

FLORA
OF INDIA
SERIES 3

FLORA OF
BILASPUR DISTRICT M.P.

VOLUME I
(RANUNCULACEAE TO CONVOLVULACEAE)

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BOTANICAL SURVEY OF INDIA

FLORA OF BILASPUR

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FOREWORD

The Botanical Survey of India has taken up publication of the new flora of India under four series : Series 1 on the national flora comprising taxonomic revisions of families, tribes and large genera for the whole country ; Series 2 on the floristic inventories of different states or large regions ; Series 3 on the district floras and Series 4 to include special publications and monographs on Indian flora.

Madhya Pradesh, the largest state in the country with its dense forests forms a meeting ground of floristic elements characteristic to north-eastern, western and south-western India. The state has not been fully explored for its plant wealth and no flora for the state as such has been written. With the opening of the Central Circle of the Botanical Survey of India at Allahabad in July, 1962, several botanical explorations in floristically diverse areas and hill ranges in the state have been undertaken with a view to prepare a much needed state Flora of Madhya Pradesh. It is in this context areas and districts like Pachmarhi, Raipur, Durg and Rajnandgaon were botanically explored and their floras published by the Botanical Survey of India.

The present work on the flora of Bilaspur district is the outcome of extensive and intensive botanical explorations in the district and a critical evaluation of the flora carried out by Dr. G. Panigrahi and Dr. S. Krishna Murti of the Botanical Survey of India.

In the introduction, the authors have given interesting details on the physical and climatic features, different types of vegetation and their floristic composition, economic plants and phytogeographical considerations of the district. The families Ranunculaceae to Convolvulaceae have been dealt in this volume.

The flora provides a comprehensive coverage of the floristics of the Bilaspur district. I trust this work will be of immense help to students and teachers of botany, foresters, environmentalists, conservationists and persons concerned with raw plant materials for industry alike and will also richly contribute for writing up of the Flora of Madhya Pradesh.

1st March, 1989.
Botanical Survey of India
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M. P. NAYAR
Director

PREFACE

Flora of Bilaspur district, Madhya Pradesh, India—its publication is indeed a 'Dream comes true'. It was conceived way back in 1970, when both the authors were posted at the Central Circle, Botanical Survey of India, Allahabad. It was submitted as a Thesis to the Calcutta University in June 1985, and the Ph.D. Degree was awarded to the Jr. author (S. K. Murti) by the University in July 1988. And, the release of Volume I, with a Foreword by Dr. M. P. Nayar, the present Director, in early 1989, is indeed the much-awaited and most important milestone in our endeavour to make available to the readers, at large, a District Flora, should one say, in a semi-revisionary format.

The Flora of Bilaspur District is a thoroughly revised version of the original Thesis, re-set, edited and proof-read, solely by the senior author. It is designed to provide much more information than a District Flora usually does : (i) references to protologue literature and citation of type genus/type species, respectively, for 125 families and some 500 genera of Indian angiosperms, would aid those investigators in fundamental taxonomic research, who do not have easy access to Farr *et al.* (1979), *Index Nominum Genericorum (Plantarum)*, to Stafleu and Cowan (1976-1987), *Taxonomic Literature—2* and to the *International Code of Botanical Nomenclature* (Berlin Code), 1988; (ii) a mine of information on the economic/medicinal uses of plants, both as a separate section and appended as notes against many species dealt with and citation of Sanskrit/Local names for most species would act as : (a) an aid for development of plant-based rural and cottage industries, (b) a guide to the practitioners of Ayurvedic/Unani medicines, and (c) a Handbook for environmentalists to focus attention on conservation of indigenous germplasm of economic plants and of rare/threatened/endangered taxa in all-India context.

Nomenclature of several taxa has been up-dated, with critical comments, as and when called for, citing references to publications, upto 1988.

The authors are indeed grateful to Dr. V. S. Agarwal, former Editor of publications, to Sri S. K. Pal, Publication Assistant and to the authorities of the Pooran Press, Calcutta who have shown exemplary patience and extended cooperation for incorporating much additional new information from time to time. Despite such efforts, if any serious lacunae are noticed, the responsibility is entirely of the senior author.

We hope, Botanical Survey of India will follow up the release of Volume I, with publication of Volume 2, comprising the remaining families, from the Solanaceae to the Poaceae, *Literature cited* and an *Index to botanical names*, both for Volume I and Volume 2 and a synopsis of Cronquist's (1981) system of classification, following which the families recognised in the 'Flora' have been, by and large, delineated.

Calcutta
16th March, 1989

G. Panigrahi
Sri Krishna Murti

INTRODUCTION

For a proper utilization of the vegetable raw materials in a developing country like India, the need for surveying the plant-resources—indigenous, naturalized and introduced, for developing rural, as well as urban economy, is often emphasized; and for this, factual data, involving the vegetation, flora and economic plants of the area, are essential for planning development programmes. Such assessment of the floristic components and the resulting inventory of the vegetable raw materials of potentially economic value would not only help plant-based industries of a developing country, but also would stimulate rural people to utilize the minor forest produce available locally or in the neighbourhood for cottage industries. For drawing up rational social forestry schemes, such assessments of floristic wealth of a region is essential.

It should be realized that a 'Flora' will be able to offer critical knowledge of numerous forest products, plants containing vegetable oils, fats and resins, timber, gums, fruits, insecticides, fibres, dyes and medicines, or species which may serve for afforestation, for ornamental use, as new green manures, fodder plants, or possibly, of species withstanding drought or being resistant to fire or inundation, suitable for combating erosion and other economic aspects (van Steenis, Fl. Males. Ser. I, 4 : x. 1948).

Further, there is a severe threat to natural vegetation owing to increasing urbanization. Listing of the endangered, threatened and extinct species of a flora and drawing attention to the occurrence of such species in different forest-types of India would aid in creating an awareness amongst the people as a whole to protect such species from extinction and to take necessary measures for conservation of our seriously disturbed ecosystem and the environment. 'Flora' is an inventory for such purposes and hence a necessity.

Madhya Pradesh, the largest state of the Indian Union is in the centre of India. The state was formed in 1948, from the former Central Provinces and Berar. Subsequently, in 1956, Berar was transferred to Maharashtra, and Madhya Bharat (the former Central Indian Agency or Central India and at one time, a part of Rajputana) and Vindhya Pradesh (formerly a part of Central India, known as Bundelkhand) were merged with Madhya Pradesh to form the present state. Jashpur, Surguja and Bastar, belonging to the Eastern State Agency, were also merged into Madhya Pradesh.

Madhya Pradesh forms a compact and distinct phytogeographical unit and is floristically one of the most interesting sectors of the country. Phytogeographically, the area comes under the Deccan sub-region of India (Chatterjee, 1940). From a botanical point of view this region is of high interest, as it forms the meeting ground of some forms of flora, which appear to be characteristic of north-eastern, western and south-western India. And yet, no 'Flora' exists for the state. The systematic study of the flora of Madhya Pradesh has been very much neglected. Hawetson (1951) has done well to draw attention of botanists to this lacuna. Sengupta (1979) has summarized the efforts at botanisation of Madhya Pradesh over the last one hundred years or more. This lacuna becomes more apparent in view of regional Floras of neighbouring states viz., Prain's (1903) 'Bengal Plants', Haines' (1921-25) 'Botany of Bihar and Orissa', Mooney's (1950) 'Supplement to the Botany of Bihar and Orissa', Gamble & Fischer's (1915-36) 'Flora of Madras Presidency' and Duthie's (1903-23) 'Flora of Upper Gangetic Plain and of the adjacent Siwalik and sub-himalayan tracts'. All these were inspired by the monumental work—'Flora of British India' (Hooker *et al.*, 1872-97).

Although Duthie's (1903-23) 'Flora of Upper Gangetic Plain and of the adjacent Siwalik and sub-himalayan tracts' and Haines' (1921-25) 'Botany of Bihar and Orissa' and Mooney's (1950) 'Supplement to the Botany of Bihar and Orissa' could be utilized as probable indicators of the floristic elements of Bilaspur district, there is hardly any publication on the flora of eastern Madhya Pradesh, of which Bilaspur district forms an integral part. It is noticed that with the exception of Watt, who made sporadic collections of economic plants in 1894 and of Haines, who surveyed from time to time the Vindhyan range, Kaimur hills and plains (also touching a part of Bilaspur district), no other botanist appears to have made any collection of flora of Bilaspur before the reorganization of the Botanical Survey of India in 1954.

In consideration of these facts and circumstances, a comprehensive survey of the Bilaspur district (about 45% of whose total area is under forest and about 60% of these forest-areas represent high rugged hills and valleys, supporting rich tropical and sub-tropical flora) for preparation of a 'Flora', was undertaken. The botanical interest in the flora of Bilaspur district was heightened further from the three following major considerations viz., the district

- (i) forms almost north-eastern limit of the Deccan sub-region conceived as one of the eight phyto-geographical units proposed by Chatterjee (1940, 1962);

- (ii) falls within the range of the 'Indian Region', one of the 37 floristic divisions recognised by Good (1947) for the world;
- (iii) is an integral part of an endemic centre located at the junction of Bihar, Orissa and Madhya Pradesh (Clayton and Panigrahi, 1975).

This 'Flora' should, therefore, be a step towards better understanding of the flora of the state in general.

MATERIALS

More than 17,000 plant-specimens belonging to about 2500 field numbers and collected in different seasons in 12 collection trips involving about 200 collection-days between the years 1962 and 1973, form the basis of the present work. The herbarium materials have been deposited in the herbaria of Botanical Survey of India at Allahabad (BSA) and Howrah (CAL). The details of field numbers and months of collection with names of collectors are given in the following table :

TABLE I : Collection trips undertaken in Bilaspur District

Sl. No.	Field From	Numbers To	Month of Collection	Name of Collector
1	2		3	4
1.	3701	3965	April—May	C. M. Arora
2.	3966	4000	December	G. Panigrahi
3.	7101	7384	December—January	G. Panigrahi
4.	8501	9000	April	S. K. Murti
5.	12701	13100	October—November	S. K. Murti
6.	13201	13214	November	S. K. Murti
7.	13215	13400	February	S. K. Murti
8.	15201	15500	February	S. K. Murti
9.	16701	16760	February	S. K. Murti
10.	16761	16860	February	S. K. Murti
11.	19001	19400	July	S. K. Murti
12.	19401	19600	August	S. K. Murti

STYLE OF PRESENTATION OF THE FLORA

The Flora of Bilaspur district is presented in two volumes. Volume I is divided into two parts. Part one deals with the general considerations of the Flora, which include introduction, materials, abbreviations and general account dealing with area, topography, geology and soil, climate,

vegetation, biotic influences over vegetation and faunal composition. A few photographs, depicting different vegetation-types of the district, are included.

This is followed by general discussion, comments of nomenclatural interest, a statistical analysis of the flora and treatment of the rare and endangered elements, aliens, wild plants of ornamental importance and plants of economic value, including medicinal plants and their uses, etc.

The second part deals with the systematic account of families of angiosperms. Two lists of families are given in the Appendix—one indicates the families as delimited by Cronquist (1968) and adopted in the present work and the other shows the sequence of families followed in the systematic part. The families are arranged according to the sequence outlined in the system of Bentham and Hooker (1862-1883), with some modifications based on the recent knowledge as in Cronquist (1968). According to his terminology the Dicotyledons are called Magnoliatae and the Monocotyledons, the Liliatae; the family delimitations are altered in several cases, e.g. the Nymphaeaceae segregated from the Nelumbonaceae, the Amaryllidaceae merged in the Liliaceae, the Smilacaceae and the Agavaceae segregated from the Liliaceae, etc. A key to the four groups of families recognised and keys to the families in each of these respective groups precede the systematic part.

In the systematic part the genera and species are alphabetically arranged within the family/genus as the case may be, keys to the genera and species are given. Full author citations for families, genera and species are provided. For correct names of genera adopted, reference to the validating original literature is given and the type/lectotype species of the genus are cited on the authority of the Index Nominum Genericorum Plantarum (Farr *et al.*, 1979).

Description of only the species with data on flowering and fruiting time is given. Nomenclature has been brought up-to-date in accordance with I. C. B. N. (1983), as far as practicable. In several cases reference to types/lectotypes/syntypes or type localities, as available, are cited after the description of the taxon. The field numbers of the collector(s) are provided after the locality. For the names of collector(s), Table 1 may be referred to. Interesting notes on nomenclature, habit, habitat, economic aspects or any other point of interest, are given. Illustrations showing the habit and diagnostic characters of some selected species are provided.

Volume II deals with the systematics of the remaining families and ends with a comprehensive bibliography.

The systematic accounts of the 120 families are suitably split up in the two volumes.

ABBREVIATIONS

For economy of space, the following abbreviations have been used in reference citations of species, descriptions of taxa and at other places. These are explained below :

Art.	= Articles of I.C.B.N. 1983
BSA	= Herbarium of Botanical Survey of India at Allahabad, U. P., India
Bor, Grasses	= The Grasses of Burma, Ceylon, India and Pakistan (excluding Bambuseae) by N. L. Bor (1960)
CAL	= Herbarium of Botanical Survey of India at Howrah, W. B., India (Central National Herbarium—CNH)
cm	= <i>Centimetrum</i> : centimetre
comb. nov.	= <i>Combinatio nova</i> : new combination of name and epithet
etc.	= <i>et cetera</i> : and other
et al.	= <i>et alia</i> : and others
excl.	= <i>exclusus</i> : excluded
F.B.I.	= Flora of British India by J. D. Hooker <i>et al.</i> (1872-97)
Fl.	= Flowering time
Fl. Hassan	= Flora of Hassan district, Karnataka, India by C. J. Saldanha and D. H. Nicolson (ed.) (1976)
Fr.t.	= Fruiting time
Haines, Botany	= Botany of Bihar and Orissa by H. H. Haines (1921-25 ; BSI repr. ed. 1961)
Hara <i>et al.</i> Enum.	= Enumeration of flowering plants of Nepal by H. Hara <i>et al.</i> Vols. 1-3 (1978, 1979, 1982)
ibid.	= <i>ibidem</i> : the same, in the same place
I.C.B.N.	= International Code of Botanical Nomenclature
incl.	= <i>inclusus</i> : included
LU.C.N.	= International Union for Conservation of Nature and Natural Resources

LT.	\equiv <i>Lectotypus</i> : Lectotype
I.c.	\equiv <i>loco citato</i> : at the place cited
m	\equiv <i>meter</i> : metre
nom.	\equiv <i>nomen</i> : name
nom. alt.	\equiv <i>nomen alternativum</i> : alternative name
nom. confus.	\equiv <i>nomen confusum</i> : confused name
nom. cons.	\equiv <i>nomen conservandum</i> : conserved name vide International Code of Botanical Nomenclature, App. III. 1983
nom. cons. prop.	\equiv <i>nomen conservandum propositum</i> : name proposed for conservation
nom. illeg.	\equiv <i>nomen illegitimum</i> : illegitimate name
nom. nov.	\equiv <i>nomen novum</i> : new name
nom. nud.	\equiv <i>nomen nudum</i> : name unaccompanied by a description or reference to a published description
op. cit.	\equiv <i>opere citato</i> : in the work cited
p.p.	\equiv <i>pro parte</i> : partly
pro syn.	\equiv <i>pro synonymia</i> : as far as synonym(s) is concerned
q.e.	\equiv <i>quod est</i> : which is
quoad descrip. et spec.	\equiv <i>quod descriptio et specimen</i> : as far as the description and specimen(s) are concerned
quoad spec.	\equiv <i>quod specimen</i> : as far as specimens are concerned
quoad syn.	\equiv <i>quod synonymon</i> : as far as synonym(s) is concerned
sens. lat.	\equiv <i>sensu lato</i> : in a wide sense
sens. strict.	\equiv <i>sensu stricto</i> : in a narrow sense
s.n.	\equiv <i>sine numero</i> : without the collector's number, unnumbered
sphalm.	\equiv <i>sphalmate</i> : by mistake
stat. nov.	\equiv <i>status novus</i> : new rank
ssp.	\equiv <i>subspecies</i> : subspecies
Typ.	\equiv <i>typus</i> : type
typ. cons.	\equiv <i>typo conservandum</i> : type conserved
typ. excl.	\equiv <i>typo excluso</i> : type excluded
var.	\equiv <i>varietas</i> : variety

GENERAL ACCOUNT

AREA

Bilaspur district (Map) belongs to the Mahakosal region (Chhattisgarh basin) of Madhya Pradesh, which also includes the districts of Raigarh, Raipur and Durg. The district lies between $21^{\circ}37' & 23^{\circ}78'N$ and $81^{\circ}12' & 83^{\circ}40'E$ and the area of the district is roughly 19,755 sq. km. The greatest length from Pandaria on the west, through Bilaspur town to Padampur on the east, is about 322 km and the greatest width from north to south is about 128 km. The district is bounded on the east by Raigarh district, on the west by the districts of Mandla and Shahdol, on the north by the Ambikapur district and on the south by the districts of Durg, Raipur and southern part of Raigarh district.

Bilaspur district is divided into two forest divisions viz., North Bilaspur Forest Division and Bilaspur Forest Division for administrative purposes. The former lies in the north and for the most part is hilly, while the latter lies in south and consists mainly of plain or undulating ground with a few scattered hills.

TOPOGRAPHY

(i) General :

The district is bounded by ranges of hills in the north, west and east, while the southern part is generally open and is delimited for the greater part of its length by the course of Mahanadi and Shaonath rivers. The Maikal range represents the eastern extension of the Satpuras and runs from south-west to north-east along the north-western border. Starting off from Saletekri hills of the Balaghat district, it culminates in the peak of Amarkantak in the Shahdol district. The range slopes gradually in the north and north-west to form the fertile narrow valley of the Narbada but the slope is rather abrupt on the southern side. The eastern-most portion of the district, lying between Siang and Kudmura sector is generally flat. On the eastern border the Sakti hills lead almost down to the course of the Mahanadi river, completing almost semi-circular chain by which the wide plain country of the Bilaspur Forest Division is surrounded.

The northern hills run along the whole face of the plain, sometimes thrusting forth an arm, or throwing out an isolated peak and advancing boldly in the level country or receding into deep hollows and bays. These are usually covered with luxuriant vegetation and are included

within the ambit of the North Bilaspur Forest Division. In this Forest Division, Pandra lies on a plateau (600 m) between the Maikal range and the eastern hill ranges. It presents varied aspects of hills and dales, consisting partly of dense forests and partly of open areas cleared by tribals* for settlements. Matin and Uptora comprise the most rugged country of the eastern hill ranges, covered with dense forests.

In Bilaspur Forest Division a cluster of forests, comprising the Baloda range and forming a part of the plains lies scattered in the centre and on the east of the district, where terrain is flat or undulating. There are also a few isolated hills in this sector e.g., Sonthi hills on the Khondra plateau. Madanpur-Kanteli and Champa lie embedded in the open country and there are large reserve forests of Lormi and Pandaria, Kanda, Lapha, Chhuri and Korba, which, while consisting of some hilly tracts, also have, with exception of Lapha, fair stretches of open country. Korba is situated to the east of Hasdo river.

(ii) Elevations :

In the Bilaspur Forest Division the important peaks are Gargaj Pahar (900 m) and Dalha (800 m), both on the Sonthi hills in the Baloda range. The level of the plain country decreases from about 300 m in the west in Mungeli to 200 m at the south-eastern extremity of the district, Bilaspur city itself standing at an elevation of about 250 m. In Mungeli sector, the Kathar hills, about 9 km north-east of Lormi, is the highest point (710 m).

In the north Bilaspur Forest Division, in contrast, there are a large number of peaks varying between 900 and 1200m, viz., Bijora hills (1100 m), Mahadeo hills (1050 m), Manguru hills (1000 m), all in Uprora sector; Karela (1090 m), Simbidi (1025 m), both in the Korba sector; Godhaora (940 m), Mukua (900 m), Matin (750 m), all in Matin sector; Palma (1150 m), Dhitor (1000 m) in Lapha sector and Lilawani (1200 m) and Barabahar (950 m) in Pendra sector. The elevation varies from 300 to 500 m on the slopes of the hills in Lormi and Kota ranges, rising to 950 m on the hills abutting on the main Maikal range in the vicinity of Lamni.

(iii) Drainage system :

The northern hills provide an important water-shed, in as much as the two great rivers, the Narbada and the Son take their rise in them and flow

*The tribal or aboriginal population of the district consists of Baiga, Dhanwar, Gond, Kanwar, Korwa and Pando.

west and north, and have practically no influence on the drainage system of Bilaspur.

The most important tributary of the Mahanadi river is Hasdo river. It rises in the upland of Ambikapur district and after a wild and picturesque course through the rocky gorges of Matin and Uprora, traverses Chhuri and Korba and debouches itself into the plain and passes through Champa, before joining the Mahanadi, about 12 km east of Seorinarayan. Its best known tributaries are the Jatashankari or Ahiran, Tan, Gel and Chornai.

The important tributaries of the Sheonath river, from west to east are Hanp, Maniari, Agar, Arpa, Kharung and Lilagar, each of which is fed by a number of streams and rivulets and which criss-cross the south-western sector of the district.

The drainage system which does influence the vegetation and flora of the district as a whole is represented, thus, by these tributaries of the rivers, Mahanadi and Sheonath.

Two dams erected on the rivers Maniari at Khuria and Kharung at Khootaghat (marked '1' and '2' in the map), have created two water reservoirs with vast expanses of water inside the forest tracts.

GEOLOGY AND SOIL

(i) Geology :

The southern flat area is occupied by horizontal or gently dipping purple shales and limestones belonging to the Rajpur series, a member of the Cuddapah system. These rocks are mostly concealed by alluvial and lateritic deposits and constitute a portion of the extensive flat expanse known as the Chhattisgarh basin. This basin is said to have originated as a sedimentary plain by the filling up of a sea during the pre-Cambrian times. These flats-to-gently-dipping sedimentary beds cover, unconformably, the Archaean granites and gneisses. It is only along a narrow discontinuous belt bordering their outcrop that the Chandanpur sandstones i.e., the basal members underlying the Raipur series, become visible, forming a raised rim round the Chhattisgarh basin. The Chandanpur sandstones are restricted to a narrow zone extending from about 16 km east of Bilaspur up to the easternmost boundary of the district. Elsewhere, the Raipur series rest directly upon older rocks without the intervention of basal sandstones.

The northern hilly part of the district includes a varied assemblage of rocks, some of which are older, the others newer than the Cuddapah rocks of the southern belt. The rocks older than the Cuddapah system include gneisses, granites and schists of Archaean age and slates belonging to the Dharwar system, locally known as the Chilpighat series. Granites are mainly composed of quartz and felspar. Gneisses are divided into granite gneiss, granite-ferous gneiss and fine-grained biotite gneiss. Schists are mainly of two types *i.e.* mica-schists and quartz-mica-schists. The rocks newer than the Cuddapah system belong to the Gondwana system and include several sub-divisions *viz.* the Talchirs and the Barakars (coal-measures), belonging to the Lower Gondwana of Permian age and the Kamthi rocks belonging to the Middle Gondwana of Triassic age. Of all these rocks the older ones prevail in the north-western half, which is occupied almost entirely by crystalline formations of the Archaean gneisses, while the Gondwanas occupy the north-eastern portion.

While the basal beds of Talchirs include greenish sandstones and shales, through which are scattered large boulders regarded as of glacial origin, the Barakars include white or grey sandstones interbedded with shales and coal seams. There are two patches of these rocks along the Mand and Hasdo valleys, constituting the Mand and Korba coal fields, separated from one another by a lofty hill-mass constituted by the massive sandstone of the Middle Gondwana or Kamthi. Rocks of Barakar formations are exposed between Korba, Kendai, Madanpur and Pali, being most predominant around Korba. The rocks are also predominant round about Kartala in the south to Siang in the north running in a narrow strip along the eastern boundary of North Bilaspur Forest Division. Intrusive dykes and sills, some of which are of very large size, consisting of basalt and dolerite of the age of the Deccan Trap (Upper Cretaceous), often intersect the Gondwana rocks.

Palma Pahar and hills around Lapha are composed of the trap occurring on the hill tops and are flanked successively by the Lametas, Barakars and Talchirs along foot of the hills. Laterite occurs capping the trap hills. The laterite occurring on top of ridge and plateau are primary in origin and belong to lower Vindhyan group. Secondary laterites also occur in the area, but they are confined to the valleys and slopes and they are devoid of bauxite concentration. The most common variety of bauxite is either grey or pink.

(ii) Soil :

The soils vary in composition and texture from place to place depending

upon the underlying rocks and topography. The soil is of good depth along the river banks, of fair depth on gentle slopes, but is generally shallow and gravelly on the higher and steeper slopes.

According to the broad classification of soil types in India (Roychowdhury, 1962) the soils met within the Bilaspur district are included in Classes 12-18, viz., mixed red and black soil, red loam soil, red gravelly soil, red and yellow soil, all supporting mixed deciduous forests, in which 'sal' is the predominant crop and laterite soil, laterite and lateritic soil and brown soil, supporting stands of deciduous forests.

The parent rocks consist of limestone, shales and sandstones in the southern part and granites and gneisses in the northern part. The south-western part of the district is mainly a black soil tract, the soil being formed from disintegrated trap rocks. It is suggested that in the centre and east of the district the red soil has been formed from the Vindhyan sandstones or the Gondwana rocks. Soils derived from the Gondwana rocks are generally immature soils and may be described as pale thin, sandy and calcarious soil, low in humus with no marked salinity or alkalinity. The Barakar-soils are generally in flat areas with deep sandy loam soil and mostly bear some of the very good sal forests of Kudmura, Korba and Kendai ranges. Soils derived from schists and slates are clayey. Gneiss and granite soils are generally reddish to dark brown in colour due to the diffusion of iron and of varying depth. In acidic area they support excellent growth of 'sal', whereas in the basic tracts the crop changes to mixed forests. These rocks give rise to either clayey or sandy soil depending on location. Soils derived from shales are pinkish to brownish and support mixed forests, where *Cleistanthus collinus* (Karra) forms almost pure crops.

The deciduous forests, in Bilaspur Forest Division, generally make a poor contribution of humus to soil. In contrast, the soil in the North Bilaspur Forest Division, which harbours mainly moist deciduous or semi-evergreen forest, is rich in humus content.

CLIMATE

The type of vegetation met within an area depends on the climate, the soil and the biotic factors. And, the climate, in its turn, is governed by the temperature, the rainfall and the relative humidity. Champion and Seth (1968) define tropical climate as "very hot and winterless" and

subtropical climate as "hot with cool winter". The following tabular representation of their data on mean annual temperature, mean January temperature and winter is of significance :

Zone	Mean annual temperature	Mean January temperature	Winter
1. Tropical	Over 24°C	Over 18°C	None, no frost
2. Sub-tropical	17° to 24°C	10° to 18°C	Definite but not severe ; frost rare

From the data provided in Table 2 below, it may be seen that Bilaspur district, as a whole, enjoys tropical climate, on the basis of mean annual temperature, but in the winter season, it experiences subtropical climate.

TABLE 2 : Average seasonal variations

Season	Period	Rainfall in cm	Rainy days (nos.)	Average temp. °C	Max. temp. °C	Min. temp. °C	Relative humidity %
Summer	Mar.—June	5.72	5.3	29.4	42.5	16.9	29.5
Rainy	June—Oct.	119.38	60.0	27.2	39.5	17.8	74.1
Winter	Nov.—Feb.	6.98	4.8	19.3	29.5	9.8	55.2

The factors which affect directly the seasonal temperature, as above, are altitude of the place. It is stated that for every rise of 270m in altitude, temperature falls by 1°C (up to about 1500 m). The altitudinal range of the Bilaspur district, varying between 300 to 1200 m may then account for a depression of about 3 to 4°C, compared to places near the sea level, thus transforming the expected tropical climate of the area to a subtropical one, in the winter months. Puri (1954) found that the soil temperature at all depths under the 'sal' forests was higher in the cold weather months than under deciduous forests or in the open.

While the total rainfall for an area is an important factor in determining the nature of vegetation, its seasonal distribution exerts an equally far-reaching influence. The maximum rainfall for the district is recorded from the middle of June to middle of October, the wettest month being July and August. It is derived mainly from the south-west monsoon, while the winter showers during November-January owe their origin to the north-east monsoon, the latter more severe in the northern part of the district. The average annual rainfall recorded for the district is about 132 cm. Champion and Seth (1968) notice no marked variations



Plate 1 *Shorea robusta* Gaertn forest (almost a pure formation);
with dense undergrowths.



Plate 2 Moist mixed forest with lianes and climbers, such as *Bauhinia vahlii*.

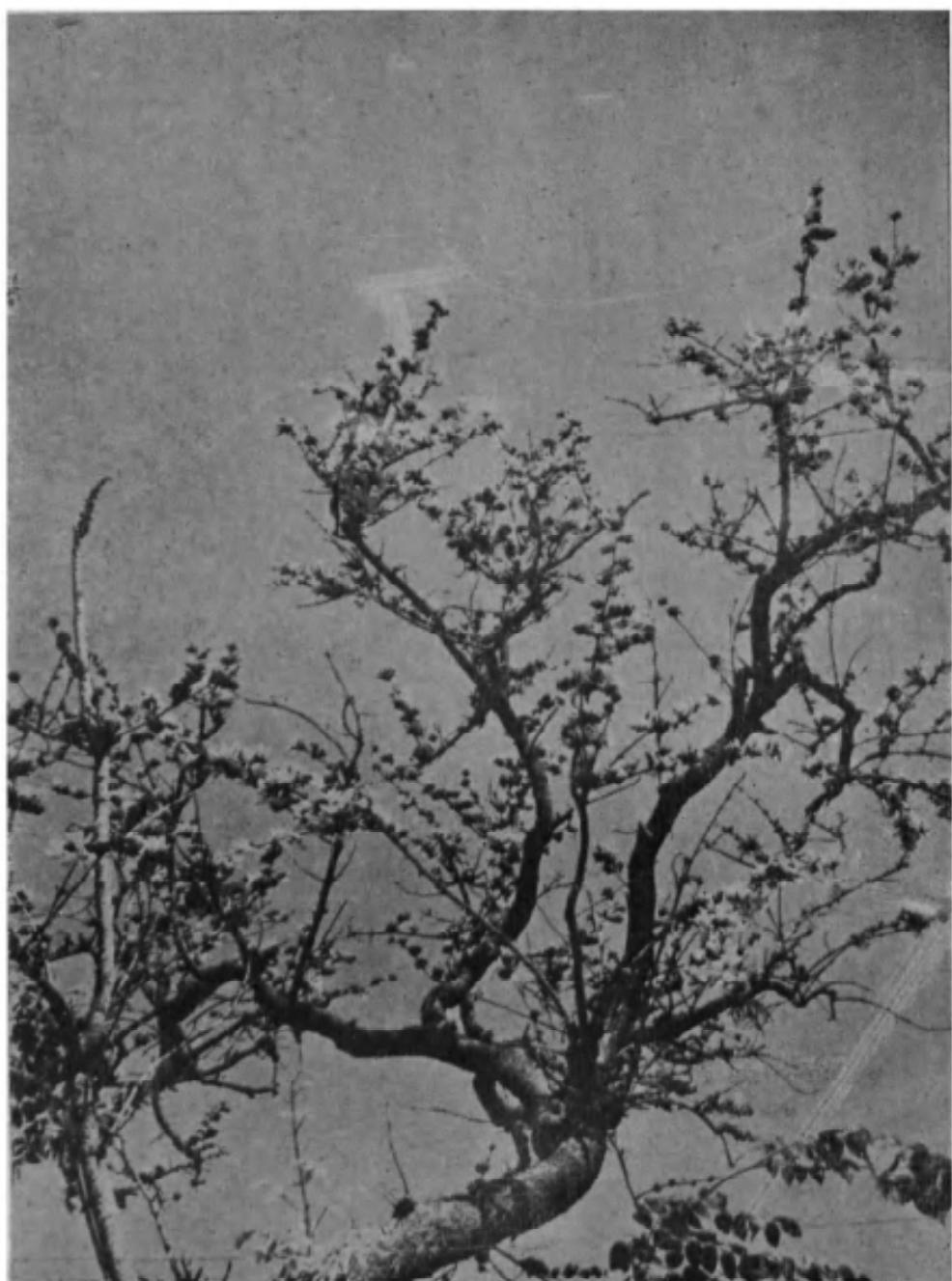


Plate : 3. *Butea monosperma* (Flame of the Forest) in bloom.



Plate : 4. Mixed Sal forest with *Shorea robusta*, *Anogeissus latifolia*, etc.
and scanty undergrowth.



Plate 5 Dry mixed deciduous forest.



Plate 5. *Dendrocalamus strictus* (Bamboo) formation—an edaphic climax.

in rainfall due to the altitude. Yet, the mountain masses largely generate their own climate. Mountainous country with its steep gradients greatly emphasize the climatic effects of aspect, such as, differences in incident radiation, including light and moisture relations, particularly in the soil and exposure to wind, all in addition to the effects of altitude on temperature. Therefore, the climates on the hill-tops of the North Bilaspur Forest Division is generally moister than in the low-lying Bilaspur Forest Division.

While, thus, temperature and rainfall each plays vital role in determining the vegetation type, Champion and Seth (1968) admit that, when both the factors are seen together, it is not possible to analyse the complex factors responsible to explain the development of any given type of vegetation in an area.

Generally, frosts are common in the 'sal' area e.g., Matinara nala and Maniari river areas in the Lamni and Lormi ranges. Amadob and Amanala valleys in Keonchi block also experience frequent frosts. The severity of frost is reduced by the occasional winter rains.

VEGETATION

General :

Champion and Seth (1968) discuss the climatic climax vis-a-vis the polyclimax theory. While the climatic climax theory of Clements (1916) holds that a single climatic climax develops in a given type of climate, the polyclimax theory considers that each pronounced variation in site conditions within a given type of climate will tend to have its own recognisable climax. They prefer to classify the forest types of India as various climatic climaxes depending on sites and soils of medium depth and fertility and define 'edaphic climaxes' as those types which appear to be the expression of markedly different conditions of soil.

Steenis (in the Mountain Flora of Java, Leiden : 17-18, 1972), in his adopted thermal ecological concept, classifies the plants occurring in the subtropical (as also, in the warm temperate) climatic conditions as Mesotherm plants and those restricted to tropical zones, as Megatherm plants. He equates the megatherm plants of the equatorial belt with the tropical montane forests (such as those found in Bilaspur at 1,200 m) and assigns the families Anacardiaceae, Burseraceae, Capparaceae, Combretaceae, Dilleniaceae, Dipterocarpaceae, Flacourtiaceae etc. as representing the Megatherm plant families characteristic of true tropical lowlands. He defines the climax vegetation as the original plant cover for each locality in agreement with the climate and soil. Climax vegetation may be inferred if the autecology of

each of the component species is adapted to perform its full life cycle in the climax and is capable to perpetuate as long as habitat factors remain constant. It follows that, of each individual species, plants of different ages will be present, from the germling to full-grown stages. He concludes from this that the germination of seeds of species in a climatic climax forest must be shade-tolerant, a most important point.

However, a broader correlation seems to exist between the forest types and the soil types supporting it. The red and the black soils/red and yellow soils derived from the disintegration of the underlying trap rocks and the Barakar soils in flat areas with deep sandy loam soil support mixed deciduous forests, in which 'SAL' is predominant; the laterite and the brown soils derived from the Vindhyan sandstones or the Gondwana rocks or schists and shales support stands of deciduous forests in which 'SAL' is somewhat tolerant and *Cleistanthus collinus* is predominant. While the 'acidic' soils support rich growth of 'sal', in the 'basic' soils, the crop changes to mixed forests, the underlying geological formations playing thus only an indirect role in determining the natural vegetational/floristic cover.

As per classification of forest types by Champion and Seth (1968), the forests of the Bilaspur district can be classified as follows :

I. Moist Tropical Forest

Group 3—Tropical moist deciduous forest

Sub-group 3—North Indian moist deciduous forest

C₂—Moist 'sal'-bearing forest

c—Moist Peninsular 'sal' forest

C₃—Moist mixed deciduous forest (without 'sal')

II. Dry Tropical Forest

Group 5—Tropical dry deciduous forest

Sub-group 5B—Northern tropical dry deciduous forest

C₁—Dry 'sal'-bearing forest

c—Dry Peninsular 'sal' forest

C₂—Northern dry mixed deciduous forest

III. Montane Sub-tropical Forest

For general purposes the forests of Bilaspur district can be broadly classified into 'sal' forests (moist and dry); mixed deciduous forests (moist

and dry); bamboo forests representing edaphic climaxes and montane subtropical forests.

I. Group 3—Sub-group 3—C₂

e—Moist Peninsular 'sal' forest : (Plate 1)

The 'sal' (*Shorea robusta*) forests represent a stable climatic climax. 'Sal' is generally more aggressive than any of its associates in relation to the natural gregarious habit, coppicing power, resistance to burning, regeneration, adaptability to soil and site conditions and longevity. The 'sal' typically forms high forest, in which it constitutes 60 to 90% of the top canopy and attains 25-40 m in height. An important feature of 'sal' is its semi-evergreen habit throughout the year interspersed by a deciduous period of only 5-15 days at the beginning of the hot weather. The shade from the new foliage keeps the sal forests cool, in striking contrast to the fully deciduous forests. A dense shrubby undergrowth is usual, the shrubs being mostly semi-evergreen, but in some places almost pure sal forests with practically no undergrowth or very less undergrowth also occur.

The 'sal' grows best on well-drained flat plains, low hills, gentle slopes and valleys. Conditions required for the best growth appears to be well-drained deep loamy soils on the Kota, Lamni and Lormi ranges. Gondwana sandstones, Kamthi and Barakar series carry extensive areas of Sal as in Dhajag, Paturia, Lampahar of Kendai range, Semarkona, Sarsedewa, Thengrimar, Madanpur blocks of Kudmura range and Dondru, Kesla and Gorma blocks of Korba range. Ghatbahera, Bagru, Puta, Basti, Ramgarh, Umankhoi, Sadhwan, Jilda, part of Kherdi, Jamdikhurd and Keonchi of Pendra range also have good sal forests. Sal usually degenerates in growth as it ascends hill slopes and ultimately gives place to mixed forests.

Sal grows best on acidic rock formation and its quality and quantity deteriorates as acidic condition retrogresses and is ultimately replaced by mixed crop on basic rock formation e.g., Dhawalpur, Amlikunda, Senha-Lainga and parts of Matin and Ringania blocks. Sal occurs on cooler aspects, only where soil moisture content is higher. The northern slopes have sal forest, whereas mixed forests occur on southern slopes.

The chief associates of moist sal forests in the first storey are *Terminalia alata*, *T. chebula*, *Anogeissus latifolius*, *Adina cordifolia*, *Mitragyna parvifolia*, *Stereospermum chelonoides*, *Lagerstroemia parviflora*, *Diospyros melanoxylon*, *Miliusa tomentosa*, *Pterocarpus marsupium*, *Schleichera oleosa*, *Albizia procera*, *Bridelia airyshawii*, *Gmelina arborea*, *Syzygium cumini* and *Madhuca longifolia* var. *latifolia*.

The second storey consists of *Ougeinia oojeinensis*, *Kydia calycina*, *Bauhinia malabarica*, *B. semia*, *Wendlandia exserta*, *Buchanania lanza*, *Phyllanthus emblica*, *Semecarpus anacardium*, *Careya arborea*, *Grewia tiliaceifolia*, *Mallotus philippensis* etc.

The third storey consists of *Flemingia macrophylla*, *F. nana*, *F. strobilifera*, *Phoenix humilis*, *Antidesma acidum*, *Indigofera cassioides*, *Helicteres isora*, *Colebrookea oppositifolia*, *Vernonia divergens*, *V. pyramidale*, *Embelia basual* and *Grewia hirsuta*.

The herbaceous undergrowth consists of *Hybanthus enneaspermus*, *Drymaria cordata*, *Geranium mescatense*, *Biophytum reinwardtii*, *B. sensitivum*, *Leea alata*, *L. aspera*, *Desmodium dichotomum*, *D. gangeticum*, *Indigofera linifolia*, *Begonia picta*, *Rubia wallichiana*, *Blumea bifoliata*, *B. membranacea*, *Laggera alata*, *Mazus pumilus*, *Andrographis paniculata*, *Dipteracanthus prostratus*, *Aerva lanata*, *Euphorbia heterophylla*, *E. dracunculoides*, *E. thymifolia*, *Phyllanthus debilis*, *P. maderaspatensis*, *Chlorophytum arundinaceum*, *Commelina suffruticosa*, *Kyllinga tenuifolia*, *Alloteropsis cimicina*, *Brachiaria distachya*, *Eragrostis* spp., *Heteropogon contortus*, *Imperata cylindrica*, *Themeda quadrivalvis*, *Thysanolaena maxima*, *Vetiveria zizanioides* etc.

The important climbers include *Smilax zeylanica*, *Bauhinia vahlii*, *Millettia extensa*, *Ventilago denticulata*, *Celastrus paniculatus*, *Asparagus racemosus*, *Dioscorea bulbifera*, *D. hispida*, *D. oppositifolia* and *D. pentaphylla*.

The undergrowth (see Plate 1) is very dense in shady and cool localities. At places *Vernonia pyramidale* covers up the area completely, making it difficult for the 'sal' seedlings to come up. In the areas of Lormi and Lamni, *Colebrookea oppositifolia* grows densely, particularly along nala and river-banks. *Dendrocalamus strictus* creeps into these forests only at the fringes, where sal is overwhelmingly mixed with miscellaneous species. *Bambusa arundinacea* is restricted to special damp sites. Where 'sal' is almost pure, bamboo is scrupulously absent.

Group 3—Sub-group 3

C₃ *Moist mixed deciduous forest*: (Plate 2)

This is a fairly closed high forest, commonly 20-30 m or more in height, as the preceding Moist 'Sal' Forest, but the dominant species are mostly deciduous, though often only for brief periods. Although intimate mixture of species is the rule, a relatively smaller number of species form more or less pure associations in the top canopy. However, the evergreen

habit is more developed in the lower storey, giving the forest, as a whole, a more or less evergreen appearance over most of the year. A bamboo undergrowth is characteristic, although it may be locally absent on some sites. Climbers are abundant. The chief feature of the Moist Deciduous Forest is a leafless period in the dry season, which may or may not begin with the cold weather, but is met with typically during March-April, when the upper canopy is almost entirely leafless. Quite a number of species flower, while more or less leafless e.g., *Bombax ceiba*, *Cassia fistula*, *Sterculia urens*, *Erythrina suberosa*, *Lannea coromandelica*, or as the species start forming new foliage, e.g., *Dalbergia sissoo*.

This forest-type is found usually in patches in the midst of the 'sal' forest and over large areas in the relatively flatter plains e.g., in Lormi, Kota and Baloda ranges of the Bilaspur Forest Division and Katghora, Pasan, Kudmura and Kendai ranges of the North Bilaspur Forest Division. The mixed deciduous forests are also met with on the upper slopes and dadar (flat hill-tops) and the southern aspects of hills.

Occasionally, moderately moist mixed deciduous forests, in which 'sal' is scarce or absent, is seen, but such forests appear to be only seral in status. Once the progression of this forest has reached a point at which 'sal' can obtain a footing, *Shorea robusta*, relatively quickly, establishes its dominance and characterises the climax formation. In more mesophytic habitats, however, such a progression may be arrested because of special site conditions and are considered as edaphic variations on the climax community.

The chief associates of these forests in the first storey are *Terminalia alata*, *T. bellirica*, *T. chebula*, *Anogeissus latifolius*, *Diospyros melanoxylon*, *Lagerstroemia parviflora*, *Madhuca longifolia* var. *latifolia*, *Pterocarpus marsupium*, *Bridelia airyshawii*, *Syzygium cumini*, *Dalbergia paniculata*, *Garuga pinnata*, *Adina cordifolia*, *Schleichera oleosa*, *Lannea coromandelica*, *Soymida febrifuga*, *Bombax ceiba*, *Chloroxylon swietenia*, *Semicarpus anacardium*, *Phyllanthus emblica*, *Aegle marmelos*, *Buchanania lanzae*, *Kydia calycina*, *Ougeinia oojeinensis*, *Butea monosperma*, (Plate 3), *Bauhinia malabarica*, *B. purpurea*, *B. variegata*, *B. semia*, *Hymenodictyon orixense*, *Sterculia urens* and *Dendrocalamus strictus*.

The second storey consists of *Mallotus philippensis*, *Xeromphls spinosa*, *X. uliginosa*, *Hollarrhena pubescens*, *Litsea glutinosa*, *L. monopetala*, *Nyctanthes arbor-tristis*, *Flacourzia indica*, *Cassia fistula*, *Ziziphus mauritiana*, *Carissa spinarum*, *Cleistanthus collinus*, *Casearia graveolens*, *Gardenia resinifera*, *G. turgida*, *G. gummiifera*, *G. latifolia*, *Wendlandia exserta*, *Grewia tiliacefolia*, *G. hirsuta* etc.

The third storey consists of *Colebrookea oppositifolia*, *Helicteres isora*, *Eriolaena hookeriana*, *Pogostemon benghalense*, *Embelia basaal*, *Petalidium barlerioides*, *Woodfordia fruticosa*, *Phoenix humilis* etc.

The fourth storey consists of *Desmodium dichotomum*, *D. gangeticum*, *Indigofera linifolia*, *I. tinctoria*, *Cayratia trifolia*, *Begonia picta*, *Rubia wallachiana*, *Blumea bifoliata*, *B. fistulosa*, *Elephantopus scaber*, *Plumbago zeylanica*, *Bacopa monnieri*, *Mazus pumilus*, *Blepharis maderaspatensis*, *Dicliptera verticillata*, *Dipteracanthus prostratus*, *Boerhavia diffusa*, *Achyranthes aspera*, *Aerva lanata*, *Alternanthera sessilis*, *Celosia argentea*, *Acalypha ciliata*, *Euphorbia heterophylla*, *E. dracunculoides*, *E. thymifolia*, *E. hypericifolia*, *Phyllanthus debilis*, *P. maderaspatensis*, *P. virgatus*, *Chlorophytum arundinaceum*, *Amischophacelus axillaris*, *Commelina suffruticosa*, *C. paludosa*, *C. hasskarlii*, *Amorphophallus bulbifer*, *Alloteropsis cimicina*, *Arthaxon lancifolius*, *Brachiaria distachya*, *Heteropogon contortus*, *Eragrostis tenella*, *Imperata cylindrica* etc.

Some important climbers met within these forests are *Smilax zeylanica*, *Milletia extensa*, *Cryptolepis buchananii*, *Ampelocissus latifolius*, *Ventilago deniculata*, *Celastrus paniculatus*, *Dioscorea bulbifera*, *D. hispida* and *Bauhinia vahlii*. Bamboos (see Plate 2) are common on the slopes.

II Group 5—Sub-group 5B—C₁

c—Dry Peninsular 'Sal' Forest: (Plate 4)

Shorea robusta of low quality and height predominates, the height not exceeding 10-15 m and regeneration is slow and difficult. It is mixed with other species in greater number than in the Moist Deciduous Forests and is often broken up into characteristically pure groups or mixed patches of varying extent between which its associates predominate. Most of the species also occur in the Moist Deciduous Forest. Though they form part of the main canopy in Dry Deciduous 'Sal'-bearing Forests, in the Moist Deciduous Forests, they may be in the second storey. Practically, all the trees are deciduous during the dry season, usually for several months and during monsoon season the forest takes on an almost luxuriant appearance from the growth of an ephemeral herbaceous vegetation. The lower canopy is likewise almost entirely deciduous or wherever evergreen or semi-evergreen species are present, they are inconspicuous and mainly confined to the moister and more-sheltered spots. An undergrowth of shrubs is usually present. Bamboos are often present but not luxuriant. Climbers are comparatively few. Epiphytes and ferns are quite inconspicuous.

These forests are met with on shallow loose sandy and friable soil on plains and undulating country which is cut up into ravines by numerous streams. Karella, Paunakhar, Rapti, Manguru Pahar, Ajagarbahan, Aratara, Ringania, Matin and Pasan are some of the important areas having this type of forest. Main rock formations consist of granite and schist. Parts of Semardari; Rumga, Dugra, Jogisar, Jamdikhurd, Khodri and Darnoli of Pendra range have this type of forests. Sandstones of Kainthi series also carries dry sal forests at Nonbira, Bundeli, Shreemar and Rampur. Parts of Kota and Baloda ranges also have such forests.

The chief associates of dry deciduous sal-bearing forests in the first storey are *Boswellia serrata*, *Adina cordifolia*, *Lannea coromandelica*, *Soymida febrifuga*, *Terminalia alata*, *Anogeissus latifolius*, *Lagerstroemia parviflora*, *Madhuca longifolia* var. *latifolia*, *Pterocarpus marsupium*, *Diospyros melanoxylon* etc.

The second storey consists of *Buchanania lanzae*, *Phyllanthus emblica*, *Semicarpus anacardium*, *Flacourzia indica*, *Bauhinia semia*, *Ougeinia oojeiensis*, *Ziziphus xylopyrus*, *Gardenia latifolia*, *Cleistanthus collinus*, *Cassia fistula*, *Nyctanthes arbor-tristis* etc. *Dendrocalamus strictus* is occasionally met with in this storey.

The third storey consists of *Indigofera cassiodoides*, *Embelia basaal*, *Woodfordia fruticosa*, *Helicteres isora* and *Grewia hirsuta*.

The fourth storey consists of *Cayratia trifolia*, *Tephrosia purpurea*, *Uraria alopecuroides*, *Cassia obtusifolia*, *Blumea fistulosa*, *Andrographis paniculata*, *Dicliptera verticillata*, *Justicia betonica*, *Achyranthes aspera*, *Euphorbia heterophylla*, *E. hypericifolia*, *Phyllanthus debilis*, *Carex cruciata*, *Cyperus* spp., *Aristida adscensionis*, *Brachiaria distachya*, *Themeda quadrivalvis*, *T. laxa*, *Thysanolaena maxima*, *Iseilema laxum* etc. The important climbers are *Bauhinia vahlii* and *Smilax zeylanica*.

II. Group 5—Sub-group 5B

C₂ Northern dry mixed deciduous forest : (Plate 5)

The upper canopy is thin but fairly complete in this type. Most trees have low-spreading crowns. Trees are deciduous during the dry season. *Boswellia serrata* and *Cleistanthus collinus* are characteristic of such forests. At the foot of the hills miscellaneous species are found associated with *Boswellia serrata* ('Salai'), but as the slope is ascended, the proportion of 'Salai' increases until it forms pure crop on hill tops. Bamboos are found scattered throughout.

These forests are found in vast stretches in Dhawalpur, Chindipani, parts of Amlikunda, Jatga, Senha-Lainga, Ringania and Matin of Pasan range, parts of Pendra and Katghora ranges, Mukia, Latgarh, Naktikar and Batali blocks of Korba range and southernmost part of Kudmura range. Sandstone and mica-schists are common rock formations. Soil is coarse sandy and shallow.

The main components of first storey are *Pterocarpus marsupium*, *Anogeissus latifolius*, *Acacia catechu*, *Diospyros melanoxylon*, *Butea monosperma*, *Phyllanthus emblica*, *Lannea coromandelica*, *Chloroxylon swietenia*, *Dalbergia paniculata*, *Lagerstroemia parviflora*, *Terminalia alata* etc.

The second storey consists of *Cleistanthus collinus*, *Ougeinia oojeinensis*, *Aegle marmelos*, *Careya arborea*, *Bridelia airyshawii*, *Buchanania lanza*, *Gardenia resinifera*, *Bauhinia racemosa*, *Carlissa spinarum*, *Ziziphus xylopyrus*, *Flacourtie indica*, *Nyctanthes arbor-tristis*, *Calotropis procera*, *Adhatoda zeylanica* etc.

The third storey consists of *Woodfordia fruticosa*, *Indigofera cassioides*, *Grewia hirsuta*, *Barleria prionites*, *Cassia tora*, *Peristrophe bicalyculata*, *Phoenix humilis* etc.

The undergrowth consists of *Tephrosia purpurea*, *Uraria alopecuroides*, *U. picta*, *Boerhavia diffusa*, *Achyranthes aspera*, *Aerva lanata*, *Alternanthera sessilis*, *Chrozophora prostrata*, *Euphorbia thymifolia*, *E. hypericifolia*, *Carex cruciata*, *Kyllinga tenella*, *Aristida adscensionis*, *A. setacea*, *Imperata cylindrica*, *Heteropogon contortus*, *Thysanolaena maxima*, *Vetiveria zizanioides*, *Themeda quadrivalvis*, *T. triandra*, *Sehima nervosum* etc. Climbers are few and include *Asparagus racemosus*, *Smilax zeylanica*, *Celastrus paniculatus* etc.

Cleistanthus collinus grows, at places, in abundance and forms pure crop e.g., parts of Ringania, Tanakha, Latgarh, parts of Katghora range, parts of Senha, Dhawalpur, Amlikunda of Pasan range and Rampahar, Naktikhar, Betati and Bundeli of Korba range. Sandstone and gneiss with intrusive of trap are the main rock formations. Soil is sandy, loose and dry.

Common associates of these forests in the first storey are *Boswellia serrata*, *Terminalia alata*, *Anogeissus latifolius*, *Lagerstroemia parviflora* and *Lannea coromandelica*. The underwood consists of *Buchanania lanza*, *Phyllanthus emblica*, *Bauhinia malabarica* and *Ougeinia oojeinensis*. The undergrowth consists mainly of *Gardenia resinifera*, *Woodfordia fruticosa* and *Phoenix humilis*. Grasses are a few. Climbers are rare.

Acacia catechu occurs on deteriorated soils and areas subjected to erosion e.g., Manikpur and Mukua blocks of Pasan range.

Edaphic type : Bamboo forest : (Plate 6)

While Lamni, Lormi ranges and the Khondra block of Baloda range support some of the very good bamboo forests, some areas in Achanakmar and hills of Pandaria also have pure thick growth of bamboos; Jatga, Lendia, Pantha, parts of Matin, Ringania, Dhawalpur and Mukua also have moderately good bamboo forests. Bamboo grows best in localities where the soil is deep and loamy in texture, without excessive amount of clay and humus. *Dendrocalamus strictus* is the main species, but *Bambusa arundinacea* also occurs along the banks of rivulets.

III. Montane sub-tropical forest :

Typical Montane Subtropical Forest does not occur in the Bilaspur district, but in some pockets on higher hilly tracts in North Bilaspur Forest Division, components of such a forest type are met within cool, sheltered and moister places. These areas are usually above 1000 m e.g., Kabirchabutra, Lamni, Bijra hills, Mahadeo hills, Karcia Pahar, Palma etc.

The chief components of this type in the first storey are *Canthium dicoccum*, *Syzygium cumini*, *S. nervosum*, *Litsaea glutinosa*, *L. monopetala*, *Ficus semicordata*, *Manilkara hexandra*, *Miliusa tomentosa* etc.

The second storey consists of *Grewia tiliaceifolia*, *Glochidion multiloculare*, *G. zeylanicum*, *Mallotus philippensis*, *Symplocos laurinus*, *S. racemosus*, *Alangium salvifolium* subsp. *salvifolium* etc.

The third storey consists of *Colebrookea oppositifolia*, *Pogostemon benghalensis*, *Ixora arborea*, *Melastoma malabathrica*, *Jasminum auriculatum*, *Ochna obtusata* ssp. *obtusata*, *Thalictrum foliolosum*, *Rhamnus purpureus*, *Indigofera cassioides* etc.

The fourth storey consists of *Reinwardtia indica*, *Vernonia cinerea*, *V. divergens*, *V. pyramidale*, *Blumea membranacea*, *B. laciniata*, *B. mollis*, *B. bifoliata*, *Laggera alata*, *Leea indica*, *L. alata*, *Geranium mascatense*, *Wendlandia exserta*, *Ardisia solanacea*, *Celosia argentea*, *Begonia picta*, *Exacum tetragonum*, *Bacopa monnierii*, *Mazus pumilus*, *Dipteracanthus prostratus*, *Euphorbia heterophylla*, *E. dracunculoides*, *Chlorophytum arundinaceum*, *Commelinia suffruticosa*, *C. paludosa*, *Amorphophallus bulbifer*, *Hypericum japonicum*, *Campanula benthamii*, *Lobelia alsinoides*, *Micromeria biflora*, ferns

and epiphytic herbs. The important climbers are *Clematis smilacifolia*, *Bauhinia vahlii*, *Venilago denticulata*, *Ampelocissus latifolius*, *Smilax zeylanica* etc.

HYDROPHYTIC VEGETATION

General :

Weaver & Clements (1938) define the herbaceous vascular hydrophytes as "plants that grow in water, in soil covered with water or in soil that is usually saturated with water". Muenschar (1944) considered aquatic plants as "those species which normally start in water and must grow for at least a part of their life-cycle in water, either completely submerged or emerged". He includes some 'border-line' species of bogs and marshes among the aquatic plants. Reid (1961) expressed the same view when he defined water-plants as "those whose seeds germinate either in the water-phase or in the substrate of a body of water, and which must spend part of their life-cycle in water". According to Daubenmire (1956), "hydrophytes include aquatics which normally grow in water and swamps and bog-plants which inhabit soil containing a quantity of water that would prove supra-optimal for the average plant".

It is, however, difficult to draw line between a 'border-line' and a 'terrestrial' species growing on the shores of lakes, ponds or rivers which are periodically inundated or imersed and thus, grow in water for a brief period. Sculthorpe (1967) describes aquatic vascular plants as vascular hydrophytes and states, "it is difficult to suggest a definition of vascular hydrophytes, because aquatic habitats cannot be sharply distinguished from terrestrial ones. In most climates there is a seasonal fluctuation of the water-table. Habitats with standing water for most of the year may dry out completely in the summer, whilst normally terrestrial soils may be flooded during the rainy season. At no time there is an abrupt change from land to water, but rather a gradual transition from dry, through water-logged, to submerged soils. The reversion of vascular plants to aquatic life has involved colonisation of these transitional habitats and some of the marginal sites that are periodically flooded, have come to possess their own distinctive plant associations". Raunkiaer (1934) considered hydrophytes as plants which have vegetative parts submerged or floating at the water surface but not emerging up the air and which survive unfavourable seasons as submerged buds attached to the parent plant or lying free on the substrate. The concept would exclude : (a) *Phragmites*, *Typha* etc. which have submerged lower parts, but essentially aerial leaves ; (b) also annuals, such as *Najas* and *Trapa*, which survive as seeds ; (c) some species of *Potamogeton* and *Nymphaea* which produce

reduced land-forms as hemicryptophytes, if the habitat dries out; (d) the geophytes or species that pass the dry season as subterranean tubers or rhizomes, such as the sedges. Saxton (1924) refers to the adaptability of a hydrophyte to different seasonal and environmental factors during its life-cycle and enunciates the concept of "mixed formation in time".

Aquatic habitats :

The common habitats of hydrophytes in the Bilaspur district are a number of lakes, tanks, water-reservoirs, rivers, streams, deserted wells and the canal-systems from the Khuria and Khootaghat reservoirs. Seasonal puddles and ditches are scattered throughout the area. They get filled up with water during the monsoon period. Some dry in a short period, while, in others, water may persist for a long period. Some of the streams are permanent, while the others are temporary and seasonal. Paddy-fields also support hydrophytic vegetation. There are a few tanks which are considerably big in size viz., one at Ratanpur, two at Pali, one on the way to Pali from Ratanpur and one each at Kota and Passan.

Classification :

Arber (1920) classified the hydrophytic plants into two groups—plants not rooted in soil (non-anchored hydrophytes) and plants rooted in soil (anchored hydrophytes). Weaver & Clements (1938) divided the hydrophytes into three groups viz., floating, submerged and amphibious hydrophytes. Daubenmire (1956) recognized four groups within the hydrophytes—floating, suspended, submerged-anchored and emergent-anchored types. In the present work, the hydrophytes are classified, following Arber (*l.c.*), into two main groups, with one or more subgroups.

I. Non-anchored hydrophytes

- Free-floating hydrophytes
- Submerged hydrophytes

II. Anchored hydrophytes

- Floating hydrophytes
- Submerged hydrophytes
- Emergent hydrophytes
- Marshy-amphibious hydrophytes
- Wetland hydrophytes

Free-floating hydrophytes : These occur in stagnant water-bodies or slow-flowing waters and have contact with water and air only. Examples : species of *Azolla*, *Lemna*, *Wolffia*, *Spirodela*, *Trapa*, *Nymphaeoides*, *Pistia* etc.

Floating hydrophytes (anchored) : These plants are in contact with soil, water and air, e.g., *Nymphaea pubescens*, *Nelumbo nucifera*.

Submerged hydrophytes (non-anchored) : They generally occur submerged in stagnant water, e.g., *Ceratophyllum demersum*, *Najas* spp., *Potamogeton pectinatus* etc.

Submerged hydrophytes (anchored) : These plants are in contact with soil and water, but usually the flowering parts are raised above the water level : *Hydrilla verticillata*, *Ottelia alismoides*, *Vallisneria natans*, *Najas graminea*, *Potamogeton nodosus* etc.

Emergent hydrophytes : They occur on exposed or submerged soil and are usually rhizomatous or cormous perennials. The roots, lower part of the stems and the lower leaves are submerged, but the upper part of the stem and flowering parts emerge out of water-level and are in contact with air, e.g., *Aeschynomene indica*, *Caesulia axillaris*, *Limnophila indica*, *Hygrophila auriculata*, *Sagittaria guayanensis* subsp. *lappula*, *Butomopsis latifolia*, *Phragmites karka*, *Monochoria vaginalis*, *Oryza rufipogon* etc. *Monochoria vaginalis* is perennial in permanently aquatic habitats but behaves as annual when growing in paddy-fields which are inundated for only 3-4 months and then dry up.

Marshy-amphibious hydrophytes : They occur on soft wet mud or root in shallow water. Many of these species thrive well even after the substratum is considerably dried up: e.g., *Ipomoea aquatica*, *Ludwigia adscendens*, *I. octovalvis*, *I. perennis*, *I. prostrata*, *Phyla nodiflora*, *Hoppea dichotoma*, *Bacopa monnieri*, *Limnophila aromatica*, *L. chinensis*, *Eclipta prostrata*, *Veronica anagallis-aquatica*, *Polygonum barbatum*, *P. glabrum*, *P. hydropiper* etc.

Wetland hydrophytes : These are so-called 'border-line' species. A few woody trees/shrubs e.g., *Terminalia arjuna*, *Vitex negundo*, *Homonoia riparia*, *Salix tetrasperma*, *Tamarix dioica* are usually found near streams, rivers and on the lake margins. Herbaceous elements like *Gnaphalium polycaulon*, *Ageratum conyzoides*, *Portulaca pilosa*, *Sphaeranthus indicus*, *Canscora diffusa*, *C. decussata*, *Exacum tetragonum*, *Ammannia baccifera*, *A. multiflora*, *Rotala indica*, *R. rotundifolia* etc. also grow in marshy or wetland habitats.

It is difficult to distinguish the zone of submerged hydrophytes from the zone of floating hydrophytes, the zones overlapping with each other. Floating hydrophytes like *Pistia*, *Eichhornia* etc. may also grow as emergent forms or some border-line plants send out long floating shoots on the surface of water e.g., *Ipomoea aquatica*. In the zone of emergent hydrophytes, occasional puddles, which are deep enough, support submerged hydrophytes. Some floating species with extensive root system may become anchored in shallow water, several species may produce land-forms when stranded on marginal wet soil, *Ipomoea carnea* subsp. *fistulosa*, a species naturalized in India, exhibits quite different phenotypes in water, on wet muddy soil and on drier habitats.

Hydrophytic plant-communities :

The following hydrophytic plant-communities are conspicuous in the district :

Azolla-Lemna community.

Eichhornia-Pistia community.

Ludwigia-Polygonum community.

Hygrophila auriculata-Caesulia axillaris community.

Nelumbo nucifera-Nymphaea pubescens-Nymphoides community.

Rostellaria-Caesulia-Alternanthera community.

General composition of hydrophytic vegetation :

Ipomoea aquatica forms floating mats during rainy season. *Cleome chelidonti* grows luxuriantly in the ditches and puddles at Khuria. *Lemna* and *Wolffia* form dense cover on the surface of many stagnant water-bodies. The tanks at Pali and Ratanpur are full of *Nelumbo nucifera* and species of *Nymphoides*. *Trapa bispinosa* is commonly cultivated in the ponds. *Hygrophila auriculata* is very common in ditches. The irrigation canals near Khuria and Khootaghat reservoirs contain species of *Potamogeton*, *Vallisneria*, *Hydrilla*, *Sagittaria*, *Najas* etc. On canal-banks grow *Mazus pumilus*, *Echinochloa colona*, and species of *Commelinaceae*, *Ammannia*, *Rumex*, *Lindernia* and sedges. *Rotula aquatica* is most common in sandy-rocky river beds. During monsoon the paddy fields support the growth of large number of marshy species viz., *Utricularia aurea*, *U. caerulea*, *U. exoleta*, *Juncus leschenaultii*, *Drosera burmanni*, *D. indica*, *Eriocaulon cinereum*, *E. polyccephalum*, *E. quinquangulare*, *Pogostemon stellatus*, sedges etc. In the marshy depressions and swampy areas inside the forests we generally find *Limnophila rugosa*, *Bacopa monnieri*, *Monochoria vaginalis*, *Centella asiatica*, *Lindernia crustacea* etc.

A rich carpet-vegetation consisting of *Phyla nodiflora*, *Polygonum plebiun*, *Veronica anagallis-aquatica*, *Bergia ammonioides*, *Mollugo pentaphylla*, *Caesulia axillaris*, *Eclipta prostrata*, *Cyatholine purpurea*, *Lobelia alsinoides*, *Anagallis arvensis*, *Hydrolea zeylanica*, *Allmania nodiflora*, *Burmarrnia coelestis*, *Xyris pauciflora*, *Amischophacelus axillaris*, *Cyanotis fasciculata*, *Floscopia scandens*, *Polycarpaea aurea*, *P. corymbosa*, *Ammannia baccifera*, *A. multiflora*, *Rotala indica*, *R. rosea*, *R. rotundifolia*, *R. serpyllifolia*, *Glinus lotoides*, *G. oppositifolius*, *Oldenlandia corymbosa*, *O. diffusa*, *Merremia emarginata*, *M. tridentata*, *Limnophila aromatica*, *L. chinensis*, *L. rugosa*, *Eriocaulon cinereum*, *E. polyccephalum* and many species of sedges etc. occur around the tanks in Pasan, Ratanpur, Pali, around water reservoirs at Khuria and Khootaghat and other aquatic habitats.

Very few members of the largest and most advanced monocot families viz. Poaceae and Orchidaceae venture into the water and there is equally conspicuous paucity of hydrophytes among the gamopetalous dicots. This led Arber (1920) to postulate that the highly evolved angiosperms probably lack the plasticity of their early aquatic pioneers derived from the more primitive stocks.

Adventive spread of certain aquatic vascular plants:

The geographical distributions of many vascular hydrophytes are intriguing and anomalous. About 40% of hydrophytes display smaller ranges confined within the limits of a single continent or major land-mass. In common with the more extensive types, many of them exhibit marked latitudinal penetration. Such latitudinal extension, not so conspicuous amongst terrestrial herbs, is attributable primarily to the less violent variations of temperature and edaphic factors in the aquatic environments and perhaps also to the dissemination of seeds and vegetative propagules by migrant birds.

Yet, it is surprising to note that about 25 to 30% of hydrophytes in an area are endemic, related probably to the edaphic limitation of hydrophytes. Most endemic hydrophytes are to be found in the tropics viz. numerous ecologically restricted members of the Podostemaceae. Yet, as a result of dispersal and colonisation, on the one hand, and the changing climate, physical and edaphic factors of the environment, on the other, great migrations of species continue to occur, as they have occurred during the geological and historical times and floras everywhere; consequently the aquatic, no less than the terrestrial, are always in a state of flux. The adventive spread and naturalisation of certain hydrophytes and

the extension and post-glacial restriction of others, illustrate these dynamic aspects of plant geography.

- (a) Temperate European species introduced to India :
Veronica anagallis-aquatica, *Anagallis arvensis*, *Oxalis corniculata*,
Polygonum hydropiper, *Potamogeton crispus*.
- (b) Neotropical or neo-temperate species introduced to palaeotropics :
Ageratum conyzoides, *Eclipta prostrata*, *Eichhornia crassipes*, *Ipomoea carnea* subsp. *fistulosa*.
- (c) Tropical and sub-tropical species of the Old World introduced to Europe etc. :
Azolla pinnata, *Najas graminea*, *Nelumbo nucifera*, *Ottelia alismoides*,
Trapa bispinosa, *Vallisneria natans*.

Riverain vegetation :

The vegetation along the course of rivers, rivulets, streams and in the sandy-rocky river beds are quite characteristic. The stream beds appear as an arid stretch of sand and boulders.

Terminalia arjuna, *Bombax ceiba*, *Aegle marmelos*, *Dalbergia sissoo*, *Ficus benjamina* subsp. *comosa*, *F. hispida*, *F. microcarpa*, *F. racemosa*, *Mitragyna parvifolia* etc. are some of the common trees and shrubs along the streams and river courses. The shrubby vegetation is represented by *Woodfordia fruticosa*, *Adhatoda zeylanica*, *Calotropis procera*, *C. gigantea*, *Vitex negundo*, *Lantana camara*, *Tragia involucrata*, *Ludwigia octovalvis* etc. *Ipomoea carnea* subsp. *fistulosa* forms a continuous straggling mass along streams and rivers. *Homonoia riparia* and *Rotula aquatica* are always found in the boulder-strewn river beds.

The herbaceous flora is represented by *Indigofera linifolia*, *Alysicarpus vaginalis*, *Solanum surattense*, *Phyla nodiflora*, *Rumex dentatus* subsp. *klotzschianus*, *Heliotropium strigosum*, *H. indicum*, *Boerhavia diffusa*, *Cassia occidentalis*, *C. pumila*, *C. tora*, *Cyperus alutatus*, *C. iria*, *C. distans*, *C. niveus*, *C. rotundus*, *Fimbristylis bisumbellata*, *F. complanata*, *F. miliacea*, *Bulbostylis barbata*, *Gomphrena celosioides*, *Allmania nodiflora*, *Dactyloctenium aegyptium*, *Imperata cylindrica*, *Saccharum spontaneum*, *Equisetum diffusum* etc. Weeds of exotic origin, such as *Ageratum conyzoides*, *Argemone mexicana*, *A. ochroleuca* sometimes form pure patches in the sandy river beds. *Polygonum barbatum*, *P. hydropiper* and *P. stagninum* are found in streams with sluggish water. Several of cultivated species belonging to Brassicaceae, Malvaceae, Fabaceae Cucurbitaceae, Apiaceae, Asteraceae, Solanaceae etc. find their way in these river beds as escapes.

PTERIDOPHYTIC FLORA

The vegetation of Bilaspur district is quite rich in ferns and fern-allies. These are found mainly in sheltered localities, in shady and cool places under moist conditions. They are one of the chief constituents of moist deciduous forests. The following list includes 33 species under 21 genera belonging to 13 families.

Selaginellaceae

Selaginella bryopteris (L.) Bak., *S. ciliaris* (Retz.) Spring, *S. kurzii* Bak. and *S. repanda* (Desv. ex Poir.) Spring

Isoetaceae

Isoetes cormandelina L. f., *I. bilaspurensis* Panigrahi

Equisetaceae

Equisetum diffusum D. Don

Ophioglossaceae

Ophioglossum reticulatum L.

Lygodiaceae

Lygodium flexuosum (L.) Sw.

Gleicheniaceae

Dicranopteris linearis (Burm. f.) Underwood

Adiantaceae

Adiantum incissum Forssk., *A. lunulatum* Burm. f.

Sinopteridaceae

Aleuritopteris anceps (Blanf.) Panigrahi, *A. farinosa* (Forssk.) Féo, *A. grisea* (Blanf.) Panigrahi, *Cheilanthes tenuifolia* (Burm. f.) Sw.

Pteridaceae

Pteris quadriaurita Retz. complex, *P. vittata* L.

Lindsaeaceae

Sphenomeris chinensis (L.) Maxon

Parkeriaceae

Ceratopteris thalictroides (L.) Brongn.

Thelypteridaceae

Ampelopteris prolifera (Retz.) Copel., *Pronephrium lakhimpurens* (Rosenst.) Holtt., *P. nudatum* (Roxb. ex Griffith) Holttum.
Thelypteris arida (D. Don) Morton, *T. dentata* (Forssk.) E. St. John

Athyriaceae

Athyrium falcatum Bedd., *A. hohenackerianum* (Kze.) Moore

Dryopteridaceae

Dryopteris cochleata (D. Don) C. Chr.

Tectariaceae

Tectaria macrodonta (Fée) C. Chr.

Polypodiaceae

Leptochilus axillaris (Cav.) Kaulf., *L. decurrens* Bl.

Marsiliaceae

Marsilia minuta L.

Azollaceae

Azolla pinnata R. Br.

BIOTIC INFLUENCES OVER THE VEGETATION

General :

Man and the domestic animals have always played a vital role in changing the vegetation pattern of any place. The same is true also for the Bilaspur district. The vegetation has been degraded into scrub jungles in some localities and to grassland, in other places.

Population pressure :

Due to mounting population pressure, some of the forest areas have been converted into agricultural lands. Due to destruction of the original forests several obnoxious exotic plants have invaded the area viz., *Lantana camara*, *Malvastrum coromandelianum*, *Bidens pilosa*, *Acarthospermum hispidum*, *Tridax procumbens*, *Ageratum conyzoides*, *Argemone mexicana*, *Cassia occidentalis*, *Ipomoea carnea* subsp. *fistulosa*, *Xanthium strumarium*, *Urena lobata* etc. The formation of bare ravines due to soil erosion is a result of forest clearing. The exposed soil surface, either due to clearing of forest for agricultural purposes or for habitation, faces direct action of wind and rain.

Cattle-grazing :

Due to grazing and browsing by domesticated animals, some of the forest areas have changed into grasslands. Domesticated cattle, goat etc. freely graze in the forests and on the slopes, thus transforming these forests into grasslands. Further, trampling of the forest floor by the cattle has adverse affects on seedlings, obstructing the successional stages of recovery. Lopping of forest trees and shrubs has also affected the vegetation. The regeneration is poor and even absent in some localities. Selective fellings and hacking are common in the forests close to human habitation, leading on to forests devoid of valuable tree-growth, leaving only the malformed ones.

Fire hazards :

Fire for hunting, for pleasure, for pestering neighbours or neighbouring village, for clearing land, for making land passable, for converting forest into pasture land, has played havoc with the forest and affected the vegetation to a great extent (Steenis in Fl. Males. Bull. 22 : 1562-1567, 1967). All gradations can be observed from the 'Sal' forests to the grasslands studded with a few crooked shrubs and stunted trees in the district. Occasionally, fire is used for clearing the undergrowth of 'Sal' forests. Fire also causes the change of the normal habit-form of certain species e.g., *Premna herbacea*, an undershrub transformed into a dwarf, stemless herb of 5-15 cm high. A few plants viz., *Desmodium pulchellum*, *D. triflorum*, *Uraria rufescens* etc. are fire-indicator species. The recurrence of fire depletes the plant cover. With rainfall, water washes away the surface soil, exposing the hard rock.

Shifting cultivation (BEWAR or PODDU or JHUMING) :

The practice of shifting cultivation (bewar) has resulted in extensive hill slopes being cleared of vegetation, as in Aurapani in the Lormi range. The Baigas of Amanala, Amadob, Khairdabre etc. largely depend for their livelihood on bewar cultivation. In such cases, 'Sal' forest has changed to mixed forest with poor regeneration and malformed tree-habit.

Soil erosion :

It is seen mostly in the areas with mixed forests where recurrence of fires deplete the plant cover, or to 'Sal' areas, where felling has been done. With heavy rainfall water washes away the surface soil, exposing the hard rock. These conditions are noticeable in the old 'bewar' areas of Aurapani in the Lormi range to the north and west of the villages. Areas subject to gully erosion due to fellings and heavy grazing are seen

along the hill slopes to the north-west of Sonthi in the Baloda range and to the west of Sheotarai in the Kota range. Sheet erosion is commonly noticed in areas where grazing pressure is high e.g., Bhimpuri in Lormi range, north of Belukri, north and south of Karli in Baloda range and in areas north of Tingipur in Kota range. The effect of soil erosion can also be seen in Kesla, Dordro, Barpali, Gorma, Chhindipani, Ringania, Pantha, Sakti and on the steep hill slopes of Bhojgarh, Latgarh, Led, Lampahar and Ajgarbahar, all in North Bilaspur Forest Division.

Industrial activities :

Industrial activities at Korba and other places and mining activities at places, where aluminium ore (Bauxite) and coal are being extracted on a massive scale, have also adversely affected the vegetation.

FAUNAL COMPOSITION

The district does not have any sanctuary or national park. Although during 1942-43, two sanctuaries, one around Khurita and another around Katra were created, soon after, these were abolished. Wild animals used to be abundant in the recent past, but are gradually decreasing in number. The remoter areas, particularly Lormi, Lamni, Kota, Pasan, Pandra, Mafin, Uprora, Kendai etc. were once rich in games.

The animals commonly met with are tiger, panther, hyena, jackal, wolf, fox, bear, spotted deer, barking deer, chamois, antelope, gazelle, bison, hare, monkey, a wild pig, flying-squirrel, 'Neelgai' and jungle fowl, pea poul, partridge, peacock, green pigeon, quail, sand gourouse, snipes and egrets, among birds.

Tiger is mostly seen around Aurapani, Lomni, Chaparwa, Rajak, Khondra and Sarasdol. Panthers are seen around Achanakmar, Lormi and Lamni. Bison is found around Khondra and Seotarai. Bear can be seen around Samardhasan and Chaparwa and in such areas, where *Ziziphus xylopyrus*, *Diospyros melanoxylon*, *Buchanania lanza*, *Madhuca longifolia* var. *latifolia* grow in abundance, because they consume fruits of these species. Chamois is found in Mukua, Amlikunda, Jatga, Rapti, Madanpur etc. Spotted deer, bison and Neelgai, prefer bamboo forests and can be seen in Jatga, Lendia, Pantha, parts of Matin, Ringania, Dhawalpur and Mukum. Ape enjoys fruits of *Bauhinia semia*, *Buchanania lanza*, *Phyllan-*

thus emblica, Ficus benghalensis, Shorea robusta, leaves of Bridelia airyshawii, Cleistanthus collinus and flowers of Diospyros melanoxylon and Shorea robusta. Monkeys are found throughout the district.

ANALYSIS OF THE FLORA

Of the 852 species in 507 genera under 120 families, the class Magnoliatae (Dicotyledons) comprise 96 families, 377 genera and 604 species and the class Liliatae (Monocotyledons) comprise 24 families, 130 genera and 248 species. Out of 120 families, the dicotyledons represent 80% and monocotyledons represent 20%. Out of 507 genera, the dicotyledonous genera represent 74.35% and monocotyledonous genera represent 25.65%. Out of 852 species the dicotyledons represent 70.90% and monocotyledons represent 29.10%. There are 109 species of trees, 102 species of shrubs, 565 species of herbs, 60 species of climbers, 6 species of epiphytes, 5 species of parasites and 5 species of insectivorous plants. Out of 565 herbaceous species, about 185 species are hydrophytic.

Table 3 indicates the break up of the 852 species with respect to the dicotyledons and monocotyledons and the former, in the three broad groups as recognised by Bentham and Hooker (1862-1883). Table 4 shows the number of genera and species in respect of the 10 dominant families represented in collections from Bilaspur district.

TABLE 3

Group	Families		Genera		Species	
	No.	% of total	No.	% of total	No.	% of total
I. Dicotyledons						
1. Polypetae	54	45	157	30.95	264	31.00
2. Gamopetae	32	25	177	34.90	260	30.50
3. Monochlamydeae	12	10	43	8.50	80	9.40
II. Monocotyledons	24	20	130	25.65	248	29.10
Total :	120	100	507	100	852	100

TABLE 4

Sl. no.	Name of family	Genera	Number of Species
1.	Poaceae	64	116
2.	Fabaceae	43	98
3.	Cyperaceae	13	52
4.	Asteraceae	37	49
5.	Euphorbiaceae	17	35
6.	Acanthaceae	18	32
7.	Rubiaceae	18	26
8.	Scrophulariaceae	13	22
9.	Lamiaceae	16	21
10.	Malvaceae	9	19

The ten dominant families comprise 470 species i.e. about 55.15% of the total species dealt with, remaining 110 families with a total of 382 species constitute 44.85%. The families represented by a single genus with a single species are Dilleniaceae, Nymphaeaceae, Nelumbonaceae, Violaceae, Portulacaceae, Elatinaceae, Hypericaceae, Dipterocarpaceae, Bombacaceae, Geraniaceae, Olacaceae, Celastraceae, Crassulaceae, Lecythidaceae, Trapaceae, Passifloraceae, Begoniaceae, Cactaceae, Alangiaceae, Stylidiaceac, Plumbaginaceae, Hydrophyllaceae, Orobanchaceae, Plantaginaceae, Chenopodiaceae, Salicaceae, Ceratophyllaceae, Burmanniaceae, Costaceae, Taccaceae, Pontederiaceae, Xyridaceae, Juncaceae, Arecaeac, Butomaceae, Najadaceae and Aponogetonacae. Some of the dominant genera with maximum number of species are *Cyperus* (16), *Fimbristylis* (13), *Eragrostis* (10), *Ficus* (10), *Ipomoea* (9), *Desmodium* (8), *Cassia* (8), and *Blumea* (8).

Although *Shorea robusta* constitutes the dominant vegetation of the district with millions of trees of timber value, neither the genus, nor the family Dipterocarpaceae come up as amongst those which are considered composing the 'dominant' families/genera in the area, when judged by the number of taxa, as distinct from the biotypes.

Some of the genera, which are represented in India by single species/varieties (some of them aliens), also occur in the district: *Cissampelos*, *Nelumbo*, *Drymaria*, *Waltheria*, *Aegle*, *Limonia* (monotypic), *Dodonaea*, *Lablab* (monotypic), *Lawsonia* (monotypic), *Woodfordia*,

Diplocyclos, *Centella*, *Anthocephalus*, *Amberboa*, *Blainvillea*, *Butmopsis* (monotypic), *Centipeda*, *Chrysanthellum*, *Crassocephalum*, *Eclipta*, *Grangea*, *Lagascea*, *Siegesbeckia*, *Tridax*, *Holarrhena*, *Dregea*, *Hemidesmus* (monotypic), *Oxystelma*, *Hydrolea*, *Coldenia*, *Rotula*, *Nicandra* (monotypic), *Sutera*, *Martynia* (monotypic), *Nelsonia* (monotypic), *Petalidium*, *Duranta*, *Phyla*, *Tectona*, *Allmania* (monotypic), *Ricinus* (monotypic), *Sebastiania*, *Hydrilla* (monotypic), *Nechamandra*, *Ottelia*, *Costus*, *Gloriosa*, *Floscopa*, *Pistia* (monotypic), *Limnophyton* (monotypic), *Acrachne* (monotypic), *Apluda*, *Desmostachya* (monotypic), *Dieckomis* (monotypic), *Elytrophorus*, *Pseudosorghum* (monotypic), *Thysanolaena* (monotypic).

An analysis of the 852 species shows that it shares as many as 795 species with Bihar and Orissa (*vide* Haines, 1922-1925), 728 species with the Upper Gangetic Plain (*vide* Duthie, 1903, 1922), 757 species with Madras Presidency (*vide* Gamble and Fischer, 1915-1935) and Karnataka (*vide* Saldanha and Nicolson, 1976) and 619 species with Nepal Himalayas (*vide* Hara *et al.*, 1978, 1979, 1982). It is evident, then, that Bilaspur district provides a cradle, a meeting ground, of many of the indigenous taxa met with in the eastern, northern, western and southern India.

It is of further interest to record that 26 monotypic genera, of which 8 are endemic in India, have also been collected from the district. Again, 35 species reported as endemic to India and which include some monotypic genera, such as, *Soymida*, *Chloroxylon*, *Schleichera*, *Spermadictyon* etc. have also turned up here. *Cucumis setosus* known to be endemic to Maharashtra and Rajasthan and *Euphorbia perbracteata* endemic to Maharashtra, extend their range to Bilaspur district. *Limnophila chinensis* var. *clarkei* (Haines) S. K. Murti, earlier known from Chotanagpur in Bihar, also occurs here.

All the same, presence, in Bilaspur flora, of as many as 46 species not recorded by Haines, 11 species not recorded by Hooer *et al.*, 99 species not recorded by Duthie, 88 species not recorded by Gamble & Fischer, Saldanha & Nicolson and as many as 220 species not recorded by Hara *et al.* from Nepal, may suggest that Bilaspur district harbours a number of species (although not endemic) not yet known to have been recorded from the adjoining areas of the Indian region.

The following 10 species are new records for Madhya Pradesh (Murti, 1972, 1976, 1979) : *Althaea ludwigii* L., *Arundinella setosa* Trin. var. *lanifera* C.E.C. Fischer, *Cymbidium macrorhizone* Lindl., *Desmodium benthamii* Balak., *Pogostemon stellatus* (Lour.) Kuntze, *Lepidagathis purpurea* Wall. ex Nees, *Ludwigia prostrata* Roxb., *Plantago exigua* Juss. ex Murray, *Stylium kunthii* Wall. ex DC. and *Syzygium nervosum* DC.

Another lot of 64 species have turned up as new records for Bilaspur district (some of them are species of special interest), such as : *Aeginetia indica* L., (root parasite), *Androsace umbellata* (Lour.) Merr. (the lone member of the Primulaceae, a family restricted to the temperate Himalayas), *Eleotis monophylla* (Burm. f.) DC. (Fabaceae), *Radermachera xylocarpa* (Roxb.) K. Schum. (Bignoniaceae—an antidote for snake-bite; cf. Panigrahi 1963), *Clematis smilacifolia* Wall., *Tacca leontopetaloides* (L.) Kuntze and *Thalictrum foliolosum* DC. (species of higher latitudes/altitudes) and a number of species of orchids. [both terrestrial and epiphytic, e.g. *Aerides multiflorus* Roxb., *Eulophia flava* (Lindl.) Hook. f., *E. nuda* Lindl., *Geodorum densiflorum* (Lam.) Schlecht., *Habenaria dentata* subsp. *ecalcarata* (King and Pantling), *H. digitata* Lindl., *Peristylus constrictus* (Lindl.) Lindl., *P. goodyeroides* (D Don) Lindl., *P. lawii* Wight and *Pelatantheria insectifer* (Reichb. f.) Ridley].

Three species, viz. *Desmodium benthamii* Balak., *Arundinella setosa* Trin. var. *lanifera* C.E.S. Fischer and *Cymbidium macrorhizon* Lindl. collected from the district, extend the known range of distribution from South India/the Eastern Himalayas.

Plants of higher elevations, such as *Argostemma sarmentosum*, *Begonia picta*, *Clematis smilacifolia*, *Coryza stricta*, *Cymbidium macrorhizon*, *Hypericum japonicum*, *Lepidagathis purpuricaulis*, *Laggera alata*, *Rorippa indica*, *Rhamnus purpureus*, *Swertia angustifolia* and *Thalictrum foliolosum* etc. and some temperate genera, such as *Sonchus*, *Dumasia*, *Pimpinella*, *Geranium*, *Swertia* and *Gerardinia* etc. descend down to the tropical latitudes and find shelter in the higher altitudes in the North Bilaspur Forest Division.

RARE, ENDANGERED AND ENDEMIC PLANTS

Some of the rare elements of the flora are: *Clematis smilacifolia*, *Thalictrum foliolosum*, *Althea ludwigii*, *Geranium mascatense*, *Psoralea corylifolia*, *Drosera burmannii*, *D. indica*, *Bignonia picta*, *Argostemma sarmentosum*, *Carthium dicoccum*, *Crassocephalum crepidioides*, *Dicrcephala integrifolia*, *Stylium kunthii*, *Androsace umbellata*, *Diospyros malabarica*, *Marsdenia tenacissima*, *Oxystelma esculentum*, *Exacum petiolare*, *Swertia angustifolia*, *Rhamnus purpureus*, *Catsytha filiformis*, *Elatostema cuneatum*, *Ficus benjamina* subsp. *comosa*, *Typhonium trilobatum*, *Brachiarla deflexa* and *Spadio-pogon rhizophorus*.

The orchids, so widely distributed in India, are scarce in the district and are becoming scarcer day by day due to destruction of habitat and

over exploitation, despite the fact that orchids are listed as 'threatened' and included in the Red Data Book by I.U.C.N. From Bilaspur district 15 species of orchids have been collected, of which 6 are epiphytic : *Aerides multiflora*, *Oberonia falconeri*, *Rhynchostylis retusa*, *Pecteilis insectifera*, *Vanda testacea* and *V. tassellata* and 9 are terrestrial : *Cymbidium macrorhizon*, *Eulophia flava*, *E. nuda*, *Geodorum densiflorum*, *Habenaria dentata* subsp. *ecalcarata*, *H. digitata*, *Peristylus constrictus*, *P. goodyeroides* and *P. lawii*. *Cymbidium macrorhizon* is credited with a distributional range from N.W. Himalaya, Sikkim, Meghalaya to Nagaland. The present collection from Sonmuda extends its range to Madhya Pradesh.

None of the species collected from the district is endemic to Madhya Pradesh, but about 41 species, restricted to India, occur as rare elements in the Bilaspur district.

Aliens Naturalized in the Flora :

About 65 exotic species of flowering plants, naturalized in the district have been collected. For an account of these species, indicating their country of origin, probable year of introduction to India, and the localities where they occur, one may refer to Murti, (1979). These naturalized elements in the Indian flora have been grouped into 4 categories viz. Neo-tropical, North temperate, North-African and Austro-Asian

NOTES ON NOMENCLATURE

Some intricate problems of nomenclature unravelled during this study are :

Thevetia L. (1758) is conserved against *Ahouai* P. Miller (1754); with *T. ahouai* (L.) DC. (1844), (*Cerbera ahouai* L.) (typ. cons.) and *Thevetia* Adans. (1763) is a later homonym.

Volvulopsis Roberty (Candollea 14 : 28, 1953), typified by *Evolvulus nummularia* (L.) L. is nom. superfl. illeg. for *Evolvulus* L. (1762), lectotypified by *E. nummularius* (L.) L. (*Convolvulus nummularius* L.) (vide Britton and Brown, Ill. Fl. N.U.S. ed. 2, 3 : 42, 1913).

Medicus (1790), in establishing *Adhatoda zeylanica* Medic. (*Justicia adhatoda* L.) made it explicit that *J. adhatoda* L. (1753) is the type species of *Adhatoda* Miller (1754). In view of this, N. L. Britton's (Fl. Bermuda : 354, 1918) subsequent lectotypification of *Justicia* L. by the type species of *Adhatoda* P. Miller, (vide Farr, et al. 1979) must be set aside. Hitchcock and Green (Int. Bot. Cong. Cambridge, 1930) have, in the circumstances, justifiably selected *J. hyssipifolia* L. as the lectotype species of *Justicia* L. (1763), when it is treated generically distinct from *Adhatoda* Mill.

El-Gazzer and Watson (Taxon 16 : 136-189. 1967) transferred four species of *Dysophylla* Bl., including the type species, *D. auricularia* Bl., to *Pogostemon* Desf. Panigrahi (1976, 1984 a, b), Keng (1978) and Press (1982) transfer the verticillate-leaved species of *Dysophylla* Bl. sect. *Verticillatae* Benth. to *Pogostemon* Desf. sect. *Verticillati* (Benth.) Panigr., and following Kuntze (1891), the species of this section now stand transferred to *Pogostemon* Desf. (1815). [cf. Panigrahi 1984 a, b]

Loranthus Jacq. (1762) (T. : *L. europaeus* Jacq.) is *nom. cons.* against *Loranthus* L. (1753) and *Scurrula* L., the latter typified by *S. parasitica* L. In 1762, Linnaeus merged *Scurrula* L. in *Loranthus* L., but was in error in naming the species *L. scurrula* L. in stead of renaming it as *L. parasitica* (L.) L.

Author citations for *Anisochilus* and *A. carnosus* are established as Walt. ex Benth. (1830) and (L. f.) Wall., respectively (Panigrahi and Murti, 1981).

Volutarella Cass. (1826), typified by *V. lippii* (L.) Cass. is conserved against *Amberboa* Adans. (1763) *nom. rej.* vs *Amberboa* (Pers.) Less. (1832), *nom. cons.* Therefore, *Amberboa ramosa* (Roxb.) Jafri is established as the correct name for *V. ramosa* (Roxb.) Santapau.

Following Cronquist (1968), Saldanha and Nicolson (1976) and Robson (1972) include *Hypericum* L., the type genus of the Hypericaceae Juss. (1789), in the Clusiaceae Lindl. (1836). If the two families are to be united, although both are listed as family conserved (*vide* App. II, ICBN 1983) and Guttiferae Juss. (1789) is an alternate name for the Clusiaceae Lindl., it is a moot point whether Art. 57.1, would apply in accepting the Clusiaceae Lindl. (1836) (Alt. Guttiferae Juss.) to be the correct name for the Hypericaceae Juss. (1789).

Alpinia L. (1753) based on *A. racemosa* L. is *nom. rejic.* in favour of *Alpinia* Roxb. (1810) *nom. cons.* with *A. galanga* (L.) Willd. (1797) (*Maranta galanga* L.) (*typ. cons.*) ; similarly, *Curcuma* L. (1753) is *nom. rejic.* in favour of *Curcuma* Roxb. (1810) with *C. longa* L. '*typ. cons.*' (cf. Taxon 33. 705-707. 1984).

Borreria G.F.W. Mey. (1818), *nom. cons.* is not conserved against *Spermacoce* L. (1753) and the only difference between the two genera rests on one character : whether the fruits dehisce or not. Verdcourt (1975), in agreement with Hook. f. (1881) and Bremekamp (1934), treats them as congeneric, reducing the former as a section, viz., *Spermacoce* L., sect. *Borreria* (Mey.) Verdc. (Kew Bull. 30 : 366. 1975).

Leea aspera Wall. in Roxb., Fl. Ind. 2 : 468, 1824, *adnota*, is *nom. nud.* (Art. 34.1.c) but was validated by G. Don (1831) and again independently by Edgeworth (1846). Therefore, *L. edgeworthii* Santapau proposed as a *nom. nov.* for *L. aspera* Wall. ex Edgew., non G. Don (1831) is to be rejected as *nom. superfl. illeg.* for *L. aspera* Wall. ex G. Don (1831), the latter reduced as a taxonomic synonym of *L. crispa* D. van Royen ex L. (1767) (*cf.* Panigrahi, 1978). However, the correct name of the taxon is now established as *Leea asiatica* (L.) Ridsdale.

The correct names for black mustard (kala sarson) and yellow mustard (pila sarson) are established as *Brassica rapa* L. subsp. *campestris* (L.) Clapham var. *campestris* and *B. rapa* L. subsp. *campestris* var. *glauca* (Roxb.) Watt.

Lipocarpha R. Br. (1818) is *nom. cons.* with *L. senegalensis* (Lam.) T. & H. Durand (*Scirpus senegalensis* Lam.). But *S. senegalensis* Lam. is also one of the syntype species of *Hypolytrum* L. C. Rich. (1805) and of *Hypaelyptrum* Vahl (1806), *nom. rejic.* To maintain the status quo and the current usage of *Lipocarpha* R. Br. and *Hypolytrum* L. C. Rich. as two distinct genera, Panigrahi [Taxon 34 (3) : 510-512. 1985] has selected *Hypolytrum latifolium* Rich. and *Hypaelyptrum filiformis* Vahl, as lectotype species of *Hypolytrum* Rich. and *Hypaelyptrum* Vahl, respectively.

Farr *et al.* (1979) treat *Kydia calycina* Roxb. as the type species of *Kydia* Roxb. Since Roxburgh (Pl. Cotom. 3 : 11. 1811) described two species, *viz.* *K. calycina* (t. 215) and *K. fraterna* (t. 216), without naming any one of them as the type, *K. calycina* Roxb. is to be treated as the lectotype species.

Malvastrum A. Gray was proposed to be conserved with *M. coromandelianum* (L.) Garcke as the lectotype species (Borssum in Taxon 9 : 212-213, 1960). Since A. Gray did not include *M. coromandelianum* within the scope of her genus, Borssum (Blumea 14 : 151. 1966) again proposed *M. spicatum* (L.) A. Gray as the lectotype. However, *Malvastrum* A. Gray *nom. cons.*, is finally lectotypified with *M. wrightii* A. Gray (*typ. cons.*).

R. Brown (Tuck. Narr. Exp. Congo : 484. 1818) was the first to combine *Waltheria indica* L. (1753) and *W. americana* L. (1753), accepting *W. indica* L. as the name for the combined taxon. Although *W. americana* L. was selected as the lectotype species at a later date by N. L. Britton, (Fl. Bermuda : 242. 1918), R. Brown's choice has to be followed (Art. 57.2, Ex. 3).

Although Arnott in Wight et Arnott, Prodr. : 226 1834 combined *Hedysarum dichotomum* Willd. and *H. diffusum* Willd. under *Desmodium diffusum* (Willd.) DC. (Nov. 1825), the latter is a later homonym of *D. diffusum* Roxb ex DC. (Jan. 1825). *D. dichotomum* (Willd.) DC. (Nov. 1825) is, therefore, the correct name for the later homonym.

Emblica J. Gaertn. [LT. *E. officinalis* J. Gaertn. based on *Mirobalanus emblica* Rumph. 1756, nom. invalid,] and *Kirganelia* Juss. are treated as congeneric synonyms of *Phyllanthus* L. (1753); *Cyperus* L., *Kyllinga* Rottb., *Mariscus* Vahl, nom. cons. *Pycreus* P. Beauv., as also *Rikliella* Raynal (1973), *Schoenoplectus* Palla, nom. cons. and *Scripus* L. sens. strict. are treated as generically distinct (S. Hooper, 1976; Koyama 1977, 1978); *Bothriochloa* Kuntze (1891), *Capillipedium* Stapf (1917) and *Dichanthium* Willem. (1796) are treated as generically distinct, although some treat them as congeneric : *Pseudobrachiaria* E. Launert (1970), with *P. deflexa* (Schumach.) E. Launert as its type, is reduced as congeneric with *Brachiaria* (Trin.) Griseb. (1853) (Cope, 1982).

Butomopsis Kunth (May, 1841) and *Tenagocharis* Hochst (June 1841), when treated as congeneric, the former is the correct name.

Attention may be drawn to the fact that in respect of 404 species as dealt with in *Flora of British India* (1872-1896), of 61 species as in the *Herbaceous Flora of Dehra Dun* (1977), of 34 species as in the *Flora of the Hassan District, Karnataka State* (1976) and of 47 species as in *Enumeration of the Flowering plants of Nepal* (1978, 1979, 1982), name changes have been effected after due scrutiny of published literature to conform with the I.C.B.N. (1983). Citation of original literature and type/lectotype in respect of 507 genera (from amongst an estimated total of 2,200 genera of angiosperms for India) in consultation with Farr *et al.* (1979), is a unique feature of the FLORA OF BILASPUR DISTRICT. All these, together with reference to the types/syntypes/lectotypes/type localities of a number of species, as available, are aimed at setting a new trend in floristic research in this country and is designed to have wider impact and to stimulate research over a wider area beyond the borders of the district/state. It must be emphasised that 852 species in the systematic treatment do not include any of the exotic species, maintained purely in cultivation/plantation/gardens, although references to some of them are made here and there in some other context.

It is our hope and belief that the present Flora of Bilaspur district would not only enable one to know about the vegetation and flora of the area in a most modern context, but would give an integrated view of the physical, ecological and biotic factors that condition the composition of the vegetation. Of late, the natural ecosystems are being drastically altered by human

interference in the form of deforestation, industrialisation, urbanization, extension of agriculture, construction of huge dams over rivers etc. For achieving balanced ecosystem, conducive to better life of the people of the region, such rapid inroads of modern civilisation should be checked/moderated.

Since we in India are familiar with Bentham and Hooker's (1862-1883) system of classification and all Indian herbaria are arranged (even current regional Floras are being published) according to this system, the sequence of presentation of the 120 families to which the 507 genera from Bilaspur are assigned, is presented after this system for convenience of reference and study. Yet, in view of the fact that Cronquist's (1968) classification of the Magnoliophyta (Angiosperms) is accepted currently as a phylogenetic one. 507 genera are assigned to 120 families, as delimited by Cronquist, with minor exceptions (e.g. Hypericaceae Juss. segregated from the Clusiaceae Lindley). The position of these families are shown in a hierachical system which recognises CLASSES, SUBCLASSES and ORDERS (Appendix I) and in which the subclass Magnoliidae are considered more primitive than the subclass Hamamelidiidae, the subclass Caryophyllidae representing an evolutionary blind end. But according to some others (see Panigrahi, Jour. Orissa Bot. Soc. 7 : 1-14. 1984 for a review), the Hamamelidiidae are more primitive than the Magnoliidae.

ECONOMIC PLANTS

Man's dependence on Plants needs no exaggeration. An attempt has been made to enumerate plants of economic importance and of medicinal value with notes on their local names, parts of plants and for the purpose for which they are used. It is hoped that planned cultivation of some of these plant species on a larger scale may be of considerable help to young entrepreneurs interested in starting small-scale industries. For example, *Hyptis suaveolens* yields an aromatic oil which is mosquito-repellant. This can be profitably exploited. *Eichhornia crassipes* may be a substitute for cow-dung in operating "Gobar-Gas Plants", for which there is popular demand throughout the country. *E. crassipes* may also be grown *in vivo* for purifying industrial affluents of hard metals, such as cobalt and magnesium, which prove health-hazards.

It is also hoped that the Flora would stimulate chemotaxonomic and phytochemical studies, comparatively recent areas of investigations. A phytochemical study of the hitherto uninvestigated taxa of medicinal importance may unravel new compounds and potential drugs of great therapeutic value, and in the years ahead, may bring to market newer drugs of enormous utility in alleviating human suffering. Discovery of the alkaloid reserpine in the roots of *Rauvolfia serpentina*, as late as 1956, and of

colchicine from the seeds of *Iphigenia stellata* (endemic in the Western ghats) only in 1974, speak volumes to commence similar investigations of various other species listed elsewhere. Panigrahi [Bull. Reg. Res. Lab. Jammu I (2) : 112-116, 1963] listed more than 200 species of medicinal plants of local use in the Gandhamardan Parbat of Orissa; of these, *Curculigo orchoides*, *Asparagus racemosus* and *Pueraria tuberosa* are regarded as plants for rejuvenation etc. and *Radermachera xylocarpa* as a snake-bite cure. All these species occurring within the district, may need to be phytochemically investigated.

The plants of economic importance occurring in Bilaspur district, either indigenously or in cultivation, are grouped under different categories, viz. plants under cultivation as agricultural crops, those planted along roadsides as avenue trees: species of timber value, bamboos, plants used for fuel and charcoal, those which yield fibre, oils, gums/resins; indigenous wild species which provide edible rhizomes / corms / tubers / leaves / flowers / fruits (unripe / ripe) / seeds (consumed raw or dried), and finally, the medicinal plants collected by us during field tours. The local name and the parts used for economic uses are mentioned.

Plants under cultivation :

Cereals and pulses : Bilaspur district is chiefly a paddy (*Oryza sativa*) growing area. The other common crops cultivated in the district are *Triticum aestivum* (Wheat-Gehun), *Zea mays* (Maize-Makai), *Pennisetum glaucum* (Millet-Bajra), *Cicer arietinum* (Gram—Chana), *Hordeum vulgare* (Barley-Jau), *Sorghum cernuum* (Jowar) and coarse cereals viz. *Setaria italica* (Kangni), *Panicum miliare* (Kutki), *P. maximum*, *Paspalum scorbiculatum* (Kodo) and *Lathyrus sativus* (Khesari). Among the pulses the most commonly grown are *Cajanus cajan* (Arhar), *Vigna mungo* (Urd) and *V. radiata* (Mung). Other pulses grown in the area are *Vigna unguiculata* (Barbati) and *Lens culineria* (Masur).

Vegetables :

Following is a list of common vegetable-crops grown in the district :

Abelmoschus esculentus (Bhindi); *Allium cepa* (Pyaj, Onion); *A. sativum* (Lassun, Garlic); *Amaranthus caudatus* (Ramdana); *A. spinosus* (Katilichawhai); *A. tricolor* (Lal Chawhai); *Anethum graveolens* (Sowa, Dill); *Artocarpus heterophyllus* (Katahal); *Benincasa hispida* (Pethe); *Beta vulgaris* (Chaukondar); *Brassica juncea* (Rai); *B. nigra* (Rai); *B. oleracea* var. *botrytis* (Phul Gobhi); *B. oleracea* var. *capitata* (Patta Gobhi); *B. oleracea* var. *gongyloides* (Ganthi Gobhi); *B. rapa* (Shalgam); *B. rapa* subsp. *campestris* var. *campestris* (Kala Sarson); *B. rapa* subsp. *campestris* var. *glauca* (Pila Sarson); *Capsicum annuum* (Mircha); *C.*

frutescens (*Mircha*) ; *Chenopodium album* (*Bathua*) ; *Citrullus lanatus* (*Tarbij*, Watermelon) ; *Coccinia grandis* (*Kundru*) ; *Colocasia esculenta* (*Arvi*) ; *Coriandrum sativum* (*Dhania*) ; *Cucumis melo* (*Kharbuja*) ; *C. sativus* (*Khira*, *Kakdi*) ; *Cucurbita maxima* (*Kumrah*) ; *C. pepo* (*Kumrah*, *Kasiphali*) ; *Cuminum cyminum* (*Jeera*) ; *Curcuma longa* (*Haldi*) ; *Cyamopsis tetragonoloba* (*Gowar*) ; *Daucus carota* (*Gajar*) ; *Dolichos uniflorus* (*Kulthi*) ; *Foeniculum vulgare* (*Saunf*) ; *Ipomoea batata* (*Shakarkand*) ; *Lablab purpureus* (*Sem*) ; *Luffa acutangula* (*Tori*) , *L. cylindrica* (*Ghie Tori*) ; *Lycopersicum esculentum* (*Tamator*) ; *Lagenaria siceraria* (*Lauki*) ; *Mentha arvensis* (*Pudina*) ; *Momordica charantia* (*Karala*) ; *M. dioica* (*Ban Karala*) ; *Moringa oleifera* (*Saijan*) ; *Phaseolus vulgaris* (*Fras Bean*, French Bean) ; *Pisum sativum* (*Motor*) ; *Raphanus sativus* (*Muli*, Radish) ; *Solanum melongena* (*Baigan*, Brinjal) ; *S. tuberosum* (*Aalu*, Patato) ; *Spinacea oleracea* (*Palak*) ; *Trichosanthes anguina* (*Chichinda*) ; *T. dioica* (*Parwal*) ; *Trigonella foenum-gracum* (*Methi*) ; *Vigna unguiculata* subsp. *unguiculata* (*Cow Pea*) ; *V. unguiculata* subsp. *cylindrica* (*Lobia*) ; *V. unguiculata* subsp. *sequipedalis* (*Yardlong Bean*) and *Zingiber officinale* (*Adrak*, Ada).

Fruits :

Some common fruit trees/shrubs found in cultivation are :

Aegle marmelos (*Bel*) ; *Anacardium occidentale* (*Kaju*) ; *Annona squamosa* (*Sarifa*) ; *Avarrhoa carambola* (*Kumrakh*) ; *Carissa carandas* (*Karonda*) ; *Citrus aurantifolia* (*Nimboo*) ; *C. aurantium* (*Khatta Narangi*) ; *C. grandis* (*Chakotra*) ; *C. limon* (*Kagji Nimboo*) ; *C. medica* (*Nimboo*) ; *C. reticulata* (*Mandrain*) ; *C. sinensis* (*Santara*) ; *Mangifera indica* (*Aam*) ; *Morus indica* (*Shahitul*) ; *Musa paradisiaca* (*Kela*) ; *Phyllanthus emblica* (*Aorla*) ; *Psidium guajava* (*Amrud*, Guava) ; *Punica granatum* (*Anar*) ; *Pyrus sinensis* var. *culta* (*Naspatti*) ; *Spondias pinnata* (*Amra*) ; *Syzygium cumini* (*Jamun*) ; *Tamarindus indica* (*Imli*) and *Ziziphus mauritiana* (*Ber*).

Miscellaneous :

Some of the other commonly cultivated species are : *Saccharum officinarum* (*Ganna-Sugarcane*) ; *Nicotiana tabacum* (*Tombakku-Tobacco*) ; *Hibiscus subdariffa* ssp. *subdariffa* (*Patua*—for fibre) ; *H. subdariffa* ssp. *cannabinus* (for fibre, calyx edible) ; *Carthamus tinctorius* (*Kusum*—oil from seed) ; *Linum usitatissimum* (*Alsi*—oil from seed) ; *Gossypium arboreum* (*Kapas-cotton*) and *Arachis hypogaea* (*Mungphali-groundnut*).

Roadside and avenue trees :

Acacia leucophloea (*Hivar*, *Kikar*) ; *A. nilotica* subsp. *indica* (*Babul*) ; *Albizia lebbeck* (*Kala siris*) ; *A. procera* (*Safed siris*) ; *Anthocephalus chinensis* (*Kadamba*) ; *Azadirachta indica* (*Neem*) ; *Dalbergia sissoo*

(Shesham) ; *Delonix regia* (Gul Mohar) ; *Mangifera indica* (Aam, Mango) ; *Ficus benghalensis* (Bergad) ; *F. religiosa* (Peepal) ; *Manilkara hexandra* (Maulseri) ; *Melia azedarach* (Bakain) ; *Polyalthia longifolia* (Ashok) ; *Poneamia pinnata* (Karanj) ; *Tamarindus indica* (Imli) ; *Szygium cumini* (Jamun) and *Terminalia arjuna* (Arjun, Kaua).

Timber-yielding plants :

The forest is quite rich in plants of timber value, as listed below : *Adina cordifolia* (Haldu) ; *Albizia lebbeck* (Kala siris) ; *A. procera* (Safed siris) ; *Anogeissus latifolius* (Dhaora) ; *Anthocephalus chinensis* (Kadamba) ; *Atalanitia monophylla* ; *Azadirachta indica* (Neem) ; *Bombax ceiba* (Semal) ; *Boswellia serrata* (Salai) ; *Buchanania lanza* (Achar) ; *Butea monosperma* (Palas) ; *Chloroxylon swietenia* (Bhirra) ; *Dalbergia latifolia* ; *D. paniculata* (Dhobin) ; *D. sissoo* (Sisham, Sisu) ; *Diospyros melanoxylon* (Tendu, Biripatti tree) ; *Gmelina arborea* (Gamari) ; *Grewia tiliifolia* (Dhaman) ; *Lannea coromandelica* (Jingan) ; *Limonia acidissima* (Kaitha) ; *Litsea monopetala* ; *Madhuca longifolia* var. *latifolia* (Mahua) ; *Mangifera indica* (Aam) ; *Manilkara hexandra* (Maulsari) ; *Miliusa tormentosa* (Kari, Kirua) ; *Mitrangyna parvifolia* (Keli-Kadamba) ; *Ougeinia oojeinensis* (Tinsa) ; *Phyllanthus emblica* (Aonla) ; *Pterocarpus marsupium* (Bija sāl) ; *Radermachera xylocarpa* (Bhumia, Akash-garuda) ; *Semicarpus anacardium* (Bhilwa) ; *Shorea robusta* (Sal, Sarai, Sakhu) ; *Soymida febrifuga* (Rohan) ; *Sterculia urens* (Gulu) ; *Stereospermum chelonoides* (Paral) ; *Tamarindus indica* (Imli) ; *Tectona grandis* (Sagaun) and *Terminalia alata* (Saj).

Bamboos :

Dendrocalamus strictus is the most important species. It is chiefly used in paper industry, for which it is being exported to even neighbouring states. It is also used for fencing, roofing of houses and huts, preparation of mats, baskets and door-curtains etc.

Plants for fuel and charcoal :

The plants most commonly used for making charcoal are : *Acacia nilotica* subsp. *indica* (Babul), *Anogeissus latifolius* (Dhaora), *Butea monosperma* (Palas), *Dillenia aurea*, *Madhuca longifolia* var. *latifolia* (Mohua), *Terminalia alata* (Saj) etc. These species, in addition to those mentioned in the list of timber-plants, are lopped and also used as fuel for cooking etc.

Fibre-yielding plants :

The species whose bark yield fibres of commercial value are : *Abelmoschus manihot* subsp. *manihot* ; *Acacia catechu* (Khair) ; *A. nilotica* subsp. *indica* (Babul) ; *Anogeissus latifolius* (Dhaora) ; *Bauhinia*

purpurea; *B. racemosa*; *B. semla*; *B. vahlii* (*Siari*, *Siali*); *Boehmeria macrophylla*; *Bombax ceiba* (*Semal*); *Butea monosperma* (*Palas*); *Calotropis gigantea* (*Madar*); *C. procera* (*Madar*); *Coreya arborea*; *Corchorus fascicularia*; *C. olitorius*; *Crotalaria juncea*; *Eriolaena hookeriana*; *Erythrina suberosa*; *Ficus benghalensis*; *Garuga pinnata* (*Kekad*); *Girardinia diversifolia*; *Grewia tiliifolia* (*Dhaman*); *Helicteres isora* (*Petmuri*, *Marorphali*); *Hibiscus subdariffa* subsp. *subdariffa* (*Patua*); *Melochia corchorifolia*.

In addition, the leaves of *Agave sisalana*, extensively planted, yield fibre of good quality.

Tannin-yielding plants:

The important plants used for tanning purposes are:

Acacia catechu (*Khair*—bark); *A. nilotica* subsp. *indica* (*Babul*—bark); *Aegle marmelos* (*Bel*—fruit-rind); *Albizia lebbeck* (*Kala siris*—bark); *A. procera* (*Safed siris*—bark); *Anogeissus latifolia* (*Dhaora*—bark and leaf); *Antidesma ghaesembilla* (bark); *Bauhinia racemosa* (Seed); *B. semla* (*Katmohli*—bark); *B. vahlii* (*Mohlein*—seed); *B. variegata* (*Kachnar*—seed, bark); *Boswellia serrata* (*Salai*—fruit); *Bridelia airyshawii* (*Kasai*—bark); *Buchanania lunzar* (*Achar*—bark); *Careya arborea* (bark); *Cassia alata* (bark-seed); *Ficus racemosa* (*Gular*—bark); *Garuga pinnata* (*Kekad*—bark); *Gmelina arborea* (*Gambari*, *Khamhari*—wood, ash); *Holarrhena pubescens* (*Kuro*—wood, ash); *Lagerstroemia parviflora* (*Lendia*—bark); *Mangifera indica* (*Aam*—bark); *Ougeinia oojeiensis* (*Tinsa*—bark); *Terminalia alata* (*Saj*—bark, fruits); *T. arjuna* (*Kaua*, *Kahua*—bark, fruits); *T. bellirica* (*Bahera*—bark, fruits); *T. chebula* (*Harra*—fruits).

Oil-yielding plants:

The important oil-yielding plants (grouped according to their common uses, such as edible oil, aromatic oil, industrial oil and limpid oil) are:

Edible oils:

Brasslea rapa subsp. *campestris* var. *campestris* (*Kala sarson*—seed); *B. rapa* subsp. *campestris* var. *glauca* (*Pila sarson*—seed); *Carthamus tinctorius* (*Kusum*—seed yielding Safflower oil of commerce); *Linum usitatissimum* (*Alsi*—seed yielding Linseed oil); *Sesamum orientale* (*Tila*—seed yielding Til oil).

Aromatic oils:

Eucalyptus tereticornis—(leaf yielding Eucalyptus oil); *Geranium maccatense* (leaf—Geranium oil); *Cymbopogon martinii* var. *motia* (*Rosa*—leaf, Palmrosa oil).

Industrial oils :

These are obtained from seeds and are used for making soap, for lubrication for machines and/or for confectionary :

Butea monosperma (*Palas*) ; *Guizotia abyssynica* ; *Madhuca longifolia* subsp. *latifolia* (*Mohua*) ; *Moringa oleifera* (*Saijan*) ; *Ricinus communis* (*Arandi*) ; *Shorea robusta* (*Sal*).

Minor or Limpid oils :

Albizia lebbeck (*Kala siris*—seed) ; *Azadirachta indica* (*Neem*—seed) ; *Bombax ceiba* (*Semal*—seed) ; *Buchanania lanzen* (*Achar*—fruit and kernel) ; *Chloroxylon swietenia* (*Bhirra*—seed) ; *Jatropha curcas* (seed) ; *Lepidium sativum* (seed) ; *Schleichera oleosa* (*Kusum*—seed) and *Semecarpus anacardium* (*Bhilwa*—nut).

Gum-and resin-yielding plants :

The following species yield gum and resin used in medicines, as food, and/or in/some industries.

Acacia catechu ; *A. nilotica* subsp. *indica* ; *Aegle marmelos* ; *Albizia lebbeck* ; *Anogeissus latifolius* ; *Artocarpus heterophyllus* (resin from latex) ; *Azadirachta indica* ; *Madhuca longifolia* var. *latifolia* ; *Bauhinia semota* ; *B. vahlii* ; *B. variegata* ; *Bombax ceiba* ; *Boswellia serrata* ; *Bridellia airyshawii* ; *Butea monosperma* ; *Careya arborea* ; *Cassia fistula* (*Amaltas*) ; *Chloroxylon swietenia* (*Bhirra*) ; *Eucalyptus teretecornis* ; *Ficus benghalensis* and *F. racemosa* (resin from latex) ; *Gardenia gummifera* (*Dikamali*) ; *G. resinifera* ; *Garuga pinnata* (*Kekad*) ; *Iannea coromandelica* ; *Mangifera indica* ; *Pterocarpus marsupium* (resin) ; *Semecarpus anacardium* (resin) ; *Shorea robusta* (resin) ; *Spondias pinnata* ; *Sterculia urens* ; *Terminalia alata* ; *T. arjuna* ; *T. bellirica* and *Woodfordia fruticosa*.

Wild plants of food-value :

To sustain the world population running to five billions, only some 30 species of plants yield all the food required by mankind. Yet, another 80,000 taxa of plants are listed as yielding parts of plants which are usable in various ways as food in times of necessity. Some important food-plants coming under this category and occurring in the district are grouped as follows :

Plants with underground edible parts :

The tubers/rhizomes which store starch and are eaten raw or after cooking or after dipping it in boiling water for some minutes (boiling with water removes acridity) are :

Chlorophytum arundinaceum (*Safed Musli*) ; *Colocasia esculenta* (*Arvi*) ; *Curcuma angustifolia* (*Tihur*) ; *Cyperus rotundus* (*Mothe*) ; *Dioscorea oppositifolia* (*Ban Kanda*) ; *Nelumbo nucifera* (*Kamal*) ; *Pueraria tuberosa* (*Ban Kumra*) ; *Tacca leontopetaloides*.

Plants with edible leaves :

The leaves are used as pot-herbs, eaten raw/cooked or used as condiments or as flavouring agents.

Amaranthus spinosus (*Kantalli-Chaulai*) ; *A. tricolor* (*Chaulai*) ; *Antidesma acidum* (*Amia*) ; *Ardisia solanacea* ; *Caesulia axillaris* ; *Cayratia auriculata* ; *Colocasia esculenta* ; *Hydrophila auriculata* ; *Indigofera glabra* ; *Ipomoea aquatica* (*Karamu*) ; *Lannea coromandelica* (*Ganja*) ; *Leucas aspera* ; *Portulaca pilosa* (*Ban Kulfa*) ; *Spermatoce hispida* and *Sphaeranthus indicus*.

Plants with edible flowers :

These are consumed raw or cooked :

Bauhinia purpurea (*Keolar*) ; *B. variegata* (*Kachner*) ; *Bombax ceiba* (*Semal*) ; *Indigofera cassioides* (*Neel*) ; *Madhuca longifolia* var. *lutifolia* (*Mahua*) ; *Moringa oleifera* (*Saijana*).

Plants with edible fruits :

Majority of these fruits are eaten raw or when ripe. It is the sweet pulp or the fleshy pericarp that is generally consumed. Apart from being eaten raw, some are cooked as vegetables or are pickled.

Fruits edible when ripe :

Aegle marmelos ; *Alangium salvifolium* subsp. *salvifolium* (*Akol*) ; *Anthocephalus chinensis* ; *Buchanania lanza* (*Achar*) ; *Carissa carandas* ; *C. spinarum* ; *Diospyros malabarica* ; *D. melanoxylon* ; *Flacourzia indica* (*Kakai*) ; *Gardenia gummiifera* ; *G. latifolia* ; *Garuga pinnata* ; *Grewia tiliifolia* ; *Limonia acidissima* ; *Phoenix humilis* (*Chhind*) ; *Solanum nigrum* (*Makoi*) ; *Spondias pinnata* (*Amra*) ; *Xeromphis uliginosa* and *X. spinosa*.

Unripe edible fruits :

Aegle marmelos ; *Atalantia monophylla* ; *Ficus hispida* (*Konea dumbar*) ; *F. racemosa* (*Fular*) ; *Moringa oleifera* ; *Mucuna pruriens* (*Kawach*) ; *Phyllanthus emblica* (*Aonla*) ; *Xeromphis spinosa* and *X. uliginosa*.

Plants with edible seeds (raw or fried) :

Buchanania lanza ; *Chrysopogon fulvus* ; *Cleome viscosa* (*Hurhura*) ; *Echinochloa colona* ; *Gardenia gummiifera* ; *Mucuna pruriens* ; *Nelumbo*

nucifera (*Kamal*) ; *Nymphaea pubescens* ; *Oryza rufipogon* (*Jangali Dhan*) ; *Bauhinia vahlii* ; *Semecarpus anacardium* ; *Sterculia urens* ; *Vigna trilobata* and *V. unguiculata*.

Medicinal plants :

Ayurveda, the Science of Life, dates back to the days of *Caraka Sanhita* and *Sushruta Sanhita* (1,200 A.D.), and even remotely to Ayurveda (c. 1000 B.C.). That the body and mind should remain healthy and there should be equilibrium between the two, is the recurring theme of *Ayurveda*. And, that for achieving this end, drug plants and drug-yielding plants are the principal ingredients, has been acknowledged throughout the centuries.

This is the age of synthetic drugs and establishment of government and government-sponsored hospitals and dispensaries throughout the length and breadth of the country is the cry of the day. Yet, millions of people living in the vast country-side, the backward classes, the tribals inhabiting the hills, and even urbanised intelligentia depend solely on crude drugs/ Ayurvedic preparations for ameliorating their ailments/to avoid the undesirable side-effects of repeated use of allopathic drugs. And, there is wide-awakening to conserve the medicinal plants in their original habitats and to screen the biological activity of the indigenous drug-yielding plants.

That the indigenous drug plants of India do indeed possess active pharmaceutical principles, is confirmed by the derivation of *reserpine* alkaloid from the roots of *Rauvolfia serpentina*, as late as 1956, to treat hypertension, high blood pressure, insanity etc.; that India can save crores of rupees in foreign exchange if our indigenous plants are assayed properly, is exemplified by *Iphigenia stellata* of the Western Ghats and in whose seeds the alkaloid *Colchicine* was discovered as late as 1974; that the steroidal saponins from the rhizomes of *Dioscorea deltoidea* and *D. prazeri* etc. can help in the family-planning programmes and in fighting many skin diseases, that cardiac glucosides (digicorin) from *Digitalis*, aid us in fighting out often fatal heart complaints, etc., are too well-known. Our knowledge of the medicinal plants is so ancient and that literature therefore so scattered, written as these are in diverse languages of the subcontinent, that to compile all known uses and efficacy of the drug plants of India is a stupendous job. Yet, it is estimated that from amongst an estimated number of 15,000 species vascular plants of India, about 3,000 species are reputed as drug plants or drug-yielding plants. Although the Central Drug Research Institute, Lucknow and similar institutions in India have been carrying out bioassay of many of these drug plants, not even a fraction of our flora has been covered.

We list below some of the drug-yielding plants collected by us from the Bilaspur district and append notes on their reported local medicinal uses,

as also the active principles present in them, wherever such species have been pharmaceutically assayed. This is followed by a list of plants that are commonly used in epilepsy, diabetes, heart-diseases and against piles; a list of some of the Ayurvedic preparations available in the market and principal species from which such preparations are made, ends the section on medicinal plants.

Abrus precatorius L. (Gungchil, Ratti, Indian Liquorice)

Seeds are poisonous due to presence of toxalbumen abrin which shows a haemagglutinating activity. Roots possess glycyrrhizin and are useful in cough, colds and colic pains. Seed extract also shows anti-tumor activity; leaves used in painful swellings and are chewed as masticatory to relieve hoarseness of the throat. It is generally reported that tribals soak 2-3 seeds of the white variety in water overnight and the decoction is administered orally a few times in empty stomach to ladies to prevent conception. The seeds with black eye are uniform in weight and are used as a 'rati' measure by goldsmiths.

Adhatoda zeylanica Medic. (Vasaka)

Vasaka is an important Unani and Ayurvedic drug for cough, chronic bronchitis, early asthma and diseases of lungs and is used for jaundice. Roots are antispasmodic and used against phthisis; leaves used in rheumatism and are insecticidal and contain an essential oil having vasicine useful in skin diseases; flowers are antiseptic.

Aegle marmelos (L.) Corr. (Bael)

Leaves contain sterols asgalin *r*-sitosterol and alkaloid aegele-pine; fruits contain mucilage, tannins and marmalosin; ripe fruits useful in chronic dysentery; pulp is cooling and is antipyretic and anti-scorbutic; unripe fruits used against constipation and dyspepsia, its pulp astringent, digestive and stomachic; tender aromatic leaves are eaten to check diabetes. Wood, bark and leaves are used in religious ceremonies. It is stated that a BAEL tree around the house acts as a snake-repellant.

Alangium salvifolium (L.f.) Wang subsp. *salvifolium* (Akola, Akarkonta)

Alkaloids alangin, akoline, lamarkine, alangicine and tuberlosine have been isolated. Drupes contain butain. Leaves are used in rheumatic pains and as poultice; roots in fever and skin diseases, and as purgative and anthelmintic. Fruits are edible.

Andrographis paniculata Nees (Kiryat, Kalmegh)

It contains the bitter principle, andrographolide and kalameghin; used as febrifuge, tonic, alterative and anthelmintic; useful in debility, dyspepsia and liver troubles; infusion of plants given in fevers; roots stomachic; leaves stimulate, protect and promote physiologic functions of liver, accelerate natural gastrointestinal hormonal actions and is hepatoprotective against hepatotoxins.

Argemone mexicana L. (Bharbanda, Shialkanta : Prickly poppy)

Plant shows anticancer activity. Seeds yield 22% oil, non-edible, as it contains alkaloids berberine, protopine and sanguinarine; oil is purgative and when used to adulterate mustard oil, exhibits toxic effects similar to epidemic dropsy. Root is diuretic, alterative, anodyne and hypnotic. Yellow juice of the plant is useful in dropsy and jaundice and in cutaneous affections. Seeds are laxative, nauseant and emetic.

Asparagus racemosus Willd. (Satavar, Shatamuli)

Tuberous or fasciculated roots contain saponin, asparagin and are used as anti-diarrhoeotic, refrigerant, diuretic, anti-dysenteric, aphrodisiac, antispasmodic, nutritive tonic, galactagogue and as demulcent for cattle. Roots are also used in West Bengal to prepare sweets in commercial scale.

Azadirachta indica A. Juss. (Neem-tree : Margosa-tree)

Plants reduce chemical pollutants from the atmosphere. Oil from seeds contain two bitter substances, nimbin and nimbidin, the latter containing sulphur. Flowers yield a glucoside nimbosterine and an essential oil nimbosterol and flavonoides kaempferol, quercetin and myrecetin; dry flowers, as also fresh flower-buds and young leaves when eaten, raw or fried, have tonic effect. Leaves act as insecticide and antiseptic, used as poultice for boils; bark used as bitter tonic, astringent and blood purifier; gum is demulcent and tonic, stimulant. Plant is used in various ways in leprosy, small pox, intestinal worms, piles and urinary diseases. Neem toothpaste and Margosa soap are popular commercial items.

Bacopa monnieri Wett (Brahmi, Nira-brahni)

Plants show anti-cancer activity. Alkaloid brahmine, herpestine have been derived; the plant is a nerve tonic, used in asthma, epilepsy, and insanity. Stem and leaves ground as paste with water is eaten as a pickle; ghee prepared from its leaf-oil is applied in neuralgia and hysteria; dried leaf-powder is very effective in nervous break-down (asthenia) and is a good heart-tonic.

Baliospermum montanum Muell.-Arg. (Danti)

Roots cathartic, used in dropsy and jaundice; decoction of leaves is given orally in asthma; seeds purgative, used as rubifacient and in snake-bite; oil from seeds hydrogogue, cathartic and useful as external application in rheumatism.

Bauhinia purpurea L. (Keolar, Kaliar, Khairwal)

Bark contains tannin; seeds contain a non-drying oil for industrial purposes; bark astringent, used in diarrhoea; roots carminative; flower-buds laxative, used as a pot herb and eaten after frying; flowers contain isoquercetin, astragalin, quercetin and its glycosides; gum used in medicine and in sweets; leaves as fodder, and also as pot herb by tribals.

B. racemosa Lam. (Amta, Banraj)

Stem-bark shows anti-cancer activity; gum eaten as tonic and is soothing to intestines; decoction of leaves given in headache and malaria; bark is astringent, useful in diarrhoea and dysentery.

Boerhavia diffusa L. (Punarnava, Hog weed)

Active constituent alkaloid is punarnavine. It is a bitter stomachic, laxative, diuretic, expectorant, diaphoretic and febrifuge, in stomach troubles, oedema and anaemia etc., used also in jaundice and skin diseases. It is reported as an antidote to snake venom.

Boswellia serrata Roxb. (Salai, Indian Olibanum tree)

Roots show anti-cancer activity; gum edible, used as diaphoretic, diuretic, astringent, emmenagogus, in rheumatism, nervous and skin diseases; plant yields oleoresin with olibanum odour and is burnt to disinfect environment.

Butea monosperma (Lam.) O. Ktze. (Palas, Dhak)

Fresh seeds contain proteolytic and lipolytic enzymes. Flowers contain glucoside butrin, butein and bufin. Seeds show anti-fertility activity and are anthelmintic; gum astringent, edible and used in diarrhoea and dysentery. Leaves and flowers are astringent, used as tonic, diuretic, depurative and aphrodisiac. Flowers yield a yellow dye, antiseptic; seed oil used for making soap and as lubricant. The young twigs on a standing tree act as host for breeding lac-insects and yield commercial lac.

Calotropis gigantea (L.) R. Br. ex Ait. (Ak, Madar)

It contains bitter resins calotropin, akundarin, calotoxin. Latex contains proteolytic enzymes, uscharin, calotoxin, calactin-calotropoel, amyrin and

calcium oxalate and is strong irritant to skin and particularly to eyes. Root-bark is used in dysentery, is diaphoretic, expectorant, emetic; root paste in water is applied externally in elephantiasis. Tincture of leaves is used in intermittent fever. Powdered flowers used in cold, cough, asthma and in indigestion. Plant shows anti-cancer activity. Floss from fruits used for making pillows, beds etc.

C. procera (Ait.) R. Br. (Madar)

Properties same as of *C. gigantea*. Leaves contain calotropin and calotropagenin; latex contains uscharin, calotoxin and calactin and is credited with as a rich source of hydrocarbon for gasolin. Stem-fibre is useful for nets and strings.

Capparis zeylanica L. (Ardanda)

Plants contain alkaloid, phytosterol and water-soluble acid. Root-bark is sedative, stomachic, anti-hidrotic, bitter cholagogue; given in cholera. Leaves are counter-irritant and used in boils, swellings and piles. The fruits are supposed to have anti-tubercular activity, edible and flowers laxative.

Cardiospermum halicacabum L. (Kanphuti)

Plants contain saponin and used in rheumatism and in stiffness of limbs. Roots diaphoretic, diuretic, laxative, rubefacient, emmenagogus; leaves rubefacient and used as poultice in rheumatism; leaf-juice used as a cure for earache.

Carthamus tinctorius L. (Kusum, Safflower)

Seeds are purgative, used in rheumatism; roots diuretic. Seeds yield an edible oil (30%), reported to lower the level of blood-serum cholesterol, mainly due to the presence of oleic acid and linolic acid. Flowers are laxative, diaphoretic and used in jaundice. Flowers yield a red dye carthamine and carthamone for colouring toys, garments etc. and also in varnishes, paints; oil-cake is cattle-feed.

Cassia fistula L. (Amaltas; Indian Laburnum)

Leaves contain anthraquinone derivatives. Root-bark contains tannin, phlobaphenes and oxy-anthroquinone substance; pulp contains rhein. Root-bark, seeds and leaves used as laxative; also used as tonic and febrifuge. Seeds are emetic; leaf juice in skin diseases. Plant shows anti-bacterial activity. The dry fruit is ignited and the smoke is applied to cattle suffering from foot-and-mouth diseases.

C. occidentalis L. (Kasondi, Chakwad; Negro coffee)

Seeds contain tannic acid, fatty oil, emodin and toxalbumin. Plants show anti-bacterial activities and used as febrifuge, purgative, diuretic and tonic; leaves, roots and seeds purgative. Seeds and leaves are used externally in skin diseases, also antiperiodic. The root is made into paste along with black pepper and juice of leaves of *Artocarpus heterophyllus* and applied to throat swellings of cows.

C. tora L. (Tarota, Chakwad, Chakunda)

Plants contain emodin, glucosides and a pleasant smelling fixed oil. Leaves and seeds contain emodin and anthroquinon derivatives. Mucilaginous and foetid smelling leaves have been found to be internally gentle aperient and externally used as germicide and anti-parasitic in ring-worm. They have anodyne action. Pods are used by tribals as famine food and is given to hens as chicken-feed, not toxic.

Centella asiatica (L.) Urban (Brahmi, Pennywort)

Fresh leaves have glucoside asiaticoside, essential oil, fatty oil, sitosterol, tannin and resinous substance. Alkaloid hydrocotylin has been isolated from the dried plants. Leaves and roots also contain a bitter principle, vellerine, pectic acid and resin. Asiaticoside is shown to be active in treatment of leprosy. Plant is useful as alterative and tonic in diseases of skin, leprosy, nerve and blood. Leaves are taken as tonic and for improving memory, useful in syphilitic skin diseases, both internally and externally; useful for green-manuring.

Chloroxylon swietenia DC. (Bhirra; Satin wood tree)

Plants contain alkaloids chloroxylonine and chloroxyline. Chloroxylonine is a powerful irritant. Bark contains tannin and yields gum for making sticking paste. Seeds contain fatty oil for illumination and as lubricant. Bark is astringent; leaves applied to wounds and in rheumatism. Its fragrant wood is used for fine work for mathematical instruments, stethoscopes, frames for carving etc.

Cissampelos pariera L. var. *hirsuta* (DC.) Forman.

(Akanadi; False Pareira Brava)

Alkaloids sepeerine, berbeerine, cissampeline, hyatin, hyatinin have been isolated. Plant-extract also contains saponin and a quercitol. Santhale give the root in diarrhoea. Roots are one of the ingredients of *Dashmularisht*. It is stomachic, bitter tonic diuretic and anthelmintic and is considered to have sedative and astringent action on mucous membrane of the genito-urinary organs. Leaves are applied externally for itches; rhizomes used in the fermentation of rice beer.

Cleome viscosa L. (Hushur; Hulhul)

Seeds contain viscosic acid, viscosin and fatty oil. Leaves rubefacient, vesicant and sudorific. Juice of leaves used for earache. Seeds are carminative, anthelmintic and rubefacient, edible and as condiment, rich in iron 24.45 mg/100gm seeds; seed-paste in water applied externally in chronic painful joints.

Cocculus hirsutus (L.) Diels (Jamti)

Root is refrigerant, laxative, sudorific, alterative and is also useful in chronic rheumatism and venereal diseases and stomach pains. The plant, when triturated with water, is said to gelatinise it, which is taken as a cooling medicine for gonorrhoea and used externally for eczema and impetigo.

Colocasia esculenta (L.) Schott (Arvi; Cocoyam)

The tubers contain amylase and sapotoxin. Leaves and petiole are good source of vitamin B and iron. Juice of petiole is styptic, stimulant and rubefacient. Juice of tubers used in alopecia and scorpion-bite; tubers are edible as vegetable, rich in vitamin C and protein; its decoction in heart weakness, astringent and useful in colitis.

Crotalaria sericea Retz. (Jhumjhunia)

Seeds, leaves and stems contain monocrotaline. Plant is poisonous to livestock. It is used in scabies and impetigo. Stem yields low quality fibre for mats, nets etc; a good cattle feed.

Curculigo orchioides Gaertn. (Kalinuski, Talamuli)

It is a bitter aromatic tonic. It is used along with *Pueraria tuberosa* and *Asparagus racemosus* for rejuvenation (Panigrahi, 1963). It is used as demulcent, diuretic and restorative. Roots are alterative and used in treatment of asthma, jaundice, piles, diarrhoea and colic.

Datura metel L. (Dhatura)

Plants contain alkaloids hyoscyamine, hyoscins and atropine. Leaves and seeds are narcotic, antiseptic and anodyne. Roots, leaves and seeds are useful in insanity, fevers, cerebral complications and skin diseases. Plants emit antimicrobial activity and green leaves for dyeing cloth.

Dioscorea bulbifera L. (Rataloo)

Plants contain poisonous glucosides. Leaves and nodal ganglion (Nodal plexus) contain apart from glucosides, carbohydrate, alkaloids, proteins and phenolic compounds. Tubers are used in piles, dysentery, syphilis and applied to ulcers. Tubers are edible after cooking.

Dolichos uniflorus Lam. (Kulthi, Horse gram)

Seeds are rich source of urease and are astringent and diuretic and a good cattle feed. Decoction of seeds is used in leucorrhoea and menstrual disorders; seeds are rich in proteins (22%) with calcium, phosphorus and nicotinic acid.

Eclipta prostrata L. (Bhringraj, Bhangra)

Plant contains alkaloid ecliptine and nicotine and is used as tonic, emetic and deobstruent in hepatic and spleen enlargements; also in jaundice. Leaves are used as vegetable and in preparing digestive chutneys and in scorpion-sting, its juice as remedy for catarrh in infants. Roots are emetic, purgative and applied to ulcers and wounds in cattle; leaf juice in oil as hair tonic; fresh plants rubbed on gums in tooth-ache and with sesamum oil, on elephantiasis.

Embelia basaai (Baibirang, Vidingi)

Dried berries yield embelin, potassium hydrogen oxalate and fatty ingredients. Fruits are antiseptic, carminative and anthelmintic; dried bark of root used for tooth-ache.

Euphorbia hirta L. (Dudhi)

1-inositol and an alkaloid xanthorhamnin have been isolated. Plant is used in diseases of children in worms, bowel troubles and cough. The juice is given in dysentery and colic. Decoction is given in bronchial affections and asthma. Plant is toxic and has depressive action on heart and respiratory system. Leaves are eaten by tribals and its latex is said to cure conjunctivitis, if applied as *KAJAL*.

E. hypericifolia L. (Dudhi)

Plant contains phenolic substance, essential oils, glycosides and alkaloids. Infusion of dried leaves is astringent and used in dysentery, diarrhoea, menorrhagia and leucorrhoea; with milk to children in colic pains.

Ficus hispida L. f. (Konee-dumbar, Dadusi)

Leaves and fruits contain saponin; bark and fruits used as purgative, lactagogue and emetic; raw fruits made into curries; leaves for poulticing boils.

Gloriosa superba L. (Karihari, Malabar Glory)

Plants contain alkaloids superbine, gloriosine and colchicine. Colchicine is used for treatment of gout. Its derivative thiocol-chiocida has been

useful for treatment of oedema. Root is purgative, anthelmintic and cholagogue and used in leprosy, piles, colic, skin diseases and in snake-bite and scorpion-sting; starch from root given internally in gonorrhoea; root-tubers used as abortifacient; ornamental flowers very popular.

Grewia tiliifolia Vahl (Dhaman, Dhamni)

Wood-powder emetic, antidote to opium poisoning; bark in dysentery; applied externally to remove irritation from cow-itch; fruits edible.

Gymnema sylvestre R. Br. (Merasingi, Gurmar)

Leaves contain anthraquinone compound, gymnemic acid. Leaves, when chewed, make sugar tasteless; so, leaves are used in diabetes; roots emetic and expectorant; the plant is stomachic, stimulant, laxative and diuretic; given in cough, biliousness and eye sores; leaves increase secretion of urine and activates uterus.

Helicteres isora L. (Marorphali, Indian Screw tree)

Bark contains sterols and saponins. Fruits are useful as demulcent, astringent; useful in griping bowels and flatulence of children. Bark is used in dysentery and diarrhoea. Root is expectorant, demulcent and astringent, used in diabetes and also in stomach affections and in amoebic dysentery. Plant is a cure for scabies when applied topically. Wood is used for making gunpowder charcoal. Bark yields commercial fibre.

Hemidesmus indicus R. Br. (Anantmui, Indian Sarsaparilla)

Roots contain essential oils, sterols, glucoside, saponine, resin acid and tannins. Roots are used as substitute for *sarsaparilla*. It is used as demulcent, alterative, diaphoretic, diuretic, tonic, appetite-stimulator; in fever, skin diseases; as blood-purifier, in leucorrhoea, syphilis, rheumatism and in scorpion-sting; given in kidney gravel and made into syrups, as flavouring agent in cooling preparations.

Hibiscus subdariffa L. (Patua, Patsan, Red Sorrell)

Seeds contain fatty oil like arachis oil, glucosides and flavonol. Leaves are purgative; juice of flowers with sugar and black pepper used in biliousness with acidity. Seeds are aphrodisiac, fattening; applied externally to pains and bruises. Flowers contain flavonol cannabisectin.

H. subdariffa subsp. *canabinia* (Mesta, Lalambare)

The flowers contain citric acid, tartaric acid, malic acid, gossypetin, anthocyanin and glucoside hibiscin. Dried fruits contain vitamin C, calcium oxalate, gossypetin and anthocyanin. Dry petals contain flavonol glucoside

hibascitrin. Succulent calyx is boiled in water and used as a drink in bilious condition. Leaves, fruits, seeds and ripe calyces are diuretic and antiscorbutic; for making jellies, syrups; fruits for soups, puddings and cake etc.

Holarrhena pubescens Wall. (Kuro, Kurchi)

Bark contains alkaloides conessine, kurchine, kurchicine, holarrhimine, conarrhimine, conassidine, conkurchine and conesimine and is used in dysentery; dried bark ground and rubbed over the body in dropsy. Seeds are astringent, febrifuge in fever, diarrhoea and intestinal worms; seeds in pessaries promote conception in ladies.

Homonoia riparia Lour. (Kshudrapashanbeda)

Milky juice contains toxalbumin crepetin. Roots are laxative, diuretic; given for ulcers, strangury, urinary discharge and its decoction is used in piles, stone in bladder, gonorrhoea and syphilis, in chaste pain, as mouth wash in toothache; leaves depurative applied to hairs to remove dandruff; wood infusion in malaria.

Hygrophila auriculata (Schum.) Heine (Talmakhana; Ratanpurus)

Plant contains alkaloids and regarded as tonic and diuretic. Leaves are demulcent administered as an infuston in gonorrhoea and urinary affections; leaf paste in water is added to the food of pregnant women. Seeds contain mucilage, potassium salts, enzyme diastase, lypase and protease and alkaloids. Decoction of roots is diuretic; leaves, roots and seeds are used in jaundice, rheumatism and diseases of urinary-genital organs. Seeds are also used in gonorrhoea and spermatorrhoea. Quite a good number of medicines are prepared from the plant, e.g. Kokilakshya, kulekhara, kuliakhra and kakjangha etc.

Indigofera tinctoria L. (Neel, Indian Indigo)

Plants contain glucoside indican. Juice of leaves is prophylactic against hydrophobia. Extract of plant given in epilepsy and nervous disorders; used in bronchitis and as ointment in sores, ulcers, and haemorrhagia. Roots are used in hepatites; leaves yield indigo dye.

Jatropha curcas L. (Bagbherenda; Safed arand; Purging nut)

Seeds contain toxic principles curcin; seed kernels give fatty oil and resinous matter having nauseating, purging and griping effect. Plants are used as fish poison. Leaves are used in form of decoction and cataplasma to the mammae, as a lactogogue and rubifacient. Twigs are used as tooth brush in swollen gums. Juice of the plant useful in scabies, eczema, ring-worm. Seeds are purgative. Curcas oil from seeds for making varnish, in soap industry, as lubricant and as illuminant for making candles.

Kyllinga nemoralis

Roots yield an oil which is used to promote action of liver and relieve pruritus. Decoction of roots is used to relieve thirst in fever and diabetes. Oil boiled with root is used to relieve pruritus of the skin.

Lantana camara L. var. aculeata Mold. (Ghaneri)

Plants yield an essential oil containing camerenene, isocamerene and micranene. Leaves during flowering and seedling stages yield lantanine. Plant is considered diaphoretic, carminative and antiseptic. Decoction is given in tetanus, rheumatism and malaria; used in ataxy of abdominal viscera.

Lathyrus sativus L. (Khesari; Grass Pea)

Seeds contain a poisonous principle. Oil from seeds is a powerful and dangerous cathartic; toxic, if eaten without treatment causes paralysis; leaves eaten as pot herb. Seed on boiling in lime water and decoction discarded, becomes nutritive diet rich in vitamin A and protein.

Leonotis nepetaefolia R. Br.

Leaves contain bitter substances and its decoction is used as tonic. Roots are crushed and rubbed on the breast when it swells and milk does not pass through nipples. Ashes of flower-heads applied to burns and scalds; mixed with curd, it is applied to ringworm and itchy skin diseases. Seed oil aromatic and is used as a base oil in medicine.

Madhuca longifolia var. *latifolia* (L.) Macbride (Mahua)

Leaves contain alkaloid, glucoside, saponin. Seeds contain fatty oil. Bark-decoction is astringent and tonic. Flowers yield distilled spirit which is astringent, tonic, appetizing and is regarded as cooling, nutritive. Flowers fried in ghee, is eaten by persons suffering from piles; oil cake from fruits for making insecticidal preparations; bark powder in bleeding gums, itches, ulcers of skin, rheumatism, tonsilitis and diabetes etc.

Mangifera indica L. (Aam, Mango)

Fruits contain vitamin A, C and D. Bark is astringent; used in uterine haemorrhage, haemoptysis, melaena and diarrhoea. Kernel astringent, anthelmintic; its juice is put into nose to stop bleeding. Unripe fruit is useful as ophthalmic and in eruptions. Ripe fruits rich in iron, vitamin A 4850 I.U., riboflavin 50 u.g. and is nutritive, laxative, diuretic, astringent. Rind of fruit is astringent, stimulating tonic in debility. Seeds are used in asthma. Leaves emit high degree of antimicrobial activity.

Mucuna pruriens Baker (Kawach, Kaunch, Cowhage)

Seeds contain alkaloid mucunine and mucunadine and used as aphrodisiac and nervine tonic. Pods are anthelmintic, roots purgative; root-paste applied to the body in dropsy, and strong infusion mixed with honey, is given in cholera.

Nelumbo nucifera Gaertn. (Kamal ; Indian Lotus)

Leaf and pedicels contain alkaloid nelumbine. Flowers are cooling, used as astringent, in diarrhoea, in fever, liver trouble, in cholera ; as cardiac tonic. Seeds are diuretic and refrigerant ; form a cooling medicine for skin diseases and leprosy. Root powder demulcent, used in piles ; also used for dysentery and dyspepsia.. Rhizomes are used as vegetable rich in calcium ; fruit torus is edible, tonic, digestive and cooling ; roasted seeds rich in calcium are a tonic, good in colitis etc. ; rhizome paste is used in ringworm and skin diseases.

Ocimum americanum L. (Kalatulsi)

Seeds contain essential oils (camphor, citronellal, thymol, borneol), and is antibacterial. Leaves are made into paste and used in parasitical skin diseases. Seeds diuretic, tonic, carminative, diaphoretic ; plant extract with honey is given in cough, cold, bronchitis.

O. basilicum L. (Babui tulsi, Sweet Basil)

Fresh leaves yield essential oil containing alcohols (as linalol), cineols, eugenol, methyl cinnamate, tarpinene etc. ; plants aromatic, carminative, diuretic, stimulant and demulcent. Seed infusion given in gonorrhoea, dysentery and chronic diarrhoea. Roots are used in bowel complaints of children.

Pergularia daemia (Forsk.) Chiov. (Sagovani, Utran)

Plants contain a bitter resin, glucoside and sterols and are expectorant and emetic. Juice of leaves expectorant, useful in catarrhal affections, infantile diarrhoea, and asthma ; applied to rheumatic swellings in combination with lime or ginger. Fresh leaves made into paste and used as poultice in carbuncles and with lime and root-bark mixed with cow's milk applied in rheumatic swellings and the latter, as purgative.

Phyllanthus emblica L. (Amla, Aonla, Indian Goosberry)

Fruits are rich source of vitamin C (119mg/100gm of fruit pulp). Seeds contain fixed oil, phosphides and essential oil. Fruits, bark and leaves are rich in tannin. Fruits are acrid, cooling, refrigerant, diuretic and laxative ; used for treatment of scurvy. Raw fruit is aperient. Dried fruits

are useful in haemorrhage, diarrhoea and dysentery; in combination with iron, used for anaemia, jaundice and dyspepsia. Fermented liquor prepared from the fruit is used in jaundice, dyspepsia and cough. Fruit-exudation used as external application for the inflammation of the eye. Roots and barks are astringent. Seeds are used for asthma, bronchitis and biliousness; one of the ingredients of 'Triphala' and of chawanprash, tonic; oil from seeds is popular as hair-oil.

Plumbago zeylanica L. (Chitramuli, Swetachita)

Plants contain napthoquinon-derivative plumbagin which externally is a strong irritant and a powerful germicide; stimulates muscular tissues in smaller doses and paralyses in larger ones; stimulates contraction of the heart muscles and has stimulant action on the nervous system. Roots used in skin diseases, diarrhoea, dyspepsia, piles, anasarca, abortifacient; made into paste with vinegar, milk or salt-water, is applied externally in leprosy; tincture of the root bark is a powerful sudorific, antiperiodic; root—juice is applied in scabies and ulcers; fresh leaves, if eaten, is reported, to cause abortion.

Polygonum hydropiper L. (Packurmul)

Leaves contain essential oil, oxymethylanthraquinones, polygonic acid having irritating properties, glycoside which promotes the coagulation of blood and a polygonoil-containing ethereal oil which lowers blood pressure. Roots are stimulant, bitter tonic. Leaves are acrid, stimulant, diuretic, emmenagogue; used in amenorrhoea and other uterine troubles; plant-extract acts as oral contraceptive.

Pongamia pinnata (L.) Pierre (Kanji, Karanja)

Seeds contain karangin, pongamol and glabrin; used as external application in skin diseases. Oil from seeds useful in cutaneous affections, herpes and scabies and in tanning industry and soap-making. Fresh bark is used internally in bleeding piles; leaves in form of poultice applied to ulcers infested with worms; juice of roots used for closing fistulous sores and for cleaning foul ulcers.

Psoralea corylifolia L. (Babchi, Bukchi)

Seeds contain essential oil, resin, psoralen and isopsoralen. Psoralen and isopsoralen possess the curative action in non-syphilitic leucoderma. Seeds aphrodisiac, laxative, stomachic, deobstruent, anthelmintic, diuretic and diaphoretic. Seed-oil used as turpenoid oil in paint and varnish.

Pterocarpus marsupium Roxb. (Bijasal, Kino tree)

Plants yield gum *kino*, which contains kino-tannic acid, is astringent, in diarrhoea and locally applied in leucorrhoea; leaves made to a paste and applied to boils, sores and skin diseases. Bark is astringent.

Ricinus communis L. (Jada, Castor)

Plants contain alkaloid ricinine, toxalbumin, ricin. Seed-oil is purgative: leaf used as poultice for boils.

Schleichera oleosa (Kusum)

Seeds contain cyanogenetic glucosides. Bark is astringent; powdered seeds are applied to ulcers of animals and for removing maggots; seed-oil and bark used to cure itches: stimulating agent for the scalp, both cleansing and promoting growth of hair; seeds act as purgative.

Semecarpus anacardium L. f. (Bhilawa, Marking nut)

Nuts contain anacardic acid, cardol, catechol, anacerdol, slamecatpol, bhilawanol and show anti-cancer activity; fixed oil used as vermifuge; the nut-oil is vesicant, but used externally in rheumatism and leprosy nodules; gum is used in scrofulous, venereal and leprosy affections and nervous debility. Dried thalamus used as a masticatory and a tonic after delivery. Tar-like-oil from the pericarp is used to cure foot-sore of the cattle. Bruised nut and/or root placed on the mouth of the uterus of a 3-5 months-pregnant woman causes abortion; root cooked in rice water and taken for 3 days at the end of menstruation, produces sterility.

Sida acuta Burm. f. (Bariera)

Roots astringent, cooling, tonic, useful in nervous and urinary diseases and in disorders of the blood and bile; also used as a febrifuge, stomachic, in chronic bowel complaints and as aphrodisiac. Leaves demulcent, diuretic, given in rheumatic pains, with gingelly oil is applied to ulcers and elephantiasis.

S. cordifolia L. (Safed brela, Kungzi, Country Mallow)

Plant contains an alkaloid, probably identical with aphadrine. Decoction of root with ginger, used as febrifuge; root-bark with sesamum oil and milk, effective in curing cases of facial paralysis and sciatica; as powder given with milk and sugar, for relief of frequent micturition and leucorrhoea. Juice of plant given for spermatorrhoea. Seeds are aphrodisiac; administered in gonorrhoea.

Solanum ferox L. (Vribati, Poison berry)

Plants contain alkaloid solanine, solanidine (in roots and leaves). Roots are carminative, expectorant, useful in asthma, cough, catarrhal affections, toothache, fever, worm complaints, colic, in dysuria; juice of leaves with ginger is taken to stop vomiting.

S. nigrum L. (Makoi, Black night shade)

Plants, especially berries, contain alkaloid solanine, saponin. Berries used in fever, diarrhoea, eye troubles, hydrophobia. Juice of plant hydrogogue, cathartic, diuretic, aiterative; given, in chronic enlargement of the liver, piles, dysentery etc. Decoction of leaves is diuretic and laxative; a household remedy for anthrax pustules; leaves used as adulterant to *belladonna*.

S. surattense Burm. f. (Ankaranti, Kateli, Kantakari)

Fruits yield carpesteral, solanocarpine, solanine, solanidine and solassidine. Roots are expectorant; used in cough, asthma, catarrhal fever; juice of berries useful in sore throat; stems, flowers and fruits bitter carminative. Plants are used in diuretic dropsy; leaf-juice with black pepper given in rheumatism.

Soymida fabrifuga A. Juss. (Rohan)

Bark contains bitter principles and acts as astringent, bitter tonic, febrifuge; used in general debility, intermittent fever, diarrhoea and dysentery; bark powder in malaria, bark extract in gargling vaginal infections.

Sphaeranthus indicus L. (Mundi; Gorakhmundi)

Leaves, stem and flowers contain alkaloid, *sphaeranthine* and an essential oil. Plant is a tonic, deobstruent, alterative and aphrodisiac. Roots and seeds are anthelmintic. Flowers are alterative, cooling and used as tonic. Decoction of plant is used as a diuretic in urethral discharges. Leaf juice is styptic, given in liver and gastric disorders, and boiled with milk, very effective in cough.

Spilanthes paniculata Wall. ex DC. (Akkar katha)

Spilanthal obtained from flowers has strong local anaesthetic action; flowers contain also a sterol and a non-reducing polysaccharide; when made into a tincture, is used to relieve toothache; a powerful mosquito larvicide; flower-heads-tincture a substitute for *pyrethrum*.

Stereospermum personatum (Hassk.) D. Chatt. (Padar, Parral)

Root bark contains bitter principles and is considered cooling, diuretic, tonic and antibacterial; forms an ingredient in 'Dasmularish'. Flowers rubbed with honey is given to check hiccups; taken as a confection, acts as an aphrodisiac; root extract in asthma, cough and excessive thirst.

Syzygium cumini (L.) Skeels (Jaman)

Seeds contain ellagic acid; an aqueous extract of the seeds or as powder causes marked, prolonged decrease in blood sugar. Bark, juice of leaves and fruits are useful astringents in bilious diarrhoea and dysentery.

Tephrosia purpurea (L.) Persoon (Sarphonka)

Roots contain tephrosin, deguelin, isotephrosin, rotenone and leaves, a glucoside osyritin. Plants regarded as a laxative and used as anthelmintic. Root juice is bitter, applied in tympanitis and to cure dyspepsia and chronic diarrhoea. Fresh root-bark made into a paste with black pepper, is given in colic pain.

Terminalia arjuna (Roxb.) Wight & Arn. (Arjun, Kaua, Kahua)

Bark contains arjunine, arjunetin, a lactone, essential oil and tannin, used as tonic, astringent, febrifuge; in heart-disease, as a cardiac tonic; in bilious affections, for sores and as an antidote to poison. Fruits are deobstruent and tonic. Bark tannin is used for colouring and imparting strength to fishing nets.

T. bellirica Roxb. (Bahlra)

Fruit contains tannin, and is bitter, astringent, tonic, laxative, antipyretic; used in piles, dropsy, diarrhoea, leprosy, biliousness, dyspepsia and headache; kernel, a narcotic. Fruit is one of the ingredients of 'Triphala'

T. chebula Retz. (Harra)

Fruits contain tannin, chebulinic acid, tannic acid, gallic acid, resin; act as astringent, laxative, alterative, and used externally as a local application in ulcers and wounds; finely powdered, used as a dentifrice, useful in bleeding and ulcerations of the gum. It is one of the ingredients of 'Triphala'. Bark is diuretic and cardio-tonic.

Thalictrum foliolosum DC. (Mamira, Mamiri)

Plants contain berberine and thalictrine. Root is used as tonic, aperient, purgative, diuretic, febrifuge, and as a good remedy for dyspepsia; root juice in cataract.

Urginea indica Kunth (Jangli Pyaj, True Squill)

Fresh squill yields two glycosides, scillaran—A, which is crystalline and scillaran—B, which is amorphous. Bulb is regarded as cardiac stimulant, diuretic, expectorant, in chronic bronchitis; a substitute for *Digitalis* and adulterant for *Scilla* bulbs.

Vanda tessellata Lodd. ex Loud. (Rasna)

Plants contain alkaloids and glucosides. Roots are useful in rheumatism; used with til oil for external application in diseases of nervous system. Leaf-juice is introduced into the aural meatus as a remedy for otitis.

Vetiveria zizanioides (L.) Nash (Khaskhas, Khas)

Roots contain essential oils: as infusion, considered refrigerant, febrifuge, diaphoretic, stimulant, stomachic and emmenagogue; pulverized and made into a paste in water, used as a cooling, and as external application in fevers; root-essence used as a tonic, carminative, in colitis.

Vitex negundo L. (Nirgundi)

Plants contain alkaloid nishindine and an essential oil. Leaves aromatic, regarded as tonic, vermifuge; used in rheumatism. Roots are expectorant, febrifuge and tonic. Decoction of leaves with pepper is given in catarrhal fever with heaviness of head and dullness of hearing. Juice of leaves used for removing foetid discharge and worms from ulcers. Dried fruits are vermifuge; seeds cooked and eaten.

Wrightia tinctoria R. Br. (Indrajau)

Seeds contain fixed oil. Bark and seeds are used for the same purpose as those of *Holarrhena pubescens*. Bark is regarded as tonic. Seeds are aphrodisiac.

Xanthium strumarium L. (Chhota gokhru)

Seeds contain glucoside xanthostumarin, oxalic acid. Plants regarded as diaphoretic, sedative, sudorific, sialogogue; considered useful in malaria. Roots are bitter tonic, useful in strumous diseases and cancer. Fruits are cooling, demulcent and given in small pox. Leaves rich in vitamin C and iodine.

Ziziphus mauritiana Lam. (Pahari ber)

Young stem and bark used as a dentifrice; bark considered useful in diarrhoea; root-decoction used in fever. Bark-extract in milk and honey is used as a blood purifier; fruits rich in vitamin C, B complex and iron.

TABLE 5

Additional list of species with medicinal properties and plant-parts used

Name of species	Plant-parts used	Medicinal properties/uses
<i>Acacia nilotica</i> ssp. <i>indica</i>	Bark, leaves, gum	Astringent, demulcent, diarrhoea, dysentery.
<i>A. pennata</i>	Leaves, bark	Gum trouble.
<i>Achyranthes aspera</i>	Whole plant, root, seeds	Purgative, diuretic; stops bleeding after abortion, dropsy, piles, boils, hydrophobia.
<i>Adina cordifolia</i>	Bark	Febrifuge, antiseptic; kills worms in sores.
<i>Aerva lanata</i>	Whole plant, root	Anthelmintic, diuretic, demulcent.
<i>Ageratum conyzoides</i>	Root, leaves	Styptic; cuts, sores.
<i>Albizia lebbeck</i>	Leaves, bark, root-bark, seeds	Astringent; piles, gum trouble, diarrhoea, night blindness.
<i>A. odoratissima</i>	Bark, leaves	Cough, leprosy.
<i>A. procera</i>	Leaves	Insecticide, ulcers.
<i>Alternanthera sessilis</i>	Whole plant	Galactagogue, cholagogue.
<i>Alysicarpus vaginalis</i>	Root	Cough.
<i>Amaranthus caudatus</i>	Whole plant	Diuretic, blood purifier; piles.
<i>A. spinosus</i>	Root, leaves	Laxative menorrhagia, gonorrhoea, colic, abscesses, night blindness.
<i>A. tricolor</i>	Whole plant	Astringent, menorrhagia, diarrhoea, ulcer.
<i>Anagallis arvensis</i>	Whole plant	Gout, cerebral affections, hydrophobia, leprosy, epilepsy.
<i>Anisochilus carnosus</i>	Whole plant	Stimulant, expectorant, cooling, cough.
<i>Annona squamosa</i>	Root, leaves, fruits, seed	Insecticide, abortifacient.
<i>Anthocephalus chinensis</i>	Bark, leaves	Astringent, tonic, febrifuge.
<i>Antidesma acidum</i>	Root, leaves	Blood dysentery.
<i>Atylosia scarabaeoides</i>	Whole plant	Diarrhoea in cattle.
<i>Barleria cristata</i>	Root, leaves	Cough, swellings.

Name of species	Plant-parts used	Medicinal properties/uses
<i>Barleria prionitis</i>	Leaves, bark	Catarrhal affections, cough, anasarca, toothache.
<i>B. strigosa</i>	Root	Spasmodic cough.
<i>Bauhinia variegata</i>	Root, bark, flowers	Alterative, tonic, astringent, skin diseases, ulcers, dysentery, piles.
<i>Biophytum sensitivum</i>	Root, leaves, seeds	Diuretic, wounds, gonorrhoea.
<i>Bombax ceiba</i>	Root, bark, gum	Stimulant, tonic, impotency, emetic, aphrodisiac, demulcent.
<i>Bridelia airyshawii</i>	Root, bark	Astringent, causing infertility.
<i>Canscora decussata</i>	Whole plant	Laxative, alterative, nerve tonic
<i>Cassia absus</i>	Leaves, seed	Astringent, cathartic; cough, skin affections.
<i>Cassytha filiformis</i>	Whole plant	Tonic, alterative, bilious affections, dysentery, insecticide.
<i>Cayratia trifolia</i>	Root, leaves	Astringent, boils, yoke-sore on neck of bullocks.
<i>Celosia argentea</i>	Seeds	Aphrodisiac; blood diseases, diarrhoea, mouth sores.
<i>Centratherumanthelminticum</i>	Seeds	Anthelmintic; skin trouble.
<i>Chlorophytum arundinaceum</i>	Root	Tonic, diuretic.
<i>Clitorophora prostrata</i>	Leaves, seed	Purgative, depurative.
<i>Cissus repanda</i>	Whole plant	Ulcers, boil.
<i>Cleistanthus collinus</i>	Leaves, root, fruits	Violent gastro-intestinal irritant.
<i>Clerodendrum serratum</i>	Root, leaves	Fever, ophthalmic, febrile and catarrhal affections.
<i>C. viscosum</i>	Root, leaves	Antiperiodic, vermifuge, febrifuge, tonic.
<i>Clitoria ternatea</i>	Root, seed	Purgative, aperient, diuretic, laxative.
<i>Combretum roxburghii</i>	Leaves	Skin troubles.
<i>Commelina diffusa</i>	Leaves	Itches, burns, boils.
<i>Corchorus fascicularis</i>	Whole plant	Seminal and general weakness, tonic.
<i>Costus speciosus</i>	Root	Bitter astringent, purgative, depurative, stimulant, tonic.
<i>Cryptolepis buchanani</i>	Leaves	Toxic; rickets in children, rheumatism.

Name of species	Plant parts used	Medicinal properties/uses
<i>Cyanotis cristata</i>	Root	Cattle fever.
<i>Cymbopogon martinii</i>	Whole plant	Aromatic tonic, stimulant, rheumatism.
<i>Dalbergia lanceolaria</i>	Bark, seed	Intermittent fever, dyspepsia, seed-oil in rheumatic affection.
<i>D. latifolia</i>	Whole plant	Bitter tonic, stomachic, dyspepsia, diarrhoea, leprosy.
<i>D. sissoo</i>	Root, leaves	Bitter, stimulant; gonorrhoea, astringent.
<i>Dendrophoea falcata</i>	Bark	Astringent, narcotic; wounds, menstrual disorders.
<i>Desmodium gangeticum</i>	Root	Astringent, diuretic, biliaryness, asthma, cough, diarrhoea.
<i>D. pulchellum</i>	Bark, flowers	Haemorrhage, diarrhoea, eye diseases.
<i>D. triflorum</i>	Leaves	Galactagogue, diarrhoea, dysentery, wounds.
<i>Dioscorea oppositifolia</i>	Tubers	Swellings, scorpion-sting, snake-bite.
<i>D. pentaphylla</i>	Tubers	Swellings.
<i>Diospyros malabarica</i>	Stem-bark, fruits, seeds	Astringent; diarrhoea, dysentery, intermittent fever.
<i>Dodonaea viscosa</i>	Bark, leaves	Astringent, febrifuge, sudorific, gout, rheumatism, wounds, swellings.
<i>Elephantopus scaber</i>	Whole plant, root, leaves	Astringent, cardiac tonic, alterative, dysuria, diarrhoea, dysentery.
<i>Emilia sonchifolia</i>	Whole plant	Febrifuge, eye inflammation, night blindness, sores, diarrhoea.
<i>Enicostema hyssopifolium</i>	Whole plant	Bitter stomachic tonic, laxative.
<i>Liagaria suberosa</i>	Root	Eye trouble.
<i>Euphorbia nerifolia</i>	Root, juice	Purgative, rubefacient, expectorant, antiseptic.
<i>E. thymifolia</i>	Leaves, seed, juice	Aromatic, astringent, stimulant, laxative, bowel complaint, ring worm.
<i>Evolvulus alsinoides</i>	Whole plant	Bitter tonic, febrifuge, vermifuge, dysentery.
<i>Ficus benghalensis</i>	Bark, seed, juice	Rheumatism, lumbago, tonic, astringent, dysentery, diarrhoea.

Name of species	Plant-parts used	Medicinal properties/uses
<i>Ficus racemosa</i>	Bark, root, fruits	Astringent, dysentery, bilious affections, stomachic, piles.
<i>Flacourтия indica</i>	Gum, fruit	Jaundice, enlarged spleen.
<i>Garuga pinnata</i>	Stem, leaves, fruits	Stomachic, asthma, eye trouble.
<i>Glinus lotoides</i>	Whole plant	Purgative, diarrhoea, bilious attack.
<i>Gnaphalium luteo-album</i>	Leaves	Astringent, vulnerary, paste applied on breast for lactation.
<i>Grangea maderaspatana</i>	Leaves	Stomachic, antiseptic, earache, menstrual disorder.
<i>Guizotia abyssinica</i>	Seed	Oil in rheumatism.
<i>Heliotropium indicum</i>	Leaves	Diuretic; boils, ulcers.
<i>H. strigosum</i>	Whole plant	Laxative, diuretic; gum trouble, boils, sore eyes.
<i>Hypsis suaveolens</i>	Whole plant	Parasitical cutaneous diseases.
<i>Ichnocarpus frutescens</i>	Root, leaves	Alterative, tonic.
<i>Indigofera glabra</i>	Leaves	Febrifuge, bitter tonic.
<i>I. tinctoria</i>	Juice	Antiscorbutic, alterative, diuretic, venereal affections.
<i>I. tinctoria</i>	Leaves	Hydrophobia.
<i>Ipomoea aquatica</i>	Whole plant, juice	Emetic, purgative, antidote to opium and arsenical poison.
<i>I. pes-tigridis</i>	Root	Purgative, antidote to dog-bite, boils.
<i>Jasminum arborescens</i>	Leaves	Astringent, emetic, tonic.
<i>J. auriculatum</i>	Flowers	Consumption.
<i>Jatropha gossypifolia</i>	Leaves, bark, seed	Emmenagogue, emetic; boils, carbuncles, eczema; seed causes insanity.
<i>Kydia calycina</i>	Leaves	Rheumatism, lumbago.
<i>Lannea coromandelica</i>	Bark, leaves	Astringent, swellings, boils, ulcers.
<i>Lesa indica</i>	Root	Sudorific; diarrhoea, dysentery, colic.
<i>Lepidagathis cristata</i>	Whole plant	Tonic, skin trouble.
<i>L. trinervis</i>	Whole plant	Bitter tonic.
<i>Leptadenia reticulata</i>	Whole plant	Stimulant, tonic.
<i>Leucas aspera</i>	Whole plant	Antipyretic, insecticide, psoriasis, scabies.
<i>Mallotus philippensis</i>	Hairs on fruits	Bitter, anthelmintic, styptic, cathartic.

Name of species	Plants-parts used	Medicinal properties/uses
<i>Malvastrum coromandelianum</i>	Whole plant, flowers	Diaphoretic, sores, wounds.
<i>Martynia annua</i>	Juice, leaves, fruit	Epilepsy, sore throat, alexiteric.
<i>Melastoma malabathricum</i>	Leaves	Astringent, in leucorrhoea, diarrhoea, dysentery.
<i>Melia azedarach</i>	Root-bark, flowers, fruit, seed, leaves	Deobstruent, alexipharmac, antilithic, diuretic, rheumatism, leprosy.
<i>Mirabilis jalapa</i>	Root, leaves	Aphrodisiac, purgative, matutant, boils.
<i>Mollugo pentaphylla</i>	Whole plant	Stomachic, aperient, antiseptic, emmenagogue, antiperiodic.
<i>Nepeta hindostana</i>	Whole plant	Cardiac tonic, fever, gonorrhoea.
<i>Nerium indicum</i>	Root	Resolvent, attenuant.
<i>Nicandra physalodes</i>	Whole plant	Diuretic.
<i>Nyctanthes arbor-tristis</i>	Leaves	Cholagogue, laxative, sciatica, fever, rheumatism.
<i>Nymphaea pubescens</i>	Root, flowers	Demulcent, astringent, cardio-tonic, piles.
<i>Ochna obtusata</i> ssp. <i>obtusata</i>	Root, bark	Digestive, tonic, menstrual disorders, asthma, emollient cataplasm.
<i>O. obtusata</i> ssp. <i>pumila</i>	Root, bark	Digestive, tonic, asthma, emollient cataplasm.
<i>Ocimum americanum</i>	Leaves	Parasitical skin diseases.
<i>O. basilicum</i>	Root, leaves	Carminative, diuretic, stimulant, demulcent, diarrhoea, dysentery.
<i>Olax scandens</i>	Bark	Anaemia.
<i>Oldenlandia corymbosa</i>	Whole plant	Remittent fever, nervous depression, jaundice, liver trouble.
<i>Operculina turpethum</i>	Root	Purgative.
<i>Opuntia elatior</i>	Leaves, juice, fruit	Purgative, gonorrhoea, spasmodic cough.
<i>Ougeinia oojeinensis</i>	Bark, gum	Febrifuge, dysentery, diarrhoea.
<i>Oxalis corniculata</i>	Whole plant	Scurvy, cooling, refrigerant, antiscorbutic.
<i>Oxystelma esculentum</i>	Root	Jaundice.
<i>Passiflora foetida</i>	Leaves, fruits	Biliousness, asthma, emetic.
<i>Phyllanthus maderaspatensis</i>	Leaves	Headache.

Name of species	Plant-parts used	Medicinal properties/uses
<i>Phyllanthus reticulata</i>	Leaves, bark	Diuretic, cooling, alterative.
<i>P. urinaria</i>	Whole plant	Diuretic, gonorrhoea, fish poison.
<i>Physalis divaricata</i>	Whole plant	Tonic, diuretic, purgative.
<i>Pistia stratiotes</i>	Whole plant, bark	Demulcent, refrigerant, dysuria, emollient, laxative.
<i>Pogostemon benghalensis</i>	Leaves, root	Styptic, haemorrhage, antidote to scorpion-sting.
<i>Polycarpaea corymbosa</i>	Whole plant	Boil, swellings, bites from animals.
<i>Polygala arvensis</i>	Root	Fever, dizziness.
<i>P. crotalarioides</i>	Whole plant, root	Catarrhal affections, snake-bite.
<i>Polygonum barbatum</i>	Root, seed	Colic; astringent, cooling.
<i>P. plebeium</i>	Whole plant, root	Bowel complaint.
<i>Pueraria tuberosa</i>	Root	Demulcent, refrigerant, rejuvenant, rheumatism, emetic, tonic, lactagogue.
<i>Radermachera xylocarpa</i>	Oil from wood ; seed	Cutaneous affections. Seed against snake-bite.
<i>Rhynchosia minima</i>	Leaves	Abortifacient.
<i>Rorippa indica</i>	Whole plant	Diuretic, stimulant, antiscorbutic.
<i>Rotula aquatica</i>	Root	Piles, stones in bladder, venereal diseases.
<i>Salvia plebeia</i>	Seeds	Diarrhoea, gonorrhoea.
<i>Sebastiania chamaelea</i>	Juice	Astringent, tonic, demulcent.
<i>S. orientale</i>	Seeds	Dysentery, diuretic, lactagogue.
<i>Sesbania sesban</i>	Bark, seed	Astringent, diarrhoea, menstrual disorders.
<i>Shorea robusta</i>	Resin	Astringent, dysentery, gonorrhoea.
<i>Sida rhombifolia</i>	Root, leaves	Swellings, rheumatism, demulcent.
<i>S. spinosa</i>	Root, bark, leaves	Tonic, diaphoretic, fever, gonorrhoea, demulcent.
<i>Stegesbeckia orientalis</i>	Whole plant	Depurative, tonic, ulcers.
<i>Smilax zeylanica</i>	Root	Veneral diseases, rheumatism.
<i>Solena heterophylla</i>	Root	Spermatorrhoea.
<i>Spondias pinnata</i>	Bark, fruit	Antiscorbutic, astringent, dysentery, rheumatism.

Name of species	Plant-parts used	Medicinal properties/uses
<i>Symplocos racemosa</i>	Bark	Cooling, astringent, bowel complaints, eye trouble.
<i>Tacca leontopetaloides</i>	Tuber	Dysentery.
<i>Thespesia lampas</i>	Root, fruit	Gonorrhoea.
<i>Tragia involucrata</i>	Root	Diaphoretic, alterative.
<i>Trema orientalis</i>	Whole plant	Epilepsy.
<i>Trichosanthes cucumerina</i>	Whole plant, leaves	Bitter laxative, emetic, cathartic.
<i>Tridax procumbens</i>	Leaves	Antiseptic, hair-tonic.
<i>Triumfetta rhomboidea</i>	Leaves, flowers, fruits	Demulcent, astringent, gonorrhoea, diuretic.
<i>Uraria lagopodioides</i>	Whole plant	Alterative, tonic, anticatarrhal.
<i>U. picta</i>	Whole plant	Antidote to snake-bite.
<i>Vallisneria natans</i>	Whole plant	Stomachic, leucorrhoea.
<i>Ventilago dentata</i>	Juice	Malarial fever.
<i>Vernonia cinerea</i>	Whole plant, seeds	Diaphoretic, anthelmintic, piles, dropsy.
<i>Woodfordia fruticosa</i>	Flowers	Astringent, dysentery, liver trouble.
<i>Xeromphis spinosa</i>	Fruits	Emetic, anthelmintic, abortifacient, dysentery.
<i>X. uliginosa</i>	Fruits	Dysentery, diarrhoea.
<i>Zornia diphylla</i> sep. <i>gibbosa</i>	Root	Induces sleep in children.

A few plants, used for some common ailments are listed below.

Plants used in epilepsy :

Anagallis arvensis; *Canscora decussata*; *Colebrookea oppositifolia*; *Indigofera tinctoria*; *Ipomoea eriocarpa*; *Martynia annua*; *Moringa oleifera*; *Trema orientalis*.

Plants used in diabetes :

Coccinia grandis; *Ficus benghalensis*; *F. racemosa*; *Gymnema sylvestre*; *Helicteres isora*; *Momordica charantia*; *Syzygium cumini*; *Scoparia dulcis*; *Tephrosia villosa*.

Plants used in heart-disease :

Nepeta hindostana; *Tephrosia purpurea*; *Terminalia alata*; *T. arjuna*; *Urginea indica*.

Plants used in piles :

Achyranthes aspera; *Albizia lebbeck*; *Bauhinia variegata*; *Capparis zeylanica*; *Ficus racemosa*; *Gloriosa superba*; *Lantana camara*; *Momordica dioica*; *Plumbago zeylanica*; *Sesamum orientale*; *Terminalia bellirica*.

Plants used in rheumatism :

Adhatoda zeylanica; *Alangium salvifolium* ssp. *salvifolium*; *Ammania baccifera*; *Betiospermum montanum*; *Boswellia serrata*; *Cassia fistula*; *Celastrum paniculatus*; *Chloroxylon swietenia*; *Clerodendrum inerme*; *Odonia viscosa*; *Gmelina arborea*; *Hemidesmus indicus*; *Lantana camara*; *Leucas aspera*; *Linum usitatissimum*; *Melia azaderach*; *Moringa oleifera*; *Nyctanthes arbor-tristis*; *Premna herbacea*; *Semecarpus anacardium*; *Sida rhombifolia*; *Solanum surattense*; *Vitex negundo*; *Xeromphis spinosa*.

Some common Ayurvedic drugs and some of the species used in their preparation, are mentioned below :

Name of drug	Name of species	Disease for which used
Liviad	<i>Embelia basaal</i> <i>Hygrophila auriculata</i> <i>Solanum nigrum</i> <i>Terminalia arjuna</i> (also <i>Capparis spinosa</i> , <i>Plumbago rosea</i>)	Liver disorders, indigestion and dyspepsia.
Livergen	<i>Andrographis paniculata</i> <i>Hygrophila auriculata</i> <i>Trigonella foenum-graecum</i> (also <i>Apium graveolens</i> , <i>Cassia uncustifolia</i>)	Hepatitis and liver disorders.
Liv-52	<i>Solanum nigrum</i> <i>Cassia occidentalis</i> <i>Terminalia arjuna</i> <i>Eclipta prostrata</i> <i>Phyllanthus amarus</i> <i>Boerhavia diffusa</i> <i>Phyllanthus emblica</i> <i>Plumbago zeylanica</i> <i>Terminalia chebula</i> <i>Raphanus sativus</i> <i>Embelia basaal</i> (with several other species)	Liver tonic and in jaundice.

Name of drug	Name of species	Disease for which used
Purol-H	<i>Hemidesmus indicus</i> <i>Plumbago zeylanica</i> <i>Cassia tora</i> <i>Albizia lebbeck</i> <i>Melia azaderach</i> <i>Acacia catechu</i> (with several other species)	Psoriasis, leucoderma, dermatitis, scabies etc.
Arjunarishta	<i>Terminalia glata</i> <i>T. arjuna</i>	Heart-trouble.
Dikamali	<i>Gardenia resinifera</i> <i>G. gummifera</i>	Brain diseases.
Vidarikand	<i>Pueraria tuberosa</i>	Gastric troubles.
Falandu	<i>Urginea indica</i>	Heart tonic and urinary troubles.
Varahikand	<i>Dioscorea bulbifera</i>	Menorrhoea and other female diseases.
Kantakari	<i>Solanum surattense</i>	Pulmonary troubles, cough, cold and rheumatism.
Nishoth	<i>Operculina turpethum</i>	Bitter tonic, stimulant, purgative, insect-bite.

Miscellaneous :

The wood of *Diospyros melanoxylon* (*Tendu*) and *Ougeinia oojeinensis* (*Tinsa*) are used for making shafts for plough and carts. The wood of *Anogeissus latifolius* (*Dhaora*) is used for making axle of carts. The handles for axe are made from *Grewia tiliifolia* (*Dhaman*). The leaves of *Diospyros melanoxylon* are used as "biri-patta" i.e. for wrapping tobacco in the form of 'biri', one of the most popular intoxicating item of commerce in the Old World market. The leaves of *Bauhinia vahlii* (*Siari*), *Madhuca longifolia* var. *latifolia* (*Mahua*), *Butea monosperma* (*Palas*) and *Shorea robusta* (*Sal*) are used for preparation of plates (*Pattal*) and sacks (*Dona*). Very often the local tribals use the leaves of *Shorea robusta* to make crude smoking pipes. The leaves of *Bauhinia vahlii* are also used by local tribals for making crude umbrellas and umbrella-like caps to protect themselves from rains. The inflorescence of *Thysanolaena maxima* (*Phulbahari*) and the leaves of *Phoenix humilis* (*Chhind*) are used for making brooms. *Themeda*, *Heteropogon* and *Imperata cylindrica* (*Chhir*) are used as thatching grass. On young branches of *Butea monosperma* (*Palas*) and *Schleichera oleosa* (*Kusum*) the 'lac' insects are reared. *Iselima laxum* (*Mushan*) is one of the principal fodder grass.

Legend to the technical terms used for names of diseases and medicinal properties :

Abortifacient : means for causing abortion. *Aphrodisiac* : exciting sexually. *Alopecia* : baldness. *Alterative* : having power to alter, a medicine that makes changes in vital functions. *Amenorrhoea* : failure of menstruation. *Antiperiodic* : medicine destroying the periodicity of the disease. *Anasarea* : diffused dropsy in the skin and subcutaneous tissues. *Anodyne* : medicine that allays pain. *Anthelmintic* : destroying or expelling worms, a drug used for that purpose. *Astringent* : having power to contract organic tissues. *Atonic* : weakness, debility. *Aperient* : laxative (having the power to loosening the bowels). *Carminative* : medicine that expels flatulence. *Cataplasma* : plaster or poultice. *Cathartic* : purifying, cleansing having the power of cleansing the bowels. *Chalagogue* : a purgative causing evacuations of bile. *Demulcent* : soothing; medicine that relieves irritation. *Deobstruent* : removing obstructions. *Depurative* : to purify. *Diaphoretic* : promoting sweating. *Diuretic* : promoting the discharge of urine. *Dropsy* : morbid accumulation of water fluid in any part of the body. *Dysuria* : a difficulty or pain in passing urine. *Emetic* : causing vomiting; a medicine that causes vomiting. *Emmenagogue* : medicine intended to restore, or to bring on, the menses. *Emollient* : softening as poultices, fomentation. *Febrifuge* : that which drives off fever. *Galactagogue* : a medicine that promotes secretion of milk. *Haemorrhoids* : dilatation of vein about the anus usually in piles. *Hydragogue* : removing water or serum, a drug with that effect. *Hypnotic* : a sleep-like state in which mind responds to external suggestions and can recover forgotten memories. *Leucorrhœa* : an abnormal mucous or muco-purulent discharge from vagina, the whites. *Impetigo* : skin disease characterised by thickly-set clusters of pustules. *Masticatory* : chewing. *Micturition* : frequent desire to pass urine, the act of urinating. *Purgative* : *Cleansing* : having the power of evacuating the intestines. *Otitis* : inflammation of the ear. *Refrigerant* : refreshing, cooling, giving the feeling of coolness. *Rubefacient* : an external application that reddens the skin. *Sialagogue* : anything that stimulates flow of saliva. *Stomachic* : good for the stomach. *Styptic* : checking bleeding. *Strumous* : inflation of the thyroid gland. *Spasmodic* : intermittent convulsions. *Strangury* : painful retention of or difficulty in discharge of urine. *Tympanitis* : flatulent distention of the belly. *Spermatorrhœa* : involuntary seminal discharge. *Sudorific* : causing sweat. *Vermifuge* : a drug that expels worms. *Vesicant* : anything that causes blisters.

SYSTEMATIC ACCOUNT

Key to the families of flowering plants :

- 1a. Leaves usually parallel-veined, mostly alternate; flowers usually 3-merous, rarely 6-merous Group IV
- 1b. Leaves usually net-veined, alternate or opposite, flowers usually 4- or 5-merous (3-merous in Menispermaceae)
 - 2a. Perianth 1-seriate, mostly calycine, rarely absent Group III
 - 2b. Perianth 2- or more-seriate, differentiated into calyx and corolla
 - 3a. Petals free or rarely connate at base; stamens not epipetalous Group I
 - 3b. Petals united, rarely free; stamens mostly epipetalous Group II

GROUP I

- 1a. Gynoecium composed of 2 or more separate or nearly quite separate carpels with separate styles and stigmas (rarely the free carpels immersed in an expanded torus as in Nelumbonaceae)
- 2a. Leaves stipulate STERCULIACEAE
- 2b. Leaves ex-stipulate
 - 3a. Carpels completely sunk in the tissue of the large broad torus or surrounded by a cupular receptacle; aquatic herbs
 - 4a. Pollen monocolporate; ovary inferior; fruits a fleshy berry with many seeds NYMPHAEACEAE
 - 4b. Pollen tricolporate; ovary superior; fruits an aggregate of single-seeded nutlets NELUMBONACEAE
 - 3b. Carpels neither sunk in the torus, nor surrounded by receptacle; plants not aquatic
 - 5a. Stamens as many as and opposite the petals; flowers dioecious, 3-merous MENISPERMACEAE
 - 5b. Stamens numerous and alternate with petals or monadelphous; flowers bisexual, 4 or 5-merous
 - 6a. Stamens numerous, more than 12.
 - 7a. Sepals and petals in distinct series ANNONACEAE
 - 7b. Sepals and petals not in distinct series or rarely the sepals gradually passing into the petals

- 8a. Trees; sepals accrescent DILLENIACEAE
- 8b. Herbs; sepals not accrescent
- 9a. Carpels free from the beginning; each carpel with one ovule RANUNCULACEAE
- 9b. Carpels at first connivent; at length free, each carpel with many ovules PAPAVERACEAE
- 6b. Stamens 12 or fewer
- 10a. Leaves gland-dotted RUTACEAE
- 10b. Leaves not gland-dotted
- 11a. Trees; leaves alternate; pistil one ANACARDIACEAE
- 11b. Herbs; leaves opposite pistils four CRASSULACEAE
- 1b. Gynoecium composed of 1 carpel or 2 or more united carpels with free or united styles, or if carpels free from below, then styles or stigmas more or less united
- 12a. Placentation parietal or marginal
- 13a. Ovary superior
- 14a. Leaves alternate or reduced to scales
- 15a. Fertile stamens numerous, rarely fewer
- 16a. Filaments \pm connate
- 17a. Filaments connate into a tube or column FABACEAE
(Mimosoideae)
- 17b. Filaments connate into separate bundles
- 18a. Bundles of filaments opposite the sepals TILIACEAE
- 18b. Bundles of filaments opposite the petals FLACOURTIACEAE
- 16b. Filaments free or partly adnate to a gynophore or shortly connate only at the base
- 19a. Ovary supported on a gynophore CAPPARACEAE
- 19b. Ovary sessile or nearly so

- 20a. Anthers opening by apical pores or short pore-like slits OCHNACEAE
- 20b. Anthers opening their full length by slits CACTACEAE
- 15b. Fertile stamens 15 or fewer, rarely more
- 21a. Stamens tetrodynamous, sepals 4 and petals 4 ; ovary divided by a false septum BRASSICACEAE
- 21b. Stamens not tetrodynamous ; the other characters not associated
- 22a. Flowers zygomorphic
 - 23a. Stamens 5 ; placenta 3 MORINGACEAE
 - 23b. Stamens 8-10 ; placenta 1
 - 24a. Stamens 8 ; ovary of 2 or more carpels POLYGALACEAE
 - 24b. Stamens 10 ; ovary of one carpel FABACEAE
Faboideae & Caesalpinoideae)
- 22b. Flowers actinomorphic
 - 25a. Flowers with a distinct corona PASSIFLORACEAE
 - 25b. Flowers without a corona
 - 26a. Stamens united into a tube MELIACEAE
 - 26b. Stamens free or united only at the base or rarely only the anthers connivent
 - 27a. Plants insectivorous ; leaves sticky with gland-tipped hairs ; petals all equal DROSOPHILACEAE
 - 27b. Plants not insectivorous ; leaves not glandular-hairy ; lowermost petal largest and often spurred VIOLACEAE
- 14b. Leaves opposite or verticillate
- 28a. Stamens arising from hypanthium (perigynous) LYTHRACEAE
- 28b. Stamens arising from receptacle (hypogynous) HYPERICACEAE

- 13b. Ovary inferior or semi-inferior
- 29a. Flowers bisexual
- 30a. Anthers opening lengthwise by slits ONAGRACEAE
 - 30b. Anthers opening by terminal pores
 - 31a. Leaves gland-dotted MYRTACEAE
 - 31b. Leaves not gland-dotted LECYTHIDACEAE
- 29b. Flowers unisexual
- 32a. Plants with tendrils; stipules absent; stamens 3 or 5, one of the anthers often 1-locular CUCURBITACEAE
 - 32b. Plants without tendrils; stipules present; stamens many, anthers 2-locular BEGONIACEAE
- 12b. Placentation axile, basal or pendulous
- 33a. Ovary superior, rarely partly (or at length wholly) immersed in disc or calyx
 - 34a. Stamens more than twice the number of the sepals or petals or more
 - 35a. Sepals imbricate or contorted, rarely completely connate or calyprate
 - 36a. Petals and stamens perigynous or epigynous PORTULACACEAE
 - 36b. Petals and stamens more or less hypogynous or flowers unisexual
 - 37a. Trees
 - 38a. Leaves compound or rarely uni-foliate and then petiole tumid at the apex SAPINDACEAE
 - 38b. Leaves simple DIPTEROCARPACEAE
 - 37b. Herbs
 - 39a. Stamens quite free among themselves, but sometimes slightly adherent to the base of petals GERANIACEAE
 - 39b. Stamens connate at base OXALIDACEAE
 - 35b. Sepals valvate or open
 - 40a. Trees; leaves digitately compound; carpels in fruit not or rarely splitting away from the central axis; pollen mostly smooth BOMBACACEAE

- 40b. Herbs, undershrubs or shrubs; leaves simple; carpels often splitting away from central axis or becoming free in fruit; pollen more or less muricate MALVACEAE
- 34b. Stamens not more than twice the number of sepals or petals
- 41a. Flowers zygomorphic BALSAMINACEAE
- 41b. Flowers actinomorphic
- 42a. Perfect stamens alternate with petals
- 43a. Leaves compound or unifoliate, alternate BURSERACEAE
- 43b. Leaves simple, though sometimes much divided, opposite or verticillate
- 44a. Trees CELASTRACEAE
- 44b. Herbs, sometimes rather woody at base
- 45a. Ovary incompletely septate with free central or basal placentation CARYOPHYLLACEAE
- 45b. Ovary completely septate
- 46a. Leaves with stipules in pairs ELATINACEAE
- 46b. Leaves without stipules or rarely these represented by glands or by a transverse line
- 47a. Leaves with 3 or more longitudinal parallel veins; anthers usually appendaged and opening by a terminal pore MELASTOMATACEAE
- 47b. Leaves without veins, as above; anthers opening lengthwise by slits
- 48a. Stamens perigynous TRAPACEAE
- 48b. Stamens hypogynous or nearly so
- 49a. Petals contorted; fruits septicidally dehiscent LINACEAE
- 49b. Petals contorted; fruits loculicidally dehiscent or by a transverse slit MOLLUGINACEAE
- 42b. Perfect stamens opposite the petals
- 50a. Leaves without stipules; sepals valvate or calyx much reduced; fertile stamens 2 or 3 OLACACEAE

50b. Leaves with stipules ; sepals imbricate rarely valvate ; fertile stamens 4-5	
51a. Styles free and conspicuous ; leaves simple	RHAMNACEAE
51b. Styles none or short ; leaves compound	
52a. Erect undershrubs without any tendril ; petals connate at the base ; ovary 6-celled, cells 1-ovuled	LIFEAEAE
52b. Climbers with tendrils ; petals free or connate at top only ; ovary 2-celled ; cells 2-ovuled	VITACEAE
33b. Ovary more or less inferior, rarely semi-inferior	
53a. Leaves opposite	COMBRETACEAE
53b. Leaves alternate ; spirally arranged or all radical	
54a. Stamens numerous ; anthers opening by slits	ALANGIACEAE
54b. Stamens the same number and alternate with petals or fewer ; anthers opening lengthwise	APIACEAE

GROUP II

1a. Placentation parietal or marginal	
2a. Leaves with interpetiolar stipules ; ovary inferior	RUBIACEAE
2b. Leaves without stipules or if stipules present, not interpetiolar ; ovary superior	
3a. Corolla actinomorphic or nearly so ; stamens as many as corolla lobes	
4a. Aquatic herbs ; leaves alternate ; disc of 5 nectariferous glands present	MENYANTHACEAE
4b. Terrestrial ; leaves opposite or subverticillate ; disc of glands absent	
5a. Ovules and seeds a few	VERBENACEAE
5b. Ovules and seeds many	GENTIANACEAE
3b. Corolla zygomorphic ; stamens fewer than corolla lobes	
6a. Herbs without leaves ; never green ; root-parasites ; ovules and seeds many	OROBANCHACEAE
6b. Herbs with green leaves ; not parasitic ; ovules and seeds a few	PEDALIACEAE
1b. Placentation axile or basal or pendulous	
7a. Ovary superior	

- 8a. Petals very slightly connate at base
 9a. Shrubs; leaves alternate; petals gland-dotted; fruits fleshy MYRSINACEAE
 9b. Herbs; leaves opposite or radical; petals not gland-dotted; fruits circumscissile PRIMULACEAE
- 8b. Petals united into a tube with free corolla lobes
 10a. Corolla actinomorphic
 11a. Calyx with stalked glands; stamens epipetalous PLUMBAGINACEAE
 11b. Calyx without glands; stamens not epipetalous but alternate with corolla-lobes
 12a. Leaves opposite
 13a. Shrubs; flowers 4-merous; corolla imbricate; fruit a capsule BUCKELIACEAE
 13b. Herbs; flowers 5-merous; corolla valvate; fruit a berry LOGANIACEAE
- 12b. Leaves alternate
 14a. Style gynobasic, arising from between lobes of ovary BORAGINACEAE
 14b. Style terminal on the ovary, not gynobasic
 15a. Stamens fewer than corolla-lobes
 16a. Stamens 2; ovules a few OLEACEAE
 16b. Stamens usually 4, rarely 5; ovules many SCROPHULARIACEAE
- 15b. Stamens as many as or more than corolla-lobes
 17a. Corolla-lobes valvate or plicate in bud CONVOLVULACEAE
 17b. Corolla-lobes contorted or imbricate in bud
 18a. Corolla-lobes contorted in bud
 19a. Carpels completely united
 20a. Ovary 4-locular; styles often twice 2-lobed BORAGINACEAE
 20b. Ovary 1- or 2-locular; style at most once-lobed SOLANACEAE
- 19b. Carpels more or less free
 21a. Pollen agglutinated into wax-like masses; nectariferous corona present; carpels united only at stigmatic disc ASCLEPIADACEAE

- 21b. Pollen not agglutinated into wax-like masses ; nectariferous corona absent ; carpels united by styles but free in fruit APOCYNACEAE
- 18b. Corolla-lobes imbricate in bud
- 22a. Plants with radical leaves and broad-sheathing petioles ; flowers in dense head-like spikes LANTAGINACEAE
- 22b. Plants with caudine leaves, petiole not sheathing ; flowers in fascicles or cymes, rarely solitary
- 23a. Herbs ; corolla widely campanulate ; fruit a capsule HYDROPHYLLOACEAE
- 23b. Trees ; corolla rotate or urceolate ; fruit a berry
- 24a. Flowers dioecious ; corolla urceolate ; stamens not epipetalous EBENACEAE
- 24b. Flowers bisexual ; corolla rotate ; stamens epipetalous SAPOTACEAE
- 10b. Corolla zygomorphic
- 25a. Stamens fewer than the corolla-lobes
- 26a. Leaves compound ; seeds winged BIGNONIACEAE
- 26b. Leaves simple ; seeds not winged ACANTHACEAE
- 25b. Stamens as many as or more than corolla lobes
- 27a. Plants insectivorous ; leaves modified into bladders with sensitive trap doors ; ovary not vertically lobed ; styles not gynobasic LENTIBULARIACEAE
- 27b. Plants not insectivorous ; leaves not modified as above ; ovary deeply vertically 4-lobed ; style gynobasic LAMIACEAE
- 7b. Ovary more or less inferior
- 28a. Petals free ; stamens many SYMPLOCACEAE
- 28b. Petals united ; stamens 2-5 or as many as corolla-lobes
- 29a. Leaves alternate, spirally arranged or some radical
- 30a. Flowers in heads, surrounded by a common involucre or bracts ; calyx absent or modified into pappus ASTERACEAE
- 30b. Flowers not in heads ; calyx otherwise
- 31a. Stamens 2 STYLIIDIACEAE

31b. Stamens 5	CAMpanulaceae
29b. Leaves opposite	
32a. Leaves with inter-or intra-petiolar stipules ; others free	Rubiaceae
32b. Leaves without stipules ; anthers connate or connivent around the style	ASTERACEAE
GROUP III	
1a. Plants hemi-parasitic ; ovary inferior	LORANTHACEAE
1b. Plants autotrophic (except <i>Cassytha</i> of Lauraceae) ; ovary superior	
2a. Leaves alternate	
3a. Flowers in cyathia ; ovary usually 3-locular	EUPHORBIACEAE
3b. Flowers not in cyathia ; ovary 1-locular	
4a. Stipules ochreate	POLYGONACEAE
4b. Stipules not ochreate	
5a. Stamens inflexed in bud	
6a. Trees : ovules pendulous	MORACEAE
6b. Herbs, some with stinging hairs : ovules basal	URTICACEAE
5b. Stamens erect in bud	
7a. Inflorescence a catkin ; flowers unisexual ; perianth absent ; ovules 4-8 ; fruit a capsule ; seeds comose	SALICACEAE
7b. Inflorescence cymose or fasciculate, rarely sub-capitiate ; flowers polygamous ; tepals usually 5 ; ovules solitary ; fruit a drupe or samara ; seeds not comose	ULMACEAE
2b. Leaves opposite	
8a. Leaves stipulate	
9a. Flowers in cyathia, usually monoecious with upper flowers male, male flowers reduced to 1 stamen each ; ovary often stalked, usually 3-locular	EUPHORBIACEAE
9b. Flowers not in cyathia, usually dioecious ; stamens usually more than 1 ; ovary mostly sessile, 1-locular	URTICACEAE
8b. Leaves exstipulate	

10a. Perianth and bracts scarious	AMARANTHACEAE
10b. Perianth and bracts not scarious	
11a. Plants submerged, free-floating	CERATOPHYLLACEAE
11b. Plants not submerged or aquatic	
12a. Anthers opening by 2 or 4 upcurved lids	LAURACEAE
12b. Anthers not opening by lids	
13a. Perianth corolline, style not branched	NYCTAGINACEAE
13b. Perianth calycine; style 2- or more branched	CHENOPodiACEAE

GROUP IV

1a. Ovary superior	
2a. Perianth absent or represented by hypogynous setae, scales or lodicules; flowers reduced to spikelets	
3a. Stems mostly solid and triquetrous; leaves usually with closed sheath; flowers in the axil of a single bract; anther basifixed; style 1; seed 2-3-angled	CYPERACEAE
3b. Stem mostly with hollow internodes and usually terete; flowers enclosed by a bract and bracteole (lemma and palea); anthers mostly dorsifixed; style 2; seeds rounded	POACEAE
2b. Perianth present; flowers not reduced to spikelets	
4a. Carpels free or only slightly united at base or gynoecium reduced to 1 carpel	
5a. Flowers bracteate	
6a. Inflorescence an umbel; flowers bisexual; ovules spread all over the inner surface of the carpels or on the intruding septa	BUTOMACEAE
6b. Inflorescence a panicle, flowers unisexual; bisexual or polygamous; ovules inserted on a placenta or at the base or apex of the carpel	ALISMATACEAE
5b. Flowers ebracteate	
7a. Leaves denticulate; flowers axillary, solitary; stamen 1	NAJADACEAE
7b. Leaves entire or undulate, flowers in spikes; stamens 4-6	

- 8a. Flowers usually arranged on one side of the inflorescence ; tepals 1-3, usually 2, all petaloid ; stamens 6 ; carpels 3 ; seeds many, oblong APONOGETONACEAE
- 8b. Flowers all round the axis of the inflorescences ; tepals 4, not petaloid, stamens 4 ; carpels 4 : seed 1, reniform POTAMOGETONACEAE
- 4b. Carpels more or less completely united into an ovary
- 9a. Perianth distinct into calyx and corolla, sometimes both series dry and hyaline
- 10a. Flowers in cymes, or spikes, without an involucre of bracts but enclosed by large leafy, boat-shaped bract or coloured leaves COMMELINACEAE
- 10b. Flowers in heads, often surrounded by 2 or more involucral bracts
- 11a. Flowers bisexual ; stamens 3, staminodes 3 ; ovules many per locale XYRIDACEAE
- 11b. Flowers unisexual ; stamens 6 ; ovules 1 per locale ERIOCAULACEAE
- 9b. Perianth not distinct into calyx and corolla
- 12a. Perianth dry and glumaceous, flowers mostly small and inconspicuous
- 13a. Plants woody ; leaves plicate in bud, pinnately or palmately divided later ; flowers unisexual ; tepals 6, in 2 series, outer imbricate, inner valvate, rarely persistent ; ovules solitary ARECACEAE
- 13b. Plants herbaceous ; leaves entire, not plicate ; flowers bisexual ; tepals in 1 series, imbricate, persistent ; ovules many JUNCACEAE
- 12b. Perianth neither dry nor glumaceous ; flowers conspicuous ; perianth segments petaloid
- 14a. Flowers in spadix, subtended by or enclosed in a spathe ARACEAE
- 14b. Flowers in racemes or umbels
- 15a. Aquatic herbs ; inflorescence subtended by a spathe-like leaf-sheath ; floral bracts very small or absent PONTEDERIACEAE

- | | | |
|------|---|------------------|
| 15b. | Terrestrial, rarely marshy plants ; inflorescence not subtended by a spathe-like leaf-sheath ; floral bracts conspicuous, rarely absent | |
| 16a. | Leaves 3-5-veined, with reticulate venation ; petiole broad, with tendrilliferous sheath, flowers dioecious ; anthers 1-locular | SMILACACEAE |
| 16b. | Leaves with parallel veins ; petiole not tendrilliferous ; flowers mostly bisexual ; anthers usually 2-locular | LILIACEAE |
| 1b. | Ovary inferior | |
| 17a. | Aquatic plants | HYDROCHARITACEAE |
| 17b. | Terrestrial or epiphytic plants | |
| 18a. | Perianth composed of separate calyx and corolla, the calyx often green or different from the inner petaloid series | |
| 19a. | Staminodes, if present, not petaloid ; ovary twisted | ORCHIDACEAE |
| 19b. | Staminodes petaloid ; ovary not twisted | |
| 20a. | Aerial stems occasionally twisted ; leaves spirally arranged, their sheaths closed, at length sometimes opened by growth ; lateral staminode often absent or tooth-like | COSTACEAE |
| 20b. | Aerial stem not twisted ; leaves in two rows, their sheaths open on the upper side ; lateral staminodes large and petaloid | ZINGIBERACEAE |
| 18b. | Perianth-segments more or less all-alike and usually petaloid | |
| 21a. | Herbs usually with much reduced, scale-like, colourless leaves or leaves absent | BURMANNIACEAE |
| 21b. | Herbs or shrubs with well-developed leaves | |
| 22a. | Ovary 1-celled, fruit baccate, indehiscent | TACCAEAE |
| 22b. | Ovary 3-celled, fruit a dehiscent capsule or in-dehiscent berry | |

- 23a. Plants climbing, leafy throughout; flowers unisexual, usually very small, inconspicuous DIOSCOREACEAE
- 23b. Plants not climbing, stem with a tuft of leaves: flowers bisexual, conspicuous
- 24a. Inflorescence radical; flowers solitary, perianth-segments free to the base LILIACEAE
(Curculigo)
- 24b. Inflorescences scapose; perianth-segments connate upto the middle or more
- 25a. Inflorescences panicle on the scape AGAVACEAE
- 25b. Inflorescence an umbel, subtended by 2 spathaceous bracts LILIACEAE
(Crinum)

RANUNCULACEAE

A. L. de Juss. Gen. Pl. : 231. July-Aug. 1789.

T. : *Ranunculus* L.

Ranunculus sceleratus L. is likely to occur in the district.

Fig. 1

1a. Lianas ; leaves opposite ; petioles without any sheath ;
sepals valvate ; achenes with long feathery styles

CLEMATIS

1b. Erect rigid herbs ; leaves alternate ; petioles with a basal
auricular sheath ; sepals imbricate ; achenes without feathery
styles

THALICTRUM

Clematis L. Sp. Pl. : 543. 1753 & Gen. Pl. ed. 5 : 242. 1754.

LT. : *C. vitalba* L. vide N. L. Britton et A. Brown, Ill. Fl. N.U.S.
ed. 2. 2 : 121. 1913.

Clematis smilacifolia Wall. in Asiat. Res. 13 : 402. 1820 ; Haines, Botany
1:4. *C. loureiriiana* auct. non DC. 1818 ; Balakrishnan, Fl. Jowai 1:55. 1981.

Branches sulcate. Leaves simple, rarely once ternate, coriaceous, shining, cordate-ovate, 7-20 × 2-8 cm, upper smaller, narrower and cuneate at base, with 7-9 basal veins. Inflorescence axillary panicle, 15-30 cm long ; flowers erect, about 3.5 cm in diam. ; sepals 4-5, 1.5-2 cm long, coriaceous, spreading from the base, brownish tomentose outside, purple within ; petals absent ; stamens indefinite, filaments membranous, linear, inner shorter with longer anthers. Achenes with silky, greenish-white, persistent hairy styles.

Fl. : Oct.-Feb. Frt. : May

Occasionally found in damp places in semi-evergreen forests on slopes, climbing on Sal and other trees.

Kabirchabutra : 13397.

India, Nepal, Burma, Thailand—Vietnam, S.W. China, Malaysia.

Thalictrum L. Sp. Pl. : 545. 1753 & Gen. Pl. ed. 5 : 242. 1754.

LT. : *T. foetidum* L. vide N.L. Britton et A. Brown Ill. Fl., N.U.S.
ed. 2.2:118. 1913.

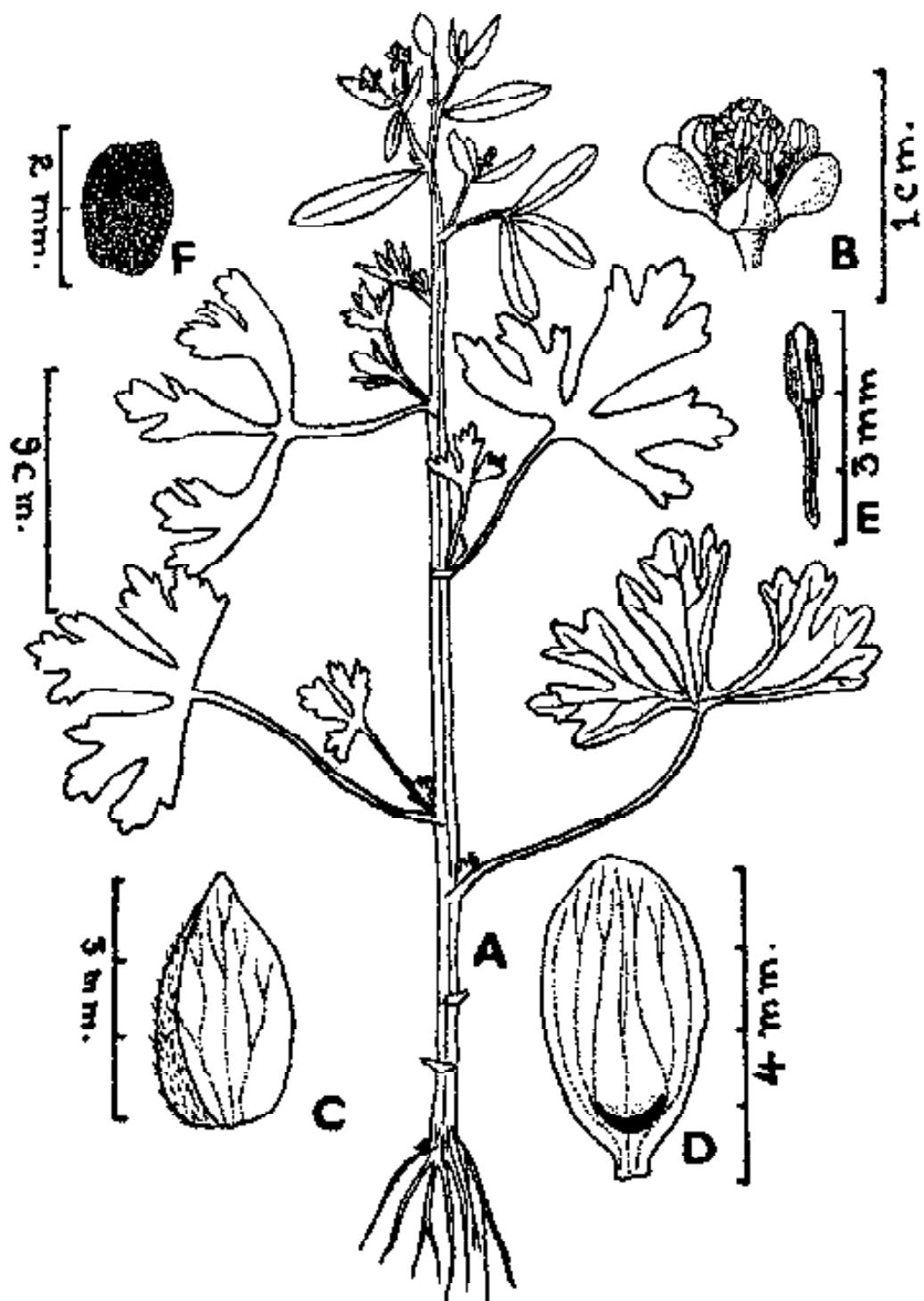


Fig. 1. *Ranunculus sceleratus* L.
A. Habit. B. Flower. C. Sepal. D. Petal. E. Stamen. F. Seed.

Thalictrum foliolosum DC. Syst. Nat. 1:175. 1817; Haines, Botany 1:14, (*Mamiri*).
Fig. 2

Rhizomatous herb. Aerial stem up to 2 m high, erect and flexuous, glabrous. Leaves long-petioled, pinnately decompound, leaflet lobulate, sub-orbicular, membranous, glaucous beneath, $0.5-0.75 \times 1-1.5$ cm. Inflorescences terminal, much-branched panicle; flowers polygamous, dull bluish or greenish-white, 0.2-0.5 cm long; pedicels filiform; sepals 4, 0.2-0.5 cm long; petals absent; stamens about 20, exserted, filaments filiform, anthers beaked. Achenes 2-5, short, oblong, acute at both ends, 8-ribbed with a 0.5-1 mm beak.

Fl. : July-Aug. Frt. : Sept.-Oct.

Confined to higher localities (900-1200 m) in Kabirchabutra, Lamni and nearby areas, in damp places.

Kabirchabutra : 13313, 19188.

India, Nepal, Burma.

The root is used in the form of decoction, extract or powder in fever and eye diseases (cataract) and as a febrifuge, diuretic, bitter tonic and antiperiodic.

DILLENIACEAE

Salisb., Parad. Lond. 2(1) : sub t. 73, 1807. (*Dilleneae*)

T. : *Dillenia* L.

DILLENSIA L. Sp. Pl. : 535 1753 & Gen. Pl. ed. 5 : 239. 1754.

T. : *D. indica* L.

Dillenia aurea Sm. Exot. Bot. 2:65. t. 92, 93. 1806; Haines, Botany 1:7; Hoogland in Blumea 7 : 128. 1952; Majumdar in Fasc. Fl. Ind. 2:5. 1979. (*Karingila*, *Karmara*, *Ghamaggai*)

Tree; branchlets scabrid. Young leaf silky tomentose; mature leaf obovate, broadly oblong or elliptic, tapering at base, crenate-toothed, strongly veined, $30-45 \times 12-20$ cm. Petiole 3-6.5 cm long. Flowers solitary or in a few-flowered fascicles, terminating axillary short shoots, yellow, 10-12 cm across. Pedicel 5-12 cm long, with ovate bracts at the base of the peduncles. Sepal 5, fleshy, villous when young, glabrous and glaucous at maturity, persistent; petals 5, obovate-lanceolate; stamens many, in two distinct groups, innermost ones much longer than outer ones; styles 10. Fruits orange-yellow, 5 cm in diam.

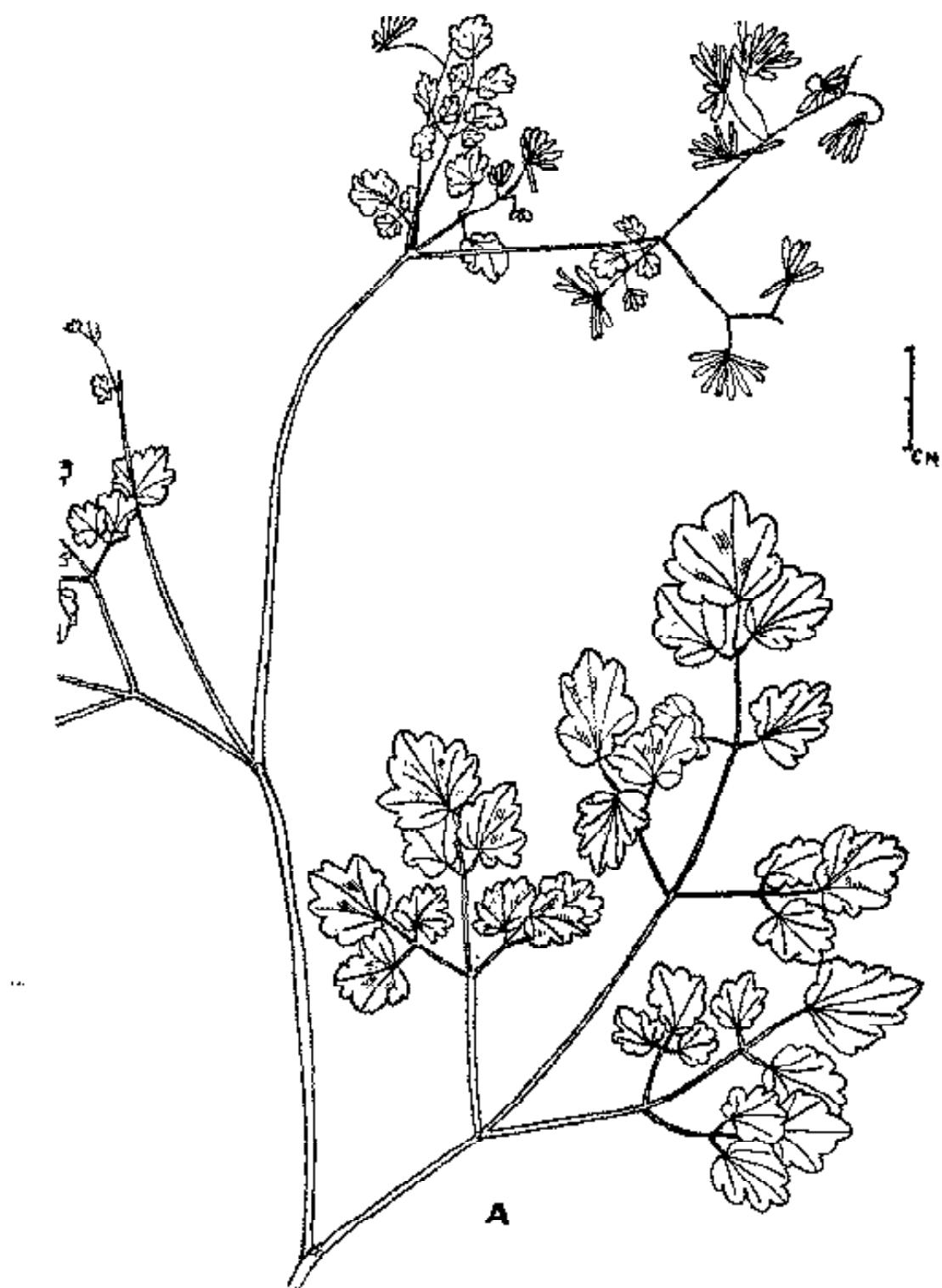


Fig. 2. *Thalictrum foliolosum* DC.
A. Leafy branch with flowers.

Type : t. 92.93 in Sm. l.c.

Fl. : Apr.-May. *Frt.* : June-July : the new foliage appear in Apr.-May after the flowers have opened.

Occasionally found in mixed forests.

Lammi : 19261.

India, Burma, N.E. Thailand.

Wood grey, beautifully mottled, mostly used for fuel; fruit edible, mostly as cattle feed.

ANNONACEAE

A. L. Juss. Gen. Pl. : 283. 1789 (*Anonae*)

T. : *Annona* L.

Polyalthia longifolia (Sonner.) Thw. is commonly grown in gardens and as avenue trees in the city.

1a. Inner petals membranous or absent; stamens concealed by the overlapping connectives; carpels united, at least in fruit; fruits round with knobby, separable bulges

ANNONA

1b. Inner petals distinct; stamens not concealed by the connectives; carpels apocarpus throughout; fruit an umbel of roundish black, fleshy berries

MILIUSA

ANNONA L. Sp. Pl. : 536. 1753 & Gen. Pl. ed. 5 : 241. 1754.

LT. : *A. muricata* L. vide Safford, Jour. Wash. Acad. Sci. 1:119. 1911.

Annona squamosa L. Sp. Pl. : 537. 1753 ; Haines, Botany 1:10 (*Sphalm-squamata*) ('Sharifa', the Custard Apple).

Small bushy trees. Leaves pellucid-punctate, oblong or oblong-lanceolate, acute or obtuse, glaucous beneath and pubescent when young, 3.5-12.5 x 2.5-5 cm. Flowers solitary, terminal or leaf-opposed, drooping, stalked, creamy-yellow or greenish-yellow, 2-3 cm long; sepals 3, valvate, triangular, united at the base; petals 3; occasionally there is an inner series of 3 rudimentary petals, narrow oblong; stamens many. Fruit 5-10 cm across, tubercled, green when ripe, fleshy, areolate.

Fl. : Apr.-June. *Frt.* : July-Oct.

Generally planted, getting naturalized.

Marwahi : 19024.

The plant is native of tropical America and West Indies; naturalised throughout India.

The roots, bark, leaves and seeds have valuable medicinal properties. Fruits edible, pulp for making custard powder.

MILIUSA Leschen, ex A.DC, Mem. Soc. Phyl. Genev. 5:213, 1832.

T. : *M. indicus* Leschen, ex A.DC.

- 1a. Tree upto 7 m high; outer petals linear, base of inner petals saccate, pubescent on both the surfaces; ovules 6 *M. tomentosa*

1b. Small, shrubs; outer petals ovate, base of inner petals not saccate, inner surface glabrous; ovules 1-2 *M. velutina*

Miliusa tomentosa (Roxb.) J. Sinclair in Gard. Bull. Singapore 14 : 378, 1955. *Uvaria tomentosa* Roxb. Pl. Corom. 1 : 31. t. 35. 1795, *Saccoperatum tomentosum* (Roxb.) Hook. f. & Thoms. in Fl. Ind. 152. 1855; Haines, Botany 1 : 14. (*Karri*, *Kirua*)

Trees upto 7 m high. Leaves ovate or ovate-oblong, base obliquely cordate or obtuse or round, pubescent beneath, glabrous above except midvein, $7.5-14 \times 5-7.5$ cm. Inflorescence of 1-3 flowers in leaf-opposed or subterminal cymes; flowers purple, 2.5 cm in diam.; peduncle 5-7 cm long, slender, downy; sepals 3, 0.4 cm long, lanceolate, pubescent; petals 6, in 2 series, outer petals 0.4 cm long, linear lanceolate, pubescent, inner petals upto 1 cm long, ovate-oblong, obtuse, downy; stamens many, in several series. Fruitlets 1.5-2.5 cm in diam., round, purple, tomentose, 3-4-seeded.

Fl. : Mar.-June. *Frt.* : July-Oct.; new leaves appear in May-June and turn to orange-yellow before falling.

Common in mixed forests.

Lamni : 19206.

India, Nepal.

The leaves are used as fodder; the wood is strong and durable, used for poles; tree gum as a substitute to tragacanth obtained from *Acacia*.

M. velutina (Dunal) Hook. f. & Thoms., Fl. Ind. 151. 1855; Haines, Botany 1 : 14. *Uvaria velutina* Dunal, Monogr. Anon. : 91. 1817. (*Karri, Domsal*).

Shrubs upto 3 m high, young branches tomentose. Leaves ovate or broadly ellipsoid, acute, round or slightly cordate at base, tomentose, 7-15 × 5-10 cm, lower smaller and often obtuse. Inflorescences leaf-opposed cymes of 1-6 flowers; flowers greenish-yellow or pale-yellow, 1.5 cm across, on 5-10 cm long, drooping, tomentose pedicels; sepals 3, ovate, 0.3 cm long; petals 6, in 2 series, outer petals ovate, sepaloid, 0.4 cm long, inner petals upto 0.8 cm long, broadly ovate, dark brown, densely tomentose outside, glabrous inside; stamens many, filaments stout, shortly apiculate. Fruitlets ellipsoid or ovoid, downy, shortly stalked, 2-ovuled, 1-2 cm in diam., purple when ripe.

Fl. : Mar.-June. *Frt.* : July-Oct.; new leaves appear in May-June

Frequently found in damper localities in mixed forests.

Pali : 8585.

India, Burma.

Wood is moderately hard and durable, but being liable to warp, is seldom used as timber; leaves are used as fodder, fruits are edible. Stem fibre for making ropes and strings; bark purgative.

MENISPERMACEAE

A. L. Juss. Gen. Pl. : 284. 1789 (*Menisperma*).

T. : *Menispermum* L.

1a. Leaves peltate; flowers with large foliaceous bracts; male flowers 4-merous; female flowers with 2 tepals; stamens 4-6, connate; carpel usually 1

CISSAMPELOS

1b. Leaves not peltate; flowers without large foliaceous bracts; flowers all 6-merous; stamens free; carpels usually 3-6

COCCLUS

CISSAMPELOS L. Sp. Pl. : 1031. 1753 & Gen. Pl. ed. 5 : 455. 1754.

Lt. ; *C. pareira* L. vide N. L. Britton et Millspaugh, Bahama Fl. : 142. 1920.

Cissampelos pareira L. var. *hirsuta* (Buch.-Ham. ex DC.) Forman in Kew Bull. 22:356. 1968. *C. hirsuta* Buch.-Ham. ex DC. Syst. Nat. 1:535. 1817. *C. pareira* sensu Hook. f. & Thoms. in FBI 1:103. 1872, non var. *pareira* L.; Haines, Botany, 1:17. (*Akandi*)

Climbing dioecious shrubs. Leaves simple, subpeltate, orbicular to reniform, obtuse or mucronate, base truncate or cordate, 3-8 cm across, more or less tomentose on both sides, ultimately becoming glabrous above and glaucous beneath; petiole pubescent, equalling the leaf or longer. Male inflorescences in pedunculate, branched cymes, 1.5-3.5 cm long, clustered in the axils of small leaves; sepals 4, subequal, obovate-spathulate; petals 4, connate into a 4-toothed cup, hairy outside; stamens 4, filaments connate, column short, anthers connate encircling the top of the column. Female flowers clustered in the axils of orbicular, hoary bracts, on 5-10 cm long racemes; sepals ovate-oblong; petals obtriangular-sub-reniform, sometimes absent. Carpel 1, densely hairy; style shortly 3-fid. Drupes compressed or subglobose, hirsute, red when ripe, black when dry, 4-6 × 3-4 mm; endocarp with tuberculate ridges.

Type : Nepal, Sembu, Buchanan Hamilton s.n. (BM).

Fl. : June-Nov. Frt. : Nov.-Apr.

Common in hedges, forest clearings and in mixed forests, climbing over bushes.

Khondra : 12746; Madai : 12897; Lamni : 19259.

India, Nepal, Sri Lanka, Burma.

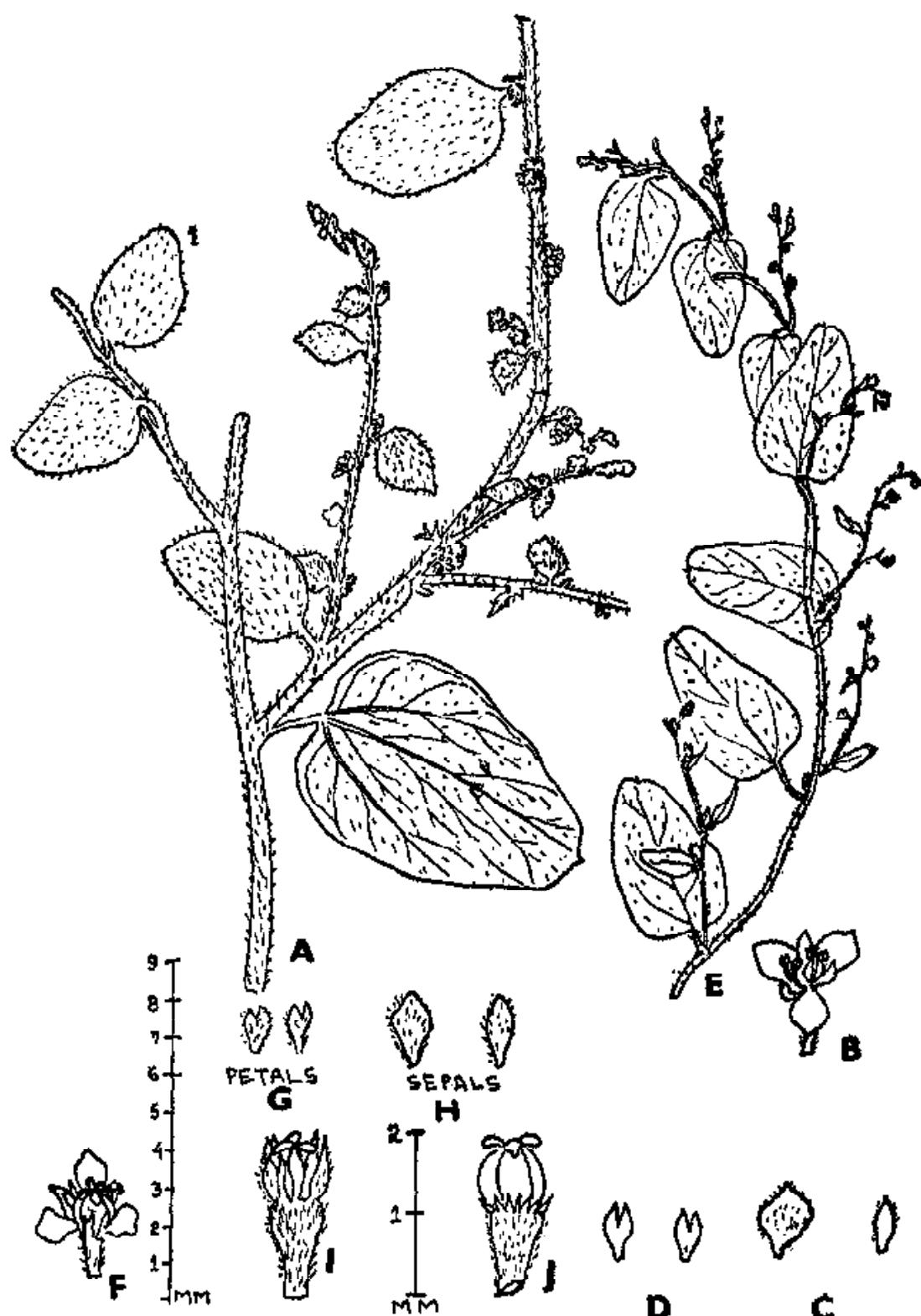
var. *pariera* L. is restricted to the New World and has more cordate and less hairy leaves with somewhat shorter petioles than var. *hirsuta*.

It is a source of alkaloids like Seeprine, Berberine and Cissampeline. The leaves and roots are used as a cure for diarrhoea, diarrhoea, snake bite. The stem yields a strong fibre. The plant has long, slender rhizome, which is used in the fermentation of rice beer by the tribals (Haines l.c.).

Cocculus A.P. de Candolle, Syst. Nat. 1:515. 1817 (1818), *nom. cons.*

T. : *Cocculus hirsutus* (L.) Diels, (*Menispermum hirsutum* L.) (*typ. cons.*).

Cocculus hirsutus (L.) Diels. in Engl., Pflanzenteich. IV, 94, Heft 46:236. 1910; Haines. Botany 1:20. *Menispermum hirsutum* L. Sp. Pl. : 341. 1753, *Cocculus villosus* (Lam.) Wall. ex DC. Syst. Nat. 1:525. 1817; FBI 1:101. 1872; *nom. illeg.* (*Jamatikibel*). Fig. 3

Fig. 3. *Cocculus hirsutus* (L.) Diels.

A. Leafy branch with female flowers. B. Male flower. C. Sepals. D. Petals. E. A leafy branch with male flowers. F. Female flower. G. Petals. H. Sepals. I. Female flower with persistent calyx. J. Young fruit.

Slender climber, branchlets villous-tomentose; dioecious or polygamous. Leaves densely greyish tomentose or puberulous, shortly petiolate, deltoid to ovate-oblong, base of the lower leaves cordate, of the upper ones rounded, 5-8 × 4-5 cm; bracts minute, linear. Male flowers in short panicles; female flowers 1-3, axillary, 0.5-2.5 cm long, rarely racemed; sepals 6, in 2 whorls, inner large; petals 6, smaller than the sepals, with inflexed lateral auricles embracing the stamens; stamens 6, anthers subglobose; staminodes 6. Pistil 3. Drupes laterally compressed, black purple, 0.2-0.3 cm long.

Types : 'India Orientalis', Plukenet's drawing; specimens in Herb. Sloane (BM).

Fl. : Oct.-Apr. Frt. : Mar-May.

Common in hedges.

Lafa ; 13019 ; Khuria ; 15469.

Africa to India.

The roots and leaves are used as a tonic in Ayurvedic medicines. The juice of the ripe fruits makes a durable bluish-purple ink (Duthie, 1903). The plant, when triturated with water, is said to gelatinise it (Haines l.c.). Leaf juice with its mucilage is taken as a cooling medicine in gonorrhoea; and is externally used in eczema.

Tinospora cordifolia (Willd.) Miers. (*Guluchi*) is likely to occur in the district.

Fig. 4

NYMPHAEACEAE

R. A. Salisb. Ann. Bot. (König & Sims,) 2:70. 1805. (*Nymphaeae*)

T. *Nymphaea* L., nom. cons.

NYMPHAEA L. Sp. Pl. : 510. 1753 & Gen. Pl. ed. 5 : 227. 1754; nom. cons.

T. : *N. alba* L. (typ. cons.)

Nymphaea pubescens Willd. Sp. Pl. 2 : 1154. 1799; *N. lotus* L. var. *pubescens* (Willd.) Hook. f. & Thoms. Fl. Ind. 1:241. 1855; Haines, Botany 1 : 21. pro. part. *N. nouchali* auct., non Burm. f. 1768; Sant., Fl. Khandala : ed 3 : 5. 1967. (*Water Lily*, *White lotus*).

Aquatic herbs, corms nodular, Leaf-blade oval or orbicular, 15-30 cm across, sharply dentate at margin, green above, brown and short-hairy beneath, young leaves sagittate. Flowers 5-20 cm across, white, pink or red, floating on the water; sepals 4, obtuse, 5-10-ribbed, adnate to the base of the disk; petals linear or ovate-oblong; stamens with yellow filaments and orange anthers, connective hooded over and hardly exceeding

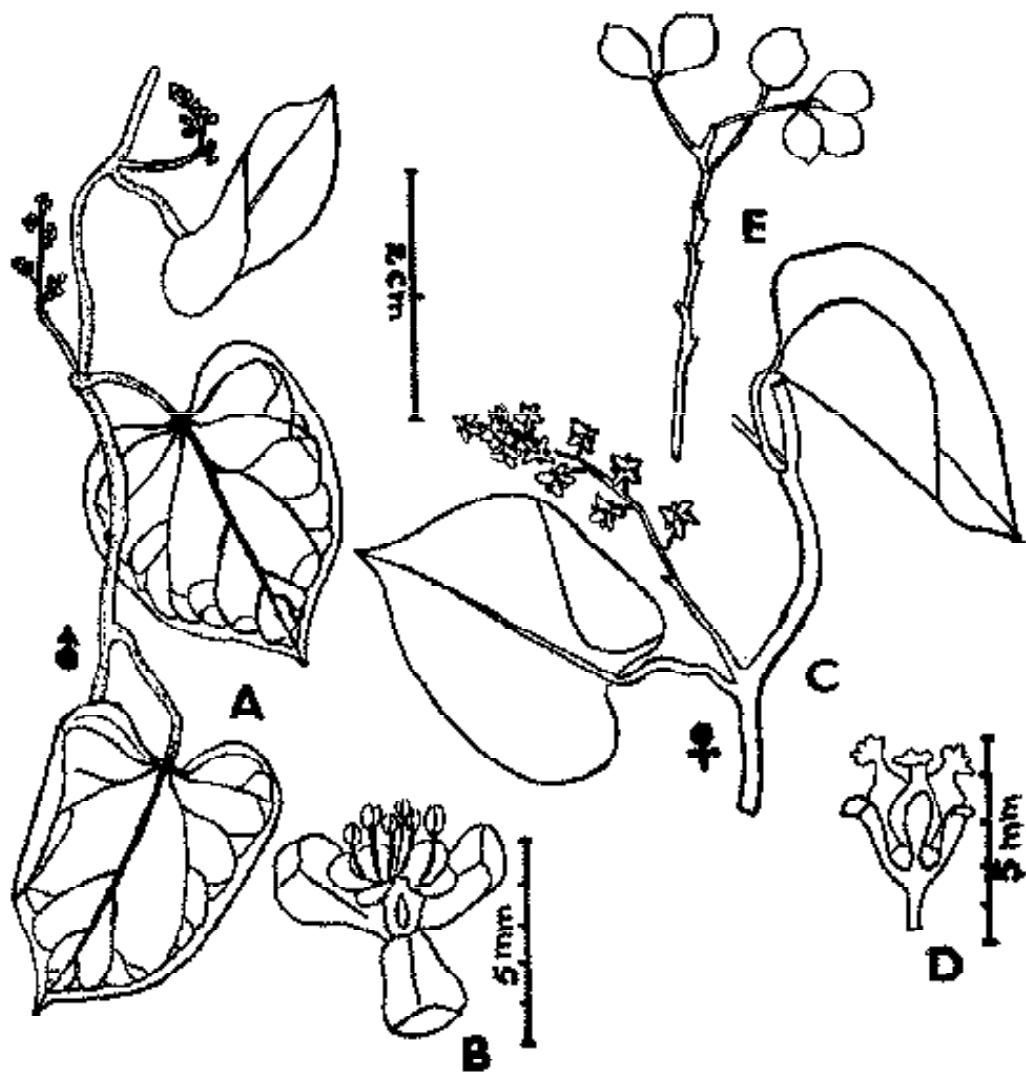


Fig. 4. *Tinospora cordifolia* (Willd.) Miers.

A. A leafy branch with male flowers. C. Same with female flowers. B. Male flower.
D. Female flower. E. Fruits on a stalk.

anthers; ovaries many, sunk in the fleshy disk; stigma orange, stigmatic rays with clubbed appendages. Fruit a spongy berry.

Fl. : July-Oct. *Frt.* : Sept.-Nov.; plant is night-flowering.

Common in tanks.

Katghora : 6081; Lafa : 13021

India, Africa, Malaysia.

N. nouchali Burm. f. differs from it in having leaves glabrous, entire to bluntly dentate and is day-flowering. The tubers are eaten raw or roasted and the dried seeds after parching; its powdered root is used to cure piles.

NELUMBONACEAE

Dumort., Anal. Fam. Pl. 53. 1829. (*Nelumboneae*)

T. : *Nelumbo* Adans.

NELUMBO Adans., Fam. 2:76. 582. 1763.

T. : *N. nucifera* J. Gaertn. (*Nymphaea nelumbo* L.).

Nelumbo nucifera J. Gaertn. Fruct. 1:73. 1788; *Nymphaea nelumbo* L. Sp. Pl. : 511. 1753. *Nelumbium speciosum* Willd. Sp. Pl. 2 : 1258. 1799; Haines, Botany 1:23.

(*Indian Lotus*; *Pundarika*—the white variety; *Kokanada*—the red variety; *Kumal*, *Padma*).

Aquatic herbs with a creeping, rhizomatous rootstock. Leaves peltate, orbicular, upto 70 cm across, margin upturned; peduncle and leaf-stalk upto 180 cm long, with small scattered prickles. Flowers solitary, much raised above the water, rose, pink or rarely yellow-coloured or white 10-25 cm in diam.; sepals 4-5, caducous; petals many, in several series, caducous, elliptic; stamens many, in several series, anthers appendaged. Carpels many, surrounded by and embedded in cavities of the broadly, spongy torus; stigma peltate.

Fl. : Apr.-July. *Frt.* : Dec.-Jan.

Common in tanks throughout the Eastern Madhya Pradesh.

Champa to Birra : 8748 ; Pali to Rata npur : 19493

India, China, Australia.

The sacred lotus (*Padma*, *Kamal* of Indian mythology) is India's National Flower : it was often confused with the Egyptian lotus—*Nymphaea lotus* L.

The rhizomes, stalks, flowers and seeds are edible. The leaves are used as plates. Plant is medicinal : several alkaloids, e.g. nuciferine, nelumbine etc. have been isolated.

PAPAVERACEAE

A. L. Juss. Gen. Pl. : 235. 1789.

T. Papaver L.

ARGEMONE L., Sp. Pl. : 508. 1753 & Gen. Pl. ed. 5 : 225. 1754.

LT. : *A. mexicana* L. vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. 2:138. 1913.

- 1a. Flowers bright yellow, petals 2 (-2.5) × 1 (-1.5) cm ; stigma-lobes more or less appressed ; capsule oblong-ellipsoid *A. mexicana*
- 1b. Flowers pale-yellow or white, petals 3.5 × 2 cm ; stigma-lobes spreading ; capsule ovate-lanceolate or lanceolate *A. ochroleuca*

Argemone mexicana L. Sp. Pl. 508. 1753 ; Haines, Botany 1:24. (*Mexican Poppy* ; *Agara*).

Erect, prickly herbs, with yellow juice. Lower leaves in a rosette, petioled, upper ones sessile, with a semi-amplexicaul base, sinuate-pinnatifid, margin spinulose-dentate, prickly on both surfaces, 7-15 cm long. Flowers solitary, terminal, sessile or shortly pedicelled, subtended by a leaf-like bract at base, 2-4 cm across ; sepals 3, prickly on the back, horned at apex ; petals 4-6 ; stamens many ; stigma 4-7 lobed, on a very short style. Capsule prickly, pruinose on the ribs, 1.5-3 cm long.

Types : Mexico, Jamaica, Carribies & S. Europe, Herb. Linn. 670.I (LINN).

Fl. : Feb.-May. *Frt.* : Apr.-June.

Common along roads, river banks, forest edges, in waste places, and in cultivated fields.

Korba : 8621; Keonchi to Lamni : 15391; Bilaspur city : 19530.

$2n = 28$ (tetraploid).

A native of Central America and West Indies, is naturalized throughout India (Murti, 1975).

The latex is used in dropsy, jaundice and eye troubles and in the treatment of scabies. Oil from seed is used for burning and in medicines and also for painting purposes, and when mixed in mustard oil as an adulterant, causes jaundice.

A. ochroleuca Sweet, Brit. Fl. Gard. 3.t. 242. 1828; Rajagopal in Proc. Nat. Acad. Sci. Ind. 35(1):36. 1965. *A. mexicana* var. *ochroleuca* (Sweet) Lindl. Bot. Reg. t. 1343. 1830.

Erect, prickly herbs, with yellow milky sap. Lower leaves petioled, upper ones sessile, semi-amplexicaul, sinuate-pinnatifid, spinulose-dentate, prickly on both surfaces, 7-20 cm long. Flowers solitary, terminal, sessile, subtended by a leaf-like bract at base; sepals 3, prickly on the back; petals 4-6; stamens many; stigma 5-lobed, on a short style; capsule prickled, pruinose on the ribs..

Type : Cultivated in Britain from seeds collected in Mexico.

Fl. : Feb.-May. *Fr.t.* : Apr.-June.

Occasionally found growing with the former species.

Aurapani to Rajak : 15481.

$2n = 56$ (Octoploid) (Malhotra in Cur. Sci. 29:282. 1960).

Note : Whether the octoploid taxon originated from *Argemone mexicana* L. (4n) by auto- or allo-polyplody, before their migration from Mexico, is not known.

Fumaria indica (Hausek.) Pugsley is likely to occur in the district.

Fig. 5

BRASSICACEAE

Burnett, Ocul. Bot. : 1123. 1835.

T. : *Brassica* L.

CRUCIFERAE A. L. Juss., Gen. Pl. 237. 1789; *nom. alt.*

Several species are rich in sulphur compounds and yield many vegetables and oil-seeds. *Raphanus sativus* L. (*Muli*) is commonly cultivated. *Iberis amara* L. is a common garden annual.

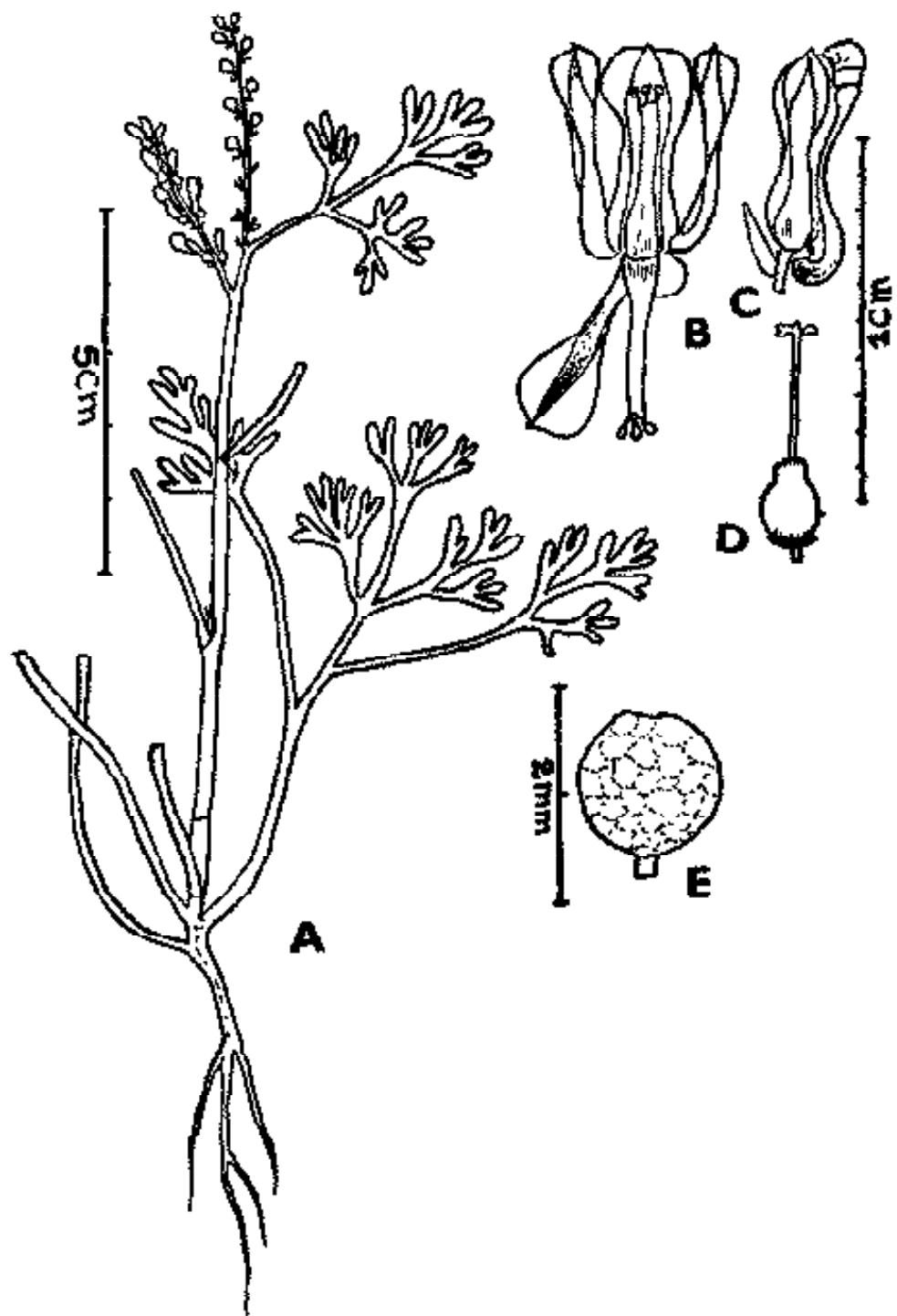


Fig. 5. *Fumaria indica* (Hausck.) Pugsley
A. Habit. B. Flower (frontal view). C. Lateral view. D. Carpel. E. Fruit.

- 1a. Pods compressed laterally at right angles to septum, as long as broad, 2-seeded LÉPIDIUM
- 1b. Pods terete or compressed parallel to septum, 2-3 times as long as broad; many-seeded
- 2a. Pods terete and not bearing seeds throughout their whole length i.e. pods with a seedless beak; seeds 1-seriate; sepals pouched at base BRASSICA
- 2b. Pods compressed parallel to septum and bearing seeds throughout their whole length i.e. pods without seedless beak; seeds 2-seriate; sepals not pouched RORIPPA

BRASSICA L., Sp. Pl. 666. 1753 & Gen. Pl. : ed. 5 : 299. 1754.

LT: *B. oleracea* L. vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2.2:192. 1913.

Brassica juncea (L.) Czern. (*Indian Red mustard*), *B. nigra* (L.) Koch, *B. rapa* L. subsp. *rapa*, *B. oleracea* L. var. *botrytis* L. (*cauliflower*), *B. oleracea* L. var. *capitata* L. (*cabbage*) and *B. oleracea* L. var. *gongylodes* L. (*kohlrabi*) are commonly cultivated as vegetables.

- 1a. Leaves always glabrous; green above, glaucescent beneath; pods slender; seeds brown *B. rapa* subsp.
campestris var.
campestris
- 1b. Leaves all or young ones hairy; pods stout; seeds yellow *B. rapa* subsp.
campestris var.
glauca

Brassica rapa L. subsp. *campestris* (L.) Clapham var. *campestris*; Clapham in Fl. Brit. Isles ed. 2. 126. 1962; Jafti in Fl. West Pakistan No. 55; 25.1973. *B. rapa* L. Sp. Pl. : 666. 1753. *B. campestris* L. Sp. Pl. : 666. 1753; Haines, Botany 1:25 : O. E. Schulz in Engl., Pflanzenreich IV. 105 (Ht. 70) ; 45.1919. *B. rapa* : 666. 1753. *B. campestris* L. Sp. Pl. Lips. : 491. 1838. *Sinapis dichotoma* Roxb. Fl. Ind. ed. 2, 3:117. 1832. *Brassica campestris* L. subsp. *campestris* var. *dichotoma* (Roxb.) Watt. Econ. Dict. 1:523.1889. *B. rapa* L. var. *dichotoma* (Roxb.) Kitam. in Acta Phytotax. Geobot. 16:62.1955 ; *B. napus* L. var. *dichotoma* (Roxb.) Prain in Agri. Ledger 5:36. t. 8.1898. pro. part. ; Haines, Botany 1:26 (*Kala sarson*).

Erect annual, glaucous herbs: roots tuberous. Leaves petioled, 10-25 × 3-6 cm, basal leaves lyrate-pinnatifid, dentate, upper ones oblong or lanceolate. Inflorescences corymbose raceme. Flowers yellow; sepals 4, erect, 0.4-0.5 cm long; petals 4, persistent till the corymb lengthens, with a long claw, 0.7-1 cm long; stamens usually 6. Pod sessile, cylindric, patent or erecto-patent, beak flat, seedless, replum membranous.

Fl. : Nov.-Jan. *Frt.* : Jan.-Mar.

Cultivated, often met with as an escape in waste places and fields.

Achanakmar : 19289.

Cultivated throughout the world; presently seen naturalized in waste places.

Native to Mediterranean region.

Heywood (*Fl. Europ.* 1 : 337.1964) combined *B. campestris* L. and *B. rapa* L., accepting *B. rapa* L. as the correct name of the combined taxon. But Baily (*Gant. Herb.* 2:215. 1930) maintained both as distinct species, distinguishing *B. rapa* L. from *B. campestris* L. by its tuberous roots and non-auriculate leaf-base.

Leaves are used as 'Sag'. Seeds yield edible oil.

B. rapa L. subsp. *campestris* (L.) Clapham var. *glaucia* (Roxb.) Watt. Econ. Dict. 1 : 523.1889. *Sinapis glauca* Roxb., Fl. Ind. 3 : 118.1832. *Brassica campestris* L. subsp. *napus* (L.) Hook. f. & T. Anders. var. *glaucia* (Roxb.) Watt, i.c. *B. campestris* sensu Hook. f. & T. Anders. in FBI 1:156. 1872. *pro. part. quoad. syn., excl. 3 subspp., et descript.* *B. campestris* L. var. *sarson* Prain in Agri. Ledger 5 : 24. t. 5-7. 1898. *pro. part.*; Haines, Botany 1 : 26. (*Pila sarson*).

Erect, annual, glaucous herbs; roots fusiform. Leaves petioled, glabrous and glaucous, 7-15 × 2.5-4 cm, basal leaves lyrate-pinnatifid, dentate, the upper ones oblong or lanceolate, entire-dentate. Inflorescences racemose corymb. Flowers yellow; sepals 4, erect, 0.4-0.5 cm long; petals 4, deciduous, 0.7-1 cm long; stamens usually 6. Pod sessile, cylindric, 6-11 cm long, beak flat and seedless, replum membranous.

Fl. : Nov.-Jan. *Frt.* : Jan.-Mar.

Cultivated; often met with as escapes in waste places and near cultivated fields.

Katghora : 8649.

Leaves are used as pot herb (Sag) and seeds yield edible oil.

LEPIDIUM L., Sp. Pl. : 643. 1753 & Gen. Pl. ed. 5 : 291. 1754.

L.T. : *L. latifolium* L. vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2.2:164. 1913.

Lepidium sativum L. Sp. Pl. : 644. 1753; Haines, Botany 1 : 29 (*Garden cress; Halim*).

Erect annual herbs. Lower leaves petioled, pinnatipartite, with pinnatifid segments, upper ones sessile, pinnatifid or lobed with oblong, obtuse or linear lobes. Inflorescences in terminal racemes, 10-15 cm long. Flowers white; pedicel 0.3-0.35 cm long; sepals 4, short, obtuse, 0.12-0.15 cm long; petals 4, 0.2-0.25 cm long. Siliques orbicular-ovate or oblong, compressed, with an apical notch having a short style included within, but not spine-tipped, valves winged, 5-6 mm long, 2-seeded. Seeds 3 mm long, 1 mm broad, brown.

Type : Described from Europe, Herb. Linn. 824.11 (LINN).

Fl. : Nov.-Jan. Frt. : Jan.-Apr.

Occasionally cultivated and consumed raw in salads and also used in medicine; often met with as escapes in waste places and near cultivated fields.

Kabirchabutra : 15256.

Native of Egypt & West Asia.

RORIPPA SCOP., Pl. Carn. : 520. 1760.

T. : *R. sylvestris* (L.) Besser (*Sisymbrium sylvestre* L.)

Rorippa indica (L.) Hiern, Cat. Afr. Pl. Welw. 1:26. Add. & Corr. 1896. *Sisymbrium indicum* L., Sp. Pl. ed. 2 : 917. 1763, et Mant Pl. 1:93. 1767. *Nasturtium indicum* (L.) DC., Syst. Nat. 2:199. 1821; FBI 1:134. 1872. pro. part. excl. syn. et var. *benghalensis* DC.; Haines, Botany 1:27.

Robust suberect or erect annual or biennial herbs, usually glabrous. Leaves 10-15 × 2-3.5 cm, lower petioled, lyrate-pinnatipartite, with 1-5-toothed segments on either side, upper sessile, base amplexicaul, entire to lyrate-pinnatifid, lanceolate. Inflorescences terminal raceme, 3-10 cm long. Flowers yellow; sepals 4, 0.3 cm long, spreading; petals 4, equalling the sepals, oblanceolate. Pod erect or erecto-patent, slightly curved, beaked, 1-2 cm long, cylindrical, shortly pedicelled. Seeds 0.5 mm long.

Type : Described from India.

Fl. : Oct.-Mar. Frt. : Dec.-Apr.

Common weed in cultivated fields near water channels.

Ratanpur : 16764 ; Bilaspur : 19357.

India, China, Japan, Malaya.

Sometimes nodal thread-like roots are present below, in addition to its main root.

There is some overlapping of characters with *R. montana* (Walt. ex Hook. f. & Thoms) Small, but *R. montana* is perennial with leaves more entire and smoother, plants less robust and siliquae narrower (more than 2 cm long and 1 mm broad) on slightly zigzag axis with 50-90 seeds and seeds 0.7 mm long.

CAPPARACEAE

A. L. Juss., Gen. Pl. : 242. 1789 (*Capparides*).

T. : *Capparis* L.

1a. Perennial, climbing shrubs with stipular spines; indumentum eglandular; fruits without false septum, indehiscent

CAPPARIS

1b. Annual herbs; indumentum glandular; fruits siliqua with false septum (replum), dehiscent

CLEOMR

CAPPARIS L., Sp. Pl. : 503. 1753 & Gen. Pl. ed. 5 : 222. 1754.

LT. : *C. spinosa* L. vide N. L. Britton et Millspaugh, Bahama Fl. : 150. 1920.

C. decidua (Forsk.) Edgew. and *C. sepiaria* L. may also occur in the district.

Capparis zeylanica L. Sp. Pl. ed. 2. : 720. 1762; non sensu Hook. f. & Thoms. 1872. *C. horrida* L.f. Suppl. 264. 1782; Haines, Botany 1:32. *C. incanescens* DC., Prodr. 1:247. 1824. *C. sepiaria* L. var. *incanescens* (DC.) Hook. f. & Thoms. in FBI 1:177. 1873. **Fig. 6**

Climbing shrubs, with recurved stipular thorns, young parts brownish-red or greyish tomentose. Leaves ovate-elliptic, coriaceous, glabrous or glabrescent, subcordate or rounded at base, acute or acuminate at tip, with a stiff recurved mucro, 5-7.5 × 2-3.5 cm. Inflorescences racemose or corymbose. Flowers 2-6, in vertical lines on the branches, dull white or purplish, often appearing before leaves; sepals 4, in 2 series, ovate-rounded, densely tomentose, 1-1.4 cm long; petals 4, ovate to orbicular, tomentose within, 1.5-1.7 cm long; stamens many, filaments pinkish; gynophore slender, glabrous except at base; ovary globose or broadly ovoid, glabrous. Berries globose-ellipsoid, reddish, 2.6-3.5 cm in diam.

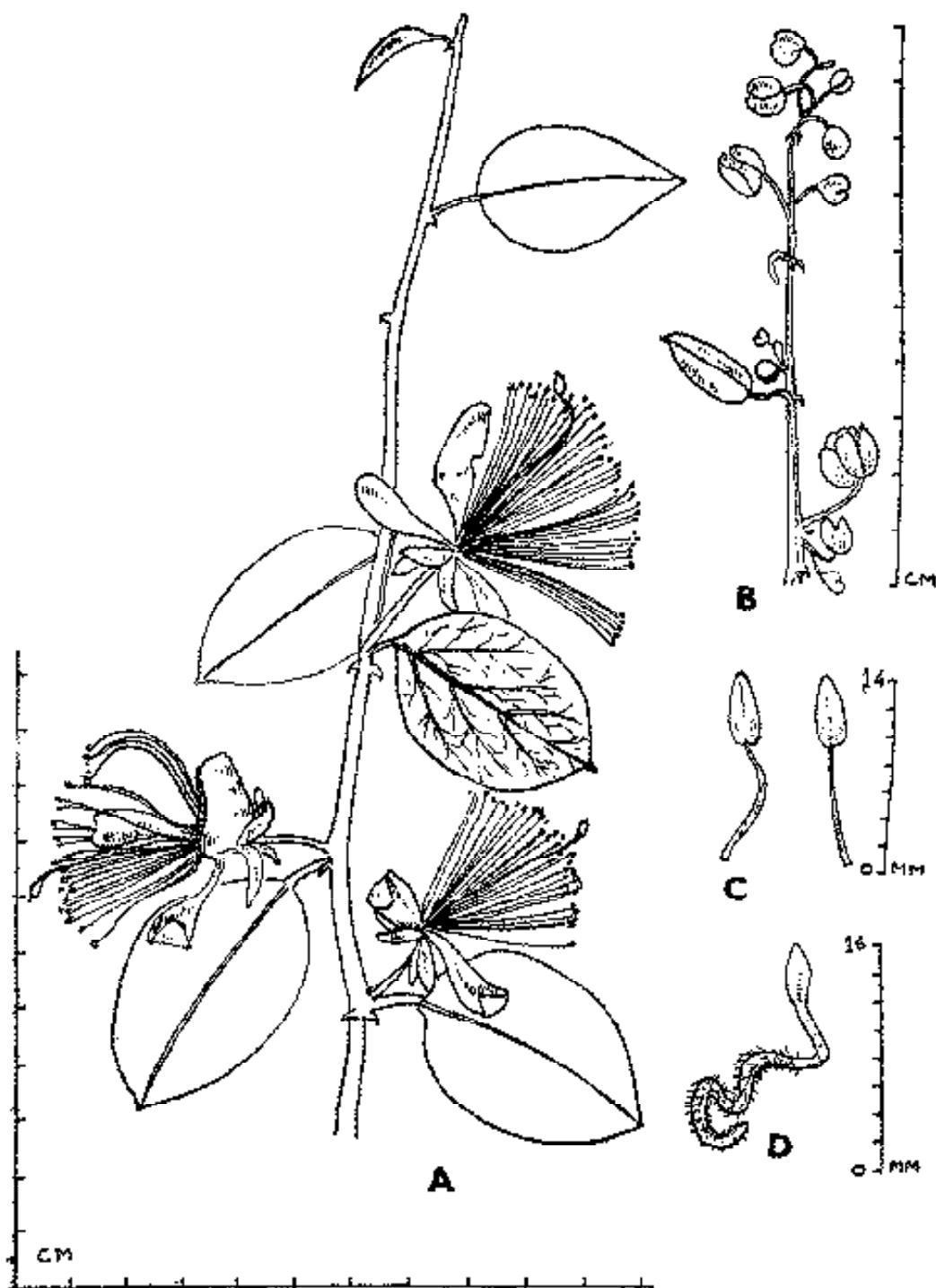


Fig. 6. *Capparis zeylanica* L.
 A. Leafy branch with axillary flowers. B. Flowering axis (terminal).
 C. Stamens. D. Young ovary.

Types : Ceylon, *Hermann* (BM).

Fl. : Feb.-May. *Frt.* : Sept.-Oct.

Common as hedges, at the edge of forest, in waste places.

Pali : 8586.

India, Sri Lanka, Burma, China, W. Malaysia.

C. zeylanica L. was described on *Hermann* (BM) and *C. horrida* L.f., on *Koenig* (LINN), both from Sri Lanka, but the two are conspecific. Although Roxb. (1832) and Wt. & Arn. (1834) correctly interpreted *C. zeylanica* L., Hook. f. & Thoms. (1872) misapplied *C. zeylanica* L. to what should have been called *C. brevispina* DC. and treated *C. horrida* L.f. as a distinct species.

CLEOME L., Sp. Pl. : 671. 1753 & Gen. Pl. ed. 5 : 302. 1754.

LT. : *C. ornithopodioides* L. vide M. L. Green, Prop. Brit. Bot. 172. 1929.

Cleome L., together with a few other genera of the tribe Cleomoideae (Pax in Engl. & Prantl., Pflanzenfam. III. 2 : 220. 1891), is placed in a new family Cleomaceae (Pax) Airy Shaw [Kew Bull. 18(2) : 356. 1965], Airy Shaw stating, "the Cleomaceae are a logical necessity" but this family is not included in App. II, ICBN, 1983.

C. gymandra L. may occur in the district.

- | | |
|--|----------------------|
| 1a. Leaves simple ; stamens 6 | <i>C. monophylla</i> |
| 1b. Leaves compound ; stamens 10 to many | |
| 2a. Plant glandular-pubescent ; flowers yellow ; stamens 10-20 ; filaments almost filiform ; capsule glandular-pubescent | <i>C. viscosa</i> |
| 2b. Plant glabrous or sometimes strigose pubescent, but never glandular ; flowers pink-rose or violet ; stamens 30 or more, filaments club-shaped ; capsule glabrous | <i>C. chelidonii</i> |

Cleome chelidonii L. f. Suppl. Pl. : 300. 1782; Haines, Botany 1 : 31 ; Jacobs in Fl. Males. ser. I. 6 : 102. 1960.

Erect annual herbs, upto 90 cm long, somewhat scabrid but glabrous. Leaves 5-9-foliolate, upper leaves 3-foliolate, leaflets 3-5 × 0.5-1 cm, lower

ovate or oblong, upper linear. Inflorescence racemose, afterwards corymbose. Flowers 2.5 cm across, long pedicelled, pedicel 2.5 cm long; sepals 4, spreading; petals 4, ovate; stamens many, filaments clavate above. Capsules slender, tapering at both ends, 5-10 cm long. Seeds pale brown, muricate.

Fl. : July-Aug. *Frt.* : Aug.-Sept.

Common in marshy places, in ditches and fresh water swamps.

Khuria : 19307.

India, Burma, Java.

The seeds are said to be used in curries for flavouring.

C. monophylla L. Sp. Pl. 672. 1753; Haines, Botany 1 : 30 (*Hurhur*).

Erect, glandular-pubescent herbs upto 90 cm tall. Leaves oblong, oblong-lanceolate or ovate-lanceolate, acute or acuminate, subcordate, 3.5 × 0.7-1.2 m. Inflorescences racemose, racemes elongating in fruits. Flowers pale-purple or white; sepals 4, linear, spreading; petals 4, ascending, long clawed, 0.5 cm long; stamens 6; ovary glandular, elongating in fruits. Capsule sessile or shortly stalked, cylindrical, striate, 5-10 cm long. Seeds rugose-tuberous, black.

Fl. : July-Aug. *Frt.* : Aug.-Sept.

Common weed along roads, in waste places, forest clearings.

Katghora : 6057; Pasan to Pendra : 19135.

India, Sri Lanka, tropical Africa.

The roots made into a paste and put on the lips by the tribals to restore consciousness when some one has fainted (Haines *i.c.*).

C. viscosa L., Sp. Pl. : 672. 1753; Haines, Botany 1:30; **C. icosandra** L. Sp. Pl. 672. 1753. (*Hurhur*). Fig. 7

Erect annual herbs, upto 100 cm tall. Leaves digitately 3-5-foliate, leaflets equalling or shorter than the petiole, elliptic-obovate to oblong, acute or obtuse at apex, cuneate at base, the central one the longest, upper leaves usually sessile. Inflorescences terminal, corymbose-raceme. Flowers solitary, in axils of reduced leaves, long pedicelled, yellow, pedicel ascending, 1-3 cm long; sepals 4, ovate, acute, 0.5-0.8 cm long; petals 4, reflexed, narrowed upward, 1-1.4 cm long; stamens 10-20, filaments unequal, anthers bluish. Capsule cylindrical, 6-12 cm long, beaked; seeds dark brown.

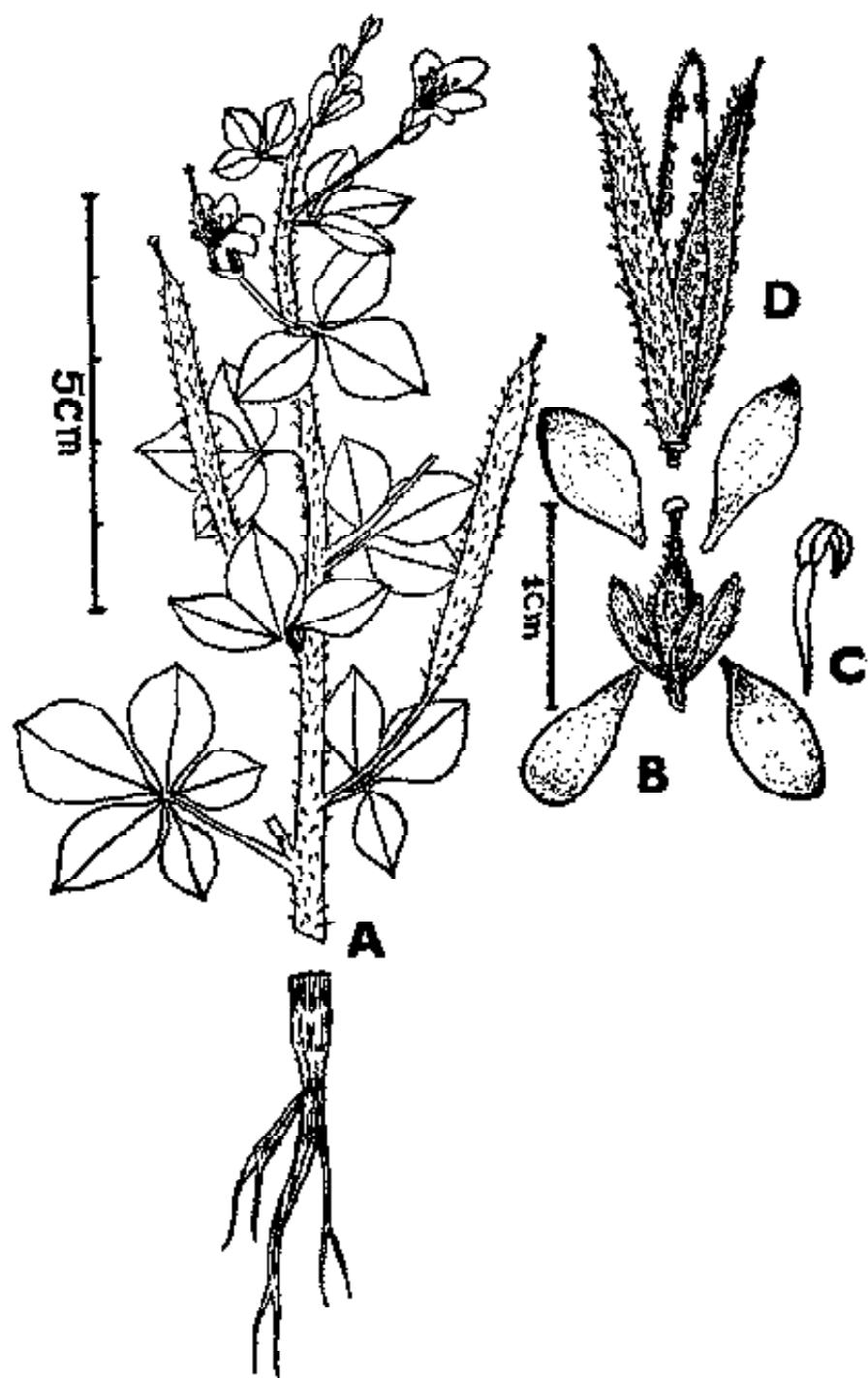


Fig. 7. *Cleome viscosa* L.
A. Habit. B. Floral parts dissected. C. Stamen. D. Fruit dehiscing.

Types : Ceylon, Herb. *Hermann* 241 (BM).

Fl. : June-Aug. *Frt.* : Aug.-Sept.

A common ruderal weed along roads, in sandy river-beds, waste places, forest clearings and edges.

Lamni to Achanakmar : 19263.

Pantropical.

The seeds are anthelmintic, carminative and stimulant (Chopra, Nayar & Chopra, 1958). The juice of the leaf is used in ear-trouble. Seeds are used for flavouring as those of *C. gynandra* L.

VIOLACEAE

Batsch, Tab. Affin, Regni, Veg. : 57. 1802 (*Violarie*).

T. : *Viola* L.

Several forms of *Viola tricolor* L. are cultivated in gardens as ornamental plants.

HYBANTHUS N. J. Jacq., Enum. Syst. Pl. Carib. 2:17. 1760. *nom. cons.*

T. : *H. havanensis* N. J. Jacquin.

Hybanthus enneaspermus (L.) F.v. Muell., Fragm. Phyt. Austr. 10:81. 1876; Tennant in Kew Bull. 16:431. 1963. *Viola enneasperma* L. Sp. Pl. 937. 1753. *Ionidium suffruticosum* (L.) Roem. & Schult., Syst. Veg. 5:394. 1819; Haines, Botany 1:34. *Viola suffruticosa* L. Sp. Pl. 937. 1753. *Hybanthus suffruticosus* (L.) Baillon, Bot. Med. 2:841. 1884.

Diffuse, perennial herbs, with woody branches and woody base. Leaves alternate, sub-sessile, linear-lanceolate, serrate, 1.6-3 × 0.2 cm. Stipules subulate. Flowers solitary, red; sepals 5, subequal; petals 5, unequal, lower-most largest with an elongate, spurred claw towards base and an obovate, broad limb above; stamens 5, 2 with filiform appendages on anterior filaments; ovary ovoid; style clavate, incurved, stigma oblique. Capsules 3-valved, subglobose. Seeds globose, striate.

Type : Sri Lanka, Herb. *Herman*, Vol. I, p. 19 (BM).

Fl. : July-Dec. *Frt.* : Dec.-Jan.

Common in dry rocky places.

Bilaspur to Seput : 13010; Khootaghat : 19517.

Africa to Australia.

Robson (in Bot. Soc. Brot. 32:164, 1958) recognised *H. enneaspermus* and *H. suffruticosus* as distinct species. However, Dalzell & Gibson (Bomb. Fl. 12, 1861) united these two Linnean taxa under *Ionidium enneaspermum* (L.) Vent. and this choice has been followed ever since (Art. 57.1).

FLACOURTIACEAE

A. P. DC., Prodr. 1 : 255, 1824 (*Flacourtiaceae*)

T. : *Flacourtie* Comm. ex L' Herit.

- 1a. Plants unarmed ; leaves pinnately veined ; flowers bisexual ; stamens 6-10, perigynous ; ovaries 1-loculed ; ovules many ; fruits fleshy capsules CASEARIA
- 1b. Plants often armed ; leaves sub-palmately veined ; flowers dioecious ; stamens many, hypogynous ; ovaries incompletely 2-6-loculed ; ovules usually in pairs on each placenta ; fruits berries FLACOURTIA

CASEARIA N. J. Jacq., Enum. Pl. Carib. 4: 21, 1760.

LT. : *C. nitida* (L.) N. J. Jacq. (*Samyda nitida* L.) vide N. L. Britton et Millspaugh, Bahama Fl. 285, 1920.

Casearia graveolens Dalz. in Hook. Kew Jour. Bot. 4:107, 1852 ; Haines, Botany 1:40. (*Bairi*)

Small trees. Leaves elliptic or elliptic-oblong, shortly acute, rounded at base, crenate, glabrous, 5-12 × 2-5 cm. Flowers in dense, axillary clusters, greenish-white, 6.0 mm across ; sepals 5, pubescent at the base, persistent ; petals absent ; stamens 8, alternating with hairy, scale-like staminodes, united into a tube. Capsules broadly ellipsoid or oblong, yellow, glabrous, 2-2.5 cm long.

Fl. : May-June. Frt. : June-July ; the tree is nearly leafless at the time of flowering ; old leaves turn red during winter.

Common at the edge of the forest.

Katghora : 3725 ; Pali : 8640 ; Marwahi : 19003.

India, Burma.

FLACOURTIA Commers. ex L'Heritier, Stirp. Nov. 59, 1786.

T. : *F. ramontchi* Commers. ex L' Heritier.

Flacourtie indica (N. Burm.) Merr., Interpr. Rumph. Herb. Amboin. 377, 1917. *Gmelina indica* N. Burm., Fl. Ind. 132. t. 39, f. 5, 1768. *Flacour-*

tia ramontchi L'Herit., Stirp. Nov. 3:59. t. 30 & 30b. 1786; Haines, Botany 1:38. *F. sepiaria* Roxb., Pl. Corom. 1:48. t. 68. 1795; Haines, Botany 1:37. (*Kanker, Kakai*).

Small thorny trees or shrubs. Leaves alternate, elliptic-oblong, obovate or suborbicular, obtuse or obtusely pointed, crenate, glabrous or pubescent beneath, midrib glabrous, 2-12 × 1-5 cm. Inflorescences racemose on short branches, pubescent or tomentose; occasionally axillary, solitary or clustered. Flowers dioecious, yellowish-green, 0.6 cm across, pedicel articulate below the middle; sepals 4-6, pubescent or hirsute; petals 4, united below; stamens many, exserted; styles 5, stigma capitate. Berries purple, 6.0-8.0 mm in diam.

Fl. : Dec.-Mar. *Frt.* : Apr.-May; deciduous just before flowering; new shoots appear during Feb.-Mar.

Common in mixed dry deciduous forests.

Khuria : 15472 ; **Karidongari** : 19314.

India, W. China, Malaysia, Polynesia.

Sleumer (in Fl. Malesiana, Ser. I. 5(1):76, 1954) states "I cannot find any constant character neither in leaves, nor flowers or fruits which allow to segregate the two species [i.e. *ramonichi* (trees with non-flowering thorns) and *sepiaria* (white-flowered with flowering thorns)] in the *F. indica* complex". *F. sepiaria*, *F. occidentalis*, *F. ramonichi*, *F. latifolia*, *F. sapida* etc. are uniform in their characters of the styles and stigmas.

The fruit is eaten raw or cooked.

POLYGALACEAE

R. Br. in Flinders, Voy. Terra Austr. 2:542. July-Aug. 1814.

(*Polygalaceæ*)

[A. L. Juss., Ann. Mus. Natl. Hist. Nat. 14: 389 1809 (*Polygalaceae*)].

T. : *Polygala* L.

POLYGALA L., Sp. Pl. : 701, 1753 & Gen. Pl. ed. 5 : 315, 1754.

LT. : *P. vulgaris* L. vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed 2. 2. : 446. 1913.

- 1a. Keels hooded, not crested; calyx deciduous after flowering *P. fureata*
 1b. Keels crested; calyx persistent
 2a. Wings petaloid; flowers pink or white with purple tints

- 3a. Racemes axillary, 0.5-1.5 cm long; flowers lilac or white with purple tips; strophioles 2-3-appendiculate *F. crotalarioides*
- 3b. Racemes terminal and axillary, dense, 2-5 cm long, tail-like; flowers pink; strophioles not appendaged *P. longifolia*
- 2b. Wings herbaceous; flowers yellow *P. arvensis*

Polygala arvensis Willd. Sp. Pl. 3 : 876. 1802; Burtt in Notes Roy. Bot. Gard. Edin. 32 (3) : 404. 1973. *P. chinensis* sensu Bennett in FBI 2 : 204. 1872. *pro part., non* L. 1753; Haines, Botany 1 : 42; Adema in Blumea 14 : 269. 1966.

Erect or diffuse herbs; stems hairy with curled hairs. Leaves alternate, orbicular-oblong or obovate to narrow-linear, thick, coriaceous, glabrous, ciliate, hoary or pubescent; petioles short. Inflorescences sub-solitary or in many lateral, dense-flowered racemes, much shorter than leaves; bracts persistent; flowers 0.5-0.75 cm across; outer sepals small, ovate, wings very oblique, acute; petals 3, united at base with staminal tube; stamens 8, shorter than wings, notched, narrowly winged, ciliate; strophioles with 3 very short appendages. Capsules suborbicular.

Type : Described from S. India.

Fl. & Frt. : July-Dec.

Common in open scrub jungles, in waste grassy places, forest clearings.

Khuria : 19354; Champa to Korba : 19376; Pali to Ratanpur : 19495; Ratanpur : 13015.

India, Burma, Sri Lanka, Australia.

Roots are given in fever, dizziness, antiseptic; tender leaves are eaten as vegetable.

P. crotalarioides Buch.-Ham. ex DC. Prodr. 1 : 327. 1824; Haines, Botany 1 : 43; Iqbal Dar in Fl. W. Pak. No. 52 : 4. fig. 1 D-G. 1973. (*Bijnori*)

Erect, glabrescent to villous, perennial herbs or undershrubs. Leaves subsessile, obovate-oblong to rounded, cuneate or acute at base, obtusely retuse at apex, ciliate, glabrescent, 2-10 × 1.5-3 cm. Inflorescence a short raceme; bracts minute, persistent, subulate; outer 3 sepals ovate-oblong, subacute, ciliate; wing obovate-rounded, hairy on the back, twice as long

as the capsule. Capsule orbicular, ciliate, notched at apex, broader than long.

Type : Nepal, *Buchanan-Hamilton* (G-DC).

Fl. & Frt. : May-Sept.

Frequently found near forest edges, clearings, in open forests.

Pasan : 19123.

India, Burma, Thailand, Laos, Vietnam, China.

Decoction of the plant is used to cure cough.

P. furcata Royle, Ill. Bot. Himal. t. 19 B. 1-4, March 1834; Panigrahi in Kew Bull. 29 : 657. 1974. *P. glaucescens* Wall. (Num. List No. 4182. 1831, *nom. nud.*) ex Royle, Ill. Bot. Himal. : 76. June 1834. *P. triphylla* Buch.-Ham. ex D. Don var. *glaucescens* (Wall. ex Royle) Bennett in FBI 1 : 201. 1872; *pro. part.*; *P. triphylla* Buch.-Ham. ex D. Don, Prodr. Fl. Nep. : 200. 1825; *nom* Burm. f. 1768; Haines, Botany 1 : 44.

Erect-ascending annual herbs. Leaves spatulate, narrowed into a petiole, 1.5-7 cm long, membranous, glabrous. Inflorescences terminal, raceme, secund to 5.0 cm long; flowers yellow; outer sepals small, ovate, wings petaloid, elliptic, equalling the corolla, with 2 inflated terminal lobes; petals 3, united at the base with staminal tube; lateral petals narrow. Capsules orbicular, entire, narrowly winged.

Type : NW India, (Mussoorie) during the rainy season, *Royle s.n.* (K).

Fl. & Frt. : Sept.-Jan.

Frequently found in drying up nala, edge of forests.

Korba : 12924.

India, Burma, W. China.

The name, *P. furcata* Royle (1834) is nomenclaturally valid, though published without a description. (Art. 42.2 ICBN 1983).

P. longifolia Poir. in Lam. Encycl. Meth. Bot. 5:501. 1804; *P. leptales* DC. Prodr. 1:325. 1824; Haines, Botany 1:43.

Erect, glabrous, perennial herbs. Leaves narrow linear, acuminate, scarcely petioled, lower leaves often oblong-lanceolate, 1.5-2 cm long. Inflorescences dense, 2.0-5.0 cm long racemes; bracts deciduous immediately after the flowers expand; wings 3-nerved, narrowly obovoid; petals 3, united at base with the staminal tube. Capsules oblong-obovoid, retuse and somewhat oblique above, nearly as long as wings; strophiole small paleate.

Fl. & Frt. : Sept.-Dec.

Common on 'Sal' forest floor, in drier localities.

Lamni : 15414.

India.

CARYOPHYLLACEAE

A.L. Juss. Gen. Pl. : 299. 1789. (*Caryophyllea*) fam. nom. cons.

T. : *Caryophyllum* P. Miller non L., nom. illeg. (≡ *Dianthus* L.)

Dianthus caryophyllum L. and *D. chinensis* L. are commonly cultivated in gardens.

- | | |
|--|------------|
| 1a. Erect herbs; sepals scarious throughout; styles 3-toothed | POLYCARPÆA |
| 1b. Diffuse herbs; sepals scarious only on the margins; styles 3-fid | |
| 2a. Leaves opposite, ovate to orbicular, 3-7-veined; sepals not keeled; petals 2-6-fid; stamens 2-3 (-4) | DRYMARIA |
| 2b. Leaves in pseudowhirls, linear-lanceolate or spatulate, single-veined; sepals keeled; petals entire; stamens 5 | POLYCARPON |

DRYMARIA Willd. ex Schult. in Roem. et Schult. Syst. Veg.

5:31. 406. 1820.

LT. : *D. arenarioides* Roem. et Schult. vide N. L. Britton et Millsbaugh, Bahama Fl. : 137. 1920.

Drymaria cordata (L.) Willd. ex Roem. et Schult. ssp. *diandra* (Bl.) J. Duke in Ann. Missouri Bot. Gard. 48 : 253. 1961; Majumdar in Bull. Bot. Surv. India 10 : 294. 1969. *Drymaria diandra* Bl., Bijdr. 62. 1825. *D. cordata* sensu Haines, Bot. 1 : 46, non (L.) Roem. et Schult. (1820).

Prostrate or decumbent annual herbs, internodes longer than the leaves. Leaves with a rounded subcordate base, apiculate, 0.8-3 × 0.5-2.5 cm; stipules lacerate. Inflorescences lax, glandular puberulous, repeatedly forked axillary or terminal cymes; flowers greenish-white; sepals 5,

free, obovate-oblong, puberulous glandular on the protrusive middle vein; petals 5, shorter than the sepals; capsule 3-gonous, 1.5-2.5 mm long; seeds 1.4-2.0 mm, densely tuberculate.

Fl. : Aug.-Sept. *Frt.* : Nov.-Dec.

Frequently found in humid and shady places, at the edge of forests, ravines and slopes; prevents soil erosion.

Lamni : 13247, 15421.

India, Africa, W. & S. China, S. Japan, Malaya, Australia, Oceania.

POLYCARPaea Lamarck, Journ. Hist. Nat. Par. 2 : 3 (*Polycarpea*),
5. 1792. *nom. cons.*

T. : *P. teneriffae* Lam. (*typ. cons.*)

- 1a. Leaves with inrolled margins and less than six per node; stipules hardly fimbriate; internodes densely white tomentose; sepals ovate elliptic, coloured *P. aurea*
- 1b. Leaves flat, more than eight per node; stipules much fimbriate; internodes with scattered hairs; sepals elliptic lanceolate; white *P. corymbosa*

Polycarpaea surea (Wight) Wight & Arn., Ann. Nat. Hist. Ser. I. 3 : 91. 1839. *P. corymbosa* (L.) Lam. var. *aurea* Wight, Ill. 2 : 44. t. 110. 1831; Edgeworth & Hook. f. in FBI 1 : 245. 1874.

Perennial herbs, 15-30 cm high, densely tomentose. Leaves opposite, pseudo-virgicillate, narrow linear or subulate; stipules lanceolate or subulate. Inflorescences dense, excessively branched, terminal, silvery cymes: sepals 5, free, brown and shining, lanceolate, very acute, much exceeding capsules, glabrous or pilose; petals 5, entire, 2-toothed or erose, red, shorter than sepals; stamens 5, hypogynous or sub-perigynous. Capsules ellipsoid, loculicidally 3-valved.

Fl. & *Frt.* : Apr.-Oct.

Frequently found near streams, waste places.

Katghora : 3703, 7109.

India, Sri Lanka, Burma.

P. corymbosa (L.) Lam., Tab. Encycl. 2 : 129. 1797; Haines, Botany 1 : 47. *Achyranthes corymbosa* L., Sp. Pl. : 205. 1753.

Erect or procumbent, tufted, annual or perennial, hoary argenteate pubescent or glabrescent herbs, 15-35 cm (-1 m) high. Leaves opposite

or fascicled in whorls at nodes, linear, aristate, 10×1 mm. Inflorescences terminal or axillary, silvery, bracteate cyme; flowers small, exceeded by the subtending bracts; sepals 5, free, white, lanceolate, acute, exceeding the capsule, glabrous or pilose; petals 5, entire, 2-toothed, completely enclosed in calyx; stamens 5, with filaments flattened. Capsules ellipsoid, dehiscing longitudinally in 3 valves.

Fl. : Aug.-Nov. *Frt.* : Oct.-Mar.

Common in coarse sandy river-beds, stream beds.

Pasan : 13284.

Cosmopolitan in the tropics.

POLYCARPON Loefl. ex L Syst. ed. 10. : 881. 1759.

T. : *P. tetraphyllum* (L.) L. (*Mollugo tetraphylla* L.)

P. prostratum (Forsk.) Aschers. & Schweinf. in Oester. Bot. Zeitschr. 39 : 128. 1889. *Pharnaceum depressum* L. Mant. Pl. : 562. 1771. non *Poly-carpon depressum* Nutt. ex Torrey & Gray. 1838. *Alsine prostrata* Forsk. Fl. Aegypt.-Arab. : 207. 1775. *Hapolosa loeflingiae* Wall. ex Wt. & Arn. Prodr. : 358. 1834. *Polycarpon loeflingiae* (Wall. ex Wt. & Arn.) Benth. et Hook f., Gen. Pl. 1:153. 1862; Haines, Botany 1:47.

Prostrate or decumbent-ascending, glabrate-pubescent, annual herbs with stout tap root. Stems covered with simple and branched hairs. Leaves narrowed to the base into a short petiole, subacute, ciliate, glabrate or hairy, 0.5-1.5 cm long. Stipule scarious. Flowers greenish-white, terminal, subsessile, 0.2-0.25 cm long, in dense, repeatedly forked terminal or axillary cymes; sepals 5, linear-oblong, with obtuse, incurved tips; petals white, half as long as the calyx, lanceolate, notched or truncate-dentate at apex; styles 2-3 mm long. Capsules ovoid, 0.16-0.2 cm long.

Fl. & *Frt.* : Nov.-July.

Common in dry cultivated fields, waste lands.

Katghora : 8650; Pasan to Korba : 19083.

India, Africa, Trop. Asia.

PURTULACACEAE

Juss. Gen. Pl. : 312. 1789 (*Portulaceæ*).

T. : *Portulaca* L.

PORFULACA L. Sp. Pl. : 445. 1753 & Gen. Pl. ed. 5 : 204. 1754.

LT. : *P. oleracea* L. vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2.2 : 39. 1913.

Portulaca pilosa L. Sp. Pl. : 445. 1753; Geesink in Blumea 17:294. 1969; Ghafoor, Fl. West Pakistan No. 51:7, fig. 1. H. I. 1973.

Annual, erect herbs with nodes woolly hairy. Rootstock perennial, fleshy, fusiform, not tuberous. Stem tinged with reddish-purple. Leaves alternate, terete, fleshy, lanceolate-oblong, with a rounded-cuneate base obtuse, 1.5-2 × 0.18-0.4 cm; stipules hairy. Flowers solitary or 3-4 together within the involucre of 8-10 leaves, 1 cm across, sepals ovate, acute; petals 5-6, lanceolate, apiculate, reddish purple; stamens many; style 5-fid. Capsules subglobose, apiculate; seeds lenticular.

Type : Described from S. America. Herb. Linn. 625.2 (LINN).

Fl. & Frt. : July-Oct.

Common on sandy river bed, waste places.

Khuria : 15460; Khootaghat : 19519.

India, Sri Lanka.

Geesink (l.c.) recognises several subspecies and races. Our specimens belong to subsp. *pilosa*, a native of tropical America and naturalized in the district.

ELATINACEAE

Dumort., Anal. Fam. Pl. : 44. 49. 1829 (*Elatinideae*)

T. : *Elatine* L.

BERGIA L., Mant. Pl. 2 : 152, 241. 1771.

T. : *B. capensis* L.

Bergia ammannioides Roxb. Hort. Beng. 34. 1814; Haines, Botany 1:51; Robinson, Philipp. J. Sci. 7 : 414. 1912. *Lechea verticillata* Willd., Sp. Pl. 1 : 495. 1797. [non *Bergia verticillata* Willd.]

Prostrate or decumbent-ascending, glandular-pubescent, annual herbs. Leaves opposite, subsessile or shortly petioled, lanceolate-elliptic to oblong or obovate-oblong, subacute to obtuse-serrate, glandular-hairy or glabrate; stipules persistent. Flowers minute, reddish, in a few- to many-flowered, axillary fascicles; sepals acute, 5, glandular-pubescent, keeled; petals 5, white; stamens 5. Capsules ovoid, 5 valved.

Fl. & Frt. : Oct.-Jan. and June-Aug.

Frequently found in forest clearings, marshy places.

Khondra : 12823.

Africa, India, Sri Lanka, Australia.

HYPERICACEAE

A. L. Juss., Gen. Pl. : 254. 1789 (*Hyperica*)

T. : *Hypericum* L.

Takhtajan (1969) lists only the Clusiaceae Lindl. in his system. But, both the Clusiaceae Lindl. (1836) (T. : *Clusia* L.) and the Hypericaceae Juss. (1789) (T. : *Hypericum* L.) are conserved family names (vide App. II : 255, 259. ICBN 1983). Therefore, the inclusion of *Hypericum* L. the type genus of the Hypericaceae Juss. (1789) in the Clusiaceae Lindl. (1836) is contrary to the rules (Principle II, III). But whether Art. 57.1, would apply to Cronquist's choice, is a moot point. However, Hutchinson (1973) and Hara *et al.* (1979) rightly continue to treat *Hypericum* L. within the Hypericaceae Juss. and we opted to follow this treatment in preference to Robson (1972) and Elwar Rao and Saldanha (1984).

HYPERICUM L. Sp. Pl. : 783. 1753 & Gen. Pl. : ed. 5 : 341. 1754.

LT. : *H. perforatum* L. vide N. L. Britton et A. Brown, Ill Fl. N. U.S. ed. 2. 2 : 529. 1913.

Hypericum japonicum Thunb. ex Murr. Syst. Veg. ed. 14 : 702. July. 1784 ; Thunb. Fl. Jap. : 295. t. 31. Aug. 1784 ; Haines, Botany 1 : 53 ; Robson, Blumea 20 (2) : 267. 1972.

Erect or procumbent, slender, branched herbs. Leaves elliptic, ovate-lanceolate, obtuse or subacute at apex, cordate, 0.6-1 × 0.3-0.6 cm, venation sub-palmate, 3-5-nerved. Cymes terminal ; bracts linear-lanceolate ; flowers 0.8-1 cm across ; sepals 5, entire, oblong or narrowly elliptic, 5 mm long ; petals yellow, 3.5 mm long, persistent ; stamens 5, connate at base ; style 3, shorter than ovary ; ovary 1-celled. Capsules subcylindrical, 3.5 mm long.

Fl. & Frt. : Oct-Jan.

Common near fields, wastelands in damp situations. It is a polymorphic species, leading Robson (1972) to recognise five variants in it.

Korba : 8692 ; Kabirchabutra : 19184.

India, Sri Lanka, S. E. China, New Guinea, S. & S. E. Australia, New Zealand.

Erect annual herbs. Stem, petiole and pedicels densely hairy with simple and stellate hairs. Leaves orbicular to elliptic, 5-17-palmately lobed to palmatipartite, segments triangular or oblong or ovate, coarsely dentate-serrate; hirsutely hairy; stipules linear to filiform. Flowers axillary, solitary or a few together; epicalyx 10-16, ciliate; calyx densely hairy; corolla yellow with purple centre. Capsules ovoid to globular, hirsute or hispid, obtuse or cuspidate at the tip.

Type : Burma, Prome, *Wallich* Num. List No. 1922 (K-W).

Fl. : Aug.-Nov. *Frt.* : Oct.-Jan.; plants generally die after flowering.

Common in dried up ditches, waste places, in undergrowths of deciduous forests.

Korba : 12934.

India, Burma, Thailand to Vietnam, S. China, Malaysia.

A. ficulneus (L.) Wt. & Arn. ex Wt. Cat. 14, 833, 1833, et Prodr. : 53. 1834; Borssum in Blumea 14:101, 1966; *Hibiscus ficulneus* L. Sp. Pl. : 695. 1753; Haines, Botany 1:69. (*Ram Bhindi*).

Erect herbs. Stem scabrous. Leaves suborbicular, hispidly hairy, upper deeply 3-5-lobed, rounded, constricted at base, crenate-setrate; stipules subulate, lanceolate, caducous. Flowers a few, in terminal racemes; epicalyx usually 5, occasionally 4 or 6, linear-subulate or lanceolate; calyx hispid; corolla white or pinkish, petals obovate, 3 mm long. Capsules ovoid, apiculate, tomentose, obscurely 5-angled.

Type : *Dillenius*, Hort. Elth. t. 157, f. 190.

Fl. : Aug.-Nov. *Frt.* : Oct.-Jan.

Frequently seen in open places, along forest roads, near cultivated fields.

Khondra : 12794; Bilaspur to Seput : 12983.

East Africa to Australia.

Plants yield fibre.

A. manihot subsp. *manihot* (L.) Medic. Malvanfam : 46. 1787; Borssum in Blumea, 14 : 95. 1966; *Hibiscus manihot* L. Sp. Pl. : 696. 1753; FBI 1:341. 1874.

Erect undershrubs. Stem terete, fistular, glabrescent. Leaves orbicular to widely ovate, cordate, 3-7-lobed, 3-20 cm across, segments triangular ovate obovate, coarsely dentate to serrate, glabrous or densely hairy, often hispid on the veins. Flowers axillary solitary; epicalyx 4-6, ovate to oblong, acute to acuminate, 1-3 cm long, hirsute; calyx 2-3 cm long, outside velutinous to tomentose, inside siliceous; corolla yellow with purple centre, rarely white, petals obovate to orbicular, 3.5-8 cm long; stigma hairy. Capsules oblong ovoid, 5-angled, acuminate, 3.5-6 cm long, usually densely-hispid, especially on the costae.

Type : Hortus Cliffortianus, s.n. (BM).

Fl. : July-Oct. Frt. Oct-Nov.

Commonly cultivated, also occurs as an escape from cultivation.

Bilaspur : 12983A.

Native of China (Hara *et al.*, 1979)

Borssum (I.c.) distinguishes ssp. *manihot* from ssp. *tetraphyllus* (Roxb. ex Hornemann) Borss. by its almost glabrous stems, ssp. *tetraphyllus* having stems densely covered with prickly hairs. He treated wild plants as ssp. *tetraphyllus* and the cultivated one, as ssp. *manihot*. Stems yield a strong fibre.

A. moschatus Medic. Malvanfam. : 46. 1787 subsp. *moschatus*; Borssum in Blumea 14 : 90. 1966; *Hibiscus abelmoschus* L. Sp. Pl. : 696. 1753 : Haines, Botany 1 : 67.

Erect fruticosa herbs or undershrubs. Stem, petioles pedicels and leaf-surface retrorsely bristly with simple and stellate hairs. Leaves polymorphic, orbicular-elliptic, base cordate, 3-7-lobed to -partite, upper ones ovate-obovate, spatulate to lanceolate or linear, serrate dentate; stipules linear to filiform. Flowers solitary axillary; epicalyx 7-10, linear, filiform, lanceolate or oblong; sepals stellate tomentose; petals yellow with a purple centre, obovate. Capsules ovoid-globose, 5-8 cm long, thinly hairy, with epicalyx lobes appressed in fruit.

Type : Hortus Cliffortianus, s. n. (BM).

Fl. : Aug.-Nov. Frt. : Oct.-Jan.

Common on slopes, waste places, along roads; also cultivated.

Lammi : 13240; Bilaspur to Seput : 13012.

Africa, India, Sri Lanka, Burma.

ABUTILON P. Mill. Gard. Dict. Abridg. ed. 4. 1754.

LT. : *A. avicannae* J. Gaertner (*Sida abutilon* L.) vide N. L. Britton et Millspaugh, Bahama Fl. : 264. 1920.

A. indicum (L.) Sweet is expected to occur in the district.

Abutilon persicum (N. Burm.) Merr. in Phillip. Jour. Sci. 19 : 364. 1921; Borssum in Blumea 14 : 163. 1966; *Sida persica* N. Burm. Fl. Ind. 148. t. 47. f. 1. 1768. *Abutilon polyandrum* (Roxb.) Wt. & Arn. Prodr. 55. 1834, non G. Don 1831; Haines, Botany 1 : 63.

Tall suffruticose herbs. Leaves long-petioled, orbicular or ovate, acuminate, cordate at base, crenate 20×18 cm, stellately hairy above, appressed glaucous-tomentose beneath. Flowers orange coloured, 13.5 cm in diam., in loose terminal raceme; calyx 5-fid, lobes shorter than cocci, lanceolate; petals 5, free above, connate below and adnate to the tube of the stamens; staminal tube with a ring of hairs at apex; filaments free upto the base. Carpels 5, awned, hairy and glandular, exceeding the calyx, awns erect.

Type : *Burman* f., Fl. Ind. t. 47.

Fl. : May-Oct. Frt. : Sept.-Nov.

Occasional at the edge of forest, along road sides, on river banks.

Khondra : 12810.

Africa, W. Asia, India, Burma, Malaysia.

ALTHAEA L. Sp. Pl. : 686. 1753 & Gen. Pl. ed. 5 : 307. 1754.

LT. : *A. officinalis* L. vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. 2 : 513. 1913.

Alcea rosea L. [*Althaea rosea* (L.) Cav.] is grown in gardens as ornamental plant.

Althaea ludwigii L. Mant. ; 98. 1767; FBI 1:319. 1874; Murti in Bull. bot. Surv. India 21(1-4):183. 1979.

Slender, prostrate or decumbent, hispid annual herbs. Stems prostrate or ascending. Leaves long petioled, orbicular, deeply 5-7-lobed; lobes wedge shaped, 3-fid. Flowers shortly stalked, 2-4 in a cluster, 1.5 cm in diam., white; bracteoles 6-9, as long as the calyx, connate at base; sepals lanceolate; petals exceeding the sepals; staminal tube 2-3 mm long, pubescent; styles as many as carpels. Carpels glabrous, wrinkled at the sides, separating from axis when ripe.

Type : Linn, Herb. no. 868. (LINN)

Fl. & Frt. : Feb.

Rare, in black cotton soil of a cultivated field.

Khami to Pandaria : 16702.

North western India, West Asia, Mediterranean region and S. Africa

Hibiscus L. Sp. Pl. : 693. 1753 & Gen. Pl. ed. 5 : 310.
1754, nom. cons.

T. : *H. syriacus* L.

H. rosa-sinensis L. and *H. schizopetalous* (Mast.) Hook. f. are commonly grown in the gardens.

- | | | |
|--|--|--|
| 1a. Calyx with 10 strongly prominent veins and glandular outside ; epicalyx-segments prickly | | |
| 2a. Stems to 3 m tall, simple or sparingly branched ; epicalyx and calyx not fleshy ; capsules globose ; seeds nearly glabrous | | <i>H. subdariffa</i>
ssp. <i>subdariffa</i> |
| 2b. Stems to 1 m tall, profusely branched from the base ; epicalyx and calyx both fleshy and purplish ; capsules ovoid ; seeds subglabrous | | <i>H. subdariffa</i>
ssp. <i>cannabinus</i> |
| 1b. Calyx not prominently veined, eglandular ; epicalyx segments smooth | | |
| 3a. Epicalyx-segments absent or very small | | <i>H. lobatus</i> |
| 3b. Epicalyx-segments present and conspicuous | | <i>H. panduriformis</i> |

Hibiscus lobatus (J. A. Murr.) O. Ktz., Rev. Gen. Pl. 3:19. 1898 ; Borssum in Blumea 14:77. 1966. *Solandra lobata* J. A. Murr., Comm. Soc. Reg. Sci. Gott. 6 : 20. t.1. 1785. *Hibiscus solandra* L'Hérit., Stirp. Nov 1:103. t.49. 1788 ; Haines, Botany 1:69.

Erect, glabrescent or stellate-pubescent annual herbs. Leaves broadly ovate-orbicular, cordate at base ; lower ones larger, angular-lobed or -partite, upper ones smaller, entire, glabrescent or stellate-hairy, serrate, acuminate. Flowers white, in racemes ; calyx divided half way down, soft pubescent, 0.7-0.8 cm long, segments lanceolate, subacute ; petals obovate, entire ; staminal tubes 0.7 cm long. Capsules oblong, beaked, pilose at apex, longer than calyx.

Type : J. A. Murr., Comm. Soc. Goett. Reg. Sci. 6:20. t.1.

Fl. : Sept.-Oct. Frt. : Oct.-Nov.

Common on forest floor.

Kabirchabutra : 13309.

Trop. Africa, Madagascar, India, Sri Lanka, Burma, Malayasia.

H. panduriformis N. Burm. Fl. Ind. : 151. t. 47. f. 2. 1768 : Haines, Botany 1:71; Rakshit et Kundu Bull. Bot. Surv. Ind. 12:162. 1972. (*Panduraeformis*).

Erect, densely stellately or simple tomentose undershrubs. Upper leaves 8 × 4.5 cm, shallowly crenate, acute at tip, cordate at base, oblong-lanceolate; lower leaves ovate and lobed, all coarsely irregularly toothed; stipules linear, 2-3-parted with filiform segments. Flowers solitary, axillary and sub-terminal, 2.5-3 cm in diam., yellow, on very short, stout articulate peduncles; bracteoles entire. Calyx 5-cleft, lobes campanulate, hairy; petals broadly obovate. Capsules ovoid, hairy, turning glabrescent.

Type : Burm. f., Fl. Ind. t. 47. f. 2.

Fl. & Frt. : Nov.-Jan.

Common near cultivated fields, waste land, edge of the forest, forest clearings.

Khondra to Pali : 12863; Khami to Pandaria : 16708.

Tropical Africa to Australia.

H. subdariffa subsp. *subdariffa* L. Sp. Pl. : 695. 1753; non L. 1763: FBI 1 : 340. 1874; Abedin, Fl. West Pakistan No. 130 : 9. 1979. (*Patua*).

Erect, annual herbs. Stems glabrous except a line of hairs along internodes. Leaves broadly ovate-orbicular, 3-to 5-lobed to pedately compound with linear-lanceolate to oblong, serrate, attenuate segments, glabrous or thinly scabridly bristly; stipules caducous. Flowers solitary in the axils of upper leaves, 5-10 cm across; epicalyx-bracteoles 8-10, shorter than the calyx, linear-subulate, 1-2 cm long; calyx campanulate, white, tomentose, bristly, 5-lobed, persistent; segments lanceolate-linear, setaceous; corolla large, 5, adnate to staminal tube at base; staminal tube white, glandular hairy. Capsules globose, pointed, bristly with appressed hairs, 2.5-3 cm long.

Lectotype : Comm. Hort. 1 : 35, t. 18. 1701 (selected by Abedin I.C.).

Fl. : Oct.-Nov. Frt. : Dec.-Feb.

Common along roads, waste places, at the edge of forest; also cultivated.

Khondra : 12859.

Native of tropical America; cultivated in most tropical countries. Stems yields a valuable fibre.

H. subdariffa L. subsp. *cannabinus* (L.) Panigr. et S. K. Murty, comb. nov. & stat. nov. *H. cannabinus* L. Syst. Nat. ed. 10.. 2 : 1149. 1759; Abedin, l.c. pro syn. *H. subdariffa* auct., non L. 1753; FBI 1 : 340. 1872. pro part.; Haines, Botany 1 : 70. (*Tak-Bhindi*).

Erect glabrous annual herbs without prickles. Stems and petiole often reddish. Lower leaves undivided; upper palmately 3-5 lobed, glandular beneath; petiole 5 cm long. Flowers axillary, solitary, on very short peduncle; bracteoles 8-12, linear. Calyx accrescent; sepals connate below the middle into a deep fleshy cup, bristly, lobes fleshy; corolla 6 cm across, yellow. Capsules ovoid, villous, shorter than the calyx.

Fl. : July-Sept. Frt. : Oct.-Dec.

Commonly cultivated, also found as escape.

Pasan : 13270A; Katghora : 6092.

Throughout the tropics.

Masters (FBI) included *H. subdariffa* in the section "Bracteoles adnate to the base of the calyx" and described the sepals as forming a "purplish fleshy cup, capsule ovoid and seeds sub-glabrous". This represents the "Tak Bhindi" of the Northern India. Var. *subdariffa* (= *H. cannabinus* sensu Masters in FBI) has bracteoles linear and shorter than the calyx, capsule globose and seeds nearly glabrous. Abedin (l.c.), who lectotypified *H. subdariffa* L. 1753 (non L. 1763), states that it has epicalyx segments not adnate to the calyx and calyx with a white arachnoid tomentum.

Although Abedin (l.c.) reduces *H. cannabinus* L. as a synonym of *H. subdariffa*, Hara et al. (Enum. Fl. Pl. Nepal 2:67. 1979, as also Masters (l.c.) treat them as specifically distinct. Since *H. cannabinus* L. is a largely cultivated taxon, although very distinct in characters, as set out in the key, we reduce it as a subsp. of *H. subdariffa*. The calyces are fleshy and made into jelly; also cooked and eaten.

Kydia Roxb. Pl. Corom. 3 : 11. 1811 (1819).

LT. : *K. calycina* Roxb. (selected here).

Kydia calycina Roxb. Pl. Corm. 3:11. t. 215. 1811; Haines, Botany 1:76. (*Bon Kapas*).

Trees. Leaves 15 × 15 cm, ovate-orbicular, 7-ribbed, glabrous or stellately pubescent above, downy below, more or less lobed. Inflorescence a panicle, axillary or terminal, with dense tomentum; flowers white or pink, polygamous; epicalyx 4-6, spathulate-oblong, downy, persistent; calyx-lobes 5, broadly triangular acute; petals 5; obovate, marginate, fimbriate along margin, clawed and hairy below; staminal tube shorter than the petals, divided about the middle into 5 divisions, each bearing 3 reniform anthers; styles 3-cleft, stigma 3, peltate. Capsules subglobose, muticous, enclosed in the calyx.

Fl. : Sept.-Nov. Frt. : Dec.-May.

Common element in mixed moist deciduous forests.

Khondra : 12803, 12855; Achanakmar : 15444.

India, Burma, Thailand, Yunnan.

Farr *et al.* (1979) treat *K. calycina* Roxb. as the type species of *Kydia* Roxb. Since Roxburgh (1811) described two species, *K. calycina* Roxb. t. 215 and *K. fraterna* Roxb. t. 216, *K. calycina* must be treated as the lectotype species.

It is an ornamental, quick-growing tree; bark-fibre is used for cordage and ropes.

MALVASTRUM A. Gray, Mem. Amer. Acad. Arts. Ser. 2.

4 : 21. 1849, *nom. cons.*

T. : *M. wrightii* A. Gray (*typ. cons.*)

Malvastrum coccineum (Nutt.) A. Gray, the type species of *Malvastrum* A. Gray was transferred as a species of *Sphaeralcea* J. St. Hill. Thereupon, *Malvastrum* A. Gray was conserved with *M. coromandelianum* (L.) Garcke as the lectotype species (Botss., Taxon 9. 212-213. 1960). Since A. Gray (1849) did not include *M. coromandelianum* within the scope of her genus, Borssum (Blumea 14:151.1966) proposed *M. spicatum* (L.) A. Gray as the most suitable lectotype. Finally, however *Malvastrum* A. Gray, *nom. cons.* is typified with *M. wrightii* A. Gray (*type cons.*).

Malvastrum coromandelianum (L.) Gärcke in Bonplandia 5 : 295. 1857 ; Haines, Botany 1:60 ; Borssum in Blumea 14 : 152. 1966 ; Hill. in Rhodora 84(839) : 324. 1982. *Malva coromandeliana* L., Sp. Pl. : 687. 1753. *Malvastrum tricuspidatum* A. Gray. Pl. Wright 1 : 16. 1852 ; FBI 1:321. 1874. *Malva tricuspidata* R. Br. in W.T. Ait Hort. Kew, ed. 2. 4:210. 1812, nom. Superfl.

Erect or decumbent perennial herbs. Stems densely stellately hairy. Leaves ovate-lanceolate to oblong, subcordate-truncate or cuneate at base, acute or obtuse, dentate-serrate, strigose with simple, appressed hairs, 2-10 × 1.5-5 cm. Flowers brownish-yellow, solitary or 2-3 together in leaf axils ; bracteoles 3, linear-subulate ; calyx appressed-pilose, 5-fid halfway down ; segments ovate-triangular, acuminate ; petals obliquely obcordate, staminal column 2.5-3.5 mm long. Carpels 10-12, 3-cuspidate, strigose.

Type : Hortus Upsaliensis, Herb. Linn. No. 870. 3 (LINN)

Fl. & Fr. : July-Nov.

Common along forest roads, forest clearings, at edge of forests.

Khondra : 12712.

Native of tropical America, naturalized in India and elsewhere in the tropics (Murti, 1975).

SIDA L. Sp. Pl. : 683. 1753 & Gen. Pl. ed. 5 : 306. 1754.

LT. : *S. rhombifolia* L. vide M. L. Green, Prop. Brit. Bot. 172. 1929.

- | | |
|---|-----------------------|
| 1a. Trailing herbs | <i>S. cordata</i> |
| 1b. Erect undershrubs | |
| 2a. Awns of carpel exceeding calyx ; leaves 5-9-veined | <i>S. cordifolia</i> |
| 2b. Awns of carpel equal to or shorter than calyx ; leaves 3-veined | |
| 3a. Plants with recurved spines below petiole ; leaves cordate or truncate ; stipules shorter than petioles | <i>S. spinosa</i> |
| 3b. Plants without spines ; leaves cuneate ; stipules longer than petiole | |
| 4a. Leaves hoary or stellate beneath, broadly rhomboid or obovate ; peduncles longer than petiole | <i>S. rhombifolia</i> |
| 4b. Leaves glabrous beneath, narrowly oblong or lanceolate ; peduncles equal | <i>S. acuta</i> |

Sida acuta N. Burm. Fl. Ind. : 47. 1768 emend. K. Schum. Fl. Bras. 12 : 326. 1891 ; Haines, Botany 1:63 ; Borssum in Blumea 14 : 186. 1966 ; *S. carpinifolia* sensu Masters in FBI 1 : 323. 1874, non L. f. 1782.

Erect, glabrate or thinly stellate-hairy, perennial herbs or undershrubs. Leaves subacute, serrate-dentate. Flowers 1 or 2, axillary, yellow ; calyx-tube subglobose, divided halfway down ; sepals 5, lobes ovate-triangular, sharply acute or acuminate, ciliate, 3 mm long ; petals 5, obovate-cuneate, obliquely truncate at apex, ciliate, as long as calyx. Capsules glabrous.

Lectotype : Java, s. coll. s. n. (G) (vide Borssum l.c.).

Fl. & Frt. : Aug.-Dec.

Common throughout the area in waste places, forest clearings, along roads.

Lamni : 13233A ; Parasi : 19049.

Pantropical.

Roots and leaves are credited with medicinal properties ; stems yield fibre.

S. cordata (N. Burm.) Borssum in Blumea 14 : 182. 1966 ; *Melochia cordata* N. Burm. Fl. Ind. : 143. 1768. *S. veronicifolia* Lam. Encycl. Meth. Bot. 1:5. 1783 ; Haines, Botany 1:61 (as *veronicaefolia*).

Perennial herbs. Leaves broadly ovate-cordate, acute to acuminate, serrate; puberulous ; petioles shorter than blade. Flowers yellow, 1.3-1.5 cm across, solitary or two in axils of leaves, distant or arranged in loose racemes ; peduncles jointed at or above middle ; pedicel slender ; calyx 5-angled : 7 mm long, divided halfway down, lobes triangular acuminate, ciliate ; petals reflex at apex, broad, truncate ; staminal column 4 mm long, hirsute ; carpels 5, smooth, inuncinate or cuspidate. Capsules subglobose, 3.5-3.8 mm across.

Type : s. coll. s.n. (G).

Fl. & Frt. : Aug.-Oct.

Common in waste places, amongst bushes, forest undergrowths.

Khondra : 12799, 12830 ; Kabirchabutra : 15214 ; Khootaghat : 19514 ; Hasdo river bank : 8616 ; Katghora : 6036.

Pantropical ; probably native of tropical America (Murti, 1975). It yields a good fibre.

S. cordifolia L. Sp. Pl. : 684. 1753 ; Haines, Bot. 1 : 61 ; Borssum in Blumea 14 : 199. 1966. (*Bariola*)

Erect, stellate-tomentose, villous perennial undershrubs. Leaves 2.5-4.5 cm long, ovate-oblong to cordate, obtuse or rounded or acute at apex, crenate, downy on both surfaces; petioles about as long as blade; stipules linear, shorter than petioles, deciduous. Flowers small, yellow, 1.5-2 cm across, solitary, in axils of leaves or in fascicles; calyx 7 mm long, divided halfway down; lobes ovate-triangular, ciliate; corolla 7-8 mm long, petals ciliate at top; staminal column hairy below middle; carpels 10-awned, furrowed at back, reticulated on sides. Capsules 7-8 mm across.

Type : Herb. Linn. No. 866. 12 (LINN).

Fl. : Aug.-Dec. *Frt.* : Oct.-Jan.

Common in waste places, along forest roads, near cultivated fields.

Pasarkhet : 16817.

Pantropical.

Seeds are used in leucorrhoea, spermatorrhoea and gonorrhoea.

S. rhombifolia L. Sp. Pl. : 684. 1753; Haines, Botany 1 : 63; Borssum in Blumea 14 : 193. 1966.

Erect, glabrate or stellate-hairy undershrubs. Leaves 2.5-4 cm long, acute or acuminate, glabrous or slightly hairy above, margin entire towards base, dentate serrate above; stipules linear-setaceous. Flowers pale yellow, 1.5-2 cm across; pedicels 1-2 cm long, jointed above middle; sepals deltoid, acute or acuminate, 10-veined; corolla, glabrous within and stellate hairy without, truncate at apex; staminal column 5-6 mm long; carpels 10, beaked. Capsules 3.5-4 mm across, stellate-hairy in upper part.

Lectotype: Herb. Clifford (BM).

Fl. & *Frt.* : Aug.-Dec.

Common in rock crevices, waste grounds.

Achanakmar : 13226; Pasan : 13274A.

Pantropical.

Plants yield fibre. To obtain long staple fibre, the plant must be cultivated in close crops, but good seeds could no doubt be obtained from some of the tall forest varieties (Haines *l.c.*).

S. spinosa L. Sp. Pl. : 683. 1753; Haines, Botany 1 : 62; Borssum in Blumea 14 : 191. 1966; Abedin, Fl. West Pakistan No. 130 : 82, fig. 19. G-H. 1979.

Erect undershrubs. Stems stellate hairy. Leaves ovate-obovate or lanceolate, obtuse, serrate, glabrous above, stellate-pubescent beneath; 1.4 × 0.5-3 cm; stipules subulate; peduncles jointed near flower. Flowers 1.5 cm across, white; calyx-tube cup-shaped, hairy; segments triangular, acute; carpels 5, with 2 long, erect beak equalling the calyx.

Type : Herb. Linn. No. 866. 1 (LINN).

Fl. & Frt. : Sept.-Feb.

Common near fields, waste places.

Khondra : 12713.

Throughout the tropics.

THESPESIA Soland. ex Corr. Ann. Mus. Nat. Hist. Paris 9 :
290. 1807. *nom. cons.*

T : *T. populnea* (L.) Soland. ex Corr. (*Hibiscus populneus* L.)

Theespesia lampas (Cav.) Dalz ex Dalz. & Gibs., Bomb. Fl. ; 19. 1861 ; Haines, Botany 1:73 : Borssum in Blumea 14:116. 1966 ; *Hibiscus lampas* Cav. Diss. 3 : 154. t. 56. f. 2. 1787. *Azanja lampas* (Cav.) Alef. Bot. Zeit. 19 : 297. 1861 ; Babu, Herb. Fl. Dehra Dun : 84. 1977.

Erect shrub. Leaves ovate-cordate; lower ones long petioled, 3-lobed; lobes entire, acuminate; upper ones on shorter petioles, cordate at base, scabridly stellately hairy above and stellate tomentose beneath. Flowers solitary, axillary, deep yellow with dark purple centre, 8-12 cm across; epicalyx-bracteoles 5, subulate, deciduous; calyx cupular, with 5 triangular-subulate segments; petals obliquely obovate, rounded-truncate; staminal tube 3 cm long. Capsules 2.5 cm long, globose to ovoid, mucronate, 5-angular, stellate hairy or glabrescent, valves woody.

Type : Philippines, Sonnerat s.n. (P-JU)

Fl. : Aug.-Oct. Frt. : Oct.-Dec.

Common element in mixed forest, along roads.

Achanakmar : 15437 ; Pasan to Laianga : 19120.

Africa, India, Sri Lanka.

It yields a strong fibre. The root and fruits are given in gonorrhoea.

URENA L., Sp. Pl. : 692. 1753 & Gen. Pl. ed. 5 : 309. 1754.

LT. : *U. lobata* L. vide N. L. Britton et P. Wilson, Scient. Surv. Porto Rico 5 : 558. 1924.

Urena lobata L. subsp. *sinuata* (L.) Borss. var. *sinuata* Borssum in Blumea 14 : 142. 1966; *U. lobata* L. Sp. Pl. 692. 1753, *pro part.*; Haines Botany 1:65.

Erect undershrubs; stems and branches stellate hairy. Leaves 5-7.5 cm long, deeply lobed, acute at tip, truncate at base, softly hairy on both surfaces; stipules linear. Flowers 1.5-2.5 cm across, pink with darker centre; epicalyx spreading or reflexed in fruit; calyx campanulate; corolla rotate; staminal column antheriferous only in upper half. Carpels 5, rounded on the back, densely stellate hairy, with many hooked bristles.

Lectotype : Ceylon, Herb. Hermann, Vol IV. fol. 34. (BM).

Fl. & Frt. : Aug.-Dec.

Common as forest undergrowths in scrub forests, waste places, along forest roads.

Kota : 13201; Korbi : 15341.

Pantropical.

It yields a fibre.

BOMBACACEAE

Kunth, Malvaa. 5 : 12. Mai 1822 (*Bombaceae*)

T. : *Bombax* L.

BOMBAX L., Sp. Pl. : 511. 1753 & Gen. Pl. ed. 5 : 227. 1754. *emend.*
A. Robyns, Bull. Jard. Bot. Brux. 33 : 84. 1963.

LT. : *B. ceiba* L. vide Robyns, Taxon 10 : 156 1961, et Bull. Jard. Bot. Brux. 33.I. 1963.

Bombax ceiba L. Sp. Pl. : 511. 1753. *pro part. quoad plantas asiaticas excl. syn. Bauhin*; Robyns in Taxon 10 : 157. 1961; Nicolson in Taxon 28 : 369. 1979; *Salmalia malabarica* (DC.) Sch. & Endl. Melet Bot. : 35. 1832; *Bombax malabaricum* DC. Prodr. 1 : 479. 1824; Haines, Botany 1 : 77. (*Semul*).

Large prickly, deciduous trees. Leaves digitately compound, leaflets 5-7, petiole 12-16 cm long; leaflets petiolate, 8-16 × 3-7 cm, elliptic, acute at tip, narrowed below, entire. Flowers deep red, solitary, usually on leafless branches; calyx campanulate, irregularly lobed, woolly within; petals usually 5, free, adnate to staminal tube, oblong, acute, hairy externally; stamens many, connate, branching into 5-6 fascicles; styles 5-branched. Capsules woody, 5-valved, velvety. Seeds many, covered with cottony hairs.

Lecto type: *Rheede*, Hort. Ind. Malab. 111. t. 52. 1682.

Fl.: Jan.-Mar. Frt.: Mar.-May.

Occasional in mixed dry deciduous forests.

Korba to Kudmura : 16805.

India to W. China, Malaysia.

Wood is used in packing cases and in match industry. The floss from the capsule is used as cotton for stuffing purposes. The tree is easily grown from seed and easily transplanted. Immersion of wood in water improves its durability.

STERCULIACEAE

Bartling, Ord. Nat. Pl. : 255, 340. 1830;

[Vent., Jard. Malm. 2 : sub t. 91. 1805 (*Sterculiacees*)]

T. : *Sterculia* L.

1a. Flowers unisexual or polygamous; petals absent	STERCULIA
1b. Flowers bisexual; petals present	
2a. Petals with long appendages	GYTINERIA
2b. Petals without appendages	
3a. Staminal tube adnate to gynophore	HELICTERES
3b. Staminal tube distinct from carpel and enclosing them	
4a. Petals deciduous; staminal-tube antheriferous throughout, anthers often with long filaments	ERICOLAENA
4b. Petals persistent; staminal-tube short, anthers 5, tubular below, without filament	
5a. Ovary 5-celled	MALOCHIA
5b. Ovary 1-celled	WALTHERIA

BYTTNERIA Loefling, Iter. Hisp. : 313. 1758, *nom. cons.*

T. : *B. scabra* Loefling ex L. (Syst. nat. ed. 10 : 939. 1759).

Byttneria herbacea Roxb. Pl. Corom. 1 : 28 t. 29. 1795, et Fl. Ind. 1 : 619. 1820; Haines, Botany 1 : 87.

Branched perennial undershrubs. Leaves simple, distant, ovate-lanceolate, acuminate, cordate at base, glabrescent; stipules linear, equalling petiole. Flowers in axillary cyme, deep red to pinkish-violet, bracteolate; sepals 5, shortly connate below; petals 5, free, adnate to staminal-tube, clawed; staminal-tube distinct from carpel; stamens 5, alternating with 5 staminodes, all fused at base into column; ovary 5-locular. Capsule septically 5-valved, globose-ovoid, covered with short prickles.

Fl. : June-Oct. Frt. : Oct.-Nov.

Common on hard rocky soil in west places, along roads, near cultivated fields.

Madai : 12886; Marwahi : 19011; Lamni : 19204; Siang : 16829; Korbi : 19096.

Throughout the warmer parts of Central and South India.

The roots are ground and applied on swellings of legs.

Note : *Sterculiaceae* Bartling is conserved against *Byttneriaceae* R. Br. in Flinders, Voy. Terra Austr. 2 : 540. 1814 (ICBN : 267. 1983).

ERIOLAENA A.P. DC., Mem. Mus. Hist. Nat. Paris 10 : 102. 1823.

T. : *E. wallichii* A.P. DC.

Eriolaena hookeriana Wt. & Arn., Prodri. 1 : 70. 1834 (*Eriochlaena*) ; Haines, Botany 1 : 84.

Shrubs. Leaves 6-10 cm across, roundish, broadly orbicular, acuminate, serrate, cordate, thinly stellate hairy or glabrescent above, rusty tomentose beneath. Peduncle 1-few-flowered, stellately pubescent, longer than petiole; bracteoles shorter than calyx, laciniate; flowers 4-5 cm across, yellow; sepals narrowly lanceolate, 5-parted; petals flat with dilated tomentose claws, deciduous; style pubescent; stigma 5-10. Capsules ovoid, tubercled, usually 8-10 valved, 2.5 cm long.

Fl. : Apr.-June. *Frt.* : Nov.-Jan.

Occasional in mixed forests, at the edge of forest on slopes.

Pendra : 15273; Khuria : 19308.

Western Peninsula, Nilgiri, Bihar.

The wood is strong and used for agricultural implements.

HELICTERES L., Sp. Pl. : 963. 1753 et Gen. P. ed. 5 : 411. 1754.

L.T. : *H. isora* L. vide N. L. Britton et Millspaugh, Bahama Fl. : 275. 1920.

Helicteres isora L., Sp. Pl. : 963. 1753; Haines, Botany 1:82.

Shrubs. Leaves oblique, shallowly cordate, broadly oblong or rounded, acute-acuminate at tip, crenate serrate, pubescent; stipules subulate, deciduous. Flowers solitary or in a few- flowered, minutely bracteolate cymes; scarlet red, 4 cm long; calyx brown-tomentose, tubular, 3-5-toothed, oblique at mouth; posterior 2 petals larger, winged towards tip, the other 3 narrow, auricled at tip; receptacle produced into elongated gynandrophore; stamens 10, on short staminal tube, terminating gynandrophore, hiding the 5 inwardly placed staminodes; styles 5, stigmatose at tip. Fruit of 5 spirally twisted, many-seeded 'follicles'.

Type : Habitat in Malabar. Herb. Linn. 1074.1 (LINN)

Fl. : Apr.-Dec. *Frt.* : Oct.-Jan.

Common on slopes, in mixed forests.

Khondra : 12809; Achanakmar : 15438; Khuria : 19310.

India, China, Malaya, Australia.

Masters (1874) distinguished three varieties :

- | | |
|---|-------------------------|
| 1a. Leaf surface nearly glabrous beneath | var. <i>glabrescens</i> |
| 1b. Leaf surface pubescent or tomentose beneath | |
| 2a. Leaf surface pubescent beneath | var. <i>isora</i> |
| 2b. Leaf surface tomentose beneath | var. <i>tomentosa</i> |

The specimens from Bilaspur represent var. *isora*.

Roots, bark and follicles are used in Ayurvedic medicine. It is a good source of strong fibre obtained from the bark. The fruit is of medicinal value in the treatment of gastric and intestinal disorders.

MELOCHIA L., Sp. Pl. : 674. 1753 & Gen. Pl. ed. 5 : 304. 1754

LT. : *M. corchorifolia* L. vide N. L. Britton et Millspaugh, Bahama Fl. 277. 1920.

Melochia corchorifolia L. Sp. Pl. : 675. 1753 ; Haines, Botany 1 : 85.

Erect shrubs or undershrubs. Leaves ovate-lanceolate, cordate or rounded at base, acute, coarsely irregularly serrate-incised to lobulate-dentate, glabrous. Flowers in subsessile, terminal, subglobose, many-flowered heads subtended by 1-4 leaves and linear-subulate 4.5-6 mm long stipules ; calyx tubular, truncate, 5-6-toothed, hispid hairy outside ; petals 5, 5-6 mm long, free, spatulate, obovate, pink ; filaments connate halfway up in the tube ; styles 5, connate at base. Capsules depressed-globose, hispid, 5-valved.

Type : Habitat in India : Herb. Linn. 855.6 (LJNN).

Fl. & Frt. : July-Oct.

Common along forest roads, forest clearings, edge of forest, waste places near streams and bunds of cultivated fields.

Siang : 16827 ; Karidongri : 19325 ; Pasarkhet : 16825 ; Korba : 8712 ; Pasarkhet to Siang : 19420 ; Hasdo river Bank : 8614.

Pantropical.

Stems yield fibre ; tender leaves are used as 'sag'.

STERCULIA L., Sp. Pl. : 1007. 1753, et Gen. Pl. ed. 5 : 438. 1754.

LT. : *S. foetida* L. vide M.L. Green, Prop. Brit. Bot. : 190. 1929.

Sterculia urens Roxb. Pl. Corom. 1:25. t. 24. 1795 ; Haines, Botany 1:79.

Trees with thin, white, papery peeling bark. Leaves 20 × 20 cm, orbicular, digitately 3-5-lobed, glaucous beneath ; stipules caducous. Inflorescences of racemes or panicles, axillary or terminal ; flowers small, reddish-brown ; calyx-tube 5-toothed ; petals absent ; receptacles produced into elongate gynandrophore ; stamens 15, crowded together at tip of gynandrophore ; carpels 5. Follicles acute at both ends, bristly hairy.

Fl. : Dec.-Feb. Frt. : Apr.

Common on dry rocky hill slopes in mixed dry deciduous forests.

Katghora : 3738 ; Khutia : 15456.

India, Sri Lanka.

Gum is used in medicines and textile industries. The seeds are roasted and eaten. The barks yield fibre.

WALTHERIA L., Sp. Pl. : 673. 1753 & Gen. Pl. ed. 5 : 304. 1754.

LT. : *W. americana* L. vide N. L. Britton, Fl. Bermuda 242. 1918.

Waltheria indica L. Sp. Pl. : 673. 1753. R. Br. Tuck. Narr. Exp. Cong. : 484. 1818 ; Haines, Botany 1 : 85 ; Adams, Fl. Pl. Jamaica : 483. 1972 ; *W. americana* L., Sp. Pl. : 673. 1753.

Erect, suffruticose, stellate-pubescent shrubs. Leaves broadly ovate oblong or lanceolate oblong, obtuse or rounded at apex, rounded or subcordate at base, irregularly serrate. Flowers yellow, in sessile or shortly peduncled, axillary and terminal clusters, bracteate ; calyx 5-partite, pubescent, lobes lanceolate-subulate, acuminate, 4 mm long ; petals 5, clawed, as long as or scarcely longer than the calyx, ob lanceolate, glabrous except hairy at the top ; stamens 5 ; styles hairy. Capsules obovoid, enclosed by withering calyx, pilose at top, 2-valved.

Type : Fl. Herb Linn. 852. 3 et 4 (LINN).

Fl. & Fr. : July-Dec.

Occasional in dry hard soil, in waste places.

Korbi : 15340.

Throughout the tropics.

R. Brown (1818) was the first to accept *W. indica* L. as the correct name of the combined taxon, reducing *W. americana* as a synonym. Although the latter is the lectotype species of the genus, the correct name is *W. indica* L. (Art. 57. 2, Ex. 3).

TILIACEAE

A.L. Juss. Gen. Pl. : 289. 1789.

T. : *Tilia* L.

- 1a. Basal serrations of lamina mostly glandular ; ovary with uncinate hairs ; capsules covered with uncinate spines TRIUMFETTA
- 1b. Basal serrations of lamina mostly eglandular ; ovary glabrous or with simple stellate hairs ; capsules or drupes without spines.
- 2a. Herbs, rarely undershrubs ; petals not clawed, neither pitted nor glandular at the base ; fruits elongated or subglobose capsules COCHORUS

- 2b. Trees or shrubs; petals clawed, thick, pitted or glandular at base; fruits entire or lobed, 1-4 pyrened drupes

GREWIA

CORCHORUS L., Sp. Pl. : 529. 1753 & Gen. Pl. ed. 5 : 234. 1754.

LT. : *C. olitorius* L. vide N. L. Britton et Millspaugh, Bahama Fl. : 262. 1920.

- 1a. Leaf-blade without setose or filiform appendages at base; stamens 5-10; capsules 1.5-2 cm long, cylindric 3-valved, beak short, pubescent

C. fascicularis

- 1b. Leaf-blade with setose or filiform appendages at base; stamens many; capsules 5-6 cm long; 10-ribbed, 5-valved, beak long, glabrous

C. olitorius

Corchorus fascicularis Lam. Encycl. Meth. Bot. 2:104. 1786 : Haines, Botany 1:90.

Perennial, suffruticose shrubs or undershrubs. Leaves 2.5-5 cm long, narrowly oblong-lanceolate, serrate; petiole short, pilose; stipules linear acuminate. Peduncle 2-5-flowered, leaf-opposed, lateral or sub-axillary. Flowers small, yellow; sepals linear, apiculate; petals oblong-obovate; stamens 5-10. Capsules 3 or 4 together, short, cylindric, hairy, shortly-beaked; fascicled, 1.5-2 cm long.

Type : Pluk. Amalthe. Bot. 85. t. 439. fig. 6. 1705.

Fl. : July-Sept. Frt. : Oct.-Nov.

Occasional in waste grounds, edge of forests, forest clearings.

Bilaspur : 12993 ; Khuria : 15462 ; Hasdo river bank : 8627.

Africa, India, Sri Lanka, Tropical Australia.

The fibre extracted from the plants is used for making ropes. The plant, on grinding, forms a mucilaginous jelly-like substance which is used in seminal and general weakness as a tonic and is valued as an astringent and restorative (Ghafoor, 1974).

C. olitorius L., Sp. Pl. : 529. 1753 ; Haines, Botany 1 : 90.

Erect glabrous herb. Leaves ovate oblong to lanceolate, crenate serrate, glabrous except veins beneath; two of the serratures near the base of some or all the leaves produced into slender tails. Flowers 1 or 2 together, subsessile, axillary or leaf-opposed; sepals oblong, mucronate, cucullate at apex; petals spathulate, retuse, with ciliate claws. Capsule longitudinally grooved with purplish streaks along grooves, hispidulous when young.

Type : Described from India, Herb. Linn. 691. 5 (LINN)

Fl. & Fr. : July-Oct.

Common in waste places, as an escape from cultivation.

Khondra : 12711.

Africa, India; cultivated in tropical countries.

The bark-fibres yield 'Jute' of commerce, obtained from the sclerenchymatous lignified secondary phloem elements. The leaves are useful in chronic cystitis, gonorrhoea, and dysuria and their infusion is given as tonic and febrifuge. The seeds have purgative properties and the fruit contains ascorbic acid (Gafoor, 1974).

GREWIA L., Sp. Pl. : 964. 1753 & Gen. Pl. ed. 5 : 414. 1754.

LT. : *G. occidentalis* L. vide M.L. Green, Prop. Brit. Bot. 186. 1929.

- 1a. Leaf broadly ovate, suborbicular or obliquely ovate, often cordate, 5-veined; stipules leafy, falcate, acuminate, auriculate, sagittate *G. tiliifolia*
- 1b. Leaves lanceolate or ovate lanceolate, 3-4 (-5)-veined; stipules linear subulate or ensiform
 - 2a. Leaves 4 (-5)-veined, glabrous above, white hoary tomentose beneath; flowers yellow; fruits globose
 - 2b. Leaves 3-veined, glabrescent or pilose above, densely stellate tomentose or pilose on veins beneath; flowers white; fruits lobed *G. rothii*
 - 3a. Trees; leaves 10-15 × 3.5-5.5 cm; glabrescent, veins pilose beneath; flower-buds ovoid, ribbed; pubescent; peduncles much longer than petiole; drupes 2-lobed; stones 1-celled *G. glabra*
 - 3b. Undershrubs; leaves 6.5-9.5 × 2.5-3.5 cm; pilose above, densely stellate tomentose beneath; flower-buds oblong-obtuse, pilose, not ribbed; peduncles as long as or only slightly longer than petiole; drupes 4-lobed; stones 2-celled *G. hirsuta*

Grewia glabra Bl., Bijdr. : 115. 1825; Burret, Notizbl. Bot. Gart. Berlin-Dahlem 9:676.1926. *G. levigata* auct. non Vahl 1794; Masters, FBI 1:389. 1874. *G. disperma* auct., non Rottler ex Spneng. (1825); Haines, Bot. 1:95.

Evergreen trees. Branchlets shortly pubescent, slender. Leaves lanceolate, acute to acuminate, serrate, narrowed at base, glaucous beneath, 8 × 3 cm. Inflorescences cymes, axillary, peduncles 2-3 together, 2-3-flowered; flowers white, turning pale; sepals 3-veined, lanceolate, pubescent externally; petals

oblong-lanceolate, half as long as sepals. Drupe fleshy, 2-lobed, hairy, becoming glabrous with age, drying black.

Fl. : June-Oct. *Frt.* : Dec.-Feb.

Common in mixed forests along streams.

Khondra : 12798; Aurapani to Rajak : 15480; Achanakmar : 13207.

Africa, India, Malaysia.

Ghafoor (1974) and Ramesh (1984) treat *G. glabra* Bl. as the correct name for *G. laevigata sensu* Masters (l.c.), *non* Vahl (1790). Hara *et al.* (1979) suggest that the earliest name for this very variable species may be *G. serrulata* DC. (*Prodr.* 1:510, 1824).

The fibre extracted from the bark is used for cordage, but is not of much commercial value.

G. rothii DC. *Prodr.* 1 : 509. 1824; [\cong *G. bicolor* Roth (1821), *non* Juss.] Haines, Botany 1 : 98. *G. excelsa* auct., *non* Vahl (1790); Masters, FBI 1 : 285. 1874.

Evergreen shrubs; sometimes scandent with hoary branches. Leaves oblong or ovate-lanceolate, acuminate, finely serrulate or crenulate; stipules linear. Flowers in axillary cymes; peduncles 2-6, slender, 1.5-2.5 cm long, each with 3 very slender pedicels, flowers brownish-yellow, 3-5 mm across; sepals linear; petals oblong, half as long as sepals. Fruits sub-persistently hoary, globose.

Type: In India orientalis.

Fl. : Apr.-Sept. *Frt.* : June-Oct.

Common in mixed forests.

Madai : 12901; Pasan : 19073. 13277A; Siang : 19404.

Africa, India.

G. hirsuta Vahl, *Symb. Bot.* 1 : 34. 1790; Wight, *Ic.* : t. 76. 1838; Haines, Botany 1 : 93.

Diffused shrubs; branches tomentose or stellately villosus all over. Leaves distichous, acute or acuminate, cordate at base, irregularly serrate, glaucous hairy beneath, stellate hairy above when young. 4-5.5 x 2-3 cm. Inflorescences cymes, axillary, peduncles 1-3 together, 2-4-flowered; flowers white, turning pale; sepals lanceolate acute at both ends, hairy externally; petals oblong, half as long as sepals; stamens many, free, borne on a torus; ovaries 2-locular; ovules 2-many in each; stigmas 2-5-lobed. Fruits drupeaceous; drupes fleshy, entire or 2-lobed.

Fl. : July-Sept. *Frt.* : Nov.-Jan.

Common in open mixed forests.

Pasan to Korba : 19087; Keonchi : 19151.

Nepal, India, Sri Lanka, Burma.

G. tiliifolia Vahl, Symb. 1 : 35. 1791; Bedd., Fl. Sylv. t. 108. 1871; Haines, Botany 1 : 95. (*Dhaman*).

Large shrubs or small trees. Leaves orbicular, cordate, acute, serrate, pubescent, glabrous with age. Inflorescences in clustered axillary cymes, usually 3-flowered; peduncles 1 cm long; flower-buds ovate-oblong; flowers yellow; sepals oblong, acute, hairy externally, 0.6-1.25 cm long; petals oblong, emarginate. Drupes 2-lobed, in bunches, black when ripe, fleshy; nuts 3-6-celled.

Fl. : Apr.-July. *Frt.* : Aug.-Oct.

Common in mixed forests.

Kabirchabutra : 19158; Kota : 19300; Marwahi to Pasan : 19071.

Tropical Africa, India, Sri Lanka, Burma.

Fruits are edible. Wood is strong and elastic and is suitable for agricultural implements.

TRIUMFETTA L., Sp. Pl. : 444. 1753 et Gen. Pl. ed. 5 : 203. 1754.

T. : *T. lappula* L.

- 1a. Leaves always unlobed, lanceolate, or ovate-lanceolate, acuminate; flowers 1 cm or more across; bristles on burr exceeding diam. of capsule *T. pilosa*
- 1b. Leaves lobed, orbicular, rhomboid or roundish, apex rounded or lobed; flowers less than 1 cm across; bristles on burr not exceeding diam. of capsule
- 2a. Herbs; leaves glabrescent or hairy on both surfaces; sepal linear; petals glabrous below; stamens mostly 5, rarely 10; fruits oblong or ovoid *T. pentandra*
- 2b. Shrubs or undershrubs; leaves tomentose beneath, glabrescent above; sepals oblong apiculate; petals ciliate at base; stamens mostly 15 (not less than 10); fruits globose
- 3a. Lower leaves 3-5-lobed; stamens 10-15; spines on capsules glabrous *T. rhomboidea*
- 3b. Lower leaves broadly ovate-orbicular; stamens 15-25; spines on capsules pubescent *T. rotundifolia*

Triumfetta pentandra A. Rich. in Guill. et Perr., Fl. Seneg Tent 1 : 93. t. 19. 1831. *T neglecta* Wt. & Arn. Prodr. : 75. 1834; Haines, Botany 1 : 89.

Erect annual or perennial herbs or undershrubs. Leaves rounded, subcordate, acuminate, 3-to 5-palmatislobed, serrate, hairy on both surface; upper leaves lanceolate. Flowers reddish, in extra-axillary, cymose-clusters combined to form interrupted racemes; sepals linear; petals oblong, obtuse; stamens 5-10. Fruits indehiscent, covered with hooked spines; spines ciliate in upper parts.

Type : Described from Senegambia (W. trop. Africa).

Fl. & Frt. : Sept.-Dec.

Occasional in waste places, forest clearings.

Katghora : 8618; Kabirchabutra : 15203.

Africa, India, Sri Lanka.

T. pilosa Roth, Nov. Pl. Sp. : 223. 1821; Haines, Botany 1 : 88.

Erect undershrubs; densely hispid with tubercle-based stellate hairs. Lower leaves 3-lobed, upper ovate or ovate-lanceolate, unequally toothed, cordate or sub-cordate at base, thinly hairy above and densely pubescent beneath; stipules subulate aristate. Flowers yellowish, 1-1.3 cm across; sepals linear, apiculate, stellate hairy; petals shorter than sepals, clawed below, oblong-spathulate, ciliate on claws; stamens 10. Capsules globose, tormentose, 5-6 cm across; prickles hooked and ciliate along lower edge and glabrous along upper edge.

Type : Described from India.

Fl. : Sept.-Nov. Frt. : Nov.-Jan.; flowers generally open in the evening.

Occasional near nallas, edge of the forest, road-sides.

Khondra : 12801; Lamni : 13249A, 13365.

Africa, India, Sri Lanka, Thailand to Vietnam.

T. rhomboidea N. Jacq. Enum. Pl. Carib. : 22. 1760; Haines, Botany 1 : 89; *Bartramia indica* L. Sp. Pl. 378. 1753, non *Triumfetta indica* Lam. 1792. *Triumfetta bartramia* L. Syst. Nat. ed. 10. 2 : 1044. 1759, nom. illegit.

Erect perennial undershrubs. Leaves ovate rounded to rhomboid, acute; lower ones deeply 3-lobed; upper ones lobed or entire; all leaves subcordate or rounded to cuneate at base; covered with bulbous based stel-

late hairs. Flowers in dense cymes, yellow, 6-7 mm long; sepals oblong, mucronate, stellate hairy outside; petals clawed below, ciliate at base. Capsules globose or ovoid pubescent and with hooked spines. 5 mm across.

Type : Habitat in Insulis Carihaeis Vicinaque Americas contenta.

Fl. & Frt. : Oct.-Jan.

Common in coarse sandy beds of nala, waste places, edge of forests.

Pasan : 13274.

Africa, India, east to China, Malaysia.

Stems yield a soft glossy fibre. The sub-mucilaginous leaves are used as a pot-herb. The leaves, flowers and fruits are demulcent, astringent and given in gonorrhoea. The bark and fresh leaves are used in diarrhoea and dysentery. The seeds are anthelmintic.

T. rotundifolia Lam. Encycl. Meth. Bot. 3 : 421. 1789 ; Haines, Botany 1 : 89. *T. orbiculata* DC., Prodr. 1 : 506. 1824.

Erect suffruticose undershrubs. Leaves orbicular, unequally crenate, serrate, densely grey tomentose beneath, glabrescent above; stipules subulate. Flowers in interrupted racemes, yellow; sepals linear-oblong, apiculate; tomentose outside; petals oblong, ciliate at base, clawed; stamens 20. Fruits globose, pubescent with hooked, pubescent bristles.

Fl. & Frt. : Sept.-Dec.

Fairly common on dry waste grounds, forest clearings, along roads.

Bilaspur to Seput : 12995.

Endemic to the Indian subcontinent.

LINACEAE

S.F. Gray, Nat. Art. Pl. 2 : 622, 639. 1821 (*Lineae*).

T. *Linum* L.

1a. Erect annual herbs; leaves linear to lanceolate, sessile; stipules absent; styles 5; capsules 10-locular; seeds compressed

LINUM

1b. Diffused undershrubs or shrubs; leaves elliptic-lanceolate, petiolate; stipules present; styles 3, rarely 4; capsules 6-8-locular; seeds reniform

REINWARDTIA

LINUM L., Sp. Pl. : 277. 1753 & Gen. Pl. ed. 5 : 135. 1754.

LT. : *L. usitatissimum* L. vide J. K. Small, N. Amer. Fl. 25 : 67. 1907.

Linum usitatissimum L. Sp. Pl. : 277. 1753 ; Haines, Botany 1 : 155.
(*Alsi, flax*).

Erect annual herbs. Stems solitary below, corymbosely branched above. Leaves linear-lanceolate to oblong, acute, sub-3-veined. Flowers in terminal and leaf-opposed broad cymes, 1-2.5 cm across, bluish-violet coloured; sepals ovate-lanceolate, acuminate, with scarious hairy margins, petals obovate, rounded-truncate, dentate-crenate; stigma linear-clavate. Capsules globose, 5-ribbed. Seeds slimy wetted.

Type : Described from Southern Europe; Herb Linn. 396.1 (LINN).

Fl. : Jan. Frt. : Feb.-May.

Commonly cultivated; also found as escapes from cultivation.

Neur : 16725.

India, Western Asia.

'Flax' is grown for its bast fibres from which linen cloth and ropes are made. Linseed oil (*Alsi-ka-Tel*) is extracted from the seeds which is used medicinally and for burning, while the seed-cake is used for feeding cattle.

REINWARDTIA Dumort : Comment. Bot. : 19. 1822.

T. : *R. indica* Dumort.

Reinwardtia Indica Dumor. Comm. Bot. : 19. 1822. *R. trigyna* Planch. in Hook. Lond. Jour. Bot. 7 : 522. 1848 ; Haines, Botany 1:155. *Linum trigynum* Roxb. in As. Res. 6:357. 1799. *nom illegit, non* L. 1753.

Diffused bushy shrubs or undershrubs. Leaves elliptic-ob lanceolate to ovate-oblong alternate at base. Bracts imbricate, in 2-3 pairs, linear. Flowers 2.5 cm across, showy, solitary, axillary and terminal, yellow; sepals lanceolate-oblong, acute, 1.2-1.5 cm long; petals obovate, rounded-truncate, 2-3.5 cm long; filaments of fertile stamens unequal; styles usually 3. Capsules globose, shorter than the calyx, 0.5-0.6 cm across.

Type : Roxb. Ic. 1048 (K, CAL).

Fl. & Frt. : Oct.-Apr.

Common on hill slopes, on shady banks and ravines.

Kabirchabutra : 13388 ; Lamni : 13252A.

India, Burma, Thailand to Vietnam, China.

A very variable species in size and shape of leaves, flowers, length of pedicels, size and shape of sepals and number of styles. The plant is ornamental.

GERANIACEAE

A.L. de Juss., Gen. Pl. : 268. 1789. (*Gerania*)

T: *Geranium* L.

GERANIUM L., Sp. Pl. : 676. 1753 & Gen. Pl. ed. 5 : 306. 1754.

LT. : *G. sylvaticum* L. vide J. K. Small, N. Amer. Fl. 25 : 4. 1907.

Geranium mascatense Boiss. Diagn. 1:59. 1843 ; Fl. Orient. 1 : 882. 1867 ; *G. ocellatum* Cambess. in Jacq. Voy. Ind. 4 (Bot). 33. t. 38. 1884 ; Haines, Botany 1:161. Fig. 8

Annual, prostrate, caespitose herbs ; glandular hairy to pubescent. Basal leaves crowded, long petioled ; upper ones in remote pairs, short petioled ; orbicular-subreniform, palmately 5-7-fid or partite, 5-8 cm across, segments obovate-cuneate ; peduncles 2-flowered. Flowers purple with dark purple centre, 1.5-2 cm across ; sepals ovate, broad or cordate, mucronate, 0.5 cm long, glandular-hairy outside ; fruiting calyx erect, closely appressed to fruits ; petals obovate, 0.8-1 cm long ; perfect stamens 10, rarely fewer. Capsule stalk, 1-1.2 cm long ; carpels corrugated.

Fl. : Oct.-Dec. Frt. : Dec.-Apr

Frequently found in wet, muddy places.

Kabirchabutra to Chauradadar : 15226.

Afghanistan, India.

Leaves are used medicinally.

OXALIDACEAE

R. Br. in Tuckey, Narr. Expl. Congo 433. 1818. (*Oxalideae*)

T. *Oxalis* L.

1a. Leaves digitately or pinnately 3-foliate, never crowded at apices of aerial stems ; capsules longitudinally dehiscent, valves cohering with axis

OXALIS

1b. Leaves pinnate with more than 3 pairs of leaflets, crowded at apices of aerial stems ; capsules stellately 5-valved ; valves usually separating from axis to base

BIOPHYTUM

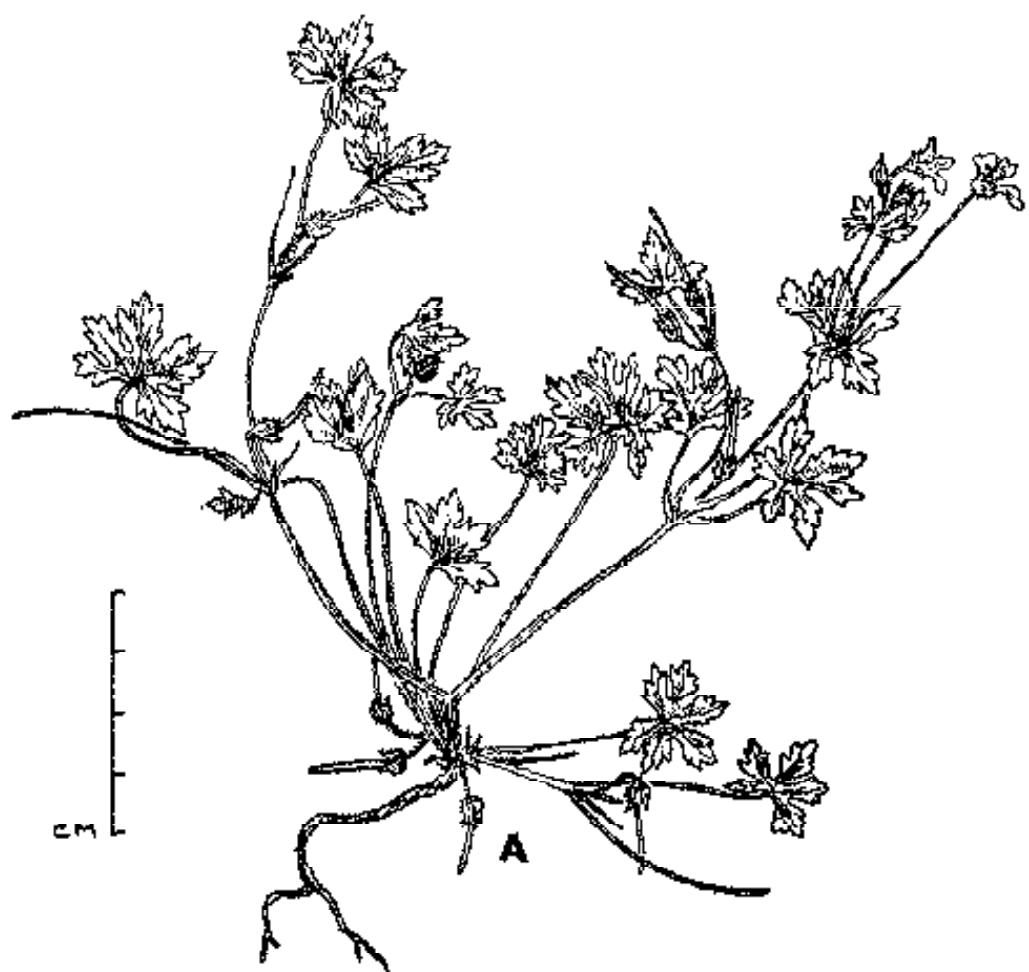


Fig. 8. *Geranium macrorhizum* Boiss.
A. Entire plant with flowers and young fruits.

BIOPHYTUM A. DC., Prodr. 1 : 689. 1824.

LT. : *B. sensitivum* (L.) A. DC. (*Oxalis sensitiva* L.) vide J. K. Small, N. Amer. Fl. 25 : 57. 1907.

- 1a. Leaves with 3-9 pairs of leaflets; leaflets orbicular to elliptic, mid-vein arched, veins more or less perpendicular to midrib; flowers sessile *B. petersianum*
- 1b. Leaves with 7-20 (-32) pairs of leaflets; leaflets elliptic-lanceolate to oblong-lanceolate, mid-veins more or less straight and median, veins oblique to midrib; flowers distinctly peduncled
 - 2a. Leaflets coriaceous, midribs thick upto 1.5 mm; sepals more or less equaling petals, in fruits 4-7 mm long, longer than pedicels, 1.5-2 times as long as fruits *B. sensitivum*
 - 2b. Leaflets membranous, midribs slender, thick upto 0.5 mm; sepals more or less half as long as petals, in fruits 2.25-4 mm long, shorter than pedicels, more or less as long as fruits *B. reinwardtii*

Biophytum petersianum Klotzsch in Peters, Reise Mossamb. Bot. 1 : 81. t. 15. 1862; Veldkamp in Fl. Maks. Ser. I. 7 : 161. fig. 3a-c. 1971.
B. apodiscias (Turcz.) Edgew. & Hook. f. in FBI 1 : 437. 1874; Haines, Botany 1 : 161. *Oxalis apodiscias* Turcz. Bull. Soc. Nat. Moscou 36 : 595. 1863.

Erect annual herbs upto 5 cm tall with simple stems. Leaves glabrous to appressed-pubescent; leaflets often overlapping, 5-7 pairs, small shortly and reniformly obovoid widening towards rounded tip, coriaceous, terminal leaflets 1.5-1.75 times as long as the preceding, 2-8×2-5 mm, obovate; other leaflets triangular to orbicular-elliptic; glabrous or sparsely ciliate on margins. Flowers solitary; sepals ovate-lanceolate, acute, sparsely hairy, in fruits 5-8-nerved, more or less exceeding pedicels; petals lanceolate, 5-6 × 1 mm, apex retuse, yellow in lower half, orange in upper half. Fruits 3-4 × 2-2.5 mm; seeds tubercled.

Fl. & Fr. : Sept.-Oct.

Occasionally found in moist shady places.

Pasarkhet : 12960.

India, Java.

B. reinwardtii (Zucc.) Klotzsch. in Peters. Reise Mossamb. Bot. 1 : 85. 1862; Haines, Botany 1 : 162. *Oxalis reinwardtii* Zucc. in Munch. Abhand. 1 : 274. 1830.

Erect, annual hairy herbs with simple stems 5-15 cm high. Stems clothed with reflexed hairs. Leaves even-pinnate with rachis ending in subulate tip; leaflets 10-20 pairs, subsessile, opposite; lower ones smaller lanceolate-oblong, upper ones larger, falcate, cuneate, tip rounded. Flowers in pseudo-umbellate clusters, on 25 cm long peduncles; calyx 0.3-0.4 cm long, glandular hairy on back; corolla yellow, 0.4-0.45 cm long. Capsules globose, glandular hairy at top, 0.3-0.32 cm long; seeds spirally furrowed.

Fl. & Frt. : July-Dec.

Frequently found in moist, shady rocky places.

Madai to Korba : 12925A ; Lamni : 19254.

India, Sri Lanka, S. China, Malaysia.

B. sensitivum (L.) DC. Prodr. 1 : 690. 1824 ; Haines, Botany 1 : 161 ; *Oxalis sensitiva* L., Sp. Pl. 434. 1753. Fig. 9 (I-L)

Erect, stout, annual herbs upto 20 cm. Stems with appressed or erecto-patent hairs. Leaves 4-12 cm long. Leaflets 8-15 pairs, glabrous. Flowers in pseudo-umbellate clusters on peduncles 0.3-0.9 cm long; peduncles not clubbed at the top; calyx 0.4-0.8 cm long, longer than pedicels, sometimes equalling or shorter; corolla yellow, 5-7 cm long; petals oblong-obovate. Capsules 0.3-0.35 cm long, elliptic; seeds with tubercled ridges.

Type : Herb. Linn. 600.37 (LINN).

Fl. & Frt. : July-Oct.

Common in moist shady places on sandy alluvium.

Madai to Korba : 12925 ; Bilaspur to Champa : 19374 ; Lamni : 19254A.

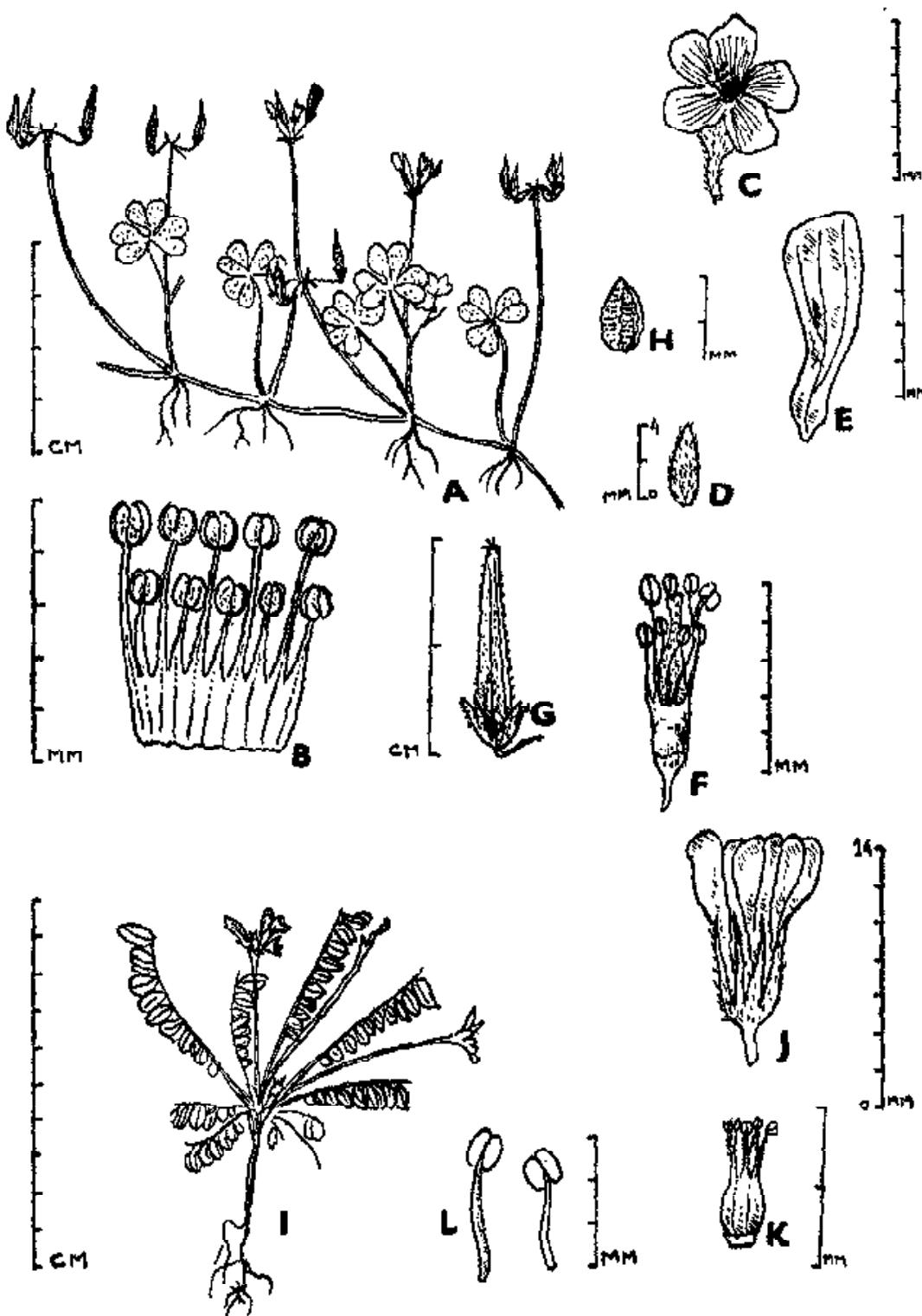
Tropical Africa, India, Sri Lanka, Thailand, China, Malaysia.

OXALIS L, Sp. Pl. : 433. 1753 & Gen. Pl. ed. 5 : 1754.

L.T. : *O. acetosella* L. vide J. K. Small, N. Amer. Fl. 25:25. 1907.

Oxalis corniculata L. Sp. Pl. : 435. 1753 ; Haines, Botany 1:162 ; Eiten in Taxon 4 : 99. 105. 1955. (*Khatri-but*). Fig. 9(A-H)

Perennial, appressed-hairy herbs. Stems creeping with ascending or suberect branches. Leaves digitately 3-foliate; long-petioled; leaflets subsessile, obovate, cuneate or acute at base, 0.6-1.8 × 1.2-2.5 cm; stipules adnate to petioles. Flowers 2-8, yellow, in umbellate clusters, borne on 0.5-8 cm long peduncles; bracts setaceous; sepals lanceolate oblong, notched, 0.6-0.8 cm long. Capsules oblong, narrowed at apex, pubescent, 1.5-2 cm long.

Fig. 9. (A-H) : *Oxalis corniculata* L.

A. Habit. B. Stamens united below and in two whorls. C. Flower.

D. Flower bud. E. Petal. F. Staminal tube.

Fig. 9. (I-L) : *Biophytum sensitivum* (L.) DC.

I. Habit. J. Flower. K. Staminal whorl. L. Stamens.

Type : Described from Italy and Sicily, Herb. Linn. 600.31 (LINN)

Fl. & Frt. : Throughout the year, generally Mar.-Dec.

Common in shady places, river banks, wall-margins, gardens, cultivated fields, roadsides, forest edges etc.

Keonchi : 19154.

Pantropical.

Very variable in habit, size and shape of leaflets and degree of hairiness.

The leaves are used as a vegetable. The juice of the plant mixed with onion is used to remove warts.

BALSAMINACEAE

A. Rich., Dict. Class. Hist. 2 : 173. 1822 (*Balsamineae*).

T. : *Balsamina* P. Miller, *nom. illeg.* (= *Impatiens* L.)

Note : Although Balsaminaceae A. Rich. is based on an illegitimate generic name, it is conserved Art. 18. 3. (App. II; ICBN : 253. 1983).

IMPATIENS L., Sp. Pl. : 937. 1753 & Gen. Pl. ed. 5 : 403. 1754.

LT. : *I. noli-tangere* L. vide Rydberg, N. Amer. Fl. 25 : 93. 1910.

Impatiens balsamina L. Sp. Pl. : 938. 1753 ; Haines, Botany 1 : 163. (Gul Mehandi). Fig. 10

Erect, sparsely hairy or glabrous herbs with stilt roots from lower nodes. Leaves narrowed into a short petiole, acutely serrate, 6-15 × 1.5-2.5 cm. Flowers 1-3 together in leaf-axils, 2.5-3 cm across; sepals 0.3-0.35 cm long; calcarate sepal ovate-oblong, petaloid with yellowish blotch inside, 1.2-1.5 cm long; spur 0.2-0.3 cm long; standard notched; wings with 0.4-0.5 cm long, ovate-rounded auricle, deeply notched. Capsules ovoid-ellipsoid, acuminate, pubescent, 1.5-2.5 cm long.

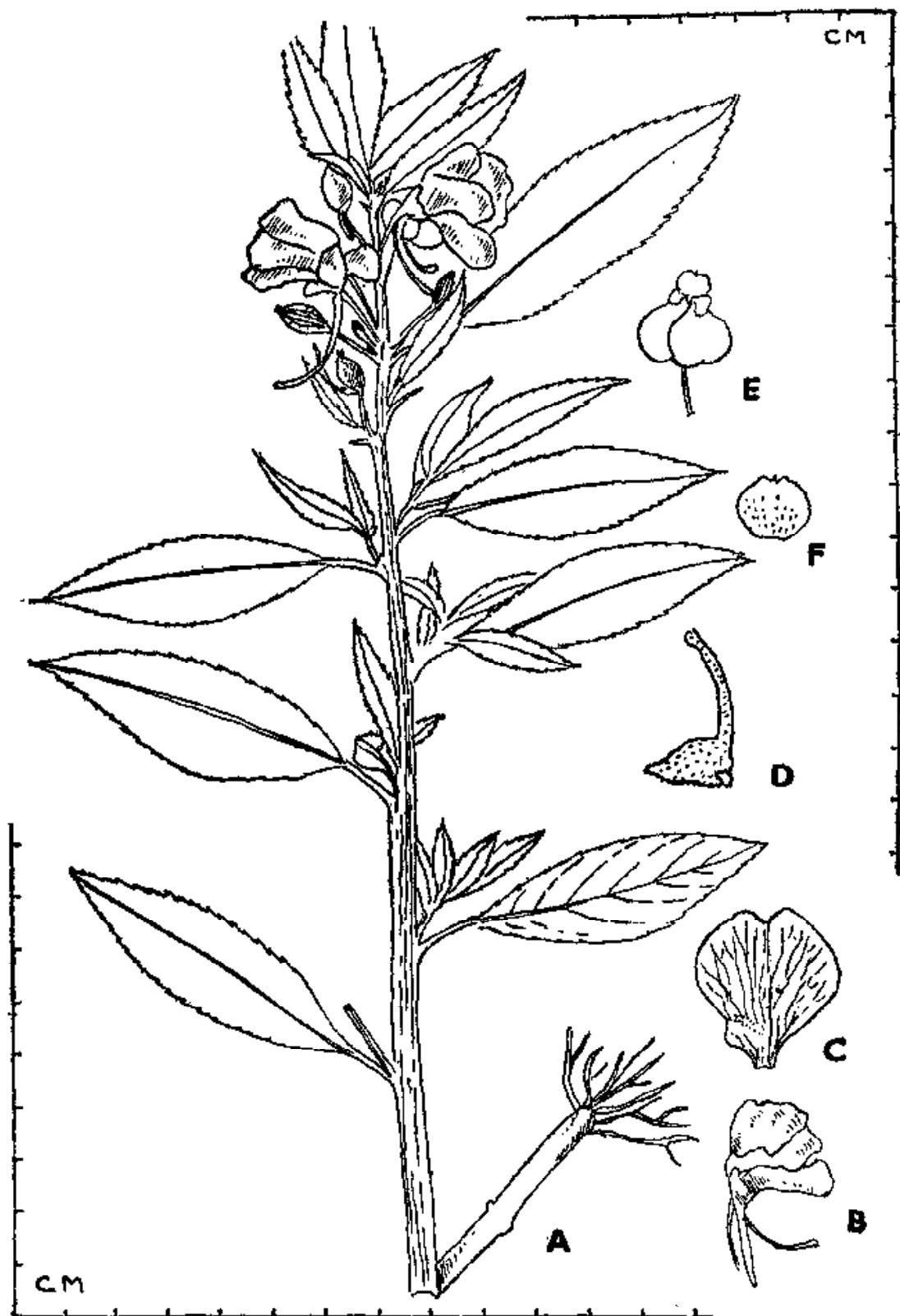
Type : Herb. Linn. 1053. 34 (LINN).

Fl. & Frt. : July-Sept.

Common along river banks, waste places.

Korba : 19451.

Native of S.E. Asia (Hara *et al.* 1979) ; the 'Garden-Balsam' or 'touch me not' is variable in size, pubescence and colour of the flowers. The species has given rise to many cultivars of the garden-balsam.

Fig. 10. *Impatiens balsamina* L.

A. Habit. **B.** Flower. **C.** Petal. **D.** Spur. **E.** Flower without spur and larger petal.
F. Seed.

RUTACEAE

A. L. Juss., Gen. Pl. : 296. 1789.

T. : *Ruta* L.

Citrus limon (L.) Burm. f., *C. medica* L., *C. aurantiifolia* (Christm.) Swingle (*kaghazi nimboo*), *C. maxima* (Burm.) Merr. (Chakotra) are cultivated in the area.

- 1a. Stamens 6-8, anthers broadly ovoid; ovules 1 or 2 in each cell ATALANTIA
- 1b. Stamens 10 or more, anthers linear-oblong; ovules many in each cell.

 - 2a. Leaves 3-foliate; stamens 20-60; ovaries 8-many-loculed AEGLE
 - 2b. Leaves pinnate; stamens 10-12; ovaries 3-6-loculed.
 - 3a. Ovaries 3-loculed; fruits 3-valved capsules CHLOROXYLON
 - 3b. Ovaries incompletely 5-6-loculed; fruits globose berries LIMONIA

AEGLE Cort. in Trans. Linn. Soc. Lond. 5 : 222. 1800. *nom. cons.*

T. : *A. marmelos* (L.) Correa (*Crateva marmelos* L.)

Aegle marmelos (L.) Cort. in Trans. Linn. Soc. Lond. 5:223. 1800; Haines, Botany 1 : 173; *Crateva marmelos* L. Sp. Pl. : 444. 1753. (Bel.).

Deciduous, thorny trees. Leaflets ovate-lanceolate, laterals sessile, terminal stalked. Flowers large, greenish-white, sweet scented, in axillary panicles; pedicels and calyx pubescent; calyx small, 4-5-toothed; petals 4-5, spreading, imbricate; stamens 20-60, inserted round an inconspicuous disk; filaments short, subulate; ovaries ovoid; stigmas capitate. Fruits large, globose-ovoid.

Fl. & Frt. : Mar.-May.

Common elements of the dry deciduous forests; also planted.

Kota : 13077; Achanakmar : 15441; Lamni : 19268; Katghora : 3714.

India, Burma, Thailand to Vietnam, Malaysia.

Pulp is edible and is used for medicinal purposes in diarrhoea and dysentery. The root-bark and leaves are also used medicinally. A good gum exudes from the stems, and a dye is prepared from the rind of the fruit. The leaves are offered to Lord Shiva in worship.

ATALANTIA Correa in Ann. Mus. Natl. Hist. Nat. Paris. 6 : 383, 385,
386. 1805. *nom. cons.*

T. : *A. monophylla* A.P. de Candolle.

Atalantia monophylla DC. Prodr. 1 : 535. 1824; Haines, Botany 1:167.
Limonia monophylla Roxb., Pl. Corom. I, t. 82. 1789, *non* L. 1767.

Medium-sized, thorny tree. Leaves alternate, 1-foliolate, coriaceous, ovate-elliptic, elliptic or lanceolate. Flowers fascicled or in short axillary racemes or corymbs, white; calyx irregularly 3-5-lobed or partite, split to base on one side; petals 3-5, adnate at base to staminal tube; filaments monadelphous; ovary usually 4-celled, sessile on short disk; stigma clavate. Fruits round, wrinkled.

Fl. : Oct.-Dec. *Frt.* : Apr.-May.

Occasionally found in the mixed forest near streams.

Pasarkhet to Madanpur : 19425.

India, Sri Lanka.

CHLOROXYLON DC., Prodr. 1 : 625. 1824, *nom. cons.*

T. : *C. swietenia* DC. (*Swietenia chloroxylon* Roxb.)

Airy Shaw (Dict. Flow. Pl. & Ferns : 245. 1973) includes *Chloroxylon* DC., in the Flindersiaceae (Engl.) C. T. White ex Airy Shaw, but Hutchinson, in Fam. Flow. Pl., 3rd. edn. : 436. 1973, includes the Flindersiaceae C. T. White and Record (1931) in the Rutaceae Juss. Voss *et al.* (ICBN, App. III, No. 4065, 1983) who include *Chloroxylon* DC., *nom. cons.* in the Rutaceae, do not list the family Flindersiaceae in the Appendix II. (*Nomina Familiarum Conservanda*). Gandhi in Flora Hassan (1976) comments. "The genus (*Chloroxylon* DC.) with its capsular fruits and alate seeds, was included in the Meliaceae by Bentham and Hooker, although it has glandular-punctate leaves". Airy Shaw (1973) considers that the Flindersiaceae comprising the two genera *Flindersia* R. Br. and *Chloroxylon* DC. is somewhat intermediate between the Rutaceae and the Meliaceae.

Chloroxylon swietenia DC. Prodr. 1:625. 1824; Haines, Botany 1:179;
Swietenia chloroxylon Roxb. Pl. Corom. ; t. 64. 1795. (*Bhirra*; *Satinwood* Eng.).

Small trees with corky bark. Leaves paripinnate, greyish or glaucous-green, leaflets 10-20 pairs, about 2.5 cm long, gland-dotted, obtuse, oblique, entire. Flowers white, in terminal and axillary panicles; calyx deeply lobed;

petals spreading, clawed; disc thick, 10-lobed, pubescent; stamens 10, inserted in the depressions of the lobed disc, free, alternate; ovary sunk in disc, 3-lobed, pubescent; style short; stigmas small, capitate. Capsule coriaceous, 3-celled.

Fl. & Fr. : Mar.-June.

Frequently found in mixed dry deciduous forests.

Katghora : 3737.

India (Central India, Western Ghats).

Wood is hard and durable, beautifully mottled, used for picture-frames, cabinet work, and in construction work. It is a very good coppicer. It thrives even with heavy grazing owing to the very aroid juice. The tree also yields a gum.

LIMONIA L., Sp. Pl. ed. 2 : 554. 1762.

T. : *L. acidissima* L.

Limonia acidissima L., Sp. Pl. ed. 2 : 559. 1762; Brummit in Taxon 31(3) : 504. 1982. *Schinus limonia* L., Sp. Pl. : 389. 1753. *Feronia limonia* (L.) Swingle in Journ. Wash. Acad. Sci. 4 : 328. 1914. *F. elephantum* Corr. in Trans. Linn. Soc. 5 : 225. 1800; Haines, Botany 1 : 173. *Limonia elephantum* (Corr.) Panigrahi in Taxon 26 : 576-577. 1977. (Kaitha : Wood-apple; Elephant-apple—Eng.).

LT. : Ceylon, Hermann Herb. Vol. 2, p. 8 (BM).

Small spinous, deciduous trees. Leaves alternate, leaflets opposite, sub-sessile; petioles winged or not. Flowers in terminal or lateral loose panicles of racemes, polygamous, 1.5 mm across, pale green; calyx small, 5-toothed; petals 5, spreading, imbricate; inserted. round short disc, tip subulate; ovary oblong; stigma oblong, fusiform. Fruits large, 6-7 cm across, globose, with rough woody rind.

Fl. : Feb.-May. *Fr.* : Oct.

Occasionally planted, also along road sides.

Belghana : 16771.

India, Sri Lanka, Java.

Fruits edible; leaves, fruits and seeds are used in Ayurvedic medicines. Wood is durable, yields a gum; used in Japan as a substitute for soap.

OCHNACEAE

DC., Ann. Mus. Hist. Natl. Hist. Nat. Paris 17 : 410. 1811.

T. : *Ochna* L.

OCHNA L., Sp. Pl. : 513. 1753. Gen. Pl. ed. 5 : 229. 1754.

LT. : *O. jabolapita* L. (vide Robson, Taxon, 11 : 51. 1962).

- 1a. Inflorescences thyrses up to 1.5 cm long peduncles,
with many distichously conferted, caducous bracts, leaving
a broad annulus of scars; flowers 1.5-2.5 cm across;
shrubs or treelets

O. obtusata subsp.
obtusata

- 1b. Inflorescences simple cymes on 3-7 cm long peduncles,
without annulus; flowers 3-4 cm across; undershrubs,
sprouting yearly from tuberous stem-base

O. obtusata subsp.
pumila

Ochna obtusata DC. Ann. Mus. Hist. Nat. Paris 17 : 411. t. 11. 1811;
Kania in Blumea 16 : 29. 1968. *O. squarrosa* sensu Roxb., Pl. Cor. t.
89. 1798; non L. 1762; Haines, Botany 1 : 175.

Leaves acute to acuminate at apex, attenuate at base, finely denticulate, chartaceous or subcoriaceous. Inflorescences compound, many-flowered; rachis 0.5-4(-6) cm long; pedicels 1.5-3.5 cm long; flowers yellow, sweet smelling; sepals 4-7, red in fruits; petals 5-10; disc enlarged; stamens 30-60; anthers more than twice as long as filaments. Drupes round, 7-8 mm across, seated on greatly enlarged disc and surrounded by persistent, coriaceous red calyx.

Type : India orientalis, (G-DC.).

Fl. : Apr.-May. Frt. : June-July.

Occasionally found in mixed forests on rocky slopes.

Katghora : 3701.

India, Nepal, Sri Lanka.

O. obtusata DC. subsp. *pumila* (Buch.-Ham. ex DC.), Panigr. et S. K. Murti, comb. nov. & stat. nov. *O. pumila* Buch.-Ham. ex DC. Prodr. 1 : 736. 1824; Haines, Botany 1 : 175. *O. obtusata* DC. var. *pumila* (Buch.-Ham. ex DC.) Kanis in Blumea 16 : 34. 1968; Hara *et al.*, Enum. 2 : 84. 1979.

Leaves obovate, oblong or oblanceolate, obtuse to acute at apex, acute at base, margin faintly denticulate, herbaceous or chartaceous. Inflorescence

2-3(-4) flowered; pedicels 1-4 cm long; flowers yellow, disc large; stamens 70-120; anthers 2.5-4 cm long, about as long as or little longer than filaments. Drupe seated on the enlarged disc and surrounded by spreading-deep red finely reticulate calyx.

Type : Buchanan-Hamilton in Herb. Lambert (BM).

Fl. : Feb.-Mar. *Frt.* : Mar.-July; the new shoots usually appear immediately after forest fires.

Occasionally found in mixed forests in open grassy places.

Marwahi to Pasan : 19067; Pasarkhet to Madanpur : 19431.

India, Burma.

In reducing *Ochna pumila* Buch.-Ham. ex DC. as a variety of *O. obtusata* DC., Kanis (*i.c.*) states "*O. pumila* Buch.-Ham. ex DC. has been regarded as a separate species by all previous authors because of its conspicuous habit. I treat it here as a separate variety, as distinction by inflorescence and androecium is rather easy". In view of the clear-cut differences as set out in the key formulated by Kanis himself, *O. obtusata* var. *pumila* is raised here to subspecific status in consideration of his further statement that "some of the typical characters will be found to be hereditary "

BURSERACEAE

Kunth, Ann. Sci. Nat. (Paris) 2 : 346. 1824.

T. : *Bursera* N.J. Jacq. ex L., *nom. cons.*

- 1a. Flowers with campanulate calyx tube; fruits indehiscent drupes GARUGA
- 1b. Flowers with small urceolate or saucer-shaped calyx; fruits dehiscent drupes BOSWELLIA

BOSWELLIA Roxb. ex Colebr. in As. Res. 9 : 379. 1807.

T. : *B. serrata* Roxb. ex Colebr.

Boswellia serrata Roxb ex Colebr. in As. Res. 9:379. t. 5. 1807; Haines, Botany 1:177. (Salai).

Trees with green, grey or reddish papery bark peeling off thin flakes. Leaves 30-40 cm long with 9-15 pairs of opposite, coarsely crenate-serrate leaflets 4-7.5 cm long. Flowers small, white, in numerous racemes or panicles at the tip of the branches, usually appearing when tree is leafless; calyx cupular, 5-6-lobed, villous, persistent; petals 5, imbricate, oblong-ovate with thickened

base; disc scarlet, fleshy, papillose, annular, crenate; stamens 10, inserted at the base of the disc; ovary sessile, 3-celled; styles short; stigmas 3-lobed. Drupes 3-gonous.

Fl. : Feb.-Apr. *Frt.* : May-July.

Common elements in dry deciduous mixed forests, on rocky slopes; at places forming pure forest.

Pasan to Korbi : 15309.

India, Burma, Malaya, Philippines.

Wood is used as timber, paper pulp, and in matchstick industry. Resin gum from bark; flowers and fruits are used in medicines.

GARUGA Roxb., Pl. Corom. 3 : 5. 1811 (1819).

T. : *G. pinnata* Roxb.

Garuga pinnata Roxb. Pl. Corom. 3:5. t. 208. 1811 ('1819'), et Hort. Beng. 33. 1814; Bennett in Hook. f. FBI 1:528. 1875; Haines, Botany 1:176; Kalkman in Blumea 7(2):468. 1953; Fl. Hassan : 372. 1976. (*Gari-rukh*, *Kakad*, *Ghogar*).

Trees with pale grey, small or flaky bark. Leaves alternate, imparipinnate, 30-45 cm long, 8-16 pairs, ovate-lanceolate leaflets: leaflets crenate, caudate, glabrate with age. Flowers yellow, polygamous, in much branched panicles; 0.6-0.8 (-1) cm long; receptacle cylindrical; calyx campanulate, 5-fid, lobes deltoid, 0.25-0.35 cm long; petals 5, oblong inserted on calyx-tube; disc cup-like, conspicuous, lining calyx-tube; stamens 10, inserted at margin of disc; filaments hairy at base; ovary 4-5-celled. Drupes globose, fleshy black, 1-2.3 cm long.

Fl. : Mar.-May. *Frt.* : July-Oct.; old leaves turn red before falling.

Common element in mixed forests.

Keonchi to Kabirchabutra : 19155.

India, Burma, Thailand to Vietnam, Malaysia.

The bark is used for tanning and the drupes are eaten raw or cooked. The species is fire-hardy and good for reclamation of grasslands. It grows readily from cuttings and coppices easily.

MELIACEAE

Juss., Gen. Pl. : 263. (*Meliae*).

T. : *Melia* L.

1a. Seeds with wings	SOYMIDA
1b. Seeds without wings	
2a. Stigmas 3-fid; drupes oblong, 1-seeded	AZADIRACHTA
2b. Stigmas capitate; drupes globose, 3-6-seeded	MELIA

AZADIRACHTA A.H.L. Juss. in Mem. Mus. Hist. Nat. Cass. apud Gull. in Bull. Sci. Paris 19 : 220. 1830.

L.T. : *A. indica* A.H.L. Juss. (*Melia azadirachta* L.).

Azadirachta indica A.H.L. Juss. in Mem. Mus. Hist. Nat. Paris 19 : 221. t. 2. f. 5. 1830; Haines, Botany 1 : 182; *Melia azadirachta* L., Sp. Pl. : 385. 1753; Hiern in Hook. f. FBI 1 : 544. 1875. (*Neem*).

Evergreen trees upto 15 m tall, branches glabrous. Leaves imparipinnate, pulvinous at base; leaflets 4-6 × 1-1.5 cm, ovate-lanceolate, subsessile, acuminate. Flowers white, sweet-scented; sepals 5, free; petals obovate, margin ciliate; staminal tube puberulous, 10-striate, 10-toothed; anthers oblong, basifixed; ovary subglobose; styles linear; stigmas 3-lobed. Drupes oblong, 1.3-2 cm long, greenish-yellow, 1-seeded.

Type : Herb. Linn. 543.1 (LINN.)

Fl. : Mar.-May. Frt. : June-July.

Common along roads, outskirts of village, edge of the forest.

Korba : 16793A.

A native of Burma, China and India; naturalized throughout the area extending to Malaysia.

It yields good timber and is considered sacred, so much so, that the body of Lord Jagannath at Puri is made and re-made every twelve years from this wood. All parts of the plant are medicinal. The leaves are used as poultice for boils. The fruits yield oil and are preventive against and cure for small-pox; insect-repellant. Flowers and young leaves are edible on frying.

MELIA L., Sp. Pl. : 384. 1753 & Gen. Pl. ed. 5 : 182. 1754.

LT. : *M. azedarach* L. vide N. L. Britton, Fl. Bermuda : 204. 1918.

Melia azedarach L., Sp. Pl. : 384. 1753; Haines, Botany 1 : 183; (*Bakain; The Persian Lilac*).

Medium-sized trees, with 2-3-pinnate leaves. Leaves 15-40 cm long; leaflets ovate or lanceolate, serrate, or entire, acuminate. Flowers lilac, in large axillary panicles, sweet smelling; calyx 5-lobed, lobes lanceolate; petals 5, free, linear-spathulate, minutely hairy; disc annular; staminal tube cylindric, dilated at mouth, purple; anthers 10, included on or near margin of tube, apiculate; ovary 5-celled; styles cylindric; stigmas capitate. Drupes, yellowish with very hard endocarp.

Type : Herb. Hermann, vol. 1 : fol. 10 (BM).

Fl. : Apr.-June. Frt. : Nov.-Dec.; fruits often remain on the tree throughout the cold weather; plants are leafless Dec.-Apr.

Commonly found along road sides, at the edge of forests.

Katghora : 6063.

Iran, India, China; probably a native of W. Asia (Santapau & Henry, 1973); and Burma.

'Persian Lilac' is a fast-growing tree of the plains and foot hills, cultivated along road sides and in villages. The fruit is eaten by goats and sheep and the stony endocarp is used as beads. Wood is handsomely-grained. The inner bark contains a resinous alkaloidal substance and is used as an anthelmintic.

Soymida A. Juss. in Mirb. & Caes. apud. Guill. in Bull. Sci. Nat. Geol. 23 : 238. 1830, et in Mem. Mus. Hist. Nat. Paris 19 : 250. t. 22, f. 2b 1832.

T. : *S. febrifuga* (Roxb.) A. H. L. Juss. (*Swietenia soymida* A. Duncan 1794. (nom. illeg. \equiv *Swietenia febrifuga* Roxb. 1793)).

Soymida febrifuga (Roxb.) A. H. L. Juss. in Mem. Hist. Nat. Paris 19 : 251. t. 22. f. 26. 1832; Haines, Botany 1:181; Mabberley in Taxon 31(1):66. 1982. *Swietenia febrifuga* Roxb. Bot. Descr. *Swietenia* : 1. (1793), et in Med. Fact's Obs. 6 : 129. 1795, et Pl. Corom. 1:18. t. 17. 1795. *S. soymida* A. Duncan, Tent. Inaug. Swietenia : 16. 1794, nom. superfl. (*Rohani, Rohan*).

Medium-sized trees with wrinkled branchlets. Leaves paripinnate, 20-45 cm long with 3-6 pairs of opposite, or sometimes alternate leaflets; young leaflets with peltate glands. Flowers greenish-white, in axillary and terminal panicles; calyx 5-cleft; petals 5, free, suberect, imbricate, ovate, clawed; staminal tube cupular, 10-cleft sometimes stamens nearly free, inserted at

top of flat disc; ovary 5-celled. Capsules 5-valved, woody, valves separating from large 5-rayed central axis, 2.5-4 cm long, black when ripe; seeds winged.

Fl. : Feb.-Mar. *Frt.* : May-June.

Common along roads.

Korba : 16793.

India, Sri Lanka.

The reddish-brown wood is hard and durable. The bark is bitter and astringent and used in dysentery and diarrhoea.

OLACACEAE

Mirbel, ex DC. Prodr. I : 531. 1824 (*Olacinaeae*) [A. L. Juss., Mem. Mus. Hist. Nat. 2 : 441. 1815 (*Olacinees*)].

T : *Olax* L.

OLAX L., Sp. Pl. : 34. 1753 & Gen. Pl. ed. 5 : 20. 1754.

T. : *O. zeylanica* L.

Olax scandens Roxb., Pl. Corom. 2(5) : t. 102. 1799, et Fl. Ind. 1:163. 1820; Haines, Botany 1:189. (*Dantripori*).

Large, usually scandent, evergreen shrubs. Leaves patent orbicular, elliptic-oblong or ovate with rounded base, apex obtuse or rounded, pubescent beneath. Flowers creamy-white in axillary racemes or panicles with inconspicuous bracts; perianth minute, outer calyciform rim accrescent in fruits and 3-6 free or more or less connate tepals; stamens 9 or more, usually 3 fertile, fertile stamens usually opposite to and attached to edge and staminodes opposite centres of tepals; ovary superior, 3-celled below and 1-celled above; stigmas 3-lobed. Fruits drupaceous, orange-yellow.

Fl. : Apr.-July. *Frt.* : Oct.-Dec.

Common along road sides, edge of the forests, near streams.

Kota to Lormi : 15455; Achanakmar : 19290; Katghora : 3709, 3721, 6091; Kota : 8573; Khondra : 12776.

India, Sri Lanka, Burma, Java.

Fruits are edible; as climber, it is destructive to trees.

CELASTRACEAE

R. Br. in Flinders, Voy. Terra. Austral. 2 : 554. 1814 (*Celastrinae*).

T. : *Celastrus* L.

CELASTRUS L., Sp. Pl. : 196. 1753 & Gen. Pl. ed. 5 : 91. 1754.

LT. : *C. scandens* L. vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2, 2 : 492. 1913.

Celastrus paniculatus Willd. Sp. Pl. 1:1125. 1797; Haines, Botany 1 : 195; (*Amjun, Malkangni*)

Large scandent shrubs. Leaves alternate, ovate or obovate, acuminate, usually serrate. Flowers yellowish-green, polygamous, in elongated terminal or axillary panicled cymes or racemes; sepals 4-5, orbicular, erose; petals 4-5, spreading, ovate-oblong obtuse; disc flat or cup-shaped; stamens 5, inserted on free margin of disc; ovary 2-4 celled; stigma 3-lobed or 3-fid. Capsules coriaceous, globose, yellow when ripe.

Fl. : Mar.-July. Frt. : Oct.-Dec.

Common along road sides, at the edge of the forests.

Keonchi: 19153; Marwahi to Pasan : 19057; Katghora : 3720; Khondra : 12848; Marwahi : 19004.

India, Sri Lanka, Burma, Thailand to Vietnam, China, Taiwan, Malaysia, Australia.

Gavde (in Jour. Biol. Sc. 6.(1):8-10, 1963) reports that the male flowers described by earlier workers are, in fact, bisexual flowers; as in these flowers ovaries develop at a later stage and fruits are seen on the plants. The bisexual flowers are extremely protandrous and show extremely slow development of the carpels. At the time of anthesis the ovary is undeveloped and remains hidden in the disc. Cross pollination becomes a rule in these extremely protandrous flowers. Leaves and seeds are used medicinally. Seeds yield oil which is used for burning.

RHAMNACEAE

Juss., Gen. Pl. : 376. 1789 (*Rhamnus*).

T. : *Rhamnus* L.

1a. Climbers	VENTILAGO
1b. Small trees or large shrubs	
2a. Fruits fleshy drupes; ovary half-inferior	ZIZIPHUS
2b. Fruits berries; ovary superior	RHAMNUS

RHAMNUS L., Sp. Pl. : 183. 1753 & Gen. Pl. ed. 5 : 87. 1754.

LT. : *R. catharticus* L. vide Adanson, Fam. 2:514, 559, 587, 620. 1763.

Rhamnus purpureus Edgew. in Trans. Linn. Soc. 20 : 44. 1846; Lawson in Hook. f. FBI 1:639. 1875; Hara *et al.*, Enum. 2 : 91. 1979.

Small trees between rock boulders; branches purplish. Leaves ovate, shortly acuminate, closely and finely serrate, membranous; young leaves pubescent beneath. Flowers minute, 2-3, fascicled; calyx-tubes urceolate or turbinate, lobes 4-5, keeled within; petals absent; stamens 4-5; disc thin, lining calyx-tube; ovary free, 3-4-celled. Fruits berry-like drupes, sometimes lobed.

Fl. & Frt. : June-July.

Occasionally found on slopes.

Kabitchabutra : 19182.

India, Nepal.

VENTILAGO J. Gaertn., Fruct. 1 : 223. 1788.

T. : *V. madraspatana* J. Gaertn. (*Maderaspatana*)

Ventilago denticulata Willd. Ges. Natur, f. Pr. Neue. Schr. 3 : 417. 1801; Banerjee & Mukherjee in Ind. For. 96:209. 1970. *V. maderaspatana* auct., non Gaertn. 1788; Roxb. Pl. Corom. 1 : 55. t. 76. 1796 et Fl. Ind. 2 : 413. 1824; Haines, Bot. 1:200. *V. calyculata* Tulasne in Ann. Sci. Nat. Ser. 4. 8 : 124. 1857; Lawson in Hook. f. FBI 1:631. 1875; Haines, Botany 1 : 200. (*Keonti*; *Kalsibal*).

Scandent shrubs or liana. Leaves ovate or elliptic-oblong, bifarious, usually acuminate, usually unequally rounded at base. Flowers pale-green or yellow in terminal and axillary, leafless panicles, bad smelling; calyx 5-fid, cup covering more than half of the nut, lobes spreading; petals 5, cucullate or conduplicate over stamens; stamens 5, opposite and equal to petals; disc 5-lobed, villous; ovary hairy, sunk in disc, 2-celled; styles 2-fid. Fruits samaroid, distinguishable into a lower globose seed-chamber and upper flat wing by distinct constriction.

Fl. : Sept.-Mar. *Frt.* : Feb.-June.

Common at the edge of the forests, along streams.

Khondra : 12728; Kota to Lormi : 15451; Katghora : 3710; Kotba : 8655.

India, Burma, Vietnam and Malaysia.

ZIZIPHUS P. Mill., Gard. Dict. Abridge ed. 4. 3. 1754.

LT. : *Z. jujuba* P. Mill. (*Rhamnus zizyphus* L.) vide Suessenguth in Engl. et Prantl. Nat. Pflanzenfam. ed. 2, 20d : 124. 1953.

- 1a. Cymes panicled, on long peduncles; petals absent *Z. rugosa*
- 1b. Cymes axillary, sessile or on short peduncles; petals present
 - 2a. Peduncles of cymes absent or shorter than pedicels; styles 2 *Z. mauritiana*
 - 2b. Peduncles of cymes longer than pedicels; styles 3 *Z. xylopyrus*

Ziziphus mauritiana Lam. Encycl. Meth. Bot. 3 : 319. 1789. *Z. jujuba* sensu Lawson in Hook. f. FBI I : 632. 1875, non (L.) P. Mill. 1754; Haines, Botany 1 : 201. (*Ber*).

Large shrubs with drooping branches, armed with hooked prickles. Leaves with reddish-brown tomentum beneath, glabrous shining above, usually serrulate, oblong or ovate, obtuse or acute. Flowers small, greenish, in dense axillary tomentose cymes or fascicles; calyx 5-fid, lobes spreading, triangular, keeled within; petals minute, spatulate, white, concave; disc 10-lobed; ovaries 2-celled, immersed in disc; styles 2-4, free or partially united. Drupes globose, oblong or ovoid, yellow or red, fleshy.

Fl. : Oct.-Nov. *Frt.* : Dec-Jan.

Common in waste places, along road sides, forest clearings, at the edge of forests.

Keonchi : 13264; Achanakmar : 13216; Pasan to Korbi : 15318; Lamuni : 19229.

Tropical Asia, Australia.

Fruits edible; the bark contains tannin and is used in diarrhoea.

Z. rugosa Lam. Encycl. Meth. Bot. 3 : 319. 1789; Haines, Botany 1 : 203; (*Ber*).

Large scandent shrubs, sometimes climbing on trees; young branches, inflorescence, prickles and underside of leaves usually clothed with dense rusty-tomentum. Leaves ovate or elliptic, base oblique or cordate, serrulate. Flowers pale-green or greenish-yellow, in peduncled cymes, lower cymes axillary; calyx 5-fid, pubescent inside; petals absent; disc 5-lobed, hairy; ovary sunk in disc, 2-4-celled; styles 2, united below middle. Fruits drupes, globose or obovoid, whitish, fleshy.

Fl. : Feb.-Apr. *Frt.* : May-July.

Frequently found in the mixed forests.

Pasan to Korbi : 15327.

India, Sri Lanka, Burma.

Fruits are edible, bark is used medicinally.

Z. xylopyrus (Retz.) Willd. Sp. Pl. 1 : 1104. 1798; Haines, Botany 1 : 202; *Rhamnus xylopyrus* Retz., Obs. Bot. 2 : 11. 1781. (*Ghont, Ghoti*).

Armed, straggling trees. Leaves broadly elliptic, ovate or orbicular, obliquely rounded or subcordate at base, obtuse or acute, serrulate, dark-green, glabrous above and pubescent beneath. Flowers small, greenish, in axillary peduncled cymes, 4-merous; calyx glabrous inside; petals reflexed, spatulate, hooked; disc flat, thin, 5-angled; ovary usually 3-celled, quickly rising up above disc on fertilization; styles 3, free almost to base; drupes, globose, green.

Fl. : Apr.-June. *Frt.* : Nov.-Jan.

Common in dry deciduous forests.

Katra : 16732; Marwahi to Pasan : 19066; Khondra : 12800.

India, Sri Lanka.

Fruits and barks are used in tanning, wood is hard and durable.

VITACEAE

Juss., Gen. Pl. : 267. 1789 (*Vites*).

T. : *Vitis* L.

- 1a. Flowers polygamo-monoecious; usually 5-merous; petals expanding AMPELOCISSUS
- 1b. Flowers bisexual; 4-merous, petals at first connivent, then spreading
 - 2a. Leaves usually simple, often angled or lobed, rarely 3-foliate or digitate; berries usually 1-seeded; seeds ellipsoid or pyriform CISSUS
 - 2b. Leaves 3-5-foliate, pedate or digitate; berries 2-4-seeded; seeds hemispherical with deep pits CAVRATIA

AMPELOCISSUS J. E. Planchon, Vigne Am. 8 : 371. 1884. *nom. cons.*

T. : *A. latifolia* (Roxb.) Planch. (*Vitis latifolia* Roxb. (*typ. cons.*))

- 1a. Plants quite glabrous ; peduncles bearing slender wiry tendrils slightly below cymes ; seeds oblong ; flowers paniculately cymose ; disc thick, 5-furrowed *A. latifolia*
- 1b. Plants tomentose ; peduncles bearing stiff woody, tendrils 2.5 cm below cymes ; flowers usually umbellately cymose ; disc thin, not furrowed *A. tomentosa*

Ampelocissus latifolia (Roxb.) Planch. in Vigne Am. 8 : 374. 1884.
Vitis latifolia Roxb. Fl. Ind. 1:661. 1820; Haines, Botany 1:210.

Extensive but scarcely woody climbers ; stems hollow. Leaves long petioled, orbicular cordate, lobes dentate, crenate-serrulate. Flowers minute, red, in pyramidal, panicled cymes, borne on stout peduncles ; calyx 4-5, small ; petals 4-5, oblong, expanding, saccate at base ; disc-lobes becoming adnate and often showing as ring on fruits. Berries globose, fleshy, black or dark-brown.

Fl. : June-July. *Frt.* : Aug.-Oct. ; the stems die down annually to the perennial root stock ; it flowers before the leaves are fully developed.

Common in mixed moist deciduous forests, especially in low scrub jungles.

Khondra : 12726, 12854 ; Marwahi : 19030.

India, Nepal.

Fruits are edible.

A. tomentosa (Heyne ex Roth) Planch. in Vigne Am. 8 : 374. 1884.
Vitis tomentosa Heyne ex Roth. Nov. Sp. : 157. 1821; Haines, Botany 1 : 210.

Extensive but scarcely woody climbers. Flowers red, sessile, in divaricate cymes on a peduncle under 2.5 cm long, which are borne together with tendril on common woody branchlets 7-10 cm long ; calyx small, 4-5-lobed or truncate ; petals 4-5, spreading, often calyptrate ; disk-lobes becoming adnate and often showing as ring on fruits. Berries globose, fleshy, black.

Fl. : July-Sept. *Frt.* : Sept.-Nov.

Common in the mixed moist deciduous forests.

Achanakmar : 13232 A.

India, Nepal. Sri Lanka.

CAYRATIA A. L. Juss., Dict. Sci. Nat. 10 : 103. 1818, *nom. cons.*

T. : *C. pedata* (Lour.) Juss. ex Gagnep. (*Columella pedata* Lour.)

- 1a. Leaves pedately 3-foliate, petioles 6.8 cm long; leaflets rounded or acute, dentate; peduncles equalling petioles, not fleshy; fruits black; seeds trigonous *C. trifolia*
- 1b. Leaves digitately 5-foliate; petioles 10-18 cm long; leaflets obovate, acuminate, serrate; peduncles longer than petioles, fleshy; fruits red or pink; seeds obovate-oblong, furrowed and transversely ridged on back *C. auriculata*

Cayratia auriculata (Roxb.) Gamble in Fl. Mad. : 237. 1918. *Cissus auriculata* Roxb. Fl. Ind. 1:430. 1820. *Vitis auriculata* (Roxb.) Wall. Num. List No. 6031. 1832; Haines, Botany 1:213.

Large succulent climbers. Stems upto 4 cm in diam., with spongy, deeply cracked bark; young branches pubescent with white hairs. Leaves digitate, pedate, 5-foliate, long petioled, crenate or serrate, shining above; stipules falcate, ear-like. Tendrils 2-3-branched. Pedicels fleshy. Flowers greenish-white, small, in large divaricating cymes on long succulent peduncles; calyx 4-lobed, truncate; petals 4. Fruits globose, cherry-like, fleshy, 1-seeded, red or pink when ripe.

Fl. : July-Sept. Frt. : Oct.-Dec.

Frequently found in mixed forest in moist localities.

Khondra : 12731.

India, Burma, China, Malaysia.

C. trifolia (L.) Gagnep. in Lecomte, Notul. Syst. 1 : 347. 1911; Domin in Biblioth. Bot. 89 : 371. 1927. *Vitis trifolia* L., Sp. Pl. : 203. 1753; Haines, Botany 1:213. *Cissus carnosia* Lam. Encycl. Meth. Bot. 1 : 31. 1783. *Cayratia carnosia* (Lam.) Gagnep. in Lecomte, Nat. Syst. 1 : 347. 1911. *Vitis carnosia* (Lam.) Wall. Num. List No. 6018. 1832; Lawson in Hook. f. FBI 1 : 654. 1875.

Large climbers. Stems succulent, compressed, upto 2.5 cm in diam., with corky barks, young branches pubescent. Leaves 3-foliate; leaflets subcordate or cuneate at base, crenate or dentate. Tendrils leaf-opposed, 2-3 branched. Petioles fleshy. Stipules not ear-like. Flowers small greenish-white, in lax, thinly hairy, corymbiform cymes; calyx minute, cupular, tube truncate; petals ovate, obtuse, saccate at tip, hairy outside; disc white, cupular, 4-lobed, crenate. Fruits berries, depressed-globose, fleshy.

Fl. : Apr.-Sept. *Frt.* : Sept.-Dec.

Frequently found at the edge of forests on *Ziziphus* bushes.

Kabirchabutra : 19193; Achanakmar : 19291.

India, Burma, Thailand to Vietnam, Malaya.

Cissus L., Sp. Pl. : 117. 1753 & Gen. Pl. ed. 5 : 53. 1754.

T. : *C. vitiginea* L.

Cissus repanda Vahl, Symb. 3 : 18. 1794. *Vitis repanda* (Vahl) Wt. & Arn. Prodr. : 125. 1834; Haines, Botany 1 : 209. (*Duker bel*).

Large, tomentose creeping or climbing herbs. Stems terete, soft with corky barks. Leaves large, simple, broadly cordate, coarsely crenate or dentate or repandly toothed. Petioles 15-30 cm long. Tendrils forked. Flowers creamy-white in terminal, peduncled cymes, pedicelled in umbel-like clusters; calyx 4, truncate; petals 4, ovate, calyptrate or expanding widely and reflexed; disc 4-lobed; stamens from between the lobes. Fruits tipped with persistent styles, pyriform.

Fl. : Apr.-June. *Frt.* : June-July.

Frequently found in damp and shady localities in Sal forests.

Korba : 8731.

India, Sri Lanka.

LEEACEAE

Dumort. Anal. Fam. Pl. : 21, 27. 1829.

T. : *Leea* D. van Royen ex L.

Leea L., Syst. Nat. ed. 12. 2 : 627. 1767, et Mant. Pl. 1 : 17, 124. 1767. *nom. cons.*

T. : *L. aequata* L. (*typ. cons.*).

- | | |
|---|------------------|
| 1a. Inflorescences and petals red | <i>L. alata</i> |
| 1b. Inflorescences and petals greenish-white | |
| 2a. Leaves simple-pinnate; upper surface of leaflets
setose or scabrous; main veins close and parallel;
anthers not united in bud | <i>L. crispa</i> |
| 2b. Leaves 2-3-pinnate; leaflets glabrous; main veins
distant, curved; anthers united in bud | <i>L. indica</i> |

Leea alata Edgew. in Trans. Linn. Soc. 20 : 36. 1846; Haines, Botany 1 : 214; Risdale in Blumea 22 : 91. 1974.

Shrubs. Leaves simple-pinnate; leaflets oblong or oblong-lanceolate, serrate, sessile or subsessile; petioles winged; stipules large, rounded, deciduous. Flowers in dense corymbs; calyx 5-toothed; petals 5, connate at base and adhering to 5-toothed staminal tube, revolute; anthers connate; ovary inserted on disc, 3-6-celled. Fruits berries, subglobose, reddish-purple, succulent.

Fl. : July-Aug. Frt. : Sept.-Oct.

Occasionally found in the 'Sal' forests as forest undergrowths.

Lamni : 19245.

India.

L. asiatica (L.) Risdale in Manilal, Bot. Hist. Hort. Malab. 189. 1980. *Phytoloca asiatica* L. Sp. Pl. : 474. 1753. *Leea crispa* van Royen ex L. Syst. Nat. ed. 12. 2 : 627. 1767; Haines, Botany 1 : 215; Risdale in Blumea 22:88. 1974. *L. aspera* Wall. ex G. Don, Gen. Syst. 1 : 713. 1831; Edgew. in Trans. Linn. Soc. 20 : 36. 1846; Panigrahi, Phytomorphology 28:250. 1978; Haines, Botany 1:215. *L. edgeworthii* Santapau in Rec. Bot. Surv. India 16:54. 1953. nom. illegit. superfl.

Undershrubs; stems herbaceous, pubescent, often with crisped wings. Leaflets ovate-oblong or elliptic, cordate, acuminate, crenate-serrate, stalked. Flowers in peduncled, leaf-opposed, compound corymbose cymes; calyx 5-toothed; petals 5, lanceolate; anthers distinct; ovary inserted on disc. Fruits berries, cherry-like, fleshy, black when ripe.

Fl. : July-Aug. Frt. : Sept.-Oct.

Common inside 'Sal' forests, mixed forests, in damper localities.

Pasan : 19081; Khondra : 12840; Lamni : 13242A.

India, Burma, Thailand, Vietnam, W. China.

Leea aspera Wall. in Roxb. Fl. Ind. ed. Carey. 2 : 468. 1824 ad nota, was a nom. nud. [Art. 34(c). ICBN 1983]. The epithet was validated by G. Don in 1831 and also by Edgeworth in 1846, both basing their names on Wallich in Roxb. Fl. Ind. ed. Carey. 2:466. 1824; therefore *L. edgeworthii* Santapau, proposed as nom. nov. for *L. aspera* Wall. ex Edgew. (1846) is a superfluous illegitimate name for *L. aspera* Wall. ex G. Don (1831). It was being treated as conspecific with *L. crispa* van Royen ex L. (1767) (cf. Panigrahi, Phytomorphology 28(12):250. 1978) until Risdale (l.c.) established its name as *Leea asiatica* (L.) Risdale.

L. indica (N. Burm.) Merr. Philip. Jour. Sci. 14:245. 1919; Risdale in Blumea 22:95. f. 4/6-8. 5/1-7.8/5. 1974. *Staphylea indica* N. Burm. Fl. Ind. 75. t. 23. f. 2. 1768. *Leea sambucina* (L.) Willd. Sp. Pl. 1 : 1177. 1789; Lawson in Hook. f. FBI 1:666. 1876. *pro. part.*; Haines, Botany 1 : 216. *Aquilia sambucina* L. Mant 2:211. 1771.

Shrubs. Leaflets lanceolate to ovate-oblong, acute or acuminate, serrate, shining drying black. Inflorescences corymbs, large, panicled, 2-3-chotomous. Flowers greenish-white, with yellowish staminal tube; calyx 5-toothed; petals 5, lanceolate; anthers connate; ovary inserted on disc. Berries succulent, black, pruinose when ripe, 3-6-celled.

Fl. : June-Sept. Frt. : Oct.-Mar.

Occasionally found in damp places.

Bilaspur to Achanakmar : 13202; Khondra : 12730.

India, Sri Lanka, Burma, Thailand to Vietnam, China, Malaysia, N. Australia, Polynesia.

SAPINDACEAE

Juss., Gen. Pl. : 246. 1789 (*Sapindi*).

T : *Sapindus* L.

- 1a. Climbing herbs with tendrils; leaves ternately divided; flowers petalous, irregular CARDIOSPERMUM
- 1b. Erect shrubs or trees; leaves simple or pinnate; flowers apetalous, regular

 - 2a. Shrubs; leaves simple; viscid shining; stamens inserted outside the disc; disc inconspicuous or absent in male flowers; ovules 2; fruits septicidally dehiscent; seeds exarillate DODONAEA
 - 2b. Trees; leaves paripinnate, not viscid shining; stamens inserted inside the disc; disc prominent in male flowers; ovules solitary; fruits indehiscent; seeds arillate SCHLECHTERA

CARDIOSPERMUM L., Sp. Pl. : 366. 1753. & Gen. Pl. ed. 5 : 171. 1754.

T. : *C. halicacabum* L.

Cardiospermum halicacabum L. Sp. Pl. 1 : 366. 1753; Haines, Botany 1 : 218. (*The Baloon-vine*).

Thinly pubescent or nearly glabrous. Leaflets lanceolate-oblong to ovate, acute or obtuse, incised-serrate to pinnatifid. Flowers white, peduncled,

in axillary inflorescences with 3 racemiform branches; sepals suborbicular, outer 2 flat, inner 2 grooved; petals obovate-spathulate; stamens 8, filaments hairy; ovary hairy on angles. Capsules 3-gonous, subglobose, inflated.

Fl. & Fr. : July-Nov.

Common at the edge of forests, as undergrowth in nurseries.

Khondra : 12843; Karidongri : 19331.

Probably a native of S. America (Murti, 1975), naturalized throughout the tropics and subtropics.

Roots, leaves and seeds are used medicinally. The plant contains saponin.

DODONAEA P. Mill., Gard. Dict. Abr. ed. 4. 1754.

T. : *D. viscosa* N. Jacq.

Dodonaea viscosa N. Jacq. Enum. Pl. Garib. 10. 1760; Hiern in Hook. f. FBI 1 : 697. 1875; Haines, Botany 1 : 225; Fl. Hassan : 367. 1976. *Ptelea viscosa* (N. Jacq.) L. Sp. Pl. ed. 2 : 173. 1762, non L. 1753.

Bushy shrubs. Leaves alternate, oblanceolate, subsessile, glabrous, base cuneate attenuate. Flowers small, greenish, in short axillary and terminal cymes or panicles; sepals 5, spreading; stamens 8; ovary 3-4-celled; style 3-6-sided, tip 3-6-clawed. Capsules membranous, winged; wings of each carpel oblong-orbicular extending from base to style.

Fl. : Nov.-Feb. *Fr.* : Oct.-Nov.

Frequently grown as hedge plant; also found as escape from cultivation along road sides.

Pasan : 15373.

India, Sri Lanka, Malay Peninsula, Australia.

The quick growth and gregarious habit of this shrub makes it an excellent hedge plant. The branches are used as fire-wood. The wood is used for making walking-sticks and tool handles.

SCHLEICHERA Willd. Sp. Pl. 4(2) : 1096. 1806. *nom. cons.*

T. : *S. trijuga* Willd.

Schleichera oleosa (Lour.) Oken, Allg. Naturgesch. 3(2) : 1341. 1841. *Pistacia oleosa* Lour. Pl. Cochinch. : 615. 1790. *Schleichera trijuga* Willd. Sp. Pl. 4 : 1096. 1806; Haines, Botany, 1 : 221. (*Kusum*).

Trees. Leaflets 2-4-paired, opposite, entire, basal ones smallest, elliptic or elliptic-oblong, obtuse or shortly acuminate. Flowers small, yellowish or greenish, in numerous lateral racemes, often panicled in males: calyx small, cupular, 4-6-lobed; stamens 4-8, longer than calyx; ovary ovoid, glabrous, 3-celled, narrowed to rigid styles; stigmas lobed. Fruit ellipsoid, glabrous, apiculate, smooth or spinous, roughly coriaceous.

Fl. : Feb.-Mar. *Frt.* : July-Aug.

Scarcely found in the outskirts of villages inside forests; often planted.

Kudmura : 16811; Korba : 8647, 8647A.

India, Sri Lanka.

The best lac is reared on this tree. Seeds yield an oil which is used for burning. Fleshy aril of the seed is edible. Wood is heavy and durable.

ANACARDIACEAE

Lindley Intr. Nat. Syst. Bot. : 127. 1830.

T. : *Anacardium* L.

1a. Leaves pinnate

2a. Leaves without intramarginal veins; flowers in simple or branched racemes; calyx 4-lobed; petals imbricate; ovary 1-celled; drupes small, compressed

LANNEA

2b. Leaves usually with intramarginal veins; flowers in erect panicles; calyx 5-toothed; petals valvate; ovary 2-5-celled; drupes large, ellipsoid or ovoid

SPONDIAS

1b. Leaves simple

3a. Fruits on fleshy hypocarp

SEMECARPUS

3b. Fruits not on hypocarp

4a. Flowers polygamous; calyx-lobes deciduous; stamens 1-5, inserted just within disc or on it; carpel one; drupes large, fleshy

MANGIFERA

4b. Flowers bisexual; calyx-lobes persistent; stamens 8-10, inserted at base of disc; carpels 5; drupes small, flesh scanty

BUCHANANIA

BUCHANANIA Spreng. in Schrad. Jour. Bot. 1800 (2) : 234. 1802 ('1801').

T. : *B. lanzae* Spreng.

Buchanania lanzae Spreng. in Schrad. Jour. Bot. 7800 (2) : 234. 1802;
B. latifolia Roxb. Fl. Ind. 2 : 385. 1824; Haines, Botany 1 : 229; Hata
et al., Enum. 2 : 100. 1979. (*Char*, *Achar*).

Medium-sized trees with rough bark. Leaves alternate, petioled, coriaceous, entire, 15-25 cm long, strongly veined, broadly oblong or ovate-oblong, rounded at tip. Flowers small, white or creamy, in dense pyramidal panicles, panicles densely pubescent; sepals 5, nearly free; petals 5, triangular or oblong spreading; disc swollen, 5-lobed; stamens as long as petals; carpels hairy. Drupes, subglobose.

Fl. : Jan.-Mar. *Frt.* : Apr.-June.

Common in mixed dry deciduous forests.

Katghora : 3716; Pasan : 15308.

India, Burma, Thailand.

Fruits (Chironji) edible, used in confectionary; bark is used for tanning.

LANNEA A. Rich. in Guill., Perr. et A. Richard, Pl. Seneg.
Tent. 1:153. 1831, *nom. cons.*

T. : *L. velutina* A. Rich. (*typ. cons.*).

Lannea coromandelica (Houtt.) Merr. in Jour. Arn. Arb. 19 : 353. 1939. *Dialium coromandelicum* Houtt. Nat. Hist. Ser. 2. 2 : 39. t. 5. f. 2. 1774. *Odina wodier* Roxb. Fl. Ind. ed. 2. 2 : 293 1832; Haines, Botany I : 231. *Lannea grandis* Engl. Pflanzenfam. Nachtr. III-5 : 213. 1897. (*Jhingan, Gunja, Moyen, Howai*).

Medium-sized trees. Leaves 3-many-foliolate, odd-pinnate; leaflets paired, ovate acuminate, with oblique base. Flowers small, greenish, dioecious or polygamodioecious, 4-merous; sepals united below into short tube; petals longer than sepals; male flowers with deeply 4-lobed pistillode; female flowers with staminodes. Fruits drupes, often oblique, compressed, reniform, on short pedicels, red when ripe.

Fl. : Mar.-Apr. *Frt.* : May-June.

Common elements in the mixed forests.

Katghora : 3717; Khuria : 15470.

India, Sri Lanka, Burma, Thailand to Vietnam, China, Malaya.

A yellowish-white gum from bark is used in textile industries and in medicines. It coppices easily.

MANGIFERA L., Sp. Pl. : 200. 1753 & Gen. Pl. ed. 5 : 193. 1754.

T. : *M. indica* L.

Mangifera indica L. Sp. Pl. : 200. 1753 ; Haines, Botany 1 : 228 ; (Aam).

Trees. Leaves alternate, simple, petiolated, entire, coriaceous, oblong, linear-oblong, elliptic or obovate-lanceolate, obtuse, acute or acuminate. Flowers small, creamy-yellow, polygamous, in terminal, usually tormentose, panicles ; calyx 4-5, imbricate, deciduous ; petals 5, with 3 ridges, free or adnate to disc, imbricate, spreading ; stamen only 1 perfect, inserted upon tumid, lobed disc ; staminodes 4, minute ; ovary sessile. Fruits drupes, fleshy.

Fl. : Jan.-Mar. *Frt.* : May-June.

Common along road sides, edge of forests, outskirts of village ; also planted.

Khondra : 16748 ; Kabitchabutra ; 15245.

India, Sri Lanka, Burma, Thailand to Vietnam, Malaysia.

Fruits edible; wood is used as timber.

SEMECARPUS L. f., Supp. Pl. : 182. 1782.

T. : *S. anacardium* L.f.

Semecarpus anacardium L.f., Suppl. Pl. : 182. 1782 ; Haines, Botany 1 : 230, (Bhilwa, washerman's nut).

Medium-sized trees. Leaves 20-60 cm long ; alternate, entire, coriaceous, oblong or obovate, tip rounded, base rounded-cordate or cuneate ; strongly veined, clustered at ends of branches. Flowers small, greenish-yellow, subsessile, fasciculate on branches of stout pubescent panicles, polygamous or dioecious ; calyx 5-6-fid ; petals 5-6, imbricate ; stamens inserted at base of broad, annular disc. Drupes obliquely ovoid or oblong, smooth, shining black, seated on orange-red cup, 2.5 cm long.

Fl. : June-Sept. *Frt.* : Nov.-Mar.

Commonly found in mixed forest.

Pasan : 15303 ; Katghora : 6099 ; Pasarkhet : 12971, 19383 ; Marwahi : 19075.

India, Burma, Malaysia, N. Australia.

Gum from the bark, fruit pulp and oil are used medicinally. Bark is used in dyeing. Fleshy orange coloured, receptacles are edible. Juice from pericarp of the fruit is used as marking ink by washermen. The black juice of pericarp causes blisters.

Spondias L., Sp. Pl. : 371. 1753 & Gen. Pl. ed. 5 : 174. 1754.

T. : *S. mombina* L.

Spondias pinnata (L. f.) Kurz, in Prelim. Rep. For. & Veg. Pegu, Append. A. 44. App. B. 42. 1875; Airy Shaw & Forman in Kew Bull. 21(1):8. 1967. *Mangifera pinnata* L. f., Suppl. : 156. 1782. *Spondias mangifera* Willd., Sp. Pl. 2 : 754. 1799; Haines, Botany 1:232. (*Amra*)

Large trees. Leaves alternate, odd-pinnate, usually crowded at ends of branchlets; leaflets 4-6 pairs, strongly veined, broad, oblong acuminate. Flowers small, greenish-white, polygamous, in 30-60 cm long, terminal pyramidal panicles; calyx 5-6, salver-shaped; petals 5-6, ovate-oblong, spreading; stamens 8-10, inserted beneath broad, pulvinate, lobulate disc. Drupes fleshy, yellow when ripe, 3-5 cm long; one-seeded.

Fl. : Feb.-Mar. Frt. : Jan.

Occasionally found in the mixed forests.

Khondra : 16756.

India, Sri Lanka, Thailand, Malaysia.

Various parts of the tree are used medicinally; fruits are eaten raw or pickled.

MORINGACEAE

Dumort. Ann. Fam. Pl. : 43, 48. 1829.

T. : *Moringa* Adans.

MORINGA Adans., Fam. Pl. 2 : 318, 579. 1763.

T. : *M. oleifera* Lam. (*Guilandina moringa* L.)

- | | |
|--|-----------------------|
| 1a. Leaves 2-pinnate, emarginate at apex, main veins distinct; leaflets 2.5-3.7 cm long; flowers yellow, streaked with pink; seed-wings elongate | <i>M. concanensis</i> |
| 1b. Leaves 3-pinnate, rounded at apex, main veins obscure; leaflets 1.5-2 cm long; flowers white; seed-wings short | <i>M. oleifera</i> |

Moringa concanensis Nimmo ex Dalz. & Gibs., Bomb. Fl. : 311. 1861; Hook. f. in FBI 2 : 45. 1876. (*Saijan*)

Small trees. Leaves alternate; leaflets, broadly elliptic or suborbicular, opposite, entire. Flowers in axillary panicles; calyx 5-cleft, segments unequal, petaloid, deciduous from above the base; petals 5, unequal; fertile stamens 5, inserted on edge of disc, declinate, opposite petals and alternating with 5 antherless filaments; disc lining calyx tube. Capsules elongate, beaked, acutely triquetrous, valves hard.

Type : India, Concan, in the jungles near Penn, Kolaba Distr. *Nimmo* (presently untraceable).

Fl. : Nov.-Dec. Frt. : Jan.-Mar.

Commonly found in and outskirts of villages; frequently planted.

Near : 16720.

India, Pakistan.

Fruits and flowers are edible as vegetables. Root, bark, leaves, flowers and fruits are used medicinally.

M. oleifera Lam., Encycl., Meth. Bot. 1 : 398. 1785 ; Haines, Botany 2 : 235 ; van Steenis in Fl. Males. Ser. I. 4 : 45. 1945 ; *Gaulandina moringa* L. Sp Pl. : 381. 1753. *Moringa pterygosperma* Gaertn., Fruct. 2 : 314. 1791 ; Hook. f. in FBI 2 : 45. 1876 ; (*Saijan*).

Small trees. Leaves alternate; leaflets 6-9 pairs, opposite, elliptic-ovate or obovate, pale beneath. Flowers in spreading panicles, pedicelled, sweet smelling; calyx 5-cleft, lobes linear-lanceolate, reflexed; petals 5, narrowly spatulate; fertile stamens 5, filaments villosus, inserted on edge of disc. Capsules elongate, 9-ribbed.

Type : Described from Malabar, Sri Lanka and other regions of India (panicles and flowers), *Sommerat*; (fruit) *de Jussieu* (P).

Fl. : Jan.-Mar. Frt. : Apr.-May.

Commonly found in and outskirts of villages; also planted.

Pasan to Korbi : 15310.

Africa, Turkey, India.

Flowers, fruits and seeds are used as vegetables. Roots, bark, leaves, flowers and fruits are also used medicinally. 'Ben-oil' from the seeds are used as a lubricant in fine machinery. The tree grows readily from cuttings.

FABACEAE

Lindley Nat. Syst. Bot. ed. 2. 148. 1836. *Leguminosae* Juss. Gen. Pl. : 349. 1789 or *Papilionaceae* Giseke, nom. alter.

Cicer arietinum L., *Vigna mungo* (L.) Hepper, *V. unguiculata* (L.) Walp. subsp. *cylindrica* (L.) Verdcourt, *Pisum sativum* L. and *Lens culinaris* Medik. are commonly cultivated in the district.

1a. Stamens free	SOPHORA
1b. Stamens monadelphous or diadelphous	
2a. Plants with hairs fixed by their centres; anthers gland-tipped	INDIGOFERA
2b. Plants with basifixed hairs or glabrous; anthers not gland-tipped	
3a. Pods indehiscent	
4a. Leaves pellucidly gland-dotted	PSORALIA
4b. Leaves not gland-dotted	
5a. Pods not segmented	
6a. Herbs; leaflets with marginal teeth	TRIGONELLA
6b. Trees; leaflets entire	
7a. Leaflets opposite	PONGAMIA
7b. Leaflets alternate	
8a. Flowers small, white or pink	DALBERGIA
8b. Flowers medium, yellow	PTEROCARPUS
5b. Pods of 1 or several 1-seeded segments	
9a. Leaflets without stipules	
10a. Stamens monadelphous	ZORNIA
10b. Stamens diadelphous	
11a. Pods twisted, enclosed in calyx	SMITHIA
11b. Pods straight, exserted from calyx	AESCHYNOMENE
9b. Leaflets with stipules	
12a. Trees	OUGENIA
12b. Herbs or undershrubs	
13a. Racemes lax with distant flowers	ELEIOTIS.
13b. Racemes dense	
14a. Pods twisted so that joints are transverse to its axis	URARIA
14b. Pods not twisted	
15a. Pods turgid, often terete	ALYSICARPUS
15b. Pods flattened	DESMOGIUM

3b. Poda dehiscent		
16a. Leaves even-pinnate; leaf-rachis ending in tendril		
17a. Woody climbers; stamens monadelphous		AERUS
17b. Herbs; stamens diadelphous		
18a. Staminal tubes oblique at mouth		VICIA
18b. Staminal tubes truncate at mouth		LATHYRUS
16b. Leaves odd-pinnate; leaf-rachis not ending in tendrils		
19a. Leaves simple or digitately compound		
20a. Leaves glandular beneath; stamens diadelphous		FLEMINGIA
20b. Leaves not glandular beneath; stamens monadelphous		CROTALARIA
19b. Leaves pinnately compound		
21a. Leaves pinnately 3-foliate		
22a. Trees		
23a. Unarmed; petals equal or slightly unequal		BUTEA
23b. Armed; petals very unequal		ERYTHRINA
22b. Herbs, shrubs or liana		
24a. Leaves glandular beneath		
25a. Woody undershrubs		CAJANUS
25b. Climbers		
26a. Poda 4-6-seeded, densely brown silky hairy		ATYLOSTIA
26b. Poda 2-seeded, glabrescent		RHYNCHOSIA
24b. Leaves not glandular beneath		
27a. Style bearded below stigma		
28a. Stigma oblique		VIGNA
28b. Stigma not oblique, terminal		

29a. Flowers large, blue; petals very unequal	CLITORIA
29b. Flowers never blue; petals equal	
30a. Styles thickened upward, bearded on inner face	LABLAB
30b. Styles slender, hairy all round stigmas	DOLICHOS
27b. Style not bearded below stigma	
31a. Nodes of racemes swollen	
32a. Petals unequal; stamens diadelphous	MUCUNA
32b. Petals equal; stamens monadelphous	PUERARIA
31b. Nodes of racemes not swollen	
33a. Calyx toothed; styles filiform without flattened portions in middle	SHUTERIA
33b. Calyx truncate; styles filiform, with flattened portions in middle	DUMASIA
21b. Leaves pinnately 5-many-foliate	
34a. Inflorescences axillary; pods long, transversely septate	SESBANIA
34b. Inflorescences terminal or leaf-opposed; pods not septate	
35a. Leaflets closely parallel-veined; pods thin	TEPHROSIA
35b. Leaflets net-veined; pods thick	MILLETIA

In addition, *Medicago denticulata* Willd., is likely to occur in the district.

Fig. 11

ABRUS Adans. Fam. Pl. 2 : 327. 511. 1763.

T. : *A. precatorius* L. (*Glycine abrus* L.)

Abrus precatorius L. Syst. Nat. ed. 12. 2 : 472. 1767; Haines, Botany 2 : 259. Verdcourt in Kew Bull. 24 : 240. 1970; (*Ghumchi, Ratti, Gunja*)

subsp. *precatorius*.

Slender twiners. Leaves upto 10 cm long; leaflets 8-20 pairs, paripinnate, oblong, rounded-truncate, mucronate at apex, glabrous above, thinly hairy beneath. Flowers small, pale pinkish-white, in crowded rigid, thick, strongly falcate racemes on axillary peduncles or short branches; calyx campanulate, appressed hairy outside, teeth short; corolla much exserted; standard short, clawed, adnate to staminal tubes; wings narrow; keels curved; stamens 9. Pods oblong, flat or turgid, thinly septate, truncate at base, appressed hairy, 2.5-3.5 cm long, 3-7-seeded, seeds ellipsoid-globose, red or white with a black cap.

Types: Ceylon, Herb. Hermann vol. 2, fol. 6(BM).

Fl.: Aug.-Sept. Frt.: Jan.-Apr.

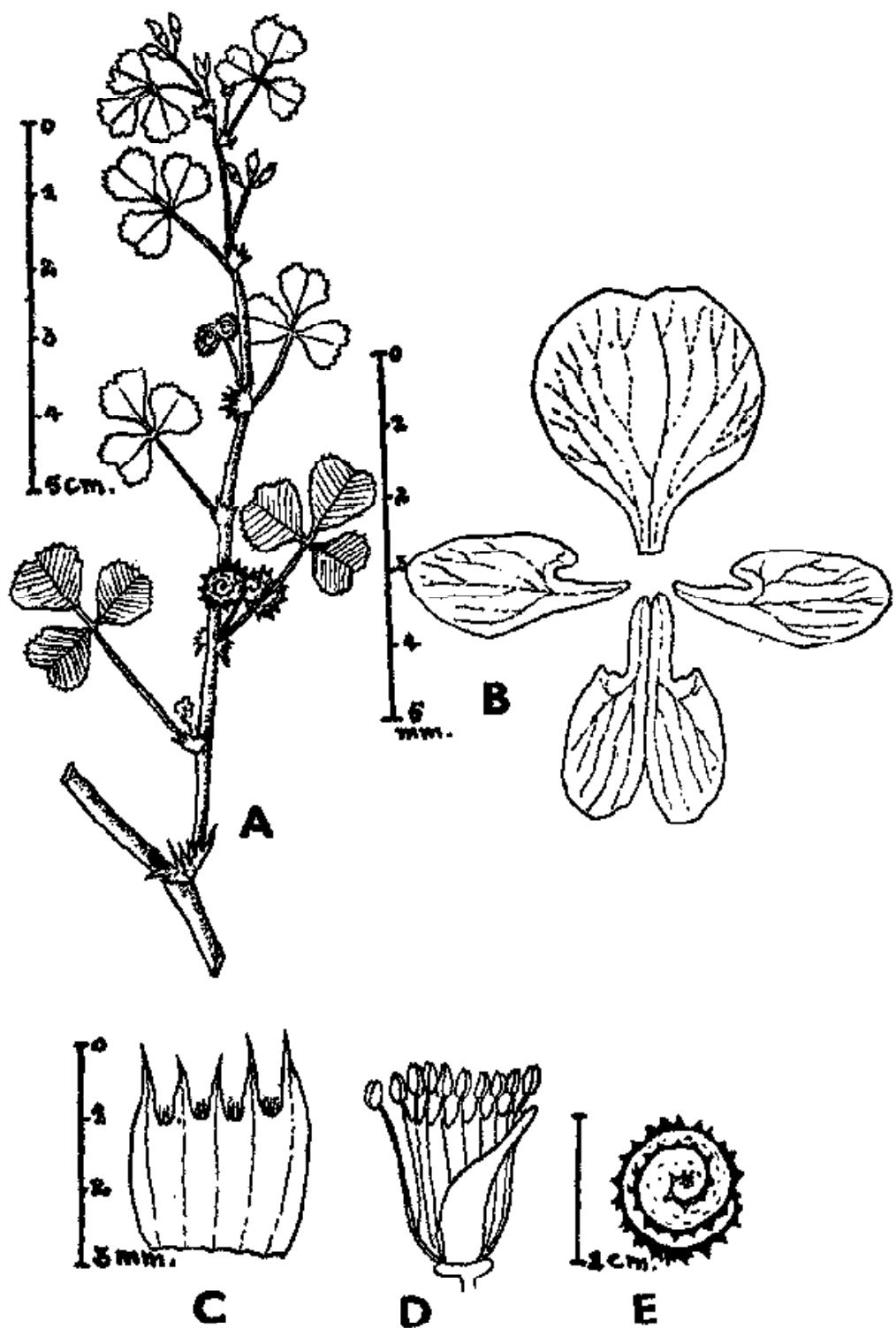


Fig. 11. *Medicago denticulata* Willd.

A. A leafy branch with flowers and fruits. B. Petals dissected. C. Calyx tube spread out. D. Diadelphous stamens and young ovary. E. Fruit.

Climbing over *Woodfordia* and other shrubs at the edge of forests, in plantation and cultivated fields.

Kota : 13091.

Africa, Asia, Australia, Pacific Islands.

Roots, leaves and fruits have medicinal properties. The seeds are used by jewellers as weights. The seeds are poisonous, purgative and emetic and the decoction of seeds is taken orally allegedly to prevent conception.

AESCHYNOMENE L., Sp. Pl. : 713. 1753 & Gen. Pl. ed. 5 : 319. 1754.

LT. : *A. aspera* L. vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. 2 : 392. 1913.

Aeschynomene indica L. Sp. Pl. : 713. 1753 ; Haines, Botany 2:265 ; Rudd in Reinwardtia 5(10) : 30. 1959.

Erect, much-branched, annual herbs or undershrubs. Stems not spongy, branches terete with prickle like glandular papillae. Leaves pinnate, 2-8 cm long ; leaflets 21-71, alternate, small, closely set, sessile, lanceolate-oblong to elliptic, base obliquely rounded-subcordate, obtuse, mucronate, glabrous. Flowers 1-4, 0.6-1.2 cm long, in short peduncled, hispidulous, axillary racemes, yellowish ; calyx 0.4-0.8 cm long, lower lip shortly 3-toothed, upper retuse or 2-dentate, glabrous ; corolla 1 cm long ; standard yellow, streaked with purple. Pods stalked, 6-10-jointed, 2.5-3.5 cm long, upper suture straight, lower more or less indented, each joint 1-seeded, not echinulate when mature.

Type : Malabar, Neilitali, *Rheede*, Hort. Mal. 9 : 31. t. 18. 1689.

Fl. : July-Sept. Frt. : Sept.-Nov.

Common in the mud of road side ditches, cultivated fields, etc.

Bilaspur : 13003 ; Pasarkhet : 19387.

Pantropical.

Rudd (l.c.) treats this species to be native of America, but the type comes from India.

ALYSICARPUS Desv., Jour. Bot. Agric. : 120. 1813, *nom. cons.*

T. : *A. bupleurifolius* (L.) DC. (*Hedysarum bupleurifolium* L.) (*type cons.*).

- 1a. Calyx much longer than first joint of pods.
- 2a. Leaves linear ; flowers in distant pairs ; pods net veined or rugose *A. bupleurifolius*
- 2b. Leaves elliptic ; racemes close ; pods rugose, transversely plicate *A. scariosus*

- 1b. Calyx shorter or scarcely longer than first joint of pods

 - 3a. Stems glabrescent *A. vaginalis*
 - 3b. Stems densely clothed with spreading hairs
 - 4a. Pods moniliform, veins indistinct *A. monilifer*
 - 4b. Pods not moniliform, reticulate-veined *A. hamosus*

Alysicarpus bupleurifolius (L.) DC. Prodr. 2 : 352. 1825; Haines, Botany 2 : 269. *Hedysarum bupleurifolium* L. Sp. Pl. : 745. 1753; Roxb. Pl. Cor. : t. 194. 1805.

Erect or decumbent annual herbs. Leaves not dimorphic, 1-foliolate, shortly stalked, linear-lanceolate to oblong, often lower ones rounded, acute or obtuse; stipules small, subulate. Flowers bluish-pink, shortly pedicelled, usually in pairs in racemes; calyx-teeth ciliate; corolla not exserted; standard broad; keel obtuse, adhering to wings; stamens diadelphous. Pods 2-4-jointed, 1 cm long, stalked, cylindric, glabrous, joints slightly longer than broad.

Fl. : July-Aug. *Frt.* : Sept.-Nov.

Growing amidst grasses.

Achanakmar : 13213.

India, Sri Lanka, Malaysia, China.

A. hamosus Edgew. in Jour. As. Soc. Beng. 21 : 171. 1853; Haines, Botany 2 : 271.

Prostrate, procumbent-ascending, hairy herbs with stems rooting at base. Leaves simple, rounded-suborbicular, obtuse and mucronate at apex, cordate at base, entire, appressed hairy. Flowers bluish or purplish 3-4 mm long in 2-6-flowered racemes; pedicels equaling calyx; calyx much shorter than lowest joint of pod; teeth linear; corolla not exserted; standard broad; keel obtuse; stamens diadelphous. Pods about 1.5 cm long, falcate-oblong, 4-7-jointed, appressed hairy on faces, often continuous within.

Fl. : July-Aug. *Frt.* : Sept.-Nov.

Common along road sides, river-beds, grassy places.

Madai : 12898.

India, Pakistan,

A. monillifer (L.) DC. Prodr. 2 : 353. 1825; Haines, Botany 2 : 270.
Hedysarum monilliferum L. Mant. Pl. : 102. 1767.

Small diffuse perennial herbs. Leaves simple, upto 1.5 cm long, oblong, obtuse, often cordate, glabrous. Flowers small, shortly stalked, 4-10, in close, erect, pedunculate racemes, scarlet red; calyx obscurely hairy, teeth very narrow; corolla not exserted, standard broad, keel obtuse, adhering to wings; stamens diadelphous, anthers uniform. Pods 3-6 (-8)-jointed, 1.5-2 cm long, clothed with hooked hairs.

Type : Cotmandel, Herb. Burman (? G).

Fl. : July-Aug. *Frt.* : Aug.-Nov.

Common at the edge of forests, forest clearings, waste places.

Khuria : 15494; Parasi : 19048; Katghora : 6040.

India, Sri Lanka, Burma.

A. scariosus Grah. ex Thwaites, Enum. Pl. Zeyl. : 88. 1858; Ali, Fl. West Pakistan No. 100 : 342. 1977. *A. rugosus* (Willd.) DC. var. *styracifolius* Baker in Hook. f., FBI 2 : 159. 1876; Haines, Botany 2 : 270; Saldanha, Karnataka 1 : 420. 1984. Fig. 12

Small, stunted herbs. Stems finely pubescent. Leaves 1-foliolate; leaflets small, elliptic-oblong, obtuse, pubescent beneath. Flowers small, in short dense spikes; calyx hairy, with distinctly ciliate edges, sepals acute; corolla purplish, not exserted; keel obtuse. Pods 1 cm long, about 2 mm broad, rarely exserted; 1-seeded parts transversely rugose.

Type : Wallich, Num. List No. 5766 (K).

Fl. : July-Sept. *Frt.* : Sept.-Nov.

Occasionally found in waste places, on black cotton soil in cultivated fields.

Bilaspur : 12991.

Pakistan, India, Sri Lanka.

Sedgwick (Jour. Ind. Bot. Soc. 1 : 18. 1919) maintained *A. heyneanus* Wt. & Arn., *A. styracifolius* L. DC., *A. ludens* (Wall. ex Baker) Sedgwick and *A. rugosus* DC. as distinct species, which are treated as varieties of *A. rugosus* by Baker (l.c.) and Saldanha (1984). Ali (l.c.) regards *A. rugosus* var. *styracifolius* Baker as a synonym of *A. scariosus* Grah. ex Thw.

A. vaginalis (L.) DC. Prodr. 2 : 352. 1825; Haines, Botany 2 : 271. *Hedysarum vaginalis* L., Sp. Pl. : 746. 1753.

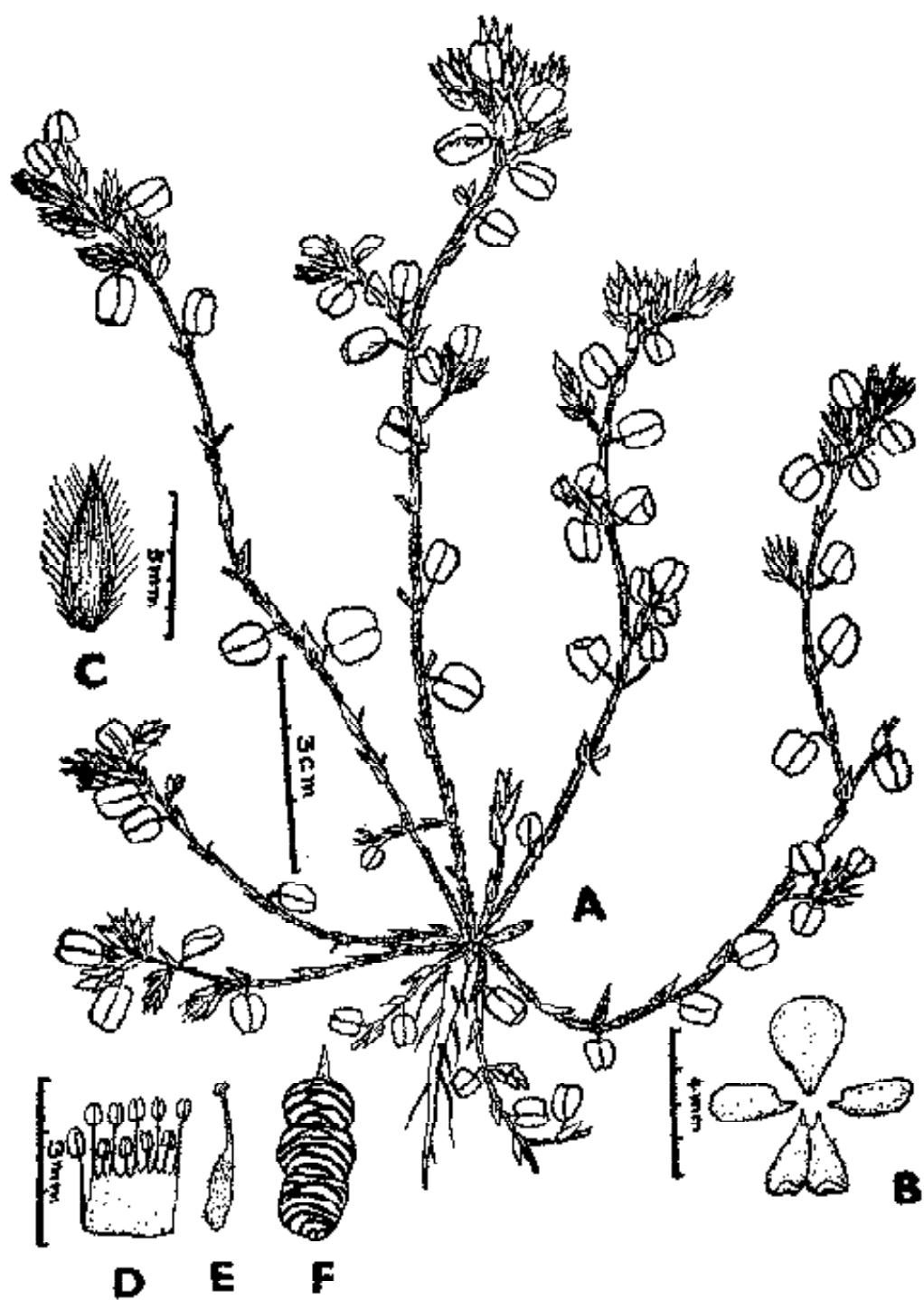


Fig. 12. *Alysicarpus scoriosus* Grub. ex Thwaites

A. Habit. B. Petals dissected. C. Sepal with ciliate hairs. D. Staminal tube (diadelphous). E. Young carpel. F. Fruit.

Prostrate or decumbent-ascending, perennial herbs. Leaves 1-foliolate; stipules ovate, acute, half as long as petioles; leaflets glabrous, oblong to ovate, elliptic or lanceolate, usually cordate at base. Flowers small, light violet or purple, in lax racemes; calyx-teeth linear, 3-4 mm long; corolla small, included, yellow, tinged with pink; standard red, wings dark red; stamens diadelphous, anthers uniform. Pods 5-8-jointed, not constricted at joints, 1.5-2.5 cm long, pubescent.

Fl. : July-Aug. *Frt.* : Sept.-Dec.

Common along road sides, waste places, at the edge of forests.

Khondra : 12839; Lamni : 19226; Katghora : 8610.

Tropics of the Old World, introduced to tropical America.

ATYLOSLA Arn. in Wt. & Arn. Prodr. 1 : 257. 1834.

LT. : *A. candollei* Wt. & Arn., nom. illeg. [= *Odonia trinervia* Spreng., *A. trinervia* (Spreng.) Gamble], vide Hutchinson, Gen. Fl. Pl. 1:421. 1964.

Atylosia scarabaeoides (L.) Benth. ex Baker in Hook. f. FBI 2 : 215. 1876; Haines, Botany 2:287. *Dolichos scarabaeoides* L. Sp. Pl. 1:726. 1753. *Atylosia scarabaeoides* Benth. in Miq. Fl. Jungh. 1:242. 1852 comb. invalid.

Slender, copiously branched, pubescent herbs. Leaves 3-foliolate; leaflets elliptic-obovate to oblong, obtuse or rounded and mucronate at apex, rounded at base, pubescent, strongly veined, petiolules 5-7 mm long. Flowers small, yellow, in 1-2 cm long corymbose racemes on densely pubescent short axillary peduncles; calyx densely grey-silky, teeth linear, 7-7.5 mm long; corolla slightly exserted, keel abruptly incurved at tip; standard about 1 cm long; stamens diadelphous. Pods 4-6-seeded, densely clothed with appressed-hairs.

Syntypes : Ceylon, Herb. Hermann Vol. 1 : p. 34 & Vol. 2. p. 60(BM) and Linn. Herb. no. 900. 9. (LINN).

Fl. : July-Sept. *Frt.* : Oct.-Apr.

Common along road sides and waste places.

Khondra : 12845; Kotba to Kudmura : 16806; Katghora : 6037.

India, Sri Lanka, S. E. Asia, China, Malaysia; introduced into Africa.

The plant is given to cattle in diarrhoea.

BUTEA Roxb. ex Willd. Sp. Pl. 3 : 917. 1802; Panigrahi et S. C. Mishra, Taxon 33(1) : 119. 1984, *nom. cons.*

T. : *B. frondosa* Roxb. ex Willd., *nom. illeg.* [= *B. monosperma* (Lam.) Taub., *Erythrina monosperma* Lam.]

Correct author citation of *Butea* is Roxb. ex Willd. *nom. cons.*, not Koenig ex Roxb. [Ali, 1977; Farr *et al.* Ind. Nom. Gen. Plant, 1979], Roxb., or Koenig (Airy Shaw, 1973)].

Butea monosperma (Lam.) Taub. in Engl. et Prantl. Natur. Pflanzenfam. 3 : 366. 1894. *Erythrina monosperma* Lam. Encycl. Meth. Bot. 1:391. 1785. *Butea frondosa* Koenig. ex Roxb. As. Res 3 : 469. 1792; Roxb. ex Willd. Sp. Pl. 3 : 917; 1802. *nom. illeg.*; Haines, Botany, 2 : 292. *Plaso monosperma* (Lam.) O. Kuntz., Rev. Gen. Pl. 1 : 202. 1891. (*Palas*).

Trees with crooked trunk and black, nodose branches. Leaves large, 3-foliate, leaflets coriaceous, 10-20 cm long, grey tomentose or pubescent beneath, terminal leaflets obovate, rounded at apex, lateral leaflets oblique, smaller. Branches of inflorescences brown velvety. Flowers scarlet red, 3-5 cm long, densely fascicled on tumid nodes of racemes or panicles borne in great profusion on usually leafless branches; calyx velvety black, campanulate, coriaceous; corolla silvery tomentose outside; standard 2.5 cm broad; keel much curved, acute, 3-4-times as long as calyx; stamens diadelphous. Pods much compressed, oblong, about 15 cm long, velvety brown.

Types : Malabar, Rheede, Hort. Mal. 6 : t. 16, t. 17.

Fl. : Feb.-Apr. Fri. : May-July.

Common in the mixed forests.

Kathghora : 3713; Kota to Lormi : 15453.

India, Sri Lanka, Malaysia.

'Flame of the Forest' is also planted as an ornamental tree. The tree is used for lac cultivation. Root-bark yields fibres. The gum from the bark is red and astringent and is used in diarrhoea and also as dye. Leaves are used as plates, for making crude umbrellas and as cattle-fodder. Seeds are used medicinally. Flowers yield a yellow dye.

CAJANUS Adans., mut. DC. Cat. Pl. Hort. Bot. Monsp. 85. 1813, *nom. cons.*

T. : *C. cajan* (L.) E. Huth (*Cytisus cajan* L.).

Cajanus cajan (L.) E. Huth in Helios 11 : 133. 1893.; Millsp. in Field Columb. Mus. Bot. 2 : 53. 1900; Poston in Mussorie Bot. Gard. 67(3) :

555, 1980. *C. indicus* Spreng., Syst. Veg. 3 : 248, 1826. nom. illeg.; Haines, Botany 2 : 287. *Cytisus cajan* L., Sp. Pl. : 739, 1753. (*Arhar*, *Pigeon Pea*).

Erect shrubs; perennial but usually grown as annual; branches sulcate, silky, hairy. Leaflets lanceolate-oblong, acute or acuminate, mucronate, glabrescent on upper surface, densely hairy on lower surface. Flowers yellow, often tinged with reddish-brown, in densely hairy, peduncled, corymbose racemes, forming a terminal panicle; calyx 1.5 cm long, glandular pubescent without, divided less than half way down; corolla much exserted; standard pale yellow with reddish purple streaks; wings yellow. Pods sessile, linear, straight, narrowed at both ends, glandular pubescent, often with reddish brown streaks, 3-5-seeded, with oblique linear depressions.

Syntypes : Ceylon, Hermann Vol. 2. fol. 76 & Vol. 3. fol. 30 (BM).

Fl. : July-Aug. *Frt.* : Oct.-Dec.

Cultivated; often found as escapes in waste places.

Pasan to Korbi : 15312.

$n = 11$; $2n = 22$.

Throughout the tropics, probably a native of Africa (Hara *et al.* 1979).

Although the authority for the type species for item No. 3892 (ICBN, 1983) *Cajanus* DC. *nom. cons.* is cited as *C. cajan* (L.) Millsp. (1900). Farr *et al.* (1979) and Poston [Mussorie Bot. gard. 67(3) : 555, 1980] cite the authority (L.). Huth (1893) and is adopted here.

Seed is an important pulse. Leaves and husk of pod are used as cattle feed.

Note : No tangible generic distinction exists between *Cajanus* DC. and *Atylosia* Arn. except that seeds are arillate in the latter. In both the genera $n = 11$ and intergeneric hybrids are fertile. *A. cajanifolia* Haines is called *Ban-Arhar* and many species of *Atylosia* have since been transferred to *Cajanus* DC. Patnaik and Mahanty (Pers. comm.) have synthesized fertile hybrids between the type species of the two genera and cytological analysis of F_1 hybrids, however, show some genetical incompatibility.

CLITORIA L., Sp. Pl. : 753. 1753. & Gen. Pl. ed. 5 : 334. 1754.

LT. : *C. ternata* L. vide N.L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. 2 : 416. 1913.

Clitoria ternata L. Sp. Pl. : 753. 1753; Haines, Botany 2 : 306; (*Aparajita*).

foliolate; leaflets stipulate, 2-5 cm long, downy. Leaves pinnately 3-7-lobed. Twining herbs, stems slender, angled, ovate or oblong, obtuse, subcoriaceous. Flowers showy, solitary, axillary, light blue; bracteoles large; calyx 1-1.5 cm long; teeth lanceolate, nearly as long as tube; corolla much exserted; standard far exceeding wings and keel, spoon-shaped; stamens diadelphous. Pods linear, flat, sparingly hairy, 6-10-seeded, 5-8 cm long.

Syntypes : Ceylon. Hermann Vol. 3, fol. 13, 20 & Vol. 4 fol. 45 (BM)

Fl. : July-Aug. Frt. : Nov.-Dec.

Common in gardens, on hedges, in waste places, also sometimes cultivated.

Champa : 19379.

Throughout tropics; Hara *et al.* (1979) consider it a native of S. America, but the type locality is Sri Lanka (Ali, 1977).

Roots, leaves and seeds are used medicinally.

CROTALARIA L., Sp. Pl. : 714. 1753 & Gen. Pl. ed. 5 : 320. 1754.

LT. : *C. latifolia* L. ('*latifolia*') vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. 2 : 346. 1913.

C. juncea L. (the 'Sun Hemp') of commerce is cultivated in the district.

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| 1a. Leaves 3-foliate; fruits pubescent | <i>C. medicaginea</i> |
| 1b. Leaves simple; fruits glabrous | |
| 2a. Stipules prominent, decurrent as a persistent wing to branches | <i>C. alata</i> |
| 2b. Stipules none or small, not decurrent | |
| 3a. Corolla half as long as calyx | <i>C. calycina</i> |
| 3b. Corolla more than half as long as calyx | |
| 4a. Flowers more than 1 cm long | <i>C. spectabilis</i> |
| 4b. Flowers upto 1 cm long | |
| 5a. Inflorescences less than 5-flowered | <i>C. albida</i> |
| 5b. Inflorescences more than 5-flowered | |
| 6a. Fruits more than 1.7 cm long | <i>C. mysorensis</i> |
| 6b. Fruits less than 1.5 cm long | <i>C. prostrata</i> |

Crotalaria alata Buch.-Ham. ex D. Don. Prodr. Fl. Nep. : 241. 1825 ; Haines, Botany 2 : 241. *C. bialata* auct. non Schrank, 1819 ; Roxb. Fl. Ind. ed. 2. 3 : 274. 1832.

Erect, perennial herbs or undershrubs, often branched from base. Stems softly hairy, winged. Leaves elliptic rounded to ovate, obtuse or reflexed, mucronate, acute and slightly oblique at base, appressed hairy, 3-10 × 1-4 cm. Flowers pale yellow, in a few-flowered racemes on elongated, often leafy, lateral peduncles; calyx 1.5 cm long, densely silky, tube campanulate; corolla scarcely exserted; standard rounded or ovate, shortly clawed, wings obovate-oblong; keel broad; stamens monadelphous, anthers dimorphous. Pods stalked, oblong, 4 cm long including stalk, 30-40-seeded.

Fl. : July-Sept. Frt. : Sept.-Dec.

Common in waste places, forest clearings.

Achanakmar : 13222A.

India, Burma, Malaysia, Java; probably a native of North America.

C. albida Heyne ex Roth, Nov. Pl. Sp. : 335. 1821 ; Haines, Botany 2 : 242; de Munk in Reinwardtia 6(3) : 200. 1962.

Erect perennial herbs with numerous terete, obscurely silky branches. Leaves subsessile, lanceolate-oblong to oblanceolate-obovate, obtuse, mucronate, glabrate or thinly pilose above, appressed-hairy on lower surface. Flowers yellow, in 2-20 cm long, hairy, terminal racemes, laxly 6-20-flowered; calyx appressed hairy, turbinate, 1 cm long, elongating in fruits upto 1.5 cm; corolla as long as or scarcely exceeding calyx; standard mucronate, appressed-hairy at top on back. Pods sessile, about twice as long as calyx, oblong-cylindrical, glabrous, 6-12 seeded.

Type : India Orientalis, Benj. Heyne, s.n.

Fl. & Frt. : Sept.-Jan.

Common amongst forest undergrowths, on slopes, in scrub jungles and grassy places.

Khondra : 12833, 12835; Madai : 12895; Pali : 19489; Korbi : 15332; Pendra : 15285; Korba to Putka Pahar : 19456; Korba : 8738.

India, S.E. Asia, Malaysia, China.

C. calycina Schrank, Pl. Raf. Hort. Acad. Monac. t. 12. 1817; Haines, Botany 2 : 242; de Munk l.c. : 202.

Erect annual herbs; branches clothed with appressed, brown hairs. Leaves lanceolate-oblong, subacute or subobtuse, mucronate, appressed-hairy beneath, $3.8 \times 1-1.5$ cm. Flowers 2-6, in short, lax racemes; calyx 1.5-2.5 cm long, densely clothed with long silky-brown hairs, teeth long, lower lanceolate and acuminate, upper broader, subobtuse, elongating in fruits; corolla shorter than calyx, glabrous; standard ovate; wings obovate-oblong; keel broad, equalling wings; stamens monadelphous, anthers dimorphous. Pods sessile, linear-oblong, included, 2 cm long, 20-35-seeded.

Type: Plate 12 in Pl. Rar. Hort. Acad. Monac. 1817.

Fl.: July-Sept. *Frt.*: Oct.-Nov.

Common near cultivated fields, forest clearings.

Khondra to Rali : 12865; Lamji : 15424.

Africa, India, Sri Lanka, S. E. Asia, Malaysia, China, N. Australia.

C. medicaginea Lam. Encycl. Meth. Bot. 2:201. 1786; Haines, Botany 2 : 244; Ali, Fl. West Pakistan No. 100; 41. f. 3 A-E. 1977.

Small perennial herbs, less than 30 cm tall; branches many from a thick woody rootstock, thinly silky. Petiole less than 1 cm long. Leaflets subsessile, oblanceolate-cuneate or lanceolate-oblong, glabrous above, appressed hairy beneath. Flowers 2-many, in dense terminal or leaf-opposed racemes, yellow; bracts subulate, bracteoles minute; calyx clothed with appressed, silky hairs, teeth linear, longer than tube; corolla twice as long as calyx; standard appressed hairy on back; wings ovate-oblong; stamens monadelphous; anthers dimorphous. Pods sessile, 5 mm long, beaked with persistent style-base, 2-seeded, obliquely subglobose.

Fl.: July-Aug. *Frt.*: Sept.-Nov.

Common in grassy places, forest clearings, slopes.

Pasan to Semore : 15351.

India, Sri Lanka, Thailand, Malaysia, Australia.

C. mysorensis Roth, Nov. Pl. Sp. : 338. 1821; Haines, Botany 2 : 242; de Munk I.c. : 210.

Erect annual herbs; branches densely clothed with ferruginous, erecto-patent or patent hairs. Leaves subsessile, lanceolate, obtuse, mucronate, appressed hairy, $3.8 \times 0.5-1.5$ cm; stipules foliaceous. Flowers yellow, 3-8, in terminal and lateral, lax racemes; calyx densely ferruginous hairy, segments lanceolate-setaceous; corolla as long as calyx; standard hairy at

top on back; stamens monadelphous, anthers dimorphous. Pods subsessile, 3-3.5 cm long, 40-50-seeded.

Type : Mysore, *Benj. Heyne*.

Fl. : July-Sept. *Frt.* : Oct.-Jan.

Occasionally found in waste places, at the edge of forests, and forest clearings.

Keonchi : 13255A.

de Munk (l.c.) treats this species as a native of Southeast Asia, whereas Ali (l.c.) considers this as restricted to India and Pakistan.

C. prostrata Rottl. ex Willd. Enum. Hort. Berol. 2 : 747. 1809 ; Roxb., Hort. Beng. 54. 1814 ; D. Don, Prodr. Fl. Nep. : 241. 1825 ; Haines, Botany 2 : 240 ; de Munk l.c. : 211. (as 'Roxb. ex D. Don').

Prostrate or decumbent-ascending, diffuse perennial herbs, clothed with yellowish-brown silky hairs. Leaves subsessile, ovate-oblong lanceolate, obtuse, base obliquely rounded, hairy on both surfaces. Flowers yellow, in 2-4-flowered racemes; calyx densely silky; teeth linear, 5-6 mm long; corolla scarcely exserted; standard notched; keel broad, twisted, equalling wings; stamens monadelphous. Pods 1.5 cm long, 15-20-seeded, linear-oblong, glabrous.

Type : 'Habitat in India Orientalis', *Rottler* s.n.

Fl. : July-Sept. *Frt.* : Oct.-Dec.

Common along roadsides, in ditches at the edge of forests, and forest clearings.

Khondra : 12796; Madai : 12908; Pasarkhet to Siang : 19415; Lamni ; 15407; Katghora : 6056.

India, Sri Lanka, Malaysia.

Hara *et al.* (1979) cite the authority as 'Rottb. ex Willd.', which is corrected as above, since the type is of Rottler.

C. spectabilis Roth, Nov. Pl. Sp. : 341. 1821 ; *C. sericea* Retz. Obs. Bot. 5 : 26. 1789, *non* Burm. f. 1768; Haines, Botany 2 : 243 ; de Munk l.c. : 214.

Erect, glabrous undershrubs. Leaves shortly stalked, oblong-lanceolate, acute or subacute, upper ones obtuse or rounded, mucronate, glabrous above, appressed hairy beneath, 5-20 × 1.5-10 cm. Flowers bright yellow,

in 30-40-flowered, lax terminal racemes; calyx 1.5 cm long; teeth lanceolate, twice as long as tube; corolla 2.5 cm long; standard suborbicular-rounded, retuse, yellow, tinged with purple; stamens monadelphous. Pods subsessile, 5-6 cm long, oblong, exserted; glabrous, 20-30-seeded

Type : India Orientalis, *Benj. Heyne.*

Fl. : July-Sept. Frt. : Oct.-Jan.

Frequently found near ponds, fields, edge of forests.

Katghora : 6065 ; Kabinchabutra : 13348.

India, Burma.

DALBERGIA L.f., Supp. Pl. : 52. 316. 1782, *nom. cons.*

T. : *D. lanceolaria* L.f.

- | | |
|---|-----------------------|
| 1a. Climbing shrubs | <i>D. volubilis</i> |
| 1b. Trees | |
| 2a. Stamens monadelphous | |
| 3a. Leaflets 3-5, cuspidate or acuminate; flowers subsessile; corolla yellowish | <i>D. sissoo</i> |
| 3b. Leaflets 5-7, obtuse or emarginate; flowers distinctly stalked; corolla white | <i>D. latifolia</i> |
| 2b. Stamens diadelphous | |
| 4a. Leaflets turn black on drying; flowers in compact terminal panicles; standard oblong | <i>D. paniculata</i> |
| 4b. Leaflets not black on drying; flowers lax, terminal and axillary panicles; standard orbicular | <i>D. lanceolaria</i> |

Dalbergia lanceolaria L.f. Supp. Pl. : 316 1782; Haines, Botany 2 : 309.

Deciduous trees with white or grey, nearly smooth bark. Leaves 7-15 cm long, odd-pinnate; leaflets 11-15, alternate, subcoriaceous, 2.5-5 cm long, ovate or obovate, rounded at base, often emarginate at apex, pale and glaucous beneath. Flowers dull-white or pinkish, unilateral on spreading branches of large, lax axillary and terminal panicles; calyx dull-purple, silky outside, upper teeth obtuse, 3-lower ones longer, acute; keels shorter than wings. Pods 5-7 cm long, stalked, narrowed at both ends, flexible, glabrous, bright brown-chocolate coloured, usually 1-seeded, sometimes 3-seeded.

Type : Herb. Linn. 886. 1 et 3 (LINN).

Fl. : Mar.-May. Frt. : Sept.-Jan.

Common along road sides.

Siang : 16842 ; Katghora : 3730.

Indigenous in India.

An ornamental tree; wood is used as a timber, but of poor quality.

D. latifolia Roxb. Pl. Corom. 2 : 7. t. 113. 1799 ; Haines, Botany 2:307.

Medium-sized trees with light-coloured barks. Leaves odd-pinnate, 10-15 cm. long, 5-7-foliolate; leaflets unequal in size, large sub-orbicular with round or emarginate tip, cuneate at base, often glaucous beneath. Flowers white, in very numerous, lax axillary panicles; calyx teeth obtuse, shorter than tube; corolla twice as long as calyx; stamens 9. Pods oblong-lanceolate, flat, 1-3, rarely 4-seeded, brown coloured.

Fl. : Apr.-May. *Frt.* : Oct.-Jan.

Common along roadsides.

Achanakmar : 13230A.

India, Thailand to Vietnam, Malaysia.

The black heart wood with purple streaks is much valued as timber. Twigs and leaves are used as fodder.

D. paniculata Roxb. Pl. Corom. 2 : 8. t. 114. 1799 ; Haines, Botany 2 : 309. (*Dhobin*)

Large, deciduous trees with white bark, ultimate branches silky pubescent. Leaves 7-15 cm long; leaflets 7-15, alternate, smaller leaflets orbicular or oval, larger oblong-elliptic, pale glaucous beneath, cuneate or rounded at base. Flowers bluish-white or pinkish, in shortly pedicelled, brown silky racemes, arranged in compact and usually terminal panicles; calyx teeth as long as tube, acute, densely silky. Pods 5-7.5 cm long, tapering at both ends, and at base, into a slender pedicel, 1-3-seeded, brown-coloured.

Fl. : Apr.-July. *Frt.* : Oct.-Jan.

Common along roadsides.

Khandra to Pali : 12868 ; Khutia : 19337.

India, Burma.

D. sissoo Roxb. ex DC. Prodr. 2 : 416. 1825. Haines, Bot. 2 : 307. (*Sisham*)

Medium-sized trees with grey or pale brown bark. Leaves odd-pinnate; leaflets 3-5, broadly elliptic, ovate or obovate, acuminate, larger 2.5-5 cm long. Flowers small, secund on branches of densely pubescent, axillary panicles; calyx teeth obtuse, shorter than tube; corolla twice as long as calyx; standard with long claw; stamens 9. Pods 4-7.5 cm long, strap shaped, obtuse, narrowed below into stalk, 1-3-seeded.

Type : Roxburgh Icon. 970 (K, CAL).

Fl. : Mar.-May. Frt. : Oct.-Jan.

Common inside mixed forests, along roadsides ; also planted.

Bilaspur : 19370.

Native of tropical Himalayas (Hara *et al.*, 1979).

Wood is an important timber as it is hard, heavy and durable.

D. volubilis Roxb., Pl. Corom. 2 : 48. t. 191. 1805 ; Haines, Botany 2 : 309.

Climbing or scandent shrubs. Leaves 8-12 cm long, 7-13-foliolate ; leaflets obovate or ovate-oblong, obtuse or emarginate, apiculate, nearly glabrous. Flowers pale blue or pale purple, in copious, terminal and axillary panicles, with pubescent, horizontal or decurved branches bearing densely corymbose cymes ; bracts and bracteoles persistent ; calyx densely velvety, tube campanulate, upper two teeth suborbicular, lower narrower, acute, longer ; corolla 2-3 times as long as calyx ; standard reflexed at base with orbicular emarginate limb ; stamens 10, diadelphous. Pods oblong, 5-8 cm long, narrowed at both

Fl. : Feb.-Mar. Frt. : May-June.

Frequently found inside mixed forests, along streams.

Khondra : 16755.

India, Sri Lanka, Burma.

Desmodium Desv. Jour. Bot. Agri. 1 : 112. 1813. *nom. cons.*

T. : *D. scorpiurus* (Sw.) Desv. (*Hedysarum scorpiurus* Sw.) (*typ. cons.*).

1a. Leaves 1-foliolate

2a. Trailing herbs ; pods 2-jointed *D. benthamii*

2b. Shrubs or undershrubs ; pods 4-8-jointed

3a. Leaflets glabrescent on upper surface ; stipules lanceolate ; pods glabrescent or thinly hairy pedicels 3-4 mm long *D. gangeticum*

3b. Leaflets scabrous on upper surface ; stipules ovate, acuminate ; pods densely brown hairy ; pedicels 1-2.5 cm long *D. velutinum*

1b. Leaves 3-foliolate

4a. Pods indistinctly jointed, not separating into segments *D. motoriae*

4b. Pods distinctly divided into several 1-seeded joints

5a. Herbs

- 6a. Trailing herbs leaflets upto 2.5 cm long ; flowers all axillary *D. triflorum*
- 6b. Stout, diffuse herbs ; leaflets 5-7.5 cm long ; flowers in axillary and terminal panicle *D. dichotomum*

5b. Undershrubs or shrubs

- 7a. Clusters of flowers concealed by large 2-3-foliaceous bracts *D. pulchellum*
- 7b. Flowers not concealed by bracts *D. heterocarpon*

D. benthamii Balakrishnan in Jour. Bomb. nat. Hist. Soc. 63(2) : 328, 1967; Ohashi in Ginkgoana 1. 249. 1973; Murti in Bull. bot. Surv. Ind. 18 (1-4) : 211. 1976. *D. brachystachyum* Grah. ex Benth. in Miq. Pl. Jungh. 223. 1852, non Schlecht 1838; Haines, Botany 2 : 277.

Trailing herbs or undershrubs. Leaflets elliptic-oblong, broadly oblong or roundish, obtuse or emarginate, cordate at base. Flowers deep purple, in short, dense, axillary and terminal racemes ; bracts ovate, acuminate, persistent ; calyx densely clothed with white hairs, teeth nearly as long as corolla, lanceolate-cuspidate ; corolla exserted ; standard broad ; wings more or less adherent to obtuse keels ; upper stamen entirely or partially free, the other 9 united. Pods sessile, not longer than calyx.

Fl. : Sept.-Oct. Frt. : Dec.

Rare plant in the area ; along forest roads, open forests.

Pasarkhet : 12962.

Ohashi (l.c.) was probably not aware of the Balakrishnan's (l.c.) publication and in proposing a *nom. nov.*, cited only 2 specimens viz., Wight 791 b (E) and Narayanaswami 443 (CAL) ; he considered this species as restricted to southern India. A critical study of the specimens in CAL shows that the taxon also occurs in M.P., Bihar and Bengal (Panigrahi & Murti, 1981).

D. dichotomum (Willd.) DC. Prodr. 2 : 336. Nov. 1825; Knaap van Meenwan in Reinwardtia 6(3) : 248. 1962. *Hedysarum dichotomum* Willd. Sp. Pl. 3, 2, : 1180. 1803. *Desmodium diffusum* (Willd.) DC. Ann. Sci. Nat. (Paris) Ser. 1. 4 : 100. Nov. 1825, non DC, Jan. 1825; Haines, Botany 2 : 275. *Hedysarum diffusum* Willd., l.c.

Stout, diffuse herbs. Leaves 3-foliolate ; stipules large, oblong, auricled, cuspidate ; leaflets ovate, oblong or elliptic-oblong, obtuse, apiculate.

rounded or acute at base, subcordaceous. Flowers minute, bluish, in terminal, panicles in axil of 3-nale, small, lanceolate bracts; calyx-teeth small, linear, ciliate; corolla twice as long as calyx. Pods 1.5-2 cm long, indented on both sutures, 5-6-jointed, joints subcircular with minute hooked hairs.

Fl. : Sept. *Frt.* : Oct.-Dec.

Frequently found along forest roads, roadside ditches, and edges of forests.

Khondra : 12786.

India, Sri Lanka, Burma.

In 1802, Willdenow published two species viz., *Hedysarum dichotomum* Willd. and *H. diffusum* Willd. Although Arnott (in Wt. & Arn., Prod. 226. 1834) combined the tw. Willdenow's species under *D. diffusum* (Willd.) DC., (cf. DC. Prodr. 2 : 336. Nov. 1825) this epithet cannot be used for the combined taxon as it is an illegitimate later homonym of *D. diffusum* Roxb. ex DC. (Prodr. 2 : 335. Jan. 1825).

D. gangeticum (L.) DC. Prodr. 2 : 327. 1825; Knaap van Meeuwen in Reinwardtia 6(3) : 249. 1962; Haines, Botany 2 : 276. *Hedysarum gangeticum* L., Sp. Pl. : 746. 1753.

Erect herbs or undershrubs. Leaves shortly petioled; leaflets ovate oblong or narrowly ovate, acute, rounded subcordate or truncate at base, glabrous above, appressed-pubescent beneath, 2-18 × 1.5-6 cm. Flowers purple, in ascending, lax, elongate, slender, axillary and terminal panicled racemes, 10-45 cm long; calyx 5-6 mm long, teeth as long as tube or longer, lanceolate or deltoid; standard 5-6 mm long. Pods 6-8-jointed, joints indehiscent, upper suture straight or slightly indented, falcate, clothed with minute hooked hairs.

Type : Habitat in India.

Fl. & *Frt.* : Most of the year, but flowering mostly during rainy season.

Common in mixed forests, in cultivated fields, grassy localities, waste places.

Khondra : 12764.

India, Sri Lanka, S.E. Asia, China, Malaysia, Australia.

Plant is regarded as febrifuge and anti-catarrhal.

D. heterocarpon (L.) DC. Prodr. 2 : 237. 1825; Knaap van Meeuwen in Reinwardtia 6(3):251. 1962; Ohashi in Ginkgoana 1. 210. 1973. *Hedysarum heterocarpon* L., Sp. Pl. : 747. 1753. *H. polycarpum* Poir. in

Lam. Encycl. Meth. Bot. 6 : 413. 1805. *Desmodium polycarpum* (Poir.) DC. Prodr. 2 : 334. 1825; Haines, Botany 2 : 276.

Erect or suberect undershrubs. Leaves 3-foliate; leaflets ovate-rounded, elliptic-oblong, rounded at base, retuse at apex, glabrate or thinly hairy above, pubescent beneath, 2-6 cm long. Flowers bright purple, in lax racemes; calyx 2 mm long, glabrous, teeth acuminate, exceeding tubes; corolla 5-6 mm long. Pods 1.5-2 cm long, clothed with hooked hairs, 5-8-jointed, joints as long as broad.

Type : Habitat in India—Ceylon, Herb. Hermann (BM).

Fl. : Sept.-Oct. *Frt.* : Nov.-Dec.

Common along streams, at the edge of forests.

Lamni : 13250A; Khondra : 12785; Pasarkhet : 12964, 12965.

India, Sri Lanka, China, Japan, Malaysia, Australia.

D. motorium (Houtt.) Merr. in Jour. Arn. Arb. 19 : 345. 1938; Knaap van Meeuwen in Reinwardtia 6(3) : 254. 1962; *Hedysarum motorium* Houtt. Nat. Hist. 2. 10 : 246. 1779. *Desmodium gyrans* (L.f.) DC. Prodr. 2 : 326. 1825; Haines, Botany 2 : 278. *Hedysarum gyrans* L.f. Supp. Pl. : 332. 1782. *Codariocalyx motorius* (Houtt.) Ohashi in Jour. Jap. Bot. 40 : 367. 1965, et Ginkgoana, 1 : 46. 1973.

Erect, stout herbs or undershrubs. Terminal leaflet ovate-oblong or elliptic-rounded, obtuse, truncate at base glabrous above, appressed hairy beneath, 3-10 cm long; lateral ones much smaller, lanceolate-oblong. Bracts cymbiform, 1 cm long. Flowers purplish to bluish, large, in axillary and terminal, lax racemes 10-15 cm long; calyx campanulate, teeth deltoid, shorter than tube; corolla 5-7 mm long; standard broad. Pods slightly curved, shallowly incised along lower suture, 2.5-4 cm long, joints 6-10, inconspicuous. (joints not spreading).

Type : Cultivated at Leiden, Sept. 1778, *van Royen* (untraceable).

Fl. : July-Oct. *Frt.* : Oct.-Dec.

Common along forests, ravines, near streams, forest clearings.

Madai to Korba : 12927; Lafa : 13034.

India, Sri Lanka, S.E. Asia, China, Malaysia, Australia.

The Telegraph Plant or Semaphore Plant owes its name to the fact that the leaflets, especially the lateral ones, when exposed to sun light, exhibit spontaneous jerky movements.

D. pulchellum (L.) Benth. Fl. Hongk. 83. 1861; Knaap van Meeuwen in Reinwardtia 6(3) : 256. 1962; Haines, Botany 2 : 273; *Hedysarum pulchellus* L. Sp. Pl. : 747. 1753. *Phyllodium pulchellum* (L.) Desv. in Jour. Bot. ser. 2. 1 : 124. t. 5. f. 24. 1813; Ohashi in Ginkgoana, 1. 276. 1973.

Erect, much-branched shrubs. Leaves 3-foliolate; stipules lanceolate-acuminate; terminal leaflets larger than lateral, ovate-elliptic-lanceolate, obtuse, mucronate, rounded at base, glabrescent above, appressed hairy beneath, 4-12 cm long. Bracts appressed pubescent within. Flowers white or yellowish, small, 3-5 in each cluster. Racemes 5-15 cm long, erect, terminal and axillary racemes; calyx 3 mm long, hairy, teeth lanceolate, shorter than tube; corolla three times as long as calyx; upper stamens entirely or partially free from the other 9. Pods glabrous, shallowly incised along both sutures, 1-3-jointed, joints reticulate.

Type : Habitat in India—Linn. Herb. 921. 24 (LINN).

Fl. : Sept.-Nov. Frt. : Jan.-Feb.

Common along forest roads, edge of forest, forest clearings.

Madai to Korba : 12915; Korbi : 15333.

India, Sri Lanka, S.E. Asia, China, N. Australia.

D. triflorum (L.) DC. Prodr. 2 : 334. 1825. *pro. part. excl. syn.* Haines, Botany 2 : 278; Knaap van Meeuwen in Reinwardtia 6(3) : 261. 1962. *Hedysarum triflorum* L. Sp. Pl. : 749. 1753, p.p.

Slender trailing herbs rooting at basal nodes and clothed with fine, spreading hairs. Leaves 1.5 cm long; stipules lanceolate, persistent; leaflets obovate-obcordate, truncate or emarginate, glabrous above, appressed white hairy beneath. Flowers small, pink, 1-4 together; calyx 4.5-5 mm long, appressed hairy, teeth setaceous; corolla scarcely longer than calyx; standard retuse; wings and keels bluish, shorter than standard. Pods curved, 3-5-jointed, on filiform pedicels, 1.5 cm long, pubescent.

Type : Habitat in India. Herb. Linn. 924.45 (LINN).

Fl. & Frt. : Throughout the year; usually Aug.-Jan.

Common in grassy places, edge of forests, forest clearings, waste places.

Madai : 12891; Hasdo river bank : 8615.

Africa, India, Sri Lanka, S. E. Asia, China, Australia.

D. velutinum (Willd.) DC. Prodr. 2 : 328. 1825; Knaap van Meeuwen in Reinwardtia 6(3) : 264. 1962; *Hedysarum velutinum* Willd. Sp. Pl.

3 : 117. 1803. *Desmodium latifolium* (Roxb. ex Ker.-Gawl.) DC. Prodr. 2 : 328. 1825; Haines, Botany 2 : 277. *H. latifolium* Roxb. (Hort. Beng. : 57. 1814, *nom. nud.*) ex Ker-Gawler, Bot. Reg. 5 : t. 355. 1819-1820.

Erect undershrubs; branches densely brown hairy. Leaves 1-foliate; stipules small, subulate, base cordate; leaflets ovate-rounded-cordate; obtuse or retuse, mucronate, subcordate or truncate at base, 5-10 cm long, thick, subcoriaceous, softly pubescent beneath. Bracts ovate. Bracteoles inserted at top of pedicels. Flowers purple, in lax racemes; calyx 3.5-4 mm long, densely brown hairy, teeth lanceolate, as long as tube; corolla 3-4-times as long as calyx; standard retuse, 5-6 mm long. Pods 4-6-jointed, shallowly incised along lower sutures.

Fl. & Frt. : Aug.-Dec.

Common at the edge of the forest, forest clearings, along roadsides.

Khondra : 12834, 12836.

Africa, India, Sri Lanka, S. E. Asia.

DOLICHOS L. Sp. Pl. : 725. 1753 & Gen. Pl. : ed. 5 : 324. 1754. *nom. cons.*

T. : *D. trilobus* L. (*typ. cons.*).

Hutchinson (1964) treated *Lablab* Savi (1824) with *L. niger* Medik. as its type and *Dolichos* Lam. emend. DC. (1826) with *D. uniflorus* Lam. as its lectotype, as two good genera, without any reference to *Lablab* Adanson (1763) and *Dolichos* L. (1753). Neither Airy Shaw (1973), nor Farr et al. (1979) list *Lablab* Savi and the latter reduce *Lablab* Adans. as a superfluous name for *Dolichos* L. (Art. 63. 1), citing *D. lablab* L. as its lectotype species. In contrast, Airy Shaw (*l.c.*) treats *Lablab* Adans. as a good genus with *L. niger* Medik. as its type. However, conservation of *Dolichos* L. with *D. trilobus* L. (*typ. cons.*) releases *Lablab* Adans. from illegitimacy, to be adopted as a valid and legitimate generic name (cf. Verdcourt, Kew Bull. 24 : 407-408. 1970), thereby reducing *Lablab* Savi as a later homonym (Art. 64.1). The remarks under *Lablab* Adanson and Westphal in Taxon 24 : 189-192. 1975 may also be seen.

Dolichos uniflorus Lam. Encycl. Meth. Bot. 2 : 299. 1786; *D. biflorus* sensu Murr. Syst. Nat. ed. 13. 548. 1774 pro. part. quond. syn. Pluck. tentum. non L. 1753; Haines, Botany 2 : 305.

Trailing annual herbs, branches villous. Leaves stipellate, 3-foliate; leaflets lanceolate to ovate-lanceolate or ovate-oblong, hairy, 2-5 × 1-3 cm. Flowers 1-3 in axils of leaves, pale yellow; calyx downy, teeth lanceolate.

setaceous, much exceeding tubes; corolla 1.5 cm long; standard with crimson spots; keels narrow, obtuse, shorter than standard; stamens diadelphous; styles filiform, minutely pinnicillate around stigma. Pods falcate, curved, hairy, 4.5 cm long, tipped with persistent style.

Fl. : Sept.-Oct. *Frt.* : Nov.-Dec.

Commonly cultivated; also met with as escapes from cultivation.

Khondra : 12706.

India, Burma.

DUMASIA DC. in Ann. Sci. Nat. (Paris) Ser. I, 4 : 96. 1825.

LT. : *D. villosa* DC. vide Hutchinson, Gen. Fl. Pl. 1 : 447. 1964.

Dumasia villosa DC. in Ann. Sci. Nat. (Paris) Ser. I, 4 : 96. 1825; Haines, Botany 2 : 288.

Densely hairy, climbing herbs. Leaves 3-foliolate; leaflets ovate, obtuse or broadly ovate-oblong, terminal sub-rhomboid, membranous. Flowers pale yellow, 1.5 cm long, in slender racemes; calyx-tube cylindrical, mouth oblique-subtruncate, base gibbous; corolla twice as long as calyx; standard spurred on both sides of the base of limb, reflexed, deeply emarginate; wings and keels adherent with small blades and long claws; stamens diadelphous. Pods linear, falcate, torulose, velvety 2.5-3.5 cm long.

Fl. : Oct.-Nov. *Frt.* : Nov.-Dec.

Frequently found climbing over bushes at the edge of forest, on slopes.

Kabirchabutra : 13318.

Africa, India, Sri Lanka, S. E. Asia.

According to Haines (l.c.), only *D. villosa* var. *leiocarpa* (Benth.) Baker with nearly glabrous pods occurs in Bihar and Orissa and that, the type variety with velvety pods had not been found by him. The specimens from Kabirchabutra with velvety pods is, then, an interesting record for the area.

ELEIOTIS DC. Prodr. 2 : 348. 1825.

LT. : *E. monophylla* (N. Burm.) DC. (*Glycine monophylla* N. Burm.) vide Hutchinson, Gen. Fl. Pl. 1 : 487. 1964.

Eleotis monophylla (N. Burm.) DC., Prodr. 2 : 348. 1825, et Mem. Legum. : 350. 1826. *Glycine monophylla* N. Burm., Fl. Ind. : 161, t. 50, fig. 2. 1768. *Eleotis sororia* DC. l.c.; Haines, Bot. 2 : 267; [as (L.) DC.]

nom. illeg. Type : Same as for *G. monophylla* N. Burm. *Hedysarum sororium* L., Mant. Alter. : 270. 1771, *nom. superfl.* Type : same as for *G. monophylla* N. Burm.

Annual, trailing herbs. Leaves 1-foliate; leaflets membranous, shortly stalked, stipellate, orbicular, emarginate; stipules chaff-like. Flowers small, reddish, in a few-flowered, axillary racemes longer than leaves; calyx with short tube and 5 subequal teeth; corolla minute; standard broad; keels obtuse, adhering to wings; stamens 9+1. Pods 1-jointed and glabrous, 1-seeded, 0.7-0.9 mm. long.

Type : 'Habitat in Coromandeli'; fig. 2, N. Burm. I.c.

Fl. & Frt. : Sept.-Oct.

Rare along streams, amidst bushes, at the edge of forests.

Pasarkhet : 12967.

India, Sri Lanka.

ERYTHRINA L. Sp. Pl. : 706. 1753 & Gen. Pl. ed. 5 : 316. 1754.

LT. : *E. corallodendron* L. vide N. L. Britton et P. Wilson, Scient. Surv. Porto. Rico : 427. 1924.

Erythrina suberosa Roxb., Fl. Ind. 3 : 253. 1832; Haines, Botany 2 : 298. (*Pangra*).

Deciduous, prickly trees with corky bark; young parts, undersurface of leaflets and inflorescence softly tomentose. Leaves pinnately 3-foliate, stipellate; terminal leaflets 10-22 cm broad, base usually rhomboid or subcuneate, entire or lobed. Flowers showy, scarlet, red in dense, subcapitate racemes terminating branches, produced usually before appearance of leaves; calyx persistent, campanulate, 2-lipped; corolla unequal; standard exserted, 3-5 cm long, oblong, narrowed into a claw, twice as long as keel; keel-petals connate; upper stamens 10, vexillary stamen free or connate at base, other connate at middle; pods spindle-shaped, 10-15 cm long including slender stipes, 4-5 seeded.

Fl. : Mar.-May. *Frt.* : Apr.-June.

Occasionally found in the outskirts of villages, along roadsides, sometimes planted.

Belghana : 16765.

India, Burma, Thailand to Vietnam.

FLEMINGIA Roxb. ex W. Ait. et W. T. Ait. Hort. Kew, ed. 2.
4 : 349. 1812. *nom. cons.*

T. : *F. strobilifera* (L.) Roxb. ex W. Ait. et W. T. Ait. (*Hedysarum strobiliferum* L.).

Flemingia Roxb. ex W. Ait. et W. T. Ait. (1812) is conserved against *Flemingia* Roxb. ex Rottl. (1803) (Acanthaceae) and = *Lourea* Neckér ex J. St. Hill, (1812) (cf. Taxon 21 : 532-533. 1972; Kew Bull. 25.(1) 146. 1971).

- 1a. Leaves 1-foliate; flowers in small cymes, each hidden by large, conduplicate, persistent bracts *F. strobilifera*
- 1b. Leaves 3-foliate; flowers in racemes, not hidden by bracts
 - 2a. Leaflets lanceolate, ribs not prominent; bracts exceeding buds *F. macrophylla*
 - 2b. Leaflets large, broadly elliptic, ribs prominent, bracts not exceeding buds *F. nana*

Flemingia macrophylla (Willd.) Prain ex Merr. Philipp. Jour. Sci. Bot. 5 : 130. 1910, non Boldinlh 1916. *Crotalaria macrophylla* Willd. Sp. Pl. 3 : 982. 1802. *Flemingia congesta* Roxb. ex W. Ait. et W. T. Ait. Hort. Kew. ed. 2. 4 : 349. 1812; Haines, Botany 2 : 282; *Maughania macrophylla* (Willd.) O. Kuntze, Rev. Gen. Pl. 1 : 199. 1891 (*Moghania*); van Steenis in Reinwardtia 5(4) : 430. 1961.

Erect shrubs or undershrubs, branches triquetrous. Leaves 3-foliate. Leaflets obovate-oblong, acuminate 15-30 cm long with 1-3-veined base. Flowers purplish-yellow, in 5-10 cm long, dense, oblong-cylindrical, axillary, often fascicled racemes, smaller than petiole; conspicuous by densely imbricating, brown, linear-lanceolate bracts; calyx silky; teeth linear, lowest much longer than others; petals equal; keels obtuse; stamens diadelphous. Pods 1-1.5 cm long, hairy, 2-seeded.

Fl. : Jan.-Mar. Frt. : Apr.

Common inside forests, under shady situations along streams, ravine slopes.

Lamni : 15409, 132414.

India, Sri Lanka, S.E. Asia, Australia, China.

Ali (1977) attributes *Flemingia macrophylla* to ('Willd.) Alston' (1931) and treats it as a later homonym of *F. macrophylla* Boldinlh (1916). But Alston (1931) was unaware of Merr's (1910) publication.

F. nana Roxb. (Hort. Beng. : 56. 1814, *nom. nud.*) Fl. Ind. 3 : 339. 1832; Haines, Botany 2 : 282. *F. congesta* Roxb. ex W. Ait. W. T. Ait. var. *nana* (Roxb.) Baker in Hook. f. FBI 2 : 229. 1876; *Maughania nana* (Roxb.) Mukherjee in Bull. bot. Soc. Beng. 6 : 20. 1952.

Low undershrubs. Leaves with winged petiole; lateral leaflets broadly elliptic or obliquely oblong; terminal obovate. Flowers small, reddish, in panicled racemes; bracts lanceolate; calyx covered with minute, viscid, red glands, tube short, teeth narrow; corolla slightly or not exserted; keels obtuse; stamens diadelphous; ovary sub-sessile, 2-ovuled. Pods covered with minute viscid hairs, oblong, 2-seeded, about 8 mm long.

Fl. : Mar.-Apr. Frt. : Apr.-May.

Common in damp situations, inside forests, along ravines.

Lamni : 15408.

India.

F. strobilifera (L.) W. Ait. et W. T. Ait., Hort. Kew. ed. 2.4 : 350. 1812; Haines, Botany 2 : 280; *Hedysarum strobiliferum* L. Sp. Pl. : 746. 1753. *Maughania strobilifera* (L.) St. Hill. ex O. Kuntze, Rev. Gen. Pl. 1 : 199. 1891; van Steenis in Reinwardtia 5(4) : 433. 1961.

Bushy shrubs. Stems slightly angular. Leaves ovate-oblong to lanceolate, obtuse or acute, rounded or subcordate at base, 4-15 × 2-7 cm. Flowers small, white or purple, in a few-flowered cymes, arranged in racemes, racemes combined into panicles; bracts ovate, cordate, rounded, apiculate or shortly acuminate; calyx 4.5-5 mm long, teeth lanceolate, hairy, lowest longer than others; corolla exserted, 5-6 mm long. Pods hairy, 0.8-1 cm long, oblong, hairy, 2-seeded.

Type : Herb. Linn. 921. 21 (LINN).

Fl. : Mar.-Apr. Frt. : Apr.-June.

Common inside Sal forests in moist situations, forest clearings.

Madai to Korba : 12922; Lamni : 15415; Aurapani : 15479; Pasan to Semra : 15349.

Tropical and sub-tropical Asia, America.

According to Ali (1977), as also Baker (1876), R. Br. is the author of the combination in Aiton's (1812) publication and therefore, the correct citation is *F. strobilifera* (L.) R. Br. But Hara *et al.* (1979) considered W. T. Aiton as the author; entry against item 3899 (App. III, ICBN 1983) reads "(Linnaeus) W. Aiton et W. T. Aiton". This needs verification.

INDIGOFERA L. Sp. Pl. : 731. 1753 & Gen. Pl. ed. 5 : 333. 1754.

L.T. : *I. tinctoria* L. vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. 2 : 371. 1913.

- 1a. Leaves simple; pods globose, 1-seeded
- 2a. Leaves linear, acute; flowers 6-12, in axillary racemes *I. linifolia*
- 2b. Leaves obovate, obtuse with mucro; flowers solitary in leaf axile *I. linifolia*
subsp. *campbellii*
- 1b. Leaves pinnately compound; pods linear or oblong, 1-12-seeded
 - 3a. Leaflets alternate; flowers in dense, sessile heads; pods 1-3-seeded *I. hirsutae*
 - 3b. Leaflets opposite; flowers in axillary, elongated racemes; pods 6-12-seeded
 - 4a. Racemes laxly 2-4-flowered *I. glabra*
 - 4b. Racemes more than 12-flowered
 - 5a. Leaflets 13-17; inflorescences with sterile bracts at base, exceeding bud; flowers large, upto 1 cm across; fruits glabrous *I. cassiodoides*
 - 5b. Leaflets 5-13; bracts minute; flowers small, less than 0.5 cm; fruits hairy
 - 6a. Stems densely hairy; pods tetragonal, densely hairy with stiff spreading hairs, 6-8-seeded *I. astragalina*
 - 6b. Stems sparingly hairy or glabrous; pods sparingly hairy, cylindrical, 10-12-seeded *I. tinctoria*

Indigofera astragalina DC. Prodr. 2 : 228. 1825; Gillett in Kew Bull. 14 : 290. 1960. Nair & Koshy, J. Bombay Nat. Hist. 60 : 330. 1963. *I. hirsuta* auct. mult. non L. 1753; Baker in Hook. f. FBI 2 : 98. 1876. pro. part.; Haines, Botany 2 : 250.

Annual or biennial herbs. Leaves 7-9(-11)-foliolate, 10-12 cm long; leaflets opposite, short-petioluled, obovate, rounded to oblong, obtuse, retuse, mucronate, acute at base, appressed hairy, 3-5 × 2-3 cm, terminal one largest. Flowers pink, dense on short peduncles, 2.5 cm long, densely patent hairy racemes, 5-15 cm long; calyx densely pubescent, teeth long, setaceous, plumose; corolla twice as long as calyx; standard obovate; keel straight, not beaked, spurred on each side near base. Pods 2.0 × 0.3 cm, tetragonal 4-6-seeded; with stiff, spreading white hairs on dorsal surface.

Fl. : July-Aug. *Frt.* : Sept.-Dec.

Frequently found in rocky places.

Pendra Road : 13265A; Madai : 12876.

Africa, India, Sri Lanka, Burma, Java, Philippines, N. Australia.

I. cassioides Rottl. ex DC. Prodr. 2 : 225. 1825 : *I. pulchella* *sensu* Baker in Hook. f. FBI 2 : 101. 1876. *pro. part., non* Roxb. 1832 ; Haines, Botany 2 : 251 (*Birhul, Neel*).

Erect, much-branched shrubs. Leaves odd-pinnate, 8-15 cm long with 11-15 leaflets; leaflets opposite or sub-opposite, elliptic oblong or oblong-ovate, 1.5-2.5×1.0-1.5 cm. Flowers pink or rose, in numerous, dense racemes with long, boat-shaped, acuminate, deciduous bracts covering young buds; calyx oblique, often petaloid, broadly campanulate with lanceolate acuminate teeth, hairy; corolla glabrous externally; standard elliptic-oblong, reflexed; stamens diadelphous. Pods straight, cylindrical, glabrous, 8-12-seeded, 2.5 cm long.

Type : Mount Nilligery, Ind. Orient, 1823, *Leschenault* (G).

Fl. : Oct.-Mar. *Frt.* : Feb.-May.

Common throughout the area.

Madai : 12877; Kabirchabutra to Pendra : 15272; Katghora : 6064; Korba : 8732.

India, Burma, China.

Note : Study of the type is required to decide whether it is conspecific with *I. atropurpurea* Buch.-Ham. ex Hornem. Reg. B. Hafn. Suppl. : 152. 1819. According to Ali (1977), *I. cassioides* Rottl. ex DC. (1825) and *I. atropurpurea* Buch.-Ham. ex Hornem. (1819) are specifically distinct and *I. pulchella* *sensu* Baker *pro. part., non* Roxb. (1832) is conspecific with *I. cassioides*. Hara *et al.* (1979), while treating *I. cassioides* DC. as a synonym of *I. atropurpurea*, say that it consists of 2 forms, the one with purple flowers and smaller leaflets is *I. pulchella* Roxb.

Leaves are used as pot-herbs.

I. glabra L. Sp. Pl. : 751. 1753; *I. pentaphylla* J. Murray, Syst. Veg. ed. 13 : 564. 1774; Haines, Botany 2 : 249.

Diffuse herbs; hairy except pods. Leaves membranous, odd-pinnate with 3-7 leaflets, leaflets obovate, obtuse, less than 1 cm long; stipules lanceolate, acute, hairy, persistent. Flowers small, red in short, axillary, 2-4-flowered racemes; peduncles-capillary, upto 2 cm long; calyx teeth three times as long as tube, setaceous, silky; standard broad; 2-3 mm long; stamen dia-

delphous. Pods slender, straight, turgid, tipped with hardened style base, 8-12-seeded, 2-3 cm long.

Fl. & Frt. : July-Dec.

Common in sandy bed of rivers, waste places, forest edges.

Pasan : 13286.

India, Sri Lanka.

I. linifolia (L. f.) Retz. Obs. Bot. 4 : 29. 1786 ; Haines, Botany 2 : 248 ; Ali in Fl. West Pakistan No. 100 : 69, fig. 9 M.O. 1977. *Hedysarum linifolium* L. f. Suppl. Pl. 331. 1782.

Prostrate or decumbent-ascending, perennial herbs with appressed-hairy stems. Leaves sub-sessile, linear-lanceolate or linear-oblong, apiculate, appressed hairy, 0.5-3 × 0.2-0.4 cm; stipules subulate. Flowers small, bright red, in axillary, bracteate racemes; calyx-tubes short, with subulate setaceous teeth as long as pods; corolla 2-3 times calyx; standard appressed hairy on back; stamens diadelphous. Pods ovoid-globose, 1-seeded, appressed hairy.

Type : Ind. Orient. Herb. Linn. 921.5 (LINN).

Fl. : July-Aug. *Frt.* : Aug.-Feb.

Common on hard soil in forest clearings, road-sides.

Katghora : 6090 ; Palni : 16714.

Africa, W. Asia, India, Sri Lanka, Malaya, Australia, China.

The roots are usually copiously covered with tubercles due to nitrogen-fixing bacteria, so that the plant is useful as soil-fertiliser.

I. linifolia (L. f.) Retz. subsp. *campbellii* (Wt.), Panigr. et S. K. Murti, comb. nov. & stat. nov. *I. campbellii* Wt., Icon. 1(15-16) t. 313. 1840. *I. linifolia* (L. f.) Retz. var. *campbellii* (Wt.) Baker in Hook. f. FBI 2 : 93. 1876 ; Saldanha & Singh, Fl. Karnataka 1 : 472. 1984. (as Wight ex Baker)

Plants similar to subsp. *linifolia* but leaves obovate, obtuse, macronale, glaucous, 6-10 × 2-3 mm; flowers solitary in every axil.

Fl. & Frt. : Oct.

Occasionally found along roadsides.

Bilaspur : 12994 ; Kota to Bilaspur : 13052.

Africa, W. Asia, Sri Lanka, India, S. E. Asia, Australia, China.

I. haneet Ali in Bot. Notiser 3 : 549. 1958 ; cf. Fl. West Pakistan No. 100 : 75, 1977. *Hedysarum prostratum* L. Mant. Pl. 1 : 102. 1767.

Indigofera enneaphylla L. Mant. Pl. 2 : 272. et Append. 571. 1771 *nom. illeg.*; Haines, Botany 2 : 249. *I. prostrata* (L.) Domin, Bibl. Bot. Stuttgart ; 187. 1926. *non* Willd. 1802.

Prostrate or decumbent-ascending perennial herbs with appressed hairy, not whitish hairy, catespitose, trailing branches. Leaves 1.5-2 cm long, 5-9-foliolate; leaflets subsessile, alternate, oblanceolate-oblong, obtuse, retuse, mucronate, appressed hairy, 1-1.2 × 0.2-0.3 cm. Flowers red; calyx appressed hairy, teeth long setaceous; corolla exserted; stamens diadelphous. Pods cylindrical, oblong, appressed hairy, 1-3-seeded 0.5-0.7 cm long.

Type: Coromandal, Herb. Sloane, Vol. 95. fol. 186 (BM)

Fl.: July-Aug. Frt.: July-Nov.

Common in waste places, along roads.

Kota to Bilaspur : 13053; Achanakmar : 19287.

Throughout India, Sri Lanka, Burma, Thailand to Vietnam.

I. tinctoria L. Sp. Pl. : 751. 1753; Wight, ic. : t. 365. 1840, Haines, Botany 2 : 250.

Slender erect shrubs; branches appressed hairy, sharply angled. Leaves odd-pinnate, elliptic or elliptic-ovate membranous leaflets, base rounded. Flowers small, red, shortly stalked in slender axillary racemes; calyx shallow, silvery pubescent, teeth more than twice as long as tube, narrowly lanceolate acuminate; standard suborbicular; keel spurred half way up, free. Pods straight or slightly curved, glabrous when mature, 8-12-seeded, 2.5-3 cm long.

Type: Ceylon, Herb. Hermann Vol. 3. fol. 20, (BM).

Fl.: Aug.-Sept. Frt.: Oct.-Dec.

Common in waste places, along streams, edge of forest, forest clearings.

Khondra : 16756; Kota to Bilaspur : 13058; Khuria : 19312.

India, Sri Lanka, Burma, Thailand to Vietnam; introduced in Tropical America.

LABLAB Adans, Fam. 2 : 325. 1763.

T. : *Lablab niger* Medic. (≡ *Dolichos lablab* L.)

Farr *et al.* (1979) treat *Lablab* Adans. as congeneric with *Dolichos* L. and cite *D. lablab* L. as the type species of *Dolichos* L. But this is contrary to the entries in I.C.B.N., 1983 against *Dolichos* L. *nom. cons.* The proto-

logue of *D. purpureus* L. Sp. Pl. ed. 2 : 1021. 1763 examined shows that it is not a superfluous name for *D. lablab* L.; therefore, *Lablab purpureus* (L.) Sweet would have priority over *L. niger* Medic. (1787).

Lablab purpureus (L.) Sweet, Hort. Brit. ed. 1. 481. 1826; Verdcourt in Kew Bull. 24 (3) : 410. 1970. *Dolichos lablab* L. Sp. Pl. : 725. 1753; Haines, Botany 2 : 209; *D. purpureus* L., Sp. Pl. ed. 2. 1021. 1763. *Lablab niger* Medic. Vorles. Churpf. Phys.—Okon. Ges. 2 : 354. 1787. *Lablab vulgaris* Savi in Nouv. Giorn. Lett. (Pisa) 8 : 116, fig. 81, a-c. 1824.

Twining annual or perennial herbs. Leaves 3-foliolate; leaflets broadly ovate-elliptic, acute, entire, cuneate-rounded at base; terminal one deltoid. Flowers red, white or purple in axillary or terminal racemes; nodes tumid with 1-4 flowers; calyx campanulate, sub-equally toothed; standard broad; keel rostrate; styles bearded down inner face, thickened upwards, narrowed to base. Pods white to purple and shining, wider above middle, tipped with sharply bent styles, recurved 2-4-seeded.

Fl. : Sept.-Oct. Fru. : Nov.-Jan.

Commonly cultivated; also found as escapes from cultivation.

Passes to Korbi : 15314.

Throughout the tropics.

Fruits edible.

LATHYRUS L. Sp. Pl. : 1753 & Gen. Pl. : 730. ed. 5 : 326. 1754.

T. : *non designatus*

Two lectotypes have been chosen; *L. sativus* L. (vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2.2 : 412. 1913) and *L. sylvestris* L. (vide M. L. Green, Nom. Prop. Brit. 175. 1930).

Lathyrus sativus L. Sp. Pl. 730. 1753; Haines, Botany 2 : 261.

Annual glabrous herbs. Stems winged. Leaves 2-(4) foliolate, ending in 3-fid tendrils; stipules semisagittate; leaflets linear-lanceolate acuminate. Peduncles longer than petioles, 1-flowered; calyx-teeth spreading in flowers, lanceolate, about twice as long as tube; corolla purple or blue; standard broader than long, emarginate. Pods winged along dorsal suture, 3-5 cm long, 4-5-seeded.

Syntypes: 'Habitat in Hispania, Gallia', Herb. Linn. 905.6 (LINN); Hort. Cliff. (BM).

Fl. & Frt. : Dec.-Mar.

Commonly cultivated, also found as escapes from cultivation.

Kota to Lormi : 15454.

Europe, N. Africa, S. W. Asia, India.

Plant is used as fodder; human consumption of seeds is considered injurious and may even result in paralysis.

MILLETTIA Arnott in Wight & Arnott, Prodr. : 263. 10 Oct. 1834; Stafleu, Tax. Lit. (Reg. Veg. No. 52) : 502. 1967; Geesink in Taxon 30 : 327-329. 1981, et Brummitt in Taxon 33 : 298. 1984; *nom. cons.*

LT. : *M. rubiginosa* Arnott vide Hutchinson, Gen. Fl. Pl. 1 : 377. 1964.

Pongamia Ventenat Jard. Malm. : t. 28. Dec. 1803, *nom. rej. nom. cons.*

T. : *P. glabra* Vent., *nom. illeg.* (*Robinia mitis* Linnaeus, *nom. illeg.*) [= *Pongamia pinnata* (L.) Pierre; *Cytisus pinnatus* L.; *Derris indica* (Lamarck) Bennett] (*typ. cons.*).

Note : Stafleu (1967) states, "Arnott alone did the Leguminosae (Bentham, Comm. Legum. gen. 1837)".

Brummitt (1984) records that the Committee for Spermatophyta in their report no. 27, approved by 9 : 2 votes, the Proposal No. 549, to treat *Millettia* Arnott (as 'Wight & Arnott') as *nom. cons.* (3720) and to reject *Pongam* Adanson (1763) and *Pongamic* Ventenat (1803) as *nom. rej.* Although *Millettia* and *Pongamia* have traditionally been referred to different tribes of the Leguminosae, recent revision of tribal and generic boundaries indicates that they should now be regarded as congeneric. The name *Pongamia* is earlier, but applies currently to a genus of only two species, while *Millettia* includes some 200 taxa, some of which are economically important; hence *Millettia* Arnott is *nom. cons.*

When *Pongamia* Vent. is rejected in favour of *Millettia* Arnott, the correct name of *Pongamia pinnata* (L.) Pierre should be *Millettia pinnata* (L.) Panigr., comb. nov., as set out and keyed below:

- 1a. Robust climbers; leaves 30-50 cm long; pods 10-15 cm long, permanently clothed with reddish-brown tomentum *M. extensa*
- 1b. Trees; leaves 15-20 cm long; pods 3.5-5.0 cm long, glabrous *M. pinnata*

Millettia extensa (Benth.) Benth. ex Baker in Hook. f. FBI 2 : 109. 1876. *Otosema extensa* Benth. in Miq. Pl. Jungh. 249. 1852. *Millettia*

delphous. Pods linear, flat, smooth, formed of 2-5 large, more or less distinct joints, 5-10 cm long; seeds 1-5, compressed, reniform.

Type : Roxburgh, Icon. 1588 (K, CAL).

Fl. : Feb.-Apr. *Frt.* : Apr.-June.

Common in dry deciduous forests.

Pali : 8596; Neur : 16719.

India.

Gums from bark is used medicinally and as fish-poison.

PSORALEA L. Sp. Pl. : 762. 1753 & Gen. Pl. ed. 5 : 336. 1754.

N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. ; 360. 1913 regard *P. bituminosa* L. as type.

L.T. : *P. pinnata* L. vide M. L. Green, Prop. Brit. Bot. : 176. 1929.

Psoralea corylifolia L., Sp. Pl. : 764. 1753; Haines, Botany 2 : 253; Ali in Fl. West Pakistan No. 100 : 215. 1977. (*Babchi*)

Perennial herbs or undershrubs. Leaves simple, broadly ovate, repand-dentate, long petioled, strongly veined, punctate beneath; stipule triangular-oblong, acuminate. Flowers small, purple, in dense, long-peduncled heads; calyx campanulate, teeth lanceolate, glabrous; corolla little exserted; wings exceeding keel; stamens 10, one filament free; ovary 1-ovuled. Pods included, densely gland-punctate, glabrous, subglobose, 1-seeded.

Type : India, Herb. Linn. 928. 24 (LINN).

Fl. : Oct.-Dec. *Frt.* : Dec.-Feb.

Occasionally found on bund of cultivated fields, waste lands, along roadsides.

Bilaspur : 12982; Khami to Pandaria : 16706.

Arabia, Somalia, India, Sri Lanka, Burma, China.

Knaap van Meeuwen *et al.* (*op. cit.*) treat this species as native of India-Burma-Vietnam region.

Bark and seeds are used medicinally in leucoderma. The seeds are laxative.

PTEROCARPUS N. J. Jacq. Select Stirp. Amer. Hist. : 283. 1763. *nom. cons.*

T. : *P. officinalis* N. J. Jacq. (*typ. cons.*)

Pterocarpus marsupium Roxb. Pl. Corom. 2 : 9. t. 116. 1798; Haines, Botany 2 : 310. (*Bija, Bija sal*)

Large trees. Leaves odd-pinnate, 15-25 cm long; leaflets 5-7, oblong or elliptic, 7-12 cm long, with rounded or obtuse ends, glaucous beneath, veins close, prominent. Flowers yellowish, in large, much-branched, dense, terminal panicles; rachis and pedicels rusty-puberulous; calyx turbinate, curved in bud, teeth short; corolla exserted, petals clawed; standard and wings crisped; keels obtuse; stamens diadelphous (5+5) or monadelphous with sheaths slit above only, or upper stamens free; ovary stipitate, 2-ovuled. Pods orbicular with a broad wing.

Fl. : Oct. Frt. : Dec.-Jan.

Common in mixed forests near nala, slopes.

Khondra : 12766; Pasan : 13282A; Khutia to Aurapani : 15478.

Throughout the tropics.

Wood is used as timber. The bark yields a valuable astringent gum; leaves are used as fodder.

PUERARIA A. P. DC. in Ann. Sci. Nat. Paris 4 : 97. 1825.

LT. : *P. tuberosa* (Roxb. ex Willd.) DC. (*Hedysarum tuberosum* Roxb. ex Willd.) vide Burkart, Las Leguminosas—Argentinas : 544. 1943.

Pueraria tuberosa (Roxb. ex Willd.) DC. in Ann. Sci. Nat. Paris 4 : 97. 1825 et Prodr. 2 : 240. 1825; Haines, Botany 2 : 294; *Hedysarum tuberosum* Roxb. ex Willd. Sp. Pl. 3 : 1197. 1802.

Large woody climber; flowering when leafless. Leaves 3-foliate, large; terminal leaflet rhomboid, longer than broad, lateral obliquely ovate, prominently appressed, white-silky beneath; stipellae lanceolate, subulate. Flowers blue-purple, ternate, in dense, virgate, leafless, often paniced racemes; calyx silky, teeth shorter than tube, subequal, two upper connate; corolla exserted; standard orbicular, clawed; wings obliquely oblong; keels obtuse; stamens usually diadelphous. Pods linear, hairy, 5-8 cm long, 3-6-seeded, constricted between seeds.

Type : 'Habitat in India Orientalis', Roxburgh, Herb. Willdenow (B-W).

Fl. : Feb.-Apr. *Frt.* : May-June.

Occasional in mixed forests.

Pasarkhet to Kartala : 19435.

Pakistan, India, Nepal.

The tubers are used medicinally.

RHYNCHOSIA Lour. *Fl. Cochinch.* : 460. 1790. *nom. cons.*

T. : *R. volubilis* Lour.

Rhynchosia minima (L.) DC. *Prodri.* 2 : 385. 1825; Haines, *Botany*, 2 : 284; Verdcourt in *Kew Bull.* 25(1) : 102. 1971; *Dolichos minimus* L. *Sp. Pl.* : 726. 1753.

Slender trailing or twining herbs. Leaves pinnately 3-foliate; leaflets orbicular or ovate-rhombose, acute, pubescent above and on veins, glandular punctate below. Flowers yellow, small, in lax, 3-8-flowered racemes; calyx minutely silky, teeth subulate acuminate, corolla exserted; standard hairy; stamens diadelphous; ovary glandular hairy. Pods flattened, oblong-ob lanceolate, slightly curved, hairy, 1-1.5 cm long, usually 2-seeded.

Lectotype : Jamaica, St. Jago de la Vega, Sloane 3 : 79 (BM) vide Ali (*op. cit.*)

Fl. : Aug.-Sept. *Frt.* : Oct.-Nov.

Common amidst grasses, forest clearings.

Bilaspur : 12986.

Africa, W. Asia, India, Sri Lanka, S.E. Asia, China, tropical America.

SESBANIA Scopoli, *Intr.* : 308. 1777. *nom. cons.*

T. : *S. sesban* (L.) Merrill (*Aeschynomene sesban* L.).

- 1a. Annual, armed, undershrubs; leaves 15-30 cm long, leaflets 41-81; flowers uniformly yellow; pods not twisted, erect *S. bispinosa*
- 1b. Perennial, unarmed shrubs; leaves 10-15 cm long; leaflets 25-41; flowers orange, red or deep purple; pods twisted, pendulous *S. sesban*

Sesbania bispinosa (Jacq.) W. F. Wight in U.S. Dept. Agr. Bur. Pl. Ind. Bull. No. 137 : 15. 1909; Gillett in Kew Bull. 17(1) : 129. 1963;

Aeschynomene bispinosa Jacq. Ic. Pl. Bar. 3 : 13. t. 564. 1792. *Coronilla aculeata* Willd. Sp. Pl. 3 : 1147. 1802. nom. illeg. *Sesbania aculeata* Poir. in Lam. Encycl. Meth. Bot. 7 : 128. 1806. Pers. Syn. Pl. 2 : 316. 1807 (as 'Sesban aculeatus') ; Haines, Botany 2 : 257.

Erect undershrubs upto 2 m tall. Leaves odd- or even-pinnate; leaflets short petioluled, oblong-lanceolate, slightly oblique at base, 5-15 × 2-4 mm. Flowers yellow, in short axillary raceme; calyx campanulate, teeth short, subequal; petals long-clawed; standard broad; stamens diadelphous; ovary many-ovuled. Pods ascending, slightly curved, 20-30 cm long, narrow, dehiscent, septate between numerous seeds, beaked.

Type : Plant of unknown origin, cultivated in Vienna before 1788 and figured in Jacq., Ic. Pl. Rar. 3. t. 564. 1792.

Fl. : July-Aug. Frt. : Sept.-Oct.

Common in cultivated fields, waste places.

Pasan : 13279A.

Tropical Africa, Asia; probably a native of tropical Asia (Hara *et al.* l.c.).

Stems yield fibres.

S. sesban (L.) Merr. in Philip. Jour. Sci. 7 : 235. 1912. *Aeschynomene sesban* L. Sp. Pl. : 714. 1753. *Sesbania aegyptiacus* Poir. in Lam. Encycl. Meth. Bot. 7 : 128. 1806; Pers. Syn. Pl. 2 : 316. 1807; Haines, Botany 2 : 256. *S. aegyptiacus* Poir. var. *bicolor* Arn. in Wt. & Arn., Prodr. 1 : 214. 1834.

Large shrubs. Leaves pinnate, ending in a point; leaflets closely set, linear-oblong, membranous, pale green. Flowers in lax racemes; calyx with short deltoid teeth; standard dark brown outside, orange-brown inside; stamens diadelphous; ovary many-ovuled. Pods slender, thin, torulose, twisted, 15-22 cm long.

Type : Herb. Linn. 922. 12 (LINN).

Fl. : Oct.-Dec. Frt. : Nov.-Jan.

Commonly grown as hedge, also for green manure; frequently found as escape from cultivation.

Semra : 15353.

A native of tropical Africa and Asia, naturalized throughout the tropics (Hara *et al.*, l.c.).

Ali (I.c.) recognizes two varieties viz. var. *sesban* and var. *muricata* Baquar (1969), the latter differing from var. *sesban* in having branches and rachis aculeate and endemic to Pakistan.

SHUTERIA Arn. in Wt. & Arn., Prodr. 207. 1834. *nom. cons.*

T. : *S. vestita* Arn. (*typ. cons.*).

Shuteria involucrata (Wall.) Arn. var. *glabrata* (Arn.) Ohasi in Jour. Jap. Bot. 50 : 305. 1975. *S. glabrata* Arn. in Wt. & Arn., Prodr. : 207. 1834. *S. vestita* Arn. var. *glabrata* (Arn.) Baker in Hook. f. FBI 2 : 182. 1876. *S. densiflora* Benth. in Miq. Pl. Jungh. : 232. 1852; Haines, Botany 2 : 288.

Twinters. Leaves 3-foliate, stipellate; leaflets ovate-obovate to round, rounded or emarginate, glabrous, 3-3(-10) × 3.5-5 cm. Flowers small, pink, in dense, axillary, fascicled, 5-9 cm long racemes; bracts brown, striate; calyx glabrous or pubescent, tube gibbous, teeth short; corolla greenish-yellow; standard exceeding spurred wings, keel-petals united. Pods flat, linear, dehiscent with spirally twisted valves, 6-8-seeded, pubescent.

Fl. : Dec.-Feb. Frt. : Feb.-Apr.

Occasional on slopes.

Kabirchabutra to Chauradadar : 15227.

India, Sri Lanka, S. E. Asia, China.

SMITHIA W. Aiton, Hort. Kew. ed. 1. 3 : 496. 1789. *nom. cons.*

T. : *S. sensitiva* W. Aiton.

- | | |
|---|---------------------|
| 1a. Flowers in pairs, in axil of leaves; upper lip of calyx glabrous or with few bristle-hairs, lower lip long hairy; bracteoles with some long hairs | <i>S. conferta</i> |
| 1b. Flowers 1-6, in short, simple, leafless, peduncled racemes; calyx and bracteoles glabrous or with a few scattered bristle hairs | <i>S. sensitiva</i> |

Smithia conferta Sm. in Rees, Cycl. 33. No. 2. 1819; Haines, Botany 2 : 264; van Steenis in Reinwardtia 5(4) : 445. 1961. *S. geminiflora* Roth, Nov. Pl. Sp. : 352. 1821; Baker in Hook. f. FBI 2 : 149. 1876 p.p., incl. var. *conferta* (Sm.) Baker.

Decumbent-ascending herbs. Leaves 1-3 cm long; leaflets 4-6(-8), oblong, acute or obtuse; stipules with long tailed auricles. Flowers yellow, subsessile; calyx deeply 2-lipped, posterior slightly longer, ovate or elliptic, scarious with many close parallel veins; wings clawed and auricled; stamens diadelphous; ovary many-ovuled. Pods 8-10-jointed, joints connected by dorsal sutures.

Fl. : Sept.-Oct. *Frt.* : Oct.-Nov.

Common on bund of cultivated fields, forest clearings.

Khondra : 12760; Khondra to Pali : 12867.

India, Sri Lanka, S. E. Asia, N. Australia, China.

S. sensitiva W. Ait., Hort. Kew. ed. 1.3 : 496. 1789; Haines' Botany 2 : 265; van Steenis in Reinwardtia 5(4) : 444. 1961.

Diffuse herbs. Leaves 1-1.5 cm long; leaflets 4-12, rarely upto 20, linear-oblong, obtuse, long ciliate, long hairy on midribs below. Flowers small, yellow, in close peduncled raceme with short, ascending pedicels; calyx with acute, entire lips, with a few short deciduous bristles, veins close parallel, 5-6 mm long; corolla with brown band in throat; wings clawed and auricled; stamens diadelphous. Pods 4-6-jointed, flattened.

Fl. & *Frt.* : Oct.-Nov.

Frequently found along sides in ditches.

Pali to Katghora : 12866.

Africa, India, S. E. Asia, China, tropical Australia.

SOPHORA L. Sp. Pl. : 373. 1753 & Gen. Pl. ed. 5 : 175. 1754.

LT. : *S. alopecuroides* L. vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. 2 : 342. 1913.

Sophora glauca Lessch. ex DC. in Ann. Sci. Nat. 4 : 98. 1825, et Prodri. 2 : 95. 1825; Baker in Hook. f. FBI 2 : 249. 1878; Hara et al., Enum. 2 : 190. 1979.

Shrubs; branches clothed with dense persistent grey or brown pubescence. Leaves 12-15 cm long; leaflets 21-25, oblong, acute sub-coriaceous, glabrescent above, densely grey-silky beneath, finally nearly glabrescent. Flowers purple, in dense, terminal, short peduncled racemes, pedicels shorter than calyx and both densely silky, teeth distinct; corolla twice as long as calyx; stamens 10, free. Pods persistently velvety, 7-10 cm long, 5-6-seeded.

Fl. : Mar.-May. *Frt.* : Oct.-Feb.

Occasionally found near streams, along forest edges.

Katghora : 6067.

India, Nepal, W. China.

- 3a. Prostrate, suffruticose undershrubs; leaflets 2.5-5 cm long; racemes 2.5-5 cm long; pods pubescent or puberulous *U. lagopodioides*
- 3b. Erect undershrubs with diffused branches; leaflets more than 5 cm long; racemes 5-10 cm long; pods glabrous *U. lagopus*

***Uraria lagopodioides* (L.) Desv.** J. Bot. 1 : 22. 1813; DC. Prodr. 2 : 324. 1825; Haines, Botany 2: 267; *Hedysarum lagopodioides* L. Sp. Pl. : 1198. 1753. *Uraria alopecuroides* Sweet, Hort. Brit. ed. 2 : 148. 1830; Haines 2 : 267. *Doodia alopecuroides* Roxb. Fl. Ind. 3 : 368. 1832.

Suffruticose undershrubs. Leaflets roundish or broadly oblong, obtuse or emarginate, rounded at base. Racemes cylindrical, dense, conspicuous from plumose persistent calyx-teeth. Bracts ovate, cuspidate, ciliate. Flowers pink; 2 upper calyx-teeth short; corolla pink; wings adhering to keels; keels obtuse. Pods with oblong finely pubescent joints, 2-jointed.

Fl. : July-Aug. *Frt.* : Sept.-Oct.

Occasionally found amidst grasses, forest clearings.

Korbi : 12851.

India, S. E. Asia, China, tropical Australia.

***U. lagopus* DC.** in Ann. Sci. Nat. 4 : 100. 1825, et Prodr. 2 : 324. 1825; Baker in Hook. f. FBI 2 : 156. 1876 *pro part.*

Undershrubs. Stems clothed with hooked hairs. Lower leaves 1-foliate, upper ones 3-foliate; leaflets oblong, cordate at base, upto 11 cm long. Stipules lanceolate-acuminate from a broadly cordate base. Racemes strobiliform, at length cylindrical; in buds conspicuous from long awned bracts and afterwards plumed pedicels and calyx-teeth. Bracts deciduous, densely ciliate. Flowers pink; calyx hairy; wings adhering to keels; keels obtuse. Pods 2-jointed.

Fl. : July-Sept. *Frt.* : Sept.-Oct.

Occasionally found in grassy places amidst bushes.

Pasarkhet to Madanpur Phulwaria : 19429.

India, Nepal.

***U. picta* (Jacq.) Desv.** (Jour. de Bot. Desv. : 123. t. 5. f. 19. 1813, comb. nud.) ex DC. Prodr. 2 : 324. 1825; Haines, Botany 2 : 267; *Hedysarum pictum* Jacq. Coll. Bot. 2 : 262. 1789.

Erect shrubs. Stems pubescent. Lower leaves 1-foliolate, suborbicular, middle ones 3-5-foliolate, linear, upper ones 5-9-foliolate, linear-lanceolate, rigidly coriaceous, variegated with pale or purple and greyish encrustations. Racemes 7-30 cm long, cylindrical. Bracts brown, scarious, many-veined, long acuminate, ciliate. Flowers small; calyx 4-5 mm long, pubescent; corolla purple or pink, 8-9 mm long. Pods 3-6-jointed, 5-9 mm long, joints of pods hard, polished grey.

Lectotype : Ghana (Guinea) Isert; *Jacquin*, Ic. Pl. Rar. 3. t. 567. 1792. vide Ali (*op. cit.*)

Fl. : July-Aug. *Frt.* : Sept.-Oct.

Occasionally found in waste places, open forests etc.

Madai to Korba : 12911.

Tropical Africa, India, Sri Lanka, S. E. Asia, China, Australia.

According to Hara *et al.* (Enum. Fl. Pl. Nepal 2 : 132. 1979), *U. picta* (Jacq.) Desv. (1813), with illustrations etc. is *comb. nud.* This needs to be verified with the original publication.

U. rufescens (DC.) Schindl., Fedde, Repert. 21 : 14. 1925; *Desmodium rufescens* DC., Ann. Sci. Nat. Paris 4 : 101. 1825. *Doodia hamosa* Roxb. (Hort. Beng. 57. 1814. *nom. nud.*) Fl. Ind. ed. Carey 3 : 367. 1832. *Uraria hamosa* (Roxb.) Sweet (Hort. Brit. ed. 2. 149. 1830. *comb. nud.*) ex Ampott in Wight & Arn. Prodr. : 222. 1834; Haines, Botany 2 : 268. *U. hamosa* Wall. Num. List. No. 568. 1829, *nom. nud.*

Undershrubs; younger parts clothed with straight and short hooked or curved hairs. Leaflets elliptic-ovate to oblong, rounded or subcordate at base, 5-15 × 2.5-7.5 cm; stipellae subulate, setaceous. Racemes 10-14 cm long; flowers pink or purple, 1-3-nate, mostly paired on slender pedicels; calyx-teeth slender, hairy, longer than tube; wings adhering to keels; keels obtuse. Pods 4-8-jointed, pubescent.

Fl. : July-Sept. *Frt.* : Oct.-Jan.

Common in humus and leaf-litters in 'sal' forests.

Lamni : 13242.

India, Sri Lanka, S. E. Asia, China.

VICIA L. Sp. Pl. : 734. 1753 & Gen. Pl. ed. 5 : 327. 1754.

LT. : *V. sativa* L. vide N. L. Britton et A. Brown III. Fl. N.U.S. ed. 2. 2 : 408. 1913.

Vicia sativa L. Sp. Pl. : 736. 1753; Baker in Hook. f. FBI 2 : 178. 1876, *pro part. excl. vars.*, Haines, Botany 2 : 260; Ali, Fl. West Pakistan No. 100 : 269. f. 36C. 1977.

Prostrate, annual herbs. Stems angular. Leaves paripinnate; rachis ending in a short tendril; leaflets 8-12, obovate or oblong or linear-ligulate, more than 5 times as long as broad, tip truncate or retuse, 1.5-2.5 cm long; stipules semi-hastate, often with a dark blotch, toothed or entire. Flowers purple, solitary or paired, subsessile; calyx cup 2-3 mm broad, calyx-teeth reach same level; styles bearded on lower side near tip. Pods glabrescent to glabrous, 3.5-5 cm long, 8-10-seeded.

Type : Herb. Linn. 906. 20 (LINN.).

Fl. : Sept.-Oct. Frt. : Oct.-Dec.

Weed in cultivated fields, forest clearings; sometimes cultivated for fodder.

Khami to Pandaria : 16703; Siang ; 16845.

India, Sri Lanka.

Plants used as fodder.

VIGNA Savi in Pisa Nuov. Giorn. Lett. 8 : 113. 1824., Brummitt in Taxon 29 : 491-492. 1980.

T. : *V. villosa* Savi nom. illeg. [*Dolichos luteola* N. J. Jacq., *V. luteola* (N. J. Jacq.) Benth.]

Vigna mungo (L.) Hepper, (Urdu) *V. radiata* (L.) Wilzek (Mungo), *V. unguiculata* (L.) Walp. (The Cow Pea), *V. unguiculata* (L.) Walp. subsp. *cylindrica* (L.) Eseltine (Lobia) and *V. unguiculata* (L.) Walp. subsp. *sesquipedalis* (L.) Verdc. (The yard-long bean) are cultivated in the district.

- 1a. Leaflets shortly 3-lobed, shorter than petioles; pods terete; seeds rounded at ends *V. trilobata*
- 1b. Leaflets entire or repand, scarcely lobed, longer than petiole; pods sub-compressed; seeds truncate at ends *V. umbellata*

Vigna trilobata (L.) Verdourt in Taxon 17 : 172. 1968. *Dolichos trilobatus* L. Mant. Pl. 1 : 101. 1767. *Phaseolus trilobatus* (L.) Schreb. in Nova Acta Acad. Caes. Laop. Carol. Germ. Nat. Curios 4 : 132. 1770. *P. trilobus* auct. non (L.) W. Ait. 1789; Haines, Botany 2 : 301.

Trailing, glabrescent herbs. Leaves 3-foliolate, 1.2-2.5 cm long, central lobe oblong to spatulate. Stipules oblong or ovate-oblong, 8-12 mm long,

attached above their bases; stipellae small, spreading, foliaceous. Bracts deciduous. Racemes capitate or spiciform, long-peduncled; flowers yellow; calyx campanulate, deltoid, 2.5 mm long, teeth minute; corolla yellow, 5-6.5 mm long; styles bearded downside below very oblique stigma. Pods 2.5-5 cm long, narrowly linear, sometimes curved, 6-12-seeded, glabrous or sparingly pubescent.

Type : Plukenet, Alm. Bot. Phytogr. t. 120. f. 3. 1694.

Fl. : July-Sept. Frt. : Sept-Oct.

Common weed amidst grasses and cultivated fields.

Bilaspur : 12980; Khami to Pandaria : 16709; Khuria : 19348.

Throughout the tropics.

Seeds used as scarcity food. Plants used as fodder.

V. umbellata (Thunb.) Ohwi & Ohsaki in Jour. Jap. Bot. 44 : 31. 1968.
Dolichos umbellatus Thunb. in Trans. Linn. Soc. Lond. 2 : 339. 1794.
Phaseolus calcaratus Roxb., Fl. Ind. ed. 2. 3 : 289. 1832; Haines, Botany 2 : 301. *P. pubescens* Bl., Cat. Gew. Buitenz. : 93. 1823; Babu, Herb. Fl. Dehra Dun : 157. 1977.

Slender, hairy twiner. Leaves pinnately 3-foliate; leaflets 5-10 cm long, terminal rhomboid-ovate; stipules 8-12 mm long, peltately oblong hairy and ciliate. Flowers yellow, in 3-6 (-8) cm long, peduncled racemes, patent hairy; calyx campanulate, 4 mm long, pubescent, teeth about 2 mm long; corolla yellow; styles bearded on inner face below very oblique stigma. Pods terete, subtorulose, slightly curved at apex, 8-15 cm long, 8-12-seeded.

Type : Uppsala No. 16789 (UPS).

Fl. : July-Sept. Frt. Sept.-Nov.

Common as forest undergrowths, along forest-roads.

Pasan : 13282; Korba : 12912.

Africa, India, China, Malaya.

ZORNIA J.F. Gmel. Syst. Nat. 2 : 1076. 1096. 1792.

T. : *Z. bracteata* J.F. Gmel.

Zornia diphyllea (L.) Pers. subsp. *gibbosa* (Spanoghe), Panigr. et S. K. Murti, comb. nov. & stat. nov. *Z. gibbosa* Spanoghe in Linnæa 15 : 192. 1841; Hara et al., Enum. 2 : 133. 1979. *Z. diphyllea* sensu Baker in Hook. f. FBI 2 : 147. 1876. *pro part. excl. typ. et vars*; Haines, Botany 2 : 263.

Prostrate-decumbent herbs. Leaves pinnate with only 1-2 opposite pairs of leaflets; leaflets lanceolate, acute, rigidly coriaceous, glabrous, dotted with black glands, oblique-rounded at base; stipules small, with a spur, peltately attached, deciduous. Flowers yellow, small, in 2-12-flowered, lax, 2.5-8 cm long racemes hidden by geminate, peltately attached, doubly lanceolate bracts; stamens monadelphous, anthers dimorphous. Pods 1-6-jointed, 4-12 mm long, muticcate with hooked, retrorsely hairy bristles.

Type : Circa Koepang, 1836. *Spanoghe* (untraceable).

Neotype : Cochinchina, Cai-cong, Thoral 1426 (US) vide Ali (*op. cit.*)

Fl. : July-Aug. *Frt.* : Aug.-Sept.

Common in open grassy places.

Madai to Korba : 12932.

India, East to China, Malaysia, Australia.

Mohlenbroek, in his monograph on the genus *Zornia* [Webbia 16(1) : 1-141; 1961], pointed out certain morphological differences between *Z. diphylla* (L.) Pers. and *Z. gibbosa* Spanoghe and gave Sri Lanka and South India as the geographical range of the former, and for the latter, as the rest of India. However, Meeuwen, Nooteboom & van Steenis [Reinwardtia 5(4) : 419, 1961] accepted only one species in *Zornia* and are of the opinion that it is very variable and shows regional variations. Gandhi in Fl. Hasan reports *Z. gibbosa* from Karnataka, where *Z. diphylla* (L.) Pers. subsp. *diphylla* seems to be absent; yet in Gamble's Fl. Madras : 325, 1918, the presence of the ovate-leaved taxon is reported in Tamil nadu and described as *Z. zeylonensis* Pers. [= *Z. diphylla* var. *zeylonensis* (Pers.) Baker (1876)]. In view of the constant differences in the leaf-shape and distinct geographical range, we reduce *Z. gibbosa* as a subsp. of *Z. diphylla*.

Several pulses are cultivated in the district; *Arachis hypogea* L. (Ground nut; China-badam); *Cicer arietinum* L. (Chana, Bengal gram), *Pisum sativum* L. (Garden pea; molar), *Vicia faba* L. (Broad bean) are among the most common.

Gliricidia sepium (Jacq.) Kunth ex Walp. is planted as an ornamental and as a hedge.

CAESALPINIACEAE R. Br. in Flinders, Voy. Terra Austr. 2 ; 551, 1814
(*'Caesalpineae'*)

T. : *Caesalpinia* L.

Delonix regia (W. Hook.) Rafin. is commonly planted as avenue tree.

- 1a. Leaves bipinnate CAESALPINIA
- 1b. Leaves simple, variously deeply bilobed or simple pinnate
 - 2a. Leaves simple or variously deeply bilobed BAUHINIA
 - 2b. Leaves simple-pinnate
 - 3a. Petals 5; calyx-tube short; disc subbasal; stamens 10, anthers basifix, dehiscing by a terminal pore or short slit CASSIA
 - 3b. Petals 3; disc at the top of prolonged calyx-tube; perfect stamens 3, anthers versatile, dehiscing longitudinally TAMARINDUS

BAUHINIA L. Sp. Pl. : 374. 1753 & Gen. Pl. ed. 5 : 177. 1754.

LT. : *B. divaricata* L., vide Gen. Pl. ed. 5 : 177. 1754; in OBS etiam vide Hitchcock, Prop. Brit. Bot. 152. 129, et de Wit, Reinwardtia 3 : 390 1956.

- 1a. Lianas with tendrils *B. vahlii*
- 1b. Trees or erect shrubs
 - 2a. Calyx lobed or dentate
 - 3a. Fertile stamens 3; stigmas small, indistinct *B. semia*
 - 3b. Fertile stamens 10; stigmas large *B. malabarica*
 - 2b. Calyx spathaceous
 - 4a. Inflorescences many-flowered racemes; fertile stamens 10 *B. racemosa*
 - 4b. Inflorescences corymbs; fertile stamens 3-5
 - 5a. Leaves deeply cordate, leaflets cleft $\frac{1}{3}$ way down, hypanthium subequal to calyx; petals obovate; fertile stamens 5; stigmas minute *B. variegata*
 - 5b. Leaves shallowly cordate, leaflets cleft $\frac{1}{2}$ way down; hypanthium shorter than calyx; petals oblanceolate; fertile stamens 3; stigmas large, oblique *B. purpurea*

Bauhinia malabarica Roxb. (Hort. Beng. : 31. 1814, nom. nud.) Fl. Ind. 2 : 321. 1832 subsp. *malabarica*; Haines, Botany 2 : 322. *Piliostigma malabaricum* (Roxb.) Benth. in Miq., Pl. Jungh. : 261. 1852; (*Amti, Amta*).

Evergreen trees. Leaves deeply bifid, glabrous on lower surface, rigidly coriaceous, 5-12 cm long, 8-16 cm wide, base rounded to subcordate, top lobes broadly rounded, 7-9-veined. Racemes corymbose, on short branchlets; flowers dioecious; male flowers with rudimentary ovary and stipe and female flowers with 10 minute staminodes; calyx limb 5-cleft, downy. Pods strap-shaped, often bent, thick, not dehiscent, 20-26 cm long and 2-3 cm wide, 20-30-seeded.

Fl. : Sept.-Nov. *Frt.* : Jan.-Mar.

Frequently found in open forests.

Khondra : 12846; Lamni : 15404; Kabirchabutra : 13350.

India, S. E. Asia, Malaysia.

B. purpurea L., Sp. Pl. : 375. 1753; Haines, Botany 2 : 323.
(*Kanchan*—O; *Deva-Kanchan*—Beng.).

Trees. Leaves ovate, often broader than long; 9-11-veined, rigidly chartaceous, 8-12 (-16) cm across, top lobes rounded to obtuse or acute. Flowers pinkish or reddish with white centre; pedicels 1-2 cm long; petals 3-4 cm long, clawed; staminodes capillary, 5-6, connate. Pods strap-shaped, 20-25 cm long, 2-2.5 cm wide, glabrous, dehiscent, valves thin, coriaceous, twisted.

Neotype : Merrill, Sp. Balanoanae no. 1050 (L 920. 278-111). (de Wit in Reinwardtia 3 : 381-338. 1956).

Fl. : Sept.-Dec. *Frt.* : Jan.-Mar.

Common in dry deciduous forests; also planted.

Kota : 16734.

India, S. E. Asia, S. W. China.

The tree is frost hardy. It is often planted as an ornamental along road sides and as a garden plant. The leaves, flower-buds, flowers and young pods are edible after cooking. Flower buds are pickled, leaves are used as fodder. The plant yields gum and the bark is good as tanning material and for fibre. The wood is used for making agricultural implements and for fuel. The bark, root and flowers have medicinal value.

B. racemosa Lam. Encycl. Meth. Bot. 1 : 390. 1785; Baker in Hook. f. FBI 2 : 276. 1878, *pro part. excl. syn.*; Haines, Botany 2 : 322; *Pilosigma racemosa* (Lam.) Benth. in Miq., Pl. Jungh. 262. 1852.

Leaves broader than long, grey pubescent beneath, lobes obtuse, 7-9-veined, rigidly coriaceous, slightly cordate, 2.5-3.5 x 3.5-6 cm. Flowers

small, whitish; calyx-limbs entire, tube turbinate; petals oblanceolate; anthers densely villous. Pods stalked, 10-20 cm long, about 2 cm wide, thick, septate, sometimes slightly torulose, falcate.

Type : East India, Sonepat (P).

Fl. : Apr.-June, *Frt.* : Nov.-Feb.

Common in dry mixed forests, along forest roads.

Kota : 13078; Parasi : 19054; Achanakmar : 19269.

India, Sri Lanka, Burma, China.

The inner bark fibre is used for making rope, the wood, for agricultural implements and leaves, for fodder. Gum and leaves are used medicinally.

B. semla Wunderlin in Taxon 25 : 362, 1976, p.p. excl. *syn.* Panigrahi, Taxon 35 (1) : 162, 1986. *B. retusa* Roxb. *Fl.* Ind. ed. 23 : 324, 1832; non Poiret (1811), nec Roxb. ex DC. (1825); Haines, Botany 2 : 324. *Phanera retusa* Benth. in Miq., Pl. Jang. : 263, 1852. *B. emarginata* Roxb. ex Wall. Num. List No. 5792 B. 1831-1832. *nom. nud.*, non Roxb. et G. Don (1832); nec P. Miller 1768. (*Choari-O*; *The retusa-leaved mountain ebony*).

Trees. Leaves 10-15 cm long, broader than long, entire or emarginate at apex, cordate or truncate at base, coriaceous, cleft only at tip, 9-veined, glabrous beneath. Flowers pale yellow, 2.5 cm across, in corymbose racemes, arranged in terminal panicles; calyx-tube turbinate, short; petals sub-rhomboid, oblong above, long clawed, twice as long as sepals. Fertile stamens 3, monadelphous, ovary stipule attached to calyx tube. Pods straight, 12-17 cm long, 3-4 cm wide, thin, deep red, hard, flat, glabrous, 6-8-seeded.

Lectotype : *Roxburgh*, Icon. No. 1237 (CAL) selected by *Panigrahi* (I.c.)

Roxburgh's illustration is named *B. emarginata* and this is also the name in Roxburgh's 'Flora Indica' manuscript at Kew, but later, it was changed to *B. retusa* in the published version.

Fl. : Sept.-Dec. *Frt.* : Feb.-March.

Frequently found along forest roads, edges of forests.

Khondra : 12719; Kabirchabutra : 13387; Korbi : 12860.

Pakistan, India, Nepal.

In Uttar Pradesh, the tree is tapped for gum and the gum is reported to be diuretic and emmenagogue. It is also used against sores.

B. vahlii Wt. & Arn. Prodr. 297. 1834; Haines, Botany 2 : 324.
Phanera vahlii (Wt. & Arn.) Benth. in Miq., Pl. Jungh. : 263. 1852.
(Sialpatta, Siari-O.)

Extensive lianas; shoots and young parts villously tomentose; tendrils simple, circinate, mostly leaf-opposed. Leaves deeply 2-lobed, deeply cordate, 11-13-veined, persistent, pubescent, 5-45 cm in diam. Flowers white or creamy, in dense-flowered corymbs; calyx spathaceous, tubes cylindrical; petals densely villous on back; fertile stamens 3. Pods woody, flat, velvety, 15-30 cm long, 3.5-5 cm wide, 8-12-seeded.

Syntypes: Wt. & Arn. (l.c.) state that "our Indian specimens were obtained from the Missionaries Garden and are without flowers or fruits; and as we had not an opportunity of examining Dr. Wallich's, we have described the flowers from a cultivated one in Mr. Arnott's herbarium from the Mauritius and taken the character of the legume from Roxburgh's *Flora Indica*".

Fl. : Apr.-June. Frt. : Dec.-Mar.

Extensive lianas, climbers on trees inside mixed forests.

Keonchi : 13296; Kabinchabutra : 19159.

Pakistan, India, Nepal.

It is also grown as an ornamental plant. The foliage is used as fodder and for making plates and cups used in restaurants. Bark yields good fibre for ropes etc. Plant is also good for tanning. The seeds are edible and are also used as tonic and aphrodisiac, the leaves are demulcent and mucilaginous.

B. variegata L., Sp. Pl. : 375. 1753; Haines, Botany 2 : 323.

Leaves broadly ovate to often broader than long, 6-14 cm across, 9-11-veined, base cordate, lobes broadly rounded. Flowers white or pink, often variegated with yellow purple blotches, on thick, striate, puberulous, 1.5-2 cm long pedicels, merging gradually into receptacles; calyx-limbs equalling cylindrical tubes; petals unequal, more or less clawed, broadly obovate; staminodes 5, capillary. Pods strap-shaped, up to 30 cm long and about 2.5 cm wide, nearly smooth, 10-15-seeded.

Neotype : Bengal, Bogra, Bodupore, 16. 2. 1897, *Report on Economic Products to the Government of India* 12187, vide de Wit in *Reinwardtia* 3 : 438. 1956.

The specimen 525. 2 (LJNN) bears in Linnaeus's hand-writing '5 Virgata'. But as the specimen is devoid of flowers or buds, which Linnaeus described, de Wit rejected it and selected a neotype.

Fl. : Feb.-Mar. *Frt.* : Apr.-June.

Common in the mixed forest, edges of the forests, outskirts of villages, along forest roads.

Khondra : 12737; Pendripani : 15368; Semra : 15367.

India, Burma, China; possibly a native of China (de Wit, *l.c.*).

Root is used as tonic and carminative; bark is astringent and flowers are laxative. Bark is also used for dyeing and tanning. Wood is used for making agricultural implements.

CAESALPINIA L. Sp. Pl. : 380, 1753 & Gen. Pl. ed. 5 : 178, 1754.

LT. : *C. brasiliensis* L. vide N. L. Britton et P. Wilson, Scient. Surv. Porto Rico : 377, 1924.

C. pulcherrima (L.) Swartz is cultivated in the gardens.

- | | |
|--|----------------------|
| 1a. Pedicels as long as calyx; petals narrow; pods covered with prickles, 1-3-seeded | <i>C. bonduc</i> |
| 1b. Pedicels twice the length of calyx; petals broad; pods unarmed, 4-8-seeded | <i>C. decapetala</i> |

Caesalpinia bonduc (L.) Roxb. Fl. Ind. 2 : 362, 1832 emend. Dandy & Exell in J. Bot. 76 : 175, 1938; Brenan in Milne-Redhead & Pothill, Fl. E. Trop. Afr. 37, 1967; *Guilandina bonduc* L. Sp. Pl. : 381, 1753, non L. 1762; *Caesalpinia crista* auct. non L. (1753); Haines, Botany 2 : 331. *Guilandina bonducella* L. Sp. Pl. ed. 2 : 545, 1762, *nom. illeg.* *Caesalpinia bonducella* Fleming in As. Research 11 : 159, 1810.

Large scandent, spiny shrubs; branches hairy. Stipules large, foliaceous, lobed. Leaves upto 40 cm long abruptly bipinnate, pinnae 12-16 cm long, leaflets 6-10 pairs on each pinna, opposite, elliptic-oblong, obtuse, mucronate, hairy. Flowers yellow in dense, long peduncled, simple or panicled, axillary and terminal, (upto 25 cm long) racemes; calyx 5-7.5 mm long, sepals oblong or spatulate; petals oblanceolate, spreading, clawed, 1-1.5 cm long; stamens 10, filaments hairy in lower half. Pods short stalked, oblong with 5-8 mm long prickles, 1-3-seeded.

Lectotype : Herb. Hermann Vol. 2, fol. 17 & Vol. 3 fol. 35 (BM). [Vide Dandy & Exell (*l.c.*)].

Fl. : July-Aug. *Frt.* : Sept.-Nov.

Note : *Caesalpinia crista* L. (1753), lectotyped with Kuburuwael material. Herb. Hermann Vol. 1 : fol. 68 (BM), has smooth fruits.

Frequently found along roads, growing as hedge plants.

Kota to Bilaspur : 13065 ; Bilaspur to Champa : 19362.

Throughout the tropics.

The status of *Caesalpinia crista* L. pro. part. incl. typo needs further careful study.

The seeds and root-bark are used as antiperiodic and febrifuge in fever. The seed and leaves are also used in colic, diarrhoea and rheumatism.

C. decapetala (Roth) Alston in Trimen, Handbook Fl. Ceylon 6 : 89. 1931; *Reichardia decapetala* Roth, Nov. Pl. Sp. : 212. 1821. *Caesalpinia sepiaria* Roxb. Fl. Ind. 2 : 360. 1832; Haines, Botany 2 : 331. (*Chilati*).

Scandent, spiny shrubs. Branchlets, leaf rachis and panicles rusty pubescent. Leaves upto 30 cm long, abruptly 2-pinnate, pinnae 12-20; leaflets 16-24, 1.5-2.5 cm long, broadly oblong, close, rounded or retuse at both ends, puberulous both surfaces. Flowers golden yellow, 2-2.5 cm across, in long peduncled, simple racemes; calyx pubescent; filaments woolly at base. Pods oblong compressed, 7-8.5 cm long, tipped with straight hardened beak, pendulous, glabrous; fruiting pedicels stout.

Type : India, *Heyne* (B?)

Fl. : Oct.-Apr. Frt. : June-Aug.; old fruits remain on the plants for quite sometime.

Frequently found along forest roads, edge of forests, ditches.

Kabirchabutra : 13349, 13357; Marwahi : 19021.

Africa, India, Sri Lanka, S.E. Asia, Malaysia, China.

The bark said to be used for tanning in S. India. The root is purgative.

CASSIA L. Sp. Pl. : 376. 1753 & Gen. Pl. ed. 5 : 178. 1754.

LT. : *C. fistula* L. vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. 2 : 1913.

1a. Foliar glands absent

2a. Stamens all fertile, 3 stamens at least twice as long as others with deeply curved filaments which are many times as long as anthers, anthers finally longitudinally split, not distinctly basifix; pods indehiscent

C. fistula

- 2b. Stamens not all fertile, nearly equally short, often 2- or 3 slightly longer, filaments shorter than or as long as anthers, anthers opening by single or double terminal pores, basifixied, pods dehiscent *C. alata*
- 1b. Foliar glands present on leaf rachis
- 3a. Shrubs or undershrubs; sepals blunt or rounded; pods indehiscent or subdehiscent; funicle capillary
- 4a. Glands inserted on petiole above, not between leaflets *C. occidentalis*
- 4b. Glands inserted between first or more pairs of leaflets
- 5a. Glands between lowest pair of leaflets; pedicel 1.2-3.5 cm long (in flowers), 1.5-3.5 cm long (in pods); areoles on both sides of seeds, narrow, linear, 0.3-0.5 mm wide *C. obtusifolia*
- 5b. Glands between two lower pairs of leaflets; pedicel 4-10 mm long (in flowers), upto 15 mm long (in pods); areoles on both sides of seeds, 1.5-2 mm wide *C. tora*
- 3b. Herbs; sepals very acute; pods flat, dehiscent; funicle short, broad, almost triangular
- 6a. Leaflets 2(or 1) pairs; plants viscid hairy *C. absus*
- 6b. Leaflets more than 5 pairs; plants not viscid
- 7a. Petiole with a large sessile gland; stamens 10 (-9) *C. mimosoides*
- 7b. Petiole with a stalked gland; stamens 5 *C. pumila*

Cassia absus L. Sp. Pl : 376. 1753 ; Haines, Botany 2 : 319 ; de Wit in Webbia 11 : 279. 1955.

Erect, viscous-hairy herbs. Leaflets in two pairs, ovate or rhombic-ovate unequal-sided, base rounded or cuneate, subacute, 2-2.8 (-3.5) × 1-1.8 (-2.5) cm. Stipules linear, 4 mm long, persistent. Flowers red, in terminal and leaf-opposed racemes, 4-12 cm long; calyx 5. 4 mm long, sepals glandular hairy; petals broadly obovate, 5-7 mm long; stamens 5. Pods flat, hairy, 2.5-4 cm long, 5-8 seeded, with oblique depressions between the seeds, dehiscent.

Type : Herb. Hermann Vol. 2. fol. 4(BM).

Fl. : Apr.-Aug. Frt. : Aug.-Oct.

Frequently in open forests, waste places.

Khondra : 12832; Korba : 8737.

Throughout the tropics.

Chaksine, extracted from the plant, is reputed to have an action on central and peripheral nervous system. Seeds are astringent and strengthen the sight when used as collyrium. Powdered seeds are used in ophthalmia and conjunctivitis. It is also used as cathartic and in cases of skin infection.

C. alata L. Sp. Pl. : 378. 1753 ; de Wit in Webbia 11 : 231. 1955 ; Ali, Fl. West Pakistan No. 54 : 25. f. 6A-J. 1973.

Large shrubs ; stems marked with leaf-scars ; branches downy. Leaves 30-50 cm long, pinnate ; petiole 1.5-2.5 cm long ; leaflets 8-14 pairs, oblong, obtuse, rigidly subcoriaceous, broadly rounded, oblique at base, 5-12 cm long ; stipules 6-9 mm long, deltoid, persistent, auriculate. Flowers yellow ; showy, in narrow, peduncled racemes 15-70 cm long ; sepals 1.5-2 cm long ; petals 1.5-2 cm long ; stamens 9 or 10, very unequal. Pods 10-20 cm long, ligulate with a broad wing down middle of each valve, 40-50-seeded.

Fl. : Aug.-Dec. Frt. : Jan.-Feb.

Occasionally found in outskirts of forest villages.

Kota to Bilaspur : 13064 ; Katghora : 6038.

Pantropical ; probably of S. American origin (de Wit, l.c. ; Murti, 1975).

Often cultivated as an ornamental plant. It is reputed to have medicinal properties against skin spots, scabies and ringworms. The active principle is chrysophanic acid. The roasted leaves are taken as laxative.

C. fistula L. Sp. Pl. : 377. 1753 ; Haines, Botany 2 : 315. (*Amaltas*).

Trees. Leaves 20-40 cm long ; leaflets 4-8-paired, closely veined, ovate, ovate-lanceolate or ovate-oblong, acuminate or acute, 5-18 cm long. Stipules deltoid, acute, 1-2 mm long, caducous. Flowers yellow, showy, in long, lax, pendulous racemes, 10-45 cm long ; peduncle 2-10 cm long ; calyx 5, glabrous, caducous, folded backward, 8-9 mm long ; petals 5, obovate ; stamens 10, 3 longest much curled. Pods cylindric, drooping, 30-60 cm long, 2.5 cm in diam., woody, green, turning brownish-black on ripening, 40-100-seeded.

Type : Herb. Linn. 528. 15 (LINN.)

Fl. : Mar.-July. Frt. : Aug.-Nov.

Common along the forest roads and in mixed deciduous forests.

Khuria to Aurapani : 15474 ; Achanakmar : 13320.

Africa. W. Asia. India. S.E. Asia. Malaysia. China; probably a native of E. India, Burma, Malaya Island (Hara *et al.* l.c.)

An ornamental tree. The bark is used as tanning material and wood ash, as mordant in dyeing. The pulp of pods is used in Bengal to flavour tobacco. The wood is hard and durable and used for various purposes. Wood is also used for fire wood and charcoal. Fruits and seeds are used medicinally; decoction of leaves and fruits are used as laxative.

C. mimosoides L. Sp. Pl. : 379. 1753; Haines, Botany 2 : 319; de Wit in Webbia 11 : 283. 1955.

Subsp. *mimosoides*.

Diffuse herbs; stems appressed hairy. Leaves 5-9 cm long; leaflets 40-60 pairs, linear, narrowly oblong, obliquely mucronate, ciliate; stipules linear, subulate, persistent. Flowers solitary, rarely two, with slender pedicels arising from a pair of extra-axillary bracts, 4-5 stamens distinctly larger than others. Pods strap-shaped, appressed pubescent, 3-5 cm long, 10-20-seeded.

Fl. : July-Aug. Frt. : Sept.-Oct.

Occasionally found in grassy places.

Korba : 8736.

Pantropical.

Hara *et al.* (1979) recognised two subsp. in *C. mimosoides* L. subsp. *mimosoides* and subsp. *leschenaultiana* (DC.) Ohasi in J. Jap. Bot. 50 : 308. 1975, and the latter with 2 varieties viz. var. *leschenaultiana* and var. *aureocoma* Benth. in Trans. Linn. Soc. 27 : 580. 1871; Baker in FBI 2 : 266. 1878. The specimens from the district belong to subsp. *mimosoides* with pantropical distribution.

C. obtusifolia L. Sp. Pl. : 377. 1753; de Wit, in Webbia 11 : 254. 1955; Ali, Fl. West Pakistan No. 54 : 17. f. 4A-C. 1973. *C. tora* sensu Baker in Hook. f. FBI 2 : 263. 1878, *pro. part., non* L. 1753. *C. tora* L. var. *obtusifolia* Haines, Botany 2 : 318.

Undershrubs, or shrubs. Leaflets 3-pairs, obovate-cuneate or rounded, tip minutely acute, ciliate 1.5 × 1.2-3 cm; stipules linear subulate, caducous 5-10 mm long. Flowers yellow, 1-2, axillary; sepals membranous, ovate, 6-7 mm long; petals unequal, ovate, obtuse 12-15 mm long, distinctly clawed; stamens 10, 3 uppermost reduced to minute staminodes. Pods subterete, erect, recurved, glabrous, 10-25 cm long, 20-50-seeded.

Type : Hortus Elthamensis, *Dillenius* (OXF). Grown from seeds collected 'Circa Havanam in Cuta insula'.

Fl. : June-Aug. *Frt.* : Sept.-Nov.

Common in waste places, along roads, etc.

Ratanpur : 19524.

Throughout the tropics except Polynesia and Australia; introduced from tropical America (Murti, 1975).

The strong foetid smell of *C. tora* is nearly absent in *C. obtusifolia*. Brenan (Kew Bull. 1958(2) : 248-252. 1958) mentioned some more differences between these two species.

C. occidentalis L. Sp. Pl. : 377. 1753; Haines, Botany 2 : 318; de Wit in Webbia 11 : 256. 1955.

Diffuse, subglabrous undershrubs. Leaves 12-20 cm long; leaflets 3-6 pairs, opposite, ovate or ovate-lanceolate, acute-acuminate, 2.5-9 cm long, glabrous or finely pubescent; stipules acuminate, caducous, 4-6.5 mm long. Flowers yellow, 1.2 cm across, usually in axillary and terminal racemes; calyx about 1 cm long, sepals obtuse; white, tinged with pink; corolla oblong-ovate, obtuse, 1.2 cm long; stamens 10, 3 lower longer. Pods laterally compressed, 10-12 cm long, slightly falcate, glabrous, distinctly torulose, sutures thick, 15-30-seeded.

Types : A cultivated plant in Herb. Clifford (BM.).

Fl. : July-Sept. *Frt.* : Sept.-Nov.

Common in waste places, along roads, forest clearings.

Kota : 13206A; Achanakmar : 19294.

India, Nepal; possibly of S. American origin (de Wit, l.c.; Murti, 1975).

The species is used as green manure. The seeds are roasted and used as a substitute for coffee in Africa and Argentina. Leaves, roots and seeds are considered to be medicinally important as a febrifuge, purgative, diuretic and tonic. Leaves and seeds are externally applied as anti-periodic and skin diseases. Root is said to be effective in snake bite also.

C. pumila Lam. Encycl. Meth. Bot. 1 : 651. 1785; Haines 2 : 320. (*Dwarf Sena*).

Erect or decumbent-ascending herbs. Leaflets 6-25 pairs, subfalcate linear-oblong to lanceolate, mucronate, larger 7-13 mm long; stipules linear,

5-12 mm long, ciliate, persistent. Flowers yellow, 1-2, axillary or lateral; sepals lanceolate, acute, 5-6 mm long; petals unequal, narrowly oblong to broadly orbicular and retuse, 3-5 mm long; stamens 5, about as long as filaments. Pods flat, glabrescent, 2-3 cm long, 6-12-seeded.

Fl. : July-Sept. *Frt.* : Oct.-Dec.

Frequently found in waste places and forest clearings and pastures.

Madai : 12893; Korba ; 8715.

Africa, India, Australia.

It is used as a soil cover plant and is planted between rows of other plants to prevent soil erosion.

C. tora L. Sp. Pl. : 376. 1753; Haines, Botany 2 : 318; de Wit in Webbia 11 : 296. 1955. (*Tarota, Chakwad*).

Foetid shrubs. Leaves 5-10 cm long; leaflets 3 pairs, membranous, obovate, obtuse, rounded or retuse, hairy or glabrescent, $0.5-5 \times 0.5-2.5$ cm; stipules linear acute, fugaceous. Flowers yellow, usually 2, sometimes solitary or more than two; peduncles hairy, 3-4 mm long; sepals ovate, 5-6 mm long; petals unequally, ovate, 8-10 mm long; stamens 7, 3 largest; staminodes 3. Pods terete or 4-angled, glabrescent, slender, falcate, 15-20 cm long, 20-30-seeded.

Lectotype : Herb. Hermann Vol. 4, fol. 79. (BM) (vide Ali I.c.)

Fl. : July-Sept. *Frt.* : Oct.-Jan.

Common in waste places, forest clearings, along roads.

Pasan : 13275A.

India, Nepal; probably of S. American origin (Hara et al, I.c.)

This plant is used as green manure and as fodder. Leaves are laxative, antiperiodic, aperient and anthelmintic. Seeds are used as tonic and stomachic. Leaves and seeds are recommended in skin diseases viz. ring-worm, scabies and leprosy.

Note : *Cassia javanica* L. with pink flowers and filaments swollen in the middle and *Cassia spectabilis* DC. with acute—acuminate leaflets and yellow flowers are common ornamental trees.

TAMARINDUS L. Sp. Pl. : 34. 1753 & Gen. Pl. ed. 5 : 20. 1754.

T. : *T. indica* L.

Tamarindus indica L. Sp. Pl. : 34. 1753 ; Haines, Botany 2 : 325 ; (*lml*).

Evergreen tree. Leaves 3.5-15 cm long, paripinnate; leaflets 10-20 pairs, oblong, obtuse, opposite, glabrescent, 1.2-1.8×0.3-0.5 cm. Stipules linear, caducous. Flowers red and yellow, in 10-15-flowered lax racemes at end of short lateral branchlets; calyx 1.2 cm long, tube turbinate, 2 lowest teeth connate; three upper petals developed, 1-1.5 cm long, two lower reduced to filamentous scales; stamens monadelphous, 3 perfect. Pods 7-15 cm long, about 2.5 cm wide, curved, linear, compressed thick with thin crustaceous epicarp, indehiscent, 3-10-seeded.

Fl. : Apr.-July. Frt. : Dec.-Feb.

Commonly grown in villages, along roads, in abandoned places.

Marwahi : 19023.

Pantropical; supposed to be native of Africa (Hara *et al.* 1979).

Almost all parts of the plant are used, particularly the pulp of the fruits and young leaves, which are regarded as important ingredients of many tasty dishes. Pulp of the fruits, seeds, leaves, flowers and bark are put to various medicinal uses.

MIMOSACEAE R. Br. in Flinders, Voy. Terra Austr. 2 : 551. 1814.
(*Mimosaceae*)

T. : *Mimosa* L.

1a. Stamens definite, usually 10	MIMOSA
1b. Stamens indefinite	
2a. Stamens free; usually spiny or prickly trees or shrubs	ACACIA
2b. Stamens monadelphous, usually unarmed trees	ALBIZIA

ACACIA P. Hill, Gard. Dict. abr. ed. 4. 1754 ; Pedley in Bot. Journ. Linn. Soc. 92(3) : 219-254. 1986.

LT. : *A. nilotica* (L.) Delile (*Mimosa nilotica* L.) vide N. L. Britton et Rose, Fl. N. Amer. 23 : 85. 1928.

A. auriculiformis A. Cunn. ex Benth. [= *Racosperma auriculiforme* (Cunn. ex Benth.) Pedley, l.c. : 247] is often planted as ornamental plants in gardens.

1a. Flowers in cylindric spikes; spines stipular, short, curved	<i>A. catechu</i>
1b. Flowers in globose heads; spines straight and long when stipular or short-curved when not stipular	

- 2a. Scandent shrubs with non-stipular prickles on stems and leaf-rachis
 - 3a. Leaflets 40-50 pairs, crowded, closely set and overlapping, less than 2 mm broad, semi-truncate at base; petiole-gland not conical; flowers stalked
 - A. pennata*
 - 3b. Leaflets 20-30 pairs, not crowded, more than 2 mm broad, truncate at base; petiole-gland conical; flowers sessile
 - A. torta*
- 2b. Trees with straight, stipular spines
 - 4a. Heads in terminal panicles; flowers white; pods linear, curved, not moniliform
 - A. leucophloea*
 - 4b. Heads on axillary peduncles, solitary or fascicled; flowers yellow or orange-yellow; pods moniliform
 - A. nilotica*
subsp. *Indica*

Acacia catechu (L.f.) Willd. Sp. Pl. 4 : 1079. 1806; Haines, Botany 2 : 343; Ali, Fl. West Pakistan No. 36 : 5. 1973. *Mimosa catechu* L.f. Suppl. Pl. : 439. 1782; Roxb. Pl. Cor. t. 175. 1802. (*Khair.*)

Small deciduous trees; young branches puberulous. Spines in pairs. Leaves bipinnate; pinnae 10-30 pairs 1.3-3.5 cm long, pilose: leaflets 20-25 pairs, sessile, ciliate, 3-6 mm long; stipules spiny, flattened, hooked, upto 8 mm long; rachis with a large gland near base of petiole and often several glands between pinnae. Flowers small, white or creamy, in dense, pubescent spikes 5-8 cm long, axillary on young shoots; calyx campanulate, pubescent or villous outside, 1.2-1.5 mm long, teeth deltoid; corolla 2-3 times as long as calyx, villous or slightly pubescent, lobes ovate-oblong. Pods 5-14 cm long, often irregularly constricted, flat, straight, dehiscent.

Fl. : June-Aug. Frt. : Oct.-Jan.

Common in dry mixed and scrub forests at places forming pure stands.

Khondra : 12827; Khuria : 15471; Pasan to Korbi : 19089.

India, Nepal, Burma, Thailand, S. China.

Bark is used for dyeing. 'Katcha' is obtained from heart-wood and used in betel and also in medicine, tanning etc. Wood is durable and used for agricultural implements, also for charcoal.

A. leucophloea (Roxb.) Willd., Sp. Pl. 4 : 1083. 1806; Haines, Botany 2 : 339; *Mimosa leucophloea* Roxb. Pl. Corom. 2 : 27. t. 150. 1802. (*Gandhirwa, Rounjha*)

Trees; bark yellowish; young branches grey tomentose; spines stipular, in pairs, 3.25 mm long or absent. Leaves bipinnate; pinnae 6-12 pairs,

1.3-3.8 cm long, leaflets 15-30 pairs sessile, crowded, linear, or linear-oblong, rigidly coriaceous, 2.5-8 mm long. Stipules spiny. Panicles terminal, tomentose; heads pedunculate; calyx about 1.2 mm long, campanulate, villous; corolla about 2.5 mm long, hairy outside. Pods 10-15 cm long linear, curved, clothed with persistent grey tomentum, ligulate, falcate.

Type : Dry mountains of Coromandel, *Roxburgh*. Pl. Corom. t. 150.

Fl. : Aug.-Oct. *Frt.* : Dec.-Jan.

Frequently found in mixed forests.

Khuria : 15491.

India, Sri Lanka, Burma.

The wood is strong, hard and durable and used for agricultural implements and fuel. The bark yields a coarse fibre and also used in distillation of spirits from sugar and palm-juice in South India (Oommachan, 1977).

A. nilotica (L.) Willd. ex Delile subsp. *indica* (Benth.) Brenan in Kew Bull. 12 : 84. 1957; Fl. Hassan : 227. 1976. *A. arabica* (Lam.) Willd. var. *indica* Benth. in Hook., Lond. Jour. Bot. 1 : 500. 1842. *Mimosa nilotica* L., Sp. Pl. 521. 1753. *pro. part.* *Acacia arabica* sensu Baker; Haines, Botany 2 : 338. (*Babul*).

Spiny trees; barks deep brown or blackish. Leaves 2.5-5 cm long; pinnae 3-11 pairs; leaflets 10-20 pairs, 1.5-7 mm long, glabrous or pubescent; leaf rachis with a cup-shaped gland at the base of lowest and upper most pair of pinnae; stipules spiny, upto 8 cm long. Inflorescences axillary, pedunculate heads, 6-15 mm in diam.; flowers yellow; calyx 1-2 mm long pubescent; corolla twice as long as calyx; ovary pilose. Pods usually solitary, 7-15 cm long, distinctly stalked, whitish tomentose, deeply constricted between seeds, indehiscent, strap-shaped, not spirally twisted.

Lectotype : East India, *Roxburgh* (K) vide (Brenan l.c.).

Fl. : July-Nov. *Frt.* : Dec.-Apr.

Along roads, on bunds of cultivated fields, open forests.

Bilaspur to Katra : 16728; Marwahi : 19019.

India, Sri Lanka.

The wood is hard and durable and used for agricultural implements. Bark yields gum and also used for dyeing and tanning. Twigs and leaves are used as fodder.

A. pennata (L.) Willd. Sp. Pl. 4 : 1090. 1806; Haines, Botany 2 : 341; *Mimosa pennata* L. Sp. Pl. : 522. 1753. ('*Choti chilati, Ar, Ail*').

Scandent or climbing shrubs or rarely small trees; branches tomentose, usually more or less 5-angled. Leaf-rachis with a gland between petiole and pinnae; pinnae 8-15 pairs, 2-6 cm long, upper pinnae also with glands; leaflets rigidly coriaceous, very narrow, densely crowded. Panicles exceeding leaves; heads white or pale yellow; calyx campanulate, 1-2 mm long; corolla 2-3 mm long. Pods 12-17 cm long, flat, thin, glabrous, stalked. Linear oblong, suddenly obtusely acuminate or acute, dehiscent.

Fl. : July-Sept. Frt. : Oct.-Dec.

Frequently on slopes in open forests.

Khondra : 12763, 16737, 16752; Bilaspur : 19528.

India, Sri Lanka, S. E. Asia, China, Malaysia.

A. torta (Roxb.) Craib. in Kew Bull. Misc. Inform. : 410. 1915; Haines, Botany 2 : 342; *Mimosa torta* Roxb. Fl. Ind. 2 : 566. 1832. *Acacia intia* Willd. var. *caesia* Baker in Hook. f. FBI 2 : 297. 1878. *A. caesia* Atti. in Wt. & Arn., Prodr. 278. 1834, non Willd.

Scandent shrubs; stems usually channelled or 5-angled; young branches tomentose; internodes with spines upto 2.5 mm long. Leaf-rachis with a gland at base; pinnae 7-11 pairs, 5-10 cm long; leaflets 4-8 mm long, oblong, rigidly spreading, somewhat pubescent beneath, not overlapping. Inflorescences in large terminal panicles, pedunculate, 30-flowered; calyx 2 mm long, pubescent; corolla ca 3 mm long. Pods flat, dry, with strong sutures, 7.5-15 cm long, light brown, usually cuneate at both ends, rusty tomentose when young.

Type : *Roxburgh*, Icon. 1865 ined. (K, CAL).

Fl. : May-Sept. Frt. : Jan-Mar.

Frequently found in open forests on slopes.

Kabirchabuttra to Chauradadar : 15222.

India, Sri Lanka, S. E. Asia.

ALBIZIA Durazzini in Mag. Tosc. III. 4 : 13. 1772.T. : *A. julibrissin* Durazz.

- 1a. Flowers stalked; umbels not panicled; pods straw-coloured *A. lebbeck*
- 1b. Flowers sessile; heads copiously panicled; pods brown or reddish brown
 - 2a. Leaflets obliquely ovate, broad and rounded at base on upper—and narrower and alternate on lower side of midrib; calyx tubular; pods reddish brown, 1-2.5 cm broad *A. procera*
 - 2b. Leaflets oblong, curved upwards, broadest on lower side of midrib, rounded or semicordate at base; calyx campanulate; pods brown, 2.5-3.5 cm broad *A. odoratissima*

Albizia lebbeck (L.) Benth. in Hook., Lond. Jour. Bot. 3 : 87. 1844; Haines, Botany 2 : 346; *Mimosa labbeck* L. Sp. Pl. : 516. 1753. *Acacia lebbeck* (L.) Willd. Sp. Pl. 4 : 1006. 1806. (*Kala Siris*)

Large, deciduous trees; barks dark greyish. Leaves with 2-4 pairs of pinnae, 5-20 cm long; large gland near base of main petiole; pinnae with or without a gland between lowest pair; leaflets 4-9 pairs, obtuse, oblong, rounded, glabrescent. Heads many-flowered, short-pedicuncled, 3-4 together; flowers fragrant, pink, sometimes greenish-yellow; calyx pedicellate, campanulate or funnel-shaped, 3-4 mm long, hairy, teeth deltoid, acute; corolla 7-8 mm long, funnel-shaped. lobes hairy externally; staminal tubes, shorter than corolla tube. Pods strap-shaped, 15-30 cm long and 2.5-5 cm wide, smooth and glossy, 6-12-seeded.

Type : Egypt, Herb. Linn. 1228. 16 (LINN.)

Fl. : Apr.-June. Frt. : Oct.-Jan.

Common along road sides.

Bilaspur : 19299.

Africa, India, Sri Lanka, S. E. Asia, N. Australia.

Wood is used as timber. Bark, leaves, flowers and seeds are used medicinally.

A. odoratissima (L. f.) Benth. in Hook., Lond. Jour. Bot. 3 : 88. 1844; Haines, Botany 2 : 347; *Mimosa odoratissima* L. f. Suppl. Pl. 437. 1782. *Acacia odoratissima* (L. f.) Willd. Sp. Pl. 4 : 1063. 1806. (*Chichwa*)

Almost evergreen trees; dark grey or blackish. Leaves alternate with 3-6 pairs of pinnae; rachis 10-20 cm long, with a gland near base and 1-2 glands between upper pairs of pinnae; leaflets 8-20 pairs, oblong sessile,

obtuse or acute, pubescent or nearly glabrous above, articulated on rachis, rigidly subcoriaceous. Inflorescences brownish pubescent; peduncled heads solitary or in panicles, a few-flowered; flowers yellowish-white, fragrant, sessile; calyx 1-2 mm long, campanulate, densely pubescent, teeth obsolete; corolla upto 3 mm long white grey-hairy outside, lobes lanceolate; stamens about 20, staminal tubes about 2-3 mm long. Pods purplish green and hairy when young, 15-30 cm long, usually 2.5 cm wide, flat, 8-12-seeded.

Type : Sri Lanka, Koenig, Herb. Linn. 1228, 18 (LINN).

Fl. : Apr.-June. *Frt.* : Nov.-Feb.

Frequently found amidst rock boulders on slopes at the edge of forest.

Khondra : 16751; Sonmuda : 13337.

India, Sri Lanka, Burma.

The wood is fairly durable, used as timber; leaves and twigs are used for fodder.

A. procera (Roxb.) Benth. in Hook. Lond. Jour. Bot. 3 : 89. 1844; Haines, Botany 2 : 346; Ali, Fl. West Pakistan No. 36 : 25. 1973. *Mimosa procera* Roxb. Pl. Corom. 2 : 12. t. 121. 1799. (*Safed Siris*).

Large deciduous trees; bark whitish. Leaves alternate, with 2-6 pairs of pinnae; rachis with a gland near base of petiole; leaflets 5-12 pairs, shortly stalked, more or less hairy below, obtuse, emarginate or apiculate. Inflorescences in peduncled heads, fascicled or in axillary or terminal panicles; heads 1-4-nate; flowers greenish-white, about 5 mm long, calyx sessile, funnel-shaped. Pods 10-20 cm long and about 2.5 cm wide, strap-shaped, glabrous.

Fl. : July-Sept. *Frt.* : Dec.-May.

Common near cultivated fields, along water courses.

Kota to Lormi : 15452; Marwahi : 19026.

India, Burma; probably a native of Central India (Ali, I.c.).

Wood is used as timber and for agricultural implements.

MIMOSA L. Sp. Pl. : 576. 1753 & Gen. Pl. ed. 5 : 233. 1754.

LT. : *M. sensitiva* L. vide N. L. Britton et P. Wilson, Scient. Surv. Porto Rico 5 : 357. 1924.

Mimosa pudica L., a native of tropical America, is occasionally met with in gardens and on waste grounds.

Mimosa rubicaulis Lam. subsp. *himalayana* (Gamble) Ohashi in Hara et al., Enum. 2 : 126. 1979. *M. himalayana* Gamble in Kew Bull. 1920; 3. 1920; Haines, Botany 2 : 336; *M. rubicaulis* sensu Baker in Hook. f. FBI 2 : 291. 1876, *pro. part.*, *non* Lam. (1783).

Erect or suberect, prickly shrubs: young branches tomentose. Leaf-rachis prickly, with 2.5-6.5 cm long, 4-10 pairs of pinnae; leaflets 16-20 pairs, 5-7.5 mm long, oblong, obtuse or subacute, base semi-rectangular, hairy beneath. Flowers pink, fading to white, in heads about 1.5 cm diam., axillary and in long thyrsiform panicles; calyx about 1 mm long, hairy; corolla about 3 mm long, tubular, 4-lobed; stamens 8, long-exserted. Pods linear-oblong, strap-shaped, little curved, 5-8 cm long, 10-12 mm broad, 4-10-jointed and seeded, occasionally with prickles on sutures.

Lectotype : Simla, Aug. 9, 1831. *Lady Dalhousie* (K) vide Ali, I.c.

Fl. : July-Sept. Frt. : Dec.-Apr.

Common in open forests, edges of forests along roads.

Katra to Khondra : 16735; Pali : 19491.

Afghanistan, India, Pakistan.

ROSACEAE

Juss. Gen. Pl. : 334. 1789.

T. : *Rosa* L.

Rosa multiflora Thunb. the climbing rose is occasionally found as a hedge plant. Many varieties of *Rosa* sp. are grown in gardens. *Prunus persica* (L.) Batsch. (*Peach, Aroo*) is cultivated in the district. *Potentilla supina* L. occurring in the neighbouring district of Shahdol is expected to occur here.

CRASSULACEAE

DC. in Lam. & DC., Fl. Franc., ed. 3. 4 (1) : 382. 1805.

T. : *Crassula* L.

KALANCHOE Adans. Fam. 2 : 248. 1763.

T. : *K. laciniata* (L.) A. DC. (*Cotyledon laciniata* L.).

Kalanchoe pinnata (Lam.) Pers. Syn. Pl. 1 : 446. 1805; Babu, Herb. Fl. Dehra Dun : 183. 1977. *Cotyledon pinnata* Lam. Encycl. Meth. Bot. 2 : 141. 1786. *Bryophyllum calycinum* Salisb. Parad. Lond. t. 3. 1805; C.B. Clarke in Hook. f. FBI 2 : 413. 1878; Haines, Botany 2 : 357. *B. pinnatum* (Lam.) Oken. Allgem. Naturgesch. 3(3) : 1966. 1841; Hara et al., Enum 2 : 159. 1979. (*Amar poi*).

Perennial, glabrous herbs; woody at base. Leaves simple, oblong or elliptic, crenate, sometimes 3-5-foliolate at middle of stems. Panicles upto 70 cm long; flowers purple; calyx inflated, campanulate. 3-3.5 (-4) cm long, divided less than half-way down; corolla nearly included, 4.5-5 cm long. Follies included in persistent perianth.

Fl. : Dec.-Feb. Frt. : Apr.-June.

Commonly planted in gardens; often met with as escapes in waste places.

Lamni : 15402, 15403.

Throughout the tropics; possibly a native of Madagaskar.

Young plants are produced from the leaf-crenatures when leaves are laid in the damp ground.

DROSERACEAE

Salisb. Parad. Lond. 2(1). sub. t. 95. 1808. (*Drasereae*)

F. : *Drosera* L.

DROSERA L. Sp. Pl. : 281. 1753 & Gen. Pl. ed. 5 : 136. 1754.

LT. : *D. rotundifolia* L. vide N. L. Britton et A. Brown, Ill ; Fl. N.U.S. ed. 2. 2 : 203. 1913.

- 1a. Leaves radical, forming basal rosettes; stamens short; styles 5, undivided *D. burmannii*
- 1b. Leaves caudine, alternate; stamens elongate; styles 3, bifid to base *D. indica*

Drosera burmannii Vahl, Symb. Bot. 3 : 50. 1794; Haines, Botany 2 : 359, (*burmanni*).

Small, reddish herbs. Leaves obovate or obtuse, 5-10 mm long, covered with scarlet glandular hairs. Scapes erect, 7-15 cm long; flowers red, secund, in helicoid, leaf opposed cymes, usually only one or a few opening at a time; calyx reddish, covered with short papillae, sepals persistent. Fruits loculicidally 2-5-valved.

Fl. : Oct.-Apr. Frt. : Apr.-June.

Rare, on damp sandy ground.

Katghora : 3729, 8599; Keonchi; 15384.

W. Africa, India, Nepal, Burma, East to China, Malaysia.

Insectivorous plants.

D. indica L. Sp. Pl. : 282. 1753; Haines, Botany 2 : 359.

Slender herbs; stems suberect or decumbent. Leaves linear, covered with glandular hairs, 2.5-4.5 cm long. Flowers blue, with long pedicels, in helicoid, leaf-opposed cymes, about 1 cm across; sepals lanceolate, thinly glandular hairy. Fruit loculicidally 2-5-valved; pedicels spreading in fruits.

Fl. : Oct.-Apr. Frt. : Apr.-June.

Rare, in damp places near ponds and river-beds.

Korba : 8709.

Africa, India, Nepal, Burma.

Insectivorous plants.

COMBRETACEAE

R. Br. Prodr. 351. 1810.

T. : *Combretum* Loefling, nom. cons.

Quisqualis indica L. (*Madhu malati*) is grown in the gardens.

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| 1a. Scandent shrubs; leaves opposite; petals present, 4-5 | COMBRETUM |
| 1b. Trees; leaves alternate or subopposite, petals absent | |
| 2a. Flowers in capitate heads; calyx campanulate, deciduous; fruits 0.5 cm across | ANOGEISSUS |
| 2b. Flowers racemose or spicate; calyx limb triangular; fruits more than 1 cm across | TERMINALIA |

ANOGEISSUS (DC.) Wall. ex Guill., Perr. & A. Rich., Fl. Seneg. Tent. 1 : 280, t. 65. 1832.

LT. : *A. acuminatus* (Roxb. ex DC.) Guill. et Perr. (*Conocarpus acuminatus* Roxb. ex DC.) vide DC., Prodr. 3 : 16. 1828 et Excell. J. Bot. 69 : 127. 1931.

Anogeissus latifolia (Roxb. ex DC.) Wall. ex Guill., Perr. & A. Rich., Fl. Seneg. Tent. 1 : 280. 1832; Haines, Botany 2 : 370; Scott in Kew Bull. 33 (4) : 560. 1979. *Conocarpus latifolia* Roxb. ex DC. Prodr. 3 : 17. 1828, et Mem. Combret. : 25. 1828. (*Dhaora*).

Deciduous trees; bark whitish; young parts rusty-pubescent. Leaves broadly elliptic, rounded or obtuse at both ends, glabrous with age. Flowers in heads, fascicled or in short axillary cymes; calyx yellow or pinkish yellow, tube 3 mm long, lobes reflexed; stamens 10, in two series; discs crenate, hairy. Fruits orbicular, shining when ripe, broadly two-winged.

Type : Southern India, Wight in Wallich Cat. No. 4015b (K, holotype; BM, isotype).

Fl. : May-July. *Frt.* : Dec.-Jan.

Common in mixed forests, open valley.

Pasan to Krobi : 15306.

India, Sri Lanka.

Gandhi in Fl. Hassan and Hara et al. (1979) attribute the authority for the combination to (Roxb. ex DC.) Bedd. (1869).

Wood is used as cheap timber. Leaves are used for tanning. Gum is used in cloth-printing.

COMBRETUM Loefl. Iter Hispan. App. : 308. 1758 *nom. cons.*

T. : *C. fruticosum* (Loefl.) Stuntz. (*Gaura fruticosa* Loefl.)

Combretum roxburghii Spreng. Syst. 2 : 331. 1825 ; Hara et al., Enam. 2 : 167. 1979. *C. decandrum* Roxb. Pl. Corom. 1 : 43. t. 59. 1795 ; non Jacq. 1760 ; Haines, Botany 2 : 373. (*Paibel*).

Scendent shrubs; conspicuous by large white bracts in inflorescences. Leaves opposite, coriaceous oblong, abruptly acuminate, 7-12 cm long, hairy when young. Flowers creamy white, in large axillary and terminal, rusty villous panicles, 5-merous; calyx-limbs deciduous, tube not or shortly produced beyond ovary, urceolate; petals ovate, acuminate, hairy; stamens twice as many as petals, 2-seriate. Fruits oblong or elliptic, 2.5-3 cm long, 5-winged.

Fl. : Oct.-Feb. *Frt.* : Apr.-June.

Common along nala, in mixed forest.

Katghora : 3706, 3972; Korba : 8656; Kota to Lormi : 15449; Pali to Katghora : 12869.

India, Burma, Thailand to Vietnam, W. China.

TERMINALIA L. Syst. Nat. ed. 12. 2 : 674 (err. 638), 1767 et Mant.
Pl. : 21. 128. 1767. *nom. cons.*

T. : *T. catappa* L.

1a. Fruits winged.

2a. Adult leaves glabrous; bark pale smooth; fruits with short hard angles or wings, usually notched near top

T. arjuna

- 2b. Adult leaves hairy or tomentose beneath; bark dark; fruits with long, thin, papery wings, usually rounded at top *T. alata*
- 1b. Fruits not winged
- 3a. Leaves alternate, clustered towards end of branchlets; petiole without glands; calyx-lobes pubescent; fruits tomentose *T. bellirica*
- 3b. Leaves opposite or sub-opposite, not clustered towards end of branchlets; petiole with 2 glands; calyx-lobes glabrous; fruits glabrous *T. chebula*

Note : *Panell* Adans. (1763) included as *nom rej* against *Terminalia* L. is deleted and added as a synonym of *Glycosmis Correa* [vide Nicolson & Suresh, Taxon 34(4) : 715. 1985].

Terminalia alata Heyne ex Roth, Nov. Pl. Sp. 379. 1821; Fl. Hassan; 293. 1976. *T. tomentosa* (Roxb. ex DC.) Wt. & Arn., Prodr. 314. 1834; C. B. Clarke in Hook. FBI 2 : 447. 1878; Haines, Botany 2 : 369. *Pentaptera tomentosa* Roxb. ex DC., Prodr. 3 : 14. 1828. (*Saj, Saja*).

Deciduous trees; bark dark, deeply cracked. Leaves coriaceous, sub-opposite or uppermost alternate, elliptic or elliptic-ovate, entire or rarely crenulate, cordate or suddenly narrowed into petiole; petioles with 2 glands near base. Flowers creamy; sessile, in erect, panicled spikes; calyx pubescent outside; petals absent. Fruits 4-5 cm long, wings over 1.5 cm broad with transverse striations, glabrous or hoary, ovoid-oblong.

Fl. : Apr.-June. Frt. : Feb.-Mar.

Common throughout the district.

Parasi : 19055.

India, Sri Lanka, Burma, Thailand to Vietnam.

Wood is used as cheap timber; also used for fuel.

T. arjuna (Roxb. ex DC.) Wt. & Arn. Prodr. 314. 1834; Haines, Botany 2 : 368. *Pentaptera arjuna* Roxb. (Hort. Beng. 34. 1814 *nom. nud.*) ex DC. Prodr 3 : 14. 1828, et Mem. Combr. t. 2, 1825; Roxb. Fl. Ind. 2 : 438. 1832. (*Kaua, Arjun, Kahu*).

Trees; bark smooth. Leaves subopposite, oblong or elliptic, obtuse or shortly acute at apex, suddenly narrowed at base; petioles short, with 2 glands at apex. Flowers whitish-greenish, in terminal and axillary, panicled spikes; calyx glabrous; petals absent. Fruits 2.5-3 cm long, wings under 1.5 cm, usually premorse above, with ascending striations, glabrous, ovoid or obovoid-oblong.

Fl. : Apr.-June. *Frt.* : Mar.-Apr.

Common throughout the district.

Pasan to Semra : 15359; Keonchi : 19149.

India, Sri Lanka, Thailand, Malaysia.

Bark is used for tanning. Wood is used for agricultural implements.

T. bellirica (Gaertn.) Roxb. Pl. Corom. 2 : 54. t. 198. 1805 (*bellerica*) ; C. B. Clarke in Hook. f. FBI 2 : 445. 1878 (*bellerica*) ; Haines, Botany 2 : 367 ; *Myrobalanus bellirica* Gaertn. Fruct. 2 : 90. t. 97. f. a-d. 1791. ('*bellirina*') (*Bahera*).

Deciduous trees; bark dark grey. Leaves alternate, broadly elliptic and obovate, subacute or acuminate, glabrous when mature and generally punctate on upper surface; petioles 2.5-6 cm long, without glands. Flowers solitary, axillary or in extra-axillary simple spikes; flowers greenish-white or yellowish; upper flowers of spike male, lower bisexual; bracteoles minute; calyx-teeth densely villous; petals absent. Fruits about 2 cm in diam., subglobose or pyriform, faintly 5-ribbed when dry.

Type : Gaertn. Fruct. 2 : 90. t. 97. f. a-d. 1791.

Fl. : Mar.-Apr. *Frt.* : Jan.-Feb.

Common in mixed forests.

Katghora : 3739; Kenda to Pondu : 16775; Marwahi : 19025.

India, Sri Lanka, Burma, Thailand to Vietnam, Malaysia.

Fruits are used medicinally and also for dyeing.

T. chebula Retz. Obs. Bot. 5 : 31. 1788; Haines, Botany 2 : 368 ; *Myrobalanus chebula* (Retz.) Gaertn. Fruct. 2 : 91. t. 97. 1791 (*Hara*).

Deciduous trees; bark dark brown. Leaves opposite or sub-opposite, ovate or elliptic, acute, base rounded, petioles 1.5-2 cm long, often with 2 glands near top. Spikes simple, from axils of upper new leaves, forming terminal panicles; flowers bisexual, dull white; bracteoles conspicuous in young spikes, exceeding flowers, pubescent, soon deciduous; calyx hairy inside; petals absent. Drupes ellipsoid, 2.5-3.5 cm long, 5-ribbed when dry.

Type : *India orientalis*, Montibus Palliacathensisbus . Koenig (LD).

Fl. : Mar.-May. *Frt.* : Nov.-Feb.

Common in the mixed forests.

Marwahi : 19001; Kabirchabutra : 13384; Katghora : 3726; Pendra Road : 13262A; Pasan to Korbi : 15323; Korba : 8644.

India, Sri Lanka, Burma.

The tree is frost-hardy and coppices well. The fruits have reputed medicinal properties, and also used for tanning.

MYRTACEAE

Juss. Gen. Pl. : 322. 1789. (*Myrti*)

T. : *Myrtus* L.

Psidium guajava L. (*Guava*) is commonly cultivated in orchards. *Callistemon lanceolatus* DC. (*Bottle Brush*) is grown in the gardens.

- | | |
|--|------------|
| 1a. Leaves opposite; ovaries 2-celled; fruits 1-seeded | SYZYGIUM |
| 1b. Leaves alternate; ovaries 3-4-celled; fruits many-seeded | EUCALYPTUS |

EUCALYPTUS L'Herit., Sert. Angl. : 18. 1789, et t. 20. 1792; Maiden,

A Critical Revision of the genus *Eucalyptus* Vols. 1-8, Sydney, 1903-1931.

T. : *E. obliqua* L'Herit.

Eucalyptus tereticornis Sm. Bot. N. Holl. 41. 1795 et in Trans. Linn. Soc. 3 : 284. 1797; Haines, Botany 2 : 382.

Trees; bark ashy grey or white. Leaves gland-dotted, lanceolate-falcate, with prominent secondary veins. Umbels short-peduncled, 4-8-flowered; calyx-tube semi-globose, with lid often much elongated in gradually tapering cones, petals calyptate. Fruits sub-globose, with a protruding top, loculicidally splitting.

Fl. : July-Sept. Fru. : Feb-Apr.

Extensively planted in forest clearings.

Pali : 19487.

Native to Australia; introduced all over India.

SYZYGIUM J. Gaertn. Fruct. Sem. Pl. 1 : 166. t. 33. 1788. *nom. cons.*

T. : *S. caryophylleaum* J. Gaertn. (*typ. cons.*)

Schmid in Amer. Jour. Bot. 59 : 423-36. 1972, has discussed, in detail the distinctions between *Syzygium* J. Gaertn. and *Eugenia* L.

- 1a. Leaves usually elliptic, ovate or obovate, apex rounded or shortly abruptly acute, lateral veins distant-anastomosing near margins but not producing a clearly marked intramarginal vein; hypanthium obconic; sepals present; berries globose or ovoid, 6-8 mm in diam *S. nervosum*
- 1b. Leaves usually lanceolate, apex long caudate, lateral veins very close, joining in a distinct intramarginal veins; hypanthium turbinate; sepals absent, rarely present, inconspicuous; berries oblong or ellipsoid, often curved, usually much larger than 1 cm *S. cumini*

Syzygium cumini (L.) Skeels, U.S. Dept. Agric. Bur. Pl. Industr. Bull. 248. 2. 1912. *Myrtus cumini* L. Sp. Pl. : 471. 1753. *Eugenia jambolana* Lam. Encycl. Meth. Bot. 3 : 198. 1789; Haines, Botany 2 : 376. (Jamun)

Evergreen trees. Leaves shining, slightly narrowed at base, 7-12 cm long, coriaceous, blackens on drying. Flowers white, sessile, mostly in threes, in 3-chotomous panicles with terete branches; petals 4, calyprate. Fruits 1-seeded.

Fl. : May-June. *Frt.* : July-Aug.

Common along the rivers and nala in mixed forests; also planted as evergreen, avenue trees.

Pali : 8592; Madai : 19465.

India, Sri Lanka, Malaysia, Australia.

Wood reddish-brown to reddish grey; used for agricultural implements, well-curbes, carts, for bridges etc. and also for fuel. Fruits are edible. Fruits and seeds are used as stomachic and in diarrhoea and diabetes.

S. nervosum DC. Prodr. 3 : 260. 1828. Panigrahi and Mishra, Taxon 34(2) : 299. 1985. *S. operculatum* Niedenzu in Engl. & Prant., Nat. Pflanzenfam. 3(7) : 85. 1893. *Eugenia operculata* Roxb., Fl. Ind. ed. 2. 2 : 486. 1832, nom. illeg. superfl.; Duthie in Hook. f. FBI 498. 1878. *Cleistocalyx operculatus* Merr. & Perry in Jour. Arn. Arb. 18 : 337. t. 215, f. 41-48. 1937; Hara et al. Enum. 2 : 168. 1979.

Evergreen trees. Leaves 8-15 cm long, subcoriaceous. Flowers white, sessile, ternate, in branched panicles mostly from old leaf-scars; sepals 4, transversely oblong, glandular; petals 4, calyprate. Fruits 1-seeded.

Type : "India, Roxburgh, m Lambert, 1816" (G-DC.)

Fl. : Apr.-June. *Frt.* : June-July.

Frequently found in the mixed forests near streams.

Pali : 8702, 8705; Pasarkhet to Siang : 19408.

India, Sri Lanka, Burma, east to S. China.

Wood is used for agricultural implements. Fruits are edible; also have medicinal properties, used in rheumatism.

LECYTHIDACEAE

Poiteau. Mém. Mus. Hist. Nat. (Paris) 13 : 143. 1825. (*Lecythidaceae*)

T. : *Lecythis* Loefling.

Payens [Blumea 15(2) : 157-263. 1967] has united the Barringtoniaceae Rudolphi (1830) with the Lecythidaceae Poiteau (1825). Although both the families are treated as conserved in App. II, ICBN (1983), *Barringtonia* J.R. et G. Forster is cited under Lecythidaceae in App. III vide item no. 5506.

CAREYA Roxb. Pl. Corom. 3 : 13. 1811. nom. cons.

T. : *C. herbacea* Roxb. (pp. cons.).

Careya arborea Roxb. Cor. Pl. Corom. 3 : 14, t. 218. 1811; Haines, Botany 2 : 383. (*Kumbhi*)

Deciduous trees. Leaves ovate or obovate, glabrous, slightly crenate-denticulate, alternate, usually clustered towards end of branchlets. Flowers 7-10 cm across, sessile, white or pink, in 1-3-flowered spikes with large bracts and bracteoles; sepals ovate, obtuse, deciduous; petals 4, elliptic, obtuse yellowish-white; stamens numerous, staminodes present, filaments pink; disc annular. Fruits globose, baccate, many-seeded, 5-7 mm in diam., crowned by its calyx-tube and style inserted in a depressed pit at vertex.

Fl. : Mar.-Apr. Frt. : July.

Occasionally found in moist areas in mixed forests.

Katghora : 3719; Pali : 8575.

Afghanistan, India, Malaya.

Wood is used for fuel and agricultural implements; also used as a support for black pepper vines in South India (Donimechan, 1977). Bark yields a coarse fibre. The species is resistant to fire.

MELASTOMATACEAE

Juss. Gen. Pl. 328. 1789 (*Melastomae*)T. *Melastoma* L.

- 1a. Stamens dimorphous; fruits dehiscing irregularly MELASTOMA
- 1b. Stamens all similar; fruits dehiscing by valves or pores at tip
 - 2a. Petals 3; stamens 3; fruits dehiscing apically by 3 valves SONERILA
 - 2b. Petals 4-5; stamens 8 or 10; fruits dehiscing by pores at apex OSBECKIA

MELASTOMA L. Sp. Pl. : 389. 1753 & Gen. Pl. : ed. 5 : 184. 1754.

LT. : *M. malabathricum* L. vide Hitchcock et Green, Prop. Brit. Bot. : 153. 1929.

Melastoma malabathricum L. Sp. Pl. : 390. 1753; C. B. Clarke in Hook. f. FBI 2 : 523. 1879 (*malabathrica*); Haines, Botany 2 : 388; Hara *et al.*, Enum. 2 : 170. 1979 (*melabathricum*).

Bushy shrubs; young branches densely strigosely-scaly, 4-angled. Leaves simple, coarse with scabrid adpressed hairs, broadly oblong, lanceolate, 3-5-veined from base. Bracts large, elliptic, narrowed into a stalk generally enclosing buds. Flowers showy, bluish violet or purple, 2.5-4 cm across, in clusters of 1-5 at ends of twigs, 5-merous; scaly hairs closely appressed at their base to calyx tube, lobes deciduous; stamens twice as many as petals, with continuous yellow anthers. Fruits oval, transversely dehiscent, pulpy within.

Fl. : Feb.-Apr. Frt. : Nov.-Dec.

Frequently found in moist places along streams.

Nonbira to Pasarkhet : 16813; Korba : 8695; Pasarkhet : 19409.

India, Sri Lanka, Burma, Thailand to Vietnam, Malaysia, Australia

Sweetish placentae and seeds edible.

OSBECKIA L. Sp. Pl. : 345. 1753 & Gen. Pl. : ed. 5 : 162. 1754.

T. : *O. chinensis* L.

Osbeckia chinensis L. Sp. Pl. : 345. 1753; Haines, Botany 2 : 386; Hansen in Ginkgoana 4 p-49, f. 15. 1977. *O. angustifolia* D. Don, Prodr. 221. 1825.

Erect herbs, 20-45 cm high. Leaves linear, linear-lanceolate or oblong, 3-5-veined from base, appressed hairy. Flowers mauve-coloured, about 2.5 cm across, capitate at tip of branches; fruiting calyx-tubes with a few or none adpressed pectinate scales, soon smooth, shining, lobes white-ciliate on margins; anthers with a long beak. Fruits glabrous, about 7 mm across, opening by pores at its apex.

Type : *Osbeck, s.n.* (LINN—lectotype) vide Hansen *t.c.*

Fl. : Aug.-Oct. *Frt.* : Dec.-Feb.

Frequently found in wet places.

Kabirchabutra : 13383; Lamni : 15411.

India, Burma, China, S. Japan, Thailand to Vietnam, Malaysia, N. Australia.

SONERILA Roxb. (Hort. Beng. : 5. 1014, *nom. nud.*)

Fl. Ind. 1 : 180. 1820. *nom. cons.*

T. : *S. maculata* Roxb. (*typ. cons.*).

Sonerila tenera Royle, Illustr. 215, t. 45, f. 2. 1835; Haines, Botany 2 : 388; Hara *et al.*, Enum. 2 : 171. 1979.

Slender, erect, annual herbs; stems glandular-pilose, often winged. Leaves membranous, ovate or oblong, obtuse, entire or serrulate, 3-veined from base, sparsely hairy. Flowers pink, in racemes or scorpioid spikes; sepals broadly ovate, short cuspidate; petals clawed; anthers short, oblong, truncate. Fruits trigonous, 6-ribbed, opening at top by 3 valves.

Fl. & Frt. : Oct.-Nov.

Occasionally found in damper localities.

Madai : 12885.

India, Thailand to Vietnam, S. China, Philippines.

LYTHRACEAE J. St.-Hill, Expos. Fam. Nat. 2 : 175. 1805 (*Lythrariae*)

T. : *Lythrum* L.

1a. Herbs, hygrophilous

2a. Inflorescences cymose; bracts scale-like; bracteoles shorter than flowers; capsules irregularly circumsessile; pollen 6-colpate

AMMANNIA

2b. Inflorescences spicate or solitary; bracts leaf-like; bracteoles equaling flowers; capsules valvular; pollen 3-colpate

ROTALA

- 1b. Trees or shrubs, not hygrophilous
- 3a. Leaves black-dotted; inflorescences axillary cymes; flowers sub-zymomorphic; hypanthium longer than broad; calyx-tube curved; stigma bilobed WOODFORDIA
- 3b. Leaves not black-dotted; inflorescences terminal panicles; flowers actinomorphic; hypanthium broader than long; calyx-tube straight; stigma simple or capitate
- 4a. Flowers 6-merous; bracteoles present; hypanthium cupular in fruits; stamens numerous; capsules 3-4-valved LAGERSTROEMIA
- 4b. Flowers 4-merous; bracteoles absent; hypanthium peltate in fruits; stamens 8; capsules irregularly dehiscing LAWSONIA

AMMANNIA L. Sp. Pl. : 119. 1753 & Gen. Pl. ed. 5 : 55. 1754;
 S. G. Panigrahi, Phytomorphology 30 : 1-10. 1982, et Bot. J. Linn. Soc.
 93 : 389-403, figs. 1-39. 1986.

LT. : *A. latifolia* L. vide N. L. Britton et A. Brown, Ill. Fl. N.U.S.
 ed. 2. 2 : 577. 1913.

- 1a. Leaves auriculate cordate; flowers in compound peduncled cymes; petals present; hypanthium ribbed; styles filiform *A. multiflora*
- 1b. Leaves narrowed or upper ones almost rounded at base; flowers clustered in leaf axils, in sessile or subsessile cymes; petals absent; hypanthium not ribbed; styles thick
- 2a. Leaves tapering at base; stem-branches slender; inflorescences lax at fruiting stage; capsules 1-1.25 mm in diam *A. baccifera*
- 2b. Leaves rounded or cordate at base; stem-branches robust; inflorescences dense at fruiting stage; capsules 1.5-2 mm in diam *A. baccifera*
subsp. *aegyptiaca*

Ammannia baccifera L. Sp. Pl. : 120. 1753; Koehne in Engl. Pflreiche, IV. 216 (Ht. 17) : 53. 1903; Haines, Botany 2 : 396. S. G. Panigrahi in Bull. Bot. Surv. India 18 : 178-193. 1979.

Erect annual or perennial herbs. Leaves sessile, oblong-lanceolate to oblanceolate, acute or rounded. Flowers minute, greenish, turning reddish; calyx-tubes hemispherical, lobes 4-6, broad, triangular; hypanthium broadly campanulate or obconic; stamens 4, filaments short. Capsules depressed-globose, exceeding calyx.

Type : China, Osbeck Herb. Linn. 156. 3 (LINN)

Fl. & Fr. : Rainy and cold seasons.

Common throughout the area in wet places, rice fields.

Korba : 8713; Bilaspur : 8688; Kota to Bilaspur : 13046; Kota : 13073; Khondra : 12815; Pasan to Semra : 15346.

Tropical Africa, S. Europa, C. Asia, India, east to China and S. Japan, Malaysia, Australia.

Bruised fresh leaves are used for raising blisters in rheumatic pains, fever etc. Leaf extract is poisonous.

A. baccifera L. Sp. Pl. : 119. 1753, ssp. *aegyptiaca* (Willd.) Koehne in Engl. Bot. Jahrb. 1 : 260. 1880. *A. aegyptiaca* Willd. Enum. Hort. Berol. 1 : 167. t. 6. 1809. *A. salicifolia* sensu Hiern et al. in Oliv., Fl. Trop. Afr. 2 : 478. 1874, excl. syn. pro. part.; sensu C. B. Clarke in Hook. f. FBI 2 : 569. 1879, non Monti 1767; Haines, Botany 2 : 396.

Erect annual or perennial herbs; stems 4-angled, lower branches usually spreading, rarely simple. Leaves narrowly oblong, oblanceolate or linear lanceolate, moderately thick, often deflected when fruits mature. Inflorescences dense; calyx 1.3-2 mm long, tubes as long as or shorter than lobes, in fruits, hemispheric; stamens 4. Capsules depressed globose, red.

Fl. & Fr. : Rainy season and cold seasons.

Commonly found in wet muddy places, cultivated fields.

Pasan : 13280; Achankmar : 19277; Pandu to Ratnpur : 16583.

Africa to India, east to China, Australia.

A. multiflora Roxb., Fl. Ind. 1 : 447. 1820; Koehne in Pfeilich, IV. 216 (Ht. 17) : 48. 1903: Haines, Botany 2 : 396.

Erect, profusely 4-angled branched herbs. Leaves linear or linear-oblong, opposite, sessile. Cymes usually longer than subtending leaves; calyx campanulate, 8-ribbed, hemispheric; lobes 4, short triangular, shorter than hypanthium; petals minute, red, caducous, sometimes absent; stamens 4, 6 or 8, with slender filaments exceeding sepals. Capsules globose, red.

Fl. & Fr. : Rainy and cold seasons.

Commonly found in wet muddy places, in the cultivated fields.

Khondra : 12821.

Africa, W. Asia, India, east to China and Japan, Malaysia, Australia.

LAGERSTROEMIA L., Syst. Nat. ed. 10, 2 : 1068, 1076, 1372. 1759, et
Sp. Pl. ed. 2. 1 : 734. 1762.

T. : *L. indica* L.

Lagerstroemia parviflora Roxb., Pl. : Corom. 1 : 47. t. 66. 1795;
Koehne in Engl. Pflneich. IV. 216 (Ht. 17) : 258. 1903; Haines, Botany
2 : 392; Furtado in Gard. Bull. Singapore 24 : 195. f. 3a. 1969. (*Lendia*,
Sidha, *Senha*)

Trees or large shrubs; young branches often 4-winged. Leaves narrowly elliptic or oblong or ovate-lanceolate, acute or acuminate, distichous, glabrous, young hoary beneath. Panicles many- or a few-flowered; flowers white; calyx in fruits persistent, somewhat funnel-shaped at base, lobes small; petals narrow, long-clawed, wrinkled; stamens inserted near base of hypanthium. Capsules ellipsoid, polished, 3-4-valved.

Fl. : Apr.-May. Fri. : Dec.-Jan.; deciduous in Feb.-Mar.; flowers on new shoots.

Common throughout the area in mixed and scrub forests.

Marwahi : 19005; Parasi : 19053 Pasan to Korbi : 15307; Katghora : 3736; Pasarkhet : 19399.

India, Burma.

Bark and leaves are used for tanning. Bark-gum is edible. The leaves are used to feed tasar silk-worms (Oommachan, 1977). The wood is hard, tough and elastic and is used in agricultural implements.

LAWSONIA L., Sp. Pl. : 349. 1753 & Gen. Pl. : ed. 5 : 166. 1754.

LT. : *L. inermis* L. vide N. L. Britton et Millspaugh, Bahama Fl. : 299. 1920.

Lawsonia inermis L. Sp. Pl. : 349. 1753; Haines, Botany 2 : 390. *L. alba* Lam. Encycl. Meth. Bot. 3 : 106. 1789; C. B. Clarke in Hook. f. FBI 2 : 573. 1879. (*Mehndi*)

Small trees or shrubs; branches often ending in thorns. Leaves opposite, lanceolate or narrow rhomboid, narrowed at base, sometimes shortly petioled, acute or obtuse. Inflorescences terminal, paniced cymes; flowers 5-7 mm across, sweet scented, creamy or white coloured; calyx-lobes 4, ovate; petals 4, obovate wrinkled, inserted at top of calyx-tubes; stamens inserted in pairs between petals. Capsules red when young, seated on hypanthium with persistent small sepals, depressed globose, crowned with styles.

Type : Described from India & Aegypt, Herb. Linn. 496.1 (LINN).

Fl. : Oct.-Nov. Fru. : Nov.

Common in waste places; also grown as hedges.

Marwahi : 19020.

Africa, Asia.

An orange red dye is obtained from macerated, triturated or powdered leaves. The dye is used for dyeing clothes and hairs, for staining nails, palms and soles by ladies. Leaves, flowers and seeds are used in medicines. Root and leaf-powder in milk are used for jaundice (Oommachan, 1977).

ROTALA L. Mant. Pl. Alt. : 143, 175. 1771. C. D. K. Cook,
Boissiera 29 : 1-152. 1979.

T. : *R. verticillaris* L.

- 1a. Calyx in fruits hemispheric, calyx-tubes as broad as or broader than long *R. rosea*
- 1b. Calyx in fruits campanulate, calyx-tubes longer than broad
 - 2a. Flowers axillary or in sessile, axillary spikes *R. indica*
 - 2b. Flowers distinctly spicate; spikes peduncled, terminal
 - 3a. Leaves orbicular; petals twice as long as sepals; hypanthium campanulate; bracteoles absent or minute; capsules 4-valved *R. rotundifolia*
 - 3b. Leaves elliptic or ovate; petals almost as long as sepals; hypanthium tubular; bracteoles prominent; capsules 2-valved *R. serpyllifolia*

Rotala indica (Willd.) Koehne, in Engl., Bot. Jahrb. 1 : 172. 1880; C. D. K. Cook, Boissiera 29 : 108. 1979. *Peplos indica* Willd., Sp. Pl. 2 : 244. 1799. *Ammannia peploides* Spreng., Syst. 1 : 444. 1824; C. B. Clarke in Hook. f. FBI 2 : 566. 1879, nom. illeg. *A. nana* Roxb. Fl. Ind. 1 : 448. 1820 non Wallich; C. B. Clarke in Hook. f. FBI 2 : 566 1879. *A. indica* (Willd.) Haines, Botany 2 : 394.

Erect or decumbent herbs; stems 4-angled, often rooting at base. Leaves opposite, short-petioled or sessile, elliptic-obovate, narrowed at base, margins cartilaginous. Flowers pinkish, tetrapterous, small in numerous sessile axillary spikes, solitary, sessile in axils of reduced floral leaves; sepals 4, lanceolate, acuminate, exceeding 4 very minute petals or petals absent. Capsules ellipsoid, 2-valved.

Type : India, 1795, *Klein* 546 (B-W. No. 814/7001).

Fl. & Fr. : Oct.-Dec.

Common in moist situations near ponds, rice fields, muddy places.

Katghora : 3966, 3998 ; Kota to Bilaspur : 13060.

India, east to China, Japan, Malaysia.

R. rosea (Poir.) C. D. K. Cook in Boissiera 29 : 86. 1979 ; Hara *et al.*, Enum. 2 : 173. 1979. *Ammannia rosea* Poir. in Lam., Encycl. Meth. Bot. Suppl. 1 : 329. 1810. *A. pentandra* Roxb. Fl. Ind. (ed. 1) 1 : 448. 1820 ; Haines, Botany 2 : 395. *Rotalapentandra* (Roxb.) Blatt. & Hallib. in Jour. Bomb. nat. Hist. Soc. 25 : 707. 1918, *pro. part. pro. basionym et syn.* *R. leptopetala*. *Ammannia leptopetala* Bl. Mus. Bot. 2 : 134. 1856. *nom. illeg.* based on *Ammannia pentandra* Roxb. 1820 ; *Rotala leptopetala* Koehne in Engl., Bot. Jahrb. 1 : 162. 1880, *pro. part. emend.* Koehne, Bot. Jahrb. 3 : 388. 1883, Fl. Hassan : 274. 1976 *nom. illeg.*

Erect herbs ; often with many spreading branches. Cauline leaves usually upto 2.5 cm long, oblong or lanceolate, acute, base cordate or truncate ; upper floral leaves smaller, becoming bractiform, oblong. Flowers sessile, pink, often approximate, in every axil, never in distinct spikes ; sepals 5, lanceolate ; epicalyx 5, subulate ; petals 5, narrow obovate or absent ; ovaries 3-lobed. Capsules spherical or depressed globose, 3-valved.

Type : *Indes orientales*, herb. *Desfontaines* (Holotype : FT)

Fl. & Fr. : July-Jan.

Common near ponds, in moist places rice fields.

Katghora : 3968 ; Bilaspur : 13007 ; Pasan : 15297 ; Lamni : 13257 ; Korba to Kudmura : 16802.

Afghanistan, India, east to China, Japan, Malaysia.

R. rotundifolia (Buch.-Ham. ex Roxb.) Koehne in Engl., Bot. Jahrb. 1 : 175. 1880 et Pflrech IV. 216 (Ht. 17) : 41. 1903. *Ammannia rotundifolia* Buch.-Ham. ex Roxb., Fl. Ind. 1 : 446. 1820 ; Haines, Botany 2 : 394.

Herbs ; branches erect and prostrate, forming pinkish mats. Leaves opposite, sessile or shortly petioled, approximate below, becoming distant towards spikes. Flowers sessile, dense, in terminal spikes ; floral leaves one to each flower, ovate or oblong ; calyx-tube campanulate, 1 mm long. lobes 4 ; petals 4, obovate, bright red. Stamens 4, capsules ellipsoid, 4-valved.

Type : India, "Plants sent from Lukshmeepora and Malda flowered in (Calcutta) botanic garden during cold season 1797"; vide Roxb. Icon. No. 1344 CAL., K. (see Cook 1979).

Fl. & Frt. : Jan.-May.

Common in wet muddy situations, in rice fields.

Korba : 8664; Kabirchabutra : 15248.

India, east to China and S. Japan (see map 5 in Cook I.c.).

R. serpyllifolia (Roth) Brem. in Acta Bot. Neerl. 3 (1) : 149. 1954.
Micranthus serpyllifolius Roth, Nov. Pl. : Sp. 282. 1821. *Ammannia tenuis* (Wt.) C. B. Clarke in Hook. f. FBI 2 : 567. 1879; Haines, Botany 2 : 394.
Rotala tenuis (Wt.) Koehne, in Engl., Bot. Jahrb. 1 : 177. 1880. *Ameletia tenuis* Wt. Ic. 1 : n. 13. t. 257B. 1840.

Erect, slender herbs; short creeping at base. Leaves opposite sessile, ovate or elliptic, often acute, 2-15 mm long. Flowers red, in dense spikes; floral leaves one to each flower, oblong or lanceolate; calyx-tube 2 mm long, constricted at throat elongate, lobes 4, acute; petals 4, obovate. Stamens 4; carpels 2 capsules ellipsoid, much longer than broad, 2-valved shorter than calyx (see Fig. 9, A-D in Cook I.c.).

Type : Herb. Ind. Or., Heyne (isotype; L.)

Fl. & Frt. : Oct.-Dec.

Frequently found in coarse sandy river beds, moist places, cushion-forming.

Keonchi to Lamni : 15390; Katghora : 7101.

India, Pakistan.

WOODFORDIA Salisb. Parad. Lond: t. 42. 1806.

T. : *W. floribunda* Salisb., nom. illeg. [*Lythrum fruticosum* L., *W. fruticosa* (L.) Kurz].

Woodfordia fruticosa (L.) Kurz in Jour. As. Soc. Beng. 40 : 56. 1871; Koehne in Engl. Pflreicht. IV. 216 (Ht. 17) : 79. 1903; Haines, Botany 2 : 390. *Lythrum fruticosum* L. Sp. Pl. : 641. 1753. *Woodfordia floribunda* Salisb., Parad. Lond. t. 42. 1806, nom. illeg. C. B. Clarke in Hook. f. FBI 2 : 572. 1879. *Grislea tomentosa* Roxb. Pl. Corom. 1 : 29. t. 31. 1795. (*Dhawai*, *Julbuli*, *Jilbilli*).

Shrubs. Leaves sessile or subsessile, distichous, linear-lanceolate, acuminate, rounded or cordate at base, silvery grey pubescent and black dotted beneath. Flowers tubular, scarlet red, in fascicled, axillary cymes; calyx red,

abruptly widened above base, lobes 6, mouth oblique; epicalyx 6, scale like; petals 6, inserted at top of calyx-tube; stamens 12, declinate. Capsules ellipsoid, membranous.

Type : Described from Asia and tropical Africa, Herb. Linn. 62.4 (LINN)

Fl. : Jan.-Apr. Frt. : Apr.-June.

Common in open dry mixed forests.

Korba : 8734 ; Katghora : 7106, 3723 ; Pasan to Korbi : 15304.

Africa, W. Asia, India, Sri Lanka, Burma, east to China.

Leaves and bark yield a yellow dye used in printing, dyeing and tanning, and petals yield a reddish dye. Flowers and leaves are used as astringent and analgesic.

PUNICACEAE

Horaninow, Prim. Lin. Syst. Nat. : 81. 1834.

T. : *Punica* L.

The only genus *Punica* L. distributed from S. E. Europe to N. W. India and Socotra, with 2 species—one endemic in Socotra and the other viz., *P. granatum* L. from Balkans to India, is commonly cultivated.

ONAGRACEAE

Juss., Gen. Pl. : 317. 1789. (*Onagracea*)

T. : *Onagra* P. Miller, nom. illeg. (= *Oenothera* L.)

LUDWIGIA L. Sp. Pl. : 118. 1753 ('*Ludvigia*'); corr. Gen. Pl. : ed. 5. 55. 1754.

LT. : *L. alternifolia* L. vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. 2 : 586. 1913.

1a. Sepals 5-15 mm long; petals 3-18 mm long; stamens twice as many as sepals

2a. Creeping herbs with spongy floats; leaves obovate or oblanceolate, obtuse; sepals 5-7, rarely 4; petals 5, creamy white, yellow at the base; seeds embedded in endocarp, uniseriate

L. adscendens

2b. Erect herbs or undershrubs without floats; leaves linear lanceolate or subobovate, acute; sepals 4; petals 4, yellow; seeds free, not embedded in endocarp, many seriate

3a. Pubescence appressed or largely wanting; leaves lanceolate or linear

L. octovalvis
subsp. *octovalvis*

- 3b. Pubescence of long erect hairs; leaves often subovate *L. octovalvis*
subsp. *sessiliflora*
- 1b. Sepals 1.3-3.5 mm long; petals 1-3 mm long; stamens as many as sepals
- 4a. Petals elliptical; capsules oblong, terete, less than 2 cm in size; seeds in many rows in each locule, ellipsoid-rounded, 0.3-0.5 mm long and 0.2-0.25 mm wide *L. perennis*
- 4b. Petals narrow, spatulate; capsules linear, somewhat 4-angled, more than 2 cm in size; seeds in one row in each locule, ovoid, 0.5-0.6 mm long, 0.3 mm wide *L. prostrata*

Ludwigia adscendens (L.) Hara in Jour. Jap. Bot. 28. : 290. 1953; Raven in Reinwardtia 6 : 387. 1963; *Jussiaea adscendens* L., Mant Pl. : 69. 1767. *J. repens* L., Sp. Pl. : 1 : 388. 1753, non *Ludwigia repens* Forster 1771; Haines, Botany 2 : 398.

Herbs; branches prostrate or ascending. Leaves narrowly cuneate at base, 0.4-7×0.7-4 cm, main veins 6-13 on each side of mid-vein. Flowers solitary, in upper leaf axils; sepals deltoid, acuminate, 5-11 cm long, 2-3.2 mm wide; petals 9-18 mm long, 6-10 mm wide. Capsules glabrous or villous, 1.2-2.7 cm long, with 10 conspicuous dark brown ribs, irregularly dehiscent.

Fl. & Frt. : Oct.-Jan.

Commonly found in muddy places; often growing in submerged muddy soil.

Ratanpur : 13039.

India, east to China, Malaysia, Australia.

L. octovalvis (Jacq.) Raven in Kew Bull. 15 : 476. 1962, et Reinwardtia 6 : 356. 1963 subsp. *octovalvis*. *Oenothera octovalvis* Jacq., Enum. Syst. Plant 19. 1760. *Jussiaea suffruticosa* L., Sp. Pl. : 388. 1753, pro. part.; Haines, Botany 2 : 398.

Erect undershrubs. Leaves linear or linear lanceolate, narrowly broadly cuneate at base, apex attenuate, main veins 11-20 cm each side of mid-vein, subglabrous or with sparse appressed pubescence, 3-14.5 × 0.4-4 cm. Flowers yellow, solitary, axillary; sepals ovate or lanceolate, 8-13 mm long; petals broadly obovate, 5-16 mm long, 4-17 mm wide. Capsules thin-walled, 1.7-4.5 cm long, 2-8 mm thick, terete, pale brown, with 8 darker ribs.

Fl. & Frt. : Oct.-Feb.

Occasionally found in wet places, near ponds in marshy places.

Korba to Kudmura : 16801; Khondra : 12755; Bilaspur : 19356; Katghota : 6074.

Africa, India, east to Japan, Malaysia, Australia.

L. octovalvis (Jacq.) Raven ssp. *sessiliflora* (Mich.) Raven in Kew Bull. 15 : 476. 1962, et Reinwardtia 6 : 362. 1963. Shinnar in Sida 1 : 385. 1964; Hara *et al.*, Enum 2 : 176. 1979. *Jussiaea octonervia* var. *sessiliflora* Michelii in Martius, Fl. Bras. 13 (2) : 180. 1875. *J. suffruticosa* L.; Clarke in Hook. f. FBI 2 : 587. 1879 non *L. suffruticosa* Walt (1788).

Erect undershrubs. Leaves ovate or subovate with spreading pubescence, broadly cuneate at base, alternate, 2-10 × 0.8-4 cm. Flowers yellow, solitary axillary; sepals 6-15 mm long; petals 6-17 mm long, 5-17 mm wide. Capsules terete, 1.5-4 cm long, pale brown with darker ribs.

Fl. & Fr. : Oct.-Feb.

Commonly found in wet muddy places near ponds, ditches.

Pasan to Semera : 15364; Khootaghat : 19575.

E. Africa, India, east to China and S. Japan, Malaysia, N. Australia.

L. perennis L. Sp. Pl. : 119. 1753, *pro. part.* Raven in Reinwardtia 6 : 367. 1963. *L. parviflora* Roxb. (Hort. Beng. II. 1814 *nom. nud.*) Fl. Ind. 1 : 440. 1820; Haines Botany 2 : 399. *Jussiaea perennis* (L.) Brenan in Kew Bull. 1953 : 163. 1953.

Annual herbs upto 60 cm tall. Leaves linear lanceolate, lanceolate to narrowly elliptic, narrowly cuneate at base, apex subacute, main veins 6-12 on each side of midvein, 2-10 × 0.3-2.7 cm. Flowers yellow, solitary axillary, shortly pedicelled, usually 4-merous; sepals deltoid. Capsules 3-16 mm long, oblong, inflated, smooth, raphe obscure.

Lectotype : Sri Lanka, Hermann (BM) vide Brenan, Fl. Trop. E. Africa, Onagr. : 13. 1953.

Fl. : Oct.-Nov. *Frt.* : Nov.-Jan.

Frequently found in wet, muddy places, in rice fields.

Hasdo river : 8607; Pali : 8598.

Africa, Afghanistan, India, east to S. Japan, Malaysia, Australia.

L. prostrata Roxb. (Hort. Beng. II. 1814 *nom. nud.*) Fl. Ind. I : 441. 1820; Haines, Botany 2 : 399; Murti in Bull. bot. Surv. India 18 : 211. 1976.

Annual, diffused herbs. Leaves lanceolate or narrowly elliptic, narrowly cuneate at base, apex acute, 1-13 × 0.3-2.7 cm. Flowers yellow, solitary, axillary, sessile; sepals 4, lanceolate, acute, deltoid, 1.3-2.5 mm long; petals narrowly spatulate, 1.3-2.2 mm long. Capsules thin-walled, glabrous, 1.25-1.8 cm long.

Fl. : Oct.-Nov. *Frt.* : Nov.-Jan.

Commonly found in wet, muddy places, rice fields.

Korba : 12946; Achanakmar : 13212A; Siang : 16837; Lamni : 19235.

India, Burma, east to S. China, Malaysia.

TRAPACEAE

Dumortier, Anal. Fam. Pl. : 36, 39, 1829.

T. : *Trapa* L.

Formerly kept under the Onagraceae, but later separated mainly on the basis of its unique anatomical features. There are some differences in morphological features also, such as stipular leaves (exstipulate in the Onagraceae), calyx-tube half-adnate to the ovary (wholly adnate in the Onagraceae) and ovary half-inferior (inferior in the Onagraceae).

Trapa quadrispinosa Roxb. (=*T. natans* auct. non L. 1753) with 4-horned fruits, 2 of which are smaller, is likely to occur in the district.

TRAPA L. Sp. Pl. : 120. 1753 & Gen. Pl. ed. 5 : 56. 1754.

T. : *T. natans* L.

Trapa bispinosa Roxb. Pl. Corom. : t. 234. 1815; Haines, Botany 2 : 400; Ghazanfar in Fl. West Pakistan No. 97 : 1. f. 1A-E. 1976; *T. natans* L. var. *bispinosa* (Roxb.) Makino in Iinuma, Somoku-Dzusetsu, ed. 3. 1 : 137. 1907; Fl. Hassan : 277. 1976. (*Singhara*).

Aquatic, floating herbs. Leaves dimorphic : of submerged ones opposite, root-like, pinnatipartite; floating ones rosulate, rhomboid, denticulate, dentate, serrate or incised, pubescent and red beneath, 5 × 6-7 cm; petioles with a spongy swelling near its apex. Flowers white, axillary, solitary, peduncled; calyx-tubes cupular, lobes 4, 2 becoming spines on fruits; petals 4, inserted on margin of epigynous, cup-shaped disc; stamens 4, inserted on disc. Fruits drupes, 2-horned, urnshaped, 1-celled, indehiscent, 2.5-3.5 cm across.

Lectotype : India. *Roxburgh* (BM, vide Ghazanfar l.c.).

Fl. : July-Aug. *Frt.* : Oct.-Dec.

Commonly cultivated in ponds.

Ratanpur : 13037; Pali : 19490.

Trop. Africa, India, Sri Lanka.

Fruits are edible raw or boiled; ripe seeds powdered yield flour for cooking.

TURNERACEAE

DC. Prodr. 3 : 345. 1828.

T. : *Turnera* L.

Turnera ulmifolia L., a native of tropical America is commonly cultivated in the gardens.

PASSIFLORACEAE

Juss. ex Kunth in H.B.K., Nov. Gen. Sp. 2, ed. fol. 100; ed. quæ
126. 1817 ('Passifloræ')

[Juss. Ann. Mus. Natl. Hist. Nat. 6. 102. 1805 ('Passiflorees')].

T. : *Passiflora* L.

PASSIFLORA L. Sp. Pl. : 955. 1753 & Gen. Pl. ed. 5. : 410. 1754.

LT. : *P. incarnata* L., vide N. L. Britton et A. Brown, Ill. Fl. N.U.S.
ed. 2, 2 : 565. 1913.

Passiflora foetida L. Sp. Pl. : 959. 1753; Haines, Botany 2 : 402;
Ghafoor, Fl. West Pakistan No. 66 : 4. 1974.

Tendril-bearing, twining herbs. Leaves ovate, 3-lobed, acute or acuminate, cordate, 3-6 cm long, ciliate and denticulate with glandular hairs; petioles long, eglandular; stipules laciniate with thickened, glandular hairy segments. Flowers white or greenish, 2.5 cm across, mostly solitary, axillary, with an involucle of finely pinnatifid bracteoles, pedicels 2-6 cm long; calyx 1.2-1.5 cm long, divided halfway down; segments lanceolate; petals oblong. Fruits globose, berry, surrounded by bipinnatifid bracts.

Type : Herb. Linn. 1070. 20 (LINN).

Fl. & *Frt.* : July-Dec.

Frequently found amidst bushes, hedges, waste places.

Karidongri : 19330; Lamni : 13234.

Tropical American plant, naturalized all over the tropics (Murti, 1975).

CARICACEAE

Dumortier. Ann. F. Pl. 37, 42. 1829.

T. : *Carica* L.

Carica papaya L., (*Papaw*) a native of S. America, is commonly cultivated.

CUCURBITACEAE

A.L. Jussieu Gen. Pl. : 393. 1789.

T. : *Cucurbita* L.

Benincasa hispida (Thunb.) Cogn. (*Petha*), *Citrullus lanatus* (Thunb.) Matsum. & Nakai—a native of S. W. Africa (*Tarbu*), *Cucurbita maxima* Duch. ex Lam. (*Kumrah*), *C. pepo* L. (*Kumrah*) and *Lagenaria siceraria* (*Molina*) Standley (*Lauki*) are cultivated in the district.

1a. Corolla gamopetalous, tubes exceeding lobes	COCCTNIA
1b. Corolla 5-partite to base	
2a. Anther cells straight	
2b. Anther cells flexuous or conduplicate	
3a. Petals fimbriate on margins	TRICHOSANTHES
3b. Petals entire	
4a. Stamens inserted at or near mouth of calyx-tubes, fruits fibrous, dry, operculate	LUFFA
4b. Stamens inserted below mouth of calyx-tubes; fruits otherwise	
5a. Anthers free, anther-cells curved or sigmoid	DIPLOCYCLOS
5b. Anthers cohering, cells horse-shoe shaped or conduplicate	
6a. Peduncles bracteate, male flowers racemmed	MOMORDICA
6b. Peduncles not bracteate; male flowers solitary or clustered	CUCUMIS

COCCINIA Wt. & Arn., Prodr. 1 : 347. 1834.

T. : *C. indica* Wt. & Arn. nom. illeg. *Bryonia grandis* L. [= *C. grandis* (L.) J. O. Voigt].

Coccinia grandis (L.) Voigt, Hort. Suburb. Cal. : 59. 1845; Chakravarty, Pl. India Fasc. 11 : 24. 1982. *Bryonia grandis* L. Mant. Pl. 1 : 126. 1767. *Cephalandra indica* Naud. in Ann. Soc. Nat. ser. 5, 5 : 16. 1866; Haines,

Botany 2 : 417. *Coccinia indica* Arn. in Wt. & Arn., Prodr. 347. 1834, nom. illeg. (*Ban kundri*; *Kundrun*).

Annual, climbing herbs; tendril simple. Leaves ovate, 5-angular or -lobed, deeply cordate at base, denticulate, pellucid dotted above, gland-dotted on lower surface, scabrid. Male flowers : peduncle about 2.5 cm long. 1-3 in axils of leaves; calyx-tubes campanulate, 4-5 mm long, lobes linear oblong; corolla white, 2.5-3.5 cm long; stamens 3, anthers exserted; female flowers : peduncle about 0.5-0.7 cm long, solitary; staminodes 3; stigma densely papillose; ovary 10-15 mm long. Fruits ellipsoid, green with white streaks when unripe, scarlet when ripe, 2.5-5 cm long and 1.5-2.5 cm broad.

LT. LINN 1153/2 (vide Jeffrey 1967).

Fl. : Aug.-Dec. Frt. : Dec.-Jan.

Frequently found in the outskirts of villages, in waste places.

Neur : 16724.

Pantropical.

Fruits are edible as vegetables, roots, stems and leaves are used medicinally in skin diseases, catarrha, bronchitis and diabetes.

CUCUMIS L. Sp. Pl. : 1011. 1753 & Gen. Pl. ed. 5 : 442. 1754.

LT. : *C. sativus* L., vide N. L. Britton et P. Wilson, Scient. Surv. Porto Rico 6 : 264. 1925.

C. melo L. (*Kharbuja*) and *C. sativus* L. (*Khira*) are commonly cultivated in the district.

Cucumis setosus Cogn. in DC. Monog. Phan. 3 : 491. 1881; Chakravarty in Fl. India Fasc. 11 : 38. 1982.

Annual, setose climbing herbs. Tendrils sparsely villous hirsute. Leaves ovate triangular, trilobed, base slightly emarginate, scabrid, membranous, 4-6 cm across; lobes triangular, acute. Flowers monoecious; male flowers : fasciculate or subsolitary; calyx-tubes campanulate, densely long villous, about 3 mm long, sepals subulate; corolla sparsely villose, petals oblong; stamens 3, connective-appendix compressed; female flowers : ovary oblong, villous. Fruits oblong, 20-25 mm long, 10-12 mm thick, sparsely long setose.

Type : India orientalis, Ritchie 321 (E; iso—K).

Fl. : July-Aug. Frt. : Aug.-Oct.

Frequently found at the edges of the forests, climbing on bushes.

Kota : 13204A.

India. (endemic).

DIPLOCYCLOS (Endl.) Post & O. Kuntze, Lexic. 178. 1903 ('*Diplocyclus*').
Corr. C. Jeffrey in Kew Bull. 15 : 354. 1962. Panigrahi and Mishra,
 Bangladesh J. Bot. 14 (2) : 189-190 : 1985.

T. : *non designatus*.

Jeffrey (1962) reduces *Bryonopsis* Arn. as congeneric with *Kedrostis* Medic. (1791) with the remark (p. 343) "other changes proposed are the sinking of *Bryonopsis* Arn. into *Kedrostis* Medic" and makes the combination *Kedrostis courtallensis* (Arn.) Jeffrey. Yet, Farr *et al.* (1979) erroneously cite *Bryonopsis* Arnott (1841) typified by *B. courtallensis* Arn., *non* Rafin. (1814) as a (Endl.) Post & O. Kuntze (1903).

Diplocyclos palmatus (L.) Jeffrey in Kew Bull. 15 : 352. 1962;
 Chakravarty, Fl. India Fasc. 11 : 48. 1982. *Bryonia palmata* L. Sp. Pl. 1012.
 1753, *pro. part. excl. syn.* *B. laciniosa* L. Sp. Pl. 1013. 1753, *pro. part. excl.*
type; *Bryonopsis laciniosa* auct. *sensu* auct. *non* (L.) Naud. S. S.; *sensu*
 Chakravarty l.c. : 16; Haines, Botany 2 : 409.

Annual, scabrous or nearly glabrous, climbing herbs. Leaves broadly ovate, suborbicular, 8-15 cm across, deeply palmately 5-7-lobed; lobes elliptic-lanceolate; punctate above. Tendrils bifurcate. Flowers yellow, monoecious, males and females clustered in same axils; male flowers : pedicels 1-2 cm long; calyx-tubes broadly campanulate, teeth subulate; corolla 5-partite, campanulate, hairy within; lobes ovate, acute; pistillodes absent; stamens 3; female flowers : pedicels shorter than of males, calyx and corolla as in males; staminodes 3; ovary with 3 placentas; stigmas 3, bilobed. Fruits nearly sessile, often 2-3 together, globose, baccate, red with white stripes, 1.2-1.5. cm across.

LT. : Ceylon, Hermann s.n. (BM) (vide C. Jeffrey 1967).

Fl. & Fr. : Apr.-Jan.

Common in hedges, edges of the forests, waste places.

Katghora : 6098; Khondra : 12781.

Africa, India, Sri Lanka, east to S. China, S. Japan, Malaysia, Australia.

Plant is important medicinally and contain bryonin.

Both *Bryonia laciniosa* L. and *B. palmata* L. are from Sri Lanka as the type localities. Whereas in *B. laciniosa* L. the "foliis palmatis scabris, laciniis lanceolatis serratis lateralibus minimis", in *B. palmata* L. "the foliis palmatis laevibus quinquepartitis laciniis lanceolatis repando-serratis". The specimens from Bilaspur are palmate, 5-lobed beyond the middle and with

2 subsidiary basal pedate lobes, slightly scabrid above and almost smooth beneath, margins minutely denticulate and therefore are identified with *B. palmata* L., *B. laciniosa* L. is lectotypified by C. Jeffrey with LT : from a plant cult. at Harte Camp, Holland (BM) [= *Cayaponia laciniosa* (L.) C. Jeffrey, 1962].

LUFFA P. Mill. Gard. Dict. Abridg. ed. 4. 1754.

T. : *L. aegyptiaca* P. Mill. (*Momordica luffa* L.).

L. acutangula (L.) Roxb. (*Tarot*) and *L. hermaphrodita* Singh & Bhandari (*Satputia*) are cultivated in the district.

Luffa cylindrica (L.) M. J. Roem., Fam. Syn. Monogr. 2 : 63. 1846; Chakravarty, Fl. India Fasc. 11 : 70. 1982. *Momordica cylindrica* L. Sp. Pl. : 1009. 1753. *Luffa aegyptiaca* P. Mill. Gard. Dict. ed. 8. 1768; Haines, Botany 2 : 414; (*Nenua*, *Taroi*, *Ghia-Toroi*).

Annual, glabrous, climbing herbs; tendrils 2-3-fid. Leaves reniform-orbicular, 5-angled or lobed, dentate, scabrous, punctate on both surfaces, pubescent on veins beneath, 10-25 cm across. Flowers yellow, male and female often in same axils, males racemed on 10-15 cm long peduncles, females solitary on 2-10 cm long peduncles; calyx 2-3 cm long, lobes triangular; corolla spreading, 3.5-4 cm long, thinly hairy; stamens 5. Fruits elongate, clavate; smooth, fibrous inside, 15-40 cm long.

Type : *Pepo indicus*.... Hien, Hort. Acad. Lugd.—Bat. Cat. : 482. 1687.

Fl. : July-Aug. Frt. : Oct.-Dec.

Commonly cultivated, also found as escapes from cultivation, climbing on hedges along road sides.

Near : 16723; Pendra : 15287; Ratnapur : 13017.

Throughout the tropics.

Fruit used as vegetables. The dried fibrous vascular tissues of ripe fruits are used as bath-sponge.

MOMORDICA L., Sp. Pl. : 1009. 1753 & Gen. Pl. ed. 5 : 440. 1754.

LT. : *M. balsamina* L., vide N. L. Britton et Millspaugh. Bahama Fl. 425. 1920.

M. charantia L. var. *charantia* (*Karala*) and var. *muricata* (Willd.) Chakrav. (*Uchche*) are both commonly cultivated in the district.

Momordica dioica Roxb. ex Willd., Sp. Pl. 4 : 605. 1805; Haines, Botany 2 : 412; Chakravarty, Fl. India Fasc. 11 : 94. 1982. (*Ban Korela*).

Perennial, slender, nearly glabrous climbers with foetid smell; dioecious; tendrils simple. Leaves ovate, mucronate, base emarginate, entire or lobed, undulate and denticulate, glabrous often punctate beneath, 5-10 cm across. Flowers yellow; male peduncles 1-flowered, 5-15 cm long, with persistent, spathaceous, deeply concave, orbicular bracts, wrapping round buds and enclosing base of flowers; female peduncles with a small bract or ebracteate, 1.5-2.5 cm long; calyx-lobes oblong, 5-7 mm long, lanceolate, densely villous; corolla 2.5-3 cm long; the two 2-anthered filaments 2-fid half way down. Fruits 2.5-5 cm long, without any ribs.

Type : Peninsular Indiae Orientalis, Klein 768 (B-W 18027) (see C. Jeffrey l.c.)

Fl. : Aug.-Sept. Frt. : Sept.-Oct.

Commonly found at the edges of the forests, in bushes, waste places.

Korba : 4257; Pasan to Korbi : 19078; Lamni : 19205, 19256; Marwahi to Pasan : 19064.

India, Sri Lanka, Burma, east to W. China, Malaya.

Note : Chakravarty (l.c.) is in error in citing Rottler s.n. (K) as the type of this species.

MELOTHRIA L. Sp. Pl. : 35. 1753, et Gen. Pl. ed. 5 : 440. 1754.

T. : *M. pendula* L.

Solena Lour. Fl. Cochinch. : 514. 1790. (*Cucumis maderaspatana* L.).

T. : *S. heterophylla* Lour.

Mukia Arn. Madras J. Lit. Soc. : 50. 1840, et Hook. Journ. Bot. 3 : 271. 1841.

T. : *Mukia scabrella* (L. f.) Arn. (*Bryonia scabrella* L. f.).

Note : C. Jeffrey (Kew Bull. 3 : 343. 1962, et Kew Bull. 24 : 789-809. 1980) treats *Melothria* L., *Solena* Lour. and *Mukia* Arn. as generically distinct and considers *Melothria* L. as a genus restricted to America. But Chakravarty (l.c., 1982) Panigrahi and Mishra (J. Econ. Tax. 5 : 415-417. 1984) consider the presence of dithecous stamens in some species as not a constant feature. They reduce *Solena* Lour. and *Mukia* Arn. as congeneric synonyms of *Melothria* L.

- | | |
|-------------------------|-------------------------|
| 1a. Plants monococcious | <i>M. maderaspatana</i> |
| 1b. Plants dioecious | <i>M. heterophylla</i> |

Melothria maderaspatana (L.) Cogn. in DC. Monogr. Phan. 3 : 623. 1881; Chakravarty in Rec. bot. Surv. Ind. 17 : 141. 1959, et Fl. India Fasc.

11 : 83. 1982. *Cucumis maderaspata na* L. Sp. Pl. : 1012. 1753. *Bryonia scabrella* L. f. Suppl. Pl. 424. 1782. *Mukia scabrella* (L. f.) Arn. in Hook. Lond. Jour. Bot. 3 : 276. 1841. *Mukia maderaspata na* (L.) M. J. Roem., Fam. Syn. Monogr. 2 : 47. 1846; Haines, Botany 2 : 408.

Annual, scabrous climbers; tendrils simple. Leaves 3-7-angular, broadly ovate-reniform, rough hispid beneath, serrated, deeply cordate, 2.6(-10) cm across. Flowers yellow, male and female clustered, hispid, lobes subulate; corolla 0.5-0.6 cm across, lobes ovate-rounded hairy; stamens 3, inserted low in the calyx-tube; ovary very hispid. Fruits scarlet red, ovoid-globose; seeds rough on their faces.

LT. : t. 170, fig. 2, *Cucumis maderaspatensis fructo minimo* Pluck. Phytoogr. 3 : 1692 (vide Mecuse, 1962).

Fl. & Frt. : July-Dec.

Common along road sides, waste places, on hedges, at the edges of forests.

Keonchi : 13295A ; Pasarkhet ; 19406 ; Kaighora : 3975.

Africa, India, east to China, Malaysia, Australia, New Zealand.

The plant is having medicinal properties.

Melothria heterophylla (Lour.) Cogn. in DC. Monog. Pham. 3 : 618. 1881; Haines, Botany 2 : 407; Chakravarty, Fl. India Fasc. 11 : 79. 1982. *Solena heterophylla* Lour. Fl. Cochinch. 1 : 514. 1790; Hara et al. Enum. 2 : 180. 1979. *Zehneria umbellata* (Arn.) Thw., Enum. 125. 1859; C. B. Clarke in Hook. f. FBI 2 : 625. 1879, *pro. part.*

Perennial, glabrous climbers; tendrils, simple. Leaves cordate or hastate, rounded, angled, lobed or 3-5-partite nearly to base, scabrid above, glabrous, gland-punctate on lower surface, base emarginate, 4-15 × 2-8 cm. Male flowers articulate in corymbose racemes and usually with a solitary female flower from same axil; calyx-tube campanulate, 5 mm long, lobes subulate; corolla lobes spreading, triangular, glandular pubescent, 1.3-1.5 (-3) mm long. Fruits 3-6 cm long, ellipsoid, angular or ribbed, scarlet with red pulp.

Type : Cochinchina (Vietnam), *Loureiro s.n.* (BM).

Fl. : Apr.-Oct. *Frt.* : May-June.

Common along roads, forest clearings, hedges.

Lamni : 19258; Achanakmar : 19292.

Afghanistan, India, Sri Lanka, Burma, Indo-China, S. W. China, Malaysia, Australia.

Note : According to Jeffrey (1980), *Melothria heterophylla* (Lour.) Cogn. is conspecific with *Solena amplexicaulis* (Lam.) Gandhi (*Bryonia amplexicaulis* Lam. 1783), *M. amplexicaulis* (Lam.), Cogn.

The roots are considered as stimulant and purgative and used in gonorrhoea and spermatorrhoea.

TRICHOSANTHES L., Sp. Pl. : 1008. 1753. & Gen. Pl. ed. 5 : 439. 1754.

LT. : *T. anguina* L., vide M. L. Green Prop. Brit. Bot. 190. 1929

T. anguina L. (*Chichinda*) and *T. dioica* Roxb. (*Parwal*) are commonly cultivated.

Trichosanthes cucumeriana L., Sp. Pl. : 1008. 1753 ; Haines, Botany 2 : 405 ; Chakravarty in Fl. India Fasc. 11 : 112. 1982.

Annual, slender, rather succulent climbers; tendrils 2-5-fid. Leaves cordate, subreniform, 5-lobed or—angular, sometime 3- or 7-angular, dentate, 5-20 cm across. Flowers white, males and females from same axils, males in ebracteate racemes or bracts minute; females solitary; calyx-tube dilated at apex, 2.5 cm long, glandular hairy, lobes erect, lanceolate; corolla 8 cm long. Fruits 2.5-7.5 cm long ovoid-conical, green with white stripes when young, turning red on ripe.

Holotype : Rheed, Hort. Malab. 8 : 39. t. 15.. 1688 *Pada Valam* vide N. C. Majumdar & D. N. Guha Bakshi in Taxon 28(4) : 344. 1979 et C. Jeffrey op. cit. (1980).

Fl. : July-Dec. Frt. : Sept.-Jan.

Climbing over walls, road side bushes.

Ratanpur : 19500; Bilaspur : 19527.

India, Sri Lanka, Malaysia, N. Australia.

BEGONIACEAE

C. A. Agardh, Aphor. Bot. 200. 1825.

T. : *Begonia* L.

BEGONIA L. Sp. Pl. : 1056. 1753 & Gen. Pl. ed. 5 : 475. 1754.

T. : *B. obliqua* L.

Begonia picta Sm., Exot. Bot. 2 : 81. t. 101. 1805; Haines, Botany 2 : 418; Ghazanfar and Aziz, Fl. West Pakistan No. 96 : 1. f. 1A-E. 1976.

Perennial herbs; root-stocks tuberous. Leaves 1-3 on each stem, ovate-acuminate, cordate, doubly finely serrate, pilose above, villous on veins beneath, 3-20 × 2.20 cm. Flowers monoecious, reddish, mostly in terminal or axillary, dichasial cymes and usually bilateral; male perianth of 2 outer valvate, opposite, petaloid tepals and 2 smaller, inner ones; stamens many, connate at base; female perianths of 5 tepals, outer larger, pubescent. Capsules 3-celled, triquetrous, angles produced into three unequal, papery wings, about 2.5 cm long, usually pubescent.

Fl. : Aug.-Oct. Frt. : Sept.-Jan.

Commonly found on shaded moist, stony slopes.

Madai to Korba : 12919.

India, Nepal.

CACTACEAE

Juss. Gen. Pl. : 310. 1789 (Cacti)

T. : *Cactus* L. (= *Mammillaria* Haw., nom. cons.)

OPUNTIA P. Mill. Gard. Dict. Abr. ed. 4. 1754.

L.T. : *O. vulgaris* P. Mill. (*Cactus opuntia* L.), vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2.2 : 571. 1913.

Opuntia elatior P. Mill., Gard. Dict. ed. 8. n. 4. 1768; Babu, Herb. Fl. Dehra Dun : 207. 1977. *O. dilectii* auct. pl., non (Ker-Gawler) Haw. 1819; Haines, Botany 2 : 421. (Nag-phani)

Large straggling, succulent shrubs with limbs (internode-like portions between articulations) much compressed, ovate-oblong, faintly ribbed by slightly raised lines joining the areoles, somewhat glaucous. Areoles with 2-5 strong, divaricate, tawny, pale yellow or purplish black spines. Young leaves subulate, fleshy, seated on a swollen, fleshy base. Flowers solitary, yellow, soon becoming tinged with purple; outer tepals sepaloid, inner numerous, petaloid; stamens many, inserted on cupular or saucer-shaped hypanthium, purple. Berries obovoid, red, marked with areoles but bristles and spines deciduous.

Fl. & Frt. : May-Oct.

Common in waste places, forest clearings.

Bilaspur : 13355

An American plant, naturalized throughout India (Murti, 1975).

MOLLUGINACEAE

Hutchinson, Fam. Fl. Pl. 1 : 128. 1926.

T. : *Mollugo* L.

- 1a. Prostrate, stellately hairy herbs; leaves opposite; flowers in axillary fascicles; stamens 5-10; staminodes present; stigmas 5; capsules shorter than sepals; seeds strophiolate

GLINUS

- 1b. Erect or suberect herbs, not stellately hairy; leaves pseudo-vermicillate, alternate or basal; flowers in terminal cymes; stamens usually 3, rarely 5, staminodes usually absent; stigmas 3; capsules as long as sepals; seeds not strophiolate

MOLLUGO

GLINUS L. Sp. Pl. : 463. 1753 & Gen. Pl. ed. 5. 208. 1754.

T. : *G. lotoides* L.

- 1a. Leaves orbicular to obovate and spatulate; flowers sessile or subsessile, sepals densely hairy; capsules oblong; appendages of seeds a membranous scale from which proceeds a linear bristle that curls half round seeds

G. lotoides

- 1b. Leaves oblanceolate, rarely orbicular; flowers long pedicelled; pedicels filiform; sepals glabrous; capsules ellipsoid; appendages of seeds a minute short, subulate bristle, not curling round seeds

G. oppositifolius

Glinus lotoides L., Sp. Pl. : 463. 1753; Nasir, Fl. West Pakistan No. 40 : 1, f. 1A-D 1979. *Mollugo hirta* Thunb., Fl. Cap. 120. 1794; C. B. Clarke in Hook. f. FBI 2 : 662. 1879. *M. lotoides* (L.) O. Ktze., Rev. Gen. Pl. 264. 1891; Haines, Botany 1 : 50.

Annual herbs. Leaves opposite, subverticillate: base more or less cuneate, 1.2 (-3) × 0.8-1.5 (-2) cm. Flowers green, 3-8 together; tepals 4-4.5 mm long, elongating upto 7 mm in fruits, persistent, ovate to ovate-oblong, acute. Capsules subglobose or oblong, about 6 mm long, membranous, enclosed in tepals. Seeds many, tuberculate, strophiolate.

Type : Described from Sicily and Spain, Herb. Linn. 631. 1 (LINN).

Fl. & Fr. : Feb.-July.

Common in waste places, cultivated fields, in sandy ditches along roads.

Korba : 8609; Keonchi to Lamni : 15392; Pasan : 19113.

Throughout the tropics.

The plant is credited with medicinal properties. The tender shoots and leaves are used as pot herb.

G. oppositifolius (L.) A. DC. in Bull. Herb. Boiss., Ser. 2. 1 : 559. 1901; *Mollugo oppositifolia* L. Sp. Pl. : 89. 1753. *M. spergula* L. Syst. Nat. ed. 10 : 881. 1759; Haines, Botany 2 : 50.

Herbs with branches from the base. Leaves pseudo-whorls, more rarely opposite, 1.5-2.5 × 1-1.5 cm. Flowers greenish or white; pedicels 0.9-1.2 cm long; tepals oblong, margins often membranous, 0.8-1.2 cm long; stamens 5-10. Seed many, covered with raised tubercles.

Fl. & Fr. : May-July.

Common in waste places around ponds, cultivated fields.

Lamni : 15396, 19212; Pali : 8582.

Common throughout the tropics.

MOLLUCO L. Sp. Pl. : 89. 1753 & Gen. Pl. ed. 5 : 39. 1754.

LT. : *M. verticillata* L., vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. 2 : 35. 1913.

Mollugo pentaphylla L. Sp. Pl. : 89. 1753; Sivarajan and Usha. Taxon 32 : 123. 1983. *M. stricta* sensu Clarke in Hook f. Fl. Brit. Ind. 2 : 663. 1879 pp., sensu Haines; Bot. 2 : 49 pp. non L. (1762).

Annual herbs. Leaves elliptic lanceolate, acute to obovate, obtuse, much narrowed at base, 1-5 × 0.3-1 cm. Cymes compound, branches sometimes racemed; flowers greenish-white; tepals obovate-oblong, white margined, patent during anthesis, connivent in fruiting, 0.17-0.2 cm long; filaments dilated. Capsules globose, oblong, terete, loculicidally 3-valved, 0.2 cm long, 12-15-seeded; seeds dark chestnut coloured; seed-coat granulate.

Type : Herm. Herb. 3 : 23. et 4 : 47 (BM).

Fl. & Fr. : Mar.-Nov.

Common in grassy localities, along roads, waste places, along rivers.

Pasan : 13285; Marwahi to Parasi : 19034; Pasarkhet : 19385, 19444.

India, east to China, Japan, Malaysia, Australia

The plant is medicinally used and the leaves as pot-herb.

Note : *Mollugo stricta* L. Sp. Pl. 2 : 131. 1762. differs from *M. pentaphylla* L. Sp. Pl. : 89. 1753 (see Sivarajan et al., l.c. figs. 1-10) as :

- 1a. Lower leaves obovate-obtuse; tepals white without a broad green middle band, vascularised throughout the length; seeds arculate

M. pentaphylla

- 1b. Lower leaves linear-lanceolate; tepals greenish with a broad green middle band, vascularised only about 2/3 of the length; seeds tuberculate

M. stricta

APIACEAE

Lindl. Nat. Syst. Bot. ed. 2 : 21. 1836.
(*Umbelliferae* Juss. Gen. : 218. 1789. *nom. alt.*).

T. : *Apium* L.

A feature of the *Apiaceae* is the relative uniformity in inflorescences, flowers and basic fruit structures. This places considerable constraints on the characters available for providing a satisfactory classification above the level of the species. Despite this general uniformity, there is considerable variations in vegetative characters, as well as in the details of fruit morphology and anatomy.

Anethum graveolens L. (*Sowa*), *Daucus carota* L. (*Gajar*), *Foeniculum vulgare* Mill. (*Saunf*), *Coriandrum sativum* L. (*Dhania*) and *Cuminum cyminum* L. (*Jeera*) are cultivated in the district.

- | | |
|--|-------------------|
| 1a. Leaves orbicular, undivided; umbels simple | <i>Centella</i> |
| 1b. Leave 3-5-partite; umbels compound. | |
| 2a. Fruits narrowest at commissure, laterally compressed | <i>Pimpinella</i> |
| 2b. Fruits widest at commissure, dorsally compressed | <i>Peucedanum</i> |

CENTELLA L. Pl. Afr. Rar. : 28. 1760; Sp. Pl. ed. 2 : 1393. 1763;
Gen. Pl. ed. 6 : 485. 1764.

LT. : *C. villosa* L., vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2.2 : 651. 1913.

Centella asiatica (L.) Urban in Mart. Fl. Brass. 11 : 287. t. 78. 1879; Nasir, Fl. West Pakistan No. 20; 10. f. 2A-C. 1972. *Hydrocotyle asiatica* L. Sp. Pl. : 234. 1753; Haines, Botany 2 : 423. (*Brahmi*, *Thalakudi*).

Creeping herbs with perennial root stock; rooting at nodes. Leaves orbicular-reniform, entire, crenate or lobulate, long-petiolated. Inflorescences glabrate to finely arachnoid; involucle of 2 ovate bracts, embracing flowers; umbels 3-6-flowered, flowers very small, deep red; sepals minute or absent; petals obtuse, imbricate; stamens red. Fruits laterally compressed, ovate to orbicular, 2-3 mm long, pericarp much thickened, primary and secondary ridges distinct, commissures narrow. Seeds compressed laterally.

Fl. & Frt. : July-Jan.

Common in wet places, near nadas, ponds.

Lamni : 13243; Pasan : 15295; Kaburcharbutra to Amarkantak : 19164.

Widespread in tropical and subtropical regions throughout the world.

Plant is important medicinally and used in skin diseases and as brain tonic; its leaves are edible.

PEUCEDANUM L. Sp. Pl. : 245. 1753 & Gen. Pl. ed. 5 : 116. 1754.

LT. : *P. officinale* L., vide Hitchcock, Prop. Brit. Bot. 139. 1929.

Peucedanum nagpurensis (C. B. Clarke) Prain, Bengal Pl. 1 : 540. 1903; Haines, Botany 2 : 431; Hara *et al.*, Enum. 2 : 187. 1979. *P. glaucum* DC. var. *nagpurensis* C. B. Clarke in Hook. f. FBI 2 : 710. 1879.

Erect, stout herbs. Leaves twice ternately compound, leaflets on lower leaves very large, upto 15 cm long, ovate, acuminate, strongly serrate, upper lanceolate to linear, uppermost occasionally filiform. Flowers green or yellowish-brown, in compound umbels, rays about 12; sepals truncate, mucronate; petals obovate, emarginate; stamens often 2 only perfect. Fruits narrowed at base, commissure vittae, cocci elliptic-oblong, broadly winged.

Fl. & Frt. : Oct.-Feb.

Commonly found in rock-crevices in shady situations.

Achanakmar : 13224.

Nepal, India.

The roots are medicinal and used as stomachic.

PIMPINELLA L. Sp. Pl. : 263. 1753 & Gen. Pl. ed. 5 : 128. 1754.

LT. : *P. saxifraga* L. vide Hitchcock, Prop. Brit. Bot. 141. 1929.

- | | |
|--|-----------------------|
| 1a. Fruits glabrous; disc absent; carpophores deeply 2-fid | <i>P. heyneana</i> |
| 1b. Fruits pubescent; disc present, carpophores entire or very shortly 2-fid | <i>P. wallichiana</i> |

Pimpinella heyneana (DC.) Kurz, Jour. Asiat. Soc. Beng. 46 : 115. 1877; Haines, Botany 2 : 427. *Helosciadium heyneanum* DC. Prodr. 4 : 106. 1830.

Erect, slender, branched herbs. Leaves 1-2-ternately compound, usually orbicular, deeply serrate, sparsely puberulous, lower caudine 3-partite or twice or thrice 3-partite, ultimate segments ovate or ovate-lanceolate, narrowed at base. Flowers minute, white, in leaf-opposed umbels; rays 4-14, 1-3 cm long, 3-7.5 cm in diam.; calyx-teeth absent or small, lanceolate; petals usually emarginate, ovate, acute or lanceolate, caudate. Fruits didy-

mous, broader than long, glabrous, ridges slender; carpels ellipsoid, almost globose.

Fl. : Oct.-Nov. *Frt.* : Nov.-Jan.

Often found in between rock-boulders in moist shaded situations.

Achanakmar : 13228A ; Kabirchabutra : 13391.

India, Sri Lanka, Burma.

P. wallichiana (Miq.) Gandhi in Saldan. & Nicols., *Fl. Hassan*; 417. 1976. *Helosciadium wallichianum* Miq. *Bot. Zeit.* 7 : 775. 1849. *Pimpinella monoica* Dalz. in Hook. *London Jour. Bot.* 3 : 212. 1851; Haines, *Botany* 2 : 427.

Copiously, corymbosely branched herbs. Lower caudine leaves 3-partite, leaflets long petioluled, cordate, ovate, upper leaves often much reduced, cut into setaceous linear segments. Flowers white, in numerous umbels terminating all the branches; calyx-teeth absent or small lanceolate; petals emarginate, ovate acute or lanceolate-caudate. Fruits terete, subscabrid, subdidymous, ovoid, minutely papillose, compressed; carpels each with 3 distinct primary ridges with 2 vittae between.

Fl. : Oct.-Dec. *Frt.* : Dec.-Jan.

Occasionally found in rock crevices in shaded localities.

Kabirchabutra : 13344.

India.

ARALIACEAE

Juss. *Gen. Pl.* : 217. 1789 ('*Araliae*')

T. : *Aralia* L.

Schefflera stellata (Gaertn.) Harms, growing between rock boulders near Kapildhara at Amarkantak (Shahdol district) is expected around Kabirchabutra. *Tetrapanax papyriferus* (Hook.) K. Koch. is often grown in gardens.

ALANGIACEAE

DC. *Prodri.* 3 : 203. 1828. ('*Alangiaceae*')

T. : *Alangium* Lam. *nom. cons.*

ALANGIUM Lam. *Encycl. Meth. Bot.* 1 : 174. 1783. *nom. cons.*

T. : *A. decapetalum* Lam. (*typ. cons.*).

Alangium salvifolium subsp. *salvifolium* (L. f.) Wangenin in Engl. Pflreich IV. 200 b. (Ht. 41) : 9. 1910; Verdcourt in Fl. Trop. East Afr. 1. 1958. *Grewia salvifolia* L. f. Suppl. Pl. : 409. 1782. *Alangium lamarckii* sensu C. B. Clarke in Hook. f. FBI 2 : 741. 1879, pro. part., non Thw. 1859; Haines, Botany 2 : 437. (Akel).

Small bushy tree; sometimes spinous. Leaves oblong, oblong-lanceolate, 7.5-15 cm long, acute or subobtuse, base unequal, somewhat rounded, pubescent all over when young. Flowers creamy white, scented, in small, close fascicles; peduncles, pedicels and calyx-tubes usually woolly; calyx-limbs minutely 5-10-toothed; petals 5-10, usually 6-7, recurved or revolute, woolly without, 1-2 cm long; stamens 20-30, villous below. Fruits ellipsoid, crowned by calyx, pubescent or finally glabrous, succulent, appearing ribbed when dried, about 1.5 cm across.

Fl. : Mar.-May. Frt. : June-July.

Common along nadas, waste grounds inside mixed forests.

Katghora : 3732; Belghat : 16763; Kota : 8574.

Africa, India, Sri Lanka, Thailand to Vietnam, China.

The root bark is aromatic. Wood is strong and used for agricultural implements. The bark and root are used in jaundice. The fruits are edible.

Note : Although Alangiaceae DC. and Cornaceae Dumort. are both conserved vide App. II, *Angium* Lam. nom. cons. is listed under *Cornaceae* Dumort. in App. III item 6154. ICBN 1983.

RUBIACEAE

Juss. Gen. Pl. : 196. 1789.

T. : *Rubia* L.

Hamelia parens Jacq. and *Mussaenda glabrata* (Hook. f.) Hutch. are commonly cultivated in gardens.

1a. Ovules solitary in each cell

2a. Trees or shrubs

3a. Fruits capsular; styles with 5 linear stigmatic branches, papillose all over

SPERMADICTYON

3b. Fruits baccate or drupaceous; styles simple or 2-branched, not papillose

4a. Corolla-lobes valvate in bud

5a. Ovaries 3-9-locular

MEYNA

5b. Ovaries 2-locular

CANTHIMUM

4b. Corolla-lobes twisted in bud

6a. Leaves thick; bracts coriaceous, not sheathing; styles 2-branched, shorter than corolla-lobes; drupes of two, 1-seeded pyrene

IXORA

6b. Leaves thin; bracts membranous, lower sheathing; styles entire, longer than corolla-lobes; drupes of 1, 2-seeded pyrenes

PAVETTA

2b. Herbs

7a. Climbing scabrid herbs; leaves whorled, exstipulate; fruits indehiscent

RUBIA

7b. Erect herbs; leaves opposite, stipulate; fruits dehiscent or of 2 cocci

8a. Flowers axillary, clustered; stamens inserted on throat or tube of corolla

SPERMACOCE

8b. Flowers corymbose; stamens inserted on mouth of corolla

KNOXIA

1b. Ovules 2 or more in each cell

9a. Flowers collected into dense globose heads

10a. Corolla-lobes imbricate; flowers ebracteolate; ovaries confluent; fruits forming a globose fleshy mass; seeds not winged

ANTHOCEPHALUS

10b. Corolla-lobes valvate; flowers bracteolate; ovaries free or nearly so; fruits free, capsular; seeds winged

11a. Leaves cordate at base; stigmas clavate; calyx-limbs 5-lobed

ADINA

11b. Leaves acute-rounded at base; stigmas mitriform; calyx-limbs entire

MITRAGYNA

9b. Flowers solitary, axillary, fascicled or in cymes, umbels or corymbs, never in globose heads

12a. Corolla-lobes valvate in bud

13a. Trees; inflorescences with 2 foliaceous bracts; seeds winged

HYMENODICTYON

13b. Herbs; inflorescences without foliaceous bracts; seeds not winged

14a. Corolla-lobes toothed; fruits indehiscent

DENTELLA

14b. Corolla-lobes entire; fruits dehiscent

- 15a. Anthers connivent; dehiscent by apical pores; stigmas capitate ARGOSTEMMA
- 15b. Anthers not connivent; dehiscent laterally; stigmas 2-lobed OLDENLANDIA
- 12b. Corolla-lobes twisted in bud
- 16a. Fruits capsules, less than 1 cm in diam.; flowers small, 2-4 mm across, panicled WENDLANDIA
- 16b. Fruits berries or drupes, more than 2 cm in diam.; flowers large showy, solitary, fascicled or in small cymes
- 17a. Stipules amplexicaul; ovaries 1-celled GARDENIA
- 17b. Stipules not amplexicaul; ovaries 2-celled XEROMPHIS

ADINA Salisb. Parad Lond. : 115. 1807.

T. : *A. globiflora* Salisb.

Adina cordifolia (Willd. ex Roxb.) Benth. & Hook. f. ex Brandis, Forest Fl. : 263, t. 33. 1874; Haines, Botany 2 : 441. *Nauclea cordifolia* Willd. ex Roxb., Pl. Corom 1 : 40. t. 53. 1795, et Fl. Ind. 2 : 122. 1824. (*Haldia*, *Kalmi*)

Medium-sized tree. Leaves petioled orbicular, cordate abruptly acuminate, pubescent beneath, coriaceous, 10-20 cm broad; petioles 5-7 cm long, tomentose or glabrescent; stipules orbicular or oblong, enclosing terminal bud at middle, caducous. Peduncles 1-3, 2-7 cm long, axillary; flowers yellow, small in dense heads, 2-3 cm in diam., on globose hairy receptacle; sepals 5, linear; corolla downy, 4-6 mm long. Capsules cuneate, downy, 6-seeded.

Fl. : June-July. Frt. : Feb.-May.

Common in open forests.

Pasan : 13283A; Lamni to Achanakmar : 19262; Korbi : 15329.

India, Nepal, Sri Lanka. Thailand to Vietnam.

ANTHOCEPHALUS A. Rich, in Mem. Fam. Rub. : 157. 1830.

T. : *A. indicus* A. Rich, nom. illeg. [*Cephaelanthus chinensis* Lam., *A. chinensis* (Lam.) Walp.].

Anthocephalus chinensis (Lam.) A. Rich. ex Walp., Rep. 2 : 491. 1843 ; Bakh. f. in Taxon 19 : 469. 1970. *Cephalanthus chinensis* Lam. Encycl. Meth. Bot. 1 : 678. 1785. *Anthocephalus indicus* A. Rich. in Mem. Soc. Hist. Nat. Paris. 5 : 238. 1834, nom. illeg. *Nauclea cadamba* Roxb. Fl. Ind. 2 : 121. 1824. *Anthocephalus cadamba* (Roxb.) Miq. Fl. Ind. Bat. 2 : 135. 1856 ; Haines, Botany 2 : 441. (*Kadamba*)

Large evergreen trees; branches spreading, sub-whorled. Leaves elliptic-oblong, ovate or ovate-cordate, acute, coriaceous, pubescent beneath, 12-25 cm long; petioles 2-5 cm long; stipules narrow lanceolate, caducous, 10-12 mm long. Heads solitary, terminal globose; flowers orange-coloured, sweet smelling; calyx-limbs tubular, 5-lobed, lobes oblanceolate; corolla-tubes funnel-shaped, 5-lobed; stamens on throat of corolla tube, disc of 5 fleshy lobes. Fruits a fleshy globose mass of a few-seeded, coriaceous pyrenes.

Fl. : May-July. *Frt.* : Aug.-Oct.

Occasionally seen along road-sides near villages.

Parasi : 19052.

India, Nepal, Sri Lanka, Burma, Thailand to Vietnam, S. China, Malaysia.

A fast growing tree, its wood is used for planking and boxes. Fruits are edible.

ARGOSTEMMA Wall. in Roxb., Fl. Ind. 2 : 324. 1824.

L.T. : *A. sarmentosum* Wall. (*sarmentosa*), vide Pfeiffer, Nom. 1 : 262. 1873.

Argostemma sarmentosum Wall. in Roxb., Fl. Ind. 2 : 324. 1824 (*sarmentosa*), et Num. List No. 8396B. 1847 ; Hara *et al.*, Enum. 2 : 199. 1979.

Small, delicate herbs, with filiform, long, simple or branched runners from buds below leaves. Leaves sessile or petioled, opposite or 4 in a whorl, orbicular, elliptic, or broadly ovate, obtuse, sparingly pubescent, 2.5-10 cm long. Umbels simple, 1-many-flowered; bracts ovate; flowers white, 4-merous, calyx-tubes hairy; lobes ovate, triangular; corolla-lobes ovate lanceolate, acuminate. Capsules 2-celled, dehiscing at apex by an operculum.

Fl. : July. *Frt.* : Aug.-Sept.

Rare, in moist sandy alluvium near streams in shady situations.

Pasarkhet to Madanpur Phulwaria : 19426.

India, Nepal, Burma.

This is a Himalayan species being recorded from Bilaspur.

CANTHIUM Lam., Encycl. Meth. Bot. 1 : 602. 1785.

LT. : *C. parviflorum* Lam. vide Steudel, Nom. ed. 2. 1 : 275. 1840.

Canthium dicoccum (Gaertn.) Teysmann & Binnendijk. Cat. Hort. Bog. : 113. 1866; Hara *et al.*, Enum. 2 : 200. 1979. *Psydrax dicoccus* Gaertn., Fruct. 1 : 125. t. 26. 1788. *Canthium didymum* Gaertn. f., Fruct. 3 : 94. t. 196. 1806; Haines, Botany 2 : 459.

Medium-sized unarmed, evergreen trees. Leaves ovate-lanceolate or suborbicular, coriaceous, polished above, obtusely caudate-acuminate, base acute, obtuse or cordate, 10-15 cm long. Cymes compressed shortly peduncled, axillary; flowers greenish-white, 5-merous; calyx truncate or obscurely toothed; corolla campanulate, lobes subacute, lanceolate. Fruits globose, ellipsoid or obovoid with 2 oblong nearly terete pyrenes, green when young, turning black when ripe.

Fl. : Feb.-Apr. *Frt.* : May.

Frequently found along the streams, on slopes.

Pasarkhet to Siang : 19413; Katghora : 7117, 8657; Siang : 16828.

India, Nepal, Sri Lanka, China, Southeast Asia.

DENTELLA J.R. & G. Forst. Chart. Gen. : 25. 1776.

T. : *D. repens* J. R. & G. Forst.

Dentella repens J. R. & G. Forst., Chart. Gen. 25. t. 13. 1776; Haines, Botany 2 : 464; Verdcourt, Kew Bull. 37(4) : 543. 1983. *Oldenlandia repens* L., Mant. Pl. : 40. 1767, *nom. illeg. non* Burm. f. 1768.

Straggling herbs, rooting at nodes. Leaves obovate spathulate or elliptic, membranous, ciliate or glabrous. Flowers minute, inconspicuous, solitary axillary in the forks, sessile or pedicelled, white; calyx tubes globose, sepals 5; corolla funnel-shaped, hairy within; lobes 5, 2-3-toothed; styles cleft near to base. Fruits small, dry, globose, 2-celled, indehiscent. Seeds minute, angled.

Type : India. Herb. Linn. 155.2 (LINN).

Fl. & *Frt.* Sept.-Jan.

Khuria : 19340; Pasan : 13272; Pali : 8719; Katghora : 8674.

India, Indo-malaysia, Polynesia.

GARDENIA J. Ellis in Phil. Trans. 51 (2) : 935, t. 23, 1761, *nom. cons.*

T. : *G. jasminoides* J. Ellis

- 1a. Plants with spines ; flowers upto 4 cm in diam., dimorphic ; corolla cylindric or campanulate ; fruits 5-8 cm in diam. with 5-6 placentas ; seed-testa smooth *G. turgida*
- 1b. Plants without spines ; flowers 5-10 cm in diam., not dimorphic ; corolla salver-shaped ; fruits 1.5-5 cm in diam. with 2-5 placentas ; seed-testa rugose.

 - 2a. Leaves 4-6.5 cm long ; calyx-teeth short, ovate or lanceolate, acute ; flowers sessile *G. gummifera*
 - 2b. Leaves 7.5-20 cm long ; calyx-teeth long, lanceolate, acuminate ; flowers peduncled
 - 3a. Leaves elliptic, shortly petioled, veins 20-39 pairs ; calyx-limbs tubular ; fruits with 2 placentas *G. resinifera*
 - 3b. Leaves broadly elliptic or orbicular, attenuate at base to a very short petiole, veins 12-18 pairs ; calyx-limbs campanulate ; fruits with 4-5 placentas *G. latifolia*

Gardenia gummifera L. f., Suppl. Pl. 164, 1782; Haines, Botany 2 : 450.

Shrubs : buds resinous. Leaves sessile or subsessile, acute or obtuse, shining, coriaceous, base obtuse, or cordate ; stipules connate, truncate or mucronate. Flowers axillary, solitary, white ; calyx-limbs tubular, lobes ovate acute ; corolla glabrous or pubescent, lobes 5, oblong obtuse. Fruits 2.5-4 cm across, with a stout beak, ellipsoid or oblong, smooth, placentas 4-5.

Fl. : Mar.-May. *Frt.* : June-Aug.

Common along forest roads, on slopes.

Pasan to Karbi : 19092; Katghora : 3724; Pali : 8587; Pasarkhet : 12972; Achanakmar : 19280.

India.

This species does not extend farther north of Bundelkhand in Uttar Pradesh.

G. latifolia Ait., Hort. Kew. 1 : 294, 1789; Haines, Botany 2 : 452. (*Papra*)

Small trees with whitish smooth bark ; branchlets woody, resinous. Leaves opposite or 3-nate, subsessile, broadly elliptic or orbicular-obtuse,

glabrous or pubescent beneath. Flowers solitary or 2-nate, white, changing to yellow, fragrant; calyx-limbs campanulate, sepals 5-9, subulate-lanceolate, unequal, pubescent; corolla-tubes pubescent or hirsute, petals 5-9, obovate, oblique. Fruits 2.5-5 cm in diam., beaked by calyx-limbs, globose smooth, placentas 4-5.

Fl. : Apr.-May. *Frt.* : Dec.-June.

Common along streams, on slopes, along forest roads.

Pasan : 19127; Khuria : 19309; Katghora : 7107.

India, Burma.

G. resinifera Roth. Nov. Pl. Sp. 150. 1821. *G. lucida* Roxb. Fl. Ind. 2 : 553. 1824; Hook. f. in FBI 3 : 115. 1880; Haines, Botany 2 : 451. (*Dikmali*)

Small trees: branchlets woody, resinous. Leaves short-petioled, elliptic, obtuse or subacute, shining, base narrowed; stipules large, broadly ovate, connate. Flowers solitary axillary, white, turning yellow, fragrant; calyx-tubes oblong, limbs tubular, lobes 5-9, narrow, elongate lanceolate persistent; corolla-tubes glabrous or puberulous, lobes, 5, oblong. Fruits ellipsoid or globose, smooth, crowned with slightly enlarged calyx.

Fl. : Apr.-July. *Frt.* : Apr.-June (of following year).

Common along streams, slopes, edges of the forests.

Khondra : 12811; Marwahi : 19015; Pasan : 15305; Hasdo river banks : 8635.

India, Burma.

It yields a clear yellow resin from bark and leaf-buds. This resin is used, externally as antiseptic and stimulating, internally as carminative, anti-spasmodic and anthelmintic.

G. turgida Roxb., Fl. Ind. 2 : 557. 1824; Haines, Botany 2 : 449. (*Kharhar*; *Safed Phetra*).

Small thorny trees. Leaves elliptic-obovate or orbicular, obtuse, acute or subacute, coriaceous, glabrous pubescent or tomentose beneath, narrowed into a short petiole 2.5-10 cm long; stipules sheathing with triangular, caducous limbs. Male flowers fascicled, female flowers solitary apparently terminal; calyx of male small, mouth wide, truncate, of female longer, limbs shortly campanulate, sepals oblong or sub-spathulate, foliaceous; corolla-tubes sub-cylindric, slightly dilated upwards, petals 1-1.5 cm long, oblong. Fruits ovoid or globose, smooth, not beaked, with 5 placentae.

Fl. : Apr.-May. *Frt.* : June-July (of following year).

Common in dry deciduous forests; frequently seen in secondary forests.

Khondra : 12812; Achanakmar to Kota : 15446; Korba : 8745;
Lamki : 19240.

India, Burma.

The wood is hard and used for agricultural implements.

HYMENODICTYON Wall. in Roxb., Fl. Ind. ed. Carey 2 : 128. 1824,
nom. cons.

T. : *H. excelsum* (Roxb.) Wall. (*typ. cons.*).

Hymenodictyon excelsum (Roxb.) Wall. (*sphalm Wall.*) is treated as *typ. cons.* vide No. 8197 (I.C.B.N., 1983). But *H. orixense* (Roxb.) Mabberley, based on *Cinchona orixensis* Roxb. (1795) is an earlier heterotypic taxonomic species. Whether a proposal to revise the entry in the Code should be submitted, has to be carefully considered.

Hymenodictyon orixense (Roxb.) Mabberley, Taxon 31 (1) : 66. 1982.
Cinchona orixensis Roxb. Bot. Descr. Swietenenia 21. 1793 et Med. Facts Obs. 6 : 152. 1795. *Hymenodictyon excelsum* (Roxb.) Wall. in Roxb., Fl. Ind. 2 : 149. 1824; Hook. f. in FBI 3 : 35. 1880; Haines, Botany 2 : 446. *Cinchona excelsa* Roxb. Pl. Corom. 2 : 3. t. 106. 1799. (*Bhawarmal*).

Deciduous trees with smooth bark. Leaves membranous, ovate-elliptic or orbicular, abruptly acuminate, membranous, ovate elliptic or orbicular, abruptly acuminate, narrowed into a petiole, veins 7-10 pairs, finely pubescent on both surfaces, 10-20 × 6-12 cm; stipules subentire, broad, recurved, usually glandular serrate, not enclosing buds. Panicles large, 7-15 cm long, spreading, compound, pubescent, drooping, subtended by long-petioled, leaf-like bracts; flower small, white or greenish, pedicelled, clustered; calyx tube pubescent, lobes 5-6, ovate or subulate, deciduous; corolla tubular or funnel-shaped, lobes 5. Capsules on thick decurved pedicels, ellipsoid or ovoid loculicidally 2-valved, 1.5-2 cm long.

Fl. : July-Aug. *Frt.* : Jan.

Common in rocky places, edge of the forests.

Achanakmar to Kota : 19298; Khotaghat : 19507.

India, Burma, Thailand to Vietnam, Malaysia.

The tree coppices well. The wood is light and soft and used for making toys; also yields good planks. The inner barks and roots are used in fevers.

Ixora L., Sp. Pl. : 110. 1753 & Gen. Pl. ed. 5 : 48. 1754.

LT. : *I. coccinea* L., vide Hitchcock, Prop. Brit. Bot. 124. 1929.

Ixora arborea Roxb. ex Sm. in Rees. Cycl. 19. No. 5. 1818. *I. parviflora* Vahl, Symb. Bot. 3 : 11. t. 52. 1794. non Lam. 1791; Haines, Botany 2 : 455. (*Lado, Lokhandi*).

Small trees. Leaves subsessile, oblong or elliptic, obtuse, base rounded or cordate, rarely narrowed, coriaceous; petioles very stout. Cymes sessile, bracteate with 3-5 pairs of short branches; flowers in subglobose clusters, white, sessile or pedicelled; lower bracts stipuliform; calyx-teeth short obtuse; corolla glabrous, petals oblong, spreading and reflexed; anthers tailed; styles very pubescent. Fruits small, globose, shining black.

Fl. : Mar.-May. Frt. : May-June.

Common near nallas inside mixed forests.

Madai : 19468 : Kota ; 8572.

India, Sri Lanka, Burma.

Knoxia L., Sp. Pl. : 104. 1753 & Gen. Pl. ed. 5 : 46. 1754.

T. : *K. zeylanica* L.

Knoxia sumatrensis (Retz.) DC. Prodr. 4 : 569. 1830. *Spermacoce sumatrensis* Retz. Obs. Bot. 4 : 23. 1786. *Knoxia corymbosa* auct. pl., non Willd. 1797; Haines, Botany 2 : 473; Hara *et al.*, Enum. 2 : 203. 1979.

Erect, annual, pubescent herbs; internodes long. Leaves petiolated or sessile, linear or ovate-lanceolate or oblong, narrowed into short petiole, 5-12 × 1.5-2.5 cm; stipular bristles hairy. Cymes 3-chotomous, dense, many flowers, pubescent; flowers minute, white or purplish; calyx-teeth minute, triangular, subequal; corolla tubes cylindric, hairy within; stamens exerted, anther pinkish. Fruits spicate, secund, sessile or shortly pedicelled, ellipsoid, 4-angled; ripe fruits detaching from columella by a basal perforation.

Fl. & Frt. : Aug.-Dec.

Common in grassy places, under shade edges of forests.

Madai : 12902; Pasarkhet : 12957.

India, Nepal, China, Malaysia.

Meyna Roxb. ex Link, Jahrb. Gewachsk III, 1 (3) : 32. 1820.

T. : *M. spinosa* Roxb. ex Link.

Meyna spinosa Roxb. ex Link, Jahrb. Gewachsk III, 1 (3) : 32. 1820.

Vangueria spinosa (Roxb. ex Link) Roxb., Fl. Ind. 2 : 172. 1824; Hook. f. in FBI 3 : 136. 1880, *pro. part. excl.* var.; Haines, Botany 2 : 460.

Small trees with straight, opposite simple or 3-nate branches. Leaves elliptic ovate, acuminate, opposite or 3-nately whorled, 7-10 cm long, glabrous or thinly hairy; stipules cuspidate from a broad base. Cymes sessile or shortly peduncled in axils of new leaves; flowers greenish, pedicelled; calyx 5-toothed; corolla-tubes subglobose, lobes triangular, ovate, spreading, mouth densely villous. Drupes subglobose or turbinate, pyrenes 4-5.

Fl. : Apr.-June. Frt. : Dec.-Jan.

Frequently found in the mixed forests.

Achanakmar : 19284.

India, Burma, Malaysia.

The fruits are used as fish-poison.

Mitragyna Korthals, Observ. Naucl. Ind. : 19. 1839, *nom. cons.*

T. : *M. parvifolia* (Roxb.) Korth (*Nauclea parvifolia* Roxb.). (*typ. cons.*).

Mitragyna parvifolia (Roxb.) Korth., Obs. Naucl. Ind. : 19. 1839; Haines, Botany 2 : 442. *Nauclea parvifolia* Roxb., Pl. Corom. 1 : 40 t. 52. 1796. *Stephegyne parvifolia* (Roxb.) Korth. in Verh. Gesch. Nat. Bot. 161. 1840; Hook. f. in FBI 3 : 25. 1880. *Mitragyna parviflora* sensu Gandhi in Fl. Hassan : 581. 1976 [*sphalm. parviflora* (Roxb.) Kunth]. (*Mudhi, Mundl, Kalam*).

Trees; branches silvery grey. Leaves variable, orbicular, oblong, ovate, cordate or broadly elliptic, acute or acuminate, veins oblique, 6-8 pairs; petioles short, 10-15 × 7-10 cm; stipules obovate, keeled. Heads about 2.5 cm in diam., 1-3 together on short lateral axillary branches bearing 2 pale-coloured, linear-oblong leaves at base; flowers creamy-yellow, narrowly funnel-shaped; calyx-limbs cupular or tubular, truncate or 5-toothed; corolla glabrous within, lobes 5, corolla-tubes much exceeding lobes. Capsules ellipsoid, verrucose, or 2 dehiscent cocci.

Fl. : June-July. Frt. : Mar.-Apr. (of following year).

Common in the mixed deciduous forests along roads.

Pasan : 19059; Khondra : 12829; Keonchi : 13258A; Bilaspur to Champa : 19375.

India, Nepal, Sri Lanka.

OLDENLANDIA L., Sp. Pl. : 119. 1753 & Gen. Pl. ed. 5 : 55. 1754.

LT. : *O. corymbosa* L. vide Hitchcock, Prop. Brit. Bot. 125. 1929; etiam vide Bremekamp, Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. ser. 2. 48 (2) : 183. 1952.

- 1a. Leaves elliptic or ovate; capsules 4-angled or winged; seeds globbose or subglobose, deeply coarsely pitted *O. ovatifolia*
- 1b. Leaves narrowly lanceolate; capsules terete; seeds angular, smooth.
 - 2a. Flowers partly axillary and partly terminal panicled cymes; corolla-tubes far longer than sepals; capsules globose *O. affinis*
 - 2b. Flowers axillary, corolla-tubes short or slightly exceeding sepals; capsules didymous
 - 3a. Flowers pedicelled, in 2-4-flowered, peduncled cymes *O. corymbosa*
 - 3b. Flowers sessile, solitary *O. diffusa*

Oldenlandia affinis (Roem. & Schult.) DC., Prodr. 4 : 428. 1830; Verdcourt in Kew Bull. 30 : 293. 1975. *Hedyotis affinis* Roem. & Schult. Syst. 3 : 194. 1819. *Oldenlandia dichotoma* (Koen. ex Roth) Hook. f. in FBI 3 : 67. 1880; Haines, Botany 2 : 470.

Slender, erect, copiously, paniculately branched, glabrous or sparsely hairy, annual herbs; branches terete, filiform; nodes distant. Leaves linear, linear-lanceolate, acute, veinless, 2.5-5 cm long. Peduncles capillary, axillary and in open terminal panicles; flowers minute, bluish, solitary on 1.4 cm long filiform pedicels; calyx-teeth subulate, much shorter than slender corolla-tubes, sepals 4; corolla funnel-shaped, blue, petals 4; stamens inserted in throat of corolla-tubes. Capsules globose, not exceeding hypanthium, loculicidal.

Type : India, Koenig s.n. (B).

Fl. & Fr. : July-Mar.

Frequently found in open, rocky places under shade.

Katghora : 3995; Madai : 12910.

India.

O. corymbosa L., Sp. Pl. : 119. 1753; Haines, Botany 2 : 468; Verdcourt in Kew Bull. 30 : 296. 1975. *Hedyotis corymbosa* (L.) Lam. Encycl. Meth. Bot. 1 : 272. 1792; Hara *et al.*, Enum. 2 : 202. 1979.

Diffused, slender, glabrous or minutely hispidulous annual herbs. Leaves linear or narrowly elliptic-lanceolate, 1.5-4.5 cm long. Cymes 2-4-flowered, axillary, peduncled; flowers pedicelled, minute, white or pale-purple; calyx-lobes ovate-triangular or subulate, shorter than corolla lobes; corolla-lobes obtuse; stamens included. Capsules glabrous, didymous, with a truncate mouth, 2 mm across, loculicidal.

Fl. & Frt. : June-Jan.

Common in sandy alluvium of talas, in cultivated fields, on slopes in moist conditions.

Hasdo river bank : 8634; Katighora : 8716; Bilaspur : 12987; Ratanpur : 16789; Pasarkhet to Siang : 19419; Khondra : 12822.

Africa, India, Sri Lanka.

The decoction of plant is given as a remedy for bilious attacks.

O. diffusa (Willd.) Roxb. Hort. Beng. II. 1814, et Fl. Ind. 1 : 423. 1820; Haines, Botany 2 : 468. *Hedyotis diffusa* Willd. Sp. Pl. 1 : 566. 1798; Hara *et al.*, Enum. 2 : 202. 1979.

Diffused, glabrous, annual herbs; often rooting at nodes. Leaves linear-lanceolate to oblong, acute, margin usually revolute 1.5 cm long; stipules short, laciniate. Flowers solitary, rarely 2 together, axillary, sessile or short-pedicelled, white; calyx-lobes subequal, subulate, shorter than corolla-tube; corolla-lobes ovate, acute; stamens included. Fruits glabrous, subglobose, didymous, 2-4 mm across.

Fl. & Frt. : July-Dec.

Frequently found in grassy places, moist cultivated fields.

Lamni : 15393.

Tropical and subtropical eastern Asia, India, S. China, Japan, Malaysia.

O. ovatifolia (Cav.) DC. Prodr. 4 : 427. 1830. *Hedyotis ovatifolia* Cav. Descr. Pl. Ic. 6 : 52. t. 573. f. 1. 1801; Hara *et al.*, Enum. 2 : 202. 1979. *Oldenlandia nudicaulis* Roth, Nov. Pl. Sp. : 96. 1821; Haines, Botany 2 : 471. *Gonotheca ovatifolia* (Cav.) Sant. & Wagh in Bull. Bot. Surv. Ind. 5 : 107. 1963, non Rafin. 1818, nec Blume ex A. DC. 1830. *Thecagonum ovatifolium* (Cav.) Babu in Bull. Bot. Surv. Ind. 11 : 214. 1969.

Erect, annual herbs; stems furfuraceous or with thick hairs below, naked towards panicles, with 2 leaves below and 4 leaves in a whorl at apex of stems. Leaves broadly elliptic or ovate, obtuse, pubescent on veins beneath, 2-5 cm long. Cymes 5-10 cm long, terminal, long-peduncled, fascicled, much dichotomously branched; flowers small, white; calyx-teeth minute, subulate; corolla-tubes short, hairy within, lobes rotate, oblong. Capsules 4-angled or -winged, loculicidally dehiscent at top, seeds pitted.

Fl. & Fr. : Aug.-Oct.

Common in moist places, open forests etc.

Madai : 12884.

India, Thailand, Laos, Cambodia, Vietnam, Malaysia.

PAVETTA L. Sp. Pl. : 110. 1753 & Gen. Pl. ed. 5 : 49. 1754.

T. : *P. indica* L.

P. indica L. is likely to occur in the district.

Pavetta tomentosa Roxb. ex Sm. in Rees, Cycl. 26. No. 2. 1819. *P. indica* L. var. *tomentosa* (Roxb. ex Sm.) Hook. f. in FBI 3 : 150. 1880; Haines, Botany 2 : 456. *Ixora tomentosa* Roxb. Hort. Beng. 10. 1814. nom. nud. *I. tomentosa* (Roxb. ex Sm.) Roxb. Fl. Ind. 1 : 396. 1820.

Large shrubs or small trees; branchlets pubescent. Leaves elliptic or obovate to oblanceolate, acute, acuminate or caudate, softly pubescent or tomentose, 7-22 cm long; stipules membranous, united into an intrapetiolar sheath. Cymes pubescent or tomentose, in corymbose panicles; flowers pedicelled, white, 1-2 cm long; calyx truncate or with very short triangular teeth; corolla glabrous, petals oblong or oblanceolate, tubes pilose within, twice or thrice as long as lobes; styles far exserted. Fruits globose, black, 3-4 mm in diam., 1-seeded.

Fl. : June-Aug. *Fr.* : Oct.-Jan.

Common on shady slopes, inside mixed deciduous forest, along forest roads.

Keonchi : 13256; Marwahi : 19010; Kabirchabutra : 19187, 19200.

India, Burma, Indo-China.

RUBIA L. Sp. Pl. : 109. 1753 & Gen. Pl. ed. 5. : 47. 1754.

LT. : *R. tinctorum* L. vide Hitchcock, Prop. Brit. Bot. 124. 1929.

Rubia wallichiana Decne. Recher. Garance. 61. 1837; Hara in Fl. E. Himal. 315 & 652. t. 31b. 1966. *R. cordifolia* auct., non L. 1767; Wall. Num. list. No. 6209. 1831-32, pro. part.; Haines, Botany 2 : 474; Deb & Malik in Bull. Bot. Surv. India 10 : 6. 1968, pro. part.

Scandent, climbing, scabrid herbs; stems 4-angled; roots orange-yellow. Leaves 4, in whorls, ovate or ovate-oblong to lanceolate, base rounded or cordate, acute or acuminate, scabrid, 5-7 veins from base, 4-10 × 1.5-5 cm. Cymes many-flowered, panicled, terminal; spreading with opposite, sessile, leafy, cordate bracts; flowers minute, greenish-yellow, umbellate on branches of 3-chotomous cymes; calyx-tubes ovoid or globose; corolla hispid, rotate, lobes lanceolate, tips incurved. Fruits glabrous, didymous or globose, bluish-black, fleshy.

Fl. & Frt. : Oct.- Jan.

Commonly found scrambling over bushes.

Kabirchabutra : 13325, 13394.

Paleotropics.

Hara *et al.* (*l.c.*) recognise two species, *Rubia manjith* Roxb. ex Flem. and *R. wallichiana* Decne. within *R. cordifolia* auct. non L. 1767. While *R. wallichiana* has two chromosomal races viz. $2n=44$ and $2n=132$, *R. manjith* has $2n=66$ and *R. cordifolia* L. with $2n=22$. The three species are distinguished from each other as follows.

R. manjith with leaves 4-nate, long acuminate, midrib hispid, flowers brownish-orange, rotate, 0.2-0.35 cm across; fruits black when ripe, 0.3-0.4 mm across; *R. wallichiana* with leaves in 3-4 whorls, vegetative parts green, flowers larger, greenish-yellow, fruits black; and *R. cordifolia* with leaves in whorls 4-10, flower greenish or yellowish, fruits red. Biosystematic investigations are required to establish interspecific relationships between the three species.

SPERMACOCE L. Sp. Pl. : 102. 1753 & Gen. Pl. ed. 5. : 44. 1754.

LT. : *S. tenuior* L. vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. 3 : 256. 1913.

Borreria G.F.W. Meyer, Prim. Fl. Esseq. : 79. 1818, nom. cons. T. : *Borreria suaveolens* G.F.W. Meyer (typ. cons.).

Although *Borreria* G. F. W. Mey (1818) is nom. cons. against *Borrera* Acharius (1810) and *Tardavel* Adans. (1763), it is not conserved against *Spermacoce* L. (1753). The only difference between *Borreria* and *Spermacoce* rests on one character, viz. whether the fruits dehisce or not, which

cannot be treated sufficient for keeping them distinct. Hook. f. (1881) also treated the two as congeneric and Bremekamp (1934) considered the differences between them as very small, hardly of sufficient importance to justify their generic separation. Therefore, Verdcourt (1975) has argued in favour of merging *Borreria* G.F.W. Mey in *Spermacoce* L., reducing the former as a section, Sect. *Borreria* (G.F.W. Mey) Verdcourt (Kew Bull. 30 : 366, 1975) and transferred all species of *Borreria* in East Africa to *Spermacoce* L.

- 1a. Annual herbs; stems erect; bracteoles exceeding calyx; corolla 0.3 cm long; capsules narrowed at base, dehiscing ventrally without a persistent septum *S. ramanii*
- 1b. Perennial herbs; stems procumbent; bracteoles equaling calyx; corolla 0.8-1.5 cm long; capsules rounded at base, dehiscing ventrally, with a persistent septum *S. articulata*

Spermacoce articulata Linn. f. Suppl. Pl. : 119. 1782; Wall. in Roxb Fl. Ind. 1 : 378. 1820. Sivarajan & R. V. Nair, Taxon 35 : 366, figs. 5-10. 1986. *Borreria articulata* (L.f.) F. N. Williams, Bull. Herb. Boiss. ser. 5.2 : 956. 1905. *Borreria articulata* var. *articulata*; Sivar. & Mani. New Botanist 2 : 88. 1975. *Spermacoce hispida* sensu auct. mult., non L. (1753); Haines, Bot. Bihar & Orissa : 451 (472). 1922; Deb & Dutta, Jour. Econ. Tax. Bot. 5 : 1046. 1984, in part. *Borreria hispida* sensu Gamble, Fl. Pres. Madras : 654. 1921, non (L.) K. Schum. (1891), nec. Spruce ex Schum. (1888).

Prostrate or diffuse scabrid hirsute or hispid herbs; stem 4-angled with long internodes. Leaves scabrid, spatulate oblong or elliptic, obtuse, margins flat, rigidly coriaceous, 1.5-4 cm long. Flowers in axillary clusters of less than 6 flowers, bluish-white; hypanthium narrow, ellipsoid; calyx-teeth linear-lanceolate, hispid; corolla funnel-like, with a ring of hairs just above base of tubes, lobes lanceolate; stigma 2, very short. Capsules pubescent or hispid, obovoid. Seeds oblong, granulate, smooth, testa retinulate.

Type : Based on plants grown in Uppsala Botanic Garden (grown from seeds from 'Indiae orientalis') (Herb. Linn. 125.6-LINN; microf. CAL seen).

Fls. : July-Aug. Frts : Oct.-Dec.

Common in open waste places, near cultivated fields.

Pasan : 13271; Pasarkhet : 16822; Karidongri : 19517; Korba : 8622; Katghora : 6039; Pasan to Korbi : 19079.

India, Nepal, Sri Lanka, east to China, Malaysia.

Spermacoce ramanii Sivarajan and R. V. Nair, Taxon 35 : 367, figs. 11-18, 1986. *S. stricta* auct. mult., non L.f. (1782); Roxb. Fl. Ind. 1 : 376. 1820; Hook. f. Fl. Brit. India 3 : 200. 1881; pro parte; Haines, Bot. Bihar & Orissa : 450 (472). 1922. *S. pusilla* auct. mult., non Walt. (1820); Deb & Dutta, Journ. Econ. Tax. Bot. 5 : 1057. 1984. *Borreria stricta* auct. non (L.f.) K. Schum. (1891), nec Mayer (1818). *B. pusilla* auct. mult. non (Wall.) DC. (1830), Mani. & Sivar. Fl. Calicut : 136. 1982.

Erect, simple or branched herbs 30-50 cm tall, highly branched stout; stems scabrid on angles. Leaves 10-12 per node elliptic or lanceolate, acute, coriaceous, glabrous or with scabrid veins beneath, narrowed at both ends, sub-sessile, 2-6 cm long, margin not revolute. Heads terminal and axillary, globose many flowered; flowers white, hypanthium pubescent above; calyx hispid or pubescent lobes linear-lanceolate; corolla-lobes ovate, obtuse; stigma 2-lobed. Capsules obovoid, hispidly hairy at top, glabrous below. Seeds linear-oblong, polished.

Type : India, Kerala, Calicut University Campus, common in grass lands along lateritic slopes, 50 m, Sivarajan 625 (Holo.-MH; iso-CAL).

Fl. : July-Aug. Frt. : Oct.-Dec.

Common in waste lands, near nala-bank and open places.

Lamni : 13246; Pasan : 13270.

Africa, India, Nepal, Sri Lanka.

SPERMADICTYON Roxb. Pl. Corom. 3 : 32. 1815.

T. : *S. suaveolens* Roxb.

Spermadictyon suaveolens Roxb. Pl. Corom. 3 : 32. t. 236. 1815. *Hamilzonia suaveolens* Roxb. (Hort. Beng. 15. 1814, nom. nud.) Fl. Ind. 2 : 223. 1824; Haines, Botany 2 : 463.

Hispid or glabrate shrubs. Leaves opposite, elliptic-lanceolate or ovate, acute, glabrous or pubescent, 10-22 × 3.5-7 cm. Flowers in sub-globose heads, copiously produced in terminal, 3-branching, pubescent panicled or sub-umbellate cymes, fragrant, sessile or pedicelled, white or lilac; bracts and bracteoles glandular-hairy; sepals 4-5, subulate, glandular-hairy; corolla-tubes pubescent or woolly, 1-1.5 cm long, petals 4-5; stamens inserted in throats; ovaries 5-furrowed, almost free from hypanthium. Capsules ellipsoid, 1-celled, 5-valved at top.

Fl. : Aug.-Jan. Frt. : May-June.

Common on rocky slopes along forest-roads.

Achanakmar : 13229A ; Kabirchabutra 15271.
India.

The roots are used in diarrhoea and Cholera.

WENDLANDIA Bartl. ex DC. Prodr. 4 : 411. 1830. *nom. cons.*

T. *W. paniculata* (Roxb.) DC. (*Rondeletia paniculata* Roxb.). (*typ. cons.*).

Wendlandia exserta (Roxb.) DC. Prodr. 4 : 411. 1830; Haines, Botany 2 : 446; Cowan in Notes Roy. Bot. Gard. Edinb. 16 : 249. t. 233. f. 2. 1932. *Rondeletia exserta* Roxb. (Hort. Beng. 14. 1814, *nom. nud.*) Fl. Ind. 2 : 135. 1824. (*Tilwan, Tiwasi*)

Large evergreen shrubs or small trees; branches hoary or pubescent. Leaves opposite, ovate-lanceolate or oblong, acuminate, coriaceous, 10-20 × 2.5-6 cm; stipules ovate or broadly oblong, acute, recurved, persistent. Cymes terminal, dense, panicled; panicles sessile, pyramidal, 7-15 cm long, lower branches sometimes axillary; bracts rhomboid-lanceolate, 2-4 mm long, each subtending a subsessile cyme of about 3 flowers; flowers white, fragrant, sessile; calyx hairy, lobes ovate or subulate; corolla-tubes shorter than lobes, broad, veined, throats glabrous or hairy; anthers much exserted; stigma 2-partite. Capsules globose, white, tomentose, loculically dehiscent.

Fl. : Mar.-Apr. Frt. : Apr.-May

Occasionally found in the mixed dry deciduous forests.

Pali : 8589.

India, Nepal, Sri Lanka.

A fast-growing tree; ornamental. The wood is tough and used for agricultural implements, house posts.

XEROMPHIS Rafin. Sylv. Tellur 21. 1838.

T. : *X. retzii* Rafin., *nom. illeg.* (*Gardenia dumetorum* Retz.).

- 1a. Leaves obovate, 2.5-7 cm long; stipules ovate, acuminate; spines axillary, opposite or alternate; corolla hairy externally; fruits less than 5 cm across *X. spinosa*
- 1b. Leaves oblong or elliptic, 7.5-20 cm long; stipules triangular; spines in 1-2 pairs at end of arrested branchlets; corolla glabrous externally; fruits 5-7 cm across *X. uliginosa*

Xeromphis spinosa (Thunb.) Keay in Bull. Jard. Bot. Brux. 28 : 37. 1958. *Gardenia spinosa* Thunb. Diss. Gard. No. 7. t. 2. f. 4. 1780. *G. dumetorum* Retz.

torum Retz. Obs. Bot. 2 : 14. 1781. *Randia dumetorum* (Retz.) Poir. in Lam. Encycl. Meth. Bot. 2 : 829. 1812; Haines, Botany 2 : 453. *Catunaregam spinosa* (Thunb.) Tirvengadam in Taxon 27 : 515. 1978. (*Mainhar, Mainphal*).

Thorny shrubs or trees. Leaves mostly clustered on short branchlets, obovate to oblanceolate, obtuse or shortly acuminate, base narrowed into a short petiole, glabrous or pubescent. Flowers solitary or rarely 2-3 on a peduncle, subsessile, creamy-yellow or white; calyx-tubes strigose; sepals ovate or ovate-lanceolate; corolla campanulate, lobes broad, reflexed. Berries globose or ovoid, smooth or obscurely ribbed, yellow, glabrous or pubescent, crowned by calyx-tubes; 2-4 cm across.

Type : Macao, South China, J. B. Bladh s.n. (BM).

Fl. : Apr.-June. Frt. : Aug.-Jan.

Common in the mixed forests, plains, valleys.

Keonchi : 13259; Pasan; 19085; Kabirchabutra : 19198.

India, Sri Lanka, Burma, Indo-China, S. China, Malaysia.

Fruits are cooked and used as vegetables.

X. uliginosa (Retz.) Maheshwari in Bull. Bot. Surv. Ind. 3 : 92. 1961.

Gardenia uliginosa Retz. Obs. Bot. 2 : 14. 1781. *Randia uliginosa* (Retz.) DC. Prodr. 4 : 386. 1830; Haines, Botany 2 : 452. (*Thelkao, Kala phetra, Mainphal*).

Thorny shrubs or trees; branchlets black; sometimes unarmed. Leaves oblong or elliptic, obtuse, clustered at ends of branchlets. Flowers solitary, white, often dimorphic; calyx-tubes terete, lobes rounded; corolla-tubes campanulate, not much exceeding calyx and a ring of hairs within or glabrous in small forms, petals orbicular; stigmas 2-lobed in sessile flowers, entire in peduncled ones. Berries ellipsoid, crowned with calyx tubes; 5-7 cm across.

Type : India, Koenig s.n. (B).

Fl. : May-July. Frt. : Dec.-Feb.

Common in the mixed forests, plains, valleys.

Korba : 12852; Achanakmar : 19285; Kota : 15447.

India, Burma, Nepal, Thailand to Vietnam.

Note : Although Tirvengadam (Taxon 27 : 513-517. 1978) treated *Catunaregam* Wolf (Gen. Pl. Vocab. Char. Def. : 75. 1776) congeneric with *Xeromphis* Rafin. (1838), he treated *X. uliginosa* (Retz.) Maheshwari as an excluded species and made the combination, *Catunaregam*

spinosa (Thunb.) Tirvengadum (*Gardenia spinosa* Thunb. 1730). Again, he (in Bull. Mus. Natn. Hist. nat. Paris 3 e, 521, Bot. 35 : 15. 1978) established *Ceriscoides* (Hook. f.) Tirvengadum and transferred to it *Gardenia turgida* Roxb. (1824) as *Ceriscoides turgida* (Roxb.) Tirvengadum, and lastly, Tirvengadum and Sastre (in Mauritius Inst. Bull. 8 : 85. 1979) proposed *Tamilnadia* Tirvengadum & Sastre and transferred to it *Gartenia uliginosa* Retz. (1781) as *Tamilnadia uliginosa* (Retz.) Tirvengadum & Sastre.

The three genera representing armed trees or scandent shrubs are diagnosed from each other and from *Gardenia* Ellis, as set out below:

- 1a. Unarmed trees/shrubs; flowers solitary or in pairs; berries 2.5 to 5.0 cm across *Gardenia*
- 1b. Armed trees or scandent shrubs
 - 2a. Leaves 20-25 cm long; berries ovoid *Tamilnadia*
 - 2b. Leaves upto 8 cm long; berries globose
 - 3a. Trees dimorphic; ovary 1-celled *Ceriscoides*
 - 3b. Scandent shrubs; flowers not dimorphic; ovary 2-celled *Calunaregam*

These information were available too late for recasting the key to the genera of the Rubiaceae and are presented here for updating the taxonomy of the genera involved.

ASTERACEAE

Dumort. Comment. Bot. 55. 1822. (*Astereae*), (Compositae Giseke, Praed. Ord. Nat. Pl. : 538. 1792. *nom. alt.*).

T. : *Aster* L.

Aster amellus L., *Calendula officinalis* L., *Chrysanthemum indicum* L., *Dahlia pinnata* Cav., *Helianthus annuus* L., *Tagetes erecta* L. and *Zinnia elegans* Jacq. are commonly cultivated in the gardens. Further, *Launea nudicaulis* Hook. f., a wide spread species in the tropics, is likely to occur in the area. (Fig. 13)

- 1a. Florets all ligulate; herbs with usually milky-juice
- 2a. Stout, fistular herbs; leafy throughout; leaves spinulose-serrate; achenes not beaked, compressed *SONCHUS*
 - 2b. Slender herbs; leaves all radical, toothed or pinnatifid; achenes beaked, fusiform or oblong *YOUNGIA*
 - 1b. Florets all tubular or ray florets ligulate and disc-florets tubular; juice not milky

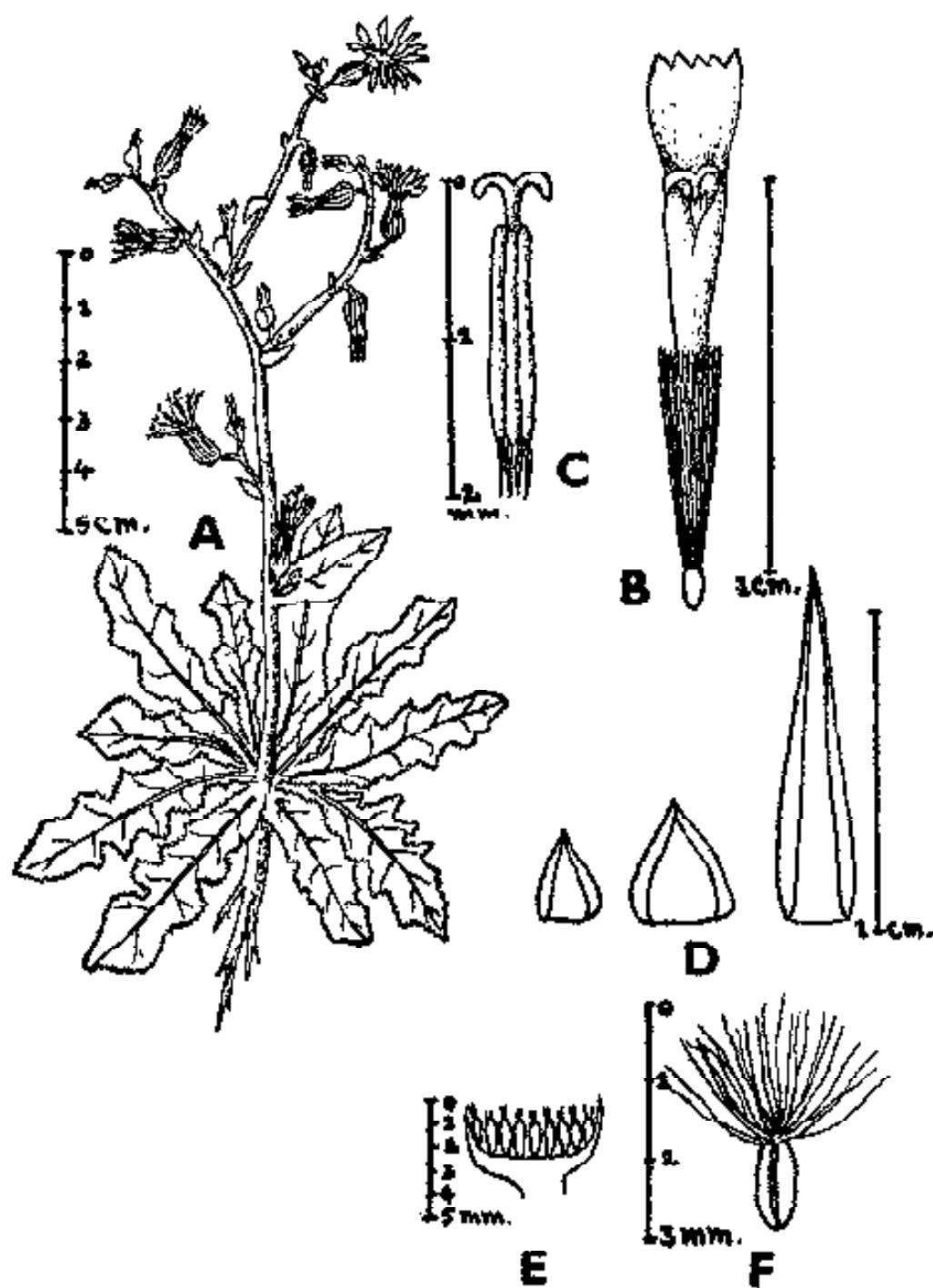


Fig. 13. *Launaea nudicaulis* Hook. f.

A. Habit. B. Ray floret. C. Syngenesia anthers and protruding stigma. D. Bracts and bracteoles. E. L.S. capitulum (diagram). F. Fruit with pappus.

3a. Florets all tubular

4a. Florets all similar

5a. Receptacles densely bristly; leaves or involucral bracts often spinous or cottony

6a. Florets purple; heads heterogamous; pappus of unequal, scaberulous bristles; achenes terete

AMMERBOA

6b. Florets orange-red; heads usually homogamous; pappus absent; achenes ovoid, 4-angled

CARTHAMUS

5b. Receptacles neither paleaceous, nor bristly; leaves never spinose

7a. Heads with 1-a few-florets aggregated into compound heads

8a. Leaves alternate; heads sessile, in axils of dilated leaf-sheaths; involucral bracts 2, keeled or winged, anther-bases sagittate, tails branched; pappus absent

CAESULIA

8b. Leaves mostly radical, a few alternate; heads peduncled and collected into a dense terminal cluster; involucral bracts 8, alternately flat and conduplicate; anther-bases obtuse; pappus of bristles present

ELEPHANTOPUS.

7b. Heads with many-florets, simple

9a. Involucral bracts 1-2 seriate

10a. Involucral bracts 2-seriate; heads bracteolate at their bases; flowers yellow; style-arms appendaged; leaves alternate; achenes narrow, many ribbed

CRASSOCERPHALUM

10b. Involucral bracts 1-seriate; heads without bracteoles at their bases; flowers purple or pink; style-arms without an appendage; leaves radical, a few cauline and stem-clasping; achenes sub-terete or angled, 5-ribbed

EMILIA.

9b. Involucral bracts many-seriate

11a. Leaves opposite or only upper alternate

12a. Flowers white; pappus of 2-3 glandular knobs; heads in corymbs; achenes 5-ribbed

ADENOSTEMMA

- 12b. Flowers blue; pappus of 5 scales,
heads in paniculate corymbs, achenes
5-angled AGERATUM
- 11b. Leaves alternate
- 13a. Involucral bracts with foliaceous
upper parts CENTRATHERUM
- 13b. Involucral bracts without foliaceous
upper parts VERNONIA
- 4b. Florets not all similar, outer female, filiform, usually
2-3-toothed, inner bisexual, stouter, usually 5-toothed
- 14a. Pappus absent or minute, insignificant and cupular
- 15a. Stems and peduncles winged; anther-bases
tailed; style-arms linear, filiform SPHAERANTHUS
- 15b. Stems and peduncles not winged; anther-bases
sub-entire; style-arms short, flattened, truncate
- 16a. Leaves simple, achenes 4-angled CENTRIPIDA
- 16b. Leaves pinnatifid; achenes compressed
- 17a. Receptacles conic or convex; pappus
present; anther-bases obtuse GRANGEA
- 17b. Receptacles elongate; pappus
absent; anther-bases truncate
- 18a. Receptacle-tops flat; achenes
with a thickened margin; co-
rolla of female flowers reddish,
of bisexual flowers yellow DICROCEPHALA
- 18b. Receptacle-top convex; achenes
without a thickened margin;
corolla rose-purple CYATHOCLINE
- 14b. Pappus prominent, of hairs or bristles
- 19a. Anther-base tailed with a basal filiform
appendage
- 20a. Involucral bracts scarious or hyaline;
style-arms truncate, plants white woolly GNAPHALIUM
- 20b. Involucral bracts not scarious; style-
arms long, semi-terete, acuminate;
plants not white woolly BLUMEA
- 19b. Anther-bases entire or sagittate, not tailed
- 21a. Stems winged with decurrent leaf-bases,
the latter cordate, amplexicaul LAGGERA
- 21b. Stems not winged, leaf base cuneate,
narrowed

- 22a. Style-arms flattened, bearing stigmatic surface in two conspicuous marginal lines above which is a short or elongated more or less conical tip with brush hairs or papillae CONYZA
- 22b. Style-arms semiterete, acuminate, stigmatic on their inner surfaces, with brush hairs on their outer surfaces and extending to below fork BLUMEOPSIS
- 3b. Flowers not all tubular, ray-florets ligulate, disc-florets tubular
- 23a. Receptacles naked, not paleaceous
- 24a. Head solitary; achenes usually ribbed; pappus double, outer row of scales, inner of hairs PULICARIA
- 24b. Heads corymbose or panicled; achenes terete; pappus of ray-florets scanty or absent, of disc-florets of a few slender hairs VICOA
- 23b. Receptacles paleaceous
- 25a. Male and female heads separate XANTHIUM
- 25b. Male and female heads not separate
- 26a. Heads 1-flowered LAGASCEA
- 26b. Heads many-flowered
- 27a. Achenes spinous with 2 long horns at tip ACANTHOSPERMUM
- 27b. Achenes not spinous
- 28a. Leaves alternate
- 29a. Ligules of ray florets 2-fid; limbs of disc-florets 4-fid; pappus of 2 smooth, stiff awns GLOSSOCARDIA
- 29b. Ligules of ray-florets entire or 2-toothed; limbs of disc-florets 5-fid; pappus a minute rim CHRYSANTHELLUM
- 28b. Leaves opposite or upper only alternate
- 30a. Leaves pinnatifid or 1-2-pinnate
- 31a. Involucral bracts free; pappus bristles plumose; achenes turbinate or oblong, silky TRIDAX

31b. Involucral bracts connate at base; pappus bristles retrorsely barbellate; achenes 4-gonous or dorsally compressed, linear, not silky

32a. Leaves trifoliate; ligules white or yellowish; achenes not beaked

BIDENS

32b. Leaves pinnatisect; ligules rosy or orange; achenes beaked

COSMOS

30b. Leaves entire or crenate

33a. Inner involucral bracts glandular, clavate, embracing flowers; achenes ovoid, oblong, not compressed

SIEGESBECKIA

33b. Inner involucral bracts not glandular, nor embracing flowers; achenes laterally or dorsally compressed

34a. Receptacle not paleaceous; palea not embracing flowers

ECLIPTA

34b. Receptacle paleaceous; palea embracing flowers

35a. Pappus absent

GUILZOTIA

35b. Pappus present

36a. Receptacles flat; anther-bases obtuse; achenes not ciliate, of bisexual flowers 3-4 angled; style-arms of bisexual flowers with acute or sub-obtuse appendages, ligules filiform, included

BLAINVILLEA

36b. Receptacles raised, conical; anther-bases truncate; achenes usually ciliate, of bisexual flowers laterally compressed; style-arms of bisexual flowers truncate ligules exserted

SPILANTHES

ACANTHOSPERMUM Schrank, Pl. Rar. Hort. Monac. : 53. 1820 (1819)

T. : *A. brasiliense* Schrank

Acanthospermum hispidum DC. Prodr. 5 : 522. 1836; Hara *et al.*,
Enum. 3 : 9. 1982.

Erect or diffused, annual herbs to 40 cm; hispidly hairy. Leaves sessile, or sub-sessile opposite, obovate-spathulate, toothed, palmately veined, 4-10 × 3-6.5 cm. Heads sessile, solitary in forks of dichotomous branches, radiate, greenish-yellow; involucral bracts few, outer ciliate along margins, inner few, globose, tough, papillose without, tubular; receptacles paleaceous; palea enclosing bisexual florets; ligule 2-dentate; style-arms longer in female florets. Achenes 5-10, triangular, compressed with 2 large, straight or hooked spines.

Fl. & Frt. : Nov.-Apr.

Frequently seen on bundh of cultivated fields.

Pasan : 13278A; Korba : 8653; Katghora : 6069.

Native of Brazil, naturalised throughout India. (Murti, 1975).

ADENOSTEMMA J. R. & G. Forst. Chart. Gen. 89. t. 45. 1776.

T. : *A. viscosum* J. R. & G. Forst.

Adenostemma lavenia (L.) O. Kuntz., Rev. Gen. Pl. 1 : 304. 1891;
Panigrahi in Kew Bull. 30(4) : 648. 1975. *Verbesina lavenia* L. Sp. Pl. : 902. 1753, *Adenostemma viscosum* J. R. & G. Forst. Chart. Gen. 90. 1776; Haines, Botany 2 : 485.

Erect, glabrous or viscidly pubescent herbs. Leaves opposite or upper alternate, very variable, linear to ovate, serrate, sessile or petioled, 6-20 × 4-15 cm. Heads in lax or dense panicles or corymbs, 6-10 mm across, white or pinkish; involucral bracts glandular hairy; corolla infundibuliform, glandular especially at lower level, more or less hirsute at the upper part, 1.5-2 mm long, limbs campanulate, 5-toothed; anthers with a glandular tip; style-branches long, linear, clavate, white, exerting. Achenes 5-ribbed, glandular; pappus-hairs 3-5, short rigid, often clavate.

Lectotype : Sri Lanka, plate 42 of Burm., Thes. Zeyl. 1737. vide Panigrahi (*l.c.*)

Fl. & Frt. : Oct.-Jan.

Rare in damp grassy places, on slopes, near streams.

Kabirchabutra : 13343, 19192.

Pantropical.

AGERATUM L. Sp. Pl. : 839. 1753 & Gen. Pl. ed. 5 : 363. 1754.

LT. : *A. conyzoides* L. vide N. L. Britton & P. Wilson, Scient. Surv. Porto Rico 6 : 286. 1925.

Ageratum conyzoides L. Sp. Pl. : 839. 1753 ; Haines, Botany 2 : 485 ; Koster in Blumea 1 : 484. 1935.

Erect, hispidly hairy herbs. Leaves opposite, upper sometimes alternate, petioled, ovate, rhomboid-ovate or deltoid ovate, crenate ; petioles short, hairy. Heads small, in dense, terminal corymbs or panicles, 60-75-flowered ; involucral-bracts 2-3-seriate, oblong, elliptic, acute, herbaceous ; flowers blue ; corolla white or purple, tubular, equal, regular, tubes glandular, limbs 5-cleft ; anthers obtuse below, appendaged above ; style-arms slender, clavate. Achenes oblong, 5-angled, glabrous, pappus of 5, free, paleaceous scales, lacerate below.

Fl. & Fr. : Throughout the year.

Common weeds in cultivated fields, near water-channels, waste places.

Katghora : 6032, 8624 ; Khondra : 16740 ; Kabirchabutra : 13303 ; Karidongri : 19323 ; Parasi : 19047.

Native of New world-tropics, now pantropical. (Murti, 1975).

AMBERBOA (Pers.) Lessing, Syn. Gen. Comp. : 8. 1832. *nom. cons.*

T. : *A. moschata* (L.) DC. (*Centaurea moschata* L.) (*typ. cons.*).

Amberboa ramosa (Roxb.) Jeffrey in Scientist 3 : 29. 1959. *Carduus ramosus* Roxb. Fl. Ind. 3 : 407. 1832. *Volutarella ramosa* (Roxb.) Saut. Pl. Saurashtra 22. 1953 ; Kitamura, Pl. West Pakistan & Afgh. : 159. 1964. *V. divaricata* (DC.) Benth. Gen. Pl. 2 : 476. 1873 ; Haines, Botany 2 : 518. *Microlonchus divaricatus* DC. Prodr. 6 : 562. 1838. *Oligochaeta divaricata* auct. non (Fischer et Mey.) Koch. 1843. Fig. 14

Dichotomously branched, spreading, rigid herbs ; branches channelled, slightly scabrid, thinly cottony. Leaves oblong or obovate, toothed or pinna-tifid, lobes mucronate, 3-7 (-12) cm long. Heads about 2 cm long, bottle-shaped, pale-purple, terminating branches ; involucral-bracts many-seriate, outermost ovate with long, spreading or recurved, spinescent awns, inner linear-lanceolate, green with spreading or erect spines, inner-most with erect, soft spines ; ray-florets 1-seriate, neuter, disc-florets bisexual ; tubes slender, limbs 5-fid. Achenes 4-5-angled, striate and punctate on ribs ; pappus spiny, of many unequal scaberrulous hairs, silvery brown, connate in a ring at base, deciduous.

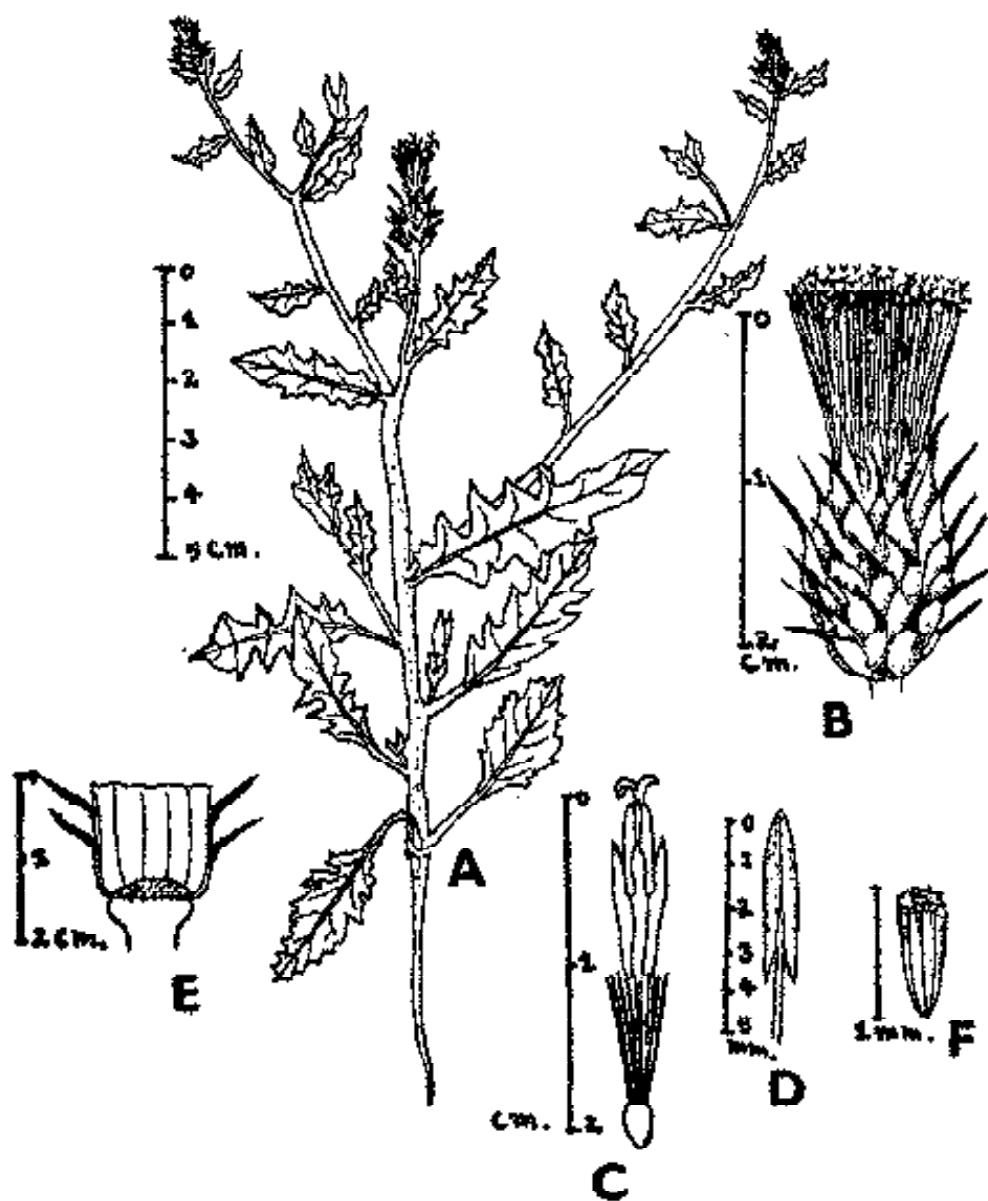


Fig. 14. *Amberboa ramosa* (Roxb.) Jafri.

A. Habit. B. Capitulum with spiny involucres. C. Disc floret. D. Stamen.
E. A part of involucre. F. Fruit.

Fl. & *Frt.* : Jan.-Apr.

Occasional in waste places.

Aurapani to Rajak : 15482.

Afghanistan, Pakistan, India.

Kitamura (1964) made the combination *V. ramosa* (Roxb.) Kitamura presumably being unaware of Santapau's (1953) publication. *Volutarella* Cass. (1826), typified by *V. lippi* (L.) Cass., is an illegitimate name for *Amberboa* Adans. (1763), both being based on *Centauria lippi* L. as the type species. And, *Amberboa* (Pers.) Less (1832) is conserved against *Amberboia* Adans. (1763).

Bidens L. Sp. Pl. : 831. 1753 & Gen. Pl. ed. 5 : 362. 1754.

L.T. : *B. tripartita* L. vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2.3 : 494. 1913.

Bidens pilosa L. Sp. Pl. : 832. 1753 ; Hook. f. in FBI 3 : 309. 1881, *pro. part. incl.* type var. ; Haines Botany 2 : 507.

Erect, glabrous or pubescent herbs. Leaves opposite, 3-foliate or 3-sect.; leaflets ovate or lanceolate, serrate, 4-10 × 1.8-5 cm. Heads in corymbs, on long peduncles; involucral-bracts many-seriate, with broad scarious margins; capitulum broader than long, covered with brown-veined palea; ray-florets white, female; disc-florets bisexual, tubular; corolla in female ligulate, 2-3-dentate; style-arms hairy. Achenes black, slender, with 2-4 tuberculate apical hairs with recurved tips; pappus of 2-4 retrorsely hispid bristles.

Fl. : Sept.-Dec. *Frt.* : Nov.-Jan.

Common in waste places, near streams.

Pendra : 15283.

Afghanistan, Pakistan, India, Nepal, Sri Lanka; probably of American origin.

Bidens pilosa L. is often confused with *B. bipinnata* L. and *B. biternata* (Lour.) Merrill & Sherff ex Sherff. Hook. f. (1881) reduced *B. bipinnata* L. as a variety of *B. pilosa* L. but Hara *et al.* (l.c.) re-instate it as a distinct species, because the leaves are bipinnately compound vis-a-vis *B. pilosa* L. with leaves 3-foliate or 3-sect. *B. bipinnata* has yellow ray-florets, heads longer than broad and the inner achenes almost glabrous and longer than the outer ones. Some treat *B. biternata* (Lour.) Sherff as the correct name for *B. pilosa* auct. non L. (1753).

BLAINVILLEA Cassini Dict. Sci. Nat. 29 : 493. 1823.

T. : *B. rhomboidea* Cass.

Blainvillea acmella (L.) Philipson in Blumea 6 : 350. 1950. *Verbesina acmella* L. Sp. Pl. : 901. 1753. *Eclipta latifolia* L.f. Suppl. Pl. : 378. 1782. *Blainvillea latifolia* (L.f.) DC. in Wight, Contrib. Bot. Ind. : 17. 1834; Haines, Botany 2 : 504. *Spilanthes acmella* (L.) Murr. Syst. Veg. ed. 13. 610. 1774. *B. rhomboidea* Cass. l.c. : 493.

Hispidly hairy herbs. Leaves opposite or upper alternate, petioled, ovate-lanceolate, cuneate at base, serrate, appressed hairy, 6-15 × 3-7 cm. Heads white, peduncled, 1.5 cm across, solitary in forks and subcorymbose at top of branches; involucral-bracts 2-seriate, outer 5, herbaceous, oblong, acute or obtuse, inner paleaceous; receptacles flat, with folded palea enclosing florets; ray-florets female, with 2-dentate, white turning yellow with age, disc florets tubular, limbs dilated, 5-fid; anthers black; style-arms flattened. Achenes in female florets 3-questrous or dorsally compressed, hairy, in bisexual florets 3-4-angled or laterally compressed; pappus of 2-5 unequal bristles or scales connate at bases or absent

Fl. & Fr. : Sept.-Jan.

Common weeds throughout the area.

Katghora : 6071; Bilaspur; 12989.

A native of S. America, naturalised throughout India (Murti, 1975).

Ramamoorthy in Fl. Hassan : 603 considers this species "Asiatic".

BLUMEA A. P. DC. Arch. Bot. (Paris) 2 : 514. 1833. nom. cons.

T. : *B. balsamifera* (L.) DC. (*Conyza balsamifera* L.) (typ. cons.).

- 1a. Heads solitary, axillary and terminal; upper leaves in sub-opposite pairs; receptacles areolate *B. bifoliata*
- 1b. Heads many, glomerulate or variously paniculate; upper leaves never in sub-opposite pairs, receptacles alveolate
 - 2a. Heads glomerulate, clusters interruptedly spicate; phyllaries not entirely reflexed at maturity *B. retulosa*
 - 2b. Heads paniculate; phyllaries entirely reflexed at maturity
 - 3a. Leaves serrate-dentate with hard spinous teeth; corolla of both types of florets hairy
 - 4a. Erect herbs; corolla-tubes as well as lobes hairy *B. eriantha*

- 4b. Prostrate herbs with a central rootstock and radiating and ascending branches; only corolla-lobes hairy *B. oxyodonta*
- 3b. Leaves not spinous-toothed; corolla of female florets glabrous
 - 5a. Receptacles minutely pilose *B. laciniata*
 - 5b. Receptacles glabrous
 - 6a. Achenes subangulate to terete; leaves usually not lobed *B. mollis*
 - 6b. Achenes ribbed; lower leaves lyrate-lobed
 - 7a. Plants pilose with stalked glands; heads 5-7 mm in diam.; phyllaries herbaceous *B. membranacea*
 - 7b. Plants more or less strigose and robust; heads 7-8 mm in diam.; phyllaries rigid *B. membranacea*
var. *jacquemontii*

Blumea bifoliata (L.) DC. in Wight, Contrib. Bot. Ind. 14. 1834; Randeria in *Blumea* 10 (1) : 288. 1960. *Conyza bifoliata* L. Sp. Pl. : 862. 1753.

Erect or decumbent ascending herbs; pubescent or glabrate. Leaves mostly cauline, sessile, ovate or oblong, serrate, obtuse or acute, uppermost leaves in sub-opposite pairs, 2.5-7 × 1.5-4 cm. Heads usually solitary or rarely 2 at ends of branchlets, peduncled, yellow, 6-14 mm in diam.; involucral bracts villous, many-seriate; receptacles glabrous, tubercled; ray florets female, disc florets bisexual, tubular, 5-toothed; corolla-lobes of bisexual flowers 3.5-4.5 mm long, pale-yellow, hairy. Achenes pale-brown, narrowly oblong, with 4-5 hairy angles, not ribbed; pappus white, 3-4 mm long, caducous.

Type : India, Tanjore and Travancore State, Wight 1425(K).

Fl. & Frt. : Dec.-May.

Common in damp, sandy alluvium in open places, grasslands and along road-sides.

Bilaspur to Champa : 19361; Parasi : 19042; Kota : 13059.

India, Pakistan, Sri Lanka, Burma.

B. eriantha DC. in Wight, Contrib. Bot. Ind. : 15. 1834; Randeria in *Blumea* 10 (1) : 279. 1960.

Erect tomentose herbs; branches divaricate, dichotomous. Leaves alternate, lower petioled, obovate, obtuse, acutely irregularly toothed, upper sessile, obovate or oblong, acute, $2.5-17 \times 1.5-12$ cm. Heads small, 0.5-0.7 cm across, mostly on long slender peduncles of dichotomous cymes, rarely fascicled; peduncles and involucres clothed with long silky hairs; receptacles glabrous; florets numerous, disc florets usually with abortive anthers, rarely bisexual, ray-florets female, corolla yellow, tubular, hairy, 5-toothed. Achenes very minute, angles obtuse, sparingly silky; pappus 1-seriate, white, upto 3.5 mm long.

Type : India, Madras, Wight 1435(P).

Fl. & Frt. : Oct.-Apr.

Occasional on slopes, edges of the forests.

Achanakmar : 15448.

India.

The high degree of abortion of the anthers indicates that *B. eriantha* is probably an apomictic species (Randeria, l.c.)

B. fistulosa (Roxb.) Kurz in Jour. As. Soc. 2 : 187. 1877; Randeria l.c. : 256. *Conyza fistulosa* Roxb., Fl. Ind. 3 : 427. 1832. *Blumea glomerata* DC. in Wt. l.c. : 15; Haines, Botany 2 : 492.

Erect, pubescent herbs. Lower leaves petioled, obovate or oblanceolate, serrate or lyrate pinnatifid, hairy beneath, upper oblong, incised, passing into bracts, $7-12 \times 3-10$ cm. Heads 0.5 cm across, in small, sessile, axillary clusters all along branches, purple or yellow; involucral bracts subulate lanceolate, hairy, purplish; receptacles pilose; ray-florets female, disc-florets bisexual, tubular; corolla yellow, lobes slightly hairy. Achenes 8-10-ribbed, 4-angled, glabrous or sparsely hairy; pappus white, upto 3.5 mm long.

Iconotype : India, Roxburgh(K, CAL)

Fl. & Frt. : Dec.-May.

Common on slopes, along forest-roads, in open grasslands.

Pasan to Semra : 15358; Kabirchabutra to Chauradadar : 15208.

India, Nepal, Burma, China, Thailand to Vietnam.

B. laciniata (Roxb.) DC. Prodr. 5 : 436. 1836; Haines, Botany 2 : 494; Randeria l.c. : 258. *Conyza laciniata* Roxb., Fl. Ind. 3 : 427. 1832.

Erect, pubescent, aromatic herbs; stems striate, leafy. Leaves membranous, runcinate lyrate or pinnatifid, toothed, upper leaves simple lobed, obovate, entire to coarsely toothed, all pubescent, glandular, $6-12 \times 3-7$ cm. Heads long pedicelled, in large 10-25 cm long, oblong or spreading panicles or in broad open corymbs, yellow; involucral-bracts lanceolate, acuminate, villous, outer short, narrow, glandular; receptacles minutely pilose; corolla yellow, lobes of bisexual flowers hairy. Achenes 8-10-ribbed, silky hairy, brown; pappus white, upto 4 mm long.

Iconotype : India, *Roxburgh* (K, CAL).

Fl. & Frt. : Mar.-Dec.

Frequently seen on slopes in shady places, edges of the forests, old clearings, along roads and in waste places.

Kabirchabutra to Pendra : 15281; Keonchi; 13293A.

India, Nepal, Sri Lanka, Burma, China, New Caledonia, Hawaii.

B. membranacea DC. Prodr. 5 : 440. 1836; Randeria in Blumea 10 : 269. 1960. *B. virens* sensu Haines, Botany 2: 494, pro. part. non DC. 1834.

Tall, erect (to 5 m high), pilose slender, much-branched, herbs; young branches and inflorescences glandular pubescent. Leaves 8.5×5.0 cm, membranous, pubescent, irregularly or sinuate-toothed, lower leaves petioled, obovate, lyrate or runcinate, deeply lobed, 10-14 cm long, terminal lobes elliptic ovate or obovate upper leaves oblong, small, very numerous, bractiform, sub-sessile. Heads on slender, 6-18 mm long divaricating pedicels, in large, open, much-branched panicles; involucral bracts slender, 4-5-seriate, ciliolate, linear, pinkish; heads ca 5 cm across, yellow; corolla tubular. Achenes 5 mm long, 8-10-ribbed, silky pubescent, pappus white, upto 25 mm long.

Type : Burma, Prome, *Wallich* 3019/129(K)

Fl. & Frt. : Aug.-May.

Common in moist shady situations on slopes, inside forests as under-growths, and along streams.

Kabirchabutra : 13389.

India, Indomalaysia, China.

B. membranacea DC. var. *jacquemontii* (Hook. f.) Randeria in Blumea 10(1) : 271. 1960. *B. jacquemontii* Hook. f. in FBI 3 : 265. 1881; Haines, Botany 2 : 494.

Erect, densely hairy herbs. Lower leaves petioled, obovate-lanceolate, coarsely irregularly serrate, pubescent, upper sessile, toothed or lacerate. Heads 0.7-0.8 cm across, on 1-2 cm long divaricating pedicels, in large corymbs, peduncles, branches and pedicels hairy with spreading soft hairs; involucral-bracts subulate, lanceolate, rigid, tinged with purple, puberulous; receptacles scabrid pubescent; corolla yellow, lobes of disc-florets hairy. Achenes 8-10-ribbed, finely silky, pappus white, upto 7 mm long.

Syntypes : Behar, Pareshnath. 1220 m. J. D. Hooker s.n.; Central India, Jacquemont 1054; Nilgherry Mts, C. B. Clarke s.n.

Of these, Randeria (l.c.) selects "India, Bihar State, Hooker 386(K)" as the lectotype.

Fl. & Frt. : Jan.-Apr.

Common in shady places on the slopes.

Kabirchabutra to Chauradadar : 15207; Kabirchabutra : 15231.

India.

B. mollis (D. Don) Merr. in Philipp. Jour. Sci. Bot. 5 : 395. 1910; Randeria l.c. 261. *Erigeron molle* D. Don, Prodr. Fl. Nepal. 172. 1825. *Blumea wightiana* DC. in Wight, Contrib. Bot. Ind. ; 14. 1834; Haines, Botany 2 : 493.

Erect, villous, white woolly hairy, aromatic herbs; stems striate, several branches from base, leafy. Leaves petioled, obovate or elliptic-oblong, cuneate, irregularly toothed or serrate, usually not lobed, white woolly beneath, 5-12 × 2-8 cm. Heads 0.5-0.8 cm across, in terminal, spiciform dense cymes, not in panicles, pale purple, branches of panicles glandular pubescent; involucral bracts glandular hairy; receptacles alveolate, glabrous; corolla of bisexual florets purple, lobes glandular. Achenes terete or 4-5-angled, not ribbed, sparsely hairy.

Type : Nepal, Wallich s.n. (BM).

Fl. & Frt. : Jan.-Nov.

Common in dry places at the edge of the forest, on slopes, in open waste lands, grass-fields, along road sides and on old walls.

Khondra : 16758; Lamni : 15419; Keonchi : 8562; Pendra : 15279.

Paleotropics.

It resembles *B. lacera* (Burm. f.) DC., but the latter has glabrate leaves (sometimes hairy, but not woolly, nor white) and yellow flowers.

B. oxyodonta DC. in Wight, Contrib. Bot. Ind. : 15. 1834; Haines, Botany 2 : 491; Rauderia *i.e.* 280.

Prostrate herbs with a central rootstock and radiating, ascending, hairy branches. Leaves often crowded at base, all villous, obovate oblanceolate, membranous, spinulose-toothed, petioled, glandular hairy beneath, upto 7 cm long, upper leaves oblong, sessile, thinly hairy. Heads 0.5-1 cm across, solitary or clustered on slender peduncles, involucral bracts woolly or glabrate, linear acute; receptacles arcolate, glabrous; florets numerous, multi-seriate; corolla tubular yellow. Achenes sparingly hairy or glabrous, brown, not ribbed, those of central florets mostly abortive; pappus white, deciduous, 3-4 mm long.

Type : India, Negapatam, Wight 1436(K).

Fl. & Frt. : Oct.-May.

Common weeds in waste places, open forests, between rock boulders, stream beds, on river banks, in grassy places, pastures and rice fields and along railway lines and road sides.

Katghora : 7110; Kabirchabutra : 13364, 13365, 13373; Pasan to Semera : 15369; Korba : 8613; Keonchi : 8562, 8564.

India, Pakistan, Burma, S. China, Thailand to Vietnam.

BLUMEOPSIS Gagnep. in Bull. Mus. Hist. Nat. Paris 26 : 75. 1920.

T. : *B. flava* (DC.) Gagnep. (*Blumea flava* DC.).

Blumeopsis flava (DC.) Gagnep. in Bull. Mus. Hist. Nat. Paris 26 : 76. 1920. *Blumea flava* DC. Prodr. 5 : 439. 1836; Haines, Botany 2 : 495. *Laggera flava* (DC.) Benth. ex C. B. Clarke in Comp. Ind. 90. 1876.

Erect glabrous or puberulous herbs. Leaves sharply toothed, lower petioled, caudine, oblong, cordate, half-amplexicaul, upto 15 cm long, upper smaller, sessile, lanceolate oblong. Heads 0.5-0.7 cm across, yellow, peduncled, in cymes or corymbose panicles. Involucral bracts many-seriate, outer ovate, acute, inner longer, lanceolate, acuminate, glabrous; receptacles glabrous, flat; ray-florets female, many-seriate; disc-florets bisexual, tubular; corolla-lobes of bisexual florets glabrous; anthers sagittate; style-arms stigmatose. Achenes minute, ribbed, glabrous; pappus 1-seriate, white, caducous.

Fl. & Frt. : Nov.-Feb.

Common in open places, waste lands, edges of the forests.

Lafa hills : 13033; Madai : 12883; Pasan to Semera : 15357; Katghora : 6060.

India, eastwards to Burma, China, Malaysia.

CAESULIA Roxb. Pl. Corom. 1 : 64. 1798 (1795)

T. : *C. axillaris* Roxb.

Caesulia axillaris Roxb. l.c. : 64, t. 93. Haines, Botany 2 : 499. (*Maka*).

Erect or suberect, marshy herbs *ca* 0.5 m high; glabrous. Leaves alternate, linear, serrulate, acuminate at both ends, with a scarious, semi-amplexicaul, dilated, sheathing base, .7-1.2 × 0.5-1 cm. Heads axillary, solitary, sessile, *ca* 1.5 cm across, involucrate, globose clusters, subtended by a common involucre, sessile on a broad, convex, common receptacle, pale-blue, changing to pearly-white; involucral-bracts 2, opposite, compressed, keeled or winged, at length adnate to and including achenes; florets all bisexual, tubular, limbs narrowly campanulate, deeply 5-fid; anthers far-exserted, dark brown, bases with branched tails. Achenes dark brown, ovoid; pappus absent.

Fl. & Frt. : July-Jan.

Common in muddy situations, along dried up streams along with *Ageratum conyzoides*, *Cyperus* spp. and *Polygonum glabrum*.

Pasarkhet : 12951; Korba : 8718; Katghora : 3999; Pasan : 15299.

India, Nepal, Burma.

CARTHAMUS L. Sp. Pl. : 830. 1753 & Gen. Pl. ed. 5 : 361. 1754.

LT. : *C. tinctorius* L. vide M. L. Green, Prop. Brit. Bot. 179. 1929.

Carthamus tinctorius L. Sp. Pl. : 830. 1753; Haines, Botany 2 : 518. (*Kusum*; Safflower).

Erect annual herbs; branches puberulous, white. Leaves oblong or oblong-lanceolate, lower shortly spinulose-toothed, upper half-amplexicaul, spinous. Heads terminal, usually homogamous, 2.5 cm long, orange-yellow; involucral bracts many-seriate, outer foliaceous, ovate-oblong, constricted above base; white below constricted portions, green above it with yellow spines, exceeding heads, inner ovate-oblong or lanceolate; receptacles flat, bristly; florets usually bisexual, rarely a few male or neuter, tubes slender, limbs dilated, 5-cleft, segments linear; anthers-bases sagittate, filaments hairy. Achenes glabrous, ovoid 4-angled, smooth shining, truncate at top; pappus absent.

Fl. & Frt. : Feb.-Apr.

Commonly cultivated; also found as escapes from cultivation.

Khondra : 16743.

India, Nepal.

Flowers yield a red and yellow dye used for colouring butter, liquors and candles; seeds yield a graying oil, used in medicines, for burning, and in paints, varnishes and linoleum; fried achenes used in chutneys; capitula laxative and diaphoretic, used in jaundice; pressed cake excellent food for cattle.

CENTIPEDA Lour. Fl. Cochinch. 2 : 492. 1790.

T. : *C. orbicularis* Lour.

Centipeda minima (L.) A. Br. & Aschers. in Ind. Sem. Hort. Berol., App. 6. 1867. *Artemisia minima* L. Sp. Pl. : 849. 1753. *Centipeda orbicularis* Lour. Fl. Cochinch. 2 : 493. 1790; Haines, Botany 2 : 512. (*Nakk-chikni-Hindi*).

Prostrate, glabrous or sparsely hairy herbs with radiating branches. Leaves alternate, sessile, obovate-oblong, coarsely toothed, less than 0.8 cm long. Heads minute, 2-3 mm across, sessile or sub-sessile, discoid, globose, solitary, axillary, yellowish; involucres hemispheric, bracts 2-seriate, lanceolate, scarious-margined; receptacles flat, glabrous; outer florets female, many-seriate, inner bisexual; corolla of female florets minute, 2-3-dentate, tubes cylindric; corolla of bisexual florets campanulate, 4-fid, tubes short, white. Achenes oblong, 4-angled, tip obtuse, angles hairy; pappus absent.

Fl. & Frt. : Mar.-Jan.

Common in muddy places, waste grounds, in harvested paddy fields

Kota : 13071; Korba to Kudmura : 16796; Marwahi to Parasi 19036.

Afghanistan, India, Sri Lanka, Australia, Pacific Islands.

Plants are used medicinally in cough and cold and toothache; powdered leaves and minute seeds used in the preparation of snuff; seeds yield an essential oil.

CENTRATHERUM Cassini, in Bull. Sci. Soc. Phil. Paris 1817 : 31. 1817 et
Dict. Sci. Nat. 7 : 383. 1817.

T. : *C. punctatum* Cass.

Centratherum anthelminticum (L.) Kuntz., Rev. Gen. Pl. 1 : 320. 1891. *Conyza anthelmintica* L. Sp. Pl. ed. 2. 1207. 1762. *Vernonia*

anthelmintica (L.) Willd. Sp. Pl. 3 : 1634. 1803; Haines, Botany 2 : 483; Hara et al., Enum. 3 : 47. 1982. (*Somraj-Hindi*).

Erect, coarse, glandular pubescent herbs to 1.5m; stem terete, grooved. Leaves petioled, lanceolate or ovate-lanceolate, acute or acuminate, serrate, membranous, cuneate attenuate at base, 7-20 cm long, green and hairy beneath. Heads 1.5 cm across, stout, solitary, peduncled; involucral-bracts 4-5-seriate, outer herbaceous with broad purplish tips, corolla purple. Anthers obtusely auricled. Achenes terete, 10-ribbed, pubescent; pappus hairs 2-seriate, outer brown, paleaceous, shorter, shining, flattened; inner white, longer, rigid, denticulate and persistent.

Fl. : Sept.-Dec. Frt. : Nov.-Jan.

Common in shady places along roadsides, edges of the forests.

Pasarkhet : 12974.

Afghanistan, India, Nepal.

Hook. f. (1881) and Hara et al. (1982) include this species in *Vernonia* L., whereas Ramamoorthy in Fl. Hassan (1976) treats it as a species of *Centratherum*. The two genera are diagnosed from each other as follows: *Centratherum* with involucral bracts having upper parts foliaceous and *Vernonia* with involucral bracts but without foliaceous upper parts. The present species shares the generic character of *Centratherum*, hence included in it.

Leaves and seeds are used medicinally as vermifuge; and effective against threadworms; seeds contain a fixed oil.

CHRYSANTHELLUM L. C. Rich, in Pers., Syst. Pl. 2 : 471. 1807.

T. : *C. procumbens* Pers. nom. illeg. (*Verbesina mutica* L. nom. illeg., *Anthemia americana* L.).

Chrysanthellum indicum DC. Prodr. 5 : 631. 1836; Haines, Botany 2 : 509. Hara et al., Enum. 3 : 19. 1982.

Procumbent, diffuse, rigid, leafy herbs. Leaves alternate, pinnatifid or radical toothed, segments oblong or cuneiform, obtusely lobed or cut. Heads peduncled, 0.5-0.7 cm across, 1 cm across in fruits, axillary or terminal, solitary, yellow; involucral-bracts 1-2-seriate, lanceolate, obtuse, widely spreading; receptacles flat, with narrow scarious palea; ray-florets female, 1-seriate, with spreading ligules, disc-florets bisexual, tubes short, limbs

campanulate, 5-lobed; style-arms of bisexual florets with long subulate arms. Achenes cuneate, oblong or linear-oblong, dorsally compressed, grooved, smooth, margin thick, not winged, equaling involucral bracts; pappus a minute corona or absent.

Fl. & Frt. : Sept.-Dec.

Common amidst grasses.

Rampur Nursery : 19446; Pali : 8667.

Trop. Africa, Madagascar, India, Nepal.

Milne-Redhead (Kew Bull. 1948 : 466, 1948), treated *C. indicum* DC, as conspecific with *C. americanum* (L.) Vatke, but Hook. f. (1881) and Hara *et al.* (1982) consider the two distinct on the ground that the achenes of *C. indicum* are smaller and never broadly winged as in *C. americanum* ($n=8$).

CONYZA Lessing, Syn. Gen. Compos. 203. 1832, *nom. cons.*

T. : *C. chilensis* K. Spreng. (*typ. cons.*).

- 1a. Leaves not fastigiate; plants viscid; heads 0.5 cm across; achenes glabrous, rarely minutely villous *C. leucantha*
- 1b. Leaves fastigately arranged; plants not viscid; heads 0.2-0.3 cm across; achenes hairy *C. stricta*

Conyza leucantha (D. Don) Ludlow & Raven in Kew Bull. 17 : 71. 1963. *Erigeron leucanthum* D. Don, Prodr. Fl. Nepal : 171. 1825. *Conyza viscidula* Wall. ex DC. Prodr. 5 : 383. 1836; Haines, Botany 2 : 488.

Glandular pubescent, corymbosely branched herbs. Leaves lanceolate, narrowed at both ends, entire or serrate, lower upto 20 cm long, upper gradually smaller. Heads peduncled, in loose corymbs, purple or pink; involucral bracts 2-3-seriate, campanulate, linear lanceolate, edges scarious, purple tinged on margins, hairy and glandular outside; corolla of bisexual florets with linear-oblong lobes; anther-cells apiculate; style-arms long pubescent. Achenes minute, pale, ovoid, glabrous; pappus reddish.

Fl. & Frt. : Dec.-Mar.

Frequently seen on slopes.

Lamni : 15406; Kabirchabutra to Pandra : 15274.

India, Indomalaysia, China.

C. stricta Willd. Sp. Pl. 3 : 1922. 1803; Haines, Botany 2 : 488.

var. *stricta*.

Hoary pubescent, erect, corymbosely branched herbs. Leaves narrowly linear to spatulate-obovate, entire or toothed, obtuse, lower ones petioled, upper sessile. Heads numerous, peduncled in terminal corymbose panicles, yellow; involucral bracts narrowly lanceolate, 2-seriate; ray florets female, corolla white, bidentate, disc-florets bisexual, corolla tubular, hairy; style-arms in female much longer than in bisexual florets. Achenes laterally compressed, puberulous, minute, pale yellow; pappus silky, reddish or white, 1-2-seriate, denticulate, deciduous.

Fl. & Frt. : Oct.-Dec.

Occasionally found on slopes.

Kabirchabutra : 13326.

India, Burma, Africa, W. Asia.

Hara *et al.* (1982) recognise two varieties in *Conyza stricta* Willd. : var. *stricta* and var. *pinnatifida* (D. Don) Kitamura. The plants from Bilaspur with entire or toothed leaves are identified with the var. *stricta*.

COSMOS Cavanilles, Icon. et descript. Pl. 1 : 9. 1791.

T. : *C. bipinnatus* Cav.

Cosmos sulphureus Cav. I.c. : 56. t. 79; Haines, Botany 2 : 508.

Erect, much-branched, sulcate hairy herbs to 80 cm high. Leaves 2-3-pinnatifidate or pinnate, pinnules decurrent, ovate, acute lobes entire, glabrous, 7-8 cm long. Heads usually solitary, peduncled, orange-yellow; involucral bracts 2-many-seriate, outer linear-lanceolate, spreading, shorter, inner oblong-lanceolate; receptacles paleaceous; ray-florets female, with sharply 3-toothed ligules; corolla deep yellow; style-arms densely pilose hairy in bisexual florets. Achenes with a beak as long as itself, fusiform, 4-angular, hispidulous with 2-3 apical awns; pappus absent.

Fl. & Frt. : Oct.-Dec.

Commonly cultivated, also found as escapes from cultivation near streams, waste places.

Khondra : 12715, 12743; Pasam : 13279; Kabirchabutra : 13396.

Native of Mexico, naturalised and cultivated throughout India (Murti, 1975).

Yields coreopsin, a bright yellow colouring matter.

CRASSOCEPHALUM Moench, Meth. : 516. 1794.

T. : *C. vernuum* Moench, nom. illeg. [*Senecio rubens* B. Juss. ex N. J. Jacquin: *Crassocephalum rubens* (Jacq.) S. Moore.

Note : ICBN (1988) indicates *Gynura* Cass. (1825) as congeneric with *Crassocephalum* Moench (1794) and conserves the former (vide item No. 9405). However, contemporary taxonomists consider them distinct and diagnose them as :

- | | |
|---|-----------------------|
| 1a. Heads of equal florets (all bisexual) | <i>Gynura</i> |
| 1b. Heads with outer florets (female) distinct from the inner
florets bisexual | <i>Crassocephalum</i> |

Crassocephalum crepidioides (Benth.) S. Moore in Jour. Bot. 211. 1912; Backer & Bakhu. f., Fl. Java 2 : 426. 1965. Fl. Hassan : 610. 1976; Hara et al., Enum. 3 : 22. 1982. *Gynura crepidioides* Benth. in Hook., Niger Fl. : 438. 1849.

Erect, slender herbs. Leaves alternate, lyrate petiolate, pinnatifid, crenate-serrate, 20 × 4 cm, elliptic-lanceolate, acute-acuminate. Heads homogamous, terminal, glabrous on slender pedicels, 1-2 cm long, lax, corymbose cymes; rarely solitary, axillary, orange-red or purple; involucral bracts linear-subulate, nearly glabrous, 1-seriate; receptacles flat, naked alveolate; florets all tubular, bisexual or a few outer with imperfect anthers; corolla shorter than or nearly equalling pappus, tubes long, widening into short limbs; anther-base entire or bidentate; style-arms papillous at top and tipped by a subulate appendage. Achenes terete, striate; pappus of copious white hairs, denticulate, deciduous.

Fl. & Frt. : Dec.-Feb.

Rare on slopes.

Kabirchabutra to Pendra : 15280

Chromosome no : n=20.

It is an African plant, described by Bentham from Nigeria; now pantropical. Hara's (1982) statement that it is an American plant, does not conform to the type locality.

CYATHOCLINE Cass. in Ann. Sci. Nat. Paris Ser. I. 17 : 419. 1829.

T. : *C. lyrata* Cass.

Cyathocline purpurea (D. Don) Kuntz in Rev. Gen. Pl. 1 : 333. 1891. *Tanacetum purpureum* D. Don, Prodr. Fl. Nepal. : 181. 1825. *Cyathocline lyrata* Cass. in Ann. Sci. Nat. Paris Ser. L. 17 : 420. 1829. Haines, Botany 2 : 486.

Erect, sparsely hairy, aromatic herbs 1.25 m high. Leaves all or upper pinnatifid, sessile, glandular viscid, segments serrate-dentate to lobed, caudine leaves with large auricles, upto 15 cm long. Heads in small rounded paniculate corymbs, peduncled, rose-purple; involucral bracts 2-seriate, herbaceous; outer florets many-seriate, filiform, female, 2-toothed; inner florets bisexual, regular, 5-cleft; style-arms papillose. Achenes minute, fusiform oblong, smooth; pappus absent.

Fl. & Frt. : Dec.-Mar.

Common in wet places near streams, between rock boulders in the stream beds.

Kota : 13084; Kabirchabutra : 15268; Lamni : 19201.

India, Nepal, Burma, Thailand to Vietnam.

DICHROCEPHALA L'Herit. ex DC. in Guill. Archiv. Bot. Paris 2 : 517. 1833.

T. : *D. latifolia* (Pers.) L'Herit ex DC. nom. illeg. (*Cotula latifolia* Pers. nom. illeg., *Cotula bicolor* Roth, *D. bicolor* (Roth) D.F.L. Schlech.)

Dichrocephala integrifolia (L. f.) Kuntz., Rev. Gen. Pl. 1 : 333. 1891. *Hippia integrifolia* L. f. Suppl. : 389. 1782. *Dichrocephala latifolia* (Lam.) DC. in Guill., Archiv. Bot. 2 : 518. 1833, et Wt., Contrib. Bot. Ind. 11. 1834. *Grangea latifolia* Lam. Tab. Encycl. Meth. Bot. t. 699. f. 1. 1823.

Erect, glabrous or pubescent herbs; sometimes decumbent, rooting at nodes. Leaves petioled, ovate or lanceolate, 5-nerved, entire, pinnatifid or lyrate, terminal lobes broadly ovate coarsely toothed. Heads globose, very small, in terminal panicles, greenish-yellow; involucral bracts 2-seriate lanceolate; receptacles flat-raised, glabrous; ray florets pinkish, filiform, curved, obscurely toothed, female; disc florets white, bisexual, narrow 4-5-toothed. Achenes smooth compressed; pappus absent or in bisexual florets of 2 minute bristles.

Fl. & Frt. : Dec.-Feb.

Rare on slopes.

Kabirchabutra : 19178.

Tropical and subtropical Africa and Asia.

Decoction of flowers considered diuretic; tender shoots employed as a poultice for blennorrhoea.

ECLIPTA L. Mant. Pl. 2 : 157, 286. 1771 nom. cons.

T. : *E. erecta* L. nom. illeg (*Verbesina alba* L., *E. alba* (L.) Hassk. typ. cons.)

Eclipta prostrata (L.) L., Mant. Pl. 2 : 286. 1771; Roxb. Fl. Ind. 3 : 438. 1832, Greuter *et al.* Regn. veg. 118 : Art. 57, Ex. 5. 1988, *Verbesina prostrata* L. Sp. Pl. 902. 1753. *Eclipta alba* (L.) Hassk. Pl. Jav. rar. 528. 1848; Haines, Botany 2 : 503; *Verbesina alba* L. Sp. Pl. 902. 1753; (Bhringaraj. Kesaraj).

Erect or diffused, hirsute or strigose herbs. Leaves opposite, sessile, linear or oblong-lanceolate, subentire or toothed, narrowed at both ends. Heads axillary and terminal, peduncled, subglobose, white; involucral bracts ovate, obtuse or acute, equalling or exceeding florets, strigose; receptacles flat, paleaceous; palea enclosing bisexual florets; ray florets female, sub-2-seriate, with 2-dentate white ligules, disc florets bisexual, tubular limbs 4-5-fid. Achenes of ray florets narrow triquetrous, of disc florets stouter, 4-angled, laterally sub-compressed, tip entire, toothed or 2-aristate; pappus obsolete or of 2 short awns or teeth.

Fl. & Frt. : Aug.-Feb.

Common in moist places, near cultivated fields, water channels.

Achanakmar : 13205A; Katghora : 8617; Parasi : 19051; Lanni : 15394.

Chromosome no. : n=11

Pantropical but probably native of S. America (Murti, 1975).

Tonic and deobstruent, used against hepatic and spleen enlargements. Source of a black stain and is used in preparations for darkening hair tattooing etc. Root emetic and purgative; source of thiophene active against nematodes.

Although *Eclipta alba* (L.) Hassk. was cited as the correct name for the combined taxon (vide Art. 57. 1, ICBN, 1983, and as type species for *Eclipta* L. nom. cons—item 9166, App. IIIA), *E. prostrata* (L.) L. is now accepted, (vide Art. 57. 1., Ex. 5, ICBN 1988), because it was Roxburgh (Fl. Ind. 3 : 438. 1832) who was the first author to combine the two taxa, *Verbesina alba* L. (1753) and *V. prostrata* L. (1753), accepting *E. prostrata* (L.) L. as the correct name.

ELEPHANTOPUS L. Sp. Pl. : 814. 1753 & Gen. Pl. ed. 5 : 355. 1754.

LT. : *E. scaber* L. vide N. L. Britton et A. Brown Ill. Fl. N.U.S. ed. 2. 3 : 353. 1913.

Elephantopus scaber L. Sp. Pl. : 814. 1753; Haines, Botany 2 : 484. (Gojikva-Sans.)

Erect, subscapose rigidly hairy herbs. Lower leaves in basal rosettes, obovate-oblong, crenate, glabrescent above, appressed-pubescent beneath, 7-14 × 2.5-4.5 cm; caudine-leaves a few, alternate, sessile or amplexicaul. Heads 2-5-flowered, clustered, surrounded by cordate, leafy bracts, usually three in number, on 4-20 cm long peduncles, homogamous, discoid; involucral bracts 2-seriate; outer 4 ovate-lanceolate, acute inner 4 lanceolate; corolla with pale violet or reddish violet 5-lobed limbs; style-arms long, hairy. Achenes hairy, 10-ribbed; pappus of 4-5 rigid bristles, dilated at base.

Fl. : Sept.-Nov. *Frt.* : Oct.-Dec.

Common in open places.

Pali : 13026; Katghora : 6046.

Pantropical.

Mucilaginous decoction of roots and leaves is used as an emollient in dysuria, diarrhoea, dysentery and swelling and stomach pains; roots powdered with pepper applied in toothache and vomiting.

EMILIA Cass. in Bull. Sci. Soc. Philom. Paris 1817 : 68. 1817.

T. : *E. flammula* Cass. (*Cacalia sagittata* Willd. 1803. *non* Vahl 1794).

Emilia sonchifolia (L.) DC. in Wt., Contrib. Bot. Ind. : 24. 1834; Haines, Botany 2 : 513. *Cacalia sonchifolia* L. Sp. Pl. : 835. 1753. (*Hirankhuria*-H; *Sadhimodi*-Beng).

Erect or decumbent ascending, nearly glabrous herbs. Lower leaves lyrate-pinnatifid - or - partite, crenate, often rosulate, upper caudine leaves lanceolate or oblong-lanceolate, auriculate at base. Heads long peduncled, solitary or corymbose on leafy branches, 5-6 mm long, elongated to 1 cm in fruits, homogamous, red or pink; involucral bracts 1-seriate, lanceolate; all florets tubular, limbs elongate, 5-toothed, corolla-lobe less than 1 mm long; style-arms half-cylindric, tip conic. Achenes 5-ribbed, hairy on ribs, scabrid; pappus hairy, white.

Fl. & Frt. : July-Oct.

Common in moist places, in gardens, cultivated fields.

Parasi : 19046; Pasarkhet : 12956; Pali : 8711; Katghora : 8606; Pasan : 15301.

Chromosome no. : $n=5$; $2n=10$.

Pantropical; probably native to Afro-Asian regions (Murti, 1975). Adams (*Fl. Jamaica* : 757. 1972) records it as a diploid species with $2n=10$ and as obligately inbreeding because of cleistogamous flowers.

GLOSSOCARDIA Cass. in Bull. Sci. Soc. Philom. Paris 1817 : 138. 1817.

T. : *G. linearifolia* Cass.

Glossocardia bosvallea (L.f.) DC. in Wt., Contrib. Bot. Ind. 19. 1834.
Varbesina bosvallea L.f. Suppl. Pl. 379. 1782. *Glossocardia linearifolia* Cass. in Dict. Sci. Nat. 19 : 62. 1821 ; Haines, Botany 2 : 509.

Prostrate, diffusely branched, glabrous herbs. Leaves radical, pinnatisect, segments filiform, petioles long, slender. Heads solitary, oblong, shining, terminal and axillary, 0.7-0.8 cm across, shortly peduncled; involucres ovoid-oblong with a few bracts, outer shorter, inner oblong, scarious along margins; receptacles paleaceous; ray florets usually one, with 2-fid ligule, female; disc florets bisexual, a few fertile, corolla 4-fid, yellow; style-arms papillose. Achenes narrowly oblong, dorsally much compressed, densely hairy along margins, black; pappus of 2 smooth, stiff awns.

Fl. & Fr. : Aug.-Oct.

Occasionally found in sandy alluvium in waste places, on bundhs of cultivated fields amidst grasses.

Madai : 19478.

India.

GNAPHALIUM L. Sp. Pl. : 850. 1753 & Gen. Pl. ed. 5 : 368. 1754.

LT. : *G. uliginosum* L.

Note : Two lectotypes have been selected viz. *G. luteo-album* L. (vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. 3 : 453. 1913) and *G. uliginosum* L. (vide A. S. Hitchcock and M. L. Green, Nom. Prop. Brit. Bot. 181. 1929, the latter favoured by C. Jeffrey vide *Taxon* 28 : 349-351. 1979).

- 1a. Leaves under 2.5 cm long, rarely longer; heads in leafy spikes; bisexual flowers in each head 2, rarely 3; stereome of involucral bracts undivided *G. polycaulon*
- 1b. Leaves over 2.5 cm; heads in corymbose, leafless clusters; bisexual flowers in each head more than 4; stereome of involucral bracts fenestrated
 - 2a. Stems single, stout, branching above; leaves linear, acuminate, 2.5-3.5 cm long; heads pale yellow, bisexual flowers in each head 10-12 *G. hypoleucum*
 - 2b. Stems usually many from base; leaves oblong-spathulate, upper lanceolate, about 5 cm long; heads golden yellow or brown; bisexual flowers in each head about 4 *G. luteo-album*

Gnaphalium hypoleucum DC. in Wight., Contrib. Bot. Ind. 21. 1834; Hara *et al.*, Enum. 3 : 29. 1982. *Pseudognaphalium hypoleucum* (DC.) Hilliard & Burtt, Bot. Journ. Linn. Soc. 82 : 205. 1981.

Erect perennial herbs; stems woolly above. Leaves sessile, linear, often decurrent, acuminate, puberulous or scaberulous above, woolly beneath, base dilated, auricled. Heads many, in corymbose, dense clusters; involucral bracts many-seriate, oblong, obtuse yellowish or golden glistening; ray florets female, 3-4-toothed, ligules filiform, 2-3-fid, disc florets bisexual, limbs dilated, 5-toothed; style-arms capitate. Achenes papilose, not ribbed; pappus usually 1-seriate, deciduous.

Fl. & Frt. : Mar.-May.

Occasionally found in waste places.

Katghora : 3722.

India, Nepal, Burma, Thailand to Vietnam, Philippine, China, Japan.

G. luteo-album L. Sp. Pl. : 851. 1753; Haines, Botany 2 : 498. *Pseudognaphalium luteo-album* (L.) Hilliard & Burtt in Bot. Journ. Linn. Soc. London 82 : 206. 1981.

Erect, corymbosely branched herbs to 35 cm high; occasionally several branches from base. Leaves woolly on both surfaces, oblong-spathulate, not decurrent obtuse, upper lanceolate, acute, half-amplexicaul. Heads pale brown, sometimes golden yellow, shining, in dense, terminal, peduncled corymbs; involucral bracts oblong, obtuse, 2-3-seriate; ray florets female, ligules filiform, 2-3-fid; disc florets bisexual, limbs 5-toothed; style-arms capitate. Achenes ellipsoid, often angular, brown, tubercled or with minute curved bristles; pappus white, 1-seriate, deciduous.

Fl. & Frt. : Mar.-May.

Common in waste places, ditches, cultivated fields, open places.

Lamni : 15395.

Pantropical.

Leaves astringent and vulnerary.

G. polycaulon Pers. Syn. Pl. 2 : 421. 1807; Grierson, Notes Roy. Bot. Gard. Edin. 31 : 135-138. 1971; Hilliard, Bot. J. Linn. Soc. London 82 : 289. 1981. *G. indicum* auct. pl., non L. 1753; Haines, Botany 2 : 498.

Erect, softly cottony herbs, less than 15 cm tall; several branches from roots, ascending, leafy. Leaves linear-obovate, spathulate or oblanceo-

late, more or less acute. Heads heterogamous in terminal clusters from upper leaves and forming terminal, leafy spikes, golden yellow in colour; involucral bracts linear-oblong or lanceolate, acute, woolly at base, reddish brown or yellowish-brown, 2-3-seriate, stereome undivided, flat; outer florets female, ligules filiform, 2-3-fid, disc florets bisexual; corolla lobes with hairs on abaxial surface; style-arms truncate and pinnicillate. Achenes oblong, minutely papillose, not ribbed; pappus white, free.

Fl. & Frt. : Nov.-Feb.

Common in ditches, cultivated fields, waste ground.

Bilaspur : 8576; Kabirchabutra : 15225; Mulmul : 19534; Katghora : 6051.

Pantropical.

GRANGEA Adans. Fam. Pl. 2 : 121. 563. 1763.

T. : *G. maderaspatana* (L.) Poir. (*Artemisia maderaspatana* L.)

Grangea maderaspatana (L.) Poir. in Lam., Encycl. Meth. Bot. 2 : 825. 1811; Haines, Botany 2 : 487. *Artemisia maderaspatana* L. Sp. Pl. : 849. 1753. ('*Mustaru*'—Hindi).

Prostrate, pubescent or villous herbs. Leaves alternate, sinuately pinnatifid, radical, 2.5-7 cm long, caudine 1-2.5 cm long. Heads button-shaped, 0.5-1 cm across, shortly peduncled, solitary, terminal or leaf-opposed, yellow; involucral bracts 2-3-seriate, outer herbaceous, ciliate along margins; outer florets female, filiform, 2-3-seriate, outermost 2-fid, inner 2-4-fid, ligules filiform, 2-lobed; disc florets bisexual, tubes slender, limbs campanulate, 4-5-cleft; stamens 4-5; style-arms short, truncate in bisexual florets, elongate in female florets. Achenes stipitate, pale brown, flattened or sub-terete, turbinate, glandular; pappus connate into a cylindric fimbriate tube.

Fl. & Frt. : Dec.-May.

Common weeds in cultivated fields, waste places.

Korba : 8603; Khuria : 15466.

Asiatic, now pantropical.

Infusion of leaves is considered stomachic, antispasmodic and deobstruent.

GUIZOTIA Cass. Dict. Sci. Nat. 59 : 237, 247, 248. 1829, nom. cons.

T. : *G. abyssinica* (L.f.) Cass. (*Polymnia abyssinica* L.f.).

Guizotia abyssinica (L.f.) Cass. in Dict. Sci. Nat. 59 : 248. 1829; Haines, Botany 2 : 507; *Polymnia abyssinica* L.f. Suppl. Pl. 383. 1782. ('*Kalatil*', '*Ramtil*'-Hindi).

Erect leafy herbs to 1.5 m high; pubescent upwards. Leaves opposite or upper alternate, half-amplexicaul, linear or lanceolate-oblong, subcordate, obtuse, serrate, 7-12 cm long. Heads 1.5-2.5 cm across, on peduncles 2.5-5 cm long, axillary and terminal, rayed, yellow; involucral bracts 5, sub-2-seriate, outer sub-foliaceous, inner paleaceous, enclosing florets; receptacles raised, paleaceous; ray florets female, 1-seriate, fertile, ligule 2-3-toothed; bright yellow; disc florets bisexual, limbs campanulate, 5-fid, tubes of both woolly embracing the top of achenes. Achenes of ray florets 3-, of bisexual flowers 4-angled: pappus absent.

Fl. & Frt. : Nov.-Dec.

Commonly cultivated; also found as escapes from cultivation.

Pasarkhet : 16824.

A native of tropical Africa (Murti, 1975); cultivated throughout India and naturalised.

The seeds yield an oil (Niger-seed oil) used in food, paints, soap manufacture and adulteration of Rape and Sesame-oils. Seed cake is used as cattle feed or as manure.

LAGASCEA Cav. Ann. Ci. Nat. 6 : 331. 1803. (*Lagasea*); Corr. Willd., Enum. Pl. Hort. Berol. : 941. 1809, *orth. et nom. cons.*

T. : *L. mollis* Cavanilles.

Lagascea mollis Cav. in Ann. Cienc. Nat. 6 : 331. t. 44. 1803; Ramamoorthy in Fl. Hassan : 619. 1976.

Much-branched, annual, scabrid or subglabrous procumbent herbs. Leaves opposite or upper alternate, petioled, ovate, acuminate, sub-crenate, silky hairy beneath, 2.5-4 cm long. Heads 1-flowered, in clusters on a common receptacle supported by bracteate, silky leaves, clusters solitary terminal and peduncled or in corymbose panicles; involucres of 5 connate, pilose bracts; florets white, bisexual, tubular, tubes short, limbs elongate, cylindric or dilated, 5-fid; anther-bases sagittate. Achenes cuneate, compressed or 3-angled, tip rounded; pappus obscure, of a toothed or fimbriate rim.

Fl. & Frt. : Oct.-Feb.

Frequently found at the edges of forests, in the hedges of cultivated fields, along forest roads on slopes.

Khondra : 12701; **Lamni** : 19229; **Kabirchabutra** : 13371.

Native of Central America, naturalised in India (Murti, 1975).

LAGGERA C. H. Schult.-Bip. ex K. H. E. Koch in Linnaea 19 : 391. 1847.

T. : *L. purpurescens* C.H. Schult.-Bip. ex K.H.E. Koch.

Laggera alata (D. Don) C.H. Schult.-Bip. ex Oliv. in Trans. Linn. Soc. London 39 : 94. 1873; Haines, Botany 2 : 489. *Erigeron alatum* D. Don, Prodr. Fl. Nepal. 171. 1825. *Conyza alata* (D. Don) Roxb. Fl. Ind. ed. 3 : 430. 1832.

Stout, much-branched, leafy pubescent or tomentose herbs, to 90 cm high; stems with entire wings. Leaves oblong or oblong-ob lanceolate, sessile with decurrent bases forming wings, toothed, sometimes almost entire, 2-5-10 cm long. Heads racemed on short axillary, winged branches, drooping in fruits, purple; involucral bracts many-seriate, outer short, herbaceous, recurved, inner long, straight; outer florets female; disc florets fewer, bisexual; anther-bases 2-lobed or sagittate; style-arms stigmatose. Achenes hairy; angled or ribbed, glabrous; pappus white, 1-seriate, persistent.

Fl. & Frt. : Nov.-Jan.

Common on slopes, at the edges of forests, in grassy places.

Kabirchabutra : 13370, 15209.

Paleotropic.

Leaves yield an essential oil.

PULICARIA J. Gaertn. Fruct. 2 : 461. 1791.

T. : *P. vulgaris* J. Gaertn. (*Inula pulicaria* L.).

Pulicaria foliolosa DC. Prodr. 5 : 480. 1836; Haines 2 : 501.

Annual, copiously-branched leafy herbs; pubescent or tomentose. Leaves flaccid, sessile, half-amplexicaul, linear-oblong or -ob lanceolate, lower spathulate-oblong, quite entire and glabrous, tips apiculate, recurved, usually woolly and glandular, on slender, often pilose or villous, lateral and terminal 2.5-5 cm long, or lower upto 10 cm long. Heads numerous, orange-yellow, peduncles; involucral bracts setaceous, glandular and sparsely hairy; ray florets female, filiform, tubular, ligules absent; disc florets bisexual, shortly

5-fid; anthers with capillary tails. Achenes smooth, usually hairy; pappus 2-seriate, white, outer shorter, inner elongate, dentate, deciduous.

Fl. & Frt. : Feb.-May.

Commonly found near streams, ponds.

Khuria : 15489.

Used as fodder for camels.

Afghanistan, Pakistan, India.

SIGESBECKIA L. Sp. Pl. : 900, 1753 & Gen. Pl. ed. 5 : 383. 1754.

L.T. : *S. orientalis* L. vide Steud., Nom. 1 : 777. 1821.

Sigesbeckia orientalis L. Sp. Pl. : 900. 1753; Roxb. Fl. Ind. ed. 2. 3 : 439. 1832; Haines, Botany 2 : 502. *S. brachita* Roxb. l.c. (*Lalatia*—Bihar).

Erect, annual herbs; pubescent with crisped hairs. Leaves opposite, long-petioled, lower ovate-triangular, toothed or crenate, base incised truncate or cuneate, softly pubescent, 12-15 × 7 cm., upper smaller, subsessile, oblong, coarsely dentate, hispid on upper surface, glandular punctate and pubescent beneath. Heads in terminal, leafy panicles, peduncled, yellow; involucral bracts 2-seriate, outer 5 longer, linear-spathulate, clavate, glandular-viscid; inner smaller, 5-7, broadly ovate, embracing ray florets; receptacles paleaceous; ray florets female, 5-7, ligules 3-dentate; disc florets bisexual, limbs 5-fid. Achenes ovoid-oblong slightly curved, outer achenes rough; pappus absent.

Fl. & Frt. : Oct.-Jan.

Occasionally found on slopes between rock boulders.

Lamni : 13236, 13241; Kabitchabutra : 19181.

Throughout the tropics; probably native of S. America (Murti, 1975).

Herb is considered diaphoretic, cardiotonic, antiscorbutic and sialagogue; used in renal colic and rheumatism.

SONCHUS L. Sp. Pl. : 793. 1753 & Gen. Pl. ed. 5 : 347. 1754.

L.T. : *S. oleraceus* L. vide N. L. Britton, et A. Brown Ill. Fl. N.U.S. ed. 2. 3 : 316. 1913.

Sonchus wightianus DC. Prodr. 7 : 187. 1838; Hara *et al.*, Enum. 3 : 43. 1982. *S. arvensis* auct; non L. (1753); Haines, Botany 2 : 522. (*Dudhi, Dodak*—Hindi).

Erect, hollow-stemmed, glabrous herbs; umbellately branched above; root-stock creeping. Leaves oblong-lanceolate, often in rosettes: lower runcinate pinnatifid; spinous-toothed, half-amplexicaul with appressed rounded auricles, glaucous beneath; uppermost lanceolate. Heads glandular-hispid, about 1.5 cm long, in sparse panicles or in umbelliform corymbs, bright yellow, peduncles glandular or not; florets all bisexual; corolla 5-dentate; involucral bracts 3-4-seriate, lanceolate; outer ones white floccose. Achenes narrow sub-compressed, pale brown, 4-(-6)-ribbed, often alternating with intermediate ribs; pappus-hairs white, united at base into a deciduous ring.

Fl. & Frt. : Oct.-Feb.

Common in waste places, ditches, on old walls.

Achanakmar : 19275; Kabirchaburta : 13340.

India, Sri Lanka, Burma, China, Malaya.

Valued as a galactagogue and for liver troubles.

SPHAERANTHUS L. Sp. Pl. : 927. 1753 & Gen. Pl. ed. 5 : 399. 1754.

T. : *S. indicus* L.

Sphaeranthus indicus L. Sp. Pl. : 927. 1753; Haines, Botany 2 : 496.
S. hirtus Willd. Sp. Pl. ed. 4. 3 : 1395. 1802 ('Gorakhundi'-H).

Prostrate or decumbent-ascending, viscous-pubescent, aromatic herbs; stems narrowly winged. Leaves alternate, decurrent at base, sessile, obovate-oblong or oblanceolate, toothed or serrate. Heads in terminal, solitary, globose or shortly oblong clusters, discoid, heterogamous, usually involucrate by empty bracts; involucral bracts narrow, toothed, acute, hairy in upper half; peduncles winged; outer florets female, corolla pale violet, tubular, 2-3-fid; disc florets bisexual, limbs 4-5-toothed; anther-bases sagittate, auricles acute or tailed. Achenes oblong, sub-compressed, glandular hairy; pappus absent.

Fl. & Frt. : Dec.-Apr.

Common in wet places, in cultivated fields, ditches.

Korbi : 15342; Katghora : 6031; Hasdo river banks : 8612.

Africa, India, Nepal, Sri Lanka, Burma, Malaya, Australia.

Roots, stems, leaves, flowers and seeds are used medicinally; also used as fish poison. Juice is credited with antitubercular properties. Herb is stuffed to holes to kill crabs and snakes. Herb yields an essential oil and fatty oil.

SPILANTHES N. J. Jacq. Enum. Pl. Carib. i. 1760.

LT. : *S. urens* N. J. Jacq. vide A. H. Moore, Proc. Amer. Acad. Arts. 45 : 252. 1907.

S. calva DC. may occur in the district.

Spilanthes paniculata Wall. ex DC. Prodr. 5 : 625. 1836; Koster & Philip. in Blumea 6 : 354. 1950; *S. acmella* var. *paniculata* (DC.) Clarke; Hook. f. in FBI 3 : 307. 1881, [*non S. acmella* (L.) Murr. 1774]; Haines, Botany 2 : 506.

Erect or ascending annual herbs. Leaves opposite, petioled, broadly ovate or elliptical ovate, acute or obtuse at tip, gradually attenuate in 3-45 mm long petioles, entire, undulate, undulate-serrate or repando-serrate. Heads orange yellow, on 2.5-16 cm long peduncles, in axillary and terminal panicles, rarely solitary, at first sub-globose, 5-6 mm across, afterwards conical-ovoid, 10-15 × 7-9 mm; involucral bracts 2-seriate, outer herbaceous, usually fimbriate, inner carinate, enclosing florets; florets white, ray florets female, a few, with 2-3-dentate ligule; disc florets bisexual, corolla funnel-shaped, 4-5-fid. Achenes of outer florets triquetrous, margins thickened and ciliate, thinly and shortly pubescent at top, 2.5 mm long, those of inner florets dorsally compressed, ciliate along margins, both black, verrucose; pappus of 2 bristles or absent.

Fl. & Frt. : Sept.-Feb.

Common in wet places, cultivated fields.

Khondra : 12704; Khuria to Khami, : 15500.

India, Malayasia, China.

Roots, leaves and flowers are used medicinally.

TRIDAX L. Sp. Pl. : 900. 1753 & Gen. Pl. ed. 5 : 382. 1754.

T. : *T. procumbens* L.

Tridax procumbens L. Sp. Pl. : 900. 1753; Haines, Botany 2 : 510; Powell in Brittonia 17 : 80. 1965. (*Mexican Daisy, Coat buttons*--Eng.).

Procumbent and ascending hirsute herbs. Leaves opposite, ovate or lanceolate, deeply irregularly serrate or lobed, 2-7 × 1-4 cm. Heads upto 1.5 cm across, solitary, on peduncles upto 30 cm long; involucral bracts 2-to 3-seriate, outer herbaceous, ovate-lanceolate, hairy, inner scarious, pinkish, lanceolate, puberulous; receptacles paleaceous; ray florets female, tubes hairy, pale yellow or white, 3-dentate, ligulate or 2-lipped, with outer lip large 3-fid or 3-partite, inner small, 2-lobed; disc florets bisexual, tubular,

bright yellow, limbs 5-fid; anther-bases with short acute auricles; style-arms of bisexual florets hairy above with subulate tips. Achenes turbinate or oblong, brown, hairy, 2 mm long; pappus of aristate, feathery bristles.

Fl. & Fr. : Throughout the year.

Common in pastures, waste places, road sides.

Pasan to Korbi : 19082.

Native of tropical America : naturalised throughout India (Murti, 1975).

Juice of leaf is insecticidal and piscidal and is used to check bleeding from cuts, bruises and wounds and is popularly known as "Bishalya Karani".

VERNONIA Schreber Gen. Pl. 2 : 541. 1794, *nom. cons.*

T. : *V. noveboracensis* (L.) Willd. (*Serranula noveboracensis* L.) (*typ. cons.*).

- 1a. Annual herbs; achenes smooth or slightly 4-5-angular, not ribbed, appressed silky hairy *V. cinerea*
- 1b. Perennial undershrubs, achenes ribbed, glabrous or sparsely hairy
 - 2a. Leaves petioled, distantly serrate, scabrid above, pubescent beneath; involucral bracts obtuse, mucronate; heads 8-12-flowered *V. divergens*
 - 2b. Leaves sub-sessile, sharply, closely-serrate, scabrous; involucral bracts acuminate, often aristate; heads 30-flowered *V. pyramidale*

Vernonia cinerea (L.) Less. in Linnaea 4 : 291. 1829; Haines, Botany 2 : 483; *Conyza cinerea* L. Sp. Pl. : 862. 1753. ('Sahadevi'-Sansk.).

Erect or decumbent-ascending, hoary pubescent herbs. Leaves petioled, linear to elliptic, ovate or obovate, acute to rounded, entire or toothed, pubescent or hairy, 1-6 × 1-2 cm. Heads 5-7 mm across, oblong, in rounded or open and flat topped corymbs, or loose panicles, peduncled; flowers purple; involucral bracts linear-lanceolate, tips awned, glabrous or hairy; florets bisexual, corolla with 5-pubescent lobes; anther-bases obtuse or minutely tailed. Achenes narrowly cylindric, attenuate at base, terete or sub-terete, densely hairy; pappus white or dirty white, 2-seriate, outer hairs shorter.

Fl. & Fr. : July-Feb.

Common in waste places, road-sides, on old walls.

Kota : 13090; Pasarkhet : 16823; Pasan : 19121; Marwahi : 19014; Kabirchabutra : 19197; Madai : 19474.

Paleotropic.

Plants, flowers and seeds are used medicinally in fever and seeds as anthelmintic, and alexiphamic, effective against threadworms and round-worms.

V. divergens (Roxb.) Edgew. in Jour. As. Soc. Beng. 21 : 172. 1853; Haines, Botany 2 : 483. *Eupatorium divergens* Roxb. Fl. Ind. 3 : 414. 1832.

Erect, undershrubs; pubescent, tomentose or scabrid. Leaves short-petioled, elliptic-ovate or lanceolate, acute at both ends, serrate, scabrous-hispidulous above, hispid-pubescent beneath, 4-12 × 1.5-4 cm. Heads 4-6 mm across, narrowly campanulate, in usually dense, much-branched, panicled, rounded corymbs; short-peduncled; involucral bracts a few, oblong-obtuse, acute or mucronate, outermost ovate; florets bisexual; corolla purple, glabrous, 5-lobed; anther-bases minutely tailed or obtuse. Achenes glabrous, 8-10-ribbed; pappus uniseriate, pale reddish-brown or dirty white.

Fl. : Dec.-Jan. Frt. : Feb.-May.

Common on slopes.

Keonchi : 13299; Kabirchabutra : 15230.

India, Burma.

V. pyramidale (D. Don) Mitra, Ind. For. 99 : 100. 1973. *Eupatorium pyramidale* D. Don, Prod. Fl. Nepal, 170. 1825. *Vernonia roxburghii* Less. in Linnaea 6 : 674. 1831; Haines, Botany 2 : 482. ('Mohi').

Erect, stout, rigid, scabrid undershrubs. Leaves tough, sub-sessile or shortly petioled, elliptic, obovate-lanceolate or oblanceolate, acuminate, acutely serrate, 5-12 × 2-7 cm. Heads purple, large, fascicled in terminal panicled corymbs, or in young plants, at top of main stems; involucral bracts often red at ends, linear obtuse and apiculate or acuminate or pungent, outermost subulate; flowers bisexual, purplish; corolla 5-lobed; anthers sagittate below. Achenes 8-10-ribbed, sparsely hairy between ribs; pappus uniseriate, dirty white or reddish.

Fl. : Sept-Feb. Frt. : Feb.-May.

Common in waste places, on forest floors in scrub forests.

Kenda : 16774; Achanakmar : 13220A; Madai : 12888; Katghora : 6061.

India, Burma.

VICOA Cassini in Ann. Sci. Nat. Paris Ser. I. 17 : 418. 1829.

T. : *V. auriculata* Cass.

Vicoa indica (L.) DC. in Wight., Contrib. Bot. Ind. 10, 1834; Haines, Botany 2 : 500. *Inula indica* L. Sp. Pl. ed. 2 : 1236. 1762. *Vicoa auriculata* Cass. l.c.; Hook. f. in FBI 3 : 297. 1881.

Erect, rigid, glabrous or pubescent herbs; stems reddish-brown. Leaves sessile, lanceolate or oblong-lanceolate, base auricled amplexicaul, acuminate, entire or serrulate, often scabrid above and with small glistening glands beneath, 4-8 × 1-1.5 cm. Heads 1.3-1.5 cm across, on long, slender, spreading peduncles in large corymbose, loose panicles; involucral bracts 2-seriate, outer short subulate, inner linear acuminate, all glandular; ray florets a few, female, corolla ligules ligulate, elliptic oblong, 3-dentate, revolute, as long as involucral bracts, bright yellow; disc florets bisexual; anthers sagittate below. Achenes pale, terete, sparsely hairy, of ray florets quite smooth and without pappus, of disc florets pappus hairs a few, uniseriate.

Fl. & Frt. : Oct.-May.

Common on rocky slopes, in open jungles, edges of the forests.

Pendra : 15275.

India, Sri Lanka.

Used as fodder; also listed as a medicinal plant.

XANTHIUM L. Sp. Pl. : 987. 1753 & Gen. Pl. ed. 5 : 424. 1754.

LT. : *X. strumarium* L. vide Fourreau, Ann. Soc. Linn. Lyon. ser. 2, 17 : 110. 1869.

Xanthium strumarium L. Sp. Pl. : 987. 1753; Haines, Botany 2 : 502. ('Shanskheswar', Cocklebus, Burweed).

Erect herbs; stems hispidulous or strigillose. Leaves long-petioled, ovate triangular or orbicular, 3-lobed, toothed, base cuneate, strongly 3-veined, scabrid, 5-10 cm long. Heads monoecious, discoid, male heads in upper axils, female heads in lower axils; flowers yellow; male heads : involucral bracts uniseriate; receptacles paleaceous; florets many, appearing bisexual but achenes sterile, corolla tubular, 5-toothed; style-arms short, included; female heads : involucral bracts united into an ovoid, 2-celled utricle, each cell with a single flower, utricle with 2 horns and covered by hooked spines, corolla absent; style-arms exserted. Achenes in male sterile, enclosed within palea; in female 2, enclosed within hardened, spinescent involucre; pappus absent.

Fl. : Nov.-Jan. *Frt.* : Mar.-May.

Common in waste places, along road sides, near streams, in dried river-beds.

Katghora : 6055 ; Khondra : 16738.

Throughout the tropics but probably native of America (Murti, 1975).

Roots and fruits are used medicinally. It contains glucoside xanthos-trumarin. The species is included among the allergic plants. Herb is poisonous, but toxic substances are removed by cooking—young floral top and leaves immediately below are boiled and eaten as a pot-herb. Seeds yield a semi-drying oil called 'Gokhuru' oil.

Note : *Xanthium indicum* Koenig ex Roxb. Fl. Ind. 3 : 601. 1832 ; DC. in Wt. Contrib. Bot. Ind. : 17. 1834, et DC. Prodr. 5 : 529. 1836 p.p., is sometimes treated as the correct name of *X. strumarium* auct. non L. But in India, others recognise the occurrence of both as distinct species.

YOUNGIA Cass. in Ann. Sci. Nat. Paris Ser. I. 23 : 88. 1831.

T. : *non designatus*.

Youngia japonica (L.) DC. Prodr. 7 : 194. 1838 ; Hara *et al.* Enum. 3 : 49. 1982. *Prenanthes japonica* L. Mant. Pl. 1 : 107. 1767. *Crepis japonica* (L.) Benth. Fl. Hongk. : 194. 1861 ; Haines, Botany 2 : 519.

Erect, glabrous or puberulous herbs; stems fistular, ribbed. Basal leaves in rosettes, obovate-oblong, sinuate-toothed or runcinate-pinnatifid, lobes denticulate or mucronate, puberulous both surfaces, 3.5-22 cm long; caudine leaves a few, subsessile, smaller. Flowering stems 1 or many from root-stock, 15-45 cm long, nearly leafless. Heads 3-4 mm long, 10-20-flowered, on slender, bracteolate peduncles, copiously panicled; involucral bracts 2-seriate, inner linear, fruiting with a strong basal mid-vein, outer a few, short; flowers yellow, bisexual, rarely a few outer males or neuter; tubes slender; limbs dilated, 5-cleft, segments long, linear; anther-bases sagittate, filaments hairy in middle. Achenes fusiform, brown, compressed, ribbed, equalling or shorter than pappus.

Fl. & Frt. : almost throughout the year.

Common near nala-banks, in moist shady places, along road sides.

Kabirchabutra : 15202.

Pakistan, India, Nepal, Sri Lanka, China, Japan, Philippines, Malaysia, Thailand to Vietnam.

STYLDIACEAE

R. Br. Prodr. 565. 1810. ('*Styldiae*')

T. : *Stylium* Sw. ex Willd.

STYLEDIUM Swartz ex Willd. Sp. Pl. 4 : 7, 146. 1805, *nom. cons.*

T. : *S. graminifolium* Swartz ex Willd. (*typ. cons.*).

Stylium Kunthii Wall. ex DC. Prodr. 7 : 335. 1838; Hajnes, Botany 2 : 523; Slooten in Fl. Males. Ser. I. 4 : 529. 1954; Murti in Bull. Bot. Surv. India 14 (1-4) : 187. 1972.

Delicate herbs, 3-10 cm high; stems short. Leaves fleshy, ovate-orbicular or oblong-spathulate, clustered about base or top of stems. Cymes long-stalked; flowers minute, irregular, white or purple, sessile at forks; bracts usually 2, opposite at forks of peduncles, linear-oblong; calyx 2-lipped, upper lip of 3 oblong sepals, lower spoon-shaped, notched; anterior lobes of corolla longer than two lateral, oblanceolate and emarginate with minute 2-fid ligules at their bases; stamens 2, filaments connate with styles. Capsules linear, 0.5-1 cm long, valves 2, dehiscing from top, recurved.

Fl. & Fr. : Oct.-Jan.

Rare in the district, rooting in damp sandy alluvium amidst grasses.

Pali : 8689.

India, Bangladesh, Burma.

CAMPANULACEAE

A. L. Juss., Gen. Pl. : 163. 1789; Ramamoorthy in Fl. Hassan : 566. 1976.

T. : *Campanula* L.

LOBELIACEAE

R. Brown, Trans. Linn. Soc. London 12 : 133. 1812.

T. : *Lobelia* L.

1a. Flowers solitary axillary; corolla zygomorphic; anthers connate; stigmas shortly bifid

LOBELIA

1b. Flowers panicled or racemed; corolla actinomorphic; anthers free or nearly so; stigmas 3-5-lobed.

2a. Capsules dehiscing irregularly at base or on sides outside calyx teeth

CAMPANULA

2b. Capsules dehiscing loculicidally 2-3-valved at top within calyx teeth

WAHLENBERGIA

CAMPANULA L. Sp. Pl. : 163. 1753 & Gen. Pl. ed. 5 : 77. 1754.

LT. : *C. latifolia* L. vide N. L. Britton et A. Brown Ill. Fl. N.U.S. ed. 2. 3 : 294. 1913.

Note : *Sphenoclea zeylanica* Gaertn., [Sphenocleaceae (Lindl.), Mart. ex DC.], the type species of the monotypic genus *Sphenoclea* Gaertn. *nom. cons.* is likely to occur in the area. (Fig. 15)

Campanula benthamii Wall. ex Kitamura, Pl. Afgh. : 377. 1960; Panigrahi in Phytomorphology 28 : 251. 1978; Hara et al., Enum. 3 : 50. 1982. *C. canescens* Wall. ex DC. Prodr. 7 : 473. 1839, non Roth 1827; Haines, Botany 2 : 528. *C. wallichii* Babu in Jour. Bomb. nat. Hist. Soc. 65 : 808. 1969, *nom. illeg. superfl.*

Erect, annual, hairy herbs; often several stems from rootstock. Leaves oblong or lanceolate, crenate, sessile or sub-sessile, pubescent, 2.5-4 cm long. Flowers usually sub-spicate on branches of narrow panicles, becoming more diffuse with elongate pedicels in fruits, lilac or grey purple, dimorphic (one form without corolla or stamens); calyx deeply 5-lobed, teeth linear-lanceolate, hairy, persistent; corolla broadly campanulate, shortly 5-lobed, hairy outside; stamens 5, filaments dilated at base; ovary 3(-5)-celled; capsules hemispheric hispidly hairy.

Fl. & Frt. : Feb.-Apr.

Common in sandy alluvium of dried up streams, moist places etc.

Kabirchabutra : 13390, 13393.

Afghanistan, India, Nepal, Sri Lanka, Burma.

LOBELIA L. Sp. Pl. : 929. 1753 & Gen. Pl. ed. 5 : 401. 1754.

T. : *non designatus*.

Two lectotypes have been selected : *L. dortmanna* L. (vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. 3 : 299. 1913) and *L. cardinalis* L. (vide M. L. Green, Prop. Brit. Bot. 184. 1929).

Note : *App. IIA. ICBN (1988) lists *Campanulaceae* Juss. and *Lobeliaceae* R. Br. as "Nomina Familiarum conservanda". But Airy-shaw (1973) includes *Lobelia* L. in the *Campanulaceae*. Hutchinson (1973), Dahlgren (1983), Greuter et al. (1988) segregate the *Lobeliaceae* R. Br. (1917) as a separate family from the *Campanulaceae* Juss. (1789), but Mabberley (1987) reduces the former as a subfamily, *Lobelioideae* and distinguishes the two sub-families as : Flowers more or less regular, anthers eventually free-*Campanuloideae* ; Flowers irregular usually, anthers connate-*Lobelioideae*. And, he observes : Some genera, e.g. *Lobelia* shows transition from fleshy to dry fruit and erect pachycaul treelets to

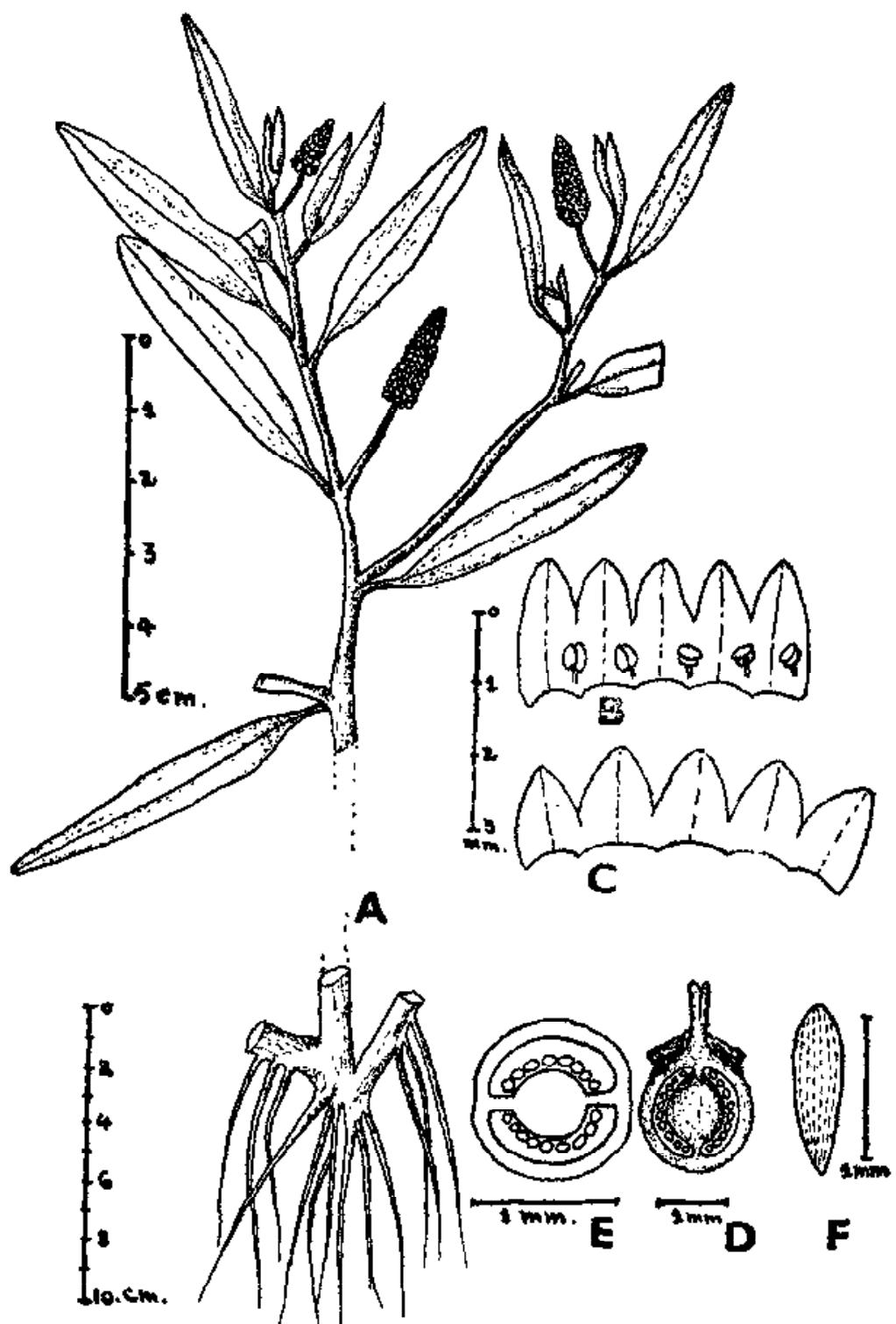


Fig. 15. *Sphenoclea zeylanica* Gaertn.

A. Habit. B. Corolla tube with epipetalous stamens. C. Calyx tube spreadout.
D. L. S. carpel. E. T. S. ovary. F. Fruit.

creeping rhizomatous herbs with concomitant reduction of vessel-element length. Woody species often considered 'anomalous', but occur widely scattered in the family.

Lobelia alsinoides Lam. Encycl. Meth. Bot. 3 : 588. 1792; Moeliono & Tuyn in Fl. Males. Ser. I. 6 : 126. 1960. *L. trigona* Roxb. Fl. Ind. 2 : 111. 1824; C. B. Clarke in Hook. f. FBI 3 : 423. 1881.

Erect or ascending herbs; stems sharply 3-angular. Leaves ovate-oblong or elliptic, denticulate, sessile, 2-2.5 × 0.5-1 cm. Flowers solitary axillary, blue; pedicels 1-1.8 cm long; bracts small; hypanthium ribbed; calyx 5-partite; corolla 2-lipped, lower lip of 3 connate lobes, upper one of 2 separating lobes; staminal tubes free or nearly so, all anthers bearded at their apex; stigmas 2-lobed, hairy. Capsules loculicidally 2-valved above, ellipsoid.

Fl. & Fr. : Oct.-Jan.

Common in damp places, near streams.

Pasan : 13266A; Keonchi; 13293; Achanakmar : 13217A.

India, Burma, east to W. China, Malaysia.

WAHLENBERGIA H. A. Schrad. ex Roth, Nov. Pl. Sp. : 399. 1821, *nom. cons.*

T. : *W. elongata* (Willd.) H. A. Schrad. ex Roth (*Campanula elongata* Willd., [= *Campanula capensis* L.; *W. capensis* (L.) DC.].

Note : Haridasan & Mukherjee [Phytomorphology 37 (4) : 277-285. 1987] studied the seed surface patterns of both the species of *Wahlenbergia* through SEM and demonstrated that this genus is better related to *Campanula* but *Sphenoclea* may justifiably be segregated to a separate family (see App. IIA, ICBN, 1988).

- 1a. Calyx-tubes hairy; corolla stellately 5-partite, rotate; basal part of filaments 3-lobed; ovary sub-globose; capsules with as many veins as calyx lobes, 0.2-0.3 cm long *W. erecta*
- 1b. Calyx-tubes glabrous; corolla with a distinct tube, campanulate; basal part of filaments about pentagonal, deltoid or pseudo 2-lobed; ovary turbinate; capsules with twice as many veins as calyx lobes, 0.5-0.9 cm long *W. marginata*

Wahlenbergia erecta (Roth) Tuyn in Pl. Males. Ser. I. 6 : 113. 1960. *Dentella erecta* Roth in Roem. & Schult. Syst Veg. 5 : 25. 1819, *pro. part. excl. descr.*; et in Nov. Pl. Sp. 140. 1821. *Cephalostigma schimperi* Hochst. ex Rich. Tent. Fl. Abyss. 2 : 2. 1851; Haines, Botany 2 : 526. *W. perotifolia* Wight & Arn. ex DC. Prodr. 7 : 434. 1839; Wight, Ic. t. 842. 1844-45, *nom. Superfl.*

Erect, patently pilose herbs, mostly with a central stem and copious, horizontal branches, ending in minute flowers. Leaves sessile or sub-sessile, narrowed at both ends, linear-oblong and elliptic, acute, margins undulate, crisped recurved, patently pilose or glabrescent; upper lanceolate and gradually smaller and narrower. Branches capillary cymose or simple; flowers solitary, purple or pale blue; calyx-lobes linear-lanceolate, bristly; Petals free; staminal column not widened below, stamens 4, free, inserted with corolla on margin of epigynous disc; stigmas 3-lobed. Capsules sub-globose or ovoid, with a conical beak nearly as long as sepals, 3-valved.

Fl. & Frt. : Oct.-Dec.

Rare in open grassy moist places.

Korbi : 15336.

Indomalaysia.

W. marginata (Thunb.) A. DC. Monogr. Camp. : 143. 1830; Tuyn in Fl. Males. Ser. 1.6 : 115. 1960. *Campanula marginata* Thunb. Fl. Jap. : 84. 1784; Haines, Botany 2 : 527. *Campanula gracilis* Forst. Prodri. : 84. 1786. *Wahlenbergia gracilis* (Forst.) DC. Monogr. Camp. : 142. 1830.

Erect or decumbent herbs; simple or divaricately branched from base; glabrous or sparsely hairy. Leaves linear to obovate-oblong, denticulate, sessile, lower 2.5-5 cm long, upper reduced to bracts. Peduncles terminal, sub-panicled; branches of panicles usually bifurcate; flowers solitary, narrowly campanulate, pale blue; calyx-teeth short linear, from a triangular base, glabrous, erect in fruits; corolla-lobes broad-oblong fused for half their length, stamens 4, free, inserted on margin of epigynous disc, filaments widened below; hairy; stigmas 3-lobed. Capsules erect, loculicidally 2-3-valved above, tapering into peduncle.

Fl. & Frt. : May-June.

Occasionally found on slopes, on murrum soil.

Pondi to Ratanpur : 16782.

Indomalaysia, Japan.

PLUMBAGINACEAE

A. L. Juss. Gén. Pl. 92. 1789 ('*Plumbagines*')

T. : *Plumbago* L.

PLUMBAGO L. Sp. Pl. : 151. 1753 & Gen. Pl. ed. 5 : 75. 1754.

LT. : *P. europaea* L. vide N. L. Britton et Millspaugh, Bahama Fl. 319. 1920.

Plumbago zeylanica L. Sp. Pl. : 151. 1753 ; Haines, Botany 2 : 530 ; Bokharii in Fl. West Pakistan No. 28 : 2. 1972. (*Chitrakasi*--S. ; *Chitah*--H. ; *Chitamula*--Or.).

Undershrubs, branches rambling. Leaves alternate, ovate or oblong-ovate, 3.0×3.5 cm, acute, suddenly narrowed into short amplexicaul petioles. Flowers in terminal, panicled spikes or spiciform racemes, white or pale blue, sessile; calyx-tubes covered with stalked viscid glands; corolla-tubes long, lobes 5; stamens 5, filaments linear, dilated at base; styles with 5 terminal branches, stigmatose nearly throughout their length. Capsules membranous, oblong, acute, longitudinally furrowed, circumscissile.

Fl. : Sept.-Nov. *Frt.* : Nov.-Dec.

Occasionally found between rocks, edges of forests.

Lamni : 13235.

Tropical Africa and Asia.

Roots abortifacient, vesicant and diuretic, used in piles, dyspepsia, diarrhoea and skin diseases. Root-bark contains plumbagine, the active principle.

PRIMULACEAE

Ventenat, Tabl. Règne Vég. 2 : 285. 1799.

T. : *Primula* L.

Lysimachia obovata Buch.-Ham. ex Hook. f., occurring in adjacent localities of Amarkantak, may occur in the district.

1a. Herbs not scapigerous; leaves mostly caulin, flowers not in whorls; corolla 5-partite, lobes contorted; capsules splitting transversely; seeds many, planoconvex

ANAGALLIS:

1b. Herbs usually scapigerous; leaves in basal rosettes; flowers in one or more superposed whorls; corolla 5-lobed, with distinct tubes, lobes imbricate; capsules dehiscing by valves; seeds usually 2, angular or sub-globose

ANDROSACE.

ANAGALLIS L. Sp. Pl. : 148. 1753 & Gen. Pl. ed. 5 : 189. 1754.

LT. : *A. arvensis* L. vide N. L. Britton et A. Brown, Ill. Fl. N U.S. ed. 2. 2 : 716. 1913.

Anagallis arvensis L. Sp. Pl. : 151. 1753 ; Haines, Botany 2 : 531 ; Taylor in Kew Bull. 1955. 329. 1955. (*Scarlet Pimpernel*, *Poor man's or Sheperd's Weather-glass*--Eng.).

Erect or procumbent herbs; stem 4-angled. Leaves opposite, sessile, ovate cordate or lanceolate, acute, palmately 3-veined, 1-1.5 × 0.5-1 cm. Flowers solitary, axillary, ebracteate, blue to red, peduncles 1-1.25 cm long, erect in flowers, decurved in fruits; sepals 5, narrow lanceolate, acuminate, almost equalling corolla, persistent; corolla rotate, petals orbicular, often ciliate; stamens 5, epipetalous, filaments villous; stigmas capitate. Capsules globose, circumscissile. Seeds 3-gonous, plano-convex.

Fl. & Frt. : Jan.-Mar.

Common in cultivated fields, near water channels.

Khondra : 16742.

Throughout temperate and tropical regions; probably indigenous to Europe (Murti, 1975).

Herb accredited with expectorant, stimulant properties, used for dropsy, leprosy, hydrophobia and is active against *Ranikhet virus*. An acetyl-saponin isolated showed marked taenicial activity.

ANDROSACE L. Sp. Pl. : 141. 1753 & Gen. Pl. ed. 5. 179. 1754.

LT. : *A. maxima* L. vide N. L. Britton & A. Brown, Ill. Fl. N.U.S. ed. 2. 2 : 709. 1913.

Androsace umbellata (Lour.) Merr. in Philipp. Jour. Sci. 15 : 237. 1919. *Drosera umbellata* Lour., Fl. Cochinch. : 186. 1790; *Androsace saxifragae-folia* Bunge, Enum. Pl. Chin. Bor. : 53. 1831 et Mém. Sav. Etr. Acad. Sci. St. Petersb. 2 : 127. 1835; Haines, Botany 2 : 530. *Primula umbellata* (Lour.) Bentvelzen in Fl. Males. ser. I. 6 : 191. 1962.

Annual, glandular pubescent, scapigerous herbs. Leaves long-petioled, rounded-cordate, lobulate and crenate-toothed, hairy above, 0.5-2 cm in diam; petioles about 2 cm long. Scapes many, glands hairy, 3-10 cm long; flowers in 1-several-flowered umbels, white, about 5 mm across, on slender, hairy pedicels 1-3 cm long; calyx deeply 5-cleft, segments elliptic-acuminate, stellately spreading in fruits; corolla salver- or funnel-shaped, tubes short or narrower or broader than calyx, mouth annulate; anthers subsessile, included in tubes. Capsules ovoid or globose, 5-valved. Seeds deeply pitted.

Fl. & Frt. : Jan.-Mar.

Occasionally found near streams in damp shady places.

Keonchi to Lamni : 15389.

Pakistan, India, Burma, China, Japan.

MYRSINACEAE

R. Br. Prodr. : 532. 1810 ('Myrsinaceae').

T. : *Myrsine* L.

- 1a. Flowers in short fascicles, umbels or corymbs, bisexual; petals contorted, united; anthers much longer than filaments and sagittate; ovules in many rows; stigmas punctiform

ARDISIA

- 1b. Flowers in elongated, lax racemes, polygamous, mostly dioecious; petals imbricate, free, anthers not longer than filaments, not sagittate; ovules in 1 row; stigmas capitate

EMBELIA

ARDISIA Swartz, Prod. Veg. Ind. Occ. 3 : 48, 1788, *nom. cons.*

T. : *A. tinifolia* Swartz (*typ. cons.*).

Ardisia solanacea Roxb. Pl. Corom. 1 : 27. t. 27. 1795; Haines, Botany 2 : 534. *A. humilis* sensu C. B. Clarke in Hook. f. FBI 3 : 529. 1882, *pro. part. excl. syn., non* Vahl, 1794; Jafri & Qaiser in Fl. West Pakistan No. 89 : 8. 1975.

Erect, evergreen, branched shrubs. Leaves obovate-oblong or elliptic, shortly acuminate or subobtuse, base cuneate, coriaceous, rather fleshy, 15-20 × 5-7 cm. Flowers in simple or compound umbels or racemes; peduncles axillary, patent or suberect; pedicels stout; flowers pink or rose coloured, waxy, 2-2.5 cm across; calyx-lobes 5, elliptic, obtuse, in fruits enlarged, rounded concave with membranous margins, closely pressed to berries; corolla 5-partite, lobes acute, twisted to right in buds; anthers sagittate at base. Berries depressed globose, 0.5-0.7 cm across, black when ripe. Seeds solitary, globose.

Fls. : Apr.-May. *Frt.* : Oct.-Jan.

Common on the banks of streams, in the forests and in the ravines.

Lamni : 13244A; Kabirchabutra : 13398, 19176.

India.

A. humilis Vahl, which is a smaller shrub, is known from the coastal regions of India (Jafri & Qaiser, 1975).

Sometimes it is cultivated in the gardens for its evergreen foliage and attractive pink flowers. Leaves eaten in salads; roots used in fever, diarrhoea and rheumatism. Berries yield a yellow dye.

EMBELIA N. L. Burman, Fl. Ind. 62. 1768, *nom. cons.*

T. : *E. ribes* N. L. Burm.

Embelia basaal (Roem. & Schult.) A. DC. in Trans. Linn. Soc. 17 : 131. 1837; *Panigrahi & S. M. Almeida*, J. Bombay Nat. Hist. Soc. 84 : 471. 1987. *Ardisia basaal* Roem. & Schult. Syst. Veg. 4 : 517. 1819. *Embelia robusta* sensu C. B. Clarke in Hook. f. FBI 3 : 515. 1882, *pro part. quoad E. Basaal* in syn.; Haines, Botany 2 : 533; Jafri & Qaiser in Fl. West Pakistan No. 89 : 6. f. 1 D-E. 1975. non Roxb. (1820), *Basaal* Rheede, Hort. Malab 5 : 23 t. 12. 1685; Lam. Dict. Encycl. Bot. 1 : 381. 1789 (as *Basal* or *Basaal*). *Dauceria acuta* Dennstedt. Schules, Zum. Hort. Malab. : 31. 1818, *nom. invalid.* *Dauceria acuta* Dennst. ex Steudel, Nom. Bot. 1 : 485. 1840, *nom. illeg. superfl.* Type : Same as for *Ardisia*? *Basaal* Roem. et Schults. *Basal acutipetalum* Hassk. Horli. Mal. Rheedeani Clavis : 40. 1867 ('as Lamrk. Encycl. 1 : 381'), *nom. superfl. illeg.* *Embelia acutipetalum* S. M. Almeida & M. R. Almeida in Journ. Bombay Nat. Hist. Soc. 81 : 741. 1894 [as '(Lam. ex Hassk)', comb. nov.], *nom. Superfl. illeg.* Type : Same as for *Ardisia*? *Basaal* Roem. et Schult. ('*Videngi*'—Marathi; '*Bibirang*'—Oriya).

Rambling shrubs or trees. Leaves obovate-oblong, elliptic or obovate, acute-acuminate, undulate or obscurely serrulate, cuneate, rusty pubescent or rarely glabrous beneath, 4.5-10 × 2.5-6 cm. Racemes bracteate, more or less rusty pubescent; flowers white or greenish-yellow; calyx 4-5-lobed, persistent, pubescent without, glandular; corolla puberulous, petals 4-5, free or only slightly connate at base, imbricate in buds; filaments more or less adnate to petals. Berries red, sub-globose, tipped by style, 1-seeded. Seeds globose.

Type : "In Malabar et Cochinch.". Rheede, Hort. Malab. 5 : t. 12. 1685.

Fl. : May-July. *Frt.* : Nov.-Jan.

Common in the mixed forests, at the edges of the forests along forest roads.

Lamni : 13248; Pasan : 19132; Kabirchabutra : 19162.

India, Burma, Thailand to Vietnam.

Fruits are edible, carminative, antispasmodic and taenifuge; contains Embelin. Dried barks and roots are used for toothache.

Note : Ambast [Ed. 1986 in '*The useful Plants of India*' consider *E. ribes* Burm f. as *Vidanga* of Sanskrit and *Vardinga*—Marathi (cf. Panigrahi & Almeida 1987), for nomenclatural discussion].

Embelia basaal (Roem. & Schult.) DC. subsp. *ferruginea* (Wall. ex DC), Panigr. et S. K. Murti, comb. nov.; *E. ferruginea* Wall. ex DC. Prodr. 8 : 86. 1844; *E. robusta* var. *ferruginea* (Wall. ex DC.) C. B. Clarke in Hook. f. FBI 3 : 515. 1882.

SAPOTACEAE

A. L. Juss. Gen. Pl. 151. 1789. (*Sapotae*)T. : *Sapota* P. Mill., nom. illeg. (≡ *Achras* L.).

Note : Although *Sapota* P. Mill. nom. illeg. is not conserved, Sapotaceae Juss. is conserved (App. IIA, & Art. 14, 12, ICBN 1983).

- | | |
|--|-----------|
| Ja. Sepals 4 ; petals 8 ; staminodes none ; seeds non endospermous | MADHUCA |
| 1b. Sepals 6 ; petals 6 ; staminodes 5 ; seeds endospermous | MANILKARA |

MADHUCA J.F. Gmel. Syst. Nat. 2 (pars. 1) : 773, 799. Sept.-Nov. 1791.

T. : *M. indica* J.F. Gmel.

Madhuca longifolia (Koenig) MacBride in Contrib. Gray Herb. 53 : 17. 1918. var. *latifolia* (Roxb.) Chevalier in Rev. Int. Bot. Appl. 23 : 149. 1943 ; Von Royen in Blumea 10(1) : 55. 1960. *Bassia latifolia* Roxb Pl. Corom. 1 : 20. t. 19, 20. 1795 ; Haines, Botany 2 : 536. *Madhuca latifolia* (Roxb.) MacBride in Contrib. Gray Herb. 53 : 17. 1918. (*M. indica* J.F. Gmelin, Syst. Nat. : 799. 1791. *B. longifolia* Koenig in L. Mant. Alt. App. : 563. 1771.) (Mahua).

Large trees ; twigs pubescent or tomentose. Leaves clustered at ends of branches, elliptic or oblong-elliptic, obtusely acuminate at apex, base cuneate, secondary veins 10-12 pairs, densely woolly beneath when young, glabrescent later, 13-25 × 4.5-9 cm ; petioles 2.5-5 cm long. Stipules linear, caducous. Flowers 3-5, axillary on long rusty, tomentose pedicels, clustered at ends of leafless branches from leaf scars ; ovoid, fleshy, cream-coloured ; calyx-lobes 2-seriate, ovate, subacute, rusty tomentose, 2 outer segments subvalvate and enclosing 2 others ; corolla campanulate or ovoid urceolate, lobes short erect 2-seriate, fleshy ; stamens 20-25, anthers hairy. Berries ovoid, 1-4-seeded, 2.5-5 cm long.

Type : Roxburgh s.n. (K).

Fl. : Feb.-Apr. Frt. : June-July.

Common near villages, inside mixed dry deciduous forests.

Lainga : 15372; Pasan : 19117.

India, Burma.

Note : var. *longifolia*, with leaves linear-oblong or lanceolate, pedicels slender, is treated as varietally distinct from var. *latifolia* characterised by leaves broadly elliptic, pedicels stout.

Flowers edible; and is commonly used for distillation of alcohol. Seeds yield an oil, used for burning and soap-making. Wood is strong and durable and is used for musical instruments. Mahua cake is used as manure; it possesses insecticidal and piscicidal properties.

MANILKARA Adans. Fam. Pl. 2 : 166, 574. 1763, *nom. cons.*

T. : *M. kauki* (L.) Dubard (*Mimusops kauki* L.) (*typ. cons.*).

Note : Saldanha (Fl. Karnataka 1 : 331. 1984) attributes the authority of the genus as "Adanson emend. Gilly".

Manilkara hexandra (Roxb.) Dubard in Ann. Inst. Bot.-Geol. Colon. Marseille Ser. 3.3. 23 : 10. t. 2. 1915; Royen in Blumea 7(2) : 408. 1953. *Mimusops hexandra* Roxb. Pl. Corom. 1 : 16. t. 15. 1795; Haines Botany 2 : 538. (*Khirni*—Hindi, *Khilai*, *Khirkuli*—Oriya).

Trees. Leaves elliptic-obovate or oblanceolate-oblong, rounded, emarginate at apex, base cuneate or rhomboid, coriaceous glabrous, nerve veins obscure, 7-10 × 3-5 cm. Flowers 5-7 mm across, on 0.5-0.8 cm long pedicels, in fascicles of 2-6, from axils of fallen leaves; white; calyx-lobes 2-seriate, elliptic, subacute, tomentose; petals 2-seriate, narrower than their 2-fid ligules; stamens 6; staminodes 6, lobed. Berries oblong, ellipsoid, about 1.5 cm across, 1-2-seeded.

Fl. : Nov.-Jan. Frt. : Apr.-June.

Occasionally found on slopes, near streams.

Pasarkhet to Madanpur Phulwaria : 19424.

India, Sri Lanka.

Ripe fruits edible; seeds yield an edible oil; leaves used as fodder and bark febrifuge, contains tannin; wood is hard and provides good timber for various industrial/agricultural purposes.

EBENACEAE

Gürke in Engler et Prantl, Nat. Pflanzenfam. 4(1) : 153. 1891.

T. : *Ebenus* O. Kuntze, *nom. illeg.* (≡ *Maba* J. R. Forster et G. Forster)

Diospyraceae Voigt, Hort. suberb. Calcutta. : 343. 1845.

Type : *Diospyros* L.

Note : Although *Ebenus* O. Kuntze *nom. illeg.* is not conserved, *Ebenaceae* Gürke is conserved (App. II B, ICBN 1988).

DIOSPYROS L., Sp. Pl. : 1057. 1753 & Gen. Pl. ed. 5 : 478. 1754.

LT. : *D. lotus* L. vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2. 2. : 720. 1913.

Maba J.R. & G. Forst. Char. Gen. Pl. : 121. 1776.

T. *Diospyros kaki* Thunb.

1a. Seeds with ruminant albumen

2a. Leaves with secondary distinct venation, lower surface pubescent, not black when dry; calyx lobes of female flowers cordate, margins wavy, forming in fruits a very shallow cup; corolla of male flowers ± tubular; seeds oblong, compressed

D. melanoxylon

2b. Leaves with secondary venation indistinct, turn black when dry; calyx lobes of female flowers rounded, reflexed and accrescent in fruits, not wavy; corolla of male flowers urceolate; seeds ovoid or globose

D. sylvatica

1b. Seeds with albumen not ruminant

3a. Corolla salver-shaped, densely fulvous or rufous-tomentose without; stamens about 16; ovary hairy

D. lancifolia

3b. Corolla urceolate; glabrate or nearly so without; stamens 24-64; ovary densely pilose

D. malabarica

Diospyros lancifolia Roxb., Fl. Ind. 2 : 537. 1832; Hara *et al.*, Enum, 3 : 77. 1982; *D. multiflora* Wall. (Num. List No. 4144. 1831, *nom. nud.*) ex A.P. DC. in Alph. DC. Prodr. 8 : 231. 1844.

Trees; branchlets soon glabrous. Leaves oblong or lanceolate, acuminate, base rhomboid or subobtuse, glabrous, coriaceous, midrib deeply impressed from above, much elevated below. Male flowers: sessile, clustered; calyx-lobes 4, obovate, ferruginous sericeous, deciduous; filaments minutely pilose. Female flowers: solitary, subsessile; calyx-lobes ovate with reflexed margins, cordate-ovate, densely fulvous tomentose, persistent; corolla as of male; ovary 8-celled. Fruits ovoid, or subglobose, ferruginous villous; fruiting calyx 2.5 cm in diam.

Fl. : Mar.-Apr. Frt. : following Feb.-Mar.

Occasionally found in mixed forests.

Siang : 16830.

India, Nepal, Malaysia.

Timber suitable for building construction.

D. malabarica (Desrousseaux) Kosteletsky, Allg. Med. Pharmc. Fl. 3 : 109. 1834; Panigrahi & Murti in Bangladesh J. Bot. 10(1) : 36. 1981; *Garcinia malabarica* Desr. in Lam., Encycl. Meth. Bot. 3 : 701. 1789; *Diospyros embryopteris* Pers., Syn. Pl. 2 : 624. 1807, pro. part, *nomen superfl. illeg.*; C.B. Clarke in Hook. f. F.B.I. 3 : 556. 1882, pro. part. excl. syn. *E. peregrina* Gaertn. (1788), non Spreng. (1825).; Haines, Botany 2 : 543; *D. peregrina sensu* Gürke in Engl. & Prantl., Nat. Pflanzenfam. 4 : 164, t. 87. 1897, pro. part. *majore excl. ref.* Gaertn., non *D. peregrina* (Gaertn.) Gürke. ('Gaub Persimmon').

Trees upto 14 m high and 70 cm diam.; branches low spreading; branchlets glabrous; bark black, scaly, strips 5-20 mm wide, brittle. Live bark 4-10 mm thick, dark beefy red. Leaves oblong or narrowly oblong, obtuse at base, obtuse or sub-acuminate at tip, glabrous, coriaceous, shining, secondary veins many, scarcely raised, 14-22 × 5 cm. Male flowers : white in short umbellate cymes, peduncles 8-10 mm long; buds ovoid-oblong; calyx urceolate, silky, lobes triangular, deciduous; filaments pilose; female flowers : white, 1-5 together, peduncles stout, 10-12 mm long; calyx-lobes sub-auriculate at base; staminodes 1-12, ovary 8-celled. Fruits usually solitary, 2.5-5 cm in diam., subglobose, glandular or rusty, fruiting calyx accrescent, pulp sweet, astringent. Seeds 4-8, up to 25 mm long, elliptical-wedge-shaped.

Type : Panitsjiku maram, Rheede, Hort. Malab. 3 : 45. t. 41. 1682.

Fl. : Apr.-May. Frt. : Mar.-Apr. (of following year).

Frequent along streams in rocky ravines.

Korba : 8703.

India, Nepal, Sri Lanka, Malaysia.

Fruits are edible. Rind and bark have astringent properties and used in diarrhoea. The oil from seeds is used in dysentery. Timber moderately hard and heavy, used for boat building and construction.

D. melanoxylon Roxb., Pl. Corom. 1 : 36. t. 46. 1795; Haines, Botany 2 : 545; Kostermans, Rev. Handb. Fl. Ceylon 3 : 37. 1981. (*Tendu*)

Trees to 8 m high and 2 m in diam.: branchlets with grey or rusty tomentose bark. Leaves sub-opposite, broadly ovate or elliptic, narrowed at both ends, coriaceous, tomentose to glabrescent beneath, 10-20 × 5-6 cm. Monoecious : male flowers : 4-6-merous, in 3-12-flowered, villous, simple or branched, often drooping cymes; calyx-lobes acute; corolla-lobes yellow, hairy without, stamens 5, (4-20); female flowers : solitary axillary, short-

peduncled; calyx-lobes cordate, broadly 2-winged; corolla as of males; staminodes 8-10; ovary 4-8-celled, densely hairy. Berry globose to ovoid, 2.5-3.5 cm in diam., densely hairy when young, smooth and yellowish when ripe; fruiting calyx thick, coriaceous, margin wavy, reflexed. Seeds 1-4, oval-wedge-shaped, up to 20 mm long.

Type : Roxburgh Icon. t. 46. (CAL).

Fl. : Apr.-May. Frt. : Apr. (of following year).

Common in the mixed dry deciduous forests.

Keonchi : 19156; Pasan to Semra : 15370; Katghora : 8638, 6100.

India, Sri Lanka.

Fruits edible. Leaves are used for rolling and wrapping tobacco to make 'Bidi' or 'beedee', the Indian Cigarette. The leaves of root suckers are preferred as they are larger, they are cut in quadrangular pieces and dried; the dried leaves do not tear, nor deteriorate. Timber is one of the oldest kinds of ebony for export.

D. sylvatica Roxb., Pl. Corom. 1 : 37. t. 47. 1795; Haines, Botany 2 : 543. Kostermans, Rev. Handb. Fl. Ceylon 3 : 35. 1981.

Large trees upto 30 m high and 60 cm diam. dioecious and polygamous. Leaves narrow-elliptic or elliptic-oblong, acute or acuminate, narrowed at base, glabrous, 8-15 × 3-5 cm, smooth, thinly coriaceous. Male flowers : in small, dense, peduncled, axillary cymes; calyx-lobes 4, rounded, minutely hairy; corolla short urceolate, glabrate without, lobed half way down, lobes: 4; stamens 12-24, glabrous or sparsely pilose, paired in threes or in fascicles; female flowers : solitary, on special branchlets, silky pubescent, white; calyx-lobes 4, ovate-oblong; corolla as in male, bigger; staminodes 4; styles 4-branched. Fruits about 2 cm in diam., globose, nearly glabrous, 1-4-seeded; fruiting calyx accrescent with 4 reflexed-lobes. Seeds 2-8, ovoid to oblong or globose, upto 14 mm long.

Fl. : Apr.-May. Frt. : Jan.-Mar.

Frequently in damper places inside semi-evergreen forest.

Kabirchabutra : 13368.

India, Sri Lanka.

SYMPLOCACEAE

Desfontaines, Mém. Mus. Hist. Nat. (Paris) 6 : 9. 1820 ('Symploceae').

T. : *Symplocos* N. J. Jacquin.

SYMPLOCOS N. J. Jacq., Enum. Syst. Pl. Carib. 5. 24. 1760.

T. : *S. martinicensis* N. J. Jacq.

- 1a. Twigs glabrous ; inflorescences in spikes ; flowers sessile ; bracts persistent ; disc glabrous ; drupe ampuliform, ribbed *S. laurina*
- 1b. Twigs hairy ; inflorescences in racemes ; flowers pedicelled ; bracts caducous ; disc hairy ; fruits ellipsoid, smooth *S. racemosa*

Symplocos laurina (Retz.) Wall., Num. List No. 4413. 1831 ; Panigrahi & Murti in Bangladesh J. Bot. 10(1) : 32. 1981 ; *Myrtus laurinus* Retz., Obs. Bots. 4 : 26. 1786 ; *Symplocos spicata* Roxb., Fl. Ind. 2 : 542. 1832 ; Haines, Botany 2 : 547 ; *S. cochinchinensis* (Lour.) S. Moore subsp. *laurina* (Retz.) Nooteboom, Rev. Symplo. 156. 1975 ; et Handb. Rev. Fl. Ceylon 3 : 458. 1981.

Small trees. Leaves shining, broadly lanceolate or elliptic-oblong, acute, base cuneate, serrate, or serrulate, veins distant, parallel, glabrous, 8-15 × 3-7 cm. Inflorescences 5-10 cm long, branched, axillary ; flowers white, bracteate ; calyx-tubes embraced by 3, persistent, ovate-obtuse bracteoles, lobes 5, round, glabrous or puberulous, persistent ; petals 5, imbricate ; stamens many, multi-seriate ; ovary usually 3-celled, slightly depressed. Fruits globose ovoid, ribbed, crowned by small, glabrous, cylindric, calyx.

Fl. : Sept.-Oct. Frt. : Apr.

Frequently seen along streams.

Pasarkhet : 12966.

India, Sri Lanka.

Note : Nooteboom (1975, 1981) reduces *Myrtus laurinus* Retz. Obs. Bot. 4 : 26A. 1786 [*Symplocos laurina* (Retz.) Wall.] [as 'Cat. 4416. 1831. nomen'. ex G. Don, Gen. Syst. 4 : 3...1837] as a subspecies of *Dicalyx cochinchinensis* Lour. (1790) [= *Symplocos cochinchinensis* (Lour.) S. Moore 1914]. This is not in conformity with the rule of priority and Art. 11.3. ICBN 1988.

S. racemosa Roxb., Fl. Ind. 2 : 539. 1832 ; Haines, Botany 2 : 547 ; Nooteboom, op. cit. 271. 1975.

Evergreen trees. Leaves oblong, elliptic or elliptic-lanceolate, cuneate at both ends, obscurely crenate, coriaceous, glabrous or pilose on midrib beneath, 5-12 × 3.5-6 cm. Inflorescences 5-7.5 cm long, hairy, axillary, simple ; flowers bracteate, white, turning yellow ; calyx-tubes usually glabrous,

sepals 5, broadly ovate-oblong, connate below, minutely pubescent; petals 5, connate below; stamens many, multi-seriate. Fruits ellipsoid, smooth, purple-black, crowned by calyx.

Fl. : Oct.-Jan. *Frt.* : Dec.-May.

Common in open forests.

Pasan : 13278 ; Korbi : 15331

India.

OLEACEAE

Hoffmannsegg et Link Fl. Portug. 1 : 385. 1813-20. (*Oleaginee*)

T.; Olea L.

JASMINUM L. Sp. Pl. 7. 1753 & Gen. Pl. ed. 5. 7. 1754.

LT. : *J. officinale* L. vide N. L. Britton, Fl. Bermuda : 287. 1918.

- 1a. Leaves glabrecent; cymes lax, 12-20-flowered; pedicels 0.5-0.7 cm long; calyx-teeth 3-4 mm long; corolla-lobe oblong-acute *J. arborescens*

1b. Leaves pubescent; cymes dense, many-flowered, pedicels upto 0.3 cm long or absent; calyx-teeth less than 1 mm long, or absent; corolla-lobe elliptic *J. auriculatum*

Jasminum arboreascens Roxb. Fl. Ind. ed. Carey & Wall. 1 : 94. 1820;
Haines, Botany 2 : 551; Grohmann in Fl. West Pakistan No. 59 : 20.
f. 4E. 1974. (*Tree Jasmini*; *Bela Chameli*)

var. *arborescens*.

Large shrubs, not twining; branchlets scandent, hairy. Leaves opposite, ovate, acute, subcordate or broadly-ovate, shortly acuminate, glabrous with age, veins distinct beneath, lower divaricate, 13-20 × 8.5-13 cm; petioles 1-2.5 cm long. Cymes trichotomous, hairy, 12-20-flowered, lax; flowers white; calyx-teeth short, linear, pubescent, divaricate, basal sinus wide; corolla-tubes about 1.5 cm long, lobes lanceolate, as long as or longer than tubes; stamens included; stigmas 2; berries oblong or ellipsoid, often curved, nearly black.

Iconotype : India, Roxburgh, Icon. 1514 (K, CAL).

Fl. : Apr.-May, *Frt.* : June-July.

Common along streams, between rocks.

Pali : 8590.

India, Pakistan.

Juice of leaves enters into prescriptions in bronchial obstructions. Leaves astringent, stomachic, tonic and berries used as tonic.

C.B. Clarke (1882) distinguishes three varieties var. *arborescens*, var. *latifolium* (Roxb.) C.B. Clarke and var. *montana* (Roth) C.B. Clarke. The specimen from Bilaspur belongs to the var. *arborescens* in being shrubs without twining branches and leaves ovate with rounded or cordate base and young parts hairy.

J. auriculatum Vahl, Symb. Bot. 3 : 1. 1794; Haines, Botany 2 : 551. ('Juthika' 'Juhi', 'Banamallika'—Oriya).

Scandent, bushy shrubs; branches usually densely pubescent. Leaves simple, sometimes with 2 small stipule-like lateral leaflets, ovate, acute or acuminate, base obtuse or round, pubescent, veins a few, lowest oblique, Cymes compound, many-flowered, terminal and from upper leaf-axils, paniculate, grey-pubescent; flowers greenish white; calyx-teeth minute, narrowly oblong or absent; corolla-tubes 1-1.5 cm long, lobes elliptic; stamens included; stigmas 2. Berries globose, black, about 0.5 cm in diam.

Fl. : Apr.-Aug. Frt. : Dec.-Feb.

Frequently found near streams; also under cultivation.

Lamni : 19242.

India, Pakistan, Sri Lanka.

Flowers used for perfumed hair-oils and attars.; also used for consumption.

APOCYNACEAE

A. L. Jussieu, Gen. Pl. : 143. 1789 ('Apocineae')

T. : *Apocynum* L.

Plumeria rubra L., (*P. acuminata* Ait.; *P. acutifolia* Poir.), native of Central America, and *Tabernaemontana divaricata* (L.) R. Br. ex Roem. & Schult., a native of Southern Himalaya, are cultivated in the gardens.

1a. Anthers exserted

WRIGHTIA

1b. Anthers included

2a. Anthers adhering to stigmas, anther-cells spurred; corolla-lobes overlapping to right

3a. Climbers; leaves opposite; corolla-mouth without scales

ICHNOCARPUS

- 3b. Tree or shrubs; leaves whorled; corolla-mouth with scales NERIUM
- 2b. Anthers free from stigmas, anther-cells not spurred; corolla-lobes overlapping to left
- 4a. Plants armed; ovary syncarpous, 2-celled CARISSA
- 4b. Plants unarmed; ovary of 2 distinct carpels
- 5a. Leaves alternate; flowers 5-8 cm long, showy, yellow; calyx glandular, lobes 7-20 mm long; corolla-tubes widened towards mouth; ovules a few in each carpel; fruits drupaceous THEVETIA
- 5b. Leaves opposite; flower less than 5 cm long, white or pink; calyx eglandular, lobes upto 5 mm long; corolla-tubes not widened towards mouth; ovules many in each carpel; fruits follicular
- 6a. Herbs or undershrubs; ovules 2-seriate; follicles 5-7 cm long CATHARANTHUS
- 6b. Trees or shrubs; ovules many-seriate; follicles upto 40 cm long HOLARRHENA

CARISSA L., Syst. Nat. ed. 12 (2) : 189. 1767, et Mant. Pl : 7, 52.
1767, *nom. cons.*

T. : *C. carandas* L.

- 1a. Leaves elliptic-oblong, obtuse or emarginate at apex, subcordate at base, widest above middle, 5-8 cm long; peduncles well-developed, 2.0-2.5 cm long; cells of ovary 4-ovuled; berries ellipsoid, about 2 cm in diam *C. carandas*
- 1b. Leaves ovate or sub-orbicular, acute and mucronate at apex, rounded or slightly acute at base, widest in or below middle, 1.5-4.5 cm long; peduncles obsolete or short, not exceeding 1.5 cm in length; cells of ovary 2-ovuled; berries ovoid, upto 1 cm in diam *C. spinarum*

Carlissa carandas L., Mant. Pl. : 52. 1767; Haines, Botany 2 : 561.
(*Karonda*—Oriya).

Large shrubs or small trees; branches dichotomous, rigid; axils and nodes with 2 simple or forked thorns. Leaves sub-sessile, thinly coriaceous, shining above, cymes terminal, peduncled, puberulous, lax, usually binate; flowers crowded, white or pale rose-coloured; calyx-segments subulate-lanceolate, acute, puberulous and ciliate; corolla-tubes upto 2.5 cm long, pubescent within with swollen throat, lobes oblong lanceolate, acute,

pubescent, about half as long as tubes; stamens inserted near apex of corolla-tubes, anthers apiculate. Berries ellipsoid, 1-2.5 cm in diam., 4-or more-seeded, red, then black.

Type : Rumph. Herb. 7, t. 25-1755.

Fl. : Mar.-May. *Frt.* : Nov.-Feb.

Common at the edge of the forest, also under cultivation.

Pasan to Semra : 15355; Kabirchabutra : 19183.

India, Nepal, Sri Lanka, Burma, Malaysia.

Ripe fruits are sweet and edible, unripe ones pickled. The wood is suitable for turnery. Tusser silk worms feed on it.

C. spinarum L., Mant. Alt : 559. 1771, excl. syn. Rumph: Haines, Botany 2 : 560. (*Anka, Karamdika*—Oriya).

Small shrubs; branches diffuse or scandent; thorns slender, simple or forked. Leaves shining, with 3-6 secondary veins conspicuous, spreading and then arched or looped well forward. Cymes sessile or shortly peduncled, many-flowered, close, terminal and axillary, pubescent; flowers white; corolla-tubes thinly pubescent, petals oblong or oblong-lanceolate. Berries subglobose or elliptic, 2-4-seeded.

Type : Koenig in Herb. Linn. 295/2 (LINN).

Fl. : Mar.-May. *Frt.* : Nov.-Jan.

Common in open forests, also under cultivation.

Kabirchabutra : 13312; Marwahi to Pasan : 19061.

India, Sri Lanka, Burma.

Flowers are eaten by the villagers. Leaves rich in tannin (9-15%). Fruits are pickled. The wood is suitable for turnery, for making combs and spoons etc.; shrub used for fences.

CATHARANTHUS G. Don, Gen. Hist. 4 : 71, 95. 1837. Stearn, Lloydia 29 : 196-200. 1966.

LT. : *Catharanthus roseus* (L.) G. Don (vide Huber, Rev. Handb. Pl. Ceylon 4 : 43 1983).

C. roseus (L.) G. Don, (*Periwinkle*) a native of Madagaskar, is grown in the gardens. It is rich in about 67 named alkaloids, notably Vincristine and others which have retarding effect on progress of leukaemia and was discovered when tested for alleged effects in diabetes. It has become an

important drug because of its cytostatic properties and acts as growth inhibiting for tumour.

Airy Shaw (1973), as also Huber (1983) reduce *Lochnera* Reichb. f. (Conspect Reg. Veg. : 134. 1828) as a congeneric synonym of *Catharanthus* G. Don (1837), although the latter is not listed as *nom. cons.*

Catharanthus pusillus (Murr.) G. Don, Gen. Hist. 4 : 95. 1838; *Vinca pusilla* Murr., Novi Comment. Soc. Regiae. Sci. Gott. 3 : 66, t₁, t₂. 1773; Haines, Botany 2 : 563; *Lochnera pusilla* (Murr.) K. Schum. in Engl. & Prantl., Pflanzenfam. 4(2) : 145. 1895. (Sanghi-Sansk.).

Type : Murray. l.c. t₁, t₂.

Erect, annual, glabrous, pale green herbs; branched from base; stems and branches acutely 4-angled. Leaves opposite, narrowly lanceolate, acuminate, base attenuate, margin minutely scabrid; stipular glands subulate. Flowers solitary axillary, white, subsessile; calyx 5-partite, sepals filiform; corolla-mouth narrow, hairy, swollen above, tube salver-shaped, 6-9 mm long, lobes obovate, 2 mm long; ovules 6 or more, 2-seriate; in each carpel. Follicles 2, slender, glabrous, diverging, straight, membranous, 5-8 cm long.

Fl. & Frt. : July-Sept.

Frequently found in moist places, in dry cultivated fields and open forests.

Pasarkhet to Siang : 19423.

India, Sri Lanka.

Plant poisonous, particularly to cattle, causing temporary blindness with urticarial rash on the body; relieves lumbago pain.

HOLARRHENA R. Br., Asclepiadaceae 51. 1810, et in Mem. Wern. Nat. Hist. Soc. 1 : 62. 1811.

T. : *H. mittis* (Vahl) Roem. & Schult. (*Carissa mittis* Vahl).

Holarrhena pubescens (Buch.-Ham.) Wall. ex G. Don, Gen. Syst. 4 : 78. 1838.; Kruif, Medd. Landbouwh. Wagenig. Nederland : 17, figs. 5, 6, maps 4, 5. 1981; Panigrahi, Taxon 36(2) : 464. 1987. *Nerium antidysentericum* L. Sp. Pl. : 209. 1753, p.p., excl. lectotype *Hermann* 44 (BM; vide R. Brown, 1811). *Echites antidysenterica* sensu Roxb. Hort. Beng. 20. 1814, non (L.) Roxb. (1814). *E. antidysenterica* Roth in Roem. et Schult. Syst. Veg. 4 : 394. 1819, et Nov. Gen. Sp. : 138. 1821, non. (L.) Roxb. ex Fleming (1810), p.p. *E. pubescens* Buch.-Ham. in Trans. Linn. Soc. 13 : 521. 1822. *Holarrhena antidysenterica* sensu Wallich, Num. List No. 1672. 1829, non (L.) Wall. (1829) : Hook. f. Fl. Brit. Ind. 3 : 644. 1882; Haines, Botany 2 : 564. (Kura, Kuruchi, Koriya, Indrajava—Oriya, Sansk.).

Large shrubs or small trees. Leaves shortly petioled, elliptic-oblong obtusely acuminate, base obtuse, 7-15 cm long, rounded or acute, 10-25 × 6-12 cm. Cymes terminal or subaxillary, corymbose; flowers white, about 3 cm across, puberulous; calyx 5-lobed or -partite, with small basal glands within, sepals acuminate; corolla-tubes slender, salver-shaped, 10 mm long, pubescent; lobes oblong, 10-14 mm long, tip rounded. Follicles 2, slender, terete, coriaceous, with small white spots, 15-30 cm long.

Fl. : May-July. *Frt.* : Dec.-Feb.

Common in damp localities, near streams, open forests.

Katra : 16731; Pasan to Korbi : 19093; Pasarkhet to Siang : 19407; Pasarkhet : 12942.

India, Malaya Peninsula.

A.O. Chater (1982) and Rani & Mathew (1983) treat *Nerium antidysentericum* L. as *nom. ambig.* and also set aside the priority of *Echites antidysenterica* Roxb. ex Flem. (1810). Stevens in *Fl. Hasan* (1976) accepts *E. antidysenterica* Roth as the basionym of *H. antidysenterica* (Roth) DC. because *E. antidysenterica* Roxb. allegedly according to him, "is an unpublished name"; he also rejects *Holarrhena antidysenterica* Wall., based on *E. antidysenterica* (L.) Roxburgh (1814), because, allegedly again, it "lacked a description". Panigrahi (*Taxon* 36 (2) : 464. 1987.) discusses the nomenclatural problems involved.

Bark, known as Conessi Bark, Tellichery bark, is astringent, anthelmintic stomachic, antipyretic and tonic, used in amoebic dysentery; contains alkaloid conessine and tannin.

ICHNOCARPUS R. Br., Asclepiadaceae 50. 1810, et in Mem. Wern. Nat. Hist. Soc. 1 : 61. 1811, *nom. cons.*

T. : *I. frutescens* (L.) R. Br. (*Apocynum frutescens* L.).

Ichnocarpus frutescens (L.) R. Br. in Mem. Nat. Hist. Soc. 1 : 62. 1811, et in Ait., Hort. Kew. ed. 2, 2 : 69. 1811; Haines, Botany 2 : 573; *Apocynum frutescens* L., Sp. Pl. : 213. 1753, *Echites frutescens*, (L.) Roxb. Hort. Beng. 20. 1814. (*Shyumalata*, *Kalidudhi*—Oriya).

Climbing shrubs; glabrous or branches softly tomentose. Leaves opposite, elliptic-oblong or lanceolate, acute or acuminate, base rounded or acute, 4-11 × 2-5 cm. Cymes pubescent, terminal and axillary, paniculate, leafy; flowers white; calyx 5-fid, lobes ovate obtuse or subacute; corolla tubular, twice as long as calyx, tubes inflated in middle, lobes 6-7 mm long, falcate, acuminate, mouth and margins sparingly hairy; stamens inserted near

middle of tubes, anthers sagittate, connivent, adnate to stigma; nectary 5-lobed. Follicles slender, curved, acute, densely red tomentose when young, 7-15 cm long.

Type : Herb. Hermann 3 : 29 (BM).

Fl. : Sept.-Dec. *Frt.* : Jan.-Apr.

Common in hedges, on shrubs in dry localities.

Khondra : 12724 ; Khuria : 15483 ; Korba : 8659.

Indomalaysia, Australia.

Roots demulcent, tonic, diaphoretic and diuretic. Powdered roots used in diabetes and stone in bladder. Switchy branches used for fishing nets and basket-making.

NERIUM L., Sp. Pl. : 209. 1753 & Gen. Pl. ed. 5. 99. 1754.

LT. : *N. oleander* L. vide Steudel, Nom. 1 : 553. 1821.

Nerium indicum Mill. Dict. Abr. ed. 8. No. 2. 1768 ; *N. odoratum* Soland. in Ait., Hort. Kew. ed. 1.1 : 297. 1789 ; Haines, Botany 2 : 567 ; *N. odoratum* Lam., Encycl. Meth. Bot. 3 : 456. 1792. (Sweet-scented *oleander*. *Karavira*—Oriya).

Large shrubs. Leaves 3-4-nately whorled, linear-lanceolate, base and apex acute, thick, coriaceous, 10-20 cm long. Cymes terminal, racemose; flowers about 4.5 cm across, sweet smelling, purple or white; calyx 5-partite, glandular within, sepals subulate, lanceolate; corolla salver- or funnel-shaped, tubes cylindric, 12-15 cm long, throat with broad, laciniate, toothed scales; stamens inserted at base of widened portion of tube, anthers connivent and adnate to stigma, spurs of anthers linear, twice as long as cells, tips of connectives greatly extended, pilose. Follicles cylindric, straight, hairs appressed, 15-22 cm long.

Fl. : Feb.-July. *Frt.* : Sept.-Dec.

Commonly planted, also found as escapes from cultivation.

Kabirchabutra : 13305.

Native of W. Himalaya (Fl. Hassan), now planted and naturalised throughout Asian tropics.

Chief active principle in leaves is Oleandrin; it stimulates heart and acts as a tonic. Bark contains glycosides with digitalis-like activity.

THEVETIA L. *Opera Varia* (*Syst. Nat.* ed.) : 212. 1758. *nom. cons.*

T. : *T. ahouai* (L.) A. de DC. (*Cerbera ahouai* L.) (*typ. cons.*).

Thevetia peruviana (Pers.) K. Schum. in Engl. & Prantl. *Pflanzenfam.* II. 4 : 159. 1895. Merr. in Philipp. Jour. Sci. Bot. 9 : 130. 1914. *Cerbera peruviana* Pers. *Syn. Pl.* 1 : 267. 1805. *Thevetia nerifolia* Juss. ex Steud., *Nom. ed.* 2. 2. : 680. 1814 (as *nerifolia*) ; Haines, *Botany* 2 : 562. *Cascabela thevetia* (L.) Lippold in Fedde Report 91 : 52. 1980, *Cerbera thevetia* L. *SP. Pl.* 209. 1753. ('Kaner', 'Kanear'—Oriya).

Large shrubs or small trees. Leaves crowded, alternate, single-veined, linear, tapering at both ends, glabrous, margins revolute. Cymes subterminal, shorter than leaves, usually 1-flowered; about 6 cm long, yellow, funnel-shaped; calyx glandular within; corolla salver-shaped, lobes spreading; stamens inserted in tube, anthers connivent; ovary with 2 carpels, ovules 2 in each carpel. Drupes rounded, subglobose, somewhat angular, indehiscent.

Fl. & Frt. : Almost throughout the year.

Commonly planted, also found naturalised.

Marwahi : 19031.

Native of Central and South America; naturalised and cultivated throughout tropics.

Note : Both Airy Shaw (1973) and Mabberley (1987) reduce *Cascabela* Rafin. as a congeneric synonym of *Thevetia* L. *nom. cons.* although Mabberley remarks that of "all the 8 tropical American species", excepting the type species of *Thevetia* L. "sometimes considered a separate genus *Cascabela* Rafin". And, Huber (1983) cites *Cerbera thevetia* L. (1753) as the first synonym (= basionym) of *Thevetia peruviana* (Pers.) Merrill and *Cerbera peruviana* Pers. (1805) as a synonym, suggesting that Merrill (1914) was guided by the rule of tautonym [Art. 23.4; Art. 55. 1(a), ICBN 1988].

WRIGHTIA R. Br. *Asclepiadaceae* : 73. 1810, et in *Mem. Wern. Nat. Hist. Soc.* 1 : 73. 1811.

LT. : *W. zeylanica* (L.) R. Br. ('*zeylonica*') (*Nerium zeylonicum* L.) vide Pfeiffer, *Nom.* 2(2) : 1621. 1874.

Wrightia arborea (Dennst.) Mabberley in *Taxon* 26 : 533. 1977; *Periploca arborea* Dennst., *Schlüssel* : 13, 23, 35 (1818) & in *Forts. Allg. Deutsch. Garten-Mag.* 3 : 32, 41, 83 (1818). *Wrightia tomentosa* Roem. & Schult., *Syst. Veg.* 4 : 414. 1819; Haines, *Botany* 2 : 568; Nagan in *Ann. Miss. Bot. Gard.* 52 : 147. 1965, *W. coalita* [Buch.-Ham. ex] Dillwyn, *Review* : 40. 1839, *nom. illeg.* (include *Periploca arborea* Dennst. 1818).

Type : *Klein s.n.*

Type : Same as for *Periploca arborea* Dennst. (1818), (*Dudhi-Hindi*).

Large shrubs or small trees; branches pubescent. Leaves elliptic, caudate-acuminate, base acute, often tomentose on both surfaces, dark brown when dry, $5-10 \times 2-5$ cm. Cymes many-flowered, terminal or sub-axillary, sessile or peduncled, corymbose; flowers greenish-orange or cream-coloured, about 2.5 cm in diam., calyx 5-partite, with glands or scales inside, sepals half as long as corolla-tubes rounded; corolla salver-shaped, throat with 1-2 series of scales, lobes linear- or obovate-oblong; stamens inserted near apex of tubes, filaments dilated, anthers white, sagittate, adhering to stigma. Follicles 15-30 cm long, connate into a cylinder with a deep groove, verrucose with white tubercles.

Type : Rheede, Hort. mal. 9 : t. 3 (flowers), 4 (fruits) 1689.

Fl. : Apr.-July. Frt. : Dec.-Feb.

Common in damp places, open forests.

Korba : 8639.

India, Sri Lanka, Burma.

Dried bark is used as an adulterant and substitute of *Kuruchi* bark; alkaloid conessine is the active principle in both.

Note 1. : *Periploca arborea* Dennst. (1818) is valid only because *Periploca* L. was a valid genus; the new generic names in Dennst. (1818) are all *nomina nuda*. (Stafleu TL 1 : 102. 1967).

2. : Type of *W. tomentosa* Roem. et Schult is Klein s.n. (B).

ASCLEPIADACEAE

R. Br. the Asclepiadæ : 12, 17. 1810 ('Asclepiadæ')

T. : *Asclepias* L.

1a. Filaments free; pollen-masses glandular, 2 in each cell

2a. Flowers in terminal or axillary peduncled, dichotomous, few-flowered cymes, flowers lax; corolla-lobes imbricate, 10-12 mm long; appendages of corpuscles oblong; stigmas broadly conic

CRYPTOLEPIS.

2b. Flowers in axillary, subsessile, many-flowered cymes, flowers crowded; corolla-lobes valvate, 4-5 mm long; appendages of corpuscles dilated or hooded; stigmas 5-angled, crown flat

HEMIDESMUS.

1b. Filaments connate into a tube; pollen masses waxy, 1 in each cell

- 3a. Anthers without a membranous tip ; pollinia sessile or subsessile LEPTADENTIA
- 3b. Anthers with a membranous tip ; pollinia usually stalked
- 4a. Pollinia pendulous from corpuscle
- 5a. Erect shrubs ; corolla-lobes valvate in bud ; corona single CALOTROPIS
- 5b. Twining herbs ; corolla-lobes imbricate in bud ; corona double
- 6a. Leaves linear or linear-lanceolate ; follicles smooth, slender OXYSTELMA
- 6b. Leaves broadly ovate, cordate ; follicles echinate PERGULARIA
- 4b. Pollinia erect or horizontal on corpuscle (rarely pendulous in *Tylophora*)
- 7a. Corona adnate to corolla-tubes GYMNEMA
- 7b. Corona adnate to staminal column
- 8a. Corolla campanulate MARDENIA
- 8b. Corolla rotate
- 9a. Corona-processes stellately spreading ; pollinia oblong ; pollen-masses erect ; stigmas conical or dome-shaped, follicles winged or ribbed WATTAKAKA
- 9b. Coronal-processes rounded or depressed ; pollinia globose ; pollen masses usually horizontal ; stigmas disciform, 5-gonal ; follicles smooth TYLOPHORA

CALOTROPIS R. Br. On Asclepiad. 20. 1810, et in Mem. Wern. Nat. Hist. Soc. 1 : 39. 1811.

T. : *C. procera* (W. Ait.) W. T. Ait. (*Asclepias procera* W. Ait.).

- 1a. Corolla uniformly coloured ; lobes spreading ; corona-scales truncate, narrow, shorter than staminal column, back pubescent, apex entire, with 2 obtuse auricles *C. gigantea*
- 1b. Corolla white with purple blotch on lobes ; lobes erect ; corona-scales acute, equal or longer than staminal column, glabrous on back, apex bifid, without auricles *C. procera*

Calotropis gigantea (L.) W.T. Aiton, Hort. Kew. ed. 2. 2 : 78. 1811; Haines, Botany 2 : 577; Nicolson et al. Regnum Veg. 119 : 61. 1988. *Asclepias gigantea* L., Sp. Pl. : 214. 1753. (*Madar, Akanda, Arakha—Oriya*).

Stout shrubs or occasionally small trees; branches felted-white tomentose. Leaves sessile, ovate-oblong or elliptic-ovate, base cordate, often amplexicaul, smooth above, cottony beneath, 10-20 cm long. Cymes umbelliform or sub-racemose, lateral, cottony, peduncled; flowers light purple or whitish, 2-5 cm in diam.; corolla-lobes spreading, ovate-lanceolate, revolute and twisted; corona of 5 lobes adnate to gynostegium, each with recurved vesicle at base and a pair of auricles at apex; stigmas depressed, 5-angled or -lobed. Follicles thick, recurved, obtuse, 7-10 cm long.

LT. : Herb. Hermann 2 : 112 (BM).

Iconotype : Rheede, Hort. Malab 2 : 53-56, t. 31. 1679.

Fl. : Dec.-July. Frt. : Feb.-June.

Common in open waste places, bundh of cultivated fields.

Khondra : 12762; Lamni : 19244; Korba : 8636.

Throughout tropical Asia.

From stems the bast fibers are obtained. The floss from seed is used for stuffing. The sap is toxic and used for various medicinal purposes including leprosy. Bark of the root is used in medicine as a tonic.

C. procera (Ait.) Dryand ex Ait., Hort. Kew. ed. 2. 2 : 78. 1811; Haines, Botany 2 : 578; *Asclepias procera* Ait., Hort. Kew. ed. 1. 1 : 305. 1789. ['(Ait.) Dryand'] ('Madar'—Oriya).

Shrubs, not usually over 1.5 m high. Leaves sessile, oblong, acute or sub-mucronate, cottony beneath, old glabrous both sides; peduncles often paired in axils, 2.5-6 cm long, branched, tomentose; flowers about 1 cm across; sepals glandular within, short, spreading; corolla-lobes erect, white with purple blotch in upper half; corona of 5 fleshy, laterally compressed scales, radiating from staminal column; coronal-processes with a purple, obtuse, mucous tip and fleshy, upturned white base. Follicles 5-8 cm long, recurved, somewhat sausage-shaped.

Fl. & Frt. : Almost throughout the year.

Common in waste places, bundh of cultivated fields, roadside ditches.

Palmi : 16715.

Throughout tropics.

Roots, barks, leaves and latex possess medicinal properties. Flowers are also used in religious ceremonies and worship of Lord Shiva. Latex is a rich source of hydrocarbons (gasoline). Roots used as chew sticks in Africa.

CRYPTOLEPIS R. Br., On Asclepiad., 58. 1810, et in Mem. Wern. Nat. Hist. Soc. 1 : 69. 1811.

T. : *C. buchananii* R. Br. ex Roem. & Schult. ('*buchananii*').

Cryptolepis buchananii R. Br. ex Roem. & Schult., Syst. Veg. 4 : 409. 1819; Haines, Botany 2 : 576; (*Dudhi, Nag bel*).

Twining shrubs. Leaves opposite, oblong or elliptic, shining above, pale-glaucous beneath, coriaceous, apiculate or acuminate, base acute; 7-12 × 2.5-6 cm. Cymes shortly peduncled, lax, axillary, many-flowered, paniculate, usually 2.5-5 cm long, branches short, divaricate; flowers pale yellow, about 1.5 cm across; sepals short, ovate-acute with 5 scales within; corolla campanulate, tubes short, lobes lanceolate, imbricate; coronal corona of a blunt, fleshy lobe from each sinus, coronal scales almost as long as the anthers, clavate, fleshy inserted about or above middle of corolla-tubes; staminal corona absent; anthers sagittate, connivent over style-apex. Follicles straight, rigid, gradually narrowed from about middle, 5-10 cm long.

Type : *Buchanan-Hamilton* s.n. (BM).

Fl. : May-June. Frt. : Dec.-Feb.

Climbing over bushes along forest roads.

Marwahi : 19006; Pasan : 19062; Kabirchabutra : 19186.

Peninsular India, Sri Lanka.

Yields a fibre used by the tribals for cordage and for making a kind of cloth; the plant is used medicinally (Panigrahi 1963).

GYMNEMA R. Br., On Asclepiad. 22. 1810, et in Mem. Wern. Nat. Hist. Soc. 1 : 33. 1811.

LT. : *G. sylvestre* (Retz.) R. Br. ex J.A. Schult. (*Periploca sylvestris* Retz.) vide E.P. Phillips, Gen. S. African Fl. Pl. ed. 2 : 616. 1951.

Note : Huber (Rev. Handb. Fl. Ceylon 4 : 97. 1983) lists *Asclepias lactifera* L. as the type species.

Gymnema sylvestre (Retz.) R. Br. ex Schult. in Roem. & Schult., Syst. Veg. ed. 15, 6 : 57. 1819/1820; Haines, Botany 2 : 583; *Periploca sylvestris* Retz., Obs. Bot. 2 : 15. 1781. (*Gudmar*).

Woody climbers; branchlets yellow pubescent or hirsute. Leaves broadly elliptic-oblong or obovate, acute, thinly coriaceous, sparsely to densely pubescent, base rounded or cordate, 2.5-5 × 3 cm. Cymes hairy, peduncled,

umbelliform or corymbose, 2-nate; flowers minute, yellow; calyx 5-partite, sepals ovate or broadly oblong, hairy, margins membranous; corolla campanulate with rotate limbs, tubes short, with fleshy coronal processes on throat, projecting above sinuses; each process with a decurrent base flanked by 2 rows of short stiff hairs, with ciliate margins; corolla-lobes glabrous or minutely ciliate, 2-4 mm long; gynostegium elongate, without a corona; pollinia erect from horny corpuscula, waxy. Follicles slender, glabrous, terete, gradually tapering from base to tip, usually solitary, 5-7 cm long.

Type : Koenig s.n. (LUND).

Fl. : Aug.-Sept. Frt. : Jan.-Mar.

Common on bushes in open forests.

Marwahi : 19016; Pasan : 19060.

Tropical Africa, Asia, Malaysia.

Locally, it is known as 'Gudmar', because, if a few leaves are chewed, the tongue loses the taste of sugar; hence it is considered as cure for diabetes.

HEMIDESMUS R. Br. On Asclepiad. : 45. 1810, et in Mem. Wern. Nat. Hist. Soc. 1 : 56. 1811.

T. : *H. indicus* (L.) R. Br. (*Periploca indica* L.).

Note : Farr *et al.* (1979) attribute the authority of the type species as '[(Willd.) J.A. Schult.]'.

Hemidesmus indicus (L.) W.T. Aiton, Hort. Kew. ed. 2. 2 : 75. 1811; Haines, Botany 2 : 575; *Periploca indica* L., Sp. Pl. : 211. 1753. (*Ananta Mula*—Oriya; *Indian Sarasaparilla*). Fig. 16

Twining herbs or shrubs. Leaves opposite, from broadly obovate to oblong-elliptic, linear or linear-lanceolate, apiculate, hoary or pubescent beneath; sometimes with a white streak above, 2.5-5.0 × 0.6-3.0 cm. Cymes subsessile, crowded, opposite in leaf axils; flowers green outside, purple within, 4-6 mm across; sepals 5, glandular within, acuminate, spreading; corolla rotate, lobes 4-5 mm long, thick valvate; coronal scales 5, inserted on corolla-throat, alternate with its lobes, fleshy; staminal corona absent; anthers connivent by their tips over style-apex; pollinia granular; stigmas capitate, 5-angled. Follicles long slender, terete, divaricate or reflexed, 10-12 cm long.

Type : Hermann Herb. 3 : 51. (BM).

Fl. : Aug.-Sept. Frt. : Oct.-Dec.

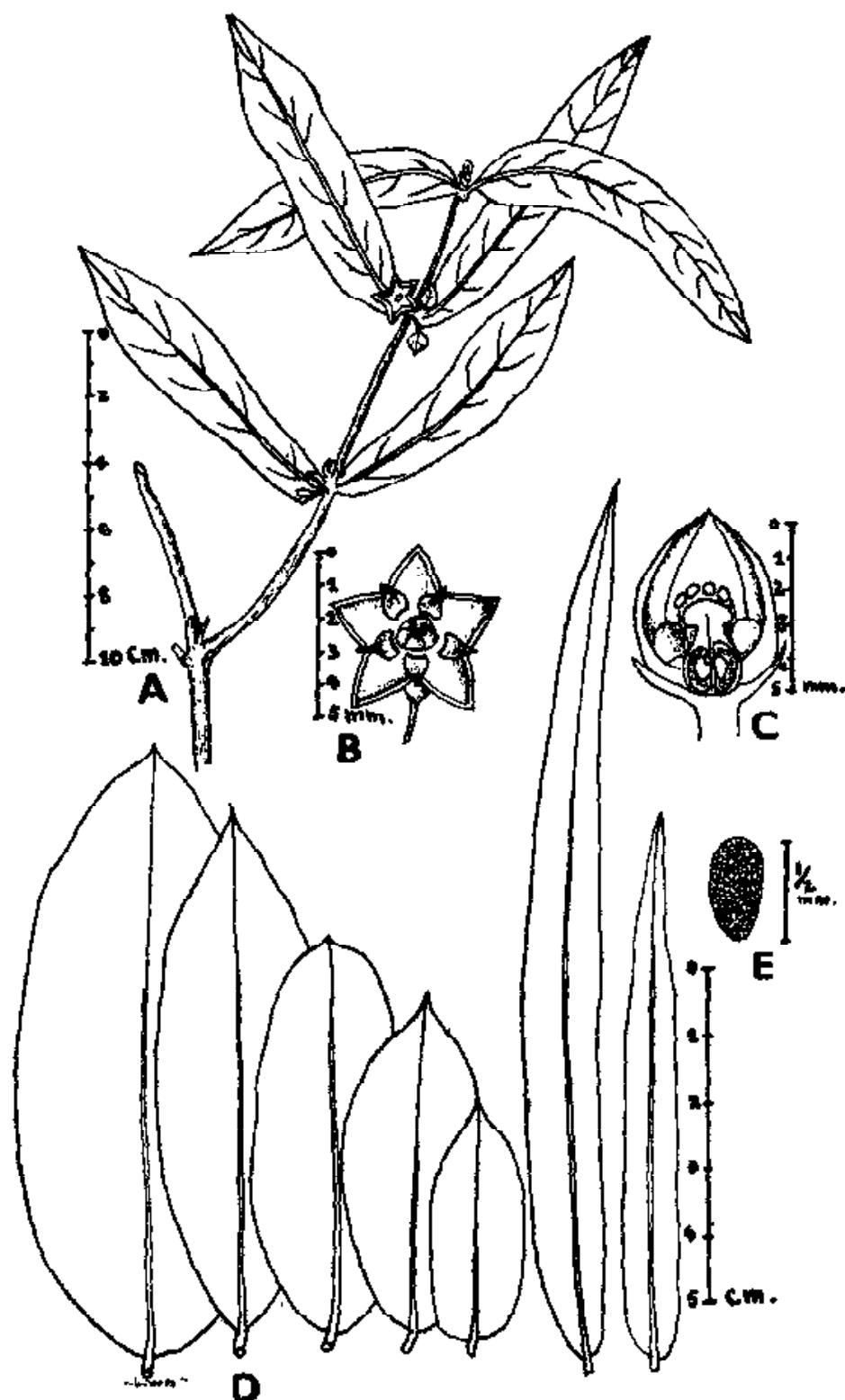


Fig. 16. *Hemidesmus indicus* (L.) R. Br.

A. Leafy branch with flowers. B. Flower. C. L. S. Flower. D. Leaves of different sizes and shapes (Polymorphic). E. Seed.

Common in moist localities in shady situations.

Korba : 19448, 8658, 8730; Keonchi : 13297.

Peninsular India, Sri Lanka.

Roots possess medicinal properties and are used as an ingredient for various diseases including leucoderma, psoriasis, and used as demulcent, diaphoretic, diuretic and alterative, prescribed in rheumatism, gravel and other urinary diseases and skin troubles.

Note : *Hemidesmus* R. Br., *Periploca* L. *Cryptolepis* R. Br. and *Cryptostegia* R. Br. are included in the family Periplocaceae Schlechter (App. II B, ICBN 1988, Airy Shaw, 1973 and Huber 1983), and Airy Shaw asterisks *Periploca* L. as 'nom cons', but this is not listed in App. IIIA.

Periplocaceae Schlechter is distinguished from *Asclepiadaceae* R. Br. by its free stamens, spathulate pollen carriers and granular pollen. Its pollination mechanism is also unique : pollen is discharged on to the spoon-shaped carriers and removed by visiting insects to whose heads the glandular base of the carrier adheres.

LEPTADENIA R. Br., On Asclepiad. : 23. 1810, et in Mem. Wern. Nat. Hist. Soc. 1 : 34. 1811.

T. : *Leptadenia heterophylla* (Del.) Decne. (vide Huber, Rev. Handb. Fl. Ceylon 4. 112. 1983).

Leptadenia reticulata (Retz.) Wight & Arn. in Wight, Cat. Ind. Pl. : 89. 1834; Contrib. Bot. India : 47. 1834; Haines, Botany 2 : 589; *Cynanchum reticulatum* Retz. Obs. Bot. 2 : 15. 1781.

Twining herbs or shrubs; hoary pubescent. Leaves ovate-cordate or elliptic acute, base obtuse or rounded or subcordate, hoary beneath, 5-7 cm long. Cymes many-flowered, peduncled, hoary, crowded axillary umbelliform, solitary or in pairs; flowers greenish white or yellow; calyx turbinate, shortly 5-lobed; lobes ovate-oblong, obtuse; corolla rotate, thick, pubescent; corolline corona of a fleshy bilobed knob at each sinus; staminal corona of inconspicuous undulating ring on lower part of stipitate gynostegium; pollinia erect from horny corpuscula, waxy; stigmas included, flat, 5-gonal, 2-cuspidate. Follicles on short thick stalks, minutely white dotted, with a long acumen and often curved tip, 7-8 cm long.

Type : *Koenig* s.n. (LD-holotype; BM-isotype).

Fl. : July-Oct. Frt. : Mar.-Apr.

Common in open mixed forests.

Pasan to Pendra : 1931; Madai : 19463.

India, Sri Lanka, eastward to Burma.

Note : *Leptadenia reticulata* is often confused with *Gymnema sylvestre*, but is easily separated by the mealy puberulous outside of corolla.

MARSDENIA R. Br., On Asclepiad. 17. 1810, et in Mem. Wern. Nat. Hist. Soc. 1. : 28, 1811.

LT. : *M. tinctoria* R. Br, vide Bullock, Kew Bull. 1956. 510. 1957.

Maradenia tenacissima (Roxb.) Moon, Cat. Pl. Ceylon ; 21. 1824; Haines, Botany 2 : 585; *Asclepias tenacissima* Roxb., Fl. Corom. 3 : 35. t. 24. 1815.

Large twiners, densely softly pubescent. Leaves opposite, velvety both sides, broadly ovate, suddenly shortly acuminate or cuspidate, deeply cordate, 5-15 × 7-13 cm; petioles 5-7 cm long. Cymes corymbosely branched; tomentose, sessile or shortly peduncled; flowers green; calyx 5-partite, segments ellipsoid; corolla sub-campanulate, lobes oblong, ciliate pubescent without, glabrous within, as long as tube; corolline corona of thickened calli and a villous ring in throat, sometimes absent; staminal corona of 5 appendages, fleshy, membranous above with erect tips; pollinia erect, waxy. Folicles velvety, usually solitary, tapering from thickest part to a short thick beak, longitudinally wrinkled, 10-12 cm long, 3.5-5 cm in diam.

Type : Roxburgh in Herb. Wallich 8176/a (K).

Fl. : Apr.-June. Fru. : Jan.-Mar.

Common over bushes in the mixed forests.

Khuria : 19335.

India, Sri Lanka, Burma, Java.

The genus *Dregea* E. H. F. Meyer (1838) was merged in *Marsdenia* R. Br. (1810) by N.E. Brown in Dyer, Fl. Trop. Afr. 4 : 417, 1903; but Bullock in Kew Bull. 19. 512, 1965 and Hara *et al.* (1982) treat them as genetically distinct. Similarly, Huber (1983) segregates *Wattakaka* (Decne.) Hassk. as genetically distinct from *Dregea* E. Mey. although Airy Shaw (1973) treats them as congeneric.

OXYSTELMA R. Br., On Asclepiad. 29. 1810, et in Mem. Wern. Nat. Hist. Soc. 1 : 40, 1811.

T. : *O. esculentum* (L. f.) Smith. (*Periploca esculenta* L. f.).

Oxystelma esculentum (L.f.) Smith in Rees, Cyclop. 25, No. 1, 1813; R. Br. ex Schult., Syst. Veg. 6 : 89, 1820; Haines, Botany 2 : 579. *Periploca esculenta* L.f., Suppl. Pl. : 168, 1782; *Sarcostemma esculentum* (L.f.) R. Holm in Ann. Miss. Bot. Gard. 37 : 482, 1950, *in adnota.*

Slender twiners or liane. Leaves opposite, usually deciduous, lanceolate or linear-lanceolate, acuminate, base acute, rounded or cordate, 7-14 cm long; petioles slender, about 1 cm long. Cymes axillary, loose racemose or umbelliform; peduncles and pedicels capillary; flowers 2.5 cm across, showy, white and pink with purple veins on petals; calyx glandular within, lobes 5; corolla broadly urceolate, campanulate or rotate, margins villous; corolline corona annular, papillose or villous within; staminal corona of 5 scales with cordate or dilated bases and 2-keeled within; pollinia pendulous, oblong compressed. Follicles oblong lanceolate or ovoid, 4-7 cm long, oblique or curved.

Type : *Koenig*, Herb. Linn 307, 7 (LINN).

Fl. : July-Sept. Frt. : Nov.

Frequently seen on *Acacia* trees along roads, in cultivated fields.

Champa to Korba : 19377.

India, Sri Lanka, Burma, China, Java.

Flowers, fruits and leaves eaten in times of scarcity; herb antiseptic, depurative and galactagogue; fresh roots prescribed in jaundice.

PERGULARIA L., Systema Naturae ed. 12 : 191, 1767. et Mant. Pl. : 8, 53, 1767, Swarupanandan, Taxon 32 : 468, 1983.

LT. : *P. tomentosa* L. vide N. E. Brown, Bull. Misc. Inform. Kew 1907 : 323, 1907.

Pergularia daemia (Forsk.) Chiov., Result. Sci. Miss. Stefani-Paoli Somal. Ital. 1 : 115, 1916; Blatter & McCann in J. Bombay Nat. Hist. Soc. 36 : 528, 1933. *Asclepias daemia* Forsk., F. Aegypt.-Arab. : 51, 1775; *Cynanchum extensum* N. J. Jacq., Misc. 2 : 353, 1782; *Daemia extensa* (N. J. Jacq.) R. Br. in Ait., Hort. Kew. ed. 2, 2 : 76, 1811; *Pergularia extensa* (N. J. Jacq.) N. E. Brown in Thistleton-Dyer, Fl. Cap. 4 : 758, 1908; Haines, Botany 2 : 579.

Foetid climbers, subhispidly hairy. Leaves opposite, membranous, broadly ovate or orbicular, acuminate, deeply cordate, pubescent beneath lobes rounded incurved, 5-10 cm across; petioles 5-10 cm long. Cymes axillary, racemiform or corymbiform; pedicel filiform; peduncles long; flowers yellowish-green and red; sepals ovate, pubescent, with 2 glands

within; corolla campanulate, ciliate; lobes broadly ovate, spreading with reflexed margins; corona white, double, coralline, at base of staminal tube, annular, 5-10 lobed or crenate; staminal column of 5 laterally compressed scales adnate to anthers and spurred behind; pollinia pendulous from horny corpuscula, waxy, Merocarps half-ovoid, beaked, with long soft bristles usually in pairs, 3-5 cm long.

Type : *Forskal* (C?).

Fl. : Oct.-Dec. *Fr.t.* : Dec.-Jan.

Common in hedges.

Palmi : 16716; Ratanpur; 19501.

Africa, India, Sri Lanka.

The plant contains cardiotoxic glycosides and has emetic properties.

TYLOPHORA R. Br., On Asclepiad. 17. 1810, et in Mem. Wern.

Nat. Hist. Soc. 1 : 28. 1811.

LT. : *T. flexuosa* R. Br. vide Bullock, Kew Bull. 1954 : 580. 1955.

Tylophora rotundifolia Buch.-Ham. ex Wight, Contrib. Bot. Ind. 50. 1834; Haines, Botany 2 : 588.

Creeping herbs; stems and branches long, pubescent or tomentose. Leaves opposite, shortly petioled, rotund base rounded or cordate, coriaceous, pilose on margins and veins below, closely appressed to ground, 5-11 cm across. Cymes hairy, many-flowered, umbellate or paniculate, peduncled; pedicels filiform, 2-5 cm long; flowers small greenish yellow; sepals deltoid, lanceolate, hispid; petals ovate, 3.5-4.5 mm long; coronal process globose, adnate to column; gynostegium sessile; stigmas disciform, 5-angled. Follicles single, broadly lanceolate, grooved on one side, glabrous, 6-7.5 cm long.

Fl. : May-July. *Fr.t.* : Nov.-Dec.

Frequently seen inside mixed forests, creeping on forest-floors.

Pasarkhet : 19388.

Peninsular India.

Used medicinally (cf. The useful Plants of India CSIR, New Delhi, 1986).

WATTAKAKA, Hasskarl, Flora 40 : 99. 1857.

Type : *Wattakaka viridiflora* (R. Br.), Hassk.

Wattakaka volubilis (L. f.) Stapf, Bot. Mag. 148. sub. t. 8976. 1923.
Asclepias volubilis L. f., Suppl. Pl. : 170. 1782. *Dregea volubilis* (L. f.) Benth. ex Hook. f. in FBI 4 : 46. 1883; Haines, Botany 2 : 586; *Wattakaka viridiflora* Hassk. Flora 40. 99. 1857, nom. illeg. superfl.

Stout climbers; branches usually pustular or lenticellate. Leaves ovate suborbicular or cordate, acuminate, base rounded or cordate, hoary with curled pubescence, 7-15 × 5-10 cm. Cymes axillary, umbelliform, drooping, peduncles 2.5-7 cm long, pedicels 1.5-3 cm long; flowers green, 1-1.5 cm across; sepals triangular, ovate-lanceolate, spreading; corolla cupular, lobes triangular, erect; staminal corona of 5 scales, hemispheric, fleshy; stamens attached to base of corolla-tubes, filaments connate in a short column, pollinia 1 in each cell, narrow oblong, erect, waxy. Follicles solitary or usually paired and divaricate, 7-10 cm long and 2.5-4 cm thick, broadly lanceolate, turgid, tapering from base, wrinkled or ribbed when dry.

Type : Koenig, Herb. Linn. 310/6 (LINN).

Fl. : May-June, Frt. : Dec.-Feb.

Common in scrub forests, along roads on bushes.

Bilaspur to Champa : 19364.

India, Sri Lanka, China, Java.

Stems yield a strong fibre. Leaves are applied on boils and for fevers in children; also cooked and eaten as a curry.

BUDDLEJACEAE

Wilhelm, Samenpfl. : 90. 1910. (*Buddleiaceae*)

T. : *Buddleja* Lissnaeus.

BUDDLEJA L. Sp. Pl. : 112. 1753 & Gen. Pl. ed. 5 : 51. 1754.

T. : *B. americana* L.

Buddleja asiatica Lour., Fl. Cochinch. : 72. 1790; Haines, Botany 2 : 591; Leenhouts in Steenis, Fl. Males. Ser. I. 6 : 337. 1962. Fl. Hassan : 509, fig. 94. 1976. Fig. 17

Large evergreen shrubs; branchlets appressedly white stellate-tomentose. Leaves opposite, lanceolate, acuminate, entire or crenate, narrowed at base, dark green, above, white tomentose beneath, 7-12 × 1.5-2 cm. Spikes

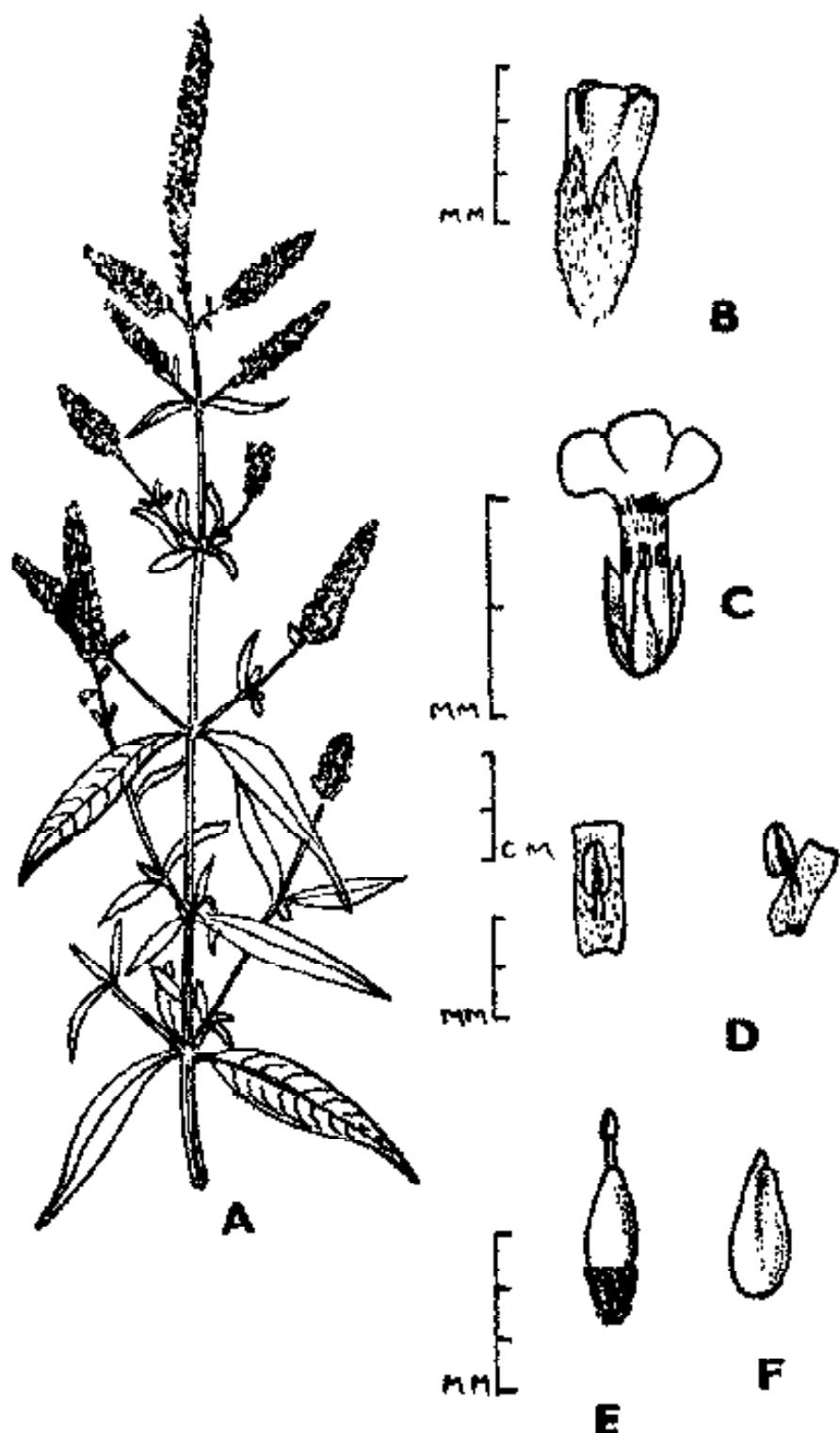


Fig. 17. *Buddleja asiatica* Lour.

A. Leafy branch with inflorescences. B. Flower. C. L. S. Flower. D. Stamens.
E. Carpel. F. Seed.

terminal and axillary, often panicled, with uninterrupted densely arranged flowers, 5-20 cm long, grey tomentose or pubescent; flowers white, 4-merous; calyx campanulate, persistent; corolla tubular, tubes 2.5-4.5 mm long, densely stellate hairy outside; stamens 4, inserted in corolla-tubes; stigmas clavate. Capsules ellipsoid, 3 mm long, septicidally 2-valved.

Fl. : Dec.-Feb. *Frt.* : Feb.-Mar.

Common in open, often disturbed or secondary vegetation near streams, in ravines, on rocky slopes.

Achanakmar : 13352.

Indomalaysia, China.

Fish poison.

LOGANIACEAE

C.F.P. Martius, Nov. Gen. et Sp. Pl. 2 : 133. 1827, ('*Loganieae*')

T. : *Logania* R. Br. nom. cons.

MITREOLA L., Opera Varia : 214. 1758.

T. : *Ophiorrhiza mitreola* L. [= *M. petiolata* (Gmel.) Torr. & A. Gray.]

Mitreola petiolata (J.F. Gmel.) Torr. & A. Gray, Fl. N. Amer. 2 : 45. 1845; Heine, in Kew Bull. 23 : 251. 1969; *Ophiorrhiza mitreola* L., Sp. Pl. : 150. 1753; *Cynoctonum petiolatum* J.F. Gmel., Syst. Nat. ed. 13.2 : 443. 1791; *C. mitreola* (L.) Britton in Mem. Torrey Bot. Club 5 : 258. 1894; Heine in Kew Bull. 17 : 172. 1963. *Mitreola oldenlandioides* Wall. ex A. DC. Prodr. 9 : 9. 1845; Haines, Botany 2 : 593.

Erect annual herbs. Leaves opposite, membranous, oblong, narrowed at both ends, glabrous, 2.5 x 1-3 cm; stipules membranous, connate in a transverse ridge; petioles 0.5 cm long. Cymes terminal and axillary, 2-3-chotomous, unilateral, helicoid; flowers sub-sessile, minute, white; calyx divided less than halfway down, lobes linear, 1-2 mm long; corolla urceolate, lobes oblong obtuse, valvate, hairy at base inside; stamens 5, included; styles 2, connate in the stigma, ultimately divergent. Capsules 2-horned, laterally compressed, erect, unilateral on branches, dehiscing from top of septum downwards. Seeds elongate, trigonous.

Fl. & *Frt.* : Oct.-Nov.

Common in road side ditches, moist shady places.

Madai to Korba : 12921.

Pantropical.

It is commonly associated with mesophytic annuals with an abundant production of very small seeds which may easily be carried by water currents.

GENTIANACEAE

A. L. Juss., Gen. Pl. : 141. 1789 (*Gentianae*).

T. : *Gentiana* L.

1a. Ovaries 2-celled	EXACUM
1b. Ovaries 1-celled	
2a. Style absent or short	SWERTIA
2b. Style present, elongate, filiform	
3a. Flowers regular; corolla-lobes with depressions or pits near base	ENICOSIMA
3b. Flowers irregular; corolla-lobes without depressions or pits	
4a. Flowers pink or white; calyx tubular; stigmas 2-lobed or -partite	CANSORA
4b. Flowers yellow; calyx campanulate; stigmas sub-entire	HOPPEA

Canscora Lam., Encycl. Meth. Bot. 1 : 601. 1785.

T. : *C. perfoliata* Lam.

1a. Stems, branches, and pedicels winged; flowers white; calyx winged	<i>C. decussata</i>
1b. Stems, branches and pedicels not winged; flowers pink; calyx not winged	<i>C. diffusa</i>

Canscora decussata (Roxb.) J.A. Schult. & J.H. Schult., Syst. Mant. 3 : 289. 1827; Haines, Botany 2 : 597. *Pladera decussata* Roxb., Fl. Ind. 1 : 418. 1820, excl. syn.

Erect herbs; stems 4-angled, winged, branches mostly 3-chotomous. Leaves sessile, oblong lanceolate, 3-veined, upto 2.5 cm long, gradually smaller upwards and bractiform on inflorescences. Cymes axillary and terminal, rigidly erect; flowers white, pedicelled, irregular; calyx-wings narrowly lanceolate, teeth sharp; corolla-tubes as long as calyx, lobes obovate, obtuse; one stamen larger, fertile than three others. Capsules oblong, shorter than calyx, 2-valved to base.

Type : Roxb. Icon. No. 236 (K. CAL).

Fl. & Frt. : July-Feb.

Common in the clayey soil of road-side ditches, forest floors.

Madai : 12882 ; Lamni : 15413.

Tropical Africa, Madagascar, India, Sri Lanka, Burma, Malaya, Australia.

The plants are used as tonic, laxative and in fever.

C. diffusa (Vahl) R. Br., Prodr. : 451. 1810, in Obs. Haines, Botany 2 : 597; *Gentiana diffusa* Vahl, Symb. Bot. 3 : 47. 1794.

Erect herbs : stems 4-angled, densely dichotomously branched upwards. A pair of sessile, broadly ovate leaves or bracts at each fork ; lower leaves lanceolate, elliptic or oblong, acute or shortly acuminate, 3-veined, 1-3.5 cm long ; upper passing into bracts. Cymes terminal, diffuse, leafy ; sometimes flowers solitary ; bracts large, ovate, acute, sessile, membranous, gradually becoming linear upwards ; pedicels slender, flexuose ; flowers pink ; calyx-tubes striate with setaceous teeth, as long or nearly as long as corolla-tubes, obovate ; one stamen perfect, larger than 3 others, inserted on corolla-throat. Capsules oblong, as long as calyx, 2-valved to base.

Type : ex India Orientali (C—not traced).

Fl. & Frt. : Almost throughout the year, especially during July-Aug.

Common in moist places, near streams, on slopes.

Khondra : 12795 ; Kobirchabutra : 15204 ; Katghora : 6047.

Tropical Africa to Indomalaysia.

ENICOSTEMA Bl., Bijdr. : 848. 1826, *nom. cons.*

T. : *E. littorale* Bl.

Enicostema axillare (Lam.) Raynal, Adansonia 9 : 75. 1969 ssp. *axillare* ; Kramer, Rev. Handb. Fl. Ceylon 3 : 67. 1981. *Gentiana axillare*, Lam. Ill. Gen. 1(2) : 487. 1793, non Räfinesque (1828), nec. Reichb. f. (1828). *Enicostema hyssopifolium* (Willd.) Verdon, in Bothalia 7 : 462. 1961 ; *Exacum hyssopifolium* Willd., Sp. Pl. ed. 4. 1 : 640. 1798 ; *Enicostema littorale* auct. non Bl. (1826) ; C. B. Clarke in Hook. f. FBI 4 : 101. 1883.

Erect herbs to 55 cm high from a long rootstock ; stems terete or quadrangular ; internodes short. Leaves sessile, opposite, ovate-lanceolate or linear-lanceolate, 4-5 cm long. Flowers in sessile, axillary clusters, white ;

calyx-tubes campanulate, deeply 5-fid, lobes narrowly oblong, obtuse, margins membranous; corolla 7-8 mm long, tubular, funnel-shaped, lobes 5, 2.5 mm long, elliptic, spreading; stamens 5, on upper part of corolla-tubes; stigmas large, 2-lobed. Capsules ellipsoid, 3 mm long, carpels separating. Seeds many, subglobose, reticulated.

LT. : India, Pondicherry Sonnerat s.n. (P-LA) (vide Kramer 1981).

Fl. & Frt. : June-Dec.

Common in cultivated fields, road-side ditches.

Bilaspur : 19529.

India, Sri Lanka, South Africa.

Note : Subsp. *littorale* (Bl.) Raynal is restricted to Malesia (Kramer 1981).

EXACUM L., Sp. Pl. : 112. 1753 & Gen. Pl. ed. 5 : 51. 1754.

LT. : *E. sessile* L. (vide Hitchcock, Prop. Brit. Bot. 125. 1929).

- 1a. Herbs upto 15 cm high; leaves petioled, elliptic or ovate-lanceolate; acute; flowers small, upto 1.5 cm in diam., white or light blue; calyx prominently winged *E. carinatum*
- 1b. Herbs upto 40 cm high; leaves sessile, lanceolate, acuminate; flowers upto 4 cm in diam., deep blue; calyx scarcely winged *E. tetragonum*

Exacum carinatum Roxb., Fl. Ind. 1 : 415. 1820. Fl. Hassan : 425. 1976; *E. petiolare* Griseb. in DC., Prodr. 9 : 46. 1845; C. B. Clarke in Hook. f. FBI 4 : 96. 1883; Haines, Botany 2 : 595; Kramer, Rev. Handb. Fl. Ceylon 3 : 64. 1981.

Type : ex India Orientali Hugel s. n. (holotype n.v.).

Erect herbs, usually branched only above; stems quadrangular. Leaves petioled, elliptic or ovate, broad at base, suddenly narrowed into short petioles, 3-7 cm long, usually 5-veined; leaves in smaller plants lanceolate and subsessile. Cymes terminal, erect, 1-flowered; peduncles at bifurcation of cymes often 2.5-6 cm long; flowers white or bluish, 4-merous; calyx-wings broad, in fruits ovate or cordate, veined; corolla rotate, tubes globose; lobes ovate or oblong. Capsules subglobose, septicidally 2-valved, winged, wings upto 1 cm long.

Fl. & Frt. : Sept.-Nov.

Rare, in damp shady places.

Achanakmar : 13221A.

India.

E. tetragonum Roxb., Fl. Ind. 1 : 413. 1820; Haines, Botany 2 : 594.

Erect herbs, usually branched only above, stems quadrangular. Leaves sessile, opposite, decussate, broad-lanceolate, often united at their base, 5-veined, 7-12 cm long. Panicles large and compound, terminal and axillary; flowers azure-blue, about 3 cm across, 4-merous; calyx-lobes ovate acuminate, keeled, 5-10 mm long; corolla-lobes broadly elliptic, acute, 10-20 mm long; stamens 4, inserted on corolla-throat. Capsules globose, septiodially 2-valved.

Fl. : Aug.-Dec. Frt. : Nov.-Jan.

Common in damp, grassy places, near streams.

Kabirchabutra : 13386.

India, Burma, China.

HOPPEA Willd., Ges. Naturf. Freunde Berlin Neue Schriften 3 : 434. 1801, [non *Hopea* Roxb. (1811) nom. cons., Dipterocarpaceae].

T. : *H. dichotoma* Heyne ex Willd.

Hoppea dichotoma Henye ex Willd., Ges. Naturf. Freunde Berlin Neue Schriften 3 : 435. 1801; Haines, Botany 2 : 598; Raynal in Adansonia 6 : 546. 1967.

Small herbs; divaricately densely branched from base, stems quadrangular. Leaves sessile, ovate or elliptic, acute, becoming lanceolate and bractiform on the inflorescences, 3-veined. Cymes paniculate, leafy, 2-3-chotomous. Flowers sessile or sub-sessile, green or white, 4-merous; calyx campanulate, 4-lobed, lobes scarious, marginal veins green; corolla ventricose, shorter than calyx, lobes short, triangular in fruit, wider upwards with lobes incurved, overtopped by acute calyx-teeth; stamen 1; stigma clavate, obscurely 2-fid. Capsules subglobose, 0.2 cm long, 2-valved.

Fl. & Frt. : Sept.-Jan.

Common in moist grassy places, near streams.

Korba to Kudmura : 16798; Korbi : 19106; Katghora : 6085; Lamni : 13251.

India.

SWERTIA L., Sp. Pl. : 226. 1753 & Gen. Pl. ed. 5 : 107. 1754.

LT. : *S. perennis* L. (vide Hitchcock, Prop. Brit. Bot. : 138. 1929).

Swertia angustifolia Buch.-Ham. ex D. Don, Prodr. Fl. Nepal : 127. 1825; Haines, Botany 2 : 595.

Erect or diffuse herbs; stems 4-angled above. Leaves opposite, narrowly lanceolate, narrowed at base, 5-10 cm long. Cymes in corymbose panicles; flowers 10-18 mm across, 4-merous, white or pale blue; sepals 4, oblong-linear, often longer than corolla; corolla rotate, lobes 4, oblong acute, with one large orbicular gland near base; stamens 4, attached near base of corolla; style short or absent; stigmas 2. Capsules ovate sessile, separating into 2 carpels. Seeds polyhedral.

Fl. : Oct.-Dec. *Frt.* : Dec.-Jan.

Frequently found amidst grasses in moist open places.

Kabirchabutra to Amarkantak : 13322.

India, Nepal, Burma, China.

MENYANTHACEAE

Dumort., Anal. Fam. Pl. 20, 25. 1829 ('Menyanthideae').

T. : *Menyanthes* L.

NYMPHOIDES Seguier, Pl. Veron, 3 : 121. 1754; J. Hill, Brit. Herb. : 77. 1756-1757.

T. : *Menyanthes nymphoides* L.

Note : Kramer (Rev. Handb. Fl. Ceylon 3 : 207. 1981) lists *Menyanthes trifoliata* L. as the type species.

Limnathemum Gmel., Novi Comment. Acad. Sci. Imp. Petrop. 14(1). 527. 1770.

T. : *L. peltatum* Gmel.

- 1a. Flowers 1-1.5 cm across; corolla-lobes not fimbriate, glandular, crested with 3 longitudinal folds, white; capsules subglobose; seeds 10-20, large, tuberculate *N. hydrophyllum*
- 1b. Flowers 2.5-3 cm across; corolla-lobes fimbriate, not crista-
tate, white with yellow centre; capsules subquadrate:
seeds many, small, smooth *N. indica*

Nymphoides hydrophyllum (Lour.) Kuntze, Rev. Gen. Pl. 1 : 429. 1891; Kramer, Rev. Handb. Fl. Ceylon 3 : 208. 1981. A. O. Charter in Hara *et al.* Enum. 3 : 95. 1982 Nicolson *et al.* Reg. Veg. 119 : 181. 1988; *Menyanthes hydrophylla* Lour., Fl. Cochinch. : 129. 1790; *M. cristata* Roxb., Pl. Corom. 2 : 3. t. 105. 1798; *Limnanthemum cristatum* (Roxb.) Griseb., Gen. Sp. Gent. : 342. 1839; Haines, Botany 2 : 599; *Nymphoides cristata* (Roxb.) Kuntze, Rev. Gen. Pl. 1 : 429. 1891; Ramamoorthy, Fl. Hassan : 475, fig. 90A. 1976.

Aquatic floating herbs; stems numerous from long, slender rhizomes, filiform, rooting at nodes, sometimes simulating a petiole. Leaves rather fleshy, orbicular or orbicular-oblong, deeply cordate with an acute sinus, 10.5×8.5 cm, verrucose beneath, smooth above, palmately veined, margin sinuate; petioles absent or very short. Flowers pedicelled, densely fascicled at nodes, but only 1 or 2 flowering at a time; pedicels deflexed after flowers open; sepals narrowly lanceolate or oblong, slightly connate at base, 5-7, persistent; corolla white with yellow base, rotate, tubes with a ring of white hairs round throat, lobes often 6, linear-oblong, acute glandular below fold. Stamens 5-7, epipetalous, anthers versatile. Disc of 5 nectariferous glands alternating with stamens at the base of ovary. Ovary superior, 1-locular, style simple, homostylous, stigma 2-3-fid. Capsules about 0.5 cm long, ovoid or oblong, indehiscent. Seeds lenticular, 5-10 in a capsule, tuberculate.

Type : Cochinchina, Loureiro.

Fl. & Frt. : June-Sept.

Common in ponds.

Lafa : 13022; Terhapani : 16729; Kota to Bilaspur : 13044; Khuria : 19344.

India, Malaysia, South China.

Note : In general, this is a smaller plant than the following species. The centrally flanged or crested corolla lobes are distinctive (Kramer l.c.).

N. indica (L.) Kuntze, Rev. Gen. Pl. 1 : 429. 1891; Ramamoorthy, l.c. : 475, fig. 90B. 1976; Kramer l.c. 207. 1981. *Menyanthes indica* L. Sp. Pl. : 145. 1753; *Limnanthemum indicum* (L.) Griseb., Gen. Sp. Gent. : 343. 1839, emend. Thw., Enum. 205. 1860; Haines, Botany 2 : 598. *Limnanthemum wightianum*, Griseb. l.c. : 344. 1839; LT. Madras, Wight s.n. (K). (vide Kramer l.c. : 208).

The species shares all the characters as of *N. hydrophyllum* except that; its leaves are larger, 7.5×20.5 cm; thick petioled; stems thick; sepals ovate-lanceolate, acute; petals ovate-lanceolate, eglandular, densely fimbriate on the inner surface; styles heterostylous; fruit globose, bursting irregularly and seeds 25-many, smooth.

Type : Ceylon, Herman s.n. (BM).

Fl. & Frt. : June-Sept.

Common in ponds.

Katghora : 6080; Pali, 19486.

Indomalaysia.

HYDROPHYLLACEAE

R. Br. Bot. Reg. 3 : sub t. 242. 1817 ('*Hydrophyllae*').

T. : *Hydrophyllum* L.

HYDROLEA L., Sp. Pl. ed. 2. 328. 1762, *nom. cons.*

T. : *H. spinosa* L.

Hydrolea zeylanica (L.) Vahl, Symb. Bot. 2 : 46. 1791; Haines, Botany 2 : 599. *Nama zeylanica* L., Sp. Pl. 226. 1753.

Erect or procumbent annual herbs, often succulent. Leaves alternate, lanceolate, acuminate, upper gradually smaller and bracteate; larger leaves 7-10 cm long. Racemes or cymes at ends of short lateral branches and terminal, panicled by suppression of leaves, patently viscidly hairy. Flowers blue, regular, 5-merous, 10-12 mm across; calyx divided nearly to base, lobes lanceolate, striate, exceeding capsules; corolla widely campanulate, lobes imbricate; stamens attached to short corolla tubes, almost exserted, anthers sagittate, often twisted; stigmas capitate. Capsules globose or ovoid, septicidal or irregularly 4-valved.

Fl. & Frt. : Jan.-Feb.

Common in marshy places, cultivated fields, road-side ditches.

Bilaspur to Seput : 13009.

Tropical America, Africa, India, S. E. Asia.

BORAGINACEAE

A. L. Juss., Gen. Pl. 128. 1789 ('*Boragineae*'),

T. : *Borago* L.

- 1a. Ovaries 4-lobed; styles gynobasic or subterminal; fruits of usually 4 nutlets
 - 2a. Flowers solitary axillary, going off into terminal raceme by gradual reduction of floral-leaves; calyx not enlarged in fruits; corolla with scales on throat; apices of anthers obtuse or apiculate, not contorted; styles gynobasic; carpophore conical CYNOCLOSSUM
 - 2b. Flowers in elongated racemes; calyx enlarged in fruits; corolla without scales; apices of anthers subulate and contorted; styles subterminal (arising from between carpels); carpophore pyramidal TRICHODESMA
- 1b. Ovary entire; styles terminal; fruits drupaceous

- 3a. Calyx tubular, teeth short, often unequal; styles twice 2-partite i.e. styles 4 CORDIA
- 3b. Calyx 4-5-partite or sub-partite; styles entire or divided to base or once 2-partite i.e. styles 1 or 2
- 4a. Styles 2-partite or divided to base
 - 5a. Prostrate herbs; styles divided to base; drupes of 4 subconnate 1-seeded pyrenes COLDENIA
 - 5b. Trees or shrubs; styles 2-partite; drupes 1-4-seeded, two 2-seeded or four 1-seeded pyrenes, rarely one 1-seeded pyrene EHRETIA
- 4b. Styles entire
 - 6a. Herbs; flowers in many-flowered, long, terminal scorpioid cymes; style-apex disciform HELIOTROPIUM
 - 6b. Hard, virgate shrubs; flowers in a few-flowered, small, sub-terminal racemes; style-apex simple ROTULA

Coldenia L., Sp. Pl. : 125. 1753 & Gen. Pl. ed. 5 : 61. 1754.

T. : *C. procumbens* L.

Coldenia procumbens L., Sp. Pl. : 125. 1753; Haines, Botany 2 : 606; Kazmi in Jour. Atm. Arb. 51 : 148. 1970; Murti in Bull. bot. Surv. Ind. 17 : 89. 1975.

Prostrate, scabrous herbs; younger parts covered with white silky hairs. Leaves crisped, alternate, elliptic-obovate, oblique, cuneate, coarsely serrate or sub-pinnatifid, densely scabrous or hispid above, 2-4 cm long. Flowers minute, yellow or white, axillary or extra-axillary, sessile or sub-sessile, upper sometimes in 1-sided, spiciform cymes, 4-5-merous; calyx 4-partite, hairy sepals narrow ovate; corolla-tubes short, lobes imbricated in buds, limbs spreading; stamens 4-5, inserted on corolla-tubes; styles 2 or 1, 2-lobed or -partite above; stigmas capitate. Drupes of 4 one-seeded pyrenes; pyrenes sub-connate into an acute, 4-ribbed pyramid, awned with hardened style-lobes.

Type : "Habitat in India" Herb. Linn. 174.1 (LINN).

Fl. & Frt. : July-May.

Common on waste grounds near canal banks, on hard soil.

Khuria : 19338, 15497; Marwahi to Pasan : 19038; Katghora : 3712; Champa : 8747.

Coldenia is exclusively a New World genus (Murti, 1975), naturalized throughout tropical India, Pakistan, Sri Lanka.

CORDIA L., Sp. Pl. : 190. 1753 & Gen. Pl. ed. 5 : 87. 1754.

LT. : *C. sebestena* L. (vide Hitchcock, Prop. Brit. Bot. 133. 1929).

Kazmi (1970) lists *C. myxa* L. as the type species, although Hitchcock (l.c.) selected *C. sebestena* L. as the lectotype species.

Cordia macleodii (Griff.) Hook. f. & T. Thoms. in Jour. Linn. Soc. 2 : 128. 1858; Haines, Botany 2 : 603; Kazmi in Jour. Arn. Arb. 51 : 143. 1970; *Hemigymnia macleodii* Griff. in Calc. Jour. Nat. Hist. 3 : 363. 1843.

Trees; branchlets covered with a dense felted tomentum. Leaves alternate or sub-opposite, broadly ovate-cordate, obtuse, tomentose beneath, impressed rugose above, 10-20 cm long. Corymbs short, 5-10 cm in diam., tomentose. Flowers white, polygamous; calyx tubular or campanulate, 5-6 mm long, teeth very short, irregular, in fruits accrescent; corolla funnel-shaped, tubes glabrous within, lobes 4-8, oblong, 6-8 mm long; stamens 4-8, usually hairy at base. Berries acutely conical when young, ovoid on ripening, yellowish, somewhat tomentose, seated in broadly campanulate, toothed or lobed, ribbed or striate calyx.

Type : *Sylvae Jubbulpore vicines, pierumque cum Tectona consociata, Griffith s. n.* (K).

Fl. : Mar.-Apr. Frt. : May-June.

Occasionally in dry deciduous forests.

Katghora : 8502.

India, Pakistan.

CYNOCLOSSUM L., Sp. Pl. : 134. 1753 & Gen. Pl. ed. 5 : 65. 1754.

LT. : *C. officinale* L. (vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2.3 : 75. 1913).

Cynoglossum lanceolatum Forsk. Fl. Aegypt.-Arab. : 41. 1775; Haines, Botany 2 : 610; Kazmi in Jour. Arn. Arb. 52 : 343. 1971.

Erect herbs; appressed hispid. Lower leaves petioled, broadly lanceolate, strongly veined; upper sub-sessile, linear-lanceolate; radical leaves usually oblanceolate, tapering at base into long, slender petioles; all leaves crispedidate, hispid. Racemes upto 15 cm long, strigose; flowers pedicelled, white with a bluish or purple eye; calyx campanulate, 2 mm long, elongating in fruits, deeply cleft into ovate-oblong lobes. corolla-tubes urceolate, 0.25-0.3 cm long, lobes sub-orbicular, throat nearly closed by hooded, sulcate,

pink scales. Nutlets 2 mm across, shortly ovate, not margined, densely glochidiate all over.

Type : *Hadie*, *Forskål*, s.n. (C).

Fl. & *Frt.* : Oct.-May.

Common amidst grasses, in waste places.

Achanakmar : 13222; Lamni : 19208.

India, Pakistan, Arabia.

EHRETIA P. Browne, Civ. Nat. Hist. Jamaica : 168, 1756.

T. : *E. linifolia* L.

Note : *Ehretiaceae* Lindley, Int. Nat. Syst. Bot. : 242, 1830 with *Ehretia* P. Browne is Fam. nom. cons. (App. II B, ICBN 1988).

Ehretia laevis Roxb., Pl. Corom. 1 : 42, t. 56, 1796; Haines, Botany 2 : 605; Kazmi in Jour. Ann. Arb. 51 : 147, 1970. (*Chamror*, *Mosonea*).

Trees; branchlets glabrous or hirsute. Leaves alternate, ovate or elliptic, shortly acuminate, cuneate, entire, usually glabrous except for small tufts of hairs in axils of veins beneath, 7-10 (-15) cm long; petioles 1-2.5 cm long. Flowers white, 8-10 mm across, sessile or pedicelled in dichotomous, scorpioid cymes, 5-10 cm long, branches recurved in fruits; calyx 5-partite, lobes small, pubescent, oblong or lanceolate, ovate in fruits; corolla-tubes short or cylindric, lobes 5, 1 mm long, acuminate, spreading; stamens 5, on corolla-tubes; styles 2-fid. Drupes subglobose, when dry, distinctly 4-ribbed, pyrenes 4, each 1-seeded.

Type : "Circar Mountains" without citation of collector's name (vide Roxburgh, Pl. Corom. t. 56).

Fl. : Feb.-Apr. *Frt.* : Apr.-May.

Occasionally found between rock boulders, in the river beds.

Khuria : 15499.

Iran, Pakistan, India, Burma, Thailand to Vietnam, Australia.

Wood is used for agricultural implements, shoe-lasts, brush-backs, match boxes. Fruits and inner bark eaten in times of scarcity.

HELIOTROPIUM L., Sp. Pl. : 130 1753 & Gen. Pl. ed. 5. : 63. 1754.

L.T. : *H. europaeum* L. (vide N. L. Britton et A. Brown, Ill. Fl. NUS ed. 2.3 : 73. 1913).

- 1a. Leaves large, 5-8 cm long ; spikes ebracteate ; fruits of two 2-seeded pyrenes *H. indicum*
- 1b. Leaves small 3-4 cm long : spikes bracteate ; fruits of 4 nutlets
 - 2a. Leaves elliptic or obovate ; bracts conspicuous, ovate, acute ; inflorescences ebracteate *H. ovalifolium*
 - 2b. Leaves linear or linear-lanceolate ; bracts inconspicuous, narrow ; inflorescences bracteate wholly or at least in lower portion *H. strigosum*

Heliotropium indicum L., Sp. Pl. : 130. 1753 ; Haines, Botany 2 : 607. (*Hati-sund*—Oriya).

Coarse herbs to 40 cm ; branches ascending, hirsute. Leaves alternate, rarely subopposite, ovate or ovate-oblong, subserrate, rugose above and with a few hairs, pilose beneath, petioled, 5-10 cm long. Spikes (cincinnus) mostly leaf-opposed, 5-15 cm long, dense, ebracteate ; flowers lilac or bluish-white, 2-ranked ; calyx 5-partite or lobed, sepals lanceolate or linear ; corolla-tubes narrow cylindric, constructed near throat, hairy outside, lobes 5, small, round, crenate, spreading ; stamens 5, on corolla-tubes, anthers free ; style 0.5-0.7 mm ; fruits about 2 mm long, 2-lobed, each lobe 4-ribbed, 2-angular, dividing into two 1-seeded pyrenes, separating in pairs.

Fl. & Frt. : July-Apr.

Common in waste places, along road, ditches.

Khuria : 19306.

Pantropical, probably native of S. America (Murti, 1975).

Emollient, vulnerary and diuretic and used as local application for ulcers, wounds and skin-affections. Flowers emmenagogue/abortifacient.

H. ovalifolium Forsk. Fl. Aegypt.-Arab. 38. 1775 ; Haines, Botany 2 : 67 ; Johnston in Jour. Arn. Arb. 32 : 111. 1951 ; Kazmi, Ibid. 51 : 178. 1970.

Diffused herbs ; branches ascending, softly silky white hairy. Leaves elliptic or obovate, entire, mucronate or rounded-obtuse at apex, narrowed towards base, covered with long, appressed, silky hairs, 1-4 cm long. Spikes elongate, dense, usually paired, flowers sessile, funnel-shaped, 2-ranked ; white,

calyx 5-partite, one sepal bractiform, elliptic or ovate, 3-4 mm long, other sepals narrow-elliptic or linear-oblong, 2 mm long; corolla-tubes cylindric, hairy, lobes minute, ovate, patent, subacute; stamens 5, on corolla-tube, anthers not connivent by their tips, linear with connective produced as an acumen; style none, stigmas sessile, minutely hairy. Nutlets 4, strigosely hairy, all separating.

Type : Hadie, *Forsskal.* s.n. (C).

Fl. & Frt. : July-Feb.

Common in waste p'aces, road-side ditches.

Khuria : 15465, 19339; Marwahi to Parasi : 19041.

Old World tropics.

Applied to syphilitic ulcers.

H. strigosum Willd., Sp. Pl. 1 : 743. 1798; Haines, Botany 2 : 608; Kazmi in Jour. Arn. Arb. 51 : 152. 1970.

Erect ascending herbs; branches many, spreading from base, appressed hairy. Leaves linear-lanceolate, margins recurved, subacute, subacute, scabrous hairy, 5-20 mm long. Spikes simple, 2.5-5 cm long with narrow small bracts; flowers white, 2-ranked, lower often pedicelled, upper ones sessile or subsessile; calyx 2 mm long, strigose, one sepal broadly lanceolate-ovate, others narrow lanceolate; corolla 0.15 cm long, salver-shaped, strigose, lobes ovate, short; stamens 5, on corolla-tubes, anther-connectives produced into long acumen; stigmas conical. Fruits ovoid, not or obscurely 4-lobed with minute grey hairs, depressed conical at apex.

Type : "Habitat in Guinea" without citation of collector's name(B).

Fl. & Frt. : Almost throughout the year.

Common in waste places, in cultivated fields.

Marwahi : 19013.

Throughout the tropics.

Laxative and diuretic. Juice applied to sore-eyes; also used for boils, wounds and ulcers.

ROTULA Lour., Fl. Cochinch. : 121. 1790.

T. : *R. aquatica* Lour.

Note : Airy Shaw (1973) includes *Rotula* Lour. in *Ehretiaceae* Lindley.

Rotula aquatica Lour., Fl. Cochinch. : 121. 1790. *Rhabdia lycioides* sensu Haines, Botany 2 : 606; non Mart. 1827. *Ehretea cuneata* Wight Ic. t. 1385. 1848. (*Sherni, Phanbidi*).

Rigid, diffused shrubs. Leaves alternate or clustered, linear-oblong, entire or toothed, acute, narrowed at base, 1-2.5 × 0.2-0.4 cm, appressed hairy, shining or almost silvery beneath. Flowers terminal or in a few-flowered terminal racemes on short lateral branches; 5-merous, pink, shortly pedicelled; sepals lanceolate, acuminate; corolla-tubes short campanulate, lobes oblong, imbricate in buds; stamens epipetalous. Drupes orange-red, with 4 pyrenes.

Fl. : Oct.-Jan. *Frt.* : Dec.-Feb.

Common, generally always in rocky river-beds.

Kota : 16736; Kheota Ghat : 19512; Katra : 16736.

Brazil, Africa, India, S.E. Asia.

Johnston in Journ. Arn. Arb. 32 : 15. 1951 regards the Brazilian, *R. lycioides* (Mart.) Johnston as representing a distinct species.

Decoction of roots (*Pasanbedha*) used as diuretic and laxative; also for piles, stone in the bladder and venereal diseases. Diuretic action is due to allantoin (cf. Useful Plants of India, New Delhi, 1986).

TRICHODESMA R. Br., Prodr. : 496. 1810, *nom. cons.*

T. : *T. zeylanica* (N. L. Burm.) R. Brown (*Borago zeylanica* N. L. Burm.) (*typ. cons.*).

1a. Calyx lobes hastate at base; corolla white, over 1.5 cm in diam., tubes as long as lobes, throat of tubes with glandular spots

T. indicum

1b. Calyx lobes rounded at base; corolla blue, under 1.5 cm in diam., tubes longer than lobes; throat of tubes without glandular spots

T. zeylanicum

Trichodesma indicum (L.) R. Br. ex Lehmann, Pl. Fam. Asperif. : 193. 1818 ('*indica*'); Haines, Botany 2 : 608. *Borago indica* L., Sp. Pl. : 137. 1753.

Diffused herbs, bristly hairy and villous. Leaves opposite, sessile, cordate, subsagittate or amplexicaul at base, linear, oblong, lanceolate or ovate, thinly hairy above, densely hairy beneath with tubercle-based hairs,

3-10 cm long. Flowers solitary, axillary, usually nodding, becoming cymose by reduction of leaves, 5-merous, pale-blue or white, 1-2 cm across; calyx-lobes ovate-lanceolate, hispid hairy, margins ribbed, base connivent and produced downwards into a distinct auricle, enlarged in fruits; corolla-tubes campanulate-cylindric, lobes rounded, suddenly narrowed to a twisted tip, a gland or depression near base of each lobe; anthers connivent in a cone, cone densely woolly on back, connectives produced and twisted. Nutlets white, smooth with polished back, scarcely margined, elliptic oblong.

Type : Habitat in India Orientale, Herb. Linn. 188/2 (LINN).

Fl. & Frt. : July-Nov.; perhaps most of the year.

Common in waste places, open forests, at the edge of the forest, near streams.

Ratanpur : 13035; Karidongti : 19332, Katghora : 6096; Lamni : 19243.

Afghanistan, India, Mauritius.

Hara *et al.* (l.c.) attribute the authority for the combination to (L.) R. Br., but, according to Ramamoorthy (Fl. Hassan : 483, 1976), R. Brown (1810) merely "stated that *Borago indica* belonged to *Trichodesma* and did not actually make the combination (Art. 33.1)" *Boraginoides* Boehmer (1760) based on *Borago indica* L. (1753) is *nom rej.* against *Trichodesma* R. Br. (1810), *nom. cons.*

T. zeylanicum (N. L. Burm.) R. Br. Prodr. 496, 1810 ('*zeylanica*'), Haines, Botany 2 : 609. *Borago zeylanica* N. L. Burm. Fl. Ind. : 41, 1768.

Diffused herbs, bristly hairy. Lower leaves petioled, oblanceolate, oblong, obtuse or acute at base, hairy beneath with tubercle-based hairs, upto 15 cm long, upper sessile, lanceolate-oblong, passing into bracts. Flowers usually solitary, nodding; upper ones in leafy racemes, 5-merous, blue, about 1 cm across; calyx-lobes lanceolate or ovate-lanceolate, often over-topping corolla, margins connivent below, spreading in fruits; corolla tubular, campanulate, lobes broad or obovate with acuminate, twisted tips; anthers bearded below, connectives produced and twisted. Nutlets ovoid-oblong, obscurely margined, grey polished outside.

Fl. & Frt. : Almost throughout the year.

Common in waste places, open forests, near streams.

Tethapani : 17626.

India, Sri Lanka, Australia.

CONVOLVULACEAE

A. L. Juss., Gen. Pl. : 132. 1789. ('*Convolvuli*').T. : *Convolvulus* L.

Porana paniculata Roxb. and *Ipomoea batatas* (L.) Lam. are commonly cultivated in the district. *Cuscuta reflexa* Roxb. segregated to Cuscutaceae Dumortier (1829), fam. nom. cons. (App. IIB, ICBN 1988) is the common parasitic twiner on plants in the area.

1a. Petals bitlobed or emarginate; styles absent	ERYCIBE
1b. Petals not lobed; styles present	
2a. Styles 2, each lobed into 2 filiform stigmas	EYEVULUS
2b. Styles 1, undivided; stigma globose	
3a. Pollen grains spinulose; corolla-tubes not uniformly enlarged from base	
4a. Corolla funnel-shaped, usually with 5, hairy mid-petaline bands; fruits woody, indehiscent	ARGYREIA
4b. Corolla campanulate, usually glabrous or with 2 hairy mid-petaline bands; fruits thin-walled and not woody, dehiscent	IPOMOEA
3b. Pollen grains smooth; corolla-tubes uniformly enlarged from base	
5a. Stems not winged; capsules septicidally 4-valved	MERREMIA
5b. Stems winged; capsules circumscissile above middle or dehiscing irregularly	OPERCULINA

ARGYREIA Lour., Fl. Cochinch. : 134. 1790.

LT. : *A. obtusifolia* Lour. (vide Merrill, Trans. Amer. Philos. Soc. ser. 2, 24 : 329. 1935).

Argyreia strigosa (Roth) Sant. & Patel in Trans. Bose Res. Inst. Cal. 22 : 41. 1958; *Ipomoea strigosa* Roth, Nov. Pl. Sp. 113. 1821; *Lettsonia setosa* Roxb., (Hort. Beng. 13. 1814, nom. nud.) Fl. Ind. 2 : 80. 1824, et ibid ed. 2. 1 : 40. 1832; Haines, Botany 2 : 618; *Argyreia setosa* (Roxb.) Choisy in Mem. Soc. Phys. Hist. Nat. Geneve : 425. 1834. (*Baghchood*).

Large climbers; branches adpressedly strigose. Leaves broadly ovate or oblong-ovate, cordate, acute or subobtuse, sparsely hirsute on both surfaces. 10-15 cm across, upper sometimes ovate-lanceolate. Cymes upto 14 cm in diam, dense, hairy, corymbiform, on stout, strigose peduncles. 7-18 cm

long; bracts ovate, obtuse, coriaceous, adpressedly strigose, deciduous in fruits; flowers white, tubular, funnel-shaped, 3-5 cm long, sessile; sepals ovate or elliptic, 6-10 mm long, coriaceous, strigose, accrescent in fruits; corolla strigose on white bands, limbs 2.5-3 cm in diam., stamens included, filaments hairy at base; disc annular. Berries adpressed-globose, succulent, yellow to bright orange, 4-seeded.

Fl. : Oct.-Nov. *Frt.* : Nov.-Jan.

Common in open grassland on bushes.

Kabirchabutra : 13383.

India, Sri Lanka, Burma.

Hara *et al.* (1982) recognise two varieties in *Argyreia setosa* (Roxb.) Choisy, viz. var. *setosa* and var. *obovata* (C. B. Clarke) Yamazaki (1966). On transfer to *A. strigosa* (Roth) Sant. & Patel, the following combinations are made.

1. *A. strigosa* (Roth) Sant. & Patel subsp. *obovata* (C. B. Clarke) Panigrahi et S. K. Murti, comb. nov. & stat. nov.; *Lettsonia setosa* Roxb. var. *obovata* C. B. Clarke in Hook f. FBI 4 : 194, 1883; *Argyreia setosa* (Roxb.) Choisy var. *obovata* (C. B. Clarke) Yamazaki in Fl. E. Himal. 263, 1966; Vickery in Hara *et al.*, Enum. 3 : 105, 1982. *Convolvulus obovatus* Wall., Num. List No. 1381, 1829, *nom. nud.*

Endemic to Nepal.

2. *A. strigosa* (Roth) Sant. & Patel subsp. *minor* (C. B. Clarke), Panigr. et S. K. Murti, comb. nov. & stat. nov.; *Lettsonia setosa* Roxb. var. var. *minor* C. B. Clarke in Hook. f. FBI 4 : 194, 1883.

Syntypes : Deccan Wight s.n., S. Concan, & Bababoodan Hills, Lawson.

Endemic to Deccan Peninsula.

ERYCIBE Roxb., Pl. Corom. 2 : 31, 1802.

T. : *E. paniculata* Roxb.

Erycibe paniculata Roxb., Pl. Corom. 2 : 31, t. 159, 1789; Hainss. Botany 2 : 634, Nicolson *et al.* Reg. Veg. 119 : 87, 1988. *Erycibe rheedei* (Schult.) Bl., Bijdr. : 1047, 1827 ("rheedii").

Scandent shrubs or lianas; branchlets angular, rusty tomentose. Leaves obovate or obovate-oblong, abruptly acuminate, base attenuate, glabrous with age, 8-12.5 × 2-4 cm. Cymes in terminal, rusty tomentose, narrow panicles, 10-18 cm long; flowers yellowish-white, about 1.25 cm across; sepals oblong rounded or orbicular, hairy outside, 3 mm long; corolla-tubes

about 3 mm long, campanulate, densely hairy, lobes 5, each 2-lobulate; stamens included, anthers apiculate; stigmas sub-globose, 2-lobed or-partite; Berries fleshy, ellipsoid, black, seated on spreading calx, 1.25 cm in diam.

Fl. : May-June. *Frt.* : May (of the following year).

Common in the mixed dry deciduous forests, associated with *Venitago* sp., along rivers and streams.

Katghora : 3718; Kota : 13086.

India, Sri Lanka, Burma, Malaya Peninsula, Australia.

Fruits are edible. Bark possesses medicinal properties.

Evolvulus L., Sp. Pl. ed. 2 : 391, 1762.

LT. : *E. nummularius* (L.) L. (*Convolvulus nummularius* L.) (vide N. L. Britton et A. Brown, Ill. Fl. N.U.S. ed. 2, 3 : 42, 1913).

Volvulopsis Roberty (Candollea 15 : 28, 1953), typified by *Evolvulus nummularius* (L.) L., is rejected as *nom. illeg.* for *Evolvulus* L.; the latter was lectotypified with the same species at an earlier date by Britton & Brown (l.c.).

- 1a. Leaves lanceolate, oblong with acute or rounded base; peduncles well-developed, upto 2 cm long; flowers pale blue; sepals lanceolate, acute or acuminate; corolla shallowly lobed or not *E. alsinoides*
- 1b. Leaves broadly oblong-rounded, with a cordate or truncate base; peduncles absent or very short; flowers white; sepals ovate-oblong, obtuse; corolla distinctly lobed *E. nummularius*

***Evolvulus alsinoides* (L.) L.**, Sp. Pl. ed. 2, 2 : 382, 1762; Haines, Botany 2 : 614 Nicolson *et al.* Reg. Veg. 119 : 88, 1988. *Convolvulus alsinoides* L. Sp. Pl. : 157, 1753.

Decumbent, prostrate herbs; branches numerous, thinly or densely silky white fulvous or almost rufous. Leaves linear lanceolate, oblong, 0.5-2.5 cm long, densely appressed hairy. Flowers 1-3 together; peduncles slender, with 2-3 subulate bracts at end; pedicels short or flowers subsessile on peduncles; sepals lanceolate, acute, hairy; corolla subrotundate, funnel-shaped, 6 mm long; limbs 5-plaited; ovary 2-1-celled; styles 2, distinct from base, each cleft into 2 linear or subclavate stigmas. Capsules globose, 4-valved.

Type : Vistnu-Clandi Rheede, Hort. Malab. 11 : 131-132, t. 64, 1692.

LT. Herb. Hermann 3 : 55 (BM) Verdecourt, Fl. Trop. Afr. : 18, 1963).

Fl. & *Frt.* : July-Dec.

Common along forest roads, open pasture lands, near streams; invariably in open ground; a polymorphic taxon.

Madai : 12894 ; Pasan : 19118 ; Katghora : 3735 ; Pasan to Semra : 15352.

Southern U.S.A. through Central and South America, Africa, Iran, Pakistan, India, Sri Lanka, Malaysia.

The plant is of medicinal importance and used as a tonic, vermifuge and for asthma.

E. nummularius (L.) L., Sp. Pl. ed. 2, 2 : 391. 1762; *Convolvulus nummularius* L., Sp. Pl. : 157. 1753; *Volvulopsis nummularia* (L.) Roberty in Candollea 15 : 28. 1953.

Prostrate herbs, often rooting from nodes, branches patent hairy. Leaves oblong-rounded to obovate-elliptic, base cordate, retuse, glabrous except hairy on veins beneath, 0.5-2 × 0.4-2 cm; petioles 2-8 mm long; flowers 1-2, in sessile cymes; pedicels 2.5-5 mm long; calyx 0.3 cm long, sepals lanceolate, ciliate; corolla 0.2-0.4 cm long, lobes oblong, 2-lobulate, 2-3 mm long, hairy on mid-petaline bands. Capsules globose, 4(-2)-valved.

Fl. & Fr. : July-Feb.

Common in waste places, along roads.

Marwahi : 19017; Khondra : 12773; Khuria : 15463.

Native of America, now naturalised throughout India (Murti, 1975).

Plants possess medicinal properties.

IPOMOEA L., Sp. Pl. 159. 1753. & Gen. Pl. ed. 5. 76. 1754, *nom. cons.*

T. : *I. pes-tigridis* L. (*typ. cons.*).

1a. Sepals awned at or below apex; corolla tubular-or salver-

shaped; stamens exserted; ovaries 4-celled

I. hederifolia

1b. Sepals acute, obtuse or long acuminate, not awned; corolla campanulate or funnel-shaped; stamens included; ovaries 2- or 3-celled

2a. Leaves palmately 3-lobed; ovaries 3-celled

I. nil

2b. Leaves entire or 5-9-lobed; ovaries 2-celled

3a. Sepals green, herbaceous, hairy

4a. Flowers aggregated into heads, in leaf axils or on long peduncles

5a. Leaves entire; flowers aggregated in leaf axils, not involucrate by bracts; corolla campanulate; capsules globose, patently hairy

I. eriocarpa

5b. Leaves 5-9-lobed ; flowers aggregated at end of long peduncles, involucrate by large bracts ; corolla funnel-shaped ; capsules ovoid glabrous

I. pers-tigridis

4b. Flowers in lax, 1-several-flowered cymes

6a. Straggling scandent shrubs ; peduncles 5-15 cm long, stout, cymosely several-many-flowered ; calyx-segments sub-equal or outer ones slightly shorter ; corolla 7.5-9 cm long, pink or pale lilac, inside often dark purple towards base ; capsules ovoid, mucronate, 1.5-2 cm long

I. carnea subsp.
fistulosa

6b. Twining herbs ; peduncles upto 4 cm long, 1-3-flowered ; calyx-segments very unequal, outer 2-3 sepals much larger than inner ; corolla upto 2 cm long, white ; capsules globose, apiculate, upto 9 mm long

I. sinensis

3b. Sepals dry, membranous or somewhat fleshy with scarious margins, glabrous

7a. Leaves digitately 5-lobed

I. cairica

7b. Leaves entire

8a. Aquatic or marshy, creeping and floating herbs ; leaves elliptic-oblong, cordate or hastate, entire or angular ; flower over 3 cm long ; corolla purple with a dark purple centre ; seeds minutely hairy or nearly glabrous

I. aquatica

8b. Terrestrial, twining herbs ; leaves broadly ovate or sub-orbicular, acute, deeply cordate ; flowers under 2.5 cm long ; corolla yellow or white with purple spot at base ; seeds densely softly brown velvety

I. obscura

Ipomoea aquatica Forsk., Fl. Aegypt. -Arab. : 44. 1775; Austin & Ghazanafar in Fl. West Pakistan No. 126 : 38. f. SC-D, 1979; *I. reptans* Poir. in Lam., Encyl. Meth. Bot. 3 : 460. 1814. [*non Convolvulus reptans* L. 1753]; Haines, Botany 2 : 626. ('Karemu' Sag; *Kalama* Saga—Oriya) *I. repens* auct. Roth, Nov. Pl. Sp. : 110. 1821, non Lam. 1791, neo-*Convolvulus repens* L.

Aquatic and marshy annual herbs, stems trailing on mud and floating on water, spongy. Leaves elliptic-oblong or broadly lanceolate, cordate or hastate, entire or angular-lobed, 4-15 cm long. Flowers solitary or in 2-5-flowered cymes; peduncles 5-15 cm long; flowers white or pale purple with a darker purple centre, 2.5-5 cm long on 2-4 cm long pedicels; sepals ovate-obtuse, subequal, gland-dotted within; corolla glabrous, funnel-shaped, 4 cm long, limbs subentire, stamens included, filaments thickened at base and densely papillose, pollen spinulose; disc annular. Capsules ovoid globose, 1 cm across, 4-6-valved, glabrous.

Type : Yemen, Zepid, *Forskål*. (C—holotype, BM—iso.).

Fl. & Frt. : Almost throughout the year, especially Oct.-Dec.

Common in the ponds.

Ratanpur : 16761; Siang : 16835.

A native of Old World tropics (Austin & Ghazanfar, l.c.).

Leaves are used as pot herb. Plant-juice, stems and leaves are used in medicines.

I. carica (L.) Sweet, Hort. Brit. : 287. 1827; Austin & Ghazanfar in Fl. West Pakistan No. 126 : 40, f. 5G-I. 1979; *Convolvulus cairicus* L., Syst. Nat. ed. 10 : 922. 1759; *Ipomoea palmata* Forsk., Fl. Aegypt.-Arab. : 43. 1775; Haines, Botany 2 : 630. (Railway creeper).

Large climbers; older branches tubercled with large lenticels. Leaves digitately 5-lobed almost to base, lobes elliptic or lanceolate, subentire, usually obtuse and mucronate, 2.5-7 cm in diam.; petioles 2.5-5 cm long. Peduncles 3-1-flowered; flowers violet-purple with purple tubes, 3-5 cm across; sepals ovate or elliptic-oblong, obtuse, with membranous margins, about 5 mm long; corolla funnel-shaped, lobes spreading; stamens included, filaments papillose at base, pollen spinulose; disc annular. Capsule ovoid, glabrous, 2-celled, 2-4-valved, 4-seeded.

Fl. & Frt. : Almost throughout the year.

Commonly grown in the gardens, also found naturalised in waste places.

Champa : 19380.

An American species, now naturalised in Africa and Asia.

I. carnea Jacq. subsp. *fistulosa* (Mart. ex Choisy) D. Austin in Taxon 26 : 237. 1977; Panigrahi & Murti in Bangladesh J. Bot. 10(1) : 33. 1981; *I. fistulosa* Mart. ex Choisy in DC., Prodr. 9 : 349. 1845; *I. crassicaulis* (Benth.) Robins. in Proc. Amer. Acad. 51 : 530. 1916; *Batatas crassicaulis* Benth. in Voy. Sulph. 134. 1845; *Ipomoea carnea* sensu Haines, Botany 2 : 630, non Jacq. 1760.

Large, straggling, scandent shrubs with milky juice; stems fistular; branchlets puberulous. Leaves ovate, lanceolate, triangular, base cordate or hastate, glabrescent, 12-20 cm long, two glands at base of midrib; petioles 2-15 cm long. Cymes lax, 2-chotomous, axillary and terminal, many-flowered; peduncles 4-20 cm long; flowers pink-purple, about 7 cm across; sepals sub-equal, broadly ovate-oblong, rounded, obtuse, 6-7 mm long, with alternate glands; corolla hypocrateriform, with two hairy mid-petaline bands; tubes puberulous; stamens unequal, ciliate below, anthers oblong; pollen spinulose.

Capsules globose, glabrous, 1.5-2 cm long.

Type : Brazil, Martius 2389 (M).

Fl. & Frt. : Oct.-Jan.

Common along roads, in ditches, growing as hedges.

Khootaghat : 19525; Belghana : 16770; Katghora : 3742.

Native of tropical America, naturalized throughout India (Murti, 1975).

It differs from subsp. *carnea* in its habits, the shape of the leaves and being mostly glabrous or puberulent; and does not seem to occur in Asia.

Grown as hedge plant, it serves as a good and cheap fuel for the villagers.

I. eriocarpa R. Br., Prodr. : 484. 1810; Austin & Ghazanfar in Fl. West Pakistan No. 126 : 41, f. 6A-B. 1979; *Convolvulus hispidus* Vahl, Symb. Bot. 3 : 29. 1794; *Ipomoea hispida* (Vahl) Roem. & Schult., Syst. Veg. 4 : 238. 1819, non Zuccagni 1807; Haines, Botany 2 : 624.

Slender twining herbs; hairy. Leaves oblong cordate or ovate-lanceolate, acuminate or acute, base cordate, sparsely hairy, 5-7 cm long or upper smaller; petioles 2.5-5 cm long with reflexed hairs. Cymes axillary, sessile or subsessile, capitate; flowers small, less than 1 cm long, pink or purple; sepals imbricate, orbicular, with a long spreading acumen or cusp; corolla campanulate or urceolate, 1.5-2 cm in diam., pubescent, lobes acute; stamens included, pollen spinulose. Capsules globose, patently hairy, 2-4-valved, 2-celled, 4-seeded, about 5 mm in diam.

Type : Australia 'New Holland', Banks and Solander (BM) (vide Verdcourt, Fl. Trop. E. Afr. 1963).

Fl. : July-Aug. *Frt.* : Sept.-Nov.

Frequently found on hedges, in open forests.

Katghora : 3977.

Palaeotropics.

I. hederifolia L., Syst. Nat. ed. 10 : 925. 1759. *I. coccinea* sensu C. B. Clarke in Hook. f. FBI 4 : 199. 1883, non L. 1753; *I. angulata* Lam., Encycl. Meth. Bot. 1 : 464. 1791; *Quamoclit coccinea* sensu Haines, Botany 2 : 620, non Moench 1794; *Q. angulata* (Lam.) Bojer, Hort. Maurit. 224. 1837; *Q. phoenicea* (Roxb.) Choisy, Mem. Soc. Phys. Geneve 6 : 433. 1834; *Ipomoea phoenicea* Roxb., Fl. Ind. ed. Carey & Wall. 2 ; 92. 1824.

Slender, herbaceous climbers; stems and branches puberulous or glabrescent. Leaves broadly ovate-cordate, acute, glabrous, 3-7 cm in diam., entire or lobed; petioles 5-10 cm long. Cymes few-many-flowered, lax; peduncles 8-11 cm long; flowers deep crimson; sepals elliptic or oblong suddenly acuminate, outer with a long awn; corolla tubular, funnel-shaped; tubes 2.5 cm long, limb about 1.5 cm in diam.; stamens exserted, pollen spinulose; ovary 4-celled. Capsules ovoid, smooth, 4-celled, with membranous septa, about 5 mm in diam.

Lectotype : West Indies based on Plumier, Pl. Amer. 81. t. 93. f. 2. 1756. (vide O'Donell in Lilloa 29 : 48. 1957).

Fl. : July-Aug. *Frt.* : Oct.-Dec.

Common in hedges; also grown in gardens.

Katghora : 6078.

Native of tropical America, and naturalised throughout India. Under cultivation, sometimes yellow or orange flowers are also found.

I. nil (L.) Roth, Cat. Bot. 1 : 36. 1797; Austin, Taxon 35 : 356. 1986. *Convolvulus nil* L. Sp. Pl. ed. 2. : 219. 1762; *Ipomoea hederacea* L. Sp. Pl. : 154 1753. C. B. Clarke in Hook. f. FBI 4 : 199. 1883; Haines Botany 2 : 631; non *Ipomoea hederacea* Jacquin (1787).

Slender twiners; stems retrorsely hirsute. Leaves ovate-cordate, 3-lobed, lobes ovate, acuminate, 5-13 cm long, thinly hairy; petioles 2.5-10 cm long. Cymes 1-5-flowered, sub-umbellate; peduncles 4-6 cm long, hirsute with reflexed hairs; flowers rose-coloured, blue or somewhat orange below, sometimes bluish violet; sepals gradually narrowed, the long acute tips suberect, straight, scarcely spreading, 1.5-2.5 cm long; corolla tubular, funnel-shaped, 3-4, 5 cm long. Capsules ovoid, subglobose, smooth, 1 cm long.

LT. : Based on Dillenius, Hort. Eith. t. 80, fig. 91 (selected by Verdcourt, Taxon 6 : 231, 233, 1957; Taxon 7 : 84-85, 1958).

Fl. : Aug.-Nov. *Frt.* : Oct.-Dec.

Common in hedges.

Bilaspur : 12978.

An American plant, naturalized throughout the tropics.

Note : 1 *Ipomoea nil* (L.) Roth and *I. hederacea* Jacq. (1787) are often confused with each other by many authors. But Austin (1986) would diagnose them from each other as follows :

- 1a. Sepals gradually narrowed, the long acute tips suberect, straight, scarcely spreading *I. nil*
- 1b. Sepals abruptly narrowed, the long subacute tips strongly spreading or curved *I. hederacea*
- 2. *Convolvulus hederacea* L. (1753) is lectotypified by Verdcourt (1957) with Linnaeus Herb. 218, 8 (LINN), whereas *Ipomoea hederacea* Jacq. (1787) is lectotypified with Dillenius, Hort. Eith. t. 80, fig. 92 (see Austin l.c.). The latter is not based on the former.
- 3. There is no genetic barriers between the two species, although *I. nil* is a tropical plant that will grow in temperate countries, but *I. hederacea* is a temperate species.

I. obscura (L.) Ker-Gawl. in Bot Reg. 3, t. 239, 1817; Haines, Botany 2 : 626. *Convolvulus obscurus* L., Sp. Pl. ed. 2, 1 : 220, 1762.

Slender twiners, stems hairy. Leaves ovate-cordate or sub-orbicular, deeply cordate, acute or shortly acuminate, entire, hairy beneath, puberulous above, about 7-palmately veined, 2.5-5 cm across; petioles 2.5-5 cm long, hairy. Cymes 1-3-flowered; peduncles 3-5 cm long; flowers white with bands yellowish or yellow, always with a dark purple centre; sepals ovate, subacute, nearly glabrous, shortly cuspidate, broader, obtuse, reflexed, in fruits, 5 mm long; corolla-tubes narrow, ochroleucous with a purple base, mouth wide, 2-3 cm long. Capsules ovoid, subacute, glabrous, 2-valved, 4-seeded, seeds 8 mm long.

Fl. & Frt. : Sept.-Dec.

Common in hedges, waste places.

Khuria : 19303; Kota to Lormi : 15450.

Palaeotropics.

I. pes-tigridis L., Sp. Pl. : 162 1753; Haines, Botany 2 : 624. Nicolson et al. Reg. Veg. 119 : 92. 1988. *I. pes-tigridis* L. var. *hepatocaefolia* (L.) C. B. Clarke in Hook. f. i.c. : 204.

Slender twiners; fulvous hairy or hirsute. Leaves deeply palmately 5-9-lobed, lobes elliptic-oblong, acuminate, narrowed at base, pubescent, 5-12.5 cm in diam.; petioles 2.5-5 cm long. Flowers capitate, involucrate cymose, heads peduncled, fulvous hirsute; peduncles 1.5-7 cm long; outer bracts ovate or elliptic-oblong, 2.5 cm long, inner bracts smaller, narrower, acute; flowers pink; sepals lanceolate, acute, hirsute, 8-10 mm long; corolla funnel-shaped, tubes narrow, mouth suddenly widened, sparsely hairy without, 2.5-3 cm long. Capsules ovoid, papery, glabrous, 5-8 mm in diam.

Lectotype : Ceylon, Herb. Hermann 4.82 (BM) (vide Verdcourt in Fl. Trop. E. Afr. : 108. 1963).

Fl. : July-Aug. *Frt.* : Oct.-Nov.

Common in hedges, scrub jungles, dry localities bunds of cultivated fields.

Khondra : 12838.

Throughout the tropics.

I. sinensis (Desf.) Choisy in Mem. Phys. Soc. Geneve 6 : 459. 1834; Verdcourt in Kew Bull. 1958 : 204. 1958; *Convolvulus sinensis* Desf. in Lam., Encycl. Meth. Bot. 3 : 557. 1791; *C. calycinus* Roxb., Fl. Ind. ed. Carey & Wall. 2 : 51. 1824; *Ipomoea calycina* (Roxb.) Benth., Gen. Pl. 2 : 872. 1876; Haines, Botany 2 : 623.

Twining herbs; stems vilous. Leaves ovate, deeply cordate, acute, entire, sparsely hairy, 5-7 cm long; petioles 3-5 cm long. Flowers solitary or in a few-flowered, peduncled cymes, white, 2 cm long; pedicels deflexed in fruits; bracts ovate-cordate, acute; sepals ultimately ovate-lanceolate, cordate or sagittate, unequai, ciliate, 7 mm long in flowers, 1.7-2 cm long in fruits; corolla tubular, about 2 cm long, mouth funnel-shaped, narrow, Capsules ovoid, glabrous, 5 mm in diam.

Fl. : July-Aug. Frt. : Sept.-Nov.

Occasionally found on bushes.

Pasarkhet : 12976.

Africa, India.

MERREMPIA Dennstedt ex Endlicher, Gen. Pl. 1 : 403. 1. 1841, nom. cons.

T. : *M. hederacea* (N. L. Burm.) H. Hall. (*Evolvulus hederaceus* N. L. Burman).

- 1a. Leaves palmately 5-7-lobed to palmately compound with 5 leaflets; corolla more than 2.5 cm long; ovaries 4-celled *M. aegyptia*
- 1b. Leaves entire, crenate or most 3-lobed; corolla under 2.5 cm in length; ovaries 2-celled
 - 2a. Leaves reniform or broadly ovate-cordate, stems creeping and rooting at nodes; peduncles very short or absent; sepals long ciliate, inner three longer and deeply emarginate *M. emarginata*
 - 2b. Leaves not reniform or broadly ovate-cordate; stems twining or prostrate, not rooting at nodes; peduncles 1.5-7 cm long; sepals not ciliate, inner ones not emarginate
 - 3a. Twining herbs; leaves long-petioled, ovate-cordate, acuminate, entire, toothed or 3-lobed; flowers in dense, axillary, dichasial cymes; sepals truncate and cucullate, obtuse or apiculate; seeds pubescent *M. hederacea*

3b. Prostrate herbs; leaves sessile, oblong, oblanceolate, hastate-oblong or subquadrate, obtuse, truncate or 3-toothed at apex, several spinulose teeth also at base; flowers 1-3 together on axillary peduncles; sepals elliptic, mucronate, glabrous; seeds glabrous

M. tridentata subsp.
hastata

Merremia aegyptia (L.) Urban, Symb. Antill. 4 : 505. 1910. *Ipomoea aegyptia* L., Sp. Pl. : 162. 1753; *Convolvulus pentaphyllus* L., Sp. Pl. ed. 2 : 223. 1762; *Ipomoea pentaphylla* (L.) Jacq., Collect. 2 : 297. 1788; C. B. Clarke in Hook. f. FBI 3 : 202. 1883; *Merremia pentaphylla* (L.) Hall. f. in Bot. Jahrb. Syst. 16 : 52. 1893.

Twining, annual herbs; thinly hirsute with yellow-brown patent hairs. Leaves digitately 5-lobed; leaflets broad-lanceolate, acuminate, subsessile, hirsute, 5-10 × 3.5 cm; petioles 5 cm long. Cymes long-peduncled, laxly dichotomous, with yellow strigose hairs; flowers white or yellowish; peduncles 2.5-20 cm long, hirsute; sepals 2 cm long, elliptic, obtuse or subacute, outer patently hirsute, inner glabrous, in fruits enlarged upto 2.5 cm; corolla funnel-shaped, glabrous, 2.5-3.5 cm long. Capsules ovoid, papery, 4-celled, 1-2 cm across, subtended and partially surrounded by calyx.

Type : Based on several specimens in the Linnaean Herb. (LINN). (Microfiche).

Fl. : July-Aug. Frt. : Oct.-Dec.

Common in hedges.

Pasan : 13280A.

Pantropical.

M. emarginata (N. L. Burm.) Hall. f. in Bot. Jahrb. Syst. 16 : 552. 1893. *Evolvulus emarginatus* N. L. Burm., Fl. Ind. : 77. t. 30. f. 1. 1768; *Convolvulus reniformis* Roxb., Fl. Ind. 1 : 481. 1820; *Ipomoea reniformis* (Roxb.) Choisy in DC., Prodr. 9 : 351. 1845; Haines, Botany 2 : 625; *Merremia gangetica* sensu Gandhi in Fl. Hassan : 473. 1976, non (L.) Cufod. 1961.

Much-branched, creeping herbs, rooting at nodes; glabrous or sparingly pubescent. Leaves reniform or ovate-cordate, crenate or dentate, obtuse, 0.5-2 cm in diam.; petioles 5-10 mm long. Flowers 1-3 together, axillary, yellow, 1-2 cm long; peduncles 5 mm long; sepals ovate, obtuse, glabrescent on back,

margins ciliate, two outer smaller, ovate-lanceolate, apiculate, three inner larger, emarginate; corolla campanulate, lobes 5, acute. Capsules sub-globose, 2-celled, about 4 mm in diam., surrounded by ciliate, enlarged sepals.

Fl. & Frt. : Sept.-Jan.

Frequently found on moist sandy soil near ponds, streams.

Khuria : 5498.

Palaeotropics.

C. B. Clarke (1883) stated that Choisy considered *Convolvulus gangeticus* L. (1756) and *C. reniformis* Roxb. (1820) as conspecific. Linnaeus, however, described *C. gangeticus* as having leaves and flowers very hirsute, peduncles capillary.

M. hederacea (N. Burm.) H. Hall, in Bot. Jahrb. Syst. 18 : 118. 1893. *Evolvulus hederaceus* N. Burm., Fl. Ind. : 77. t. 30. f. 2. 1768; *Ipomoea chryseoides* Ker-Gawl. in Bot. Reg. 4. t. 270. 1818; Haines, Botany 2 : 626; *Merremia chryseoides* (Ker-Gawl) Hall. f. l.c. 16 : 552. 1893.

Slender twiners; glabrous, often muriculate, sometimes hairy at nodes; stems angular. Leaves ovate-cordate, acute or acuminate, entire or shallowly 3-lobed and repand toothed, 2.5-5 × 2-2.5 cm; petioles upto 6.5 cm long. Cymes 2-6-flowered, forked, axillary, dense, peduncled; peduncles 1.5-7 cm long; flowers yellow, 1.5-2 cm long; sepals elliptic, glabrous, outer two 4 mm long, inner 5 mm long, glabrous or pilose, ultimately spreading; corolla funnel-shaped, glabrous without, 6-10 mm long. Capsules ovoid, somewhat angular, umbonate, 2-celled, 5-6 mm long, seated on green or brownish, sub-equal sepals.

Type : East Indies, Java, *D. Pryan* (G).

Fl. & Frt. : Sept.-Dec.

Common in moist shady places.

Khondra : 12782.

Africa, Asia, China, Malaysia, Queensland.

Juice of the plant is used medicinally.

M. tridentata (L.) H. Hallier subsp. *hastata* Ooststr. in Blumea 3 : 317. 1939, et in Fl. Males. Ser. I 4 : 445. 1953. *Convolvulus hastatus* Desv. in

Lam. Encycl. Meth. Bot. 3 : 542. 1792, *non* Forsk. 1775; *Merremia hastata* H. Hall. in Bot. Jahrb. Syst 16, 552. 1893 *nom. illeg.*; *Ipomoea angustifolia* Jacq. Ic. Pl. Rar. 2 : 10. 1795; t. 317. 1789; C. B. Clarke in Hook. f FBI 4 : 205. 1883, *I. hastata* Haines, Botany 2 : 625.

Prostrate herbs; many branches from woody rootstock, glabrous. Leaves sessile or subsessile, hastate-oblong, oblong or sub-quadrate obtuse, acute or mucronate, truncate or 3-toothed at base, 1-5 cm long. Flowers 1-3 on slender, axillary peduncles, 1-4 cm long, pale yellow; sepals ovate or elliptic-oblong, acute apiculate, glabrous 2-5 mm long; corolla funnel-shaped, 1 cm long. Capsules subglobose, papery, 2-celled, glabrous, 4-2-seeded, seeds 6 mm in diam.

Fl. & Fr. : July-Sept.

Common in open places, near streams.

Champa : 8739; Khootaghat : 19509.

Palaeotropics.

Subsp. *tridentata* has leaves and outer sepals obtuse-emarginate, whereas in subsp. *hastata*, the leaves and sepals are acute-mucronate. Austin and Staples (Brittona 32 : 533. 1980) establish *Xenostegia* Austin & Staples and make the combination, *X. tridentata* (L.) Austin & Staples. On transfer to *Xenostegia*, *X. tridentata* subsp. *hastata* (Ooststr.) Panigrahi et S. K. Murti (*Merremia tridentata* ssp. *hastata* Ooststr. Blumea 3 : 317. 1938) is made.

OPERCULINA S. Manso, Enum. Subst. Bras. 16, 49. 1837.

T. : *O. turpethum* (L.) S. Manso ('*turpētum*') (*Convolvulus turpethum* L.)

Operculina turpethum (L.) S. Manso, Enum. Subst. Bras. 16, 49. 1837; Austin & Ghazanfar in Fl. West Pakistan No. 126 : 57. f. 8A. 1979; *Convolvulus turpethum* L., Sp. Pl. : 155. 1753; *Ipomoea turpethum* (L.) R. Br., Prodr. 485. 1810; Haines, Botany 2 : 629.

Large climbers, pubescent or glabrate, stems quadrangular, winged. Leaves broadly ovate or oblong, acute and apiculate, base cordate or obtuse, entire, dentate or shallowly lobed, pubescent beneath, 5-15 × 10 cm; petioles 2.5-5 cm long, winged on lower leaves. Cymes 3-5-flowered, 5-7 cm long, bracts oblong, cuspidate, pinkish, 1-2.5 cm long; peduncles

2.5-8 cm long, pubescent; pedicels 2.5-3 cm long; flowers white, occasionally with yellow base; sepals ovate-oblong or elliptic, outer 1.5-2.5 cm long, usually softly pubescent, inner 2 cm long, glabrous, all enlarged, hardened and often split in fruits; corolla tubular, campanulate, 3.5 cm long, limbs 3-4 cm in diam. Capsules globose, 2-celled, 4-seeded, 1.5-2 cm in diam.

Lectotype : Ceylon, Herb. Hermann 2 : 68 (BM) (vide Verdcourt in Fl. Trop. E. Afr. 61. 1963).

Fl. & Frt. : Mar.-Dec.

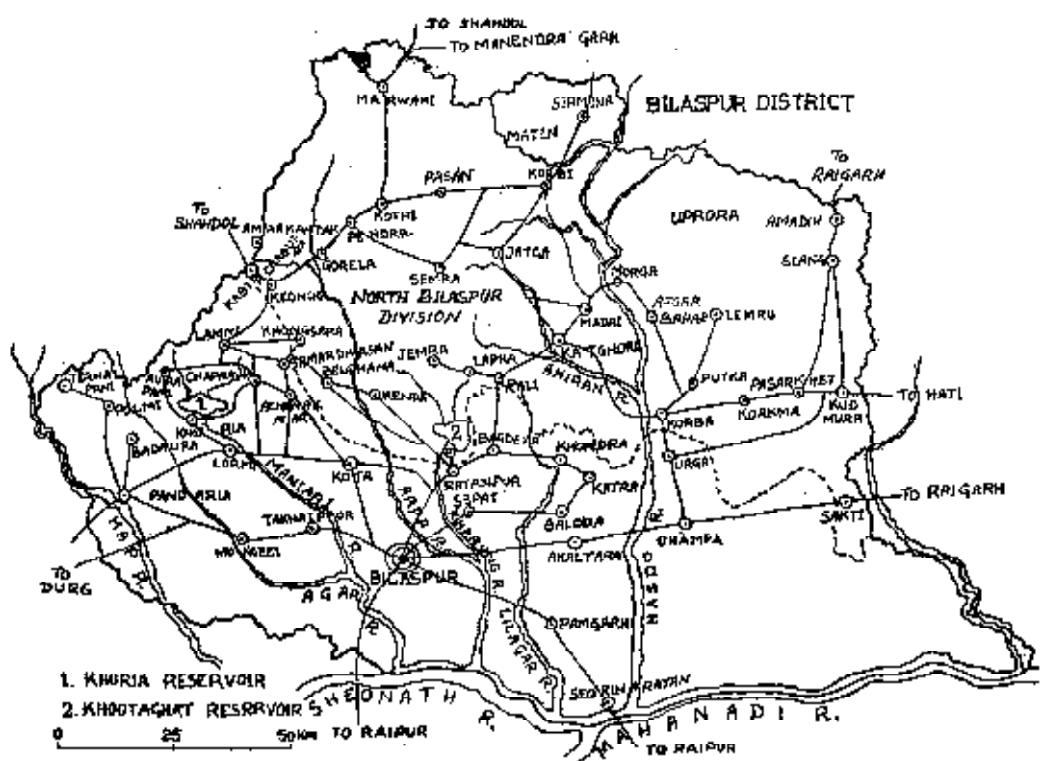
Occasionally found on bushes along roads.

Pali : 8595.

Africa, India, Sri Lanka, Australia.

The stems and roots are used in medicines.

Note : *Operculina* Silva Manso (1837) is *nom. rej.* as a taxonomic (=) synonym in favour of *Merremia* Dennst. ex Endl. (1811) *nom. cons.*



Map of Bilaspur District, Madhya Pradesh.