seeds exalbuminous, many in each coccus.

Fl. & Fr. : July-November.

Common in open wastelands; Paloda, Lodha tank (*Kanodia* 75338, BSI).

21. OXALIDACEAE

- 1a. Leaves pinnately many-foliate, crowded at the apex of aerial stem.
- 1b. Leaves palmately 3-foliate, never crowded at the apex of the aerial stem

Biophytum 1

Oxalis 2

1. BIOPHYTUM DC.

Biophytum sensitivum (L.) DC. Prodr. 1 : 690. 1824; Edgew. & Hook. f. in Fl. Brit. India 1 : 436. 1874; Duthie, Fl. Gangetic Plain 1 : 131. 1903; van Steenis in Bull. Bot. Gard. Btz. 18 : 452. 1950. *Oxalis sensitiva* L. Sp. Pl. 434. 1753. 'Lazili, Chui-mui' (Hindi).

Annual herbs, 8-20 cm high, with a rosette of leaves on the top. Leaflets 6-15 pairs, oblong, 0.5-1.0 x 0.4-0.7 cm. Flowers yellow, in short umbels. Fruiting calyx longer than capsule. Capsules subglobose, apiculate, stellately 5-valved. Seeds ovoid, white, with transverse tubercled ridges.

Fl. & Fr. : August-November.

Common in wet and shady habitats in the forests, wastelands and gardens; Rowal Hindvela forest.

2. OXALIS L.

- 1a. Plants caulescent, with creeping stem. Flowers yellow.
- 1b. Plants acaulescent, with an underground bulbous root-stock. Flowers purplish.

O. corniculata 1

O. corymbosa 2

1. **Oxalis corniculata** L. Sp. Pl. 435. 1753; Wight, Icon. 1 : t. 18. 1838; Edgew. & Hook. f. in Fl. Brit. India 1 : 436. 1874; Duthie, Fl. Gangetic Plain 1 : 130. 1903; Calder in Rec. Bot. Surv. Ind. 6 (1) : 131. 1919; Eiten in Taxon 4 : 99. 1955. 'Kharto' (Hindi).

Perennial, procumbent herbs, clothed with appressed hairs. Leaflets obovate, acidic to taste. Flowers axillary, solitary or in 2 to 8-flowered umbels borne on 0.5-8.0 cm long peduncles. Capsules linear-oblong, 1.5-2.5 cm long, 5-angled, beaked, pubescent. Seeds ovoid, transversely ribbed.

Fl. & Fr. : Most part of the year.

Common in wet and shady habitats in cultivated fields, gardens and forests; Banswara, Kushalgarh, Hura Bowji forest.

2. **O. corymbosa** DC. Prodr. 1 : 696. 1824; Calder in Rec. Bot. Surv. Ind. 6(1) : 337. pl. 9. 1919. *O. martiana* Zucc. in Denkschr. Akad. Munch. 9. 144. 1823-24; Mahesh. Illus. Fl. Delhi f. 42. 1966.

Perennial herbs, with scaly, globose bulbs producing many side bulbils. Petioles arising directly from the bulbs. Leaflets broadly obovate, cuneate-based, 1.2-1.8 x 1.8-2.5 cm, hairy, punctate with black glands, rounded at the sides. Scapes 2-3, 16-21 cm long. Cymes umbelliform, 6 to 8-flowered, bracteate. Stamens 10, united for about one-third from the base. Capsules obtusely 5-angled, glabrous.

Fl. & Fr. : October-January.

Native of Europe; naturalised in the gardens and often in forests in wet and shady habitats; Banswara (*Majumdar* 10251, BSA).

Notes : De Candolle's binomial has got priority over that of Zuccarini's one because Zuccarini (l.c.) himself cited *O. corymbosa* DC. as a distinct species in his publication.

22. BALSAMINACEAE

IMPATIENS L.

Impatiens balsamina L. var. **rosea** (Lindl.) Hook. f. Fl. Brit. India 1 : 454. 1874; Duthie, Fl. Gangetic Plain 1 : 133. 1903. *I. rosea* Lindl. in Bot. Reg. t. 27. 1841. *I. balsamina* L. var. *brevicalcarata* Cooke, Fl. Pres. Bomb. 1 : 174. 1901.

Annual herbs, 30-80 cm high. Leaves alternate, elliptic or lanceolate, 5-17 x 1.5-2.5 cm, serrate. Flowers rose-coloured, 1 to 3 in the leaf-axils. Sepals 3, one of them suborbicular, retuse and spurred. Petals 3; wings much broad, unequally 2-lobed; spur short. Capsules ovoid-ellipsoid, 1.5-2.5 cm long, tomentose, elastically opening upwards by 5 valves. Seeds smooth.

Fl. & Fr. : August-November.

Naturalised from plains to the top of the hills in various habitats; often

cultivated in the gardens for ornamental purposes; Anand Sagar forest (*Kanodia 75291*, BSI).

23. RUTACEAE

AEGLE Corr. *nom. cons.*

Aegle marmelos (L.) Correa in Trans. Linn. Soc. London 5: 223. 1800; Wight, Icon. 1 : 16. 1838; Hook. f. Fl. Brit. India 1 : 516. 1875; Duthie, Fl. Gangetic Plain 1 : 143. 1903. *Crateva marmelos* L. Sp. Pl. 444. 1753. 'Billi-patra, Bel' (Hindi).

Trees, armed with 2-3 cm long spines. Leaflets 3, ovate-lanceolate, 4-13 x 2.5-7.0 cm. Flowers 2-sexual, greenish-white, 5-merous, in axillary panicles. Stamens more than 20. Fruits globose, 5-15 cm in diam.; rind grey, stoney; pulp sweet, yellowish, with sticky mucilage around the seeds.

Fl. : March-May; *Fr.* : April-November.

Common in wastelands and forests; also planted in the gardens for its edible fruits; Kotharia forest, Bagaycha forest.

Citrus medica L.—Shrubs or small trees, with axillary spines, 1-foliolate leaves, white flowers and acidic juice containing fruits. Cultivated in the gardens and fruit orchards. 'Nimbu' (Hindi).

Murraya paniculata (L.) Jack (*Chalcas paniculata* L., *Murraya exotica* L.)—Evergreen, unarmed shrubs or small trees, with 1-pinnate leaves, white flowers and red, ovoid berries. Cultivated ornamenteally in the gardens. 'Kamni' (Hindi).

24. SIMAROUBACEAE

The genus *Balanites* Del. is often included in this family.

AILANTHUS Desf. *nom. cons.*

Ailanthus excelsa Roxb. Pl. Cor. 1 : 24. t. 23. 1795; Bennett in Hook. Fl. Brit. India 1 : 518. 1875; Duthie, Fl. Gangetic Plain 1 : 144. 1903. 'Arru' (Hindi).

Soft-wooded trees. Leaves crowded at the end of branches, pinnately many foliolate; leaflets 8-14 pairs, alternate to opposite, oblong, 5-13 x 3-5 cm, coarsely toothed, oblique-based, ill-smelling. Flowers dull yellow, polygamous, in much branched panicles. Filaments shorter than anthers. Samaras acute at both ends, twisted at the base, many-nerved. Seed solitary in the centre of the samara which is reticulately veined over them.

Fl. & Fr. : April-June.

Common in wastelands; also planted along the roads and in the

gardens. It is a fast growing tree; Banswara.

25. BALANITACEAE

BALANITES Delile *nom. cons.*

Balanites aegyptiaca (L.) Del. Descr. Aegypte Hist. nat. 221. t. 28. f. 1. 1813; Wight, Icon. 1 : t. 274. 1840. *Ximenia aegyptiaca* L. Sp. Pl. 1194. 1753. *Balanites roxburghii* Planch. in Ann. Sci. Nat. ser. 4. 2 : 258. 1854; Bennett in Hook. f. Fl. Brit. India 1 : 522. 1875. *B. aegyptiaca* Delile var. *roxburghii* (Planch.) Duthie, Fl. Gangetic Plain 1 : 145. 1903. 'Hingotia' (Hindi).

Scraggy shrubs or small trees. Branches armed with 2-3 cm long, axillary thorns. Leaflets 2, oblanceolate to obovate or elliptic, 1.5-5.0 x 1.0-2.5 cm. Flowers greenish white, fragrant, in axillary, short-peduncled cymes. Ovary entire, silky. Drupes ovoid, woody, 5-grooved, 4.5-5.5 x 3.0-3.5 cm.

Fl. : April-May; *Fr.* : June-September.

Rare, in the wastelands and along the roads. It spreads by suckers and, therefore, a group of trees are always found to grow together; Ghatol, Pipalkhund.

26. BURSERACEAE

BOSWELLIA Roxb. ex Colebr.

Boswellia serrata Roxb. ex Colebr. in As. Res. 9 : 379. t. 5. 1807; Bennett in Hook. f. Fl. Brit. India 1 : 528. 1875; Duthie, Fl. Gangetic Plain 1 : 147. 1903. *B. glabra* Roxb. Pl. Cor. t. 207. 1811. *B. serrata* Roxb. ex Colebr. var. *glabra* (Roxb.) Bennett, l.c. 1 : 528. 1875; Duthie, l.c. 1 : 148. 1903. 'Salar' (Hindi).

Deciduous trees, with greyish-white bark peeling off in thin flakes. Leaves crowded at the end of branches, 1-pinnate; leaflets 11-25, ovate-oblong, serrate, oblique-based. Flowers white, 5-merous, in axillary, pubescent racemes borne at the end of branches. Hypanthium absent. Fruits 3-gonous, dehiscent, 3-valved. Seeds 3, compressed; margins winged.

Fl. & Fr. : March-May.

Common in forests, particularly on hills; Wadita Hillage forest, Rowal Hindvela forest, Asirgarh hills (*Kanodia* 75624, BSI).

27. MELIACEAE

AZADIRACHTA A. Juss.

Azadirachta indica A. Juss. in Mem. Mus. Hist. Nat. Paris 19 : 221. t. 13. f. 5. 1830; Wight, Icon. 1 : t. 17. 1838. *Melia azadirachta* L. Sp. Pl. 385. 1753; Hiern in Hook. f. Fl. Brit. India 1 : 544. 1875; Duthie, Fl. Gangetic Plain I : 150. 1903. 'Neem' (Hindi).

Large evergreen trees. Leaves 1-pinnate; leaflets subopposite, 9-16, obliquely lanceolate, 3-8 x 1.5-2.5 cm, serrate, acuminate. Flowers white, in racemes or panicles. Staminal column 10-fid at the apex. Drupes oval or oblong, 1-locular, 1-seeded, yellow when ripe and with white latex when immature. Seeds exarillate.

Fl. : March-May; *Fr.* : June-August.

Common in wastelands and rare in forests; usually planted along the roads for shade and timber; Loharia forest.

Melia azedarach L.—Trees, with bipinnate leaves, lilac flowers and 5-celled, 5-seeded drupes. Native of Persia and Asia Minor; planted along the roads and in the gardens. 'Bakain' (Hindi).

28. CELASTRACEAE

CELASTRUS L.

Celastrus paniculatus Willd. Sp. Pl. 1 : 1125. 1797; Wight, Icon. 1 : t. 158. 1839; Lawson in Hook. f. Fl. Brit. India 1 : 617. 1875; Duthie, Fl. Gangetic Plain I : 158. 1903.

Deciduous, unarmed, shrubby climbers. Leaves alternate, ovate-elliptic, 5-10 x 3-5 cm, crenulate. Flowers yellowish or greenish-white, unisexual, in terminal pyramidal panicles. Sepals fimbriate at tip. Ovary free from disc. Capsules subglobose, 3-valved, transversely wrinkled, tipped by persistent style. Seeds 1-6, crimson arillate.

Fl. & Fr. : November-February.

Occasional, in the forests; Badri (*Kanodia* 75415, BSI).

29. RHAMNACEAE

ZIZIPHUS Mill.

- | | |
|--|------------------------|
| 1a. Styles 3, distinct. Fruits 3-celled, woody, puberulous, inedible. | <i>Z. xylopyrus</i> 3 |
| 1b. Styles 2, connate to the middle. Fruits 1 to 2-celled, fleshy, edible: | |
| 2a. Diffuse shrubs. Drupes not exceeding 1.5 cm in diameter. | <i>Z. nummularia</i> 2 |
| 2b. Small trees. Drupes more than 1.5 cm in diameter. | <i>Z. mauritiana</i> 1 |

1. *Ziziphus mauritiana* Lam. Encycl. Meth. Bot. 3 : 319. 1789; Mahesh. Illus. Fl. Delhi f. 44. 1966. *Z. jujuba* Lam. Encycl. Meth. Bot. 3 : 318. 1789, non Mill. 1768; Lawson in Hook. f. Fl. Brit. India 1 : 632. 1875; Duthie, Fl. Gangetic Plain 1 : 163. 1903 'Bor' (Hindi).

Large shrubs or small trees, clothed with white tomentum. Leaves ovate-oblong, 2.5-6.5 x 2-5 cm, crenate-serrate, tomentose beneath. Stipular spines paired, one straight, other hooked. Flowers greenish yellow, in short peduncled, axillary cymes. Drupes globose or ovoid, 2-3 cm in diam., yellow or red when ripe.

Fl. : August-October; *Fr.* : November-March.

Common in wastelands, often forming pure community; also cultivated in the gardens for edible fruits; Ghatol, Banswara (*Kanodia* 75736, BSI).

2. *Z. nummularia* (Burm. f.) Wt. & Arn. Prodri. 162. 1834; Lawson in Hook. f. Fl. Brit. India 1 : 633. 1875; Mahesh. Illus. Fl. Delhi f. 45. 1966. *Rhamnus nummularia* Burm. f. Fl. Ind. 61. 1768. *Ziziphus rotundifolia* Lam. Encycl. Meth. Bot. 3 : 319. 1789; Duthie, Fl. Gangetic Plain 1 : 164. 1903. 'Jhar-Bor, Chanbor' (Hindi).

Bushy shrubs, clothed with buff tomentum. Leaves suborbicular, 1.0-2.5 cm in diam., crenate-serrate in the upper half, tomentose beneath. Stipular spines paired, one erect and other hooked. Flowers greenish yellow, in axillary cymes. Drupes globose, red when ripe.

Fl. & Fr. : February-June.

Common in wastelands, open forests, along the roads, as a troublesome weed in cultivated fields; Ghatol, Banswara (*Kanodia* 75401, BSI).

3. *Z. xylopyrus* (Retz.) Willd. Sp. Pl. 1 : 1104. 1798; Lawson in Hook. f. Fl. Brit. India 1 : 634. 1875 ; Duthie, Fl. Gangetic Plain 1 : 165. 1903. *Rhamnus xylopyrus* Retz. Obs. Bot. 2 : 11. 1781. 'Ghat Bor' (Hindi).

Trees, 4-5 m high. Leaves elliptic-oblong or ovate-oblong, 5-9 x 2.5-5.0 cm, serrulate, pubescent, with the oblique, 3-nerved base. Prickles axillary, paired. Flowers greenish-yellow, axillary, solitary or in cymes. Fruits globose, dry, hard, 1.5-2.0 x 1.5-2.0 cm.

Fl. : August-October; *Fr.* : October-January.

Rare, in the forests on hill-slopes; Kotharia forest, Loharia forest, Bhapur (*Kanodia* 75223, BSI).

30. VITACEAE (AMPELIDEAE)

The genus *Leea* L. is, often included in this family.

- | | |
|--|-----------------------|
| 1a. Leaves simple. Inflorescence tendril bearing. | <i>Ampelocissus</i> 1 |
| 1b. Leaves pedately 3 to many-foliolate. Tendrils leaf-opposed,
not on the inflorescence. | <i>Cayratia</i> 2 |

1. AMPELOCISSUS Planch. *nom. cons.*

Ampelocissus latifolia (Roxb.) Planch. in Journ. Vigne Am. 374. 1883 & in DC. Monogr. Phan. 5(2) : 370. 1887. *Vitis latifolia* Roxb. Fl. Ind. 1 : 661. 1820; Lawson in Hook. f. Fl. Brit. India 1 : 652. 1875; Duthie, Fl. Gangetic Plain 1 : 171. 1903. 'Bechuti' (Hindi).

Extensive climbers, with hollow, striated branches. Leaves orbicular-cordate, 3 to 7-angled, 10-15 cm in diam., dentate, many-nerved at the base. Flowers reddish-brown, in leaf-opposed cymes; peduncles with a forked tendril just below the cymes. Petals and anthers free. Berries globose, black, glabrous, 2-celled. Seeds ellipsoid.

Fl. & Fr. : May-September.

Common in forests at the foot of hills; Loharia forest, Bhapur (*Kanodia* 75210, BSI).

2. CAYRATIA A. Juss. *nom. cons.*

Cayratia trifolia (L.) Domin in Biblioth. Bot. 89 : 371. 1927; Suessenguth in Engl. Pfl.-fam. ed. 2, 20 d : 280. 1953. *Vitis trifolia* L. Sp. Pl. 203. 1753; Duthie, Fl. Gangetic Plain 1 : 174. 1903. *Cissus carnosa* Lam. Encycl. 1 : 31. 1783. *Vitis carnosa* (Lam.) Wall. ex Wt. & Arn. Prodr. 127. 1834; Lawson in Hook. f. Fl. Brit. India 1 : 654. 1875. *Cayratia carnosa* (Lam.) Gangep. in Nat. Syst. 1 : 347. 1911; Mahesh. Illus. Fl. Delhi f. 46. 1966. 'Char' (Hindi).

Climbing herbs, with forked, wiry tendrils. Leaflets 3, ovate-oblong, 4-11 x 2.5-7.0 cm, crenate-serrate, lateral ones oblique-based. Flowers greenish-white, in umbellate, long peduncled, leaf-opposed cymes. Petals and anthers free. Berries globose, black, 2-celled. Seeds 2-4, trigonous.

Fl. & Fr. : August-November.

Common climber on trees and shrubs in wastelands, open forests, boundaries of fields, gardens and often on the walls of old buildings; Paloda, Chandan Singh-ki-Bassi, Banswara (*Verma* 241, BSA).

3. LEEACEAE

LEEA L.

- 1a. Leaves 1 or rarely 2-pinnate; leaflets scabrous above, with close and parallel primary nerves. *L. edgeworthii* 1
- 1b. Leaves 3 or rarely 2 pinnate; leaflets glabrous, with distant primary nerves. *L. indica* 2

1. **Leea edgeworthii** Sant. in Rec. Bot. Surv. Ind. 16(I) : 54. 1953. *L. aspera* Edgew. in Trans. Linn. Soc. 20 : 36. 1841, non Wall. ex Roxb. 1832;

Lawson in Hook. f. Fl. Brit. India 1 : 665. 1875; Duthie, Fl. Gangetic Plain 1 : 176. 1903; Gangnep. in Bull. Soc. Bot. Fr. 57 : 331-336. 1910.

Annual herbs or undershrubs, upto 1.5 m high. Stem not winged. Tendrils absent. Leaves unipinnate or lower ones bipinnate; leaflets ovate-oblong or elliptic-oblong, 10-20 x 6-10 cm, serrate, acuminate, truncate or cordate at base. Flowers greenish, in dichotomous cymes. Calyx-lobes gland-tipped. Petals connate at the base. Anthers united into a funnel. Berries globose, 1.0-1.5 cm in diam., purple when ripe, 3 to 6-celled.

Fl. & Fr. : August-November.

Common in forests in shady habitats; Puna Pathar forest, Bagaycha forest, Hura Bowji forest, Kushalgarh (*Kanodia* 75667, BSI).

Notes : Suessenguth (Pflan. ed. 2. 20d : 385. 1953) considered *L. masteri* Cl. as conspecific with this taxon. If it is true, the correct name of this taxon should be *L. masteri* Cl. Since, the type specimen of the latter are not in hands, it is not possible to adopt it in the present work.

2. *L. indica* (N. Burman) Merrill in Philipp. Journ. Sci. 14 : 245. 1919; Ridsdale in Blumea 22 : 95. 1974. *Staphylea indica* N. Burman, Fl. Ind. 75. t. 23, f. 2. 1768. *Aquilegia sambucina* L. Mant. Alt. 211. 1771, *nom. illegit.* *Leea sambucina* (L.) Willd. Sp. Pl. 1 : 1177. 1798, *nom. illegit.*; Lawson in Hook. f. Fl. Brit. India 1 : 666. 1875; Duthie, Fl. Gangetic Plain 1 : 176. 1903. *L. staphylea* Roxb. Fl. Ind. 1 : 658. 1832; Wight, Icon 1 : t. 78. 1838.

Herbaceous shrubs. Tendrils absent. Leaves 2 to 3-pinnate; leaflets ovate or oblong-lanceolate, 6-17 x 3-6 cm, serrate, truncate-cordate at the base, acute or acuminate at the apex. Flowers greenish-white, in large, corymbose cymes. Petals connate at the base. Anthers united into a funnel. Berries depressed globose, about 6 mm in diam., 3 to 6-celled, often 2 to 6-lobed, smooth, purple-black.

Fl. & Fr. : July-December.

Occasional, in the forests; Kushalgarh (*Kanodia* 75692, BSI).

32. SAPINDACEAE

CARDIOSPERMUM L.

Cardiospermum halicacabum L. Sp. Pl. 366. 1753; Wight, Icon. 2 (2) : 8. t. 508. 1841; Hiern in Hook. f. Fl. Brit. India 1 : 670. 1875; Duthie, Fl. Gangetic Plain 1 : 178. 1903. 'Chirphuta, Kanphuta' (Hindi).

Annual, climbing, polygamo-dioecious herbs, with the opposite, circinate tendrils below the cymes. Leaves bipinnate; leaflets deeply cut, acuminate. Flowers white, in axillary, few-flowered, long-peduncled umbellate cymes; peduncle with 2 circinate tendrils at the top. Stamens 8. Fruits pyriform, 3-gonous, winged on the angles. Seeds globose, with sheet-shaped aril.

Fl. & Fr. : August-October.

Common climber on bushes and shrubs on the boundaries of fields and gardens; Hindolia, Bhongra (*Kanodia* 75431, BSI).

Dodonaea viscosa (L.) Jacq. (*Ptelea viscosa* L.) Evergreen shrubs, with greenish-yellow flowers and samara fruits. Commonly cultivated in hedges. 'Vilayti-mehdi' (Hindi).

Sapindus aurifolius Vahl (*S. trifoliatus* *sensu* Hiern, non L. 1753)- Medium-sized trees, with 2-3 pairs of leaflets, pale-green flowers and 3-lobed, velvety fruits. Planted in the gardens and along the roads. 'Ritha Saban' (Hindi).

33. ANACARDIACEAE

- 1a. Leaves simple. Drupes 5-40 cm long. Ovule raised up by a basal funicle (sub-basal). Style 1. *Mangifera* 2
- 1b. Leaves imparipinnate. Drupes 1-2 cm long. Ovule pendulous from the top (sub-apical). Styles 3-4. *Lannea* 1

1. LANNEA A. Rich. *nom. cons.*

Lannea coromandelica (Houtt.) Merr. in Journ. Arn. Arb. 19 : 353. 1938. *Dialium coromandelicum* Houtt. Nat. Hist. ser. 2, 2 : 39. t. 5. f. 2. 1774. *Odina wodier* Roxb. Fl. Ind. 2 : 293. 1832; Wight, Icon. 1 : t. 60. 1838; Hook. f. Fl. Brit. India 2 : 29. 1876, Duthie, Fl. Gangetic Plain 1 : 188. 1903. 'Gurjan' (Hindi).

Large, dioecious trees, with ash-coloured bark. Leaflets 7-11, ovate-oblong, 4.5-13.0 x 2.5-6.0 cm, acuminate, entire, without submarginal veins. Racemes borne at the end of branches; males drooping, compound; females simple, erect. Flowers yellowish-green, tetramerous. Petals imbricate. Fertile stamens 8-10. Drupes ovoid or sub-reniform, 1-locular, 1-seeded.

Fl. & Fr. : March-June.

Common in forests, particularly on the hills; Loharia forest.

2. MANGIFERA L.

Mangifera indica L. Sp. Pl. 200. 1753; Bedd. Fl. Sylv. 2 : 162. pl. 162. 1871; Hook. f. Fl. Brit. India 2 : 13. 1876; Duthie, Fl. Gangetic Plain 1 : 189. 1903. 'Aam' (Hindi).

Large, evergreen trees. Leaves oblong-lanceolate, acuminate, crowded at the end of the branches. Flowers yellowish-green, polygamous, in terminal panicles. Fertile stamen one. Style eccentric. Disc lobed. Drupes ovoid, with sweet pulp when mature. Seeds compressed.

Fl. : March-April; *Fr.* : April-August.

Common near habitations; planted in gardens, fruit orchards and along

the roads; Ghatol, Banswara (*Majumdar* 10244, BSA).

34. MORINGACEAE

MORINGA Adans.

Moringa concanensis Nimmo ex Dalz. & Gib. *Bomb. Fl.* 311. 1861;
Hook. f. Fl. Brit. India 2 : 45. 1876; *Duthie, Fl. Gangetic Plain* 1 : 193. 1903.
‘*Sainjna*’ (Hindi).

Small trees. Leaves 2-pinnate; leaflets 4-6 pairs and an odd one, broadly elliptic to suborbicular, 15-30 mm long. Flowers yellow streaked with red, in lax panicles. Capsules acutely 3-questrous, slightly constricted between the seeds. Seeds 3-winged.

Fl. & Fr. : Most part of the year.

Common in forests, particularly on hill slopes; Barighata forest, Loharia forest.

Moringa oleifera Lam. (*M. pterygosperma* Gaertn.)-Quick growing, soft-wooded, small trees, with 3-pinnate leaves and white flowers. Planted in the gardens and house campus for edible flowers and fruits. ‘*Sainjana*’ (Hindi).

35. FABACEAE (PAPILIONACEAE *nom. alt.*)

1a. Stamens 1-adelphous:		
2a. Pods prickly, jointed.		<i>Zornia</i> 31
2b. Pods neither prickly nor jointed:		
3a. Trees.		<i>Dalbergia</i> 10
3b. Erect, prostrate or twining herbs or shrubs:		
4a. Erect or prostrate herbs or shrubs. Flowers yellow:		
5a. Flowers axillary, solitary. Pods flattened.		<i>Goniogyna</i> 15
5b. Flowers in racemes. Pods turgid.		<i>Crotalaria</i> 9
4b. Herbaceous or woody twiners. Flowers not yellow:		
6a. Stamens 9 only.		<i>Abrus</i> 1
6b. Stamens 10:		
7a. All anthers uniform, fertile:		
8a. Leaflets 5-7. Flowers blue, white or pinkish. Styles bearded below the stigmas.		<i>Clitoria</i> 8
8b. Leaflets 3. Flowers white or pinkish-purple. Styles not bearded below the stigmas.		<i>Canavalia</i> 7
7b. Alternate anthers small and abortive.		<i>Teramnus</i> 26
1b. Stamens 2-adelphous:		
9a. Stamens in two bundles of 5 each:		
10a. Leaves even-pinnate. Ripe pods included in the calyx.		<i>Smithia</i> 24
10b. Leaves odd-pinnate. Ripe pods much exserted from the calyx.		
9b. Stamens in two bundles of 9+1:		<i>Aeschynomene</i> 2
11a. Leaf-rachis or leaflets modified into tendrils:		

12a. Staminal tube truncate at the mouth.	<i>Lathyrus</i> 17
12b. Staminal tube oblique at the mouth.	<i>Vicia</i> 29
11b. Leaf-rachis or leaflets not modified into tendrils, i.e. plants are without tendrils:	
13a. Pods jointed:	
14a. Joints of pods flattened.	<i>Desmodium</i> 11
14b. Joints of pods turgid:	
15a. Leaves simple. Pod-joints not folded:	
16a. Spiny herbs or shrubs.	<i>Alhagi</i> 3
16b. Unarmed herbs or shrubs.	<i>Alysicarpus</i> 4
15b. Leaves pinnate. Pod-joints folded on one another.	<i>Uraria</i> 28
13b. Pods not jointed, but may be septate or torulose:	
17a. Small or large trees:	
18a. Trees unarmed. Petals almost equal in size. Pods flat, ligulate.	<i>Butea</i> 6
18b. Trees armed with prickles. Petals very unequal in size. Pods torulose.	<i>Erythrina</i> 13
17b. Herbs, shrubs or twiners:	
19a. Climbing or twining herbs or shrubs:	
20a. Leaves gland-dotted beneath:	
21a. Pods 1 to 2-seeded. Seeds strophiolate.	<i>Rhynchosia</i> 22
21b. Pods 3 to many-seeded. Seeds strophiolate.	<i>Atylosia</i> 5
20b. Leaves not gland-dotted beneath:	
22a. Style bearded below the stigma:	
23a. Petals almost equal in size.	<i>Vigna</i> 30
23b. Petals very unequal in size, standard much longer than keels.	<i>Clitoria</i> 8
22b. Style not bearded below the stigma:	
24a. Petals almost equal in size. Anthers uniform. Pods glabrous or pubescent, not covered with irritant bristles:	
25a. Nodes of racemes tumid. Calyx-teeth distinct.	<i>Galactia</i> 14
25b. Nodes of racemes not tumid. Calyx-mouth obliquely truncate; teeth not distinct.	<i>Dumasia</i> 12
24b. Petals very unequal in size. Anthers dimorphic. Pods covered with brittle irritant fine bristles.	<i>Mucuna</i> 20
19b. Erect or prostrate herbs or shrubs:	
26a. Anthers apiculate.	<i>Indigofera</i> 16
26b. Anthers obtuse or muticous:	
27a. Leaves or leaflets entire, not dentate or toothed:	
28a. Petals very unequal, standard much longer than keels.	<i>Clitoria</i> 8
28b. Petals almost equal in size:	
29a. Racemes axillary. Pods slender, turgid, septate.	<i>Sesbania</i> 23
29b. Racemes leaf-opposed or terminal, if flowers not in racemes, then axillary. Pods flat, linear, aseptate.	
27b. Leaves or leaflets dentate, serrate or toothed:	<i>Tephrosia</i> 25

30a. Leaves simple, gland-dotted. Seeds adherent to the pericarp.	<i>Psoralea</i> 21
30b. Leaves 3—foliolate, not gland-dotted. Seeds not adherent to the pericarp:	
31a. Stipules adnate to the petioles in lower half. Flowers in elongate racemes.	<i>Mellotus</i> 19
31b. Stipules free, lateral. Flowers in capitate or condensed racemes or in axillary clusters :	
32a. Pods globose or subglobose, 1 to 2-seeded:	
33a. Flowers sessile, in axillary clusters.	<i>Trigonella</i> 27
33b. Flowers condensed at the end of axillary peduncles almost equalling the petioles in length.	<i>Medicago</i> 18
32b. Pods not globose or subglobose, many-seeded:	
34a. Pods linear, turgid or flat.	<i>Trigonella</i> 27
34b. Pods spirally 2-3 times coiled.	<i>Medicago</i> 18

1. ABRUS Adans.

Abrus precatorius L. Syst. Nat. ed. 12. 472. 1767; Baker in Hook. f. Fl. Brit. India 2 : 175. 1876; Duthie, Fl. Gangetic Plain 1 : 262. 1903; Breteler in Blumea 10 : 617. f. 5. 1960; Mahesh. Illus. Fl. Delhi f. 71. 1966; Verdcourt in Kew Bull. 24(2) : 240. 1970. 'Chirma, Ratti, Sarmai' (Hindi).

Twining shrubs. Leaflets 10-20 pairs, oblong or obovate-oblong, 1.0-5.5 x 0.5-1.0 cm, entire, apiculate, appressed hairy. Flowers pink or white, fascicled on the swollen nodes of axillary racemes. Styles not bearded. Pods oblong, turgid, 2-5 x 1.5 cm, 3 to 5-seeded, appressed hairy. Seeds subglobose, scarlet, shining, with white-dotted black spot at the hilum.

Fl. : August-October; *Fr.* : November-February.

Common among clumps of trees and shrubs in wastelands and open forests; Paloda, Parsolia (*Kanodia* 75586, BSI), Singhpura (*Kanodia* 51062, BSI).

2. AESCHYNOMENE L.

Aeschynomene indica L. Sp. Pl. 713. 1753; Wight, Icon. 2(1) : 9. t. 405. 1840; Baker in Hook. f. Fl. Brit. India 2 : 151. 1876; Duthie, Fl. Gangetic Plain 1 : 270. 1903; Rudd in Reinwardtia 5(1) : 30. 1959. *A. pumila* L. Sp. Pl. ed. 2. 1061. 1763. 'Chhui-mui' (Hindi).

Annual herbs or undershrubs, upto 1.5 m high. Rachis with minute glandular outgrowths on the surface. Leaflets alternate or subopposite, 21-71, linear-oblong, 2-8 x 2-3 mm, glabrous. Flowers yellow, in 1 to 4-flowered, exillary, viscid racemes. Calyx glabrous. Pods flat, 3-4 cm long, indented on the lower suture. Seeds 4-10, black.

Fl. & Fr. : August-November.

Common in low-lying areas, ponds and rice-fields. Rarely the flower colour is white; Danpur, Banswara (*Kanodia* 75335, BSI).

3. ALHAGI Tourn. ex Adans.

Alhagi maurorum Medic. in Vorles. Churpf. Phys. Oek. Ges. 2 : 397. 1787; Baker in Hook. f. Fl. Brit. India 2 : 145. 1876. *Hedysarum pseudalhagi* M. Bieb. Fl. Taur—Cauc. 2 : 174. 1808. *Alhagi pseudalhagi* (M. Bieb.) Desv. J. Bot. ser. 2 (1) : 120. 1813; Mahesh. Illus. Fl. Delhi f. 66. 1966. *A. camelorum* Fisch. ex DC. Prodr. 2 : 352. 1825; Duthie, Fl. Gangetic Plain 1 : 279. 1903. 'Jawasa' (Hindi).

Deep-rooted, bushy undershrubs, with axillary, 2.5-6.0 cm long, straight spines bearing red flowers. Leaves obovate-oblong, upto 2 x 1 cm, entire, mucronate or emarginate. Pods linear-cylindric, 2.4 x 0.2 cm, irregularly torulose, beaked. Seeds subreniform, blackish.

Fl. & Fr. : March-July.

Frequent weed in alkaline and sandy soils in wastelands ; Talwara.

4. ALYSICARPUS Desv. nom. cons.

1a. Pods moniliform :

2a. Calyx shorter or as long as the first joint of pod. *A. monilifer* 4

2b. Calyx much longer than the first joint of pod :

3a. Joints of pods smooth. *A. roxburghianus* 5

3b. Joints of pods transversely ribbed-corrugate or reticulate:

4a. Pods slender, not 4-gonous :

5a. Pods longer than calyx; joints reticulately veined. *A. longifolius* 3

5b. Pods shorter than calyx or as long as calyx; joints transversely ribbed-corrugate. *A. glumaceus* var. *heyneanus* 1

4b. Pods 4-gonous.

A. tetragonolobus 6

1b. Pods not moniliform :

6a. Leaflets broadly elliptic-oblong or linear-lanceolate. Pods turgid, not indented.

A. vaginalis 7

6b. Leaflets suborbicular. Pods compressed, shallowly indented on both sutures.

A. hamosus 2

1. *Alysicarpus glumaceus* (Vahl) DC. var. *heyneanus* (Wt. & Arn.) Raizada in Suppl. Duthie, Fl. Gangetic Plain 47. 1976. *A. heyneanus* Wt. & Arn. Prodr. 234. 1834. *A. rugosus* (Willd.) DC. var. *heyneanus* (Wt. & Arn.) Baker in Hook. f. Fl. Brit. India 2 : 159. 1876; Duthie, Fl. Gangetic Plain 1 : 278. 1903.

Annual, pubescent herbs. Leaflets obovate-oblong. Racemes lax, 10-15 cm long. Calyx ciliate on the edges only. Standard flesh-coloured; wings and keel purple. Pods hardly exserted, turgid, apiculate, moniliform with 2-5 joints, marked with transverse ribs.

Fl. & Fr. : September-January.

Rare, among grasses in wastelands; Bhimgarh (*Kanodia* 75379, 75719, BSI).

2. *A. hamosus* Edgew. in Journ. Asiat. Soc. Beng. 21 : 171. 1853; Baker in Hook. f. Fl. Brit. India 2 : 157. 1876; Duthie, Fl. Gangetic Plain 1 : 276. 1903. *Hedysarum procumbens* Roxb. Fl. Ind. 3 : 345. 1832, non Mill. 1768. *Alysicarpus procumbens* (Roxb.) Schindl. in Fedde, Repert. 21 : 11. 1925; Raizada in Ind. For. 92 : 301. 1966.

Annual, diffuse herbs, clothed with long spreading hairs. Leaflet solitary, suborbicular, 1.5-3.0 cm in diam. Flowers paired along the peduncle, in axillary, 4 to 8-flowered racemes. Calyx shorter than first joint of pod. Pods linear, about 2.5 cm long, flat, 3 to 7-jointed, clothed with hooked hairs. Seeds oval, brown, smooth.

Fl. & Fr. : August-October.

Common in wastelands and open forests, particularly among grasses. Often mistaken for *Desmodium* Desv. due to compressed pods; Shergarh forest, Lasara, Anand Sagar (*Kanodia* 75253, BSI).

3. *A. longifolius* (Rottl. ex Spreng.) Wt. & Arn. Prodr. Pen. Ind. Or. 233. 1834; Wight, Icon. 1 : t. 251. 1840; Baker in Hook. f. Fl. Brit. India 2 : 159. 1876; Duthie, Fl. Gangetic Plain 1 : 278. 1903; Ali in Biologia 12(2) : 35. 1966. *Hedysarum longifolium* Rottl. ex Spreng. Syst. 3 : 319. 1826. 'Gubal' (Hindi).

Perennial, hairy herbs, upto 1 m high. Leaflet solitary, linear-oblong or obovate-oblong, 2-12 x 0.6-3.0 cm, entire. Stipules lanceolate, scarious. Flowers in terminal and lateral, spicate racemes. Calyx enclosing 2-3 joints of pods. Joints of pods 4-6, 1-seeded.

Fl. & Fr. : September-November.

Common weed in cultivated fields and gardens; Kushalgarh.

Notes : Two forms of this species were noted in the field—I. the dwarf form, which bears linear leaves and resembles *A. bupleurifolius* (L.) DC.; II. the robust form, which possesses ovate-oblong leaves and resembles *A. glumaceus* (Vahl) DC.

4. *A. monilifer* (L.) DC. Prodr. 2 : 353. 1825; Baker in Hook. f. Fl. Brit. India 2 : 157. 1876; Duthie, Fl. Gangetic Plain 1 : 276. 1903; Ali in Biologia 12(2) : 34. 1966. *Hedysarum moniliferum* L. Mant. I : 102. 1767.

Deep-rooted, perennial, prostrate herbs. Stipules lanceolate, scarious, closely appressed to the stem, almost as long as petioles. Leaflet solitary, oblong to suborbicular, 0.5-2.5 x 0.5-1.5 cm. Flowers pink, in axillary and terminal, few-flowered racemes longer than leaves. Joints of pods 2-8, 1-seeded, subglobose, downy with minute hooked hairs, not veined.

Fl. & Fr. : August-November.

Common, forming carpets along the roads and in wastelands; Savania, Banswara (*Kanodia* 75101, 75386, BSI).

5. *A. roxburghianus* Thoth. & Pramanik in Bull. bot. Surv. India 21 : 189. 1981. *Hedysarum bupleurifolium* Roxb. Pl. Cor. t. 194. 1805, non L. 1753, nec. Roxb. 1832. *Alysicarpus bupleurifolius* auct. non (L.) DC. 1825; Baker in Hook. f. Fl. Brit. India 2 : 158. 1876, *pro parte*; Duthie, Fl. Gangetic Plain 1 : 277. 1903, *pro parte*.

Erect or decumbent, annual herbs. Leaflet solitary, linear-lanceolate to oblong, 1.3-3.0 x 0.4-0.8 cm, entire, acute, glabrous except on the nerves beneath. Stipules lanceolate. Flowers bluish-pink, in lax, terminal racemes. Joints of pods 2-6, 1-seeded, smooth, neither veined nor rugose, slightly longer than broad.

Fl. & Fr. : August-November.

Frequent in grasslands. Sometimes the flower-colour is yellow or white. Near Dayla tank (*Kanodia* 75190, BSI).

6. *A. tetragonolobus* Edgew. in Journ. As. Soc. Beng. 21 : 169. 1853; Baker in Hook. f. Fl. Brit. India 2 : 159. 1876; Duthie, Fl. Gangetic Plain 1 : 279. 1903.

Diffusely branched, procumbent herbs. Leaflets solitary, elliptic-oblong or lanceolate. Stipules lanceolate, scarious. Flowers pink, in lax racemes. Sepals distinctly ciliate. Pods with a projecting ridge down the middle of each face making the pods 4-angular; joints 2-6, transversely ribbed or reticulate.

Fl. & Fr. : August-October.

Common in wastelands, open forests and on naked hillocks; Kotharia forest, Kushalgarh (*Kanodia* 75248, BSI).

7. *A. vaginalis* (L.) DC. Prodr. 2 : 353. 1825; Baker in Hook. f. Fl. Brit. India 2 : 158. 1876; Duthie, Fl. Gangetic Plain 1 : 277. 1903 ; Meeuwen et al. in Reinwardtia 6(1) : 87. 1961; Mahesh. Illus. Fl. Delhi f. 69. 1966. *Hedysarum vaginalle* L. Sp. Pl. 746. 1753. *Alysicarpus vaginalis* (L.) DC. var. *nummularifolius* Miq. Fl. Ind. Bat. 1 : 232. 1855; Baker, l.c. 2 : 158. 1876; Duthie, l.c. 277. 1903.

Annual herbs, 50-70 cm high. Flowers pink, solitary or paired in slender, leaf-opposed, 6 to 12-flowered racemes longer than leaves. Calyx longer than first joint of pod. Pods slender, veined, 1.5-2.5 cm long, segmented into 5-9, 1-seeded joints with prominent septa in between.

Fl. & Fr. : September-November.

Common weed in cultivated fields, gardens and wastelands; Lasara, Banswara (*Kanodia* 51120, BSI).

5. ATYLOSLA Wt. & Arn.

Atylosia scarabaeoides (L.) Baker in Hook. f. Fl. Brit. India 2 : 215. 1876; Duthie, Fl. Gangetic Plain 1 : 212. 1903. *Dolichos scarabaeoides* L. Sp. Pl. 726. 1753. *Atylosia scarabaeoides* Benth. in Miq. Pl. Jungh. 242.

1852, *nom. nud.*

Twining, densely hairy-pubescent herbs. Leaves exstipellate, 3-foliolate; leaflets obovate-oblong or elliptic-oblong, 1-3 x 0.8-2.0 cm, grey-tomentose. Flowers yellow, racemed on axillary, hairy peduncles shorter than leaves. Pods oblong, 2.0-2.5 cm long, hairy, 3 to 6-seeded, depressed between the seeds, oblong, back.

Fl. & Fr. : August-November.

Often grows in wastelands among bushes; Banswara (*Verma* 245, BSA), Shyampura (*Kanodia* 75390, BSI).

6. BUTEA Roxb. ex Willd. *nom. cons.*

Butea monosperma (Lam.) Taub. in Engl. & Prantl. Nat. Pfam. 3(3) : 366. 1894; Mahesh. Illus. Fl. Delhi f. 74. 1966. *Erythrina monosperma* Lam. Encycl. 2 : 391. 1786. *Butea frondosa* Koenig ex Roxb. in As. Res. 3 : 369. 1792 & Pl. Cor. 1 : 22. t. 21. 1795; Baker in Hook. f. Fl. Brit. India 2 : 194. 1876; Duthie, Fl. Gangetic Plain 1 : 240. 1903. 'Chhola, Palas, Khankara, Kesu' (Hindi).

Medium-sized, deciduous trees. Leaflets 3, rhomboid or broadly obovate, upto 25 cm in diam., hairy. Flowers orange-red, showy, 5-8 cm long, in terminal and lateral racemes. Lowest calyx-tooth shortest. Pods flat, 12-18 x 2.5-5.5 cm, grey-silky, one-seeded.

Fl. & Fr. : March-June.

Common from plains to the foot of hills; never seen at high elevation. It is a perfect invader in the damaged forests and is gradually marching inwards replacing the original flora; Kotharia forest, Khora forest, Paloda, Talwara, Kushalgarh.

7. CANAVALIA Adans. emend. DC. *nom. cons.*

Canavalia ensiformis (L.) DC. Prodr. 2 : 1404. 1825; Baker in Hook. f. Fl. Brit. India 2 : 195. 1876; Duthie, Fl. Gangetic Plain 1 : 235. 1903. *Dolichos ensiformis* L. Sp. Pl. 725. 1753. *Dolichos gladiatus* Jacq. Coll. Bot. 2 : 276. 1788. *Canavalia gladiata* (Jacq.) DC. Prodr. 2 : 404. 1825; Wight, Icon. 3(1) : 3. t. 753. 1844. 'Jangli Sem' (Hindi).

Twining herbs. Stipules 3-angular. Leaflets 3, ovate to suborbicular, 4-12 x 3.5-9.0 cm, acute or abruptly acuminate. Racemes upto 3 cm long, axillary. Pods 10-20 x 3-4 cm, flat. Seeds subreniform, glabrous.

Fl. & Fr. : August-December.

Common on the edges of fields and gardens; Loharia, Ghatol (*Kanodia* 75420, 51142, BSI).

8. CLITORIA L.

- 1a. Erect herbs. Pods upto 2 cm long, deflexed. *C. biflora* 1
 1b. Twining herbs or shrubs. Pods more than 5 cm long, spreading, never deflexed. *C. ternata* 2.

1. **Clitoria biflora** Dalz. in Kew Journ. Bot. 2 : 35. 1850; Baker in Hook. f. Fl. Brit. India 2 : 208. 1876; Raizada, Suppl. Duthie, Fl. Gangetic Plain 48. 1976.

Annual herbs, upto 60 cm high. Leaflets 5, elliptic to ovate-lanceolate, 2.5-15.0 x 1.2-4.0 cm, acute. Flowers axillary, geminate or rarely solitary due to the abortion of one flower, deflexed. Bracteoles ovate-lanceolate, aristate. Pods flat, 3-5 cm long, pubescent, 5 to 6-seeded.

Fl. & Fr. : August-October.

Common in forests in shady habitats; Anand Sagar forest, Loharia forest, Kushalgarh (*Kanodia* 75689, BSI).

2. **C. ternata** L. Sp. Pl. 753. 1753; Baker in Hook. f. Fl. Brit. India 2 : 208. 1876; Duthie, Fl. Gangetic Plain 1 : 230. 1903. 'Gokarni' (Hindi).

Twining herbs. Leaflets 5-7, ovate-oblong or elliptic, 2-5 x 1.2-2.5 cm. Flowers upside down, 2.5-6.0 cm long, axillary, solitary or paired. Bracteoles suborbicular. Pods linear, flat, 8-15 cm long, pubescent, many-seeded. Seeds oblong, black, glabrous.

Fl. & Fr. : December-March, often during August-September.

Common among bushes along the roads, particularly near habitations; also cultivated ornamenteally as a wall climber; Banswara, Ghatol (*Majumdar* 10248, BSA).

9. CROTALARIA L.

- 1a. Leaves simple. Pods 2 to many-seeded :
 2a. Stipules present :
 3a. Pods glabrous. *C. mysorensis* 6.
 3b. Pods hairy :
 4a. Branches terete. Pods 8 to 10-seeded. *C. hirsuta* 3.
 4b. Branches triquetrous. Pods 15 to 20-seeded. *C. triquetra* 8.
 2b. Stipules absent :
 5a. Xerophytic undershrubs. Leaves deciduous. *C. burhia* 2.
 5b. Mesophytic herbs. Leaves persistent :
 6a. Corolla much exserted. Pods as long a calyx. *C. linifolia* 4.
 6b. Corolla not or hardly exserted. Pods longer than calyx :
 7a. Leaves with an oblique base. Racemes 2 to 5-flowered. *C. prostrata* 7.
 7b. Leaves with an acute base. Racemes 6 to 20-flowered. *C. albida* 1.
 1b. Leaves 3-foliate. Pods 2-seeded. *C. medicaginea* 5.

1. **Crotalaria albida** Heyne ex Roth, Nov. Sp. Pl. 333. 1821; Baker in Hook. f. Fl. Brit. India 2 : 71. 1876; Duthie, Fl. Gangetic Plain 1 : 205.

1903; Munk in Reinwardtia 6(3) : 200. 1962; Ali in Biologia 12 : 27. 1966. *C. montana* Roxb. Fl. Ind. 3 : 265. 1832, non Heyne ex Roth, 1821.

Diffuse, annual herbs, 20-30 cm high, clothed with appressed hairs. Leaves subsessile, elliptic-oblong or oblanceolate, 1-3 x 0.5-1.0 cm, gland-dotted, entire. Racemes 2-20 cm long, few to many-flowered. Calyx 0.8-1.0 cm long. Pods oblong, 1.5 x 0.8 cm, glabrous, 6 to 12-seeded.

Fl. & Fr. : August-October.

Rare, a wasteland ruderal; Banswara (*Majumdar* 10293, BSA).

2. *C. burhia* Buch.-Ham. ex Benth. in Hook. Lond. Journ. Bot. 2 : 474. 1843; Baker in Hook. f. Fl. Brit. India 2 : 66. 1876; Duthie, Fl. Gangetic Plain 1 : 202. 1903; Mahesh. Illus. Fl. Delhi f. 50. 1966; Ali in Biologia 12 : 26. 1966. *C. burhia* Buch.—Ham. ex Benth. var. *tomentosa* Boiss. Fl. Or. 2 : 26. 1872.

Xerophytic undershrubs, with short-lived, subsessile, mucronate, oblong-lanceolate leaves and erecto-patent branches. Flowers in terminal, 6 to 12-flowered racemes. Bracteoles 2, lanceolate. Corolla almost as long as calyx. Pods oblong, villous, 3 to 4-seeded, longer than the calyx.

Fl. & Fr. : March-August.

Rare, in dry habitats in wastelands. It is a desert plant and is gradually invading the area; Banswara (*Majumdar* 10275, BSA).

3. *C. hirsuta* Willd. Sp. Pl. 3 : 978. 1802; Baker in Hook. f. Fl. Brit. India 2 : 68. 1876; Duthie, Fl. Gangetic Plain 1 : 203. 1903. *C. rubiginosa* Roxb. Fl. Ind. 3 : 269. 1832, non Willd. 1802; Wight, Icon. 3(2) : 7. t. 885. 1844-45.

Annual herbs, clothed with long, spreading hairs. Leaves ovate-lanceolate, 3.0-6.5 x 1.5-4.0 cm, entire, acute. Stipules lanceolate, reflexed. Flowers in 2 to 5-flowered racemes. Pods oblong, 1.5-2.0 cm long, hairy, 8 to 10-seeded.

Fl. & Fr. : August-November.

Common in protected grasslands; Kushalgarh, Deri-wali-Dungri (*Kanodia* 75133, BSI).

4. *C. linifolia* L. f. Suppl. 322. 1781; Baker in Hook. f. Fl. Brit. India 2 : 72. 1876; Duthie, Fl. Gangetic Plain 1 : 204. 1903; Munk in Reinwardtia 6(3) : 207. 1962. *C. montana* Heyne in Roth, Nov. Sp. Pl. 335. 1821.

Annual herbs, clothed with appressed hairs. Leaves oblanceolate or obovate-oblong, 2.5-5.0 x 0.8-2.0 cm. Flowers in lax, terminal, 5 to 20-flowered racemes. Bracts subulate. Upper teeth of calyx connate. Corolla hardly exserted. Pods ovoid-oblong, as long as calyx, 4 to 10-seeded, glabrous, black when ripe.

Fl. & Fr. : August-October, often upto March.

Common in wastelands in shady habitats; Lasara, Jolana (*Kanodia* 16, BSI), Ghatol (*Kanodia* 75197, BSI).

5. *C. medicaginea* Lam. Encycl. Meth. Bot. 2 : 201. 1786; Baker in Hook. f. Fl. Brit. India 2 : 81. 1876; Duthie, Fl. Gangetic Plain 1 : 207. 1903; Munk in Reinwardtia 6(3) : 208. 1962; Mahesh. Illus. Fl. Delhi f. 49. 1966. *C. neglecta* Wt. & Arn. Prod. 192. 1834. *C. luxurians* Benth. in Hook. Lond. J. 2 : 578. 1843. *C. medicaginea* Lam. vars. *neglecta* (Wt. & Arn.) Baker & *luxurians* (Benth.) Baker, I.c. 2 : 81. 1876 ; Duthie, I.c. 1 : 207. 1903. 'Gulati, Jhojhru' (Hindi).

Erect, annual herbs, 20-80 cm high. Leaflets abovate-oblong, longer than petioles, 1-3 x 0.3-1.0 cm, retuse, often apiculate. Racemes leaf-opposed, 2 to 3-flowered. Calyx-teeth exceeding the tube. Corolla exserted. Pods subglobose, silky, beaked with persistent stylar base.

Fl. & Fr. : July-November.

Abundant in open, grassy wastelands, lawns, gardens, etc.; Pipalkhund, Bhongra (*Kanodia* 75434, BSI).

6. *C. mysorensis* Roth, Nov. Pl. Sp. 338. 1821; Baker in Hook. f. Fl. Brit. India 2 : 70. 1876; Duthie, Fl. Gangetic Plain 1 : 204. 1903; Munk in Reinwardtia 6(3) : 210. 1962; Ali in Biologia 12 : 29. 1966. *C. ferruginea* sensu Duthie, I.c. 1 : 203. 1903, non Grah. ex Benth. 1843.

Erect, annual herbs, clothed with ferruginous, erecto-patent hairs. Leaves subsessile, lanceolate, 2-10 x 0.5-1.5 cm, obtuse, mucronate, hairy. Stipules linear or lanceolate. Flowers yellow, in lax, 6 to 10-flowered racemes. Bracts lanceolate, leafy. Bracteoles inserted just below the calyx. Corolla as long as calyx. Pods subsessile or shortly stalked, 3.0-3.5 cm long, many-seeded.

Fl. & Fr. : August-December.

Rare, among grasses in the gardens and neglected corners of fields. Very close to *C. ferruginea* Grah. ex Benth.; Bhimgarh (*Kanodia* 75378, BSI).

7. *C. prostrata* Rottl. ex Willd. Enum. Hort. Berol. 2 : 747. 1809; Duthie, Fl. Gangetic Plain 1 : 202. 1903; Munk in Reinwardtia 6(3) : 211. 1962; Ali in Biologia 12 : 29. 1966. *C. prostrata* Roxb. ex D. Don, Fl. Nep. 241. 1825; Baker in Hook. f. Fl. Brit. India 2 : 67. 1876.

Annual herbs, 20-30 cm high, clothed with yellowish-brown hairs. Leaves sessile, oblong or ovate-lanceolate, 1.5-3.5 x 0.8-1.5 cm, entire, oblique at the base. Flowers 2-5, in lax, 3-10 cm long racemes. Bracts subulate. Upper calyx-teeth connate upto the middle. Pods linear-oblong, turgid, 1.2-1.5 cm long, glabrous, 6 to 20-seeded.

Fl. & Fr. : August-November.

Frequent weed in the wastelands and open forests ; Hura Bowji forest, Bhongra (*Kanodia* 75465, BSI).

8. *C. triquetra* Dalz. in Hook. Kew Journ. Bot. 2 : 34. 1850 ; Baker in Hook. f. Fl. Brit. India 2 : 71. 1876.

Suffruticose herbs, with slender, 3-angled branches. Leaves elliptic-

oblong, obtuse, about 2.0 x 0.5 cm, glabrous above. Racemes 1 to few-flowered. Calyx upto 1 cm long. Corolla exserted, glabrous. Pods oblong, about 2.5 x 0.4 cm.

Fl. & Fr. : December-March.

Occasional, in wastelands; Deri-wali-Dungri (*Kanodia* 75133, BSI).

10. DALBERGIA L. f. *nom. cons.*

- | | |
|---|-----------------------|
| 1a. Leaflets acute or acuminate. Flowers subsessile. | <i>D. sissoo</i> 2 |
| 1b. Leaflets obtuse or emarginate. Flowers distinctly pedicelled. | <i>D. latifolia</i> 1 |

1. **Dalbergia latifolia** Roxb. Pl. Cor. 2 : 7, t. 113. 1799 & Fl. Ind. 3 : 221. 1832; Wight, Icon. 3(4) : 15. t. 1156. 1846; Baker in Hook. f. Fl. Brit. India 2 : 131. 1876; Duthie, Fl. Gangetic Plain I : 263. 1903. '*Saphed Sisum, Pai*' (Hindi).

Deciduous trees, upto 10 m high. Leaflets 5-9, broadly elliptic or elliptic-obovate, 2-5 x 1.5-4.0 cm, glabrous. Flowers white, in lax, axillary panicles. Stamens 9. Pods oblong-lanceolate, 4-8 x 1.5-2.0 cm, flat, narrowed at both ends, 1 to 3-seeded, glabrous, black when ripe. Seeds reniform, black, glabrous.

Fl. & Fr. : March-August.

Sparsely distributed in the forests; Bagaycha forest.

Notes : The illustration of Wight (*l.c.*) is often given as a synonym under *D. latifolia* Roxb. Indeed, the illustration combines characters of two taxa viz. *D. latifolia* Roxb. and *D. sissooides* Grah. ex Wt. & Arn.

2. **D. sissoo** Roxb. Fl. Ind. 3 : 223. 1832; Baker in Hook. f. Fl. Brit. India 2 : 231. 1876; Duthie, Fl. Gangetic Plain I : 264. 1903; Roxb. Icon. no. 970. 1973. '*Sisum*' (Hindi).

Large trees. Leaves 1-pinnate ; rachis zigzag; leaflets 3-5, suborbicular, alternate, 2.5-6.0 cm in diam. Flowers yellowish, in axillary panicles. Stamens 9. Pods oblong, flat, 4-6 x 1 cm, narrowed at both the ends, 1 to 4-seeded.

Fl. & Fr. : March-August.

Common in wastelands, on the edges of fields and gardens ; also planted along the roads for shade and timber ; Pipalkhund, Danpur, Shyam-pura (*Kanodia* 75397, BSI).

11. DESMODIUM Desv. *nom. cons.*

- | | |
|--|------------------------|
| 1a. Leaves 1-foliolate : | |
| 2a. Pods indented on both the sutures. | <i>D. velutinum</i> 5 |
| 2b. Pods indented on the lower suture only. | <i>D. gangeticum</i> 2 |
| 1b. Leaves 3-foliolate : | |
| 3a. Erect herbs or shrubs. Pods indented on both the sutures : | |

- 4a. Pods spirally twisted. *D. procumbens* 3
 4b. Pods not spirally twisted. *D. dichotomum* 1
 3b. Trailing or creeping herbs. Pods indented on the lower suture only. *D. triflorum* 4

1. **Desmodium dichotomum** (Willd.) DC. Prodr. 2 : 336. 1825; Meeuwen in Reinwardtia 6(3) : 248. 1962. *Hedysarum dichotomum* Willd. Sp. Pl. 3 : 1180. 1802. *H. diffusum* Willd. Sp. Pl. 3 : 1180. 1802. *Desmodium diffusum* (Willd.) DC. Prodr. 2 : 336. 1825, non DC. Jan. 1825; Wight, Icon. 1 : t. 298. 1840; Baker in Hook. f. Fl. Brit. India 1 : 169. 1876; Duthie, Fl. Gangetic Plain 1 : 285. 1903. 'Gander-lapto' (Hindi).

Undershrubs, upto 1 m high, with deeply grooved stem and branches clothed with white, spreading hairs. Leaflets ovate-oblong or elliptic-oblong, 3-8 x 1.5-4.5 cm. Stipules foliaceous, subamplexicaul. Flowers pink, fascicled in racemes or panicles. Pods 1.3-2.0 cm long, flat, indented into 3-8, 1-seeded rectangular joints, hooked-hairy.

Fl. & Fr. : August-October.

Common in forests in shady habitats; Khora forest, Anand Sagar forest (*Kanodia* 75283, BSI).

2. **D. gangeticum** (L.) DC. Prodr. 2 : 327. 1825; Wight, Icon. I : t. 271. 1840; Baker in Hook. f. Fl. Brit. India 2 : 168. 1876; Duthie, Fl. Gangetic Plain 1 : 286. 1903; Meeuwen in Reinwardtia 6(3) : 249. 1962. *Hedysarum gangeticum* L. Sp. Pl. 746. 1753. *H. maculatum* L. Sp. Pl. 746. 1753. *Desmodium gangeticum* (L.) DC. var. *maculatum* (L.) Baker, I.c. 2 : 168. 1876; Duthie, I.c. 1 : 287. 1903. 'Solpiani, Karet' (Hindi).

Undershrubs, upto 1 m high. Leaflet ovate-oblong, 3-15 x 2-8 cm, hairy beneath, entire or repand. Stipules lanceolate. Flowers purple-pink, clustered in racemes. Pods linear, flat, falcate, distinctly indented into 4-8, 1-seeded joints on the lower suture, hooked-hairy. Seeds suborbicular, brown.

Fl. & Fr. : August-November.

Common in wastelands, open forests, protected gardens and other similar localities; Banswara (*Kanodia* 75185, 75526, BSI).

Notes : The choice of Wight & Arnott (Prodr. 225. 1834) has been followed regarding the selection of specific epithet '*gangeticum*' from the equally old epithets '*maculatum* and *gangeticum*'.

3. **D. procumbens** (Mill.) Hitchc. in Rep. Mo. Bot. Gard. 4 : 76. 1893; Meeuwen in Reinwardtia 6 (3) : 255. 1962. *Hedysarum procumbens* Mill. Gard. Dict. ed. 8. no. 10. 1768. *H. spirale* Sw. Prodr. 107. 1788. *Desmodium spirale* (Sw.) DC. Prodr. 2 : 332. 1825; Baker in Hook. f. Fl. Brit. India 2 : 164. 1876; Duthie, Fl. Gangetic Plain 1 : 284. 1903.

Erect, annual, pubescent herbs, upto 60 cm high. Stipules linear-subulate. Leaflets ovate, ciliate, pubescent; lateral ones much smaller than terminal. Flowers red, in racemes. Calyx incised half way down. Pods flat indented very deeply on both the sutures; segments rhomboid, pubescent, with strongly

involute and revolute margins, thus giving the pod a spirally twisted appearance, joints connected by a narrow isthmus.

Fl. & Fr. : August-October.

Common in forests; Hura Bowji forest, Ghatol (*Kanodia* 51158, BSI).

Notes : This species resembles closely with *D. neomexicanum* A. Gray, a native of Tropical America. But, the margins of the joints of pods are merely sinuate, not involute or revolute in *D. neomexicanum* A. Gray.

4. *D. triflorum* (L.) DC. Prodr. 2 : 334. 1825, excl. *syn. biflorum*; Wight, Icon. 1 : t. 291. 1840; Baker in Hook. f. Fl. Brit. India 2 : 173. 1876; Duthie, Fl. Gangetic Plain 1 : 285. 1903; Meeuwen in Reinwardtia 6(3) : 261. 1962. *Hedysarum triflorum* L. Sp. Pl. 749. 1753, excl. vars. β & γ .

Creeping herbs, clothed with fine hairs, rooting at the lower nodes. Leaflets obovate, about 1.5 cm in diam., emarginate. Stipules scarious, not auricled. Flowers white or pink, 1 to 3-together, fascicled in the leaf axils or leaf-opposed. Fruits flat, indented into 3-5, 1-seeded joints, pubescent.

Fl. & Fr. : September-November.

Common in wastelands and gardens in wet and shady habitats; Lasara, Ghatol (*Kanodia* 75479, BSI), Singhpura (*Kanodia* 51063, 75178, BSI).

5. *D. velutinum* (Willd.) DC. Prodr. 2 : 228. 1825; Meeuwen in Reinwardtia 6(3) : 264. 1962. *Hedysarum velutinum* Willd. Sp. Pl. 3 : 1174. 1802. *H. latifolium* Roxb. Fl. Ind. 3 : 350. 1832. *Desmodium latifolium* (Roxb.) DC. Prodr. 2 : 328. 1825; Wight, Icon. 1 : t. 270. 1840; Baker in Hook. f. Fl. Brit. India. 2 : 168. 1876; Duthie, Fl. Gangetic Plain 1 : 287. 1903.

Erect, hairy undershrubs, 1-2 m high. Leaflet ovate, 3-12 x 3-11 cm, entire or sinuate-repend, pubescent above, tomentose beneath. Stipules ovate, acuminate. Flowers pink to purple, fascicled in axillary and terminal, spicate racemes. Bracts ovate, acuminate. Joints of pods 3-6, as broad as long, clothed with hooked hairs.

Fl. & Fr. : August-November.

Common in forests; Puna Pathar forest, Hura Bowji forest, Bagaycha forest.

12. DUMASIA DC.

Dumasia villosa DC. in Ann. Sci. Nat. 4 : 96-97. 1825; Baker in Hook. f. Fl. Brit. India 2 : 183. 1876; Duthie, Fl. Gangetic Plain 1 : 231. 1903. *D. congesta* Grah. ex Wt. & Arn. Prodr. 206. 1834; Wight, Icon. 2(2) : 2. t. 445. 1841.

Climbing herbs, clothed with grey or ferruginous hairs. Leaves pinnately 3-foliolate; leaflets ovate, about 8 x 5 cm, obtuse, truncate at the base. Stipules setaceous; stipels filiform, caducous. Flowers yellow or purplish, in 6-10 cm long, lax racemes. Bracts and bracteoles setaceous. Pods linear, falcate, torulose, upto 6 cm long, velvety, 3 to 4-seeded.

Fl. & Fr. : November-January.

Rare, in forests; Bhapur forest (*Kanodia* 75206, BSI).

13. ERYTHRINA L.

Erythrina suberosa Roxb. Fl. Ind. 3 : 253. 1832; Baker in Hook. f. Fl. Brit. India 2 : 189. 1876; Duthie, Fl. Gangetic Plain 1 : 238. 1903; Roxb. Icon. no. 104. 1971. *Micropteryx suberosa* Walp. in Linnaea 23 : 744. 1850.

Small trees, with corky, deeply cracked bark. Leaflets 3, rhomboid-ovate, 10-15 cm long and broad, pubescent below, stipellate. Flowers scarlet, 1.5-3.0 cm long, in racemes gathered at the end of branches. Calyx 2-lipped. Pods linear, 6-15 x 0.3-0.8 cm, straight, torulose, 2 to 5-seeded.

Fl. & Fr. : March-June.

Rare, in wasteland and on the fringes of forests; Danpur, Waghdasi (*Kanodia* 75664, BSI).

14. GALACTIA P. BR.

Galactia tenuiflora (Klein ex Willd.) Wt. & Arn. Prodr. 206. 1834; Baker in Hook. f. Fl. Brit. India 2 : 192, 1876. *Glycine tenuiflora* Klein ex Willd. Sp. Pl. 3 : 1059. 1802. *Galactia villosa* Wt. & Arn. Prodr. 207. 1834; Duthie, Fl. Gangetic Plain 1 : 239. 1903. *G. tenuiflora* (Klein ex Willd.) Wt. & Arn. var. *villosa* (Wt. & Arn.) Baker, l.c. 2 : 192. 1876.

Twining herbs, woody at the base. Leaflets 3, ovate-oblong, 3.5-8.0 x 1.5-4.0 cm, stipellate, hairy on both sides, not gland-dotted. Flowers pink-purple, in axillary racemes. Nodes of racemes tumid. Two upper calyx-teeth fused into one. Anthers all fertile. Pods flat, many-seeded, 4-5 x 0.5-0.7 cm, with straight style.

Fl. & Fr. : August-October.

Common in forests, particularly in interior parts. Often mistaken for *Teramnus* species; Anand Sagar forest.

15. GONIOGYNA DC.

Goniogyna hirta (Willd.) Ali in Taxon 16 : 463. 1967. *Hallia hirta* Willd. Sp. Pl. 3 : 1169. 1802. *Heylandia latebrosa* auct. non (L.) DC. 1825; Baker in Hook. f. Fl. Brit. India 2 : 65. 1876; Duthie, Fl. Gangetic Plain 1 : 200. 1903. 'Gorakbuti' (Hindi).

Prostrate, annual herbs, clothed with long, spreading hairs. Leaves sessile, cordate-ovate, 0.8-1.5 x 0.5-1.0 cm, entire, ciliate, obtuse. Flowers bright yellow with purple veins, solitary, axillary. Anthers dimorphic. Pods flat, oblong, 1 to 2-seeded, beaked, hairy.

Fl. & Fr. : August-November, often during March-April.

Occasional, in dry, exposed land. Superficially resembles *Indigofera cordifolia* Heyne ex Roth which, however, bears red flowers; Anand Sagar (*Kanodia* 75244, BSI).

16. INDIGOFERA L.

1a. Leaves simple :		
2a. Leaves linear-lanceolate. Corolla exserted. Pods globose, 1-seeded.		<i>I. linifolia</i> 6
2b. Leaves ovate-cordate. Corolla not exserted. Pods oblong, 1 to 2-seeded.		<i>I. cordifolia</i> 2
1b. Leaves compound :		
3a. Pods 1 to 2-seeded :		
4a. Leaflets 3.		<i>I. glandulosa</i> 3
4b. Leaflets 5-11.		<i>I. linnaei</i> 7
3b. Pods more than 2-seeded :		
5a. Pods 4-angled or winged :		
6a. Leaflets gland-dotted beneath.		<i>I. trifoliata</i> 10
6b. Leaflets not gland-dotted :		
7a. Leaflets 3.	<i>I. trita</i> subsp. <i>subulata</i>	
7b. Leaflets 5-11.	var. <i>subulata</i>	11
7b. Leaflets 5-11.		<i>I. hirsuta</i> 4
5b. Pods neither angled, nor winged :		
8a. Racemes longer than leaves. Pods torulose :		
9a. Stem and pods not glandular hairy. Pods 3 to 8-seeded.	<i>I. oblongifolia</i>	8
9b. Stem and pods glandular hairy. Pods 10 to 12-seeded.	<i>I. colutea</i>	1
8b. Racemes shorter than leaves. Pods not torulose :		
10a. Flowers white. Pods flat.	<i>I. hochstetteri</i>	5
10b. Flowers red. Pods cylindric, not flat.	<i>I. tinctoria</i>	8

1. ***Indigofera colutea*** (Burm. f.) Merrill in Philip. J. Sci. 19 : 335, 1921. *Galega colutea* Burm. f. Fl. Ind. 172. 1768. *Indigofera viscosa* Lam. Encycl. Meth. Bot. 3 : 247. 1789; Wight, Icon. 2(1) : 9. t. 404. 1840; Baker in Hook. f. Fl. Brit. India 2 : 95. 1876; Duthie, Fl. Gangetic Plain 1 : 251. 1903.

Annual herbs, clothed with viscous gland-tipped hairs. Leaflets 7-11, obovate-elliptic, obtuse, apiculate, appressed hairy. Stipules filiform. Flowers pink, in 6 to 12-flowered, glandular racemes not exceeding the leaves. Calyx-teeth setaceous. Pods subcylindric, faintly torulose, glandular hairy.

Fl. & Fr. : August-October.

Rare, in wastelands. Very close to *I. coerulea* Roxb.; Ghatol (*Kanodia* 75478, BSI).

2. ***I. cordifolia*** Heyne ex Roth, Nov. Pl. Sp. 357. 1821; Baker in Hook. f. Fl. Brit. India 2 : 93. 1876; Duthie, Fl. Gangetic Plain 1 : 250. 1903; Ali in Bot. Notis. 111 : 545. 1958; Nair & Koshy in Journ. Bomb. nat. Hist. Soc. 60 (2) : 328-1963. 'Meh-phuli' (Hindi).

Prostrate or diffuse, annual herbs, clothed with long, white hairs. Leaves subsessile, apiculate, 0.7-1.5 x 0.5-1.0 cm. Flowers red, in small, sessile,

4 to 8-flowered, axillary racemes. Pods acute, longer than broad, when 2-seeded then slightly torulose. Seeds truncate at one end and rounded on the other.

Fl. & Fr. : August-December.

Common in wastelands and crevices of rocks in dry habitats. It is a good sand binder; Jua Fall, Banswara (*Kanodia* 67285, BSI).

3. *I. glandulosa* Willd. Sp. Pl. 3 : 1227. 1802; Wight, Icon. 2 (1) : 2. t. 330. 1840; Baker in Hook. f. Fl. Brit. India 2 : 94. 1876; Duthie, Fl. Gangetic Plain 1 : 250. 1903; Nair & Koshy in Journ. Bomb. nat. Hist. Soc. 60 (2) : 329. 1963. 'Hara-Johru' (Hindi).

Erect, annual herbs, clothed with appressed greyish-brown hairs. Leaflets 3, oblanceolate-spathulate, punctate with black glands beneath, 1.5-4.0 x 0.5-1.0 cm, obtuse and mucronate. Stipules subulate. Flowers yellow or reddish, in dense, short, globose, axillary racemes shorter than leaves. Bracts subulate. Pods oblong, 1 to 2-seeded, with winged sutures.

Fl. & Fr. : August-November.

Rare, weed in cultivated fields; Malki-Dungri (*Kanodia* 75428, BSI).

4. *I. hirsuta* L. Sp. Pl. 751. 1753; Baker in Hook. f. Fl. Brit. India 2 : 98. 1876; Duthie, Fl. Gangetic Plain 1 : 254. 1903; Ali in Bot. Notis. 111 : 559. 1958; Mahesh. Illus. Fl. Delhi f. 59. 1966. *I. astragalina* DC. Prodr. 2 : 228. 1825; Nair and Koshy in Journ. Bomb. nat. Hist. Soc. 60 (2) : 330. 1963.

Annual or biennial herbs, clothed with spreading brown hairs. Leaflets 5-11, opposite, obovate or elliptic-oblong, 2.5-6.0 x 1.5-3.5 cm, appressed hairy. Flowers red, in dense, spicate racemes exceeding the leaves. Pods straight, 4-angled, tomentose, closely appressed to the peduncles, 3 to 6-seeded.

Fl. & Fr. : August-November.

Common along the roads in wastelands; Bagaycha, Ghatol (*Kanodia* 75510, BSI).

Notes : Ali (*l. c.*) has been followed for treating *I. hirsuta* L. including *I. astragalina* DC. as a single polymorphic species. The characters like length of peduncle, size of pod, number of seeds, colour of hairs on the pods, number of leaflets, which have been used to differentiate two species by Gillett (Kew Bull. 14 : 290-295. 1960) do not hold good.

5. *I. hochstetteri* Baker in Oliv. Fl. Trop. Afr. 2 : 101. 1871; Ali in Bot. Notis. 111 : 552. 1958; Nair & Koshy in Journ. Bomb. nat. Hist. Soc. 60(2) : 330. 1963; Mahesh. Illus. Fl. Delhi f. 57. 1966. *I. anabaptista* Steud. ex. Baker in Hook. f. Fl. Brit. India 2 : 102. 1876; Duthie, Fl. Gangetic Plain 1 : 251. 1903.

Diffuse, annual herbs, with terete branches. Leaflets 5, elliptic-lanceolate or oblanceolate, about 1.0 x 0.5 cm, apiculate, appressed hairy. Flowers red, in dense, 12 to 20-flowered racemes shorter than leaves. Pods linear, falcate, deflexed, 6 to 8-seeded, appressed hairy, partitions between the seeds appear

as transverse ridges.

Fl. & Fr. : August-November.

Occasional, in dry sandy habitats; Banswara (*Kanodia* 75263, BSI).

6. *I. linifolia* (L. f.) Retz. Obs. Bot. 4 : 29. 1786; Wight, Icon. 1 : t. 313. 1840; Baker in Hook. f. Fl. Brit. India 2 : 92. 1876; Duthie, Fl. Gangetic Plain 1 : 249. 1903; Ali in Bot. Notis. 111 : 546. 1958; Nair and Koshy in Journ. Bomb. nat. Hist. Soc. 60(2) : 328. 1963. *Hedysarum linifolium* L. f. Suppl. 331. 1781. 'Pandar-phali' (Hindi).

Annual or perennial, erect or prostrate herbs. Leaves 1.0-4.5 x 0.2-0.5 cm, apiculate, appressed hairy. Flowers red, in axillary, 6 to 20-flowered racemes shorter than leaves. Pods upto 2 mm in diam., pubescent.

Fl. & Fr. : July-December.

Widely distributed in the forests, wastelands, parks and lawns in various habitats; Bagaycha forest, Bhongra (*Kanodia* 75438, BSI).

7. *I. linnaei* Ali in Bot. Notis. 111 : 549. 1958. *Hedysarum prostratum* L. Mant. 1 : 102. 1767, non *I. prostrata* Willd. 1803. *H. prostratum* Burm. f. Fl. Ind. 168, t. 55. f. 1. 1768, non L. 1767. *Indigofera enneaphylla* auct. plur. non L. 1771; Wight, Icon. 2(1) : 8, t. 403. 1840; Baker in Hook. f. Fl. Brit. India 2 : 94. 1876; Duthie, Fl. Gangetic Plain 1 : 250. 1903. *I. prostrata* (Burm. f.) Domin in Bibl. Bot. Stuttgart 187. 1962, non Willd. 1803. 'Jhun-Jhni, Buigoli' (Hindi).

Prostrate herbs, clothed with appressed hairs. Leaflets alternate, obovate, truncate or emarginate. Flowers red, in dense, axillary, 10 to 15-flowered, spicate racemes shorter than leaves. Pods oblong, acute, about 6 mm long, turgid, torulose, appressed hairy. Seeds 2, globose, shining.

Fl. & Fr. : August-December.

Common in wastelands in dry and sandy soils; Paloda, Jolana (*Kanodia* 51197, BSI).

8. *I. oblongifolia* Forsk. Fl. Aegypt.-Arab. 137. 1775; Duthie, Fl. Gangetic Plain 1 : 253. 1903; Ali in Bot. Notis. 111 : 546. 1958; Nair & Koshy in Journ. Bomb. nat. Hist. Soc. 60(2) : 334. 1963; Mahesh. Illus. Fl. Delhi f. 55. 1966. *I. paucifolia* Delile, Fl. Aegypt. 251. 1813-14; Baker in Hook. f. Fl. Brit. India 2 : 97. 1876. *I. argentea* Roxb. Fl. Ind. 3 : 374. 1832, non L. 1771, non Burm. f. 1768. 'Khuara' (Hindi).

Much-branched shrubs, upto 1 m high. Leaflets 3-5, alternate, oblong-ob lanceolate, not more than 1 cm in length. Flowers red, in long, spicate, 20 to 50-flowered racemes longer than leaves. Pods borne along the whole length of the peduncle, deflexed, 5 to 8-seeded, pubescent, torulose. Seeds truncate at both ends.

Fl. & Fr. : August-November.

Common in dry, rocky wasteland habitats. The plants are usually browsed upon by cattle; Borigame (*Kanodia* 51007, BSI).

9. *I. tinctoria* L. Sp. Pl. 751. 1753; Wight, Icon. 2(1) : 5, t. 365. 1840;

Baker in Hook. f. Fl. Brit. India 2 : 99. 1876; Duthie, Fl. Gangetic Plain 1 : 254. 1903; Ali in Bot. Notis. 111 : 567. 1958; Nair & Koshy in Journ. Bomb. nat. Hist. Soc. 60(2) : 335. 1963. *I. indica* Lam. Encycl. Meth. Bot. 3 : 245. 1789. 'Neel' (Hindi).

Undershrubs, upto 1 m high. Leaflets 7-13, obovate or oblanceolate, apiculate. Flowers red, in axillary racemes shorter than leaves. Pods slightly curved, brown, deflexed, 2.0-3.5 cm long, glabrous or finely pubescent, 8 to 10-seeded, septate between the seeds. Seeds oblong, truncate at both ends.

Fl. & Fr. : August-November.

Common in wastelands, open forests and along the roads; Bagaycha forest, Anand Sagar forest (*Kanodia* 75261, BSI), Bhimgarh (*Kanodia* 75366, BSI).

10. *I. trifoliata* L. in Turner, Cent. Pl. 2 : 29. 1756; Wight, Icon. 1 : t. 314. 1840; Baker in Hook. f. Fl. Brit. India 2 : 96. 1876; Duthie, Fl. Gangetic Plain 1 : 251. 1903; Ali in Bot. Notis 111 : 552. 1958. 'Buigoli' (Hindi).

Annual or perennial herbs, glabrous or clothed with few appressed hairs. Leaflets 3, obovate-oblanceolate, 1.2-2.5 x 0.3-1.2 cm, retuse or rounded. Flowers red, in axillary, 6 to 12-flowered racemes shorter than leaves. Pods deflexed, linear, 1.5-2.0 cm long, not torulose, with two narrow wings on either side of the suture, 6 to 10-seeded.

Fl. & Fr. : July-November.

Common in wastelands and open forests in wet and shady habitats; Lalpura forest, Bhongra (*Kanodia* 75446, BSI).

Notes : This species resembles closely to *I. prostrata* Willd. which, however, bears obtuse leaflets and wingless pods. Baker, Duthie and Ali (*I. c.*) have merged *I. prostrata* Willd. under *I. trifoliata* L. Gamble (Fl. Pres. Madr. 1 : 306, 310. 1918) and Santapau (Rec. Bot. Surv. Ind. 16 : 55. 1967) maintained both as distinct species. Biosystematic studies are needed to throw light on the interrelations between these two interesting taxa.

11. *I. trita* L. f. subsp. *subulata* var. *subulata* (Vahl ex Poir.) Ali in Bot. Notis. 111 : 558. 1958. *I. subulata* Vahl ex Poir. in Lam. Encycl. Meth. Suppl. 3 : 150. 1813; Baker in Hook. f. Fl. Brit. India 2 : 96. 1876; Duthie, Fl. Gangetic Plain 1 : 252. 1903. *I. subulata* Vahl ex Poir. var. *microphylla* Chiov. in Atti Inst. Bot. Univ. Pavia 7 (ser. 4) : 128. 1936. *I. subulata* Vahl ex Poir. var. *nubica* Gillett in Kew Bull. 1958 : 13. 1958.

Grey-pubescent undershrubs, upto 1 m high, with 4-angled branches. Leaf-rachis upto 6.2 cm long; petioles upto 1.8 cm long; leaflets 3, obovate. Flowers pink, in 2.5-4.5 cm long racemes. Pods 4-angled, upto 2.8 cm long, beaked, not curved at the base, deflexed. Seeds 6-10, pyramidal.

Fl. & Fr. : July-December.

Common in open forests and wastelands; Anand Sagar forest, Looda (*Majumdar* 10297, BSA), Jolana (*Kanodia* 51188, BSI).

17. LATHYRUS L.

- 1a. Leaflets absent. Tendrils unbranched. Stipules foliaceous. *L. aphaca* 1
 1b. Leaflets 2 pairs. Tendrils branched. Stipules linear, not foliaceous. *L. sativus* 2

1. **Lathyrus aphaca** L. Sp. Pl. 729. 1753; Baker in Hook. f. Fl. Brit. India 2 : 179. 1876; Duthie, Fl. Gangetic Plain 1 : 260. 1903; Ali in Biologia 11 (2) : 2. 1965. 'Phali-mattar, Jangli-mattar' (Hindi).

Annual, climbing herbs, with 4 angled, terete branches. Stipules ovate-hastate, 1.5-3.5 x 1.0-2.5 cm. Flowers yellow, axillary, solitary, pedicels longer than stipules. Pods linear, flat, not winged, 4 to 7-seeded. Seeds smooth, black.

Fl. & Fr. : January-March.

Common weed in cultivated fields and gardens. The plants prefer wet and shady habitats; Kushalgarh.

2. **L. sativus** L. Sp. Pl. 730. 1753; Baker in Hook. f. Fl. Brit. India 2 : 179. 1876 ; Duthie, Fl. Gangetic Plain 1 : 260. 1903; Ali in Biologia 11 (2) : 7. 1965. 'Chapta-mattar, Hiran-Khuri' (Hindi).

Climbing herbs, with winged branches. Leaves 1-pinnate; rachis winged below the lowest pair of leaflets. Leaflets linear-lanceolate or oblong. Flowers reddish-purple or blue, 1.0-1.5 cm long, axillary, solitary. Pods flat, 3-4 cm long, winged on either side of dorsal suture. Seeds 4-6, compressed.

Fl. & Fr. : January-March.

Native of W. Asia to Afghanistan; frequent weed in cultivated fields; Ghatol, Danpur.

18. MEDICAGO L.

Medicago lupulina L. Sp. Pl. 779. 1753; Baker in Hook. f. Fl. Brit. India 2 : 90. 1876; Duthie, Fl. Gangetic Plain 1 : 210. 1903; Mansfield in Die Kulterpflan. 2 : 163. 1959.

Prostrate or procumbent herbs. Leaflets obovate, 0.7-1.0 x 0.5-0.8 cm, emarginate, apiculate, toothed. Stipules linear, entire. Flowers pale-yellow, about 2 mm long, racemed at the top of axillary peduncles longer than leaves. Pods 1-seeded, shell-like, black at maturity, reticulately veined, pubescent.

Fl. & Fr. : January-March.

Native of Europe; naturalized in wet and shady habitats from plains to the hills; Talwara.

19. MELILOTUS Mill.

- 1a. Flowers white. *M. alba* 1
 1b. Flowers yellow. *M. indica* 2

1. *Melilotus alba* Medik. ex Desr. in Lam. Encycl. Meth. Bot. 4: 63. 1797; Baker in Hook. f. Fl. Brit. India 2: 89. 1876; Duthie, Fl. Gangetic Plain 1: 208. 1903. 'Mokhundo' (Hindi).

Annual herbs, upto 60 cm high. Leaflets oblanceolate, elliptic or obovate, 1.7-3.0 x 1.0-1.8 cm, inciso-serrate in upper half, cuneate at the base. Racemes axillary. Flowers deflexed, about 4 mm long. Pods oblong, 1 to 2-seeded, reticulately veined.

Fl. & Fr. : January-April.

Native of Europe and Western Temperate Asia; common weed in cultivated fields and other moist habitats; Loharia.

2. *M. indica* (L.) All. Fl. Pedem. 1: 308. 1785; Duthie, Fl. Gangetic Plain 1: 208. 1903; Mahesh. Illus. Fl. Delhi f. 53. 1966. *Trifolium indica* L. Sp. Pl. 765. 1753. *M. parviflora* Desf. Fl. Atlant. 2: 192. 1798; Baker in Hook. f. Fl. Brit. India 2: 89. 1876. 'Morila' (Hindi).

Erect, annual herbs, upto 60 cm high. Leaflets oblanceolate or obovate-oblong, 1.5-2.5 x 0.5-1.5 cm, inciso-serrate in upper half, cuneate at the base. Flowers about 5 mm long, in lax, axillary racemes. Pods oblong, 2-4 mm long, 1 to 2-seeded, glabrous, reticulately ribbed.

Fl. & Fr.: January-April.

Native of S. Europe and South-Western Asia; common weed in cultivated fields; Ghatol, Banswara (*Kanodia* 51183, BSI).

20. MUCUNA Adans. *nom. cons.*

Mucuna pruriens (L.) DC. Prodr. 2: 405. 1825; Baker in Hook. f. Fl. Brit. India 2: 187. 1876; Duthie, Fl. Gangetic Plain 1: 237. 1903; Mahesh. Illus. Fl. Delhi f. 73. 1966. *Dolichos pruriens* L. in Stickman, Diss. Herb. Amb. 23. 1754. *Mucuna prurita* W. Hooker in Bot. Misc. 2: 348. 1831, *nom. superfl.* 'Kaunch' (Hindi).

Twining, hirsute, annual herbs. Leaves 3-foliolate; leaflets rhomboid-ovate, 6-9 x 3.5-8.0 cm, midrib of lateral leaflets more close to upper margin. Flowers purple, 2-3 cm long, in drooping, 6 to 30-flowered racemes. Standard shorter than keels. Pods slightly curved at both ends in opposite directions, clothed with irritant bristles, 6-10 x 1.2-2.0 cm, neither winged nor plaited.

Fl. : August-October; *Fr.*: January-April.

Common in wastelands and open forests among the clumps of trees and shrubs; Lasara, Parla-ka-Pul (*Majumdar* 10301, BSA), Bhongra (*Kanodia* 75437, BSI).

21. PSORALEA L.

Psoralea corylifolia L. Sp. Pl. 764. 1753; Baker in Hook. f. Fl. Brit.

India 2 : 103. 1876; Duthie, Fl. Gangetic Plain 1: 241. 1903. 'Baychi' (Hindi).

Annual herbs, clothed with white hairs and purple glands. Leaflet solitary, ovate to suborbicular, 2-9 x 1.5-8.0 cm. Stipules lanceolate, acuminate. Flowers bluish-purple, upto 1 cm long, closely packed in upper part of axillary racemes. Pods oblong or ovoid, upto 7 x 5 mm, closely pitted, black when ripe, glabrous.

Fl. & Fr.: October-March.

Common weed in wastelands, open forests and along the roads; Sargod, Barodia, Lodha tank (*Kanodia* 51135, BSI).

22. RHYNCHOSIA Lour. *nom. cons.*

- | | |
|---|--------------------|
| 1a. Leaflets small, nearly glabrous. Stipules caducous. Stem glabrescent. Standard 3-6 mm long. | <i>R. minima</i> 1 |
| 1b. Leaflets large, softly pubescent. Stipules subpersistent. Stem clothed with glandular hairs. Standard 7-14 mm long. | <i>R. rothii</i> 2 |

1. ***Rhynchosia minima* (L.) DC.** Prodr. 2: 385. 1825; Baker in Hook. f. Fl. Brit. India 2: 223. 1876, incl. var.; Duthie, Fl. Gangetic Plain 1: 222. 1903; Meeuwen et al. in Reinwardtia 5: 439. 1961; Mahesh Illus. Fl. Delhi f. 76. 1966. *Dolichos minimus* L. Sp. Pl. 726. 1753.

Twining, annual herbs, with finely pubescent, 4-angled branches. Leaflets 3, rhomboid or rhomboid-ovate to obovate, 1-6 x 1-6 cm, acute or obtuse; stipellate. Flowers yellow, 5-8 mm long, in lax, axillary racemes longer than leaves. Pods linear, slightly falcate, flat, 2-seeded, 1-2 cm long. Seeds compressed, blackish.

Fl. & Fr.: August-November.

Common among bushes and shrubs in wastelands, open forests and along the roads; Banswara, Ghatol (*Kanodia* 75529, 75217, BSI).

2. ***R. rothii* Benth. ex Aitch. Cat. Pl. Punj. Sindh 50. 1869; Meeuwen et al. in Reinwardtia 5: 441. 1961. *R. sericea* Spanoghe in Linnaea 15: 195. 1841, non Gill. ex Hook. & Arn. 1833; Baker in Hook. f. Fl. Brit. India 2: 225. 1876; Duthie, Fl. Gangetic Plain 1: 222. 1903.**

Woody twiners, clothed with glandular hairs. Terminal leaflet rhomboid to suborbicular, lateral leaflets very oblique, margins sinuate, surface gland-dotted beneath. Flowers yellow, in axillary, pedunculate, 20-30 cm long racemes. Bracts longer than pedicels. Calyx pubescent and gland-dotted; upper teeth partly connate. Standard pubescent and glandular on the back. Fruits 2.5-3.0 cm long, 2-seeded, softly tomentose.

Fl. & Fr.: July to October.

Rare, in wastelands, forests and on the boundaries of fields and gardens Bhapur (*Kanodia* 75207, BSI).

23. SESBANIA Adans. emend. Scop. nom. cons.

Sesbania bispinosa (Jacq.) W.F. Wight, in U.S. Dept. Agr. Bur. Pl. Ind. Bull. No. 137: 15. 1909. *Aeschynomene bispinosa* Jacq. Jc. Pl. Rar. 3: 13. t. 564. 1793-94. *Coronilla aculeata* Willd. Sp. Pl. 3: 1147. 1802, *nom. illegit.* *Sesbania aculeata* (Willd.) Poir. in Lam. Encycl. Meth. Bot. 7: 128. 1806, *nom. illegit* as *Sesban aculeatus*; Baker in Hook. f. Fl. Brit. India 2: 114. 1876; Duthie, Fl. Gangetic Plain 1: 243. 1903. 'Dadon' (Hindi).

Weak-stemmed shrubs, 2-3 m high, with prickly branches and rachis. Leaflets 12-50 pairs, linear-oblong, mucronate. Flowers yellow, in 3 to 6-flowered racemes. Standard with red dots on the back. Pods 12-25 cm long, linear, torulose, beaked, glabrous. Seeds oblong, rounded at both ends, brown, shining, 3-5 x 1.5 mm.

Fl. & Fr.: August-November.

Common in low-lying areas; often cultivated as a green manure crop;
Chandan Singh-ki-Bassi.

24. SMITHIA W. Ait. nom. cons.

Smithia conferta J.E. Smith in Rees, Cyclop. 33. no. 2. 1816: Steenis in Reinwardtia 5: 445. 1961. *S. geminiflora* Roth, Nov. Pl. Sp. 352. 1821; Baker in Hook. f. Fl. Brit. India 2: 149. 1876; Duthie, Fl. Gangetic Plain 1: 269. 1903. *S. geminiflora* Roth var. *conferta* (Smith) Baker, l.c. 2: 149. 1876; Duthie, l.c. 1: 270. 1903.

Diffuse, annual herbs. Leaflets 3-8 pairs, subsessile, linear-oblong, 0.8-1.2 x 0.2-0.4 cm, bristly-hairy on the margins and midrib beneath. Flowers yellow, solitary or 2-4 in the upper axils which are often congested into dense heads. Bracts and calyx-lobes eciliate, but hairy on the back. Pods jointed, glabrous or papillose. Seeds subglobose, glabrous.

Fl. & Fr.: September-January.

Frequent in low-lying areas among grasses, often forming dense mats;
Loharia tank, Senavasa, Banswara (*Kanodia* 75715, BSI).

25. TEPHROSIA Pers. nom. cons.

1a. Leaves simple.	<i>T. strigosa</i> 3
1b. Leaves pinnately compound :	
2a. Plants, including pods, tomentose.	<i>T. villosa</i> 4
2b. Plants, including pods, glabrescent or downy :	
3a. Diffuse, downy herbs.	<i>T. pumila</i> 1
3b. Suberect, nearly glabrous herbs.	<i>T. purpurea</i> 2

1. **Tephrosia pumila** (Lam.) Pers. Syn. Pl. 2: 330. 1807; Duthie, Fl. Gangetic Plain 1: 245. 1903; Ali in Biologia 10: 27. 1964. *Galega pumila* Lam.

Encycl. Meth. 2: 599. 1786. *Tephrosia purpurea* (L.) Pers. var. *pumila* (Lam.) Baker in *Hook. f. Fl. Brit. India* 2: 113. 1876.

Erect, annual herbs, upto 30 cm high. Leaflets 7-13, oblong or oblanceolate, 10-20 x 6-8 mm, truncate or retuse. Flowers reddish-purple, in terminal or leaf-opposed, 1 to 3-flowered racemes. Bracts 2-3 mm long. Pedicels 2.5-4.0 mm long. Pods 3-4 x 0.4 cm, pubescent, 8 to 14-seeded.

Fl. & Fr.: August-November.

Common in forests in shady habitats; Puna Pathar forest, Hura Bowji forest.

2. *T. purpurea* (L.) Pers. *Syn. Pl.* 2: 239. 1807; Baker in *Hook. f. Fl. Brit. India* 2: 112. 1876; Duthie, *Fl. Gangetic Plain* 1: 245. 1903; Ali in *Biologia* 10: 28. 1964; Mahesh. Illus. *Fl. Delhi* f. 63. 1966. *Cracca purpurea* L. *Sp. Pl.* 752. 1753. 'Unbai' (Hindi).

Perennial herbs or undershrubs, often upto 1 m high. Leaflets 9-22, obovate, 1.0-2.8 x 0.4-1.0 cm, emarginate, mucronate. Flowers reddish, 1.0-1.5 cm long, in leaf-opposed racemes. Pods linear, turgid or subflattened, 1.3-6.0 cm long, slightly falcate or straight, 2 to 8-seeded.

Fl. & Fr.: July-November.

Occasional, in wastelands; Ghatal (*Kanodia* 75468, 75622, BSI).

3. *T. strigosa* (Dalz.) Sant. & Mahesh. in *Journ. Bomb. nat. Hist. Soc.* 54: 805. 1957; Mahesh. Illus. *Fl. Delhi* f. 61. 1966. *Macronyx strigosus* Dalz. in *Hook. Kew Journ. Bot.* 2: 35. 1850. *Tephrosia tenuis* Wall. ex Dalz. & Gibbs. *Bomb. Fl.* 61. 1861; Baker in *Hook. f. Fl. Brit. India* 2: 111. 1876; Duthie, *Fl. Gangetic Plain* 1: 244. 1903.

Annual, appressed hairy herbs, 20-50 cm high. Leaves linear-lanceolate, 3-10 x 0.2-0.8 cm, apiculate. Flowers bluish-yellow, 1-2 in the axils of leaves. Standard pubescent on the back. Pods linear, flat, 1.0-3.5 x 0.5 cm, 6 to 10-seeded.

Fl. & Fr.: August-October.

Common in forests in wet and shady habitats. When grows in grasslands, hardly distinguished from grasses before fruiting; Bagaycha forest, Banswara (*Kanodia* 75106, BSI).

4. *T. villosa* (L.) Pers. *Syn. Pl.* 2: 329. 1807; Baker in *Hook. f. Fl. Brit. India* 2: 113. 1876; Duthie, *Fl. Gangetic Plain* 1: 245. 1903; Mahesh. Illus. *Fl. Delhi* f. 62. 1966. *Cracca villosa* L. *Sp. Pl.* 752. 1753. *Galega villosa* (L.) L. *Syst. ed.* 10. 1172. 1759. 'Jhojhra' (Hindi).

Perennial undershrubs, below 1 m in height, clothed with appressed hairs. Stipules linear-lanceolate, hairy. Leaflets 13-19, obovate-cuneate, 1-2 x 0.5-1.0 cm, retuse, mucronate. Flowers pink, fascicled or paired in spike-like racemes longer than leaves. Pods flat, 2.5-4.5 x 0.5-0.7 cm, densely villous, falcate, deflexed.

Fl. & Fr.: August-November.

Common in wastelands, open forests and along the roads; often forms a dense community of its own; Paloda, Shergarh forest, Banswara (*Kanodia* 75560, BSI).

Notes : Some workers consider *T. hirta* Ham. (1882) and *T. villosa* as conspecific. If the two are the same, Persoon's binomial is priorable.

26. TERAMNUS P. Br.

Teramnus labialis (L.f.) Spreng. Syst. Veg. 3: 235. 1826; Baker in Hook. f. Fl. Brit. India 2: 184. 1876; Duthie, Fl. Gangetic Plain 1: 233. 1903; Verdcourt in Kew Bull. 24: 276. 1970. *Glycine labialis* L. f. Suppl. 325. 1781; Wight, Icon. 1: t. 168. 1839.

subsp. *labialis* var. *labialis*.

Twiners, clothed with appressed hairs. Leaflets 3, rhomboid, oblong or ovate-lanceolate, 1.5-5.5 x 1.5-2.5 cm. Stipules and bracts caducous. Flowers red, solitary or clustered, in few-flowered, axillary racemes. Pods linear, turgid, 4-6 cm long, septate, 2-valved, black when ripe. Seeds 8-12, oblong, glabrous, pale, without a granular incrustation.

Fl. & Fr. : October-March.

Common among bushes and shrubs in wastelands and open forests; Ghatol, Hura Bowji forest, Banswara (*Verma* 247, BSA), Lodha tank (*Kanodia* 75186, BSI).

27. TRIGONELLA L.

Trigonella occulta Delile ex DC. Prodr. 2: 185. 1825; Baker in Hook. f. Fl. Brit. India 2: 87. 1876; Duthie, Fl. Gangetic Plain 1: 209. 1903; Ali in Pak. Journ. For. 17(2): 259. 1967.

Deep-rooted, diffuse, pubescent or glabrous herbs. Leaflets 3, oblanceolate, 3-8 x 1-4 mm, inciso-dentate, truncate at the apex, cuneate at the base. Stipules laciniate. Flowers yellow, 2 to 4-together in sessile axillary clusters. Pods ovoid, 1 to 2-seeded, not much exserted, transversely reticulate, apiculate. Seeds oblong, olive, glabrous.

Fl. & Fr. : December-April.

Common on the edges of drying ponds in association with *Polygonum plebeium* R. Br., *Gnaphalium pulvinatum* Del. and *Cyperus michelianus* (L.) Link; Banswara, Raj talab (*Kanodia* 51020, 51013, BSI).

28. URARIA Desv.

Uraria picta (Jacq.) Desv. ex DC. Prodr. 2: 324. 1825; Wight, Icon. 2 (1): 9. t. 411. 1840; Baker in Hook. f. Fl. Brit. India 2: 155. 1876; Duthie, Fl. Gangetic Plain 1: 273. 1903. *Hedysarum pictum* Jacq. Coll. Bot. 2:

262. 1789 & Ic. t. 567. 1792-94. *Doodia picta* (Jacq.) Roxb. Fl. Ind. 3: 368. 1832.

Erect, pubescent undershrubs. Leaflets 3-9, stipellate, linear-oblong to lanceolate, 4-12 x 1.5-2.5 cm, obtuse, white or dull pale spotted. Flowers red, closely fascicled on the peduncle of terminal densely hairy racemes. Pedicels curved upwards. Anthers uniform. Joints of pods transverse to their axis, seed-like, lead-coloured.

Fl. & Fr.: September-November.

Common in forests in shady habitats; Hura Bowji forests.

29. Vicia L.

Vicia hirsuta (L.) S.F. Gray, Nat. Arr. Brit. Pl. 2: 614. 1821; Baker in Hook. f. Fl. Brit. India 2: 177. 1876; Duthie Fl. Gangetic Plain 1: 258. 1903. *Eryum hirsutum* L. Sp. Pl. 738. 1753.

Climbing, annual herbs, with 4-angular to-winged stem. Leaves 1-pinnate; rachis ending into a 2-fid tendril; leaflets 4 to 8 pairs, linear-oblong, 8-25 x 1-5 mm, emarginate or truncate at the apex, apiculate. Flowers pale-blue, 3-5 mm long, axillary, solitary or 1-4 congested on 1-4 cm long peduncles. Corolla slightly exceeding the calyx. Styles bearded below stigma. Pods elliptic-oblong, flat, 0.8-1.0 cm long, hirsute, 2-seeded.

Fl. & Fr. : January-March.

Native of Europe, W. Africa and Continental Asia; common weed in cultivated fields and gardens; Telera.

30. VIGNA Savi

1a. Leaflets entire.	<i>V. radiata</i> 2
1b. Leaflets lobed :	
2a. Stipules broadly ovate, ciliolate, obtuse, 8 to 15-nerved, glabrous.	<i>V. trilobata</i> 3
2b. Stipules falcate-lanceolate or linear, acuminate, ciliate, pubescent, 3 to 7-nerved.	<i>V. aconitifolia</i> 1

1. *Vigna aconitifolia* (Jacq.) Marechal in Bull. Jard. Bot. Nat. Belg. 39: 160. 1969. *Phaseolus aconitifolius* Jacq. Obs. 3: 2. t. 52. 1766; Baker in Hook. f. Fl. Brit. India 2: 202. 1876; Duthie, Fl. Gangetic Plain 1: 225. 1903. 'Mot' (Hindi).

Annual, hairy herbs. Leaflets 3, 3 or more-lobed. Flowers yellow, in axillary racemes. Pods straight, 2-4 cm long, pubescent or glabrous. Seeds oblong, truncate at both ends, finely pubescent, without caruncle.

Fl. & Fr. : August-October.

Common in wastelands among grasses; Lasara.

2. *V. radiata* (L.) R. Wilczek in Fl. Congo Belge 6 : 386. 1954; Verdc. in Kew Bull. 24: 558. 1970. *Phaseolus radiatus* L. Sp. Pl. 725. 1753; Duthie, Fl. Gangetic Plain 1: 225. 1903. *P. aureus* Roxb. Fl. Ind. 3: 297. 1832. *P. mungo* L. var. *radiatus* (L.) Baker in Hook. f. Fl. Brit. India 2: 203. 1876. 'Mung' (Hindi).

Trailing, annual, hispid herbs. Leaflets 3, ovate. Stipules produced below their insertion. Flowers yellow, in axillary, subcapitate racemes. Keel spirally twisted upwards. Pods 4-7 cm long, turgid, hairy. Seeds oblong, rounded at one end and truncate on the other, green.

Fl. & Fr. : September-November.

Naturalized in wastelands and open forests among grasses; also cultivated for edible seeds during rainy season; Lasara, Bagaycha forest; Banswara (*Kanodia* 75147, BSI).

3. *V. trilobata* (L.) Verdc. in Taxon 17: 172. 1968. *Dolichos trilobatus* L. Mant. 1: 101. 1767. *Phaseolus tritobatus* (L.) Schreb. in Nova Acta Acad. Caes. Leop. Carol. Germ. Nat. Curios. 4: 132. 1770. *P. trilobus* auct. plur. non (L.) Ait. 1789; Wight, Icon. 1: t. 94. 1838; Baker in Hook. f. Fl. Brit. India 2: 201. 1876; Duthie, Fl. Gangetic Plain 1: 224. 1903. 'Mungi' (Hindi).

Prostrate or twining herbs. Leaflets 3, ovate, oblong or rhomboid, 3-lobed. Stipules produced below their insertion. Flowers yellow, in subcapitate, few-flowered racemes. Pods cylindric, subcompressed, 3-6 cm long, sparsely hispid, 6 to 12-seeded. Seeds oblong, rounded at both ends, green or brown with black spots, carunculate.

Fl. & Fr. : August-October.

Common in wastelands and forests among grasses; Chandan Singh ki Bassi, Lalpura forest, Bhimgarh (*Kanodia* 75383, BSI).

31. ZORNIA J.F. Gmel.

Zornia gibbosa Span. in Linnaea 15: 192. 1841; Mohlenbrock in Webbia 16(1): 112. t. 44, 76. 1961; Mahesh. Illus. Fl. Delhi f. 64. 1966. *Z. graminea* Span. in Linnaea 15: 192. 1841. *Z. diphylla* auct. plur. non Pers. 1807; Baker in Hook. f. Fl. Brit. India 2: 147. 1876, *pro parte*; Duthie, Fl. Gangetic Plain 1: 268. 1903.

Annual herbs. Stipules produced below their insertion. Petioles shorter than leaflets. Leaflets 2, linear-lanceolate, gland-dotted, acute. Bracts like stipules, punctate. Flowers yellow, in lax spikes. Lomenta with 4-6 joints; prickles scabrid.

Fl. & Fr. : August-October.

Common in forests in wet and shady habitats; Bagaycha forest, Ghatol (*Kanodia* 75111, BSI).

Arachis hypogaea L.—Annual herbs, with pinnate leaves, yellow

flowers and underground, 1 to 5-seeded pods. Native of Brazil; cultivated during rainy season on commercial scale for edible oily seeds. 'Mumphali' (Hindi).

Cajanus cajan (L.) Millsp. (*Cytisus cajan* L., *Cajanus indicus* Spreng.)—Shrubs, with 3-foliate leaves, yellow flowers and 2.5—7.5 cm long pods often blotched with reddish-purple. Native of Africa; cultivated during rainy season for edible seeds. 'Arhar, Toor' (Hindi).

Cicer arietinum L.—Much branched herbs, with pinnate leaves and turgid, 1 to 2-seeded pods. Native of Mediterranean region ; commonly cultivated for edible seeds. 'Chana' (Hindi).

Crotalaria juncea L.—Shrubs, with elliptic-lanceolate leaves, yellow flowers and turgid, oblong fruits. Cultivated during rainy season as a green manure crop and for fibres obtained from the stem. 'Sanai' (Hindi).

Cyamopsis tetragonoloba (L.) Taub. (*Psoralea tetragonoloba* L., *Cyamopsis psoraloides* DC.)—Herbs, with hollow stem, simple leaves, yellow flowers and linear, flat pods. Commonly cultivated during rainy season for its edible pods and as a fodder crop. 'Guar' (Hindi).

Derris indica (Lam.) Bennett (*Galedupa indica* Lam., *Pongamia pinnata* (L.) Pierre)—Evergreen trees, with 3-9, elliptic leaflets, pinkish-white flowers, monadelphous stamens and woody, obliquely oblong, 1-seeded pods. Often planted along the roads. 'Papra' (Hindi).

Lablab purpureus (L.) Sweet (*Dolichos purpureus* L., *D. lablab* L., *Lablab niger* Medic.)—Twining herbs, with 3-foliate leaves, white or purple flowers and flat, many-seeded pods. Cultivated for edible pods; often found as an escape near habitations. 'Sem' (Hindi).

Medicago sativa L.—Herbs, with 3-foliate leaves, purple-violet flowers in close racemes and pods with 2-3 spirals. Native of W. Temperate Asia; commonly cultivated as a fodder crop during winter and summer season. 'Rizka' (Hindi).

Pisum sativum L.—Tendril bearing herbs, with pinnate leaves and globose, turgid, not mottled seeds. Native of Western Asia; cultivated during winter season for edible seeds. 'Matar' (Hindi).

Trifolium alexandrinum L.—Fast growing herbs, with 3-foliate leaves and white flowers in condense, head-like spikes. Native of Egypt and Syria; occasionally cultivated as a fodder crop during winter season. 'Barseem' (Hindi).

Trigonella foenum-graecum L.—Herbs, with 3-foliate leaves, pale-yellow flowers and straight, turgid, beaked fruits. Native of South Europe; commonly cultivated as a vegetable and fodder crop during winter season. 'Methi' (Hindi).

36. CAESALPINIACEAE

- 1a. Leaves simple, deeply 2-lobed from the apex. *Bauhinia* 1
 1b. Leaves 1-pinnate :
 2a. Petals 3, outer 2 reduced to scales. Fertile stamens 3,
 1-adelphous. *Tamarindus* 3
 2b. Petals 5. Fertile stamens 5, 7 or 10, free. *Cassia* 2

1. BAUHINIA L.

Bauhinia racemosa Lam. Encycl. Meth. Bot. 1: 390. 1785; Bedd. Fl. Sylv. 2: 182. pl. 182. 1869; Baker in Hook. f. Fl. Brit. India 2: 276. 1878; Duthie, Fl. Gangetic Plain 1: 298. 1903; de Wit in Reinwardtia 3(4): 537. 1956; Ali in Portug. Acta Biologica 8(8) : 242. 1967. 'Jhiza, Seta' (Hindi).

Trees, 4-6 m high. Leaves broader than long, 2.5—8.0 cm in diameter. Flowers dull yellow, in terminal and leaf-opposed racemes. Calyx spathaceous, shortly toothed. Stamens 10, hairy at the base. Pods stalked, shortly falcate, 10-18 x 1.5—2.5 cm, black when ripe. Seeds oblong, brown or black.

Fl. : March-May ; *Fr.* : June-October.

Common in forests, particularly on the hill-slopes; Loharia forest, Jolana (*Kanodia* 10, BSI).

2. CASSIA L.

- 1a. Foliar glands present on the rachis or between the pairs of leaflets or on the petiole :
 2a. Leaflets 2 pairs only. *C. absus* 1
 2b. Leaflets more than 2 pairs :
 3a. Stamens 5; staminodes absent. *C. pumila* 6
 3b. Stamens 6; staminodes 3 :
 4a. Glands ovoid, sessile, borne at the base of petiole. *C. occidentalis* 5
 4b. Glands slender, between the pairs of leaflets, borne on the rachis :
 5a. Glands between all pairs of leaflets. *C. auriculata* 2
 5b. Glands between lowest 1 or 2 pairs of leaflets only :
 6a. All anthers rounded at the tip. Seed-areole more or less as wide as seed. *C. tora* 7
 6b. Four anthers rounded and three necked at the tip. Seed-areole slit-like, narrow. *C. obtusifolia* 4
 1b. Foliar glands absent. *C. fistula* 3

1. **Cassia absus** L. Sp. Pl. 376. 1753; Baker in Hook. f. Fl. Brit. India 2: 265. 1878; Duthie, Fl. Gangetic Plain 1: 294. 1903; de Wit in Webbia 11: 279. 1955; Ali & Quraishi in Sind Univ. Sci. Res. Journ. 3 : 8. 1967; Singh in Bull. Bot. Surv. Ind. 18 : 91. 1979. *Senna absus* (L.) Roxb. Fl. Ind. 2: 340. 1832.

Annual herbs, clothed with glandular-based viscous hairs. Rachis grooved. Leaflets obliquely elliptic to obovate, 2-5 x 1-3 cm. Glands linear, between both pairs of leaflets. Flowers yellow or red, in terminal or leaf-opposed, few-flowered racemes. Bracts broadly ovate, acute or acuminate. Bracteoles linear. Stamens 5 or 7. Pods 3.0—5.5 x 0.7—0.8 cm, hairy, flat. Seeds 4-8, compressed, broadly ovoid; areole absent; testa pitted.

Fl. & Fr.: August-October.

Common in forests; Bhapur forest, Baghdani (*Kanodia* 75656, BSI).

2. *C. auriculata* L. Sp. Pl. 379. 1753; Baker in Hook. f. Fl. Brit. India 2 : 263. 1878; Duthie, Fl. Gangetic Plain 1: 294. 1903; de Wit in Webbia 11 : 234. 1955; Ali & Quraishi in Sind Univ. Sci. Res. Journ. 3: 11. 1967; Singh in Bull. Bot. Surv. Ind. 18: 92. 1979. *Senna auriculata* (L.) Roxb. Fl. Ind. 2: 349. 1832. 'Anwal' (Hindi).

Much branched shrubs. Leaflets 7-10 pairs, ovate or oblong, 2.0—2.5 x 0.8—1.5 cm. Glands linear, needle-like. Base of stipules produced into filiform appendages. Flowers yellow, in corymbose racemes. Bracts ovate, apiculate, with a pair of linear glands in their axils. Stamens 7. Seeds ovate-oblong, 5-7 x 4-5 mm, wrinkled; areole 3 x 1 mm, transversely veined; cotyledons deeply wrinkled.

Fl. & Fr. : August-December.

Common in wastelands, often forming open community of its own; Banswara, Ghatol (*Majumdar* 10238, BSA), Singhpura (*Kanodia* 29218, BSI).

3. *C. fistula* L. Sp. Pl. 377. 1753; Baker in Hook. f. Fl. Brit. India 2 : 261. 1878; Duthie, Fl. Gangetic Plain 1: 291. 1903; de Wit in Webbia 11: 207. 1955; Ali & Quraishi in Sind Univ. Sci. Res. Journ. 3 : 5. 1967; Singh in Bull. Bot. Surv. Ind. 18 : 97. 1979. *C. fistula* L. var. *obovata* DC. Prodr. 2 : 490. 1825. *C. rhombifolia* Roxb. Fl. Ind. 2 : 335. 1832. 'Amaltas, Karmala' (Hindi).

Medium-sized, deciduous trees. Leaflets ovate to elliptic, 4-8 pairs. Flowers yellow, in long, pendulous racemes. Pedicels jointed just beneath the calyx. Stamens 10, unequal-sized. Pods cylindric, more than 30 cm long, with entire, transverse septa within, black when ripe. Seeds obovate, 6-8 x 4-6 mm; areole absent.

Fl. : February-June; *Fr. :* Most part of the year.

Apparently indigenous in the forests; also planted in gardens and along the roads for beautiful flowers; Pipalkhund, Kotharia forest, Lalpura forest, Banswara (*Kanodia* 75234, BSI).

4. *C. obtusifolia* L. Sp. Pl. 377. 1753; Duthie, Fl. Gangetic Plain 1 : 293. 1903; de Wit in Webbia 11 : 259. 1955; Ali & Quraishi in Sind Univ. Sci. Res. Journ. 3 : 7. 1967; Singh in Bull. Bot. Surv. Ind. 18 : 94. 1979. *C. tora* sensu Baker in Hook. f. Fl. Brit. India 2 : 263. 1878, non L. 1753. *C. tora* L. var. *obtusifolia* (L.) Haines, Bot. Bih. Orissa 304. 1922.

Annual herbs, upto 1 m high. Glands cylindrical, between 1 or 2 lowest pairs of leaflets. Sepals densely hirsute on both sides. Petals hairy on the veins. Seeds somewhat rhomboid, 5.0-6.5 x 2.5-3.0 mm; areole not more than 1 mm wide, never extending upto hilum; testa slightly muricate, not distinctly veined.

Fl. & Fr. : August-November.

Rare, in wastelands. Resembles closely to *C. tora* L.; Banswara (*Kanodia* 75117, BSI).

5. *C. occidentalis* L. Sp. Pl. 377. 1753; Baker in Hook. f. Fl. Brit. India 2 : 262. 1878; Duthie, Fl. Gangetic Plain 1 : 292. 1903; de Wit in Webbia 11 : 256. 1955; Ali & Quraishi in Sind Univ. Sci. Res. Journ. 3 : 7. 1967; Singh in Bull. Bot. Surv. Ind 18 : 89. 1979. 'Talka, Chakundra' (Hindi).

Undershrubs, 60 cm-2 m high. Leaflets 3-6 pairs, ovate, acuminate. Four or five smaller anthers straight, with small basal appendages. Stigmas plumose on one lateral side. Seeds obovoid-ovoid, 3-5 x 2-4 mm, laterally compressed; areole 2.5 x 1.5 mm, transversely veined.

Fl. & Fr. : August-November.

Common in wastelands; Ghatol, Banswara (*Kanodia* 51144, BSI).

Notes : The flower colour is yellow and not pale-lilac as mentioned by Baker (*l. c.*). The plants are very foetid, often strongly tinged with purple, varying in number and size of leaflets and in pubescence.

6. *C. pumila* Lam. Encycl. Meth. Bot. 1 : 651. 1785; Baker in Hook. f. Fl. Brit. India 2 : 266. 1878; Duthie, Fl. Gangetic Plain 1 : 295. 1903; de Wit in Webbia 11 : 288. 1955; Ali & Quraishi in Sind Univ. Sci. Res. Journ. 3 : 9. 1967; Singh in Bull. Bot. Surv. Ind. 18 : 87. 1979. *C. prostrata* Roxb. Hort. Beng. 32. 1814, *nom. nud.*, non Humb. & Bonpl. ex Willd. 1809. *Senna prostrata* Roxb. Fl. Ind. 2 : 353. 1832. 'Karelia' (Hindi).

Erect or prostrate herbs, upto 50 cm long. Leaves upto 10 cm long. Leaflets upto 30 pairs, upto 18 x 3.5 mm in size. Petiolar glands stalked, persistent; often rachis also bears similar, but deciduous glands in between the leaflets. Anthers unequal. Pods upto 4.5 cm long, straight or slightly curved.

Fl. & Fr. : August-October.

Common in wastelands and forests. The plants growing in shady habitats are usually erect, more robust and bear distinct rachis-glands; Puna Pathar forest, Hura Bowji for st, Anand Sagar (*Kanodia* 75265, BSI).

7. *C. tora* L. Sp. Pl. 376. 1753; Baker in Hook. f. Fl. Brit. India 2 : 263. 1878, *pro parte*; de Wit in Webbia 11 : 276. 1955; Ali & Quraishi in Sind Univ. Sci. Res. Journ. 3 : 8. 1967; Singh in Bull. Bot. Surv. Ind. 18 : 94. 1979. *Senna tora* (L.) Roxb. Fl. Ind. 2 : 340. 1832. 'Puadia' (Hindi).

Erect, annual herbs. Foliar glands linear, cylindrical. Leaflets 3 pairs, obovate, obtuse or mucronate. Flowers white or yellow, axillary. Bracts fugaceous. All the anthers rounded at the apex. Seeds rhomboid, 3-5 x 3 mm; testa distinctly veined, not muricated; areole 1.5-2.0 mm wide, about as wide

as seed, always extending upto hilum.

Fl. & Fr. : August-November.

Common in wastelands and forests, often forming dense community. Resembles closely to *C. obtusifolia* L.; Ghatol, Degia Bowji, Puna Pathar forest, Shergarh, Banswara (*Kanodia* 51101, BSI).

3. TAMARINDUS L.

Tamarindus indica L. Sp. Pl. 34. 1753; Bedd. Fl. Sylv. 2 : 184. pl. 184. 1872; Baker in Hook. f. Fl. Brit. India 2 : 273. 1878; Duthie, Fl. Gangetic Plain 1 : 301. 1903. 'Imli, Katara' (Hindi).

Large, evergreen trees. Leaflets 10-18 pairs, oblong, 1-2 x 0.3-0.6 cm, obtuse, oblique-based. Flowers yellowish-pink, in loose racemes at the end of branches. Pods falcate, scurfy, 6-18 x 1.2-2.5 cm, subcompressed. Seeds many, obovate-oblong, with a shallow, oblong pit on the flat faces.

Fl. : May-June ; *Fr.* : July-December.

Common in wastelands; planted in gardens and along the roads; Shergarh.

Cassia siamea Lam. (*C. sumatrana* Roxb.)-Medium-sized trees, with 4-16 pairs of leaflets, yellow flowers in panicles and linear, flat pods. Native of south-east Tropical Asia; planted in gardens and along the roads.

Delonix elata (L.) Gamble (*Poinciana elata* L.)-Small-sized trees, with bipinnate leaves and yellow-flowers with exserted filaments which are villous and thickened at the base. Commonly planted on the boundaries of fields and gardens,

D. regia (Boj. ex Hook.) Raf. (*Poinciana regia* Boj. ex Hook.)-Medium-sized trees, with bipinnate leaves, red-flowers and 30-40 cm long, woody pods. Native of Madagascar; planted in gardens, parks and along the roads for beautiful foliage and showy flowers. 'Gulmohor' (Hindi).

37. MIMOSACEAE

1a. Anthers gland-tipped :

- 2a. Flowers similar in colour and sex in a spike. Pods thick, straight or slightly falcate, septate between the seeds. *Prosopis* 6
- 2b. Flowers dissimilar in colour and sex in a spike. Pods thin, almost flat, finally twisted, aseptate. *Dichrostachys* 3

1b. Anthers not gland-tipped :

- 3a. Stamens 4-10. *Mimosa* 4
- 3b. Stamens more than 10 :
 - 4a. Stamens free. *Acacia* 1
 - 4b. Stamens 1-adelphous :
 - 5a. Plants armed with stipular thorns or spines. Pinnae and/or leaflets in one pair only. Pods circinate or twisted. *Pithecellobium* 5
 - 5b. Plant's unarmed. Pinnae or leaflets in more than one pair. Pods flat, straight. *Albizia* 2

1. ACACIA MILL.

1a. Flowers in elongate spikes.	<i>A. chundra</i> 1
1b. Flowers in globose heads :	
2a. Heads borne on axillary peduncles :	
3a. Pods moniliform.	<i>A. nilotica</i> subsp. <i>indica</i> 5
3b. Pods not moniliform :	
4a. Pods flat, legulate.	<i>A. jacquemontii</i> 3
4b. Pods turgid, cylindric-oblong.	<i>A. farnesiana</i> 2
2b. Heads in terminal panicles :	
5a. Stem armed with stipular spines, without prickles.	<i>A. leucophloea</i> 4
5b. Stem armed with prickles, without stipular spines.	<i>A. pennata</i> var. <i>arrophala</i> 6

1. *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. *Acacia sundra* DC. Prodr. 2 : 458. 1825; Baker in Hook. f. Fl. Brit. India 2 : 295. 1878. *A. catechu* (L. f.) Willd. var. *sundra* (DC.) Prain in Journ. As. Soc. Beng. 66 : 508. 1898; Duthie, Fl. Gangetic Plain 1 : 316. 1903. 'Kattha' (Hindi).

Medium-sized, totally glabrous trees, with rough bark. Spines upto 5 mm long. Pinnae 10-20 pairs. Rachis with small glands between the upper pinnae. Petiolar gland at the base of first pinnae. Leaflets 20-40 pairs, ligulate. Spikes white-flowered, drooping. Calyx, corolla and leaves glabrous. Pods strap-shaped, straight, upto 6 x 1 cm, subacute at both ends.

Fl. & Fr. : July-October.

Common in forests. Very close to *A. catechu* (L. f.) Willd., but it is totally glabrous; Loharia forest, Ghatol (*Kanodia* 75498, 75286, BSI).

2. *A. farnesiana* (L.) Willd. Sp. Pl. 4 : 1083. 1806; Bedd. Fl. Sylv. I : 52. Pl. 52. 1870; Baker in Hook. f. Fl. Brit. India 2 : 292. 1878; Duthie, Fl. Gangetic Plain 1 : 313. 1903. *Mimosa farnesiana* L. Sp. Pl. 521. 1753. 'Babool' (Hindi).

Small trees or large shrubs, Pinnae 4-8 pairs, 2-3 cm long; leaflets 12-20 pairs, linear-oblong. Spines stipular. Rachis eglandular. Petiolar gland near the middle. Heads yellow, fragrant, solitary or fascicled. Pods hard, 3.6-8.0 x 1.2 cm, with pulpy mesocarp. Seeds broadly oblong or suborbicular, biseriate.

Fl. & Fr. : August-March.

Occasional, along the roads and on the edges of fields and gardens; Danpur.

3. *A. jacquemontii* Benth. in Hook. Lond. Journ. Bot. 1 : 499. 1842; Baker in Hook. f. Fl. Brit. India 2 : 293. 1878; Duthie, Fl. Gangetic Plain 1 : 314. 1903. 'Boli, Bhubavali' (Hindi).

Glabrous shrubs. Stipular thorns 2-5 cm long. Pinnae 2-4 pairs. Leaflets

5-10 pairs, oblong. Heads yellow, pedunculate, solitary or 2 to 3-together. Pods 3-8 x 1.0-1.5 cm, reticulately or transversely veined, stalked; sutures straight. Seeds 5-6, olive-green.

Fl. & Fr. : February-May.

Occasional, in wastelands, particularly along the rivers; Pipalkhund.

4. *A. leucophloea* (Roxb.) Willd. Sp. Pl. 4 : 1083. 1806; Baker in Hook. f. Fl. Brit. India 2 : 294. 1878; Duthie, Fl. Gangetic Plain 1 : 315. 1903; Mahesh. Illus. Fl. Delhi f. 80. 1966. *Mimosa leucophloea* Roxb. Pl. Cor. 2 : 27. t. 150. 1800. 'Jhira, Safed Khejri' (Hindi).

Trees, 6-10 m high, usually with insect galls on the trunk. Pinnae 6-10 pairs, 2.5-4.5 cm long, with concave glands in between. Leaflets 15-25 pairs, linear-oblong. Stipular spines erect, upto 3.5 cm long. Petiolar gland near the middle. Heads yellow, in tomentose panicles. Pedicels with a whorl of 4, deciduous bracts towards the base. Pods sessile, flat, 6-10 x 0.5-0.8 cm, shortly falcate, pubescent.

Fl. & Fr. : September-March.

Common in wastelands, along the roads and on the fringes of forests; Barora, Banswara (*Kanodia* 75549, BSI).

5. *A. nilotica* (L.) Del. subsp. *indica* (Benth.) Brenan in Kew Bull. 12 : 84. 1957. *A. arabica* (Lam.) Willd. var. *indica* Benth. in Hook. Lond. Journ. Bot. 1 : 500. 1842; Bedd. Fl. Sylv. 1 : 47, pl. 47. 1870; Baker in Hook. f. Fl. Brit. India 2 : 293. 1878; Duthie, Fl. Gangetic Plain 1 : 314. 1903, under *A. arabica* *auct. plur.* non (Lam.) Willd. 1808. 'Babool' (Hindi).

Trees, 4-10 m high, with blackish bark. Pinnae 4-9 pairs, 2.0-3.5 cm long. Leaflets 15-25 pairs, linear-oblong, 5 x 2 mm. Stipular thorns straight, 1.5-5.0 cm long. Petiolar gland near the first pinnae. Flowers yellow. Pods 8-15 cm long, stalked, grey-downy. Seeds 8-10, in one row, suborbicular, 7-9 x 6-7 mm, compressed; areole 6.7 x 4-5 mm.

Fl. : June-October; *Fr.* : November-February.

Common in wastelands, open forests and along the roads; Savania, Kushalgarh, Banswara (*Kanodia* 51123, BSI).

6. *A. pennata* (L.) Willd. var. *arrophula* (D. Don) Baker in Hook. f. Fl. Brit. India 2 : 298. 1878; Duthie, Fl. Gangetic Plain 1 : 319. 1903. *A. arrophula* D. Don, Prodr. Fl. Nep. 247. 1825.

Prickly, glabrescent, small trees, 5-6 m high. Leaves about 70 cm long. Rachis glabrous, prickly beneath, with glands between upper pinnae; pinnae 12-15 pairs, 6 cm long; leaflets 50-60 pairs. Petiolar gland above the middle. Heads pale, 1-2 cm in diam., in 10-25 cm long panicles. Corolla longer than calyx. Pods strap-shaped, thin, dry, 10-20 x 2-4 cm, distinctly stalked. Seeds oblong.

Fl. & Fr. : May-October.

Rare, on the boundaries of fields and often in wastelands. Pods resemble those of *Albizia odoratissima* (L. f.) Benth.; Along Ghatol-Banswara road

(Kanodia 75422, BSI).

2. ALBIZIA Durazz.

- | | |
|--|--------------------------|
| 1a. Flowers stalked. Pods pale straw-coloured. | <i>A. lebbeck</i> 1 |
| 1b. Flowers sessile. Pods reddish or brown : | |
| 2a. Leaflets ovate-oblong, with a midrib near the lower edge.
Calyx-teeth distinct. | <i>A. procera</i> 3 |
| 2b. Leaflets obliquely oblong, with a midrib near the upper edge.
Calyx-teeth absolute. | <i>A. odoratissima</i> 2 |

1. **Albizia lebbeck** (L.) Benth. in Hook. Lond. Journ. Bot. 3 : 87. 1844; Bedd. Fl. Sylv. 1 : 53. Pl. 53. 1870; Baker in Hook. f. Fl. Brit. India 2 : 298. 1878; Duthie, Fl. Gangetic Plain 1 : 320. 1903. *Mimosa lebbeck* L. Sp. Pl. 161. 1753. *Acacia lebbeck* (L.) Willd. Sp. Pl. 4 : 1066. 1806. 'Siris, Charas' (Hindi).

Large trees. Pinnae 2-4 pairs, 10-20 cm long. Leaflets oblique-oblong, 2-5 x 0.8-2.7 cm, 5-10 pairs. Flowers dull yellow, pedicellate, in umbellate heads. Pods linear-oblong, flat, 20-30 x 2.5-5.5 cm, reticulately veined above the seeds. Seeds 4-14, ovoid-oblong, compressed, foveolate on both the faces.

Fl. & Fr. : April-September.

Common in forests and wastelands; also planted as an avenue tree; Deoda, Banswara, Ghatol.

2. **A. odoratissima** (L. f.) Benth. in Hook. Lond. Journ. Bot. 3 : 88. 1844; Bedd. Fl. Sylv. 1 : 54. pl. 54. 1870; Baker in Hook. f. Fl. Brit. India 2 : 299. 1878; Duthie, Fl. Gangetic Plain 1 : 321. 1903. *Mimosa odoratissima* L. f. Suppl. 437. 1781. *Acacia odoratissima* (L. f.) Willd. Sp. Pl. 4 : 1063. 1806. 'Kali Siris, Kali Charas' (Hindi).

Trees, with dark-coloured young branches. Main rachis 10-20 cm long. Pinnae 2-4 pairs, 5-10 cm long. Leaflets 6-18 pairs, obtuse. Flowers white or yellow, in 10 to 12-flowered heads; heads in terminal panicles. Pods linear-oblong, flat, 10-25 x 1.5-3.0 cm, 5 to 12-seeded, brown.

Fl. & Fr. : April-November.

Common in forests; Bagaycha forest,

3. **A. procera** (Roxb.) Benth. in Hook. Lond. Journ. Bot. 3 : 89. 1844; Brandis, Illus. For. Fl. North-West & C. India pl. 26. 1874; Baker in Hook. f. Fl. Brit. India 2 : 299. 1878; Duthie, Fl. Gangetic Plain 1 : 321. 1903. *Mimosa procera* Roxb. Pl. Cor. 2 : 12. t. 121. 1799. 'Safed Siris, Safed Charas, Gurar' (Hindi).

Trees, with grey-white bark. Pinnae 2-6 pairs, 10-15 cm long. Leaflets 6-16 pairs, obliquely ovate-oblong, 3-7 x 1.5-4 cm. Flowers pale-white, sessile, in corymbose panicles. Pods linear-oblong, 10-20 x 2.0-2.5 cm, 5 to 10-seeded, brown.

Fl. & Fr. : April-October.

Sparsely distributed in the forests; often planted as an avenue tree; Bagaycha forest.

3. DICHROSTACHYS (DC.) Wt. & Arn. *nom. cons.*

Dichrostachys cinerea (L.) Wt. & Arn. Prodr. Fl. Pen. Ind. Or. 271. 1834; Wight, Icon. 2 (1) : 4. t. 357. 1840; Baker in Hook. f. Fl. Brit. India 2 : 288. 1878; Duthie, Fl. Gangetic Plain 1 : 310. 1903. *Mimosa cinerea* L. Sp. Pl. 517, 520. 1753. 'Goya-khair, Kolai' (Hindi).

Polygamous shrubs or small trees; branches ending into thorns. Pinnae 8-14 pairs, with stalked glands in between. Leaflets 12-20 pairs, linear-oblong, oblique-based. Spikes axillary and extra-axillary. Neuter flowers loosely arranged in lower part of spike. Stamens 10. Pods flat, 4-7 cm long, glabrous, 6 to 10-seed ed.

Fl. & Fr. : August-October.

Common in open forests and on the hill-slopes; Rowal Hindvela forests, Wadita Hillage forests, Banswara (*Kanodia* 51104, BSI).

4. MIMOSA L.

- 1a. Leaf-rachis 1.2-5.5 cm long. Pods pubescent, with prickly sutures. *M. hamata* 1
- 1b. Leaf-rachis 10-23 cm long. Pods glabrous, with smooth sutures. *M. himalayana* 2

1. **Mimosa hamata** Willd. Sp. Pl. 4 : 1033. 1806; Baker in Hook. f. Fl. Brit. India 2 : 291. 1878; Duthie, Fl. Gangetic Plain 1 : 312. 1903; Mahesh. Illus. Fl. Delhi f. 79. 1966. 'Bander-ki-Rakhi, Lipti'. (Hindi).

Prickly shrubs, 1-2 m high. Pinnae 3-6 pairs, 1.0-2.5 cm long; leaflets 6-12 pairs, sessile, oblong. Flowers pink or red, in globose heads. Peduncles longer than leaves, axillary, passing upwards into racemes. Pods glabrous or velvety, falcate and twisted, 4-8 x 1.0-1.5 cm, prickly on the sutures, 3 to 8-segmented, indented on the sutures. Seeds brown.

Fl. & Fr. : August-October.

Common in wastelands, open forests and on the hill-slopes; Ghatol, Banswara (*Kanodia* 75370, BSI).

2. **M. himalayana** Gamble in Kew Bull. 1920 : 4. 1920. *M. rubicaulis sensu* Baker in Hook. f. Fl. Brit. India 2 : 291. 1878, *pro parte*, non Lam. 1783; Duthie, Fl. Gangetic Plain 1 : 311. 1903.

Large, straggling, prickly shrubs, with closely ribbed branches. Leaves 2-pinnate; pinnae 5-12 pairs; leaflets 6-20 pairs, oblong, 2.5-8 mm long, unequal-sided, obtuse, mucronate. Flowers pink, in globose, pedunculate heads; peduncles in axillary fascicles forming terminal panicles. Stamens 8. Pods falcate, 7-10 x 1.0-1.2 cm, glabrous, with 4-10, 1-seeded joints.

Fl. : July-September; *Fr.* : November-January.

Rare, in wastelands and open forests; Singhpura (*JAV.* 29222, BSI).

5. PITHECELLOBIUM Mart. *nom. cons.*

Pithecellobium dulce (Roxb.) Benth. in Hook. Lond. Journ. Bot. 3 : 199. 1844; Baker in Hook. f. Fl. Brit. India 2 : 302. 1878; Duthie, Fl. Gangetic Plain 1 : 322. 1903. *Mimosa dulcis* Roxb. Pl. Cor. 1 : 67. t. 99. 1798. *Inga dulcis* (Roxb.) Willd. Sp. Pl. 4 : 1005. 1806; Wight, Icon. 1 : t. 198. 1839. 'Jangli Jalebi' (Hindi).

Medium-sized trees. Leaflets 2, oblique-oblong, 2-4 x 1-2 cm, obtuse. Spines erect. Glands between the leaflets and at the junction of pinnae. Heads pale-green, in narrow, terminal panicles. Bracts spinulose, at the base of peduncles. Pods flat, circinate coiled, moniliform. Seeds embedded in white pulp.

Fl. & Fr. : March-August.

Native of Tropical America; common on the edges of gardens and orchards. The plants are very sensitive to frost; Banswara, Partapur (*Kanodia* 51192, BSI).

6. PROSOPIS L.

- 1a. Plants armed with conical prickles. Pods cylindric, upto 5 mm in diam., torulose. *P. cineraria* 1
- 1b. Plants armed with stipular thorns. Pods compressed, more than 5 mm wide, not torulose. *P. juliflora* 2

1. **Prosopis cineraria** (L.) Druce in Report. Bot. Exch. Club Brit. Isles 3 : 422. 1914. *Mimosa cineraria* L. Sp. Pl. ed. 2. 1500. 1763. *Prosopis spicigera* L. Mant. I : 68. 1767; Brandis, Illus. For. Fl. North West & C. India 169. pl. 25. 1874; Baker in Hook. f. Fl. Brit. India 2 : 288. 1878; Duthie, Fl. Gangetic Plain 1 : 309. 1903. 'Khejri' (Hindi).

Trees, 8-12 m high. Pinnac 1-2 pairs, 3-7 cm long. Rachis glabrous, often bears insect-galls. Leaflets upto 20 pairs, oblong, oblique-based. Flowers yellow, sessile, in axillary spikes, the latter passing into terminal panicles. Stamens 10. Pods linear, turgid, 5-10 cm long, narrowed at the ends. Seeds oblong, compressed, embedded in pulpy mesocarp.

Fl. & Fr. : February-June.

Common along the roads, in wastelands and on the fringes of forests. Often confused for *Acacia leucophloea* (Roxb.) Willd. in vegetative state; Ghatol.

2. **P. juliflora** (Sw.) DC. Prodr. 2 : 447. 1825; Duthie, Fl. Gangetic Plain 1 : 309. 1903; Mahesh. Illus. Fl. Delhi f. 78. 1966. *Mimosa juliflora* Sw. Prodr. Veg. Ind. Occ. 85. 1788. 'Vilayti Khejri' (Hindi).

Evergreen, large shrubs or small trees, with drooping and spreading branches. Pinnae 4-8 cm long. Leaflets many pairs, linear-oblong, 10-13 x 2-4 mm. Flowers yellow, subsessile, in axillary, drooping spikes or subspicate racemes. Pods shortly falcate, 15-20 x 1 cm, many-seeded. Seeds ovoid, compressed.

Fl. & Fr. : March-July.

Native of America; naturalized in wastelands and successfully planted in the water eroded areas; Kushalgarh, Talera, Garhi, Barodia.

38. ROSACEAE

POTENTILLA L.

Potentilla supina L. Sp. Pl. 497. 1753; Hook. f. Fl. Brit. India 2 : 359. 1878; Duthie, Fl. Gangetic Plain 1 : 327. 1903.

Prostrate or decumbent, annual-herbs. Leaves pinnately compound; leaflets 3-9, subsessile, obovate, cuneate, serrate-dentate, appressed hairy. Flowers yellow, solitary, axillary or terminal. Bracteoles ovate-oblong, pilose. Ovary superior, many-carpelled, apocarpus. Style lateral to sub-basal. Achenes ovoid, smooth, many on dry receptacle.

Fl. & Fr. : January-May.

Common in drying ponds and tanks, often forming a green carpet of its own; Raj-talab (*Kanodia* S1017, BSI).

39. COMBRETACEAE

1a. Trees. Petals absent. Stamens 10 :

- | | |
|---|---------------------|
| 2a. Flowers in globose heads. Fruits 2-winged. | <i>Anogeissus</i> 1 |
| 2b. Flowers in spikes. Fruits not winged, or 3 to 5-winged. | <i>Terminalia</i> 3 |
| 1b. Twining shrubs. Petals 4. Stamens 4 or 8. | <i>Combretum</i> 2 |

1. ANOGEISSUS (DC.) Guill. & Perr.

1a. Heads in cymes. Calyx-tube longer than fruit.

A. latifolius 1

1b. Heads on solitary peduncles. Calyx-tube shorter than fruit.

A. pendula 2

1. **Anogeissus latifolius** (Roxb. ex DC.) Wall. ex Guill. & Perr. Fl. Seneg. Tent. 1 : 280. 1832; Clarke in Hook. f. Fl. Brit. India 2 : 450. 1878, incl. vars. *glabra* & *villosa*; Duthie, Fl. Gangetic Plain 1 : 339. 1903. *Conocarpus latifolia* Roxb. ex DC. Prodr. 3 : 17. 1828. 'Kaldhao, Dhokra' (Hindi).

Deciduous trees, 5-8 m high. Leaves oblong or elliptic, 4-10 x 2-7 cm, glabrous. Flowers dull-yellow; peduncles axillary, branched, longer than petioles. Fruits several in a head, glabrous, beaked, longer than broad; wings entire-margined; beak as long or longer than its body.

Fl. & Fr. : October-June.

Common in forests; Puna Pathar forest, Anand Sagar (*Kanodia* 75298, BSI), Bhongra (*Kanodia* 75432, BSI).

2. *A. pendula* Edgew. in Journ. As. Soc. Beng. 21 : 171. 1853; Clarke in Hook. f. Fl. Brit. India 2 : 451. 1878; Duthie, Fl. Gangetic Plain 1 : 339. 1903; Mahesh. Illus. Fl. Delhi f. 84. 1966. 'Dhao, Kaldhai' (Hindi).

Trees, 3-5 m high, with pendulous branches. Leaves ovate-lanceolate, 3-5 x 1.5-2.5 cm, entire, glabrous or silky beneath. Flowers dull yellow. Peduncles solitary, unbranched, 1.5-2.5 cm long. Fruits suborbicular or subquadrate, glabrous, upper portion and beak hairy.

Fl. : April-May; *Fr.* : June-October.

Occasional, in deciduous forests. The plants are usually browsed by cattle on the open hillocks; near Anas River (*Kanodia* 75632, BSI).

2. COMBRETUM Loefling *nom. cons.*

Combretum ovalifolium Roxb. Fl. Ind. 2 : 256. 1832; Clarke in Hook. f. Fl. Brit. India 2 : 458. 1878; Raizada, Suppl. Duthie, Fl. Gangetic Plain 71. 1975.

Large, climbing shrubs. Leaves opposite, elliptic or ovate, often nearly orbicular, 5-10 cm long. Flowers 4-merous, in axillary, panicled spikes and often in terminal panicles. Calyx-limb deciduous, cup-shaped. Fruits golden yellow, 2.0-2.5 x 2.0-2.5 cm, winged, 4-seeded.

Fl. & Fr. : February-May.

Rare in forests, often planted in the gardens. The leaves turn red before falling; Banswara (*Verma* 222, BSA).

3. TERMINALIA L. *nom. cons.*

1a. Calyx glabrous. Fruits 5-winged or 5-angled :

2a. Glands borne on lower midrib of leaf. Veins on the wings of fruits straight, horizontal.

T. crenulata 3

2b. Glands borne at leaf-base on petiole. Veins on the wings of fruits upcurving.

T. arjuna 1

1b. Calyx pubescent outside, hairy within. Fruits neither angled nor winged.

T. bellirica 2

1. *Terminalia arjuna* (Roxb. ex DC.) Wt. & Arn. Prodr. 314. 1834; Bedd. Fl. Sylv. I : 28. pl. 28. 1869; Clarke in Hook. f. Fl. Brit. India 2 : 447. 1878; Parkinson in Ind. Fot. Rec. (n.s.) 1 (1) : 12. 1937. *Pentaptera arjuna* Roxb. ex DC. Prodr. 3 : 14. 1828, *cum descript. P. glabra* Roxb. Fl. Ind. 2 : 440. 1832. *Terminalia glabra* Roxb.) Wt. & Arn. Prodr. 314. 1834; Duthie, Fl. Gangetic Plain 1 : 336. 1903. 'Koara, Arjun' (Hindi).

Large trees, with greenish-white to black bark flaking off in flat pieces. Leaves elliptic-oblong, subopposite. Petioles with 1 or 2 glands at the top.

Flowers greenish-yellow, in axillary spikes and/or terminal panicles. Calyx-tube campanulate; teeth 3-angular. Drupes fibrous woody, ovoid or obovoid; veins of wings curving upwards.

Fl. : May-June; *Fr.* : July-November.

Common in forests. Leaves are usually infected by insects; Lalpura forest.

2. *T. bellirica* (Gaertn.) Roxb. Pl. Cor. 2 : 54. t. 198. 1805; Bedd. Fl. Sylv. 1 : 19. pl. 19. 1869; Clarke in Hook. f. Fl. Brit. India 2 : 445. 1878; Duthie, Fl. Gangetic Plain 1 : 335. 1903. *Myrobalanus bellirica* Gaertn. Fruct. 2 : 90. t. 97. 1790. 'Bahera' (Hindi).

Deciduous trees, upto 20 m high. Leaves elliptic-obovate, alternate, clustered at the end of branches. Flowers greenish-yellow, in axillary spikes with pedicellate male flowers in upper part and sub-sessile 2-sexual and female flowers in the lower region. Drupes ovoid or pyriform, tomentose, upto 3.0 x 2.5 cm.

Fl. : February-April; *Fr.* : June-October.

Common in forests and wastelands, often planted in gardens; Khora forest, Danpur.

3. *T. crenulata* Roth, Nov. Pl. Sp. 380. 1821. *T. tomentosa* Wt. & Arn. var. *crenulata* (Roth) Clarke in Hook. f. Fl. Brit. India 2 : 448. 1878.

Medium-sized trees. Leaves subopposite or alternate, elliptic-obovate, about 18 x 7 cm, entire or crenulate, with two stalked glands from lower midrib. Flowers pale yellow, in branched spikes. Calyx glabrous. Fruits 5-winged, about 3.0 x 3.5 cm, reddish.

Fl. & *Fr.* : April-August.

Frequent in dry deciduous forests; Lalpura forest, Anand Sagar (*Kanodia* 75247, BSI).

T. catappa L.—Deciduous trees, with obovate leaves at the end of branches, white flowers in spikes and broadly oval, keeled fruits. Cultivated in forest nurseries; Banswara (*Majumdar* 1969). 'Jangli Badam' (Hindi).

40. MYRTACEAE

Syzygium Gaertn. *nom. cons.*

Syzygium cumini (L.) Skeels in U.S. Dept. Agric. Bur. Pl. Industr. Bull. 248: 2. 1912. *Myrtus cumini* L. Sp. Pl. 471. 1753. *Eugenia jambolana* Lam. Encycl. 3 : 198. 1789; Brandis, Illus. For. Pl. North West & C. India 233. pl. 30. 1874; Duthie in Hook. f. Fl. Brit. India 2 : 499. 1879; Duthie, Fl. Gangetic Plain 1 : 342. 1903. *Syzygium jambolanum* (Lam.) DC. Prodr. 3 : 259. 1828. 'Jamun' (Hindi).

Trees, 1-15 m high. Petioles upto 3 cm long. Leaves lanceolate or elliptic-oblong, 8-15 x 2.3-5.5 cm. Flowers greenish-white, in axillary panicles.

Calyx-tube produced beyond ovary, broader than long. Corolla calyprate. Berries purple, globose or oblong, juicy, 1-seeded.

Fl. & Fr. : June-August; often February-April.

Common in wastelands, on the edges of gardens and fields; planted for its edible fruits; Kushalgarh.

Eucalyptus tereticornis Sm.—Trees, with ash-coloured bark, ovate to lanceolate, falcate leaves and long, conical operculum. Most successfully planted in the gardens, parks and along the roads. 'Elaychi' (Hindi).

Psidium guajava L.—Small trees, with ovate-oblong leaves, white flowers and globose to pyriform edible fruits. Cultivated in the orchards. 'Jamphal' (Hindi).

41. LYTHRACEAE

1a. Shrubs or trees. Stamens more than 6. Placentation axillary :

2a. Ovary 2-celled.

Woodfordia 4

2b. Ovary 3 to 6-celled.

Lagerstroemia 2

1b. Herbs. Stamens 1-6. Placentation free-central :

3a. Capsules septicidal, 2 to 5-valved, with finely cross-striate wall.

Rotala 3

3b. Capsules irregularly dehiscent or operculate, with smooth wall.

Ammannia 1

1. AMMANNIA L.

1a. Cymes sessile or subsessile. Petals absent. Styles absent or very minute.

A. baccifera 2

1b. Cymes distinctly pedunculate. Petals present. Styles distinct :

2a. Peduncles and pedicels filiform. Stamens as long as calyx.
Styles as long as ovary. Capsules upto 1.5 mm in diameter.

A. multiflora 3

2b. Peduncles and pedicels stout. Stamens much exserted from calyx. Style twice as long as ovary. Capsules 2.0-3.5 mm in diameter.

A. auriculata 1

I. **Ammannia auriculata** Willd. Enum. Pl. Hort. Berol. 1: 7. t. 7. 1803; Blatt. & Hall. in Journ. Bomb. nat. Hist. Soc. 26: 211. 1918; Nair in Bull. Bot. Surv. Ind. 10(2): 238. f. 1-17. 1969. *A. senegalensis* auct. non Lam. 1791. *sensu* Clarke in Hook. f. Fl. Brit. India 2: 570. 1879; Duthie, Fl. Gangetic Plain 1: 350. 1903.

Erect, annual herbs, upto 40 cm high, with 4-angled stem. Leaves elongate-oblong, 2-5 x 0.3-0.6 cm, auricled-based. Flowers pink, in axillary, pedunculate cymes shorter than leaves. Calyx campanulate, with 8 vertical lines. Petals spreading, suborbicular, caducous. Capsules subglobose, about 2 mm in diam. Seeds excavated on ventral side.

Fl. & Fr. : August-October.

Rare, in water logged soils, rice-fields etc. Very close to *A. multiflora* Roxb. which, however, bears smaller leaves and longer inflorescence; Lamero tank.

2. ***A. baccifera*** L. Sp. Pl. 120. 1753; Clarke in Hook. f. Fl. Brit. India 2: 569. 1879; Duthie, Fl. Gangetic Plain 1: 350. 1903; Blatter & Hallberg in Journ. Bomb. nat. Hist. Soc. 26: 215. 1918. *A. salicifolia* auct. non Monti 1767; *sensu* Clarke, l.c. 2: 569. 1879; Duthie, l.c. 1: 350. 1903. 'Do patti ki Kanduri' (Hindi).

Erect or decumbent, annual herbs. Leaves elliptic or lanceolate, 1-6 x 0.3-1.5 cm, with narrow base. Flowers red, in short, axillary cymes or clusters. Capsules globose, as long as calyx or slightly longer. Seeds excavated on plain faces, red.

Fl. & Fr.: August-February.

Fairly common in ponds, ditches, lakes, low-lands, rice-fields and other wet habitats; Lasara, Looda (*Majumdar* 10274, BSA), Ghatol (*Majumdar* 10237, BSA), Kushalgarh (*Kanodia* 75713, BSI).

3. ***A. multiflora*** Roxb. Fl. Ind. 1: 447. 1820; Clarke in Hook. f. Fl. Brit. India 2: 570. 1879; Duthie, Fl. Gangetic Plain 1: 351. 1903; Blatter & Hallberg in Journ. Bomb. nat. Hist. Soc. 26: 212. 1918; Roxb. Icon. no. 915. 1976.

Erect, annual herbs, upto 60 cm high. Leaves elliptic-oblong, 2-4 x 0.3-0.5 cm, auricled-based. Flowers red, in 2 to many-flowered, axillary, pedunculate, corymbose cymes. Calyx campanulate, with 8 vertical lines. Capsules globose, enclosed in the calyx-tube or slightly exserted.

Fl. & Fr.: October-February.

Common in low-lying areas, rice-fields and wet and shady localities in forests; Khora forest, Chandan Singh ki Bassi, Kushalgarh, (*Kanodia* 75675, BSI).

2. LAGERSTROEMIA L.

Lagerstroemia parviflora Roxb. Pl. Cor. 1: 47. t. 66. 1795; Wight, Icon. 1: t. 69. 1838; Clarke in Hook. f. Fl. Brit. India 2: 575. 1879; Duthie, Fl. Gangetic Plain 1: 353. 1903; Furtado & Srisuko in Gard. Bull. Sing. 24: 195. 1969. 'Kaliharia, Kakadiyo' (Hindi).

Deciduous trees, with grey bark. Leaves subsessile, elliptic or elliptic-oblong, 6-10 x 3-4 cm. Flowers white, in few-flowered panicles. Calyx not ribbed; tube with a ring of hairs inside; lobes appressed to the fruits. Petals less than 1 cm long. Capsules ellipsoid or obovoid, 2-3 x 1-2 cm, 4-valved. Seeds winged; wings much longer than seeds.

Fl. & Fr. : June-January.

Common in forests; Galdhari forest.

3. ROTALA L.

- 1a. Leaves opposite. Flowers in terminal spicate racemes. *R. serpyllifolia* 1
 1b. Leaves in whorls. Flowers in axillary whorls. *R. verticillaris* 2

1. ***Rotala serpyllifolia*** (Roth) Bremek. in Act. Bot. Neotl. 3: 149. 1954.
Mieranthus serpyllifolius Roth, Nov. Pl. Sp. 282. 1821. *Ameletia tenuis* Wight, Icon. 1; t. 257B. 1840. *Ammannia tenuis* (Wt.) Clarke in Hook. f. Fl. Brit. India 2: 567. 1879; Duthie, Fl. Gangetic Plain 1: 349. 1903. *Rotala tenuis* (Wt.) Koehne in Bot. Jahrb. 1: 177. 1880. 'Sadhan Phooli' (Hindi).

Annual herbs, 6-15 cm high, tinged with purple, often rooting on the lower nodes. Leaves opposite, obovate or broadly ovate, 2-4 mm in diameter. Flowers pink, subsessile, in 4-stichous, terminal, slender, bracteate spikes. Capsules ellipsoid, 2-valved. Seeds elliptic.

Fl. & Fr.: August-November.

Gregarious on the rocks in streams and rivers; Khora forest.

2. ***R. verticillaris*** L. Mant. Alt. 2: 175. 1771; Wight. Icon. 1: t. 260A. 1840. *Ammannia rotata* F. Muell. Fragm. 3: 108. 1862-63; Clarke in Hook. f. Fl. Brit. India 2: 567. 1879.

Annual herbs, upto 20 cm high. Leaves 3-5 in a whorl, linear. Flowers red, axillary, verticillate. Calyx tubular, exappendiculate; lobes 3, acuminate. Petals 3, small, red. Stamens 3, included. Capsules 3-valved.

Fl. & Fr. : January-March.

Rare, in semi-aquatic and marshy habitats; Bhongra (*Kanodia* 75451, BSI).

4. WOODFORDIA Salisb.

Woodfordia fruticosa (L.) Kurz in Journ. Asiatic Soc. Beng. 40: 56. 1871; Howard & Jayaweera in Baileya 10: 14. 1962. *Lythrum fruticosum* L. Syst. ed. 10. 1045. 1759. *Woodfordia floribunda* Salisb. Parad. Lond. t. 42. 1806; Clarke in Hook. f. Fl. Brit. India 2: 572. 1879; Duthie, Fl. Gangetic Plain 1: 351. 1903. 'Chaprandawi' (Hindi).

Shrubs, with bark peeling off in fibres. Leaves ovate-lanceolate, 5-8 x 2-3 cm, nigro-punctate beneath. Flowers red, 5 to 6-merous, in short, axillary cymes. Stamens 12, much exserted, reddish yellow. Capsules ovoid or ellipsoid, papery. Seeds obovoid, brown.

Fl. & Fr.: October-April.

Common in forests, wastelands and often on the walls of old buildings. Leaves turn bright red before falling; Anand Sagar forest, Naka (*Kanodia* 51032, BSI).

Lagerstroemia indica L.—Shrubs or small trees, bearing pink or white

flowers and 3 to 6-valved capsules. Native of China; cultivated in gardens and parks for ornamental purposes.

Lawsonia inermis L. (*L. alba* Lam.)-Shrubs, with branches ending into a spinous point, white flowers and globose capsules. Native of Arabia and Persia; cultivated in hedges of gardens and lawns. 'Mehndi' (Hindi).

42. ONAGRACEAE

LUDWIGIA L.

Ludwigia perennis L. Sp. Pl. 119. 1753; Raven in Reinwardtia 6: 367. 1963; Mahesh. Illus. Fl. Delhi f. 85. 1966; Sreem. in Bull. Bot. Surv. Ind. 8: 80. 1966. *L. parviflora* Roxb. Fl. Ind. 1: 440. 1820; Clarke in Hook. f. Fl. Brit. India 2: 588. 1879; Duthie, Fl. Gangetic Plain 1: 356. 1903. *Jussiaea perennis* (L.) Brenan in Kew Bull. 1953: 163. 1953. "Jalmagra" (Hindi).

Erect or decumbent, annual herbs, upto 40 cm high. Leaves elliptic-lanceolate. 3.0-7.5 x 0.8-1.3 cm. Flowers yellow, axillary, solitary or paired. Stamens as many as calyx-lobes. Capsules oblong, less than 2 cm long, 4-angled or ribbed, crowned with epigynous disk and 4-calyx lobes, seeded throughout. Seeds in many rows in each cell, brown, polished.

Fl. & Fr.: August-October.

Common on the banks of ponds, ditches and rivers, in rice fields and other similar habitats; Puna Pathar forest, Ghatoli (Kanodia 75509, BSI).

43. TRAPACEAE

TRAPA L.

Trapa natans L. var. **bispinosa** (Roxb.) Makino in Iinuma, Somoku-Dzusetsu ed. 3. 1: 137. 1907; Sant. & Wagh in Bull. Bot. Surv. Ind. 5: 109. 1963. *T. bispinosa* Roxb. Pl. Cor. t. 234. 1815; Clarke in Hook. f. Fl. Brit. India 2: 590. 1879, pro parte; Duthie, Fl. Gangetic Plain 1: 358. 1903. 'Singhara' (Hindi).

Floating, annual herbs. Floating leaves in rosette; lamina rhomboid, crenate-toothed on upper margins, 1.5-5.5 x 1.5-7.0 cm, glabrous above, hairy beneath; petiole inflated. Submerged leaves finely dissected in to root-like linear segments. Flowers white or purple, pedunculate, solitary, axillary. Stamens 4. Drupes top-shaped, 2-horned, 1-seeded.

Fl. :August-September; Fr.: September-December.

Occasional, in tanks in association with other aquatic weeds. The red-fruited and green-fruited forms are usually cultivated for their edible seeds;

Banswara, Chandan Singh-ki-Bassi, Lodha tank (*Kanodia* 75328, BSI).

44. CUCURBITACEAE

1a. Tendrils simple :	
2a. Flowers yellow :	
3a. Anther-cells arcuate. Fruits not more than 2 cm in diameter :	
4a. Style with an annular disk at the base.	<i>Mukia</i> 7
4b. Style without a disk at the base.	<i>Ctenolepis</i> 3
3b. Anther-cells triplicate ('S'-shaped). Fruits more than 2 cm in diameter :	
5a. Bracts not spathaceous. Calyx-tube without scales.	<i>Cucumis</i> 4
5b. Male peduncles with spathaceous bracts. Calyx-tube with 2-3 incurved scales near the attachment of stamens.	<i>Momordica</i> 6
2b. Flowers white.	<i>Coccinia</i> 2
1b. Tendrils branched :	
6a. Flowers white. Petals laciniate.	<i>Trichosanthes</i> 8
6b. Flowers yellow. Petals entire, not laciniate :	
7a. Anthers free, sigmoid. Fruits oblong, ultimately fibrous, operculate.	<i>Luffa</i> 5
7b. Anthers connate, conduplicate. Fruits globose, fleshy, not fibrous, indehiscent.	<i>Citrullus</i> 1

1. CITRULLUS Schrad. *nom. cons.*

Citrullus lanatus (Thunb.) Mats. & Nakai in Cat. Sem. et Sper. Hort. Bot. Univ. Imp. Tokyo 1916: 30. 1916; Chakravarty, Fl. India fasc. 11: 22. 1982. *Cucurbita citrullus* L. Sp. Pl. 1010. 1753. *Momordica lanata* Thunb. Prodr. Fl. Cap. 13. 1794. *Citrullus vulgaris* Schrad. apud. Eckl. & Zeyh. Enum. Pl. Afr. 279. 1936; Clarke in Hook. f. Fl. Brit. India 2: 621. 1879; Duthie, Fl. Gangetic Plain 1: 375. 1903. *Colocynthis citrullus* (L.) O. Ktze. Rev. Gen. Pl. 1: 256. 1891. 'Tarbu' (Hindi).

Creeping, annual, monoecious, hairy herbs, with pinnately lobed leaves. 2-fid tendrils and solitary, axillary flowers. Fruits globose, smooth, 20-40 cm in diam., fleshy with red pulp. Seeds black or white, oblong, emarginate, compressed.

Fl & Fr. : May-October.

Common in wastelands, particularly near habitations and on the fringes of forests. Cultivated for its edible fruits; Shergarh.

2. COCCINIA Wt. & Arn.

Coccinia grandis (L.) Voigt, Hort. Suburb. Calc. 59. 1845; Chakravarty, Fl. India fasc. 11: 24. f. 1-9. 1982. *Bryonia grandis* L. Mant. 1: 126. 1767. *Coccinia indica* Wt. & Arn. Prodr. 347. 1834; Duthie, Fl. Gangetic Plain 1:

376. 1903. *Cephalandra indica* (Wt. & Arn.) Naud. in Ann. Sc. Nat. Paris (ser. 5) 5: 16. 1867; Clarke in Hook. f. Fl. Brit. India 2: 621. 1879. 'Tanduri, 'Kali Tori' (Hindi).

Perennial, dioecious, climbing herbs. Leaves ovate-cordate, 4-10 cm in diam., 5-angled or lobed, 5-nerved, with circular glands between the nerves; lobes entire to pinnate-partite. Male flowers 2-4, at the apex of axillary peduncles; females axillary, solitary. Fruits ovoid or ellipsoid, 2.5-5.0 cm long, red when ripe. Seeds ovoid, compressed.

Fl. & Fr. : Most part of the year.

Common in wastelands, open forests, along the roads, among hedges of gardens and fields etc.; Banswara, Lodha (*Kanodia* 75320, BSI).

3. CTENOLEPIS Hook. f.

Ctenolepis garcini (Burm. f.) Naud. in Ann. Sci. Nat. 5. 6: 13. 1867; Cl. in Hook. f. Fl. Brit. India 2: 629. 1879. *Sicyos garcini* Burm. f. Fl. India 11. 1768. *Blastania garcini* (Burm. f.) Cong. in DC. Mon. Phan. 3: 629. 1881; Duthie, Fl. Gangetic Plain 1: 379. 1903; Chakravarty Fl. India fasc. 11: 13. 1982. 'Ankh-phorni' (Hindi).

Annual, monoecious climbers. Leaves orbicular in outline, 3 to 5-lobed, 2.0-3.5 cm in diam., scabrous. Males flowers 3-4 on each axillary peduncle; female ones solitary on short axillary pedicel in the same axils with males. Fruits fleshy, obreniform, about 1 cm in diam., white-dotted, red when ripe. Seeds concavo-convex or piano-convex, smooth, with thick and obtuse edges.

Fl. & Fr.: August-November.

Common on the boundaries of fields and gardens. Very close to *Dactyloandra welwitschii* Hook. f.; the latter, however, bears irregularly angled, oblong seeds; Bijlai hills (*Kanodia* 75681, BSI).

4. CUCUMIS L.

1a. Leaves deeply 3 to 7-lobed, scabrid. Male flowers solitary.

C. callosus 1

1b. Leaves 5-angled, softly hairy. Male flowers in clusters.

C. melo var. *cultus* 2

1. *Cucumis callosus* (Rottl.) Cong. in Engl. Pflanzennr. 88: 129. 1924; Chakravarty, Fl. India fasc. 11: 31. 1982. *Bryonia callosa* Rottl. Ges. Naturf. Freunde Berlin Neue Schriften 4: 210. 1803. *Cucumis trigonus* Roxb. Fl. Ind. 3: 722. 1824; Wight, Icon. 2(2): 6. t. 497. 1841; Clarke in Hook. f. Fl. Brit. India 2: 619. 1879; Duthie, Fl. Gangetic Plain 1: 373. 1903.

Perennial, prostrate, slender, monoecious herbs. Leaves triangular-ovate, deeply 3 to 7-lobed, about 9 x 8 cm, scabrid. Flowers yellow, solitary, small. Ovary villous. Berries ellipsoid-globose, obscurely 3-gonous, smooth, gla-

brous, about 4 x 2.2 cm, yellow with age, sometimes with green strips.

Fl. & Fr. : December-June.

Occassionally found in the wastelands, on the boundaries of fields, gardens and the fringes of forests; Bhapur (*Kanodia* 75220, BSI).

2. *C. melo* L. var. *cultus* Kurz in Journ. Asiat. Soc. Beng. 46 (2): 102. 1877; Chakrav. in Rec. Bot. Surv. Ind. 17(1): 103. 1959. *C. momordica* Roxb. Fl. Ind. 721. 1832. *C. melo*. L. var. *momordica* (Roxb.) Duthie & Fuller, Field & Gard. Crops 2: 50. t. 49. 1882-83; Duthie, Fl. Gangetic Plain 1: 372. 1903. 'Kachri, Kachra, Phut' (Hindi).

Creeping or climbing, hairy annual herbs, with broadly ovate, serrate-dentate leaves. Flowers yellow, clustered, axillary. Connectives produced. Fruits oblong, glabrous. Seeds compressed.

Fl. & Fr.: July-September.

Common in wastelands, particularly near habitations and on the fringes of forests. Cultivated with the crop of *Zea mays* L. for its edible fruits; Kushalgarh.

5. LUCCA Mill.

Luffa acutangula (L.) Roxb. Fl. Ind. 3: 714. 1832; Clarke in Hook. f. Fl. Brit. India 2: 615. 1879; Duthie, Fl. Gangetic Plain 1: 367. 1903; Chakravarty Fl. India fasc. 11: 67. 1982. *Cucumis acutangulus* L. Sp. Pl. 1011. 1753. 'Kali Tori, Karvi Tori' (Hindi).

var. acutangula

Climbing, monoecious herbs, with 5-angled branches, 3-fid tendrils, palmately 5 to 7-lobed or angled leaves and male flowers in axillary, 12 to 20-flowered racemes. Stamens 3. Female flowers axillary, solitary. Fruits clavate-ellipsoid, acutely 10-angled, 15-30 cm long. Seeds ovate-oblong, wingless, rugose, black.

Fl. & Fr. : July-October.

Common on the boundaries of fields and gardens and in forests, often on the hills. Cultivated for its edible fruits; Danpur, Anand Sagar (*Kanodia* 75272, BSI).

6. MOMORDICA L.

- | | |
|--|-----------------------|
| 1a. Plants monoecious. Fruits muricate, tubercled or smooth. Seeds with raised ridges. | <i>M. charantia</i> 1 |
| 1b. Plants dioecious. Fruits echinate. Seeds smooth. | <i>M. dioica</i> 2 |

1. **Momordica charantia** L. Sp. Pl. 1009. 1753; Wight. Icon. 2(2) : 7. t. 504. 1841; Clarke in Hook. f. Fl. Brit. India 2 : 616. 1879; Duthie, Fl. Gangetic Plain 1 : 369. 1903; Chakravarty, Fl. India. fasc. 11 : 89. 1982. 'Kerela' (Hindi).

Annual herbs. Leaves deeply 5 to 7-lobed. Male flowers solitary, with orbicular bract at or below the middle. Stigmas 3, each 2-fid in female flowers. Fruits fusiform, ribbed, bitter, greenish-yellow to orange. Seeds corrugate on the margins, sculptured on the faces, covered with reddish pulp when ripe.

Fl. & Fr. : July-October.

Naturalised in forests in wet and shady habitats; also cultivated for edible fruits; Rowal Hindvela forest, Garhi (*Kanodia* 75555, BSI).

2. *M. dioica* Roxb. ex Willd. Sp. Pl. 4 : 605. 1805; Wight, Icon. 2 (2) : 7. t. 505-506. 1841; Clarke in Hook. f. Fl. Brit. India 2 : 617. 1879, exclud. syns.; Duthie, Fl. Gangetic Plain 1 : 370. 1903; Chakravarty, Fl. India fasc. 11 : 94. 1982. 'Jangli-Karela' (Hindi).

Perennial climbers, with tuberous root-stocks. Leaves broadly ovate-cordate, 4-10 cm in diam., 3 to 5-angular or-lobed, entire or denticulate, mucronate. Male peduncles 1-flowered, 5-10 cm long, axillary, with orbicular or boat-shaped, spathaceous bracts at the top. Bracts on the female peduncles in the middle. Fruits ellipsoid, turgid, 3-5 x 2 cm, with red pulp. Seeds ellipsoid, compressed.

Fl. & Fr. : August-October.

Common in wastelands, open forests and on the boundaries of fields and gardens; Paloda, Anand Sagar (*Kanodia* 75268, BSI).

7. MUKIA Arn.

Mukia maderaspatana (L.) M. Roem. Syn. Pepon. 47. 1846. *Cucumis maderaspatanus* L. Sp. Pl. 1012. 1753. *Bryonia scabrella* L. f. Suppl. 424. 1781; Wight. Icon. 2 (2) : 7. t. 501. 1841. *Mukia scabrella* (L. f.) Arn. in Hook. Lond. Journ. Bot. 3 : 276. 1841; Clarke in Hook. f. Fl. Brit. India 2 : 623. 1879. *Melothria maderaspatana* (L.) Cong. in DC. Mon. Phan. 3 : 623. 1881; Duthie, Fl. Gangetic Plain 1 : 379. 1903; Chakravarty, Fl. India fasc. 11 : 83. 1982. 'Ankh Phor, Kamar Kakri' (Hindi).

Annual, monoecious climbers, with wiry branches clothed with white hairs. Leaves orbicular-ovate, 3 to 5-angled, 2-8 cm broad, denticulate. Flowers short-pedicelled, in axillary fascicles. Filaments pilose; connectives produced above the apex. Fruits globose, of the size of a pea, red when ripe. Seeds 1-4, ellipsoid, turgid, white, scabrous.

Fl. & Fr. : August-February.

Common in wastelands, on the fringes of forests and along the boundaries of fields and gardens; Paloda, Anand Sagar (*Kanodia* 75269, BSI).

8. TRICHOSANTHES L.

1a. Bracts of male flowers large, laciniate-incised. Calyx-lobes laciniate.

T. bracteata 1

- 1b. Bracts of male flowers usually absent, if present, then minute, linear-lanceolate, acute. Calyx-lobes acute, not laciniate. *T. cucumerina* Z

1. **Trichosanthes bracteata** (Lam.) Voigt, Hort. Sub. Calc. 58. 1845; Chakravarty, Fl. India fasc. 11 : 109. 1982. *Modecca bracteata* Lam. Encycl. 4 : 210. 1797. *Trichosanthes palmata* Roxb. Fl. Ind. 3 : 704. 1832; Clarke in Hook. f. Fl. Brit. India 2 : 606. 1879; Duthie, Fl. Gangetic Plain 1 : 363. 1903. 'Bari Ankhphor' (Hindi).

Annual, dioecious climbers, with 2 to 3-fid tendrils. Leaves orbicular-cordate, 5-12 cm broad, 3 to 7-lobed, glandular beneath, scabrid with white tubercles above. Male racemes 4 to 6-flowered; bracts obovate, 1-2 cm long, many-nerved, glandular. Female flowers solitary, axillary, ebracteate. Fruits globose, 6-8 cm in diameter. Seeds obovate, upto 1.0 x 0.6 cm, turgid.

Fl. & Fr. : June-October.

Common in forests at the foot of hills; Loharia forest, Kalinjra (*Kanodia* 75651, BSI).

2. **T. cucumerina** L. Sp. Pl. 1008. 1753; Clarke in Hook. f. Fl. Brit. India 2 : 609. 1879; Duthie, Fl. Gangetic Plain 1 : 364. 1903; Mahesh. Illus. Fl. Delhi f. 88. 1966; Chakravarty, Fl. India fasc. 11 : 112. 1982. 'Lambi Ankhphor' (Hindi).

Climbing, annual, dioecious herbs. Leaves ovate to suborbicular, 5-angled to lobed, 8-15 cm wide, denticulate, cordate at the base. Male flowers in axillary, 5-20 cm long, 8 to 15-flowered racemes; females axillary, solitary. Fruits ovoid-fusiform, 5-10 x 3-4 cm, yellow when ripe. Seeds elliptic, compressed.

Fl. & Fr. : August-October.

Common in wastelands, open forests and on the boundaries of fields and gardens; Ghatol, Bhapur (*Kanodia* 75220, BSI), Anand Sagar (*Kanodia* 75297, BSI).

Citrullus fistulosus Stocks-Prostrate annuals. Fruits subglobose, 3-10 cm in diameter, cooked as vegetable. Cultivated throughout the area. 'Tindsi' (Hindi).

Cucumis melo L.—Fruits globose, with sweet pulp. Cultivated for its edible fruits. 'Kharbuja' (Hindi).

C. sativus L.—Annual climbers or creepers. Ripe fruits oblong, smooth or tubercled, 10-30 cm long. Cultivated for its edible fruits. 'Khira' (Hindi).

Cucurbita moschata Duch. ex Poir.—Climbing annuals. Fruits subglobose, large, fleshy, depressed at both the ends, turning to deep yellow at maturity. Cultivated for its edible fruits. 'Mitha-Kaddu, Sitaphal' (Hindi).

Lagenaria siceraria (Molina) Standl. (*Cucurbita siceraria* Molina, *Lagenaria vulgaris* Ser.)—Monoecious climbers. Flowers white, axillary, solitary. Fruits bottle-shaped, cooked as vegetable. Cultivated. 'Tumri, Lauki' (Hindi).

Luffa cylindrica (L.) Roem. (*Momordica cylindrica* L., *Luffa aegyptiaca*

Mill.)—Fruits oblong, smooth, not ridged, cooked as vegetable. Cultivated. 'Tori' (Hindi).

45. CACTACEAE

OPUNTIA Mill.

Opuntia elatior Mill. Gard. Dict. ed. 8. no. 4. 1768; Burkill in Rec. Bot. Surv. Ind. 4(6) : 313. 1911; Raizada, Suppl. Duthie, Fl. Gangetic Plain 83. 1976. *O. dillenii* auct. plur. non (Ker-Gawl.) Haw. 1819; Clarke in Hook. f. Fl. Brit. India 2 : 657. 1879; Duthie, Fl. Gangetic Plain 1 : 384. 1903. 'Nagphani' (Hindi).

Succulent shrubs, 1-2 m high; stem-joints 10-30 cm long, broadly obovate, undulate. Aerioles bearing 3-8, 2-5 cm long, stout sharp, yellowish-brown spines. Glochidia yellowish, upto 1 cm long. Flowers yellow tinged with orange, 4-6 cm in diameter. Filaments pink or red; anthers apiculate. Berries pear-shaped, purple, marked with aerioles, but bristles and spines deciduous.

Fl. & Fr. : March-September.

Native of south America; naturalized in wastelands and forests, often form dense thickets. Planted on the edges of gardens and fields, Ghatol.

46. AIZOACEAE (FICOIDACEAE)

TRIANTHEMA L.

Trianthema portulacastrum L. Sp. Pl. 223. 1753; Mahesh. Illus. Fl. Delhi f. 93. 1966. *T. monogyna* L. Mant. 1 : 69. 1767; Clarke in Hook. f. Fl. Brit. India 2 : 660. 1879; Duthie, Fl. Gangetic Plain 1 : 385. 1903. 'Bawra, Patharchatta' (Hindi).

Succulent, prostrate herbs. Leaves obovate or suborbicular, 1-4 cm in diameter, unequal-sized in each pair, not distinctly papillate. Flowers solitary, sessile, almost concealed by the pouch of the petiole. Perianth-tube adnate to the petiole. Stamens 10 or more. Style one. Capsules membranous, circumscissile; lid truncate, with 2 spreading teeth. Seeds reniform, black, mucilculate.

Fl. & Fr. : July-November.

Common in wastelands, particularly in humus rich soils; Banswara.

47. MOLLUGINACEAE

1a. Flowers in axillary fascicles.

Glinus 1

1b. Flowers in axillary, leaf opposed or terminal cymes.

Mollugo 2

1. GLINUS L.

- 1a. Stellate hairy herbs. Tepals hairy. Ovary 5-celled; stigmas 5. *G. lotoides* 1
 1b. Glabrous herbs. Tepals glabrous. Ovary 3-celled; stigmas 3. *G. oppositifolius* 2

1. **Glinus lotoides** L. Sp. Pl. 463. 1753; Mahesh, Illus. Fl. Delhi f. 90. 1966. *Mollugo hirta* Thunb. Prodr. Fl. Cap. 24. 1794; Clarke in Hook. f. Fl. Brit. India 2 : 662. 1879; Duthie, Fl. Gangetic Plain 1 : 386. 1903. *M. hirta* Thunb. var. *lotoides* (L.) Clarke, l.c. 2 : 662. 1879. *M. lotoides* (L.) Kuntze, Rev. Gen. Pl. 264. 1891. 'Bakda' (Hindi).

Creeping, tomentose herbs. Leaves opposite or falsely whorled at the end of branches, obovate to suborbicular, 0.7-2.0 cm in diam., unequal. Flowers greenish, 3 to 8-together. Stamens 10, intermixed with linear staminodes. Capsules oblong, 5-valved, shorter than sepals. Seeds tuberculate, strophiolate.

Fl. & Fr. : March-July.

Common in drying ponds along the roads and in wastelands; Ghatol, Banswara (*Verma* 229, BSA).

2. **G. oppositifolius** (L.) A. DC. in Bull. Herb. Boissier ser. 2, 1 : 559. 1901. *Mollugo oppositifolia* L. Sp. Pl. 89. 1753; Duthie, Fl. Gangetic Plain 1 : 387. 1903. *M. sperrula* L. Syst. ed. 10. 881. 1759; Clarke in Hook. f. Fl. Brit. India 2 : 662. 1879.

Decumbent herbs, with many dichotomously branched stems and long internodes. Leaves in whorls of 4-5, oblanceolate or linear-lanceolate, petioled. Flowers white, in axillary fascicles of 2 or more. Stamens 5 or 3. Capsules ellipsoid, shorter than tepals. Seeds subreniform, tuberculate, appendaged with a small white scale at the hilum.

Fl. & Fr. : September-October.

Rare, on the dry banks of tanks; Nathela tank (*Kanodia* 75347, BSI).

2. MOLLUGO L.

Mollugo pentaphylla L. Sp. Pl. 89. 1753; Duthie, Fl. Gangetic Plain 1 : 387. 1903. *M. stricta* L. Sp. Pl. ed. 2. 131. 1762; Clarke in Hook. f. Fl. Brit. India 2 : 663. 1879. *M. pentaphylla* L. var. *stricta* (L.) Hochr. in Candollea 2 : 356. 1925.

Annual herbs, 10-20 cm high. Leaves obovate or lanceolate, 1-4 x 0.2-1.0 cm, in rosette at the base, in whorls of 5 each in middle region and opposite upwards. Flowers white or pale, in lax dichotomous cymes. Stamens 3. Styles 3. Capsules thin-walled, globose. Seeds 8-15, orbicular-reniform, granulate, strophiolate.

Fl. & Fr. : August-October.

Common in wet and shady localities from plains to the hills; Wadita Hillage forest, Jua Fall.

48. APIACEAE (UMBELLIFERAE nom. alt.)

- 1a. Fruits dorsally compressed. Marginal ribs of mericarps winged. *Anethum* 1
 1b. Fruits laterally compressed. Marginal ribs of mericarps not winged. *Bunium* 2

1. ANETHUM L.

Anethum graveolens L. Sp. Pl. 263. 1753; Buw. in Blumea 2(3) : 202. 1936. *A. sowa* Roxb. ex Flem. in As. Res. 11 : 156. 1810; Wight, Icon. 2(3) : 5. t. 572. 1842. *Peucedanum graveolens* (L.) Benth. & Hook. Gen. Pl. 1 : 913. 1867; Clarke in Hook. f. Fl. Brit. India 2 : 709. 1879; Duthie, Fl. Gangetic Plain 1 : 396. 1903. 'Sowa' (Hindi).

Erect, annual herbs. Lower leaves petioled, 3 to 4-pinnate; upper leaves 2-pinnate, ultimate segments filiform. Flowers yellow, in terminal or leaf-opposed umbels. Involucre and involucels absent. Ovary and fruit glabrous. Mericarps with 2-winged marginal ribs, 3-5 mm long.

Fl. & Fr. : January-March.

Native of Eurasia; frequent weed in cultivated fields; Garhi, Talera.

2. BUNIUM Koch

Bunium macra Boiss. Elench. 44. Voy. Espaque 2 : 239. t. 66. 1839. *Carum bulbocastanum* auct. non Koch 1825; *sensu* Clarke in Hook. f. Fl. Brit. India 2 : 681. 1879.

Tuberous-rooted, annual herbs, 15-80 cm high. Leaves 2 to 3-pinnate, finely dissected, ultimate segments linear. Umbels compound; rays 6-16, 2.5-4.0 cm long; pedicels 10-15. Flowers pale-yellow or white. Fruits oblong, not narrowed upwards, semiterete; ridges thin, distinct; vittae solitary, large.

Fl. & Fr. : December-April.

Rare, a ruderal along cultivated fields in dry habitats; Bhimsor (*Majumdar* 10283, BSA).

Coriandrum sativum L.—Aromatic herbs, with pinkish-white flowers and subglobose fruits. Cultivated during winter season as a Kitchen garden crop. 'Dhania' (Hindi).

Daucus carota L.—Annual herbs, with fleshy conical roots and yellow flowers in terminal umbels. Cultivated for its edible roots during winter season. 'Gajar' (Hindi).

Foeniculum vulgare Mill.—Annual herbs, with 2 to 4-pinnate leaves, yellow flowers and ellipsoid fruits. Native of Mediterranean region; cultivated as a Kitchen garden crop. 'Saunf' (Hindi).

49. ALANGIACEAE

ALANGIUM Lam. *nom. cons.*

Alangium salvifolium (L.f.) Wang. in Engl. Pflanzenr. 4(220 b) : 9. 1910; Mukerj. in Bull. Bot. Surv. Ind. 10 : 330. 1969. *Grewia salvifolia* L.f. Suppl. 409. 1781. *Alangium decapetalum* Lam. Encycl. 1 : 174. 1783; Wight, Icon. 1 : t. 194. 1839. *A. lamarckii* Thw. Enum. Pl. Zey. 133. 1859; Clarke in Hook. f. Fl. Brit. India 2 : 741. 1879; Duthie, Fl. Gangetic Plain 1 : 402. 1903. *A. salvifolium* (L.f.) Wang. subsp. *decapetalum* (Lam.) Wang. in Engl. Pflanzenr. 4(220 b) : 11. 1910. 'Akol' (Hindi).

Deciduous trees, with cream-coloured bark. Leaves alternate, ovate-lanceolate or oblong-elliptic, 10-14 x 3-6 cm. Flowers white, in axillary fascicles. Stamens more than 8. Fruits ovoid to globose, crowned with calyx. Cotyledons crumpled.

Fl. & Fr. : February-June.

Rare, in open forests; Anand Sagar forest, Kilinjra (*Kanodia* 75659, BSI).

50. RUBIACEAE

- 1a. Flowers crowded in globose heads :
- 2a. Fruits not syncarpium, dehiscent. Calyx-tubes free :
 - 3a. Leaves cordate-based. Bracteoles linear. *Adina* 1
 - 3b. Leaves rounded or acute at the base. Bracteoles spatulate. *Mitragyna* 7
- 2b. Fruit syncarpium, indehiscent. Calyx-tubes nearly connate with each other. *Morinda* 8
- 1b. Flowers not crowded in heads :
- 4a. Trees :
 - 5a. Inflorescence a spicate cyme. Flowers 2-sexual. Seeds winged. *Hymenodictyon* 4
 - 5b. Inflorescence of solitary or fascicled flowers. Flowers 1-sexual. Seeds not winged. *Gardenia* 3
- 4b. Herbs :
 - 6a. Fruits 2-seeded :
 - 7a. Flowers axillary solitary or in axillary and/or terminal fascicles. Coccii dehiscent. *Borreria* 2
 - 7b. Flowers in axillary or terminal corymbose cymes. Coccii indehiscent. *Knoxia* 5
 - 6b. Fruits more than 2-seeded :
 - 8a. Seeds shell-shaped, with a large ventral cavity. *Neanotis* 9
 - 8b. Seeds angular, without a cavity :
 - 9a. Corolla divided half way or less. Stigma overtopped by anthers. *Kohautia* 6
 - 9b. Corolla divided more than half way down. Stigma not overtopped by anthers. *Oldenlandia* 10

1. ADINA Salisb.

Adina cordifolia (Willd. ex Roxb.) Hook. f. ex Brandis, For. Fl. 263. t. 33. 1874; Hook. f. Fl. Brit. India 3 : 24. 1880; Duthie, Fl. Gangetic Plain 1 : 407. 1905; Sant. & March. in Bull. Bot. Surv. India 3 : 107. 1962. *Nauclea cordifolia* Willd. ex Roxb. Pl. Cor. 1 : 40. t. 53. 1796. 'Haldū' (Hindi).

Large trees. Leaves opposite, crowded towards the end of branches, ovate to orbicular cordate, 6-18 x 5.5-15.0 cm. Stipules suborbicular, enclosing the terminal buds, caducous. Flowers yellow; heads 2-3 cm in diam.; peduncles axillary, 1 to 3 together, with 2 bracts above the middle. Stigma clavate. Capsules cuneate, downy, of two cocci, many seeded. Seeds winged.

Fl. : August-September; Fr. : October-March.

Common in forests. Often confused for *Anthocephalus chinensis* (Lam.) A. Rich. ex Walp.; Puna Pathar forest, Hura Bowji forest.

2. BORRERIA G. F. W. Meyer nom. cons.

- 1a. Erect herbs. Corolla-tube glabrous inside. Capsules septicidal. *B. pusilla* 2
- 1b. Procumbent herbs. Corolla-tube with a ring of hairs within at the base. Capsules septifragal. *B. articulata* 1

1. **Borreria articulata** (L. f.) F. N. Will. in Bull. Herb. Boiss. ser. 2. 5 : 956. 1905; Sant. & Merch. in Bull. Bot. Surv. India 3 : 107. 1962. *Spermacoce hispida* L. Sp. Pl. 102. 1753; Hook. f. Fl. Brit. India 3 : 200. 1880; Duthie, Fl. Gangetic Plain 1 : 429. 1905. *S. articulata* L. f. Suppl. 119. 1781. *Borreria hispida* (L.) Schum. in Pflanzenfam. 4(4) : 144. 1891, non Spruce ex K. Schum. 1888.

Annual herbs, with 4-angled, hispid or scabrid branches. Leaves opposite, sessile, elliptic-lanceolate, 2-4 x 0.8-1.5 cm, entire, subacute, Stipules hispid, connate with leaf-bases, forming a cup fimbriate on the margins. Flowers white, sessile, in axillary clusters. Calyx 4-lobed. Mericarps hispid. Seeds black, oblong or ellipsoid, with a ventral groove.

Fl. & Fr. : August-October.

Common in open moist grounds and grasslands; Pipalkhund, Banswara (*Kanodia* 75113, BSI).

2. **B. pusilla** (Wall.) DC. Prodr. 4 : 543. 1830. *Spermacoce stricta* L. f. Suppl. 120. 1781; Hook. f. Fl. Brit. India 3 : 200. 1880; Duthie, Fl. Gangetic Plain 1 : 429. 1905. *S. pusilla* Wall. in Roxb. Fl. Ind. 1 : 379. 1820. *S. brachystema* R. Br. ex Benth. Fl. Austral. 3 : 439. 1867. *Borreria stricta* (L. f.) K. Schum. in Engl. & Prantl, Pflanzenfam. 4(4) : 143. 1891, non Meyer, 1818. *B. brachystema* (R. Br. ex. Benth.) Valeton in Lorentz, Nova Guinea 8 : 516. 1911. 'Ganthiya' (Hindi).

Annual herbs, with 4-angled, hispid stem. Leaves opposite or verticillate, linear-lanceolate, 2.5-4.0 x 0.5-1.0 cm, revolute-margined, acute. Stipules

connate with leaf-bases, forming a truncate fimbriate tube. Flowers white, in axillary and terminal, head-like clusters. Calyx 4-lobed. Corolla campanulate-urceolate. Stamens and style exserted. Mericarps pubescent. Seeds with a ventral groove.

Fl. & Fr. : August-December.

Abundant in the forests; often found in wastelands; Rowal Hindvela forest, Anand Sagar (*Kanodia* 75254, BSI).

Notes: In most of the Indian floras this plant is known under *Spermacoce* L. Schumann (Pfam. 4(4) : 144, 1891) considered the latter an American genus and placed the Indian plant under *Borreria* Meyer. In *Borreria* Meyer both cocci of the fruits are dehiscent at the apex, while in *Spermacoce* L. one coccus is indehiscent and adhering to the axis. Further, Meyer's *B. stricta* (Prim. Fl. Esseg. 83, t. 1, f. 1-3, 1818) is not based on L. f. *Spermacoce stricta* (Suppl. 120, 1781). The former is a synonym of *B. verticillata* (L.) Meyer (1818) based on *Spermacoce verticillata* L. (1753).

3. GARDENIA J. Ellis *nom. cons.*

Gardenia turgida Roxb. Fl. Ind. 2: 557, 1824; Wight, Icon. 2 (3) : 6, t. 579, 1842; Hook. f. Fl. Brit. India 3 : 118, 1880; Duthie, Fl. Gangetic Plain 1:422, 1905.

Small, deciduous trees. Branches armed the straight thorns. Leaves elliptic to obovate, 2.5-10.0 x 3-5 cm, entire, glabrous. Flowers white, unisexual, males fascicled, females solitary. Anthers sessile, linear. Style included; stigma 2-lobed. Drupes globose, 3-8 cm in diameter. Seeds angular.

Fl. & Fr. : April-May.

Occasional in forests; Anand Sagar (*Vasavada* 29214, BSI).

4. HYMENODICTYON Wall. *nom. cons.*

Hymenodictyon excelsum (Roxb.) Wall. in Roxb. Fl. Ind. 2 : 149, 1824; Hook. f. Fl. Brit. India 3 : 35, 1880; Duthie, Fl. Gangetic Plain 1 : 409, 1905. *Cinchona excelsa* Roxb. Pl. Cor. 2 : 3, t. 106, 1798, 'Lunkhora' (Hindi).

Bark smooth. Leaves elliptic-oblong, 10-22 x 5.5-12.0 cm, abruptly acuminate. Flowers white or grey, cymed along the rachis of spiciform, axillary and terminal, pubescent racemes. Pedicels 1-2 mm long. Corolla lobes 5, valvate. Capsules ellipsoid, 2.0-2.5 cm long, 2-valved, brown when ripe. Seeds winged all round.

Fl. : August-September; *Fr.* : October-February.

Rare, in forests; Kotharia forest.

5. KNOXIA L.

Knoxia sumatrensis (Retz.) DC. Prodr. 4 : 569, 1830; Raizada in Ind.

For. 92(6) : 375. 1966. *Spermacoce sumatrensis* Retz. Obs. Bot. 4 : 23. 1786. *Knoxia corymbosa* auct. plur. non Willd. 1797; Hook. f. Fl. Brit. India 3 : 128. 1880; Duthie, Fl. Gangetic Plain 1 : 428. 1905.

Erect, annual herbs, upto 70 cm high, with 4-angled, pubescent stem. Petioles upto 1.5 cm long. Stipule-teeth 3-4, pubescent. Leaves elliptic-lanceolate to oblong, 2-12 x 0.8-4.0 cm, acute. Flowers violet, in axillary and terminal, corymbose cymes with cincinnoid branches. Calyx-lobes subequal. Style one. Capsules ellipsoid, didymous, 2-seeded.

Fl. & Fr. : August-October.

Common in wastelands among grasses; Danpur, Banswara-Ratlam Rd. (*Kanodia* 75361, BSI).

6. KOHAUTIA Cham. & Schlecht.

Kohautia aspera (Heyne ex Roth) Bremek. in Verh. Kon. Ned. Akad. Wet. Nat. 48(2) : 113. 1952; Sant. & Merch. in Bull. Bot. Surv. India 3 : 108. 1962. *Hedyotis aspera* Heyne ex Roth, Nov. Pl. Sp. 94. 1821. *Oldenlandia aspera* (Heyne ex Roth) DC. Prodr. 4 : 428. 1830; Hook. f. Fl. Brit. India 3 : 68. 1880; Duthie, Fl. Gangetic Plain 1 : 415. 1905.

Erect, annual herbs, 20-60 cm high. Leaves whorled, sessile, linear-lanceolate, 3.5-6.5 x 0.2-0.5 cm. Flowers pale-blue or pink, subsessile, 1-few fascicled in lax, terminal cymes. Anthers included. Capsules globose, didymous, loculicidal, white-dotted. Seeds smooth, angled.

Fl. & Fr. : July-October.

Occasional, in wastelands and fields; Banswara (*Kanodia* 75570, BSI).

7. MITRAGYNA Korth. *nom. cons.*

Mitragyna parvifolia (Roxb.) Korth. Obs. Nauci. Ind. 19. 1839; Duthie, Fl. Gangetic Plain 1 : 408. 1905; Mahesh. Illus. Fl. Delhi f. 97. 1966; Ridsdale in Blumea 24(1) : 63. 1978. *Nauclea parvifolia* Roxb. Pl. Cor. 1 : 40. t. 52. 1796. *Stephegyne parvifolia* Korth. in Verh. Nat. Ges. Bot. 161. 1840; Hook. f. Fl. Brit. India 3 : 25. 1880; 'Kalmi, Kalam, Kambri' (Hindi).

Trees, 10-15 m high. Leaves elliptic-oblong, panduriform or ovate to orbicular, 3.6-18.0 x 2.5-11.0 cm. Stipules broadly oblong, enclosing the terminal buds, caducous. Flowers yellow; heads solitary, pedunculate, about 2 cm in diameter. Calyx-limb truncate. Corolla-lobes valvate. Stigma mitriform. Capsules oblong-ellipsoid, 10-ribbed, separating into 2, many-seeded cocci. Seeds winged.

Fl. : August-September; *Fr.* : October-February.

Common in forests. Very close to *Adina cordifolia* (Willd. ex Roth) Hook. f. ex Brandis; Daga Bowji hill, Ghatol, Bhongra (*Kanodia* 75452,

BSI).

8. MORINDA L.

Morinda tomentosa Heyne ex Roth, Nov. Pl. Sp. 147. 1821; Sant. & Merch. in Bull. Bot. Surv. India 3 : 108. 1962. *M. coreia* Buch.-Ham. in Trans. Linn. Soc. 13 : 537. 1822, *pro parte*. *M. tinctoria* Roxb. Fl. Ind. 2 : 197. 1824, non Noronha 1790; Hook. f. Fl. Brit. India 3 : 156. 1880. *M. tinctoria* Roxb. var. *tomentosa* (Heyne ex Roth) Hook. f. l.c. 3 : 156. 1880; Duthie, Fl. Gangetic Plain 1 : 427. 1905. 'Aal, Kalmi' (Hindi).

Trees or shrubs, with pubescent or tomentose, 4-angled branchlets. Leaves ovate-elliptic, 8-20 x 5.5-12.0 cm, tomentose, acuminate. Stipules bifid at the apex. Flowers white, fused together into globose-oblong heads by their hypanthia. Fruits fleshy, globose-oblong, of 1-seeded pyrenes.

Fl. : August-September; *Fr.* : October-December.

Commonly planted along the roads and often found in forests; Shergarh forest, Bhapor (*Kanodia* 75215, BSI).

9. NEANOTIS W.H. Lewis

Neanotis lancifolia (Hook. f.) Lewis in Ann. Miss. Bot. Gard. 53 : 39. 1966. *Hedyotis lancifolia* Dalz. in Hook. Journ. Bot. 2 : 135. 1850, non Schum. 1827. *Anotis lancifolia* Hook. f. Fl. Brit. India 3 : 73. 1880.

Erect, diffusely branched herbs, 30-75 cm high. Leaves ovate or ovate-lanceolate, 5-8 x 1.8-2.5 cm, acuminate, pubescent above, hairy on the veins beneath. Stipules shortly bristly. Flowers purple, in terminal and subterminal, many-flowered corymbose cymes. Capsules compressed, much broader than long, 2-lobed at the apex, crowned by the large, distinct, recurved calyx-teeth, dehiscing across the top. Seeds 4-6, ellipsoid or suborbicular, deeply excavated on the face, pitted, black.

Fl & Fr. : August-November.

Rare, weed in fields and wastelands; Bhongra (*Kanodia* 75445, BSI).

10. OLDENLANDIA L. *emend.* Bremek.

1a. Leaves linear-lanceolate. Bases of calyx-teeth not touching the fruits.

O. corymbosa 1

1b. Leaves elliptic. Bases of calyx-teeth touching the fruits.

O. pumila 2

1. Oldenlandia corymbosa L. Sp. Pl. 119. 1753; Hook. f. Fl. Brit. India 3 : 64. 1880, *pro parte*; Duthie, Fl. Gangetic Plain 1 : 413. 1905, excl. syn. *Hedyotis burmanniana* Wall. ex Wt. & Arn.; Bremek. in Verh. Kon. Akad. Wet. Nat. 48(2) : 254. 1952; Lewis in Ann. Miss. Bot. Gard. 53 : 257. 1966; Mahesh. Illus. Fl. Delhi f. 96. 1966. *Hedyotis corymbosa* (L.) Lam.

Encycl. Meth. Bot. 1 : 272. 1791. 'Loung' (Hindi).

var. *corymbosa*

Minutely pubescent, much-branched herbs. Leaves sessile, 1.5-3.0 x 0.1-0.6 cm, often revolute-margined. Stipules scarious, not laciniate. Flowers white, on 1 to 8-fid, axillary, solitary or paired peduncles (corymbose cymes). Stamens and style included. Capsules globose, not projecting beyond the calyx. Seeds smooth, pale-brown.

Fl. & Fr. : September-November.

Common in forests, wastelands and cultivated fields, particularly in wet habitats. It is a highly polymorphic species; Puna Pathar forest, Singhpura (*Kanodia* 75240, BSI).

2. *O. pumila* (L.f.) DC. Prodr. 4 : 425. 1830; Bremek. in Verh. K. Nederl. Akad. Wet. Afd. Natuurk. 48(2) : 250. 1952; Verde. in Polhill, Fl. Trop. East Afr. (Rubiaceae) Part 1 : 307. f. 41/32. 1976. *Hedyotis pumila* L. f. Suppl. Pl. 119. 1781. *Oldenlandia crystallina* Roxb. Fl. Ind. 1 : 443. 1820; Hook. f. Fl. Brit. India 3 : 65. 1880.

Annual, much branched herbs, scabrid on the ribs of the stem. Leaves 5-16 x 1-6 mm, scabrid above and on the margins. Flowers white, isostylous, usually solitary or in axillary, 2-flowered cymes, rarely in terminal, pedunculate, 2 to 3-flowered cymes. Capsules oblong-ovoid, terete, longer than wide. Seeds brown, conic or ellipsoid, strongly reticulate.

Fl. & Fr. : July-October.

Rare, in wastelands, forests and cultivated fields; Banswara (*Majumdar et al.*, 1969), Ghatol (*Kanodia* 75174, BSI).

Gardenia resinifera Roth (*G. lucida* Roxb.)—Shrubs or small trees, with white or dull yellow, axillary, solitary flowers and elliptic berries with 2 placentae. Planted in the gardens for ornamental purposes.

51. ASTERACEAE (COMPOSITAE *nom. alt.*)

The outer florets of the genera *Gnaphalium*, *Sphaeranthus*, *Grangea* and *Cyathocline* possess filiform, tubular corolla.

1a. Invol.-bracts spinescent :

2a. Heads 1-flowered, crowded in dense globose balls.

Echinops 9

2b. Heads many-flowered, distinct.

Oligochaeta 17

1b. Invol.-bracts not spiny :

3a. Heads with either ligulate or tubular florets :

4a. Heads with ligulate florets only :

5a. Involucre campanulate. Latex milky. Achenes with a narrow base and truncate apex.

Sonchus 21

5b. Involucre cylindrical. Latex yellow. Achenes truncate at both ends.

Launaea 16

4b. Heads with tubular florets only :

6a. Pappus present :

- 7a. Heads with bisexual florets only :
- 8a. Pappus scaly :
 9a. Anthers tailed at the base. Pappus-scales 2. Heads compound. *Caesulia* 6
 9b. Anthers not tailed at the base. Pappus-scales 5. Heads simple. *Ageratum* 2
- 8b. Pappus hairy :
 10a. Single-flowered heads aggregate into a compound head. *Lagascea* 15
 10b. Heads simple, many-flowered :
 11a. Invol.-bracts foliaceous. *Centratherum* 7
 11b. Invol.-bracts not foliaceous :
 12a. Leaves radical and caudine. Invol.-bracts 1-seriate. *Emilia* 11
 12b. Leaves caudine only. Invol.-bracts 2 to 4-seriate. *Vernonia* 24
- 7b. Heads with female and bisexual florets :
 13a. Female and bisexual florets borne in separate heads on the same plant. *Xanthium* 25
 13b. Female and bisexual florets borne in the same head :
 14a. Style-arms of 2-sexual florets capitate or truncate. Heads in clusters or fascicles. Invol.-bracts scarious. *Gnaphalium* 13
 14b. Style-arms of 2-sexual florets filiform. Heads solitary or in panicles which are often spiciform. Invol.-bracts herbaceous. *Blumea* 5
- 6b. Pappus absent :
 15a. Stem-winged. *Sphaeranthus* 22
 15b. Stem not winged, often terete or striate :
 16a. Corolla yellow. Achenes glandular. *Grangea* 14
 16b. Corolla purplish or white. Achenes eglandular. *Cyathocline* 8
- 3b. Heads with ligulate and tubular florets together :
 17a. Achenes with pointed, horne-like 2 spines. *Acanthospermum* 1
 17b. Achenes not provided with spines :
 18a. Leaves simple, entire or serrate-dentate :
 19a. Receptacles paleaceous :
 20a. Pales embracing the florets or achenes :
 21a. Ray-florets 1-seriate :
 22a. Ray-florets 3, sterile. *Sclerocarpus* 20
 22b. Ray-florets 5, fertile. *Blainvillea* 4
 21b. Ray-florets 2 to many-seriate. *Eclipta* 10
 20b. Pales not embracing the florets or achenes. *Tridax* 23
 19b. Receptacles naked or pitted, not paleaceous :
 23a. Pappus 2-seriate, outer scaly and the inner hairy, in both types of florets. *Pulicaria* 19
 23b. Pappus 1-seriate, hairy, in tubular florets only. *Pentanema* 18
- 18b. Leaves pinnate or pinnatisect :
 24a. Leaves alternate. Achenes of 2-sexual florets laterally compressed and tipped with 2, smooth awns. *Glossocardia* 12
 24b. Leaves opposite. Achenes of 2-sexual florets 3 to 4-angled and tipped with 2-4, retrorsely barbellate awns. *Bidens* 3

1. ACANTHOSPERMUM Schrank.

Acanthospermum hispidum DC. Prodr. 5 : 552. 1836; Sant. in Journ. Bomb. nat. Hist. Soc. 45 : 445. 1945; Siuessy in Rodora 72 : 106. 1970; Raizada, Suppl. Duthie, Fl. Gangetic Plain 99. 1976. *A. australe* sensu Raizada and Sharma in Ind. For. 88(5) : 364. 1962, non Kuntze 1891.

Annual, dichotomously branched, hispid herbs. Leaves ovate or obovate-spathulate, 2-8 x 1-5 cm, serrulate-dentate, cuneate at the base. Heads yellow, on deflexed peduncles in the leaf-axils or forks of branches. Anthers obtuse. Achenes compressed, spinous, 2-awned at the apex. Pappus absent.

Fl. & Fr. : July-October.

Native of south America; naturalised in wastelands, cultivated fields and forests; often gregarious at some spots and spreading very rapidly; Loharia, Kotharia forest, Ghatol (*Majumdar* 10235, BSA), Anand Sagar (*Kanodia* 75288, BSI).

2. AGERATUM L.

Ageratum conyzoides L. Sp. Pl. 839. 1753; Clarke, Comp. Ind. 30. 1876; Hook. f. Fl. Brit. India 3 : 243. 1881; Duthie, Fl. Gangetic Plain 1 : 443. 1905. 'Bhakumbar' (Hindi).

Hairy, annual herbs. Leaves ovate-cordate, 4-9 x 2.5-7.0 cm, serrate. Heads blue, white or purple, in terminal corymbs. Invol-bracts 2 to 3-seriate, linear, acute-acuminate, ribbed outside, ciliolate. Corolla 1.5 mm long. Anthers appendiculate at the apex. Pappus scales serrate, awn-tipped. Achenes angled, black, 1.6-1.8 mm long.

Fl. & Fr. : All round the year.

Native of south America; common in wet habitats from plains to the hills; often gregarious in fruit orchards; Khora forest.

3. BIDENS L

Bidens biternata (Lour.) Merr. & Sherff ex Sherff in Bot. Gaz. 88 : 293. 1929. *Coreopsis biternata* Lour. Fl. Cochinch. 508. 1790. *Bidens pilosa* auct. plur. non L. 1753; Hook. f. Fl. Brit. India 3 : 309. 1881; Duthie, Fl. Gangetic Plain 1 : 472. 1905. *Bidens wallichii* DC. Prodr. 5 : 598. 1836. *B. pilosa* non L. var. *wallichii* (DC.) Clarke, Comp. Ind. 141. 1876; Hook. f. l.c. 3 : 309. 1881, pro syn. 'Ara ka Jhara' (Hindi).

Erect, annual herbs. Leaves 1-pinnate, with 2-3 sub-opposite pairs and one terminal, often 3-lobed leaflets; lower leaflets pinnately lobed. Heads yellow, 10 to 30-flowered, 2 x 1 cm, elongating in fruit, solitary, pedunculate. Ray-florets ligulate, neuter or female. Disk-florets tubular, bisexual. Outer

invol.-bracts linear, acute, ciliate. Pappus 2-4, rigid, retroresly hispid, awned. Achenes linear, glabrous, 0.5-x 2.0 cm long, black.

Fl. & Fr. : August-January.

Native of America; naturalised in forests on the hills; Dagua Bowji hill, Ghatol, Bhongra (*Kanodia* 75426, BSI).

4. BLAINVILLEA Cass.

Blainvillea acmella (L.) Philipson in Blumea 6 : 350. 1950. *Verbesina acmella* L. Sp. Pl. 901. 1753. *Eclipta latifolia* L. f. Suppl. 378. 1781. *Blainvillea rhomboidea* Cass. in Dict. Sc. Nat. 29 : 494. 1823; Duthie, Fl. Gangetic Plain 1 : 469. 1905. *B. latifolia* (L.f.) DC. in Wt. Contrib. Bot. Ind. 17. 1834; Hook. f. Fl. Brit. India 3 : 305. 1881, 'Kanghi' (Hindi).

Annual, hispid herbs, 30-60 cm high. Leaves ovate or ovate-lanceolate, 4-10 x 2-6 cm, serrate. Heads solitary, sessile or peduncled. Ray-florets female, 1-seriate. Disk-florets tubular, bisexual. Invol.-bracts foliaceous, strongly veined. Pappus-setae 2-5, plumose. Achenes 3-quetrous, obovoid-cuneate, tubercled, pubescent, those of disk florets slightly compressed and transversely rugose.

Fl. & Fr. : August-November.

Native of south America; naturalized in wastelands and forests; Pipalkhund.

5. BLUMEA DC. *nom. cons.*

- | | |
|---|-------------------------|
| 1a. Heads solitary, peduncled, at the end of branches. | <i>B. obliqua</i> 4 |
| 1b. Heads many, in cymes, panicles, corymbbs or clusters : | |
| 2a. Leaves spinous-toothed or serrate. Corolla of both types of florets hairy. | <i>B. eriantha</i> 1 |
| 2b. Leaves not spinous-toothed or serrate. Corolla of marginal florets (female), at least, glabrous : | |
| 3a. Leaves lobed. Corolla yellow. Achenes ribbed. | <i>B. membranacea</i> 2 |
| 3b. Leaves not lobed. Corolla purple or lilac. Achenes sub-angulate to terete. | <i>B. mollis</i> 3 |

1. *Blumea eriantha* DC. in Wight, Contrib. Bot. Ind. 15. 1834; Hook. f. Fl. Brit. India 3 : 266. 1881; Duthie, Fl. Gangetic Plain 1 : 452. 1905; Randeria in Blumea 10 (1) : 279. 1960.

Dichotomously branched, pubescent, perennial or annual herbs, upto 1m high and with fibrous roots. Leaves obovate, 2-18 x 0.6—6.0 cm, apiculate at the apex, spinulose-serrate on the margins; lower leaves petiolate, pubescent or glabrous; upper sessile and hairy. Heads yellow, in terminal panicles as well as in axillary clusters. Invol.—bracts linear, glandular-hairy, reflexed at maturity. Pappus white. Achenes obscurely angled.

Fl. & Fr. : November-April.

Common in moist and shady localities in forests; Loharia forests.

2. *B. membranacea* DC. Prodr. 5 : 440. 1836; Hook. f. Fl. Brit. India 3 : 265. 1881; Duthie, Fl. Gangetic Plain 1 : 455. 1905; Randeria in Blumea 10 (1) : 269. 1960. *Conyza membranacea* Wall. Cat. no. 129. 1831, *nom. nud.*

Tall, slender, pubescent herbs. Leaves ovate-lanceolate to obovate-lanceolate or lyrate-lobed, 4-15 x 2-6 cm, long-petioled, serrate-dentate. Heads yellow, 5-8 mm in diam., in terminal panicles. Invol-bracts tinged with purple, longer than florets, reflexed at maturity. Corolla of the disk florets hairy. Receptacles flat or convex, alveolate. Pappus white, upto 5 mm long. Achenes oblong, ribbed.

Fl. & Fr. : October-May.

Common on the walls of old buildings and hills in wet and shady habitats; Lalpura forest.

3. *B. mollis* (D. Don) Merr. Philipp. Journ. Sci. (Bot.) 5 : 395. 1910; Rand. in Blumea 10 (1) : 261. 1960. *Erigeron molle* D. Don, Prodr. Fl. Nep. 172. 1825. *Blumea wightiana* DC. in Wt. Contrib. Bot. Ind. 14. 1834; Hook. f. Fl. Brit. India 3 : 261. 1881; Duthie, Fl. Gangetic Plain 1 : 453. 1905. *B. neilgherrensis* Hook. f. t.c. 3:261. 1881.

Erect, aromatic, viscid herbs, upto 1 m high. Leaves ovate, lanceolate or obovate, 1.0 — 9.5 x 0.6 — 5.0 cm, upper ones gradually smaller, serrate. Heads 3-4 mm in diam., in compact, spiciform panicles. Involucel 1-5 mm long, reflexed. Receptacles flat, alveolate, glabrous. Pappus white, 2-4 mm long. Achenes brown, pubescent.

Fl. & Fr. : February-May.

Common in wastelands. Very close to *B. lacera* (Burm. f.) DC.; Parlaka-pul (*Majumdar* 10320, BSA), Jhola (*Kanodia* 51178, BSI).

4. *B. obliqua* (L.) Druce, Rep. Bot. Soc. Exch. Club Brit. Isles 4 : 609. 1917; Rand. in Blumea 10 (1) : 286. 1960. *Erigeron obliquus* L. Mant. Alt. 2 : 573. 1771. *Blumea amplexens* DC. in Wt. Contrib. Bot. Ind. 13. 1834; Hook. f. Fl. Brit. India 3 : 260. 1881; Duthie, Fl. Gangetic Plain 1 : 451. 1905.

Deep-rooted, hairy, decumbent herbs. Leaves elliptic, oblong or spatulate, dentate or entire, clasping stem. Heads yellow, 6-10 mm in diameter. Receptacles convex, alveolate, glabrous. Involucel 1-8 mm long, reflexed. Pappus pink, 3-4 mm long. Achenes dark brown, oblong, not ribbed, pubescent.

Fl. & Fr. : October-May.

Common weed in wastelands and often on the walls of old buildings; Lasara, Chirola, Ghatol.

6. CAESULIA Roxb.

Caesulia axillaris Roxb. Pl. Cor. 1 : 64. t. 93. 1798; Wight, Icon. 3(4) : 8.

t. 1102. 1846; Clarke, Comp. Ind. 116. 1876; Hook. f. Fl. Brit. India 3 : 291. 1881; Duthie, Fl. Gangetic Plain 1:462. 1905.

Erect or decumbent, annual, succulent herbs, often rooting on the lower nodes. Leaves elliptic-lanceolate, 4-15 x 0.5-2.0 cm, serrate. Heads blue or white, many connate in a compound sessile head in the axils of dilated leaf sheaths. Pappus-scales ovate-lanceolate, 2-ribbed, apiculate. Achenes ob-ovate, 3 x 2 mm, winged on the margins, notched at the tip, hairy on flat faces, 1-nerved in the middle.

Fl. & Fr. : August-November.

Common in shallow ditches, rice-fields and other low-lying areas; Chandan Singh-ki-Bassi, Lamero tank, Bodigama (*Kanodia* 51173, BSI).

7. CENTRATHERUM Cass.

1a. Leaves green-pubescent beneath. Achenes hairy.

C. anthelminticum 1

1b. Leaves white-woolly beneath. Achenes glabrous.

C. phyllolaenum 2

1. *Centratherum anthelminticum* (L.) O. Kuntze, Rev. Gen. Pl. 1 : 320. 1891. *Conyza anthelmintica* L. Sp. Pl. ed. 2. 1207. 1763. *Vernonia anthelmintica* (L.) Willd. Sp. Pl. 3 : 1634. 1803; Hook. f. Fl. Brit. India 3 : 236. 1881; Duthie, Fl. Gangetic Plain 1 : 440. 1905.

Erect, annual, aromatic, gland-punctate or glandular hairy herbs. Leaves elliptic obovate or ovate, 4-6 x 2.0-2.5 cm. coarsely serrate, sessile to petiolate. Heads purple, 1-2 cm in diam., subsolitary, leaf-opposed, combined into terminal, leafy corymbs. Florets tubular. Receptacles naked. Invol-bracts 4 to 5-seriate. Pappus plumose, 2-seriate, the outer short and rigid, the inner ones long. Achenes terete, 10 to 12-ribbed, glandular hairy.

Fl. & Fr. : January-March, often in August-November.

Occasional, in wet and shady habitats in wastelands; Banswara (*Kanodia* 75503, 75658, BSI).

2. *C. phyllolaenum* (DC.) Benth. ex Clarke, Comp. Ind. 4. 1876; Hook. f. Fl. Brit. India 3 : 228. 1881. *Decaneuron phyllolaenum* DC. Prodr. 7 : 264. 1838.

Erect, annual herbs, with glabrous or rough stem and branches. Leaves alternate, ovate-elliptic, 5-15 x 2.5-8.0 cm, spinous-serrate to dentate, white woolly tomentose beneath, rough above, cuneate at the base. Heads purple, peduncled, solitary. Outer invol.-bracts leafy at the top, not cordate at the base; inner scarious. Receptacles flat, scaly. Pappus 1-seriate, denticulate, shorter than corolla-tube. Achenes oblong, 10 to 12-ribbed, glabrous.

Fl. & Fr. : October—December.

Rare, in forests in shady habitats; Khora forest.

8. CYATHOCLINE Cass.

Cyathocline purpurea (Ham. ex D. Don) O. Ktze. Rev. Gen. Fl. 333.

1891. *Tanacetum purpureum* Ham. ex D. Don, Prodr. Fl. Nepal. 181. 1825. *Cyathocline lyrata* Cass. in Ann. Sci. Nat. ser. 1. 17 : 420. 1829; Wight, Icon. 3 (4) : 8. t. 1098. 1846; Clarke, Comp. Ind. 37. 1876; Hook. f. Fl. Brit. India 3 : 246. 1881; Duthie, Fl. Gangetic Plain 1 : 445. 1905. 'Bandhaniya' (Hindi).

Erect, annual, delicate, scabrous or pubescent herbs, often tinged with reddish-purple. Leaves 4-12 cm long, lyrate pinnatifid. Heads hemispheric, 3 x 4 mm, in corymbose panicles. Outer florets female, inner 2-sexual. Receptacles convex at the top, naked. Corolla of outer florets filiform, longer than inner. Achenes oblong, upto 3 mm long, smooth, without thickened margins.

Fl. & Fr. : October-April.

Common in moist habitats in forests, particularly along the water-streams; often gregarious, forming dense blocks; Wadita Hillage forest, Banswara (*Majumdar* 10235, BSA), Jhola fall (*Kanodia* 51149 BSI).

9. ECHINOPS L.

Echinops echinatus Roxb. Fl. Ind. 3 : 447. 1832; Clarke, Comp. Ind. 211. 1876; Hook. f. Fl. Brit. India 3 : 358. 1881; Duthie, Fl. Gangatic Plain 1 ; 480. 1905. 'Oanti-kateli' (Hindi).

Much branched, thistle-like, deep-rooted, annual herbs. Leaves oblong, pinnatifid, 8-30 x 3-8 cm, spinescent, amplexicaul, white-woolly beneath. Head blue, white or yellow, 1-flowered, all clustered in involucrate, compound heads 2.0-4.5 cm in diam. Florets tubular, bisexual. Outer invol.-bracts shorter, pungent; the intermediate ones spatulate and one or two produced into sharp spines; the inner ones connate for half of their length and form a tube around the achenes. Pappus forming a cylindric brush above the achenes. Achenes obconic, silky.

Fl. & Fr. : October-June.

Common in wastelands and open forests in dry habitats; Barighata forest, Banswara (*Kanodia* 51028, BSI).

10. ECLIPTA L. *nom. cons.*

Eclipta alba (L.) Hassk. Pl. Jav. Rar. 528. 1848; Clarke, Comp. Ind. 134. 1876; Hook. f. Fl. Brit. India 3 : 304. 1881. *Verbesina alba* L. Sp. Pl. 902. 1753. *V. prostrata* L. Sp. Pl. 902. 1753. *Eclipta erecta* L. Mant. Pl. 2 : 286. 1771; Duthie, Fl. Gangetic Plain 1 : 468. 1905. *E. prostrata* (L.) L. Mant. Pl. 2 : 286. 1771. 'Jalmagra' (Hindi).

Erect or prostrate, hirsute herbs, often rooting on the lower nodes. Leaves ovate, elliptic, oblong or lanceolate, 2-7 x 1.0-2.5 cm, entire or undulate. Heads white, 0.5-1.0 cm in diam., on solitary or paired, unequal,

axillary or terminal peduncles. Ray-florets female or sterile. Disk-florets tubular, 2-sexual. Pappus absent or of minute hairs at the top of achenes. Achenes cuneate, compressed, tuberculate, with a thickened margin.

Fl. & Fr. : All round the year.

Common weed in wet and marshy habitats. The plants growing in dry rocky habitats are very dwarf; Paloda, Banswara (*Kanodia* 51167, 75329, BSI).

Notes : Last example of Article 57 (ICBN. 1978) cites *Eclipta alba* as the name to use when united with *E. prostrata*. Hasskarl (*l. c.*) was first to unite these taxa under *E. alba* (L.) Hassk.

11. EMILIA Cass.

Emilia sonchifolia (L.) DC. in Wt. Contr. Bot. Ind. 24. 1834 & Prodr. 6 : 302. 1838; Clarke, Comp. Ind. 174. 1876; Hook. f. Fl. Brit. Ind. 3 : 336. 1881; Duthie, Fl. Gangetic Plain 1 : 478. 1905. *Cacalia sonchifolia* L. Sp. Pl. 835. 1753.

Erect or decumbent herbs. Lower leaves ovate or obovate to lyrate, 4-10 x 2-4 cm, long-petioled; upper ones lanceolate, sagittate-amplexicaul. Heads purple, 0.5-1.5 x 0.2-0.5 cm, solitary or in lax corymbs. Receptacles naked. Invol-bracts 8-10, lanceolate. Pappus white, equalling the bracts. Achenes oblong, 5-ribbed, 2-4 mm long.

Fl. & Fr. : Most part of the year.

Common in wastelands, forests, fields and gardens in moist habitats; Kotharia forest, Asargarh (*Kanodia* 75615, BSI).

12. GLOSSOCARDIA Cass.

Glossocardia bosvallea (L. f.) DC. in Wt. Contr. Bot. Ind. 19. 1834; Clarke, Comp. Ind. 139. 1876; Mahesh. Illus. Fl. Delhi f. 109. 1966. *Verbenina bosvallea* L. f. Suppl. 379. 1781. *Glossocardia linearifolia* Cass. in Dict. Sc. Nat. 19 : 62. 1821; Hook. f. Fl. Brit. India 3 : 308. 1881; Duthie, Fl. Gangetic Plain 1 : 471. 1905. 'Chiriy-ka-Chugga' (Hindi).

Suberect or decumbent, small, annual herbs. Leaves 2-3 pinnate, 1-4 cm long. Heads yellow, pedunculate, solitary, axillary. Ray-florets ligulate, female. Disk-florets bisexual, tubular. Invol-bracts 2-seriate; outer 3, ovate-lanceolate, acute; inner many, oblong, obtuse. Pappus of 2, stiff awns. Achenes oblong, flattened, brown, hairy.

Fl. & Fr. : August-October.

Native of East Indies; naturalized in dry rocky grounds, crevices of rocks and on the walls of old buildings; Wadita Hillage forest, Kushalgarh (*Kanodia* 75714, BSI), Banswara (*Kanodia* 75104, BSI).

13. GNAPHALIUM L.

- 1a. Heads in leafy spikes. *G. polycaulon* 1
 1b. Heads in leafy clusters. *G. pulvinatum* 2

1. ***Gnaphalium polycaulon*** Pers. Syn. Pl. 2 : 421. 1807; Grierson in Notes Roy. Bot. Gard. Edinb. 31 : 135. 1971. *G. indicum* auct. plur. non L. 1753; Clarke, Comp. Ind. 114. 1876; Hook. f. Fl. Brit. India 3 : 289. 1881; Duthie, Fl. Gangetic Plain 1 : 461. 1905.

Prostrate or suberect, woolly herbs. Leaves linear-ob lanceolate to obovate or spatulate. Heads yellowish-white, sessile, passing into terminal, leafy spikes. Corolla-tube of outer florets filiform, narrow. Receptacles pitted. Pappus-hairs 1-seriate, free. Achenes oblong, hispidulous.

Fl. & Fr. : January-April.

Common in damp, sandy soils and on the rocky grounds; Ghatol, Raj talab (*Kanodia* 51014, BSI).

2. ***G. pulvinatum*** Delile, Fl. Egypt. 122. 1813 & t. 44. 1826; Hook. f. Fl. Brit. India 3 : 289. 1881; Duthie, Fl. Gangetic Plain 1 : 462. 1905. *G. depressum* Roxb. Fl. Ind. 3 : 425. 1832. *G. crispatum* Clarke, Comp. Ind. 115. 1876.

Prostrate, woolly herbs. Leaves crowded, spatulate, 0.5-1.5 x 0.1-1.0 cm, mucronate. Heads small, yellow, emerged in white wool, crowded in sub-globose, leafy or involucrate, terminal clusters. Corolla-tube of outer florets filiform, narrow. Achenes oblong, minutely papillose.

Fl. & Fr. : January-April.

Common in drying ponds along the roads in association with *Chrozophora parvifolia* Klotz. ex Schw., *Heliotropium supinum* L., *Cyperus michelianus* (L.) Link and *Polygonum plebeium* R. Br.; Kushalgarh, Banswara, Raj talab (*Kanodia* 51016, BSI).

14. GRANGEA Adans.

Grangea maderaspatana (L.) Poir. in Lam. Encycl. Suppl. 2 : 825. 1811; Wight, Icon. 3(4) : 8. t. 1097. 1846; Clarke, Comp. Ind. 37. 1876; Hook. f. Fl. Brit. India 3 : 247. 1881; Duthie, Fl. Gangetic Plain 1 : 446. 1905. *Artemisia maderaspatana* L. Sp. Pl. 849. 1753.

Prostrate, hairy herbs. Leaves sinuate-pinnatifid, with coarsely serrate-dentate lobes. Heads 0.5-1.0 cm in diam., solitary or paired on leaf-opposed peduncles. Corolla-tube of outer florets filiform, 2 to 4-fid at the apex. Receptacles convex, naked. Pappus form a short laciniate tube. Outer florets female, inner 2-sexual. Achenes turbinate, compressed.

Fl. & Fr. : December-June.

Common in drying ponds and low-lands, often forming dense mats; Ghatol, Banswara (*Verma* 219, BSA; *Kanodia* 51010, BSI), Looda (*Majumdar*

10278, BSA).

15. LAGASCEA Cav. *nom. cons.*

Lagascea mollis Cav. in Anal. Cienc. Nat. 6 : 331. t. 44. 1803; Clarke, Comp. Ind. 131. 1876; Hook. f. Fl. Brit. India 3 : 302. 1881; Raizada, Suppl. Duthie, Fl. Gangetic Plain 123. 1976. 'Gorakh-mandi' (Hindi).

Laxly branched, villous, annual herbs. Leaves ovate, 3.0-7.5 x 1.5-5.0 cm, acute, entire or serrulate. Heads white, clustered at the end of branches; clusters subtended by 5, ovate, leafy, free or connate bracts. Involucre tubular, pilose, 4 to 5-lobed. Anthers obtuse at the base. Pappus forming a lacinate cup. Achenes cuneate, compressed, enclosed within involucre.

Fl. & Fr. : August-December.

Native of Central America; naturalized in wastelands and often gregarious among bushes; Lalpura forest, Bhimsor (*Majumdar* 10279, BSA), Bhimgarh (*Kanodia* 75375, BSI).

Notes : Cavanilles (*l. c.*) named this genus as *Lagasca* Cav. Willdnow (*Enum. Pl. Hort. Berol.* 941. 1809) corrected the spelling to *Lagascea* Cav.

16. LAUNAEA Cass.

- | | |
|--|-------------------------|
| 1a. Achenes columnar, truncate at both ends. | <i>L. procumbens</i> 1 |
| 1b. Achenes narrowed at both ends, beaked. Lower end with a cupular disk beneath the pappus. | <i>L. remotiflora</i> 2 |

1. **Launaea procumbens** (Roxb.) Ramayya & Rajagopal in Kew Bull. 23 (3) : 465. 1969. *Prenanthes procumbens* Roxb. Fl. Ind. 3 : 404. 1832. *Launaea nudicaulis* auct. plur. non (L.) Hook. f. *sensu stricto* Fl. Brit. India 3 : 416. 1881; Duthie, Fl. Gangetic Plain 1 : 494. 1905; Mahesh. Illus. Fl. Delhi f. 99. 1966.

Annual or perennial herbs. Leaves mostly radical, in rosette, sinuate-lobed to lyrate-pinnatifid, cartilagenous-margined. Heads yellow, shortly pedicelled or sessile, in terminal and sub-racemose clusters or solitary. Invol-bracts 3-setiate, outer ovate, inner lanceolate. Pappus white, soft, deciduous, homomorphic. Achenes columnar, ribbed, 2-4 mm long, rugulose.

Fl. & Fr. : September-April.

Fairly common in cultivated fields and wastelands, particularly in moist habitats; Ghatol, Jua Fall, Banswara (*Kanodia* 51181, BSI).

Notes : *Launaea nudicaulis* (L.) Hook. f. based on *Chondrilla nudicaulis* L. (1767) does not occur in India. It is characterized by persistent heteromorphic pappus and 4.5-5.5 mm long achenes.

2. **L. remotiflora** (DC.) Stebbins in Ind. For. Rec. 1 (6) : 240. 1939. *Lactuca remotiflora* DC. in Wight, Contrib. Bot. Ind. 26. 1834; Hook. f. Fl.

Brit. India 3 : 403. 1881; Duthie, Fl. Gangetic Plain 1 : 490. 1905. *Brachyrramphus sonchij* *silius* DC. Prodr. 7 : 177. 1838.

Erect, annual herbs. Leaves radical, sessile, obovate or oblong-pinnatifid, 5-10 x 2.5-4.0 cm, sinuate-toothed. Heads solitary or fascicled along the naked slender branches. Florets pinkish-white, heterogamous. Outer invol-bracts ovate, inner ones linear-oblong, both scarious-margined. Anther-bases setaceo-acuminate. Pappus hairs longer than achenes. Achenes compressed, faintly ribbed, muriculate, tapering towards the base into a beak which is suddenly dilated into a cup-like disc beneath the pappus.

Fl. & Fr. : December-February.

Occasional, weed in cultivated fields; Banswara (*Kanodia* 51, BSI).

17. OLIGOCHAETA (DC.) C. Koch

Oligochaeta ramosa (Roxb.) Wagenitz in Verroffent. Geobot. Inst. 37 : 323. 1962. *Centaurea divaricata* Wall. Cat. 2984. 1831, *nom. nud.* *Carduus ramosus* Roxb. Fl. Ind. 3 : 407. 1832. *Volutarella divaricata* Benth. in Benth. & Hook. f. Gen. Pl. 2 : 476. 1873, *pro parte*; Clarke, Comp. Ind. 242. 1876; Hook. f. Fl. Brit. India 3 : 383. 1881; Duthie, Fl. Gangetic Plain 1 : 486. 1905. *V. ramosa* (Roxb.) Sant. Fl. Saur. 22. 1953. *Amberboa ramosa* (Roxb.) Jafri in Scientist 3 : 29. 1959.

Procumbent, annual, dichotomously branched herbs. Lower leaves oblong or obovate or lyrate, upper ones sinuately pinnatifid, entire or toothed with mucronate lobes. Heads ovoid-oblong, 1.5-2.2 x 1.0-1.5 cm, pale purple. Florets tubular; ray florets neuter; disk-florets 2-sexual. Receptacles bristly. Invol-bracts spinescent. Pappus-hairs unequal. Achenes acutely angled, pitted in the grooves.

Fl. & Fr. : October-May.

Common in wastelands in dry habitats; Jolana (*Kanodia* 11, BSI).

18. PENTANEMA Cass.

1a. Leaves petioled. Invol-bracts squarrose. Ray-florets pappose.
1b. Leaves sessile. Invol-bracts erect. Ray-florets epappose.

P. cernua 1
P. indica 2

1. **Pentanema cernuum** (Dalz.) Ling in Phytotax. Sin. 10 : 180. 1965. *Vicea cernua* Dalz. in Dalz. & Gibbs. Bomb. Fl. 126, 134. 1961; Hook. f. Fl. Brit. India 3 : 297. 1881; Raizada, Suppl. Duthie, Fl. Gangetic Plain 136. 1976.

Erect, annual herbs, 30-50 cm high, with terete stem and pubescent branches. Leaves petioled, elliptic-lanceolate, 5-8 x 2-3 cm, crenate-serrate, acute or acuminate,-acute at the base. Heads drooping, on filiform peduncles with a foliaceous bract above the middle. Invol-bracts setaceous, outer ones squarrose. Achenes oblong, sparsely hairy.

Fl. & Fr. : November-February.

Occasional, in wastelands and open forests; Bhandaria (*Kanodia* 51044, BSI).

2. *P. indicum* (L.) Ling in Acta Phytotax. Sin. 10 : 179. 1965. *Inula indica* L. Sp. Pl. ed. 2. 1236. 1763; Duthie, Fl. Gangetic Plain 1 : 464. 1905. *Vicoa auriculata* Cass. in Ann. Sci. Nat. Paris 17 : 418. 1829; Hook. f. Fl. Brit. India 3 : 297. 1881. *V. indica* (L.) DC. in Wt. Contrib. Bot. Ind. 10. 1834; Wight, Icon. 3(4) : 13. t. 1148. 1846; Clarke, Comp. Ind. 127. 1876. 'Jangli Ranthela' (Hindi).

Erect, annual or perennial herbs, 30-80 cm high. Leaves oblong-lanceolate, 3-6 x 0.5-1.5 cm, semi-amplexicaul. Heads bright yellow, 1.0-1.5 cm in diam., in spreading panicles. Ray-florets ligulate, female. Disk-florets tubular, 2-sexual. Invol-bracts 3 to 4-seriate, glabrous, acute. Achenes oblong, terete, softly hairy.

Fl. & Fr. : August-March.

Common weed in wastelands and sugarcane fields; Hura Bowji forest, Banswara (*Kanodia* 75135, BSI).

19. PULICARIA Gaertn.

Pulicaria angustifolia DC. Prodr. 5 : 479. 1836; Clarke, Com. Ind. 129. 1876; Hook. f. Fl. Brit. India 3 : 299. 1881; Duthie, Fl. Gangetic Plain 1 : 465. 1905. 'Soneli' (Hindi).

Erect, annual herbs, upto 60 cm high. Leaves much variable in shape and size, usually linear to obovate-oblong, sessile, glandular pubescent. Heads yellow, about 1 cm in diam., peduncled, solitary, terminal. Outer florets ligulate, female. Achenes ellipsoid or oblong, terete, sparsely hairy.

Fl. & Fr. : October-December.

Common weed in wastelands, on small open hillocks and in drying rice-fields; Loharia.

20. SCLEROCARPUS Jacq.

Sclerocarpus africanus Jacq. ex Murr. Icon. Pl. Rar. 1 : 17. 1782 & Syst. Veg. ed. 14. 783. 1784; Clarke, Comp. Ind. 134. 1876; Hook. f. Fl. Brit. India 3 : 305. 1881; Duthie, Fl. Gangetic Plain 1 : 469. 1905.

Annual, hispid herbs, upto 60 cm high. Leaves ovate, 2.5-7.0 x 1.0-3.5 cm, remotely serrate, 3-nerved, acute or acuminate. Heads yellow, 0.6-1.0 cm in diam., terminal or leaf-opposed, sessile, supported by 2-3 floral leaves. Disk-florets 2-sexual. Pappus absent. Pales boat-shaped, ribbed, glabrous. Achenes smooth.

Fl. & Fr. : August-November.

Native of south America; naturalized in moist and shady habitats in

forests; Anand Sagar forest, Banswara (*Kanodia* 75149, BSI).

21. SONCHUS L.

Sonchus oleraceus L. Sp. Pl. 794. 1753; Clarke, Comp. Ind. 275. 1876; Hook. f. Fl. Brit. India 3 : 414. 1881; Duthie, Fl. Gangetic Plain 1 : 492. 1905; Jeffrey in Kew Bull. 18 : 481. 1966.

Erect, annual herbs. Branches, peduncles and invol-bracts glandular-hairy. Leaves obovate-oblong, irregularly dentate; base sagittate, with acute, spreading lobes. Lower leaves narrowed into a petiole, pinnatifid. Heads yellow, in irregular umbellate cymes. Invol-bracts 2 to 3-seriate. Pappus white, longer than achenes. Achenes ovoid, longitudinally 3-ribbed on lateral faces, transversely muriculate between the ribs.

Fl. & Fr. : August-March.

Common in wastelands, cultivated fields, gardens etc. in wet and shady habitats. *S. asper* (L.) Hill is very close to this species, but bears smooth achenes; Ghatol, Banswara (*Kanodia* 31, BSI).

22. SPHAERANTHUS L.

Sphaeranthus indicus L. Sp. Pl. 927. 1753; Hook. f. Fl. Brit. India 3 : 275. 1881, *pro parte*; Duthie, Fl. Gangetic Plain 1 : 459. 1905. *S. hirsutus* Willd. Sp. Pl. 3 : 2395. 1803; Clarke, Comp. Ind. 97. 1876. 'Gorak-mandi' (Hindi).

Much-branched, prostrate, hairy herbs. Leaves sessile, obovate-oblong, 4-6 x 0.5-1.5 cm, double dentate, clothed with stalked glands. Compound heads ovoid-oblong or globose, 1.0-1.5 cm long, peduncled, pinkish-purple. Involucre of each head campanulate; outer florets female; inner bisexual. Achenes oblong, compressed, 1 mm long, glabrous or glandular hairy.

Fl. & Fr. : October-April.

Common in wastelands and in black-cotton soils in neglected corners of cultivated fields; Ghatol, Banswara (*Kanodia* 51170, BSI).

23. TRIDAX L.

Tridax procumbens L. Sp. Pl. 900. 1753; Clarke, Comp. Ind. 142. 1876; Hook. f. Fl. Brit. India 3 : 311. 1881; Duthie, Fl. Gangetic Plain 1 : 475. 1905; Powell in Brittonia 17 : 80. 1965. 'Gorakh-mandi, Kumru' (Hindi).

Straggling, annual or perennial, hispid herbs, upto 75 cm long. Leaves ovate or ovate-lanceolate, 2.5-7.0 x 1.5-2.5 cm, inciso-dentate to pinnatisect, cuneate-based. Heads yellow, solitary on terminal, upto 40 cm long peduncles. Ray-florets 1 to 2-seriate, female, ligulate. Disk-florets bisexual, tubular. Pappus bristles plumose, aristate. Achenes oblong, black, silky hairy.

Fl. & Fr. : Most part of the year.

Native of Central America; naturalized in wastelands and open forests among bushes in dry habitats; often found on the walls of old buildings; Paloda, Banswara (*Kanodia* 75398, BSI).

24. VERNONIA Schreb. *nom. cons.*

Vernonia cinerea (L.) Less. in Linnaea 4 : 291. 1829; Clarke, Comp. Ind. 20. 1876; Hook. f. Fl. Brit. India 3 : 233. 1881; Duthie, Fl. Gangetic Plain 1 : 441. 1905; Koster in Blumea 1 : 407. 1935; Mahesh. Illus. Fl. Delhi f. 101. 1966. *Conyza cinerea* L. Sp. Pl. 862. 1753.

Annual, glandular-pubescent herbs, upto 75 cm high. Leaves obovate or ovate to lanceolate, 1.5-7.0 x 1-5 cm. Heads lilac or pink, 5-6 x 4-5 cm, in lax, divaricate, terminal corymbose cymes. Invol-bracts linear-lanceolate, 1-nerved. Receptacles naked. Pappus persistent, with an outer row of short flattened bristles. Achenes oblong, 1.5-1.6 x 0.4-0.5 cm, terete, not ribbed, hairy.

Fl. & Fr. : Throughout the year.

Common in wastelands, forests, cultivated fields, gardens and on the walls of old buildings. It is a much variable and hardiest species of the area; Pipalkhund, Shergarh forest, Jolana (*Kanodia* 75610, BSI).

25. XANTHIUM L.

Xanthium strumarium L. Sp. Pl. 987. 1753; Clarke, Comp. Ind. 132. 1876; Hook. f. Fl. Brit. India 3 : 303. 1881; Duthie, Fl. Gangetic Plain 1 : 467. 1905. *X. indicum* Koen. ex Roxb. Fl. Ind. 3 : 601. 1832; Wight, Icon. 3 (4) : 8. t. 1104. 1846. 'Adhasisi, Chirchita' (Hindi).

Foetid-smelling herbs, about 1 m high. Leaves ovate-suborbicular, entire, toothed or 3-lobed, 8-12 x 7-10 cm, cuneate at the base. Heads greenish-yellow, in terminal and axillary racemes. Female heads 2-flowered, in the lower region of the inflorescence. Bisexual heads in upper part of inflorescence. Female florets apetalous. Invol-bracts connate into an ellipsoid, 3-locular body covered with hooked bristles and bearing a 2-dentate beak at the apex of each cell. Style-arms included. Achenes oblong-ovoid, compressed, glabrous, those of bisexual florets sterile and enclosed within pales.

Fl. & Fr. : October-May.

Native of America; naturalized in wastelands near habitations; often gregarious in forests. Bisexual florets are functionally male; Lasara, Ghatol (*Kanodia* 75525, BSI).

Tagetes erecta L.-Herbs, with pinnate leaves and yellow heads. Native of Mexico; cultivated for ornamental purposes; often found as an escape near habitations. 'Genda' (Hindi).

Helianthus annuus L.-Suraj-mukhi is also cultivated ornamenteally.

52. PLUMBAGINACEAE

PLUMBAGO L.

Plumbago zeylanica L. Sp. Pl. 151. 1753; Clarke in Hook. f. Fl. Brit. India 3 : 480. 1882; Duthie, Fl. Gangetic Plain 2 : 2. 1911; Mahesh. Illus. Fl. Delhi f. 116. 1966.

Undershrubs, about 1 m high; young shoots clothed with glands. Leaves ovate or ovate-oblong, 3.5-8.0 x 2-4 cm, entire. Petioles auricled at the base. Flowers white, 2-3 cm long, in terminal and axillary paniculate spikes; peduncles glandular. Bracts ovate, acute or acuminate. Calyx-tube 5-angled, half the length of corolla, clothed with stalked glands; teeth 5. Capsules oblong, membranous, enclosed in the calyx-tube, smooth, shortly beaked.

Fl. & Fr. : October-February.

Common in wastelands and open forests, chiefly among bushes; Parla-ka-pul (*Majumdar & Mishra* 10318, BSA), Garhi (*Kanodia* 75541, BSI).

53. PRIMULACEAE

ANAGALLIS L.

1a. Leaves 3-nerved. Corolla blue, longer than calyx.

A. arvensis 1

1b. Leaves 1-nerved. Corolla white, shorter than calyx.

A. pumila 2

1. *Anagallis arvensis* L. Sp. Pl. 148. 1753; Hook. f. Fl. Brit. India 3 : 506. 1882 ; Duthie, Fl. Gangetic Plain 2 : 6. 1911; Taylor in Kew Bull. 1955 : 329. 1955; Mahesh. Illus. Fl. Delhi f. 117. 1966. 'Neel' (Hindi).

Annual herbs, upto 60 cm high. Leaves opposite, sessile, ovate-lanceolate, 1.5-2.0 x 0.5-1.5 cm. Flowers blue, axillary, solitary. Pedicels longer than leaves, recurved in fruit. Calyx deeply 5-lobed; lobes lanceolate, acuminate, crenulate on the margins. Corolla-lobes fringed with minute glands. Capsules globose, 4-6 mm in diam., circumsciss, many-seeded.

Fl. & Fr. : December-March.

Native of Europe and Mediterranean region; naturalized as a weed in cultivated fields and gardens during winters; Pipalkhund.

2. *A. pumila* Sw. Prodr. Veg. Ind. Occ. 1 : 40. 1788; Taylor in Kew Bull. 1955 : 342. 1955. *Centrunculus pentandrus* R. Br. Prodr. 427. 1810; Duthie, Fl. Gangetic Plain 2 : 6. 1911. *C. tenellus* Duby in DC. Prodr. 8 : 71. 1844; Wight, Icon. 6 : 14. t. 2000. 1853; Hook. f. Fl. Brit. India 3 : 506. 1882.

Erect, annual herbs, 5-15 cm high. Leaves alternate or rarely lower

ones opposite, ovate or obovate-rounded, 0.5-1.0 x 0.4-0.5 cm, acute or obtuse. Flowers white, axillary, solitary. Calyx divided upto the base; lobes 2-3 mm long. Corolla-lobes ovate-lanceolate, not fringed with glands. Filaments glabrous. Capsules subglobose, as long as calyx. Seeds many, trigonous.

Fl. & Fr. : September-February.

Rare, weed in cultivated fields and nearby localities; Kushalgarh (*Kanodia* 5708, BSA).

54. SAPOTACEAE

- | | |
|---|-------------------|
| 1a. Petals with bifid petaloid appendages on the back. Stamens 8,
alternating with 8 staminodes. | <i>Mimusops</i> 2 |
| 1b. Petals without appendages. Stamens 16 or more. Staminodes
absent. | <i>Madhuca</i> 1 |

1. MADHUCA J.F. Gmelin

Madhuca longifolia (Koen.) Macbr. var. *latifolia* (Roxb.) Chevalier in Rev. Bot. Appl. 23 : 149. 1943; Royen in Blumea 10 : 55. 1960. *Bassia latifolia* Roxb. Pl. Cor. 1 : 20. t. 19. 1795; Bedd. Fl. Sylv. 1 : 41. pl. 41. 1870; Clarke in Hook. f. Fl. Brit. India 3 : 544. 1882; Duthie, Fl. Gangetic Plain 2 : 11. 1911. *Madhuca latifolia* (Roxb.) Macbr. in Contr. Gray Herb. Harv. Univ. (n.s.) 53 : 18. 1918. 'Mahua' (Hindi).

Large, deciduous trees. Leaves clustered at the end of branches, elliptic-obovate, obtusely acuminate. Flowers tomentose, cream-coloured, in 3 to 5-flowered, axillary clusters. Calyx tomentose, 4-lobed. Corolla-tube succulent. Stamens 20-30. Berries ovoid, fleshy, 1 to 4-seeded, tomentose.

Fl. : March-April ; *Fr.* : May-June.

Fairly common in forests and wastelands; Ghatot, Hura Bowji forest, Kotharia forest.

2. MIMUSOPS L.

Mimusops elengi L. Sp. Pl. 349. 1753; Wight, Icon. 4(4) : 13. t. 1586. 1850; Clarke in Hook. f. Fl. Brit. India 3 : 548. 1882; Duthie, Fl. Gangetic Plain 2 : 13. 1911; Van Royen in Blumea 6 : 594. 1952; Oza in Journ. Bomb. nat. Hist. Soc. 72(2) : 601. 1976. 'Morsali' (Hindi).

Evergreen trees, with ringed, grey bark. Leaves elliptic-oblong, 5-15 x 3-7 cm, acuminate. Flowers pinkish-white, axillary, solitary or fascicled, sweet-scented. Calyx deeply 8-lobed; lobes in two series. Corolla 8-lobed. Staminodes ovate, acute, hairy on the back. Berries elliptic-oblong, yellow, fleshy, smooth, 3 x 2 cm, edible.

Fl. : February-March; *Fr.* : April-June.

Rare, in forests, perhaps planted; Anand Sagar forest.

Manilkara achras (Mill.) Fosberg (*Sapota achras* Mill., *Achras zapota* L.)—Evergreen trees, with oblong-lanceolate to elliptic leaves, white flowers and globose fruits. Native of South America; cultivated in the gardens and fruit orchards for edible fruits. ‘Cheeku’ (Hindi).

M. hexandra (Roxb.) Dub. (*Mimusops hexandra* Roxb.)—Evergreen trees with emerginate leaves, white flowers, 6-lobed corolla, 6 stamens and ovoid, 1-seeded, reddish-yellow berries. ‘Khirni’ (Hindi).

55. EBENACEAE

DIOSPYROS L.

1a. Anthers not awned. Staminodes 8-10. Albumin of seeds

ruminant.

D. melanoxylon 1

1b. Anthers awned. Staminodes 4. Albumin of seeds not ruminant.

D. montana 2

1. **Diospyros melanoxylon** Roxb. Pl. Cor. 1 : 36. t. 46 1795; Clarke in Hook. f. Fl. Brit. India 3 : 564. 1882. *D. exculta* Buch.-Ham. in Trans. Linn. Soc. 15 : 110. 1826. *D. tupru* Buch.—Ham. I.c. 15 : 111. 1826; Clarke, I.c. 3 : 563. 1882. *D. tomentosa* Roxb. Fl. Ind. 2 : 532. 1832; Wight, Icon. 1 : t. 182-183. 1839; Duthie, Fl. Gangatic Plain 2 : 15. 1911. ‘Tendu, Timru’ (Hindi).

Dioecious trees, 4-8 m high. Bark exfoliating in 4-angular scales. Leaves ovate-elliptic or oblong, 5-17 x 4-12 cm, pubescent. Male flowers in subsessile, drooping cymes. Anthers 4-16, linear-lanceolate, not awned. Female flowers solitary. Sepals of fruiting calyx with recurved margins. Ovaries 4 to 8-celled, hairy. Fruits globose or ovoid, 2-4 cm in diam., yellow and glabrous when ripe. Seeds obovate-oblong, blackish.

Fl. : April-May; *Fr.* : June-November.

Fairly common in forests and wastelands; Rowal Hindvela forest, Wadita Hillage forest, Bagaycha forest, Bhandaria (Kanodia 75238, BSI).

2. **D. montana** Roxb. Pl. Cor. 1 : 37. t. 48. 1795; Wight, Icon. 4(1) : 10. t. 1225. 1848; Clarke in Hook. f. Fl. Brit. India 3 : 555. 1882; Duthie, Fl. Gangatic Plain 2 : 15. 1911. ‘Timru’ (Hindi).

Shrubs or trees, with hairy twigs. Leaves ovate-elliptic, 3-10 x 2-5 cm, acute, cuneate-cordate, pubescent beneath. Male flowers in cymes, female ones solitary. Calyx-lobes 4, flat in fruiting stage. Corolla-lobes 5, ovate, acute, pubescent. Stamens 15; staminodes present in female flowers. Berries globose, about 2 cm in diam., glabrous.

Fl. & *Fr.* : Summer and rainy season.

Occasional, in wastelands. Plants resemble closely *D. cordifolia* Roxb.

which, however, bears awnless anthers and more staminodes (12-16); Bagidora (*Kanodia* 75630, BSI).

56. OLEACEAE

NYCTANTHES L.

Nyctanthes arbor-tristis L. Sp. Pl. 6. 1753; Bedd. Fl. Sylv. 2 : 240, pl. 240. 1872; Hook. f. Fl. Brit. India 3 : 603. 1882; Duthie, Fl. Gangetic Plain 2 : 24. 1911; Kundu & Anima in Bull. Bot. Surv. India 10(3-4) : 397-408. 1969. '*Harsingar, Tamat*' (Hindi).

Large shrubs, with 4-angled branches. Leaves ovate or ovate-lanceolate, 4-11 x 2-7 cm, distantly serrate, scabrous with unicellular warty trichomes and glandular hairs, acute or acuminate. Flowers white to orange, fragrant, sessile, 3 to 5-together on axillary solitary or fascicled penduncles or in terminal 3-chotomous cymes. Bracts ovate. Capsules orbicular, compressed, 1.3-2.0 x 1.2-2.0 cm, 2-celled, separating into 2, 1-seeded pyrenes.

Fl. & Fr. : August-November.

Naturalized in forests, often so densely that even movement becomes difficult; Loharia forest, Anand Sagar forest.

Jasminum grandiflorum L. Scandent or climbing shrubs, with imparipinnate leaves and white flowers in lax panicles. Native of N.W. Himalaya; cultivated ornamenteally in the gardens and parks. '*Chameli*' (Hindi).

57. SALVADORACEAE

SALVADORA L.

Salvadora persica L. Sp. Pl. 122. 1753; Wight, Icon. 4(4) : 18, t. 1621. 1850; Clarke in Hook. f. Fl. Brit. India 3 : 619. 1882; Duthie, Fl. Gangatic Plain 2 : 28. 1911. '*Pilu, Jal*' (Hindi).

Evergreen trees, with drooping branches and grey-white bark. Leaves ovate-lanceolate, 3-8 x 1.0-3.5 cm, fleshy, acute. Flowers dull yellow, pedicellate, in compound panicles which are longer than the leaves. Calyx-lobes less than half the length of reflexed petals. Drupes globose, about 3 mm in diameter.

Fl. : December-April; *Fr.* : May-June.

Rare, in wastelands; Loharia.

58. APOCYNACEAE

- 1a. Plants armed with spines. Fruit an indehiscent berry.
1b. Plants unarmed. Fruit of dehiscent follicles :

Carissa 1

- 2a. Erect herbs. Seeds not comose. *Catharanthus* 2
 2b. Trees or shrubs. Seeds comose :
 3a. Anthers exserted, conniving in a cone and adhering to the stigma. *Wrightia* 4
 3b. Anthers included, free from stigma. *Holarrhena* 3

1. CARISSA L. nom. cons.

Carissa congesta Wight, Icon. 4(2) : I. t. 1289. 1848 ; Haines in Ind. For. 45 : 385. 1919. *C. carandus* auct. plur. non L. 1767 ; Hook. f. Fl. Brit. India 3 : 630. 1882 ; Duthie, Fl. Gangetic Plain 2 : 31. 1911. 'Karaunda, Jai' (Hindi).

Erect or scandent shrubs, armed with straight, paired, horizontal spines. Leaves elliptic or oblong, 2-6 x 1.5 — 4.0 cm, mucronate. Flowers white, in corymbose cymes. Berries elliptic or oblong, 1.3-2.5 x 1.0-1.5 cm, 2-celled, 4-seeded, fleshy.

Fl. : January-April ; *Fr.* : May-June.

Rare, in forests, often climbing on the trees ; also planted in gardens ; Anand Sagar forest, Bhandaria (*Konodia* 51092, BSI).

2. CATHARANTHUS G. Don

Catharanthus pusillus (Murr.) G. Don, Gen. Syst. 4 : 95. 1837-38 ; Mahesh. Illus. Fl. Delhi f. 120. 1966. *Vinca pusilla* Murr. Novi Comm. Soc. Reg. Sci. Gotting. 3 : 66. t. 2. f. 1. 1773 ; Hook. f. Fl. Brit. India 3 : 640. 1882. *Lochnera pusilla* K. Schum. in Engl. & Prantl, Nat. Pfanzenfam. 4(2) : 145. 1895 ; Duthie, Fl. Gangetic Plain 2 : 34. 1911. 'Hingmu' (Hindi).

Erect, annual herbs, 15-50 cm high. Leaves lanceolate, 3-7 x 0.7-2.0 cm, acute. Flowers white, 1.0-1.5 cm long, sessile, axillary, solitary or paired. Corolla-tube dilated at the top, upto 1 cm long. Filaments short ; anthers exappendiculate. Carpels 2, free, glabrous or pubescent. Follicles linear, pointed, 3.5-5.0 cm long, many-ribbed. Seeds oblong, black, longitudinally muricately ribbed.

Fl. & *Fr.* : July-September.

Common weed in cultivated fields and wastelands ; Paloda, Anand Sagar forest (*Konodia* 75295, BSA), Kalinjra (*Konodia* 75648, BSI).

3. HOLARRHENA R. Br.

Holarrhena antidysenterica (Roth) A. DC. in DC. Prodr. 8 : 413. 1844 ; Brandis, For. Fl. North-West & C. Ind. 326. t. 40. 1874 ; Hook. f. Fl. Brit. India 3 : 644. 1882 ; Duthie, Fl. Gangetic Plain 2 : 35. 1911. *Echites antidysenterica* Roth, Nov. Pl. Sp. 138. 1821. 'Inderjo, Dudhi, Akariyo' (Hindi).

Shrubs or small trees. Leaves ovate-elliptic, 5-20 x 5-11 cm, abruptly

acuminate. Flowers white, in corymbose cymes. Corolla tube pubescent. Stamens inserted near the base of corolla-tube. Follicles cylindric, 20-40 x 0.5-1.0 cm, lenticelled like stem. Seeds linear-oblong.

Fl. : May-June ; *Fr.* : June-September.

Common in forests. Often confused for *Wrightia tinctoria* R. Br. ; Chhatripada forest, Banswara (*Verma* 240, BSA), Bhapor (*Kanodia* 75202, BSI).

4. WRIGHTIA R. Br.

***Wrightia tinctoria* R. Br.** in Mem. Wern. Soc. 1 : 73. 1811 ; Bedd. Fl. Sylv. 3 : 241. pl. 241. 1872; Hook. f. Fl. Brit. India 3 : 653. 1882; Duthie, Fl. Gangetic Plain 2 : 38. 1911. *Nerium tinctorium* (R. Br.) Roxb. Fl. Ind. 2 : 4. 1824. 'Dudhi, Karu, Keerni' (Hindi).

Deciduous trees or large shrubs. Leaves elliptic-lanceolate or oblong, 4.5-14.0 x 2.5-6.0 cm, abruptly acuminate. Flowers white, in 2-chotomous cymes. Corolline corona of many, laciniate scales. Follicles cylindric, 15-50 x 0.6 cm, drooping, longitudinally striated, black.

Fl. : March-May; *Fr.* : June-October.

Common in forests; Dapia Bowji hill, Anand Sagar forest (*Kanodia* 75241, BSA), Ghatol (*Kanodia* 75501, BSI).

***Nerium indicum* Mill.** (*N. odoratum* Soland., *N. oleander* Blanco)-Evergreen shrubs, with linear-lanceolate leaves, white or red flowers in cymes and 12-21 cm long, longitudinally striated follicles. Native of Mediterranean region; cultivated for ornamental purposes. 'Kaner' (Hindi).

Plumeria rubra* L. forma *acutifolia (Poir.) Woods. (*P. acutifolia* Poir.)-Small trees, with obovate-lanceolate leaves and white flowers with yellow eye. Native of America; planted in the gardens for ornamental purposes.

***Tabernaemontana divaricata* (L.) R. Br.** (*Nerium divaricatum* L., *Tabernaemontana coronaria* Willd., *Ervatamia coronaria* Stapf)-Shrubs, with elliptic-oblong leaves, white flowers and 4-5 cm long follicles. Native of Tropical Asia; cultivated for ornamental purposes. 'Chandni' (Hindi).

***Thevetia peruviana* (Pers.) Merr.** (*Cerbera peruviana* Pers., *Thevetia nerii-folia* Juss. ex Steud.)-Shrubs or small trees, with linear leaves, yellow flowers and subglobose drupes. Native of Tropical America; cultivated for ornamental purposes. 'Pili-kaner' (Hindi).

59. ASCLEPIADACEAE

1a. Pollen masses erect :

2a. Corona double, corolline and staminal.

Leptadenia 4

2b. Corona single, either corolline or staminal :

3a. Corona corolline.

Gymnema 2

3b. Corona staminal :

4a. Corona-lobes tubercle-like, radiating from the base of staminal column. Pollinia-globose.	<i>Tylophora</i> 8
4b. Corona-lobes fleshy, not tubercle-like, with base adnate to staminal column and free above. Pollinia oblong :	
5a. Flowers in lax panicles. Corolla campanulate or salver-shaped.	<i>Marsdenia</i> 5
5b. Flowers in umbellate cymes. Corolla rotate.	<i>Wattakaka</i> 9
1b. Pollen masses pendulous :	
6a. Erect shrubs.	<i>Calotropis</i> 1
6b. Twining or pendulous herbs or shrubs :	
7a. Follicles echinate.	<i>Pergularia</i> 7
7b. Follicles glabrous :	
8a. Leaves linear, under 1 cm broad. Inner staminal corona 5-lobed.	<i>Oxystelma</i> 6
8b. Leaves broadly ovate-cordate, 6-15 cm broad. Staminal corona a fleshy truncate ring.	<i>Holostemma</i> 3

1. CALOTROPIIS R. Br.

Calotropis procera (Ait.) R. Br. in Ait. f. Hort. Kew. ed. 2.2 : 78. 1811; Wight, Icon. 4(1) : 17. t. 1278. 1848; Hook. f. Fl. Brit. India 4 : 18. 1883; Duthie, Fl. Gangetic Plain 2 : 48. 1911; Sant. & Irani in Univ. Bomb. Bot. Mem. No. 4 : 19. 1962. *Asclepias procera* Ait. Hort. Kew. ed. 1. 1 : 305. 1789. 'Arkhja' (Hindi).

Shrubs, covered with white pubescence. Leaves sessile, ovate-oblong or obovate, 4.5-20 x 3-12 cm, white pubescent, semi-amplexicaul at base. Cymes between the pairs of leaves on long peduncles. Corolla-lobes erect, purple-spotted. Staminal corona of 5, fleshy lobes, longer or as long as staminal column, without auricles below the apex. Follicles ellipsoid or ovate, 6-9 x 2.5-5.0 cm, turgid. Seeds ovate, tomentose; coma silky, upto 5 cm long.

Fl. & Fr. : Most part of the year.

Fairly common in wastelands; Ghatol.

2. GYMNEMA R. Br.

Gymnema sylvestre (Retz.) R. Br. ex Schuites in Roem. & Schult. Syst. Veg. 6 : 57. 1819-20; Wight, Icon. 2(1) : 3. t. 349. 1840; Hook. f. Fl. Brit. India 4 : 29. 1883; Duthie, Fl. Gangetic Plain 2 : 53. 1911; Sant. & Irani in Univ. Bomb. Bot. Mem. No. 4 : 47. 1962. *Periploca sylvestris* Retz. Obs. Bot. 2 : 15. 1781. 'Gurmar' (Hindi).

Twining shrubs. Leaves ovate or oblong-elliptic, 3-6 x 1.8-3.5 cm, apiculate. Flowers yellow, in lateral, pedunculate or nearly sessile cymes. Corolla-lobes imbricate. Ridge of corona protruding beyond the mouth of the corolla. Follicles lanceolate, terete, 6-8 x 0.7 cm. Seeds ovate-oblong, with a marginal wing.

Fl. & Fr. : August-January.

Widely distributed in the forests. The leaves destroy temporarily the taste of sugar and are used in diabetes; Shergarh forest.

3. HOLOSTEMMA R. Br.

Holostemma annulare (Roxb.) K. Schum. in Engl. & Prantl, Pflanzenfam. 4(2) : 247, 250. t. 71 J-K. 1895; Sant. & Irani in Univ. Bomb. Bot. Mem. No. 4 : 53, pl. 8. 1962. *Asclepias annularia* Roxb. Fl. Ind. 2 : 37. 1832. *Holostemma rheedianum* auct. plur. non Spreng. 1825; Duthie, Fl. Gangetic Plain 2 : 50. 1911. *H. rheedei* Wall Pl. As. Rar. 2 : 51. 1831; Wight, Icon. 2(3) : 7. t. 597. 1842; Hook. f. Fl. Brit. India 4 : 21. 1883.

Perennial climbers, with white latex and ovate-cordate, acuminate leaves with a gland pit on the midrib beneath. Flowers white, in axillary cymes. Corolla fleshy, purple inside. Anthers completely connate, with membranous appendages and one pendulous pollen mass in each cell (i.e. 10 in all). Follicles thick, linear-oblong, obtuse; coma upto 3 cm long.

Fl. & Fr. : July-January.

Rare, in forests; Shergarh forest.

4. LEPTADENIA R. Br.

- | | |
|--|--------------------------|
| 1a. Erect bushy shrubs. Leaves absent or very small and deciduous, | <i>L. pyrotechnica</i> 1 |
| 1b. Twining shrubs, with well developed persistent leaves. | <i>L. reticulata</i> 2 |

1. **Leptadenia pyrotechnica** (Forsk.) Decne. in Ann. Sc. Nat. (ser. 2) 9 : 269. 1838; Bullock in Kew Bull. 10 : 289. 1955; Sant. & Irani in Univ. Bomb. Bot. Mem. No. 4 : 59. 1962; Mahesh. Illus. Fl. Delhi f. 128. 1966. *Cynanchum pyrotechnicum* Forsk. Fl. Aegypt.-Arab. 53. 1775. *Leptadenia spartium* Wt. & Arn. in Wt. Contr. 48. 1834; Hook. f. Fl. Brit. India 4 : 64. 1883; Duthie, Fl. Gangetic Plain 2 : 63. 1911. 'Kheep, Thaliawar' (Hindi).

Leafless, bushy shrubs, upto 1.5 m high. Flowers greenish-yellow, in lateral, umbellate cymes. Corolla-lobes valvate. Corolline corona of 5, small scales. Staminal corona of raised, undulate, fleshy ring. Follicles 8-15 x 0.5-0.8 cm, terete, turgid, beaked. Seeds oblong-lanceolate, glabrous; coma 2.5-3.5 cm long.

Fl. & Fr. : August-January.

Common in wastelands in comparatively dry habitats; Paloda.

2. **L. reticulata** (Retz.) Wt. & Arn. in Wt. Contrb. Ind. Bot. 47.1834; Wight, Icon. 2(1) : 4. t. 350. 1840; Hook. f. Fl. Brit. India 4 : 63. 1883; Duthie, Fl. Gangetic Plain 2 : 63. 1911; Bullock. in Kew Bull. 10 : 291. 1955; Sant. & Irani in Univ. Bomb. Bot. Mem. No. 4 : 60. 1962. *Cynanchum reticulatum* Retz. Obs. Bot. 2 : 15. 1781. 'Jhumka' (Hindi).

Twining, much branched shrubs. Leaves ovate to lanceolate, 3-10 x

1.5-4.0 cm, entire, acute or acuminate. Flowers greenish-yellow, in lateral, unibellate cymes. Corolla-lobes valvate. Corolline corona of 5, fleshy, quadrate-truncate lobes. Staminal corona annular. Anthers without terminal appendages. Follicles 5-8 cm long, smooth, with recurved beak. Seeds ovate-oblong, flat-margined; coma 3-4 cm long.

Fl. : May-November; *Fr.* : November-March.

Common in wastelands, open forests and on the edges of fields and gardens; Paloda.

5. MARSDENIA R. Br.

Marsdenia tenacissima (Roxb.) Moon, Cat. Pl. Cey. 21. 1824; Wight, Icon. 2(3) : 7. t. 590. 1842; Hook. f. Fl. Brit. India 4 : 35. 1883; Duthie, Fl. Gangetic Plain 2 : 57. 1911; Sant. & Irani in Univ. Bomb. Bot. Mem. No. 4 : 62. 1962. *Asclepias tenacissima* Roxb. Pl. Cor. 3 : 35. t. 240. 1819.

Extensive, woody twiners, with sticky latex. Leaves ovate-cordate, 6-16 x 5-12 cm, abruptly acuminate. Flowers yellowish-green. Staminal corona basal, of linear, flattened lobes. Follicles paired, ovoid or lanceolate, 6-12 x 2-3 cm, tapering at the apex, acute, velvety pubescent. Seeds ovate-oblong; coma of white silky hairs, 3-4 cm long.

Fl. : March-June; *Fr.* : August-February.

Common on the edges of fields and gardens, in wastelands and open forests; Kushalgarh.

6. OXYSTELMA R. Br.

Oxystelma secamone (L.) Karst. Deut. Fl. 1031. 1880-83; Mahesh. Illus. Fl. Delhi f. 125. 1966. *Periploca secamone* L. Mant. 2 : 216. 1771. *P. esculentum* L. f. Suppl. 168. 1781. *Oxystelma esculentum* (L. f.) R. Br. in Mem. Wern. Soc. 1 : 40. 1811; Hook. f. Fl. Brit. India 4 : 17. 1883; Duthie, Fl. Gangetic Plain 2 : 51. 1911. 'Dudhi-ki-Bel' (Hindi).

Much branched, twinning, perennial herbs. Leaves linear-lanceolate, 4-9 x 0.4-0.6 cm. Flowers white outside, pink inside, in drooping, lateral, subumbellate cymes. Corolla rotate. Outer staminal corona of a fleshy cup, adnate to the base of column; the inner corona of 5, free lobes, 2-keeled within. Follicles ovoid-lanceolate, 3-8 x 1 cm, tapering at both ends. Seeds ovate; coma upto 2 cm long.

Fl. & *Fr.* : April-December.

Rare, in marshy habitats in association with *Typha angustata* Bory & Chaub.; Kushalgarh, Banswara.

7. PERGULARIA L.

Pergularia daemia (Forsk.) Chiov. Result. Sc. Miss. Stefan.-Paoli Somal.

Ital. I : 115. 1916; Sant. & Irani in Univ. Bomb. Bot. Mem. No. 4 : 74. 1962. *Asclepias daemia* Forsk. Fl. Aegypt.-Arab. 51. 1775. *Cynanchum extensum* N. Jacq. Misc. Aust. Bot. 2 : 353. 1782. *Daemia extensa* (N. Jacq.) R. Br. in Mem. Warn. Soc. 1 : 50. 1811; Wight, Icon. 2(3) : 7. t. 596. 1842; Hook. f. Fl. Brit. India 4 : 20. 1883; Duthie, Fl. Gangetic Plain 2 : 52. 1911. 'Dudhi' (Hindi).

Extensive twining, hispid shrubs. Leaves ovate-suborbicular, 3-9 x 2.5-6.0 cm, acuminate; base deeply cordate. Flowers greenish-yellow, in lateral, pendulous, corymbose cymes. Basal staminal corona of 5-lobed membrane; upper corona of 5, laterally compressed lobes, adnate to the anthers. Follicles lanceolate, 5-8 x 1.0-1.5 cm. Seeds ovate, dentate-margined; coma silky-white, hairy, 3-4 cm long.

Fl. & Fr. : August-January.

Common among bushes on the edges of fields and gardens, fringes of forests and in wastelands; Paloda.

8. TYLOPHORA R. Br.

Tylophora hirsuta (Wall.) Wt. & Arn. in Wt. Contrib. Ind. Bot. 49. 1834; Hook. f. Fl. Brit. India 4 : 43. 1883; Duthie, Fl. Gangetic Plain 2 : 61. 1911. *Gymnema hirsutum* Wall. Tent. Fl. Nep. 50. 1826; Wight, Icon. 4(1) : 16. t. 1272. 1848.

Twining herbs. Leaves ovate-lanceolate, 4.5-12.0 x 1.5-8.0 cm, wavy-margined, acute or abruptly acuminate, glabrous or pubescent. Flowers pale-green, in few-flowered, umbellate cymes. Calyx-segments hirsute. Corolla puberulous inside, lobes imbricate. Follicles ovate-lanceolate, 3.5-7.0 cm long, tapering upwards, glabrous.

Fl. & Fr. : July-November.

Rare, in forests in shady habitats; Puna Pathar forest, Hura Bowji forest.

9. WATTAKAKA Hassk.

Wattakaka volubilis (L. f.) Stapf in Curtis, Bot. Mag. sub. t. 8976. 1923; Huber in Abeywickrama, Fl. Cey. 1 : 50. 1973. *Asclepias volubilis* L. f. Suppl. 170. 1781. *Dregea volubilis* (L. f.) Benth. ex Hook. f. Fl. Brit. India. 4 : 46. 1883; Sant. & Irani in Univ. Bomb. Bot. Mem. No. 4 : 42. pl. 6. 1962; Mahesh. Illus. Fl. Delhi f. 126. 1966. *Marsdenia volubilis* (L. f.) Cooke, Fl. Pres. Bomb. 2 : 166. 1904; Duthie, Fl. Gangetic Plain 2 : 56. 1911. 'Hiran-Dudhi' (Hindi).

Twining shrubs. Leaves ovate, 6-12 x 4-8 cm, shortly acuminate, rounded or cordate at base. Corolla-lobes imbricate. Corona-lobes spreading, stellate, ending in small, cuspidate points. Follicles ovoid, 5-9 x 2-4 cm,

obtuse, tomentose. Seeds ovate; coma 4-5 cm long.

Fl. & Fr. : April-September.

Common in wastelands, open forests and on the edges of fields and gardens; Shergarh forest, Banswara (*Verma* 254, BSA), Bhapor (*Kanodia* 75203, BSI).

60. PERIPLOCACEAE

1a. Flowers yellowish, 0.5-2.0 cm long :

2a. Lateral nerves of leaves united with intra-marginal nerve.

Corolla-lobes imbricate.

Cryptolepis 1

2b. Lateral nerves of leaves free from intra-marginal nerve.

Corolla-lobes valvate.

Hemidesmus 3

1b. Flowers purplish-white, 5-8 cm long.

Cryptostegia 2

1. CRYPTOLEPIS R. Br.

Cryptolepis buchananii Roem. & Schult. Syst. Veg. 4 : 409. 1819; Wight, Icon. 2(2) : 6, t. 494. 1841; Hook. f. Fl. Brit. India 4 : 5. 1883; Duthie, Fl. Gangetic Plain 2 : 45. 1911; Sant. & Irani in Univ. Bomb. Bot. Mem. No. 4 : 91. 1962. 'Karmata-ki-bel' (Hindi).

Twining shrubs, with lenticelled stem. Leaves elliptic-oblong or ovate-oblong, 6-14 x 2.5-8.0 cm, shortly acuminate. Flowers in axillary, panicled cymes. Corolline-corona of 5, clavate scales. Filaments free. Follicles divariccate, 3-quetrous, 8-12 x 1.2-2.5 cm, pointed at the apex. Seeds ovate-oblong; coma white, 3-4 cm long.

Fl. : June-July; *Fr.* : August-November.

Common on the fringes of forests; Rowal Hindvela forest, Bhapor (*Kanodia* 75211, BSI).

2. CRYPTOSTEGIA R. Br.

Cryptostegia grandiflora R. Br. ex Lindl. in Bot. Reg. 5 : t. 435. 1820; Wight, Icon. 3(2) : 3, t. 832. 1844; Hook. f. Fl. Brit. India 4 : 6. 1883; Sant. & Irani in Univ. Bomb. Bot. Mem. No. 4 : 93. 1962; Raizada, Suppl. Duthie, Fl. Gangetic Plain 152. 1976. *Nerium grandiflorum* Roxb. Fl. Ind. 2 : 11. 1824. 'Rubber-ki-bel, Rubber-gugli' (Hindi).

Straggling shrubs. Leaves elliptic-oblong, 7-10 x 3-5 cm. Flowers in 2 to 3-chotomous cymes. Corona-lobes divided into two filiform segments. Follicles woody, divariccate, 3-winged or angled, 10-13 x 3-4 cm. Seeds ovate, silky, upto 4 cm long.

Fl. : April-September; *Fr.* : October-January.

Native of Tropical America; naturalized in wastelands; Pipalkhund,

3. HEMIDESMUS R. Br.

Hemidesmus indicus (L.) R. Br. in Ait. Hort. Kew. ed. 2.2 : 75. 1811; Wight, Icon. 2(3) : 7. t. 594. 1842; Hook. f. Fl. Brit. India 4 : 5. 1883; Duthie, Fl. Gangetic Plain 2 : 45. 1911 ; Sant. & Irani in Univ. Bomb. Bot. Mem. No. 4 : 96. 1960. *Periploca indica* L. Sp. Pl. 211. 1753. 'Dudhli' (Hindi).

Scandent undershrubs, with thick root-stock. Leaves linear-lanceolate to elliptic, 5.5-15 x 0.8-1.5 cm. Flowers dull yellow with purple eye, in axillary, subsessile cymes. Follicles in pairs, divaricate, 10-15 x 0.5-1.0 cm, tapering towards apex. Seeds elliptic-oblong; coma upto 4 cm long.

Fl. & Fr. : October-May.

Common in rocky habitats, especially on the hills; Ghatol (*Kanodia* 75473, BSI).

61. SPIGELIACEAE

MITREOLA L.

Mitreola petiolata (J.F. Gmel.) Torr. & A. Gray, Fl. North Amer. 2 : 45. 1845. *Ophiorhiza mitreola* L. Sp. Pl. 150. 1753. *Cynoctonum petiolatum* J.F. Gmel. Syst. Nat. ed. 13.2 : 443. 1791. *Mitreola paniculata* Wall. ex G. Don, Gard. Dict. 4 : 171. 1837; Wight, Icon. 4(4) : 14. t. 1600. 1850. *M. oldenlandioides* G. Don, Gard. Dict. 4 : 172. 1837, *nom. illegit.*; Clarke in Hook. f. Fl. Brit. India 4 : 79. 1883; Duthie, Fl. Gangetic Plain 2 : 68. 1911.

Erect, annual herbs, 10-50 cm high. Stem 4-angled, narrowly winged. Leaves ovate-lanceolate to deltoid, 2.5-6.0 x 1.5-3.0 cm, acute. Stipules broadly deltoid or ovate-oblong, intrapetiolar, often connate and reduced to a transverse ridge. Flowers white, unilateral, in dichotomous cymes on cincinniform branches. Bracts and bracteoles linear, persistent. Capsules wedge-shaped, deeply emarginate, 4-5 mm broad, 2-horned; horns incurved. Seeds ellipsoid, 3-gonous, with a ventral cavity.

Fl. & Fr. : September-December.

Common in wet and shady habitats in forests; Puna Pathar forest, Bhapor (*Kanodia* 75222, BSA).

Notes : *Mitreola* L. (Op. Var. 214. 1758) is the correct name for this taxon, as it antedates *Mitreola* Boehm. ex Ludwig (October, 1760), *Mitreola* Schaeff. (October-December 1760) and *Cynoctonum* J. F. Gmel. (1791). *Mitreola* Boehm. ex Ludwig is a superfluous name for *Ophiorhiza* L., and *Miterola* Schaeff. is a later homonym of *Mitreola* Boehm. ex Ludwig.

62. GENTIANACEAE

1a. Flowers sessile, in axillary clusters.

Enicostema 2

1b. Flowers pedicellate, solitary or in dichotomous cymes :	
2a. Flowers regular. Ovary 2-celled. Stigma 1, capitate.	<i>Exacum</i> 3
2b. Flowers irregular. Ovary 1-celled. Stigmas 2, rarely 1 and 2-lobed :	
3a. Flowers yellow, not more than 5 mm long. Stamen solitary. Stigma 1, 2-lobed.	<i>Hoppea</i> 4
3b. Flowers white, pink or lilac, more than 5 mm long. Stamens 4. Stigmas 2,	<i>Canscora</i> 1

1. **CANSORA** Lam.

1a. Pedicel and calyx quadrialate.	<i>C. decussata</i> 2
1b. Pedicel and calyx not alate :	
2a. Stem 4-winged.	<i>C. decurrens</i> 1
2b. Stem 4-angled, not winged.	<i>C. diffusa</i> 3

1. **Cansora decurrens** Dalz. in Kew Journ. Bot. 2 : 136. 1850; Clarke in Hook. f. Fl. Brit. India 4 : 103. 1883; Ramamoorthy in Sald. & Nicol. Fl. Hassan Dist. 423. 1976.

Erect, annual herbs, upto 30 cm high. Stem 4-winged; branches opposite and alternate. Leaves sessile, ovate, 3-5 x 1.0-2.5 cm, decurrent along the stem, acute, scabrid along the margins. Flowers pale-rose or white, in subtrichotomous cymes. Pedicels and calyx not winged.

Fl. & Fr. : October-December.

Occasional, in wet and shady habitats; Jhola (*Kanodia* 51148, BSI).

2. **C. decussata** (Roxb.) J.A. Schult. & J.H. Schultes, Syst. Veg. Mant. 3 : 229. 1827; Clarke in Hook. f. Fl. Brit. India 4 : 104. 1883; Duthie, Fl. Gangetic Plain 2 : 77. 1911. *Pladera decussata* Roxb. Fl. Ind. 1 : 418. 1820.

Erect, annual herbs, upto 60 cm high. Leaves sessile, ovate or oblong-lanceolate, 1.5-4.0 cm long, 3-nerved, acute. Flowers white, solitary or in few-flowered cymes. One stamen longer than other three. Capsules oblong, membranous, shorter than calyx.

Fl. & Fr. : September-November.

Common in wet and shady habitats in forests; Wadita Hillage forest, Bari Ghata forest (*Kanodia* 75403, BSI).

3. **C. diffusa** (Vahl) R. Br. ex Roem. & Schult. Syst. Veg. 3 : 301. 1820; Clarke in Hook. f. Fl. Brit. India 4 : 103. 1883; Duthie, Fl. Gangetic Plain 2 : 76. 1911. *Gentiana diffusa* Vahl, Symb. Bot. 3 : 47. 1794. *Canscora lawii* Wight, Icon. 4(2) : 7. t. 1327. 1848.

Erect, annual, glabrous herbs, upto 30 cm high. Leaves ovate-lanceolate, 1.5-5.0 x 0.8-2.5 cm, 3-nerved, acute, lower ones petiolate. Flowers pink, in paniculate cymes. Pedicels filiform. Anthers dimorphic, oblong or sagittate to hastate. Capsules narrowly oblong, as long as calyx, membranous.

Fl. & Fr. : October-March.

Common in forests in wet and shady habitats in association with *Hoppea dichotoma* Willd.; Puna Pathar forest, Bhandaria (*Kanodia* 51036, BSI).

2. ENICOSTEMA Blume *nom. cons.*

Enicostema verticillatum (L.) Engler, Pflanzenw. Ostafr. C : 313. 1895. *Gentiana verticillata* L. Syst. ed. 10. 952. 1759. *Exacum hyssopifolium* Willd. Sp. Pl. 1 : 640. 1798. *Enicostema littorale* Blume, Bijdr. 848. 1826; Clarke in Hook. f. Fl. Brit. India 4 : 101. 1883; Duthie, Fl. Gangetic Plain 2 : 73. 1911. *E. hyssopifolium* (Willd.) Verdoon in Bothalia 7 : 462. 1961; Mahesh. Illus. Fl. Delhi f. 129. 1966. 'Nawri' (Hindi).

Erect or procumbent, annual herbs, 40 cm high. Leaves elliptic-lanceolate to linear-lanceolate, 2.5-6.0 x 0.2-1.0 cm, 3-nerved, obtuse. Flowers white. Filaments with double hooded scales at the base; anthers sagittate. Capsules ovoid-oblong, 3-5 x 2 mm, 2-valved. Seeds globose, foveolate.

Fl. & Fr. : August-November.

Common in wastelands, cultivated fields and on the hills. Plants growing in dry habitats are dwarf; Dapia Bowji hill, Ghatol, Banswara (*Verma* 205, BSA), Deri-wali-Dungri (*Kanodia* 75161, BSI).

3. EXACUM L.

Exacum pedunculatum L. Sp. Pl. 112. 1753; Clarke in Hook. f. Fl. Brit. India 4 : 97. 1883; Duthie, Fl. Gangetic Plain 2 : 72. 1911. *E. pedunculare* Arn. in Ann. Sc. Nat. (ser. 2) 11 : 176. 1836; Wight, Icon. 2(1) : 2. t. 336. 1840.

Erect, annual herbs, 20-30 cm high. Leaves opposite, elliptic or lanceolate, 3-5 x 0.5-1.0 cm, entire, obtuse, 3-nerved. Flowers bluish-purple, in terminal cymes. Calyx-tube cup-shaped; lobes 4, ovate, acute, with a wedge-shaped wing extending from apex to the base on the outer surface. Anthers sagittate at the base, not spirally twisting after anthesis. Capsules globose, glabrous, membranous.

Fl. & Fr. : October-March.

Rare, in wet and shady habitats, particularly along the streams in forests; Banswara (*Majumdar* 10265, BSA).

4. HOPPEA Willd.

Hoppea dichotoma Heyne ex Willd. in Ges. Naturf. Fr. Neue Schr. 3 : 435. 1801; Clarke in Hook. f. Fl. Brit. India 4 : 100. 1883; Duthie, Fl. Gangetic Plain 2 : 76. 1911; Raynal in Adansonia 6 : 546. 1967. 'Ramjetta' (Hindi).

Annual, pale-green herbs, upto 15 cm high. Leaves ovate, upto 1.0 x 0.5

cm, 3-nerved. Flowers 4-merous, in dichotomous cymes. Calyx-lobes 4, with green veins prolonged into an apiculate tip. Corolla included. Capsules oblong, 2-valved, shorter than calyx. Seeds ovoid, red or brown.

Fl. & Fr. : October-February.

Common in wet and shady habitats, specially on rocks on the banks of water streams in forests; Khora forest, Kushalgarh (*Kanodia* 75734, BSI).

63. MENYANTHACEAE

NYMPHOIDES Hill

- 1a. Petals glandular, crested with 3 longitudinal folds, not laciniate. Seeds tuberculate. *N. cristata* 1
- 1b. Petals eglandular, laciniate, not crested. Seeds smooth. *N. indica* 2

1. ***Nymphoides cristata* (Roxb.) Kuntze**, Rev. Gen. Pl. 2 : 429. 1891; Subram. Aquatic Ang. 24. f. 16. 1962. *Menyanthes cristata* Roxb. Pl. Cor. 2 : 3. t. 105. 1798. *Limnanthemum cristatum* (Roxb.) Griseb. Gen. Sp. Gent. 342. 1839; Clarke in Hook. f. Fl. Brit. India 4 : 131. 1883; Duthie, Fl. Gangetic Plain 2 : 79. 1911. 'Kumudni' (Hindi).

Attached or floating herbs, with erect or oblique rhizomes embedded in the mud. Rhizomes bear scaly leaves, from the axils of which petiole like branches develop and come above the water surface, form a node which bears a tuft of fibrous roots below and a whorl of flowers, leaves and similar petiole-like branches above. Leaves orbicular-elliptic, with a triangular sinus at the base. Sepals obtuse. Corolla white with yellow base; lobes obovate-oblong. Fruits oblong-ovoid, 7-9 x 3-4 mm, with styles at the apex and calyx at the base.

Fl. & Fr. : January-November.

Common in ponds and tanks in association with *Hydrilla verticillata* (L.) Royle. Usually one flower of a cluster opens at one time; Lamero tank, Chandan Singh-ki-Bassi, Bhongra (*Kanodia* 75447, BSA).

2. ***N. indica* (L.) Kuntze**, Rev. Gen. Pl. 2 : 429. 1891; Subram. Aquatic Ang. 24. pl. 2. f. 17. 1962. *Menyanthes indica* L. Sp. Pl. 145. 1753. *Limnanthemum indicum* (L.) Griseb. emend. Thw. Enum. Pl. Zeyl. 205. 1860; Clarke in Hook. f. Fl. Brit. India 4 : 131. 1883; Duthie Fl. Gangatic Plain 2 : 79. 1911. 'Kumudni' (Hindi).

Attached or floating herbs. Rhizomes bear scale-like leaves; from the axils of latter, petiole-like branches come over the water surface and form a node which bears a tuft of fibrous roots below and a whorl of flowers, leaves and similar ~petiole-like branches above. Sepals acute. Corolla white with yellow base. Fruits oblong-ovoid, 7-9 x 3-4 mm.

Fl. & Fr. : February-October.

Rare, in tanks and ponds in association with other aquatic weeds;

Banswara (*Verma* 218, BSA).

64. HYDROPHYLACEAE

HYDROLEA L. *nom. cons.*

Hydrolea zeylanica (L.) Vahl, Symb. Bot. 2 : 46. 1791; Wight, Icon. 2(3) : 8. t. 601. 1842; Clarke in Hook. f. Fl. Brit. India 4 : 133. 1883; Duthie, Fl. Gangetic Plain 2 : 80. 1911. *Nama zeylanica* L. Sp. Pl. 226. 1753.

Erect or decumbent, annual herbs, rooting on the lower nodes. Leaves oblong to lanceolate, 3-5 x 0.5-1.5 cm. Flowers lilac-blue, solitary or in short, glandular-pubescent racemes or cymes. Bracts lanceolate, glandular. Sepals lanceolate, acute, glandular-hairy. Capsules ellipsoid, 4-5 mm long, glabrous, membranous, many-seeded.

Fl. & Fr. : September-November.

Common in the rice-fields, low-lying areas, ponds etc; Kushalgarh.

65. BORAGINACEAE

- | | |
|--|-----------------------|
| 1a. Flowers in spicate or racemiform helicoid or scorpioid cymes. | <i>Heliotropium</i> 2 |
| 1b. Flowers solitary or in few-flowered racemes, spikes or cymes : | |
| 2a. Calyx winged or angled at the base. Ovary deeply 4-lobed.
Style gynobasic. | <i>Trichodesma</i> 3 |
| 2b. Calyx neither winged nor angled. Ovary undivided or slightly
4-lobed. Style terminal. | <i>Coldenia</i> 1 |

1. COLDENIA L.

Coldenia procumbens L. Sp. Pl. 125. 1753; Clarke in Hook. f. Fl. Brit. India 4 : 144. 1883; Duthie, Fl. Gangetic Plain 2 : 88. 1911; Mahesh. Illus. Fl. Delhi f. 131. 1966.

Deep-rooted, procumbent, white-hairy herbs. Leaves obovate-oblong, 2.5-4.0 x 1-2 cm, crenate-crisped to subpinnatifid, oblique and cuneate at base. Flowers yellow or white, axillary, solitary. Calyx-lobes ovate. Corolla-lobes spreading. Styles 2-fid or two. Drupes pyramidal, 4-lobed, separating into 4, 1-seeded pyrenes, pubescent.

Fl. & Fr. : February-May.

Common in dry habitats, particularly on rocky grounds in association with *Heliotropium ovalifolium* Forsk.; Talwara, Banswara (*Verma* 221, BSA; *Kanodia* 51088, BSI).

2. HELIOTROPIUM L.

- | | |
|---|------------------------|
| 1a. Anthers connivent by their tips in buds : | |
| 2a. Spikes bracteate throughout. | <i>H. marifolium</i> 1 |

- 2b. Spikes ebracteate in the upper part. *H. strigosum* 3
 1b. Anthers free, not connivent by their tips :
 3a. Calyx-lobes short, almost equal in size. Calyx enveloping the fruit. *H. supinum* 4
 3b. Calyx-lobes long, narrow, very unequal in size. Calyx not enveloping the fruit. *H. ovalifolium* 2

1. *Heliotropium marifolium* Retz. Obs. Bot. fasc. 2 : 8. 1781; Wight, Icon. 4(2) : 17. t. 1390. 1848; Clarke in Hook. f. Fl. Brit. India 4 : 152. 1883; Duthie, Fl. Gangetic Plain 2 : 93. 1911. *H. scabrum* Retz. Obs. Bot. fasc. 2 : 8. 1781; Clarke, l.c. 4 : 152. 1883. *H. marifolium* Retz. var. *wallichii* Clarke, l.c. 4 : 152. 1883. *H. marifolium* Retz. subsp. *wallichii* (Cl.) Kazmi in Journ. Arn. Arb. 51 : 133. 1970.

Prostrate or decumbent, hispid, perennial herbs. Leaves linear-lanceolate or oblanceolate, appressed hairy. Flowers white. Bracts foliaceous, lanceolate. Separated anthers carrying small disc at their tip. Style terminal. Nutlets 4, with rounded, hispid back.

Fl. & Fr. : August-October.

Common in wastelands; Paloda, Nathela tank (*Kanodia* 75345, BSI), Raj tank (*Kanodia* 75226, BSI).

Notes : Very close to *H. strigosum* Willd. The character of bracts, which is generally used to distinguish these two species, does not hold good. It may be merged under *H. strigosum* Forsk.

2. *H. ovalifolium* Forsk. Fl. Aegypt.-Arab. 38. 1775; Clarke in Hook. f. Fl. Brit. India 4 : 150. 1883; Duthie, Fl. Gangetic Plain 2 : 92. 1911; Johnston in Journ. Arn. Arb. 32 : 111. 1951; Kazmi in Journ. Arn. Arb. 51(2) : 178. 1970. *H. coromandelianum* Retz. Obs. Bot. 2 : 9. 1781; Wight, Icon. 4(2) : 17. t. 1388. 1848.

Prostrate or decumbent herbs, clothed with grey, appressed hairs. Leaves petiolate, elliptic, oblanceolate or obovate, 1-4 x 0.4-1.5 cm. Flowers white. Bracts absent or in upper part only. Ovaries minutely pubescent or glabrous, 4-celled; stigmas sessile, bidentate. Nutlets 4, hispid on the back.

Fl. & Fr. : February-June.

Common in drying ponds and dry rocky habitats; Talwara, Banswara (*Verma* 220, BSA), Raj tank (*Kanodia* 75226A, BSI).

3. *H. strigosum* Willd. Sp. Pl. 1 : 743. 1798; Clarke in Hook. f. Fl. Brit. India 4 : 151. 1883; Duthie, Fl. Gangetic Plain 2 : 93. 1911; Johnston in Journ. Arn. Arb. 32 : 112. 1951; Kazmi in Journ. Arn. Arb. 51(2) : 152. 1970. 'Arkali' (Hindi).

Deep-rooted, erect, procumbent or prostrate, strigose, annual herbs. Leaves linear-lanceolate, acute or obtuse. Flowers white. Bracts linear-lanceolate, 1-3 mm long. Calyx strigose outside. Corolla-lobes apiculate, strigose outside. Anthers ovate-lanceolate, thickened and coherent at the

tip. Stigmas with disc and superimposed, narrowly conical, sterile appendages. Nutlets 4, appressed hairy in upper half, the inner face with a circular depression in the centre.

Fl. & Fr. : August-January.

Common in wastelands and open forests; Shergath forest.

4. *H. supinum* L. Sp. Pl. 130. 1753; Wight, Icon. 4(2) : 17. t. 1387. 1848; Clarke in Hook. f. Fl. Brit. India 4 : 149. 1883; Duthie, Fl. Gangetic Plain 2 : 91. 1911. *H. malabaricum* Retz. Obs. Bot. 4 : 24. 1786. *H. supinum* L. var. *malabaricum* (Retz.) Clarke, l.c. 4 : 149. 1883.

Prostrate or decumbent, villous herbs. Leaves petiolate, elliptic, ovate or suborbicular, plicate, 1.2-3.0 x 1-2 cm. Flowers white. Bracts absent. Style terminal. Fruits ovate to subglobose; nutlets 2-4.

Fl. & Fr. : March-May.

Abundant in drying ponds along the roads; Danpur, Banswara (*Verma* 227, BSA).

3. TRICHODESMA R. Br. *nom. cons.*

Trichodesma sedgwickianum Benerj. in Bull. Bot. Soc. Beng. 16 : 10. 1963; Benerj. & Pramanik in Bull. Bot. Surv. Ind. 17 : 116. f. A-D. 1978. *T. amplexicaule* DC. Prodr. 10 : 172. 1846, non Roth, 1821. *T. amplexicaule* auct. plur. non Roth, 1821; *sensu* Clarke in Hook. f. Fl. Brit. India 4 : 153. 1883, pro parte. *T. indicum* (L.) R. Br. var. *amplexicaule* Cooke, Fl. Pres. Bomb. 2 : 215. 1905, pro parte, non *T. amplexicaule* Roth, 1821 & DC. 1846. *T. indicum* auct. plur. non R. Br. ex Lehm. 1818; *sensu* Duthie, Fl. Gangetic Plain 2 : 94. 1911, pro parte. 'Salkanta' (Hindi).

Erect, annual, hispid herbs. Leaves sessile, opposite or alternate, ovate-oblong, scabrid with stiff, tubercle-based white hairs, obtuse, entire. Flowers violet, axillary, solitary. Calyx sagittate at the base, 5-angled; lobes ovate, acuminate. Corolla without scales in the throat. Anthers included, free; connectives inter-twisted into a cone. Nutlets polished on the back, smooth.

Fl. & Fr. : August-October.

Frequent weed in wastelands and along the roads; Danpur, Kalinjra (*Kanodia* 75644, BSI).

66. EHRETIACEAE

- 1a. Ovaries 2-celled; endocarp 2 to 4-lobed. Styles 2-fid.
- 1b. Ovaries 4-celled; endocarp unlobed. Styles 4-fid.

Ehretia 2
Cordia 1

1. CORDIA L.

- 1a. Leaves glabrous or slightly pubescent beneath. Calyx not ribbed. *C. dichotoma* 1

1b. Leaves densely tomentose beneath. Calyx ribbed.

C. macleodii 2

1. *Cordia dichotoma* Forst. f. Prodr. 18. 1786; Kazmi in Journ. Arn. Arb. 51(2) : 141. 1970. *C. obliqua* Willd. Phytogr. 4. t. 4. 1794; Wight, Icon. 4(2) : 15. t. 1378. 1848; Clarke in Hook. f. Fl. Brit. India 4 : 137. 1883, excl. vars. *C. myxa* auct. plur. non L. 1753; Duthie, Fl. Gangetic Plain 2 : 82. 1911. 'Lesua, Gunda, Lisora' (Hindi).

Deciduous trees, with rough, fissured bark. Leaves broadly ovate to suborbicular or elliptic. Flowers white, in lax, dichotomous cymes. Calyx glabrous, completely enclosing the corolla in bud, accrescent. Filaments hairy at the base. Drupes globose or oblong, yellow or orange when ripe.

Fl. : February-April; *Fr.* : May-June.

Common in wastelands, on the fringes of forests and often along the roads; Danpur forest.

2. *C. macleodii* (Griff.) Hook. f. & Th. in Journ. Linn. Soc. 2 : 128. 1858; Brandis, For. Fl. North-West & C. Ind. 337. t. 41. 1874; Clarke in Hook. f. Fl. Brit. India 4 : 139. 1883; Duthie, Fl. Gangetic Plain 2 : 84. 1911; Kazmi in Journ. Arn. Arb. 51(2) : 140. 1970. *Hemigymnia macleodii* Griff. Calcutta Journ. Nat. Hist. 3 : 363. 1843. 'Bara-Lasua, Gunda, Padal' (Hindi).

Deciduous trees, with white, smooth bark. Leaves ovate-cordate, 6-15 x 3.5-12.0 cm, obtuse. Flowers white, in tomentose cymes. Calyx accrescent, obconic, tomentose. Filaments hairy at the base. Drupes ovoid-oblong, 2.0-2.5 cm in diameter.

Fl. : February-April; *Fr.* : April-June.

Rare, in open forests; Anand Sagar forest.

2. EHRETIA L.

Ehretia aspera Roxb. Pl. Cor. 1 : 41. t. 55. 1796; Duthie, Fl. Gangetic Plain 2 : 87. 1911. *E. obtusifolia* Hochst. ex DC. Prodr. 9 : 507. 1845; Clarke in Hook. f. Fl. Brit. India 4 : 142. 1883. *E. laevis* Roxb. var. *aspera* (Roxb.) Clarke, l.c. 4 : 142. 1883.

Deciduous trees. Leaves oblong-elliptic or obovate, upto 8 x 6 cm, hairy beneath. Flowers white, in terminal and axillary, paniculate cymes. Drupes globose, black and wrinkled when dry; pyrenes 4, bony.

Fl. : February-April; *Fr.* : May-July.

Rare, on the hills in forests. Flowers appear before leaf renewal; Kotharia forest.

67. CONVOLVULACEAE

1a. Styles 2, each 2-fid at the apex.

Evolvulus 3

1b. Style solitary, undivided or 2-fid at the apex :		
2a. Fruit indehiscent, with a leathery or woody pericarp :		
3b. Flowers white. Stigmas linear.		<i>Rivea</i> 6
3b. Flowers rosy, purple or violet, never white. Stigmas globose.		<i>Argyreia</i> 1
2b. Fruit dehiscent, thin-walled :		
4a. Pollen grains spinulose.		<i>Ipomoea</i> 4
4b. Pollen grains smooth, not spinulose :		
5a. Stigmas filiform.		<i>Convolvulus</i> 2
5b. Stigmas globose.		<i>Merremia</i> 5

1. ARGYREIA Lour.

Argyreia sericea Dalz. in Dalz. & Gibbs. Bomb. Fl. 169. 1861; Clarke in Hook. f. Fl. Brit. India 4 : 188. 1883; Raizada, Suppl. Duthie, Fl. Gangetic Plain 160. 1976.

Large, silvery twiners. Leaves ovate-cordate, 4.5-17 x 4-17 cm, strigose above, silvery-white beneath, acuminate. Flowers pink-purple, in axillary, capitate or subcapitate, pedunculate cymes. Bracts ovate-lanceolate, silvery, parallel-nerved. Corolla hairy. Pollens spinulose. Fruits globose, about 1.5 cm in diam., orange-coloured.

Fl. & Fr. : August-November.

Common in wastelands, open forests and along roads among the clumps of trees and shrubs; Bagaycha forest, Kushalgarh (*Kanodia* 75688, BSI).

2. CONVOLVULUS L.

Convolvulus prostratus Forsk. Fl. Aegypt.—Arab. 203. 1775. *C. microphyllus* Sieb. ex Spreng. Syst. Veg. I : 611. 1825; Wight, Icon. 4(2) : 13. t. 1367. 1848; Bole & Shah in Journ. Bomb. nat. Hist. Soc. 58(3) : 838. 1961. *C. pluricaulis* Choisy in Mem. Soc. Phys. Hist. Nat. Geneve 6 : 477. 1834; Clarke in Hook. f. Fl. Brit. India 4 : 218. 1883; Duthie, Fl. Gangetic Plain 2 : 105. 1911. *C. pluricaulis* Choisy var. *macra* Clarke, l.c. 4 : 218. 1883. ‘Santari’ (Hindi).

Prostrate or suberect, often diffuse, fulvous-pilose, perennial herbs, with woody root-stock. Leaves sessile to shortly petiolate, linear or oblong to oblanceolate, 8-20 x 2-8 mm. Flowers white or pinkish, subsessile, axillary, solitary or few-together or capitate on distinct, axillary peduncles. Capsules globose, hairy. Seeds black, pubescent.

Fl. & Fr. : Most part of the year.

Common in wastelands and forests; often becomes much robust on the hills; Rowal Hindvela forest, Ghatol (*Majumdar* 10218, BSA), Bhoothkheri (*Kanodia* 75517, BSI).

3. EVOLVULUS L.

Evolvulus alsinoides (L.) L. Sp. Pl. ed. 2. 392. 1762; Clarke in Hook. f. Fl. Brit. India 4 : 220. 1883; Duthie, Fl. Gangetic Plain 2 : 104. 1911; Ooststr. in Blumea 3 : 74. 1938; Mahesh. Illus. Fl. Delhi f. 136. 1966. **Convolvulus alsinoides** L. Sp. Pl. 157. 1753.

Prostrate or erect, annual herbs, clothed with long, spreading hairs. Leaves oblong or lanceolate, 1.0-2.5 x 0.3-1.0 cm, obtuse, mucronulate. Flowers white or blue. Peduncles axillary, upto 2 cm long, 1 to 3-flowered. Calyx-lobes acute, two longer than others, hairy, ciliate. Stamens included. Pollens smooth. Capsules globose, 4-valved. Seeds 4, black, smooth.

Fl. & Fr. : July-November.

Fairly common in wastelands in dry habitats; Paloda, Banswara (*Verma* 208, BSA), Bhookhri (*Kanodia* 75515, BSI).

4. IPOMOEA L.

- 1a. Leaves entire or angled, not deeply palmately lobed :
 - 2a. Diffuse shrubs. *I. fistulosa* 5
 - 2b. Herbaceous or woody twiners, climbers or creepers :
 - 3a. Floating aquatic or creeping marshy herbs. Stem rooting on the nodes. *I. aquatica* 1
 - 3b. Terrestrial plants. Stem not rooting on the nodes :
 - 4a. Flowers in sessile or subsessile, head-like, axillary clusters :
 - 5a. Fruits hairy. Seeds glabrous. *I. eriocarpa* 4
 - 5b. Fruits glabrous. Seeds hairy. *I. sindica* 12
 - 4b. Flowers in pedunculate cymes or pedicelled and solitary axillary :
 - 6a. Stem muricated. *I. muricata* 6
 - 6b. Stem not muricated :
 - 7a. Outer sepals sagittate, hastate or cordate at the base. *I. sinensis* 13
 - 7b. Outer sepals obtuse at the base :
 - 8a. Leaves white tomentose beneath. *I. arachnosperma* 2
 - 8b. Leaves glabrous on both sides :
 - 9a. Peduncles 1 to 3-flowered. Sepals acute at the tip. *I. obscura* 8
 - 9b. Peduncles more than 3-flowered. Sepals obtuse at the tip :
 - 10a. Leaf-base cordate. *I. septaria* 10
 - 10b. Leaf-base hastate. *I. septaria* var. *stipulacea* 11
 - 1b. Leaves palmately lobed or palmately compound :
 - 11a. Flowers sessile, clustered in axillary, pedunculate heads. *I. pes-tigridis* 9
 - 11b. Flowers pedicellate, solitary or in cymes :
 - 12a. Leaves 3-lobed in the upper half. Flowers more than 25 mm long. *I. nil* 7
 - 12b. Leaves deeply palmately 3 to 7-lobed or often 3 to 7-foliate. Flowers upto 25 mm long. *I. coptica* 3

1. *Ipomoea aquatica* Forsk. Fl. Aegypt.-Arab. 44. 1775; Clarke in Hook. f. Fl. Brit. India 4 : 210. 1883; Ooststr. in Blumea 3 : 528. 1940; Mahesh. Illus. Fl. Delhi f. 139. 1966. *Convolvulus repens* Vahl, Symb. Bot. 1 : 17. 1790, non L. 1753. *Ipomoea reptans* Poir. in Lam. Encycl. Meth. Bot. Suppl. 3 : 460. 1814, non *Convolvulus reptans* L. 1753; Duthie, Fl. Gangetic Plain 2 : 114. 1911. *Ipomoea repens* (Vahl) Roth, Nov. Pl. Sp. 110. 1821, non *Convolvulus repens* L. 1753. 'Nali' (Hindi).

Floating or creeping, aquatic or marshy herbs, rooting on the nodes. Leaves variable, ovate to oblong, lanceolate or linear, 4-8 x 1-5 cm, with cordate, hastate or sagittate base. Flowers pale-rosy or purple, in axillary, 1 to 5-flowered, pedunculate cymes. Sepals obtuse, glabrous. Corolla 3-6 cm long. Capsules ovoid-globose, glabrous. Seeds minutely hairy.

Fl. & Fr. : Most part of the year.

Common in aquatic and semi-aquatic habitats; Lamaro tank, Banswara (Verma 216, BSA).

2. *I. arachnosperma* Welw. Apont. Phytogeogr. 588. 1859. *Convolvulus bicolor* Desr. in Lam. Encycl. 3 : 564. 1791, non *Ipomoea bicolor* Lam. 1791. *C. dichrous* Roem. & Schult. Syst. veg. 4 : 263. 1819, nom. illegit. *C. pilosus* Roxb. Fl. Ind. 2 : 55. 1824, non Rottl. 1803. *Ipomoea pilosa* Sweet, Hort. Brit. ed. 2. 289. 1827, non Houtt. 1777; Clarke in Hook. f. Fl. Brit. India 4 : 213. 1883; Duthie, Fl. Gangetic Plain 2 : 114. 1911.

Twining, annual herbs, clothed with long, spreading, glandular-based hairs. Leaves broadly ovate, 4.5-8.0 x 4-6 cm, entire or angled, acuminate, cordate-based. Flowers pink, in lax, axillary racemose cymes. Capsules subglobose, about 1 cm in diam., glabrous. Seeds cotton-hairy.

Fl. & Fr. : August-November.

Common along the boundaries of gardens. Flowers open in the morning hours; Kushalgarh (*Kanodia* 75728, BSI), Parsolia (*Kanodia* 75590, BSI).

3. *I. copita* (L.) Roth ex Roem. & Schult. Syst. Veg. 4 : 208. 1819; Ooststr. in Blumea 3 : 544. 1940; Mahesh. Illus. Fl. Delhi f. 142. 1966. *Convolvulus copticus* L. Mant. 2. App. 559. 1771. *Ipomoea dissecta* Willd. Phytogr. 5. t. 2. f. 3. 1794, nec Pers. 1797; Clarke in Hook. f. Fl. Brit. India 4 : 200. 1883; Duthie, Fl. Gangetic Plain 2 : 115. 1911.

Twining annuals. Leaflets serrate-dentate. Flowers white, pedunculate, axillary, solitary. Bracts lanceolate. Sepals oblong, minutely cuspidate, muriculate on the back. Capsules globose, 5-7 mm in diam. Seeds densely pubescent.

Fl. & Fr. : October-March.

Native of America; naturalized among bushes in wastelands and on the edges of fields and gardens; Loharia.

4. *I. eriocarpa* R. Br. Prodr. 484. 1810; Clarke in Hook. f. Fl. Brit.

India 4 : 204. 1883. *Convolvulus hispidus* Vahl, Symb. Bot. 3 : 29. 1794. *Ipomoea hispida* (Vahl) Roem. & Schult. Syst. Veg. 4 : 238. 1819, non Zucc. 1809; Duthie, Fl. Gangetic Plain 2 : 113. 1911. 'Ghiabato' (Hindi).

Twining or creeping, hispid, annual herbs. Leaves ovate-lanceolate, cordate, 3-8 x 1.5-5.0 cm, acuminate. Flowers white or pink. Sepals ovate, subequal, acuminate. Corolla about 1 cm long, pilose outside. Capsules ovoid or globose, 6-8 mm in diam., 2-celled, 4-valved.

Fl. & Fr. : August-October.

Rare, in forests among bushes; Puna Pathar forest, Loda tank (*Kanodia* 75316, BSI), Ghatol (*Verma* 7633, BSA).

5. *I. fistulosa* Mart. ex Choisy in DC. Prodr. 9 : 349. 1845; Mahesh. Illus. Fl. Delhi f. 138. 1966; Raizada, Suppl. Duthie, Fl. Gangetic Plain 163. 1976; Bhattachryya in Journ. Bomb. nat. Hist. Soc. 73(2) : 317. 1977. *Batatas crassicaulis* Benth. Bot. Voy. Sulph. 5 : 134. 1845. *Ipomoea crassicaulis* (Benth.) Robinson in Proc. Amer. Acad. Arts. Sci. 51 : 530. 1916. 'Nagar-Pan' (Hindi).

Stout shrubs, upto 3 m high. Stem fistular. Leaves broadly ovate-cordate, 5-20 x 3-10 cm, acuminate, wavy-margined. Cymes terminal, 1 to many-flowered. Sepals obtuse, pubescent. Corolla purple, 5-13 cm long. Stigma globular, capitate. Capsules ovoid, glabrous, upto 2 cm long, not hairy at the base. Seeds small, densely brown-villous.

Fl. & Fr. : Most part of the year.

Native of south America. Common in wastelands and along the roads, particularly near water resources it forms dense community. Very close to *I. carnea* Jacq.; Sainavasa.

6. *I. muricata* (L.) Jacq. Hort. Schoenbr. 3 : 40. t. 323. 1798; Clarke in Hook. f. Fl. Brit. India 4 : 197. 1883; Ooststr. in Blumea 3 : 551. 1940. *Convolvulus muricatus* L. Mant. Pl. 44. 1767. *Calonyction muricatum* (L.) G. Don, Gen. Syst. 4 : 264. 1838; Duthie, Fl. Gangetic Plain 2 : 118. 1911.

Twining herbs, with white latex. Leaves broadly ovate to suborbicular, cordate, 4-8 x 4-8 cm, acuminate. Flowers rose-purple or white, axillary, solitary or 2-5 on short, muricated peduncles. Pedicels thickened. Sepals awned at the apex. Corolla-tube upto 6 cm long. Capsules globose, 1.5 x 1.5-2.0 cm, glabrous, 4-seeded. Seeds black, glabrous.

Fl. & Fr. : September-November.

Common on the edges of fields and in wastelands among bushes; Danpur, Bhapor (*Kanodia* 75205, BSI).

7. *I. nil* (L.) Roth, Cat. Bot. 1 : 36. 1797; Ooststr. in Blumea 3 : 497. 1940; Mahesh. Illus. Fl. Delhi f. 145. 1966. *Convolvulus nil* L. Sp. Pl. ed. 2. 219. 1762. *Ipomoea hederacea* auct. plur. non Jacq. 1786; Clarke in Hook. f. Fl. Brit. India 4 : 199. 1883; Duthie, Fl. Gangetic Plain 2 : 116. 1911. 'Gheta' (Hindi).

Twining, perennial herbs. Leaves ovate-cordate, 3-7 x 2.5-8.0 cm,

appressed hairy. Flowers blue tinged with pink, in 1 to 5-flowered, axillary, peduncled cymes. Bracts linear. Sepals ovate, acuminate, 1.5-2.5 cm long, hirsute, ciliate, accrescent. Corolla 4-6 cm long. Capsules ovoid or globose, 1.0-1.5 cm in diam., 3-valved, 3-celled. Seeds pubescent.

Fl. & Fr. : August-November.

Common in wastelands and forests. Flowers close up before noon; Shergarh forest, Anand Sagar (*Kanodia* 75264, BSI).

8. *I. obscura* (L.) Ker-Gawl. Bot. Reg. 3 : t. 239. 1817; Clarke in Hook. f. Fl. Brit. India 4 : 207. 1883; Duthie, Fl. Gangetic Plain 2 : 215. 1911; Ooststr. in Blumea 3 : 519. 1940. *Convolvulus obscurus* L. Sp. Pl. ed. 2. 220. 1762. 'Ander-khali' (Hindi).

Twining, annual herbs. Leaves ovate to orbicular or reniform, 2-7 x 2-8 cm, cordate-based. Flowers white with yellow bands, axillary, solitary or 2 to 3-together on peduncles. Sepals subequal, about 5 mm long. Corolla 2-3 cm long. Capsules ovoid or globose, 2-celled. 4-valved. Seeds brown, velvety.

Fl. & Fr. : August-December.

Rare, among bushes in wastelands and on the edges of the fields; Chanduji-ka-Gada, Banswara (*Verma* 246, BSA), Ghatol (*Majumdar* 10243, BSA).

9. *I. pes-tigridis* L. Sp. Pl. 162. 1753; Wight, Icon. 3 (2) : 3. t. 836. 1844-1845; Clarke in Hook. f. Fl. Brit. India 4 : 204. 1883; Duthie, Fl. Gangetic Plain 2 : 116. 1911; Ooststr. in Blumea 3 : 504. 1940. *I. hepaticifolia* L. Sp. Pl. 161. 1753. *I. pes-tigridis* L. var. *hepaticifolia* (L.) Clarke, I.c. 4 : 204. 1883. 'Gheta' (Hindi).

Twining, hispid herbs. Leaves palmately 5 to 9-lobed; lobes elliptic-oblong. Flowers white or pink. Peduncles as long or longer than petioles. Bracts ovate-lanceolate, 1.5-3.0 cm long, forming an involucre. Calyx-lobes acuminate. Capsules ovoid, glabrous, enclosed in the calyx. Seeds 4, triangular, silky.

Fl. & Fr. : September-November.

Common weed in cultivated fields and grasslands. Flowers bloom in the afternoon; Kotharia, Lasara, Deri-wali-Dungri (*Kanodia* 75166, BSI).

10. *I. sepiaria* Koeh. ex Roxb. Fl. Ind. 2: 90. 1824 & 1 : 499. 1832; Clarke in Hook. f. Fl. Brit. India 4 : 209. 1883; Duthie, Fl. Gangetic Plain 2 : 115. 1911. *I. maxima* sensu auct. mult. non (L. f.) D. Don ex Sw. 1830; Ooststr. in Blumea 3 : 525. 1940. 'Phang' (Hindi).

Twining, perennial shrubs. Leaves triangular-ovate-cordate, 3.0-7.5 x 3.5 cm, acuminate. Flowers pale-lilac or white, 3 to many aggregated in umbellate cymes. Peduncles thick, long. Bracts elliptic, hyaline-margined. Capsules globose, 5-7 mm in diam., glabrous, 2-celled, 4-valved. Seeds tomentose.

Fl. & Fr. : August-October.

Occasional, among bushes along the roads and in wastelands; Ghatol, Banswara.

11. *I. sepiaria* Koen. ex Roxb. var *stipulacea* (Roxb.) Clarke in Hook. f. Fl. Brit. India 4 : 209. 1883. *Convolvulus stipulaceus* Roxb. Fl. Ind. 1 : 484. 1824. *Ipomoea stipulacea* (Roxb.) Sweet, Hort. Brit. 372. 1827, non Jacq. 1760. 'Phang' (Hindi).

Petioles with stipule-like small leaves in their axils. Calyx comparatively large and corolla small.

Fl. & Fr. : August-October.

Rare, among bushes along the roads and in wastelands; Banswara.

12. *I. sindica* Stapf in Kew Bull. 1894 : 346. 1894; Duthie, Fl. Gangetic Plain 2 : 113. 1911; Mahesh. Illus. Fl. Delhi f. 140. 1966. 'Rata-Bel' (Hindi).

Trailing or creeping, hirsute herbs. Leaves oblong to triangular-hastate or sagittate, 2.5-8.0 x 1-6 cm. Flowers white. Sepals ovate-lanceolate, acuminate, slightly enlarged in fruits. Corolla minutely pubescent outside. Capsules globose. Seeds black.

Fl. & Fr. : August-October.

Common in wastelands and open forests among grasses and bushes; Kotharia forest, Ghatol (*Kanodia* 75483, BSI), Deri-wali-Dugri (*Kanodia* 75435, BSA).

13. *I. sinensis* (Desr.) Choisy in Mem. Phys. Soc. Geneve 6 : 459. 1833; Verdcourt in Kew Bull. 1958 : 204. 1958. *Convolvulus sinensis* Desr. in Lam. Encycl. 3 : 557. 1792. *C. calycina* Fl. Ind. 2 : 51. 1824. *Ipomoea calycina* (Roxb.) Benth. ex Clarke in Hook. f. Fl. Brit. India 4 : 201. 1883; Duthie, Fl. Gangatic Plain 2 : 112. 1911.

Twining herbs, clothed with spreading hairs. Leaves ovate-cordate, 3-7 x 2.5-6.0 cm, acuminate. Flowers white, 1-3 on short, axillary peduncles. Bracts linear-lanceolate. Corolla upto 2.5 cm long, pilose outside. Capsules ovoid or globose, 0.8-1.2 x 0.7-1.0 cm, glabrous. Seeds 5-6 mm long, villous, fringed on the margins with soft, white hairs.

Fl. & Fr. : August-December.

Common among bushes in wastelands, open forests and on the edges of fields and gardens; Danpur, Anand Sagar (*Kanodia* 75280, BSI).

5. MERREMPIA Dennst. ex Endl. *nom. cons.*

1a. Leaves simple :

2a. Leaves petiolated, ovate-reniform, broader than long. Peduncles upto 5 mm long. Inner sepals 2-lobed at the apex.

M. emarginata 1

2b. Leaves subsessile, spatulate or oblanceolate, longer than broad. Peduncles more than 8 mm long. Inner sepals not lobed at the apex.

M. tridentata 3

1b. Leaves palmately 5-foliolate.

M. quinquefolia 2

1. *Merremia emarginata* (Burm. f.) Hall. f. Bot. Jahrb. 16 : 552. 1893; Duthie, Fl. Gangetic Plain 2 : 109. 1911. *Evolvulus emarginatus* Burm. f. Fl. Ind. 77. t. 30. f. 1. 1768. *Convolvulus reniformis* Roxb. Fl. Ind. 2 : 67. 1824 & 1 : 481. 1832. *Ipomoea reniformis* (Roxb.) Choisy in Mem. Soc. Phys. Geneve 6 : 446. 1834; Clarke in Hook. f. Fl. Brit. India 4 : 206. 1883. 'Popli' (Hindi).

Prostrate herbs, rooting on the nodes and sparsely clothed with white, spreading hairs. Leaves 1.2-2.5 x 1.5-3.0 cm, crenate. Flowers yellow, axillary, solitary or in 2 to 5-flowered cymose clusters. Sepals ciliate, outer 2 apiculate. Capsules subglobose, glabrous, 4-valved, enclosed in the calyx. Seeds dotted.

Fl. & Fr. : August-November.

Common in wastelands and forests in dry habitats; Puna Pathar forest.

2. *M. quinquefolia* (L.) Hall. f. in Bot. Jahrb. 16 : 552. 1893; Ooststr. in Blumea 3 : 324. 1940. *Ipomoea quinquefolia* L. Sp. Pl. 162. 1753. *Convolvulus quinquefolia* (L.) L. Syst. ed. 10. 923. 1759.

Twining, perennial herbs. Leaflets oblong-lanceolate, dentate or serrate. Flowers creamy-yellow, in 1 to 3-flowered, axillary racemose cymes; peduncles glandular with patent hairs. Outer sepals glabrous. Anthers often spirally twisted. Capsules 1 cm in diam., glabrous, 4-seeded. Seeds 3-gonous, minutely hairy.

Fl. & Fr. : August-December.

Rare, in wastelands among bushes; Ghatol (*Majumdar* 10241, BSA).

3. *M. tridentata* (L.) H. Hallier f. Bot. Jahrb. 16 : 552. 1893; Duthie, Fl. Gangetic Plain 2 : 108. 1911; Ooststr. in Blumea 3 : 315. 1940. *Convolvulus tridentatus* L. Sp. Pl. 157. 1753. *Ipomoea tridentata* (L.) Roth in Roem. & Schult. Arch. Bot. 1(2) : 38. 1798; Clarke in Hook. f. Fl. Brit. India 4 : 205. 1883.

Prostrate or twining herbs. Leaves 1-5 x 0.5-1.5 cm, emarginate or not, apiculate, auriculate and toothed at the base. Flowers white or yellow, axillary, solitary or in 2 to 3-flowered cymes. Sepals apiculate, ciliate. Capsules ovoid-globose, 4-valved. Seeds 3-gonous.

Fl. & Fr. : September-December.

Rare, in shade under shrubs in wastelands; Pipalkhund, Garhi (*Kanodia* 75558, BSI).

6. RIVEA Choisy

- Rivea hypocrateriformis* (Desr.) Choisy in Mem. Soc. Phys. Geneve 6 : 408. 1834; Clarke in Hook. f. Fl. Brit. India 4 : 184. 1883; Duthie, Fl. Gangetic Plain 2 : 119. 1911; Mahesh. Illus. Fl. Delhi f. 137. 1966. *Convolvulus*

hypocrateriformis Desr. in Lam. Encycl. 3 : 561. 1792. 'Gawal-Kakri, Phang' (Hindi).

Large climbing shrubs. Leaves broadly ovate to orbicular, 3-6 cm in diam., cordate-based, with a pair of purplish glands at the base of lamina, shortly acuminate. Flowers clove-scented, pedunculate, axillary, 1 to 3-together, subtended by deciduous bracts. Corolla hypocrateriform, slightly hairy outside. Pollens spinulose. Fruits globose or ovoid, 1.3-1.8 cm in diam., mucronate, glabrous.

Fl. & Fr. : August-November.

Fairly common along roads among the clumps of trees and shrubs; often found in forests; Banswara, Paloda, Bhapor (Kanodia 75209, BSI).

Ipomoea cairica (L.) Sweet (*Convolvulus cairicus* L., *Ipomoea palmata* Forsk.)—Twining herbs, with palmately 5 to 7-lobed or foliolate leaves, purple-violet flowers on axillary peduncles and 2-celled and 4-valved capsules. Usually grown on trellises and walls for its beautiful foliage and flowers.

I. quamoclit L.—Twining herbs, with pinnately divided leaves and red flowers on axillary peduncles. Native of Tropical America; cultivated along the trellises and walls for ornamental purposes.

68. CUSCUTACEAE

CUSCUTA L.

Cuscuta hyalina Roth, Nov. Pl. Sp. 100. 1821; Clarke in Hook. f. Fl. Brit. India 4 : 226. 1883; Raizada in Suppl. Duthie, Fl. Gangetic Plain 161. 1976. *C. arabica* Wight, Icon. 4(2) : 14. t. 137. 1848. 'Amar-bel, Akash-bel' (Hindi).

Leafless, filiform stem-parasites, with slender stem forming tangled masses. Flowers pale-yellow, in dense clusters or in pedunculate cymes. Scales at the base of corolla-tube absent. Capsules subglobose, membranous. Seeds 4, 3-angular, brownish.

Fl. & Fr. : July-October.

Occasional, parasitizing annuals like *Cassia tora* L., *Euphorbia indica* Lam.; Bhongra, Ghatol (Kanodia 75467, BSI).

69. SOLANACEAE

- | | |
|--|-------------------|
| 1a. Fruit an echinate or tubercled capsule. | <i>Datura</i> 1 |
| 1b. Fruit a smooth berry : | |
| 2a. Anthers connivent around style into a core, dehiscing by apical pores. Berries not enclosed in the calyx. | <i>Solanum</i> 3 |
| 2b. Anthers free, not connivent around style, dehiscing by longitudinal slits. Berries enclosed in the inflated calyx. | <i>Physalis</i> 2 |

1. DATURA L.

Datura fastuosa L. Syst. Nat. ed. 10. 2 : 932. 1759; Wight, Icon. 4(2) : 18. t. 1396. 1848; Clarke in Hook. f. Fl. Brit. India 4 : 242. 1883; Duthie, Fl. Gangetic Plain 2 : 132. 1911. *D. metel* L. Sp. Pl. 179. 1753, nom. conf.; Duthie, l.c. 2 : 132. 1911. *D. alba* Nees in Trans. Linn. Soc. 17 : 73. 1834; Duthie, l.c. 2 : 132. 1911. 'Kala Dhatura' (Hindi).

Herbs, upto 1 m high, clothed with fine purple dust. Leaves triangular-ovate, 6-20 x 4-15 cm, entire or sinuate-toothed. Flowers purple outside, white within, axillary, solitary. Calyx terete, reflexed in fruits. Corolla-tube 8-15 cm long, with 5, rotating nerves and 5 acuminate lobes. Capsules globose, 2.5-4.0 cm in diam., deflexed, clothed with blunt tubercles, dehiscing irregularly. Seeds 3-gonous.

Fl. & Fr. : Most part of the year.

Native of America; naturalized in wastelands and open forests; Ghatol.

2. PHYSALIS L.

Physalis minima L. Sp. Pl. 183. 1753; Clarke in Hook. f. Fl. Brit. India 4 : 238. 1883; Duthie, Fl. Gangetic Plain 2 : 127. 1911; Sant. in Journ. Bomb. nat. Hist. Soc. 47(4) : 657. 1948. *P. parviflora* R. Br. Prodr. 447. 1810. 'Papotan' (Hindi).

Erect herbs, upto 75 cm high. Leaves ovate, entire or sinuate-toothed, obtuse or acute. Flowers yellow, solitary, axillary, about 1 cm long. Anthers yellow. Berries globose, yellow when ripe, enclosed in sub-globose or ovoid, 5-angled, 5 to 10-ribbed, reticulately veined, membranous bladders of calyx.

Fl. & Fr. : August-December.

Native of South America; naturalized in wastelands and forests in shady habitats; Wadita Hillage forest, Deri-wali-Dungri (*Kanodia* 75151, BSI), Mahi Project Road (*Kanodia* 75407, BSI).

3. SOLANUM L.

1a. Plants armed with prickles :

- 2a. Prostrate or ascending herbs. All flowers of a plant bisexual. *S. surattense* 3
- 2b. Erect undershrubs or shrubs. Flowers bisexual and male on the same plant. *S. incanum* 1
- 1b. Plants unarmed. *S. nigrum* 2

1. **Solanum incanum** L. Sp. Pl. 188. 1753; Duthie, Fl. Gangetic Plain 2 : 126. 1911. *S. coagulans* Forsk. Fl. Aegypt.—Arab. 47. 1775; Clarke in Hook. f. Fl. Brit. India 4 : 236. 1883. 'Bhutkataiya' (Hindi).

Undershrubs, clothed with stellate tomentum mixed with simple hairs.

Prickles erect. Leaves ovate-elliptic, 5-12 x 3-8 cm, sinuately toothed, prickly on the veins. Flowers dull violet; peduncles extra-axillary, paired, one bearing solitary bisexual flower, other with many male flowers in racemose cymes. Berries globose, 2.0-2.5 cm in diam., yellow when ripe.

Fl. : August-October; *Fr.* : November-March.

Common in wastelands, open forests and along the roads; Rowal Hindvela forest, Danpur, Bhimgarh (*Kanodia* 75384, BSI).

2. *S. nigrum* L. Sp. Pl. 186. 1753; Clarke in Hook. f. Fl. Brit. India 4 : 229. 1883; Duthie, Fl. Gangetic Plain 2 : 124. 1911; Sant. in Journ. Bomb. nat. Hist. Soc. 47 (4) : 652. 1948. *S. rubrum* Mill. Gard. Dict. ed. 8. no. 4. 1768, non L. 1767. 'Kali-Pappotan, Mukko' (Hindi).

Perennial, fibrous-rooted, glabrous herbs, with ovate, cuneate-based, sinuately lobed, 3-12 x 2-6 cm leaves and white flowers in few-flowered, extra-axillary, subumbellate cymes. Filaments flattened, hairy at the base. Berries globose, 5-7 mm in diam., red or purple when ripe.

Fl. & Fr. : August-February.

Common weed in gardens, fields and wastelands; often found in forests in shady localities; Danpur, Jolana (*Kanodia* 51185, BSI).

3. *S. surattense* Burm. f. Fl. Ind. 57. 1768, excl. *syn. Pluk. & Raj.*; Mahesh. Illus. Fl. Delhi f. 150. 1966. *S. xanthocarpum* Schrad. & Wendl. in Schrad. Sert. Hannov. 1 : 8. t. 2. 1795; Clarke in Hook. f. Fl. Brit. India 4 : 236. 1883; Duthie, Fl. Gangetic Plain 2 : 125. 1911; Sant. in Journ. Bomb. nat. Hist. Soc. 47 (4) : 653. 1948. 'Baigan-katali, Bhurangni, Dhaturi' (Hindi).

Prostrate herbs, clothed with stellate hairs and erect, yellow prickles. Leaves ovate-elliptic or lanceolate, sinuately lobed or subpinnatifid, 5-10 x 2.5-4.5 cm. Flowers violet-purple, extra-axillary, solitary or in few-flowered cymes. Berries globose, 1.5-2.0 cm in diam., yellow when ripe.

Fl. & Fr. : Most part of the year.

Common throughout the area in different habitats; Chhatripada forest, Bhandaria (*Kanodia* 51049, BSI).

Capsicum annuum L.—Perennial herbs, with lanceolate leaves, white flowers and slender, green or red berries. Native of South America; cultivated throughout the area for its edible berries. 'Mirchi' (Hindi).

Lycopersicon esculentum Mill. (*Solanum lycopersicum* L., *Lycopersicon lycopersicum* (L.) Karst.)—Perennial herbs, with yellow flowers and globose, edible berries. Native of South America; cultivated throughout the area; often found as an escape near habitations. 'Tamator' (Hindi).

Nicotiana tabacum L.—Glandular-pubescent herbs, with pinkish flowers and ovate capsules. Native of South America; cultivated throughout the area for the leaves which are smoked or taken within. 'Tambakhu' (Hindi).

Solanum melongena L.—Erect, prickly herbs or undershrubs, with violet

or purple flowers and obovoid, globose or slender berries. Cultivated for its fruits cooked as vegetable, 'Bhatta, Bagan' (Hindi).

S. tuberosum L.—Annual herbs, with under-ground stem-tubers, odd-pinnate leaves and blue or white flowers. Native of Chile, Peru and Granada; introduced in India in 16th century. Cultivated for stem-tubers cooked as vegetable 'Aalu' (Hindi).

70. SCROPHULARIACEAE

- 1a. Stamens 2. Staminodes absent :
 - 2a. Erect or decumbent herbs, shrubs or trees. Capsules dehiscing by valves. *Veronica* 13
 - 2b. Prostrate or creeping herbs. Capsules irregularly bursting. *Peplidium* 7
- 1b. Stamens 4, if less, then the missing number reduced to staminodes :
 - 3a. Capsules dehiscing by apical pores. *Antirrhinum* 1
 - 3b. Capsules septicidally or loculicidally dehiscent :
 - 4a. Calyx and corolla 4-lobed. *Scoparia* 8
 - 4b. Calyx and corolla 5-lobed :
 - 5a. Leaves all alternate. *Verbascum* 12
 - 5b. Leaves opposite and/or whorled or the upper ones alternate, never all alternate :
 - 6a. Anthers 1-celled :
 - 7a. Corolla-tube incurved at or above the middle; two upper lobes smaller than others. *Stylga* 11
 - 7b. Corolla-tube straight or so; lobes subequal. *Buchnera* 3
 - 6b. Anthers 2-celled; both cells fertile or one of the cells barren :
 - 8a. One of the anther-cells barren. *Sepubia* 9
 - 8b. Both anther-cells fertile :
 - 9a. Capsule-valves 2-fid at the apex. *Stemodia* 10
 - 9b. Capsule-valves entire :
 - 10a. Anther-cells divergent. *Lindernia* 6
 - 10b. Anther-cells parallel, contiguous or distinct and separate :
 - 11a. Anther-cells stipitate :
 - 12a. Corolla purple or lilac, with upper lip or 2 upper lobes outermost and lower lobes innermost in bud. Placentiferous dissepiment separating with the valves, hence, septum seemingly winged in fruit. *Limnophila* 4
 - 12b. Corolla yellow, with upper lip or 2 upper lobes innermost and lower lobes outermost in bud. Placentiferous dissepiment not separating with the valves, hence, septum not winged in fruit. *Lindenberglia* 5
 - 11b. Anther-cells not stipitate. *Bacopa* 2

1. ANTIRRHINUM L.

Antirrhinum orontium L. Sp. Pl. 617. 1753; Hook. f. Fl. Brit. India 4 : 253. 1883; Duthie, Fl. Gangetic Plain 2 : 140. 1911; Chatterj. & Bharadw. in Bull. Bot. Soc. Beng. 9 (2) : 130. 1956.

Erect, annual, glandular hairy herbs, 30-70 cm high. Leaves sessile, lower opposite, upper alternate, linear to lanceolate, 2-5 x 0.1-0.5 cm, entire, revolute-margined. Flowers white, subsessile, axillary, solitary, passing into spiciform racemes. Calyx-lobes linear, foliaceous. Corolla saccate or spurred at the base. Capsules obliquely ovoid, about 1 cm long, pubescent.

Fl. & Fr. : January-March.

Rare, weed in gardens and fields; Banswara (*Verma* 250, BSA).

2. BECOPA Aubl. *nom. cons.*

Becopa monnieri (L.) Wettstein in Engl. & Prantl, Pflan. 4 (3b) : 77. 1891; Pennell in Proc. Acad. Nat. Sci. Phil. 98 : 94. 1946; Chatterj. & Bharadw. in Bull. Bot. Soc. Beng. 9(2) : 133. 1956. *Lysimachia monnieri* L. in Torner, Cent. Pl. 2 : 9. 1756. *Moniera cuneifolia* Michx. Fl. Bor. Amer. 2 : 22. 1803; Duthie, Fl. Gangetic Plain 2 : 142. 1911. *Herpestis monnieria* (L.) H. B.K. Nov. Gen. Sp. Pl. 2 : 366. 1818; Benth. Scroph. Ind. 30. 1835; Hook. f. Fl. Brit. India 4 : 272. 1884. 'Jal-Buti' (Hindi).

Perennial, succulent, decumbent herbs, rooting on the nodes. Leaves obovate-ob lanceolate, 0.8-2.0 x 0.2-0.8 cm, entire, narrowed towards base. Flowers white or pale-blue, axillary, solitary, pedicelled. Bracteoles 2, at the base of calyx. Capsules ovoid, acute, enclosed in the calyx. Seeds oblong, pale, transversely striated.

Fl. & Fr. : August-December.

Abundant in moist swampy habitats; Wadita Hillage forest, Ghatol.

3. BUCHNERA L.

Buchnera hispida Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 97. 1825; Wight, Icon. 4(3) ; 2. t. 1413. 1849; Hook. f. Fl. Brit. India 4 : 298. 1884; Duthie, Fl. Gangetic Plain 2 : 155. 1911; Penn. in Acad. Nat. Sci. Philad. Monogr. 5 : 95. 1943; Chatterj. & Bharadw. in Bull. Bot. Soc. Beng. 9(2) : 105. 1956.

Erect, hispid, semi-parasitic, annual herbs, upto 50 cm high. Leaves subsessile, lanceolate-oblong, 4-5 x 0.15-0.3 cm, serrulate, mucronate, upper ones passing into bracts, lower ones toothed. Flowers rose-purple, in terminal spike-like racemes. Bracteoles subulate. Fruits ovoid. Seeds reticulate.

Fl. & Fr. : September-November.

Rare, in grassy beds of rivers and tanks; Kushalgarh (*Kanodia* 75686, BSI).

4. LIMNOPHILA R. Br. *nom. cons.*

Limnophila indica (L.) Druce in Rep. Bot. Exch. Club Brit. Isles 3 : 420. 1914; Chatterj. & Bharadw. in Bull. Bot. Soc. Beng. 9(2) : 138. 1956; Philcox in Kew Bull. 24(1) : 115. 1970. *Hottonia indica* L. Syst. Nat. ed. 10, 919. 1759. *Limnophila gratioloides* R. Br. Prodr. Fl. Nov. Holl. 442. 1810; Hook. f. Fl. Brit. Ind. 4 : 271. 1884; Duthie, Fl. Gangetic Plain 2 : 146. 1911. *L. racemosa* Benth. Scroph. Ind. 26. 1835; Wight, Icon. 3(2) : 5. t. 861. 1844-45; Hook. f. I.c. 4 : 271. 1884; Duthie, I.c. 2 : 146. 1911. 'Gulabi' (Hindi).

Erect, aquatic herbs, 8-30 cm high, rooting on the lower nodes. Submerged leaves whorled, capillaceous-multifid, often deflexed and root-like; emerged leaves 3-nately whorled or opposite, oblong-lanceolate, entire or 3-fid, serrate, 3-nerved. Flowers pedicelled, axillary, solitary, passing into terminal, leafy racemes. Style inflexed at the apex. Capsules globose, about 4 mm in diam., 4-valved, enclosed in the membranous calyx. Seeds angled.

Fl. & Fr. : August-February.

Common in aquatic and marshy habitats; Puna Pathar forest, Rowal Hindvela forest, Lodha tank (*Kanodia* 75326, BSI).

5. LINDENBERGIA Lehm.

Lindenbergia indica (L.) Vatke, Osterr. Bot. Zeitschr. 25 : 10. 1875; Chatterj. & Bharadw. in Bull. Bot. Soc. Beng. 9(2) : 139. 1956; Mahesh. Illus. Fl. Delhi f. 154. 1966. *Dodartia indica* L. Sp. Pl. 633. 1753. *Lindenbergia urticaefolia* Lehm. in Link & Otto, Ind. Sem. Hort. Hamb. 5. 1829-30; Hook. f. Fl. Brit. India 4 : 262. 1884; Duthie, Fl. Gangetic Plain 2 : 160. 1911. *L. polyantha* Royle ex Benth. Scroph. Ind. 22. 1835; Hook. f. I.c. 4 : 262. 1884; Duthie, I.c. 2 : 160. 1911. 'Pilaphuli, Pindru' (Hindi).

Glandular-pubescent, annual herbs, 20-50 cm high. Leaves ovate-oblong, 1-10 x 1-6 cm, crenate-serrate, rounded or cuneate at the base. Flowers axillary, solitary or paired, passing into leafy racemes. Calyx-lobes obtuse. Capsules ovoid or oblong, pubescent at the top, 2-valved.

Fl. & Fr. : August-February.

Common on the walls of old buildings and steep, naked slopes of the hills. Plants are often purple-tinged; Shergarh forest, Banswara (*Kanodia* 75457, BSI).

6. LINDERNIA All.

- | | |
|---|-----------------------|
| 1a. Stamens 4. Staminodes absent. Capsules shorter or as long as calyx. | <i>L. crustacea</i> 2 |
| 1b. Stamens 2. Staminodes 2. Capsules much longer than calyx. | <i>L. ciliata</i> 1 |

1. *Linderzia ciliata* (Colsm.) Pennell in Brittonia 2 : 182. 1936 & Acad.

Nat. Sci. Phil. Monogr. 5 : 32. 1943; Chatterj. & Bharadw. in Bull. Bot. Soc. Beng. 9(2) : 145. 1956. *Gratiola ciliata* Colsm. Prod. Desc. Grat. 14. 1793. *Bonnaya brachiata* Link & Otto, Icon. Pl. Select. 25. t. 11. 1820; Hook. f. Fl. Brit. India 4: 284. 1884; Duthie, Fl. Gangetic Plain 2: 151. 1911.

Erect or decumbent, annual herbs, 10-20 cm high. Leaves oblong, 1.0-3.5 x 0.6-1.3 cm, pinni-nerved, serrate; serrations aristate. Flowers white or pink, in terminal racemes. Calyx divided to the base; lobes aristate. Capsules linear-oblong, 0.8-2.0 cm long, glabrous. Seeds truncate.

Fl. & Fr. : August-February.

Common in wet and shady localities from plains to the hills; Wadita Hillage forest, Ghatol (*Kanodia* 75476, BSI).

2. *L. crustacea* (L.) F. Muell. Syst. Cens. Austral. Pl. 97. 1882; Chatterj. & Bharadw. in Bull. Bot. Soc. Beng. 9(2) : 142. 1956. *Capraria crustacea* L. Mant. 87. 1767. *Vandellia crustacea* (L.) Benth. Scroph. Ind. 35. 1835; Wight, Icon. 3(2) : 5. t. 863. 1844-45; Hook. f. Fl. Brit. India 4 : 279. 1884; Duthie, Fl. Gangetic Plain 149. 1911.

Annual, diffusely branched herbs. Leaves ovate, 0.8-2.0 x 0.5-1.5 cm, entire or crenate, pinni-nerved. Flowers white, violet or purple, upto 8 mm long, axillary, solitary and subracemose. Calyx 5-ribbed, 5-angled, not divided below the middle. Capsules obovate or ovoid, 2-8 mm long. Seeds ovoid.

Fl & Fr. : August-February.

Common from plains to the hills in wet habitats; Lasara, Ghatol (*Kanodia* 75477, BSI).

7. PEPLIDIUM Delile

Peplidium maritimum (L. f.) Wettest in Engl. & Prantl, Natur. Pflan. 4 (3B) : 78. 1891; Raizada, Suppl. Duthie, Fl. Gangetic Plain 190. 1976. *Hedyotis maritima* L. f. Suppl. 119. 1781. *Peplidium hemifusum* Del. Fl. Egypt. 148. t. 4. 1812; Hook. f. Fl. Brit. India 4 : 287. 1884.

Succulent herbs, rooting at the nodes. Leaves obovate or spatulate; base tapering into a short petiole which is connected by a membrane with the petiole of the opposite leaf. Flowers white or pale-pink, axillary, solitary or 1 to 3-together. Calyx 5-toothed, enclosing globose capsules. Seeds angular-oblong.

Fl. & Fr. : December-April.

Common in rice-fields and other marshy habitats. It has long floating stems when growing under water; Loharia.

8. SCOPARIA L.

Scoparia dulcis L. Sp. Pl. 116. 1753; Hook. f. Fl. Brit. India 4 : 289.

1884; Duthie, Fl. Gangetic Plain 2 : 153. 1911; Chatterj. & Bharadw. in Bull. Bot. Soc. Beng. 9(2) : 132. 1956.

Herbs or undershrubs, upto 1 m high, with 4 to 6-angled branches. Leaves opposite and 3-nately whorled, elliptic or rhomboid, 1.0-7.5 x 1.0-4.5 cm, entire or serrate, glandular. Flowers white, almost actinomorphic, 3-6 in each axillary whorl, often forming whorled racemes. Corolla-throat hairy. Anthers sagittate. Capsules septicidal, subglobose, 2-3 mm in diam.; valves 2-fid. Seeds ovoid, pitted.

Fl. & Fr. : August-October.

Native of Tropical America; imperfectly naturalized in wastelands and in and around the gardens; Banswara (*Verma* 250, BSA).

9. SOPUBIA Buch.-Ham. ex D. Don

Sopubia delphinifolia (L.) G. Don, Gen. Syst. 4 : 560. 1837; Hook. f. Fl. Brit. India 4 : 302. 1884; Duthie, Fl. Gangetic Plain 2 : 159. 1911; Chatterj. & Bharadw. in Bull. Bot. Soc. Beng. 9(2) : 150. 1956. *Gerardia delphinifolia* L. in Juslenius, Cent. Pl. 21. 1756, 'delphinifolia'.

Erect herbs, with 4-angled stem and branched. Leaves 2.5-5.0 cm long, pinnatisect; segments filiform, distant, often again divided; upper leaves passing into simple, filiform bracts. Flowers purple, 2.5-3.5 cm long, axillary, solitary, passing into spikes. Calyx tubular, 10-ribbed. Anther-cells unequal, sessile, sterile ones acuminate. Capsules oblong, 5-8 mm long.

Fl. & Fr. : October-February.

Common in neglected low-lying corners of fields; Sainavasa, Kushalgarh (*Kanodia* 75731, BSI).

10. STEMODIA L. nom. cons.

Stemodia viscosa Roxb. Pl. Cor. 2 : 33. t. 163. 1802 & Fl. Ind. 3 : 94. 1832; Wight, Icon. 4 (3); 1. t. 1408. 1849; Hook. f. Fl. Brit. India 4: 265. 1884; Duthie, Fl. Gangetic Plain 2 : 144. 1911; Chatterj. & Bharadw. in Bull. Bot. Soc. Beng. 9 (2): 139. 1956.

Diffusely branched, viscidly pubescent herbs. Leaves sessile, obovate-oblong, 1.5-3.0 x 0.5-1.0 cm, serrate or dentate. Flowers violet, axillary, solitary or in few-flowered racemes. Anther cells stipitate. Capsules ovoid-oblong, glabrous, 4-valved, enclosed in the calyx. Seeds ellipsoid, faintly reticulate.

Fl. & Fr. : December-March.

Rare, a lowland and marshland ruderal; Bhimsor (*Majumdar* 10285, BSA).

11. STRIGA Lour.

1a. Root-stock tuberous. Leaves reduced to scales. Calyx 4 to

- 5-ribbed. *S. gesnerioides* 2
 1b. Root-stock not tuberous. Leaves well developed. Calyx 15-ribbed. *S. angustifolia* 1

1. *Striga angustifolia* (D. Don) Saldanha in Bull. Bot. Surv. Ind. 5(1): 70. 1963. *Buchnera angustifolia* D. Don, Prodr. Fl. Nepal. 91. 1825. *B. euphrasioides* auct. plur. non Vahl, 1794; Benth. Scroph. Ind. 41. 1835. *Striga euphrasioides* sensu Benth. Comp. Bot. Mag. 1:364. 1836 & in DC. Prodr. 10: 503. 1846, excl. basionym; Wight, Icon. 3 (2): 5. t. 855. 1844-45; Hook. f. Fl. Brit. India 4: 299. 1884; Duthie, Fl. Gangetic Plain 2: 157. 1911.

Erect, annual, scabrid herbs, 15-60 cm high. Leaves sessile, linear to lanceolate, 1-5 x 0.1-0.4 cm. Flowers white, subsessile, axillary, solitary, passing into terminal spikes. Calyx 15-ribbed. Corolla-tube abruptly incurved at or above the middle; lower lobes outside in bud. Capsules ovoid, 2-valved, apiculate, enclosed in the calyx.

Fl. & Fr. : August-October.

Common in open wastelands and cultivated fields; Lasara, Kushalgarh, Ghatol (*Kanodia* 75108, BSI), Banswara (*Kanodia* 75523, BSI).

2. *S. gesnerioides* (Willd.) Vatke, Oesterr. Bot. Z. 25: 11. 1875. *Buchnera gesnerioides* Willd. Sp. Pl. 3: 338. 1800. *B. orobanchoides* R. Br. ex Endl. Flora 15: 388. t. 2. 1832. *Striga orobanchoides* (R. Br. ex Endl.) Benth. Companion Bot. Mag. 1: 361. 1836, nom. illegit.; Wight, Icon. 4 (3): 2. t. 1414. 1849; Hook. f. Fl. Brit. India 4: 299. 1884; Duthie, Fl. Gangetic Plain 2: 156. 1911.

Erect, 15-50 cm high, purple, root parasites, with prominent haustoria and somewhat woody root-stock. Leaves scaly, ovate-lanceolate, 5-8 x 2.0-2.5 cm, acute, upper ones passing into bracts. Flowers purple, 1 to 3-nate, in terminal spikes. Bracteoles shorter than calyx. Calyx 4 to 5-ribbed, hispid. Corolla hairy outside. Capsules ovoid-globose, about 5 mm in diameter.

Fl. & Fr.: August-October.

Occasional, a root parasite on *Lepidagathis* Willd.; Banswara (*Kanodia* 75569, BSI).

12. VERBASCUM L.

Verbascum chinense (L) Sant. Fl. Puran. 90. 1958 & in Rec. Bot. Surv. Ind. 16: 177. 1967. *Scrophularia chinense* L. Mant. Pl. 2: 250. 1771. *Celsia coromandeliana* Vahl, Symb. Bot. 3: 79. 1794; Wight, Icon. 4 (3): 1. t. 1406. 1849; Hook. f. Fl. Brit. India 4: 251. 1883; Duthie, Fl. Gangetic Plain 2: 139. 1911. *Verbascum celsioides* Benth. in DC. Prodr. 10: 229. 1846; Hook. f. l.c. 4: 250. 1883. *V. coromandelianum* (Vahl) Kuntze, Rev. Gen. Pl. 1: 468. 1891; Chatterj. & Bharadw. in Bull. Bot. Soc. Beng. 9 (2): 129. 1956.

Erect, annual, glandular-pubescent herbs. Radical leaves petiolate, lyrate-

pinnatifid; caudine ones sessile, ovate, gradually smaller upwards passing into leafy bracts, crenate-dentate. Flowers yellow, axillary, solitary, passing into racemes. Filaments bearded. Capsules glandular, 2-valved. Seeds oblong, longitudinally grooved.

Fl. & Fr. : January-April.

Common in wet habitats in wastelands and forests; Bagaycha forest, Banswara (*Verma* 253, BSA), Singhpara (*Kanodia* 51065, BSI).

13. VERONICA L.

Veronica anagallis-aquatica L. Sp. Pl. 12. 1753; Hook. f. Fl. Brit. India 4: 293. 1884; Duthie, Fl. Gangetic Plain 2: 154. 1911; Chatterj. & Bharadw. in Bull. Bot. Soc. Beng. 9 (2): 148. 1956; Dutta in Journ. Bomb. nat. Hist. Soc. 57 (3): 594. 1961.

Decumbent, creeping or stoloniferous, aquatic herbs, rooting on the lower nodes. Leaves oblong-lanceolate, 2.5-10.0 x 2.5 cm, entire or serrulate, sessile with amplexicaul base or shortly petiolate with cuneate base. Flowers white, in lax, 8-15 cm long, axillary, bracteate racemes. Lower lobes of corolla outside in bud. Anther-cells with confluent tips. Capsules orbicular, eciliate, shallowly notched. Seeds oblong, biconvex.

Fl. & Fr. : October-March.

Common in aquatic and marshy habitats; Ghatol, Looda tank (*Majumdar* 10263, BSA; *Kanodia* 51133, BSI).

71. LENTIBULARIACEAE

UTRICULARIA L.

- | | |
|---|-----------------------|
| 1a. Peduncles with a whorl of spongy floats; scales (bracts and bracteoles) absent. | <i>U. stellaris</i> 2 |
| 1b. Peduncles without a whorl of floats; scales (bracts and bracteoles) present. | <i>U. exoleta</i> 1 |

1. **Utricularia exoleta** R. Br. Prodr. 1: 430. 1810; Clarke in Hook. f. Fl. Brit. India 4: 329. 1884; Duthie, Fl. Gangetic Plain 2: 166. 1911; Subram. Aquatic Ang. 32. f. 25 [1962]. *U. gibba* L. subsp. *exoleta* (R. Br.) Taylor in Mitt. Bot. Staat. Munch. 4: 101. 1961 & in Kew Bull. 18: 204. 1964.

Floating herbs, with terete stolons. Traps obliquely ovoid, replacing one of the leaf-segment at the fork. Racemes 1 to 3-flowered. Flowers yellow. Calyx-lobes 1-3 mm long, orbicular to ovate-oblong, many-nerved. Capsules globose, 2-4 mm in diam., 2-valved. Fruiting pedicels erect. Seeds with a broad, irregular wing.

Fl. & Fr. : December-April.

Rare, an aquatic weed in still water ponds; Banswara (*Verma* 214,

BSA).

Notes : K.N. Gandhi (in Saldanha & Nicols. Fl. Hassan District 564. 1976) mentioned that Mr. P. Taylor in his personal communication informed him that he now intends to reinstate *U. gibba* L. subsp. *exoleta* (R. Br.) Taylor and *U. inflexa* Forsk. var *stellaris* (L. f.) Taylor as distinct species namely *U. exoleta* R. Br. and *U. stellaris* L. f. respectively.

2. *U. stellaris* L. f. Suppl. 86. 1781; Wight, Icon. 4(4) : 9. t. 1567. 1850; Clarke in Hook. f. Fl. Brit. India 4 : 328. 1884; Duthie, Fl. Gangetic Plain 2 : 165. 1911; Subram. Aquatic Ang. 33. f. 23. 1962. *U. inflexa* Forsk. var. *stellaris* (L. f.) Taylor in Mitt. Bot. Staat. Munch. 4 : 96. 1961 & in Kew Bull. 18 : 189. 1964.

Floating herbs, with filiform, terete stolons. Normal leaves auricled at the base, deeply divided into linear segments. Traps obliquely ovoid, 1-3 mm long, stalked. Floats ellipsoid, white, spongy, 0.5-2.0 cm long. Flowers yellow, in 2 to 16-flowered racemes. Capsules globose, about 5 mm long, with reflexed calyx at the base. Seeds discoid, narrowly winged.

Fl. & Fr. : October-December.

Rare, in temporary ponds along the roads; Sainavasa, Banswara (*Verma* 275, BSA), Looda (*Majumdar* 10258, BSA).

72. BIGNONIACEAE

DOLICHANDRONE (Fenzl) Seem. *nom. cons.*

Dolichandrone falcata (Wall. ex DC.) Seem. in Journ. Bot. 8 : 381. 1870; Clarke in Hook. f. Fl. Brit. India 4 : 380. 1884; Duthie, Fl. Gangetic Plain 2 : 172. 1911; Sprague in Kew Bull. 1919 : 308. 1919. *Spathodia falcata* Wall. ex DC. Prodr. 9 : 206. 1825. *D. lawii* Seem. l.c. 8 : 380. 1870; Clarke, l.c. 4 : 380. 1884.

Trees, 4-10 m high. Leaves 1-pinnate; leaflets ovate, suborbicular or obovate, 2-5 x 1.5-4.0 cm, abruptly acuminate, entire. Flowers white, in terminal, few-flowered racemes. Calyx spathaceous. Anther-cells parallel, glabrous. Capsules flat, 15-50 x 1.5-3.2 cm, falcate, 2-valved, not speckled. Seeds 4-angular, winged.

Fl. : April-June; *Fr.* : June-April.

Common on the fringes of forests and in wastelands. The ripe fruits of previous year remain on the trees when the flowers of next year are in bloom; Danpur forest, Bagaycha forest.

Tecomia stans (L.) Kunth (*Bignonia stans* L.)—Evergreen shrubs, with 1-pinnate leaves and yellow flowers. Native of S. America; often grown in the gardens for ornamental purposes.

73. PEDALIACEAE

- 1a. Ovary-cells undivided. Fruits drupaceous, indehiscent, sub-pyramidal, 4-angled, with a spine at each basal angle. *Pedalium* 1
 1b. Ovary-cells divided by a false septum. Fruits oblong, slightly 4-lobed, dehiscent, capsular, not spinous. *Sesamum* 2

1. PEDALIUM L.

Pedalium murex L. Syst. ed. 10. 1123. 1759; Wight, Icon. 4(4) : 17. t. 1615. 1850; Clarke in Hook. f. Fl. Brit. India 4 : 386. 1884; Mahesh. Illus. Fl. Delhi f. 160. 1966. 'Vilayti-Gokhru' (Hindi).

Erect, annual, glandular-pubescent herbs, 30-50 cm high. Leaves obovate-oblong, 2-8 x 1.5-5.5 cm, repand-dentate, with minute glistening glands beneath; base cuneate, 3-nerved; petioles with two axillary, dark violet glands at the base. Flowers yellow, 2-3 cm long, axillary, solitary. Fruits glandular-pubescent.

Fl. & Fr. : August-October.

Native of Africa; naturalized in wastelands; Paloda.

2. SESAMUM L.

Sesamum indicum L. Sp. Pl. 634. 1753; Clarke in Hook. f. Fl. Brit. India 4 : 387. 1884; Duthie, Fl. Gangetic Plain 2 : 175. 1911; Mahesh. Illus. Fl. Delhi f. 161. 1966. *S. orientale* L. Sp. Pl. 634. 1753. *S. mulayanum* Nair in Bull. Bot. Surv. Ind. 5 : 251. 1963. 'Til' (Hindi).

Annual, glandular-pubescent herbs, with 4-angled stem. Leaves elliptic-lanceolate, 4-15 x 0.5-4.5 cm. Flowers pink or purple, axillary, solitary. Capsules 1.5-3.0 cm long, beaked. Seeds black or white, smooth to rugose.

Fl. & Fr. : August-November.

Black-seeded and white-seeded varieties are grown in the area. The former has truly naturalized from plains to the hills. Leaves fall before the ripening of the fruits; Shergarh, Anand Sagar forest (*Kanodia* 75278, BSI).

74. MARTYNIACEAE

MARTYNIA L.

Martynia annua L. Sp. Pl. 618. 1753; Mahesh. Illus. Fl. Delhi f. 162. 1966. *M. diandra* Glos. Obs. Bot. 14. t. 1. 1785; Clarke in Hook. f. Fl. Brit. India 4 : 386. 1884; Duthie, Fl. Gangetic Plain 176. 1911. 'Billi' (Hindi).

Annual, viscid, glandular-hairy herbs, upto 1.5 m high. Stem fistular.

Leaves ovate-cordate, 8-18 x 8-15 cm, sinuately dentate. Flowers pinkish-white, in axillary racemes. Pedicels with semilunar glands at the base. Corolla with purple dots on the anterior side within. Fruits woody, beetle-shaped, hooked at the tip, hairy, deflexed.

Fl. & Fr. : August-October.

Native of Mexico; naturalized in wastelands, along the roads and in open forests; Rowal Hindvela forest, Wadita Hillage forest, Borigama (*Kanodia* 51174, BSI).

75. ACANTHACEAE

- 1a. Fertile stamens 2 :
- 2a. Ovules 1-2 in each cell :
 - 3a. Anther-cells, at least the lower, with basal, spur-like appendages :
 - 4a. Spikes secund. Placentae separating elastically from the valves of the capsules. *Rungia* 17
 - 4b. Spikes not secund. Placentae remaining attached to the valves of the capsules. *Justicia* 12
 - 3b. Anther-cells not spurred or appendaged at the base :
 - 5a. Anther-cells parallel, equally placed :
 - 6a. Calyx 5-lobed. Corolla-lobes twisted in bud. *Eranthemum* 7
 - 6b. Calyx 4-lobed. Corolla-lobes imbricate in bud. *Barleria* 2
 - 5b. Anther-cells unequally placed :
 - 7a. Anthers apiculate. *Adhatoda* 1
 - 7b. Anthers muticous :
 - 8a. Lateral walls of capsule-valves basally separating from placenta when the capsule bursts and form a wing of it. *Dicliptera* 4
 - 8b. Lateral walls of capsule-valves permanently attached to the placenta throughout their length. *Peristrophe* 15
 - 2b. Ovules more than two in each cell :
 - 9a. Stemless herbs. Leaves radical. Calyx 4-lobed. *Elytraria* 6
 - 9b. Stem well developed. Leaves cauline. Calyx 5-lobed :
 - 10a. Cladodes present in the leaf-axils. *Haplanthodes* 8
 - 10b. Cladodes absent :
 - 11a. Flowers axillary or in terminal spikes. Corolla-lobes twisted in bud. *Hemidadelphus* 9
 - 11b. Flowers in racemes or panicles. Corolla-lobes imbricate in bud. *Indoneestella* 11
 - 1b. Fertile stamens 4 :
 - 12a. Ovules 2-1 in each cell :
 - 13a. Corolla without upper lip or with a very small lip. Anthers 1-celled. *Blepharis* 3
 - 13b. Corolla with a well developed upper lip. Anthers 2-celled :
 - 14a. Calyx 3/2, distinctly 2-lipped. Corolla subequally 5-lobed. Disk inconspicuous. One cell of each anther of upper pair of stamens sterile. *Neuracanthus* 14

- 14b. Calyx 5-lobed, not 2-lipped but appears 4-lobed due to the fusion of two lower lobes. Corolla 2/3, distinctly 2-lipped. Disk annular. Both cells of the anthers fertile.
- Lepidagathis* 13
- 12b. Ovules more than 2 in each cell :
- 15a. Corolla subequally 5-lobed. Capsules with a sterile, solid, stalk-like base, seeded in upper region only :
- 16a. Roots tuberous. Flowers lax, in axillary cymes. Bracteoles shorter than calyx.
- Ruellia* 16
- 16b. Roots not tuberous. Flowers axillary, solitary or in groups of 2-3. Bracteoles not shorter than calyx.
- Dipteracanthus* 5
- 15b. Corolla distinctly 2-lipped (2/3). Capsules without a solid stalk at base, seeded throughout.
- Hygrophila* 10

1. ADHATODA Mill.

Adhatoda zeylanica Medic. Hist. & Common. Acad. Elect. Sci. Theod.-Pal. 6 : 393. 1790. *Justicia adhatoda* L. Sp. Pl. 15. 1753; Duthie, Fl. Gangetic Plain 2 : 207. 1911. *Adhatoda vasica* Nees in Wall. Pl. As. Rar. 3 : 103. 1832; Clarke in Hook. f. Fl. Brit. India 4 : 540. 1885; Mahesh. Illus. Fl. Delhi f. 169. 1966. 'Adusa' (Hindi).

Evergreen shrubs, upto 1.5 m high. Leaves elliptic-lanceolate or oblong, 7-18 x 2-7 cm, acuminate, with cuneate and decurrent base. Flowers white with pink or purple stripes, in axillary, peduncled, 3-12 cm long spikes. Bracts foliaceous, elliptic-obovate, apiculate. Capsules oblong-clavate, pubescent. Seeds suborbicular, 1-2 in each cell, glabrous.

Fl. & Fr. : January-May.

Gregarious in wastelands, along the roads and on the fringes of forests; Loharia forest, Partapur (*Kanodia* 51194, BSI).

2. BARLERIA L.

- 1a. Plants unarmed. Flowers blue, purple, violet or white. Bracteoles serrate to spinous-toothed :
- 2a. Plants hairy. Seeds silky hairy.
- B. cristata* 1
- 2b. Plants glabrous. Seeds glabrous.
- B. prattensis* 2
- 1b. Plants armed with axillary spines. Flowers orange-yellow.
- B. prionitis* 3

1. **Barleria cristata** L. Sp. Pl. 636. 1753; Wight, Icon. 2(2) : 3. t. 453. 1841; Clarke in Hook. f. Fl. Brit. India 4 : 488. 1884; Duthie, Fl. Gangetic Plain 2 : 201. 1911, *pro parte*.

Erect or diffuse undershrubs, upto 1 m high. Leaves elliptic-oblong to lanceolate, 5-11 x 1.0-3.5 cm, ciliate. Flowers white or purple, subsessile, axillary, 1 to 3-nate or often in dense, axillary or terminal spikes. Bracts lanceolate-elliptic, spinous toothed. Bracteoles linear. Calyx-lobes in two opposite pairs; outer ones ovate-oblong, bristle-tipped, spiny-margined, pro-

minently nerved; inner ones linear-lanceolate, ciliate. Capsules ellipsoid, 4-seeded, upto 2 cm long.

Fl. & Fr. : October-February.

Common in forests in shady localities; Puna Pather forest, Singhpura (*JAV*. 29269, BSI).

2. *B. prattensis* Santapau in Kew Bull. 3 : 487. 1949 & in Univ. Bomb. Bot. Mem. No. 2 : 62. pl. 3. 1951 & in Rec. Bot. Surv. Ind. 16(1) : 179. 1960.

Erect herbs or undershrubs, with terete stem and branches. Leaves ovate or elliptic, 6-12 x 2-5 cm, cuneate at both ends, entire. Flowers purple, axillary, solitary, often forming terminal, few-flowered spikes. Bracteoles linear. Two calyx-lobes large, ovate, obtuse; other two linear, minutely hairy on the margins. Capsules about 2 cm long, 4-seeded in lower part. Seeds orbicular, compressed, black.

Fl. & Fr. : October-January.

Common in shady localities in forests in association with *B. cristata* L.; Puna Pather forest, Parla-ka-Pul (*Majumdar* 10319, BSA), Kushalgarh (*Kanodia* 75699, BSI).

3. *B. prionitis* L. Sp. Pl. 636. 1753; Wight, Icon. 2(2) : 3. t. 452. 1841; Clarke in Hook. f. Fl. Brit. India 4 : 482. 1884; Duthie, Fl. Gangetic Plain 2 : 200. 1911; Britton in Adansonia 10(2) : 17. 1925. 'Kala-Bansa, Brijdanti' (Hindi).

Prickly undershrubs, about 1 m high. Leaves ovate to elliptic-lanceolate, 6-11 x 2-5 cm, bristle-tipped, entire, with 3-4, divaricate, white spines in the axils. Flowers axillary, solitary below and in leafy and spiny spikes upwards. Bracts linear, spinescent. Outer two calyx-lobes spine-tipped. Stamens exserted. Capsules ovoid, pointed. Seeds 2, hairy.

Fl. & Fr. : October-June.

Native of Tropical Asia and Africa; naturalized in dry habitats from plains to the top of hills; Chandan Singh-ki-Bassi, Jolana (*Kanodia* 75608, BSI).

3. BLEPHARIS Juss.

- | | |
|---|-----------------------------|
| 1a. Leaves membranous, glabrous beneath, 3-9 cm long. | <i>B. maderaspatensis</i> 1 |
| 1b. Leaves thick, hairy beneath, 1-3 cm long. | <i>B. repens</i> 2 |

1. *Blepharis maderaspatensis* (L.) Roth, Nov. Pl. Sp. 320. 1821; Bremek. in Verh. K. Nederl. Acad. Wet. 45(2) : 10. 1948; Napper in Kew Bull. 24(2) : 323. 1970. *Acanthus maderaspatensis* L. Sp. Pl. 639. 1753. *Blepharis boerhaviaefolia* Pers. Syn. Pl. 2 : 180. 1806; Wight, Icon. 2(2) : 3. t. 458. 1841; Clarke in Hook. f. Fl. Brit. India 4 : 478. 1884; Duthie, Fl. Gangetic Plain 2 : 183. 1911.

Prostrate herbs, often rooting on the lower nodes. Leaves 4 in each whorl, arranged cross-wise, ovate to oblong or elliptic, 3-9 x 1.5-3.5 cm, glabrous-glaucous beneath, narrowed towards base. Flowers pale-blue or white, sessile, axillary, 1 to 4-together, often combined into a leafy spike. Bracts 8, in 4-series, obovate-spathulate, with retrorsely hairy bristles along the margins in the upper part. Capsules ovoid, 2-seeded. Seeds echinate or hairy.

Fl. & Fr. : August-February.

Common in forests in shady habitats; Khora forest.

2. *B. repens* (Vahl) Roth, Nov. Pl. Sp. 321, 1821. *Acanthus repens* Vahl, Symb. Bot. 2 : 76, 1791. *Blepharis molluginifolia* Pers. Syn. Pl. 2 : 180, 1806; Clarke in Hook. f. Fl. Brit. India 4 : 479, 1884; Duthie, Fl. Gangetic Plain 2 : 183, 1911; Mahesh. Illus. Fl. Delhi f. 164, 1966.

Diffuse, prostrate, hairy herbs. Leaves 4 in a whorl, sessile, oblong or obovate, 1-3 x 0.4-0.8 cm, entire, hispid. Flowers blue or white, axillary, solitary. Bracteoles 8, the largest at the top, all with acicular spines. Capsules ellipsoid, included in the calyx.

Fl. & Fr. : October-December.

Rare, in dry sandy soils among grasses; Banswara (*Kanodia* 75103, BSI), Malki-Dungri (*Kanodia* 75436, BSI).

4. DICLIPTERA Juss. *nom. cons.*

Dicliptera verticillata (Forsk.) Christen. in Dansk. Bot. Arkiv. 4(3) : 11, 1922. *Dianthera verticillata* Forsk. Fl. Aegypt.-Arab. 9, 1775. *Dicliptera micranthes* Nees in Wall. Pl. As. Rar. 3 : 112, 1832; Clarke in Hook. f. Fl. Brit. India 4 : 553, 1885; Duthie, Fl. Gangetic Plain 2 : 213, 1911.

Erect, pubescent, much-branched herbs. Leaves ovate-elliptic, 1.5-8.0 x 0.8-5.0 cm, acute. Flowers pink or purple, sessile, 3-6 in each axillary cluster. Bracts ciliate, spine-tipped, clothed with raphids. Calyx-lobes spinescent. Anthers superposed. Capsules ellipsoid, 4-seeded, beaked. Seeds orbicular, rugose.

Fl. & Fr. : November-March.

Common near water resources in the forests among grasses; Bagaycha forest, Ghatol (*Majumdar* 10236, BSA), Kushalgarh (*Kanodia* 75729, BSI).

5. DIPTERACANTHUS Nees *emend.* Bremek.

- | | |
|---|------------------------|
| 1a. Erect or suberect, woody herbs or undershrubs. Capsules glabrous. | <i>D. patulus</i> 1 |
| 1b. Prostrate herbs. Capsules pubescent. | <i>D. prostratus</i> 2 |

1. *Dipteracanthus patulus* (Jacq.) Nees in Wall. Pl. As Rar. 3 : 82, 1832; Wight, Icon. 4(4) : t. 1505, 1850. *Ruellia patula* Jacq. Misc. Bot. 2 : 358,

1781; Clarke in Hook. f. Fl. Brit. India 4 : 412. 1884; Duthie, Fl. Gangetic Plain 2 : 188. 1911.

Suberect undershrubs. Leaves ovate or elliptic, 1.5-5.0 x 0.6-3.0 cm, densely pubescent, rounded at the base, obtuse at apex. Flowers purplish-blue, sessile, axillary, solitary or 2 to 3-together. Bracteoles elliptic, strongly ciliate. Calyx-segments linear-lanceolate, acute. Corolla pubescent outside. Capsules clavate, glabrous. Seeds suborbicular, glabrous on the faces, marginated with hygroscopic white hairs.

Fl. & Fr. : June-November.

Occasional, in wastelands; between Borigama and Banswara (*Kanodia* 51103, BSI).

2. *D. prostratus* (Poir.) Nees in Wall. Pl. As. Rar. 3 : 81. 1832; Bremek. in Verh. Kon. Ned. Akad. Wet. 45(1) : 16. 1948. *Ruellia prostrata* Poir. in Lam. Encycl. 6 : 349. 1804; Clarke in Hook. f. Fl. Brit. India 4 : 411. 1884; Duthie, Fl. Gangetic Plain 2 : 187. 1911. *Dipteracanthus dejunctus* Nees, l.c. 3 : 82. 1832. *Ruellia prostrata* Poir. var. *dejuncta* (Nees) Clarke, l.c. 4 : 418. 1884.

Prostrate or decumbent, perennial herbs. Leaves ovate-lanceolate, rounded or subcordate at base, 2-8 x 1.5-4.0 cm, entire or repand, ciliate, lineolate with raphides, acute. Flowers pale-purple, subsessile, solitary. Bracteoles obovate-spathulate. Calyx-segments lanceolate, ciliate. Corolla hairy outside. Capsules clavate-linear, 1.8-2.0 cm long, densely pubescent. Seeds with a fringe of hygroscopic hairs on the margins.

Fl. & Fr. : Most part of the year.

Common in wastelands, in and around the gardens; Jolana (*Kanodia* 51172, BSI), Bhookeri-Ghat (*Kanodia* 75524, BSI).

6. ELYTRARIA A. Mich. *nom. cons.*

Elytraria acaulis (L. f.) Lindau in Engl. & Prantl, Pfam. 1 : 304. 1897; Bremek. in Reinwardtia 3 : 250. 1955; Mahesh. Illus. Fl. Delhi f. 163. 1966. *Justicia acaulis* L. f. Suppl. 84. 1781. *Elytraria crenata* Vahl, Enum. 1: 106. 1804; Clarke in Hook. f. Fl. Brit. India 4 : 394. 1884. *Tubiflora acaulis* (L. f.) Kuntze, Rev. Gen. Pl. 1 : 500. 1891; Duthie, Fl. Gangetic Plain 2 : 180. 1911. 'Patharchatti, Jungli-gobi' (Hindi).

Spacigerous, fibrous-rooted herbs. Leaves oblanceolate to spathulate, 6-25 x 3-9 cm, crenate-margined. Flowers white or pale-blue, exceeding the bracts, in simple or branched, 8-30 cm long spikes. Scapes many, clothed with small, rigid, ovate, spinous-pointed bracts which are pubescent inside and ciliate margined. Capsules ovoid, 6-8 mm long. Seeds ovoid.

Fl. & Fr. : August-November.

Common in wastelands and at the foot of hills in forests; Anand Sagar forest, Banswara (*Verma* 4245, BSA), Jajupura (*Kanodia* 75102, BSI).

7. ERANTHEMUM L. *emend.* Radlk.

Eranthemum purpurascens Wt. ex Nees in Wall. Pl. As. Rar. 3 : 106. 1832; Sant. in Univ. Bomb. Bot. Mem. No. 2 : 35. 1951. *Daedalacanthus purpurascens* (Wt. ex Nees) T. Anders. in Journ. Linn. Soc. 9 : 488. 1867; Clarke in Hook. f. Fl. Brit. India 4 : 420. 1884; Duthie, Fl. Gangetic Plain 2 : 194. 1911.

Erect herbs, 60 cm-1 m high. Leaves oblong-ovate or ovate-elliptic, 3-14 x 2.5-10.0 cm, acuminate, cuneate at the base. Flowers blue-purple, in terminal, 6-10 cm long spikes. Bracts green, ovate-lanceolate, acute or acuminate, ciliolate, prominently nerved. Corolla 3.5-5.0 cm long. Style hairy. Capsules clavate-oblong. Seeds ellipsoid, hairy.

Fl. & Fr. : October-May.

Common in forests as an undergrowth; often found in wastelands among the clumps of trees and shrubs in shady habitats; Ghatol, Puna Pathar forest.

8. HAPLANTHODES Ktze.

Haplanthodes verticillata (Roxb.) Majumdar in Bull. Bot. Soc. Beng. 25 (1-2) : 76. 1971. *Justicia verticillata* Roxb. Fl. Ind. 1 : 135. 1832. *Haplanthus verticillaris* Nees in DC. Prodr. 11 : 513. 1847; Clarke in Hook. f. Fl. Brit. India 4 : 506. 1884; Duthie, Fl. Gangetic Plain 2 : 198. 1911. *Bremekampia verticillata* (Roxb.) Sreem. in Bull. Bot. Surv. Ind. 6 : 323. 1965.

Erect, annual herbs, upto 75 cm high. Leaves ovate, 5-10 x 3.5-5.5 cm. Axillary cladodes (spines) 4-angled, 2.5-4.0 cm long, 10-18 at each node, with 2 spinous teeth at the apex. Flowers blue, in between the cladodes. Bracteoles subulate, finely pointed, longer than calyx. Capsules oblong, glabrous. Seeds hairy.

Fl. & Fr. : December-March.

Common in forests in shady habitats and on the walls of old buildings; Anand Sagar forest.

9. HEMIADELPHIS Nees

Hemiadelphis polyspermus (Roxb.) Nees in Wall. Pl. As. Rar. 3 : 80. 1832; Wight, Icon. 4(3) : 18. t. 1492. 1849. *Justicia polysperma* Roxb. Fl. Ind. 1 : 119. 1832. *Hygrophila polysperma* (Roxb.) Anders. in Journ. Linn. Soc. 9 : 456. 1867; Clarke in Hook. f. Fl. Brit. India 4 : 406. 1884; Duthie, Fl. Gangetic Plain 2 : 185. 1911. *Hemiadelphis polyspermus* (Roxb.) Nees var. *joshianus* Rao & Biswas in Ind. For. 94 : 657. 1968.

Erect or prostrate herbs, rooting on the lower nodes. Leaves subsessile, ovate or elliptic-lanceolate, 1.0-2.5 x 0.5-1.5 cm, obtuse or subacute. Flowers

white or pale blue, axillary, passing into terminal, leafy spikes. Bracts leaf-like. Bracteoles linear. Capsules oblong, exceeding the sepals, 2-valved, 16 to 20-seeded, hairy at the top.

Fl. & Fr. : October-March.

Common in wet and aquatic habitats; Banswara (*Verma* 213, BSA), Jolana (*Kanodia* Acc. no. 3084, BSI).

10. HYGROPHILA R. Br. *emeud*, Heine

- | | |
|--|------------------------|
| 1a. Plants armed with axillary spines. Flowers in axillary whorls. | <i>H. auriculata</i> 1 |
| 1b. Plants unarmed. Flowers in spikes. | <i>H. serpyllum</i> 2 |

1. **Hygrophila auriculata** (Schum.) Heine in Kew Bull. 16 : 172. 1962. *Barleria longifolia* L. Cent. Pl. 2 : 22. 1756, non *H. longifolia* Nees, 1847. *B. auriculata* Schum. in Schum. & Thonn. Beskr. Guin. Pl. 285. 1827. *Astera-cantha longifolia* (L.) Nees in Wall. Pl. As. Rar. 3 : 90. 1832; Wight, Icon. 2(2) : 3. t. 449. 1841; Duthie, Fl. Gangetic Plain 2 : 184. 1911. *Hygrophila spinosa* T. Anders. in Thw. Enum. Pl. Zeyl. 225. 1860; Clarke in Hook. f. Fl. Brit. India 4 : 408. 1884.

Annual, hispid herbs, upto 1 m high. Leaves opposite, apparently 6 or more in a whorl due to well developed leaves of axillary branch-buds, oblong or lanceolate, 6-15 x 1.0-2.5 cm. Axillary spines yellow, hispid. Flowers purple-blue, many in axillary whorls. Bracts involucrate, 2-seriate, lanceolate, upto 3.5 cm long, ciliate. Stamens united into pairs at the base. Capsules linear-oblong, glabrous, 4 to 6-seeded.

Fl. & Fr. : August-January.

Abundant in ditches and swampy habitats in association with grasses and sedges; Chandan Singh-ki-Bassi, Lodha tank (*Kanodia* 51108, BSI).

2. ***H. serpyllum*** (Nees) T. Anders. in Journ. Linn. Soc. 9 : 456. 1867; Clarke in Hook. f. Fl. Brit. India 4 : 406. 1884; Duthie, Fl. Gangetic Plain 2 : 186. 1911. *Physichilus serpyllum* Nees in Hook. Comp. Bot. Mag. 2 : 311. 1837; Wight, Icon. 4(3) : 18. t. 1493. 1849. *Hygrophila serpyllum* (Nees) T. Anders. var. *hookeriana* Clarke, I.c. 4 : 407. 1884.

Prostrate or suberect, hairy herbs, often rooting on the lower nodes. Leaves petioled, elliptic-lanceolate to suborbicular, upto 2.5 x 1.5 cm. Flowers violet-purple, in terminal, leafy spikes. Bracts and bracteoles elliptic-lanceolate, 5-8 mm long, acute. Capsules linear-oblong, as long as calyx, pubescent; valves grooved on the back. Seeds orbicular.

Fl. & Fr. : October-May.

Common near water resources in forests and on the rocks in the rivers; Khora forest, Bagaycha forest, Danpur.

Notes : Var. *hookeriana* is an ecoform of proper species. Many intermediate forms were noted in the field and various Indian herbaria.

11. INDONEESIELLA Sreem.

Indoneesiella echiooides (L.) Sreem. in Phytologia 16 : 466. 1968. *Justicia echiooides* L. Sp. Pl. 16. 1753. *Andographis echiooides* (L.) Nees in Wall. Pl. As. Rar. 3 : 117. 1832; Wight, Icon. 2(2) : 4. t. 467. 1841; Clarke in Hook. f. Fl. Brit. India 4 : 505. 1884; Duthie, Fl. Gangetic Plain 2 : 197. 1911. 'Jodapatta' (Hindi).

Erect, annual herbs, upto 50 cm high. Stem 4-angled, patently hairy. Leaves ovate-oblong or elliptic, 2-8 x 1.0-2.5 cm, ciliate, obtuse. Flowers white, spotted with purple, glandular hairy, in axillary, unilateral, subsecund, 4-10 cm long, candelabrum-like, spreading, glandular hairy racemes. Capsules oblong-lanceolate, 0.5-1.5 cm long, grooved on both faces. Seeds oblong or ovoid, yellow, rugose.

Fl. & Fr. : August-January.

Common in wastelands, along the roads, on the hills and the walls of old buildings; Pipalkhant, Banswara (*Majumdar* 10254, BSA), Bhapor (*Kanodia* 75221, BSI), Jolana (*Kanodia* 51171, BSI).

12. JUSTICIA L.

- | | |
|---|---|
| 1a. Bracts and bracteoles acute, shorter than the calyx. | <i>J. diffusa</i> 1 |
| 1b. Bracts and bracteoles obtuse, longer or as long as calyx. | <i>J. quinqueangularis</i>
var. <i>peploides</i> 2 |

1. **Justicia diffusa** Willd. Sp. Pl. 1 : 87. 1797; Clarke in Hook. f. Fl. Brit. India 4 : 538. 1885; Duthie, Fl. Gangetic Plain 2 : 209. 1911. *Rostellaria diffusa* Nees in Wall. Pl. As. Rar. 3. 100. 1832. *Rostellularia diffusa* Nees in DC. Prodr. 11 : 375. 1847.

Procumbent, strigose herbs. Leaves ovate to lanceolate, rarely suborbicular, 1.5-5.0 x 0.5-2.0 cm, acute. Flowers pink or pale-purple, in 3-10 cm long spikes. Calyx 4-partite; lobes scarious-margined, not aristate. Anther-cells placed at different levels. Capsules ellipsoid. Seeds rugose.

Fl. & Fr. : August-February.

Common in wastelands, forests and often on hills; Dangia Bowji hill, Ghatol, Asargarh (*Kanodia* 75627, BSI).

Notes : The genus *Rostellularia* Reichb. has been considered as congeneric with *Justicia* L. in the present study, because there is much controversy among the botanists in this regard and the author himself does not find any reasonable base for the separation of the genus *Rostellularia* Reichb. from *Justicia* L.

2. **J. quinqueangularis** Koen. ex Roxb. var. *peploides* (Nees) Clarke in Hook. f. Fl. Brit. India 4 : 537. 1885; Duthie, Fl. Gangetic Plain 2 : 209. 1911. *Rostellaria peploides* Nees in Wall. Pl. As. Rar. 3 : 101. 1832. *Rostellularia peploides* (Nees) Nees in DC. Prodr. 11 : 375. 1847.

Erect or ascending, glabrous herbs, rooting on the lower nodes. Leaves linear to elliptic-lanceolate, 1.5-4.0 x 0.5-2.0 cm. Flowers rose-coloured, in 3-10 cm long spikes. Calyx-lobes obtuse, eciliate, not scarious-margined. Anthers-cells placed at different levels. Capsules oblong-elliptic, acute.

Fl. & Fr. : Most part of the year.

Common in marshy habitats like banks of tanks and rivers, in rice-fields and other low-lands; Dapia Bowji tank, Ghatol, Kushalgarh (*Kanodia* 75677, BSI).

13. LEPIDAGATHIS Willd.

- 1a. Bracts softly hairy, with straight, apical spines. Calyx-segments thick, spine-tipped. *L. lutea* 1
- 1b. Bracts glabrous, with recurved apical spines. Calyx-segments membranous, not spine-tipped. *L. trinervis* 2

1. *Lepidagathis lutea* Dalz. in Kew Journ. Bot. 2 : 139. 1850; Clarke in Hook. f. Fl. Brit. India 4 : 517. 1885.

Perennial herbs, with 4-angled stem and woody root-stock. Leaves sessile, lanceolate to linear, 2.5-8.0 x 0.5-1.6 cm, acute, 1-nerved. Flowers white, in velvety spikes. Spikes 1 to 3-together in the axils of leaves and also in subradical congested globose heads. Capsules ovoid-lanceolate, with scarious back, 2-seeded. Seeds clothed with hygroscopic, mucilagenous hairs.

Fl. & Fr. : October-February.

Common in forests. Very close to *L. cristata* Willd., but can be distinguished by its 5-partite calyx; Hura Bowji forest.

2. *L. trinervis* Nees in Wall. Pl. As. Rar. 3 : 96. 1832; Clarke in Hook. f. Fl. Brit. India 4 : 517. 1885; Duthie, Fl. Gangetic Plain 2 : 204. 1911. *Ruellia trinervis* Buch.-Ham. ex Wall. Cat. 2500. 1830, nom. nud. 'Patthar-phor' (Hindi).

Suffruticose herbs, with perennial root-stock. Leaves linear, 2.5-5.0 x 0.2-1.0 cm, 3-nerved, acute. Flowers white, in axillary, ovoid, about 1.5 cm long spikes; many spikes closely packed together forming globose heads. Bracts ovoid-elliptic to orbicular. Capsules ovoid-lanceolate, grooved on the sides, 2-seeded. Seeds oblong, clothed with long mucilagenous, hygroscopic hairs.

Fl. & Fr. : November-February.

Common in open wastelands; Banswara (*Verma* 206, BSA), Deri-wali Dungri (*Kanodia* 75150, BSI).

14. NEURACANTHUS Nees

Neuracanthus sphaerostachyus (Nees) Dalz. in Kew Journ. Bot. 2 : 140.

1850; Clarke in Hook. f. Fl. Brit. India 4 : 491. 1884; Sant. in Univ. Bomb. Bot. Mem. No. 2 : 66. 1951. *Lepidagathis sphaerostachya* Nees in DC. Prodr. 11 : 254. 1847. *Neuracanthus lawii* Wight, Icon. 4(4) : 5. t. 1531. 1850.

Erect, perennial herbs, upto 60 cm high. Leaves elliptic-oblong, 6-10 x 4-6 cm, hairy on the veins. Flowers violet-purple, in globose, congested, silky hairy, axillary, head-like spikes. Bracts elliptic, 5 to 7-nerved, ciliate, acuminate. Capsules ovoid, glabrous. Seeds orbicular, silky.

Fl. & Fr. : August-October.

Rare, in forests in shady habitats; Loharia forest, Jolana (*Kanodia* 51048, BSI), Kalinjra (*Kanodia* 75482, BSI).

15. PERISTROPHE Nees

Peristrophe bicalyculata (Retz.) Nees in Wall. Pl. As. Rar. 3 : 113. 1832; Clarke in Hook. f. Fl. Brit. India 4 : 554. 1885; Duthie, Fl. Gangetic Plain 2 : 210. 1911; Mahesh. Illus. Fl. Delhi f. 166. 1966. *Dianthera bicalyculata* Retz. in Vet. Acad. Handl. 297. t. 9. 1775. *Justicia bicalyculata* (Retz.) Vahl, Symb. Bot. 2 : 13. 1791.

Erect or clambering, annual or perennial herbs or undershrubs, upto 1 m high. Stem sulcate, pilose. Leaves ovate, 2.5-10.0 x 0.8-4.5 cm, acute or acuminate. Flowers pink, in lax, trichotomous panicles. Bracts 2, linear, clasping solitary flowers, unequal, one longer than corolla. Calyx-lobes equal in size. Corolla 1.0-1.5 cm long. Capsules pointed, narrowed into a stalk, beaked at the apex. Seeds orbicular, glandular-papillose.

Fl. & Fr. : September-December.

Common in wastelands, neglected corners of fields, orchards and on the fringes of forests; Danpur, Banswara (*Kanodia* 51095, BSI).

16. RUELLIA L. *emend.* Bremek.

Ruellia tuberosa L. Sp. Pl. 635. 1753; Bremek. in Verh. Kon. Nederl. Akad. Wet. 45(1) : 11. 1948 & in Dansk. Botan. Arkiv. 20: 64. 1961; Raizada, Suppl. Duthie, Fl. Gangetic Plain 209. 1976.

Erect, annual herbs, 30-50 cm high, with many fasciculate tuberous roots. Leaves oblong to obovate, 5-10 x 2-4 cm, with decurrent base. Flowers blue-violet. Bracts linear-spathulate. Calyx-lobes linear, ciliate, reflexed in fruits. Capsules linear-fusiform, 2-3 cm long, grooved dorso-ventrally, 2-valved. Seeds many, ovate-oblong.

Fl. & Fr. : August-October.

Native of Tropical America; naturalized in wastelands and forests; Banswara, Dayla tank (*Kanodia* 75182, BSI).

17. RUNGIA Nees

- 1a. Sterile and fertile bracts dissimilar. Upper lip of corolla acute, not notched. *R. pectinata* 3
- 1b. Sterile and fertile bracts similar. Upper lip of corolla notched or emarginate :
 - 2a. Bracts herbaceous, not scarious-margined. Spikes perfectly 1-sided. *R. linifolia* 2
 - 2b. Bracts scarious-margined. Spikes imperfectly 1-sided :
 - 3a. Decumbent, glabrous herbs, rooting on the nodes. Capsules ovoid, acute. *R. repens* 4
 - 3b. Erect, densely hairy herbs. Capsules obovoid, obtuse. *R. elengans* 1

1. **Rungia elengans** Dalz. & Gibbs. Bomb. Fl. 196. 1861; Clarke in Hook. f. Fl. Brit. India 4 : 549. 1885.

Erect, annual herbs, upto 40 cm high, densely clothed with soft white hairs. Leaves sessile or shortly petiolate, elliptic-lanceolate, 3-6 x 1.2-4.0 cm, acute or acuminate. Flowers blue, in erect, terminal, pubescent, imperfectly 1-sided spikes. Bracts broadly elliptic, cuspidate, scarious and ciliate-margined, pubescent, imbricate. Calyx-lobes linear-subulate. Lower anther-cells with white appendages at the base. Capsules obovoid-oblong, obtuse, pubescent. Seeds broadly oblong to suborbicular, rugose with concentric furrows.

Fl. & Fr. : September-January.

Rare, on the hills; Bhandaria (*Kanodia* 75657, BSI).

2. **R. linifolia** Nees in Wall. Pl. As. Rar. 3 : 110. 1832; Clarke in Hook. f. Fl. Brit. India 4 : 548. 1885. *Rostellularia gracilis* Wight, Icon. 4(4) : 6. t. 1541. 1850.

Suberect, annual herbs, 15-40 cm high, with filiform branches. Leaves sessile, elliptic-lanceolate, 4-6 x 1.0-1.5 cm. Flowers pale-purple, in narrow, pedunculate, terminal, quadrifarious secund spikes. Bracts uniform, ovate, herbaceous, acute, mucronate, glandular-pubescent. Calyx-lobes linear-lanceolate, ciliate. Corolla pubescent outside; upper lip notched or emarginate. Filaments glabrous.

Fl. : December-February; *Fr.* : Not seen.

Rare, on the outskirts of forests; Anand Sagar forest (JAV. 29238, BSI).

3. **R. pectinata** (L.) Nees in DC. Prodr. 11 : 469. 1847; Wight, Icon. 4 (4) : 6. t. 1547. 1850. *Justicia pectinata* L. Cent. Pl. 2 : 3. 1756. *Rungia parviflora* (Retz.) Nees var. *pectinata* (L.) Clarke & var. *murallis* Clarke in Hook. f. Fl. Brit. India 4 : 550. 1885; Duthie, Fl. Gangetic Plain 2 : 212. 1911.

Much-branched, procumbent, annual herbs. Leaves elliptic-lanceolate, 4-10 x 1-4 cm, serrulate, acuminate. Flowers blue, in terminal and axillary, dense, 1-sided spikes. Bracts in 4 rows; barren ones ovate-oblong or lanceolate, with narrow scarious margins; fertile ones obovate to

orbicular, broadly scarious-margined. Capsules ovoid, 4-seeded. Seeds orbicular, yellow.

Fl. & Fr. : October-May.

Common in wet and shady habitats in forests and wastelands; Kotharia forest, Jhola fall (*Kanodia* 6, BSI).

4. *R. repens* (L.) Nees in Wall. Pl. As. Rar. 3 : 110. 1832; Wight, Icon. 2(2) : 4. t. 465. 1841; Clarke in Hook. f. Fl. Brit. India 4 : 549. 1885; Duthie, Fl. Gangetic Plain 2 : 211. 1911. *Justicia repens* L. Sp. Pl. 15. 1753. 'Kharmar' (Hindi).

Procumbent, annual herbs, often rooting on the nodes. Leaves elliptic or oblong, often ovate-lanceolate, 2.5-8.0 x 0.8-2.8 cm, acute. Flowers pink or violet, in terminal spikes. Bracts 4-ferous, ovate, 5-7 mm long, apiculate, scarious-margined, imbricately arranged. Calyx-lobes 5, linear. Anther-cells placed at different levels. Capsules ovoid, acute, pubescent.

Fl. & Fr. : August-January.

Common, forming dense mats in wet and shady localities in forests and wastelands; Danpur, Bagaycha forest, Banswara (*Kanodia* 51103, BSI).

76. VERBENACEAE

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|--|-----------------------|
| 1a. Leaves digitately 3 to 7-foliolate. | <i>Vitex</i> 6 |
| 1b. Leaves simple : | |
| 2a. Stamens 5, all equal in size. | <i>Tectona</i> 5 |
| 2b. Stamens 4, equal or didynamous : | |
| 3a. Ovaries 4 or 8-celled : | |
| 4a. Drupes with one, 4-celled pyrene. | <i>Gmelina</i> 2 |
| 4b. Drupes with four, 1-celled pyrenes. | <i>Clerodendrum</i> 1 |
| 3b. Ovaries 2-celled : | |
| 5a. Creeping herbs. Fruits dry, hard, enveloped by the calyx. | <i>Phyla</i> 4 |
| 5b. Shrubs or undershrubs. Fruits succulent, not enveloped by the calyx. | <i>Lantana</i> 3 |

1. CLERODENDRUM L.

| | |
|--|-----------------------|
| 1a. Flowers in few-flowered, axillary cymes. Calyx minutely toothed, enlarged in fruit. | <i>C. inerme</i> 1 |
| 1b. Flowers in dichotomous, terminal cymes forming panicles. Calyx lobed about half way down, not enlarged in fruit. | <i>C. phlomidis</i> 2 |

1. *Clerodendrum inerme* (L.) Gaertn, Fruct. Sem. 1 : 271. t. 57. f. 1. 1788; Clarke in Hook. f. Fl. Brit. India 4 : 589. 1885; Mueuse in Blumea 5 : 74. 1942; Raizada, Suppl. Duthie, Fl. Gangetic Plain 212. 1976. *Volkameria inermis* L. Sp. Pl. 637. 1753. 'Chandni' (Hindi).

Straggling scandent shrubs. Leaves petioled, opposite, ovate to elliptic or obovate, 2.5-5.0 x 1.0-1.5 cm, fleshy, obtuse, narrowed towards base, gland-punctate beneath. Flowers white, in 3-flowered, axillary cymes. Calyx pubes-

cent, 2-3 cm long, with sessile glands outside. Corolla-mouth oblique. Drupes obovate, hard.

Fl. & Fr. : Most part of the year.

Rare, near habitations in wastelands forming its pure community; often cultivated ornamenteally in the gardens, lawns and parks; Banswara.

2. *C. phleoidis* L. f. Suppl. 292. 1781; Wight, Icon. 4(3) : 13. t. 1473. 1849; Clarke in Hook. f. Fl. Brit. India 4 : 590. 1885; Duthie, Fl. Gangetic Plain 2 : 225. 1911. *C. multiflorum* Ktze. Rev. Gen. Pl. 587. 1891, non G. Don, 1824. 'Arni' (Hindi).

Large shrubs or small trees, with densely pubescent branchlets. Leaves 1.5-7.0 x 1.5-5.0 cm, crenate-dentate, obtuse, truncate or rounded at the base, gland-punctate beneath. Flowers greenish-white, in axillary and terminal, panicled cymes. Calyx-lobes acuminate, with few sessile glands outside. Drupes ovoid, wrinkled, with crustaceous endocarp. Seeds oblong, white.

Fl. & Fr. : August-December.

Common in wastelands and open forests. Leaves and fruits are usually attacked by insects and flowers are slightly fragrant during night; Lalpura forest, Ghatol (*Majumdar* 10225, BSA), Jolana (*Kanodia* 51175, 51184, BSI).

2. GMELINA L.

Gmelina arborea Roxb. Pl. Cor. 3 : 42. t. 246. 1815; Wight, Icon. 4(3) : 12. t. 1470. 1849; Clarke in Hook. f. Fl. Brit. India 4 : 581. 1885; Duthie, Fl. Gangetic Plain 2 : 220. 1911. 'Gambhari' (Hindi).

Deciduous trees, with grey bark. Young parts clothed with pale-yellow tomentum. Leaves ovate, acuminate, upto 15 x 12 cm, with slightly decurrent and 3 to 5-nerved base. Flowers brownish-yellow, 2.5-3.5 cm long, in paniculate, centrifugal cymes. Calyx with 2-7 glands on the anterior part. Corolla limb distinctly 2-lipped. Drupes pyriform, 1.5-2.5 cm in diam., smooth.

Fl. & Fr. : February-May.

Rare, on the fringes of forests and in wastelands; Danpur forest.

3. LANTANA L.

1a. Plants armed with prickles. Flowers of various colours, but not white.

L. camara 1

1b. Plants unarmed. Flowers white.

L. indica var.

albiflora 2

1. *Lantana camara* L. Sp. Pl. 627. 1753; Schau in DC. Prodr. 11 : 606. 1847; Clarke in Hook. f. Fl. Brit. India 4 : 562. 1885; Duthie, Fl. Gangetic Plain 2 : 216. 1911. *L. aculeata* L. Sp. Pl. 627. 1753. *L. camara* L. var. *acuteata* (L.) Moldenke in Torreya 34 : 9. 1934. 'Latina, Lal Galphusia' (Hindi).

Straggling, evergreen shrubs. Leaves ovate. Flowers yellow, red or scarlet, condensed in head-like, peduncled, 3-4 cm long spikes. Bracts lanceolate, 3 to 5-nerved. Calyx 2-lobed. Berries globose, enclosing 2 nutlets, black when ripe; pulp very sticky.

Fl. & Fr. : Throughout the year.

Native of Tropical America; naturalized in wastelands and forests; Paloda, Banswara (*Verma* 230, BSA).

2. *L. indica* Roxb. var. *albiflora* Wt. ex Clarke in Hook. f. *Fl. Brit. India* 4 : 562. 1885; Gandhi in Sald. & Nicol. *Fl. Hassan Dist.* 490. 1976. '*Kharenti, Sased Galphusia*' (Hindi).

Erect shrubs. Leaves olate. Flowers in axillary, peduncled, ovoid, head-like, 1.5-2.5 cm long spikes. Bracts ovate, acute, 5 to 7-nerved. Calyx 2-lobed. Drupes globose, purple, enclosed in transparent calyx, with two, 1-seeded pyrenes.

Fl. & Fr. : August-December.

Common component of scrub vegetation at the foot of hills and in plains; Paloda.

Notes : The var. *albiflora* Wt. ex Cl. differs from proper species because of its obtuse leaves of smaller size, acute or apiculate bracts and white corolla.

4. *PHYLA* Lour.

Pbyla nodiflora (L.) Greene in Pittonia 4 : 46. 1899; Raju in Bull. Bot. Soc. Beng. 23 (1) : 70. 1969, *Verbena nodiflora* L. Sp. Pl. 20. 1753. *Lippia nodiflora* (L.) Michx. Fl. Bor. Amer. 2 : 15. 1803; Wight, Icon. 4 (3) : 11. t. 1463. 1849; Clarke in Hook. f. *Fl. Brit. India* 4 : 563. 1885; Duthie, *Fl. Gangetic Plain* 2 : 217. 1911. 'Jal-but' (Hindi).

Creeping, perennial herbs, rooting on the nodes. Leaves petioled or subsessile, obovate-spathulate, 1.0-3.5 x 0.5-2.0 cm, entire or serrate-dentate in upper part. Flowers white or pink, condensed in head-like globose or oblong, 1.0-2.5 x 0.4-1.0 cm, axillary, pedunculate spikes. Calyx 2-partite; lobes keeled, acute. Fruits of 2, 1-seeded pyrenes.

Fl. & Fr. : Most part of the year.

Common in wet and marshy habitats, forming carpets of its own or in association with *Marselia* sp., *Eclipta alba* (L.) Hassk. etc.; Paloda, Raj tank (*Kanodia* 51012, BSI).

5. *TECTONA* L. f. *nom. cons.*

Tectona grandis L. f. Suppl. 151. 1781; Brandis For. Fl. North-West & C. Ind. 354, t. 44. 1874; Clarke in Hook. f. *Fl. Brit. India* 4 : 570 1885; Duthie, *Fl. Gangetic Plain* 2 : 220. 1911. 'Sagwan' (Hindi).

Deciduous trees, upto 30 m high, clothed with stellate tomentum. Leaves

elliptic-ovate or obovate, 20-50 x 15-40 cm, coriaceous. Flowers white, in 30-80 cm long panicles in which only few flowers are fertile. Drupes globose, stellately tomentose, 4-lobed, enclosed in the inflated calyx.

Fl. : September-October; *Fr.* : November-December.

Chief component in the forests dominating the vegetation. Plants have high regeneration power and can give many timber-crops; Wadita Hillage forest, Rowal Hindvela forest.

6. VITEX L.

Vitex negundo L. Sp. Pl. 638. 1753; Wight, Icon. 2 (3) : t. t. 519. 1842; Clarke in Hook. f. Fl. Brit. India 4 : 583. 1885; Duthie, Fl. Gangetic Plain 2 : 224. 1911; Moldenke in Phytologia 15 : 267. 1967. 'Samala' (Hindi).

Shrubs, 1.5-2.5 m high, covered with hoary tomentum. Leaflets lanceolate, 6-15 x 1.3-2.5 cm, acuminate, grey pubescent beneath, middle one long petiolulate. Flowers lavender to blue, clustered in pyramidal panicles. Drupes globose, 1 to 4-celled, black.

Fl. & Fr. : Most part of the year.

Abundant on rocky banks of the rivers and in open forests; often planted on the edges of fields; Ghatol, Anand Sagar (Kanodia 75289, BSI).

77. LAMIACEAE (LABIATAE nom. alt.)

| | |
|--|----------------------|
| 1a. Fertile stamens 2. | <i>Salvia</i> 8 |
| 1b. Fertile stamens 4 : | |
| 2a. Upper lip of corolla 4-lobed : | |
| 3a. Style 2-fld. Stigmas not capitate : | |
| 4a. Lower lip of corolla shorter than upper. | <i>Ocimum</i> 6 |
| 4b. Lower lip of corolla longer than upper. | <i>Anisochilus</i> 1 |
| 3b. Style entire. Stigmas capitate. | <i>Orthosiphon</i> 7 |
| 2b. Upper lip of corolla 2 to 3-lobed : | |
| 5a. Upper pair of stamens with 1-celled anthers. | <i>Anisomeles</i> 2 |
| 5b. All stamens with 2-celled anthers : | |
| 6a. Calyx 5-toothed. | <i>Nepeta</i> 5 |
| 6b. Calyx 6 to 10-toothed : | |
| 7a. Lower lip of corolla equalling or longer than upper lip. | <i>Leucas</i> 4 |
| 7b. Lower lip of corolla shorter than upper lip. | <i>Leonotis</i> 3 |

1. ANISOCHILUS WALL.

Anisochilus garnosus (L. f.) Wall. Pl. As. Rar. 2 : 18. 1830-31; Hook. f. Fl. Brit. India 4 : 627. 1885; Duthie, Fl. Gangetic Plain 2 : 240. 1911; Mukerji in Rec. Bot. Surv. Ind. 14(1) : 58. 1940. *Lavandula carnosa* L. f. Suppl. 273. 1781.

Erect, annual herbs, 30-60 cm high. Leaves petiolate, ovate-oblong or

rounded, 2.5-6.0 x 1.5-3.0 cm, obtuse, crenate, pubescent or glabrous above, tomentose beneath. Spikes dense and compact, 1.5-3.0 cm long. Bracts ovate, glandular-pubescent, caducous. Calyx glandular. Upper lip of corolla 4-lobed, shorter than lower lip. Styles 2-fid. Nutlets suborbicular, 1-2 mm in diam., smooth, brown.

Fl. & Fr. : August-November.

Occasional, in wastelands; Kalinjra (*Kanodia* 75640, BSI).

2. ANISOMELES R. Br.

Anisomeles indica (L.) O. Ktze. Rev. Gen. Pl. 2 : 512. 1891; Mukerj. in Rec. Bot. Surv. Ind. 14 (1) : 152. 1940; Keng in Gard. Bull. Sing. 24 : 34. 1969; Raizada, Suppl. Duthie, Fl. Gangetic Plain 217. 1976. *Nepeta indica* L. Sp. Pl. 571. 1753. *Anisomeles ovata* R. Br. in Ait. Hort. Kew. ed. 2. 3 : 364. 1811; Wight, Icon. 3(2) : 5. t. 865. 1844-45; Hook. f. Fl. Brit. India 4 : 672. 1885; Duthie, Fl. Gangetic Plain 2 : 245. 1911. *Epimeredi indicus* (L.) Rothm. in Fedde, Repert. 53 : 12. 1944.

Herbs or undershrubs, upto 1.5 m high, clothed with grey pubescence. Leaves ovate, 3-15 x 2.5-10.0 cm, crenate-serrate, obtuse to acuminate, with rounded-cordate to cuneate base. Flowers bluish-purple, in axillary verticels, combined into terminal dense spikes. Calyx 5 to 10-nerved. Anther-cells of upper pair dimidiate and of the lower pair transverse. Nutlets ovoid, compressed, polished.

Fl. & Fr. : August-November.

Common in wastelands and on the fringes of forests; Lasara, Shergarh forest, Kushalgarh (*Kanodia* 75682, BSI).

3. LEONOTIS R. Br.

Leonotis nepetifolia (L.) R. Br. Prodr. 504. 1810; Wight, Icon. 3 (2) : 5. t. 867. 1844-45; Hook. f. Fl. Brit. India 4 : 691. 1885; Duthie, Fl. Gangetic Plain 2 : 253. 1911; Mukerj. in Rec. Bot. Surv. Ind. 14(1) : 18. 1940. *Phlomis nepetifolia* L. Sp. Pl. 586. 1753.

Annual herbs, upto 1 m high. Leaves petioled, ovate-cordate, 3.5-10.0 x 2-6 cm, crenate-serrate, cuneate at base. Flowers orange-red, densely crowded in globose, 3.5-7.5 cm broad verticels in the axils of upper leaves. Bracts spine-tipped. Calyx deflexed; tube hairy, bent above the middle; teeth unequal, posterior one the longest, spinescent. Nutlets oblong, 3-gonous, obliquely truncate at both ends.

Fl. & Fr. : October-April.

Rare, in wastelands along the roads; Anjunia, Banswara (*Kanodia* 51089, BSI), Jolana (*Kanodia* 51165, BSI).

4. LEUCAS R. Br.

- 1a. Calyx-tube not bent, almost straight; calyx-mouth straight, not oblique. *L. stricta* 3
- 1b. Calyx-tube bent downwards; calyx-mouth produced above, oblique :
 - 2a. Calyx-teeth very short :
 - 3a. Leaves ovate or ovate-lanceolate. Bracts foliaceous, lanceolate, imbricate and forming an involucre covering the floral heads. Calyx-teeth subequal. *L. cephalotes* 1
 - 3b. Leaves linear. Bracts linear, neither imbricate nor forming an involucre. Upper calyx-tooth longer than others. *L. zeylanica* 4
 - 2b. Calyx-teeth long and slender. *L. nutans* 2

1. **Leucas cephalotes** (Koen. ex Roth) Spreng. Syst. 2 : 743. 1825; Wight, Icon. 2(1) : 2. t. 337. 1840; Hook. f. Fl. Brit. India 4 : 689. 1885; Duthie, Fl. Gangetic Plain 2 : 251. 1911; Mukerj. in Rec. Bot. Surv. Ind. 14 (1) : 168. 1940. *Phlomis cephalotes* Koen. ex Roth, Nov. Pl. Sp. 262. 1821. *Leucas capitata* Desf. in Mem. Mus. Hist. Nat. Paris 11 : 8.t. 4. 1824. 'Udapata' (Hindi).

Erect, annual, hispid herbs, 20-50 cm high. Leaves petioled, ovate-lanceolate, 3-7 x 1-3 cm, crenate-serrate, narrowed at both ends. Flowers white, in dense, globose, terminal whorls 3-5 cm in diam. Bracts 1.0-1.5 cm long, acute, ciliate. Calyx-mouth produced above, villous within. Upper lip of corolla three-fourth the length of lower lip. Nutlets obovoid or oblong, 3 mm long, brown.

Fl. & Fr. : August-March.

Common weed in wastelands, forests and cultivated fields; Dagua Bowji hill, Ghatol, Deri-wali-Dungri (*Kanodia* 75126, BSI).

2. **L. nutans** (Roth) Spreng. Syst. 2 : 743. 1825; Hook. f. Fl. Brit. India 4 : 688. 1885; Duthie, Fl. Gangetic Plain 2 : 251. 1911; Mukerj. in Rec. Bot. Surv. Ind. 14(1) : 169. 1940. *Phlomis nutans* Roth, Nov. Pl. Sp. 263. 1821. 'Chatia' (Hindi).

Annual, hispid herbs, 7-15 cm high. Leaves petioled, oblong or lanceolate, 2-5 x 1.0-1.8 cm, serrate, obtuse. Flowers white, in many-flowered, axillary and terminal, 1.5-2.5 cm broad whorls subtended by leaves. Bracts lanceolate, as long as calyx, ciliate, spine-tipped. Calyx-mouth produced above; teeth long, slender, spine-tipped. Lower-lip of corolla little longer than upper. Nutlets oblong, 3 mm long, brown, smooth.

Fl. & Fr. : August-November.

Common in open wastelands among small grasses and in dry exposed habitats in forests; Paloda, Rowal Hindvela forest.

3. **L. stricta** Benth. in Wall. Pl. As. Rar. 1 : 61. 1830 & Lab. Gen. Sp. 614. 1834; Hook. f. Fl. Brit. India 4 : 688. 1885; Mukerj. in Rec. Bot. Surv. Ind. 14 (1) : 170. 1940.

Erect, annual, hispid herbs, 15-30 cm high. Leaves linear-oblong or oblong-lanceolate, 2.5-6.0 x 0.4-1.2 cm, entire, obtuse. Flowers white, shortly pedicelled, in a terminal, many-flowered whorl. Bracts rigid, spinous-pointed, ciliate with bulbous-based hairs. Calyx-mouth straight, villous; teeth long, unequal, erect. Nutlets oblong, the inner face angular.

Fl. & Fr. : August-October.

Occasional, on the outskirts of forests and in wastelands; Anand Sagar forest (*Kanodia* 75209, BSI), Kalinjra (*Kanodia* 75650, BSI).

4. *L. zeylanica* (L.) R. Br. Prodr. 504, 1810; Hook. f. Fl. Brit. India 4 : 689, 1885; Mukerj. in Rec. Bot. Surv. Ind. 14(1) : 171, 1940. *Phlomis zeylanica* L. Sp. Pl. 586, 1753. *Leucas diffusa* Woodr. in Journ. Bomb. nat. Hist. Soc. 12 : 362, 1899, non Benth. 1834.

Much-branched, annual herbs, upto 30 cm high, hispid with long hairs. Leaves subsessile, linear-lanceolate, not exceeding 7.0 x 1.5 cm, entire or distantly serrulate. Flowers white, few in each axillary whorl. Calyx-mouth produced above, villous within. Lower lip of corolla twice or more long as upper lip. Nutlets obovoid-oblong, the inner face sharply angular.

Fl. & Fr. : August-October.

Common weed in cultivated fields; Shergarh.

5. NEPETA L.

Nepeta hindostana (Roth) Haines, Bot. Bih. Ori. 744, 1922; Mukerj. in Rec. Bot. Surv. Ind. 14 (1) : 133, 1940. *Glechoma hindostana* Roth, Nov. Pl. Sp. 258, 1821. *Nepeta ruderalis* Buch.-Ham. ex Benth. in Wall. Pl. As. Rar. 1 : 64, 1830; Hook. f. Fl. Brit. India 4 : 661, 1885; Duthie, Fl. Gangetic Plain 2 : 254, 1911.

Annual herbs, 20-50 cm high. Leaves ovate, oblong or suborbicular, 1-5 x 0.8-4.0 cm, crenate-serrate, with rounded, truncate or cordate base. Flowers blue-violet, in dense, long peduncled, axillary cymes which form slender panicles or interrupted spikes towards the end of branches. Calyx 3-4 mm long, more than 10 ribbed; upper lip without a dorsal appendage. Upper-lip of corolla concave. Nutlets ovoid, brown, granulate.

Fl. & Fr. : October-April.

Rare, in wastelands and often on the walls of old buildings; Chandan Singh-ki-Bassi, Banswara (*Verma* 234, BSA).

6. OCIMUM L.

1a. Lower calyx-teeth longer than the upper lip.

O. americanum 1

1b. Lower calyx-teeth shorter than the upper lip.

O. gratissimum 2

1. *Ocimum americanum* L. in Justenius, Cent. Pl. 1 : 15, 1755 & Amoen.

Acad. 4 : 276. 1759; Mahesh. Illus. Fl. Delhi f. 174. 1966; Keng in Gard. Bull. Sing. 24 : 126. 1969. *O. canum* Sims in Bot. Mag. 51. t. 2452. 1823; Hook. f. Fl. Brit. India 4 : 607. 1885; Duthie, Fl. Gangetic Plain 2 : 234. 1911; Mukerj. in Rec. Bot. Surv. Ind. 14 (1) : 17. 1940. 'Bapchi', *Nakad Bapchi* (Hindi).

Erect, semi-woody herbs, 30-80 cm high. Leaves ovate to lanceolate, acute. Flowers purplish, 3-6 in each whorl, on 10-20 cm long peduncles. Bracts ovate-lanceolate, ciliate, obtuse. Pedicels shorter than calyx, recurved in fruit. Calyx hairy within. Lateral filaments appendaged at the base. Lower lip of corolla flat. Nutlets oblong, black, pitted, punctate, 1.0-1.5 mm long, mucilagenous when wetted.

Fl. & Fr. : Most part of the year.

Common, but sparsely distributed in wastelands; Paloda, Ghatol (*Majumdar* 10219, BSA), Dayla tank (*Kanodia* 75175, BSI).

2. *O. gratissimum* L. Sp. Pl. 1197. 1753; Hook. f. Fl. Brit. India 4 : 608. 1885; Duthie, Fl. Gangetic Plain 2 : 234. 1911; Mukerj. in Rec. Bot. Surv. Ind. 14(1) : 20. 1940.

Shrubby perennials, upto 2 m high. Leaves elliptic-lanceolate, 5-13 x 4-6 cm, coarsely crenate-serrate, acute, cuneate at the base, gland-dotted. Flowers greenish-yellow, in racemosely arranged tolerably close whorls. Pedicels shorter than the calyx. Lower calyx-teeth longer than the upper. Upper filaments with a bearded tooth at the base. Nutlets subglobose, rugose, brown.

Fl. & Fr. : July-October.

Rare, in forests; Anand Sagar forest (*Kanodia* 75258, BSI).

7. ORTHOSIPHON Benth.

Orthosiphon pallidus Benth. Lab. Gen. Sp. 25. 1832; Hook. f. Fl. Brit. India 4: 613. 1885; Duthie, Fl. Gangetic Plain 2 : 236. 1911; Mukerj. in Rec. Bot. Surv. Ind. 14(1): 23. 1940; Mahesh. Illus. Fl. Delhi f. 175. 1966. 'Ban-tulsi' (Hindi).

Annual herbs, upto 30 cm high. Leaves petioled, ovate, 2-5 x 0.8-2.5 cm, serrate-crenate, cuneate at base. Flowers white or lilac, upto 6 in a whorl, combined into terminal, 6-12 cm long racemes. Calyx-tube with many nerves between the main 10 nerves. Corolla-tube equalling the 2-lipped calyx or slightly exserted; lower lip concave. Nutlets subglobose, clothed with mucilage.

Fl. & Fr. : July-November.

Common in dry habitats from wastelands to forests; Ghatol, Bhimgarh (*Kanodia* 75358, BSI).

8. SALVIA L.

Salvia plebeia R. Br. Prodr. 501. 1810; Hook. f. Fl. Brit. India 4: 655. 1885; Duthie, Fl. Gangetic Plain 2 : 256. 1911; Mukerj. in Rec. Bot. Surv. Ind. 14(1) : 111. 1940; Keng in Gard. Bull. Sing. 24: 162. 1969.

Erect herbs, 30-50 cm high. Stem retrorsely scabridly hairy. Leaves oblong-lanceolate, 2.5-7.0 x 1.5-2.5 cm, crenate-dentate, subacute, gland-punctate. Flowers violet or white. Verticillasters 4 to 6-flowered, combined into false terminal racemes forming panicles. Bracts linear-spathulate, ciliate. Calyx 2-lipped, about 2 mm long, glandular hairy. Anthers versatile. Connective transverse to the filament and articulate with it. Nuts ovoid, 1 mm long, rugose, brown.

Fl. & Fr. : January-May.

Moisture loving herbs, grow as winter season weed of cultivation; Banswara (*Majumdar* 10219, BSA; *Kanodia* 51186, BSI).

Ocimum sanctum L.—Erect, aromatic herbs. Pedicels as long as calyx. Calyx glabrous within. Cultivated in pots or on pedestals in Hindu houses and temples. 'Tulsi' (Hindi).

78. NYCTAGINACEAE

BOERHAVIA L.

Boerhavia procumbens Banks ex Roxb. Fl. Ind. I: 148. 1820; Wight, Icon. 3(2); 6. t. 874. 1844-45. *B. repens* L. var. *procumbens* (Banks ex Roxb.) Hook. f. Fl. Brit. India 4: 709. 1885. *B. repens* L. var. *diffusa* Hook. f. I.c. 4: 709. 1885. *B. diffusa* sensu Duthie, Fl. Gangetic Plain 3: 2. 1915, *auct. non* L. 1753.

Diffuse, prostrate or decumbent, perennial herbs. Leaves ovate-oblong to suborbicular, very unequal-sized at each node, entire or undulate, obtuse. Flowers subsessile, pink or white, 2-10 together, combined into axillary and terminal cymose panicles. Perianth articulated with pedicels. Stamens 1-3. Fruits clavate, 3.0-3.5 x 1.0-1.5 mm, pubescent, 5-ribbed, glandular along the ribs, not at the crown.

Fl. & Fr. : Most part of the year.

Common in wastelands, open forests and along the roads; Shergarh forest, Pipalkhund, Bhongri (*Kanodia* 75455, BSI).

Notes : *B. diffusa* L. bears fusiform fruits.

Bougainvillea spectabilis Willd.—Robust climbing shrubs, with pinkish-yellow flowers in the axils of 3, petaloid bracts. Native of South America; commonly planted for ornamental purposes.

79. AMARANTHACEAE

| | | |
|--|--|------------------------|
| 1a. Stamens (filaments) free : | | |
| 2a. Stamens 2. | | <i>Nothosaerva</i> 8 |
| 2b. Stamens more than 2, usually 3 or 5 : | | |
| 3a. Flowers unisexual. Style inconspicuous. Fruit an utricle. | | <i>Amaranthus</i> 4 |
| 3b. Flowers bisexual. Style distinct. Fruit a crustaceous nut. | | <i>Digera</i> 6 |
| 1b. Stamens (filaments) connate at the base : | | |
| 4a. Fruits 1-seeded : | | |
| 5a. Anthers 1-celled : | | |
| 6a. Filaments connate at the base into a cup. Stigma 1, capitate, entire. | | <i>Alternanthera</i> 3 |
| 6b. Filaments connate upto the top into a long tube. Stigmas 2, linear-filiform. | | <i>Gomphrena</i> 7 |
| 5b. Anthers 2-celled : | | |
| 7a. Leaves alternate. | | <i>Aerva</i> 2 |
| 7b. Leaves opposite : | | |
| 8a. Stamens with interposed staminodes. Modified flowers without hooked spines. | | <i>Achyranthes</i> 1 |
| 8b. Stamens without staminodes. Modified flowers with hooked spines. | | <i>Pupalia</i> 9 |
| 4b. Fruits 2 to many-seeded. | | <i>Celosia</i> 5 |

1. ACHYRANTHES L.

Achyranthes aspera L. Sp. Pl. 204. 1753; Wight, Icon. 5(2): 3. t. 1777. 1852; Hook. f. Fl. Brit. India 4: 730. 1885; Duthie, Fl. Gangetic Plain 3: 18. 1915. 'Andhi Jhara' (Hindi).

var. *aspera*

Erect, stiff herbs, upto 1 m high, often tinged with reddish-purple. Leaves ovate to orbicular, 3-10 x 2-7 cm, acute or obtuse, hairy. Flowers pale-green, deflexed, in 10-60 cm long spikes. Bracts and bracteoles ovate, spine-tipped. Tepals ovate-lanceolate, acute, 3-nerved. Pseudo-staminodes dorsally appendiculate just below the apex. Utricles 2-3 mm long.

Fl. & Fr. : September-February.

Common in wastelands and forests. It is a very variable species; Deoda, Deri-wali-Dungri (*Kanodia* 75152, BSI).

2. AERVA Forsk. *nom. cons.*

| | |
|----------------------------------|---------------------|
| 1a. Spikes in axillary clusters. | <i>A. lanata</i> 1 |
| 1b. Spikes in terminal panicles. | <i>A. persica</i> 2 |

1. **Aerva lanata** (L.) Juss. in Ann. Mus. Nat. Hist. Paris 11: 131. 1808, ex J.A. Schultes, Syst. Veg. ed. 15. 5: 546. 1819; Wight, Icon. 2(4): 7. t. 723.

1843; Hook. f. Fl. Brit. India 4 : 728. 1885; Duthie, Fl. Gangetic Plain 3 : 16. 1915. *Achyranthes lanata* L. Sp. Pl. 204. 1753.

Herbs or undershrubs, branching from root-stock. Leaves elliptic, ovate or oblong-obovate to suborbicular, 1.2-5.0 x 0.3-3.0 cm, white tomentose. Spikes 2 to 4-together. Flowers white, 1 or 2-sexual, 5-merous. Tepals oblong, 1-2 mm long, white woolly, two outer ones mucronate. Filaments alternating with staminodes. Stigmas 2. Seeds black.

Fl. & Fr. : August-March.

Common weed in wastelands and cultivated fields; Ghatol, Khamera, Banswara (*Kanodia* 75191, BSI).

2. *A. persica* (Burm. f.) Merr. in Phil. Journ. Sci. 19: 348. 1921. *Iresine persica* Burm. f. Fl. Ind. 212. 1768. *I. javanica* Burm. f. Fl. Ind. 212. 1768. *Aerva tomentosa* Forsk. Fl. Aegypt.-Arab. 122. 1775; Duthie, Fl. Gangetic Plain 3: 15. 1915. *A. javanica* (Burm. f.) Juss. ex Schult. Syst. Veg. ed. 15. 5: 565. 1819; Wight, Icon 3(2): 6. t. 876. 1844-45; Hook. f. Fl. Brit. India 4: 727. 1885. 'Dholphuli, But' (Hindi).

Erect, woody, dioecious, tomentose herbs or undershrubs, upto 1 m high. Leaves linear-oblong or obovate-lanceolate, 5-12 x 1.5-2.5 cm, obtuse or acute. Flowers white, 5-merous. Spikes 2.5-15.0 cm long, arranged in leafless panicles. Bracteoles 2, ovate, acute, white. Stigmas 2, as long as style. Utricles ovoid. Seeds brown, polished.

Fl. & Fr. : August-November.

Rare, in dry wastelands; Bhimsor (*Majumdar* 10282, BSA).

3. ALTERNANTHERA Forsk.

- 1a. Leaves obovate to suborbicular, unequal-sized. Tepals spine-tipped, very dissimilar. Fertile stamens 5. *A. pungens* 1
- 1b. Leaves linear-oblong, almost equal-sized. Tepals not spine-tipped, all similar. Fertile stamens 3. *A. sessilis* 2

1. *Alternanthera pungens* Kunth in H.B. & K. Nov. Gen. Sp. Pl. 2: 206. 1818; Mahesh. Illus. Fl. Delhi f. 180. 1966; Raizada, Suppl. Duthie, Fl. Gangetic Plain 233. 1976. *Achyranthes repens* L. Sp. Pl. 205. 1753. *A. echinata* Sm. in Rees, Cycl. Suppl. No. 10. 1819. *Alternanthera repens* (L.) Link, Enum. Pl. Hort. Berol. I: 154. 1821, non J.F. Gmel. 1791. 'Kante-wali-Santi' (Hindi).

Prostrate herbs, with zig-zag branches, clothed with shaggy hairs. Leaves 1.2-4.0 x 1.2-2.5 cm, cuneate at base. Flowers pale-green, in axillary, head-like, 6-12 mm long, spinescent spikes. Two inner most bracts deeply keeled-concave, hairy on the back. Utricles enclosed in the calyx, bracts and bracteoles.

Fl. & Fr. : August-December.

Native of South America; naturalized along the roads and in exposed

habitats in the forests; Anand Sagar forest.

2. *A. sessilis* (L.) R. Br. ex DC. Cat. Hort. Monsp. 77. 1813; Wight, Icon. 2(4): 7. t. 727. 1843; Hook. f. Fl. Brit. India 4 : 731. 1885 ; Duthie, Fl. Gangetic Plain 3: 20. 1915; Malville in Kew Bull. 1958: 172. 1958. *Gomphrena sessilis* L. Sp. Pl. 225. 1753. *Alternanthera repens* J. F. Gmel. Syst. Nat. 2: 106. 1791. *A. nodiflora* R. Br. Prodr. 417. 1810; Hook. f. I.c. 4: 732. 1885. 'Nari-ka-bam, Bhaji' (Hindi).

Decumbent, perennial herbs, rooting on the nodes. Leaves narrowed at both ends, 1-5 x 0.3-2.0 cm. Flowers white, in axillary, globose to cylindric head-like spikes. Tepals 1-nerved, not indurate. Pseudostaminodes entire or 2 to 3-dentate. Utricles obreniform or obcordate, enclosed in the perianth. Seeds suborbicular.

Fl. & Fr. : Most part of the year.

Common in ponds, ditches, rice-fields and other aquatic or marshy habitats; Ghatol, Banswara (*Kanodia* 51164, BSI).

4. AMARANTHUS L.

1a. Tepals 3. Stamens 3 :

2a. Bracts and bracteoles awned or setaceous, equalling or exceeding the tepals. Utricle circumscissile. *A. tricolor* 5

2b. Bracts and bracteoles acute, not awned or setaceous, shorter than tepals. Utricle indehiscent :

3a. Utricle corrugated, acute at apex, not exceeding the tepals. *A. viridis* 6

3b. Utricle smooth, obtuse, longer than tepals. *A. lividus* 3

1b. Tepals 5. Stamens 5 :

4a. Plants armed with axillary spines. *A. spinosus* 4

4b. Plants unarmed :

5a. Bracts much exceeding the tepals. Tepals of female flowers ovate-lanceolate to oblong. Panicles erect or nodding only in their upper halves. *A. hybridus* 2

5b. Bracts not much exceeding the tepals. Tepals of female flowers obovate to spatulate. Panicles drooping from the base. *A. caudatus* 1

1. *Amaranthus caudatus* L. Sp. Pl. 990. 1753; Hook. f. Fl. Brit. India 4: 719. 1885; Duthie, Fl. Gangetic Plain 3: 11. 1915; Sauer in Ann. Miss. Bot. Gard. 37: 602. 1951. 'Chaulai' (Hindi).

Tall, annual herbs, often tinged with purple. Leaves long petioled, ovate-elliptic or rhomboid, obtuse, 3-25 x 2.5-15.0 cm, obtuse, cuneate at the base. Flowers greenish, in long, axillary and terminal interrupted spikes. Bracts acuminate, hardly exceeding the obovate, mucronate tepals. Utricles ovoid.

Fl. & Fr. : August-March.

Rare, in humus-rich soils near habitations; Banswara.

2. *A. hybridus* L. Sp. Pl. 990. 1753; Bhopal & Chaudhri in Pak. Syst.

1(1): 60. pl. 8. f. A. 1977. *A. chlorostachys* Willd. Hist. Amaranth. 34. t. 10. f. 19. 1790. 'Rajra, Chimra' (Hindi).

Stout, annual, monoecious herbs, 1-2 m high. Leaves long petioled, ovate-lanceolate, 2.5-15 x 1.5-8.0 cm, retuse, mucronate, cuneate at base. Flowers greenish or reddish, in axillary and terminal dense spikes; the central spike longest, often upto 50 cm long. Bracts deltoid-ovate, setaceous. Utricles ovoid, 2-3 mm in diam., circumscissile in the middle. Seeds subglobose, black, shining.

Fl. & Fr. : August-February.

Rare, near habitations in humus-rich soils; Bagaycha.

Notes : Very close to *A. cruentus* L. (syn. *A. paniculatus* L.) and latter is often reduced to the level of subspecies under *A. hybridus* L. The inflorescence of *A. cruentus* is profusely branched at the apex and there is no terminal unbranched spike as occurs in *A. hybridus* L.

3. *A. lividus* L. Sp. Pl. 990. 1753; Brenan in Watsonia 4 : 275. 1961. *A. blitum* auct. plur. non L. 1753; Hook. f. Fl. Brit. India 4: 721. 1885; Duthie, Fl. Gangetic Plain 3: 13. 1915.

Erect or decumbent, annual herbs. Leaves ovate-elliptic or rhomboid-obovate, 0.5-1.5 x 0.5-1.2 cm, emarginate or 2-lobed, subentire, cuneate at the base, shortly petioled. Flower clusters axillary, passing into terminal spikes or panicles. Bracts ovate, mucronate. Utricles ovoid, bidentate at the apex, smooth. Seeds reddish-brown, glabrous.

Fl. & Fr. : July-May.

Common weed in gardens, fields and wastelands; Govt. College, Banswara (*Kanodia* 51096, BSI).

4. *A. spinosus* L. Sp. Pl. 991. 1753; Wight. Icon. 2(2): 8. t. 513. 1841; Hook. f. Fl. Brit. India 4: 718. 1885; Duthie, Fl. Gangetic Plain 3 : 10. 1915. 'Rajgara, Kante-wali-Chaulai' (Hindi).

Much-branched herbs, up to 1 m high, with axillary sharp, divaricate, up to 2 cm long spines. Leaves ovate-oblong or lanceolate, 1.5-10 x 0.5-5 cm, retuse, mucronate. Flowers green, in dense, axillary, globose clusters passing into terminal interrupted spikes with female flowers in the lower region. Bracts not longer than the tepals. Utricles oblong, rugose, with 3-lobed apex. Seeds brown.

Fl. & Fr. : Most part of the year.

Native of America; naturalized in wastelands and cultivated fields; Ghatol, Bhongra (*Kanodia* 75442, BSI).

Notes : The plants growing in damp and shady habitats are often devoid of spines. Such populations are often referred to var. *inermis* Schinz (Pflanzenfam. ed. 2, 16C: 35. 1934) which is probably an ecoform of *A. spinosus* L.

5. *A. tricolor* L. Sp. Pl. 989. 1753. *A. mangostanus* L. Cent. Pl. 1: 32. 1755; Hook. f. Fl. Brit. India 4: 720. 1885. *A. polygamus* L. Cent. Pl. 1: 32.

1755; Hook. f. I.c. 4: 721. 1885. *A. gangeticus* L. Syst. Veg. ed. 10. 2: 1268. 1759; Hook. f. I.c. 4: 719. 1885; Duthie, Fl. Gangetic Plain 3: 12. 1915. *A. polygonoides* L. Pl. Fam. Pugill. 2: 27. 1759. *A. gangeticus* L. var. *tristis* Prain, Beng. Pl. 870. 1903; Duthie, I.c. 3: 12. 1915. 'Chaulai' (Hindi).

Erect or diffuse, annual herbs. Leaves petioled, ovate, elliptic or oblong, 1.5-4.5 x 0.5-2.0 cm, cuneate at the base, retuse or obtuse at the apex. Flowers greenish-yellow, in axillary clusters, forming terminal interrupted spikes; male and female flowers intermixed. Bracts and bracteoles broadly ovate. Perianth segments oblong-obovate, mucronate-aristate. Utricles flask-shaped; lid with thickened base and 3-fid apex. Seeds 1.0-1.5 mm long, black or brown, shining.

Fl. & Fr. : December-May.

Native of tropical Asia; frequent weed in wastelands and fields near human dwellings. Very close to *A. graecizans* L.; Banswara (Majumdar 10255, BSA), Deri-wali-Dungri (Kanodia 75168, BSI).

6. *A. viridis* L. Sp. Pl. ed. 2. 1405. 1763; Hook. f. Fl. Brit. India 4: 720. 1885; Duthie, Fl. Gangetic Plain 3: 13. 1915. *A. gracilis* Desf. Tabl. Ecole Bot. 43. 1804. 'Jangli Chaulai' (Hindi).

Annual herbs, upto 75 cm high. Leaves petioled, ovate or deltoid-ovate, 2-8 x 1-4 cm, obtuse or retuse, cuneate at the base. Flowers pale-green, clustered in axillary and terminal spikes or panicles. Bracts ovate. Utricles ovoid or suborbicular, compressed, as long as tepals, corrugated. Seeds smooth, black.

Fl. & Fr. : August-February.

Common in wastelands, particularly near habitations; Banswara.

5. CELOSIA L.

Celosia argentea L. Sp. Pl. 205. 1753; Wight, Icon. 5(2): 1. t. 1767. 1852; Hook. f. Fl. Brit. India 4: 714. 1885; Duthie, Fl. Gangetic Plain 3: 7. 1915. *C. cristata* L. Sp. Pl. 205. 1753; Hook. f. I.c. 4: 715. 1885. 'Surli, Garke' (Hindi).

Erect, glabrous herbs, 1.0-1.5 m high. Leaves alternate, linear to lanceolate, often obovate to rhomboid, 2-15 x 0.3-6.0 cm, lower petioled, upper ones sessile. Flowers pinkish-white, in unbranched, 2.5-15.0 cm long spikes. Style one; stigma capitate. Utricles circumscissile, ovoid, included in the perianth.

Fl. & Fr. : August-October.

Native of Africa; naturalized in cultivated fields as a troublesome weed; Kushalgarh, Anand Sagar forest (Kanodia 75274, BSI).

6. DIGERA Forsk.

Digera muricata (L.) Mart. Beitr. Amar. 77, no. 2. 1825 & in Nov. Act. Acad. Caes. Leop.-Carl. nat. Cur. 13(1): 285. 1826. *Achyranthes muricata* L. Sp. Pl. ed. 2. 295. 1762. *A. alternifolia* L. Mant. Pl. 50. 1767. *Digera arvensis* Forsk. Fl. Aegypt.-Arab. 65. 1775; Griff. Icon. Pl. As. 4: 343. pl. 527. f. 2. 1854; Hook. f. Fl. Brit. India 4: 717. 1885; Duthie, Fl. Gangetic Plain 3: 8. 1915. *D. alternifolia* (L.) Aschers. in Schwein. Beitr. Fl. Aethiopiens 180. 1867. 'Lehsua, Khanjru' (Hindi).

Erect or decumbent herbs, 30-80 cm long. Leaves ovate-lanceolate to oblong, 2-8 x 0.5-6.0 cm, entire or crenulate, acute, obtuse or abruptly acuminate. Flowers pink, in axillary, 10-30 cm long racemes. Bracts oblong, scarious-margined, persistent. Two outer tepals 3-4 mm long, 5 to 7-nerved; three inner tepals shorter, narrow, 1 to 2-nerved. Fruits ovate-globose, with 2-fid apex, 1-seeded.

Fl. & Fr. : Most part of the year.

Common weed in wastelands and cultivated fields; Paloda, Deri-wali-Dungri (*Kanodia* 75163, BSI).

7. GOMPHRENA L.

Gomphrena celosioides Mart. Bietr. Amar. 93. 1825 & in Nov. Act. Acad. Caes. Leop.-Carl. nat. Cur. 13: 301. 1826; Sandwith in Kew Bull. 1946: 29. 1946; Mahesh. Illus. Fl. Delhi f. 179. 1966; Raizada, Suppl. Duthie, Fl. Gangetic Plain 235. 1976.

Annual or perennial, prostrate or decumbent herbs, clothed with white shaggy hairs. Leaves subsessile, spathulate or oblong-lanceolate, 1.5-5.0 x 0.5-1.5 cm, acute, entire. Flowers white, in sessile, terminal, subglobose heads or spikes upto 4 cm long. Perianth 4-5 mm long, pilose on the back. Receptacle knob-like. Bracteoles with an entire dorsal crest. Seeds 1.5 x 1.0 mm.

Fl. & Fr. : Most part of the year.

Native of South America; naturalized in wastelands in sandy soils. Very closely allied to *G. decumbens* Jacq.; Jua fall.

8. NOTHOAERVA Wight

Nothosaerva brachiata (L.) Wight, Icon. 6: 1. 1853; Hook. f. Fl. Brit. India 4 : 726. 1885; Duthie, Fl. Gangetic Plain 3 : 17. 1915. *Achyranthes brachiata* L. Mant. 50. 1767. *Pseudanthus brachiatus* Wight, Icon. 5(2) : 3. t. 1776. 1852, *pro parte, excl. notis*.

Erect, annual herbs. Leaves elliptic or ovate, 1.5-5.0 x 0.6-2.5 cm, acute or obtuse, shortly petioled. Flowers in 1-8, white, axillary spikes. Bracts

and bracteoles hyaline. Perianth patently villous outside. Stamens 1-2. Staminodes absent. Utricles falling off with the perianth. Seeds lenticular, shining.

Fl. & Fr. : September-November.

Occasional, in fields, gardens and wastelands; Ghatol (*Kanodia* 75417, BSI).

9. PUPALIA Juss. *nom. cons.*

Pupalia lappacea (L.) Juss. in Ann. Mus. Nat. Hist. Paris 2: 132. 1803; Hook. f. Fl. Brit. India 4: 724. 1885, incl. var. *velutina*; Duthie, Fl. Gangetic Plain 3: 19. 1915; Mahesh. Illus. Fl. Delhi f. 184. 1966. *Achyranthes lappacea* L. Sp. Pl. 204. 1753. 'Chirpita' (Hindi).

Woody, pubescent, rambling or scrambling herbs. Leaves ovate-oblong to lanceolate, 3-10 x 1.5-6.0 cm, acute or obtuse. Flowers greenish-yellow, clustered in 10-30 cm long, tomentose, axillary and terminal spikes. Imperfect flowers reduced to unequal, hooked awns which are supported by lanceolate, 3-nerved bracteoles. Tepals lanceolate-oblong, mucronate. Utricles 2-3 mm long, enclosed in the perianth. Seeds black.

Fl. & Fr. : October-January.

Common in wastelands, forests and along the roads; Loharia forest, Banswara (*Kanodia* 75635, BSI), Deri-wali-Dungri (*Kanodia* 75153, BSI).

80. CHENOPODIACEAE

CHENOPODIUM L.

- | | |
|--|--------------------------|
| 1a. Aromatic herbs. Ovary, fruit and under-surface of leaves glandular. Stigmas 5. | <i>C. ambrosioides</i> 2 |
| 1b. Scentless or foetid herbs. Ovary, fruit and leaves glandless. Stigmas 2 : | |
| 2a. Seeds black, rugose, acutely keeled. | <i>C. murale</i> 3 |
| 2b. Seeds shining, blackish, smooth, not keeled. | <i>C. album</i> 1 |

1. **Chenopodium album** L. Sp. Pl. 219. 1753; Hook. f. Fl. Brit. India 5: 3. 1886; Duthie, Fl. Gangetic Plain 3 : 22. 1915. 'Bathua, Bathal' (Hindi).

Erect, annual (often perennial) herbs, upto 1 m high, clothed with white, powdery vesicles. Leaves ovate-oblong, deeply incised. Flowers bisexual, pale-green, clustered in simple or panicled, ebracteate spikes. Utricles globose, enclosed in the perianth, eglandular. Seeds shining, blackish-brown, smooth, not keeled.

Fl. & Fr. : November-April.

Common weed in cultivated fields and gardens during winter season; Ghatol, Jolana (*Kanodia* 51162, BSI).

2. *C. ambrosioides* L. Sp. Pl. 219. 1753; Wight, Icon. 5(2). 5. t. 1786. 1852; Hook. f. Fl. Brit. India 5:4. 1886; Raizada, Suppl. Duthie, Fl. Gangetic Plain 236. 1976.

Much-branched, strongly scented, annual-perennial herbs. Leaves lanceolate-oblong to elliptic, 3-15 x 1-3 cm, subentire to serrate-dentate, thinly pilose, gland-dotted beneath, higher ones passing into bracts. Flowers in axillary clusters forming interrupted spikes which are combined into leafy panicles. Tepals 5, ovate-rounded, gland-dotted outside, connate at the base. Ovary and fruits studded with yellow glands.

Fl. & Fr. : January-March.

Occasionally found in wastelands, road-sides, sides of streams etc.; Jolana (*Kanodia* 51182, BSI).

3. *C. murale* L. Sp. Pl. 219. 1753; Hook. f. Fl. Brit. India 5 : 4. 1886; Duthie, Fl. Gangetic Plain 3: 23. 1915.

Erect, annual, foetid herbs. Leaves rhomboid-deltoid, irregularly serrate-incised, cuneate at base. Flowers in cymose clusters combined into spikes forming panicles. Tepals oblong, slightly keeled. Seeds orbicular, sharply margined, papillate.

Fl. & Fr. : January-April.

Rare, weed in gardens and fields. Plants prefer humus-rich soils; Nogama (*Kanodia* 51154, BSI).

81. POLYGONACEAE

1a. Climbers. Racemes ending into branched tendrils.

Antigonon 1

1b. Erect or prostrate herbs. Racemes not ending into tendrils.

Polygonum 2

I. ANTIGONON Endl.

Antigonon leptopus Hook. & Arn. Bot. Beech. Voy. 308. t. 69. 1841; Duthie, Fl. Gangetic Plain 3: 43. 1915; Danser in Bull. Jard. Bot. Btze. 8(3): 242. 1927.

Climbing herbs or shrubs. Leaves ovate-triangular, 3-15 x 1.5-7.0 cm, acute or acuminate, cordate-based. Flowers pink or red, 8 mm in diam., in axillary, panicled racemes; peduncles terminating into tendrils. Tepals cordate-ovate, membranous, forming wings in dry fruits. Fruits ovate, acute, glabrous. Seeds grooved.

Fl. & Fr. : August-April.

Native of Mexico; naturalized in wastelands near cities; also cultivated ornamentals; Banswara.

2. POLYGONUM L.

- 1a. Leaves linear, not more than 3 mm wide. Flowers 1-5 in the axils of leaves. *P. plebeium* var. *indica* 2
- 1b. Leaves lanceolate, more than 1 cm wide. Flowers many, in racemes or pseudo-spikes. *P. glabrum* 1

1. **Polygonum glabrum** Willd. Sp. Pl. 2: 447. 1799; Wight, Icon. 5(2): 6. t. 1799. 1852; Hook. f. Fl. Brit. India 5: 34. 1886, *pro parte*; Duthie, Fl. Gangetic Plain 3: 35. 1915. 'Pani-ki-Mirch' (Hindi).

Erect or decumbent, annual, glabrous herbs. Stem with reddish-brown nodes. Leaves lanceolate, 10-20 x 1.0-2.6 cm, glandular-punctate, acuminate. Ocreae eciliate, glabrous, upto 3 cm long. Flowers pink, 4-6 clustered in the axils of rhomboid bracts in panicled racemes. Stamens 6-8; anthers reddish. Style 2. Nutlets orbicular, biconvex, brown.

Fl. & Fr. : Most part of the year.

Common in ponds, ditches, rivers and in other aquatic habitats; Kushalgarh.

2. **P. plebeium** R. Br. var. *indica* Hook. f. Fl. Brit. India 5: 28. 1886; Duthie, Fl. Gangetic Plain 3: 31. 1915. 'Machechi' (Hindi).

Diffusely branched, prostrate, annual herbs, hairy but not woolly, with short internodes. Leaves linear-oblong or oblanceolate, not exceeding 3 cm in length. Stipules lancinate, scarious. Flowers sessile or subsessile, hidden among the stipules. Two outer tepals acute. Fruits about 1.5 mm long, trigonous.

Fl. & Fr. : September-February.

Abundant in drying ponds along the roads and in other low-lying areas; Banswara (*Verma* 211, 212, BSA), Jolana (*Kanodia* 51193, BSI).

82. ARISTOLOCHIACEAE

ARISTOLOCHIA L.

- 1a. Flowers axillary, solitary. *A. bracteolata* 1
1b. Flowers in few-flowered, axillary racemes. *A. indica* 2

1. **Aristolochia bracteolata** Lam. Encycl. Meth. Bot. 1: 258. 1783; Sant. & Wagh in Bull. Bot. Surv. Ind. 5(2): 105. 1964. *A. bracteata* Retz. Obs. Bot. 5: 29. 1789; Hook. f. Fl. Brit. India 5: 75. 1886; Duthie, Fl. Gangetic Plain 3: 44. 1915. 'Kiramar' (Hindi).

Perennial herbs. Leaves cordate-ovate to reniform, 13-9 x 2.5-8.0 cm, obtuse. Flowers purple, axillary, solitary. Pedicels 1-2 cm long, with large orbicular or reniform bracts at the base. Perianth tubular, inflated and

ventricose in lower half; mouth trumpet-shaped. Stamens 6, uniseriately epigynous; anthers adnate to the column. Capsules ellipsoid, oblong or globular, 12-ribbed, 1.5—2.5 x 1.5 cm. Seeds horizontal, flattened, deltoid with cordate base, rugose black on one side, 2-lobed and whitish on the other side.

Fl. & Fr. : Most part of the year.

Common in wastelands, along the roads in dry habitats; Pipalkhunt.

2. *A. indica* L. Sp. Pl. 960. 1753 ; Hook. f. Fl. Brit. India 5 : 75. 1886; Duthie, Fl. Gangetic Plain 3 : 44. 1915. *A. lanceolata* Wight, Icon. 5(2) : 17. t. 1858. 1852. 'Hookka-bel' (Hindi).

Twining shrubs. Leaves obovate-oblong, linear-oblong or subpandurate, 4-13 x 1.5-8.0 cm, triplinerved, abruptly acuminate, truncate or attenuate at the base or rarely cordate-based. Petioles 1-5 cm long. Flowers greenish-white, in few flowered, axillary racemes. Bracts ovate or oblong. Perianth-tube inflated or ventricose. Capsules oblong, narrowed at the base, glabrous, 6-valved. Seeds deltoid-ovate, flat, rugose, with two ridges on one side.

Fl. & Fr. : September-December.

Rare, climbing on the shrubs and small trees in the forests; Chhatripada forest.

83. LORANTHACEAE

DENDROPHTHOE Mart.

Dendrophthoe falcata (L. f.) Ettings. in Denkschr. Akad. Wissen. Math.-Naturw. 32: 52, 53, 58. t. 13. f. 14. 1872; Danser in Bull. Jard. Bot. Buitenz. ser. 3. 16: 30. 1938; Mahesh. Illus. Fl. Delhi f. 190. 1966. *Loranthus falcata* L. f. Suppl. 211. 1781. *L. longiflorus* Desr. in Lam. Encycl. Meth. Bot. 3: 598. 1792; Hook. f. Fl. Brit. India 5: 214. 1886; Duthie, Fl. Gangetic Plain 3: 63. 1915. 'Banda' (Hindi).

Perennial, partial stem parasites, with woody branches. Leaves opposite, obovate or elliptic-oblong, 4-10 x 1.5-4.0 cm, obtuse, cuneate-based. Flowers bisexual, yellow, in axillary and supra-axillary racemes. Bracts lateral, less than half the length of calyx. Corolla-tube 2.0—3.5 cm long; lobes 5, linear, spreading. Stamens 5, epipetalous upto corolla-throat. Fruits ovoid, smooth.

Fl. & Fr. : December-August.

Common facultative stem parasite on *Albizia lebbeck* (L.) Benth., *Casuarina equisetifolia* Forst., *Madhuca longifolia* (Koen.) Macbr., *Dalbergia sissoo* Roxb. etc.; Wadita Hillage forest, Anand Sagar forest (Kanodia 75245, BSI).

84. EUPHORBIACEAE

- 1a. Flowers naked. Male and female flowers represented by a single stamen and pistil respectively, arranged in cyathia. *Euphorbia* 5
- 1b. Flowers with perianth, not reduced to a single stamen and pistil, not arranged in cyathia :
- 2a. Perianth unisexual :
- 3a. Ovules two in each cell of ovary :
- 4a. Plants dioecious. Pistillodes in male flowers large. *Securinega* 10
- 4b. Plants monoecious. Pistillodes in male flowers absent :
- 5a. Stamens 3, free or monadelphous. *Phyllanthus* 8
- 5b. Stamens 5, 3 united, 2 free. *Kirganelia* 7
- 3b. Ovule one in each cell of ovary :
- 6a. Leaves peltate, palmately 5 to 7-lobed. Stamens united into several, basally coherent, branched fascicles. Anthers 2-celled. Fruits echinate. *Ricinus* 9
- 6b. Leaves neither peltate nor palmately lobed. Stamens free. Anthers 4-celled. Fruits smooth :
- 7a. Petioles without apical glands. Tepals valvate in bud. *Acalypha* 1
- 7b. Petioles with two apical glands. Tepals imbricate in bud. *Baliospermum* 2
- 2b. Perianth bisexual :
- 8a. Stamens 5. Pistillodes present in male flowers. *Bridelia* 3
- 8b. Stamens more than 5. Pistillodes absent in male flowers :
- 9a. Style-arms of each style-branch free at the apex only. *Jatropha* 6
- 9b. Style-arms of each style-branch free upto the base. *Chrozophora* 4

1. ACALYPHA L.

- 1a. Bracts concealing the capsules. *A. ciliata* 1
- 1b. Bracts not concealing the capsules. *A. malabarica* 2

1. ***Acalypha ciliata*** Forsk. Fl. Aegypt.—Arab. 162. 1775; Hook. f. Fl. Brit. India 5 : 417. 1887; Duthie, Fl. Gangetic Plain 3: 108. 1915.

Erect, annual herbs. Leaves long petioled, ovate, 3-7 x 1.8-4.5 cm, serrate, acuminate. Flowers pale-green, in small axillary spikes with male flowers above the females. Invol-bracts of the female flowers cupular, fimbriate at the rim, concealing the capsules. Tepals 3. Stamens 8. Capsules glabrous, white, twisted after dehiscence. Seeds ovoid, smooth.

Fl. & Fr. : August-February.

Common among bushes on the edges of gardens and fields; Banswara, Paloda, Deri-wali-Dungri (*Kanodia* 75159, BSI).

2. ***A. malabarica*** Mueller in Linnaea 34: 42. 1865; Hook. f. Fl. Brit. India 5: 416. 1887; Gamble, Fl. Pres. Madras 1330. 1925.

Annual, hairy herbs. Leaves ovate, 1-3 x 1.0—1.5 cm, crenate-serrate, palmately 5-nerved. Spikes axillary. Female flowers 2-3 in the axils of large,

folded, toothed, pink bracts; teeth of bracts with gland-tipped hairs. Ovary pilose.

Fl. & Fr. : August-November.

Occasional, near the tanks and in low-lying fields; Nathela tank (*Kanodia* 75344, BSI).

2. BALIOSPERMUM Blume

Baliospermum montanum (Willd.) Muell.—Arg. in DC. Prodr. 15(2): 1125. 1866. *Jatropha montana* Willd. Sp. Pl. 4: 563. 1805. *Baliospermum axillare* Blume, Bijdr. 604. 1825; Hook. f. Fl. Brit. India 5: 461. 1887; Duthie, Fl. Gangetic Plain 3: 107. 1915.

Annual herbs, upto 1 m high. Leaves ovate-lanceolate or broadly elliptic to subpandurate, 7-20 x 2.5—10.0 cm, sinuate-toothed, acuminate, cuneate at the base. Flowers pale-green, in axillary and terminal racemes or panicles with few female flowers below and several males above. Stamens 20-25. Style 2-partite. Ragma of 3, 2-valved cocci, pubescent. Seeds oblong, brown-spotted, smooth.

Fl. & Fr. : October-March.

Common in wastelands, gardens and forests in shady habitats; Ghatol, Khora forest, Jolana (*Kanodia* 30725, BSI).

3. BRIDELIA Willd.

Bridelia squamosa (Lam.) Gehrm. in Engl. Bot. Jahrb. 41. Biebl. 95: 30. 1908; Sant. in Journ. Bomb. nat. Hist. Soc. 50: 308. f. 2. 1951. *Cluytia squamosa* Lam. Encycl. 5(2): 54. 1790. *Bridelia retusa* Spreng. var. *squamosa* (Lam.) Muell.—Arg. in DC. Prodr. 15(2): 493. 1866; Hook. f. Fl. Brit. India 5: 268. 1887.

Trees, 4-10 m high; young branches tomentose or puberulous. Leaves ovate-lanceolate to broadly elliptic, 8-20 x 5-11 cm, obtuse or subacute. Stipules ovate or triangular, 3-9 mm long. Flowers in axillary clusters or in terminal leafless spikes. Stamens monadelphous. Drupes globose, 8-10 mm in diameter, turning black at maturity.

Fl. & Fr. : August-December.

Rare, in the forests; Kushalgarh.

4. CHROZOPHORA Neck ex Juss. corr. Benth. & Hook. f. *nom. cons.*

1a. Erect herbs. Leaves more than 4 cm long and broad.

C. rattleri 2

1b. Prostrate herbs. Leaves less than 4 cm long and broad.

C. parvifolia 1

1. **Chrozophora parvifolia** Klotz. ex Schweinf. Pl. Nilot. 11. 1862;

Prain in Kew Bull. 1918: 91. 1918; Mahesh. Illus. Fl. Delhi f. 196. 1966. *C. prostrata* Dalz. var. *parvifolia* (Klotz. ex Schweinf.) Duthie, Fl. Gangetic Plain 3: 106. 1915; Balakrishnan in Bull. Bot. Surv. Ind. 15(1-2): 7. 1976.

Prostrate, annual herbs, clothed with stellate tomentum. Leaves oblong-lanceolate or elliptic, with 2 glands at the base, sinuate-toothed. Flowers in dense axillary racemes. Male flowers vermillion-coloured. Capsules stellate hairy, without scales. Seeds glabrous.

Fl. & Fr. : March-July.

Common in drying ponds along the roads in association with *Heliotropium supinum* L.; Danpur.

2. *C. rottleri* (Geis.) Juss. ex Spreng. Syst. Veg. 3: 850. 1826; Duthie, Fl. Gangetic Plain 3: 105. 1915; Rao & Razi in Journ. Mysore Univ. 23(1-2): 41. 1969-70; Balakrishnan in Bull. Bot. Surv. Ind. 15(1-2): 4. 1976.

Croton rottleri Geis. Crot. Mongr. 54. 1807. *Chrozophora plicata* sensu Hook. f. Fl. Brit. India 5: 409. 1887, non Juss. 1824. 'Subali' (Hindi).

Herbs, upto 90 cm high, clothed with white, stellate tomentum. Leaves ovate to suborbicular, entire or 3-lobed, undulate or crenate-margined, with rounded, cuneate or cordate base. Flowers yellow, in 2.5–6.0 cm long racemes. Petals longer than sepals in males and shorter in females. Stigmas red. Capsules purple, stellate hairy, without scales.

Fl. & Fr. : August-March.

Common in wastelands; Ghalot, Pipalkhund, Shergarh, Jolana (*Kanodia* 91198, BSI).

S. EUPHORBIA L.

- 1a. Stem reduced to a stout underground root-stock. Leaves radical. *E. acaulis* 1
- 1b. Stem well developed above the ground. Leaves cauline :
 - 2a. Plants dendroid, armed with spines :
 - 3a. Spine-bearing tubercles arranged spirally on the stem. *E. nerifolia* 6
 - 3b. Spine-bearing tubercles arranged vertically on the stem. *E. nivulia* 7
 - 2b. Plants not dendroid, unarmed :
 - 4a. Involucre-gland solitary. *E. geniculata* 3
 - 4b. Involucre-glands 4 or 5 along the upper margin :
 - 5a. Involucre-glands 2-horned; horns outwardly directed. *E. dracunculoides* 2
 - 5b. Involucre-glands not horned :
 - 6a. Leaves 1.2-5.0 cm long :
 - 7a. Involucre-glands with conspicuous petaloid limb. *E. indica* 5
 - 7b. Involucre-glands without petaloid limb. *E. hirta* 4
 - 6b. Leaves less than 1.2 cm long. *E. thymifolia* 8

1. *Euphorbia acaulis* Roxb. Fl. Ind. 2: 472. 1824; Duthie, Fl. Gangetic Plain 3: 74. 1915. *E. fusiformis* Buch.-Ham. in D. Don, Prodr. Fl. Nep. 62. 1825; Hook. f. Fl. Brit. India 5: 257. 1887.

Dwarf, unarmed, glabrous herbs, with a long, stout, underground, cylindric root-stock. Leaves all radical, subsessile, ovate or oblanceolate, 15-25 cm long, with curled margins. Cymes from the crown of root-stock and appearing after the leaves. Bracts ovate or the upper ones truncate and 3-fid. Coccii compressed; styles connate to the middle. Seeds ovoid, smooth.

Fl. & Fr. : April-June.

Occasional, in wastelands; Ghatol (*Kanodia* 75508, BSI).

2. *E. dracunculoides* Lam. Dict. Bot. 2 : 428. 1786 & Encycl. 2: 428. 1788. Hook. f. Fl. Brit. India 5: 262. 1887; Duthie, Fl. Gangetic Plain 3: 78. 1915; Sant. Bull. Bot. Soc. Beng. 8: 11. 1955; Mahesh. Illus. Fl. Delhi f. 192. 1966, 'Jayanti' (Hindi).

Erect, annual, dichotomously branched herbs. Leaves sessile, linear-lanceolate, 2-6 x 0.2-0.8 cm. acute, entire. Cyathia subsessile, hairy inside, solitary, campanulate, subtended by lanceolate floral leaves; lobes ciliolate. Glands semilunate. Gynophores as long as stamens. Capsules glabrous, 3-lobed, 3-seeded. Seeds oblong or obovoid, whitish, rugose or tuberculate.

Fl. & Fr. : February-May.

Common weed in cultivated fields; Pipalkhund, Jolana (*Kanodia* Acc. no. 30739, BSI).

3. *E. geniculata* Ort. Nov. Rar. Pl. Hort. Matr. Decad. 18. 1797; Duthie, Fl. Gangetic Plain 3, 83. 1915; Sant. in Bull. Bot. Soc. Beng. 8 : 5. 1955; Rao & Razi in Journ. Mysore Univ. 23 (1-2): 51. 1969-70.

Erect, annual, glabrous herbs, 30-60 cm high. Stem fistular, ribbed. Leaves oblong-obovate or elliptic, 4.0—9.5 x 2-7 cm, subentire or dentate, narrowed at the base. Stipules stalked, gland-like. Cyathia arranged in dense, corymbose cymes subtended by leaves with yellowish patch at the base, 5-lobed; glands obconical with an excavated apex. Capsules 3-lobed; placenta persistent after the dehiscence. Seeds trigonous, grey, tuberculate, truncate at one end, tapering on the other.

Fl. & Fr. : July-November.

Native of Tropical America; naturalized in gardens and forests; Anand Sagar forest, Kushalgarh (*Kanodia* 75725, BSI).

Notes : Closely allied and often reduced to *E. heterophylla* L. which bears red-blotched floral leaves, long petioled and dentate-serrate leaves.

4. *E. hirta* L. Sp. Pl. 454. 1753; Duthie, Fl. Gangetic Plain 3 : 80. 1915; Sant. in Bull. Bot. Soc. Beng. 8: 15. 1955; Mahesh. Illus. Fl. Delhi f. 193. 1966. *E. pilulifera* auct. plur. non L. 1753; Hook. f. Fl. Brit. India 5 : 250. 1887. 'Duddhi' (Hindi).

Erect, prostrate or ascending, hairy herbs. Leaves ovate-lanceolate or elliptic, serrate, with an oblique base. Stipules subulate. Involucre hispid outside,

crowded in axillary and terminal, shortly pedunculate cymes. Capsules globose, 3-lobed, hispid. Seeds trigonous, transversely ribbed.

Fl. & Fr. : Most part of the year.

Common throughout the area in varying habitats like wastelands, forests, walls of the buildings, cultivated fields etc.; Paloda, Garhi (*Kanodia* 75564, BSI).

5. *E. indica* Lam. Dict. Bot. 2 : 423. 1786 & Encycl. Meth. Bot. 2 : 423. 1786; Raju & Rao in Ind. J. Bot. 2 (2) : 202. 1979. *E. hypericifolia* auct. plur. non L. 1753; Hook. f. Fl. Brit. India 5 : 249. 1887; Duthie, Fl. Gangetic Plain 3 : 80. 1915. *E. parviflora* auct. plur. non L. 1759; Sant. in Rec. Bot. Surv. Ind. 16 : 273. 1953. *E. hypericifolia* non L. var. *parviflora* Hook. f. in Prain, Beng. Pl. 2 : 924. 1903. 'Dadhal' (Hindi).

Erect or ascending, annual, hispid or puberulous herbs. Leaves oblong, obovate or ovate, serrulate, oblique-based. Involucre turbinate, hispid or glabrous at maturity, arranged in axillary and terminal, pedunculate cymes. Styles shortly 2-fid. Capsules obtusely keeled, hispid, subglobose. Seeds red, transversely ribbed-corrugated, wrinkled, not papillose.

Fl. & Fr. : Most part of the year.

Common in wastelands, forests and cultivated fields; Wadita Hillage forest, Paloda, Banswara (*Majumdar* 10287, BSA), Bhoonkri-Ghat (*Kanodia* 75511, BSI).

6. *E. nerifolia* L. Sp. Pl. 451. 1753; Hook. f. Fl. Brit. India 5 : 255. 1887; Duthie, Fl. Gangetic Plain 3 : 76. 1915, *pro parte*; Mahesh, Illus. Fl. Delhi f. 191. 1966. 'Danda Thor' (Hindi).

Erect shrubs or small trees, with cylindric branches. Leaves obovate-oblong, 10-20 cm long. Involucres 3-nate, lateral ones pedicelled, bisexual, central one male and sessile. Glands of involucre without petaloid limbs. Styles undivided, connate to the middle. Seeds smooth.

Fl. & Fr. : March-July.

Common in rocky wastelands, often planted on the edges of fields and gardens; Banswara.

7. *E. nivalia* Buch.-Ham. in Trans. Linn. Soc. 14 : 286. 1825; Wight, Icon. 5(2) : 19. t. 1862. 1852; Hook. f. Fl. Brit. India 5 : 255. 1887; Sant. in Bull. Bot. Soc. Beng. 8 : 8. 1955. *E. nerifolia* Roxb. Fl. Ind. 2 : 467. 1832, non L. 1753; Duthie, Fl. Gangetic Plain 3 : 76. 1915. 'Ghota Thor' (Hindi).

Erect shrubs or small trees, with rounded stem and branches. Leaves obovate or spatulate, fleshy, 12-18 x 3.5-6.5 cm, retuse, born towards the end of branches. Cymes 3-flowered, born from above the leaf-scares on the tubercles. Capsules glabrous. Seeds globose, dorsally lined, smooth.

Fl. & Fr. : March-July.

Common in exposed rocky lands. New leaves appear during rainy season; Banswara.

8. *E. thymifolia* L. Sp. Pl. 454. 1753; Hook. f. Fl. Brit. India 5 : 252.

1887; Duthie, Fl. Gangetic Plain 3 : 81. 1915; Sant. in Bull. Bot. Soc. Beng. 8 : 16. 1955. *E. prostrata* Graham, Cat. 179. 1839, non Ait. 1789. 'Duddhi' (Hindi).

Annual or perennial, creeping, hairy herbs. Leaves oblong or obovate-oblong, crenulate, oblique at the base. Stipules fimbriate. Cyathia compactulate, axillary, solitary or 2 to 3-together, hairy. Invol-glands stipitate, without limb. Capsules obtusely keeled, pubescent. Seeds transversely 5 to 6-furrowed.

Fl. & Fr. : August-December.

Common in wastelands and along the roads; Paloda, Kushalgarh, Banswara (*Kanodia* 75225, BSI).

6. JATROPHA L.

- 1a. Young shoots, leaves, petioles, calyx etc. clothed with gland-tipped bristles. Stipules represented by obliquely decurrent series of stalked glands. *J. gossypifolia* 2
- 1b. Young shoots, leaves, petioles, calyx etc. eglandular. Stipules, if any, subulate-triangular, entire. *J. curcas* 1

1. *Jatropha curcas* L. Sp. Pl. 1006. 1753; Hook. f. Fl. Brit. India 5 : 383. 1887, Duthie, Fl. Gangetic Plain 3 : 116. 1915; Rao & Razi in Journ. Mysore Univ. 23 (1-2) : 44. 1969-70. 'Rajan Jot, Jamal Ghota' (Hindi).

Shrubs or small trees, upto 4 m high. Leaves cordate-ovate to suborbicular, 5-12 x 5-12 cm, palmately 3 to 5-angled to-lobed, cordate and 5 to 7-nerved at the base. Flowers yellowish-green, in corymbose cymes. Petals hairy inside. Stamens 10. Capsules subglobose or ellipsoid, 2.0-2.5 x 1.5-2.0 cm. Seeds oblong, 1.5 x 1.25 cm.

Fl. & Fr. : May-December.

Native of Tropical America; naturalized in wastelands; also grown on the edges of fields and gardens; Dapia Bowji, Ghatol, Banswara (*Kanodia* 75321, BSI).

2. *J. gossypifolia* L. Sp. Pl. 1006. 1753; Hook. f. Fl. Brit. India 5 : 383. 1887; Raizada, Suppl. Duthie, Fl. Gangetic Plain 251. 1976. 'Mayla, Ratan Joti' (Hindi).

Glandular shrubs, 1-2 m high, tinged with purple. Leaves orbicular to obovate, palmately 3 to 5-lobed, 5-12 cm long, 3-nerved and cordate at the base. Flowers red, in terminal, corymbose cymes. Bracts ovate, acute. Filaments of the inner whorl connate at the base, longer than outer ones. Capsules 3-lobed, indehiscent. Seeds ellipsoid.

Fl. & Fr. : July-October.

Native of Brazil; naturalized in wastelands near human localities; also cultivated in gardens and on the edges of fields; Surpur.

7. KIRGANELIA Juss.

Kirganelia reticulata (Poir.) Baill. Etud. Gen. Euph. 613. 1874; Rao & Razi in Journ. Mysore Univ. 23 (1-2) : 47. 1969-70. *Phyllanthus reticulatus* Poir. in Lam. Encycl. Meth. Bot. 5 : 298. 1804; Hook. f. Fl. Brit. India 5 : 288. 1887; Duthie, Fl. Gangetic Plain 3 : 95. 1915. 'Kambhoe, Neelbadi' (Hindi).

Shrubs, 1-3 m high. Leaves oblong or obovate to rotundate, 1.5-3.0 x 0.6-2.0 cm, acute to truncate. Flowers greenish, axillary; males 2 to 4-together; female ones solitary. Disk 5-lobed. Pistillodes absent. Stigmas sessile. Berries globose, fleshy, violet-purple. Seeds trigonous, granulate.

Fl. & Fr. : January-October.

Common in wastelands, open forests and on the edges of fields and gardens; Ghatol, Kushalgarh, Banswara (Verma 239, BSA).

8. PHYLLANTHUS L. *emend.* Gaertn.

| | |
|---|-----------------------------|
| 1a. Trees. Styles twice 2-fid. | <i>P. emblica</i> 2 |
| 1b. Herbs. Styles ones 2-fid : | |
| 2a. Stipules peltate : | |
| 3a. Capsules echinate. Seeds transversely furrowed. | <i>P. urinaria</i> 5 |
| 3b. Capsules glabrous or rough, not echinate. Seeds finely tubercled : | |
| 4a. Leaves linear-oblong, not cuneate at the base. Anthers horizontally dehiscent. Disk of female flowers cup-shaped. | <i>P. virgatus</i> 6 |
| 4b. Leaves obovate, cuneate at the base. Anthers vertically dehiscent. Disk of female flowers consists of 6 free glands. | <i>P. maderaspatensis</i> 4 |
| 2b. Stipules simple, not peltate : | |
| 5a. Leaves acute. Disk of female flowers entire. Seeds with transverse striae between the longitudinal ribs on the back-side. | <i>P. debilis</i> 1 |
| 5b. Leaves obtuse or rounded. Disk of female flowers lobed. Seeds without transverse striae between the longitudinal ribs. | <i>P. fraternus</i> 3 |

1. **Phyllanthus debilis** Klein ex Willd. Sp. Pl. 4 : 582. 1805; Webster in Journ. Arn. Arb. 38 : 307. 1957; Raizada, Suppl. Duthie, Fl. Gangetic Plain 253. 1976. *P. debilis* Herb. & Ham. ex Hook. f. Fl. Brit. India 5 : 299. 1887.

Annual, glabrous herbs. Stem obtusely 3-gonous. Leaves obovate or ovate-lanceolate, 0.7-2.0 x 0.5-1.0 cm. Stipules lanceolate, acuminate. Flowers yellowish, axillary, pedicellate, females solitary, males fascicled. Tepals 6, obovate-lanceolate, membranous-margined. Stamens connate. Capsules oblate. Seeds trigonous, brown.

Fl. & Fr. : August-December.

Rare, in forests in moist and shady habitats; Kotharia forest.

2. *P. emblica* L. Sp. Pl. 982. 1753; Hook. f. Fl. Brit. India 5 : 289. 1887; Duthie, Fl. Gangetic Plain 3 : 96. 1915; Webster in Journ. Arn. Arb. 38 : 76. 1957; Rao & Razi in Journ. Mysore Univ. 23 (1-2) : 38. 1969-70. *Emblica officinalis* Gaertn. Fruct. 2 : 122. t. 108. 1790; Wight, Icon. 5(2) : 26. t. 1896. 1852. 'Aamla' (Hindi).

Deciduous trees, upto 15 m high. Bark grey, peeling off in irregular pieces. Leaves oblong-elliptic or linear, 1.0-1.5 x 0.5 cm, distichous, appearing like a pinnate leaf. Flowers greenish-yellow, in axillary fascicles. Disk of minute glands. Fruits globose, fleshy, 2.0-2.5 cm in diam., pale-yellow. Seeds 3-gonous.

Fl. : March-May ; *Fr.* : June-November.

Common in forests; also planted in the gardens for its edible fruits; Rowal Hindvela forest, Bagaycha forest, Ghatol (*Kanodia* 75470, BSI).

3. *P. fraternus* Webster, Contr. Gray Herb. 176 : 53. 1955; Raizada, Suppl. Duthie, Fl. Gangetic Plain 254. 1976. *P. niruri* auct. plur. non L. 1753; Hook. f. Fl. Brit. India 5 : 298. 1887; Duthie, Fl. Gangetic Plain 3 : 98. 1915.

Erect, glabrous herbs, 10-60 cm high. Leaves 5-17 x 3-9 mm, oblong, distichous, often overlapping. Flowers yellowish, axillary, hanging down below the branchlets; male flowers 1-3 in each axil; female flowers solitary. Stamens connate. Capsules depressed-globose, about 2 mm in diam., smooth. Seeds 3-gonous, pale-brown, longitudinally ribbed.

Fl. & Fr. : August-December.

Rare, weed in cultivated fields. Very close to *P. asperulatus* Hutch., which is distinguished by its longer pedicels, entire female disk and spreading styles; Paloda, Anand Sagar forest (*Kanodia* 75275, BSI).

4. *P. maderaspatensis* L. Sp. Pl. 982. 1753; Hook. f. Fl. Brit. India 5 : 292. 1887; Duthie, Fl. Gangetic Plain 3 : 97. 1915; Rao & Razi in Journ. Mysore Univ. 23 (1-2) : 39. 1969-70. *P. leprocarpus* Wight, Icon. 5 (2) : 25. t. 1895. 1852. 'Hazarmani' (Hindi).

Erect or decumbent, glabrous herbs, 40-60 cm high. Leaves truncate or rounded at the apex, 1.0-2.5 x 0.5-1.0 cm, scattered. Stipules scarious, whitish. Male flowers fascicled, subsessile; female flowers solitary, pedicellate. Stamens connate. Capsules globose, 3-lobed, 2.5-3.0 mm in diam., glabrous, with obovate, persistent sepals at the base. Seeds 3-gonous, muricated on fine longitudinal lines.

Fl. & Fr. : August-October.

Common weed in gardens and cultivated fields, often found in waste-lands; Pipalkhund.

5. *P. urinaria* L. Sp. Pl. 982. 1735; Hook. f. Fl. Brit. India 5 : 293. 1887; Duthie, Fl. Gangetic Plain 3 : 97. 1915.

Erect or decumbent, much-branched, annual herbs, with marginated branchlets. Leaves falcate-lanceolate or oblong-obovate, 0.5-2.0 x 0.3-0.7 cm, mucronate oblique-based. Stipules ovate-triangular, acuminate. Male flowers 1-3 in the axils of leaves. Stamens 3. Disk-lobes glandular. Female flowers solitary, with 6 perianth-segments. Fruits warty. Seeds transversely ribbed on the back, with 1-3, circular pits on lateral sides. Disk 6-angular to lobed.

Fl. & Fr. : January-November.

Occasional, in moist and shady localities in the gardens and fields; Hudiani Dungri (*Kanodia* 75480, BSI).

6. *P. virgatus* Forst. f. *Prodr.* 65. 1786. *P. simplex* Retz. *Obs. Bot.* 5: 29. 1789; Hook. f. *Fl. Brit. India* 5: 295. 1887; Duthie, *Fl. Gangetic Plain* 3: 97. 1915; Mahesh. *Illus. Fl. Delhi* f. 199. 1966. '*Gujrati Bawal*' (Hindi).

Erect, annual herbs, woody at the base. Stem narrowly marginated. Leaves obtuse, 1.0-3.5 x 0.3-0.8 cm, entire. Petioles upto 2 mm long. Flowers greenish-yellow, axillary, solitary, pedicelled. Stamens free. Disk cup-shaped, glandular. Capsules globose, slightly 3-lobed, smooth, not echinate or warty. Seeds trigonous, tuberculate, dark brown.

Fl. & Fr. : July-October.

Common, sparsely distributed in the forests and cultivated fields; Wadita Hillage forest, Banswara (*Kanodia* 75109, BSI).

9. RICINUS L.

Ricinus communis L. *Sp. Pl.* 1007. 1753; Hook. f. *Fl. Brit. India* 5: 457. 1887; Duthie, *Fl. Gangetic Plain* 3: 113. 1915; Rao & Razi in *Journ. Mysore Univ.* 23 (1-2) : 48. 1969-70. '*Arand, Erangi, Randi*' (Hindi).

Large shrubs or small trees, with fistular stem. Petioles with 1 or 2 glands at the apex. Flowers in pyramidal, leaf-opposed and pseudoterminal, erect panicles; male flowers below the females. Pedicels jointed a little above the middle in males and at the top in female flowers. Perianth spathaceous, splitting into 3-5, valvate lobes, glandular. Capsules subglobose-oblong, 3-lobed, 3-celled. Seeds oblong-ovoid, caruncled.

Fl. & Fr. : Most part of the year.

Native of Africa; naturalized in wastelands, particularly near habitations; Shergarh.

10. SECURINEGA Comm. ex Juss. *nom. cons.*

Securinega virosa (Roxb. ex Willd.) Baillon in *Adansonia* 6: 334. 1866; Pax & Hoffm. in Engl. & Prantl, *Pflanzenfam.* ed. 2. 19C: 60. 1931. *Phyllanthus virosus* Roxb. ex Willd. *Sp. Pl.* 4: 578. 1805. *Fluggea microcarpa* Bl. *Bijdr.* 580. 1825; Hook. f. *Fl. Brit. India* 5: 328. 1887; Duthie, *Fl. Gangetic Plain* 3:

91. 1915.

Undershrubs, with sulcate, glabrous stem. Leaves ovate-elliptic to rhomboid or obovate, 2-5 x 1.5-3.0 cm, entire-repand, obtuse or acute, cuneate at the base. Flowers white, of both sexes in axillary clusters. Pistillodes 2-lobed. Disk glandular. Styles 3, connate in the lower half, each 2-fid. Fruits depressed-globose, pruinose.

Fl. & Fr. : April-September.

Occasional, in wastelands and forests; Bhongra (*Kanodia* 75466, BSI).

Euphorbia pulcherrima Willd. ex Klotz.-Shrubs, with crimson or red, oblanceolate, foliaceous bracts and 3-lobed regmas. Native of Mexico and Central America; cultivated in the gradens for ornamental purposes.

85. ULMACEAE

HOLOPTELEA Planch.

Holoptelea integrifolia (Roxb.) Planch. in Ann. Sci. Nat. Bot. ser. 3. 10: 269. 1848; Wight, Icon. 6: 8. t. 1968. 1853; Hook. f. Fl. Brit. India 5: 481. 1888; Duthie, Fl. Gangetic Plain 3: 120. 1915. *Ulmus integrifolia* Roxb. Pl. Cor. 56. t. 78. 1798 & in Willd. Sp. Pl. 1: 1326. 1798. 'Kanjeri, Churil, Bunder-ki-Rakhi' (Hindi).

Large, deciduous trees. Leaves ovate to elliptic, 5-15 x 2.5-9.0 cm, pinnately veined, rounded or subcordate at the base, abruptly acuminate at the apex. Flowers green, in numerous fascicles on leafless branches. Tepals 4-8, imbricate. Anthers hairy. Ovary stipitate. Samaras oblique-elliptic to suborbicular, 1.5-2.5 cm in diam., compressed, winged, emarginate at tip and crowned by persistent styles.

Fl. & Fr. : February-May.

Common in wastelands; also planted as an avenue tree; Pipalkhund.

86. MORACEAE

- 1a. Flowers inserted inside the hollow, globose receptacles (hypanthodia). Stamens straight in bud, with erect anthers. *Ficus* 1
- 1b. Flowers in elongate spikes. Stamens inflexed in bud, with recurved anthers. *Morus* 2

1. FICUS L.

- 1a. Stamen one in male flowers :
- 2a. Leaves opposite. *F. hispida* 2
- 2b. Leaves alternate :
 - 3a. Leaves caudate-acuminate at the apex. *F. religiosa* 6
 - 3b. Leaves obtuse, acute or retuse, not caudate :

- 4a. Leaves glabrous. Hypanthodia (receptacles) less than 1 cm in diameter, glabrous. *F. microcarpa* 3
- 4b. Leaves tomentose, atleast beneath. Hypanthodia 1-2 cm in diameter, silky-pubescent. *F. benghalensis* 1
- 1b. Stamens more than one in male flowers :
- 5a. Receptacles axillary. *F. palmata* subsp. *virgata* 4
- 5b. Receptacles on tubercles or on special short branches. *F. racemosa* 5

1. *Ficus benghalensis* L. Sp. Pl. 1059. 1753; Hook. f. Fl. Brit. India 5: 499. 1888; Duthie, Fl. Gangetic Plain 3: 147. 1915; Corner in Gard. Bull. Sing. 21(1): 14. 1965. *F. indica* L. Sp. Pl. 1060. 1753, emend. Lam. Encycl. Meth. Bot. 2 : 492. 1788. *Urostigma benghalense* (L.) Gasp. Nov. Gen. Fici 7. 1844; Wight, Icon. 6: 12 t. 1989. 1853. 'Bar, Bargad' (Hindi).

Large, evergreen trees, with white latex and prop roots. Leaves ovate-oblong, 8-20 x 6-15 cm; lateral nerves less than 6 pairs. Receptacles globose, about 2 cm in diam., axillary, paired, red when ripe. Male, female and gall flowers in the same receptacle.

Fl. (Receptacles) : June-September.

Common in wastelands, along the roads, on the old walls and often on the tree; Pipalkhund, Ghatol.

2. *F. hispida* L. f. Suppl. 442. 1781; Hook. f. Fl. Brit. India 5: 522. 1888; Duthie, Fl. Gangetic Plain 3: 155. 1915; Corner in Gard. Bull. Sing. 21(1) : 89. 1965. *F. oppositifolia* Roxb. Pl. Cor. t. 124. 1798; Wight, Icon. 2(4): 1. t. 638. 1843. 'Katumar, Ghauter, Kalmungri' (Hindi).

Trees or shrubs, hispid, with hollow internodes. Leaves ovate or obovate-oblong, 6-30 x 3-12 cm, dentate or serrulate, hirsute, abruptly acuminate. Receptacles subglobose or obovoid, 1.5-2.5 cm in diam., pedunculate, hairy, solitary or in cymes fascicled on tubercles of stem. Bracts three, lateral ones scattered on the sides of receptacles. Male and gall flowers in one set of receptacles; female flowers in another.

Fl. (Receptacles) : Most part of the year.

Common in forests, particularly near water streams. Seedlings are very gregarious under the shade of trees; Shergarh forest, Banswara (Majumdar 10245, BSA).

3. *F. microcarpa* L. f. Suppl. 442. 1781; Corner in Gard. Bull. Sing 21(1): 22. 1965. *F. retusa* auct. plur. non L. 1767; Hook. f. Fl. Brit. India 5: 511. 1888; Duthie, Fl. Gangetic Plain 3: 149. 1915.

Shady trees. Leaves elliptic, ovate or obovate, 3.5-7.0 x 3.0-4.5 cm; lateral nerves 6-9 pairs. Receptacles depressed-globose, 8-10 mm in diam., sessile, solitary or paired, axillary or from the scars of fallen leaves, containing male, female and gall flowers.

Fl. (Receptacles) : November-April.

Common in wastelands and along the roads; Danpur.

4. *F. palmata* Forsk. subsp. *virgata* (Roxb.) Browicz in Rechinger, Fl. Iranica 153 : 12. 1982. *F. virgata* Roxb. Fl. Ind. 3: 530. 1832. *F. caricooides* Roxb. Fl. Ind. 3: 529. 1832. *F. palmata* sensu Hook. f. Fl. Brit. India 5: 530. 1888; Duthie, Fl. Gangetic Plain 3: 158. 1915, *auct. non* Forsk. 1775. 'Jangli Anjir' (Hindi).

Small trees or shrubs, with pubescent branches and a ring of lenticels on the nodes. Leaves petiolate, ovate, 4-15 x 4-12 cm, entire or lobed, serrate or dentate, acute or obtuse, 3 to 5-nerved and cordate or truncate at the base. Receptacles peduncled, subglobose or pyriform, 1.2-2.0 cm in diam., solitary, axillary. Bracts ovate. Bracteoles linear, acute. Male and gall flowers in one set of receptacles; females in another.

Fl. (Receptacles) : February-July.

Common in the gardens, boundaries of the fields and often on the fringes of forests; Kushalgarh, Shergarh forest.

5. *F. racemosa* L. Sp. Pl. 1060. 1753; Corner in Gard. Bull. Sing. 21(1): 34. 1965. *F. glomerata* Roxb. Pl. Cor. 2: 13. t. 123. 1799; Wight, Icon. 2(4): 3. t. 667. 1843; Hook. f. Fl. Brit. India 5: 535. 1888; Duthie, Fl. Gangetic Plain 3: 160. 1915. 'Umri, Gular' (Hindi).

Trees, with few, short aerial roots. Petioles upto 3 cm long. Leaves elliptic-lanceolate, about 15 x 5 cm, obtuse or acute, glabrous, with 5-6 pairs of lateral nerves. Receptacles obovoid, about 2 cm in diam., on short, warted, tubercled, leafless branchlets. Bracts lateral, at the middle of peduncles.

Fl. (Receptacles) : April-July.

Occasional, in wastelands; often planted. Fruits are eaten by the local people; Bhandaria (*Kanodia* 51059, BSI).

6. *F. religiosa* L. Sp. Pl. 1059. 1753; Hook. f. Fl. Brit. India 5: 513. 1888; Duthie, Fl. Gangetic Plain 3: 150. 1915; Corner in Gard. Bull. Sing. 21(1): 6. 1965. *Urostigma religiosum* (L.) Gasp. Ric. Caprif. 82. t. 7. f. 1-5. 1845; Wight, Icon. 6: 8. t. 1967. 1853. 'Peepal' (Hindi).

Large trees, with grey bark. Leaves long petioled, broadly ovate to suborbicular, 8-20 x 6-12 cm, entire or undulate, truncate or cordate at the base. Receptacles smooth, globose, upto 1 cm in diam., sessile, in axillary pairs. Male, female and gall flowers on the same receptacle. Female flowers pedicelled, with 5 perianth lobes; rest sessile, with 3-lobed perianth.

Fl. (Receptacles) : April-July.

Common in wastelands, on the walls of old buildings and on large trees; also planted near temples; Banswara, Ghatol (*Kanodia* 75464, BSI).

2. MORUS L.

Morus indica L. Sp. Pl. 986. 1753; Wight, Icon. 2(4): 3. t. 674. 1843; Hook. f. Fl. Brit. India 5: 492. 1888; Duthie, Fl. Gangetic Plain 3: 136. 1915. 'Shehtut' (Hindi).

Deciduous trees, 3-5 m high. Leaves ovate to suborbicular, entire or 3-lobed, 2.5-15.0 x 3-11 cm, serrate, acuminate. Peduncles 0.5-1.5 cm long, solitary. Staminate spikes lax, 2-3 cm long. Pistillate catkins 1.5-2.0 cm long. Styles 2-fid. Druplets enclosed in the 4-lobed, fleshy, confluent perianth. Seeds subglobose.

Fl. & Fr. : February-May; often in August-September.

Native of China and Japan; common in gardens and often along the roads; Kushalgarh.

87. URTICACEAE

NEODISTEMON Babu & Henry

Neodistemon indicum (Wedd.) Babu & Henry in Taxon 19: 651. 1970; Raizada in Suppl. Duthie, Fl. Gangetic Plain 257. 1976. *Distemon indicum* Wedd. Arch. Mus. Hist. Nat. Paris 9: 551. t. 20 A. 1857; Hook. f. Fl. Brit. India 5: 588. 1888.

Erect, annual herbs. Leaves ovate, 2-10 x 2-6 cm, serrate, acuminate, with a contracted base. Flowers in few-flowered clusters which are combined into axillary and terminal, 10-15 cm long pseudo-spikes; lower-clusters with 2-sessile female flowers and one or more shortly pedicelled male ones. Bracts ovate, acuminate. Fruits ovoid, beaked.

Fl. & Fr. : August-October.

Rare, in forests and wastelands; Hudiani Dungri (*Kanodia* 75487, BSI).

88. CASUARINACEAE

CASUARINA L.

Casuarina equisetifolia L. Amoen. Acad. 4 : 143. 1759 'equisetifolia'; Hook. f. Fl. Brit. India 5: 598. 1888; Duthie, Fl. Gangetic Plain 3: 162. 1915; Sant. in Rec. Bot. Surv. Ind. 16(1): 295. 1953. *C. muricata* Roxb. Fl. Ind. 3: 519. 1832. 'Jhau' (Hindi).

Large, leafless trees, with drooping branches and slender, rush-like branchlets bearing 6-8 scales on the nodes in whorls. Male spikes 2.5 x 0.4 cm, many at the end of branches. Female flowers in globose or ovoid, cone-like, 2.5 x 1.8 cm heads. Nutlets thin, winged.

Fl. & Fr. : March-July.

Rare, in open forests; Anand Sagar forest.

89. HYDROCHARITACEAE

1a. Stemless, stoloniferous herbs. Leaves radical :

- 2a. Leaves sessile, linear, ribbon-like. Flowers unisexual. Spathes not winged. *Vallisneria* 4
- 2b. Leaves long petioled, ovate, ovate-cordate to suborbicular. Flowers bisexual. Spathes winged. *Ottelia* 3
- 1b. Stem well developed. Stolons absent. Leaves caudine :
- 3a. Leaves in whorls or lower ones opposite. Stamens 3. Style entire. *Hydrilla* 1
- 3b. Leaves alternate. Stamens 2. Style slightly lobed. *Nechamandra* 2

1. HYDRILLA L. C. Rich.

***Hydrilla verticillata* (L. f.) Royle**, Ill. Bot. Himal. t. 376, 1839; Hook. f. Fl. Brit. India 5: 659, 1888; Duthie, Fl. Gangetic Plain 3: 173, 1920; Subram. Aquatic Ang. 54, f. 37, 1962. *Serpicula verticillata* L. f. Suppl. 416, 1781. *Vallisneria verticillata* (L. f.) Roxb. Fl. Ind. 3: 751, 1832.

Submerged, free-floating herbs, often with fibrous roots at the nodes. Leaves 3-8 in a whorl, oblong-linear, 1-2 x 0.1-0.3 cm, serrate-dentate. Male flowers solitary, axillary, pedicelled. Perianth of 3 sepals and 3 petals. Female spathes axillary, sessile. Fruits echinate, 5-7 mm long.

Fl. & Fr. : September-November.

Common in fresh water ponds, ditches, rivers and tanks, forming dense masses, often in association with *Potamogeton* L., *Zannichellia* L., *Nymphaea* L. etc.; Lasara, Banswara (*Verma* 225, BSA), Raj Talab (*Kanodia* 51009, BSI).

2. NECHAMANDRA Planch.

***Nechamandra alternifolia* (Roxb.) Thwaites**, Enum. Pl. Zeyl. 332, 1864; Subram. & Balakrishnan in Bull. Bot. Surv. Ind. 3(1) : 23, 1962; Subram. Aquatic Ang. 56, f. 38, 1962. *Vallisneria alternifolia* Roxb. Pl. Cor. 2: t. 165, 1802 and Fl. Ind. ed. Carey 3 : 750, 1832. *Nechamandra roxburghii* Planch. in Ann. Sci. Nat. Paris ser. 3, 11: 78, 1849. *Lagarosiphon roxburghii* (Planch.) Benth. in Benth. & Hook. f. Gen. Pl. 3: 451, 1883; Hook. f. Fl. Brit. India 5: 659, 1888; Duthie, Fl. Gangetic Plain 3: 174, 1920.

Submerged, attached or free-floating herbs. Leaves linear-lanceolate, 1.5-6.5 x 0.2-0.5 cm, serrulate, amplexicaul at the base. Male flowers sessile, crowded in the leaf-axils in a sessile, 2-fid spathe. Female flowers solitary, axillary, enclosed in the tubular spathes which are bifid at the apex. Utricles ovoid. Seeds oblong, scrobiculate.

Fl. & Fr. : August-April.

Common in stagnant water, forming dense masses. The fruiting plants appear red coloured; Lamero, Lasara.

3. OTTELIA Pers.

Ottelia alismoides (L.) Pers. Syn. Pl. 1: 400. 1805; Hook. f. Fl. Brit. India 5: 662. 1888; Duthie, Fl. Gangetic Plain 3: 177. 1920; Subram. Aquatic Ang. 61. f. 43. 1962. *Stratiotes alismoides* L. Sp. Pl. 535. 1753.

Submerged herbs, rooted in the mud. Leaves dimorphic; normal ones broadly ovate, suborbicular or cordate-reniform, 7-15 x 6-16 cm, acute or obtuse, cordate-based; abnormal ones linear, 7-10 x 1 cm. Flowers white, solitary, terminating 4 or 5-angled, 10-30 cm long peduncles. Spathes elliptic or ovate with two acute tips and serrate-tuberclled 2-10 prominent wings. Sepals linear. Petals obovate. Stamens 6-8. Ovary beaked. Fruits oblong-elliptic, 2-4 cm long, crowned with 1-nerved sepals, winged.

Fl. & Fr. : Most part of the year.

Common in slow running and stagnant water in ponds, streams, rivers etc.; Kushalgarh, Parla-ka-Pul (*Majumdar* 10305, BSA), Looda (*Majumdar* 10267, BSA), Banswara (*Kanodia* 75732, BSI).

4. VALLISNERIA L.

Vallisneria spiralis L. Sp. Pl. 1015. 1753; Hook. f. Fl. Brit. India 5: 660. 1888; Duthie, Fl. Gangetic Plain 3: 174. 1920; Subram. Aquatic Ang. 57. f. 39. 1962.

Submerged, tufted, dioecious herbs, rooted in the mud. Leaves upto 40 x 1 cm, sheathing at the base, minutely denticulate on the margins. Male flowers 3-merous, shortly penduncled, many enclosed in an ovoid, 3-lobed spathe. Female flower solitary in a tubular, 3-toothed spathe borne at the apex of long, slender, spirally coiled scape. Perianth 1-seriate. Staminodes 3, 2-fid. Styles 3. Seeds oblong to fusiform.

Fl. & Fr. : August-October; March-April.

Rare, in the fresh water tanks in association with other aquatic weeds; Talwara, Parla-ka-Pul (*Majumdar & Mishra* 10304, BSA).

90. ORCHIDACEAE

- 1a. Epiphytic plants. Leaves thickly coriaceous, channeled.
- 1b. Terrestrial plants. Leaves papery.

Aerides 1
Zeuxine 2

1. AERIDES Lour.

Aerides crispum Lindl. Gen. Sp. Orch. 239. 1833; Hook. f. Fl. Brit. India 6: 45. 1890; Sant. & Kapadia, Orch. Bomb. 122. 1966. *A. lindleyana* Wight, Icon. 5(1): 9. t. 1677. 1851.

Stem slender, stout. Flowers white tinged with pink, showy, sweet-scented, in racemose panicles. Sepals and petals not spotted. Mid-lobe of

lip triangular, crenulate, not ending in a knob; lateral lobes longer. Spur pointing forward, with calli or septa within. Capsules clavate or pyriform, slightly winged on the angles, upto 7 cm long.

Fl. & Fr. : June-August.

Rare, in the forests on the trees; Ghatol (*Kanodia* 75507, BSI).

2. ZEUXINE Lindl. *nom. cons.*

Zeuxine strateumatica (L.) Schlecht. Fedde Repert. Beih. I: 77. 1911; Sant. & Kapadia, Orch. Bomb. 167. 1966. *Orchis strateumatica* L. Sp. Pl. 943. 1753. *Zeuxine sulcata* Lindl. Gen. Sp. Orch. 485. 1840; Hook. f. Fl. Brit. India 6: 106. 1890; Duthie, Fl. Gangetic Plain 3: 219. 1920. *Z. bracteata* Wight, Icon. 5(1): 16. t. 1724. 1851.

Erect herbs, upto 30 cm high. Rhizomes covered with thin, tuber-bearing root-fibres. Leaves sessile, linear to lanceolate, 1.5-10.0 x 0.2-0.6 cm, sub-acuminate, passing upwards into bracts. Flowers white, in 1.5-15.0 cm long, terminal, spicate racemes. Bracts ovate-lanceolate, 5-nerved, acuminate. Corolla-lip saccate, keeled and glandular within. Stigmas 2. Capsules ovoid, ribbed, beak-less.

Fl. & Fr. : January-March.

Occasional, in swampy localities among short grasses; Jhola (*Kanodia* 51190, BSI).

91. ZINGIBERACEAE

CURCUMA L.

- | | |
|--|---------------------------|
| 1a. Tubers sessile. Spikes lateral, appearing before leaves. | <i>C. aromatica</i> 1 |
| 1b. Tubers borne at the end of root-fibres. Spikes central, appearing with leaves. | <i>C. pseudomontana</i> 2 |

1. *Cureuma aromatica* Salisb. Parad. Lond. t. 96. 1805; Wight, Icon. 6: 16. t. 2005. 1853; Hook. f. Fl. Brit. India 6: 210. 1890. *C. zedoaria* Roxb. As. Res. 11: 333. 1810, non Rosc. 1828.

Perennial herbs, with a large root-stock of many palmately branched tubers which are yellow inside. Leaves elliptic or lanceolate-oblong, 30-60 x 10-20 cm, caudate-acuminate. Bracts ovate, connate below, recurved, cymbiform, obtuse, pale-green. Corolla pink; lip yellow, obovate, subentire or obscurely 3-lobed. Lateral staminodes oblong, obtuse, as long as corolla-lobes. Anther-base spurred.

Fl. & Fr. : July-November.

Rare, in the forests in shady habitats; Kushalgarh (*Kanodia* 75700, 75507, BSI).

2. *C. pseudomontana* Grah. Cat. Pl. Bomb. 210. 1839; Sant. in Journ. Bomb. nat. Hist. Soc. 45 : 618-624. 1949; Sant. I. c. 51 : 135. f.

2. 1952. *C. ranadei* Prain in Journ. Bomb. nat. Hist. Soc. 11: 463. 1898. *C. montana sensu stricto* Baker in Hook. f. Fl. Brit. India 6: 214. 1890, non Rosc. 1828.

Tubers elliptic or globose, white inside. Leaves oblong-lanceolate, 16-25 x 6-13 cm, acuminate; petioles upto 20 cm long. Bracts greenish, tinged with red or purple, each enclosing 2-3 flowers. Corolla yellow. Staminodes free from the lip, lateral ones petaloid. Anther-base spurred.

Fl. & Fr. : August-October.

Common in forests in shady habitats; Dagua Bowji hill, Puna Pathar forest.

Notes : Santapau (*I c.*) mentioned that first of all a lateral spike develops which decays and gives way to the central one. No lateral spikes could be noted by the author in his field and experimental studies.

92. AMARYLLIDACEAE

CRINUM L.

Crinum defixum Ker-Gawl. in Journ. Sci. Arts 3: 105. 1817; Hook. f. Fl. Brit. India 6: 281. 1892; Duthie, Fl. Gangetic Plain 3: 248. 1920. *C. asiaticum* Roxb. Fl. Ind. 2: 127. 1832, non L. 1753. 'Jal-kanda' (Hindi).

Stout, perennial herbs, with ovoid bulbs and fusiform stoloniferous base; neck about 16 cm long, underground, clothed with leaf-scars. Leaves linear-oblong, 60-90 x 2-4 cm, channeled, obtuse or acute. Flowers white, in 6 to 12-flowered umbels. Bracts 2, enclosing flower-buds. Perianth-tube straight, 8-10 cm long; lobes 6, linear, spreading, longer than stamens. Stamens free, spreading. Fruits subglobose.

Fl. & Fr. : Most part of the year.

Common in rocky river-beds, often cultivated in the gardens; Mahi River, Pipalkhund.

93. HYPOXIDACEAE

CURCULIGO Gaertn.

Curculigo orchoides Gaertn. Fruct. 1: 63. t. 16. 1788; Hook. f. Fl. Brit. India 6: 279. 1892; Duthie, Fl. Gangetic Plain 3: 247. 1920. *C. malabarica* Wight, Icon. 6: 22. t. 2043 A. f. 1. 1853. 'Moosli' (Hindi).

Perennial herbs, with tuberous root-stock, fleshy roots and without aerial stem. Leaves basal, linear-lanceolate, 12-30 x 1.5-4.0 cm, white-dotted or sparsely hairy above. Flowers bright yellow, 2 to 3-together on 5-10 cm long, axillary peduncles which are hidden among the leaf-sheaths. Stamens 6, epiphyllous. Ovary hairy; stigmas 3. Capsules sessile, beaked, 1 to 4-

seeded, hairy at the tip, 1.5-1.8 cm long. Seeds black, strophiolate.

Fl. & Fr. : August-October.

Common in forests from plains to the hills; Puna Pathar forest, Hura Bowji forest, Ghatol (*Kanodia* 75493, BSI).

94. DIOSCOREACEAE

DIOSCOREA L.

- | | |
|---|-------------------------|
| 1a. Stem smooth, glabrous. Leaves simple, 7 to 13-nerved. | <i>D. bulbifera</i> 1 |
| 1b. Stem aculeate. Leaves 3 to 5-foliolate, less than 7-nerved : | |
| 2a. All the 6 stamens fertile. Staminodes absent. Capsules less than 3 cm long. | <i>D. hispida</i> 2 |
| 2b. Fertile stamens 3, alternating with 3 staminodes. Capsules more than 5 cm long. | <i>D. pentaphylla</i> 3 |

1. ***Dioscorea bulbifera* L.** Sp. Pl. 1033. 1753; Wight, Icon. 3(2): 6. t. 878. 1844-45; Duthie, Fl. Gangetic Plain 3: 254. 1920; Sant. in Journ. Bomb. nat. Hist. Soc. 49: 628. 1950. *D. sativa* auct. non L. 1753; Hook. f. Fl. Brit. India 6: 295. 1892. 'Gaithi, Kanda-Giloe' (Hindi).

Twinning, dioecious herbs, with globose or pyriform tubers. Leaves alternate, ovate-cordate, 5-20 x 4-20 cm, acuminate. Male flowers white or pale-rose, closely arranged in long, pendulous racemes or paniculate racemes which are fascicled in the axils of leaves or bracts. Female flowers white, distant, in pendulous, solitary or fascicled spikes. Staminodes 6. Stigmas 3. Capsules oblong, reflexed, straw-coloured, 20-22 x 8-9 mm, winged. Seeds winged on basal side only. Bulbils axillary, warted.

Fl. & Fr.: August-December.

Common in wastelands and open forests among bushes and shrubs; Shergarh forest, Sarvan, Danpur, Bhapur (*Kanodia* 75208, BSI), Kushalgarh (*Kanodia* 75674, BSI).

2. ***D. hispida* Dannst.** Schl. Hort. Ind. Malab. 15. 1818; Prain & Burkill in Kew Bull. 1927: 237. 1927. *D. triphylla* L. in Stickman, Herb. Amb. 23. 1754 & Amoen. Acad. 4: 131. 1754, non L. 1753. *D. daemonum* Roxb. Fl. Ind. 3: 805. 1832; Wight, Icon. 3(1): 7. t. 811. 1844; Hook. f. Fl. Brit. India 6: 289. 1892. *D. triphylla* L. var. *daemonum* (Roxb.) Prain & Burkill in Journ. As. Soc. Beng. 10: 26. 1914 ; Duthie, Fl. Gangetic Plain 3: 254. 1920.

Extensive, woody climbers, often with bulbils on the nodes. Tubers globose, lobed. Leaflets 3, middle one obovate-elliptic, lateral ones ovate-elliptic, acute or acuminate. Male spikes paniculate, 2 to 5-nate, pubescent, pendulous. Bracts ovate, subacute. Female spikes simple, solitary, 10-15 cm long. Capsules reflexed, oblong, subcordate at the base, rounded at apex. Seeds winged at the base.

Fl. & Fr. : August-October.

Rare, in the forests. Often bears 5-foliolate leaves and is mistaken for *D. pentaphylla* L.; Shergarh forest.

3. *D. pentaphylla* L. Sp. Pl. 1032. 1753; Wight. Icon. 3(1): 7. 814. 1844; Hook. f. Fl. Brit. India 6: 289. 1892; Duthie, Fl. Gangetic Plain 3: 253. 1920; Prain & Burkitt in Journ. Asiatic Soc. Beng. 10: 23. 1914. *D. triphylla* L. Sp. Pl. 1032. 1753. *D. jacquemontii* Hook. f. I.c. 6: 290. 1892.

Herbaceous twiners, with globose to pyriform tubers. Leaves 5-foliolate, upper ones often 3-foliolate; leaflets obovate-elliptic to oblong, densely pubescent beneath, 5-20 x 2-7 cm. Male flowers in dense, pubescent, pendent, paniculate spikes. Female racemes simple, 2 to 3-nate. Pistil hairy; styles 3. Capsules longer than broad, retuse at apex. Seeds winged at the base only. Bulbils axillary, variously lobed, corky.

Fl. & Fr. : August-October.

Occasional, in the forests; Singhpura (Kanodia 75233, BSI).

95. LILIACEAE

- 1a. Leaves absent or reduced to scales. Branchlets modified into needle-like axillary cladodes. *Asparagus* 1
- 1b. Leaves normal, well developed. Branchlets not modified into cladodes :
 - 2a. Climbers. Root-stock tuberous. Leaf-tip modified into a tendril. Perianth-segments strongly undulate. *Gloriosa* 4
 - 2b. Erect herbs. Roots-stock, if any, not tuberous. Leaf-tip acute or obtuse. Perianth-segments not undulate :
 - 3a. Root-stock bulbous. Perianth tubular, gamophyllous. Seeds many in each cell of the capsule. *Dipcadi* 3
 - 3b. Root-stock small, with many fleshy roots. Tepals free. Seeds 1-2 in each cell of the capsule. *Asphodelus* 2

1. ASPARAGUS L.

Asparagus racemosus Willd. Sp. Pl. 2: 152. 1799; Wight, Icon. 6: 26. t. 2056. 1853; Hook. f. Fl. Brit. India 6: 316. 1892; Duthie, Fl. Gangetic Plain 3: 259. 1920. 'Narkanta, Satavari, Satmuli' (Hindi).

Straggling or scandent, much branched, spinous shrubs. Roots fusiform, tuberous, fasciculated. Spines patent or recurved, about 5 mm long. Cladodes 15-30 x 0.5 mm, acicular, falcate, 3-quaternous, in axillary whorls of 2-6. Flowers white, in axillary, solitary or fascicled, simple or branched racemes terminated by flowers. Pedicels jointed at the middle. Styles shortly 3-fid. Berries globose, scarlet, 1 to 3-seeded.

Fl. : August-September; *Fr.* : October-January.

Common in forests, climbing on the shrubs and bushes or spreading on the ground; Kotharia forest, Kushalgarh (Kanodia 75696, BSI).

2. ASPHODELUS L.

Asphodelus tenuifolius Cav. in Anal. Cienc. Nat. 3: 46. t. 27. f. 2. 1801; Hook. f. Fl. Brit. India 6: 332. 1892, excl. syn. *A. fistulosus* L.; Duthie, Fl. Gangetic Plain 3: 262. 1920, excl. syn. *A. fistulosus* L.; Ingram in Baileya 12(1) : 9. 1964; Mahesh. Illus. Fl. Delhi f. 201. 1966. 'Paizi' (Hindi).

Erect, annual herbs. Stem scapose, not leafy. Leaves acicular, 10-40 x 0.2-0.3 cm, radical, hollow, terete, succulent. Flowers white, racemed on simple or branched, solid scapes longer than leaves. Pedicels jointed below the middle. Capsules globose, 3-gonous, loculicidal. Seeds 3-gonous, black, rugose.

Fl. & Fr. : January-April.

Common weed in the Rabi crops; Talwara, Bhimsor (*Majumdar* 10277, BSA).

Notes : *A. fistulosus* L. is a distinct species with perennial habit, glabrous flowering scapes and scabrid leaves on marginal nerves.

3. DIPCAIDI Medik.

Dipeadi serotinum (L.) Medik. in Act. Acad. Theod. Palat. 6: 431. 1790; Hook. f. Fl. Brit. India 6: 346. 1892; Deb & Dasgupta in Journ. Bomb. nat. Hist. Soc. 75(1) : 52. f. 1. 1978. *Hyacinthus serotinus* L. Sp. Pl. 317. 1753. *Dipeadi hydsuricum* Baker in J. Linn. Soc. 11: 397. 1871; Hook. f. I.c. 6 : 347. 1892.

Perennial herbs, with ovoid bulbs. Leaves linear, 12-40 x 0.2-0.5 cm, acuminate. Scapes 20-50 cm long; racemes 10-50 cm long, many-flowered. Bracts lanceolate, about equalling the pedicels or shorter. Flowers 1.5-3.5 mm long. Perianth-lobes subequal, three outer as long as the tube and recurved in the middle; the inner ones deflexed at the apex. Capsules quadrate. Seeds suborbicular, compressed black.

Fl. & Fr. : March-July.

Rere, in the wastelands. Very close to *Urginea indica* (Roxb.) Kunth which, however, bears elliptic capsules; Banswara (*Wadhwa* 5028, BSA).

4. GLORIOSA L.

Gloriosa superba L. Sp. Pl. 305. 1753; Wight, Icon. 6 : 25. t. 2047. 1853; Hook. f. Fl. Brit. India 6: 358. 1892; Duthie, Fl. Gangetic Plain 3 : 262. 1920. 'Lalukhri, Kaligari' (Hindi).

Climbing herbs, with tuberous, naked root-stocks. Leaves sessile, ovate-lanceolate, 10-15 x 2-4 cm, acuminate. Pedicels 10-16 cm long, deflexed at the tip. Flowers yellow tinged with red in upper half, axillary, solitary,

forming terminal corymbs. Tepals free or connate at the base, ovate-lanceolate, 5-8 x 1.0-1.5 cm, deflexed, crisped. Style 3-fid. Capsules oblong, septical. Seeds subglobose.

Fl. & Fr. : August-November.

Common among the clumps of trees and shrubs in wastelands and forests. Tubers are said to be poisonous; Chhatri Pada forest, Banswara (*Kanodia* 75160, BSI).

96. COMMELINACEAE

1a. Fertile stamens 6. Staminodes absent :

2a. Flowers sessile, embedded in the hollow axils of leaf-sheaths.
Bracteoles small, not imbricately arranged.

Amischophacelus 1

2b. Flowers in scorpioid cymes, with foliaceous bracts and 2-seriate, closely imbricating leafy bracteoles.

Cyanotis 3

1b. Fertile stamens 3. Staminodes 1-3 :

3a. Cymose-panicles open. Flowers actinomorphic. Bracts not spathaceous.

Murdannia 4

3b. Cymes enclosed in spathaceous bracts. Flowers zygomorphic.

Commelina 2

1. AMISCHOPHACELUS Rolla Rao & Kammathy

1a. Sheaths less swollen. Capsules 1-horned (beaked) at the apex.

A. axillaris 1

1b. Sheaths much swollen. Capsules 3-horned and with a depression at the apex.

A. cucullata 2

1. *Amischophacelus axillaris* (L.) Rolla Rao & Kammathy in Journ. Linn. Soc. Bot. 59: 306. 1966. *Commelina axillaris* L. Sp. Pl. 42. 1753. *Tradescantia axillaris* (L.) L. Mant. Pl. 2: 321. 1771. *Cyanotis axillaris* (L.) D. Don, Prodr. Fl. Nepal. 46. 1825; Hook. f. Fl. Brit. India 6: 388. 1892; Duthie, Fl. Gangetic Plain 3: 280. 1920; Mahesh. Illus. Fl. Delhi f. 205. 1966.

Erect or decumbent herbs, rooting at the lower nodes. Leaves sessile, linear-lanceolate to oblong, 5-15 x 0.3-1.0 cm, acute or acuminate. Flowers purple, in cymes which are reduced to axillary fascicles. Capsules oblong or ellipsoid. Seeds oblong-subcylindric, pitted, grey, truncate at one end and rounded at the other.

Fl & Fr. : August-December.

Common in marshy habitats, particularly in rice-fields; Kushalgarh (*Kanodia* 75678, BSI).

2. *A. cucullata* (Roth) Rolla Rao & Kammathy in Journ. Linn. Soc. Bot. 59: 306. 1966. *Tradescantia cucullata* Roth, Nov. Pl. Sp. 189. 1821. *Cyanotis cucullata* (Roth) Kunth, Enum. 4: 107. 1843; Hook. f. Fl. Brit. India 6: 389. 1892. *Zygomenes cucullata* (Roth) Rolla Rao & Kammathy in Notes Roy. Bot. Gard. Edinb. 25: 187. 1964.

Decumbent annuals, 15-40 cm long, rooting at the lower nodes. Leaves linear-lanceolate, 2.5-6.0 x 0.5-1.0 cm, distichous; sheaths globosely inflated. Flowers violet-blue or pink, 1-2 in all axils, included in the sheath-pouch. Filaments bearded with blue hairs. Capsules 3-gonous, almost included in the sheath-pouch. Seeds obscurely pitted.

Fl. & Fr. : August-November.

Common in rice-fields and other low-lying areas; Banswara, Bhongra (*Kanodia* 75458, BSA), Nathela (*Kanodia* 75306, 75389, BSI).

Notes : Hooker (*l.c.*) erroneously described glabrous filaments in this species while distinguishing it from *Cyanotis axillaris* (L.) D. Don to which it is closely allied.

2. COMMELINA L.

- | | |
|--|--------------------------|
| 1a. All the three locules of the ovary 1-ovuled. | <i>C. erecta</i> 2 |
| 1b. Anterior pair of the locules of ovary 2-ovuled, the posterior one 1-ovuled : | |
| 2a. Seeds rugose. | <i>C. benghalensis</i> 1 |
| 2b. Seeds smooth : | |
| 3a. Spathes ovate-lanceolate. Posterior cell of the capsule keeled. | <i>C. hasskarlit</i> 4 |
| 3b. Spathes broadly ovate-cordate. Posterior cell of the capsule not keeled. | <i>C. forskalaei</i> 3 |

1. **Commelina benghalensis** L. Sp. Pl. 41. 1753; Wight, Icon. 6 : 29. t. 2065. 1853; Hook. f. Fl. Brit. India 6: 370. 1892; Duthie, Fl. Gangetic Plain 3: 274. 1920. 'Buchna' (Hindi).

Diffusely branched, creeping herbs, rooting on the nodes, with bulbil-like cleistogamous flowers. Leaves unequal, ovate or oblong, 2-8 x 1.2-4.0 cm, obtuse; sheaths pubescent, bearded at the mouth. Subterranean cleistogamous flowers bisexual, white, with 1 to 2-celled, 1 to 2-seeded capsules. Aerial spathes 1-3 in a axil, obconic, funnel-shaped or turbinate, hairy outside. Sepals unequal. Dorsal petal long-clawed, lateral ones subsessile. Capsules 3-gonous, oblong, 3-valved.

Fl. & Fr. : June-November.

Common weed in cultivated fields, gardens and wastelands; Paloda, Asargarh (*Kanodia* 75620, BSA), Banswara (*Kanodia* 75170, 75620, BSI).

2. **C. erecta** L. Sp. Pl. 41. 1753. *C. undulata* R. Br. Prodr. 270. 1810; Hook. f. Fl. Brit. India 6: 373. 1892; Rolla Rao in Notes Roy. Bot. Gard. Edinb. 26 : 352. 1966; Raizada, Suppl. Duthie, Fl. Gangetic Plain 282. 1976. *C. kurzii* Clarke in Journ. Linn. Soc. Bot. 11 : 444. 1871; Hook. f. l.c. 6: 373. 1892; Mahesh. Illus. Fl. Delhi f. 202. 1966.

Erect or straggling herbs, 60-90 cm high, often rooting on the lower

nodes. Leaves lanceolate, 6-20 x 1.5-4.0 cm, acuminate; sheaths 1.2-2.5 cm long, sparsely villous, strongly-nerved, with bearded mouth. Spathes sessile, cucullate or cordate and complicate. Posterior sepal broadly boat-shaped; two anterior sepals ovate concave, fused for half to two-third of their length. Capsules 2-valved; posterior cell indehiscent, deciduous. Seeds lead-coloured, adnate to the cell.

Fl. & Fr. : August-October.

Common in shady habitats in wastelands and forests; Anand Sagar forest (*Kanodia* 75302, BSA).

3. *C. forskalaei* Vahl, Enum. 2: 172. 1806; Hook. f. Fl. Brit. India 6: 371. 1892; Mahesh. Illus. Fl. Delhi f. 204. 1966; Raizada, Suppl. Duthie, Fl. Gangetic Plain 281. 1976. 'Vokalu' (Hindi).

Diffusely branched, creeping herbs. Leaves linear-oblong, acute, 3.0-6.5 x 0.8-1.5 cm, undulate-margined; sheaths 0.8-1.2 cm long, hairy, with bearded mouth. Aerial spathes irregularly funnel-shaped, 1.0-1.5 cm long, with 3 pairs of nerves, axillary, hairy outside, 2 to 5-flowered. Cleistogamous flowers solitary in a spathe, 2-sexual, reduced. Two anterior cells of the capsules bear abortive seeds and posterior one bears a large, brown seed.

Fl. & Fr. : August-October.

Common weed in crop-fields; Chiriyavasa, Lasara, Banswara (*Kanodia* 75314, BSI).

4. *C. hasskarlii* Cl. Comm. & Cyrt. Beng. 13. t. 5. 1874; Hook. f. Fl. Brit. India 6: 370. 1892; Duthie, Fl. Gangetic Plain 3: 273. 1920.

Much branched herbs, rooting at the lower nodes. Leaves lanceolate, acute, 3-8 x 0.8-1.5 cm; sheaths with ciliate mouth. Flowers in pubescent cymes, the lower branches 1 to 2-flowered, the upper ones 2 to 4-flowered. Spathes cordate at the base, 1.0-3.5 cm long, axillary. Capsules quadrate, glabrous. Seeds without appendages. Cleistogamous flowers absent.

Fl. & Fr. : August-November.

Common in wet and shady habitats in the forests; Kotharia forest, Chuli River (*Kanodia* 75680, BSA).

3. CYANOTIS D. Don *nom. cons.*

- 1a. Glabrous or slightly hairy herbs. Filaments bearded with hairs of one colour. *C. cristata* 1
- 1b. Floccosely silky or cobwebby woolly herbs. Filaments bearded with bicoloured hairs. *C. fasciculata* 2

1. *Cyanotis cristata* (L.) D. Don, Prodr. Fl. Nep. 46. 1825; Wight, Icon. 6: 32. t. 2082. 1853; Hook. f. Fl. Brit. India 6: 385. 1892; Duthie, Fl. Gangetic Plain 3: 279. 1920, *Commelinia cristata* L. Sp. Pl. 42. 1753.

Annual, glabrous herbs, often rooting from the lower nodes. Leaves ovate-oblong, 3.5-6.0 x 0.6-1.5 cm, acute with sheathing base. Flowers blue, in scorpioidly recurved cymes in the axils of lanceolate, 1.5-3.0 cm long, folded, boat-shaped spathes. Capsules oblong, 3-gonous, hairy at the top. Seeds 2 in each cell, with 2 pits on the faces, glabrous, not reticulate.

Fl. & Fr.: August-October ; March-April.

Common in wet habitats; Danpur, Bhookri Ghat (*Kanodia* 75532, 75388, BSI).

2. *C. fasciculata* (Heyne ex Roth) Schult. f. in Roem. & Schult. Syst. 7(2) : 1152. 1830; Wight, Icon. 6: 32. t. 2086. 1853; Hook. f. Fl. Brit. India 6 : 387. 1892. *Tradescantia fasciculata* Heyne ex Roth, Nov. Pl. Sp. 189. 1821.

Erect herbs upto 20 cm high. Leaves linear-lanceolate or oblong-lanceolate, 3-6 x 0.3-0.8 cm, acute or acuminate. Flowers pink, in axillary and terminal cymes. Bracts lanceolate, recurved, longer than cymes. Sepals villous. Filaments spirally twisted, bearded with blue and white, moniliform hairs. Capsules oblong, 3-gonous, pilose at the apex. Seeds oblong, rugose.

Fl. & Fr. : August-October.

Common in wet and shady habitats from plains to the hills; Ghatol (*Kanodia* 75505, BSI).

4. MURDANNIA Royle *nom. cons.*

Murdannia nudiflora (L.) Brenan in Kew Bull. 7: 189. 1952; Raizada in Ind. For. 94(6): 447. 1968. *Commelina nudiflora* L. Sp. Pl. 41. 1753, *pro parte*. *Aneilema nudiflorum* (L.) R. Br. Prodr. 271. 1810; Hook. f. Fl. Brit. India 6: 378. 1892; Duthie, Fl. Gangetic Plain 3: 277. 1920.

Erect or ascending herbs, rooting on the nodes. Leaves sessile, linear-lanceolate, 2.5-12.0 x 0.5-1.3 cm, acute; sheaths strongly ciliate on the margins. Flowers blue or purple, in terminal, axillary or leaf opposed panicles. Filaments bearded. Capsules subglobose, 3-celled, with 2 seeds in each cell. Seeds 3-gonous, pitted.

Fl. & Fr. : August-October.

Common weed in the cultivated fields; occassionally found in wastelands and forests in wet and shady habitats; Shergarh, Banswara (*Majumdar* 75167, 75496, BSI).

97. ARECACEAE (PALMAE *nom. alt.*)

PHOENIX L.

Phoenix sylvestris (L.) Roxb. Fl. Ind. 3: 787. 1832; Beccari & Hook. f.

in Fl. Brit. India 6: 425. 1892; Duthie, Fl. Gangetic Plain 3: 286. 1929; Mahabale & Parthasarthy in Journ. Bomb. nat. Hist. Soc. 60(2): 374. 1963. *Elate sylvestris* L. Sp. Pl. 1189. 1753, *pro parte*. 'Khajoor' (Hindi).

Unbranched, monoecious, graceful palms. Trunk upto 10 m high, clothed with persistent bases of petioles and bears a crown of leaves at the top. Leaves pinnate; leaflets rigid, folded, spine-tipped. Spathes 20-40 cm long, woody, 2-valved. Spadix upto 1 m long. Drupes oblong-ellipsoid, 2-3 x 0.5-1.0 cm, orange-yellow, with sweet pulp. Seeds oblong, grooved ventrally, hard.

Fl. & Fr. : March-October.

Common in wastelands, particularly in low-lying areas; Danpur.

98. TYPHACEAE

TYPHA L.

Typha angustata Bory & Chaub. Exp. Sci. Mor. Bot. 3: 338. 1833; Hook. f. Fl. Brit. India 6 : 489. 1893; Duthie, Fl. Gangetic Plain 3 : 293. 1929; Mahesh. Illus. Fl. Delhi f. 206. 1966. *T. angustifolia* Sibth. & Sm. Fl. Graec. Prodr. 2 : 226. 1813, non L. 1753. *T. elephantina* Grah. Cat. 227. 1839, non Roxb. 1832. 'Patar, Pata' (Hindi).

Perennial, marshy herbs, 1.5-2.5 m high, with creeping rhizomes. Leaves 2-seriate, alternate, spongy, 1.0-1.5 m x 0.5-2.0 cm, flat, with sheathing base, not 3-gonous. Spikes cylindric, 15-25 cm long; male flowers above, separated from females by a short internode. Bracteoles spathulate. Perianth of many, capillary hairs. Pollens simple. Ovary stalked ; stigma linear.

Fl. & Fr. : August-May.

Common in ponds, low-lying areas and river-beds. It forms pure stands or grows in association with *Caesulia axillaris* Roxb., *Hygrophila auriculata* (Schumach.) Heine, species of *Cyperus* L. etc.; Ghatol, Banswara, Parsole ((Kanodia 75604, BSI).

99. ARACEAE

- 1a. Free floating, aquatic herbs.
1b. Terrestrial herbs.

Pistia 1
Plesmonium 2

1. PISTIA L.

Pistia stratiotes L. Sp. Pl. 963. 1753; Hook. f. Fl. Brit. India 6 : 497. 1893; Duthie, Fl. Gangetic Plain 3: 297. 1929; Subram. Aquatic Ang. 75, f. 49. 1962. 'Jaikumbhi' (Hindi).

Stemless, stoloniferous herbs. Root-fibres clothed with fibrillae. Leaves

obovate-cuneate, 3-6 cm in diam., pubescent, undulate, in close spirals forming cups, with flabellate venation. Spathes campanulate, 1.2-1.5 cm long, pale yellow or white, sessile. Spadix about 1 cm long, with a single pistil adnate to the spathe and few stamens gathered into a synandrium. Fruits ovoid, membranous. Seeds obovate or oblong.

Fl. & Fr. : April-November.

Rare, in still water in ponds and tanks, forming pure stands or in association with other aquatic weeds; Ghatol, Parla-ka-pul (*Majumdar* 10315, BSA), Looda tank (*Kanodia* 51143, BSI).

2. PLESMONIUM Schott

Plesmonium margaritiferum (Roxb.) Schott, *Syn. Aroid.* 1: 34. 1856; Hook. f. *Fl. Brit. India* 6: 518. 1893; Duthie, *Fl. Gangetic Plain* 3: 301. 1929. *Arum margaritiferum* Roxb. *Fl. Ind.* 3: 512. 1832; Wight, *Icon.* 3(1): 6. t. 795. 1844. 'Jamikand' (Hindi).

Tubers white, 10-15 cm in diam., bulbilliferous. Leaves 3 to 5-partite, 15-30 cm in diam.; segments pinnatisect. Spathes 15-18 x 8-11 cm, erect, ovate, obtuse, concave. Spadix stout, stipitate, obtuse, without an apical, barren appendage. Sterile flowers white, between male and female flowers. Ovaries 2 to 3-celled, with one ovule in each cell. Fruits subglobose, about 8 mm long.

Fl. & Fr. : May-August.

Rare, in forests on the hills in shady habitats ; Bagayacha forest.

Amorphophallus campanulatus (Roxb.) Bl. ex Decne. (*Arum campanulatum* Roxb.)—Perennial herbs, with depressed-globose tubers. Neuter flowers separating male and female flowers absent. Cultivated for its edible tubers. 'Jamikand' (Hindi).

100. ALISMATACEAE

SAGITTARIA L.

Sagittaria sagittifolia L. *Sp. Pl.* 993. 1753; Hook. f. *Fl. Brit. India* 6: 561. 1893; Duthie, *Fl. Gangetic Plain* 3: 310. 1929; Subram. *Aquatic Ang.* 86. 1962.

Spacigerous, monoecious, aquatic herbs. Leaves hastate or sagittate, 5-20 cm long, acute or acuminate. Flowers white with purple base, in branching racemes or spiked clusters; lower flowers female, sessile, with staminodes; upper flowers male, long pedicelled, with about 24 stamens; hermaphrodite flowers rare. Sepals spreading. Anthers brown. Achenes obliquely ovate, flat, with entire or crenate dorsal wings.

Fl. & Fr. : September-November.

Rare, in the rice-fields, ponds and on the banks of tanks. Flowers usually open at noon; Lamero tank, Chandan Singh-ki-Bassi.

101. POTAMOGETONACEAE

POTAMOGETON L.

- | | |
|---|------------------------|
| 1a. Leaves petiolate, atleast the upper ones floating. | <i>P. nodosus</i> 2 |
| 1b. Leaves sessile, all submerged : | |
| 2a. Leaves filiform, grass-like, not crisped. Spikes interrupted. | <i>P. pectinatus</i> 3 |
| 2b. Leaves linear-oblong, crisped. Spikes lax, not interrupted. | <i>P. crispus</i> 1 |

1. **Potamogeton crispus** L. Sp. Pl. 126. 1753; Hook. f. Fl. Brit. India 6: 566. 1893; Duthie, Fl. Gangetic Plain 3 : 315. 1929; Dandy in Journ. Linn. Soc. 50: 537. 1937; Mahesh. Illus. Fl. Delhi f. 210. 1966.

Slender, attached submerged herbs, with creeping root-stock. Leaves translucent. Peduncles 4-10 cm long, axillary. Spikes 1-2 cm long. Flowers greenish-yellow, bisexual. Tepals suborbicular, clawed. Druplets 4, obliquely obovoid, long-beaked.

Fl. & Fr. : January-June.

Common in fresh water ponds, tanks and rivers; Banswara (*Verma* 226, BSA; *Kanodia* 51131, BSI).

2. **P. nodosus** Poir. in Lam. Encycl. Meth. Bot. Suppl. 4 : 535. 1816; Dandy in Journ. Linn. Soc. 50: 531. 1937; Subram. Aquatic Ang. 95. 1962. *P. indicus* Roxb. Fl. Ind. 1: 471. 1820, non Roth ex Roem. & Schult. 1818; Hook. f. Fl. Brit. India 6: 565. 1893; Duthie, Fl. Gangetic Plain 3: 314. 1929.

Aquatic herbs. Floating leaves elliptic-lanceolate or oblong, 4.5-12.0 x 3.0-4.5 cm, entire; submerged ones elliptic-lanceolate, narrow and smaller, undulate. Flowers greenish-yellow, in dense, 2.5-6.5 cm long, axillary or leaf-opposed, pedunculate spikes. Tepals clawed, suborbicular. Druplets 4, shortly beaked, obovoid, 3-ribbed on the back.

Fl. : January-March; *Fr.* : April-May.

Rare, in the fresh water tanks in association with *Hydrilla verticillata* (L. f.) Royle, *Vallisneria spiralis* L. etc.; Talwara tank.

3. **P. pectinatus** L. Sp. Pl. 127. 1753; Hook. f. Fl. Brit. India 6 : 567. 1893; Duthie, Fl. Gangetic Plain 3 : 315. 1929; Dandy in Journ. Linn. Soc. 50 : 513. 1937; Subram. Aquatic Ang. 95. f. 55(1-3). 1962.

Filiform, grass-like, dichotomously branched, submerged herbs. Leaves with sheathing base, 3-nerved. Stipules adnate to the leaf-sheaths, with free tips. Spikes 0.6-3.5 cm long. Druplets 4, obliquely ovate, beaked.

Fl. : January-April; *Fr.* : April-June.

Common in fresh water pools, tanks and rivers. It resembles closely *Zannichellia palustris* L., but can be distinguished by the presence of

spikes; Talwara tank, Banswara (*Verma* 224, BSA), Looda (*Majumdar* 10273, BSA).

102. ZANNICHELLIACEAE

ZANNICHELLIA L.

Zannichellia palustris L. Sp. Pl. 969. 1753; Hook. f. Fl. Brit. India 6 : 568. 1893; Duthie, Fl. Gangetic Plain 3 : 316. 1929; Subram. Aquatic Ang. 97. f. 56 (7-9). 1962.

Submerged herbs, with corymbosely branched, leafy stem. Leaves opposite or pseudoverticillate, linear, grass-like. Male and female flowers enclosed in the same spathe. Male flowers solitary, naked. Stamen 1. Perianth of female flowers cupular. Stigma peltate. Druplets sessile, long-beaked. Seeds oblong.

Fl. : January-April; Fr. : April-June.

Abundant in stagnant water in the ponds and tanks in association with other suspended submerged aquatic weeds; Shergarh.

103. NAJADACEAE

NAJAS L.

Najas minor All. Auct. Syn. Meth. Stirp. Hort. Taurin. 3. 1773 & Fl. Pedem. 2 : 221. 1785; Hook. f. Fl. Brit. India 6 : 569. 1893, *pro parte*; Duthie, Fl. Gangetic Plain 3 : 317. 1929; Subram. Aquatic Ang. 100. 1962. *Fluvialis minor* (All.) Pers. Syn. 2 : 530. 1807.

Submerged, fragile, dichotomously branched herbs. Leaves linear, 12-25 x 0.4-0.5 mm, with 6-12, broad-based up-curved spinules on the margins. Spathes necked, ellipsoid, enclosing male flowers only. Anthers 1-celled. Fruits ellipsoid, 2-3 mm long. Seeds with 12-18 longitudinal rows of ladder-like pits.

Fl. & Fr. : September-December.

Rare, in shallow, still watered ponds in association with *Hydrilla verticillata* (L. f.) Royle and *Vallisneria spiralis* L.; Lasara tank.

104. ERIOCAULACEAE

ERIOCAULON L.

1a. Petals in female flowers eglandular :

2a. Receptacle, invol.-bracts and floral-bracts glabrous.

E. cinereum var.

sieboldianum 1

2b. Receptacle and floral bracts pilose. Invol.-bracts glabrous.

E. dianae var.

richardiana 2

1b. Petals in female flowers with an apical gland :

3a. Leaves green. Petals in male flowers unequal, one longer than floral bracts.

E. polycephalum 3

3b. Leaves red or pink. Petals in male flowers equal, all shorter than floral bracts.

E. quinquangulare 4

1. ***Eriocaulon cinereum*** R. Br. var. ***sieboldianum*** (Sieb. & Zucc. ex Steud.)

T. Koyama ex Huang, Pollen Fl. Taiwan 260. 1972. *E. sieboldianum* Sieb. & Zucc. ex Steud. Syn. Pl. Glum. 2 : 272. 1885; Hook. f. Fl. Brit. India 6 : 577. 1893; Fyson in Journ. Ind. Bot. 3 : 15. t. 50, 51. 1922; Duthie, Fl. Gangetic Plain 3 : 318. 1929.

Tufted herbs, upto 20 cm high. Leaves in rosette, linear-subulate, glabrous, acute, faintly nerved. Scapes many, exceeding the leaves. Heads globose or ovoid, whitish, unisexual. Bracts linear-oblong or oblanceolate, hyaline. Calyx-lobes connate at the base in males, otherwise free, 3-toothed in males, 2-toothed in females. Corolla tubular; lobes narrow in males, absent or rudimentary in females. Styles 3-fid. Seeds ellipsoid-ovoid.

Fl. & Fr. : September-November.

Rare, in moist habitats or often in marshy localities; Looda (*Majumdar* 10271 A, BSA).

2. ***E. dianae*** Fyson var. ***richardiana*** Fyson in Journ. Ind. Bot. 2 : 260. t. 14. 1921; Gamble, Fl. Pres. Madras 1920. 1931.

Erect herbs, upto 25 cm high. Leaves ligulate, narrowed to an obtuse apex, many-nerved, 5-30 cm long. Peduncles many, about 8-ribbed. Invol-bracts of heads lanceolate or ovate, acute. Floral bracts cuneate or oblong-obovate, cuspidate, dark green with white apex. Sepals 3 in female flowers, one sepal much narrow. Calyx of male flowers spathaceous and corolla ciliate, with an apical gland.

Fl. & Fr. : January-May.

Rare, in marshy habitats; Looda (*Majumdar* 10271, (BSA)).

3. ***E. polycephalum*** Hook. f. Fl. Brit. India 6 : 573. 1893; Moldenke in Phytologia 19 : 351. 1970. *E. longicuspis* Hook. f. var. ***polycephalum*** (Hook. f.) Fyson in Journ. Ind. Bot. 2 : 309. 1921.

Stemless herbs, more than 25 cm high. Leaves linear-ensiform, upto 20 x 0.8 cm. Peduncles 1-many, upto 50 cm long, glabrous or pubescent. Heads 8 mm in diam.; receptacles villous. Invol-bracts obovate, sparsely hairy. Floral-bracts obovate, caudate. Sepals 3, ciliate at the apex. Petals ciliate.

Fl. & Fr. : October-March.

Rare, in marshy habitats; Banswara (*Majumdar* 10271 B, BSA).

4. ***E. quinquangulare*** L. Sp. Pl. 87. 1753; Hook. f. Fl. Brit. India 6 : 582. 1893; Duthie, Fl. Gangetic Plain 3 : 319. 1929; Gandhi in Sald. & Nicol. Fl. Hassan District 654. f. 109 A. 1976.

Stemless, annual herbs. Leaves radical, linear-lanceolate, 3-10 x 0.3-0.6

cm, often red-tinged. Scapes many, exceeding the leaves. Heads tomentose, globose-ovoid, 3.0-4.5 mm in diam., grey or snow-white, subtended by linear or oblong, glabrous invol.-bracts. Floral bracts white-hairy on the back. Two sepals of male flowers connate into a spathe. Receptacles villous. Seeds subglobose, smooth.

Fl. & Fr. : October-February.

Common in wet and marshy habitats; Puna Pather forest.

105. CYPERACEAE

- 1a. Flowering glumes all distichous. *Cyperus* 2
- 1b. Flowering glumes all or at least the upper ones imbricate or spirally arranged :
 - 2a. Style dilated at the base, constricted or articulated above the nut :
 - 3a. Leaf-blade absent. Hypogynous bristles present. *Eleocharis* 3
 - 3b. Leaf-blade present. Hypogynous bristles absent :
 - 4a. Style linear, not compressed, glabrous, leaving a button on the nut. *Bulbostylis* 1
 - 4b. Style flat, hairy, not leaving a button on the nut. *Fimbristylis* 4
 - 2b. Styles not dilated at the base, neither constricted nor articulated above the nut. *Scirpus* 5

1. BULBOSTYLIS Kunth *nom. cons.*

Bulbostylis barbata (Rottb.) Clarke in Hook. f. Fl. Brit. India 6 : 651. 1893; Duthie, Fl. Gangetic Plain 3 : 358. 1929; Kern in Rainwardtia 6 : 51. 1961; Kral in Sida 4(2) : 84. 1971. *Scirpus barbatus* Rottb. Descr. Pl. Rar. Progr. 27. 1772 & Descr. Icon. 52. t. 17. f. 4. 1773. *Stenophyllus barbata* (Rottb.) Cooke, Fl. Pres. Bomb. 2 : 887. 1908. *Fimbristylis barbata* (Rottb.) Benth. Fl. Aust. 7 : 321. 1878.

Tufted annuals, 5-25 cm high. Leaves filiform; sheaths with ciliate throat. Spikelets linear, many-angled, 2-5 mm long, chestnut brown, crowded in small terminal clusters. Bracts 2-3, unequal, filiform. Glumes boat-shaped, green-keeled, mucronate. Nuts obovate or pyriform, 3-gonous, white, transversely striated, with a button-like tumor at the apex.

Fl. & Fr. : August-November.

Common in wet localities in wastelands; Paloda.

2. CYPERUS L.

C. globosus All. and *C. triceps* (Rottb.) Endl. are sometimes segregated to the genera *Pycreus* P. Beauv. and *Kyllinga* Rottb. respectively.

- 1a. Style undivided at the apex. Stigma 1, entire.

C. meeboldii 10

- 1b.** Style divided at the apex. Stigmas as many as style-arms :
- 2a. Stigmas 3. Nuts 3-gonous :
- 3a. Inflorescence a sessile cluster of few digitate spikelets at the apex of culm.
- 3b. Inflorescence umbelliform :
- 4a. Spikelets digitately clustered at the end of rays :
- 5a. Mature spikelets black or red-brown, very numerous (more than 25) in each cluster. Nuts smooth, sessile.
- 5b. Mature spikelets pale-green, few (upto 20) in each cluster. Nuts reticulate or warty, stipitate.
- 4b. Spikelets spicately, racemosely or corymbosely arranged towards the end of rays :
- 6a. Annuals, without rhizomes, stolons or suckers :
- 7a. Glumes distinctly aristate. Rachilla scarcely winged or margined :
- 8a. Spikelets spicately arranged. Arista of glumes recurved.
- 8b. Spikelets corymbosely or sub-digitately arranged. Arista of glumes straight, stout.
- 7b. Glumes obtuse, with or without a small macro, never aristate. Rachilla not margined or winged.
- 6b. Perennials, with subterranean rhizomes :
- 9a. Rhizomes horizontal, stoloniferous :
- 10a. Stolons bear tubers. Rachilla distinctly winged :
- 11a. Stem nodosely thickened at the base. Bracts 3. Glumes apiculate.
- 11b. Stem not nodosely thickened at the base. Bracts 3-6. Glumes obtuse.
- 10b. Stolons without tubers. Rachilla slightly margin-ed.
- 9b. Rhizomes short, with erect suckers, not stoloniferous.
- 2b. Stigmas 2. Nuts compressed :
- 12a. Nuts dorsally compressed :
- 13a. Spikelets in elongate spikes borne towards the end of rays of simple or compound umbels.
- 13b. Spikelets in sessile clusters or condensed in globose, sessile spikes :
- 14a. Bracts absent or not much longer than spikelets. Spikelets digitately arranged in lateral, sessile clusters. Stamens 3.
- 14b. Bracts leafy, much longer than spikelets. Spikelets spicately arranged in terminal, globose spikes. Stamens 1 or 2.
- 12b. Nuts laterally compressed :
- 15a. Spikes 3, sessile, clustered at the end of culm. Spikelets 1-flowered. Rachilla deciduous.
- 15b. Spikes more than 3, spicately arrnged towards the end of rays of umbels. Spikelets more than 2-flowered. Rachilla persistent.
- C. niveus* 11
- C. difformis* 4
- C. tenuispica* 15
- C. cuspidatus* 3
- C. compressus* 2
- C. iria* 8
- C. rotundus* 14
- C. esculentus* 6
- C. pangorei* 12
- C. eleusinoides* 5
- C. alopecuroides* 1
- C. laevigatus* 9
- C. pygmaeus* 13
- C. triceps* 16
- C. flavidus* 7

1. **Cyperus alopecuroides** Rottb. Descr. Pl. Rar. Progr. 20. 1772 & Descr. Icon. 38. t. 8. 2. 1773; Kuekenth. in Engl. Pfreich. 101 : 71. 1935; Kern in Reinwardtia 2(1) : 101. 1952; Mahesh. Illus. Fl. Delhi f. 212. 1966; Koyama in Gard. Bull. Sing. 30 : 146. 1977. *Juncellus alopecuroides* (Rottb.) Clarke in Hook. f. Fl. Brit. India 6 : 595. 1893; Duthie, Fl. Gangetic Plain 3 : 340. 1929.

Perennial sedges, upto 1.5 m high. Leaves not exceeding the stem, leathery, upto 1.5 cm wide. Spikelets elliptic-lanceolate, 5-10 mm long, compressed, in pedunculate or sessile, 2-5 cm long spikes. Bracts more than 3, leafy. Glumes ovate-oblong, apiculate, keeled. Nuts obovate, 1 mm long, pale-brown.

Fl. & Fr. : August-November.

Common in the aquatic and marshy habitats, often associated with *Typha angustata* Bory & Chaub.; Ghatol, Banswara, Jolana (*Kanodia* 51176, BSI).

2. **C. compressus** L. Sp. Pl. 46. 1753; Clarke in Hook. f. Fl. Brit. India 6 : 605. 1893; Duthie, Fl. Gangetic Plain 3 : 326. 1929; Kuekenth. in Engl. Pfreich. 101 : 156. 1935; Kern in Reinwardtia 6 : 56. 1961; Mahesh. Illus. Fl. Delhi f. 217. 1966.

Erect, annual sedges, 5-50 cm high. Leaves as long or longer than stem. Spikelets oblong, 1.0-3.5 x 0.2-0.4 cm, laterally compressed, straw-coloured, in compound umbels; some rays sessile, others 1.5-6.0 cm long. Bracts 4-6, unequal. Glumes ovate, acute, 2.8-4.0 mm long, many-nerved, lowest 2 empty. Nuts obovoid-ellipsoid, about 1.5 mm long, dark brown.

Fl. & Fr. : August-January.

Common in ponds, rice-fields, river-beds and low-lying areas ; Paloda.

3. **C. cuspidatus** Kunth in H.B. K. Nov. Gen. Sp. 1 : 204. 1816 ; Clarke in Hook. f. Fl. Brit. India 6 : 598. 1893 ; Kuekenth. in Engl. Pfreich. 101 : 261. 1936. *C. uncinatus* auct. plur. non Poir. 1806 ; Duthie, Fl. Gangetic Plain 3 : 325. 1929.

Annuals, 5-20 cm high. Leaves linear, not exceeding the stem. Spikelets 5-20 in a oblong spike with 8 to 20 florets. Glumes ovate, chestnut brown, hyaline margined, acutely keeled, 9 to 13-nerved. Stamens 3 ; anthers oblong. Nuts obovoid.

Fl. & Fr. : August-October.

Common in sandy soils in low-lying areas, river-beds, ponds etc. ; Paloda.

4. **C. difformis** L. Cent. Pl. 2 : 6. 1756 ; Clarke in Hook. f. Fl. Brit. India 6 : 599. 1893 ; Duthie, Fl. Gangetic Plain 3 : 325. 1929 ; Kuekenth. in Engl. Pfreich. 101 : 237. f. 27 F-H. 1936 ; Kern in Reinwardtia 6 : 58. 1961 ; Koyama in Gard. Bull. Sing. 30 : 143. 1977.

Erect, tufted annuals, upto 50 cm high. Stem 3-quetrous. Leaves shorter than stem, flaccid. Spikelets linear-oblong, 3-5 mm long, clustered in sessile

and rayed umbellate heads. Bracts 2-3, unequal, upto 30 cm long. Glumes obovate, about 1.5 mm long, imbricate, obtuse. Rachilla not winged. Nuts obovoid-ellipsoid, about 1 mm long, pale-coloured.

Fl. & Fr. : Most part of the year.

Common in aquatic and marshy habitats ; Bagaycha forest, Lasara, Parla-ka-pul (*Majumdar* 10310, BSA), Banswara (*Kanodia* 51071, BSI).

5. *C. eleusinoides* Kunth, Enum. Pl. 2 : 39. 1837 ; Clarke in Hook. f. Fl. Brit. India 6 : 608. 1893 ; Duthie, Fl. Gangetic Plain 3 : 330. 1929 ; Kuekenth. in Engl. Pfrisch. 101 : 144. 1935 ; Kern in Reinwardtia 2(1) : 111. 1952. *C. nutans* Vahl var. *eleusinoides* (Kunth) Haines, Bot. Bih. Or. 5 : 898. 1924. *C. nutans* Vahl subsp. *eleusinoides* (Kunth) Koyama in Gard. Bull. Sing. 30 : 136. 1977. 'Motha' (Hindi).

Erect perennials, with stoloniferous rhizomes and 3-quetrous stem. Leaves as long or longer than stem, scabrid on the margins. Spikelets pale-brown, linear, about 1 cm long, arranged spicately in umbels. Glumes elliptic, mucronate, two lower ones empty. Nuts ellipsoid, brown, embraced on either side by the wings of rachilla.

Fl. & Fr. : September-February.

Common in marshy habitats ; Banswara (*Kanodia* 51177, BSI).

6. *C. esculentus* L. Sp. Pl. 45. 1753 ; Clarke in Hook. f. Fl. Brit. India 6: 616. 1893 ; Duthie, Fl. Gangetic Plain 3 : 333. 1929 ; Blatter & McC. in Journ. Bomb. nat. Hist. Soc. 37 : 274. 1934 'Kasheru Chinchonda' (Hindi).

Perennials, with slender, subterranean stolons ending in ovoid to cylindrical tubers. Leaves shorter than stem. Spikelets linear, yellowish-brown, in umbels of spikes. Stamens 3. Nuts obovoid-ellipsoid.

Fl. & Fr. : August-November.

Rare, in the tanks. The tubers are cooked as vegetable by poor people ; Talwara tank.

7. *C. flavidus* Retz. Obs. Bot. 5 : 13. 1789. *C. globosus* All. Auct. Fl. Pedem. 49. 1789, non Forsk. 1775. *C. capillaris* Koen. ex Roxb. Fl. Ind. 1 : 198. 1820. *Pycrus globosus* (All.) Reich. Fl. Germ. Excurs. 2 : 140. 1830 ; Duthie, Fl. Gangetic Plain 3 : 337. 1929. *P. capillaris* (Koen. ex Roxb.) Nees in Linnaea 9 : 283. 1834 ; Clarke in Hook. f. Fl. Brit. India 6 : 591. 1893. *Cyperus nilagiricus* Hochst. ex Steud. Syn. Pl. Gium. 2 : 2. 1855. *C. globosus* All. var. *nilagiricus* (Hochst. ex Steud.) Clarke in Journ. Linn. Soc. 21 : 49. 1884 ; Clarke in Hook. f. l.c. 6 : 592. 1893.

Erect, tufted annuals. Stem enveloped in leaf-sheaths a little way above the base. Leaves as long or longer than stem, gland-punctate. Umbels simple. Spikelets 20 to 50-flowered. Rachilla not winged. Bracts longer than the umbels. Glumes ovate-oblong, with a 3-nerved keel, obtuse. Stamens 2. Nuts obovoid, chestnut brown, papillose, with a prominent rib on lateral faces.

Fl. & Fr. : September-November.

Common in wet and marshy habitats on the banks of rivers and tanks ; Kushalgarh.

8. *C. iria* L. Sp. Pl. 45. 1753 ; Clarke in Hook. f. Fl. Brit. India 6 : 606. 1893 ; Clarke, Illus. Cyper. t. 14. f. 2. 1909 ; Duthie, Fl. Gangetic Plain 3 : 329. 1929 ; Kuekenth. in Engl. Pfreich. 101 : 150. 1935, excl. var. *rectangularis* ; Koyama in Gard. Bull. Sing. 30 : 139. 1977.

Erect, tufted annuals, upto 80 cm high, with 3-quetrous stem. Leaves with papery sheaths and blades scabrid towards apex. Spikelets compressed, erectopatent, golden-yellow. Glumes obovate, 3 to 5-nerved, keeled, spreading. Stamen one. Styles inconspicuous. Nuts obovate-elliptic, exceeding the glumes when mature, with concave smooth sides, brown.

Fl. & Fr. : August-October.

Common in marshy habitats, particularly in low-lying areas and rice-fields ; Ghatol, Lamero tank.

Notes : My specimen No. 2903 (locality-Ghatol) slightly resembles *C. alulatus* Kern due to minutely scabrid rachis on the angles. Since, enough material is not in hands, it is not possible to include latter in the present work.

9. *C. laevigatus* L. Mant. Alt. 179. 1771 ; Kuekenth. in Engl. Pfreich. 101 : 321. 1936 ; Korlaballi in Bull. Bot. Surv. Ind. 9 : 238. 1968. *Juncellus laevigatus* (L.) Clarke in Hook. f. Fl. Brit. India 6 : 596. 1893 ; Duthie, Fl. Gangetic Plain 3 : 341. 1929.

Erect or decumbent annuals, 20-60 cm high, with creeping rhizomes covered with brown scales. Leaf-blade undeveloped ; sheaths papery, brown. Spikelets white, ovate-oblong, like the floats of *Utricularia*, upto 8 mm long, 1-30 in a cluster. Glumes ovate, obtuse or acute, membranous. Nuts ellipsoid, brown, smooth.

Fl. & Fr. : August-November.

Common in ponds along the road, river-beds and other low-lying areas ; Ghatol, Kushalgarh, Parla-ka-Pul (*Majumdar* 10303, BSA).

10. *C. meeboldii* Kuk. in Fedde, Rep. 18 : 345. 1922 ; Cherm. in Arch. Bot. Caen 7, Mem. 4 : 11. 1936 ; Raynal in Adansonia 6(2) : 304. 1966 ; Hooper in Hutchin. & Dalz. Fl. West Trop. Afr. 3(2) : 293. 1972.

Erect sedges, upto 25 cm high, with a small pseudo-bulbous base. Leaves filiform, shorter than stem. Spikelets elliptic, 4-7 x 1.5-2.5 mm, condensed in solitary, terminal heads about 1 cm in diam. and subtended by 2-3, unequal, filiform bracts. Glumes boat-shaped, mucronate, 3-nerved, 1.5 mm long. Anther one. Style slender, without stigmatic lobes. Achenes 3-gonous, turbinate, about 0.5 mm long.

Fl. & Fr. : August-November.

Common in wet habitats in wastelands ; Kushalgarh.

Notes : *C. meeboldii* Kuk., a native of Africa, has so far been reported from Badami in Mysore (see Fedde Report 18 : 345. 1922) in India. This is

the only terrestrial species bearing undivided style in India.

11. *C. niveus* Retz. Obs. Bot. fasc. 5 : 12. 1789 ; Clarke in Hook. f. Fl. Brit. India 6 : 601. 1893 ; Clarke, Illus. Cyper. t. 7. f. 4-7. 1909 ; Duthie, Fl. Gangetic Plain 3 : 327. 1929 ; Kuekenth. in Engl. Pfreich. 101 : 288. 1936 ; Kern in Reinwardtia 6 : 60. 1961.

Erect, tufted perennials, 15-30 cm high, with woody, horizontal rhizomes. Leaves shorter than stem, linear. Spikelets white, oblong-elliptic, 1.2 x 0.5-0.6 cm, sessile, 4-12 clustered together at the apex of stem and supported by linear, unequal, filiform bracts. Glumes white, ovate-lanceolate, boat-shaped, 3-5 mm long, obtuse, closely imbricate, many-nerved. Nuts black or brown, ovoid-ellipsoid, 1.5-2.0 mm long, 3-gonous, smooth.

Fl. & Fr. : August-November.

Rather common in open wastelands than marshy habitats ; Paloda.

12. *C. pangorei* Rottb. Descr. Pl. Rar. Progr. 18. 1772 & Descr. Icon. 31. t. 7. f. 3. 1773 ; Kuekenth. in Engl. Pfreich. 101 : 76. 1935 ; Koyama in Gard. Bull. Sing. 30 : 131. f. 2. 1977. *C. tegetum* Roxb. Fl. Ind. 1 : 208. 1832 ; Clarke in Hook. f. Fl. Brit. India 6 : 613. 1893 ; Clarke, Illus. Cyper. t. 17. f. 1. 1909 ; Duthie, Fl. Gangetic Plain 3 : 334. 1929.

Robust perennials, about 1 m high. Leaves as long or longer than stem, scabrid on the margins. Spikelets 1-2 x 0.1-0.2 cm, arranged spicately in compound umbels. Primary bracts 3, longer than umbels. Glumes oblong, obtuse, chestnut brown, nerved on either sides of keel. Nuts linear-oblong or ovoid, embraced by the wings of rachilla.

Fl. & Fr. : August-January.

Common in semi-aquatic habitats in tanks and ponds, often forms a dense community in association with *Paspalidium flavidum* (Retz.) A Camus ; Ghatol.

13. *C. pygmaeus* Rottb. Descr. Icon. 20. t. 14. f. 4-5. 1773 ; Koyama in Gard. Bull. Sing. 30 : 146. 1977. *Juncellus pygmaeus* (Rottb.) Clarke in Hook. f. Fl. Brit. India 6 : 596. 1893 ; Duthie, Fl. Gangetic Plain 3 : 341. 1929. *Cyperus michelianus* (L.) Delile subsp. *pygmaeus* (Rottb.) Aschers. & Graebn. Syn. Mitteleur. Fl. 2(2) : 273. 1903 ; Kuekenth. in Engl. Pfreich. 101 : 312. f. 3 F-G. 1936.

Tufted annuals. Leaves flaccid, as long or longer than stem. Spikelets about 5 mm long, congested into globose, terminal, lobed heads which are 8-12 mm in diam. Bracts more than 3, unequal. Glumes boat-shaped, acute or acuminate. Nuts ellipsoid, tipped with the remains of style-base, pale-brown.

Fl. & Fr. : Most part of the year.

Common in damp, sandy or silty soils on the banks of pond, tanks, rivers and in rice-fields ; Bari Ghata forest, Banswara (*Kanodia* 51120, BSI), Paria-ka-Pul (*Majumdar* 10303, BSA).

14. *C. rotundus* L. Sp. Pl. 45. 1753 ; Clarke in Hook. f. Fl. Brit.

India 6 : 614. 1893 ; Duthie, Fl. Gangetic Plain 3 : 332. 1929 ; Blatter & McC. in Journ. Bomb. nat. Hist. Soc. 37 : 273. 1934 ; Kuekenth. in Engl. Pfreich. 101 : 107. f. 13. 1935 ; Kern in Reinwardtia 6 : 53. 1961 ; Koyama in Gard. Bull. Sing. 30 : 132. 1977. 'Motha, Mokanja, Dogala' (Hindi).

Stolons elongate, bearing ovoid, tunicate, black tubers. Stem triquetrous, glabrous. Leaves radical, shorter or longer than stem. Spikelets linear-lanceolate, 1.5-3.5 cm long, in simple or compound umbels of short spikes. Bracts 3, unequal. Glumes ovate, 2-5 mm long, plicate, 5 to 7-nerved, straw-coloured, keeled. Nuts broadly obovoid, greyish-black.

Fl. & Fr. : Most part of the year.

Commonest and worst weed within the area. It is most variable species and produces a new inflorescence when older one is destroyed ; Paloda, Lodha tank (*Kanodia* 51117, BSA).

15. *C. tenuispica* Steud. Syn. Pl. Cyp. 2 : 11. 1854 ; Kuekenth. in Engl. Pfreich. 101 : 245. 1936 ; Kern in Reinwardtia 2(1) : 116. 1952 ; Koyama in Gard. Bull. Sing. 30 : 143. 1977. *C. flavidus* sensu Cl. in Journ. Linn. Soc. 21 : 122. 1884, non Retz. 1789 ; Clarke in Hook. f. Fl. Brit. India 6 : 600. 1893 ; Duthie, Fl. Gangetic Plain 3 : 326. 1929.

Tufted annuals, 8-40 cm high. Leaves bladeless or one with 3-gonous blade longer than stem. Spikelets greenish-yellow, linear, 5-10 mm long. Glumes ovate-oblong, incurved below, excurved above. Nuts white, about 0.5 mm long, visible between the opened glumes in fruiting spikelets.

Fl. & Fr. : April-December.

Common in marshy and wet habitats. Often confused with *C. haspan* L. ; Puna Pathar forest.

16. *C. triceps* (Rottb.) Endl. Cat. Hort. Ac. Vindob. 1 : 94. 1842 ; Kuekenth. in Engl. Pfreich. 101 : 578. 1936 ; Kern in Reinwardtia 6 : 66. 1961 ; Mahesh. Illus. Fl. Delhi f. 213. 1966. *Kyllinga triceps* Rottb. Descr. Icon. 14. t. 4. f. 6. 1773, excl. cit. Rheed ; Clarke in Hook. f. Fl. Brit. India 6 : 587. 1893 ; Duthie, Fl. Gangetic Plain 3 : 343. 1929. 'Dugali' (Hindi).

Erect, annual, tufted sedges, upto 30 cm high. Leaves as long or longer than stem. Spikelets linear-lanceolate, straw-coloured. Bracts 3-6, unequal, leafy. Glumes lanceolate, mucronate, 3 to 4-nerved on either side of keel. Nut bearing glumes not winged in upper half of the keel. Stamens 2. Nuts ellipsoid, pale-brown.

Fl. & Fr. : July-November.

Common, but sparsely distributed in open wastelands ; Paloda.

3. ELEOCHARIS R. Br.

Eleocharis atropurpurea (Retz.) J.C. Presl. Rel. Haenk. 1 : 196. 1828; Clarke

in Hook. f. Fl. Brit. India 6 : 627. 1893 ; Clarke, Illus. Cyper. t. 36. f. 6-9. 1909. *Scirpus atropurpureus* Retz. Obs. Bot. 5 : 14. 1789. *Heleocharis atropurpurea* (Retz.) Kunth, Enum. 2 : 151. 1837 ; Duthie, Fl. Gangetic Plain 3 : 348. 1929.

Tufted annuals, 5-15 cm high. Stem delicate, filiform, transversely septate. Spikelets ovate, 2-4 x 1-2 mm, obtuse, solitary, terminal. Rachilla pitted. Glumes ovate-oblong, obtuse, 3-nerved, membranous, with a green keel. Stamens 1-2. Nuts obovate, about 0.5 mm long, biconvex, crowned with disciform style-base, cuneate at the base, pale to dark-brown. Bristles 4-6, white, retrorsely scabrid, shorter than nut.

Fl. & Fr. : September-March.

Common in rice-fields and temporary ponds along the roads, often found in forests in marshy habitats ; Loharia, Puna Pathar forest.

4. FIMBRISTYLLS Vahl *nom. cons.*

1a. Spikelets solitary or 2-3, terminal :

2a. Stigmas 3. Nuts 3-gonous. *F. ovata* 4
2b. Stigmas 2. Nuts biconvex. *F. schoenoides* 5

1b. Spikelets many, in terminal umbels :

3a. Stigmas 3. Nuts 3-gonous. *F. miliacea* 3
3b. Stigmas 2. Nuts biconvex :

4a. Glumes hairy in upper half. Nuts faintly striolate. *F. steberiana* 6
4b. Glumes glabrous. Nuts with 5-10 vertical ridges :

5a. Spikelets 1.0-1.5 mm wide. Style 0.6-1.0 mm long. Nuts 0.6-0.7 mm long. *F. bisumbellata* 1
5b. Spikelets 2-4 mm wide. Style 2-4 mm long. Nuts 1.0-1.2 mm long. *F. dichotoma* 2

1. *Fimbristylis bisumbellata* (Forsk.) Bub. Dodec. 30. 1850 ; Kern in Reinwardtia 6 : 47. 1961. *Scirpus bisumbellatus* Forsk. Fl. Aegypt. -Arab. 15. 1775. *Fimbristylis dichotoma* auct. plur. non Vahl, 1806 ; Clarke in Hook. f. Fl. Brit. India 6 : 635. 1893 ; Duthie, Fl. Gangetic Plain 3 : 351. 1929 ; Mahesh. Illus. Fl. Delhi f. 223. 1966.

Tufted annuals, upto 20 cm high. Leaves ligulate, shorter than stem, 2-nerved, scabrid beneath ; sheaths dilated, hairy. Spikelets ovoid-ellipsoid, in umbels. Glumes ovate, mucronate, keeled on the back. Stamen 1. Nuts orbicularly ovoid, biconvex, shortly stipitate, trabeculate.

Fl. & Fr. : July-November.

Common in moist sandy river-beds, banks of tanks etc. ; Ghatol, Looda (*Majumdar* 10269, BSA).

2. *F. dichotoma* (L.) Vahl, Enum. Pl. 2: 287. 1806; Blake in Journ. Arn. Arb. 35 : 213. 1954; Kern in Reinwardtia 6 : 46. 1961. *Scirpus dichotomus* L. Sp. Pl. 50. 1753. *S. diphylloides* Retz. Obs. Bot. 5 : 15. 1789. *Fimbristylis diphylloides* (Retz.) Vahl, Enum. Pl. 2 : 289. 1806; Clarke in Hook. f. Fl. Brit. India 6:

636. 1893; Clarke, Illus. Cyper. t. 41. f. 1-2. 1909. *F. diphylla* (Retz.) Vahl var. *annua* Clarke, l.c. 6 : 637. 1893, auct. non *F. annua* Roem. & Schult. 1817; Duthie, Fl. Gangetic Plain 3 : 351. 1929.

Annual sedges, 10-45 cm high. Inflorescence a compound umbel, rarely with 3-1 rays only. Spikelets chestnut-brown, ovoid-lanceolate, 5-8 mm long. Glumes ovate-rounded, shortly mucronate, keeled. Stamen 1. Style hairy along the margins in the upper part. Nuts obovoid, whitish or straw-coloured, stipitate, trabeculate.

Fl. & Fr. : August-October.

Common in ponds and low-lying areas in marshy and semi-aquatic habitats; Ghatol.

3. *F. millacea* (L.) Vahl, Enum. Pl. 2: 287. 1806; Clarke in Hook. f. Fl. Brit. India. 6: 644. 1893; Duthie, Fl. Gangetic Plain 3 : 356. 1929; Blake in Journ. Arn. Arb. 35 : 216. 1954; Kern in Taxon 3 : 246. 1954. *Scirpus millaceus* L. Syst. Nat. ed. 10. 2 : 868. 1759. *Scirpus quinquangularis* Vahl, Enum. Pl. 2: 279. 1806. *Fimbristylis quinquangularis* (Vahl) Kunth, Enum. Pl. 2 : 229. 1837; Clarke, l.c. 6: 644. 1893; Duthie, l.c. 3: 356. 1929; Mahesh. Illus. Fl. Delhi f. 225. 1966.

Tufted annuals, 20-60 cm high. Leaves shorter or as long as stem; sheaths coriaceous. Ligule absent. Spikelets ovate, 2-5 mm long, pedicellate, in compound umbels. Rachilla wingless. Glumes ovate, subacute or obtuse, keeled, 3-nerved. Stamens 2. Nuts obovoid, pale-brown, apiculate, verruculose.

Fl. & Fr. : October-January.

Common in wet and marshy habitats. The plants growing in open wetlands bear much smaller spikelets on more filiform pedicels and rays, while those growing in marshy habitats bear large spikelets on stout pedicels and rays; Lasara.

4. *F. ovata* (Burm. f.) Kern in Blumea 15 : 126. 1967. *Carex ovata* Burm. f. Fl. Ind. 194. 1768. *Cyperus monostachyos* L. Mant. 2: 180. 1771. *Fimbristylis monostachya* (L.) Hassk. Pl. Jav. Rar. 61. 1848; Clarke in Hook. f. Fl. Brit. India 6 : 649. 1893; Duthie, Fl. Gangetic Plain 3 : 355. 1929; Mahesh. Illus. Fl. Delhi f. 221. 1966. *Abildgaardia ovata* (Burm. f.) Kral in Sida 4 : 72. 1971.

Tufted annuals, 20-40 cm high. Leaves filiform, 10-15 cm long. Spikelets ovoid, compressed, 1.0—1.5 cm long, solitary, terminal, subtended by 1-3, awned, scarious margined bracts. Glumes ovate, boat-shaped, keeled, cuspidate, lower ones distichous. Nuts globosely pyriform, 3-gonous, tuberculate, straw-coloured, stipitate, terete or somewhat ridged.

Fl. & Fr. : August-October.

Rare, prefers sandy moist habitats like banks of rivers and ponds; Ghatol.

5. *F. schoenoides* (Retz.) Vahl, Enum. Pl. 2 : 286. 1806; Clarke in Hook. f. Fl. Brit. India 6: 634. 1893; Duthie, Fl. Gangetic Plain 3 : 350. 1929; Kral

in Sida 4(2) : 113. 1971. *Scirpus schoenoides* Retz. Obs. Bot. 5: 14. 1789. 'Motinga' (Hindi).

Tufted annuals, upto 40 cm high. Leaves ligulate, as long as stem, involute-margined, dotted beneath; sheaths sparsely hairy. Bracts absent. Spikelets ovoid-conic, 3-6 x 1-2 mm, terminal, solitary or 1-3. Glumes orbicular, concave, apiculate, 5-nerved, lowest 1-3 bract-like and leafy. Nuts snow-white, smooth, obovoid, stipitate, finely striated with rows of isodiametric cells.

Fl. & Fr. : September-December.

Abundant on the banks of tanks in marshy habitats; Karamia tank, Chirola.

6. *F. sieberiana* Kunth, Enum. Pl. 2: 237. 1837; Kern in Blumea 8: 131. 1955; Hooper in Sald. & Nicols. Fl. Hassan Dist. 680. 1976. *F. ferruginea* (L.) Vahl var. *sieberiana* (Kunth) Boeck. in Linnaea 37 : 17. 1871.

Rhizomatous perennials, upto 50 cm high. Leaves ligulate; sheaths membranous, red-dotted, pubescent. Ligule membranous, or a fringe of hairs. Bracts longer than the rays of inflorescence. Spikelets ovate, about 1 cm long. Glumes ovate, obtuse, apiculate. Nuts obovate, distinctly stipitate.

Fl. & Fr. : August-October.

Rare, in marshy habitats, particularly in rice-fields. Very close to *F. ferruginea* (L.) Vahl, but latter bears non stipitate nuts and smaller leaves; Jolana (*Kanodia* 36, BSI).

5. SCIRPUS L.

The Species are sometimes treated under the genus *Schoenoplectus* (Reich.) Palla *nom. cons.*

- 1a. Leaves reduced to sheaths; blade absent or very small. Inflorescence a lateral cluster of digitate spikelets. Bracts absent or small, not leafy. Achenes transversely rugose :
- 2a. Stem transversely septate. Heads borne towards base. Glumes acute, hardly keeled, subcordate at the base. *S. articulatus* 2
- 2b. Stem not septate. Heads borne about or above the middle. Glumes mucronate, keeled, tapering at the base :
- 3a. Glumes many-nerved or faintly multistriate :
 - 4a. Glumes inflated in front. *S. supinus* 4
 - 4b. Glumes not inflated in front. *S. roylei* 3
 - 3b. Glumes nerveless, smooth. *S. supinus* var. *lateriflorus* 5
- 1b. Leaf-blade well developed, often as long as stem. Inflorescence terminal, consisting a cluster of sessile or stalked spikelets or latter in umbels subtended by large leafy bracts. Achenes smooth :
 - 5a. Spikelets in sessile clusters. Glumes entire. *S. affinis* 1
 - 5b. Spikelets in umbels. Glumes 2-fid at the apex. *S. tuberosus* 6

1. *Scirpus affinis* Roth in Roem. & Schult. Syst. 2 : 140. 1817 & Nov. Pl. Sp. 30. 1821; Raymond in Nat. Conad. 86 : 227. 1959. *S. maritimus* L. var. *affinis* (Roth) Clarke in Hook. f. Fl. Brit. India 6 : 659. 1893; Duthie, Fl. Gangetic Plain 3 : 366. 1929.

Rhizomatous, perennial sedges, with spongy roots. Leaves grass-like, as long as stem, 3-7 mm wide, spongy. Spikelets sessile, ovoid, 1.2 x 0.6-1.0 cm, in dense, terminal clusters of 2-5, subtended by unequal bracts. Glumes ovate-oblong, 6-10 x 2.5-5.0 mm, scarious margined, awned at the apex. Achenes compressed, broadly obovate-elliptic, cuneate at both ends.

Fl. & Fr. : January-May.

Abundant in marshlands, particularly on the banks of tanks, rivers and in ponds; Banswara (*Majumdar* 10270, BSA; *Kanodia* 51110, BSI).

2. *S. articulatus* L. Sp. Pl. 47. 1753; Clarke in Hook. f. Fl. Brit. India 5 : 656. 1893; Clarke, Illus. Cyper. t. 49. f. 1-2. 1909; Duthie, Fl. Gangetic Plain 3 : 360. 1929; Kern in Reinwardtia 6 : 34. 1961. *Schoenoplectus articulatus* (L.) Palla, Bot. Jahrb. Syst. 10 : 299. 1888.

Erect, glabrous sedges, upto 90 cm high with spongy, hollow, articulated, sub-cylindrical stem. Spikelets ovoid, rusty-brown, 8-15 mm long, terete. Glumes ovate, as long as broad, closely imbricate, hyaline-margined, mucronate-tipped. Bristles absent. Nuts obovoid, 3-gonous, black, apiculate, smooth.

Fl. & Fr. : September-February.

Rare, in marshy and semi-aquatic habitats in the ponds, tanks and rivers; Banswara (*Verma* 223, BSA), Lodha tank (*Kanodia* 51128, BSI).

3. *S. roylei* (Nees) Parker in Duthie, Fl. Gangetic Plain 3 : 361. 1929. *Isolepis roylei* Nees in Wt. Contrib. Bot. Ind. 107. 1834. *Scirpus quinquefarius* Buch.—Ham. ex Boeck. in Linnaea 36 : 701. 1870; Clarke in Hook. f. Fl. Brit. India 6 : 657. 1893; Clarke, Illus. Cyper. t. 48. f. 8-10. 1909.

Tufted annuals, 20-50 cm high. Spikelets sessile, ovoid-oblong, 0.5-2.0 x 0.2-0.8 cm, compressed. Glumes 5-ranked, elliptic-lanceolate. Bristles absent. Achenes obovoid, 3-gonous, black, rugose with transverse wavy lines.

Fl. & Fr. : September-November.

Common in marshy habitats in ponds and low-lying areas; Banswara.

4. *S. supinus* L. Sp. Pl. 49. 1753; Clarke in Hook. f. Fl. Brit. India 6 : 655. 1893; Clarke, Illus. Cyper. t. 48. f. 13-14. 1909.

var. *supinus*

Tufted annuals. Sheaths 4-12 cm long, with oblique mouth, often produced into an erect limb. Spikelets sessile, ovate or ellipsoid, 4-7 x 2-4 mm. Glumes ovate, 1.5-2.0 mm long. Bristles absent. Style-arms 2. Nuts globosely obovoid, 1.4-1.5 mm long, 3-gonous, olive-coloured, with transverse wavy lines.

Fl. & Fr. : September-January.

Common throughout the area in marshy and semi-aquatic habitats; Loharia tank, Senavasa, Banswara (*Majumdar* 10272, BSA; *Kanodia* 51109, BSI).

5. *S. supinus* L. var. *lateriflorus* (Gmel.) Koyama in Journ. Fac. Sci. Univ. Tokyo 7: 302. 1958. *S. lateriflorus* Gmel. Syst. Nat. 1: 127. 1791. *S. supinus* auct. plur. non L. 1753; *sensu* Duthie, Fl. Gangetic Plain 3 : 360. 1929. *S. supinus* L. var. *uninodis* Clarke in Hook. f. Fl. Brit. India 6: 656. 1893, *quoad specim. cit. non Isolepis uninodis* Del. 1813. *Schoenoplectus lateriflorus* (Gmel.) Lye in Bot. Not. 124 : 290. 1971.

Fibrous-rooted, slender, annual sedges, upto 60 mm high. Leaf-sheaths glabrous, often with a short leaf-blade. Spikelets 1-8 in a pseudolateral cluster, pale-brown, ovoid-oblong, 0.4-0.6 cm long. Bracts erecto-patent, 2-10 cm long. Glumes ovate, with 3-nerved keel. Stamens 3. Bristles absent. Styles 3-fid. Nuts 3-gonous, obovoid, apiculate, transversely undulate-rugose, 1.0-1.2 mm long.

Fl. & Fr. : July-November.

Frequent in rice-fields and other low-lying areas; Banswara (*Verma* 233, BSA).

6. *S. tuberosus* Desf. Pl. Atlant. 1 : 50. 1798; Beetle in Amer. Journ. Bot. 29 : 84. 1942; Mahesh. Illus. Fl. Delhi f. 228. 1966. *S. maritimus* auct. plur. non L. 1753; Clarke in Hook. f. Fl. Brit. India 6 : 658. 1893; Duthie, Fl. Gangetic Plain 3: 363. 1929.

Erect, perennials, 30-100 cm high, with creeping rhizomes and woody tubers. Bracts unequal, leafy, longer than rays. Spikelets ovate-oblong or elliptic, brown, 1-2 x 0.3-0.6 cm. Keel of the glumes excurrent as a curved awn. Bristles 3-6, retrorsely scabrid. Nuts 3-gonous, smooth, pale-yellow.

Fl. & Fr. : October-March.

Abundant on the banks of tanks and ponds; Talwara, Lamero, Banswara (*Verma* 231, BSA).

106. POACEAE (GRAMINEAE nom. alt.)

1a. Culms woody. Leaves reduced to culm-sheaths :

2a. Internodes solid. Inflorescence a compound panicle. Lodicules absent. Pericarp fleshy, not adnate to the seed. *Dendrocalamus* 16

2b. Internodes hollow. Inflorescence a pseudo-panicle. Lodicules 3. Pericarp thin, adnate to the seed. *Bambusa* 5

1b. Culms herbaceous. Leaves not reduced to culm-sheaths :

3a. Spikelets with unisexual flowers; the female spikelet solitary at the base of inflorescence enclosed in a stony, polished, cylindrical utricle-like bract. *Coix* 12

3b. Spikelets with bisexual flowers; neither solitary nor enclosed in a bract :

4a. Inflorescence feathery. Spikelets covered with silky, non-bristly hairs :

5a. Rachis continuous. Spikelets deciduous from their pedicels. Lodicules absent. *Imperata* 31

5b. Rachis disjoining. Spikelets deciduous with the contigu-

- ous joints of the rachis and pedicels. Lodicules present :
- 6a. Spikelets awnless.
- 6b. Spikelets awned.
- 4b. Inflorescence not feathery. Spikelets not covered with silky hairs :
- 7a. Inflorescence a simple, unbranched raceme or spike with each spikelet or its pedicel arising directly from the central axis :
- 8a. Spikelets subtended by bristles :
- 9a. Spikelets ellipsoid, 2-4 mm long. Upper lemma transversely rugose.
- 9b. Spikelets lanceolate, 5-7 mm long. Upper lemma smooth :
- 10a. Bristles united at the base to form a cup.
- 10b. Bristles free to the base.
- 8b. Spikelets not subtended by bristles :
- 11a. Spikelets with awned glumes and/or awned lemmas; awn(s) much longer than spikelets :
- 12a. Spikelets obconic.
- 12b. Spikelets linear-oblong :
- 13a. Awns free to the base :
- 14a. Awns 3 per spikelet, arising from lemmas.
- 14b. Awns 2 per spikelet, arising from glumes.
- 13b. Awns twisted in lower half or lower one-third :
- 15a. Lower glume flattened and channelled on back; awns minutely ciliate.
- 15b. Lower glume rounded and smooth on back; awns densely pubescent.
- 11b. Spikelets with unawned glumes and/or lemmas, or if with cusps, then latter shorter than spikelets :
- 16a. Sessile spikelets sunk in the hollows of rachis :
- 17a. Plants densely tufted, not more than 15 cm high.
- 17b. Plants spreading, rooting at lower nodes, 20-60 cm tall.
- 16b. Sessile spikelets not sunk in the hollows of rachis :
- 18a. Spikelets in groups of 2, one sessile and other pedicelled :
- 19a. Sessile spikelet spherical. Lower glume pitted and tubercled all over. Pedicelled spikelet reduced.
- 19b. Sessile spikelet oblong-elliptic. Lower glume neither pitted nor tubercled. Pedicelled spikelets well developed.
- 18b. Spikelets solitary, all pedicelled or all sessile :
- 20a. Upper glume with hooked spinules.
- 20b. Upper glume without hooked spinules :
- 21a. Flower 1 per spikelet.
- 21b. Flowers 3 per spikelet.
- 7b. Inflorescence compound, variously branched with spike-
- Saccharum* 44
Erianthus 26
- Setaria* 46
- Cenchrus* 9
Pennisetum 40
- Tetrapogon* 50
- Tripogon* 53
Perotis 41
- Sehima* 45
- Heteropogon* 30
- Oropetium* 36
- Hemarthria* 29
- Hackelochloa* 28
- Hemarthria* 29
- Tragus* 52
- Tripogon* 53
Dactyloctenium 15

- Iets 2 or more per branch :
- 22a. Inflorescence clearly paniculate :
- 23a. Spikelets awned; awns much longer than spikelets :
- 24a. Lemmas 3-awned from the tip. *Arctida* 3
- 24b. Lemmas 1-awned from the tip :
- 25a. Tip of rachilla glabrous. *Capillipedium* 8
- 25b. Tip of rachilla fulvous-hairy :
- 26a. Lemmas 5-toothed at the apex, 5-nerved. *Polygonum* 42
- 26b. Lemmas entire or less than 5-toothed at the apex, 2 to 3-nerved :
- 27a. Spikelets laterally compressed or terete. Lower glume concave. *Chrysopogon* 11
- 27b. Spikelets dorsally compressed. Lower glume flat. *Sorghum* 47
- 23b. Spikelets unawned, or if with cusp, then latter shorter than spikelets :
- 28a. Flowers 3-many per spikelet. *Eragrostis* 24
- 28b. Flowers 1-2 per spikelet :
- 29a. Lemma 1 per spikelet (1-flowered). *Sporobolus* 49
- 29b. Lemmas 2 per spikelet (2-flowered) :
- 30a. Spikelets subtended by bristles. *Setaria* 46
- 30b. Spikelets not subtended by bristles. *Panicum* 37
- 22b. Inflorescence of 2-many digitate, whorled, opposite, alternate or crowded spikes or racemes :
- 31a. Inflorescence interrupted by spathes :
- 32a. Leaves aromatic. Spathe enclosing a pair of racemes. *Cymbopogon* 13
- 32b. Leaves non-aromatic. Spathe not enclosing a pair of racemes :
- 33a. Involucre of modified, usually sterile, spikelets present at the base of fertile spikelets :
- 34a. Lower glume pitted on the back above the middle. *Eremopogon* 25
- 34b. Lower glume not pitted :
- 35a. Involucral spikelets pedicelled, deciduous. Callus of fertile spikelets truncate or obtuse. *Iseilema* 33
- 35b. Involucral spikelets sessile, persistent. Callus of fertile spikelets pointed.
- 33b. Involucre of modified spikelets absent.
- 31b. Inflorescence not interrupted by spathes :
- 36a. Spikelets in group of 2-3, one sessile and one or two pedicelled which are sometimes reduced to pedicels :
- 37a. Leaf-blade long petioled. *Spodiopogon* 48
- 37b. Leaf-blade sessile :
- 38a. Sessile spikelet 1; pedicelled spikelet reduced to a pedicel only. *Arthraxon* 4
- 38b. Sessile spikelet 1; pedicelled spikelet 1, normal :
- 39a. Sessile and pedicelled spikelets dissimilar :

- 40a. Upper glume with a row of marginal tubercles.
- Vetiveria* 55
- 40b. Upper glume without tubercles :
- Dichanthium* 18
- 41a. Glumes broadly rounded at the apex.
- 41b. Glumes acute at the apex :
- Ischaemum* 32
- 42a. Lower glume of sessile spikelet in lower half hardened, smooth, tuberculate or rugose, often winged.
- 42b. Lower glume of sessile spikelet not hardened, not tubercled, not rugose, wingless.
- Bothriochloa* 6
Arthraxon 4
- 39b. Sessile and pedicelled spikelets similar.
- 36b. Spikelets grouped or solitary, but all sessile or all pedicelled :
- 43a. Flowers 3-many per spikelet :
- 44a. Spikelets awnless :
- Eleusine* 23
- 45a. Spikelets breaking up, borne in digitate spikes.
- 45b. Spikelets falling entire, borne in spikes which are crowded into a long, narrow, dense panicle.
- Desmostachya* 17
- 44b. Spikelets awned :
- 46a. Spikelets upto 5, separate.
- Melanocenchrus* 34
- 46b. Spikelets more than 5, proximate :
- Dinebra* 21
- 47a. Racemes reflexed or spreading in a pyramidal panicle.
- 47b. Racemes neither reflexed nor spreading, not panicled, but digitate or umbellate :
- Dactyloctenium* 15
- 48a. Axis of racemes or spikes ending in a mucro. Lemma ovoid, acute.
- 48b. Axis of racemes or spikes not ending in a mucro. Lemma cymbiform, rounded :
- Tetrapogon* 50
Chloris 10
- 49a. Spikes 1-3.
- 49b. Spikes 4-many.
- 43b. Flowers 1-2 per spikelet :
- 50a. Lower glume absent or reduced to a swollen callus :
- Eriochloa* 27
- 51a. Lower glume reduced to a swollen callus below the spikelet.
- 51b. Lower glume completely reduced or absent :
- Paspalum* 39
Digitaria 19
- 52a. Upper lemma with firm involute margins.
- 52b. Upper lemma with hyaline, flat margins.
- 50b. Lower glume present, shorter than the upper glume :
- Cynodon* 14
- 53a. Lemma 1 per spikelet (1-flowered).
- 53b. Lemmas 2 per spikelet (2-flowered) :
- Alloteropsis* 1
- 54a. Upper lemma membranous or hyaline :
- 55a. Spikelets not bearded at base. Upper glume ciliate along margins.
- 55b. Spikelets bearded at the base. Upper glume eciliate along the margins.
- Dimeria* 20

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| 54b. Upper lemma crustaceous or coriaceous : | |
| 56a. Upper lemma with an apical, barbellate mucro. | <i>Urochloa</i> 54 |
| 56b. Upper lemma not mucronate : | |
| 57a. Glumes awned or aristate : | |
| 58a. Plants aquatic. Only upper glume aristate. | <i>Pseudoraphis</i> 43 |
| 58b. Plants terrestrial. Upper and lower glumes aristate. | <i>Oplismenus</i> 35 |
| 57b. Glumes acute, awnless : | |
| 59a. Lower lemma awned or aristate. | <i>Echinochloa</i> 22 |
| 59b. Lower lemma awnless, not aristate : | |
| 60a. Ligule absent. | <i>Echinochloa</i> 22 |
| 60b. Ligule present : | |
| 61a. Spikelets dorsally compressed. Lower glumes turned towards rachis. | <i>Brachiaria</i> 7 |
| 61b. Spikelets not compressed, convex on ventral side. Lower glumes always away from the rachis. | <i>Paspalidium</i> 38 |

1. ALLOTROPSIS J.S. Presl ex C.B. Presl

Allotropis cimicina (L.) Stapf in Prain, Fl. Trop. Afr. 9 : 487. 1919 ; Bor in Ind. For. Rec. 2(1) : 67. pl. 4. 1941 & Grass. Burm. Cey. Ind. Pak. 276. 1960 ; Raizada & Jain in Ind. For. Rec. 5(3) : 179. pl. 7. f. 1. 1965 ; Mahesh. Illus. Fl. Delhi f. 256. 1966. *Milium cimicinum* L. Mant. Alt. 2 : 184. 1771. *Axonopus cimicinus* (L.) P. Beauv. Ess. Agrost. 12. 1812 ; Hook. f. Fl. Brit. India 7 : 64. 1896.

Erect, delicate annuals, upto 90 cm high. Culm-base neither thick nor covered with silvery bases of sheaths. Ligule a rim of hairs. Inflorescence of 3-10, spike-like racemes seated on the top of peduncle. Spikelets green, ovate-ellipsoid, 3-4 mm long, solitary or clustered. Lower glume ovate-lanceolate, acuminate, 3 to 5-nerved ; upper glume 5-nerved, with globular-tipped purplish hairs. Upper lemma shortly aristate. Palea about 1 mm long, divided into two linear lobes or entire. Grains alliptic-oblong to suborbicular, dorsally compressed.

Fl. & Fr. : July-October.

A sporadic grass, found in wastelands, fields and at the foot of hills ; Dangia Bowji hill, Ghatol, Banswara (*Kanodia* 75409, BSI).

2. APLUDA L.

Appluda mutica L. Sp. Pl. 82. 1753 ; Bor in Ind. For. Rec. 2(1) : 71. pl. 6A-C. 1941 ; Bor, Grass. Burm. Cey. Ind. Pak. 93. 1960 ; Murty in Bull. Bot. Surv. Ind. 14 (1-4) : 150. 1975. *A. varia* Hack. subsp. *mutica* (L.)

Hack. in DC. Monogr. Androp. 6 : 197. 1889 ; Hook. f. Fl. Brit. India 7 : 150. 1896.

Erect, tufted, perennial grasses, about 1 m or more high. Upper leaf-sheaths dilated into spathes with subulate imperfect blades. Ligule short, membranous. Panicles of 2-many, simple racemes terminating the culms, each enclosed in a peduncled spathe. Spikelets in threes, one sessile, two pedicelled, and one of the latter seated upon a broad, strap-like pedicel. Upper lemma awnless. Stamens 2-3. Grains oblong.

Fl. & Fr. : August-March.

Common from plains to the hills among bushes ; Parla-ka-Pul (*Majumdar* 10321, BSA), Banswara (*Kanodia* 51042, BSI).

3. ARISTIDA L.

1a. No articulation between lemma and awn :

2a. Lateral awns of lemma much reduced and of different texture from the third awn.

A. redacta 5

2b. Lateral awns of lemma well developed and similar to the third awn :

3a. Lemma shorter or as long as upper glume.

A. adscensionis var.
adscensionis 1

3b. Lemma much longer than upper glume.

A. adscensionis
var. *pumila* 2

1b. There is an articulation between lemma and awn :

4a. Articulation is situated at the top of the column, i.e. just below the spreading awns.

A. matabilis 4

4b. Articulation is between the tip of lemma and base of column.

A. fimbriata 3

1. *Aristida adscensionis* L. Sp. Pl. 82. 1753 ; Hook. f. Fl. Brit. India 7 : 224. 1896, exclud. *syn. aliquibus* ; Henrard in Mededeel. Van's Rajks Herb. Leiden No. 54(1) : 8. 1926 ; Bor in Ind. For. Rec. 2(1) : 73. 1941 & Grass. Burm. Cey. Ind. Pak. 407. f. 43. 1960. *A. depressa* auct. non Retz. 1786.

var. *adscensionis*

Annual or perennial, erect to decumbent, densely tufted grasses, 20-60 cm tall. Leaf-blades convolute, filiform. Ligule a rim of short, fine hairs. Panicles contracted, unequally branched from the base or middle. Spikelets 7-8 mm long, 1-flowered. Glumes linear to lanceolate, acute or obtuse, 1-nerved, awnless ; the upper glumes 6-9 mm long, emarginate at the apex with a short mucro in the sinus ; the lower glumes 5-8 mm long, with a 1 mm long awn. Lateral awns shorter, central one upto 2.5 cm long. Grains as long as lemma.

Fl. & Fr. : October-December.

Common in dry, rocky exposed situations ; Hura Bowji forest.

2. *A. adscensionis* L. var. *pumila* (Decne.) Coss. & Dur. Fl. d'Alger. Glum. 84. 1855 ; Bor, Grass. Burm. Cey. Ind. Pak. 409. 1960. *A. pumila*

Decne. in Ann. Sci. Nat. ser. 2. 4 : 85. 1835. *A. adscensionis* L. var. *aethiopica* Trin. & Rupr. in Mem. Acad. Petersb. ser. 6. 7 : 134. 1843; Hook. f. Fl. Brit. India 7 : 225. 1896.

Dwarf, erect plants. Lemmas upto 12 mm long, longer than the glumes. Callus rounded at the base, not much elongated.

Fl. & Fr. : August-October.

Rare, in the wastelands ; Dhari-talai (*Verma* 1768, BSA), Banswara (*Kanodia* 75372, BSI).

3. *A. funiculata* Trin. & Rupr. Sp. Gram. Stip. 159. 1842 & in Mem. Acad. Sci. Petersb. ser. 6.7 : 159. 1843; Hook. f. Fl. Brit. India 7 : 226. 1896 ; Henrard in Mededeel. Van's Rijks Herb. Leiden No. 54(1) : 188. 1926 ; Bor, Grass. Burm. Cey. Ind. Pak. 410. 1960.

Slender, annual grasses, upto 50 cm high. Leaf-base ciliate with long hairs. Panicles narrow, 10-22 cm long. Upper glumes about three-quarter the length of the lower or nearly equal. Column of awns about 4.5 cm long ; central awn upto 5 cm long. Pedicels hairy and also with long, white hairs in their axils.

Fl. & Fr. : August-November.

Common in dry wastelands ; Banswara (*Verma* 249, BSA).

4. *A. mutabilis* Trin. & Rupr. Sp. Gram. Stip. 150. 1842 & in Mem. Acad. Sci. Petersb. ser. 6. 7 : 150. 1843 ; Hook. f. Fl. Brit. India 7 : 226. 1896 ; Henrard in Mededeel. Van's Rijks Herb. Leiden No. 54 (2) : 366. 1927 ; Bor, Grass. Burm. Cey. Ind. Pak. 411. 1960.

Annual grasses, 15-30 cm high. Leaves smooth. Panicles 8-20 cm long. Spikelets shortly pedicelled, pale-green or straw-coloured. Lower glumes longer than the upper. Central awn not feathery. Callus bearded.

Fl. & Fr. : August-October.

Rare, in open wastelands ; Banswara (*Verma* 248, BSA).

5. *A. redacta* Stapf in Kew Bull. 1892 : 85. 1892 (April) ; Hook. f. Fl. Brit. India 7 : 227. 1896 ; Henrard in Mededeel. Van's Rijks Herb. Leiden No. 54(3) : 503. 1928 ; Bor, Grass. Burm. Cey. Ind. Pak. 412. 1960. *Stipa aristoides* Stapf ex Lisboa in Journ. Bomb. nat. Hist. Soc. 7 : 358. 1892 (September).

Slender, annual grasses, 15-60 cm high. Glumes subequal. Lemmas about 4 mm long, passing into the rather coriaceous swollen twisted column.

Fl. & Fr. : August-October.

Rare, in open wastelands and on the fringes of forests ; Bhimsor (*Majumdar* 10281, BSA).

4. ARTHRAXON P. Beauv.

Arthraxon lancifolius (Trin.) Hochst. in Flora 39 : 188. 1856 ; Bor,

Grass. Burm. Cey. Ind. Pak. 100. 1960. *Andropogon lancifolius* Trin. in Mem. Acad. Sci. Petersb. ser. 6. 2 : 271. 1832. *Arthraxon microphyllus* auct. non (Trin.) Hochst. 1856 ; Hook. f. Fl. Brit. India 7 : 147. 1896.

Delicate, decumbent annuals, 10-40 cm high, puberulous below the inflorescence. Leaves lanceolate, cordate-amplexicaul-based, ciliate-margined. Ligule truncate, membranous, ciliate. Racemes 3-10, silky-silvery. Spikelets 2.5-3.0 mm long, laterally compressed, awned. Callus bearded with long hairs. Lower glumes of sessile spikelets rounded on the back, not keeled, 2-toothed, puberulous. Lower lemma absent. Upper lemma with 0.8-1.0 cm long awn, epaleate. Stamens 2. Pedicelled spikelets reduced to 1.5-1.6 mm long empty glumes. Grains linear.

Fl. & Fr. : September-December.

Abundant in damp habitats in forests along the streams ; Puna Pathar forest, Banswara (*Majumdar* 10281, BSA).

5. BAMBUSA Schreb. *nom. cons.*

Bambusa arundinacea (Retz.) Roxb. Pl. Cor. t. 79. 1796 ; Holtum in Taxon 5 : 65. 1956 & in Gard. Bull. Sing. 17(2) : 190. 1959 ; Babu, Herb. Fl. Dehra Dun 588. 1977. *Bambos arundinacea* Retz. Obs. Bot. 5 : 24. 1789. *Arundo bambos* L. Sp. Pl. 18. 1753, *nom. conf.* *Bambusa bambos* Voss in Vilmorin, Bleumengart. 1 : 1189. 1896 'Bans' (Hindi).

Culms with thorny branches. Culm-sheaths rounded at the apex, hairy with dark brown hairs on the back. Ligule truncate, long-ciliate. Leaves linear, on a short petiole. Leaf-sheaths ciliate, hairy on the back, with collar-like callus. Spikelets lanceolate, with 1-3 glumes. Lemmas 3-6, ovate, upper 1-3 barren. Lodicules 3.

Fl. & Fr. : Not seen, very infrequent.

Occasional, in forests, usually grown in forest nurseries. It is said to be very common in the forests in past, but now it has more or less disappeared due to its exploitation by the tribal people in various ways ; Bhandaria (*Kanodia* 44, BSI).

6. BOTHRIOCLOA O. Kuntze

Bothriochloa pertusa L.) A. Camus in Ann. Soc. Linn. Lyon (n.s.) 76 : 164. 1931 ; Bor in Ind. For. Rec. 2(1) : 84. pl. 12. 1941 ; Bor, Grass. Burm. Cey. Ind. Pak. 109. 1960 ; Mahesh. Illus. Fl. Delhi f. 267. 1966. *Holcus pertusus* L. Mant. Pl. Alt. 2 : 301. 1771. *Andropogon pertusus* (L.) Willd. Sp. Pl. 4 : 922. 1806 ; Hook. f. Fl. Brit. India 7 : 173. 1896. 'Sikvoli' (Hindi).

Erect or geniculately ascending perennials. Inflorescence axis shorter than the lowest racemes. Racemes upto 8, overtopping the axis, 4-5 cm

long. Sessile spikelets oblong-lanceolate, 3-4 x 1 mm ; lower glumes with 1-2 pits on the back above the middle and hairs below the middle ; upper glumes obtuse, not awned. Pedicellate spikelets narrow, awnless, unpitted, reduced to glumes. Stamens 3.

Fl. & Fr. : August-April.

Fairly common in wastelands and on the fringes of forests. Often confused for *Dichanthium* Willemet ; Shergarh forest.

7. BRACHIARIA Griseb.

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| 1a. Lower glume a minute scale, less than half the length of spikelet. | <i>B. eruciformis</i> 1 |
| 1b. Lower glume half as long as the spikelet : | |
| 2a. Lower glume 3-nerved, truncate. Pedicels bristly. | <i>B. reptans</i> 3 |
| 2b. Lower glume 5 to 7-nerved, acute. Pedicels hairy. | <i>B. ramosa</i> 2 |

1. **Brachiaria eruciformis** (Smith) Griseb. in Ledeb. Fl. Ross. 4 : 469. 1853 ; Bor, Grass. Burm. Cey. Ind. Pak. 283. 1960 ; Raizada & Jain in Ind. For. Rec. 5(3) : 163. 1965. *Panicum eruciforme* J.E. Smith in Sibth. & Smith, Fl. Graeca 1 : 44. t. 59. 1806. *P. isachne* Roth ex Roem. & Schult. Syst. V.g. 2 : 458. 1817 ; Hook. f. Fl. Brit. India 7 : 28. 1896.

Annual grasses, loosely tufted, geniculately ascending from a decumbent and rooting base. Leaves linear-lanceolate, 2-6 cm long. Ligule reduced to a dense fringe of hairs. Panicles linear, with erect, 1.3-2.5 cm long racemes. Rachis triquetrous, hairy. Spikelets closely crowded, 2.0-2.5 mm long, sometimes tinged with purple, softly hairy. Lower glume 1-nerved, hairy on the back. Upper lemma smooth. Palea obtuse. Grains oblong-elliptic or obovate-oblong, 1.0-1.5 mm long, flattened on both the faces, olive-green.

Fl. & Fr. : August-December.

Common in low-lying areas ; along Banswara-Udaipur road.

2. **B. ramosa** (L.) Stapf in Prain, Fl. Trop. Afr. 9 : 542. 1919 ; Bor, Grass. Burm. Cey. Ind. Pak. 284. 1960 ; Raizada and Jain in Ind. For. Rec. 5(3) : 164 pl. 2. f. 4. 1965. *Panicum romosum* L. Mant. Pl. I : 29. 1767; Hook. f. Fl. Brit. India 7 : 36. 1896, *pro parte*, 'Makra' (Hindi).

Much branched annuals, upto 40 cm. high. Leaves linear-lanceolate, from a rounded or cordate base, finely acuminate. Lingule a ring of hairs. Rachis triquetrous, hairy. Spikelets 2.5-5.0 mm long, paired or clustered, solitary upwards. Upper glumes 7-nerved. Lower lemma neuter, similar to upper glume, 5-nerved, epaleate, empty. Grains broadly elliptic, flat or slightly depressed on both the sides, upto 2 mm long.

Fl. & Fr. : Most of the year.

Common in wastelands and forests in moist situations ; Wadita Hillage forest, Ghatol (*Kanodia* 75169, BSI).

3. *B. reptans* (L.) Gardn. & Hubb. in Hook. *Icones Pl. sub tab.* 3363. 1938 ; Jansen in *Reinwardtia* 2(2) : 238. 1953 ; Bor, *Grass. Burm. Cey. Ind. Pak.* 285. 1960 ; Raizada & Jain in *Ind. For. Rec.* 5(3) : 162. pl. 2. f. 1. 1965. *Panicum reptans* L. *Syst. Nat. ed. 10.* 870. 1759. *P. prostratum* Lam. *Tab. Encycl. Meth. Bot.* 1 : 171. 1791 ; Hook. f. *Fl. Brit. India* 7 : 33. 1896,

Annual or perennial, much branched, prostrate grasses, rooting on the nodes. Ligule long ciliate. Sheaths finely hairy, ciliate. Recemes 3-9, secund, erect or spreading, 1.3-3.2 cm long. Rachis triquetrous, scabrid and pubescent or villous at the base. Spikelets paired, 1.5-2.0 mm long. Upper glume 7-nerved. Lower lemma 5-nerved ; upper lamina tuberculate, mucronate.

Fl. & Fr. July-November.

Common on wet and marshy banks of ponds, tanks and rivers ; Banswara (*Majumdar* 10288, BSA).

8. CAPILLIPEDIUM Stapf

Capillipedium huegellii (Hack.) A. Camus in *Rev. de Bot. App. et d' Agri. Col.* 1 : 306. 1921 ; Stapf in *Hook. Ic. Pl. sub t.* 3085. 1922 ; Bor, *Grass. Burm. Cey. Ind. Pak.* 111. 1960. *Andropogon huegelli* Hack. in *DC. Monogr. Phan.* 6 : 492. 1889; *Hook. f. Fl. Brit. India* 7 : 180. 1896. *A. schmidii* Hook. f. *I.c.* 7 : 180. 1896.

Erect annuals, with densely bearded nodes. Leaf-sheaths bearded at the mouth. Ligule membranous, ciliate. Panicles 5-10 cm long, contracted, with capillary branches and bearded axis; joints and pedicels ciliate. Sessile spikelets about 3 mm long; callus densely bearded; lower glume flat on the back; upper lemma stipiform, with a geniculate awn from tip. Pedicelled spikelets about 4 mm long; lower glume pubescent on the back and with ciliate keels; upper lemma unawned or often wanting.

Fl. & Fr. : October-January.

Rare, near water resources; Anand Sagar (*Kanodia* 75301, BSI).

9. CENCHRUS L.

1a. Bristles connate at the base only.

C. ciliaris 1

1b. Bristles connate into a cup.

C. pennisetiformis 2

1. *Cenchrus ciliaris* L. Mant. Alt. 302. 1771; Bor in *Ind. For. Rec.* 2(1) : 86. pl. 13. 1941 & *Grass. Burm. Cey. Ind. Pak.* 287. f. 33. 1960; Raizada & Jain in *Ind. For. Rec.* 5(3) : 213. 1965; Mahesh. Illus. *Fl. Delhi* f. 237. 1966. *Pennisetum cenchroides* Rich. in *Pers. Syn. Pl.* 1 : 72. 1805; *Hook. f. Fl. Brit. India* 7 : 88. 1896. *P. ciliare* (L.) Link, *Hort. Berol.* 1 : 213. 1827.

'Dhaman' (Hindi).

Tufted perennials, 30-75 cm high. Racemes 5-12 x 0.8-1.2 cm. Spikelets 1-3 in each involucre. Base of involucre elliptic, naked. Bristles antrorsely ciliate on the margins, upto 1.5 cm long; inner ones subequal. Grains oblong, enclosed but free within lemma and palea.

Fl. & Fr. : Most part of the year.

Common in dry sandy localities and can resist cutting and drought. It is considered to be most nutritious among fodder grasses; Paloda, Parla-ka-Pul (*Majumdar* 10322, BSA), Banswara (*Kanodia* 75597, BSI).

2. *C. pennisetiformis* Hochst. & Steud. ex Steud. *Syn. Pl. Glum.* 1 : 109. 1854; Bor, *Grass. Burm. Cey. Ind. Pak.* 289. 1960; Raizada & Jain in *Ind. For. Rec.* 5(3) : 214. pl. 10. f. 3. 1965. *Pennisetum cenchroides* Rich. var. *echinoides* Hook. f. *Fl. Brit. India* 7 : 88. 1896. 'Katai' (Hindi).

Tufted, perennial grasses, upto 1 m high. Racemes pale, cylindric, 5.5-10.5 x 1.0 cm. Spikelets ovate-lanceolate, 3-4 mm long, acute, pubescent. Bristles antrorsely scabrid; outer ones slender, numerous; inner ones filiform, subequal. Grains oblong, enclosed but free within the lemma and palea.

Fl. & Fr. : Most part of the year.

Common on the edges of fields and among bushes in wastelands; Parla-ka-Pul (*Majumdar* 10331, BSA).

10. CHLORIS Sw.

1a. Empty lemmas above the fertile floret solitary :

2a. Spikes 7-25 cm long, spreading. Upper glume 5.0-7.5 mm long.

C. dolichostachya 2

2b. Spikes upto 6.5 cm long, closely crowded. Upper glume 3.0-3.5 mm long.

C. virgata 4

1b. Empty lemmas above the lowest 2 to 4 :

3a. Annuals. Spikelets plump, with 3 awns. Peduncle below the inflorescence glabrous.

C. barbata 1

3b. Perennials. Spikelets cuneate, with 4 or 5 awns. Peduncle below the inflorescence hairy.

C. montana 3

1. *Chloris barbata* Sw. *Pl. Ind. Occ.* 1 : 200. 1797; Hook. f. *Fl. Brit. India* 7 : 292. 1896; Bor in *Ind. For. Rec.* 2(1) : 90. pl. 15. 1941 & *Grass. Burm. Cey. Ind. Pak.* 465. 1960. *Andropogon barbatus* L. *Mant. Pl. Alt.* 302. 1771, non L. 1759. *Chloris inflata* Link, *Enum. Pl. Hort. Berol.* 1 : 105. 1821.

Tufted annuals. Spikes 2-5, rarely upto 20, 4-8 x 0.5 cm. Spikelets secund, 2.5 x 1.5 mm. Glumes hyaline, lanceolate, acute. Lower floret hermaphrodite. Lemmas elliptic, bearded on the margins above the middle. Palea oblanceolate, 2.5 mm long, hyaline. Lodicules two. Barren lemmas 2.

Fl. & Fr. : August-October.

Common in grasslands, wastelands, lawns etc.; Pipalkhund, Banswara (*Kanodia* 75571, BSI).

2. *C. dolichostachya* Lagasca, Gen. Sp. Pl. 5. 1816; Bor, Grass. Burm. Cey. Ind. Pak. 466. 1960; Mahesh. Illus. Fl. Delhi f. 257. 1966. *C. incompleta* Roth, Nov. Pl. Sp. 60. 1821; Hook. f. Fl. Brit. India 7 : 290. 1896; Bor in Ind. For. Rec. 2(1) : 93. pl. 16. 1941. '*Moti Bihari*' (Hindi).

Erect or procumbent, annual or perennial grasses, upto 1 m high. Leaves linear. Ligule a rim of hairs. Spikes 4-10, digitate, widely spreading. Spikelets imbricately appressed to the rachis. Lower glume acuminate, 1-nerved, keeled; upper ones aristate, 1-nerved. Empty lemma represented by a fine, about 1.25 cm long awn. Awned lemma (reduced upper floret) and rachilla with a small knob at the tip, representing an immature floret which ends in a bristle. Palea 2-toothed, 2-keeled.

Fl. & Fr. : August October.

Common in wastelands, preferring wet and sandy habitats; Kotharia forest.

3. *C. montana* Roxb. Fl. Ind. 1 : 331. 1820; Hook. f. Fl. Brit. India 7 : 292. 1896; Seth in Ind. For. 81 : 186. 1955; Bor, Grass. Burm. Cey. Ind. Pak. 466. 1960. *C. decora* Thw. Enum. Pl. Zeyl. 371. 1864, non Nees, 1854. *C. montana* Roxb. var. *glaucia* Hook. f. in Trim. Handb. Fl. Cey. 5 : 276. 1900.

Perennial, decumbent grasses, rooting at the nodes. Spikes 4. Spikelets cuneate, 2.5 mm long. Upper lemma very similar to the lowest but smaller. Barren lemmas 3.

Fl. & Fr. : August-October.

Common in wastelands, but distributed very sparsely; Paloda.

4. *C. virgata* Sw. Fl. Ind. Occ. 1 : 203. 1797; Hook. f. Fl. Brit. India 7 : 291. 1896; Bor, Grass. Burm. Cey. Ind. Pak. 468. 1960. *Rhabdochloa virgata* (Sw.) P. Beauv. Ess. Agrost. 84. 158. 1812.

Erect or prostrate grasses, rooting at the nodes and sending up flowering culms. Spikes 6-15, closely crowded, ascending, not spreading. Spikelets 2-ranked, about 3.5 mm long, 2-awned, 4-glumed. Upper glumes aristulate. Barren lemmas ob lanceolate, truncate, with an arista. Grains 3-gonous.

Fl. & Fr. : August-October.

Rare, prefers dry habitats; Banswara (*Majumdar* 10233, 10262, BSA), Ghotal (*Kanodia* 75130, BSI).

11. CHRYSOPOGON Trin. *nom. cons.*

Chrysopogon hackelii (Hook. f.) Fisher in Gamble, Fl. Pres. Madras pt. 10 : 1739. 1934; Bor, Grass. Burm. Cey. Ind. Pak. 117. 1960. *Andropogon hackelii* Hook. f. Fl. Brit. India 7 : 194. 1896.

Robust, annual grasses, upto 1 m or more high. Nodes with a ring of

hairs. Leaves linear, glabrous, not distichous. Ligule a rim of hairs. Sheaths keeled on back. Panicles 10-15 cm long, with spreading branches. Pedicellate spikelets and their pedicels shorter than the sessile spikelets. Lower glumes of sessile spikelets subcymbiform, 2-lobed at the apex, awned. Lower glumes of pedicellate spikelets not awned.

Fl. & Fr. : October-January.

Common along water-streams in the forests, often gregarious; Hura Bowji forest.

12. COIX L.

Coix lacryma-jobi L. Sp. Pl. 972. 1753; Hook. f. Fl. Brit. India 7 : 100. 1896, exclud. varieties; Bor in Ind. For. Rec. 2(1) : 100. pl. 20. 1941 & Grass. Burm. Cey. Ind. Pak. 264. 1960. *C. lacryma* L. Syst. Nat. ed. 10. 1261. 1759. 'Jargadi' (Hindi).

Stout annuals, upto 2.5 m high, often rooting at the nodes. Racemes axillary and terminal, consisting one basal female spikelet enclosed in an ovoid-globose involucre and several male spikelets borne upwards on the same peduncle. Lower glume of male spikelets ovate-oblong, acute, keeled, papyraceous, narrowly or hardly winged, ciliolate. Pseudocarps (female involucre) broadly ovoid, 1.0-1.3 x 0.4-0.6 cm, white or bluish, hard, polished. Lodicules absent in female spikelets and 2 in males.

Fl. & Fr. : September-December.

Common in ponds along the roads; Borda, Jolana (*Kanodia* 75364, BSI).

13. CYMBOPOGON Spreng.

Cymbopogon martinii (Roxb.) Wats. in Atkins. Gaz. N.W. Prov. Ind. 10 : 392. 1882; Bor, Grass. Burm. Cey. Ind. Pak. 129. 1960. *Andropogon martinii* Roxb. Fl. Ind. 1 : 280. 1820. *A. schoenanthus* L. var. *martinii* (Roxb.) Hook. f. Fl. Brit. India 7 : 204. 1896.

Aromatic perennial grasses, with a stout woody root-stock. Leaves linear-lanceolate to lanceolate, tapering, with a cordate and amplexicaul base. Panicles decompound, upto 35 cm long, drooping. Joints and pedicels with very short hairs. Sessile spikelets bisexual, about 3.5 mm long, ovate or oblong, flattened on the back; lower glume with a slit-like groove in the lower half which appears as a rib on the inner surface; upper lemma cleft to the middle and awned in the sinus. Pedicelled spikelets male, lanceolate-oblong; upper florets empty; lower florets with an oblong, ciliate lemma.

Fl. & Fr. : October-April.

Occasional, in scattered patches in wastelands, grasslands and fringes of forests; Banswara (*Kanodia* 75703, BSI).

14. CYNODON Rich. *nom. cons.*

Cynodon dactylon (L.) Pers. Syn. Pl. 1 : 85. 1805; Hook. f. Fl. Brit. India 7 : 288. 1896; Bor in Ind. For. Rec. 2(1) : 111. pl. 22. 1941 & Grass. Burm. Cey. Ind. Pak. 469. f. 52. 1960; Mahesh. Illus. Fl. Delhi f. 260. 1966; Jain in Bull. Bot. Surv. Ind. 9(1-4) : 139. f. 13-25. 1968. *Panicum dactylon* L. Sp. Pl. 58. 1753. 'Doob' (Hindi).

Rhizomatous perennials, rooting on the nodes. Ligule a ring of hairs. Spikes 2-6, linear, digitate or umbellate, 2.5-5.0 cm long. Rachis flat. Spikelets conduplicate, acute, 1.5-2.5 mm long, 1-flowered. Glumes as long or slightly shorter than lemmas. Hairs on the lemmas not clavate. Palea 2-keeled. Grains oblong, 1 mm long, brown.

Fl. & Fr. : Most part of the year.

Abundant in lawns, fields, wastelands and often in river-beds or other low-lying areas. It also multiplies by small pieces of rhizomes and is hard to eradicate. It can withstand trampling and overgrazing ; Pipalkhunt, Banswara (*Majumdar* 10227, BSA).

15. DACTYLOCTENIUM Willd.

- 1a. Plants stoloniferous. Spikes 2.5-5.0 cm long. Rachis-tip upto 2 mm long. *D. aegyptium* 1
- 1b. Plants not stoloniferous. Spikes upto 2 cm long. Rachis tip upto 7 mm long. *D. aristatum* 2

1. **Dactyloctenium aegyptium** (L.) Willd. Enum. Hort. Berol. 1029. 1809 ; Bor in Ind. For. Rec. 2(1) : 113. pl. 23. 1941 & Grass. Burm. Cey. Ind. Pak. 489. f. 54. 1960 ; Mahesh. Illus. Fl. Delhi f. 263. 1966. *Cynosurus aegyptius* L. Sp. Pl. 72. 1753. *Eleusine aegyptia* (L.) Desf. Fl. Atlant. 1 : 85. 1978 ; Hook. f. Fl. Brit. India 7 : 295. 1896. 'Makra-ghas' (Hindi).

Erect or decumbent annuals, 30-60 cm long, rooting on the lower nodes. Ligule a ciliate rim. Spikes 2-6, digitate, often one somewhat below, 2.5-5.0 x 0.5-0.6 cm. Spikelets many, spreading at right angle to the rachis, 2 to 3-flowered. Lower glumes cuspidate, 1-nerved, with a ciliate winged keel ; upper ones awned. Lemmas 7-nerved, mucronate. Paleas 2-keeled, winged, ciliate on the keels. Grains obovoid or globose, rugose.

Fl. & Fr. : August-October.

Common weed in fields and wastelands. Prostrate forms were also noted in this area ; Paloda.

2. **D. aristatum** Link, Hort. Berol. 1 : 59. 1827 ; Bor, Grass. Burm. Cey. Ind. Pak. 489. 1960. *Eleusine aristata* (Link) Ehrenb. ex Boiss. Fl. Orient. 5 : 557. 1884 ; Hook. f. Fl. Brit. India 7 : 296. 1896.

Annual, erect or decumbent grasses. Spikes 1-2, digitate. Spikelets 1 to 3-flowered, often with sterile lower ones. Lower glume keeled ; keel

winged with serrulate margins, 1-nerved. Upper glumes with a geniculate awn. Lemmas 1-nerved, aristulate. Palea 2-keeled, bidentate.

Fl. & Fr. : August-October.

Rare, in wastelands. Resembles closely *D. sindicum* Boiss. and dwarf state of *D. aegyptium* (L.) P. Beauv. ; Banswara (*Kanodia* 75588, BSI).

16. DENDROCALAMUS Nees

Dendrocalamus strictus (Roxb.) Nees in Linnaea 9 : 476. 1834 ; Gamble in Hook. f. Fl. Brit. India 7 : 404. 1896. *Bambusa stricta* Roxb. Pl. Cor. 1 : 58. t. 80. 1798. 'Bans' (Hindi).

Caespitose bamboos, 3-10 m or more high, with spinescent branches at nodes. Leaves linear-lanceolate, bifarious, 1.5-3.0 cm broad ; sheaths striate, hairy. Heads dense, 2.5-4.0 cm in diam., in large panicles. Spikelets spinulose, terete, usually hairy. Glumes 1-2, mucronate, hairy at the top, many-nerved. Keel of lemma produced into a sharp spine. Palea 2-keeled, truncate. Ovary stipitate, turbinate, hairy. Grains broadly ovoid, beaked, hairy above.

Fl. & Fr. : October-December (rare and at long intervals).

Sparingly distributed in dry hilly tracts. It is said to grew once in abundance in the district, that's why the name of the district is Banswara. It is under great biotic pressure and is disappearing gradually from the area ; Puna Pathar forest, Kushalgarh (*Kanodia* 75691, BSI).

17. DESMOTACHYA Stapf

Desmostachya bipinnata (L.) Stapf in Dyer, Fl. Cap. 7 : 632. 1900 ; Bor in Ind. For. Rec. 2(1) : 115. pl. 24. 1941 & Grass. Burm. Cey. Ind. Pak. 491. 1960. *Briza bipinnata* L. Syst. Nat. ed. 10. 2 : 875. 1759. *Poa cynosuroides* Retz. Obs. Bot. 4 : 20. 1786. *Eragrostis cynosuroides* (Retz.) P. Beauv. Ess. Agrost. 162. 1812 ; Hook. f. Fl. Brit. India 7 : 324. 1896. 'Daab' (Hindi).

Tufted, rhizomatous perennials, upto 1.5 m high, with scaly root-stock. Leaves rigid, crowded at the base. Panicles 15-60 cm long. Spikelets sessile, secund, 2-seriate, crowded, deflexed, 10-15 mm long, 3 to 6-flowered. Glumes very unequal. Lemmas keeled, ovate, acute, 3-nerved, coriaceous. Palea shorter than lemma, minutely scabrid on the keels. Stamens 3. Grains obliquely ovoid, about 0.5-0.6 mm long, laterally compressed, obscurely 3-gonous.

Fl. & Fr. : July-November.

Common in low-lying areas on black cotton soils. It is a good sand-binder ; Chiriyavasa.

18. DICHANTHIUM Willemet

- 1a. Sheaths terete. Lower glume of sessile spikelet oblong, obtuse or truncate, with a median nerve. *D. annulatum* 1
- 1b. Sheaths compressed. Lower glume of sessile spikelet obovate or oblong, truncate, without a median nerve. *D. caricosum* 2

1. *Dichanthium annulatum* (Forsk.) Stapf in Prain, Fl. Trop. Afr. 9 : 178. 1917 ; Bor, Grass. Burm. Cey. Ind. Pak. 133. 1960; Mahesh. Illus. Fl. Delhi f. 268. 1966. *Andropogon annulatus* Forsk. Fl. Aegypt.-Arab. 173. 1775; Hook. f. Fl. Brit. India 7 : 196. 1896.

Caespitose perennials, upto 1 m high. Culms glabrous below the inflorescence and hairy on the nodes. Ligule membranous, glabrous, decurrent into sheaths. Spiciform racemes usually 2 to 4, rarely 8-15 or solitary, 5-7 cm long, subdigitate. Rachis-nodes bearded. Joints ciliate. Sessile spikelets oblong; keel of lower glumes not winged; upper lemma awned, very narrow, entire. Pedicelled spikelets oblanceolate; lower glume ciliate but not with bulbous-based hairs, rarely glabrous. Grains obovate-oblong, flat on ventral surface, convex dorsally.

Fl. & Fr. : August-October.

Common in wastelands, fringes of forests and grasslands. It is a good fodder grass ; Banswara (*Kanodia* 51106, BSI).

2. *D. caricosum* (L.) A. Camus in Bull. Mus. Hist. Nat. Paris 27 : 549. 1921; Bor in Ind. For. Rec. 2(1) : 119. 1941; Bor, Grass. Burm. Cey. Ind. Pak. 134. 1960. *Andropogon caricosus* L. Sp. Pl. ed. 2. 1480. 1763; Hook. f. Fl. Brit. India 7 : 196. 1896. *A. caricosus* L. subsp. *genuinus* Hack. in DC. Monogr. Phan. 6 : 568. 1889; Hook. f. I.c. 7: 196. 1896.

Perennial grasses, often stoloniferous, rooting at the lower nodes. Nodes usually glabrous. Ligule a short ciliate membrane. Spiciform racemes one or more, digitate, upto 6 cm long. Rachis jointed, fragile. Peduncles glabrous. Pedicels shorter than sessile spikelets. About 3 pairs of the lowest spikelets sterile. Lower glumes of pedicelled spikelets not armed with marginal bristles.

Fl. & Fr. : February-April.

Rare, near water streams in the forests; Bagaycha forest.

19. DIGITARIA Haller nom. cons.

- 1a. Spikelets of each pair heteromorphous; the sessile spikelets glabrous and pedicelled ones clothed with simple hairs. *D. bicornis* 2
- 1b. Spikelets of each pair identical, either glabrous or hairy :
- 2a. Spikelets glabrous. *D. ciliaris* 3
- 2b. Spikelets clothed with clavate hairs :
- 3a. Tips of the pedicels cup-shaped, with hairs on the rim and below. *D. stricta* 4
- 3b. Tips of the pedicels thickened, not cup-shaped, without a

rim of hairs.

D. abludens 1

1. **Digitaria abludens** (R. & S.) Veldk. in Blumea 21(1) : 53. 1973.
Panicum abludens R. & S. Syst. Veg. 2 : 457. 1817. *Paspalum granulare* Trin. ex Spreng. Neue Entdek. 24 : 47. 1821. *P. pedicellare* Trin. ex Steud. Nom. Bot. ed. 2. 2 : 272. 1840-41; Hook. f. Fl. Brit. India 7 : 19. 1896. *Digitaria granularis* (Trin. ex Spreng.) Henr. Monogr. Digitaria 302. 1950; Bor in Webbia 11 : 328. 1955 & Grass. Burm. Cey. Ind. Pak. 301. 1960; Raizada and Jain in Ind. For. Rec. 5(3) : 187. pl. 5. f. 2. 1965.

Slender annuals, upto 60 cm high. Nodes glabrous. Racemes 2-4, upto 10 cm long. Rachis flexuous or straight, triquetrous. Spikelets 2 to 5-nate, elliptic-oblong to lanceolate, apiculate. Lower glume absent. Upper glume ovate-lanceolate, acute, 3 to 5-nerved. Lower lemma 7-nerved, epaleate, empty; upper one shortly apiculate.

Fl. & Fr. : August-October.

Frequent in open wastelands and neglected corners of cultivated fields; Banswara (*Verma* 776, BSA).

2. **D. bicornis** (Lam.) Roem. & Schult. Syst. Veg. 2 : 470. 1817; Bor in Webbia 11 : 323. 1955 & Grass. Burm. Cey. Ind. Pak. 299. 1960; Raizada & Jain in Ind. For. Rec. 5(3) : 185. pl. 5. f. 7. 1965; Veldk. in Blumea 21(1) : 30. 1973. *Paspalum bicorne* Lam. Tab. Encycl. Meth. Bot. 1 : 176. 1791. *Panicum heteranthum* Hook. f. Fl. Brit. India 7 : 16. 1896, non Link 1820, non Nees & Meyen 1843.

Tufted annuals, upto 20 cm high. Nodes glabrous. Basal sheaths not disintegrating. Racemes 2-6, 5-12 cm long, without a common axis. Spikelets in pairs, elliptic-lanceolate. Lower lemma of sessile spikelets very prominently nerved with slit-like inter-nerve spaces. Pedicelled spikelets differ from sessile spikelets in that upper glume has spreading hairs and often stiff bristles interspersed with them. Lower lemma hairy, 7-nerved. Grains obtusely elliptic, 2.0—2.5 cm long.

Fl. & Fr. : August-October.

Rare, in forests in wet and shady places; Bagaycha forest.

3. **D. ciliaris** (Retz.) Koel. Descr. Gram. 27. 1802; Veldkamp in Blumea 21(1) : 32. 1973. *Panicum ciliare* Retz. Obs. Bot. 4 : 16. 1786. *P. adscendens* H.B. & K. Nov. Gen. Sp. Pl. 1 : 97. 1816. *Digitaria adscendens* (H. B. & K.) Henr. in Blumea 1 : 92. 1934 & Monogr. Digit. 9. 1955; Bor in Webbia 11 : 350. 1955 & Grass. Burm. Cey. Ind. Pak. 298. 1960; Raizada & Jain in Ind. For. Rec. 5(3) : 192. pl. 5 f. 6. 1965; Mahesh. Illus. Fl. Delhi f. 259. 1966.

Erect or decumbent annuals, 50-100 cm high. Leaves linear to lanceolate, scabrid on the margins and tip. Ligule a truncate rim. Sheaths very loose below, hirsute. Racemes 2-9, 8-20 cm long, with or without a common axis. Spikelets 2-nate, elliptic-lanceolate or oblong-elliptic, 2.5 — 3.0 mm

long. Upper glumes half the length of spikelets or slightly longer, 3-nerved, hairy on the nerves. Lower lemma empty, 5 to 7-nerved. Grains ellipsoid, obtuse, 2.5—3.0 mm long.

Fl. & Fr. : August-October.

Common in wastelands. The plants growing among bushes are very robust; Paloda, Banswara (*Kanodia* 75408, BSI).

4. *D. stricta* Roth ex Roem. & Schult. Syst. Veg. 2 : 474. 1817; Bor in Webbia 11 : 344. 1955 & Grass. Burm. Cey. Ind. Pak. 305. 1960; Raizada & Jain in Ind. For. Rec. 5(3) : 188. pl. 5. f. 3. 1965. *Paspalum royleanum* Nees ex Thw. Enum. Pl. Zey. 358. 1864; Hook. f. Fl. Brit. India 7 : 18. 1896.

Delicate, erect, annual grasses, upto 40 cm high, with glabrous nodes. Leaves with tubercle-based hairs in the lower one-third on the upper surface. Ligule lacerate. Racemes 3-15, subdigitate, upto 18 cm long. Rachis triquetrous, narrowly winged. Spikelets elliptic-obovate, obtuse, 1.25 mm long. Lower glume absent. Upper glume ovate, upto one-third the length of spikelet. Lower lemma hairy, 5-nerved.

Fl. & Fr. : August-October.

Rare, in the wastelands. Differs from var. *denudata* (Link) Henr. by the presence of upper glume; Banswara (*Majumdar* 10223, BSA).

20. DIMERIA R. Br.

Dimeria ornithopoda Trin. Fund. Agrost. 167. t. 14. 1820; Hook. f. Fl. Brit. India 7 : 104. 1896; Bor, Grass. Burm. Cey. Ind. Pak. 142. 1960.

Erect, annual grasses, bearded at the nodes. Leaf-sheaths keeled, shorter than internodes. Racemes 2 to 3-nate, simple, sessile, 2-4 cm long. Spikelets 1.5-2.5 mm long linear; callus bearded. Upper glume about 5 mm wide, awnless, not winged. Grains linear, included in the lemma but free, about 2 mm long.

Fl. & Fr. : October-December.

Rare, in moist habitats in wastelands and forests; Ghatol (*Kanodia* 75494, BSI).

21. DINEBRA Jacq.

Dinebra retroflexa (Vahl) Panz. in Denksch. Konigl. Akad. Wiss. Muen. 4 : 270. t. 12. 1814; Bor, Grass. Burm. Cey. Ind. Pak. 491. 1960. *Cynosurus retroflexus* Vahl, Symb. Bot. 2 : 20. 1791. *Dinebra arabica* Jacq. Fragm. 77. t. 121. f. 1. 1807; Hook. f. Fl. Brit. India 7 : 297. 1896.

Annuals, 30-75 cm high. Spikes 0.5-5.0 cm long, erect, spreading or deflexed, arranged racemosely along the axis. Spikelets sessile, secund, 2-seriate, 2 to 3-flowered. Glumes lanceolate, hyaline, keeled, awned. Lemmas 1-nerved. Rachilla produced beyond the uppermost lemma to bear an im-

flect glume. Grains oblong, 3-angled.

Fl. & Fr. : August-November.

Common in cultivated fields in the hilly tracts; Kotharia forest, Bhimgarh (*Kanodia* 75387, BSI).

22. ECHINOCHLOA P. Beauv.

Echinochloa colona (L.) Link, Hort. Berol. 2 : 209. 1833; Bor in Ind. For. Rec. 2(1) : 123. pl. 27. 1941 & Grass. Burm. Cey. Ind. Pak. 308. f. 34. 1960; Raizada & Jain in Ind. For. Rec. 5(3) : 170. 1965. *Panicum colonum* L. Syst. Nat. ed. 10. 2 : 870. 1759; Hook. f. Fl. Brit. India 7 : 32. 1896. '*Hama*' (Hindi).

Erect or ascending grasses, upto 60 cm high, often rooting on the lower nodes. Nodes glabrous. Sheaths compressed, glabrous. Spikes 8-20, sessile, alternate, suberect, appressed to the rachis, distant, 1-2 cm long. Spikelets 2 to 3-nate, globosely ovoid, hispid, 2.5-3.0 mm long. Lower glume ovate, acute, 5-nerved. Upper glume 7-nerved. Lower lemma acute or cuspidate, not awned. Grains plano-convex, about 2 mm long.

Fl. & Fr. : July-November.

Common weed of cultivated fields, particularly in water-logged situations like rice-fields; Paloda, Looda (*Majumdar* 10260, BSA), Banswara (*Kanodia* 51106 A, 75337, BSI).

23. ELEUSINE Gaertn.

Eleusine indica (L.) Gaertn. Fruct. Sem. Pl. 1 : 8. 1788; Hook. f. Fl. Brit. India 7 : 293. 1896; Bor. Grass. Burm. Cey. Ind. Pak. 493. 1960; Mahesh. Illus. Fl. Delhi f. 261. 1966; Phillips in Kew Bull 27 : 256. 1972. *Cynosurus indicus* L. Sp. Pl. 72. 1753.

Erect, annual grasses, upto 75 cm high. Ligule a ciliate rim. Basal leaf-sheaths glabrous at base. Spikes 1-4, subdigitate, upto 15 cm long, slender, narrow, straight, glabrous at base. Rachis flattened. Spikelets 2-seriate, ovate-oblong, 3 to 6-flowered. Lower glume 1-nerved. Upper glume 5-nerved. Lemmas boat-shaped, mucronate, 3-nerved. Palea 2-keeled. Grains oblong, obtusely 3-gonous, reddish-brown.

Fl. & Fr. : July-October.

Occasional, along the edges of fields, on pastures and roadsides; Banswara (*Kanodia* 75300, BSI).

24. ERAGROSTIS N. M. Wolf

1a. Spikelets breaking up from above downwards. Rachis fragile :

2a. Keel of the palea ciliate :

| | |
|--|--------------------------|
| 3a. Panicles spiciform or compact and dense : | |
| 4a. Lemmas ciliate on the keels. | <i>E. ciliaris</i> 3 |
| 4b. Lemmas eciliate on the keels. | <i>E. riparia</i> 9 |
| 3b. Panicles effuse : | |
| 5a. Culms and leaves viscous. | <i>E. viscosa</i> 13 |
| 5b. Culms and leaves not viscous. | <i>E. tenella</i> 10 |
| 2b. Keel of the palea smooth or scabrid, not ciliate : | |
| 6a. Branches of panicles whorled. Spikelets loose, scattered, upto 5-flowered. Lemmas less than 1 mm long. | <i>E. japonica</i> 6 |
| 6b. Branches of panicles solitary. Spikelets densely clustered, 6 to 14-flowered. Lemmas 1 mm long or more. | <i>E. diarrhena</i> 4 |
| 1b. Spikelets breaking up from below upwards. Rachis tough : | |
| 7a. Lemmas upto 1.8 mm long : | |
| 8a. Plants glandular, with pitted glands just above and below the lowest node of panicle. Glandular bands below the culm nodes also present. | <i>E. pilosa</i> 8 |
| 8b. Plants eglandular. | <i>E. gangetica</i> 5 |
| 7b. Lemmas over 2 mm long : | |
| 9a. Plants glandular; the glands present on the pedicels and keel and margins of leaves. | <i>E. ciliianensis</i> 2 |
| 9b. Plants eglandular : | |
| 10a. Spikelets more than 2 mm wide : | |
| 11a. Annuals. Lemmas ovate or ovate-elliptic. Grains obovoid, compressed. Sheaths not bearded at the mouth. | <i>E. unioloides</i> 12 |
| 11b. Perennials. Lemmas elliptic-oblong. Grains oblong, not compressed. Sheaths bearded at the mouth. | <i>E. atrovirens</i> 1 |
| 10b. Spikelets upto 2 mm wide : | |
| 12a. Pedicels more than 5 mm long. Lemmas broadly ovate. | <i>E. tremula</i> 11 |
| 12b. Pedicels upto 2 mm long. Lemmas narrowly elliptic-lanceolate. | <i>E. minor</i> 7 |

1. *Eragrostis atrovirens* (Desf.) Trin. ex Steud. Nom. Bot. ed. 2. 1 : 562. 1840; Bor, Grass. Burm. Cey. Ind. Pak. 503. 1960; Roy in Bull. Bot. Surv. Ind. 18 : 107. 1979. *Poa atrovirens* Desf. Fl. Atlant. 1 : 73. t. 14. 1798.

Strongly perennial grasses. Ligule membranous. Panicles ovate or oblong, upto 20 x 5 cm. Pedicels 1-3 mm long. Spikelets linear, grey or purple, 10 to 12-flowered. Glumes ovate-lanceolate, 1-nerved. Lemmas 3-nerved, acute or subacute when flattened. Palea scabrid. Anthers 3, brownish-yellow. Grains 0.5-1.0 mm long, red or brown.

Fl. & Fr. : All round the year.

This is a polymorphic species, usually confined to swampy soils; Banswara (*Majumdar* 10299, BSA).

2. *E. ciliianensis* (All.) Vignolo-Lutati in Malpighia 18 : 386. 1904; Bor in Ind. For. Rec. 2(1) : 134. 1941 & Grass. Burm. Cey. Ind. Pak. 505. 1960; Roy in Bull. Bot. Surv. Ind. 18 : 106. 1979. *Poa ciliianensis* All. Fl. Pedem. 2 : 246. t. 91. f. 2. 1785. *Eragrostis major* Host, Gram. 181. 1802; Stapf in Hook.

f. Fl. Brit. India 7 : 320. 1896. 'Pungya' (Hindi).

Annual grasses, upto 90 cm high. Leaf-sheaths bearded at the mouth. Panicles upto 20 cm long. Rachis smooth. Pedicels shorter than the spikelets. Spikelets narrowly oblong or ovate-oblong, leaden-grey, upto 6-flowered. Lemmas ovate to ovate-oblong, 2.0-2.2 mm long. Palea obovate, shorter than lemma, persistent. Grains subglobose, 0.6 mm in diam., reddish-brown.

Fl. & Fr. : August-November.

Rare, in the wastelands; Parla-ka-Pul (*Majumdar* 10324, BSA).

3. *E. ciliaris* (L.) R. Br. in Tuckey, Narr. Exp. Congo App. 478. 1818; Staph in Hook. f. Fl. Brit. India 7 : 314. 1896; Bor, Grass. Burm. Cey. Ind. Pak. 506. 1960; Roy in Bull. Bot. Surv. Ind. 18 : 103. 1979. *Poa ciliaris* L. Syst. Nat. ed. 10. 2 : 875. 1759.

Geniculately ascending annuals, upto 30 cm high. Leaves linear, 5-8 x 0.1-0.2 cm; sheaths bearded with long hairs at the mouth. Ligule a fringe of short hairs. Panicles spiciform, 1-3 cm long, cylindric, more or less interrupted, appearing hairy due to the long cilia on the keels of palea. Spikelets 6 to 12-flowered, 2-5 x 2.5 mm. Grains ovoid, 0.5 mm long.

Fl. & Fr. : October-January.

Common in wastelands and neglected corners of fields and gardens; Lasara, Banswara (*Kanodia* 75545, BSI).

4. *E. diarrhena* (Schult.) Steud. Syn. Pl. Glum. 1 : 266. 1854; Bor, Grass. Burm. Cey. Ind. Pak. 507. 1960; Mahesh. Illus. Fl. Delhi f. 254. 1966; Roy in Bull. Bot. Surv. Ind. 18 : 105. 1979. *Poa diarrhena* Schult. Mant. Syst. 2 : 616. 1827. *Eragrostis interrupta* auct. plur. non (R. Br.) P. Beauv. 1812; Staph in Hook. f. Fl. Brit. India 7 : 316. 1896. *E. interrupta* auct. non P. Beauv. var. *diarrhena* (Schult.) Staph, I.c. 7 : 316. 1896. *E. interrupta* auct. non P. Beauv. var. *koenigii* Staph, I.c. 7 : 316. 1896. *Diandrochloa diarrhena* (Schult.) Henry in Bull. Bot. Surv. Ind. 9 : 290. 1968.

Tufted annuals. Legule membranous. Spikelets ovate to linear. Palea scabrid. Stamens 2, yellowish-brown. Grains reddish-brown, polished, 0.5 mm long, embryo-end pointed.

Fl. & Fr. : October-March.

Subgregarious in damp soils on moist beds of tanks, ponds and rivers. Very close to *E. japonica* (Thunb.) Trin.; Bagaycha forest.

5. *E. gangetica* (Roxb.) Steud. Syn. Pl. Glum. 1 : 266. 1854; Bor in Ind. For. Rec 2 (1) : 131. 1941 & Grass. Burm. Cey. Ind. Pak. 508. 1960; Roy in Bull. Bot. Surv. Ind. 18 : 107. 1979. *Poa gangetica* Roxb. Fl. Ind. 1 : 341. 1820. *Eragrostis stenophylla* Hochst. ex Miq. in Verh. Konink.-Nederl. Int. 3 : 4, 39. 1851, *pro parte*; Staph in Hook. f. Fl. Brit. India 7 : 318. 1896, *pro parte*.

Tufted annuals, upto 80 cm high. Ligule membranous. Panicles ovate or oblong, 7-15 cm long, lower branches not whorled, usually solitary. Spikelets alternate but crowded, 4-10 x 1.5-2.5 mm, ovate, oblong or linear, grey-green,

30 to 40-flowered. Glumes ovate-lanceolate, 1-nerved, scabrid on keels. Lemmas 3-nerved. Palea scabrid, deciduous. Anthers 2. Grains subglobose, 0.4-0.6 mm long.

Fl. & Fr. : August-December.

Common from dry sandy and rocky grounds to aquatic habitats; Bagaycha forest, Banswara (*Majumdar* 10172 A, BSA), Lodha tank (*Kanodia* 75599, BSI).

6. *E. japonica* (Thunb.) Trin. in Mem. Acad. Sci. Petersb. ser. 6. 1 : 405. 1831; Bor, Grass. Burm. Cey. Ind. Pak. 509. 1960; Roy in Bull. Bot. Surv. Ind. 18 : 105. 1979. *Poa japonica* Thunb. Fl. Jap. 51. 1784. *Eragrostis interrupta* P. Beauv. var. *tenuissima* Stapf in Hook. f. Fl. Brit. India 7 : 316. 1896. *Diandrochloa japonica* (Thunb.) Henry in Bull. Bot. Surv. Ind. 9 : 290. 1968.

Tufted annuals, 20-80 cm high. Ligule membranous. Panicles oblong or linear, not more than 15 cm wide. Spikelets ovate, 1.2-1.5 x 0.8-1.0 mm. Glumes ovate-oblong, obtuse, 1-nerved. Lemmas 3-nerved, obtuse. Palea scabrid. Stamens 2 or 3, yellow. Grains obovoid to elliptic, 0.7 mm long, reddish-brown, polished.

Fl. & Fr. : September-January.

Common on black cotton soils in fields and wastelands, often met with on the banks of ponds and streams; Kushalgadh.

7. *E. minor* Host, Gram. Austr. 4 : 15. 1809; Stapf in Hook. f. Fl. Brit. India 7 : 321. 1896. *E. pappiana* Chiov. in Ann. R. Ist. Bot. Roma 8 : 371. 1908; Bor, Grass. Burm. Cey. Ind. Pak. 511. 1960; Roy in Bull. Bot. Surv. Ind. 18 : 108. 1979.

Annual, eglandular grasses, upto 60 cm high. Panicles not emerging from the basal sheaths. Spikelets many-flowered, pale-green or purplish. Lemmas 1.5-2.0 mm long, falling away with or without paleas from below upwards.

Fl. & Fr. : August-November.

Rare, in wastelands. Superficially resembles *E. tremula* (Lam.) Hochst. ex Steud., but its pedicels are very much shorter and lemmas are of different shape; Ghatol (*Majumdar* 10172 A, BSA).

8. *E. pilosa* (L.) P. Beauv. Ess. Agrost. 71, 162, 175. 1812; Stapf in Hook. f. Fl. Brit. India 7 : 323. 1896; Bor in Ind. For. Rec. 2(1) : 133. 1941 & Grass. Burm. Cey. Ind. Pak. 512. 1960; Mahesh. Illus. Fl. Delhi f. 251. 1966; Roy in Bull. Bot. Surv. Ind. 18 : 105. 1979. *Poa pilosa* L. Sp. Pl. 68. 1753.

Flaccid, tufted annuals, 15-60 cm high. Ligule a rim of hairs. Sheaths glabrous. Panicles 5-14 cm long, the lowest branches fascicled or subwhorled. Spikelets narrow, straight. Lower glume nerveless; upper glume 1-nerved. Lemma acute or bidentate, 3-nerved. Palea smooth or scabrid on the keels. Anthers 3. Grains ellipsoid, 0.6-1.0 cm long.

Fl. & Fr. : Most part of the year.

Native of Tropical and South Africa, naturalized on the banks of ponds,

rivers, streams and in other wet habitats; Shergarh.

9. *E. riparia* (Willd.) Nees, Agrost. Bras. 512. 1829; Bor, Grass. Burm. Cey. Ind. Pak. 513. 1960; Roy in Bull. Bot. Surv. Ind. 18 : 104. 1979. *Poa riparia* Willd. in Ges. Natur. Freunde Berlin Neue Schrift. 4 : 185. 1803. *Eragrostis tenella* (L.) P. Beauv. var. *riparia* (Willd.) Stapf in Hook. f. Fl. Brit. India 7 : 315. 1896.

Tufted perennials. Ligule ciliate. Panicles delicate, contracted, very narrow, subcylindric. Rachis glabrous. Spikelets crowded, oblong, 2-3 x 1.5 mm, rounded at the apex. Lemma eciliate. Keel of palea ciliate; cilia shorter than the width of florets; glands of hair-base inconspicuous. Anthers 3, light pink. Grains ovoid, brown.

Fl. & Fr. : August-November.

Common on loam or sandy moist soils in wastelands ; Banswara (*Majumdar* 10223 B, BSA).

10. *E. tenella* (L.) P. Beauv. ex Roem. & Schult. Syst. Veg. 2 : 576. 1817; Stapf in Hook. f. Fl. Brit. India 7 : 315. 1896; Bor in Ind. For. Rec. 2(1) : 129. 1941 & Grass. Burm. Cey. Ind. Pak. 513. 1960; Roy in Bull. Bot. Surv. Ind. 18 : 104. 1979. *Poa tenella* L. Sp. Pl. 69. 1753. *P. amabilis* L. Sp. Pl. 68. 1753. *P. plumosa* Retz. Obs. Bot. 4 : 20. 1786. *Eragrostis tenella* (L.) P. Beauv. ex Roem. & Schult. var. *plumosa* (Retz.) Stapf, I. c. 7 : 315. 1896.

Weak, tufted annuals, 10-20 cm tall. Nodes glabrous. Panicles 8-10 x 3-4 cm; axis hairy on the nodes. Spikelets ovate-oblong, 1.5-2.0 x 1.0-1.2 mm, 4 to 6-flowered. Lemmas eciliate on the keels and margins. Keels of palea more or less ciliate. Anthers 3. Grains ovoid, 0.4-0.6 mm long, light brown, polished.

Fl. & Fr. : All round the year.

Common in wastelands, pastures and forests near water resources ; Banswara, Bagaycha forest, Ghatol (*Kanodia* 75490, BSI).

11. *E. tremula* (Lam.) Hochst. ex Steud. Syn. Pl. Glum. 1 : 26. 1854; Stapf in Hook. f. Fl. Brit. India 7 : 320. 1896; Bor, Grass. Burm. Cey. Ind. Pak. 514. 1960; Mahesh. Illus. Fl. Delhi f. 250. 1966; Roy in Bull. Bot. Surv. Ind. 18 : 108. 1979. *Poa tremula* Lam. Tab. Encycl. Meth. Bot. 1 : 185. 1791.

Tufted, erect or ascending annuals, upto 70 cm high. Leaf-margins eglandular. Panicles very diffuse, with solitary, ascending, filiform branches. Spikelets linear, 1-2 cm long, more than 12-flowered. Grains nearly globose.

Fl. & Fr. : August-November.

Fairly common in fallow and cultivated fields ; Banswara (*Kanodia* 75595, BSI).

12. *E. unioloides* (Retz.) Nees ex Steud. Syn. Pl. Glum. 1 : 264. 1854; Bor in Ind. For. Rec. 2(1) : 130. pl. 29. 1941 & Grass. Burm. Cey. Ind. Pak. 515. 1960; Roy in Bull. Bot. Surv. Ind. 18 : 106. 1979. *Poa unioloides* Retz.

Obs. Bot. 5 : 19. 1789. *Eragrostis amabilis* sensu Stapf in Hook. f. Fl. Brit. India 7 : 317. 1896, non (L.) Wt. & Arn. 1838.

Annual grasses, 10-50 cm high, solitary or loosely tufted. Leaves 3-10 x 0.2-0.5 cm. Ligule reduced to a very narrow rim. Panicles oblong or ovoid, 5-10 cm long. Spikelets ovate to ovate-oblong, much compressed, 2 mm or more wide, green to reddish-purple. Glumes linear-lanceolate, acute. Palea deciduous, scabrid on keels.

Fl. & Fr. : August-November.

Common in wet and shady habitats in the forests. The species varies greatly in size of lemma, but can be distinguished by its reddish-purple spikelets ; Puna Pathar forest, Banswara (*Kanodia*, 75236, BSI).

13. *E. viscosa* (Retz.) Trin. in Mem. Acad. Sci. Petersb. ser. 6, 1 : 397. 1830 ; Bor in Ind. For. Rec. 2(1) : 128. 1941 & Grass. Burm. Cey. Ind. Pak. 515. 1960 ; Roy in Bull. Bot. Surv. Ind. 18 : 104. 1979. *Poa viscosa* Retz. *Obs. Bot.* 4 : 20. 1786. *Eragrostis tenella* (L.) P. Beauv. ex Roem. & Schult. var. *viscosa* (Retz.) Stapf in Hook. f. Fl. Brit. India 7 : 315. 1896.

Tufted, weak annuals, rarely perennials, more than half of the plant is panicle. Ligule-base and mouth of sheath with very long cilia. Panicles spreading, about 15 x 5 cm. Glumes and young parts of the stem are sticky owing to the presence of glands. Lemmas 1.0-1.25 mm long, smooth or scaberulous on the keels, ciliate. Anthers 2, yellowish or pinkish-brown. Grains 0.5 mm long, polished, pale-brown.

Fl. & Fr. : September-November.

Common in wastelands on sandy and gravelly moist soils ; Paria-ka-Pul (*Majumdar* 10312, BSA).

25. EREMOPOGON (Hack.) Stapf

Eremopogon foveolatus (Del.) Stapf in Prain, Fl. Trop. Afr. 9 : 183. 1917 ; Bor, Grass. Burm. Cey. Ind. Pak. 148. 1960 ; Mahesh. Illus. Fl. Delhi f. 232. 1966. *Andropogon foveolatus* Del. Fl. Egypt. 16. t. 8. f. 2. 1812 ; Hook. f. Fl. Brit. India 7 : 168. 1896, pro parte. *A. strictus* Roxb. Fl. Ind. 1 : 265. 1832. *Eremopogon strictus* (Roxb.) A. Camus in Ann. Soc. Linn. Lyon 68 : 208. 1922. *Dichanthium foveolatum* (Del.) Roberty in Boissiera 9 : 170. 1960.

Tufted perennials, upto 75 cm high, with bearded nodes. Leaf-sheaths shorter than internodes, with few hairs near the base. Ligule truncate, hyaline, ciliate. Racemes upto 4 cm long. Spikelets oblong-lanceolate, purplish, glabrous. Lower glume of sessile spikelets 3-4 mm long, with many, smooth nerves and a deep pit. Upper lemma reduced to stipiform base, awned from tip. Lower glumes of pedicelled spikelets 5-nerved, pitted. Lemmas awnless, often wanting.

Fl. & Fr. : July-October.

Fairly common in barren wastelands and open forests in dry habitats ; Shyampura (Kanodia 75395, BSI).

26. ERIANTHUS Michx.

Erianthus bengalensis (Retz.) Back. f. Fl. Java 3 : 586. 1968. *Saccharum bengalense* Retz. Obs. Bot. 5 : 16. 1789 ; Bor, Grass. Burm. Cey. Ind. Pak. 211. 1960. *S. arundinaceum* auct. plur. non Retz. 1789 ; Hook. f. Fl. Brit. India 7 : 119. 1896, pro parte. *S. munja* Roxb. Fl. Ind. 1 : 246. 1820. *Erianthus munja* (Roxb.) Jesw. in Arch. Suikerind. Ned.-Ind. 399. 1925 ; Raizada *et al.* in Ind. For. Rec. 4(7) : 186. 1961. 'Sarkanda' (Hindi).

Tufted, perennial grasses, 2-3 m high. Ligule truncate, membranous, ciliate. Panicles 30-90 cm long, plumose, silvery or grey ; peduncles 30-90 cm long, pliomose, silvery or grey ; peduncles glabrous. Spikelets in pairs, one sessile and the other long-pedicelled, 4-6 mm long, longer than the joints of the rachis. Lower glume of sessile spikelets villous with long hairs, 2-nerved ; upper glume glabrous. Paleas wrapping around the linear-oblong grains. Callus-hairs about 1 mm long. Pedicelled spikelets similar to sessile spikelets.

Fl. & Fr. : October-December.

More common on alluvial sandy soils near water resources, often in comparatively drier habitats ; Banswara (Majumdar 10252, BSA).

27. ERIOCHLOA H.B. & K.

Eriochloa procera (Retz.) C.E. Hubb. in Kew Bull. 1930 : 256. 1930 ; Bor, Grass. Burm. Cey. Ind. Pak. 312. 1960 ; Raizada & Jain in Ind. For. Rec. 5(3) : 196. pl. 6. f. 2. 1965 ; Mahesh. Illus. Fl. Delhi f. 276. 1966. *Agrostis procera* Retz. Obs. Bot. 4 : 19. 1786. *Eriochloa polystachya* sensu Hook. f. Fl. Brit. India 7 : 20. 1896, non H.B. & K. 1816.

Annual or perennial grasses, with simple or branched, erect or geniculate culms. Racemes peduncled or the upper ones subsessile. Spikelets ovate-lanceolate to oblong, acute or acuminate, laxly imbricate, distichous, 2.5-3.5 x 1.5 mm, falling entire from the pedicels. Lower glume absent ; upper ones 5-nerved, with a barbellate cusp. Upper lemma chartaceous, involute-margined, with an apical barbellate mucro. Stamens 3. Grains oblong, smooth, free within the hardened lemma and palea.

Fl. & Fr. : August-October.

Gregarious in shallow watered ponds ; Ghatol, Lodha tank (Kanodia 75334, BSI).

28. HACKELOCHLOA O. Ktze.

Hackelochloa granularis (L.) O. Ktze. Rev. Gen. Pl. 2 : 776. 1891 ; Bor, Grass. Burm. Cey. Ind. Pak. 151. 1960. *Cenchrus granularis* L. Mant. Pl. Alt. 2 : 575. 1771. *Manisuris granularis* (L.) L. f. Nov. Gram. Gen. 40. 1779 ; Hook. f. Fl. Brit. India 7 : 159. 1896.

Erect annuals, 30-75 cm high, hirsute with tubercle based hairs. Nodes bearded. Leaf-sheaths keeled on the back ; blades cordate at base. Spikes 1.5-2.5 x 0.3 cm. Spikelets in dissimilar pairs ; one globose, sessile, deeply pitted, 2-sexual and 1.5 mm long ; the other ovate, pedicellate and neuter. Lower glume of sessile spikelets rounded-orbicular, pitted and many-nerved ; upper glume 3-nerved. Lower glume of pedicellate spikelets asymmetrical, scaberulous, 5 to 7-nerved. Palea linear. Grains subglobose.

Fl. & Fr. : August-March.

Common in moist open grasslands, wastelands and lawns ; near Mahi river, Pipalkhund, Banswara (*Kanodia* 75351, BSI).

29. HEMARTHRIA R. Br.

Hemarthria compressa (L. f.) R. Br. Prodr. 207. 1810 ; Bor, Grass. Burm. Cey. Ind. Pak. 161. 1960 ; Mahesh. Illus. Fl. Delhi f. 244. 1966. *Rottboellia compressa* L. f. Suppl. 114. 1781 ; Hook. f. Fl. Brit. India 7 : 153. 1896.

Decumbent or floating perennials, rooting on the nodes. Ligule a scarious rim. Spikes straight, usually solitary, 5-12 x 0.2-0.3 cm, joints fused with pedicels. Sessile spikelets 4.0-4.5 mm long, with lower glumes acute, not acuminate or tailed. Pedicellate spikelets male or if hermaphrodite then with rudimentary anthers ; upper glume acuminate, 5 to 9-nerved. Terminal spikelet with a long pedicel and with glumes longer and acuminate than others.

Fl. & Fr. : August-December.

Common in temporary ponds along the roads. Sometimes it forms gregarious patches ; Ghatol, Banswara.

30. HETEROPOGON Pers.

Heteropogon contortus (L.) P. Beauv. ex Roem. & Schult. Syst. Veg. 2 : 836. 1817 ; Bor in Ind. For. Rec. 2(1) : 143. pl. 33. 1941 ; Bor, Grass. Burm. Cey. Ind. Pak. 163. f. 6. 1960 ; Mahesh. Illus. Fl. Delhi f. 234. 1966. *Andropogon contortus* L. Sp. Pl. 1045. 1753 ; Hook. f. Fl. Brit. India 7 : 199. 1896. 'Lap' (Hindi).

Tufted perennials, upto 75 cm high. Ligule a ciliate, scarious rim. Recemes bristle-hairy, upto 12 cm long. Spikelets closely imbricate ;

lower 2-6 sessile spikelets awnless, male or neuter; upper sessile spikelets long-awned, bisexual. Callus bearded. Lower glumes of sessile spikelets lanceolate, terete, 6.0-6.5 mm long. Pedicellate spikelets 8-10 mm long; lower glume eglandular, hirsute. Lower lemma empty, ciliate. Grains sub-linear, terete.

Fl. & Fr. : August-November.

Common in wastelands, particularly in neglected corners of fields and gardens. The awns with fruits and sharp callus attach themselves to clothing ; Banswara (*Verma* 253, BSA ; *Kanodia* 75246, BSI).

31. IMPERATA Cyr.

Imperata cylindrica (L.) Raeuschel. Nom. Bot. ed. 3. 10. 1797; Bor, Grass. Burm. Cey. Ind. Pak. 169. 1960 ; Mahesh. Illus. Fl. Delhi f. 243. 1966. *Lagurus cylindricus* L. Syst. Nat. ed. 10. 2 : 878. 1759. *Imperata arundinacea* Cyrill. Pl. Rar. Neap. 2 : 26. 1792 ; Hook. f. Fl. Brit. India 7 : 106. 1896.

Perennials, with creeping rhizomatous root-stocks. Ligule a scarious, erose rim. Sheaths glabrous. Panicles cylindric, silky-hairy, 5-30 cm long, with short racemes. Spikelets linear-lanceolate, acute. Callus bearded with soft, white hairs. Lower glumes lanceolate, acuminate, hairy on the back. Lower lemma oblong, truncate and ciliate at the apex, epaleate, empty. Grains oblong.

Fl. & Fr. : June-October.

Common in lawns, gardens, near ponds and canals and edges of forests ; Banswara (*Kanodia* 75572, BSI).

32. ISCHAEMUM L.

Ischaemum rugosum Salisb. Icon. Strip. Rar. I. t. I. 1791 ; Hook. f. Fl. Brit. India 7 : 127. 1896 ; Bor in Ind. For. Rec. 2(1) : 148. pl. 35. 1941 ; Bor, Grass. Burm. Cey. Ind. Pak. 184. 1960.

Erect or ascending annuals, 30-60 cm high. Leaves linear-lanceolate, 10-15 x 0.5-1.5 cm, the upper often reduced to spathiform sheaths partially enclosing racemes. Racemes usually 2, erect, 2.5-8.0 cm long, with trigonous rachis. Spikelets linear-oblong, upto 6 mm long, the sessile and pedicellate closely appressed together. Lower glume of sessile spikelets glabrous dorsally, with inturned margins from base to apex. Pedicels of pedicelled spikelets less than one-third the length of sessile spikelets. Lower glume winged along one side.

Fl & Fr. : September-November.

Common in wet and marshy habitats, especially in ponds along the roads and rice-fields ; Borda, Banswara (*Majumdar*, 10289, BSA).

33. ISEILEMA Anders.

Iseilema laxum Hack. in DC. Mon. Phan. 6 : 682. 1889 ; Hook. f. Fl. Brit. India 7 : 218. 1896 ; Bor, Grass. Burm. Cey. Ind. Pak. 188. 1960. 'Musel' (Hindi).

Erect, perennial grasses, 15-80 cm high. Leaves linear; sheaths lax, glabrous. Ligule membranous, ciliate. Panicles of distant, axillary, pedunculate fascicles. Spathes and upper floral leaves not tubercled on the keels. Involucral spikelets truly whorled, 4 mm long, oblong-lanceolate; pedicels longer than they are broad at the apex. Upper glume acute, 3 to 5-nerved; lower glume acuminate, 3-nerved. Hermaphrodite spikelets lanceolate, 4-6 mm long. Upper glume 2-fid or truncate at the tip, 3 to 5-nerved; lower glume 1-nerved, glabrous at the base, hairy-above and ciliate on the margins below.

Fl. & Fr. : August-December.

Common in protected forests, grasslands and neglected corners of gardens and fields ; Mahi River (Pipalkhund).

34. MELANOCENCHRIS Nees

Melanocenchrus jacquemontii Jaub. & Spach, Ill. Pl. Or. 4 : 36. t. 325. 1851; Bor, Grass. Burm. Cey. Ind. Pak. 473. 1960; Nair & Nayar in Bull. Bot. Surv. Ind. 16 : 142. f. 1A-F. 1977. *M. royleana* Nees ex Steud. Syn. Pl. Glum. 1 : 218. 1854. *Gracilea royleana* (Nees ex Steud.) Hook. f. Fl. Brit. India 7 : 284. 1896.

Tufted annuals, upto 25 cm high. Leaves convolute, narrow, filiform, not aggregated at the base, covered with long, tubercle-based hairs. Spikes filiform, upto 7 cm long. Spikelets, including the awns, about 8 mm long, 2-flowered, green or purple. Lemmas 3-nerved, 2-toothed at the apex, awned from the sinus. Grains oblong-elliptic, brown.

Fl. & Fr. : August-October.

Common in open dry habitats, chiefly in the cracks of rocks ; Widita Hillage forests, Jolana (*Kanodia* 75574, BSI).

35. OPLISMENUS P. Beauv.

- | | |
|---|------------------------|
| 1a. Racemes dense, upto 1.5 cm long. Rachis and pedicels with long hairs. Awns pale, barbellate. | <i>O. burmannii</i> 1 |
| 1b. Racemes lax, 3-8 cm long. Rachis and pedicels with short hairs. Awns reddish, smooth, viscid. | <i>O. compositus</i> 2 |

1. **Oplismenus burmannii** (Retz.) P. Beauv. Ess. Agrost. 54, 168, 169. 1812 ; Hook. f. Fl. Brit. India 7 : 68. 1896 ; Bor in Ind. For. Rec. 2(1) : 159. 1941 & Grass. Burm. Cey. Ind. Pak. 317. 1960 ; Raizada & Jain in Ind. For.

Rec. 5(3) : 181, pl. 4, f. 2. 1965 ; Mahesh. Illus. Fl. Delhi f. 265. 1966. *Panicum burmannii* Retz. Obs. Bot. 3 : 10. 1783. *Oplismenus indicus* sensu Duthie, Grass. N.W. Ind. 8. 1888, non Roem. & Schult. 1817.

Diffuse, procumbent, annual grasses, 15-50 cm long. Leaves ovate-lanceolate, 2-5 x 0.6-1.3 cm. Ligule a ciliate rim. Recemes 5-8, alternate along a long or short axis. Spikelets 2 to 3-nate, lanceolate, acute. Glumes awned, upper ones 5-nerved, lower ones 3-nerved ; awns longer than glumes. Lower lemma ovate, ciliate and hairy on the back at the top, 9-nerved. Upper lemma acute.

Fl. & Fr. : July-December.

Common in moist and shady habitats, particularly in gardens forming dense carpets ; Banswara (*Majumdar* 10234, BSA), Ghatol (*Kanodia* 75495, BSI).

2. ***O. compositus*** (L.) P. Beauv. Ess. Agrost. 54, 168. 1812 ; Hook. f. Fl. Brit. India 7 : 66. 1896 ; Bor in Ind. For. Rec. 2(1). 158. pl. 42. 1941 & Grass. Burm. Cey. Ind. Pak. 317. 1960 ; Raizada & Jain in Ind. For. Rec. 5(3) : 180. 1965. *Panicum compositum* L. Sp. Pl. 57. 1753.

Perennials or annuals, upto 1 m high, with decumbent culms rooting at the base. Leaves linear to lanceolate, 3.5-12.5 x 0.5-1.0 cm, hairy below, ciliate. Ligule truncate, ciliate. Spikelets 2 to 3-nate, lanceolate-oblong, 3.5-5.0 mm long, tinged with purple. Lower glume 5-nerved ; upper ones 9-nerved ; awns longer than glumes. Grains dorsally compressed.

Fl. & Fr. : September-December.

Gregarious in patches in wet and shady habitats in forests ; Puna Pathar forest.

36. OROPETIUM Trin.

Oropetium thomaeum (L. f.) Trin. Fund. Agrost. 98. t. 3. 1820 ; Hook. f. Fl. Brit. India 7 : 366. 1896 ; Bor, Grass. Burm. Cey. Ind. Pak. 474. 1960 ; Mahesh. Illus. Fl. Delhi f. 245. 1966 ; Jain in Bull. Bot. Surv. Ind. 9 : 284. f 1. 1968. *Nardus thomaea* L. f. Suppl. 105. 1781. *Rottboellia thomaea* (L. f.) Koenig in Naturf. 23 : 210. 1788.

Tufted annuals, 5-10 cm high. Roots fibrous, capillary. Leaves shorter or longer than the stem, filiform. Spikes straight or curved, solitary or 2 to 3-together, 2-5 cm long. Spikelets 1.5-2.0 mm long, 1-flowered, half immersed in the distichous cavities on the rachis. Lemmas ovate, truncate or 3-toothed, scabrid on the keels. Palea 2-keeled, glabrous. Grains fusiform or oblong, 0.8 mm long, brown, shining.

Fl. & Fr. : August-October.

Short-lived monsoon grass found in exposed wastelands ; Widita Hillage forest.

37. PANICUM L.

| | |
|--|-------------------------|
| 1a. Spikelets about 1.5 mm long. | <i>P. walense</i> 4 |
| 1b. Spikelets more than 1.5 mm long : | |
| 2a. Plants terrestrial, with tough culms. Spikelets ovate-oblong or elliptic : | |
| 3a. Panicle contracted. Spikelets persistent. Lower glume orbicular. | <i>P. sumatrense</i> 3 |
| 3b. Panicles effuse. Spikelets deciduous. Lower glume ovate. | <i>P. psilopodium</i> 2 |
| 2b. Plants aquatic or marshy, with spongy culms. Spikelets lanceolate. | <i>P. paludosum</i> 1 |

1. **Panicum paludosum** Roxb. Fl. Ind. 1 : 310. 1820 ; Bor, Grass. Burm. Cey. Ind. Pak. 329. 1960 ; Raizada & Jain in Ind. For. Rec. 5(3) : 157. pl. 1. f. 4. 1965 ; Majumdar in Bull. Bot. Soc. Beng. 27 : 51. f. 19. 1973. *P. proliferum* auct. plur. non Lam. 1797 ; Hook. f. Fl. Brit. India 7 : 50. 1896.

Perennial grasses, 1-2 m tall. Culms emerged or floating, rooting on the lower nodes. Nodes glabrous. Ligule a ring of hairs. Panicles contracted when young, later spreading, 10-20 cm long. Spikelets solitary or paired, lanceolate, 2.5-4.0 mm long, parallel to the rachis. Lower glumes orbicular in outline, almost cup-shaped in the spikelets, 3 to 5-nerved. Upper glumes ovate-lanceolate, 9-nerved. Lower lemma 9-nerved, epaleate.

Fl. & Fr. : October-May.

Rare, in the tanks. Often confused with *P. repens* L., but the culms are never spongy in latter ; Banswara (Majumdar 10300 A, BSA).

2. **P. psilopodium** Trin. Gram. Panic. 217. 1826 ; Hook. f. Fl. Brit. India 7 : 46. 1896, incl. var. *coloratum*; Bor, Grass. Burm. Cey. Ind. Pak. 329. 1960.

Erect annuals, upto 1 m tall, with glabrous nodes. Leaf-sheaths often hairy. Ligule a minute, ciliate rim. Panicles effuse, greenish. Spikelets 1 to 2-nate, elliptic, 2-3 x 1.0-1.5 mm, deciduous. Lower glumes ovate, apiculate, 3-nerved. Upper glumes acute, 1-nerved. Lower lemma 9-nerved, paleate, empty. Upper lemma acute.

Fl. & Fr. : July-November.

Common near water resources in the forests ; Shergarh forest.

3. **P. sumatrense** Roth ex R. & S. Syst. Veg. 2 : 434. 1817. *P. miliare* auct. non Lam. 1791 ; Hook. f. Fl. Brit. India 7 : 46. 1896 ; Bor, Grass. Burm. Cey. Ind. Pak. 329. 1960 ; Raizada & Jain in Ind. For. Rec. 5(3) : 156. pl. 1. f. 3. 1965.

Annuals, with glabrous nodes and leaf-sheaths. Ligule a ciliate rim. Panicles effuse, greenish, with capillary branches, upto 30 cm long. Spikelets deciduous, paired or solitary, 2-3 mm long. Lower glumes ovate to orbicular, apiculate, clasping the base of spikelet, 1 mm long, 3 to 7-

nerved. Upper glumes ovate-oblong, obtuse, 11 to 13-nerved. Lower lemma 9-nerved, empty or neuter. Grains ovoid.

Fl. & Fr. : August-October.

Rare, in forests near water resources ; Shergarh forest, Banswara (*Majumdar* 10230, BSA), Shyampura (*Kanodia* 75400, BSI).

4. *P. walense* Mez, Bot. Jahrb. 34 : 146. 1904 ; Clayton in Kew Bull. 20 : 264. 1966; Majumdar in Bull. Bot. Soc. Beng. 27 : 47. f. 9. 1973. *P. humile* Nees ex Steud. Syn. Pl. Glum. I : 84. 1854, non Thunb. ex Trin. 1826 ; Hook. f. Fl. Brit. India 7 : 48. 1896 ; Bor in Ind. For. Rec. 2(1) : 165. 1941. *P. austro-asiaricum* Ohwi in Act. Phytotax. Geobot. 2(1) : 45. 1942; Bor, Grass. Burm. Cey. Ind. Pak. 324. 1960 ; Raizada & Jain in Ind. For. Rec. 5(3) : 155. 1965.

Erect, tufted annuals, 15-45 cm high, with fascicled branches and glabrous nodes. Leaves linear, 2-15 x 0.3-0.5 cm. Ligule a minute, ciliolate rim. Panicles lax, 10-15 cm long. Spikelets narrow, lanceolate, 2-nate. Lower glume ovate-lanceolate, very acuminate, 3 to 5-nerved. Upper glume lanceolate, 1 mm long, 3-nerved. Lower lemma empty, similar to the lower glume but shorter. Grains blackish.

Fl. & Fr. : September-November.

Rare, in forests in shady habitats ; Shergarh forest.

38. PASPALIDIUM Stapf

1a. Spikes shorter than the internodes. Rachis produced into a point. Upper glume shorter than upper lemma.

P. flavidum 1

1b. Spikes longer than the internodes. Rachis not produced. Upper glume as long as the upper lemma.

P. geminatum 2

1. *Paspalidium flavidum* (Retz.) A. Camus in Lecomte, Fl. Gen. Indo-Chine 7 : 419. 1922 ; Bor in Ind. For. Rec. 2(1) : 173. pl. 44. 1941 & Grass. Burm. Cey. Ind. Pak. 333. 1960 ; Raizada & Jain in Ind. For. Rec. 5(3) : 167. pl. 3. f. 1. 1965 ; Mahesh, Illus. Fl. Delhi f. 264. 1966. *Panicum flavidum* Retz. Obs. Bot. 4 : 15. 1786 ; Hook. f. Fl. Brit. India 7 : 28. 1896.

Annuals ; culms sheathed by leaf-sheaths. Ligule a ring of hairs. Sheaths with hairy throat. Panicles falciform, upto 60 cm long, with 5-10 remote spikes. Spikes 1-2 cm long. Spikelets 2-rowed, 2-3 x 2 mm, ovate-elliptic, imbricate. Lower glumes suborbicular, 5-nerved. Upper glumes 7-nerved, about half as long as upper granular lemmas. Lodicules 4-angular, short. Grains ovoid, ~2.0-2.5 mm long.

Fl. & Fr. : July-October.

Common in semi-aquatic and marshy habitats ; Ghatol, Banswara (*Kanodia* 75406, BSI).

2. *P. geminatum* (Forsk.) Stapf in Prain, Fl. Trop. Afr. 9 : 583. 1920 ; Bor, Grass. Burm. Cey. Ind. Pak. 333. 1960 ; Subram. Aquatic Ang. 110.

f. 60. 1962 ; Raizada & Jain in Ind. For. Rec. 5(3) : 168. 1965. *Panicum geminatum* Forsk. Fl. Aegypt.-Arab. 18. 1775. *P. paspaloides* Pers. Syn. 1 : 81. 1805 ; Hook. f. Fl. Brit. India 7 : 30. 1896.

Ascending or creeping perennials, rooting on the lower nodes. Leaves 10-20 x 0.6-1.0 cm, linear, acuminate ; sheaths glabrous. Panicles 10-30 cm long, of upto 25, linear-oblong, sessile spikes. Spikelets globosely ovate, 2-3 mm long. Lower glume about one-third of lower lemma, nerveless ; upper glume 5-nerved. Grains ovate to ovoid.

Fl. & Fr. : July-April.

Common in semi-aquatic and marshy habitats ; Talwara tank, Parla-ka-Pul (*Majumdar* 10302, BSA).

39. PASPALUM L.

- 1a. Spikelets elliptic-rounded to obovate or orbicular, obtuse.
1b. Spikelets ovate-elliptic, acute.

P. scrobiculatum 1
P. vaginatum 2

1. **Paspalum scrobiculatum** L. Mant. 1 : 29. 1767 ; Hook. f. Fl. Brit. India 7 : 10. 1896 ; Bor, Grass. Burm. Cey. Ind. Pak. 340. 1960. *P. orbiculare* Forst. Fl. Austr. Prodr. 7. 1786 ; Bor, l.c. 340. 1960. *P. commersonii* Lam. Tab. Encycl. 1 : 175. t. 43. f. 1. 1791 ; Bor. l.c. 335. 1960.

Erect or decumbent, perennial grasses, upto 100 cm tall. Nodes glabrous. Leaves and sheaths hairy. Racemes 2-3, 2-5 cm long, erect or spreading, subdigitate. Spikelets 2-ranked, 2.0-2.8 mm long. Lower glume absent. Upper glume and lower lemma 3 to 7-nerved, eciliate. Stamens 3. Grains subglobose.

Fl. & Fr. : September-January.

Rare, in ponds and tanks in marshy habitats ; Banswara (*Majumdar* 10290, BSA), Shyampura (*Kanodia* 75394, BSI).

2. **P. vaginatum** Swartz. Prodr. Veg. Ind. Occ. 21. 1788 ; Bor, Grass. Burm. Cey. Ind. Pak. 341. 1960. *P. distichum* auct. plur. non L. 1753, nom. conf. ; Hook. f. Fl. Brit. India 7 : 12. 1896. *P. distichum* L. var. *vaginatum* (Sw.) Griseb. Fl. Brit. W. Ind. 541. 1864.

Perennials, with widely creeping rhizomes and stolons ; culms rooting on the lower nodes. Leaves distichous, linear-lanceolate, 5-10 x 0.8-1.0 cm ; sheath-mouth bearded and base characteristically villous. Ligule a short, truncate, membranous rim. Racemes 2 to 3-nate, less than 10 cm long. Spikelets dorsally flattened, 2 to 5 times longer than broad. Lower glume absent. Upper glume membranous, glabrous, eciliate. Palea not or obscurely auricled. Grains elliptic.

Fl. & Fr. : July-November.

Common and abundant in ponds and low lying areas. Very close to *P. distichum* L., but it bears quite glabrous upper glume ; Loharia tank,

Senavasa, Ghatol.

40. **PENNISETUM** L.C. Rich.

- 1a. Spikelets solitary, sessile. Lower glume less than half of the length of the lower lemma. Bristles glabrous or scaberulous. *P. hordeoides* 1
- 1b. Spikelets solitary and pedicelled, or in groups of 2-5, then one sessile and rest pedicelled. Lower glume half or more the length of lower lemma. Bristles woolly. *P. pedicellatum* 2

1. **Pennisetum hordeoides** (Lam.) Steud. Syn. Pl. Glum. 1 : 103. 1854; Bor, Grass. Burm. Cey. Ind. Pak. 345. 1960 ; Raizada & Jain in Ind. For. Rec. 5(3) : 210. 1965. *Panicum hordeoides* Lam. Tab. Encycl. Meth. Bot. 1 : 170. 1791. *Pennisetum parviflorum* Trin. Gram. Panic. 65. 1826 ; Hook. f. Fl. Brit. India 7 : 86. 1896.

Annual grasses, upto 1 m high, with hollow culms. Leaves linear, 10-25 x 0.4-0.8 cm, serrulate. Ligule a short, fimbriate membrane. Spikes 5-10 cm long. Spikelets spreading at right angle to the rachis which is winged and crenate. Lower lemma 3-lobed.

Fl. & Fr. : September-December.

Abundant in forests ; Puna Pathar forest.

2. **P. pedicellatum** Trin. in Mem. Acad. Sci. Petersb. ser. 6. 3 : 184. 1834 ; Hook. f. Fl. Brit. India 7 : 86. 1896 ; Bor, Grass. Burm. Cey. Ind. Pak. 346. 1960 ; Raizada & Jain in Ind. For. Rec. 5(3) : 209. pl. 9. f. 1. 1965.

Annuals, with hollow culms, linear leaves and ligule of a short fimbriate membrane. Spikelets 4-5 mm long, oblong-lanceolate, acuminate, born in woolly, reddish, dense spikes. Rachis scabrid and crenate on the angles. Lower lemma 3-toothed at the tip ; upper lemma truncate at the apex, shorter than lower.

Fl. & Fr. : August-November.

Occasional, in dry rocky habitats ; Ghatol (*Kanodia* 75145, BSI).

41. **PEROTIS** Ait.

Perotis indica (L.) O. Ktze. Rev. Gen. Pl. 2 : 787. 1891 ; Bor, Grass. Burm. Cey. Ind. Pak. 611. f. 2. 1960 ; Mihesh. Illus. Fl. Delhi f. 233. 1966. *Anthoxanthum indicum* L. Sp. Pl. 28. 1753. *Perotis latifolia* Ait. Hort. Kew. 1 : 85. 1789 ; Hook. f. Fl. Brit. India 7 : 98. 1896.

Suberect grasses, with hairy sheaths and slender, spike-like, upto 12 cm long racemes. Ligule absent. Callus definite. Spikelets linear, shortly pedicelled, 1-flowered, about 3 mm long, 2-awned. Glumes with loosely scattered hairs on the dorsal surface. Stamens 3. Palea 2-nerved. Grains cylindric.

Fl. & Fr. : August October.

Common in open dry wastelands in association with *Malanocenchris* Nees ; Shergarh forest, Banswara (*Kanodia* 34, BSI).

42. POLYPOGON Desf.

Polygong monspeliensis (L.) Desf. *Fl. Atlant.* 1 : 67. 1798 ; Hook. f. *Fl. Brit. India* 7 : 245. 1896, *pro parte* ; Bor, *Grass. Burm. Cey. Ind. Pak.* 403. 1960 ; Mahesh. Illus. *Fl. Delhi* f. 274. 1966. *Alopecurus monspeliensis* L. *Sp. Pl.* 61. 1753.

Tufted annuals, 30-60 cm high. Nodes glabrous. Ligule lacerate. Panicles dense, spiciform or lobulate, silky or not, 8-12 cm long. Spikelets linear-lanceolate, about 2 x 1 mm, minutely pubescent, shortly pedicellate. Glumes subequal, lanceolate, ciliate, 2-toothed, keeled ; awns 5-9 mm long. Lemmas oblong, 5-toothed, 5-nerved, awned. Palea oblong, notched at the apex. Grains ovoid.

Fl. & Fr. : January-March.

Common weed in fields and gardens during winter season ; Ghatol.

43. PSEUDORAPHIS Griff.

Pseudoraphis spinescens (R. Br.) Vickery in *Proc. Roy. Soc. Queensl.* 62(7) : 69. 1952 ; Bor, *Grass. Burm. Cey. Ind. Pak.* 353. 1960. *Panicum asperum* Koenig in *Naturf.* 23 : 209. 1788, non Lam. 1778. *P. spinescens* R. Br. *Prodr.* 193. 1810. *Chamaeraphis spinescens* (R. Br.) Poir. in *Lam. Encycl. Meth. Bot.* 2 : 189. 1811 ; Hook. f. *Fl. Brit. India* 7 : 62. 1896. *Pseudoraphis aspera* (Koenig) Pilger in *Notizbl. Bot. Gard. Berlin* 10 : 210. 1928 ; Raizada & Jain in *Ind. For. Rec.* 5(3) : 207. 1965.

Creeping (floating in aquatic habitats) grasses, with leafy, ascending culms. Nodes hairy. Sheaths with appressed tubercles. Ligule a ridge of minute hairs. Leaves linear-lanceolate, 25-75 x 1.6-3.5 mm. Panicles 5-10 cm long, spreading. Spikelets 4-6 mm long, subsessile. Lower glume suborbicular, nerveless ; upper glume lanceolate, scabrid on the sides, 9 to 11-nerved, with a long scabrid awn. Lower lemma shorter than upper glume, 7-nerved, acuminate or awned.

Fl. & Fr. : October-December.

Abundant in low-lying areas and ponds, often floating on the water-surface ; Loharia tank, Senavasa.

44. SACCHARUM L.

Saccharum spontaneum L. *Mant. Pl. Alt.* 2 : 183. 1771 ; Hook. f. *Fl. Brit. India* 7 : 118. 1896 ; Bor in *Ind. For. Rec.* 2(1) : 188. pl. 51. 1941 ; Mukerj. in *Bull. Bot. Soc. Beng.* 8 : 145. 1955 ; Bor, *Grass. Burm. Cey.*

Ind. Pak. 214. 1960. 'Kans' (Hindi).

Tufted or stoloniferous, coarse perennials, upto 2 m high. Panicles 15-45 cm long, with white-silvery hairs much exceeding the spikelets; peduncles hairy below the panicles. Spikelets 3-6 mm long, lanceolate. Glumes 3-6 mm long, lanceolate-acuminate, coriaceous at the base, entire or 2-toothed at the apex; lower glume 2-nerved, glabrous; upper glume 1-nerved. Callus hairy, 1.5-2.0 cm long. Grains oblong.

Fl. & Fr. : Most part of the year.

Usually found in neglected corners of cultivated fields. It is a very troublesome weed in the fields near Ganoda village on Banswara-Udaipur road ; Ganoda.

45. SEHIMA Forsk.

Sehima nervosum (Rottl. ex Willd.) Stapf in Prain, Fl. Trop. Afr. 9 : 36. 1917 ; Bor in Ind. For. Rec. 2(1) : 195. pl. 57. 1941 ; Bor, Grass. Burm. Cey. Ind. Pak. 218. 1960. *Andropogon nervosus* Rottl. in Ges. Naturf. Freunde Berlin Neue Schr. 4 : 218. 1806. *Ischaemum laxum* R. Br. Prodr. 205. 1810 ; Hook. f. Fl. Brit. India 7 : 136. 1896.

Tufted perennials, upto 1 m high, with rhizomatous base. Leaf-blade linear, hardly distinct from the sheath. Spikes 5-8 cm long. Joints of rachis and pedicels ciliate. Sessile spikelets 8-9 mm long; awns minutely ciliate along spirals. Lower glumes of pedicellate spikelets lanceolate, acuminate, 2-toothed, 5-nerved and of the sessile spikelets 6-nerved. Grains linear-oblong, somewhat trigonous, grooved on the ventral surface.

Fl. & Fr. : August-November.

Common in open wastelands ; along Banswara-Udaipur road, Banswara (*Kanodia* 75546, BSI).

46. SETARIA P. Beauv. *nom. cons.*

1a. Inflorescence a cylindric false spike :

2a. Spikelets about 3 mm long. Upper lemma keeled at the top.

S. glauca 1

2b. Spikelets about 2 mm long. Upper lemma not keeled.

S. pumila 2

1b. Inflorescence a narrow panicle, often lobed below and tapering upwards.

S. tomentosa 3

1. **Setaria glauca** (L.) P. Beauv. Ess. Agrost. 51, 169, 178. 1812 ; Hook. f. Fl. Brit. India 7 : 78. 1896 ; Bor, Grass. Burm. Cey. Ind. Pak. 360. 1960 ; Raizada & Jain in Ind. For. Rec. 5(3) : 204. pl. 8. f. 5. 1965 ; Mahesh. Illus. Fl. Delhi f. 241. 1966. *Panicum glaucum* L. Sp. Pl. 56. 1753. *Pennisetum glaucum* (L.) R. Br. Prodr. 1 : 195. 1810 ; Terrell in Taxon 25 : 297-304. 1976.

Annuals or perennials, with decumbent-ascending culms and glabrous nodes. Leaves ciliate at the base. Ligule a ring of hairs. Sheaths compressed, keeled. Spikelets solitary, often with an imperfect one. Invol-bristles 6-12, antrorsely barbed. Lower glume ovate-rounded, 3-nerved. Upper glume ovate, 5-nerved. Lower lemma 5-nerved, with obtuse or 2-toothed palea.

Fl. & Fr. : May-September.

Common in cultivated fields, gardens and wastelands. It is considered to be a good fodder ; Banswara (*Kanodia* 75228, BSI).

2. *S. pumila* (Poir.) Roem. & Schult. Syst. Veg. 2 : 891. 1817. *Panicum pumilum* Poir. in Lam. Encycl. Meth. Bot. Suppl. 4 : 273. 1816. *P. pallide-fuscum* K. Schum. Beskr. Guin. Pl. 58. 1827. *Setaria pallide-fusca* (K. Schum.) Stapf & C.E. Hubb. in Kew Bull. 1930 : 259. 1930 ; Bor, Grass. Burm. Cey. Ind. Pak. 363. 1960 ; Raizada & Jain in Ind. For. Rec. 5(3) : 204. pl. 8. f. 6. 1965.

Erect, tufted annuals, 30-60 cm high. Spikes 1.6-7.5 cm long. Rachis pubescent. Spikelets solitary in the involucre of about 8 barbellate bristles. Upper glumes shorter than the upper lemmas, 5-nerved. Grains ovoid-oblong, plano-convex, 1.6 mm long, pale.

Fl. & Fr. : August-October.

Rare, sparsely distributed in open places in the forests ; Rowal Hindvela forest.

3. *S. tomentosa* (Roxb.) Kunth, Rev. Gram. 1 : 47. 1829 ; Bor, Grass. Burm. Cey. Ind. Pak. 365. 1960 ; Raizada & Jain in Ind. For. Rec. 5(3) : 205. pl. 8. f. 4. 1965 ; Mahesh. Illus. Fl. Delhi f. 240. 1966. *Panicum tomentosum* Roxb. Fl. Ind. I : 303. 1820. *Setaria intermedia* Roem. & Schult. Syst. Veg. 2 : 489. 1817 ; Hook. f. Fl. Brit. India 7 : 79. 1896. *Panicum intermedium* (Roem. & Schult.) Roth, Nov. Pl. Sp. 47. 1821, non Vahl ex Hornem. 1813.

Tufted annuals, 30-50 cm high. Panicles 4-15 x 1-2 cm. Spikelets upto 2 mm long, solitary in the involucre. Upper glumes shorter than upper lemmas, 7-nerved. Bristles 1-3, antrorsely barbed. Grains rotundate-ovate, 1.6 mm long, plano-convex.

Fl. & Fr. : August-October.

Common in wastelands, along the roads and often in neglected corners of gardens and fields ; Deoda, Bagaycha, Banswara (*Kanodia* 75413, BSI).

47. SORGHUM Moench *nom. cons.*

Ia. Sheath-nodes densely bearded.

S. deccanense 1

1b. Sheath-nodes glabrous or pubescent, not bearded.

S. halepense 2

1. *Sorghum deccanense* Stapf ex Raizada in Ind. For. Rec. 4 : 100.

1954 ; Bor, Grass. Burm. Cey. Ind. Pak. 245. 1960. *Andropogon purpureo-sericeus* auct. plur. non Hochst. ex A. Rich. 1851 ; Hook. f. Fl. Brit. India 7 : 185. 1896.

Slender, annual grasses, 50-100 cm high, with bearded nodes. Panicles 10-15 cm long, loose ; branches in whorls of upto 6 ; rachis terete, bearded at the nodes. Joints and pedicels subequal, two-third the length of sessile spikelets, hairy with white or reddish-brown hairs. Sessile spikelets 6.5-8.5 x 2-3 mm, elliptically flask shaped, densely and coarsely hirsute. Lower glumes narrowed upwards into a beak like tip. Pedicelled spikelets shorter and narrower than sessile ones.

Fl. & Fr. : August-November.

Rare, in forests and protected grasslands ; Banswara (*Majumdar* 10229, BSA).

2. *S. halepense* (L.) Pers. Syn. Pl. I : 101. 1805 ; Bor, Grass. Burm. Cey. Ind. Pak. 222. 1960. *Holcus halepensis* L. Sp. Pl. 1047. 1753. *Andropogon halepensis* (L.) Brot. Fl. Lusit. I : 89. 1804 ; Hook. f. Fl. Brit. India 7 : 182. 1896, *pro parte*.

Perennial grasses, upto 2 m high, with long, creeping rhizomes and glabrous or silky-pubescent nodes. Leaf-sheaths glabrous or pubescent or villous externally at the junction of blade and densely silky villous inside above the ligule. Panicles lax, open. Spikelets 2-nate, sessile ones ellipt-lanceolate, obtuse, 4.0-5.5 mm long. Lower glume with the keel ending in a minute teeth forming distinctly 3-toothed tip. Lower lemma 2-nerved, ciliate. Pedicelled spikelets lanceolate, deciduous when mature. Glumes membranous, ciliate on the keels. Lemmas empty.

Fl. & Fr. : September-January.

Common in grasslands, wastelands, neglected corners of fields etc. ; Banswara (*Kanodia* 75362, BSI).

48. SPIDIOPOGON Trin.

Spodiopogon rhizophorus (Steud.) Pilgar in Engl. & Prantl, Pflan. 14e : 119. 1940 ; Bor, Grass. Burm. Cey. Ind. Pak. 246. 1960. *Andropogon rhizophorus* Steud. Syn. Pl. Glum. I : 381. 1854. *Spodiopogon albidus* Benth. in Journ. Linn. Soc. 19 : 66. 1881 ; Hook. f. Fl. Brit. India 7 : 108. 1896.

Tufted, creeping annuals. Leaf-blade flaccid, long-petioled. Panicles narrow ; rachis jointed, silky-villous. Spikelets 2 to 3-nate, laterally compressed, one sessile, one or two pedicelled, similar. Lodicules 2. Stamens 3. Styles 2, free.

Fl. & Fr. : September-February.

Abundant under the shade of trees in forests ; Asargarh (*Kanodia* 75617, BSI).

49. SPOROBOLUS R. Br.

- 1a. Upper glume longer or as long as the lemma. Pericarp furrowed on the surface. *S. maderaspatanus* 3
- 1b. Upper glume shorter than the lemma. Pericarp pitted on the surface :
- 2a. Panicles effuse at maturity :
 3a. Lemmas upto 1 mm long. Stamens 3. *S. tenuissimus* 4
 3b. Lemmas 1.5 mm long or longer. Stamens 2. *S. diander* 1
 2b. Panicles subspiciform. *S. fertilis* 2

1. ***Sporobolus diander* (Retz.) P. Beauv.** Ess. Agrost. 26, 147, 178. 1812 ; Hook. f. Fl. Brit. India 7 : 247. 1896 ; Bor in Ind. For. Rec. 2(1) : 203. pl. 61. 1941 & Grass. Burm. Cey. Ind. Pak. 629. 1960. *Agrostis diandra* Retz. Obs. Bot. 5 : 19. 1789.

Tufted, perennial grasses, upto 80 cm high. Ligule a ring of hairs. Leaves glabrous, entire, convolute ; leaf-sheaths ribbed. Panicles contracted, becoming effuse at maturity, 10-30 x 4-5 cm. Spikelets 1-flowered, elliptic-lanceolate, rather crowded, slaty-grey, below 2 mm long. Lower glume ovate, truncate, nerveless. Upper glume elliptic-obovate, often acute, 1-nerved. Lemmas longer than glumes. Grains 0.6 x 0.4-0.5 mm, flattened, truncate above ; pericarp adherent.

Fl. & Fr. : August-October.

Sporadic on a variety of soils ; Banswara (*Majumdar* 10234, BSA ; *Kanodia* 75124A, BSI).

2. ***S. fertilis* (Steud.) W.D. Clayton** in Kew Bull. 19 : 291. 1965 ; Ramamoorthy in Sald. & Nicol. Fl. Hassan Dist. 754. 1976. *Agrostis fertilis* Steud. Syn. Pl. Glum. 1 : 170. 1854. *Sporobolus indicus* auct. plur. non (L.) R. Br. 1810 ; Hook. f. Fl. Brit. India 7 : 247. 1896 ; Bor, Grass. Burm. Cey. Ind. Pak. 630. 1960.

Perennial grasses. Leaf-blade with slightly infolded margins. Panicles contracted ; branches not whorled. Upper glume shorter than lemma. Lemmas 1 to 3-nerved. Stamens 3. Grains truncate above.

Fl. & Fr. : July-September.

Rare, near paddy fields and other low-lying areas ; Banswara (*Majumdar* 10298 B, BSA), Ghatol (*Kanodia* 75124B, BSI).

3. ***S. maderaspatanus*** Bor in Kew Bull. 1957 : 234. 1957 & Grass. Burm. Cey. Ind. Pak. 632. 1960. *S. orientalis* Kunth, Enum. Pl. 1 : 211. 1833, nom. illegit. ; Hook. f. Fl. Brit. India 7 : 251. 1896.

Stoloniferous, perennial grasses. Leaf-margins spinulose. Panicles contracted, lower branches not truly whorled. Spikelets about 2 mm long. Lower glume about 0.5 mm long, rounded at the tip, shorter than lemma. Stamens 3 ; anthers 1 mm long. Grains 0.9 x 0.5 mm, lenticular in section ; pericarp not very loose.

Fl. & Fr. : August-December.

Rare, in open wastelands ; Banswara (*Majumdar* 10222, BSA).

4. *S. tenuissimus* (Schrank) O. Ktze. Rev. Gen. Pl. 3 : 369. 1893 ; Bor, Grass. Burm. Cey. Ind. Pak. 633. 1960. *Panicum tenuissimum* Schrank in Denkschr. Bot. Ges. Regensb. 2 : 26. 1822. *Vilfa minutiflora* Trin. Diss. Bot. 158. 1824. *Sporobolus minutiflorus* (Trin.) Link, Hort. Berol. 1 : 88. 1827 ; Hook. f. Fl. Brit. India 7 : 248. 1896.

Delicate annuals, 30-60 cm high. Panicles 30-40 cm long. Spikelets scattered. Lower and upper glumes shorter than lemmas. Grains 0.5-0.6 mm long, compressed, wedge-shaped ; pericarp adherent.

Fl. & Fr. : August-December.

Common, sparsely distributed in open wastelands ; Paloda.

50. TETRAPOGON Desf.

Tetrapogon villosus Desf. Fl. Atlant. 2 : 389. t. 255. 1799 ; Duthie, Fodd. Grass. N. Ind. 55. t. 68. 1888 ; Bor, Grass. Burm. Cey. Ind. Pak. 475. 1960. *Chloris villosa* (Desf.) Pers. Syn. Pl. 1 : 87. 1805 ; Hook. f. Fl. Brit. India 7 : 291. 1896. *C. tetrapogon* P. Beauv. Ess. Agrost. 158. 1812.

Tufted perennials, upto 25 cm high. Leaves linear, 25-90 x 1.5-2.5 mm, convolute or twisted, rigid. Spikes erect, 3.5-6.5 cm long. Spikelets obconic, 3-2 mm long, 4-awned. Glumes 5, those of bisexual florets ovate, hyaline-margined, hirsute. Lemmas covered with long fine hairs. Palea elliptic-obovate, hyaline, ciliate-margined. Grains linear, slender.

Fl. & Fr. : August-October.

Rare, subgregarious on the fringes of the forests ; Wedita Hillage forest.

51. THEMEDA Forsk.

1a. Involucral spikelets less than 6 mm long; awns about 1 cm long.

Lower glume strigose towards the tip only.

T. quadrivalvis 1

1b. Involucral spikelets more than 6 mm long; awns about 6 cm

long. Lower glume glabrous or strigose all over.

T. triandra 2

1. *Themeda quadrivalvis* (L.) O. Ktze. Rev. Gen. Pl. 2 : 794. 1891 ; Bor in Ind. For. Rec. 2(1) : 210. 1941 & Grass. Burm. Cey. Ind. Pak. 252. 1960. *Andropogon quadrivalvis* L. in Murr. Syst. Veg. ed. 13. 758. 1774. *Anthistiria ciliata* L. f. Suppl. 113. 1781 ; Hook. f. Fl. Brit. India 7 : 213. 1896.

Stout, annual or perennial grasses, upto 1.5 m high. Ligule membranous, about 2 mm long. Panicles dense, suberect ; lower branches solitary or 2 to 3-nate, undivided about to the middle, then bearing dense clusters of racemes. Spathes bristly. Pairs of involucral spikelets inserted at the same level. Hermaphrodite spikelets awned, with glabrous lower glume. Sessile

spikelet one in a raceme. Pedicelled spikelets 2, similar to involucral spikelets.

Fl. & Fr. : October-December.

Gregarious on stony grounds at the foot of hills, in wastelands and grasslands. Clusters of spikelets often become reddish at maturity ; Lasara, Banswara (*Verma* 243, BSA).

2. *T. triandra* Forsk. Fl. Aegypt.-Arab. 178. 1775 ; Bor, Grass. Burm. Cey. Ind. Pak. 254. f. 27. 1960. *Anthistiria imberbis* Retz. Obs. Bot. 3 : 11. 1783 ; Hook. f. Fl. Brit. India 7 : 211. 1896.

Erect, perennial, unbranched grasses. Leaf-sheaths very loose below, much compressed and keeled in upper region. Spikelets arranged in small racemosous clusters issuing from a leaf-like bract (spathe) which is bristly. Invol.-spikelets 6.9 mm long, inserted at the same level ; back of lower glume glabrous or covered with bulbous-based or simple hairs. Sessile spikelet awned, solitary in a raceme. Pedicelled spikelets similar to involucral spikelets with two glumes and one lemma.

Fl. & Fr. : September-October.

Occasional, in rocky grounds. It is a good fodder grass and may be recommended for grasslands in the area ; Ghatol (*Kanodia* 75164, BSI).

52. TRAGUS Haller *nom. cons.*

Tragus roxburghii Panigrahi in Kew Bull. 29 : 495. 1974. *Lappago biflora* *sensu* Roxb. Fl. Ind. 1 : 284. 1820, *quoad descrip. excl. typo.* *Tragus biflorus* *sensu* Schult. Syst. Veg. Mant. 2 : 205. 1824, *quoad. descrip. excl. typo* ; Bor, Grass. Burm. Cey. Ind. Pak. 682. 1960; Mahesh. Illus. Fl. Delhi f. 242. 1966. *T. racemosus* *sensu* Hook. f. Fl. Brit. India 7 : 97. 1896, non Scop. 1777.

Tufted, annual grasses, upto 15 cm high. Racemes solitary, terminal, 6 x 0.7 cm. Spikelets 5 x 2 mm, 1-flowered, in groups of two, facing each other and appearing like a single spikelet with two echinate glumes. Lemma solitary, 3-nerved. Palea as long as glumes, 2-nerved. Stamens 3. Grains linear-oblong, 1.2-1.5 mm long, pale-brown.

Fl. & Fr. : August-November.

Common in wastelands. The glandular muricate or spinulose spikelets appear like drops of dew in sunlight ; Paloda, Banswara (*Majumdar* 10257, BSA ; *Kanodia* 75385, BSI).

53. TRIPOGON Roem. & Schult.

- | | |
|---|--------------------------|
| 1a. Leaves glabrous or glaucous. Spikelets 10 to 20-flowered. | <i>T. jacquemontii</i> 1 |
| 1b. Leaves covered with a mass of matted white hairs. Spikelets 2 to +3-flowered. | <i>T. purpurascens</i> 2 |

1. *Tripogon jacquemontii* Stapf in Kew Bull. 1892 : 85. 1892 ; Hook. f. Fl. Brit. India 7 : 286. 1896 ; Bor, Grass. Burm. Cey. Ind. Pak. 522. 1960.

Tufted perennials, 30-60 cm high. Leaves 5-25 cm long, filiform, involute, cleft at the apex into 2 lobes. Ligule a scarious rim. Spike 15-20 cm long, slender, solitary. Spikelets 8-12 mm long, linear, appressed to the rachilla. Glumes 4, subcoriaceous, upper most empty. Grains 2-5 mm long, oblong, terete, glabrous.

Fl. & Fr. : September-December.

Common in exposed wastelands and on the banks of rivers and streams among rocks ; Danpur, Near Mahi River (Pipalkhund).

2. *T. purpurascens* Duthie in Ann. Roy. Bot. Gard. Calc. 9 : 74. t. 92. 1901 ; Bor, Grass. Burm. Cey. Ind. Pak. 522. 1960. *T. abyssinicus* sensu Hook. f. Fl. Brit. India 7 : 287. 1896, *pro parte*, non Nees ex Steud. 1854. *T. jacquemontii* Stapf var. *submuticus* Hook. f. l.c. 7 : 287. 1896.

Tufted perennials, 8-10 cm high. Roots fibrous. Leaves filiform, rolled, 5-15 cm long. Ligule a scarious rim. Spike narrow, not very stout, solitary, upto 10 cm long. Spikelets linear, 2-4 mm long, rather distinct, 2 to 3-flowered, awnless. Lower glume keeled, 1-nerved. Upper glume 2.5-3.5 mm long, acuminate, 1-nerved. Lemmas lanceolate, bidentate, with a minute awn in the sinus. Grains yellow or brown.

Fl. & Fr. : August-October.

Rare, in open dry places in the forests and wastelands forming a thick sward ; Wadita Hillage forest.

54. UROCHLOA P. Beauv.

1a. Spikelets glabrous.

U. panicoides var.
panicoides 1

1b. Spikelets pubescent.

U. panicoides var.
pubescens 2

1. *Urochloa panicoides* P. Beauv. Ess. Agrost. 53. t. 11. f. 1. 1812 ; Bor, Grass. Burm. Cey. Ind. Pak. 372. 1960 ; Raizada & Jain in Ind. For. Rec. 5(3) : 177. 1965. *Panicum javanicum* Poir. in Lam. Encycl. Meth. Bot. Suppl. 4 : 279. 1816, *pro parte*.

var. *panicoides*.

Tufted annuals, with erect or geniculately ascending culms from short rooting base. Leaves linear to lanceolate, 4-15 x 0.8-2.5 cm, with semi-amplexicaul base. Ligule a densely ciliate rim. Racemes 3-8, erect or spreading, secund, 2.5-5.0 cm long. Rachis 3-quetrous, scabrid on the angles. Spikelets 2-seriate, ovate to elliptic-oblong, 4-5 mm long, acute. Glumes dissimilar, upper 5-nerved, lower ones 8 to 13-nerved. Lower lemma 5 to 7-nerved. Grains rotundate-elliptic, 2 mm long, greenish-

yellow.

Fl. & Fr. : August-October.

Common in humus rich soils in temporary ponds along the roads ; Khamera, Ghatol (*Kanodia* 75135 B, BSI).

2. *U. panicoides* P. Beauv. var. *pubescens* (Kunth) Bor, Grass. Burm. Cey. Ind. Pak. 372. 1960. *U. pubescens* Kunth, Rev. Gram. I : 31. 1829.

This is the pubescent variant of the species, especially having densely pubescent spikelets.

Fl. & Fr. : August-October.

Common in open rocky wastelands ; Ghatol, Dagua Bowji, Banswara (*Kanodia* 75402, 75647, BSI).

55. VETIVERIA Bory ex Lem.-Lisanc.

Vetiveria zizanioides (L.) Nash in Small, South-East U.S. 67. 1903 ; Bor in Ind. For. Rec. 2(1) : 217. pl. 64. 1941 & Grass. Burm. Cey. Ind. Pak. 258. 1960 ; Mahesh. Illus. Fl. Delhi f. 275. 1966. *Phalaris zizanioides* L. Mant. Pl. 2 : 183. 1771. *Andropogon squarrosus* sensu Hook. f. Fl. Brit. India 7 : 186. 1896, non L. f. 1781. 'Gander, Khas' (Hindi).

Tufted, rigid perennials, 1-2 m high. Root-stock with spongy, aromatic roots. Ligule a scarious rim. Panicles oblong, contracted, 15-40 cm long. Joints and pedicels glabrous. Sessile spikelets 4-5 x 1.5 mm, linear-lanceolate, with glabrous callus. Upper glumes concave, spinulose-muricate on the keels at the top. Grains lanceolate.

Fl. & Fr. : July-January.

Common in ponds, low-lands and other heavy soils. The aromatic roots, when wetted, emit sweet smell and are used in making screens ; Banswara (*Kanodia* 75577, BSI).

Echinochola frumentacea Link-Tall robust grass with nodding panicles, secund spikes and 3-nate spikelets. Cultivated for its grains. 'Hama' (Hindi).

Eleusine coracana (L.) Gaertn. (*Cynosurus coracanus* L.)-Erect, stout, annual grass, with 4-7, incurved spikes. Cultivated for its edible grains.

Oryza sativa L.—Erect annuals, with elliptic-lanceolate, persistent spikelets and 1 grained mature florets. Cultivated in ponds and low-lying fields. 'Dhan' (Hindi).

Pennisetum typhoides (Burm. f.) Stapf & C.E. Hubb. (*Alopecurus typhoides* Burm. f., *Pennisetum typhoideum* L.C. Rich.)—Tall robust grass, with terminal, long spikes with villous or woolly rachis, two or more spikelets in an involucle and bearded anther-cells. Cultivated during rainy season for grains and fodder. 'Bajra' (Hindi).

Saccharum officinarum L.—Common perennial sugarcane plant, cultivated for cane-sugar. 'Ganna, Ink' (Hindi).

Setaria italica (L.) P. Beauv.—Erect annuals, upto 1.5 m high, with 7.5-30 cm long spikes, solitary spikelet in a bristly involucre. Cultivated during rainy season with *Zea mays* L. for grains and fodder.

Sorghum saccharatum (L.) Moench (*Holcus saccharatus* L., *Sorghum vulgare* Pers.)—Tall robust annuals, often behaving like perennials in favourable conditions, with decompound panicles and white, oblong-globose grains. Cultivated during rainy season. It is very resistant to drought and water-logged conditions. 'Jowar' (Hindi).

Triticum aestivum L.—Annuals, with awned spikelets in terminal spikes. Cultivated for its grains and hay. 'Genhu' (Hindi).

Zea mays L.—Tall, monoecious grass, with male spikelets in terminal racemes and axillary female spadix inflorescence. Cultivated during rainy season for its grains. 'Makka' (Hindi).

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INDEX TO BOTANICAL NAMES

- Abelmoschus** Medik. 45
crinitus Wall. 45
esculentus (L.) Moench 51
ficulneus (L.) Wt. & Arn. ex Wt. 45
moschatus Medic. 45
Abildgaardia ovata (Burm. f.) Kral 242
Abrus Adans. 67, 69
precatorius L. 69
Abutilon Mill. 44, 46
indicum (L.) Sweet 46
ramosum (Cav.) Guill. & Perr. 46
Acacia Mill. 97, 98
arabica (Lam.) Willd. var. *indica* Benth. 99
arrophula D. Don 99
catechu (L. f.) Willd. var. *sundra* (DC.) Prain 98
chundra (Roxb. ex Rottl.) Willd. 98
farnesiana (L.) Willd. 98
jacquemontii Benth. 98
lebbeck (L.) Willd. 100
leucophloea (Roxb.) Willd. 98, 99, 102
nilotica (L.) Del. subsp. *indica* (Benth.) Brenan 98, 99
odoratissima (L. f.) Willd. 100
pennata (L.) Willd. var. *arrophula* (D. Don) Baker 98, 99
sundra DC. 98
Acalypha L. 205
ciliata Forsk. 205
malabarica Muell. 205
Acanthaceae 30, 175
Acanthospermum Schr. 124, 125
australe auct. non Ktze. 125
hispidum DC. 125
Acanthus maderaspatensis L. 177
repens Vahl 178
Achras zapota L. 139
Achyranthes L. 195
alternifolia L. 200
aspera L. 195
brachiata L. 200
corymbosa L. 42
lanata L. 196
lappacea L. 201
muricata L. 200
repens L. 196
Adansonia digitata L. 52
Adhatoda Mill. 175, 176
vasica Nees 176
zeylanica Medic. 176
Adina Salisb. 118, 119
cordifolia (Willd. ex Roxb.) Hook. f. ex Brandis 119, 121
Aegle Corr. 60
marmelos (L.) Corr. 60
Aerides Lour. 219
crispum Lindl. 219
lindleyana Wight 219
Aerva Forsk. 195
Javanica (Burm. f.) Juss. ex Schult. 196
lanata (L.) Juss. 195
persica (Burm. f.) Merr. 195, 196
tomentosa Forsk. 196
Aeschynomene L. 67, 69
bispinosa Jacq. 88
indica L. 69
pumila L. 69
Ageratum L. 124, 125
conyzoides L. 125
Agrostis diandra Retz. 282
fertilis Steud. 282
procera Retz. 269
Ailanthus Desf. 60
excelsa Roxb. 60
Aizoaceae 32, 115
Alangiaceae 27, 118
Alangium Lam. 118
decapetalum Lam. 118
lamarckii Thw. 118
salvifolium (L. f.) Wang. 118
*subsp. *decapetalum** (Lam.) Wang. 118
Albizia Durazz. 97, 100
lebbeck (L.) Benth. 100, 04
procera (Roxb.) Benth. 100
odoratissima (L. f.) Benth. 99, 100
Alhagi Tourn. ex Adans. 68, 70
camelorum Fisch. ex DC. 70
maurorum Medic. 70
pseudalhagi (M. Bieb.) Desv. 70
Alliaceae 33, 230
Allotropis J. S. Presl & C. B. Presl 248, 249
cimicina (L.) Stapf 249
Alopecurus monspeliensis L. 278
typhoides Burm. f. 286
Alternanthera Forsk. 195, 196
echinata Sm. 196
nodiflora R. Br. 197
pungens Kunth 196
repens Gmel. 197
repens (L.) Link 196
sessilis (L.) R. Br. ex DC. 196, 197
Alysicarpus Desf. 68, 70
bupleurifolius auct. non (L.) DC. 72
bupleurifolius (L.) DC. 71
glumaceus (Vahl) DC. var. *heyneanus* (Wt. & Arn.) Raizada 70, 71
hamosus Edgew. 70, 71
heyneanus Wt. & Arn. 70
longifolius (Rottl.) ex Spreng. Wt. & Arn. 70, 71
monilifer (L.) DC. 70, 71
procumbens (Roxb.) Schindl. 71
roxburghianus Thoth. & Pramanik 70, 72
rugosus (Willd.) DC. var. *heyneanus* (Wt. & Arn.) Baker 70
tetragonolobus Edgew. 70, 72
vaginalis (L.) DC. 70, 72
*var. *numularifolius** 72
Amaranthaceae 32, 195
Amaranthus L. 195, 197
blitum auct. non L. 198
caudatus L. 197
chlorostachys Willd. 198

- cruentus* L. 198
gangeticus L. 199
 var. *tristis* Prain 199
gracilis Desf. 199
græcizans L. 199
hybridus L. 197, 198
lividus L. 197, 198
mangostanus L. 198
paniculatus L. 198
polygamous L. 199
polygonoides L. 199
spinosus L. 197, 198
 var. *inermis* Schinz. 198
tricolor L. 197, 198
viridis L. 197, 199
- Amaryllidaceae** 33, 221
Amberboa ramosa (Roxb.) Jafri 133
Ameletia tenuis Wt. 108
Amischophacelus Roll Rao & Kammathy 225.
axillaris (L.) Rolla Rao & Kammathy 225
cucullata (Roth) Rolla Rao & Kammathy 225
- Ammannia* L. 106
auriculata Willd. 106
baccifera L. 44, 106, 107
multiflora Roxb. 107
rotala F. Muell. 108
salicifolia auct. non Monti 107
senegalensis auct. non Lam. 106
tenulis (Wt.) Clarke 108
- Amorphophallus campanulatus* (Roxb.) Bl. ex Decne. 230
- Ampelidaceae** 63
Ampelocissus Planch. 63, 64
latifolia (Roxb.) Planch. 64
- Anacardiaceae** 25, 26, 66
- Anagallis* L. 137
arvensis L. 137
pumila Sm. 137
- Andrographis echiodoides* (L.) Nees 182
Andropogon annulatus Forsk. 260
barbatus L. 255
caricosus L. 260
 subsp. *genuinus* Hack. 260
contortus L. 270
foveolatus Del. 268
hakelelli Hook. f. 256
halepenis (L.) Brot. 281
huegelii Hack. 254
lanceifolius Trin. 252
martini Roxb. 257
nervosus Rottl. ex Willd. 279
perfusus (L.) Willd. 252
purpureo-sericeus auct. non Hochst. ex A. Rich. 281
quadrivalvis L. 283
rhizophorus Steud. 281
schmidii Hook. f. 254
schoenanthus L. var. *martini* (Roxb.) Hk. f. 257
quarrosus auct. non L. f. 286
strictus Roxb. 268
- Anelasma nudiflorum* (L.) R. Br. 228
- Anethum* L. 117
greveolens L. 117
sowa Roxb. ex Flem. 117
- Anisochilus* Wall. 189
carnosus (L.) Wall. 189
- Anisomeles* R. Br. 189, 190
indica (L.) Ktze. 190
ovata R. Br. 190
- Annona* L. 34
reticulata L. 34
squamosa L. 34
- Annonaceae** 28, 34
Anogeissus (DC.) Guill. & Perr. 103
latisiliolius (Roxb. ex DC.) Wall. ex Guill. & Perr. 103
pendula Edgew. 103, 104
- Anotis lancifolia* Hook. f. 122
Anthistirta ciliata L. f. 283
imberbis Retz. 284
- Anthocephalus chinensis* (Lam.) A. Rich. ex Walp. 119
- Anthoxanthum indicum* L. 277
- Antigonon* Endl. 202
leptopus Hook. & Arn. 202
- Antirrhinum* L. 166, 167
orontium L. 167
- Apiaceae** 27, 117
Apium L. 247, 249
 mutica L. 249
varia Hack. subsp. *mutica* (L.) Hack. 249
- Apocynaceae** 29, 140
Aquilegia sambucina L. 65
- Araceae** 32, 229
Arachis hypogaea L. 92
- Arecaceae** 33, 228
- Argemone* L. 36
mexicana L. 36
- Argyreia* Lour. 156
sericea Dalz. 156
- Aristida* L. 247, 250
adscensionis L. 250
 var. *adscensionis* 250
 var. *aethiopica* Trin. & Rupr. 251
 var. *pumila* (Decne.) Coss. & Dur. 250
depressa auct. non Retz. 250
funiculata Trin. ex Rupr. 250, 251
mutabilis Trin. ex Rupr. 250, 251
pumila Decne. 250
redacta Stapf 250, 251
- Aristolochia* L. 203
bracteata Retz. 203
bracteolata Lam. 203
indica L. 203, 204
lanigera Wt. 204
- Aristolochiaceae** 32, 203
Artemisia maderaspatana L. 131
- Arthritideae** 247, 248, 251
lancifolius (Trin.) Hochst. 251
- microphyllus* non (Trin.) Hochst. 252
- Arum campanulatum* Roxb. 230
margaritiferum Roxb. 230
- Arundo bambos* L. 252
- Asclepiadaceae** 29, 142
- Asclepias annularia* Roxb. 144

- daemia* Forsk. 146
procera Ait. 143
tenacissima Roxb. 145
volubilis L. f. 146
Asparagus L. 223
recemosus Willd. 223
Asphodelus L. 223, 224
fistulosus L. 224
tenuifolius Cav. 224
Asteracantha longifolia (L.) Nees 181
Asteraceae 29, 123
Atylosia Wt. & Arn. 68, 72
scarabaeoides (L.) Baker 72
scarabaeoides Benth. 72
Axonopus cimicinus (L.) P. Beauv. 249
Azadirachta A. Juss. 62
indica A. Juss. 62
Azanza Alef. 44, 46
tampas (Cav.) Alef. 46
Bacopa Aubl. 166, 167
monnierii (L.) Wetst. 167
Balanitaceae 25, 29, 61
Balanites Delile 60, 61
aegyptiaca (L.) Delile 61
 var. *roxburghii* (Planch.) Duthie 61
roxburghii Planch. 61
Baliospermum Blume 205, 206
axillare Blume 206
montanum (Willd.) Muell.-Arg. 206
Balsaminaceae 27, 59
Bambos *arundinacea* Retz. 252
Bambusa Schreb. 245, 252
arundinacea (Retz.) Roxb. 252
bambos Voss 252
stricta Roxb. 259
Barleria L. 175, 176
auriculata Schum. 181
cristata L. 176, 177
longifolia L. 181
prattensis Sant. 176, 177
prionitis L. 177
Bassia latifolia Roxb. 138
Batatas *crassicaulis* Benth. 159
Bauhinia L. 94
racemosa Lam. 94
Bergia L. 44
ammannioides Roxb. ex Roth 44
verticillata Willd. 44
Bidens L. 124, 125
biternata (Lour.) Merr. & Sherff ex
 Sherff 125
 var. *pilosa* auct. non L. 125
 var. *wallichii* (DC.) Cl. 125
wallichii DC. 125
Bignonia *stans* L. 173
Bignoniaceae 30, 173
Biophytum DC. 58
sensitivum (L.) DC. 58
Blainvillea Cass. 124, 126
acmella (L.) Philipson 126
latifolia (L.f.) DC. 126
rhomboidea Cass. 126
Blastania *garcini* (Burm. f.) Cong. 111
Blepharis Juss. 175, 177
boerhaviaefolia Pers. 177
maderaspensis (L.) Roth 177
molluginifolia Pers. 178
repens (Vahl) Roth 177, 178
Blumea DC. 124, 126
amplectens DC. 127
eriantha DC. 126
lacera (Burm. f.) DC. 127
membranacea DC. 126, 127
mollis (D. Don) Merr. 126, 127
neilgherrensis Hook. f. 127
obliqua (L.) Druce 126, 127
wightiana DC. 127
Boerhavia L. 194
diffusa auct. non L. 194
diffusa L. 194
procumbens Banks ex Roxb. 194
repens L. 194
 var. *diffusa* (L.) Hook. f. 194
 var. *procumbens* (Banks ex Roxb.)
 Hook. f. 194
Bombacaceae 27, 52
Bombax L. 52
ceiba L. 52
malabaricum DC. 52
Bonnaya *brachiata* Link & Otto 169
Boraginaceae 31, 152
Borreria G.F.W. Meyer 118, 119, 120
articulatis (L.f.) Will. 119
brachystoma (R.Br. ex Benth.) Valeton
 119
hispida (L.) Schum. 119
pusilla (Wall.) DC. 119
stricta (L.f.) K. Schum. 119
stricta Meyer 120
verticillata (L.) Meyer 120
Boswellia Roxb. ex Colebr. 61
glabra Roxb. 61
serrata Roxb. ex Colebr. 61
 var. *glabra* (Roxb.) Bennett 61
Bothriochloa O. Ktze. 248, 252
pertusa (L.) A. Camus 252
Bougainvillea *spectabilis* Willd. 194
Brachiaria Griseb. 249, 253
eruciformis (Smith) Griseb. 253
ramosa (L.) Stapf 253
reptans (L.) Gardn. & Hubb. 253, 254
Brachyrramphus *sonchifolius* DC. 133
Brassica *campestris* L. 38
 var. *tapa* (L.) Hartm. 38
 var. *sarson* Prain 38
oleracea L. 38
 var. *botrytis* L. 38
 var. *capitata* L. 38
rapa L. 38
Brassicaceae 26, 27, 37
Bremekampia *verticillata* (Roxb.) Sreem.
 180
Bridelia Willd. 205, 206
retusa Spreng. var. *squamosa* (Lam.)
 Muell.—Arg. 206
squamosa (Lam.) Gehrm. 206
Briza *bipinnata* L. 259
Bryonia *callosa* Rottl. 111
grandis L. 110
scabrella L. f. 113

- Buchnera* L. 166, 167
angustifolia D. Don 171
euphrasioides auct. non Vahl 171
gesnerioides Willd. 171
hispida Buch. Ham. ex D. Don 167
orobanchoides R. Br. ex Endl. 171
Bulbostylis Kunth 234
barbata (Rottb.) Cl. 234
Bunium Koch 117
macura Boiss. 117
Burseraceae 27, 61
Butea Roxb. ex Willd. 68, 73
frondosa Koenig ex Roxb. 73
monosperma (Lam.) Taub. 73
Cacalia sonchifolia L. 130
Cactaceae 26, 29, 115
Caesalpiniaceae 25, 94
Caesulia Roxb. 124, 127
axillaris Roxb. 127, 229
Cajanus cajan (L.) Millsp. 93
indicus Spreng. 93
Calonyction muricatum (L.) G. Don 159
Calotropis R. Br. 143
procera (Ait.) R. Br. 143
Canavalia Adans. emend. DC. 67, 73
ensiformis (L.) DC. 73
gladiata (Jacq.) DC. 73
Canscora Lam. 149
decurrens Dalz. 149
decussata (Roxb.) J. A. Schult. & J. H. Schultes 149
diffusa (Vahl) R. Br. ex Roem. & Schult. 149
lawii Wight 149
Capillipedium Stapf 247, 254
huegelii (Hack.) A. Camus 254
Capparaceae 26, 28, 39
Capparidaceae 39
Capparis L. 39
aphylla Roth 39
decidua (Forsk.) Edgew. 39
glauca Wall. ex Hook. f. & Thoms. 40
horrida L. f. 40
incanescens DC. 40
sepiaria L. 39
var. *incanescens* (DC.) Hook. f. & Th. 40
zeylanica L. 40
Capraria crustacea L. 169
Capsicum annuum L. 165
Cardiospermum L. 65
halicacabum L. 65
Carduus ramosus Roxb. 133
Carex ovata Burm. f. 242
Carissa L. 140, 141
carandus auct. non L. 141
congesta Wight 141
Carum bulbocastanum auct. non Koch 117
Caryophyllaceae 26, 42
Cassia L. 94
absus L. 94
auriculata L. 95
fistula L. 95
var. *obovata* DC. 95
obtusifolia L. 95, 97
occidentalis L. 96
prostrata Roxb. 96
pumila Lam. 96
rhombifolia Roxb. 95
siamea Lam. 97
sumatrana Roxb. 97
tora auct. non L. 95
tora L. 96, 163
var. *obtusifolia* (L.) Haines 95
Casuarina L. 217
equisetifolia L. 204, 217
muricata Roxb. 217
Casuarinaceae 32, 217
Catharanthus G. Don 141
pugillus (Murr.) G. Don 141
Cayratia A. Juss 63, 64
carnosa (Lam.) Gagnep. 64
trifolia (L.) Domin. 64
Celastraceae 25, 62
Celastrus L. 62
paniculatus Willd. 62
Celosia L. 195, 199
argentea L. 199
cristata L. 199
Celsia coromandeliana Vahl 171
Cenchrus L. 246, 254
ciliaris L. 254
granularis L. 270
pennisetiformis Hochst. & Steud. ex Steud. 254, 255
Centaurea divaricata Wall. 133
Centratherum Cass. 124, 128
anthelminticum (L.) Ktze. 128
phyllolaenum (DC.) Benth. ex Cl. 128
Centrunculus pentandrus R. Br. 137
tenellus Duby 137
Cephalandra indica (Wt. & Arn.) Naud. 111
Cerbera peruviana Pers. 142
Chalcas paniculata L. 60
Chamaeraphis spinescens (R. Br.) Poir. 278
Chenopodiaceae 32, 201
Chenopodium L. 201
album L. 201
ambrosioides L. 202
mutale L. 202
Chloris Sw. 248, 255
barbata Sw. 255
decora Thw. 256
dolichostachya Lagasca 255, 256
incompleta Roth 256
inflata Link 255
montana Roxb. 255, 256
var. *glauca* Hook. f. 256
tetrapogon P. Beauv. 283
villosa (Desf.) Pers. 283
virgata Sw. 256
Chondrilla nudicaulis L. 132
Chrozophora Neck ex Juss. corr. Benth. & Hook. f. 205, 206
parvifolia Klotz. ex Schw. 131, 206
plicata auct. non Juss. 207
prostrata Dalz. var. *parvifolia* (Klotz. ex Schw.) Duthie 207
rottleri (Geis.) Juss. ex Spreng. 206, 207
Chrysopogon Trin. 247, 256

- hackelii* (Hook. f.) Fischer 256
Cicer arietinum L. 93
Cinchona excelsa Roxb. 120
Cissampelos L. 34
 hirsuta Ham. ex DC. 34
 pareira L. var. *hirsuta* (Ham. ex DC.)
 Forman 34
Cissus cornosa Lam. 64
Citrullus Schrad. 110
 fistulosus Stocks 114
 lanatus (Thunb.) Mats. & Nakai 110
 vulgaris Schrad. 110
Citrus medica L. 60
Glechoma hindostana Roth 192
Cleomaceae 26, 38
Cleome L. 38
 icosandra L. 39
 simplicifolia (Camb.) Hook. f. & Thoms.
 38
 viscosa L. 38, 39
Clerodendrum L. 186
 inerme (L.) Gaertn. 186
 multiflorum Ktze. 187
 phlomidis L. f. 186, 187
Clitoria L. 67, 68, 74
 biflora Dalz. 74
 ternata L. 74
Cluyta squamosa Lam. 206
Coccinia Wt. & Arn. 110
 grandis (L.) Voigt 110
 Indica Wt. & Arn. 110
Cocculus DC. 34, 35
 hirsutus (L.) Diels 35
 macracarpus Wt. & Arn. 35
 villosus DC. 35
Coix L. 245, 257
 lacyma L. 257
 lacryma—*jobi* L. 257
Coldenia L. 152
 procumbens L. 152
Colocynthis citrullus (L.) Ktze. 110
Combretaceae 25, 26, 31, 103
Combretum Loefling 103, 104
 ovalifolium Roxb. 104
Commelina L. 225, 226
 axillaris L. 225
 benghalensis L. 226
 cristata L. 227
 erecta L. 226
 forskalei Vahl 226, 227
 hasskarlii Cl. 226, 227
 kurzii Cl. 226
 nudiflora L. 228
 undulata R. Br. 226
Commelinaceae 33, 225
Compositae 123
Conocarpus latifolia Roxb. ex DC. 103
Convolvulaceae 31, 155
Convolvulus L. 156
 alsinoides L. 157
 bicolor Desr. 158
 cairicus L. 163
 calycina Roxb. 161
 copticus L. 158
 dichrous Roem. & Schult. 158
 hispidus Vahl 159
 hypocrateriformis Desr. 163
 microphyllus Sieb. ex Spreng. 156
 muricatus L. 159
 nil L. 159
 obscurus L. 160
 pilosus Roxb. 158
 pluricaulis Choisy 156
 var. *macra* Cl. 156
 prostratus Porsk. 156
 quinquefolia (L.) L. 162
 reniformis Roxb. 162
 repens L. 158
 repens Vahl 158
 reptans L. 158
 sinensis Desr. 161
 stipulaceus Roxb. 161
 tridentatus L. 162
Conzya anthelmintica L. 128
 cinerea L. 136
 membranacea Wall. 127
Corchorus L. 55
 acutangulus Lam. 55
 aestuans Forsk. 56
 aestuans L. 55
 olitorius L. 55
 quinquelocularis Moench 55
 tridens L. 55, 56
 trilocularis Burm. f. 56
 trilocularis L. 55, 56
Cordia L. 154
 dichotoma Forst. f. 154, 155
 macleodii (Griff.) Hook. f. & Thoms. 155
 myxa auct. non L. 155
 obliqua Willd. 155
Coreopsis biternata Lour. 125
Coriandrum sativum L. 117
Coronilla aculeata Willd. 88
Cracca purpurea L. 89
 villosa L. 89
Crateva marmelos L. 60
 nurvala Buch.—Ham. 40
 religiosa non Forst. var. *nurvala* (Buch.—Ham.) Hook. f. & Thoms. 40
Crinum L. 221
 asiaticum Roxb. 221
 defixum Ker-Gawl. 221
Crotalaria L. 67, 74
 albida Heyne ex Roth 74
 burhia Buch.—Ham. ex Benth. 74, 75
 var. *tomentosa* Boiss. 75
ferruginea auct. non Grah. ex Benth. 76
ferruginea Grah. ex Benth. 76
hirsuta Willd. 74, 75
junccea L. 93
linifolia L. 74, 75
luxurians Benth. 76
medicaginea Lam. 74, 76
 var. *luxurians* (Benth.) Baker 76
 var. *neglecta* (Wt. & Arn.) Baker 76
montana Heyne 75
montana Roxb. 75
mysorensis Roth 74, 76
neglecta Wt. & Arn. 76
prostrata Rottl. ex Willd. 74, 76

- prostrata* Roxb. ex D. Don 76
rubiginosa Roxb. 75
triquetra Dalz. 74, 76
Croton rottleri Geis. 207
Cruciferae 37
Cryptolepis R. Br. 147
 buchananii Roem. & Schult. 147
Cryptostegia R. Br. 147
 grandiflora R. Br. ex Lindl. 147
Ctenolepis Hook. f. 110, 111
 garcini (Burm. f.) Naud. 111
Cucumis L. 110, 111
 acutangulus L. 112
 callosus (Rottl.) Cong. 111
 maderaspatanus L. 113
 melo L. 114
 var. **cultus** Kurz 111, 112
 var. **momordica** (Roxb.) Duthie & Fuller 112
 momordica Roxb. 112
 sativus L. 114
 trigonus Roxb. 111
Cucurbita citrullus L. 110
 moschata Duch. ex Poir. 114
 siceraria Molina 114
Cucurbitaceae 29, 110
Cureuligo Gaertn. 221
 mulabarica Wt. 221
 orchioides Gaertn. 221
Curcuma L. 220
 aromatica Salisb. 220
 montana auct. non Rosc. 221
 pseudomontana Grah. 220
 ranadei Prain 221
 zedoaria Roxb. 220
Cuscuta L. 163
 arabica Wight 163
 hyalina Roth 163
Cuscutaceae 30, 163
Cyamopsis psoraloides DC. 93
 tetragonoloba (L.) Taub. 93
Cyanotis D. Don 225, 227
 axillaris (L.) D. Don 225, 226
 cristata (L.) D. Don 227
 cucullata (Roth) Kunth 225
 fasciculata (Heyne ex Roth) Schult. f. 228
Cyathocline Cass. 124, 128
 lyrata Cass. 129
 purea (Ham. ex D. Don) Ktze. 128
Cymbopogon Spreng. 247, 257
 martinii (Roxb.) Wats. 257
Cynanchum extensum N. Jacq. 146
 pyrotechnicum Forsk. 144
 reticulatum Retz. 144
Cynoctonum J. F. Gmel. 148
 petiolatum Gmel. 148
Cynodon Rich. 248, 258
 dactylon (L.) Pers. 258
Cynosurus aegyptius L. 258
 coracanus L. 286
 indicus L. 263
 retroflexus Vahl 262
Cyperaceae 33, 234
Cyperus L. 229, 234
 alopecuroides Rottb. 235, 236
 alulatus Kern 238
 capillaris Koen. ex Roxb. 237
 compressus L. 235, 236
 cuspidatus Kunth 235, 236
 disformis L. 235, 236
 eleusinoides Kunth 235, 237
 esculentus L. 235, 237
 flavidus auct. non Retz. 240
 flavidus Retz. 235, 237
 globosus All. 234, 237
 var. **nilagiricus** (Hochst. ex Steud.) Cl. 237
 iria L. 235, 238
 laevigatus L. 235, 238
 meeboldii Kuk. 234, 238
 michelianus (L.) Delile subsp. **pygmaeus** (Rottb.) Aschers. & Graebn. 90, 131 239
 monostachyos L. 242
 nilagiricus Hochst. ex Steud. 237
 niveus Retz. 235, 239
 nutans Vahl subsp. **eleusinoides** (Kunth) Koyama 237
 var. **eleusinoides** (Kunth) Haines 237
 pangorei Rottb. 235, 239
 pygmaeus Rottb. 235, 239
 rotundus L. 235, 239
 tegetum Roxb. 239
 tenuispica Steud. 235, 240
 triceps (Rottb.) Endl. 234, 235, 240
 uncinatus auct. non Poir. 236
Cyrtisus cajan L. 93
Dactyliandra welwitschii Hook. f. 111
Daectyloctenium Willd. 246, 248, 258
 aegyptium (L.) Willd. 258, 259
 aristatum Link 258
 sindicum Boiss. 259
Daedalacanthus purpurascens (Wt. ex Nees) T. Anders. 180
Daemia extensa (N. Jacq.) R. Br. 146
Dalbergia L.f. 67, 77
 latifolia Roxb. 77
 sissoides Grah. ex Wt. & Arn. 77
 sissoo Roxb. 77, 204
Datura L. 163, 164
 alba Nees 164
 fastuosa L. 164
 metel L. 164
Daucus carota L. 117
Decaneuron phyllodium DC. 128
Delonix elata (L.) Gamble 97
 regia (Boj. ex Hook.) Raf. 97
Dendrocalamus Nees 245, 259
 strictus (Roxb.) Nees 259
Dendrophthoe Mart. 204
 falcata (L. f.) Ettings. 204
Derris indica (Lam.) Bennett 93
Desmodium Desv. 68, 71, 77
 dichotomum (Willd.) DC. 78
 diffusum (Willd.) DC. 78
 gangeticum (L.) DC. 77, 78
 var. **maculatum** (L.) Baker 78
 tatfolium (Roxb.) DC. 79
 neomexicanum A. Gray 79

- procumbens* (Mill.) Hitchc. 78
spirale (Sw.) DC. 78
triflorum (L.) DC. 79
velutinum (Willd.) DC. 77, 79
Desmostachya Stapf 248, 259
bipinnata (L.) Stapf 259
Dialinum coromandelicum Houtt. 66
Diandrochloa diarrhena (Schult.) Henry 265
japonica (Thunb.) Henry 266
Dianthera bicolorata Retz. 184
verticillata Forsk. 178
Dichanthium Willmet 248, 253, 260
annulatum (Forsk.) Stapf 260
caricosum (L.) A. Camus 260
foveolatum (Del.) Roberty 268
Dichrostachys (DC.) Wt. & Arn. 97, 101
cinerea (L.) Wt. & Arn. 101
Dicliptera Juss. 175, 178
micranthes Nees 178
verticillata (Forsk.) Christen. 178
Digera Forsk. 195, 200
alternifolia (L.) Aschers. 200
arvensis Forsk. 200
muricata (L.) Mart. 200
Digitaria Haller 248, 260
abildens (R. & S.) Veldk. 261
adscendens (H.B.K.) Hern. 261
bicornis (Lam.) Roem. & Schult. 260,
 261
ciliaris (Retz.) Koel. 260, 261
granularis (Trin. ex Spreng.) Hern. 261
stricta Roth ex Roem. & Schult. 260, 262
 var. *denudata* (Link) Hern. 262
Dimeria R. Br. 248, 262
ornithopoda Trin. 262
Dinebra Jacq. 248, 262
arabica Jacq. 262
retroflexa (Vahl) Panz. 262
Dioscorea L. 222
bulbifera L. 222
daemona Roxb. 222
hispida Dennst. 222
jacquemontii Hook. f. 223
pentaphylla L. 223
sativa auct. non L. 222
triphylla L. 222, 223
 var. *daemona* (Roxb.) Prain &
 Burkitt 222
Dioscoreaceae 33, 222
Diospyros L. 139
cordifolia Roxb. 139
exculpta Buch. — Ham. 139
melanoxyton Roxb. 139
montana Roxb. 139
tomentosa Roxb. 139
supra Buch. — Ham. 139
Dipodi Medik. 223, 224
hydsuricum Baker 224
serotinum (L.) Medik. 224
Dipteracanthus Nees *emend.* Bremek.
 176, 178
dejectus Nees 179
patulus (Jacq.) Nees 178
prostratus (Poir.) Nees 178, 179
Distemon indicum Wedd. 217
Dodartia indica L. 168
Dodonaea viscosa (L.) Jacq. 66
Dolichandrone (Fenzl) Seem. 173
falcata (Wall. ex DC.) Seem. 173
lawit Seem. 173
Dolichos ensiformis (L.) DC. 73
gladiata Jacq. 73
lablab L. 93
minimus L. 87
pruriens L. 86
purpureus L. 93
scarabaeoides L. 72
trilobatus L. 92
Doodia picta (Jacq.) Roxb. 91
Dregea volubilis (L. f.) Benth. ex Hook.
 f. 146
Dumasia DC. 68, 79
congesta Grah. ex Wt. & Arn. 79
villosa DC. 79
Ebenaceae 30, 139
Echinochloa P. Beauv. 249, 263
colona (L.) Link 263
frumentacea Link 286
Echinops L. 123, 129
echinatus Roxb. 129
Echites antidyserterica Roth 141
Eclipta L. 124, 129
alba (L.) Hassk. 129, 130, 188
erecta L. 129
latifolia L. f. 126
prostrata (L.) L. 129, 130
Ehretia L. 154, 155
aspera Roxb. 155
laevis Roxb. var. *aspera* (Roxb.) Clarke
 155
obtusifolia Hochst. ex DC. 155
Ehretiaceae 31, 154
Elate sylvestris L. 229
Elatinaceae 27, 44
Eleocharis R. Br. 234, 240
atropurpurea (Retz.) Presl 240
Eleusine Gaertn. 248, 263
aegyptia (L.) Desf. 258
aristata (Link) Eh. enb. ex Boiss. 259
coracana (L.) Gaertn. 286
indica (L.) Gaertn. 263
Elytraria A. Mich. 175, 179
acaulis (L. f.) Lindau 179
crenata Vahl 179
Emblema officinalis Gaertn. 212
Emitia Cass. 124, 130
sonchifolia (L.) DC. 130
Enicostema Blume 148, 150
hyssopifolium (Willd.) Verd. 150
litorale Blume 150
verticillatum (L.) Engl. 150
Epimeridi indicus (L.) Rothm. 190
Eragrostis N. M. Wolf 247, 263
amabilis auct. non (L.) Wt. & Arn. 268
atrovirens (Desf.) Trin. ex Steud. 264
cilianensis (All.) Vignolo-Lutati 264
ciliaris (L.) R. Br. 264, 265
cynosuroides (Retz.) P. Beauv. 259
diarrhena (Schult.) Steud. 264

- gangetica* (Roxb.) Steud. 264, 265
interrupta auct. non (R. Br.) P. Beauv. 265
 var. *diarrhena* (Schult.) Stapf 265
 var. *koenigii* Stapf 265
 var. *tenuissima* Stapf 266
japonica (Thunb.) Trin. 264, 266
major Host 264
minor Host 264, 266
pappiana Chiov. 266
pilosa (L.) P. Beauv. 264, 266
riparia (Willd.) Nees 264, 267
stenophylla Hochst. ex Miq. 265
tenella (L.) P. Beauv. ex Roem. & Schult. 264, 267
 var. *plumosa* (Retz.) Stapf 267
 var. *riparia* (Willd.) Stapf 267
 var. *viscosa* (Retz.) Stapf 268
tremula Hochst. ex Steud. 264, 266, 267
unioloides (Retz.) Nees ex Steud. 264, 267
 viscosa (Retz.) Trin. 264, 268
Eranthemum L. *emend.* Radlk. 175, 180
 purpurascens Wt. ex Nees 180
Eremopogon (Hack.) Stapf 247, 268
 foveolatus (Del.) Stapf 268
 strictus (Roxb.) A. Camus 268
Erianthus Michx. 246, 269
 bengalensis (Retz.) Back. f. 269
 munja (Roxb.) Jesw. 269
Erigeron *molle* D. Don 127
 obliquus L. 127
Eriocaulaceae 33, 232
Eriocaulon L. 232
 cinerium R. Br. var. *sieboldianum* (Sieb. & Zucc. ex Steud.) Koyama ex Huang 232, 233
 dianae Fyson var. *richardiana* Fyson 232, 233
 longicuspis Hook. f. var. *polycephalum* (Hook. f.) Fyson 233
 polycephalum Hook. f. 233
 quinquangulare L. 233
 sieboldianum Sieb. & Zucc. ex Steud. 233
Eriochloa H. B. & K. 248, 269
 polystachya auct. non H. B. & K. 269
 procera (Retz.) C. E. Hubb. 269
Eriolaena DC. 53
 hookeriana Wt. & Arn. 53
Ervatamia coronaria Stapf 142
Ervum hirsutum L. 91
Erythrina L. 68, 80
 monosperma Lam. 73
 suberosa Roxb. 80
Eucalyptus tereticornis Sm. 106
Eugenia jambolana Lam. 105
Euphorbia L. 205, 207
 acaulis Roxb. 207
 dracunculoides Lam. 207, 208
 fusiformis Buch.—Ham. 207
 geniculata Ort. 207, 208
 heterophylla L. 208
 hirta L. 207, 208
 hypericifolia auct. non L. 209
 var. *parviflora* Hook. f. 209
 indica Lam. 163, 207, 209
 nerifolia L. 207, 209
 nerifolia Roxb. 209
 nivulia Buch.—Ham. 207, 209
 parviflora auct. non L. 209
 pilulifera auct. non L. 208
 prostrata Graham 210
 pulcherima Willd. ex Klotz. 214
 thymifolia L. 207, 209
Euphorbiaceae 25, 32, 205
Evolvulus L. 155, 157
 alsinoides (L.) L. 157
 emarginatus Burm. f. 162
Exacum L. 149, 150
 hyssopifolium Willd. 150
 pedunculare Arn. 150
 pedunculatum L. 150
Fabaceae 25, 29, 67
Ficoidaceae 115
Ficus L. 214
 benghalensis L. 215
 caricoides Roxb. 216
 glomerata Roxb. 216
 hispida L. f. 214, 215
 indica L. 215
 microcarpa L. f. 215
 oppositifolia Roxb. 215
 palmata auct. non Forsk. 216
 palmata Forsk. subsp. *virgata* (Roxb.) Brow. 215, 216
 religiosa L. 214, 216
 retusa auct. non L. 215
 virgata Roxb. 216
Fimbristylis Vahl 234, 241
 annua Roem. & Schult. 242
 barbata (Rottb.) Benth. 234
 bisumbellata (Forsk.) Bub. 241
 dichotoma auct. non Vahl 241
 dichotoma (L.) Vahl 241
 diphylla (Retz.) Vahl 241
 var. *annua* Clarke 242
 ferruginea (L.) Vahl 243
 var. *sieberiana* (Kunth) Boeck. 243
Miliaceae (L.) Vahl 241, 242
 monostachya (L.) Hassk. 242
 ovata (Burm. f.) Kern 241, 242
 quinquangularis (Vahl) Kunth 242
 schoenoides (Retz.) Vahl 241, 242
 sieberiana Kunth 241, 243
Flacourtiaceae 32, 41
 Fluggea microcarpa Bl. 213
 Fluvialis minor (All.) Pers. 232
Foeniculum vulgare Mill. 117
Fumaria L. 37
 indica (Haussk.) Pugsley 37
 parviflora Lam. subsp. *vallantii* Hook. f. & Thoms. 37
 vallantii Loisel. var. *indica* Haussk. 37
Fumariaceae 26, 37
Galactia P. Br. 68, 80

- tenuiflora* (Klein ex Willd.) Wt. & Arn. 80.
 var. *villosa* (Wt. & Arn.) Baker 80
villosa Wt. & Arn. 80
Galedupa indica Lam. 93
Galega colutea Burm. f. 81
pumila Lam. 88
villosa (L.) L. 89
Gardenia J. Ellis 118, 120
lucida Roxb. 123
resinifera Roth 123
turgida Roxb. 120
Gentiana diffusa Vahl 149
verticillata L. 150
Gentianaceae 30, 31, 148
Gerardia delphinifolia L. 170
Glinus L. 115, 116
lotoides L. 116
oppositifolius (L.) A. DC. 116
Gloriosa L. 223, 224
superba L. 224
Glossocardia Cass. 124, 130
bosvallea (L. f.) DC. 130
linearifolia Cass. 130
Glycine labialis L. f. 90
tenuiflora Klein ex Willd. 80
Gmelina L. 186, 187
arborea Roxb. 187
indica Burm. f. 41
Gnaphalium L. 123, 124, 131
crispatum Clarke 131
depressum Roxb. 131
indicum auct. non L. 131
polycaulon Pers. 131
pulvinatum Delile 90, 131
Gomphrena L. 195, 200
celosioides Mart. 200
decumbens Jacq. 200
sessilis L. 197
Goniogyna DC. 67, 80
biria (Willd.) Ali 60
Gossypium herbaceum L. var. *acerifolium* (Guill. & Perr.) Cheval. 52
punctatum var. *acerifolium* Guill. & Perr. 52
Gracilea royleana (Nees ex Steud.) Hook. f. 272
Gramineae 245
Grangea Adans. 123, 124, 131
maderaspatana (L.) Poir. 131
Gratiola ciliata Colsm. 169
Grewia L. 55, 56
arborea Roxb. ex Rottl. 57
carpinifolia auct. non Juss. 56
flavescens Juss. 56
pilosa Wt. & Arn. 56
salicifolia L. f. 118
tiliifolia Vahl 56, 57
Gymnema R. Br. 142, 143
hirsutum Wall. 146
sylvestre (Retz.) R. Br. ex Schultes 143
Hackelochloa Kuntze 246, 270
granularis (L.) Ktze. 270
Hallia hirta Willd. 80
Haplanthodes Ktze. 175, 180
verticillata (Roxb.) Majumdar 180
Haplanthus verticillaris Nees 180
Hedyotis aspera Heyne ex Roth 121
burmanniana Wall. ex Wt. & Arn. 122
corymbosa (L.) Lam. 122
lancifolia Dalz. 122
maritima L. f. 169
pumila L. f. 123
Hedysarum bupleurifolium Roxb. 72
dichotomum Willd. 78
diffusum Willd. 78
gangeticum L. 78
latifolium Roxb. 79
linifolium L. f. 83
longifolium Rottl. ex Spreng. 71
maculatum L. 78
miniliferum L. 71
pictum Jacq. 90
procumbens Mill. 71
prostratum Burm. f. 83
prostratum L. 83
pseudalhagi M. Bieb. 70
spirale Sw. 78
triflorum L. 79
vaginale L. 72
velutinum Willd. 79
Heleocharis atropurpurea (Retz.) Kunth 241
Helianthus annuus 136
Helicteres L. 53
isora L. 53
Heliotropium L. 152
coromandelianum Retz. 153
malabaricum Retz. 154
marifolium Retz. 152, 153
 subsp. *wallitchii* (Clarke) Kazmi 153
 var. *wallitchii* Clarke 153
ovalifolium Forsk. 152, 153
seabrum Retz. 153
strigosum Forsk. 153
strigosum Willd. 153
supinum L. 131, 153, 154, 207
 var. *malabaricum* (Retz.) Clarke 154
Hemarthria R. Br. 246, 270
compressa (L. f.) R. Br. 270
Hemiadelphus Nees 175, 180
polyspermus (Roxb.) Nees 180
 var. *joshianus* Rao & Biswas 180
Hemidesmus R. Br. 147, 148
indicus (L.) R. Br. 148
Hemigymnia macleodii Griff. 155
Herpestis monnieria H.B.K. 167
Heteropogon Pers. 246, 270
contortus (L.) P. Beauv. ex Roem. & Schult. 270
Heylandia latebrosa auct. non(L.)DC. 80
Hibiscus L. 45, 47
abelmoschus L. 45
caesius Garcke 47
cancelatus Roxb. 45
cannabinus L. 52
esculentus L. 51
ficulneus L. 45
gibsonii Stocks ex Harv. 47
lampas Cav. 46

- lobatus* L. f. 47
micranthus L. f. 48
ovalifolius (Forsk.) Vahl 47, 48
panduriformis Burm. f. 47, 48
populneus L. 51
rosa-sinensis L. 52
 var. *schizopetalus* Mast. 52
schizopetalus (Mast.) Hook. f. 52
solandra L'Herit. 47
vitifolius L. 47, 48
zeylanicus L. 49
Holarrhena R. Br. 141
 antidysenterica (Roth) A. DC. 141
Holcus halepensis L. 281
 pertusus L. 252
 saccharatus L. 287
Holoptelea Planch. 214
 integrifolia (Roxb.) Planch. 214
Holostemma R. Br. 143, 144
 annulare (Roxb.) K. Schum. 144
 rheedei Wall. 144
 rheedianum auct. non Spreng. 144
Hoppea Willd. 149, 150
 dichotoma Heyne ex Willd. 150
Hottonia indica L. 168
Hyacinthus serotinus L. 224
Hybanthus Jacq. 40
 enneaspernus (L.) Muell. 40
Hydrilla Rich. 218
 verticillata (L. f.) Royle 151, 218, 231,
 232
Hydrocharitaceae 33, 217
Hydrolea L. 152
 zeylanica (L.) Vahl 152
Hydrophyllaceae 31, 152
Hygrophilia R. Br. *emend* Heine 176, 181
 auriculata (Schum.) Heine 181, 229
 longifolia Nees 181
 polysperma (Roxb.) T. Anders. 180
 serpyllum (Nees) T. Anders. 181
 var. *hookeriana* Clarke 181
 spinosa T. Anders. 181
Hymenodictyon Wall. 118, 120
 excelsum (Roxb.) Wall. 120
Hypoxidaceae 33, 211
Impatiens L. 59
 balsamina L. 59
 var. *brevicalcarata* Cooke 59
 var. *rosea* (Lindl.) Hook. f. 59
rosea Lindl. 59
Imperata Cyr. 245, 271
 arundinacea Cyr. 271
 cylindrica (L.) Raeuschel. 271
Indigofera L. 68, 81
 anahapista Steud. ex Baker 82
 argentea Roxb. 83
 astragalina DC. 82
 coerulea Roxb. 81
 colutea (Burm. f.) Merr. 81
 cordifolia Heyne ex Roth 81
 enneaphylla auct. non L. 83
 glandulosa Willd. 81, 82
 hirsuta L. 81, 82
 hochstetteri Baker 81, 82
Indica Lam. 84
linifolia (L. f.) Retz. 81, 83
linnaei Ali 81, 83
oblongifolia Forsk. 81, 83
paucifolia Delile 83
prostrata (Burm. f.) Domin 83
prostrata Willd. 84
subulata Vahl ex Poir. 84
 var. *microphylla* Chiov. 84
 var. *nubica* Gillett 84
tinctoria L. 81, 83
trifoliata L. 81, 84
trita L. f. subsp. *subulata* var. *subulata*
 (Vahl ex Poir.) Ali 81, 84
viscosa Lam. 81
Indoneesiella Sreem. 175, 182
 echooides (L.) Sreem. 182
Inga dulcis (Roxb.) Willd. 102
Inula indica L. 134
Ionidium heterophyllum Vent. 40
 suffruticosum (L.) Roem. & Schult. 40
Ipomoea L. 156, 157
 aquatica Forsk. 157, 158
 arachnosperma Welw. 157, 158
 bicolor Lam. 158
 cairiae (L.) Sweet 163
 carnea Jacq. 159
 calycina (Roxb.) Benth. ex Clarke 161
 coptica (L.) Roth ex Roem. & Schult.
 157, 158
 crassicaulis (Benth.) Robinson 159
dissecta Willd. 158
ericarpa R. Br. 157, 158
fistulosa Mart. ex Choisy 157, 159
hederacea auct. non Jacq. 159
hepaticifolia L. 160
hispida (Vahl) Roem. & Schult. 159
maxima auct. non (L. f.) D. Don ex Sw.
 160
maricata (L.) Jacq. 157, 159
nil (L.) Roth 157, 159
obscura (L.) Ker—Gawl. 157, 160
palmata Forsk. 163
pes-tigridis L. 157, 160
 var. *hepaticifolia* (L.) Clarke 160
pilosa Sweet 158
quamoclit L. 163
quinquefolia L. 162
reniformis (Roxb.) Choisy 162
repens (Vahl) Roth 158
reptans Poir. 158
sepiaria Koen. ex Roxb. 157, 160
 var. *stipulacea* (Roxb.) Clarke 157,
 161
sindica Stapf 157, 161
sinensis (Desr.) Choisy 157, 161
stipulacea (Roxb.) Sweet 161
tridentata (L.) Roth 162
Iresine javanica Burm. f. 196
persica Burm. f. 196
Ischaemum L. 248, 271
 laxum R. Br. 279
 rugosum Salisb. 271
Iseilema Anders. 247, 272
 laxum Hack. 272
Isolepis roylei (Nees) Parker 244

- unitnodis* Del. 245
Jasminum grandiflorum L. 140
Jatropha L. 205, 210
 curcas L. 212
 gossypifolia L. 210
 montana Willd. 206
Juncellus alopecuroides (Rottb.) Clarke 236
 laevigatus (L.) Clarke 2: 8
 pygmaeus (Rottb.) Clarke 239
Jussiaea perennis (L.) Brenan 109
Justicia L. 175, 182
 acaulis L. f. 179
 adhatoda L. 176
 bicalyculata (Retz.) Vahl 184
 diffusa Willd. 182
 echioides L. 182
 pectinata L. 165
 polysperma Roxb. 180
 quinqueangularis Koen. ex Roxb. var.
 peppoides (Nees) Cl. 182
 repens L. 186
 verticillata Roxb. 180
Kirganelia Juss. 205, 211
 reticulata (Poir.) Baill. 211
Knoxia L. 118, 120
 corymbosa auct. non Willd. 121
 sumatrensis (Retz.) DC. 120
Kohautia Cham. & Schlecht. 118, 121
 aspera (Heyne ex Roth) Bremek. 121
Kyllinga Rottb. 234
 triceps Rottb. 240
Labiatae 189
Lablab niger Medic. 93
 purpureus (L.) Sweet 93
Lactuca remotiflora DC. 132
Lagarosiphon roxburghii (Planch.) Benth. 218
Lagasca Cav. 132
Lagascea Cav. 124, 132
 mollis Cav. 132
Lagenaria siceraria (Molina) Standl. 114
 vulgaris Sgr. 114
Lagerstroemia L. 106, 107
 indica L. 108
 parviflora Roxb. 107
Lagurus cylindricus L. 271
Lamiaceae 30, 189
Lannea A. Rich. 66
 coromandelica (Houtt.) Merr. 66
Lantana L. 186, 187
 aculeata L. 187
 camara L. 187
 var. *aculeata* (L.) Moldenke 187
 indica Roxb. var. *albiflora* Wt. ex Cl.
 187, 188
Lappago biflora, *sensu* Roxb. 284
Lathyrus L. 68, 85
 aphaca L. 85
 sativus L. 85
Launaea Cass. 123, 132
 nudicaulis auct. non (L.) Hook. f. 132
 nudicaulis (L.) Hook. f. 132
 procumbens (Roxb.) Ramayya & Raja-
 gop. 132
 remotiflora (DC.) Stebbins 132
Lavandula carnosa L. f. 189
Lawsonia alba Lam. 109
 inermis L. 109
Lechea verticillata Willd. 44
Leea L. 63, 64
 aspera Edgew. 64
 edgeworthii Sant. 64
 indica (N. Burman) Merr. 64, 65
 masteri Cl. 65
 sambucina (L.) Willd. 65
 staphylea Roxb. 65
Leeaceae 31, 64
Lentibulariaceae 29, 172
Leonotis R. Br. 189, 190
 nepetifolia (L.) R. Br. 190
Lepidagathis Willd. 171, 176, 183
 cristata Willd. 183
 lutea Dalz. 183
 sphaerostachya Nees 184
 trinervis Nees 183
Lepidium L. 37
 sativum L. 37
Leptadenia R. Br. 142, 144
 pyrotechnica (Forsk.) Decne. 144
 reticulata (Retz.) Wt. & Arn. 144
 spartium Wt. & Arn. 144
Leucas R. Br. 189, 191
 capitata Desf. 191
 cephalotes (Koen. ex Roth)
 Spreng. 191
 diffusa Woodr. 192
 nutans (Roth) Spreng. 191
 stricta Benth. 191
 zeylanica (L.) R. Br. 191, 192
Liliaceae 33, 223
Limnanthemum cristatum (Roxb.) Griseb. 151
 indicum (L.) Griseb. 151
Limnophila R. Br. 166, 168
 gratioloides R. Br. 168
 indica (L.) Druce 168
 racemosa Benth. 168
Lindenbergia Lehm. 166, 168
 indica (L.) Vatke 168
 polyantha Royle ex Benth. 168
 urticaefolia Lehm. 168
Lindernia All. 166, 168
 ciliata (Colsm.) Pennell 168
 crustacea (L.) F. Muell. 168, 169
Lippia nodiflora (L.) Michx. 188
Lochnera pusilla K. Schum. 141
Loranthaceae 31, 204
Loranthus salicata L. f. 204
 longiflorus Desf. 204
Ludwigia L. 109
 parviflora Roxb. 109
 perennis L. 109
Luffa Mill. 110, 112
 acutangula (L.) Roxb. 112
 aegyptica Mill. 114
 cylindrica (L.) Roem. 114
Lycopersicon esculentum Mill. 165
 lycopersicum (L.) Karst. 165
Lysimachia monnierii L. 167

- Lythraceae** 27, 32, 106
Lythrum fruticosum L. 108
Macronyx strigosus Dalz. 89
Madhuca J.F.Gmelin 138
 latifolia (Roxb.) Macbr. 138
 longifolia (Koen.) Macbr. var. *latifolia*
 (Roxb.) Cheval. 138, 204
Malva coromandellana L. 48
 tricuspidata R. Br. 48
Malvaceae 27, 28, 44
Malvastrum A. Gray 44, 48
 coromandelianum (L.) Gacke 48
 tricuspidatum (R. Br.) A. Gray 49
Mangifera L. 66
 indica L. 66
Manilkara achras (Mill.) Fosberg 139
 hexandra (Roxb.) Dub. 139
Manisuris granularis (L.) L. f. 270
Marselia sp. 188
Marsdenia R. Br. 143, 145
 tenacissima (Roxb.) Moon 145
 volubilis (L. f.) Cooke 146
Martynia L. 174
 annua L. 174
 diandra Gloc. 174
Martyniaceae 29, 174
Medicago L. 69, 85
 lupulina L. 85
 sativa L. 93
Melanocenchrus Nees 248, 272, 278
 jacquemontii Jaub. & Spach. 272
 royteana Nees ex Steud. 272
Melhania Forsk. 53
 futteyporensis Munro ex Mast. 53
 var. *futteyporensis* 54
 tomentosa Stocks ex Mast. 53
Melia azedarach L. 62
 azadirachta L. 62
Meliaceae 28, 62
Melilotus Mill. 69, 85
 alba Medik. 85, 86
 indica (L.) All. 85, 86
 parviflora Desf. 86
Melochia L. 53, 54
 corchorifolia L. 54
 cordata Burm. f. 49
Melothria maderaspatana (L.) Cong. 113
Menispermaceae 25, 29, 34
Menispermum cordifolium Willd. 35
 hirsutum L. 35
Menyanthaceae 30, 150
Menyanthes cristata Roxb. 151
 indica L. 151
Merremia Dennst. ex Endl. 156
 emarginata (Burm. f.) Hall. f. 161, 162
 quinquefolia (L.) Hall. f. 161, 162
 tridentata (L.) Hall. f. 161, 162
Micranthus serpyllifolius Roth 108
Microcos lateriflora L. 57
Micropteryx suberosa Walp. 80
Milium cimicinum L. 249
Mimosa L. 97, 101
 chundra Roxb. ex Rottl. 98
 cineraria L. 102
 cinerea L. 101
 dulcis Roxb. 102
 farnesiana L. 98
 hamata Willd. 101
 himalayana Gamble 101
 juliflora Sw. 102
 lebbeck L. 100
 leucophloea Roxb. 99
 odoratissima L. f. 100
 procera Roxb. 100
 rubicaulis auct. non Lam. 101
Mimosaceae 25, 26, 97
Mimusops L. 138
 elengi L. 138
 hexandra Roxb. 139
Mitragyna Korth. 118, 121
 parvisolia (Roxb.) Korth. 121
Mitreola Boehm. ex Ludwig 148
Mitreola L. 148
 oldenlandioides G. Don 148
 paniculata Wall. ex G. Don 148
 petiolata (Gmel.) Torr. & A. Gray 148
Mitrea Schaeff. 148
Modecca bracteata Lam. 114
Molluginaceae 32, 115
Mollugo L. 115, 116
 hirta Thunb. 116
 var. *lotoides* (L.) Cl. 116
 lotoides (L.) Kitze. 116
 oppositifolia L. 116
 pentaphylla L. 116
 var. *stricta* (L.) Hochr. 116
 spergula L. 116
 stricta L. 116
Monardica L. 110, 112
 charantia L. 112
 cylindrica L. 114
 dioica Roxb. ex Willd. 112, 113
 lanata Thunb. 110
Moniera cuneifolia Michx. 167
Moraceae 32, 214
Morinda L. 118, 122
 coreia Buch.—Ham. 122
 tinctoria Roxb. 122
 var. *tomentosa* (Heyne ex Roth)
 Hook. f. 122
tomentosa Heyne ex Roth 122
Moringa Adans. 67
 concanensis Nimmo ex Dalz. & Gibs. 67
 oleifera Lam. 67
 pterygosperma Gaertn. 67
Moringaceae 26, 67
Morus L. 214, 216
 indica L. 216
Mucuna Adans. 68, 86
 pruriens (L.) DC. 86
 prurita W. Hooker 86
Mukia Arn. 110, 113
 maderaspatana (L.) Roem. 113
 scabrella (L. f.) Arn. 113
Murdannia Royle 225, 228
 nudiflora (L.) Brenan 228
Murraya exotica L. 60
 paniculata (L.) Jack 60
Myrobalanus bellirica Gaertn. 105
Myrtaceae 27, 105

- Myrtus cumini* L. 105
Najadaceae 33, 232
Najas L. 232
 minor All. 232
Nama zeylanica L. 152
Nardus thomaea L. 273
Nasturtium indicum (L.) DC. 38
 montanum Wall. ex Hook. f. & Th. 38
Neuclea cordifolia Willd. ex Roxb. 119
 parvifolia Roxb. 121
Neanotis Lewis 118, 122
 lancifolia (Hook. f.) Lewis 122
Nechamandra Planch. 218
 alternifolia (Roxb.) Thwaites 218
 roxburghii Planch. 218
Neodistimon Babu & Henry 217
 indicum (Wedd.) Babu & Henry 217
Nepeta L. 189, 192
 hindostana (Roth) Haines 192
 indica L. 190
 ruderalis Buch.—Ham. ex Renth. 192
Nerium divaricatum L. 142
 grandiflorum Roxb. 147
 indicum Mill. 142
 odorum Soland. 142
 oleander Blanco 142
 tinctorium (R.Br.) Roxb. 142
Neuracanthus Nees 175, 183
 lawii Wight 184
 sphaerocephalus (Nees) Dalz. 183
Nicotiana tabacum L. 165
Nothosaerva Wight 195, 200
 brachiata (L.) Wt. 200
Nyctaginaceae 32, 194
Nyctanthes L. 140
 arbor-tristis L. 140
Nymphaea L. 35, 218
 lotus auct. non L. 36
 lotus non L. var. *pubescens* (Willd.)
 Hook. f. & Thoms. 36
 naucalis auct. non Burm. f. 36
 nauchali Burm. f. 36
 pubescens Willd. 35, 36
 stellata Willd. 36
Nymphaeaceae 28, 35
Nymphoides Hill 151
 cristata (Roxb.) Ktze. 151
 indica (L.) Ktze. 151
Ocimum L. 189, 192
 americanum L. 192
 canum Sims 193
 gratissimum L. 193
 sanctum L. 194
Odina wodier Roxb. 66
Oldenlandia L. emend. Bremek. 118, 122
 aspera (Heyne ex Roth) DC. 121
 corymbosa L. 122
 crystallina Roxb. 123
 pumila (L.f.) DC. 123
Oleaceae 30, 140
Oligochaeta (DC.) Koch. 123, 133
 ramosa (Roxb.) Wagenitz 133
Onagraceae 27, 109
Ophiorrhiza L. 148
 mitreata L. 148
Oplismenus P. Beauv. 249, 272
 burmannii (Retz.) P. Beauv. 272
 compositus (L.f.) Beauv. 272, 273
 indicus auct. non R. & S. 273
Opuntia Mill. 115
 dillenii auct. non (Ker-Gawl.) Haw. 115
 elatior Mill. 115
Orchidaceae 33, 219
Orchis strateumatica L. 220
Oropetium Trin. 246, 273
 thomaeum (L.f.) Trin. 273
Orthosiphon Benth. 189, 193
 pallidus Benth. 193
Oryza sativa L. 286
Ottelia Pers. 218, 219
 alismoides (L.) Pers. 219
Oxalidaceae 27, 30, 58
Oxalis L. 58
 corniculata L. 58, 59
 corymbosa DC. 58, 59
 martiana Zucc. 59
 sensitiva L. 58
Oxystelma R. Br. 143, 145
 esculentum (L. f.) R. Br. 145
 secamone (L.) Karst. 145
Panicum L. 247, 274
 abrudens R. & S. 261
 ascendens H.B.K. 261
 asperum Koenig 278
 austro-asaticum Ohwi 275
 burmannii Retz. 273
 ciliare Retz. 261
 colonum L. 263
 compositum L. 273
 dactylon L. 258
 eruciforme J. E. Smith 253
 flavidum Retz. 275
 geminatum Forsk. 276
 glaucum L. 279
 heteranthum Hook. f. 261
 hordeoides Lam. 277
 humile Nees ex Steud. 275
 intermedium (R. & S.) Roth 280
Isachne Roth ex Roem. & Schult. 253
javanicum Poir. 285
miliare auct. non Lam. 274
pallide-fuscum Schum. 280
paludosum Roxb. 274
paspaloides Pers. 276
proliferum auct. non Lam. 274
prostratum Lam. 254
psilopodium Trin. 274
 var. *coloratum* Hook. f. 274
pumilum Poir. 280
ramosum L. 253
reptans L. 254
spinosens R. Br. 278
sumatrense Roth ex R. & S. 274
tenuissimus Schrank 283
tomentosum Roxb. 280
walense Mez. 274, 275
Papaveraceae 26, 36
Papilionaceae 67
Paspalidium Stapf 249, 275
 flavidum (Retz.) A. Camus 239, 275

- geminatum* (Forsk.) Stapf 275
Paspalum L. 248, 276
bicornе Lam. 261
commersonii Lam. 276
disticum auct. non L. 276
disticum L. var. *vaginatum* (Sw.) Griseb. 276
granulare Trin. ex Spreng. 261
orbiculare Forst. 276
pedicellare Trin. ex Steud. 261
royleanum Nees ex Thw. 262
scrobiculatum L. 276
vaginatum Swartz 276
Pavonia Cav. 44, 49
zeylanica (L.) Cav. 49
Pedaliaceae 30, 174
Pedalium L. 174
murex L. 174
Pennisetum L. C. Rich. 246, 277
cenchroides Rich. 254
var. *echinoides* Hook. f. 255
elliare (L.) Link 254
glaucum (L.) R. Br. 279
hordeoides (Lam.) Steud. 277
parviflorum Trin. 277
pedicellatum Trin. 277
typhoides (Burm. f.) Stapf & Hubb. 286
typhoidicum L. C. Rich. 286
Pentanema Cass. 124, 133
cernuum (Dalz.) Ling 133
indicum (L.) Ling 134
Pentaptera arjuna Roxb. ex DC. 104
glabra Roxb. 104
Peplidium Delile 166, 169
hemisusum Del. 169
matitimum (L. f.) Wetst. 169
Pergularia L. 143, 145
daemia (Forsk.) Chiov. 145
Periploca esculentum L.f. 145
indica L. 148
secamone L. 145
sylvestris Retz. 143
Periplocaceae 29, 147
Peristrophe Nees 175, 184
bicalyculata (Retz.) Nees 184
Perotis Ait. 246, 277
indica (L.) O. Ktze. 277
latisolia Ait. 277
Peucedanum graveolens (L.) Benth. & Hook. 117
Phalaris zizanioides L. 286
Phaseolus aconitifolius Jacq. 91
aureus Roxb. 92
mungo L. var. *radiatus* (L.) Baker 92
radiatus L. 92
trilobatus (L.) Schreb. 92
trilobus auct. non (L.) Ait. 92
Phlomis cephalotes Koen. ex Roth 191
nepetifolia L. 190
nutans Roth 191
zeylanica L. 192
Phoenix L. 228
sylvestris (L.) Roxb. 228
Phyla Lour. 186, 188
nodiflora (L.) Greene 188
Phyllanthus L. *emend.* Gaertn. 205, 211
asperulus Hutch. 212
debilis Herb. & Ham. ex Hook. f. 211
debilis Klein ex Willd. 211
emblica L. 211, 212
fraternus Webster 211, 212
leprocarpus Wt. 212
maderaspatensis L. 211, 212
niruri auct. non L. 212
reticulatus Poir. 211
simplex Retz. 213
urinaria L. 211, 212
virgatus J. G. Forst. f. 211, 213
virosus Roxb. ex Willd. 213
Physalis L. 163, 164
minima L. 164
parviflora R. Br. 164
Physichilus serpyllum Nees 181
Pistia L. 229
stratiotes L. 229
Pisum sativum L. 93
Pithecellobium Mart. 97, 102
dulce (Roxb.) Benth. 102
Platadera decussata Roxb. 149
Plesmonium Schott 229, 230
margaritiferum (Roxb.) Schott 230
Plumbaginaceae 30, 137
Plumbago L. 137
zeylanica L. 137
Plumeria acutifolia Poir. 142
rubra L. forma *acutifolia* (Poir.) Woods. 142
Poa amabilis L. 267
atrovirens Desf. 264
ciliarensis All. 264
ciliaris L. 265
cynosuroides Retz. 259
diarrhena Schult. 265
gangetica Roxb. 265
japonica Thunb. 266
pilosa L. 266
plumosa Retz. 267
riparia Willd. 267
tenella L. 267
tremula Lam. 267
unioloides Retz. 267
viscosa Retz. 268
Poaceae 33, 245
Polanisia hirtiporensis Munro 38
simplicifolia Camb. 38
Polyalthia longifolia (Sonnerat) Thw. 34
Polycarpaea Lam. 42
corymbosa (L.) Lam. 42
Polygala L. 41
arvensis Willd. 41
chinensis auct. non L. 41
erioptera DC. var. *erioptera* 42
Polygalaceae 27, 41
Polygonaceae 31, 202
Polygonum L. 202, 203
glabrum Willd. 203
plebeium R. Br. var. *indica* Hook. f. 90, 131, 203
Polypogon Desf. 247, 278
monspeliensis (L.) Desf. 278

- Pongamia pinnata* (L.) Pierre 93
Pontiana elata L. 97
 regia Boj. ex Hook. 97
Portulaca L. 43
 oleracea L. 43
 paniculata Jacq. 43
 patens L. 43
 quadrifida L. 43
Portulacaceae 26, 43
Potamogeton L. 218, 231
 crispus L. 231
 indicus Roxb. 231
 nodosus Poir. 231
 pectinatus L. 231
Potamogetonaceae 33, 231
Potentilla L. 103
 supina L. 103
Prenanthes procumbens Roxb. 132
Primulaceae 30, 137
Prosopis L. 97, 102
 cineraria (L.) Druce 102
 juliflora (Sw.) DC. 102
 spicigera L. 102
Pseudanthus brachystachys Wight 200
Pseudoraphis Griff. 249, 278
 aspera (Koenig) Pilger 278
 spinoscens (R. Br.) Vickery 278
Psidium guajava L. 106
Psoralea L. 69, 86
 corylifolia L. 86
 tetragonoloba L. 93
Ptelea viscosa L. 66
Pulicaria Gaertn. 124, 134
 angustifolia DC. 134
Pupalia Juss 195, 201
 lappacea (L.) Juss. 201
Pycreus P. Beauv. 234
 capillaris (Koen. ex Roxb.) Nees 237
 globosus (All.) Reich. 237
Raphanus sativus L. 38
Rhabdochloa virgata (Sw.) P. Beauv. 256
Rhamnaceae 28, 62
Rhamnus nummularia Burm.f. 63
 xylopyrus Retz. 63
Rhynchosia Lour. 68, 87
 minima (L.) DC. 87
 rothii Benth. ex Aitch. 87
 sericea Span. 87
Ricinus L. 205, 213
 communis L. 213
Rivea Choisy 156, 162
 hypocrateriformis (Desr.) Choisy 162
Rorippa Scop. 37
 indica (L.) Hiern 37
Rosaceae 26, 103
Rostellularia diffusa Nees 182
 papooides Nees 182
Rostellularia Reichb. 182
 diffusa Nees 182
 gracilis Wt. 185
 papooides (Nees) Nees 182
Rotala L. 106, 108
 serpyllifolia (Roth) Bremek. 108
 tenuis (Wt.) Koehne 108
 verticillaris L. 108
Rottboellia compressa L. f. 270
 thomaeae (L.f.) Koenig 273
Rubiaceae 29, 118
Ruellia L. emend. Bremek. 176, 184
 patula Jacq. 178
 prostrata Poir. 179
 var. *dejecta* (Nees) Cl. 179
 trinervis Buch.—Ham. ex Wall. 183
 tuberosa L. 184
Rungia Nees 175, 185
 elengans Dalz & Gibbs. 185
 linifolia Nees 185
 parviflora (Retz.) Nees var. *muralis* Cl. 185
 var. *pectinata* (L.) Cl. 185
 pectinata (L.) Nees 185
 repens (L.) Nees 185, 186
Rutaceae 28, 60
Saccharum L. 246, 278
 arundinaceum auct. non Retz. 269
 bengalense Retz. 269
 munja Roxb. 269
 officinarum L. 286
 spontaneum L. 278
Sagittaria L. 230
 sagittifolia L. 230
Salmalia malabarica (DC.) Schott & Endl. 52
Salvadora L. 140
 persica L. 140
Salvadoraceae 29, 140
Salvia L. 189, 194
 plebeia R. Br. 194
Sapindaceae 25, 27, 29, 65
Sapindus laurifolius Vahl 66
 trifoliatus auct. non L. 66
Sapota achras Mill. 139
Sapotaceae 31, 138
Schoenoplectus (Reich.) Palla 243
 articulatus (L.) Palla 244
 lateriflorus (Gmel.) Lye 245
Scirpus L. 234, 243
 affinis Roth 243, 244
 articulatus L. 243, 244
 atropurpureus Retz. 241
 barbatus Rottb. 234
 bisumbellatus Forsk. 241
 dichotomus L. 241
 diphyllus Retz. 241
 lateriflorus Gmel. 245
 maritimus auct. non L. 245
 maritimus L. var. *affinis* (Roth) Cl. 244
 miliaceus L. 242
 quinquangularis Vahl 242
 quinquesarius Buch.—Ham. ex Boeck. 244
 roylei (Nees) Parker 243, 244
Schoenoides Retz. 243
 supinus auct. non L. 245
 supinus L. 244
 var. *lateriflorus* (Gmel.) Koyama 243, 245
 var. *supinus* 244
 var. *uninodis* Cl. 245
 tuberosus Desf. 243, 245
Sclerocarpus Jacq. 124, 134

- africanus* Jacq. ex Murr. 134
Scoparia L. 166, 169
 dulcis L. 169
Scrophularia chinense L. 171
Scrophulariaceae 30, 166
Securinega Comm. ex Juss. 205, 213
 virosa (Roxb. ex Willd.) Baill. 213
Sehima Forsk. 246, 279
 nervosum (Rottl. ex Willd.) Stapf 279
Senna *abusus* (L.) Roxb. 94
 auriculata (L.) Roxb. 95
 prostrata Roxb. 96
 tora (L.) Roxb. 96
Serpula *verticillata* L. f. 218
Sesamum L. 174
 indicum L. 174
 mulayanum Nair 174
 orientale L. 174
Sesbania Adans. *emend.* Scop. 68, 88
 aculeata (Willd.) Poir. 83
 bispinosa (Jacq.) W. F. Wight 88
Setaria P. Beauv. 246, 247, 279
 glauca (L.) P. Beauv. 279
 intermedia Roem. & Schult. 280
 italica (L.) P. Beauv. 287
 pallide-fusca (Schum.) Stapf & Hubb. 280
 pumila (Poir.) R. & S. 279, 280
 tomentosa (Roxb.) Kunth 279, 280
Sicyos *garcini* Burm. f. 111
Sida L. 44, 49
 beddomei Jacob 49
 cordata (Burm. f.) Borssum 49
 cordifolia L. 49, 50
 grewioides Guill. & Perr. 50
 humilis Willd. var. *veronicifolia* (Lam.) Mast. 49
 indica L. 46
 ovata Forsk. 49, 50
 ramosa Cav. 46
 rhombifolia L. 49, 50
 var. *rhomboidea* (Roxb. ex Flem.) Mast. 50
 rhomboidea Roxb. ex Flem. 50
 spinosa L. 49, 51
 veronicifolia Lam. 49
Simarouhaceae 25, 28, 60
Sisymbrium indicum L. 37
Smithia W. Ait. 67, 88
 conferta J. E. Smith 88
 geminiflora Roth 88
 var. *conferta* (Smith) Baker 88
Sodada *decidua* Forsk. 39
Salanaceae 30, 163
Solandra *lobata* Murr. 47
Solanum L. 163, 164
 coagulans Forsk. 164
 incanum L. 164
 lycopersicum L. 165
 melongena L. 165
 nigrum L. 164, 165
 rubrum Mill. 165
 surattense Burm. f. 164, 165
 tuberosum L. 166
 xanthocarpum Schrad. & Wendl. 165
Sonchus L. 123, 135
 asper (L.) Hill 135
 oleraceus L. 135
Sopubia Buch.—Ham. ex D. Don 166, 170
 delphinifolia (L.) G. Don 170
Sorghum Moench 247, 280
 deccanense Stapf ex Raizada 280
 halepense (L.) Pers. 280, 281
 saccharatum (L.) Moench 287
 vulgare Pers. 287
Spathodia *falcata* Wall. ex DC. 173
Spergula L. 42
 arvensis L. 43
 fallax (Lowe) Krause 42
 pentandra auct. non L. 42
 pentandra L. 43
Spergularia *fallax* Lowe 42
Spermacoce L. 120
 arsicularis L. f. 119
 brachystema R. Br. ex Benth. 119
 hispida L. 119
 pusilla Wall. 119
 stricta L. f. 119, 120
 sumatrensis Retz. 121
 verticillata L. 120
Sphaeranthus L. 123, 124, 135
 hirsutus Willd. 135
 indicus L. 135
Spigeliaceae 31, 148
Spodiopogon Trin. 247, 281
 albidus Benth. 281
 rhizophorus (Steud.) Pilger 281
Sporobolus R. Br. 247, 282
 diander (Retz.) P. Beauv. 282
 fertilis (Steud.) W.D. Clayton 282
 indicus auct. non (L.) R. Br. 282
 maderaspatanus Bor 282
 minutiflorus (Trin.) Link 283
 orientalis Kunth 282
 tenuissimus (Schrantz) O. Ktze. 282, 283
Staphylea *indica* N. Burman 65
Stemodia L. 166, 170
 viscosa Roxb. 170
Stenophyllus *barbata* (Rottb.) Cooke 234
Stephegyne *parvifolia* Korth. 121
Sterculia L. 53, 54
 urens Roxb. 54
Stereuliaceae 25, 27, 28, 32, 52
Stipa *aristoides* Stapf ex Lisbosa 251
Stratiotes *alismoides* L. 219
Striga Lour. 166, 170
 angustifolia (D. Don) Saldanha 171
 euphrasioides sensu Benth. 171
 gesnerioides (Willd.) Vatke 171
 orobanchoides (R. Br. ex Endl.) Benth. 171
Syzygium Gaertn. 105
 cumini (L.) Skeels 105
 Jambolanum (Lam.) DC. 105
Tabernaemontana *divaricata* (L.) R. Br. 142
 coronaria Willd. 142
Tagetes *erecta* L. 136
Talinum *paniculatum* (Jacq.) Gaertn. 43
Tamaricaceae 25, 43
Tamarindus L. 97

- indica* L. 97
Tamarix L. 43
 dioica Roxb. ex Roth 43
Tanacetum purpureum Ham. ex D. Don 129
Tecoma stans (L.) Kunth 173
Tectona L. f. 186, 188
 grandis L. f. 188
Tephrosia Pers. 68, 88
 hirta Ham. 90
 pumila (Lam.) Pers. 88
 purpurea (L.) Pers. 88, 89
 var. *pumila* (Lam.) Baker 89
 strigosa (Dalz.) Sant. & Mahesh. 88, 89
 tenuis Wall. ex Dalz. & Gibbs. 89
 villosa (L.) Pers. 88, 89, 90
Teramnus P. Br. 67, 80, 90
 labialis (L.f.) Spreng. 90
Terminalia L. 103, 104
 arjuna (Roxb. ex DC.) Wt. & Arn. 104
 bellirica (Gaertn.) Roxb. 104, 105
 catappa L. 105
 crenulata Roth 104, 105
 glabra (Roxb.) Wt. & Arn. 104
 tomentosa Wt. & Arn. var. *crenulata* (Roth) Cl. 105
Tetrapogon Desf. 246, 248, 283
 vilosus Desf. 283
Themeda Forsk. 247, 283
 quadrivalvis (L.) O. Ktze. 283
 triandra Forsk. 283, 284
Thespesia Soland. ex Corr. 44, 51
 lampas (Cav.) Dalz. & Gibbs. 46
 macrophylla auct. non Bl. 46
 populnea (L.) Soland. ex Corr. 51
Thevetia nerifolia Juss. ex Steud. 142
 peruviana (Pers.) Merr. 142
Tiliaceae 27, 28, 55
Tinospora Miers 34, 35
 cordifolia (Willd.) Miers 35
Tradescantia axillaris (L.) L. 225
 cultellata Roth 225
 fasciculata Heyne ex Roth 228
Tragus Haller 246, 284
 biflorus sensu Schult. 284
 racemosus auct. non Scop. 284
 roxburghii Panig. 284
Trapa L. 109
 bispinosa Roxb. 109
 natans L. var. *bispinosa* (Roxb.) Makino 109
Trapaceae 27, 109
Trianthema L. 115
 monogyna L. 115
 portulacastrum L. 115
Tribulus L. 58
 lanuginosus L. 58
 terrestris L. 58
Trichodesma R. Br. 152
 amplexicaule auct. non Roth 154
 amplexicaule DC. 154
 indicum auct. non R. Br. 154
 indicum (L.) R. Br. var. *amplexicaule* Cooke 154
 sedgwickianum Benth. 154
Trichosanthes L. 110, 113
 bracteata (Lam.) Voigt 113, 114
 cucumerina L. 114
 palmata Roxb. 114
Tridax L. 124, 135
 procumbens L. 135
Trifolium alexandrinum L. 93
 indica L. 86
Trigonella L. 69, 90
 foenum-graecum L. 93
 occulta Delile ex DC. 90
Tripogon Roem. & Schult. 246, 284
 abyssinicus auct. non Nees ex Steud. 285
 jacquemontii Stapf 284, 285
 var. *submuticus* Hk. f. 285
 purpurascens Duthie 284, 285
Triticum aestivum L. 287
Triumfetta L. 55, 57
 neglecta Wt. & Arn. 57
 pentandra A. Rich. 57
 rotundifolia Lam. 57
Tubiflora acaulis (L.f.) Kuntze 179
Tylophora R. Br. 143, 146
 hirsuta (Wall.) Wt. & Arn. 146
Typha L. 229
 angustata Bory & Chaub. 229, 236
 angustifolia Sibth. & Sm. 229
 elephantina Grah. 229
Typhaceae 33, 229
Ulmaceae 31, 214
Ulmus integrifolia Roxb. 214
Uraria Desv. 68, 90
 picta (Jacq.) Desv. ex DC. 90
Urena L. 44, 51
 lobata L. subsp. *sinuata* var. *sinuata* (L.) Borssum 51
 ovalifolia Forsk. 48
 sinuata L. 51
Urginea indica (Roxb.) Kunth 224
Urochloa P. Beauv. 249, 285
 panicoides P. Beauv. 285
 var. *panicoides* 285
 var. *pubescens* (Kunth) Bor 285, 286
 pubescens Kunth 286
Urostigma benghalense (L.) Gasp. 215
 religiosum (L.) Gasp. 216
Urticaceae 32, 217
Utricularia L. 172
 exoleta R. Br. 172, 173
 gibba L. subsp. *exoleta* (R. Br.) Taylor 172, 173
 inflexa Forsk. var. *stellaris* (L. f.) Taylor 173
 stellaris L. f. 173
Uraria longifolia Sonnerat 34
Vallisneria L. 218, 219
 alternifolia Roxb. 218
 spiralis L. 219, 231, 232
 verticillata (L. f.) Roxb. 218
Vandella crustacea (L.) Benth. 169
Verbascum L. 166, 171
 celsiotoides Benth. 171
 chinense (L.) Sant. 171
 coromandelianum (Vahl) Kuntze 171
Verbena nodiflora L. 188

- Verbenaceae** 30, 186
Verbesina acmella L. 126
 alba L. 129
 bosvallea L. f. 130
 prostrata L. 129
Vernonia Schreb. 124, 136
 anthelmintica (L.) Willd. 128
 cencerea (L.) Less. 136
Veronica L. 166, 172
 anagallis-aquatica L. 172
Vetiveria Bory ex Lam.—Lisanc. 248, 286
 zizanioides (L.) Nash 286
Vicia (L.) 68, 91
 hirsuta (L.) S.F. Gray 91
Vicoa auriculata Cass. 134
 cernua Dalz. 133
 Indica (L.) DC. 134
Vigna Savi 68, 91
 aconitifolia (Jacq.) Marechal 91
 radiata (L.) R. Wilczek 92
 trilobata (L.) Verde. 92
Vilfa minutiflora Trin. 283
Vinca pusilla Murr. 141
Viola enneasperma L. 40
 suffruticosa L. 40
Violaceae 26, 40
Vitaceae 28, 63
Vitex L. 186, 189
 negundo L. 189
Vitis carnosa (Lam.) Wall. ex Wt. & Arn. 64
 latifolia Roxb. 64
 trifolia L. 64
Volkameria inermis L. 186
Volutarella divaricata Benth. 133
 ramosa (Roxb.) Sant. 133
Waltheria L. 52, 54
americanana L. 54
angustifolia L. 54
indica L. 54
Wattakaka Hassk. 143, 146
 volubilis (L.f.) Stapf 146
Woodfordia Salisb. 106, 108
 floribunda Salisb. 108
 fruticosa (L.) Kurz 108
Wrightia R. Br. 141, 142
 tinctoria R.Br. 142
Xanthium L. 124, 136
 indicum Koen. ex Roxb. 136
 strumarium L. 136
Ximenta aegyptiaca L. 61
Zannichellia L. 218, 232
 palustris L. 231, 232
Zannichelliaceae 33, 232
Zea mays L. 112, 287
Zeuxine Lindl. 219, 220
 bracteata Wt. 220
 strateumatica (L.) Schlecht. 220
 sulcata Lindl. 220
Zingiberaceae 33, 220
Ziziphus Mill. 62
 jujuba Lam. 63
 mauritiana Lam. 62, 63
 nummularia (Burm. f.) Wt. & Arn. 62,
 63
 rotundifolia Lam. 63
 xylopyrus (Retz.) Willd. 62, 63
Zornia J. F. Gmel. 67, 92
 diphylla auct. non Pers. 92
 gibbosa Span. 92
 graminea Span. 92
Zygomenes cucullata (Roth) Rolla Rao &
 Kammathy 225
Zygophyllaceae 28, 58

CORRIGENDA

| <i>Page</i> | <i>Line</i> | <i>For</i> | <i>Read</i> |
|-------------|-------------|-----------------------------|-----------------------------|
| 3 | 18 | heen | been |
| 9 | 21, 25 | <i>chilensis</i> | <i>juliiflora</i> |
| 9 | 29 | leyer | layer |
| 10 | 7 | <i>cephalotus</i> | <i>cephalotes</i> |
| 10 | 17 | <i>pseudalhagi</i> | <i>maurorum</i> |
| 12 | 36 | <i>pseudalhagi</i> | <i>maurorum</i> |
| 13 | 8 | <i>cephalotus</i> | <i>cephalotes</i> |
| 18 | 27 | sustitntes | substitutes |
| 19 | 11 | <i>hyssopifolium</i> | <i>verticillatum</i> |
| 19 | 19 | <i>metel</i> | <i>fastuosa</i> |
| 20 | 7 | <i>chilensis</i> | <i>juliiflora</i> |
| 20 | 20 | <i>Abutilon</i> | <i>Abelmoschus</i> |
| 24 | 6 | authors | author's |
| 29 | 32 | Apocynaceace | Apocynaceac |
| 42 | 6 | racemas | racemes |
| 45 | 11 | plain | Plain |
| 46 | 36 | India 1. | India 1: |
| 48 | 9 | seerate | serrate |
| 56 | 30 | 10306, BSI), (<i>Verma</i> | 10306, BSI;
<i>Verma</i> |
| 59 | 14 | 9.144 | 9:144 |
| 60 | 6 | 1:16 | 1;t.16 |
| 60 | 26 | Hook. | Hook.f. |
| 64 | 20 | Gangep. | Gagnep. |
| 65 | 2 | Gangep. | Gagnep. |
| 66 | 20 | 1876, | 1876; |
| 69 | 40 | exillary | axillary |
| 72 | 3 | auct. | <i>auct.</i> |
| 72 | 26 | Plain | Plain |
| 73 | 26 | <i>emeud.</i> | <i>emend.</i> |
| 81 | 27 | cylindric | cylindric |
| 82 | 30 | <i>L.</i> | <i>L.</i> |
| 89 | 20 | Ghatal | Ghatol |
| 93 | 20 | With | With |
| 94 | 26 | <i>pumila</i> | <i>pumila</i> |
| 98 | 7 | legulate | ligulate |
| 101 | 13 | see ed | seeded |
| 104 | 34 | In | in |
| 105 | 35 | Pl. | Fl. |
| 106 | 20 | <i>Ammamta</i> | <i>Ammannia</i> |
| 110 | 9 | mare | more |
| 111 | 19 | males | male |
| 128 | 10 | ditehes | ditches |
| 128 | 39 | Fl. | Pl. |
| 130 | 13 | Ind. | India |
| 133 | 29 | <i>cernua</i> | <i>cernuum</i> |

| <i>Page</i> | <i>Line</i> | <i>For</i> | <i>Read</i> |
|-------------|----------------|-----------------------------|---|
| 151 | 27 | <i>Ehretia</i> L. | often attribut-ed to <i>P. Ex.</i> |
| 158 | 19 | veg. | Veg. |
| 161 | 24 | <i>C. calycina</i> Fl. | <i>C. calycina</i>
Roxb. Fl. |
| 168 | 6 | Ind. | India |
| 169 | 26 | Wettest. | Wettest. |
| 179 | 6 | ciliate | ciliate |
| 180 | 32 | 4 (3: | 4 (3): |
| 181 | 7 | <i>emend.</i> | <i>emend.</i> |
| 188 | 11 | orate | ovate |
| 196 | 31 | <i>A. echinata</i> Sm. | <i>Alternanthera</i>
<i>echinata</i> Sm. |
| 202 | 1 | 5(2).5 | 5 (2);5 |
| 204 | 37 | <i>equisetifolia</i> Forst. | <i>equisetifolia</i> L. |
| 206 | 15 | Ragma | Regma |
| 211 | 25 | flowerscon sists | flowers consists |
| 213 | 27 | leaf-oppoesd | leaf-opposed |
| 216 | 3 | 5.530. | 5:530. |
| 234 | 21 | <i>cosns</i> | <i>cons</i> |
| 236 | 2 | t. 8. 2. | t. 8. f. 2. |
| 236 | 23 | 4 0 mm | 4.0 mm |
| 239 | 21 | unbelis | unabels |
| 244 | 2 | <i>maritimus</i> | <i>maritimus</i> |
| 249 | 34 | alliptic | elliptic |
| 253 | 34 | Lingule | Ligule |
| 256 | 38 | Fisher | Fischer |
| 258 | 39 | Spikeles | Spikelets |
| 273 | 15 | 2(1).158 | 2(1) : 158 |
| 279 | 15 | Rottl. in Ges. | Rottl. ex Willd.
in Ges. |
| 293 | 22 (column-II) | 04 | 204 |