FLORA OF PALAMAU DISTRICT JHARKHAND

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Editors

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भारतीय वनस्पति सर्वेक्षण
BOTANICAL SURVEY OF INDIA

BOTANICAL SURVEY OF INDIA

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Date of Publication : January 2002

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Price :

Published by the Director, Botanical Survey of India, P-8, Brabourne Road, Calcutta-700 001 and printed at Shiva Offset Press, 14, Old Connaught Place, Dehra Dun - 248 001.

ACKNOWLEDGEMENTS

We express deep sense of gratitude to the Director, Botanical Survey of India for sanctioning the research project and publishing this 'Flora'

Our sincere gratitude is also due to the Divisional Forest Officers of Daltonganj North and South Forest Division, Garwah North and South Forest Division and Latehar Forest Division for their help and permission to stay in the forest rest houses during the collection trips.

The authors wish to thank Dr. U.C. Bhattacharyya, Ex-Joint Director, Central National Herbarium, Botanical Survey of India, Calcutta, for his kind permission to consult the herbarium and the library and for his help in identification of many specimens and to Dr. D.C. Pal, Botanical Survey of India, Calcutta, for the help in identification of grasses. We are also thankful to Shri U. Chatterjee, former In-charge, Publication section, B.S.I. for his suggestion and help regarding publication of this book. Thanks are also due to Sri S.K. Sur, Sr. Proof Reader, Publication section, B.S.I., for his continuous help during the printing of this book.

We would also like to express our gratitude to Dr. G.G. Maiti and Dr. S.K. Mukherjee, University of Kalyani, for their help and suggestions during the work.

The first author is particularly grateful to his wife, Smt. Swati Sarma who assisted him in various ways and to Mr. B. Chakraborty and Mr. M. Chakarborty for their assistance in the preparation of the manuscript.

Kolkata **Authors**
14th Nov., 2001

CONTENTS

		Page No.
Introduction	.....	1
General account	.....	10
General vegetation	.....	16
Hydrophytic vegetation	.....	21
Biotic influence on the vegetation	.....	25
Statistical analysis of the flora	.....	26
Rare Plants	.....	29
Endemic Plants	.....	30
Exotic species	.....	30
Artificial key to the families	.....	31
Alphabetical list of the families	.....	49
Enumeration of species (Dicots)	.....	54
Enumeration of species (Monocots)	.....	587
References	.....	723
Index to the Genera	.....	731

INTRODUCTION

It should be realized that a 'Flora' will be able to offer critical knowledge of numerous forest products, plants containing vegetable oils, fats and resin, 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, 1948).

The natural vegetation of the district Palamau is now facing a severe threat due to increasing urbanization. The 'Flora' may help in listing of several endangered, threatened and rare species. Moreover, it will create an awareness amongst the people as a whole to protect such species from extinction and to take necessary steps for conservation of our ecosystem and environment. Thus 'Flora' is an essential inventory in this respect and hence a necessity to wide range of users.

The district is floristically rich and was formerly a district of Chotanagpur division. The flora of the district is essentially tropophilous though in some parts there is a tendency to xerophily. One of the conspicuous topographical features of the district is the presence of Natarhat hill (1126 m) which is situated on the border of Gumla and Palamau district and this hilly terrain subtends both temperate and tropical vegetation. From the botanical point of view this region is of high interest due to its affinity with the rich flora of Madhya Pradesh which lies in the border of Palamau. It usually gives rise to reddish stiff loamy soil, excellently suited for forest growth while kept covered, but bakes to brick like hardness in hot season when denuded.

Previous Work :

Apart from Hooker's (1872-1897) monumental work and of Prain's (1903) there are several works on flora of Bihar State, e.g., "Plants of Chutianagpur including Jaspur & Sirguja" (Wood-1902), "A forest flora of Chotanagpur including Gangpur and Santal Parganas" (Haines-1910), "Botany of Bihar & Orissa" (Haines- 1921-1925), " Some additions to the Botany of Bihar & Orissa" (Mooney-1941), "A list of the plants recorded from the parts of Ranchi and Palamau district and the states of Jaspur and Surguja" (Mooney-1947a), "The occurrence of some indigenous species of Rosaceae in Bihar, Orissa and neighbouring states" (Mooney-

1947b), "A Botanical tour in Chotanagpur" (Mukerjee-1947) and "Supplement to the Botany of Bihar & Orissa" (Mooney-1950) etc. In addition to the above works, Pal (1978) and Pal & Prasad (1978) recorded some new plants from Netarhat plateau.

Santapau (1951) published, "A Review of Mooney's Supplement to the Botany of Bihar & Orissa", Sanyal (1957) published "Additional notes on the Botany of Bihar & Orissa by H.H. Haines and its Supplement by Dr. Mooney" Other publications are "Recent trends in Flora of Bihar State" (Srivastava- 1959), "An account of the vegetation of Chaibasa, Singbhum district in South Bihar" (Majumdar & Biswas-1971), "Notes on the flora of Bihar and Orissa" (Saxena-1976a, 1976b and 1978) and "On the collection of plants from Netarhat Plateaux, Palamau district, Bihar" (Manna & Samaddar-1984). But due to hilly topography and difficult approachability the district still remains unexplored. Further, large number of plant names used in those books have undergone nomenclatural changes during recent times and needed corrections. Since the days of Hooker, Prain, Haines etc. many neophytes might have naturalised (Srivastava 1964, and Maiti & Guha Bakshi-1981) and many earlier mentioned species may be on the way of extinction.

In consideration of aforesaid facts and circumstances a comprehensive survey of Palamau district for preparation of a 'flora' was undertaken.

Materials :

More than 800 specimens belonging to 1190 field numbers collected in different seasons in 15 collection trips involving about 200 collection days between the year 1986-1989, form the base of this present work. The Palamau district is nearly 500 km away from the research station (Department of Botany, Kalyani University). During the collection trips various Forest Rest Houses of Daltonganj North and South forest divisions, Garwah North and South forest division, Latehar forest division, P.W.D. inspection bungalows and sometimes private houses also have been chosen for shelter. One set of collected specimens have been deposited in the Kalyani university Herbarium, Kalyani and another set in the Central National Harbarium (CNH), HOWRAH (CAL). The details of the field numbers and periods of collection with the name of collectors are given in the Table-1.

Table-1

Trip	Field Number		Month of the collection	Name of the collectors
	From	To		
1.	1	56	March (1986)	T.K. Sarma
2.	57	235	March-April	A.K. Sarkar, G.G. Maiti, S.K. Mukherjee and T.K. Sarma
3.	236	408	December	A.K. Sarkar, G.G. Maiti & T.K. Sarma
4.	409	486	December (1986) & January (1987)	T.K. Sarma
5.	487	553	July	T.K. Sarma
6.	554	664	December (1987)	T.K. Sarma
7.	665	697	February-March (1988)	T.K. Sarma
8.	698	746	March	T.K. Sarma
9.	747	808	July	T.K. Sarma
10.	809	871	July-August	T.K. Sarma
11.	872	939	September	T.K. Sarma
12.	940	967	September-Oct.	T.K. Sarma
13.	968	1047	November	A.K. Sarkar, G.G. Maiti and T.K. Sarma
14.	1048	1142	November (1988)	T.K. Sarma
15.	1143	1190	January-February (1989)	T.K. Sarma

The Project was sanctioned by the Botanical Survey of India for 3 years from February, 1986 to February, 1989.

Present Work :

The flora of Palamau district deals with the general consideration of the flora which includes introduction, materials and general account dealing with area, topography, geology and soils, climate, vegetation and biotic influences over vegetation. This is followed by a statistical analysis of the

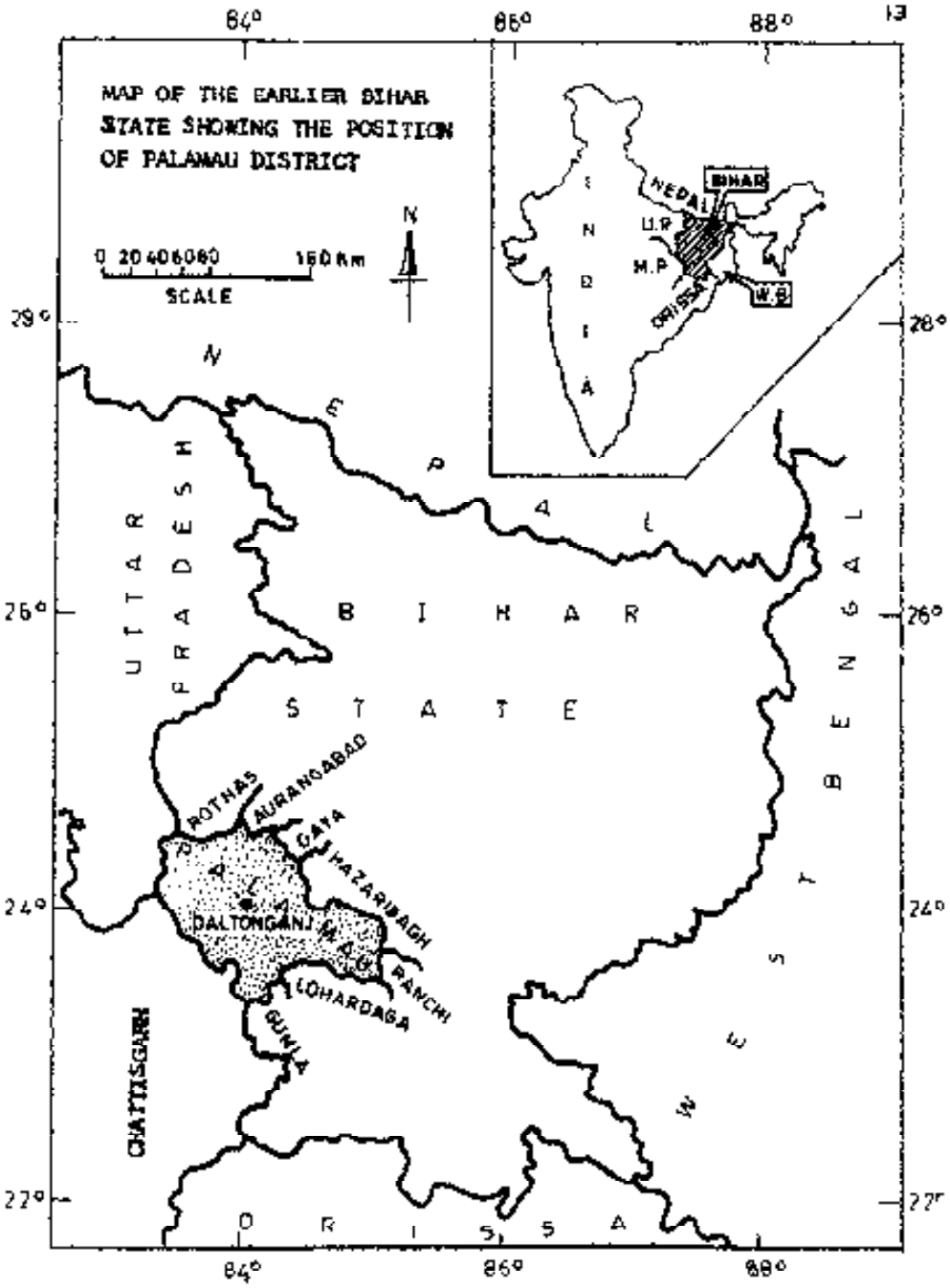
flora, treatment of rare elements and aliens naturalised in the area. After the general account it deals with the systematic account of the Dicot families and the systematic account of monocot families of Angiosperms. The families are arranged according to Bentham & Hooker's system (1862-1883) of classification as modified in K & B M., with few exceptions.

For the treatment of herbaceous members of this district, the authors have consulted Majumdar (1962) and Babu (1977). For the treatment of the family Fabaceae, van Meeuwen *et al.* (1961a & 1961b) for Convolvulaceae, van Ooststroom (1938a, 1938b and 1940), for Lamiaceae, Mukerjee (1940) and for the family Polygonaceae, Nakai (1909) and Maiti & Sikdar (1985) have been consulted. For the distributional records of some Cucurbitaceae, Chakravarty (1961) have been followed.

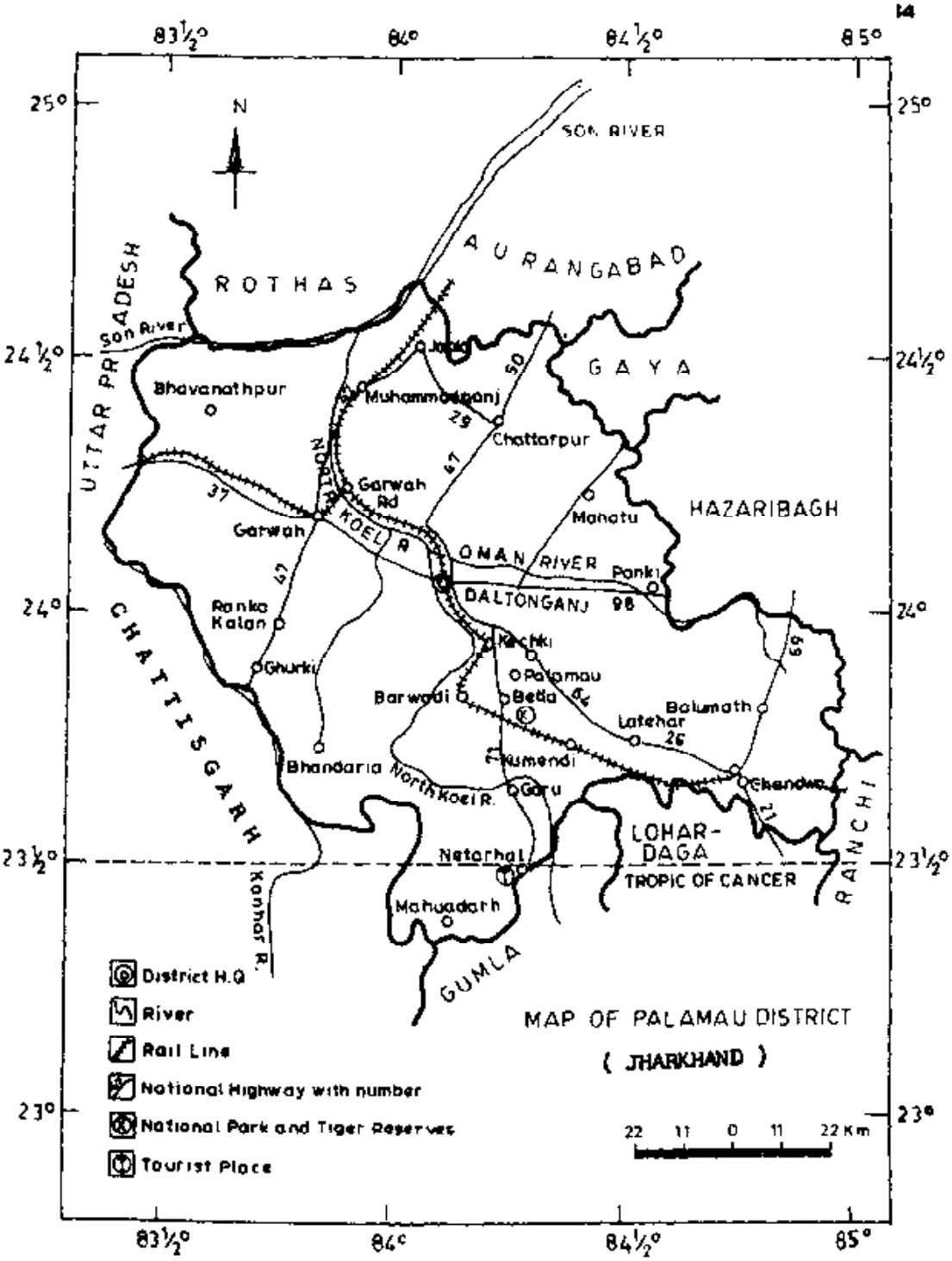
For the treatment of genus *Indigofera* Linn., Nair & Koshy (1963), for *Spermacoce* Linn., Deb & Datta (1984) and Sarma & Paine (1989), for *Lindernia* All., Mukerjee (1945) and for the genus *Ficus* Linn., Corner (1965) have been consulted. For some Monocot families the authors have consulted Mitra (1952 & 1958), Majumdar (1956), Bor (1960), Kamathy & Rao (1964), Rao *et al.* (1968), Jain *et al.* (1975), Guha Bakshi (1982), Sarma *et al.* (1987) and Chakraborty (1991).

In the systematic part a key to the groups of families and keys to the families in each of these respective groups are provided. Genera and species are alphabetically arranged within the family/genus as the case may be, keys to the genera and species are also given.

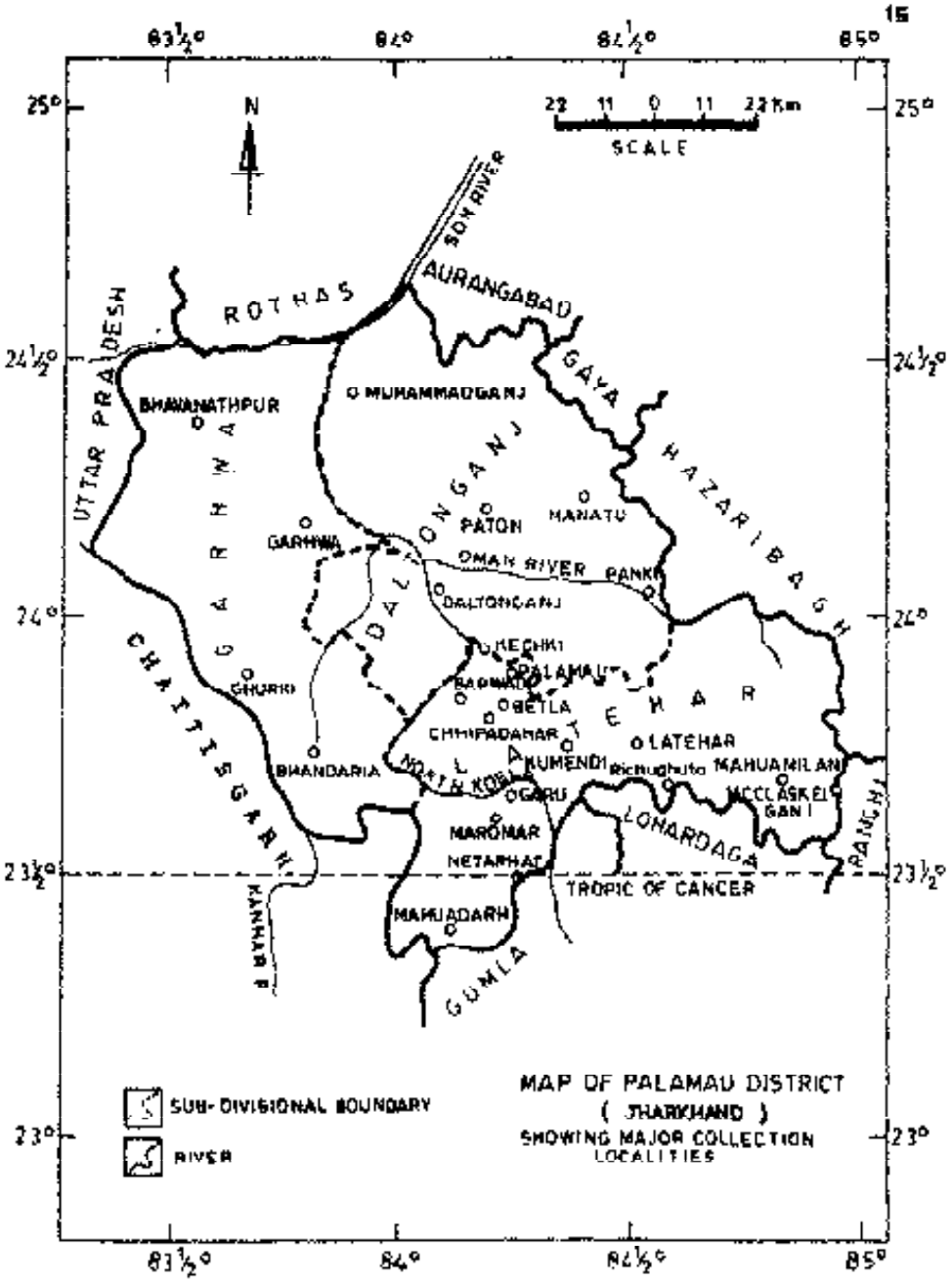
For the correct names several works of Raizada (1948, 1959, 1966 & 1968), Bennet (1987), Rao *et al.* (1988) and Karthikeyan *et al.* (1989) are consulted. Among the latest works, Flora of India, edited by Sharma *et al* (1993) Vol. 1, Sharma and Balakrishnan (1993) Vol. 2, Sharma and Sanjappa (1993) Vol. 3 and Hajra *et al.* (1995) Vol. 12 & 13, Flora of West Bangal by Bhattacharyya *et al* (1997) and Flora of West Champaran by Bhattacharyya and Sarkar (1998) are also consulted. Nomenclature has been brought up to date in accordance with I.C.B.N. as far as practicable. Brief descriptions of species with flowering and fruiting time is given. Notes on nomenclature, habit, ecnomic aspects (Watt-1889, Chopra *et al.* 1956 & 1969, Trivedi *et al.* 1985, and Ambasta *et al.* 1986) including local uses if any, local names of the plant together with Hindi


MAP OF THE EARLIER BIHAR STATE SHOWING THE POSITION OF PALAMAU DISTRICT
0 20 40 60 80 160 Km
SCALE
N
84°
86°
88°
29°
28°
26°
24°
22°
NEPAL
BIHAR
U.P
M.P
ORISSA
W.B
INDIA
UTTAR PRADESH
BIHAR STATE
WEST BENGAL
ORISSA
CHATTISGARH
ROTHAS
AURANGABAD
GAYA
HAZARIBAGH
DALTONGANJ
RANCHI
LOHARDAGA
GUMLA

Map-1


83½°
84°
84½°
85°
25°
24½°
24°
23½°
23°
N
SON RIVER
ROTHAS
AURANGABAD
GAYA
UTTAR PRADESH
Son River
Bhavanathpur
Muhammadganj
Chattarpur
Garwah Rd
Garwah
Manatu
HAZARIBAGH
NORTH KOEL R
OMAN RIVER
Panki
DALTONGANJ
Ranka Kalan
CHHATTISGARH
Ghurki
Kanchki
Palamau
Barwadi
Betla
Balumath
Latehar
Bhandaria
North Koel R.
Kumendi
Garu
Chandwa
LOHARDAGA
RANCHI
Netarhat
TROPIC OF CANCER
Kanhar R.
Mahuadarh
GUMLA
District H.Q
River
Rail Line
National Highway with number
National Park and Tiger Reserves
Tourist Place
MAP OF PALAMAU DISTRICT
(JHARKHAND)
22 11 0 11 22 Km

Map-2


15
83½°
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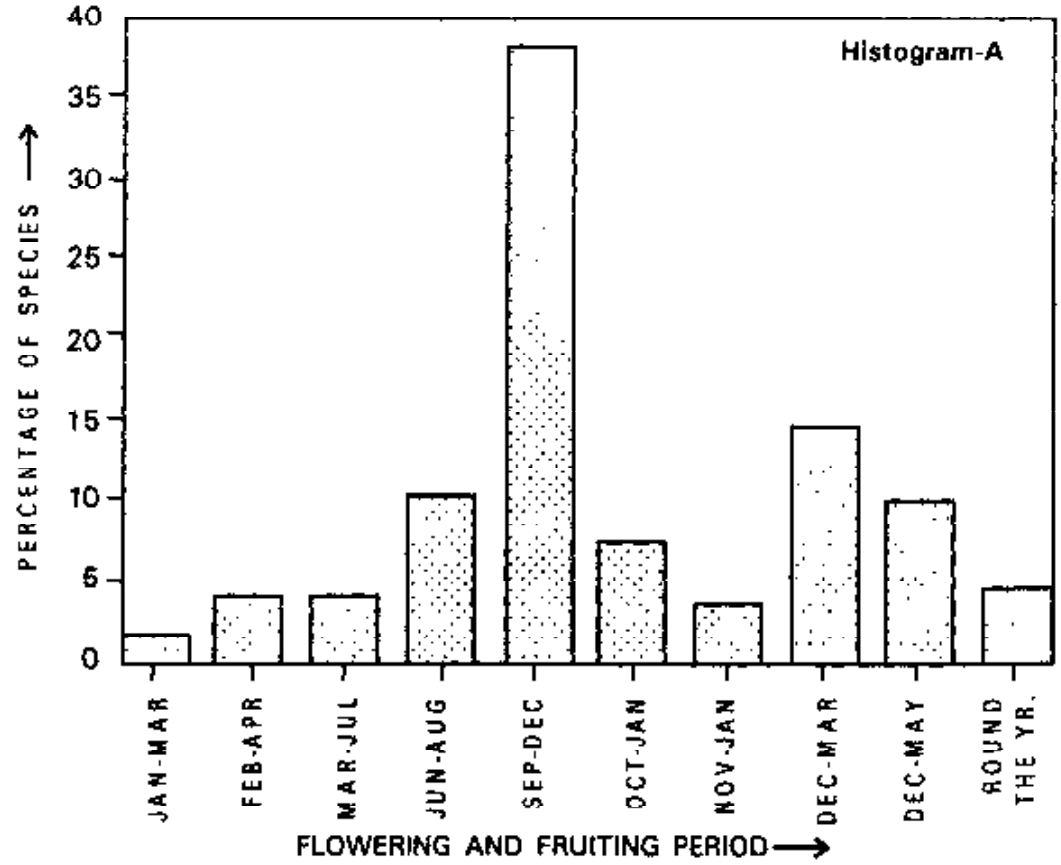
N
22 11 0 11 22 Km
SCALE
SON RIVER
ROTHAS
AURANGABAD
GAYA
HAZARIBAGH
UTTAR PRADESH
BHAVANATHPUR
MUHAMMADGANJ
GARHWA
DALTONGANJ
PATON
MANATU
OMAN RIVER
PANKI
DALTONGANJ
KECHKI
PALAMAU
BARWADI
BETLA
CHHIPADAHAR
LATEHAR
KUMENDI
Richughuta
MAHUAMILAN
MCCLASKEL GANJ
GARU
MAROMAR
NETARHAT
MAHUADARH
GUMLA
LOHARDAGA
RANCHI
CHATTISGARH
KANHAR R
TROPIC OF CANCER
SUB-DIVISIONAL BOUNDARY
RIVER
MAP OF PALAMAU DISTRICT
(JHARKHAND)
SHOWING MAJOR COLLECTION LOCALITIES

Map-3



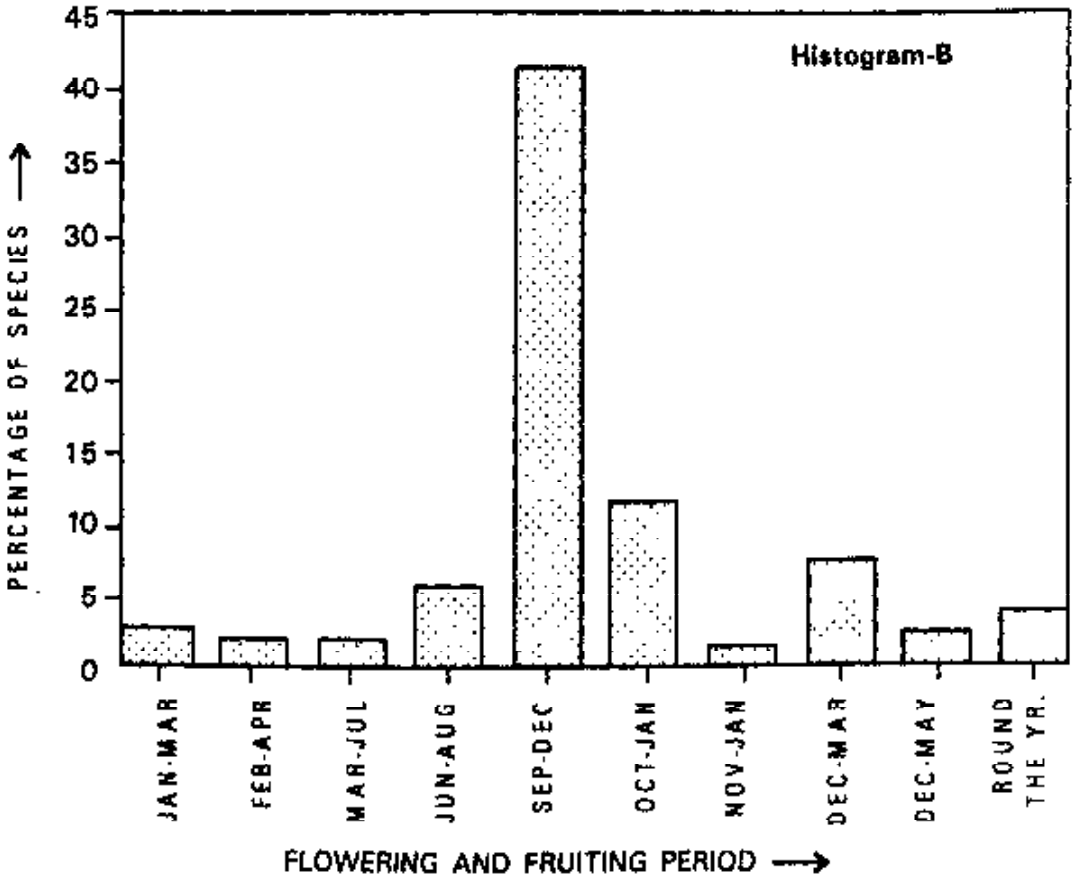


Diagram-1: Showing the percentage (%) of Flowering and Fruiting species during the calendar year; **Histogram-A:** Dicot Herbs; **Histogram-B:** Monocot Herbs.

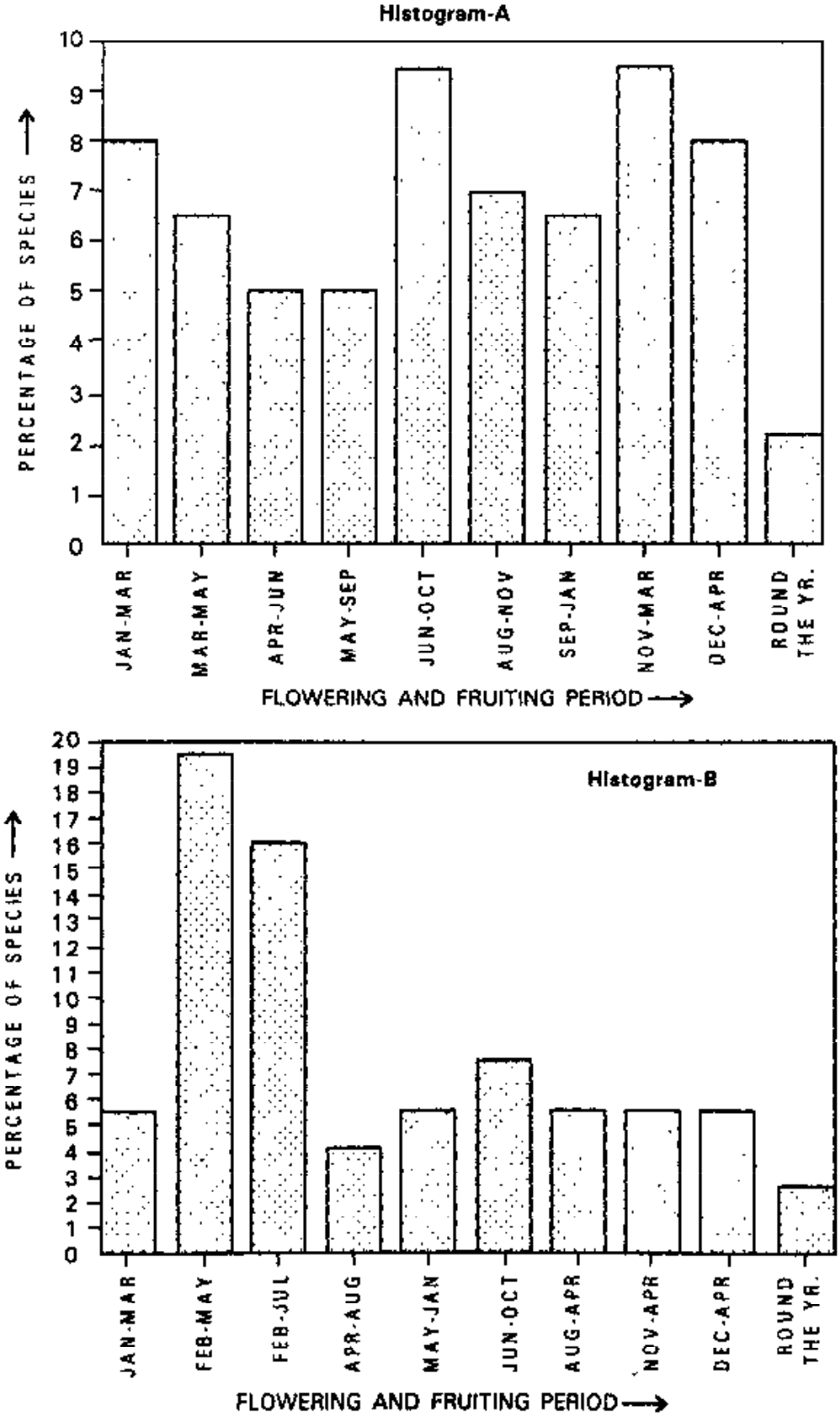


Diagram-2: Showing the percentage (%) of Flowering and Fruiting species during the calendar year; **Histogram-A:** Dicot Shrubs; **Histogram-B:** Dicot Trees.

and Bengali names as far as practicable and the distribution of every species are given. Illustrations of habit and diagnostic characters of some selected species belonging to 43 families, together with 3 maps showing the position of Palamau district in Bihar state, major collection localities and 4-histograms showing the percentage of flowering and fruiting species during a calendar year are provided.

GENERAL ACCOUNT

(Mainly from Bihar District Gazetteer, Palamau, Roy Chowdhury - 1961)

Origin of Name:

The origin of name 'Palamau' is doubtful. According to one concept it is derived from the Hindi word 'Palana', to flee, and means a place of refuge. Another concept is that, the name is a combination of two words i.e., 'Pala' meaning frost and 'mu' meaning dead, the whole word meaning dead from frost. Other suggestion is that 'Palamau' is dravidian name, that is may be a corruption of Pall-amm-u, 'Pall' meaning tooth, 'amm' meaning water while 'U' is a kind of genetive or possessive case meaning village, country, fortress etc.

Description :

Palamau forms the north-west corner of Chotanagpur division of earlier Bihar and lies between 23^0 23' and 24^0 39' North latitude and between 83^0 22' and $85^0$00' East longitude. It is covering an area of 7917.89 square kilometer, the district head quarter is Daltonganj, situated by the side of Koel river in the intersection of 24^0 03' North lat. and 84^0 04' East long. with an elevation of 221 m. The name Daltonganj was adopted after Colonel Dalton, commissioner of Chotanagpur, 1861.

Boundaries:

The district is bounded on the north by the river Son, which separates it from the district of Rothas and Aurangabad; on the east by the district of Gaya and Hazaribagh of Bihar; on the south by the district of Gumla, Lohardaga and Ranchi; and on the west by the district Mirzapur of Uttar Pradesh and the district Surguja of Chattisgarh.

Plate-1. Dry mixed deciduous forest.

Plate-2. Sal forest with dense undergrowth at Maromar.

Plate-3. *Cochlospermum religiosum* in bloom.

Plate-4. *Shorea robusta* in flowers.

Plate-5. *Firmiana colorata* in bloom.

Plate-6. *Ventilago denticulata* in fruiting.

Plate-7. *Buchanania lanzan* in bloom.

Plate-8. *Butea monosperma,* flame of the forest, in bloom.

Plate-9. *Richardia scabra* in the sandy bed of Koel river at Daltonganj.

Plate-10. *Wendlandia heynei* in bloom at Netarhat.

Plate-11. *Woodfordia fruticosa* in flowering.

Plate-12. *Woodfordia fruticosa* in close up.

Plate-13. *Jacaranda mimosifolia* in bloom.

Plate-14. *Mallotus philippensis* in fruiting.

Plate-15. *Rauvolfia tetraphylla* in fruiting at Betla.

Plate-16. *Dendrobium herbaceum* an epiphytic orchid at Netarhat.

Plate-17. *Curculigo orchioides* with flower at Barwadih.

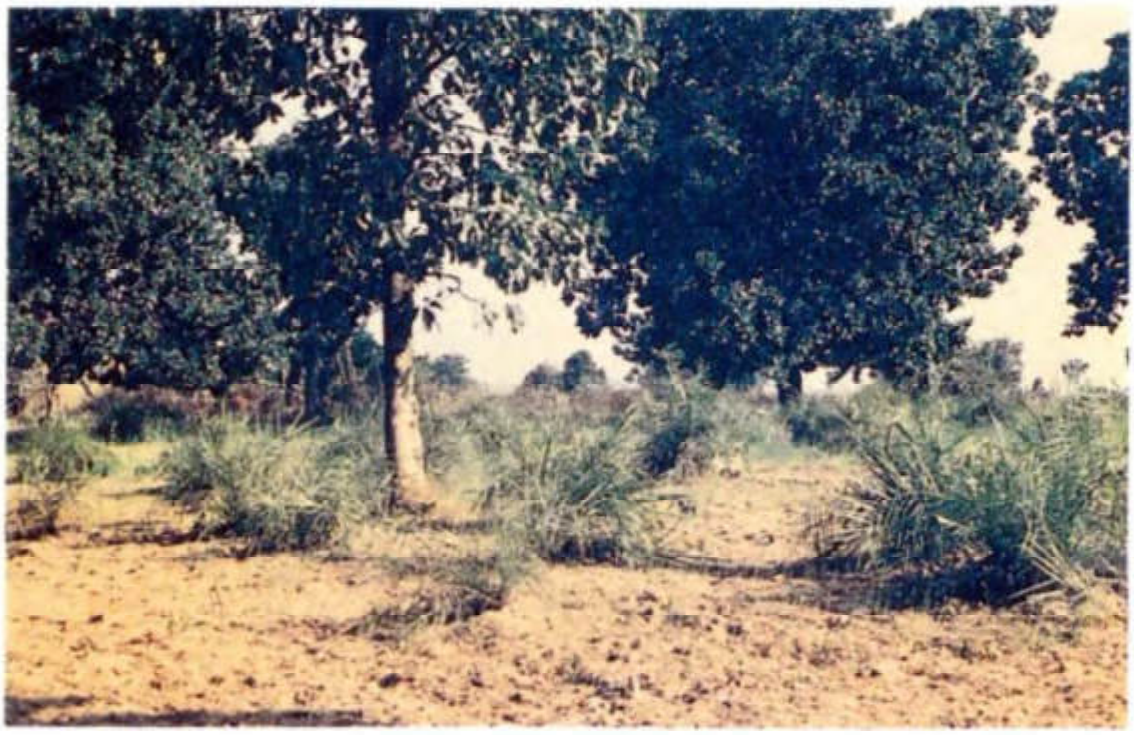


Plate-18. *Phoenix acaulis* as forest undergrowth at Bisrampur.

Plate-19. *Dendrocalamus strictus* (Bamboo) in flowering.

Topography:

(i) *General* : In shape Palamau district is roughly a parallelogram of which the eastern and western sides are of greater length than the northern and southern sides. The district has a length of 191.5 km. from north-west to south-east and a breadth of 162.5 km from west to east. The district is cut into two nearly equal parts by the river Koel, which after flowing from east to west in the southern part of the district, turns north and eventually enters the Son, at the northern boundary of the district. On the either sides of this river there are well defined ranges of hills running from east to west. In the south there is another range, running from east to west, through which the river Koel forces its way and where it turns north at Kutku gorge. In south of the Koel, where it flows from east to west, before passing through 'gorge', there is another range of hill running parellel to it and beyond that, again is the isolated cup like valley of Chhehhari. The eastern end of this southern range increases its height and turns towards the south and where it culminate in Netarhat Palateau. A series of parallel ranges running east to west through which the river Koel passes as it makes its way northward to join the Son, only the most southern zone of this range is not penetrated by Koel but it is penetrated by one of its tributaries the 'Burhi Naddi' which drains the Chhehhari valley. The most thickly vegetated land is found between the ranges in the valley and on the banks of river Koel and Son. The district mostly consists of hilly areas, broken country covered with jungle and cut in all directions by streams and torrents which dry up during summer and come down in spate during rains. The average elevation of Palamau district is about 365.76 m. The highest peak of Netarhat, which is also the highest peak of the district is 1126.54 m. The most striking topographical feature of the district is the Netarhat Plateau with its outlying spurs. This plateau is a northern prolongation of Pakri pat plateau of Ranchi district and is separated on west by its isolated cuplike valley Chhehhari Plateau of similar altitude in Sirguja. On the east it is separated by valley of north Koel from smaller plateau of about same altitude situated in Ranchi district. On the north, outlying spur of the plateau slope steeply comes down to the North Koel.

(ii) *Hill system* : The hill system of Palamau district consists of a series of parallel ridges running east and west pierced by the river Koel as it flows northwards. There are many spurs and ridges and outlying

peaks rising from comparatively open country, which stand in no obvious relation to this system, amongst these may be mentioned the metamorphic rocks which form the water shed between the Koel and the Damodar to the west of the Chandwa-Balumath road and which rise into conspicuous hills Madagir and Chetag. The majority of the spurs and ridges bear no definite names but the peaks are often called by the name of the villages in which they are situated.

Generally the hills are conspicuous for their irregular form and occurrence. Their contour depends on the nature of the rocks of which they are composed. The most numerous and ancient types are those composed of crystalline and metamorphic rocks, a class represented by a greater number of hills and ranges with elevation upto or about 914.5 m. This type of hills and ranges are found in the northern half of the district. The second class of hills and ranges consist of sandstones or conglomerates. The sandstones are represented by the long ranges east of Koel with average altitude 61-91 m above the surrounding country, but occasionally having peaks which rise about 61 m higher.

The latter are found in groups and represent the major part of the flat topped ridges, which also have average hight of 61-91 m above the surrounding country. Occasionally there are some conical peaks, such as *'Latehar peaks'* near Latehar village, which are about 277 m above the surrounding country or 625 m above sea level; *Bijka,* which rises 396 m above that village or 755.6 m above sea level and *Khaira* hill in south of Hussainabad, which rises to nearly 518 m.

The third and last class of Palamau hills include the paths or plateaux in the south, which are composed of crystalline rocks and their summit capped with sandstones or laterite. The topmost of these is Netarhat, of which the highest peak is 1126. 54 m high, and this is also the highest peak of the district. Netarhat itself is a flat topped hill, about 6.44 km long and 4.02 km broad, through the centre of which flows a small stream. Other conspicuous hills in the neighbourhood are Kottam, 850.7 m high at the south of the Garu Police Station and Kumendi, 771 m high between Garu and Latehar.

(iii) *Drainage system* : The general course of drainage is from south to north towards the river *Son.* The most important rivers are the Koel and its tributaries, the *Auranga* and the *Amanat.* There are also a

host of smaller streams, most of which are moutain torrents with rock strewn beds. The *Koel, Auranga* and *Amanat* are similar in this respect. Their upper reaches are characterized by high banks, generally rugged and occasionally precipitous with a rapid stream dashing over boulders and shingle or gliding calmly, except in time of spate. Further north, these rivers have deep sandy beds, into which the water sinks out of sight in the hot weather, percolating through the soft sand until some out crop arrest its course and forces it to the surface. The entire district is drained by the river *Koel*, except a tract in the west, drained by the river *Kanhar*, which joins the *Son* in Mirzapur district of Uttar Pradesh. All the rivers of Palamau are dangerous in rainy season, not only on account of violence of the freshets which come rushing down, but also because of the extremely treacherous quicksands in their beds. The drainage system which does influence the vegetation and flora of this district as a whole is represented, thus by the tributaries of the river Koel.

Geology :

Most of the hill ranges of Palamau district are composed of metamorphic and submetamorphic rocks but in the west and south-west, in the neighbourhood of Kanhar river, the flat topped hills are capped by the massive sand stones and laterite. In the north western hills biotite gneiss, a brownish amorphous-looking or slatey rock and a crystalline limestones are frequent. The geological formation of Palamau district comprises mainly rock of Archaean, Vindhyan and Gondwana ages. The Archaean rocks include both schists of Dharwar age, gneisses and granites. The schists mainly hornblendic and biotitic, are the oldest rock of the area and occur as parallel and lenticular bands in the gneisses. The schists are intruded epidiorites, amphibolites and gneisses. Granetiferous sillimanite-graphite schists, similar to khondalites, also occur near Daltonganj and Latehar. Cal-silicate rocks and crystalline limestones of Dharwar age are largely developed in certain areas. The gneisses and granites are the most predominant rocks of the district as in other parts of Chotanagpur.

Soil :

The soils vary in composition and texture from place to place depending upon the underlying rocks and topography. The following are the main types of soil found in the district.

i) *Heavy clay* : Locally known as *'Kewal'* becomes very hard when dry and very sticky in wet condition. There is slight variation in this type of soil due to existence of nodular lime contents and this gives a whitish tinge to this type of soil at places.

ii) *Loam soil* : Locally known as *'dorasa'*, where a typical admixture of sand and clay exists.

iii) *Sandy soil* : Locally known as *'balasundar'* and contains a considerable admixture of coarse sand.

The above three are the main types of soil found in the district. There is a great variation in their mixture due to existence of different soil constituents. The following are the admixture of soils found in the district, over the three main classes mentioned above. Local names have been used.

i) *Gangetic soil* : It has got a high percentage of kankar (stone chips) and lime.

ii) *Ankrout* : It is an admixture of sandy and gravelly soil with clay.

iii) *Pathri* : It is a reddish soil full of gravels and pebbles and found on the slopes and at the bottom of the rivers.

iv) *Lalmiti* : It is red ferruginous soil found in the south of this district near the Chotanagpur plateau and in the gneissic hillocks and ridges in the north-west.

v) *Pawar* : This soil has a large mixture of coarse sand and is very friable and poor in quality.

A considerable area of central Palamau (north of the Daltonganj) occupied by Gondwana rocks (Talchir and Damuda series), possesses chiefly sand stones, which are frequently calcareous, and some coal. Another area of this rocks also occur near Latehar and in few other places.

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. The climate of this district as a whole is dry and bracing. The year can be divided into 3 main seasons, viz, the cold season from November to early half of the March, the hot season from middle of March to May, and monsoon season - from June to September. The October is a transitional month between monsoon and winter season.

i) *Rainfall* : The average annual rainfall for the district as a whole is 1335 mm. The northern parts of the district get comparatively lesser rain than southern parts. In the rainy season (June to September) the district gets 85% of the annual rainfall. From the middle of the June rainfall rapidly increases and reaches the peak value in August. The variation of rainfall from year to year is not very large. The highest rainfall in 24 hours was 364 mm recorded at Mahuadarh on 26th June-1945.

ii) *Temperature* : Winter season starts from the November and continues till about the middle of March. December and January are the cooler months in the district, in the high plateau frost occur in December and January. By March temperature begins to rise steadily. In May and early part of June the maximum temperature can be as high as 46.7^{0}C. The effect of this extreme summer heat is some what alleviated by the dryness of the air and the strong breezes that blow in the afternoon. From April, nights are oppressive, except in the early morning hours, when the temperature drops to a comfortable level. The night temperature in June is higher than in May and July.

iii) *Humidity* : The relative humidity is generally lower in the afternoon than in the morning, except in the rainy season when there is little difference. The summer months are the driest with humidity dropping as low as 20-25% in the afternoon.

Monthly average rainfall, temperature, humidity etc. are given in the Table -II (Data collected from Alipore observatory, Calcutta-27).

Table-II

Month	Temperature in °C Max.	Min.	Relative humidity at 8.30 AM	5.30 PM	Rain fall in mm	No. of Rainy days	Mean wind speed in km/hr.
January	28.9	4.6	78	51	30.7	2.4	2.9
February	32.1	6.6	71	38	27.4	2.4	3.7
March	38.3	10.9	53	27	20.6	2.1	4.4
April	42.4	16.5	37	20	9.1	1.1	5.3
May	44.7	21.7	36	23	12.6	1.3	6.7
June	43.9	23.3	56	48	139.7	8.2	7.2
July	36.3	23.2	79	77	345.9	16.5	5.6
August	34.3	23.3	82	81	357.7	16.9	5.5
September	33	22.1	79	77	223.5	11.4	4.6
October	33.8	14.8	73	60	56.7	4.2	3.4
November	31.1	8.3	71	52	6.8	0.5	2.5
December	28.6	5.0	76	53	3.7	0.4	2.3

GENERAL VEGETATION

The vegetation of India is governed by the complex of environmental features, including climate, geology, soil, forest biota and forest history. While climate controls the general picture of vegetation the details are related to other factors of the habitat. In India where much of climax vegetation has long been destroyed, biotic and edaphic factors are considered to be more responsible for the degradation of various vegetation types than climate.

Champion and Seth (1968) discuss the climatic climax vis-a-vis the polyclimax theory, while Clements (1936) holds that a single climatic climax develops in a given type of climate, while the polyclimax theory considers that each pronounced variation within a given type of climate will tend to have its own recongnisable 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.

According to forest classification of Champion and Seth (1968), which is also followed by Puri *et al.* (1983) the forests of Palamau district can be classified as follows :

I. Moist Tropical Forest :

a) Tropical moist deciduous forest :

II. Dry Tropical Forest :

a) Tropical dry deciduous forest :

1. Dry mixed deciduous forest.
2. Dry sal forest.

III. Montane subtropical Forest :

Tropical moist deciduous forest : Typical moist deciduous forest is not seen in Palamau district, but rarely found in patches at Netarhat ranges. The dominant species of this type of forest are mostly deciduous, though often for brief periods. Although intimate mixture of species is the general fashion but 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 a more or less evergreen appearance over most of the year. A bamboo undergrowth (*Dendrocalamus strictus*) is characteristic, although it may be absent in some places. Climbers are abundant. The chief feature of moist deciduous forest is a leafless period in the dry season, which may or may not begin in winter, but is met with typically during March-April, when the upper canopy is almost leafless. A few number of species flower, while more or less leafless e.g. *Bombax ceiba, Cassia fistula, Sterculia urens* etc. or *Dalbergia sissoo* start forming new foliage.

The chief associates of these forests in the first storey are *Adina cordifolia, Anogeissus latifolia, Bauhinia purpurea, B. tomentosa, B. variegata, Bombax ceiba, Butea monosperma, Buchanania lanzan, Croton oblongifolius, Dendrocalamus strictus, Diospyros melanoxylon, Phyllanthus emblica, Garuga pinnata, Hymenodictyon excelsum, Madhuca longifolia, Mitragyna parvifolia, Schleichera oleosa, Semicarpus anacardium, Syzygium cumini, Terminalia alata, T. bellirica, T. chebula* etc.

The second storey consists of *Casearia graveolens, Carissa spinarum, Cassia fistula, Flacourtia indica, F. ramontchi, Firmiana colorata, Gardenia latifolia, Grewia tiliifolia, Hollarrhena pubescens, Nyctanthes arbor-tristis, Wendlandia heynei, W. tinctoria* etc.

The third storey consists of *Colebrookea oppositifolia, Embelia tjerium-cottam, Helicteres isora, Melastoma malabathricum, Pogostemon benghalensis, Woodfordia fruticosa* etc.

The fourth storey consist of *Achyranthes aspera, A. bidentata, Aerva lanata, A. sanguinolenta, Bacopa monnieri, Boerhavia diffusa, Begonia picta, Chlorophytum arundinaceum, Commelina hasskarlii, C. paludosa, C. suffruticosa, Desmodium gangeticum, D. pulchellum, Elephantopus scaber, Euphorbia dracunculoides, E. helioscopia, E. heterophyla, E. thymifolia, Eragrostis tenella, Heteropogon contortus, Imperata cylindrica, Indigofera cassioides, I. glabra, Mazus pumilus, Phyllanthus maderaspatensis, P. virgatus, Tonningia axillaris* etc.

Some important climbers are also found in this forest, eg. *Bauhinia vahlii, Cryptolepis buchananii, Dioscorea oppositifolia, Milletia extensa, Smilax ovalifolia, Ventilago denticulata* etc.

Dry mixed deciduous forests : The upper canopy is thin but fairly complete in this type. Most of the trees have low-spreading crowns. Trees are deciduous during the dry season. A thin papery outer bark is very characteristics of many trees growing in dry exposed places. *Boswellia serrata, Cochlospermum religiosum, Lannea coromandelica* are the characteristics species of such forest. The Palamau district mainly consists of this type of forest (National Atlas of India-Forest types -Ed. 1975). At the foot of the hills miscellaneous species are found associated with *Boswellia serrata*, but at the ascending slope the proportion of *Boswellia serrata* increases until it forms a pure crop on hill tops. Bomboos are found scattered throughout. These type of forests are found in Kundri, Seuti, Betla, Muhammadganj of Daltonganj North Forests Division; Barwadih, Maromar, Garu, Oksi etc. of Daltonganj South Forest division; Garwah, Bhavnathpur, Dhurki of Garwah North Forest division; Kutku, Bisrampur, Vandaria of Garwah South Forest Division and in Richughuta, Kumandi of Latehar Forest Division.

The main components of first storey are *Acacia catechu, Adina cordifolia, Anogeissus latifolia, Butea monosperma, Chloroxylon*

swietenia, Dalbergia sissoo, Diospyros melanoxylon, Lagerstroemia parviflora, Lannea coromandelica, Mitragyna parvifolia, Terminalia alata etc.

The second storey consists of *Aegle marmelos, Bauhinia acuminata, B. purpurea, Bridelia retusa, Calotropis gigantea, Careya arborea, Carissa paucinervia, C. spinarum, Flacourtia indica, Nyctanthes arbor-tristis, Wrightia tinctoria, Ziziphus oenoplia, Z. xylopyrus* etc.

The third storey consists of *Barleria prionitis, Cassia tora, Indigofera cassioides, I. glabra, Helicteres isora, Peristrophe paniculata, Phoenix acaulis, Rauvolfia tetraphylla, Thespesia lampas, Woodfordia fruticosa* etc.

The fourth storey consists of *Achyranthes aspera, A. bidentata, Aerva lanata, A. sanguinolenta, Alternanthera sessilis, Boerhavia diffusa, Dentela repens, Euphorbia dracunculoides, E. thymifolia, Heteropogon contortus, Imperata cylindrica, Sida cordata, S. cordifolia, S. rhombifolia, Tephrosia purpurea, Themeda triandra, Thysanolaena maxima, Uraria lagopodioides, U. picta, Vetiveria zizanioides* etc. There are few climbers e.g., *Asparagus racemosus, Bauhinia vahlii, Ichnocarpus frutescens, Smilax ovalifolia* etc.

Dry Sal Forest : These forests are characterised by low quality and low height (10-15 m) *Shorea robusta* (Sal). The regeneration is slow and difficult and it is mixed with other species All the trees are deciduous during the dry season, usually for several months and during rainy season the forest takes a luxuriant appearance from the growth of an ephemeral herbaceous vegetation. The lower canopy is almost deciduous or wherever evergreen or semievergreen species are present, they are inconspicuous and mainly confined to the moist places. An undergrowth of shrubs is usually present. Bamboos are often present but not luxuriant. Climbers, epiphytes and ferns are inconspicuous.

In the south of the district 'Sal' forms the main species along with other associates. It grows very well on the fringes of nalas and lower slopes of the hills. In fact the major areas in the district are covered with miscellaneous species with sprinkling of sal.

The chief associates of dry deciduous sal forests in the first storey are *Adina cordifolia, Anogeissus latifolia, Boswellia serrata, Diospyros*

melanoxylon. Garuga pinnata, Holoptelea integrifolia, Lagerstroemia parviflora, Madhuca longifolia, Mitragyna parvifolia etc.

The second storey consists of *Buchanania lanzan, Dillenia pentagyna, Emblica officinalis, Flacourtia indica, Gardenia latifolia, Semicarpus anacardium, Trema orientalis, Ziziphus oenoplia, Z. xylopyrus* etc.

The third storey consists of *Grewia tiliifolia, Helicteres isora, Indigofera cassioides, I. glabra, Woodfordia fruticosa* etc.

The fourth storey consists of *Acyranthes aspera, Cassia tora, C. sophera, Cayratia trifolia, Cyperus* spp., *Cynoglossum lanceolatum, Desmodium gangeticum, D. pulchellum, Euphorbia helioscopia, Flemingia chappar, F. macrophylla, Uraria lagopodioides, U. picta, Tephrosia purpurea, T. candida, Themeda quadrivalvis, Thysanolaena maxima* etc. The important climbers are *Bauhinia vahlii, Millettia extensa, Mucuna pruriens* and *Smilax ovalifolia.*

Montane subtropical forest : Typical montane subtropical forest does not occur in Palamau district, but in some pockets of higher hilly tracts components of such forest type are found in cool, sheltered and moist places. These areas are 800-1000 m high and include Netarhat, Mahuadarh, Mcclaskeiganj and to some extent Barwadih. The chief components of this type in the first storey are *Ficus semicordata, Litsea glutinosa, Manilkara hexandra, Pinus* sp., *Quercus leucotrichophora, Syzygium cumini* etc.

The second storey consists of *Alangium salviifolium, Glochidion velutinum, Grewia tiliifolia, Ficus lanceolata, Mallotus philippensis, Pittosporum floribundum, Prunus persica, Symplocos racemosa* etc.

The third storey consists of *Colebrookia oppositifolia, Indigofera cassioides, Melastoma malabathricum, Plectranthus stocksii, Pogostemon benghalensis, Salvia coccinea, Wendlandia heynei, W. tinctoria* etc.

The fourth storey consists of *Bacopa monnieri, Begonia picta, Blumea mollis, Celosia argentea, Chlorophytum arundinaceum, Commelina hasskarlii, C. paludosa, C. suffruticosa, Cymbidium macrorhizum, Drymeria cordata, Euphorbia dracunculoides, E.*

helioscopia, E. heterophylla, Geranium mascatense, Exacum pedunculatum, Hypericum japonicum, Laggera alata, L. aurita, Lobelia alsinoides, Lavendula bipinnata, Mazus pumilus, Micromeria biflora, Salvia plebeja, Vernonia cinerea, V. divergens, ferns and some epiphytic herbs. The important climbers are *Ampelocissus latifolius, Bauhinia vahlii, Clematis gouriana, Helinus lanceolatus, Rubia wallichiana, Ventilago denticulata.*

Edaphic type :

Bamboo forest : Bamboos, however, form the main species mixed with miscellaneous forests and also with sal in almost the entire forest area of this district leaving only a few exceptions. *Dendrocalamus strictus* is the main species but other 2-3 species of *Bambusa* are also found in the district. Good Bamboos abound in Betla, Netarhat, Maromar, Baresand, Richughuta, Garu, Chhipadahar and many other places.

Afforestation and arboriculture : Large stretches of forest lands which were once covered with forests have since been completely denuded of all vegetation, stand out as desolate, naked wastes on which not even grass can grow. For rehabilitating such denuded areas and for arresting the accelarated pace of erosion, afforestation schemes have been taken up by the various divisions of the forest. *Tectona grandis* and *Bombax ceiba* are successfully grown in Daltonganj North and Latehar division. The arboricultural work are mostly confined to Netarhat. The indigenous species viz. *Toona ciliata* and *Gmelina arborea* have done well. The plantation of *Pinus excelsa, Eucalyptus* spp. and *Grevillea robusta* have met with success. In many other places *Acacia auriculiformis* and *Eucalyptus* spp. are also successfully planted. In the dry areas cultivation of *Agave angustifolia* and *A. veracrus* as fibre plants are common.

HYDROPHYTIC VEGETATION

It is very difficult to define hydrophytes exactly and precisely. The hydrophytes are defined by Weaver & Clements (1938), Muenscher (1944), Reid (1961) and Doubenmire (1956) in various ways. Aquatic habitats can not be sharply distinguished from terrestrial ones. In most climates there is a seasonal fluctuation of 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 dry, through waterlogged 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.

Aquatic habitats of the district :

The common habitats of aquatic plants are a number of natural lakes, tanks, rivers, streams and the irrigation canals of North Koel river. Seasonal ponds and ditches are scattered through out the district. Generally they get filled up with water during rainy season, some dry up with in a short period, while, in others water may persist for a long period. All the streams are seasonal and temporary. They mainly exist in Netarhat and Mahuadarh. Cultivated lands also support the hydrophytic vegetation.

Growth Forms and Classification of hydrophytes :

In the present work hydrophytes are classified into 7 groups following Arber (1920) and the following growth forms of hydrophytes have been adapted from Cook (1996) in the enumeration of species.

Growth Forms :

Ephydate : Bottom rooted with floating leaves.

Helophyte : Terrestrial plants which tolerate submergence.

Hyperhydate : Emergent aquatic, lower parts almost always in water.

Plankton : Free-swimming below the water surface.

Pleustophyte : Free floating at the water surface.

Rosulate : Submerged, bottom rooted, leaves in a rosette.

Tenagophyte : Juvenile submerged, adult usually terrestrial.

Vittate : Submerged, bottom rooted, leaves cauline.

1. *Free-floating hydrophytes* : These plants are found in stagnant water and have contact with water and air only. Plants of this group are

Lemna perpusilla, Nymphoides hydrophylla, N. indica, Spirodela polyrhiza, Trapa natans var. *bispinosa.*

2. *Floating-anchored hydrophytes* : These plants have the contact with soil, water and air. Plants of this group are *Nelumbo nucifera, Nymphaea nouchali, N. pubescens.*

3. *Submerged-nonanchored hydrophytes* : They are submerged in stagnant water. Plants of this group are *Ceratophyllum demersum, Potamogeton crispus* etc.

4. *Submerged-anchored hydrophytes* : They are submerged and have contact with soil and water, but usually the flowering parts are raised above the water level. Plants of this group are *Aponogeton undulatus, Hydrilla verticillata, Ottelia alismoides, Potamogeton nodosus, Vallisneria spiralis* var. *denseserrulata.*

5. *Emergent hydrophytes* : They are the plants of exposed or submerged soil, usually with rhizomes and corms. The roots, lower parts of stems and the lower leaves are submerged but upper parts of stems, upper leaves and flowering portion emerge out of water. Plants of this group are *Aeschynomene indica, Butomopsis latifolia, Caesulia axillaris, Hygrophila auriculata, Limnophila indica, Monochoria hastata, Sagittaria guayanensis* ssp. *luppula, S. sagittifolia, Typha domingensis* etc.

6. *Marshy-amphibians hydrophytes* : They are found in soft wet mud or root in shallow water. Plants of this group are *Bacopa monnieri, Eclipta prostrata, Ipomoea aquatica, Hoppea dichotoma, Ludwigia octovalvis, L. perennis, L. prostrata, Persicaria barbata, P. glabra, P. hydropiper, Veronica anagalis-aquatica* etc.

7. *Wet land hydrophytes* : These are border-line species. There are few woody trees or shrubs e.g. *Terminalia arjuna, Tamarix ericoides, Vitex negundo* are commonly found near the river and stream. The herbaceous species like, *Ageratum conyzoides, Ammannia baccifera, Conscora diffusa, C. decussata, Gnaphalium polycaulon, Corchorus aestuans, Rotala indica, R. rotundifolia, Sphaeranthus indicus, Grangea maderaspatana* etc. also grow in marshy or wet land habitats.

It is very difficult to damarcate the zone of submerged hydrophytes from the zone of floating hydrophytes, as the zones are found to be over lapping with each other. the deep seasonal ponds support the growth of emergent as well as submerged hydrophytes. Some floating species with extensive root system may become anchored in shallow water, several hydrophytic species may produce land form when stranded on marginal wetsoil. *Ipomoea carnea* spp. *fistulosa* exhibits quite different phenotypes in water, on wet muddy soil and on dry lands.

General composition of hydrophytic vegetation :

During rainy season paddy fields support the growth of many marshy species e.g. *Caesulia axillaris, Drosera burmannii, D. indica, Eriocaulon cinereum, E. oryzetorum, E. quinquangulare, Juncus bufonius, Utricularia bifida, U. graminifolia* and many grasses and sedges. On the marshy area of the forest *Bacopa monnieri, Centella asiatia, Monochoria hastata* are commonly seen to grow. *Ipomoea aquatica* forms a floating mat on ponds and *Rotala rotundifolia* form a dense pink coloured mat on barren cultivated land during rainy season. *Lemna* and *Spirodela* form a dense green cover on the surface of the stagnant pools in Bhavnathpur and Tarhashi. *Hydrilla verticillata, Hygrophila auriculata, Vallisneria spiralis* var. *denseserrulata* etc. are very common aquatic herbs found in the ditches and ponds. At Tarhashi *Nelumbo nucifera, Nymphoides hydrophylla, N. indica* are very common. On the bank of the river canal *Majus pumilus, Echinochloa colonum, Ammannia baccifera, Commelina benghalensis, Rumex dentatus, Polygonum stagninum, Persicaria barbata* etc. are commonly grown. A rich vegetation consists of *Ammannia baccifera, Caesulia axillaris, Cyathocline purpurea, Eriocaulon cinereum, E. oryzetorum, E. quinquangulare, Eclipta prostrata, Grangea maderaspatan, Hedyotis corymbosa, Lobelia alsinoides, Polygonum plebejum, Phyla nodiflora, Rotala indica, R. rotundifolia, Rumex dentatus* etc. are commonly found eleswhere in the marshy habitats of the district.

Riverain vegetation :

The vegetation along the bank of the rivers, rivulets, streams and the sandy river beds are quite characteristic. *Trichuriella monsoonii* is commonly found in the sandy beds of Barkamana river beds, at Tarhashi and *Richardia scabra* is found in the bed of Koel river at Daltonganj. *Aegle marmelos, Ficus semicordata, F. lanceolata, F. racemosa,*

Mitragyna parvifolia, Terminalia arjuna etc. are some of the common trees and shrubs along the stream and river courses. The shrubby vegetation are represented by *Calotropis gigantea, Ludwigia octovalvis, Ipomoea carnea* subsp. *fistulosa, Woodfordia fruticosa, Ziziphus oenoplia, Z. xylopyrus* etc. The herbaceous vegetation are represented by *Ageratum conyzoides, Alysicarpus vaginalis, Alternanthera pungens, Boerhavia diffusa, Bulbostylis barbata, Cassia occidentalis, C. tora, C. obtusifolia, Coronopus didymus, Croton bonplandianum, Chenopodium ambrosioides, Cyperus compressus, C. corymbosus, C. iria, C. brevifolius, Gomphrena celosioides, Heliotropium indicum, Indigofera linifolia, Imperata cylindrica, Phyla nodiflora, Rothia indica, Scoparia dulcis, Solanum surattense, Tridax procumbens* etc. *Persicaria barbata, P. hydropiper, Polygonum stagninum* are found in stream with sluggish water.

Biotic Influence over the Vegetation :

Men and animals have vital role in changing the pattern of vegetation of any place. The vegetation has been degraded into scrub jungles as well as to grass land in some places of Palamau district.

Population pressure :

Rapid increase of population has a role in changing the vegetation pattern. Due to population pressure some of the forest areas have been converted into cultivated lands. Due to destruction of original forest by the people, abnoxious plants have invaded the district, e.g. *Ageratum conyzoides, Argemone mexicana, Acanthospermum hispidum, Bidens pilosa, Cassia occidentalis, Ipomoea carnea* subsp. *fistulosa, Lantana camara* var. *aculeata, Malvastrum coromandelianum, Parthenium hysterophorus, Tridax procumbens, Urena lobata* etc. The formation of barren fields due to soil erosion is a result of forest clearing. The exposed soil surface, it may be due to clearing of forest for cultivation or for habitation, faces direct action of wind, rain and sunrays.

Cattle grazing :

Grazing is another reason for deforestation in Palamau district. Some of the forest areas have been changed into grass lands due to grazing and browsing by domesticated animals. Domestic cattle, goat etc. freely graze in the forest and on the hill slopes, changing this forest into grass

land. Further trampling of the forest floor by the cattle has adverse affects on seedlings, and lopping of forest trees and shrubs has also affected the vegetation.

Fire hazards :

Fire is used occasionally for clearing the undergrowth of the sal forest. Fire may cause the changes of normal habit of certain species, e.g. *Pygmaeopremna herbacea*, an undershrub is changed into dwarf stemless herbs of 5-15 cm high. 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). A species viz. *Desmodium pulchellum*, *D. triflorum* etc. are fire indicator species. The recurrence of fire depletes the plant cover. With rainfall, water washes away the surface soil of forest land, exposing the hard rock.

Cultivation :

The practice of shifting cultivation on the hill slopes has an adverse effect on vegetation. The village people mainly depend on the shifting cultivation. In such cases 'Sal' forest has changed to mixed forest with poor regeneation and malformed tree habit.

Soil erosion :

It has been found mostly in the mixed forest areas, where recurrence of fires deplete plant cover or 'Sal' areas, where felling has been done. Due to heavy rainfall surface soil washes away exposing the hard rock. This condition is seen mainly in southern part of the district, i.e., Netarhat plateau. Erosion due to heavy grazing is seen along the hill slopes, and sheet erosion is commonly seen in Latehar division where grazing pressure is very high.

Statistical analysis of the Flora

The present work deals with 824 species of Angiosperms in 530 genera under 136 families. Among the total species dicotyledons comprise 110 families, 427 genera and 654 species, and monocotyledons comprise 26 families, 103 genera and 170 species. Out of total 136 families,

dicotyledons represent 80.7% and monocotyledons represent 19.3%. Out of total 530 genera, the dicotyledonous and monocotyledonous genera are 80.5% and 19.5% respectively. Out of 824 species, dicotyledons represent 79.4% and monocotyledons represent 20.6%. The ratio of dicotyledons and monocotyledons is nearly 4 : 1. Out of total studied species, herbs represent 65.3%, shrubs represent 17% and trees represent 17.7%. Among 538 species of herbs climbers, creepers, aquatic, epiphytes and parasites are represented by 8.2%, 5.6%, 5.8%, 1.1% and 0.7% respectively. Out of 140 species of shrubs, climbers represent 25%. Among 146 species of trees, timber yielding species, edible fruit yielding species, gum yielding species and fibre yielding species represented by 23.3%, 14.4%, 2.7% and 2.05% respectively.

Ten dominant families in respect of genera/species number, of Palamau district are shown in Table-III.

Table-III

Sl. No	Name of the Families	Number of	
		Genera	Species
1.	Poaceae	50	77
2.	Fabaceae	37	72
3.	Asteraceae	43	58
4.	Euphorbiaceae	19	35
5.	Cyperaceae	7	27
6.	Rubiaceae	19	26
7.	Acanthaceae	16	23
8.	Convolvulaceae	10	22
9.	Caesalpiniaceae	7	22
10.	Lamiaceae	15	21

Ten dominant families of Palamau district may be compared to the dominant families of Chotanagpur (Haines- 1910), and Bihar and Orissa (Haines 1921-1925). Table-IV shows the ten dominant families of Chotanagpur and Bihar and Orissa in respect of species number.

Table-IV

Sl. No.	Dominant families of Chotanagpur	Spp. No.	Sl. No.	Dominant families of Bihar & Orissa	Spp. No.
1.	Gramineae	150	1.	Leguminosae	282
2.	Leguminosae	132	2.	Gramineae	218
3.	Cyperaceae	70	3.	Cyperaceae	120
4.	Orichidaceae	60	4.	Compositae	103
5.	Compositae	60	5.	Euphorbiaceae	103
6.	Euphorbiaceae	50	6.	Acanthaceae	90
7.	Acanthaceae	45	7.	Rubiaceae	75
8.	Rubiaceae	45	8.	Labiatae	69
9.	Scrophulariaceae	40	9.	Scrophulariaceae	61
10.	Labiatae	35	10.	Convolvulaceae	61

The ten dominant families of Palamau district comprise 383 species i.e. about 46.5% of total species dealt with and remaining 126 families with a total 441 of total species constitute 53.5%. Fifty families i.e. 37% of the total families are represented by a single genus with a single species. Some of the dominant genera with maximum number of species are *Cyperus* (13), *Ficus* (12), *Cassia* (10), *Euphorbia* (9), *Lindernia* (9), *Crotalaria* (8), *Desmodium* (7), *Indigofera* (7), *Commelina* (7), *Eragrostis* (7), *Acacia* (6), *Sida* (6), *Bauhinia* (6). Some of the genera which are represented in India by single species, some of them are aliens, also occur in the district e.g. *Aegle, Anthocephalus, Apluda, Blainvillea, Centella, Centipeda, Cissampelos, Coldenia, Colebrookea* (monotypic), *Costus, Diplocyclos, Dodonaea, Dregea, Drymaria, Duranta, Eclipta, Elytrophorus, Gloriosa, Grangea, Hemidesmus* (monotypic), *Holarrhena, Hydrilla* (monotypic) *Hydrolea, Lablab* (monotypic), *Lagascea, Limonia* (monotypic), *Martynia* (monotypic), *Nechamandra, Nelsonia* (monotypic), *Nelumbo, Ottelia, Phyla, Ricinus* (monotypic), *Sebastiania, Tectona, Thysanolaena* (monotypic), *Tridax, Waltheria, Woodfordia.*

There are 42 species which were not recorded by Haines (1921-1925) and Mooney (1950), but collected from the district. These are: *Alternanthera paronychioides* St. Hil, *A. philoxeroides* (Mart.) Griseb., *A. pungens* Kunth, *Avena fatua* L., *Bulbostylis densa* (Wall.) Hand-

Mazz., *Callicarpa candicans* (Burm. f.) Hoch., *Cassia sophera* L. spp. *purpurea* (Edge.) Bennet., *Carex royleana* Nees., *Chenopodium murale* Linn., *Coronopus didymus* (L.) Smith, *Cymbidium macrorhizum* Lindl., *Cymbopogon citratus* (DC.) Stapf, *Cyrtococcum accrescens* (Trin.) Stapf., *Digitaria bicornis* (Lamk.) Roem. & Schult., *Duabanga grandiflora* (Roxb. ex. DC.) Walp., *Eragrostis nutans* (Retz.) Nees ex Steud., *Erechtites valerianaefolia* (Walp.) DC., *Euphorbia chamaesyce* L., *E. helioscopia* L., *Eleocharis ovata* R. Br., *Gliricidia sepium* H.B.K., *Iresine herbstii* Hook. ex Lindl., *Jatropha tanjorensis* Ellis et Saroja, *Lagascea mollis* Cav., *Lepidagathis rigida* Dalz., *Nepeta leucophylla* Benth., *Nervilia prainiana* (King & Pantl.) Scidenf. & Smitin., *Oryza rufipogon* Griff., *Oxalis richardiana* Babu, *Parthenium hysterophorus* L. *Phalaris minor* Retz., *Pennisetum purpureum* Schumach., *Plectranthus stocksii* Hook. f., *Pennisetum purpureum* Schumach., *Plectranthus stocksii* Hook. f., *Pseudanthisteria hispida* Hook. f., *Quercus leucotrichophora* A. Camus, *Richardia scabra* L., *Rosa multiflora* Thunb., *Rothia indica* (L.) Druce., *Staria viridis* (L.) P. Beauv., *Spermacoce latifolia* Aubl., *Synedrella nodiflora* (L.) Gaertn., *Zanthoxylum armatum* DC.

There are some plants which are mainly found in higher elevation are also found in the district, viz. *Begonia picta, Clematis gouriana, Colebrookea oppositifolia, Cymbidium macrorhizum, Drymaria cordata, Hypericum japonicum, Laggera alata, L. aurita, Rubia wallichiana, Quercus leucotrichophora* etc. Some temperate genera, such as *Geranium, Pimpinella, Prunus, Primula* etc. descend down to the tropical latitudes and find shelter in Netarhat.

Rare Plants

The following are the rare elements of the flora : *Begonia picta, Cassytha filiformis, Chenopodium murale, Clematis gouriana, Cymbidium macrorhizum, Didymocarpus pygmaea, Dolichos trilobatus, Drosera burmannii, D. indica, Erechtites valerianaefolia, Exacum peduncularis, Helinus lanceolatus, Lavendula bipinnata, Marsdenia tenacissima, Nervilia prainiana, Parkinsonia aculeata, Phalaris minor, Pittosporum floribundum, Pottentila supina, Pseudanthistiria hispida, Psoralia corylifolia, Pygmaeopremna herbacea, Richardia scabra, Rothia indica, Rubia wallichiana, Striga angustifolia, Utricularia bifida, U. graminifolia, Zanthoxylum armatum* etc. The orchids, so widely distributed in India, are scarce in the district

and becoming rare day by day due to destruction of habitat and over exploitation.

Endemic Plants :

None of the species collected from the district is endemic to Bihar state. But *Hoppea dichotoma* (Gentianaceae) and *Fissendocarpa linifolia* (Onagraceae) are restricted to India (Sarkar-1990), found in the district. Some other species also found in the district which are endemic to India and its neighbouring countries (Rao-1972, Nayar & Ahmed-1984, Sarkar-1985), eg. *Caesulia axillaris* (N.E. India & Burma), *Chloroxylon swietenia* (S.W. India & Sri Lanka), *Colebrookea oppositifolia* (Himalaya, India and W. China), *Cyathocline purpurea* (Himalaya, Burma, China & Thailand), *Eragrostiella bifaria* (India, Burma & Sri Lanka), *Hamiltonia suaveolens* (Himalaya, India & China).

Exotic species naturalised in the district :

About 123 exotic species naturalised in the district have been collected (Srivastava-1964, Maiti and Guha Bakshi-1981, Sarma and Sarkar-1994). Out of total 824 species, 14.92% are exotic. In the present work the country of origin of these exotic species have been indicated. In the Indian flora these naturalised exotic elements have been grouped in to 4-categories, viz. Neotropical, North temperate, North African and Austro-Asian. Out of 123 exotic species, 53.23% of American origin, 5.7% of African origin, 4.88% of Australian origin and 4.07% of European origin, the rest are introduced from other countries, including China, Japan, Malaysia, West Indies etc.

Artificial Key to the Families of Flowering Plants of Palamau District (Jharkhand)

1a. Vascular tissue usually in the stem forming one or more rings; central pith present or replaced by wood; flowers usually 4-5 merous; leaf venation usually reticulate; cotyledons usually-2 ... DICOTS

2a. Perianth absent or of one whorl .... GROUP-I

2b. Perianth present and biseriate or multiseriate :

3a. All lobes of the inner whorl of perianth free to the base:

4a. Ovary superior .... GROUP-II

4b. Ovary inferior ....GROUP-III

3b. Lobes of the inner whorl of perianth united ....GROUP-IV

1a. Vascular tissue in the stem usually scattered; periderm compact; flowers usually 3-merous; leaf venation usually parallel; cotyledon-1 ... MONOCOTS

Key to the Dicot families
Group - I
(Flowers without perianth or with only one whorl)

1a. Plants submerged .... CERATOPHYLLACEAE

1b. Plants not submerged :

2a. Flowers in cyathium inflorescence; perianth absent .... EUPHORBIACEAE (1)

2b. Flowers not in cyathium inflorescence; perianth present:

3a. Ovary inferior or covered by hypanthium :

4a. Ovary 2-6 locular :

5a. Trees; staminate flower in catkin inflorescence: fruit covered by a cupule .... FAGACEAE

5b. Herbs; staminate flowers not in catkin inflorescence; fruit not covered by cupule .... BEGONIACEAE (1)

4b. Ovary unilocular :

6a. Plants epiphytic and partially stem parasite .... LORANTHACEAE

6b. Plants not epiphytic, autotrophic :

7a. Stamens twice the number of perianth lobes .... COMBRETACEAE (1)

7b. Stamens equal or fewer than perianth lobes :

8a. Herbs; fruits circumscissile or irregularly dehiscent .... LYTHRACEAE (1)

8b. Herbs or shrubs; fruits indehiscent .... NYCTAGINACEAE

3b. Ovary superior :

9a. Anthers dehiscing by valves .... LAURACEAE

9b. Anthers not dehiscing by valves :

10a. Ovary apocarpous :

11a. Flowers unisexual ....STERCULIACEAE (1)

11b. Flowers bisexual .... RANUNCULACEAE (1)

10b. Ovary syncarpous :

12a. Ovary 2-5 locular :

13a. Flowers unisexual ..... EUPHORBIACEAE (II)

13b. Flowers bisexual :

14a. Herbs; flowers regular; inflorescence cymes .... AIZOACEAE (I)

14b. Shrubs or trees :

15a. Plants armed; leaves simple, triplinerved .... RHAMNACEAE (I)

15b. Plants unarmed; leaves compound or if simple then not triplinerved .... SAPINDACEAE (I)

12b. Ovary unilocular :

16a. Stipules ochreate type .... POLYGONACEAE

16b. Stipules absent, if present not ochreate type :

17a. Plants herbaceous :

18a. Flowers unisexual ....URTICACEAE

18b. Flowers bisexual :

19a. Ovary truncate or depressed around style .... AIZOACEAE (II)

19b. Ovary not as above :

20a. Perianth scally or rarely herbaceous .... AMARANTHACEAE

20b. Perianth fleshy, sepaloid. ....CHENOPODIACEAE

17b. Plants woody :

21a. Leaves compound .... CAESALPINIACEAE

21b. Leaves simple :

22a. Stipules present :

23a. Style branched :

24a. Anthers recurved in bud .... MORACEAE

24b. Anthers erect in bud .... ULMACEAE

23b. Style unbranched .... FLACOURTIACEAE (I)

22b. Stipules absent :

25a. Leaves entire : styles-5 .... FLACOURTIACEAE (II)

25b. Leaves divided; style -1 .... PROTEACEAE

Group - II
(Perianth lobes in two or more whorls, atleast the inner whorl free; ovary superior)

1a. Stamens more than 16:

2a. Plants aquatic, rooted .... NELUMBONACEAE

2b. Plants terrestrial :

3a. Ovary apocarpous :

4a. Stamens inserted on hypanthium .... ROSACEAE

4b. Stamens inserted on receptacle :

5a. Perianth biseriate, 5-merous :

6a. Trees; sepals accrescent .... DILLENIACEAE

6b. Herbs; sepals not accrescent .... RANUNCULACEAE (II)

5b. Perianth usually 3-seriate, 3-merous .... ANNONACEAE

3b. Ovary mono- or syncarpous :

7a. Ovules biseriate on posterior margin; carpel-one .... MIMOSACEAE

7b. Ovules not as above :

8a. Stamens inserted on hypanthium .... LYTHRACEAE (II)

8b. Stamens inserted on receptacle :

9a. Stamens monadelphous, forming a column :

10a. Anthers monothecous, reniform .... MALVACEAE

10b. Anthers dithecous, not reniform .... STERCULIACEAE (II)

9b. Stamens not forming a column :

11a. Stamens in phalanges :

12a. Stamens many in each phalange; seeds with hairs .... BOMBACACEAE

12b. Stamens 3-5 in each phalange; seed without hairs .... STERCULIACEAE (III)

11a. Stamens free or united only at base :

13a. Ovary stiptiate :

14a. Ovules in axile placentation .... TILIACEAE (I)

14b. Ovules in parietal placentation .... CAPPARACEAE (I)

13b. Ovary sessile :

15a. Flowers unisexual .... EUPHORBIACEAE (III)

15b. Flowers bisexual :

16a. Venation palmate :

17a. Trees; leaves palmately compound; seeds with coma .... COCHLOSPERMACEAE

17b. Woody herbs; leaves simple; seeds without coma .... TILIACEAE (II)

16b. Venation pinnate :

18a. Sepals 2-3:

19a. Placentation parietal; capsule dehiscing apically .... PAPAVERACEAE

19b. Placentation free-central; capsule circumscissile or valvular .... PORTULACACEAE (I)

18b. Sepals-5 :

20a. Leaves with pallucid gland dots; stamens obdiplostemonous; fruits various but not samaroid .... RUTACEAE

20b. Leaves without any glands, leathery; stamens not obdiplostemonous; fruits samaroid .... DIPTEROCARPACEAE

1b. Stamens-10 or fewer:

21a. Ovary unilocular :

22a. Petals vexillary; placentation marginal .... FABACEAE

22b. Petals not vexillary; placentation not marginal :

23a. Leaves compound :

24a. Shrubs or trees; leaves pinnately compound :

25a. Leaves tripinnate; flowers bisexual; fruits pod like capsule; seeds winged .... MORINGACEAE

25b. Leaves not tripinnate; flowers polygamous; fruits drupe; seeds not winged .... ANACARDIACEAE (I)

24b. Herbs; leaves decompound .... FUMARIACEAE

23b. Leaves simple :

26a. Ovules 1-2 per locule :

27a. Flowers 3-merous, unisexual .... MENISPERMACEAE (I)

27b. Flowers 4-5 merous :

28a. Stamens equal; fruits capsule or follicle ....STERCULIACEAE (IV)

28b. Stamens unequal; fruits drupe .... ANACARDIACEAE (II)

26b. Ovules 3-many per locule:

29a. Placentation free central or basal :

30a. Herbs :

31a. Placentation free central :

32a. Leaves alternate .... PORTULACACEAE (II)

32b. Leaves opposite .... CARYOPHYLLACEAE

31b. Placentation basal; leaves reduced, alternate .... TAMARICACEAE

30b. Shrubs .... MYRSINACEAE (I)

29b. Placentation parietal or axile :

33a. Plants insectivorous; leaves with gland tipped hairs .... DROSERACEAE

33b. Plants not insectivorous; leaves without gland-tipped hairs :

34a. Androphore or gynophore present :

35a. Plants with tendrils .... PASSIFLORACEAE

35b. Plants without tendrils .... CAPPARACEAE (II)

34b. Androphore and gynophore both absent :

36a. Anther connectives prolonged beyond cells .... VIOLACEAE

36b. Anther connectives not as above :

37a. Flowers bisexual :

38a. Small trees; leaves alternate; styles united .... PITTOSPORACEAE

38b. Herbs or shrubs; leaves opposite; styles 3-5, free .... HYPERICACEAE

37b. Flowers unisexual .... FLACOURTIACEAE (III)

21b. Ovary 2-more locular :

39a. Herbs :

40a. Stamens tetradynamous; fruits siliqua .... BRASSICACEAE

40b. Stamens not tetradynamous; fruits otherwise :

41a. Leaves compound :

42a. Plants tendril climbers .... SAPINDACEAE (II)

42b. Plants erect or prostrate :

43a. Leaves stipulate :

44a. Leaves opposite; stipules intrapetiolar, some times spinescent .... ZYGOPHYLLACEAE

44b. Leaves alternate; stipules lateral, not spinescent .... OXALIDACEAE (I)

43b. Leaves exstipulate .... CLEOMACEAE

41b. Leaves simple :

45a. Flowers irregular :

46a. Anthers connate around ovary; ovary 5 locular; ovules-many per locule .... BALSAMINACEAE

46b. Anthers on split tube; ovary 2-locular; ovule solitary per locule ..... POLYGALACEAE (I)

45b. Flowers regular :

47a. Leaves opposite or whorled :

48a. Stamens arising from hypanthium; style-1 .... LYTHRACEAE (III)

48b. Stamens arising from receptacle; styles 2-5 .... ELATINACEAE

47b. Leaves alternate :

49a. Flowers unisexual :

50a. Ovary syncarpous .... EUPHORBIACEAE (IV)

50b. Ovary apocarpous. .... MENISPERMACEAE (II)

49b. Flowers bisexual :

51a. Filaments united at base only :

52a. Plants erect; leaves opposite, pinnately veined .... LINACEAE

52b. Plants prostrate; leaves alternate, palmately veined .... GERANIACEAE

51b. Filaments united throughout into a column .... STERCULIACEAE (V)

39b. Plants woody :

53a. Leaves opposite ....CELASTRACEAE (I)

53b. Leaves alternate :

54a. Anterior petals with tuft of pennicillate hairs .... POLYGALACEAE (II)

54b. Anterior petals not as above :

55a. Stamens oppostie, equal to or fewer than petals :

56a. Fertile stamens-3; placentation axile .... OLACACEAE

56b. Fertile stamens 4-5; placentation basal :

57a. Plants with tendrils; style short or absent .... VITACEAE

57b. Plants without tendrils; styles as many as locules .... RHAMNACEAE (II)

55b. Stamens at least one whorl alternating with petals, equal to or upto twice as many as petals :

58a. Leaves compound :

59a. Disc extrastaminal; flowers often irregular .... SAPINDACEAE (III)

59b. Dise intrastaminal; flowers regular :

60a. Ovule-1 per locule :

61a. Carpels free below but united above by the style; fruits a schizocarp or capsule .... SIMAROUBACEAE

61b. Carpels united throughout; fruits a drupe .... ANACARDIACEAE (III)

60b. Ovules 2-8 per locule :

62a. Flowers unisexual; stamens twice as many as petals .... BURSERACEAE

62b. Flowers bisexual; stamens as many as petals:

63a. Leaflets without gland dots, base oblique, margin mostly serrate; stamens forming a tube .... MELIACEAE (I)

63b. Leaflets gland-dotted, base round, margin entire; stamens not forming a tube .... FLINDERSIACEAE

58b. Leaves simple :

64a. Flowers unisexual or bisexual :

65a. Flowers staminate or bisexual; ovules-2 per locule, basal ... CELASTRACEAE (II)

65b. Flowers all unisexual; ovules 1-2 per locule, axile ....EUPHORBIACEAE (V)

64b. Flowers all bisexual :

66a. Venation palmate :

67a. Stamens united throughout to form a column .... STERCULIACEAE (VI)

67b. Stamens free or united at base only .... TILIACEAE (III)

66b. Vention pinnate :

68a. Stamens twice as many as petals, forming a tube .... MELIACEAE (II)

68b. Stamens as many as petals, not forming a tube .... CELASTRACEAE (III)

Group-III

(Perianth in two or more whorls, at least inner whorl free; ovary inferior or enclosed in hypanthium)

1a. Stamens more than-10 :

2a. Plants aquatic, rooted .... NYMPHAEACEAE

2b. Plants not aquatic :

3a. Flowers unisexual; styles more than-1 .... BEGONIACEAE (II)

3b. Flowers bisexual; style-1:

4a. Plants armed :

5a. Plants succulent; leaves absent or reduced .... CACTACEAE (I)

5b. Plants woody; leaves not reduced, alternate .... ALANGIACEAE

4b. Plants unarmed :

6a. Leaves gland dotted, with intramarginal veins .... MYRTACEAE (I)

6b. Leaves not gland dotted, without intramarginal veins :

7a. Leaves opposite :

8a. Sepals-6; fruits balausta .... PUNICACEAE

8b. Sepals-4-5; fruit otherwise .... MYRTACEAE (II)

7b. Leaves alternate :

9a. Fruits woody, operculate; petals and stamens more than 4 cm long .... LECYTHIDACEAE

9b. Fruits drupaceous; petals and stamens less than 2 cm long .... SYMPLOCACEAE

1b. Stamens-10 or fewer, usually-5 :

10a. Styles more than-1 :

11a. Plants herbaceous; styles on stylopodium; fruits a cremocarp .... APIACEAE

11b. Plants woody, hook climbers; fruits not cremocarp .... RHAMNACEAE (III)

10b. Style-1 :

12a. Herbs :

13a. Fruits a horned drupe .... TRAPACEAE

13b. Fruits a capsule or berry :

14a. Leaves cauline, alternate, venation pinnate; anthers longitudinally dehiscent. .... ONAGRACEAE

14b. Leaves basal or opposite, venation palmate; anthers poricidal ....MELASTOMATACEAE (I)

12b. Plants woody :

15. Fruits a drupe, 4-winged ....COMBRETACEAE (II)

15. Fruits a capsule, not winged .... MELASTOMATACEAE (II)

Group-IV
(Lobes of the inner whorl of perianth united)

1a. Stamens more than corolla lobes :

2a. Ovary inferior .... CACTACEAE (II)

2b. Ovary superior :

3a. Leaves compound .... OXALIDACEAE (II)

3b. Leaves simple :

4a. Flowers usually unisexual; corolla urceolate :

5a. Trees with milky sap; leaves long-petioled, palmately lobed; ovary unilocular ....CARICACEAE

5b. Trees without milky sap; leaves short-petioled, entire; ovary multilocular .... EBENACEAE (I)

4b. Flowers bisexual; corolla campanualte .... SAPOTACEAE (I)

1b. Stamens as many as corolla lobes or fewer :

6a. Ovary wholly or partly inferior :

7a. Plants with tendrils ....CUCURBITACEAE

7b. Plants without tendrils :

8a. Anthers united around style :

9a. Flowers in capitulum; calyx modified into pappus; ovary 1-locular .... ASTERACEAE

9b. Flowers in cymes; calyx not modified into pappus; ovary 2-more locular :

10a. Flowers regular .... CAMPANULACEAE

10b. Flowers irregular .... LOBELIACEAE

8b. Anthers free :

11a. Leaves opposite; stipules inter or intrapetiolar .... RUBIACEAE

11b. Leaves alternate; stipules absent .... MYRSINACEAE (II)

6b. Ovary superior :

12a. Stamens opposite to petals :

13a. Ovary 2-many locular; placentation axile:

14a. Leaves compound; stamens united .... LEEACEAE

14b. Leaves simple; stamens free :

15a. Flowers bisexual; corolla campanulate; stamens epipetalous .... SAPOTACEAE (II)

15b. Flowers generally unisexual ; corolla urceolate; stamens not epipetalous .... EBENACEAE (II)

13b. Ovary unilocular; placentation free-central or basal :

16a. Calyx with stalked-glands; corolla salver shaped; styles-5; ovary unilocular with single ovule; placentation basal .... PLUMBAGINACEAE

16b. Calyx not glandular; corolla rotate; style-1; ovary unilocular with many ovules; placentation free-central .... PRIMULACEAE

12b. Stamens alternate with petals :

17a. Corolla irregular; stamens -4, didynamous or 2:

18a. Ovules and seeds few :

19a. Ovary 4-lobed or 4-partite; style gynobasic .... LAMIACEAE

19b. Ovary entire; style terminal :

20a. Fruits a capsule :

21a. Seeds on retinacula .... ACANTHACEAE

21b. Seeds not on retinacula

22a. Placentation parietal; capsule with a pair of horn like prongs .... MARTYNIACEAE

22b. Placentation axile; capsule without any prongs ....PEDALIACEAE

20b. Fruits a drupe .... VERBENACEAE (I)

18b. Ovules and seeds many :

23a. Leaves compound; seeds winged .... BIGNONIACEAE

23b. Leaves simple; seeds not winged :

24a. Plants aquatic or marshy with insectivorous bladder; placentation free central .... LENTIBULARIACEAE

24b. Plants terrestrial, not insectivorous; placentation parietal or axile :

25a. Ovary 2-locular; placentation axile .... SCROPHULARIACEAE (I)

25b. Ovary unilocular; placentation parietal :

26a. Corolla twisted; fruits a septicidal capsule .... GENTIANACEAE (I)

26b. Corolla imbricate; fruits a loculicidal capsule .... GESNERIACEAE

17b. Corolla regular; stamens 4-5 :

27a. Achlorophyllus, leafless stem parasite .... CUSCUTACEAE

27b. Plants not as above :

28a. Leaves alternate :

29a. Aquatic herbs; placentation parietal .... MENYANTHACEAE

29b. Not aquatic; placentation axile :

30a. Styles-2; seeds many. .... HYDROPHYLLACEAE

30b. Style-1, sometimes divided :

31a. Fruits of 4-nutlets or drupaceous, with 1-4 locular pyrene :

32a. Style gynobasic; fruits of 4-nutlets .... BORAGINACEAE (I)

32b. Style terminal; fruits a drupe .... EHRETIACEAE

31b. Fruits not as above :

33a. Seeds many :

34a. Placenta branched; fruits berry or capsule .... SOLANACEAE (I)

34b. Placenta unbranched; fruits a smooth capsule .... SCROPHULARIACEAE (II)

33b. Seeds few :

35a. Climbers; corolla plicate, if not then style branched .... CONVOLVULACEAE

35b. Erect; crolla imbricate, narrowly tubular; style unbranched .... SOLANACEAE (II)

28b. Leaves oppostic :

36a. Stamens-2 .... OLEACEAE

36b. Stamens-4 or 5 :

37a. Carpels free at base :

38a. Carpels united only at stigmatic disc; pollen aggregated into tetrads or pollinia :

39a. Filaments united with style forming gynostegium .... ASCLEPIADACEAE

39b. Filaments free from the style .... PERIPLOCACEAE

38b. Carpels united by styles; pollen not aggregated .... APOCYNACEAE (I)

37b. Carpels completely united :

40a. Latex present, milky .... APOCYNACEAE (II)

40b. Latex absent; sap watery :

41a. Plants herbaceous :

42a. Ovary 4-locular, 4-ovuled .... BORAGINACEAE (II)

42b. Ovary 1-2 locular :

43a. Corolline corona fimbriate .... SCROPHULARIACEAE (III)

43b. Corolline corona absent, if present then not fimbriate ....GENTIANACEAE (II)

41b. Plants woody :

44a. Fruits drupaceous with persistent calyx .... VERBENACEAE (II)

44b. Fruits capsule, without persistent calyx .... BUDDLEJACEAE

Key to the Monocot Families

1a. Perianth petaloid, atleast in part :

2a. Flowers unisexual :

3a. Plants climbing, woody :

4a. Plant tendriliferous or climbing; inflorescence an umbel .... SMILACACEAE (I)

4b. Plants twining; inflorescence various but not umbellate .... DIOSCOREACEAE (I)

3b. Plants not climbing, strictly herbaceous :

5a. Terrestrial herbs; leaves more than 1 m long .... MUSACEAE (I)

5b. Aquatic herbs; leaves less than 1 m long :

6a. Stamens-3 or less; carpels united .... HYDROCHARITACEAE (I)

6b. Stamens-6 or more; carpels free ....ALISMATACEAE (I)

2b. Flowers pistillate or bisexual :

7a. Pistils-3 or more :

8a. Ovary superior :

9a. Parianth uniseriate, 1-3, usually 2, all petaloid .... APONOGETONACEAE

9b. Perianth biseriate, 3-sepaloid, 3-petaloid :

10a. Leaves elliptic-lanceolate, bases heathing; flowers in umbels .... LIMNOCHARITACEAE

10b. Leaves otherwise, base not sheathing; flowers in racemes .... ALISMATACEAE (II)

8b. Ovary inferior :

11a. Flowers solitary or in umbellate cymes on a scape; perianth in 2-whorls .... AMARYLLIDACEAE

11b. Flowers in racemes, scape absent; perianth in 1-whorl .... HYPOXIDACEAE

7b. Pistil-1 :

12a. Ovary superior :

13a. Perianth with 3-petaloid parts .... COMMELINACEAE

13b. Perianth with 6-petaloid parts :

14a. Plants terrestrial; leaves coriaceous :

15a. Plants climbing; venation reticulate .... SMILACACEAE (II)

15b. Plants herbaceous, sometimes climbing; venation striate .... LILIACEAE

14b. Plants aquatic; leaves not coriaceous .... PONTEDERIACEAE

12b. Ovary inferior :

16a. Plants aquatic .... HYDROCHARITACEAE (II)

16b. Plants terrestrial :

17a. Plants climbing .... DIOSCOREACEAE (II)

17b. Plants not climbing :

18a. Leaves armed, atleast with prickle at tip .... AGAVACEAE

18b. Leaves unarmed :

19a. Perianth tubular, split on side; leaves more than 1 m long .... MUSACEAE (II)

19b. Perianth variously united but not in a split tube; leaves less than 1 m long :

20a. Staminodes petaloid; stamens and style separate :

21a. Top of the petiolar sheath free (ligulate); anther 2- celled on free filament; fruits smooth or winged :

22a. Aerial stem straight; leaves 2-ranked; sheath open .... ZINGIBERACEAE

22b. Aerial stem twisting; leaves spirally arranged; sheath closed .... COSTACEAE

21b. Top of the petiolar sheath not free from petiole; anther 1-celled, on and over-topped by petaloid structure .... CANNACEAE

20b. Staminodes not petaloid; stamens and style united into a column .... ORCHIDACEAE

1b. Perianth not petaloid, often reduced to scales or bristles or absent :

23a. Plants woody; leaves pinnately or palmately divided .... ARECACEAE

23b. Plants herbaceous; leaves entire :

24a. Plants minute, thalloid .... LEMNACEAE

24b. Plants with differentiated leaves :

25a. Inflorescence of heads or spikelets of floretes in the axils of glumaceous bracts :

26a. Inflorescence a solitary head on spirally ribbed peduncle .... ERIOCAULACEAE

26b. Inflorescence various, but not as above :

27a. Style very short; ovules many .... JUNCACEAE

27b. Style elongated; ovule solitary :

28a. Culms mostly solid, triangular; leaf-sheath closed; style-1; seeds 2-3 angled; fruits a nut .... CYPERACEAE

28b. Culms mostly hollow, cylindrical; leaf sheath open; styles-2; seeds (caryopsis) rounded; fruits a caryopsis .... POACEAE

25b. Inflorescence not in heads nor in glumaceous spikelets :

29a. Flowers solitary .... HYDROCHARITACEAE (III)

29b. Flowers in spike :

30a. Spike subtended by a spathe; leaf venation reticulate .... ARACEAE

30b. Spike without a spathe; leaf venation striate :

31a. Flowers scattered on axillary spike .... POTAMOGETONACEAE

31b. Flowers densely packed on terminal spike .... TYPHACEAE

(The number of times a family is keyed out is indicated by Roman numerals.)

Alphabetical list of the Families of Palamau District with their Genera and species number

Sl.No.	Name of the Families	Genera	Species	Page No.
Dicotyledons :				
1.	Acanthaceae	16	23	464
2.	Aizoaceae	3	4	286
3.	Alangiaceae	1	1	296
4.	Amaranthaceae	10	16	513
5.	Anacardiaceae	5	5	159
6.	Annonaceae	4	5	58
7.	Apiaceae	8	8	290
8.	Apocynaceae	13	18	378
9.	Asclepiadaceae	6	8	393
10.	Asteraceae	43	58	317
11.	Balsaminaceae	1	1	132
12.	Begoniaceae	1	1	284
13.	Bignoniaceae	3	3	457
14.	Bombacaceae	1	1	109
15.	Boraginaceae	4	6	407
16.	Brassicaceae	2	2	70
17.	Buddlejaceae	1	1	401
18.	Burseraceae	2	2	139
19.	Cactaceae	1	2	285
20.	Caesalpiniaceae	7	22	225
21.	Campanulaceae	2	2	362
22.	Capparaceae	1	3	71
23.	Caricaceae	1	1	274
24.	Caryophyllaceae	4	4	86
25.	Celastraceae	1	1	145
26.	Ceratophyllaceae	1	1	585

Sl.No.	Name of the Families	Genera	Species	Page No.
27.	Chenopodiaceae	1	3	526
28.	Cleomaceae	1	2	73
29.	Cochlospermaceae	1	1	76
30.	Combretaceae	3	7	248
31.	Convolvulaceae	10	22	413
32.	Cucurbitaceae	9	10	275
33.	Cuscutaceae	1	2	431
34.	Dilleniaceae	1	2	55
35.	Dipterocarpaceae	1	1	95
36.	Droseraceae	1	2	245
37.	Ebenaceae	1	2	371
38.	Ehretiaceae	2	2	411
39.	Elatinaceae	1	1	92
40.	Euphorbiaceae	19	35	540
41.	Fabaceae	37	72	172
42.	Fagaceae	1	1	584
43.	Flacourtiaceae	2	5	78
44.	Flindersiaceae	1	1	138
45.	Fumariaceae	1	1	69
46.	Gentianaceae	3	4	402
47.	Geraniaceae	1	1	128
48.	Gesneriaceae	1	1	457
49.	Hydrophyllaceae	1	1	406
50.	Hypericaceae	1	1	92
51.	Lamiaceae	15	21	494
52.	Lauraceae	2	2	535
53.	Lecythidaceae	1	1	259
54.	Leeaceae	1	2	155
55.	Lentibulariaceae	1	2	456

Sl.No.	Name of the Families	Genera	Species	Page No.
56.	Linaceae	1	1	126
57.	Lobeliaceae	1	2	363
58.	Loranthaceae	3	3	538
59.	Lythraceae	5	10	260
60.	Malvaceae	8	17	96
61.	Martyniaceae	1	1	462
62.	Melastomataceae	1	1	260
63.	Meliaceae	5	5	141
64.	Menispermaceae	3	3	62
65.	Menyanthaceae	1	2	405
66.	Mimosaceae	4	9	164
67.	Moraceae	5	17	571
68.	Moringaceae	1	1	163
69.	Myrsinaceae	1	1	366
70.	Myrtaceae	4	8	254
71.	Nelumbonaceae	1	1	67
72.	Nyctaginaceae	2	2	510
73.	Nymphaeaceae	1	2	65
74.	Olacaceae	1	1	145
75.	Oleaceae	3	4	375
76.	Onagraceae	2	4	269
77.	Oxalidaceae	2	4	129
78.	Papaveraceae	1	1	68
79.	Passifloraceae	1	1	273
80.	Pedaliaceae	1	1	461
81.	Periplocaceae	3	3	399
82.	Pittosporaceae	1	1	83
83.	Plumbaginaceae	1	1	365
84.	Polygalaceae	1	2	85

Sl.No.	Name of the Families	Genera	Species	Page No.
85.	Polygonaceae	4	10	528
86.	Portulacaceae	1	1	90
87.	Primulaceae	1	1	366
88.	Proteaceae	1	1	537
89.	Punicaceae	1	1	269
90.	Ranunculaceae	2	3	54
91.	Rhamnaceae	4	7	146
92.	Rosaceae	5	6	242
93.	Rubiaceae	19	26	297
94.	Rutaceae	5	6	132
95.	Sapindaceae	3	3	156
96.	Sapotaceae	3	4	367
97.	Scrophulariaceae	11	20	439
98.	Simaroubaceae	1	1	138
99.	Solanaceae	5	9	433
100.	Sterculiaceae	8	9	110
101.	Symplocaceae	1	1	373
102.	Tamaricaceae	1	1	91
103.	Tiliaceae	3	9	118
104.	Trapaceae	1	1	272
105.	Ulmaceae	3	3	568
106.	Urticaceae	2	2	566
107.	Verbenaceae	12	14	482
108.	Violaceae	1	1	75
109.	Vitaceae	3	4	152
110.	Zygophyllaceae	2	2	127
Monocotyledons :				
111.	Agavaceae	1	1	601
112.	Alismataceae	1	2	629

Sl.No.	Name of the Families	Genera	Species	Page No.
113.	Amaryllidaceae	1	1	600
114.	Aponogetonaceae	1	2	631
115.	Araceae	3	3	625
116.	Arecaceae	2	3	621
117.	Cannaceae	1	1	598
118.	Commelinaceae	4	11	611
119.	Costaceae	1	1	596
120.	Cyperaceae	7	27	636
121.	Dioscoreaceae	1	4	602
122.	Eriocaulaceae	1	4	634
123.	Hydrocharitaceae	4	4	587
124.	Hypoxidaceae	1	1	600
125.	Juncaceae	1	1	620
126.	Lemnaceae	2	2	627
127.	Liliaceae	6	6	605
128.	Limnocharitaceae	1	1	630
129.	Musaceae	1	1	597
130.	Orchidaceae	7	9	590
131.	Poaceae	50	77	656
132.	Pontederiaceae	1	1	610
133.	Potamogetonaceae	1	2	633
134.	Smilacaceae	1	2	609
135.	Typhaceae	1	1	623
136.	Zingiberaceae	2	2	595

RANUNCULACEAE

1a. Climbers; leaves opposite; perianth uniseriate; achenes with accrescent feathery styles .... 1. CLEMATIS

1b. Erect herbs; leaves alternate or radical; perianth biseriate; achenes with short beaked styles .... 2. RANUNCULUS

1. CLEMATIS L.

Clematis gouriana Roxb. (Hort. Beng. 43, 1814) ex DC., Syst. Nat. 1: 138. 1817; Cooke, Fl. Bombay 1: 2.1901; Haines, Bot. Bihar & Orissa 1: 4. 1961 (Rep. ed.); Rau in B.D. Sharma *et al.*, Fl. Ind. 1: 64. 1993; Uniyal & Thothathri, Fl. W. Bengal 1: 122. 1997.

Climbers. Branches with 6-12 ribs, sparsely hairy. Leaves pinnate to bipinnate, 5-9 foliolate; leaflets ovate, acuminate, entire or coarsely-toothed, up to 8 cm long; petioles often twining. Flowers in axillary and terminal panicles. Perianth white, hairy without, up to 8 mm long, spreading. Filaments glabrous, connective not prolonged. Style upto 5 cm long in fruit.

Fl. & Fr. : Nov.-Jan.

Distrib. : Indomalesia.

Specimens examined : Tarhashi, 1140.

Notes : Not common. Found in forest edge.

2. RANUNCULUS L.

1a. Hairy; achenes flattened, with an intramarginal ribs .... 1. *R. cantoniensis*

1b. Glabrous; achenes turgid, not margined .... 2. *R. sceleratus*

1. **Ranunculus cantoniensis** DC. Prodr. 1: 43. 1824; Rau in B.D. Sharma *et al.*, Fl. Ind. 1: 117. 1993. *Ranunculus pensylvanicus* (auct. non. L. f., Suppl. 272. 1781); Hook. f. in Hook. f., Fl. Brit. India 1: 19. 1872; Haines, Bot. Bihar & Orissa 1: 6. 1961 (Rep. ed.).

Collector's name for all the field numbers is T.K. Sarma unless stated otherwise.

Erect, hairy, annual herbs, up to 60 cm high. Leaves radical, 3-foliolate with 3-sect leaflets; petioles up to 8 cm long; upper most sessile on a short sheath, ternatisect, leaflets up to 3 cm long, hairy beneath, lobed and coarsely serrate. Flowers yellow, up to 2 cm in diam. Achenes in globose-ovoid head, flattened with an intramarginal rib, glabrous. Receptacle oblong, pilose.

Fl. & Fr. : June-Nov.

Distrib. : India, Nepal, extending to N. China and N. America.

Specimens examined : Netarhat, 64.

Notes : Not common, along the stream of the hills.

2. Ranunculus sceleratus Linn., Sp. Pl. 551. 1753; Hook. f. & Thomson in Fl. Brit. Ind. 1: 19. 1872; Haines, Bot. Bihar & Orissa 1: 6. 1961 (Rep. ed.); Rau in B.D. Sharma *et al.*, Fl. Ind. 1: 128. 1993; Uniyal & Thothathri, Fl. W. Bengal 1: 131. 1997.

Erect, glabrous, annual herbs, up to 60 cm high, much branched. Stem hollow, deeply furrowed. Leaves radical, reniform, 3-partite, 1.5-2.5 cm across; segments obovate-cuneate; cauline leaves shortly petiolate, 3-partite, segments linear. Flowers small, yellow, many, terminating the branchlets and from the forks, up to 10 mm in diam. Achenes many in oblong heads, turgid, not margined, obliquely obovate, very shortly apiculate or obtuse.

Fl. & Fr. : Nov.-Mar.

Distrib. : Throughout Asia, except tropical regions.

Specimens examined : Tarhashi, 1139. Tenagophyte or Epihydate.

Notes : Common, near the ponds and ditches. *Nigella sativa* Linn., cultivated as Spice.

DILLENIACEAE

DILLENIA L.

1a. Branchlets tomentose; flowers more than 10 cm across; leaf apex acute-acuminate .... 1. *D. indica*

1b. Branchlets glabrous; flowers less than 4 cm across; leaf apex acute .... 2. *D. pentagyna*

1. Dillenia indica L. Sp. Pl. 535. 1753; Hook. f. & Thoms. in Hook. f., Fl. Brit. India 1: 36. 1872; Hoogland in Blumea 7: 108. 1952; Haines, Bot. Bihar & Orissa 1: 7. 1961 (Rep. ed.); Kumar in Saldanha, Fl. Karnataka 1: 185. 1984; Guha Bakshi, Fl. Murshid. Dist. 44. 1984; Majumdar in B.D. Sharma *et al.*, Fl. Ind. 1: 155. 1993 and in Fl. W. Bengal 1: 135. 1997.

Large, evergreen trees, with spreading, tomentose branches. Leaves crowded at the end of the branches, narrowly elliptic-oblong or oblong-lanceolate, acute or obtuse at apex; narrowed down at base, margin serrate, up to 30 × 10 cm, secondary nerves 25-50 pairs, close-set, upper surface glabrous, sparsely pubescent on nerves beneath; petioles 2-5 cm long. Flowers solitary, sub-terminal, white, up to 12 cm across; peduncle up to 7 cm long. Sepals thick, fleshy, orbicular, concave, persistent in fruits. Petals oblong-obovate. Inner whorl of stamens larger than the outer whorl and recurved. Fruits 7-10 cm across, greenish-yellow, globose, fleshy within, Seeds many, reniform, margin hairy, immersed in glutinous pulp, upto 5 mm across.

Fl. & Fr. : May-Jan.

Distrib.: India, Sri Lanka, Nepal and Malaya.

Specimens examined : Tarhashi, 1136.

Notes : Not common, cultivated and often selfsown in village surroundings also in Mcclaskieganj.

Common name : Beng. & Hindi : *Chaalta*; Kol & Santal : *Korkotta*.

Uses : Thickened sepals on the fruits are edible and made into jams, jellies and pickles.

2. D. pentagyna Roxb., Pl. Cor. 1: 21, t. 20. 1795; Hook. f. & Thoms. in Fl. Brit. India 1: 38. 1872; Haines, Bot. Bihar & Orissa 1:7. 1961 (Rep. ed.); Hoogland in Blumea 7: 117. 1952; Ramam. in Sald. & Nicol., Fl. Hassan 114. 1976. Majumdar in B.D. Sharma *et al.*, Fl. Ind. 1: 156. 1993 and in Fl. W. Bengal 1: 136. 1997.

Large, deciduous trees with a straight cylindrical bole. Leaves up to 70 × 25 cm, oblong-lanceolate or narrowly elliptic, acute at apex and

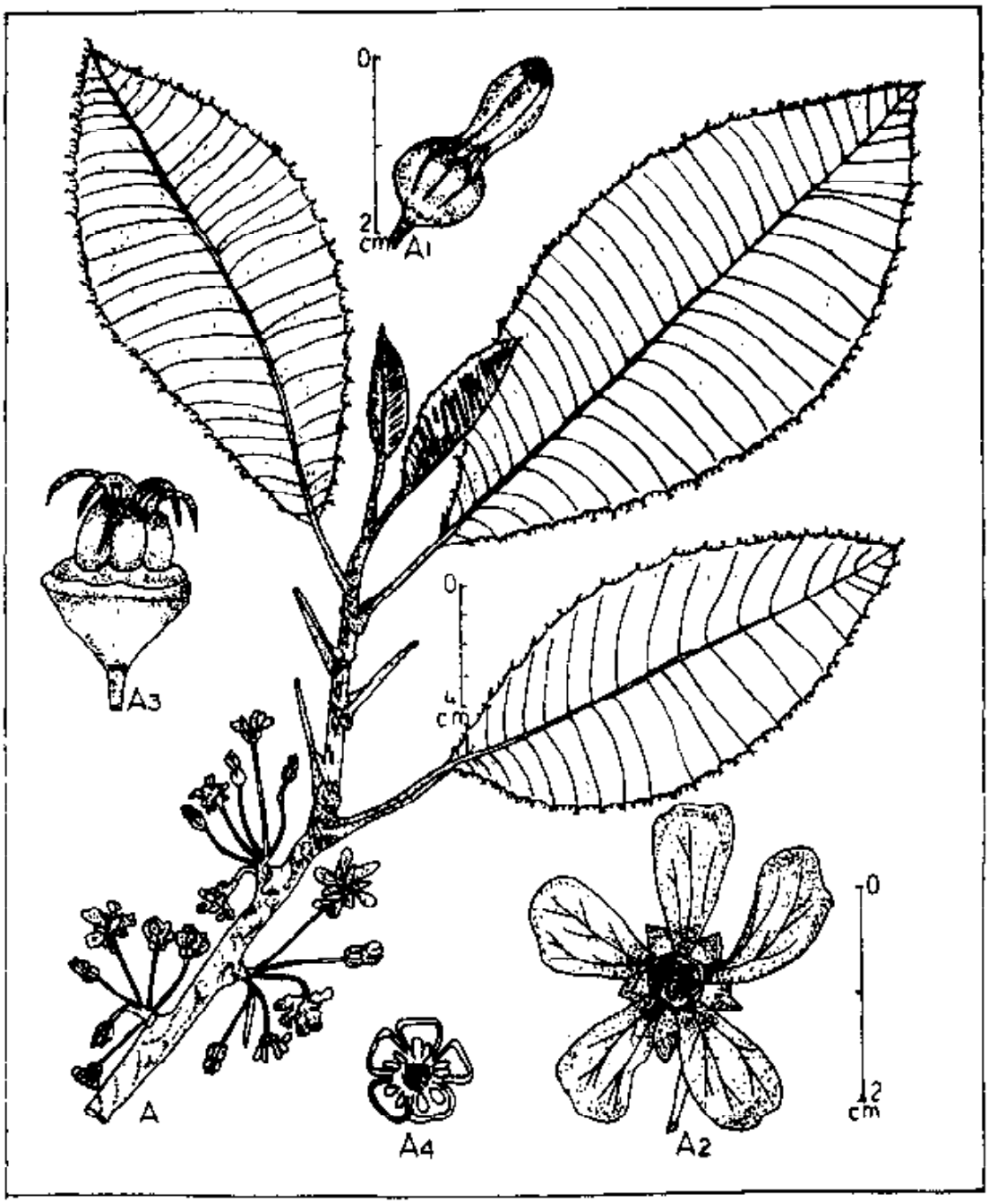


Fig. 1: Dilleniaceae (A-A_4): *Dillenia pentagyna* Roxb. : A. Flowering twig, A_1 Flower bud, A_2. Flower, A_3. Gynoecium, A_4. T.S. of ovary.

narrowed down at base, serrate, hairy when young, secondary nerves 40-50 pairs; petioles 3-6 cm long, winged at base. Flowers 2.5 cm in diam., fragrant, born in umbel along with leafless branches; pedicel 3-5 cm long, red. Sepals 5, orbicular, brown, thick, accrescent. Petals-5, obovate, bright yellow. Inner most 10 stamens longer than rest, recurved. Carpels-5, unilocular. Fruits (not seen) indehiscent, covered with fleshy yellow sepals.

Fl. & Fr.: Mar.-May.

Distrib. : China, Indomalesia and Java.

Specimens examined : Barwadih, *Sarma* 445.

Notes : Common, in the forest.

Common name : Beng : *Karkotta*; Santal : *Karkotta, Sahar*: Hindi : *Aggai*.

Uses : Buds and fruits are eaten. Wood used for house posts, rafters and planking. Leaves used as green manure.

ANNONACEAE

1a. Shrubs; climbing with hooked peduncles .... 2. ARTABOTRYS

1b. Trees or shrubs; not climbing :

2a. Anthers concealed by overlapping connectives:

3a. Inner whorl of the petals very minute or wanting; petals not spreading; fruitlets confluent .... 1. ANNONA

3b. Petals in 2 equal whorls, spreading from the base; fruitlets distinct .... 4. POLYALTHIA

2b. Anthers not concealed by connectives .... 3. MILIUSA

1. ANNONA L.

Annona squamosa L., Sp. Pl. 537. 1753; Hook. f. & Thoms. in Hook. f., Fl. Brit. India 1: 78. 1872; Prain, Beng. Pl. 1: 206. 1903 (Rep. ed. 1: 134. 1963) & in Rec. Bot. Surv. Ind. 3(2): 163. 1905; Haines, Bot. Bihar & Orissa 1: 10. 1961 (Rep. ed.); Mitra in B.D. Sharma *et al*. Fl. Ind. 1: 207. 1993 and in Fl. W. Bengal 1: 143. 1997.

Small sized trees, up to 5 m high, young shoot pubescent, by age become glabrous. Leaves 5-12 × 1.5-4 cm, membranous, oblong-lanceolate, obtuse at apex, acute at base; petioles upto 1.5 cm long. Flowers solitary, or 2-3 on lateral peduncle, drooping, yellowish-green; pedicels up to 1.5 cm long. Flowers solitary, or 2-3 on lateral peduncle, drooping, yellowish-green; pedicels up to 1.5 cm long. Sepals small, pubescent. Outer whorl of the petals upto 25 × 6 mm, slightly fleshy, inner whorl wanting, if present then very minute. Fruits 5-10 cm in diam., green, and white downy when young, purple-green by age, outside roughed by end of carpels.

Fl. & Fr. : Mar.-Sept. Exotic.

Distrib. : A native of tropical America but widely cultivated in the tropics.

Specimens examined : Mcclaskieganj, 696.

Notes : Commonly cultivated, also escaped on dry hill slopes.

Common name : Beng : *Ata, Sitaphal*; Hindi : *Sarifa*; Santal : *Mandargom.*

Uses : Fruits edible and they are made into drinks. Roots used as purgative.

2. ARTABOTRYS R. Br.

Artabotrys hexapetalus (L. f.) Bhandari in Baileya 12: 147. 1964; Nair, Fl. Punjab Pl. 4: 1978; Mitra in B.D. Sharma *et al.*, Fl. Ind. 1: 251. 1993. *Annona hexapetala* Linn. f., Suppl. 270. 1781. *Artabotrys odoratissimus* R. Br. in Bot. Reg. 5. t. 423. 1819; Hook. f. & Thomas., Fl. Brit. India 1: 54. 1872. *A. uncinatus* (Lamk.) Merrill in Phillip. J. Sci. 7: 234. 1912; Deb, Fl. Trip. 1: 82. 1981.

Large, sarmentose, glabrous shrubs. Leaves oblong or lanceolate, shining, up to 16 cm long, Flowers solitary or paired on hooked woody peduncle. Petals 2-4 cm long, hooded over the stamens, base concave. Fruitlets sessile.

Fl. & Fr. : May-Sept.

Distrib. : Pantropical.

Specimens examined : Barwadih, Sarma 939.

Notes : Not common. Found in the forest edge, also in garden.

Common name : Beng. : *Kanthalichampa;* Hindi : Champa.

3. MILIUSA Leschen

Miliusa tomentosa (Roxb.) Sinclair, Gard. Bull. Singapore 14 : 378. 1955; Ramesh in Saldanha, Fl. Karnataka 1: 45. 1984; Mitra in B.D. Sharma *et al.*, Fl. Ind. 1: 221. 1993. *Uvaria tomentosa* Roxb., Pl. Cor. 1: 35. t. 31. 1795. *Saccopetalum tomentosum* (Roxb.) Hook. f. & Thoms., Fl. Ind. 1: 152. 1855; Haines, Bot. Bihar & Orissa 1: 14. 1961 (Rep. ed.).

Small trees. Young shoots tomentose. Leaves elliptic, ovate-lanceolate, acute at apex, rounded at base, up to 15 × 8 cm. Flowers solitary or in leaf-opposed or terminal short cymes, grey tomentose; bracts ovate, deciduous; pedicels up to 1.5 cm long. Sepals linear, lanceolate. Outer petals linear, longer than sepals, inner petals oblong. Stamens many. Fruitlets stalked tomentose, up to 1.2 cm across.

Fl. & Fr. : June-Aug.

Distrib : India & Nepal.

Specimens examined : Maromar, 487.

Notes : Common in the forest.

Common name : Hindi : *Kari*; Santal : *Chara*; Kol : *Ome.*

Uses : Wood used for making huts and as good firewood.

4. POLYALTHIA Blume

1a. Leaves pubescent beneath; flower solitary, axillary, often terminal; petals ovate-lanceolate .... 1. *P. cerasoides*

1b. Leaves glabrous or pubescent on nerves; flowers solitary, extra-axillary; petals ovate .... 2. *P. suberosa*

1. **Polyalthia cerasoides** (Roxb.) Bedd., Fl. Sylv. t. 1. 1869; Hook. f. & Thoms. in Fl. Brit. India 1: 63. 1872; King, Ann. Roy. Bot. Gard. (Calcutta) 4: 65. t. 86. 1893; Haines, Bot Bihar & Orissa 1: 13. 1961 (Rep. ed.) Mitra in B.D. Sharma *et al.*, Fl. Ind. 1: 270. 1993 and in Fl. W. Bengal 1: 151. 1997. *Uvaria cerasoides* Roxb., Pl. Cor. t. 33. 1795. *Guatteria cerasoides* Dunal, Monogr. Annoac. 127. 1817.

Small trees or shrubs, with spreading branches and grey pubescent branchlets. Leaves oblong-lanceolate, often elliptic, ovate, 10-16 × 4.5-10.5 cm, acute or acuminate at apex, slightly cordate at base, pubescent; petioles upto 0.5 cm long, pubescent. Flowers greenish, usually solitary, axillary, often terminal; pedicels up to 1.5 cm long. Sepals ovate or ovate-lanceolate, 0.5-1.2 cm long, pubscent. Petals ovate-lanceolate, green, incurved. Fruitlets globose, up to 10 mm across, red when ripe, stalked.

Fl. & Fr. : April-Aug.

Distrib. : Throughout India.

Specimens examined : Maromer, 525.

Notes : Common, in the dry forest.

Common name : Hindi : *Kudumi*; Kol : *Sande Ome*; Santal : *Panjon, Rida.*

Uses : Wood used for house construction, packing-cases and for boat building. Fruits edible.

2. **P. suberosa** (Roxb.) Thw., Enum. Pl. Zeyl. 398. 1864; Hook. f. & Thoms. in Fl. Brit. India 1: 65. 1872; Prain, Beng. Pl. 1: 204. 1903 (Rep. ed. 1: 169. 1963); Haines, Bot. Bihar & Orissa 1: 13. 1961 (Rep. ed.); Mitra in B.D. Sharma *et al.*, Fl. Ind. 1: 278. 1993 and in Fl. W. Bengal 1: 152. 1997. *Uvaria suberosa* Roxb., Pl. Cor. 1: Cor. 1: 131 t. 34. 1795.

Small trees; branchlets sparingly pubescent. Leaves up to 10 x 3 cm, oblong to narrowly obovate-oblong, sub-acute or obtuse at apex, sparingly pubescent on nerves beneath; petioles upto 1.5 mm long, hairy. Flowers solitary, pale yellow; pedicels up to 1 cm long, leaf opposed. Sepals small, pubescent, ovate. Petals ovate, pubescent within. Fruitlets globose.

Fl. & Fr. : May-Dec.

Distrib. : India, South China & Malaya.

Specimens examined : Betla, 478.

Notes : Common, in the forest.

Common name : Beng. : *Barachali*; Hindi : *Cham Khirni*; Santal : *Sandioma*.

Uses : Fruits are edible.

MENISPERMACEAE

1a. Flowers in axillary short panicled cymes; condyle on endocarp laterally perforate .... 2. COCCULUS

1b. Flowers fascicled in elongate racemes; condyle on endocarp not perforate :

2a. Sepals and petals 4 in male flowers and 1 in female flowers .... 1. CISSAMPELOS

2b. Sepals 6-10 and petals 3-5 in male flower and 3-5 in female flower .... 3. STEPHANIA

1. CISSAMPELOS L.

Cissampelos pareira L., Sp. Pl. 1031. 1753. var. **hirsuta** (Buch. Ham. ex DC.) Forman in Kew Bull. 22: 356. 1968; Gandhi in Said. & Nicol., Fl. Hassan 66. 1976; Gangopadhyay in B.D. Sharma *et al.*, Fl. Ind. 1: 317. 1993. *Cissampelos hirsuta* Buch.-Ham. ex DC., Syst. Nat. 1: 535. 1817. *Cissampelos pareira* sensu Hook. f. & Thoms. in Fl. Brit. Ind. 1: 103. 1872; Haines in Bot. Bihar & Orissa 1: 17. 1961 (Rep. ed.).

Slender, twining, softly tomentose, herbaceous climbers. Stems striate. Leaves ovate to orbicular, up to 7 × 5.5 cm, apiculate at apex, peltate, shallow-cordate at base, densely hairy beneath; petioles equalling or slightly longer than leaf-blade, tomentose. Male flowers: minute, white in densely hairy cymes, in axil of foliaceous bracts, on slender shoot. Female inflorescence : longer than male with many conspicuous imbricate bracts. Fruits ovoid-subglobose, red, pilose, with sub basal persistent styler scars.

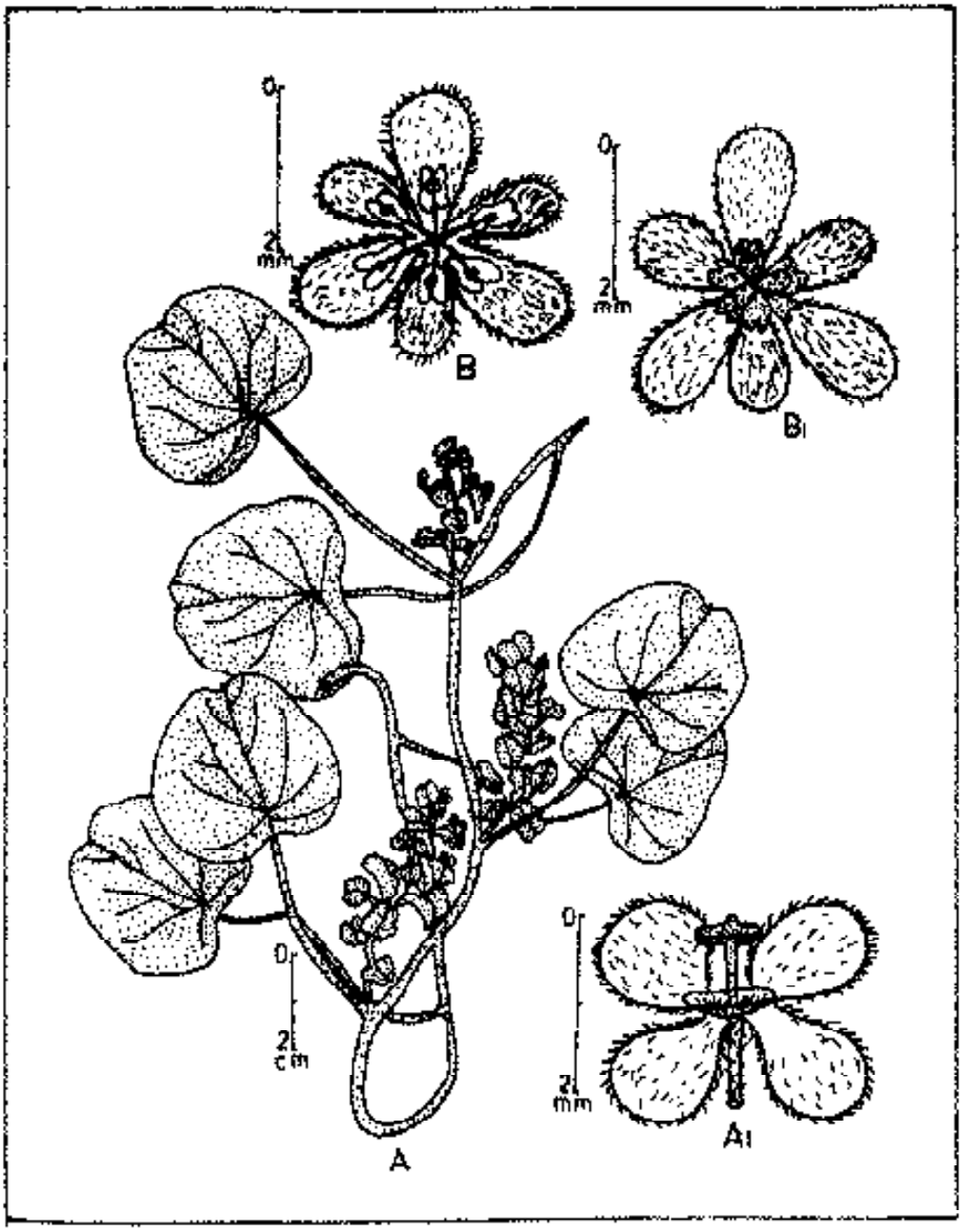


Fig. 2: Menispermaceae (A-A_1): *Cissampelos pareira* L. var. *hirsuta* (Buch-Ham. ex DC.) Forman: A. Female branch, A_1. Male flower (B-B_1): *Cocculus hirsutus* (Linn.) Diels: B. Male flowers, B_1. Female flower.

Fl. & Fr. : Aug.-Mar.

Distrib. : India, Sri Lanka, Nepal, Myanmar.

Specimens examined : Barwadih, 425; Palamau Fort (Betla), 1110.

Note : Common, on the hill slopes, climbing over bushes.

Common name : Beng. & Hindi : ***Akanadi.***

Uses : Rhizomes are used to make the Rice beer (Local hard drinks) and roots are used for diarrhoea by the Santals. Plants yields a strong fibre.

2. Cocculus DC.

Cocculus hirsutus (L.) Diels in Pfl.- reich. 46: 236. 1910; Haines, Bot., Bihar & Orissa 1: 20. 1961 (Rep. ed.) Gangopadhyay in B.D. Sharma *et al.* Fl. Ind. 1: 318. 1993. *Menispermum hirsutum* Linn., Sp. Pl. 341. 1753. *Cocculus villosus* DC., Syst. 1: 525. 1818; Hook. f. & Thoms. in Fl. Brit. India 1: 101. 1872; Prain, Beng. Pl. 1: 210. 1903 (Rep. ed. 1: 137. 1963).

Herbaceous climbers, young part densely villous; branches striate. Leaves ovate or ovate-oblong, softly villous on both surfaces, 5.5-8 × 3.5-5.5 cm, old leaves nearly glabrous except few hairs on nerves beneath, apex mucronulate, base subcordate or truncate, gradually smaller upwards, becomes oblong on the flowering branches. Flowers unisexual, dioecious, small, hairy. Outer 3-sepals subequal, 1.5 × 0.5 mm, hairy outside, oblong-ovate, inner three 1.7 × 1.2 mm. Petals 0.8 mm long, glabrous, membranous, obovate. Male flowers in axillary cymes or panicles, bracts small, subulate. Female flowers in axillary clusters, 2-3 in a group. Fruits small, 3-5 mm in diam. Seeds black when ripe.

Fl. & Fr. : Nov.-Apr.

Distrib. : Tropical and Subtropical India and Tropical Africa.

Specimens examined : Daltonganj, 328.

Notes : Common, in the hedges and thickets.

Common name : Beng. : *Huyer*; Hindi : *Jamtikibel.*

Uses : Leaf extract is applied to eczema and other skin disease.

3. STEPHANIA LOUR.

Stephania japonica (Thunb.) Miers, Ann. Mag. Nat. Hist. Ser. 3, 18: 14. 1866; Forman, Kew Bull. 11: 49. 1956; Gangopadhyay in B.D. Sharma *et al.*, Fl. Ind. 1: 335. 1993. *Menispermum japonicum* Thunb., Fl. Jap. 193. 1784. *Stephania hernandifolia* Walp., Rep. 1: 9. 1842; Haines, Bot. Bihar & Orissa 1: 17. 1961 (Rep. ed.). *Clypea hernandifolia* Wt. & Arn., Prodr. 14. 1834.

Climbing, glabrous herbs. Leaves peltate, ovate, narrowly acute from broad rounded base, 4-12 cm long with 5 nerves beneath. Flowers sessile in compound bracteate umbels. Male flowers: sepals 6-10, free. Petals 3-5, smaller than sepals. Stamens forming a synandrium. Female flowers: Sepals 3-5, free; petals 3-5. Fruits red, up to 7 mm long, dorsally ridged.

Fl. & Fr. : May-Dec.

Distrib. : Tropical and Temperate Asia.

Specimens examined : Muhammadganj, 983.

Notes : Common, in under growth of forest.

Common name : Beng. and Hindi : *Akanadi.*

Uses : Roots used for fever, diarrhoea and urinary diseses.

NYMPHAEACEAE

NYMPHAEA L.

1a. Leaves glabrous, entire to bluntly dentate; sepals veined; connectives distinctly exceeding the anthers. .... 1. *N. nouchali*

1b. Leaves pubescent beneath, sharply dentate; sepals ribbed; connectives hooded over and hardly exceeding anthers .... 2. *N. pubescens*

1. Nymphaea nouchali N. Burman, Fl. Ind. 120. 1768; Backer & Bakh. f., Fl. Java 1: 149. 1963; R.L. Mitra in B.D. Sharma *et al.*, Fl. Ind. 1: 430. 1993 and in Fl. W. Bengal 1: 176. 1997. *Nymphaea stellata* Willd., Sp. Pl. 2. 1153. 1799; Haines, Bot. Bihar & Orissa 1: 22. 1961 (Rep. ed.).

Rhizomes small, ovoid. Leaves entire to bluntly toothed, green above, pale-purple and glabrous beneath, 10-25 × 8-20 cm. Sepals green veined, purple dotted. Petals white, often bluish or red. Filaments petaloid, staminal connective distinctly exceeding the anthers.

Fl. & Fr. : Mostly throughout the year.

Distrib : Pantropical.

Specimens examined : Barwadih, 420. Epihydate.

Notes : Common, in the open ponds and ditches.

Common name : Beng. : *Nilshapla, Nilpadma*; Hindi : *Nil Kamal.*

Uses : Rhizomes, leaves and peduncles eaten as vegetable.

2. N. pubescens Willd., Sp. Pl. 2: 1154. 1799; Conrad, Monog. Nymphaea 198. 1908; Backer & Bakh. f., Fl. Java 1: 148. 1963; Sald. in Sald., Fl. Karnataka 1: 85. 1984. R.L. Mitra in B.D. Sharma *et al.*, Fl. Ind. 1:431. 1993 and in Fl. W. Bengal 1: 178. 1997. *Nymphaea nouchali* auct. non N. Burman 1768; Santapau in Fl. Khandala ed. 3, 5. 1967. *Nymphaea lotus* sensu Hook f. & Thoms. (including var. *pubescens*) in Fl. Brit. India. 1: 114. 1872 (non L.); Haines, Bot. Bihar & Orissa 1: 21. 1961 (Rep. ed.). *Nynphaea lotus* L. var. *pubescens* (Willd.) Hook. f. & Thoms., Fl. Ind. 241. 1855 & in Fl. Brit. India 1: 114. 1872.

Rhizomes subglobose or oblong, large. Leaves peltate, orbicular or subreniform, up to 30 × 25 cm, sharply dentate at margin, fibrous above, reddish-pink and hairy beneath. Flowers solitary, 6-15 cm in diam., reddish or white; peduncle pubescent. Sepals up to 8 × 1.2 cm, oblong, ribbed, obtuse. Petals oblong or outer one obovate. Connective hooded over anthers, hardly exceeding them, filaments much dilated at base. Fruits 3-4 cm in diam.

Fl. & Fr. : Throughout the year, specially in Aug.-Oct.

Distrib. : Pantropical.

Specimens examined : Panki, 959. Epihydate.

Notes : Common in the ponds and ditches, throughout the district.

Common name : Beng. : *Saluk*; Hindi : *Koka, Koi.*

Uses : Rhizomes are eaten raw or boiled, peduncle and unripe fruits are also eaten as vegetable.

Remarks : Mitra & Subramanyam (Bull. Bot. Surv. Ind. 24: 83. 1983) remark that this may prove to be a geographical subspecies of *N. lotus* L.

NELUMBONACEAE

NELUMBO Adans.

Nelumbo nucifera Gaert., Fruct, 1: 73. t. 19. f. 2,1788; Subramanyam, Aquat. Angios. 6. 1962; Saldanha in Saldanha, Fl. Karnataka 1: 85. 1984; R.L. Mitra in B.D. Sharma *et al.*, Fl. Ind. 1: 441. 1993 and in Fl. W. Bengal 1: 179. 1997. *Nymphaea nelumbo* Linn., Sp. Pl. 511. 1753. *Nelumbium speciosum* Willd., Sp. Pl. 2: 1258. 1799; Hook. f. & Thoms. in Fl. Brit. India. 1: 116. 1872; Haines, Bot. Bihar & Orissa 1: 23. 1961 (Rep. ed.). *Nelumbium nelumbo* (L.) Druce, Bot. Exel. Club. Soc. Brit. Isles 3: 421. 1914.

Aquatic herbs, with slender, subterranean long, jointed, creeping rhizomes. Leaves orbicular, 30-60 cm across, glaucous above, waxy, with prominent radiating veins; petioles up to 2 m long, some times with weak prickles. Tepals upto 10 cm long, elliptic, obtuse. Anthers linear, with a clavate appendage. Torus up to 1.8 cm high, top flat, up to 2.5 cm across. Fruits elongated, up to 9 cm long. Seeds with spongy seed coat.

Fl. & Fr. : Apr.-Nov. Exotic.

Distrib. : Native of continental Asia, now widely distributed in cultivation.

Specimens examined : Tarhashi, 1131. Epilydate, some times Hyperhydate.

Notes : Common, in the ponds and tanks.

Common name : Beng. : *Padma*; Hindi : *Kamal*.

Uses : Rhizomes and soft petioles are eaten as vegetable. Carpels are also eaten raw or roasted.

PAPAVERACEAE

ARGEMONE L.

Argemone mexicana L., Sp. Pl. 508. 1753; Hook. f. & Thoms. in Hook. f., Fl. Brit. India 1: 117. 1872; van Steenis in Fl. Males. 5: 114. 1954; haines, Bot. Bihar & Orissa 1: 24. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 49. 1977; Debnath & Nayer in B.D. Sharma & Balakrishnan, Fl. Ind. 2: 2. 1993; Debnath in Fl. W. Bengal 1: 180. 1997.

Annual robust herbs, up to 80 cm high. Stems with yellow and milky juice and with scattered prickles. Leaves 5-22 × 3-6 cm, sessile, amplexicaul, sinuate pinnatifid, variegated with green and pale white, mostly along veins, leaf margin and veins spinous. Flowers bright yellow, terminal on main stem or on branches, sessile, subsessile or on 1.8 cm long prickly peduncle. Sepals-3, oblong, green, concave, prickly without, deciduous at blooming. Petals-6, 2-2.5 cm long, obovate. Ovary covered with soft spines which become larger and stiff as ovary mature; stigma sessile, 3-6 lobed, dark red. Capsule oblong-ellipsoid, 2-3.5 cm long, open by valves at the top, spiny. Seeds many, globose, reticulate-ribbed, brownish-black.

Fl. & Fr. : Jan.-June, sometimes in other months also. Exotic.

Distrib. : Common, in Ouranga river beds, Antikheta village and in waste places.

Specimens examined : Kumendi, 721.

Common name : Beng. : *Seyalkanta;* Hindi : *Bharband;* Santal : *Gokhula Janum*.

Uses : Seeds yield a nauseous, bitter, non edible oil, used in cutaneous troubles. Presence of Argemone oil in Mustard oil is probably responsible for out breaks of epidemic dropsy. Mixed with dying oil, such as linseed oil, it may be used in paint industry, and it is also used for soap-making.

Papaver somniferum L. (Poppy) is occasionally cultivated for its flower, not for its opium.

FUMARIACEAE

FUMARIA L.

Fumaria indica (Haussk.) Pugsley in J. Linn. Soc. London Bot. 44: 313. 1919; Whitmore in Hara, Enum. Fl. Pl. Nepal 2: 36. 1979; Ellis & Balakrishnan in B.D. Sharma & Balakrishnan, Fl. Ind. 2: 84. 1993. *Fumaria vaillantii* var. *indica* Haussk. in Flora 56: 443. 1873. *Fumaria parviflora* sensu Wt. & Arn., Prodr. 1: 18. 1834 (non Lamk. 1788); Haines, Bot. Bihar & Orissa 1: 24. 1961 (Rep. ed.). *Fumaria parviflora* var. *vaillantii* Hook. & Thoms, Fl. Ind. 258. 1855. *Fumaria parviflora* spp. *vaillantii* Hook. f., in Fl. Brit. India. 1: 128. 1872.

Glabrous, spreading, dichotomously branched herbs, up to 30 cm high. Leaves finely divided into flat, linear segments which are acute and mucronate. Flowers rosy-purplish in leaf opposed racemes. Peduncle 1-2 mm long. Sepals-2, lanceolate, deciduous. Petals 2 + 2, up to 6 mm long, outer two larger, both spurred. Capsule globose, verrucose and polished, 2-2.5 mm in diam.

Fl. & Fr. : Nov.-Mar.

Distrib. : India and W. Asia.

Specimens examined : Netarhat, 123.

Notes : Common, in the cultivated land and waste places.

Common name : Beng. : *Ban Salpha*; Hindi : *Pitpápra*.

Uses : It is said to be laxative, diuretic and used for dyspepsia.

Remarks : *Fumaria parviflora* Lamk. occurs in N. Africa, Europe and Central Asia. Hence the correct name of Indian plant is *Fumaria indica* (Haussk.) Pugsley. (Bennet-1987).

BRASSICACEAE

1a. Fruit terete, long, dehiscent .... 1. BRASSICA

1b. Fruit globular, indehiscent .... 2. CORONOPUS

1. BRASSICA L.

Brassica juncea (L.) Czern., Consp. Fl. Chark. 8. 1859; Hook. f. & Anderson, in Fl. Brit. India 1: 157. 1872 p.p.; Haines, Bot. Bihar & Orissa 1: 26. 1961 (Rep. ed.); Hajra *et al.* in B.D. Sharma & Balakrishnan, Fl. Ind. 2: 134. 1993. Bhaumik in Fl. W. Bengal 1: 187. 1997.

Sinapis juncea L., Sp. Pl. 668. 1753.

Slender herbs, up to 30 cm, high, sparsely pubescent. Leaves up to 8 × 2 cm, oblong or obovate-oblong, entire or remotely serrate dentate, rarely lyrate, lower ones with 1.5-4 cm long petiole, upper ones sessile and smaller. Flowers in terminal racemes, yellow; pedicels up to 1 cm long. Calyx up to 7 mm long, sparsely hairy or glabrous. Petals up to 1 × 0.3 cm. Siliqua 2.5-4.5 cm long, with an empty beak.

Fl. & Fr. : Sept.-Dec.

Distrib. : Pantropical.

Specimens examined : Paton, 1053.

Notes : Common, in the moist waste places.

2. CORONOPUS Smith

Coronopus didymus (L.) J. E. Smith, Fl. Brit. India 2: 691. 1804; Jafri in Fl. W. Pak. 55: 62. 1973; Gandhi in Sald. & Nicol. Fl. Hassan 189. 1976; Bhaumik in B.D. Sharma & Balakrishnan, Fl. Ind. 2: 191. 1993 and in Fl. W. Bengal 1: 191. 1997. *Lepidium didymum* L., Syst. 2: 433. 1759 & Mant. 1: 92. 1767. *Senebiera didyma* Pers., Syn. 2: 185. 1805-1807; Gamble, Fl. Pres. Madras. 39. 1915.

Prostrate herbs; stems covered with simple and bifid white hairs. Leaves pinnatifid, 2-4 cm long, uppermost lanceolate, apiculate, entire. Flowers in racemes, greenish, pedicelled, 2 mm long. Sepals ovate-rounded, 0.5-1 mm long. Petals linear. Pods small, notched, reticulate, stalk 3-4 mm long.

Fl. & Fr. : Nov.-June. Exotic.

Distrib. : Native of South America; now naturalised throughout India.

Specimens examined : Netarhat, 91.

Notes : Common, in cultivated land, road side & vicinity of upper Ghagri.

Brassica juncea (L.) Czern., *Brassica oleracea* L. var. botrytis L. *Brassica oleracea* L. var. *capitata* L., *Raphanus sativus* L. are commonly cultivated throughout the district.

CAPPARACEAE

CAPPARIS L.

1a. Spines straight; flowers axillary, solitary .... 2. *C. spinosa*

1b. Spines recurved; flowers not solitary :

2a. Leaves retuse at apex; flowers in many-flowered umbel .... 1. *C. sepiaria*

2b. Leaves callus-tipped; flowers in supra-axillary rows .... 3. *C. zeylanica*

1. Capparis sepiaria L., Syst. Nat. ed. 10. 2: 1071. 1759; Hook. f. & Thoms. in Fl. Brit. India 1: 177. 1872; Haines in Bot. Bihar & Orissa 1: 33. 1961 (Rep. ed.); Jacobs in Blumea 12: 489. 1965; Sundara Raghavan in B.D. Sharma & Balakrishnan, Fl. Ind. 2: 289. 1993; Bhattacharyya, Fl. W. Bengal 1: 205. 1997.

Erect or climbing shrubs, pubescent, glabrascent; spines recurved. Leaves elliptic-oblong to suborbicular, retuse at apex, cuneate to rounded at base, up to 3 × 2 cm, slightly pubescent; petioles up to 5 cm long.

Flowers in terminal, many flowered umbels. Outer sepals up to 4 × 3 mm. Petals spathulate, up to 6 × 2 mm, hairy. Ghynophore up to 8 mm long, puberulous at base. Fruits globose, up to 8 mm across.

Fl. & Fr. : Apr.-Oct.

Distrib. : India, Tropical Africa, Australia.

Specimens examined : Boneri, 812.

Notes : Common, in Scrub forest.

Common name : Beng. : *Kaliakara.*

2. Capparis spinosa L. Sp. Pl. 503. 1753; Hook. f. & Thoms. in Hook. f., Fl. Brit. India 1: 173. 1872; Haines, Bot. Bihar & Orissa 1: 32. 1961 (Rep. ed.); Jacobs in Blumea 12: 418. 1965; Sundara Raghavan in B.D. Sharma & Balakrishnan, Fl. Ind. 2: 294. 1993.

A much branched, trailing, hairy shrub. Leaves up to 5.8 × 4 cm. orbicular or broadly ovate, pale green, bat shining, acute and apiculate at apex, entire at margin, rounded at base; petioles up to 8 mm long; spines very hard, up to 4 mm long. Flowers axillary, solitary, white with purple filaments; pedicels equalling or exceeding the leaves. Fruits ovoid, up to 4 cm across.

Fr. : Jul.-Aug.

Distrib. : India, Afghanistan, West Asia, North Africa and also Europe, Australia.

Specimens examined : Moromar, 527.

Notes : Not common, in the forest;

Common name : Hindi : *Kabra.*

Uses : Flower buds are considered as useful in scurvy. Bark used in affections of liver, rheumatism, tubercular glands and paralysis.

3. **Capparis zeylanica** L., Sp. Pl. ed. 2. 720. 1762; Jacobs in Fl. Males. 6: 87. 1960 & in Blumea 12 : 505. 1965 (non Hook. f. & Thoms. in Fl. Brit. India 1: 174. 1872); Dunn in Kew Bull. 62. 1916; Sundara Raghavan in B.D. Sharma & Balakrishnan, Fl. Ind. 2: 298. 1993. *Capparis horrida* L. f., Suppl. 264. 1781; Hook. f. & Thoms. in Hook. f., Fl. Brit. Ind. 1: 178. 1872; Haines, Bot. Bihar & Orissa 1.32. 1961 (Rep. ed.). *Capparis hastigera* Hance, Seem. J. Bot. 6: 296. 1868; Cook, Fl. Bombay 1: 47. 1901. *Capparis xanthophylla* Coll. & Hemsl., J. Linn. Soc. Lond. Bot. Bot. 28: 20. 1890; Brandis, Ind. Trees 36. 1906.

Woody, climbing shrubs, with nodal prickles; prickle small, recurved, always in pair; stems with brown hair. Leaves alternate, 3-6 × 1.5-3 cm, oblong or oblong-ovate; petioles 0.5-1 cm long. Flowers 3, in the axil, forming interrupted raceme; pedicels unequal, 0.5-1.5 cm long. Sepals up to 9 × 6 mm, concave, downy brown outside. Petals longer and narrower than sepals, pubescent. Stamens many, 2-3 cm long. Fruits up to 3 × 2 cm, subglobose, slightly 4-angled.

Fl. & Fr. : March-May.

Distrib. : India, Sri Lanka, China.

Specimens examined : Daltonganj, 15.

Notes : Common, in the hedges and climbing together with *Ichnocarpus frutescens*.

Common name : Beng. : *Bagnai, Colokera*; Santal : *Buru asaria*.

CLEOMACEAE

CLEOME L.

1a. Petals white; gynandrophore elongate and longer than petals .... 1. *C. gynandra*

1b. Petals yellow; gynandrophore absent .... 2. *C. viscosa*

1. **Cleome gynandra** L., Sp. Pl. 671. 1753; Jacobs in Fl. Males. 6: 101. 1960; Sundara Reghavan in B.D. Sharma & Balakrishnan, Fl. Ind. 2: 309. 1993; Bhattacharyya, Fl. W. Bengal 1: 208. 1997. *Gynandropsis*

pentaphylla (L.) DC., Prodr. 1: 238. 1824; Hook. f. & Thoms. in Fl. Brit. India 1 : 171. 1872; Prain, Beng. Pl. 1: 225. 1903 (Rep. ed. 1: 150. 1963) & in Rec. Bot. Surv. India 3: 173. 1905; Haines, Bot. Bihar & Orissa 1: 31. 1961 (Rep. ed.).

Erect, branched, pubescent herbs, up to 70 cm high. Stems usually purplish. Leaves digitate, long petioled, up to 10 cm long; leaflets-5, sessile, obovate or oblong-obovate, acute, entire, or faintly crenulate, usually terminal one larger and up to 50 × 23 mm, pubescent. Flowers in terminal raceme; pedicels up to 25 mm long, glandular pubescent, each subtended by a trifoliate bracts; bracts linear, upto 6 mm long, pubescent. Capsule cylindric, 4-10 cm long. Seeds many, small.

Fl. & Fr. : Jul.-Dec.

Distrib : Throughout India, Pantropical weed.

Specimens examined : Daltonganj, 351.

Notes : Common in the waste places.

Common name : Beng. : *Swet hurhuri;* Santal : *Seta Kata arak.*

Uses : Decoction of root is used to cure fever & the leaf is taken by the rural people for rheumatism.

Remarks : *Cleome* L. (1753) and *Gynandropsis* DC. (1824) are congeneric.

2. Cleome viscosa L., Sp. Pl. 672. 1753; Hook. f. & Thoms. in Hook. f., Fl. Brit. India 1: 170. 1872; Haines, Bot. Bihar & Orissa 1: 30. 1961 (Rep. ed.); Sundara Raghavan in B.D. Sharma & Balakrishnan, Fl. Ind. 2: 317. 1993; Bhattacharyya, Fl. W. Bengal 1: 209. 1997.

Erect, glandular-pubescent, annual herbs, up to 90 cm high. Leaflets 3-5, elliptic-obovate, up to 3 × 2 cm. Flowers in leafy racemes on long pedicels, up to 1.5 cm long. Sepals ovate, acute. Petals yellow, clawed. Capsule cylindric, up to 7 × 0.3 cm, densely glandular-pubescent. Seeds dark brown, with faint concentric ribs and strong cross ribs, curved, up to 1 × 1 mm.

Fl. & Fr. : Jan.-June.

Distrib. : Indomalesia.

Specimens examined : Tenarbusti (Garwah), 606.

Notes : Common weed in the open places.

Common name : Beng. : *Halde Hurhure*; Santal : *Harhara.*

Uses : The seeds are said to be anthelmintic.

VIOLACEAE

HYBANTHUS Jacq. *nom. cons.*

Hybanthus enneaspermus L. F. Muell., Fragm. Phyt. Austr. 10: 81. 1876; Tennant in Kew Bull. 16: 431. 1963; Singh in Saldanha, Fl. Karnataka 1: 274. 1984; Banerjee and Pramanik in B.D. Sharma & Balakrishnan, Fl. Ind. 2: 343. 1993. *Viola enneasperma* L., Sp. Pl. 937. 1753. *Ionidium suffruticosum* (L.) Roem. & Schult., Syst. Veg. 5: 394. 1819; Hook. f. & Thoms. in Fl. Brit. India 1: 185. 1879; Haines, Bot. Bihar & Orissa 1: 34. 1961 (Rep. ed.). *Viola suffruticosa* L., Sp. Pl. 937. 1753. *Ionidium enneaspermum* L. Vent., Jard. Malm. sub t. 27. 1803.

Diffuse or suberect, much branched, suffruticose herbs, slightly hairy or glabrous; branches 15-25 cm long. Leaves subsessile, 18-50 × 2-9 mm, linear or lanceolate, acute at apex, narrowed down at base, entire to serrate at margin; stipules subulate, appressed. Flowers pink or rose; peduncle 6-15 mm long, jointed near the tip, below the joint slender and above somewhat thickened, joint with 2 small bract like structure. Sepals 3-5 mm long, persistent, linear-lanceolate, acute, keeled. Petals: 2 upper one oblong, slightly longer than sepals, 2 lateral also longer and falcate, fifth one much larger and spurred. Anther tip with a membranous expansion. Capsule 4-5 mm diam., subglobose. Seeds pale, striate, ellipsoid.

Fl. & Fr. : Aug.-Dec.

Distrib. : India and Sri Lanka to Trop. Africa, Indo-China, South-Eastern China, Borneo and Trop. Australia.

Specimens examined : Kumendi, 725.

Notes : Common, in waste places and along the rail lines.

Common name : Beng. : *Numbora*; Hindi : *Ratanpuras;* Santal : *Tandi Sol.*

Uses : Root diuretic, used in urinary affection and bowel complaints of children.

Remarks : The two Linnaean species were first merged under the name *Ionidium enneaspermum* (L.) Vent. by Dalzell & Gibson in Bombay Fl. 1861 and their choices should be followed-Tennant. *Ionidium* Vent. (1803) is synonymous with *Hybanthus* Jacq. (1760).

Viola tricolor L. (Pansy) and *Viola odorata* L. (Sweet violet) are cultivated in gardens.

COCHLOSPERMACEAE

COCHLOSPERMUM Kunth

Cochlospermum religiosum L. Alston in Trimen. Handb. Fl. Ceylon 6: 14. 1931; Ramam. in Sald. & Nicol., Fl. Hassan 171. 1961; Balakrishnan in B.D. Sharma & Balakrishnan, Fl. Ind. 2: 383. 1993. *Bombax religiosum* L., Sp. Pl. 552. 1753. *Cochlospermum gossypium* DC., Prodr. 1: 527. 1824; Hook. f. & Thoms. in Fl. Brit. India 1: 190. 1872; Prain, Beng. Pl. 1: 153. 1963 (Rep. ed.); Haines. Bot. Bihar & Orissa 1: 35. 1961 (Rep. ed.).

Small, handsome, deciduous trees, with reddish bark. Leaves alternate, long petioled, palmately 5-lobed, cordate at base, 7-nerved, lobes acute. Flowers in terminal panicles, when plant is leafless. Flower large, yellow, hermaphrodite. Calyx hairy. Stamens many on a glandless disk, anthers with oblique pore. Capsule large woody. Seeds reniform, woolly.

Fl. & Fr. : Jan. to June. Deciduous Nov. to May.

Distrib. : Throughout India.

Specimens examined : Boneri, 190.

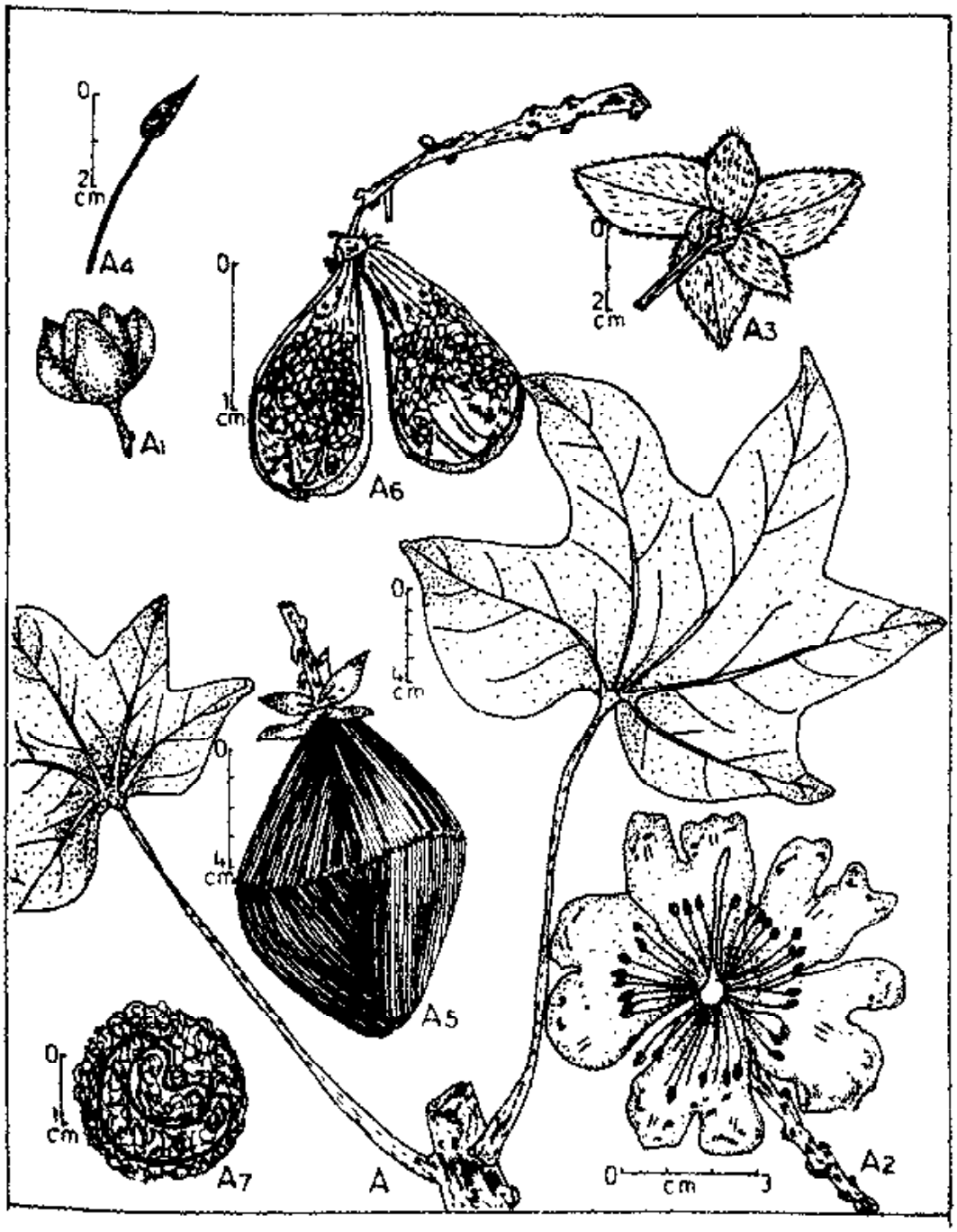


Fig. 3: Cochlospermaceae (A-A_7): *Cochlospermum religiosum* (L.) Alston: A. Leaves, A_1. Flower bud, A_2. Flower, A_3. Calyx, A_4. Stamen, A_5. Fruit, A_6. Same, showing dehiscence, A_7. Seed.

Notes : Common in the forest and in rocky area.

Common name : Beng. : *Golgol;* Hindi : *Kumbi;* Santal : *Hopo.*

Uses : Yields a gum, used as a substitute for tragacanth gum (from *Astragalus gummifer* Labil). Floss on the seeds used for stuffing mattresses, pillows etc.

FLACOURTIACEAE

1a. Flowers bisexual; ovary 1-locular; fruit a fleshy capsule .... 1. CASEARIA

1b. Flowers unisexual; ovary incompletely 5-locular; fruit a fleshy berry .... 2. FLACOURTIA

1. CASEARIA Jacq.

1a. Leaves tomentose; stipules minute, scaly .... 2. *C. tomentosa*

1b. Leaves glabrous; stipules long, lanceolate .... 1. *C. graveolens*

1. Casearia graveolens Dalz. in Hook., Kew Journ. 4: 107. 1852; Brandis, For. Fl. N.W. & C. Ind. 243. 1874; Clarke in Hook. f., Fl. Brit. India 2: 592. 1879; Haines, Bot. Bihar & Orissa 1: 40. 1961 (Rep. ed.) Mukherjee in Fl. Pach. & Bori Res. 33. 1984; Saldanha & Eswar Rao in Saldanaha, Fl. Karnataka 1: 269. 1984; R.L. Mitra in B.D. Sharma & Balakrishnan, Fl. Ind. 2: 394. 1993; B.B. Pramanik, Fl. W.Bengal 1: 228. 1997.

Large shrubs or small trees. Leaves up to 10 × 5 cm, coriaceous, glabrous, broadly elliptic, often narrower, obtuse or shortly acuminate, rounded at base; petioles short, up to 1 cm long; stipules upto 7 mm long, lanceolate, subacute, deciduous. Flowers numerous, green, in axillary clusters, with disagreeable odour; pedicels jointed, pubescent below the articulation. Calyx pubescent out side, deeply 5-lobed. Stamens 8, alternating with linear-oblong staminodes. Capsule 1-2.5 cm long, ellipsoid or subglobose, orange-yellow, 3- valved. Seeds 10-12 with red aril.

Fl. & Fr. : May-July. Plant nearly leafless during flowering.

Distrib. : India & Myanmar.

Specimens examined : Maromer, 497.

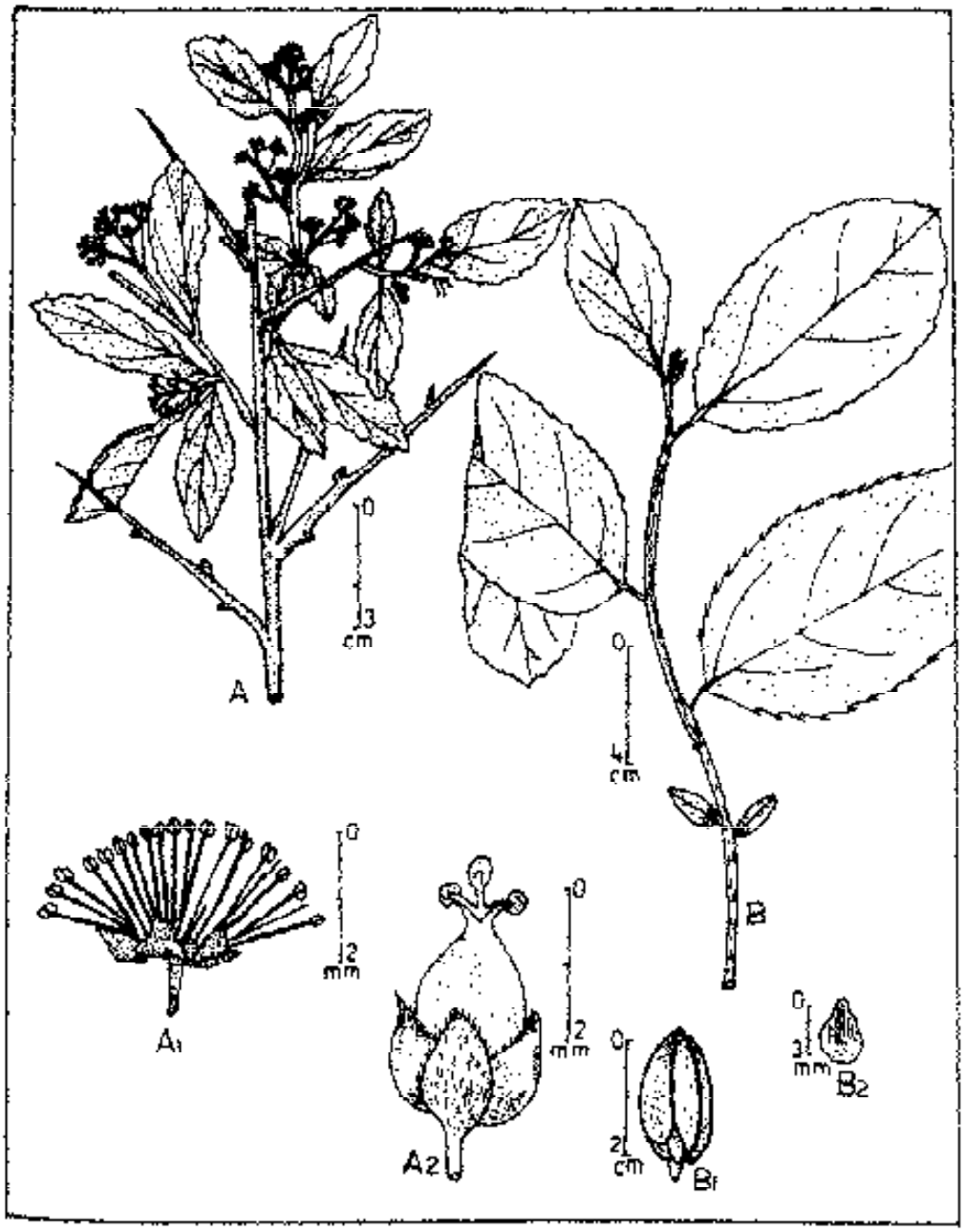


Fig. 4: Flacourtiaceae (A-A_2): *Flacourtia indica* (Burman) Merrill: A. Flowering twig, A_1. Male flower, A_2. Female flower. (B.-B_2):*Casearia graveolens* Dalz.: B. Fruiting twig, B_1. Fruit, B_2. Seed.

Notes : Common, in the forest.

Common name : Hindi : *Chilla;* Kol : *Reri*; Santal : *Nuri.*

Uses : Wood suitable for carvings and fruits used as fish-poison.

2. Casearia tomentosa Roxb., Fl. Ind. 2: 421. 1832; Clarke in Hook. f., Fl. Brit. India 2: 593. 1879; Haines, Bot. Bihar & Orissa 1: 40 1961 (Rep. ed.); R.L. Mitra in B.D. Sharma & Balakrishnan, Fl. Ind. 2: 397. 1993; B.B. Pramanik, Fl. W. Bengal 1: 228. 1997.

Small trees or large shrubs, with tomentose branches, up to 6 m. Leaves elliptic-oblong, or elliptic-lanceolate, up to 14 × 5 cm, acute at apex, asymmetrical at base, margin serrate or entire, densely tomentose beneath; petioles up to 4 mm long, tomentose. Flowers in axillary clusters; Pedicels tomentose. Flowers 3-4 mm in diam. Tepals-5, ovate, pubescent out side. Stamens-8, alternating with fleshy staminodes and opposite to the tepals. Fruits 10-12 mm long, 6-angular, oblong, yellow. Seeds many, with red aril.

Fl. & Fr. : Mar.-May.

Distrib. : India, Sri Lanka, Malaya and N. Australia.

Specimens examined : Boneri, 195.

Notes : Common, in the forest.

Common name : Beng. : *Maun;* Kol : *Rore*. Hindi : *Churchu.*

Uses : Bark used for dropsy, fever and snake bite. Fruit used for fish-poisoning.

2. Flacourtia L'Herit.

1a. Raceme glabrous; fruit more than 2 cm across .... 2. *F. jangomas*

1b. Raceme pubescent; fruit less than 1 cm across :

2a. Thorns often longer than leaf and bearing flower .... 1. *F. indica*

2b. Thorns usually shorter than leaf and never bearing flower .... 3. *F. ramontchi*

1. **Flacourtia indica** (N. Burman) Merrill, Interpr. Rumph. Herb. Amb. 377. 1917; Ramam. in Sald & Nicol., Fl. Hassan 162. 1976; R.L. Mitra in B.D. Sharma & Balakrishnan, Fl. Ind. 2: 402. 1993. *Gmelina indica* N. Burman, Fl. Ind. 132. t. 39. f. 5. 1768. *Flacourtia sepiaria* Roxb., Pl. Cor. t. 68. 1795; Hook. f. & Thoms. in Fl. Brit. India 1: 194. 1872; Haines, Bot. Bihar & Orissa 1: 37. 1961 (Rep. ed.).

Shrubs or small trees, usually armed; spines often branched at the base of the trunk. Leaves obovate-ovate, acute-acuminate, sometimes emarginate, crenate-serrate, glabrous, 2-11 × 1-4 cm. Flowers in racemes or rarely solitary, axillary or clustered. Sepals 4-6, pubescent. Petals-4, connate at base. Anthers versatile. Fruits flesy, globose, red or dark purple when ripe, upto 8 mm across.

Fl. & Fr. : Mar.-Sept.

Distrib. : Pantropical.

Specimens examined : Kumendi, 705.

Notes : Common, in the forest. Fruits edible.

2. **F. jangomas** (Lour.) Raeusch., Nom. Bot. ed. 3: 290. 1797; Sleumer in van Steenis, Fl. Males. ser. 1, 5: 72. 1954; R.L. Mitra in B.D. Sharma & Balakrishnan, Fl. Ind. 2: 403. 1993. *Stigmarota jangomas* Lour., Fl. Cochinch. 2: 634. 1790. *Flacourtia cataphracta* Roxb. ex Willd., Sp. Pl. 4: 830. 1806; Hook. f. & Thoms. in Fl. Brit. India 1: 193. 1872; Haines, Bot. Bihar & Orissa 1: 39. 1961 (Rep. ed.).

Small trees, with up to 2.5 cm long thorns; branches white-dotted, glabrous. Leaves ovate or oblong-lanceolate, up to 7.5 × 5 cm, acute to acuminate at apex, rounded to slightly cordate at base, margin crenate-serrate; petioles up to 1.2 cm long. flowers small, in irregular, glabrous racemes. Ovary flask-shaped; stigma 4-6, capitate. Fruits up to 2 cm across, reddish when ripe.

Fl. & Fr. : July-Dec.

Distrib. : India, Singapore, Malaya and China.

Specimens examined : Muhammadganj, 976.

Notes : Common, in the rocky forest.

Common name : Beng. & Hindi : *Panialah.*

Uses : Fruits are edible. Leaves and young shoots are used for diarrhoea. Infusion of bark used for gargle.

3. Flacourtia ramontchi L'Herit., Strip. Nov. 3: 59. tt. 30 & 30B. 1785; Hook. f. & Thoms. in Fl. Brit. India 1: 193. 1872; Cooke, Fl. Bombay 1: 55. 1901; Haines, Bot. Bihar & Orissa 1: 31. 1961 (Rep. ed.); Fosberg in Kew Bull. 29: 254. 1974. *F. ramontchi* var. *sapida* (Roxb.) Hook. f. & Thoms. in Fl. Brit. India 1: 193. 1872; Haines, Bot. Bihar & Orissa 1: 38. 1961 (Rep. ed.) *F. ramontchi* var. *latifolia* Hook. f. & Thoms. in Fl. Birt. India 1: 193. 1872; *F. ramontchi* var. *occidentalis* Hook. f. & Thoms. in Fl. Brit. India 1: 193. 1872; Haines, Bot. Bihar & Orissa 1: 38. 1961 (Rep. ed.). *F. latifolia* Cooke, Fl. Bombay 1: 56. 1901; Haines, Bot. Bihar & Orissa 1: 38. 1961 (Rep. ed.). *F. occidentalis* Blatter, J. Bombay Nat. Hist. Soc. 31: 914. 1927.

Small, spinous, branched trees; branchlets glabrous or pubescent. Leaves variable, ovate-elliptic or suborbicular, up to 5.5 × 4 cm, acute-acuminate at apex, rounded at base, margin crenate-serrate, glabrous, or pubescent on nerve beneath; petioles up to 5 mm long, pubescent. Flowers dioecious, in short branched, glabrous or pubescent racemes. Fruits globose, up to 6 mm across, red.

Fl. & Fr. : Dec.-May.

Distrib. : Pantropical.

Specimens examined : Muhammadganj, 1004.

Notes : Common, in hills and forest.

Common name: Beng. : *Katai, Obir;* Hindi : *Katachi;* Santal : *Merlec.*

Uses : Fruits are edible; and also used for the treatment of Jaundice.

Remarks : Merrill (Interp. Rumph. Herb. Amb. 377. 1917), Sleumer (Fl. Males, ser. 1.5: 76. 1954), and Santapau (Bull. Bot. Surv. Ind. 3: 16. 1962) merged this species (*F. ramontchi* L'Herit) with *F. indica* (Burm. f.) Merr. But Fosberg (Kew Bull. 19: 254. 1974) treats *F. ramontchi* L'Herit. as a distinct species from *F. indica* (Burm. f.) Merr.

PITTOSPORACEAE

PITTOSPORUM Banka *ex Solander*

Pittosporum napaulense (DC.) Rehder & Wilson in Pl. Wilson 3: 326. 1916; Nayar & Giri in B.D. Sharma & Balakrishnan, Fl. Ind. 2: 445. 1993. *Senacia napaulensis* DC., Prodr. 1: 347. 1824. *P. floribundum* Wight. & Arn., Prodr. 154. 1834. Hook. f. & Thoms. in Fl. Brit. India 1: 199. 1872; Gowda, Journ. Arnold Arb. 32: 332. 1951; Haines, Bot. Bihar & Orissa 1: 41. 1961 (Rep. ed.).

Sweet scented trees, up to 5 m high; young shoot glabrous. Leaves often crowded towards end of the branchlets, elliptic-obovate to oblanceolate, 7-12 × 3-5 cm, acuminate at apex, narrowed down at base, margin often wavy, glabrous, coriaceous; petioles up to 2 cm long. Panicles spreading; peduncle pubescent, up to 2.5 cm long; pedicels minutely pubescent, up to 5 mm long. Calyx lobes ovate, obtuse, sparsely pubescent, ciliate on margin, up to 1.5 mm long. Ovary pubescent; ovules 4, on basal placenta. Capsule up to 7 mm across, glabrous.

Fl. & Fr. : June-Oct.

Distrib. : South West India (Bihar, Orissa, South India) and Madagascar.

Specimens examined : Netarhat, 805.

Notes : Rare, in the Netarhat public school orchard.

Common name : Khraw : *Baghmuta.*

Uses : Bark used in bronchitis and other parts used in rheumatism.

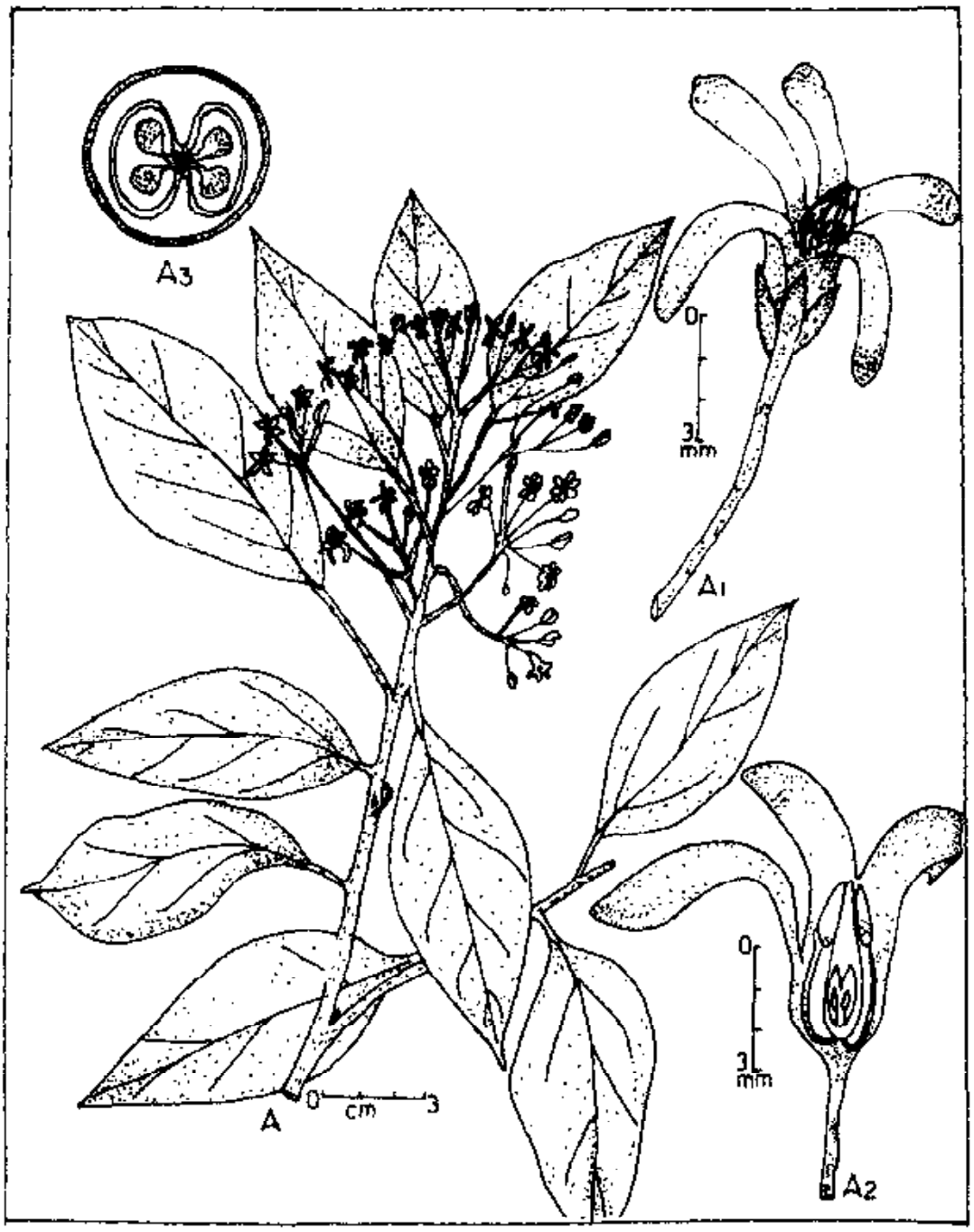


Fig. 5: Pittosporaceae (A-A_3): *Pittosporum napaulense* (DC.) Rehder & Wilson: A. Flowering twig, A_1. Flower, A_2. Same in vertical section, A_3. T.S. of ovary.

POLYGALACEAE

POLYGALA L.

1a. Wings oblique, not petaloid; strophiole 3-toothed .... 1. *P. arvensis*

1b. Wings not oblique, petaloid; strophiole 3-fid .... 2. *P. crotalarioides*

1. Polygala arvensis Willd., Sp. Pl. ed. 3, 2: 876. 1802; Burtt in Notes Roy. Bot. Gard. Edinb. 32: 404. 1973; Babu, Herb. Fl. Dehra Dun 67. 1977; Banerjee in B.D. Sharma & Balakrishnan, Fl. Ind. 2: 460. 1993 and in Fl. W. Bengal 1: 234. 1997. *Polygala chinensis* (Auct. Pl. non L. 1753); Bennett in Hook. f., Fl. Brit. India 1: 204. 1872; Haines, Bot. Bihar & Orissa 1: 42. 1961 (Rep. ed.).

An annual, diffuse or decumbent, rarely erect herbs; branches up to 30 cm long, pilose. Leaves very variable, 1-3.5 cm long, pubescent to glabrous, ovate, obovate, or linear-oblong, apex obtuse or rounded and mucronate. Flowers light yellow, usually in short axillary or extra axillary, few flowered racemes, occasionally solitary; bracts persistent. Sepal green, outer small, ovate. Wings up to 3.5 mm long, oblique and acuminate, exceeding the capsule. Petal lip become light pink with age. Capsule 3-4 mm wide, obliquely obcordate at apex, narrowly winged, ciliate. Seeds black, patently hairy, caruncle with 3-appendages.

Fl. & Fr. : Aug.-Feb.

Distrib. : India to China, through Malaya to Trop. Australia.

Specimens examined : Tenarbusti (Garwah), 613.

Notes : Common, in the grassy places and on raod sides, waste places.

Common name : Beng. : *Meradu;* Santal : *Gaighura.*

Uses : Tender leaves eaten in scarcity, infusions of the leaves given in asthma, chronic bronchitis. Roots used for fever & dizziness.

Remarks : Burtt points out that *P. arvensis* Willd. was misidentified as *P. chinensis* L.

2. Polygala crotalarioides Buch.-Ham. ex DC., Prodr. 1: 327. 1824; Bennett in Hook. f., Fl. Brit. India 1: 201. 1872; Haines, Bot. Bihar & Orissa 1: 43. 1961 (Rep. ed.); Banerjee in B.D. Sharma & Balakrishnan, Fl. Ind. 2: 466. 1993 and in Fl. W. Bengal 1: 236. 1997.

Slender, erect, small herbs, up to 20 cm high. Root stock woody; stems pubescent. Leaves oblong-obovate or lanceolate, up to 6 × 2.3 cm, glabrous, rounded or shortly mucronate at apex, base narrowed down into a short petiole, mid vein prominent, margin entire, often ciliate; petioles up to 1.5 mm long, pubescent. Racemes short, up to 1.5 cm long, dense flowered, terminal. Flowers up to 6 mm long, reddish purple; pedicels up to 2 mm long, hairy; bracts subulate, up to 1 mm long, hairy, persistent. Wings petaloid, up to 6 × 3.5 mm, obovate, margin ciliate. Capsule flat, orbicular, up to 4 × 4 mm, retuse at apex, margined, strongly ciliate. Seeds oblong, up to 2 mm long, hairy.

Fl. & Fr. : June-Aug.

Distrib. : Throughout India, Myanmar (Burma), Thailand, China, Vietnam.

Specimens examined : Netarhat, 778.

Notes : Not common, in the forest under growth.

Common name : Santal : *Lilkathi, Gaighum.*

Uses : Plants used in cough and cold.

CARYOPHYLLACEAE

1a. Stipules present; styles 2-3 fid :

2a. Leaves suborbicular; petals 2-fid; stamens 2-3 .... 1. DRYMARIA

2b. Leaves linear-lanceolate; petals entire; stamens-5 :

3a. Diffuse herbs; sepals keeled, scarious only on margin .... 3. POLYCARPON

3b. Erect herbs; sepals not keeled, scarious throughout .... 2. POLYCARPAEA

1b. Stipules absent; styles free .... 4. STELLARIA

1. DRYMARIA Willd.

Drymaria diandra Blume, Bijdr. 62. 1825; Majumdar in B.D. Sharma & Balakrishnan, Fl. Ind. 2: 533. 1993 and in Fl. W. Bengal 1: 243. 1997. *D. cordata* non L. Willd. ex Roem. & Schult. sensu Edge. & Hook. f. in Fl. Brit. India 1: 244. 1874; Haines, Bot. Bihar & Orissa 1: 46. 1961 (Rep. ed.). *Holosteum cordatum* L. Sp. Pl. 88. 1753. *D. cordata* ssp. *diandra* (Bl.) Duke., Ann. Missouri Bot. Gard. 48: 253. 1961.

Prostrate or ascending herbs. Leaves opposite, suborbicular, glabrous, 3-5 nerved, upto 1.5 × 1.4 cm. Flowers in axillary or terminal, slender, dichotomously branched cymes; bracts lanceolate, membranous. Sepals-5, bifid, narrowed at base into a claw. Capsule 2-3 valved. Seeds brown, reniform.

Fl. & Fr. : Aug.-Nov.

Distrib. : Pantropical.

Specimens examined : Bisrampur, 562.

Notes : Not common, in moist field and near ponds.

2. POLYCARPAEA Lamk.

Polycarpaea corymbosa L. Lamk., Tab. Encycl. 2: 129. 1798; Edgeworth & Hook. f. in Fl. Brit. India 1: 245. 1874; Prain, Beng. Pl. 1: 239. 1903 (Rep. ed. 1: 160. 1963) & in Rec. Bot. Surv. India 3 (2): 175. 1905; Haines, Bot. Bihar & Orissa 1: 47. 1961 (Rep. ed.); Majumdar in B.D. Sharma & Balakrishnan, Fl. Ind. 2: 549. 1993 and in Fl. W. Bengal 1: 245. 1997. *Achyranthes corymbosa* L., Sp. Pl. 205. 1753.

Erect, annual, up to 25 cm high herbs, densely tomentose, simple or dichotomously branched. Leaves pseudo-verticillate, linear or subulate, acute or acuminate at apex, up to 15 mm long; stipules lanceolate or subulate, fimbriate, scarious, up to 5 mm long. Flowers in irregular, terminal, dense, much branched cymes, up to 4 mm across. Sepals lanceolate, very acute, scarious, 4-6 mm long. Petals entire, free, ovate, obtuse at apex, up to 2 mm long. Capsule much smaller than sepals, 2 mm long, oblong. Seeds brown, ovoid.

Fl. & Fr. : Oct.-Jan.

Distrib. : Throughout India, Trop. Asia, Africa, Australia & America.

Specimens examined : Daltonganj, 289.

Notes : Common, near the river bank (Koel river).

Common name : Santal : *Janhe nanjom;* Mundari : *Ote chandoa.*

Uses : Leaves used in Jaundice by the local people.

3. POLYCARPON L.

Polycarpon prostratum (Forssk.) Asch. & Schwinf. in Ost. Bot. Zeitschr. 39: 128. 1889; Milne-Redhead in Kew Bull. 3: 451. 1948; Sant., Fl. Khandala ed. 3, 12. 1957; Rao in Saldanha, Fl. Karnataka 1: 154. 1984; Majumdar in B.D. Sharma & Balakrishnan, Fl. Ind. 2: 553. 1993 and in Fl. W. Bengal 1: 245. 1997. *Pharnaceum depressum* L. Mant. 2, 562. 1771 (non *P. depressum* Nutt ex Torrey and Gray, 1838). *Alsine prostrata* Forssk., Fl. Aegypt-Arab. 207. 1775. *Hapalosa loeflingiae* Wall. ex Wight & Arn., Prodr. 358. 1834. *Polycarpon loeflingiae* (Wight & Arn.) Benth. in Benth. et Hook. f., Gen. Pl. 1: 153. 1862; Edgeworth & Hook. f., Fl. Brit. India 1: 245. 1874; Haines, Bot. Bihar & Orissa 1: 47. 1361 (Rep. ed.)

Slightly pubescent or glabrous, prostrate herbs; branches diffuse, 7-20 cm long. Leaves whorled, 5-15 mm long, subsessile, oblanceolate, spathulate or linear-oblong, entire, acute at apex; stipules scarious. Flowers many, in dense dichotomous terminal cymes; bracts ovate, acute. Sepals up to 3 mm long, margin scarious, keeled. Petals shorter than sepals, linear. Stamens-5, alternating with petals. Capsule 3-valved. Seeds brown, minute, reticulate.

Fl. & Fr. : Mar.-Sept.

Distrib. : India, Trop. Asia and Africa.

Specimens examined : Netarhat, 157.

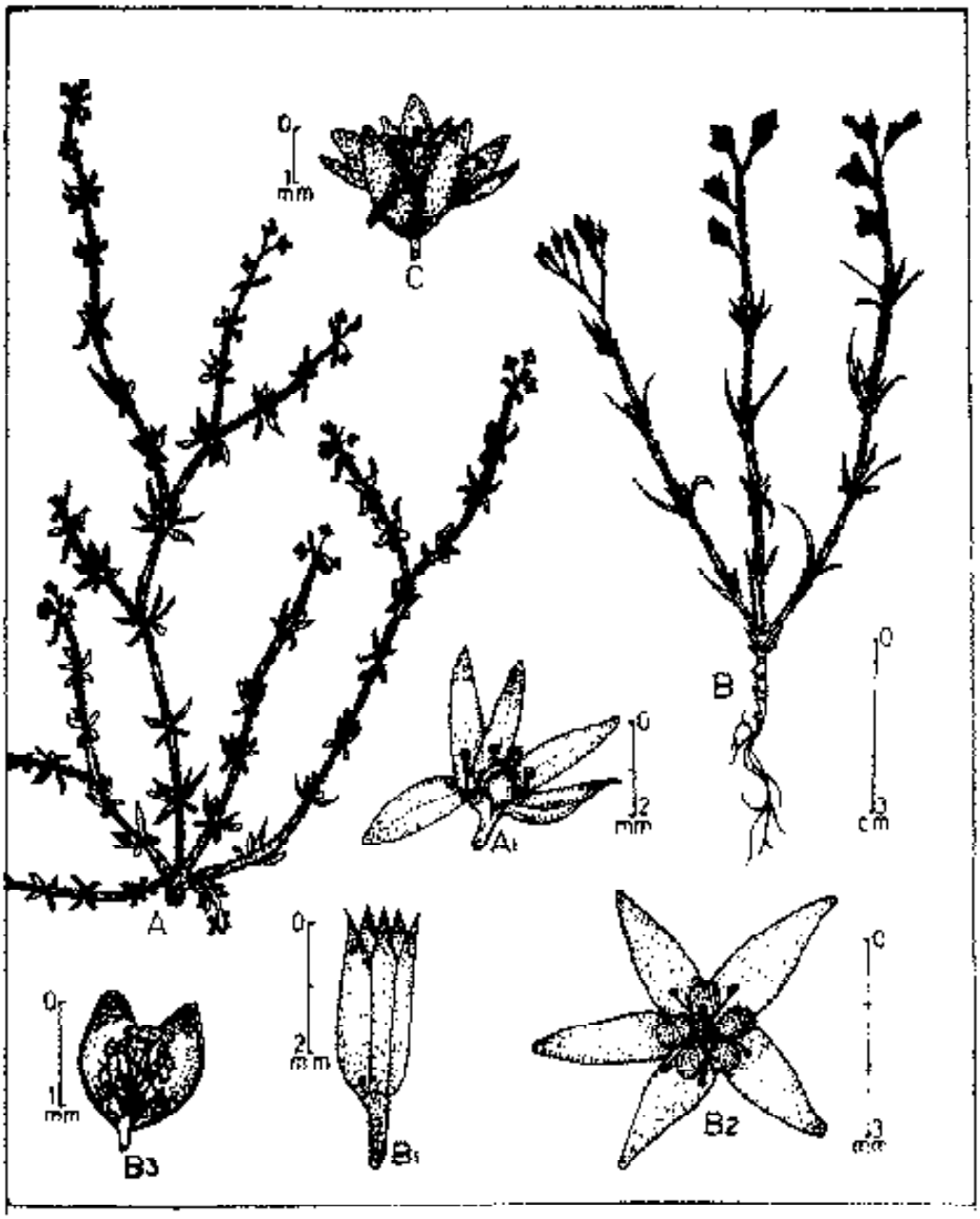


Fig. 6: Caryophyllaceae (A-A_1): *Polycarpon prostratum* (Forssk.) Aschers. & Schwinf.: A. Habit, A_1. Flower; (B-B_3): *Polycarpaea corymbosa* (L.) Lam.: B. Habit, B_1. Flower, B_2. Opened flower (top view), B_3. Capsule without one valve; C: *Drymaria diandra* Blume: Flower.

Notes : Common, in the dry ponds, ditches and also in the Netarhat school compound.

Uses : Infusion of roasted leaves given for cough following fevers, particularly after measles.

Common name : Beng. : *Geema;* Hindi : *Sureta.*

4. STELLARIA L.

Stellaria media L., Villars, Hist. Pl. Dauph. 3: 615. 1789; Haines, Bot. Bihar & Orissa 1: 45. 1961 (Rep. ed.); Rao in Saldanha, Fl. Karnataka 1: 154. 1984; Majumdar in B.D. Sharma & Balakrishnan, Fl. Ind. 2: 585. 1993 and in Fl. W. Bengal 1: 250. 1997.

Small, diffuse herbs, with a line of hairs on branches. Leaves petiolate below, subsessile above, ovate to elliptic-ovate, acute or acuminate at apex, rounded at base, up to 2.5 × 1.2 cm. Flowers axillary, solitary, white; pedicels hairy, up to 2 cm long. Sepals elliptic ovate, hairy without. Petals unequal, oblong, 2-3 nerved. Capsule longer than sepals. Seeds orbicular, tubercled, black.

Fl. & Fr. : Dec.-Mar.

Distrib. : Pantropical.

Specimens examined : Maromar, 491.

Notes : Not common, in moist area of the forest.

PORTULACACEAE

PORTULACA L.

Portulaca pilosa L., Sp. Pl. 445. 1753; ssp. **pilosa** Geesink in Blumea 17: 295. 1969 & Fl. Males. 7(1): 131. 1971; Rao in B.D. Sharma & Sanjappa, Fl. Ind. 3:6. 1993. *Portulaca tuberosa* Roxb. (Hort. Beng. 91. 1814. *nom. nud.*) Fl. Ind. 2: 464. 1832; Dyer. in Hook. f., Fl. Brit. India 1: 247. 1874; Haines, Bot. Bihar & Orissa 1: 48. 1961 (Rep. ed.). *Portulaca suffruticosa* Wall. ex Wight & Arn., Prodr. 356. 1834; Dyer. in Hook. f., Fl. Brit. India 1: 247. 1874.

A much branched herb, up to 25 cm long; rootstock tuberous. Leaves sessile, linear, terete, fleshy, up to 1.4 × 0.2 cm, with tufted white hairs at the nodes. Flowers yellow, solitary or in small terminal clusters. Sepals shorter than or equalling the petals; petals 4-6, obovate, acuminate. Fruit, sessile, shining, 0.2-0.3 cm across. Seeds minute, brown to black, often with raised tubercles.

Fl. & Fr. : June-Oct.

Distrib. : Pantropical.

Specimens examined : Daltonganj, 253.

Notes : Common, in sandy soil and Koel river bank.

Remarks : Sivarajan in Journ. Bombay Nat. Hist. Soc. 78: 259. 1979, treats *P. tuberosa* as a variety under this species and *P. suffruticosa* as synonym of this variety.

Portulaca oleracea L. and *Portulaca quadrifida* L. cultivated as pot herb.

TAMARICACEAE

TAMARIX L.

Tamarix ericoides Rottler, Ges. & Willd. in Naturf. Freunde Berline Neue Schriften 4: 214. 1803; Haines, Bot. Bihar & Orissa 1: 52. 1961 (Rep. ed.); Shetty & Pandey in B.D. Sharma & Sanjappa, Fl. Ind. 3: 25. 1993. *Trichaurus ericoides* (Rottler) Arn. ex Wt. & Arn., Prodr. 40. 1834.

Shrubs with cracked bark and fastigiate branches. Leaves ovate, acuminate, sheathing, amplexicaul at base, glaucous, 1-2 × 1-1.5 mm. Flowers in terminal racemes, pink, shortly pedicelled. Sepals-5, ovate-elliptic, with scaly margin. Petals elliptic-ovate, twice as long as sepals, persistent. Stamens-10, alternately short, glands of the disc separating the filaments; anthers purple. Capsule 3-valved, up to 1 cm long.

Fl. & Fr. : Aug.-Feb.

Distrib. : Throughout India.

Specimens examined : Daltonganj, 305.

Notes : Rare, on the bank of the river Koel.

Common name : Beng. : *Jhau;* Hindi : *Pisula.*

ELATINACEAE

BERGIA L.

Bergia ammannioides Roxb. (Hort. Beng. 34. 1814) ex Roth, Nov. Pl. Sp. 219. 1821; Dyer in Hook. f., Fl. Brit. India 1: 251. 1874; Prain, Beng. Pl. 1: 243. 1903 (Rep. ed. 1: 163. 1963) & Rec. Bot. Surv. Ind. 3(2): 176. 1905; Robinson, Philipp. J. Sci. 7. 414. 1912; Haines, Bot. Bihar & Orissa 1: 51. 1961 (Rep. ed.); Backer in Fl. Males. ser. 1. f. 205. 1951; Bhattacharya in B.D. Sharma & Sanjappa, Fl. Ind. 3: 33. 1993. *Lechea verticillata* Willd., Sp. Pl. 1: 495. 1797 (non *Bergia verticillata* Willd.).

Erect or suberect, much branched herbs, up to 30 cm high; branches mostly glandular pubescent reddish in colour. Leaves sessile, subverticillate, up to 20 × 5 mm, finely hairy or glabrous above, oblanceolate, linear-lanceolate or elliptic-lanceolate, acute at apex, narrowed down at base, glandular-ciliate, serrate, hairy on nerves; stipules membranous, linear, acute. Flowers pedicelled, crowded, rose-coloured. Sepals-5, pubescent, acute, keeled. Petals-5, acute, white. Capsule up to 2.5 mm long, ovoid, dehiscing from the central axis. Seeds numerous, ovoid.

Fl. & Fr. : Jan.-May.

Distrib. : India, Afghanistan, Trop. Asia, Africa & Australia.

Specimens examined : Daltonganj, 343. Helophyte.

Notes : Common, in the marshy area, rice field & moist waste places.

HYPERICACEAE

HYPERICUM L.

Hypericum japonicum Thunb. ex Murr., Syst. Veg. ed. 14: 702. 1784; Dyer in Hook. f., Fl. Brit. India 1: 256. 1874; Haines, Bot. Bihar &

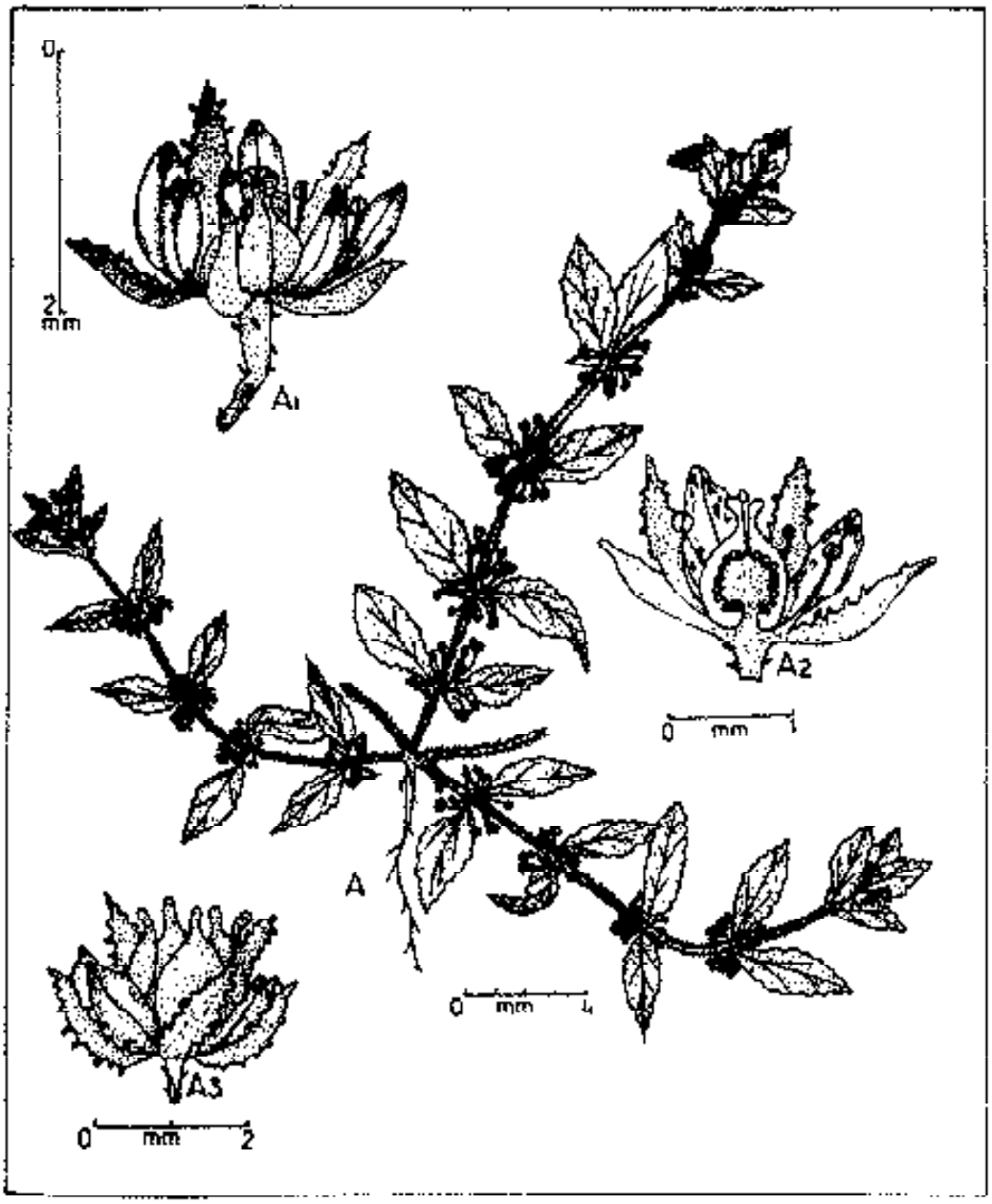


Fig. 7: Elatinaceae (A-A_3): *Bergia ammannioides* Roxb.: A. Habit, A_1. Flower, A_2. Vertical section of flower, A_3. Fruit with persistent sepals and petals.

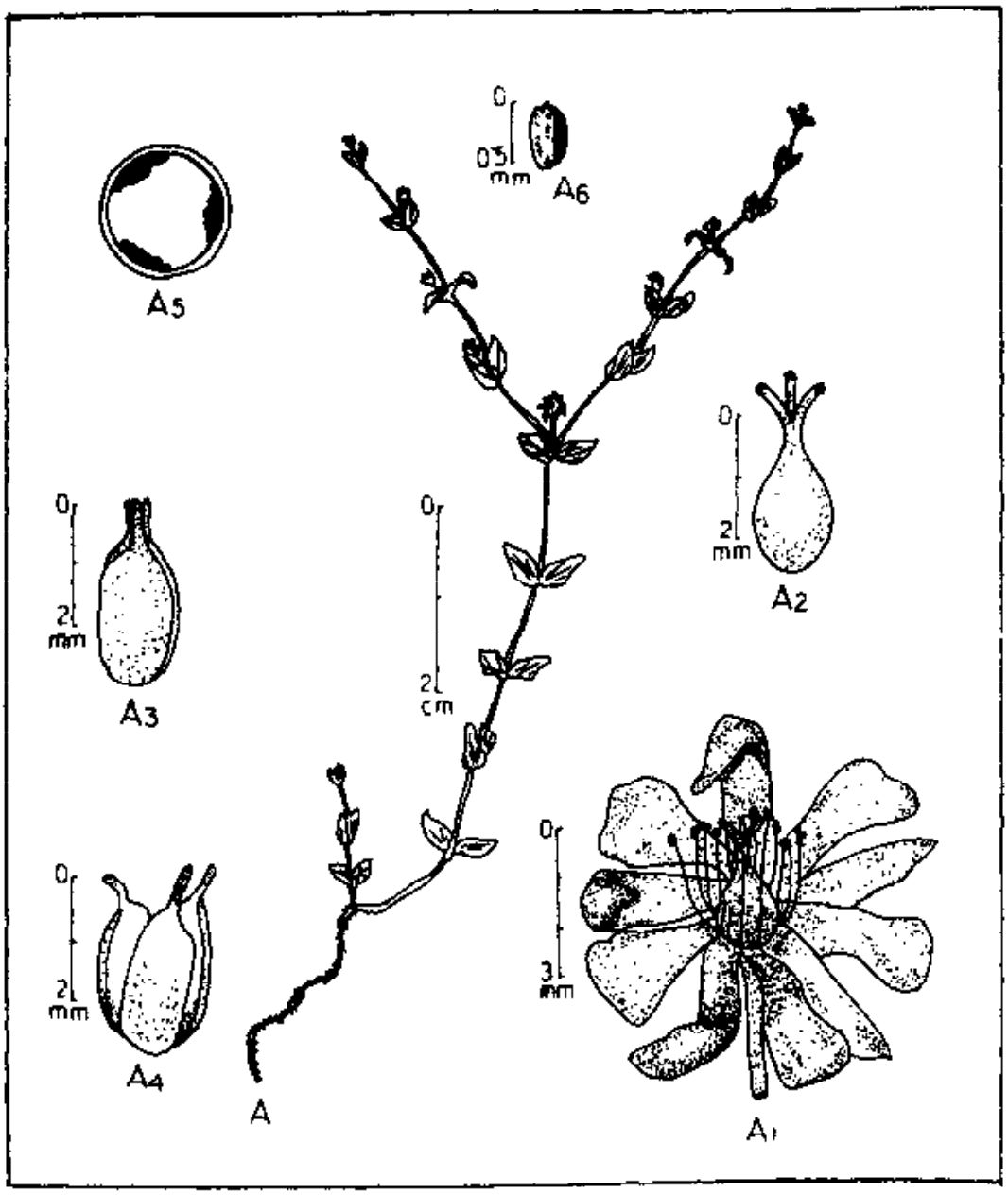


Fig. 8: Hypericaceae. (A-A_6): *Hypericum japonicum* Thunb. ex Murr.: A. Habit, A_1. Flower enlarged, A_2. Gynoecium, A_3. Fruit, A_4. Same, showing dehiscence, A_5. T.S. of ovary, A_6. Seed.

Orissa 1: 53. 1961 (Rep. ed.); Robson in Blumea 20: 267. 1972 & in Fl. Males. ser. 1. 8(1): 27. 1974; Biswas in B.D. Sharma & Sanjappa, Fl. Ind. 3: 69. 1993 and in Fl. W. Bengal 1: 264. 1997. *H. japonicum* var. *calyculatum* R. Keller in Bull. Herb. Boiss. "ser. 2", 8: 186. 1908. *H. japonicum* var. *simplicius* R. Keller in Bull. Herb. Boiss, "ser. 2", 8: 186. 1908. *H. japonicum* var. *majus* (major) Fyson, Fl. S. Ind. Hills. Stn. 1: 49. 1932.

Herbs, with erect, tufted stems, up to 20 cm long, some what 4-gonous, sometimes dichotomously branched. Leaves sessile, 3-nerved, deltoid, elliptic or oblong, rounded at apex, up to 7 × 2 mm. Flowers small, yellow, axillary or terminal on forked branches, 3-4 mm in diam. Peduncle 4-11 mm long. Sepals ovate, acute, 2 mm long. Petals equaling to calyx. Carpels 3. Capsule sub-cylindrical, up to 4 mm long.

Fl. & Fr. : Mar.-June.

Distrib. : New Zealand, Japan, China, Australia, Java also in India.

Specimens examined : Netarhat, 172.

Notes : Rare, in the marshy area and in the grass land.

Uses : Plants used for asthma and dysentery.

DIPTEROCARPACEAE

SHOREA Roxb. ex Gaertn.

Shorea robusta Roxb. ex Gaertn. f., Suppl. Carp. 3: 48. t. 186. 1805; Dyer in Hook. f., Fl. Brit. India 1: 306. 1874; Haines, Bot. Bihar & Orissa 1: 58. 1961 (Rep. ed.); Janardhanan in B.D. Sharma & Sanjappa, Fl. Ind. 3: 237. 1993; Ghosh and Samaddar in Fl. W. Bengal 1: 283. 1997.

Trees; young branches hoary or pubescent. Leaves ovate to ovate-oblong, acute at apex, cordate at base, up to 16 × 10 cm, secondary nerves 10-15 pairs, hairy; petioles up to 2.5 cm long. Flowers in branched tomentose panicle; bracts caducous, hairy, ovate, up to 6 × 3 mm. Sepals 3 × 3 mm, acute, adnate to thalamus, persistent and enlarged in fruits. Petals subulate, up to 7 mm long, with twisted acumen. Stamens many,

connectives tailed. Fruits ovoid, beaked with style, up to 12 mm long, wings linear oblong or spathulate, up to 6 cm long.

Fl. & Fr. : Mar.-July.

Distrib. : Throughout India (West Bengal, Bihar, Orissa, up to Madhya Pradesh).

Specimens examined : Netarhat, 60.

Notes : Very common, in the forest. Leafless during February-March, new leaf comes with flowers.

Common name : Beng. : *Shal;* Santal : *Serjom;* Hindi : *Sakhua.*

Uses : Resin is used in medicine, seeds are eaten by the Santals. Leaves used for the covering of bidi and also used in various ways. Timber used for railway sleeper, poles and also as fuel.

MALVACEAE

1a. Antheriferous filaments terminal to column :

2a. Herbs to shrubs; flowers bisexual; anthers free; capsules schizocarpic :

3a. Epicalyx absent :

4a. Ovules-2-many per locule, cocci 2-many seeded .... 2. ABUTILON

4b. Ovule-1 per locule, cocci-1 seeded .... 7. SIDA

3b. Epicalyx present, lobes-3 .... 6. MALVASTRUM

2b. Small trees; flowers polygamous; anthers connate in 5-phalanges; capsule loculicidal .... 5. KYDIA

1b. Antheriferous filaments lateral to column :

5a. Style as many as or twice the number of carpels :

6a. Capsule loculicidal :

7a. Calyx spathaceous, deciduous .... 1. ABELMOSCHUS

7b. Calyx not spathaceous, persistent :

8a. Capsule winged .... 3. FIORIA

8b. Capsule not winged .... 4. HIBISCUS

6b. Capsule schizocarpic .... 9. URENA

5b. Style single .... 8. THESPESIA

1. ABELMOSCHUS Medik

Abelmoschus crinitus Wall. Pl. As. Rar. 1: 39, t. 44. 1830; Borssum, Blumea 14: 103. 1966; Sald. & Ramesh in Sald., Fl. Karnataka 1: 242. 1984; Paul in B.D. Sharma & Sanjappa, Fl. Ind. 3: 302. 1993 and in Fl. W. Bengal 1: 287. 1997. *Hibiscus cancellatus* Roxb., Fl. Ind. 3: 201. 1832 (non L. f., 1781); Masters in Hook. f., Fl. Brit. India 1: 342. 1874; Haines, Bot. Bihar & Orissa 1: 67. 1961 (Rep. ed.)

A hispid or stellate-pubescent herbs, with fusiform roots, up to 90 cm high. Leaves orbicular, 10-15 cm across, 5-7-lobed, cordate at base; lobes triangular to oblong, crenate-dentate, softly villous or often with bristles on the nerves above, hairy and with stellate-bristles beneath; petioles hairy, up to 10 cm long. Flowers usually in terminal racemes; pedicels shorter than the petiole. Epicalyx lobes 10-16, linear, filiform, densely villous, up to 3.5 cm long. Corolla 6.5 cm long, yellow with purple centre. Capsule ovoid-oblong, up to 3.5 cm long, slightly ribbed, densely villous.

Fl. & Fr. : Sept.-Dec.

Distrib. : India and S.E. Asia.

Specimens examined : Mcclaskieganj, 671.

Notes : Not common, in the hill slopes.

Common name : Santal : *Bir Kaskom.*

Uses : Roots edible. Herbs used for dysentery, also yields a fibre employed for ropes and cordage.

Abelmoschus esculentus L. Moench is cultivated for its fruits (Lady's Finger).

2. ABUTILON Mill.

Abutilon indicum L. Sweet, Hort. Brit ed. 1. 54. 1827; Masters in Hook. f., Fl. Brit. Ind. 1: 326. 1874; Prain, Beng. Pl. 1: 260. 1903 (Rep. ed., 1: 176. 1963) & in Rec. Bot. Surv. Ind. 3(2): 177. 1905; Haines, Bot. Bihar & Orissa 1: 64. 1961 (Rep. ed.); Hu, Fl. China (Malvaceae) 32. 1955; ssp. **indicum** Bross. in Blumea 14: 171. 1966; Paul in B.D. Sharma & Sanjappa, Fl. Ind. 3: 266. 1993 and in Fl. W. Bengal 1: 290. 1997. *Sida indica* L. in Torner, Cent. Pl. 2: 26. 1756. *Abutilon indicum* var. *populifolium* (Lam.) Wt. & Arn., Prodr. 1: 56. 1834. Masters in Hook. f., Fl. Brit. India 1: 326. 1874; Hu, Fl. China (Malvaceae) 33. 1955.

Under shrubs, often stellate-tomentose, sometimes intermixed with simple short hairs. Leaves 5-12 × 4.9 cm, ovate to orbicular, pale beneath, acuminate at apex, deeply cordate at base, irregularly crenate-dentate, 7-9 nerved; petioles 3-14 cm long. Flowers solitary, axillary; pedicels up to 8 cm long, jointed above the middle. Sepals ovate-acute, hairy. Carpels-15. Fruits 1-2 cm in diam., hairy. Seeds 2-4 in each carpel, reniform, scrobiculate.

Fl. & Fr. : Aug.-Jan.

Distrib. : Common, in the waste places, and in the villages.

Specimens examined: Betla, 475.

Common name : Beng. : *Petari*; Hindi : *Kanghi*: Santal : *Mirubaha.*

3. FIORIA Mattei

Fioria vitifolia (L.) Mattei in Bot. Ort. Bot. Palermo n.s. 2: Fl. 1916; Paul in B.D. Sharma & Sanjappa, Fl. Ind. 3: 310. 1993. *Hibiscus vitifolius* L., Sp. Pl. 696. 1753; Masters in Fl. Brit. India 1: 338. 1874.

Grey, tomentose, under shrubs. Upper leaves orbicular-ovate, up to 3.5 cm across, lower leaves upto 9 cm across with 3-acuminate lobes and cordate base, both dentate, pubescent and with stellate hairs. Flowers axillary, droping on 2-5 cm long pedicels. Epicalyx segment 8-12, linear. Capsule globose, up to 1.5 cm across, beaked with reticulately veined wings. Seeds tuberculate.

Fl. & Fr. : Oct.-Mar.

Distrib. : Africa and Asia.

Specimens examined : Garwah, 605.

Notes : Not common, in the waste fields.

4. HIBISCUS L. *nom. cons.*

1a. Capsule ovoid, included in calyx :

2a. Epicalyx segments-8, spathulate; clayx not fleshy ... 2. *H. panduraeformis*

2b. Epicalyx segments-10, not spathulate; calyx fleshy .... 3. *H. subdariffa*

1b. Capsule oblong, not included in calyx; Epicalyx absent or minute and caducous ....1. *H. lobatus*

1. Hibiscus lobatus (J.A. Murr.) O. Kntz., Rev. Gen. Pl. 3: 19. 1898; Rakshit & Kundu, Bull. Bot. Surv. Ind. 12: 169. 1972; Babu, Herb, Fl. Dehra Dun 87. 1977; Paul in B.D. Sharma & Sanjappa, Fl. Ind. 3: 336. 1993 and in Fl. W. Bengal 1: 297. 1997. *Solandra lobata* J. A. Murr., Comm. Soc. Reg. Sci. Gott. 6: 2. t. 1. 1785. *Hibiscus solandra* L'Herit., Strip. Nov. 1: 103. t. 49. 1788; Mast. in Hook. f., Fl. Brit. India 1: 336. 1874; Haines, Bot. Bihar & Orissa 1: 69. 1961 (Rep. ed.).

Erect, annual herbs, 30-40 cm tall; stems slightly branched, pubescent or hispid. Lower leaves long petioled, ovate-orbicular, cordate at base, acuminate at apex, serrate, 2-5 cm across, upper ones often palmately 3-lobed, both hairy on both sides; stipules setaceous. Flowers axillary or in terminal lax racemes; pedicels articulate. Calyx deeply-5 lobed; lobes triangular, acute, up to 8 × 3 mm. Petals obliquely obcordate, white. Capsule oblong, beaked, sparsely pubescent, 1 × 0.5 cm. Seeds minutely tuberculate.

Fl. & Fr. : Sept.-Nov.

Distrib. : India, Trop. Africa to Malaysia.

Specimens examined : Kechki, 889.

Notes : Common, in the hill slopes.

2. Hibiscus panduraeformis N. Burman, Fl. Ind. 151. t. 47. f. 2. 1768; Haines, Bot. Bihar & Orissa 1: 71. 1961 (Rep. ed.); Borssum, Blumea 14: 79. 1966; Rakshit and Kundu, Bull. Bot. Surv. Ind. 12: 172. 1972; Paul in B.D. Sharma & Sanjappa, Fl. Ind. 3: 339. 1993 and in Fl. W. Bengal 1: 298. 1997.

Large, erect herbs; stems tomentose often with viscid hairs. Leaves ovate, 7- nerved from cordate base, irregularly crenate-dentate, up to 8 × 4 cm; stipules filiform, 3-fid. Flowers solitary, axillary or in raceme; pedicels 0.5 cm long. Epicalyx-8, linear-spathulate. Calyx tomentose. Corolla up to 4 cm long. Capsule ovoid, included in calyx, covered with bristles.

Fl. & Fr. : Nov.-Jan.

Distrib. : Tropical Africa to Australia through Asia.

Specimens examined : Maromar, 493.

Notes : Rare, in the waste field.

3. H. subdariffa L., Sp. Pl. 695. 1753; Masters in Hook. f., Fl. Brit. India 1: 340. 1874; Haines, Bot. Bihar & Orissa 1: 70. 1961. (Rep. ed.); Babu, Herb. Fl. Dehra Dun 88. 1977; Paul in B.D. Sharma & Sanjappa, Fl. Ind. 3: 391. 1993 and in Fl. W. Bengal 1: 299. 1997.

Erect, glabrous, annual herbs; stems prickly, tinged with red. Leaves often simple, ovate, especially below but mostly 3-5 palmatilobed; lobes dentate or serrate, acuminate at apex, glandular beneath; petioles often as long as leaf. Flowers yellow with purple eye, up to 7 cm across; bracteoles 8-10, linear, up to 13 mm long, accrescent to the calyx, margin setose. Calyx muricate, sepals connate below the middle into a deep fleshy cup. Corolla 6 cm across. Capsule ovoid, villous, shorter than calyx. Seeds reniform, subglabrous.

Fl. & Fr. : Nov.-Mar.

Distrib. : Pantropical.

Specimens examined : Simultarh village (Daltonganj), 266; Garwah, 610.

Notes : Cultivated, often found in the waste land as an escape.

Common name : Hindi : *Patwa Lalambari*; Santal : *Arak Kudrum.*

5. KYDIA Roxb.

Kydia calycina Roxb., Pl. Cor. 3: 12. t. 215. 1819; Masters in Hook. f., Fl. Brit. India 1: 348. 1874; Haines, Bot. Bihar & Orissa 1: 74. 1961 (Rep. ed.); Prain, Beng. Pl. 1: 178. 1963 (Rep. ed.) Ramam. in Sald. & Nicol., Fl. Hassan 152. 1976; Paul in B.D. Sharma & Sanjappa, Fl. Ind. 3: 344. 1993 and in Fl. W. Bengal 1: 302. 1997.

A small tree or large shrub. Leaves up to 11 13 cm, ovate-orbicular, 7-ribbed, stellately-pubescent on both sides, distantly crenate or with angular lobes, cordate at base; petioles up to 4 cm long, pubescent. Flowers in axillary or terminal panicles with dense tomentum. Epicalyx persistent with 4-6 spathulate-oblong, up to 15 7 m segments. Calyx lobes broadly triangular, acute. Petals obovate, emerginate, fimbriate along margin, clawed and hairy below, white. Capsule subglobose, up to 4 mm across, enclosed by the calyx.

Fl. & Fr. : Sept.-Jan.

Distrib. : Throughout India, Myanmar.

Specimens examined : Barwadih, 380.

Notes : Common, in the valleys and on the hill slopes.

Common name : Beng. : *Pola, Jara Basanda*; Santal : *Poska olat*; Hindi : *Pula, Baranga.*

6. MALVASTRUM A. Gray *nom. cons.*

Malvastrum coromandelianum L. Garcke, Bonplandia 5: 297. 1857; Hu, Fl. China (Malvaceae) 11. 1955; Haines, Bot. Bihar & Orissa 1: 60.

1961 (Rep. ed.); Borssum in Blumea 14: 152. 1966; Paul in B.D. Sharma & Sanjappa, Fl. Ind. 3: 277. 1993 and in Fl. W. Bengal 1: 305. 1997. *Malva coromandeliana* L., Sp. Pl. 687. 1753. *Malvastrum tricuspidatum* (R. Br.) A. Gray, Pl. Wright, 1: 16. 1852; Masters in Hook. f., Fl. Brit. India 1: 321. 1874. *Malva tricuspidata* R. Br. in W. Ait., Hort. Kew. ed. 2.4: 22. 1849.

Annual, erect, suffruticose, up to 80 cm high herbs; stems simple and stellate hairy. Leaves oblong-ovate, rhomboid-ovate or lanceolate, acute or obtuse at apex, truncate or obtuse at base, serrate, up to 5 × 2.5 cm, hairy on both sides; petioles up to 2.8 cm long. Peduncle up to 1 cm long. Calyx lobed to the middle; lobes 6 mm long, ovate, acuminate. Petals 7 × 4 mm, yellow, obovate. Carpels with 2 spines at the middle of the convex face and the hardened spinous style, bristly from apex to middle. Fruits up to 6 mm across.

Fl. & Fr. : Jul.-Nov. Exotic

Distrib.: Pantropical, probably of S. American origin.

Specimens examined : Daltonganj, 236.

Notes : Common in the waste land and the forest under growth.

7. SIDA L.

1a. Leaves cordate at base, 7-9 nerved :

2a. Styles and cocci-5, cocci membranous, protruberance on cocci if present not retrorsely hairy:

3a. Pedicel shorter than petiole; stem erect viscid .... 5. *S. mysorensis*

3b. Pedicel longer than petiole; stem trailing pubescent .... 3. *S. cordata*

2b. Styles and cocci-10, awns of the cocci retrorsely hairy .... 4. *S. cordifolia*

1b. Leaves cuneate to truncate at base, 3-5 nerved :

4a. Stipular pair similar :

5a. Petiolar base with spiny projections; cocci-5 .... 2. *S. alba*

5b. Petiolar base without spiny projections; cocci more than 5 .... 6. *S. rhombifolia*

4b. Stipular pair dissimilar ....1. *S. acuta*

1. Sida acuta Burm. f., Fl. Ind. 147. 1768; Haines, Bot. Bihar & Orissa 1: 63. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 90: 1977, ssp. **acuta** Borss, in Blumea 14: 186. 1966; Paul in B.D. Sharma & Sanjappa, Fl. Ind. 3: 281. 1993 and in Fl. W. Bengal 1: 308. 1997. *Sida carpinifolia* sensu Masters in Hook. f., Fl. Brit. India 1: 323. 1874 (non L. f. 1781).

An erect, under shrub, up to 90 cm high; stems tough, sparsely stellate-hairy. Leaves linear-lanceolate or oblong-lanceolate, acute at apex, subcordate at base, serrate; petioles 4-5 mm long; stipules longer than petiole, linear subulate, dissimilar. Flowers solitary on joined peduncle; peduncle equalling or slightly longer than the petiole. Sepals acuminate, ciliate. Capsule glabrous. Seed dark brown, glabrous, triangular-ovoid, pilose round the hilum.

Fl. & Fr.: Aug.-Dec.

Distrib. : Pantropical.

Specimens examined: Daltonganj, 239.

Notes : Common, in the waste land and hedges.

Common name : Beng. : *Kureta*; Hindi : *Bariara*; Santal : *Bir miru Baha*.

2. S. alba L., Sp. Pl. ed, 2, 966. 1763; Bhandari, Fl. Ind. Desert. 71. 1978; Paul in B.D. Sharma & Sanjappa, Fl. Ind. 3: 283. 1993 and in Fl. W. Bengal 1: 309. 1997. *Sida spinosa* L., Sp. Pl. 683. 1753 *pro parte;* Masters in Hook. f., Fl. Brit, India, 1: 323. 1874; haines, Bot. Bihar & Orissa 1: 62. 1961 (Rep. ed.), Ramam. in Sald. & Nicol., Fl. Hassan Dist. 155. 1977.

Erect herbs about 30-90 cm high; branches pubescent with spiny tubercles below the leaf. Leaves lanceolate, acute or obtuse at apex,

truncate at base; petioles shorter than leaves; stipules short, linear, up to 3 mm long; leaves pubescent beneath, 3-5 nerved, serrated. Flowers white, axillary, solitary; pedicels up to 10 mm long, joint near the calyx, pubescent. Cocci-5, aristate, hairy.

Fl. & Fr. : Sept.-Dec.

Distrib. : Pantropical.

Specimens examined : Daltonganj, 28.

Common name : Beng. : *Banmethi;* Hindi : *Janglimethi.*

Uses : Root extract given in fever.

3. Sida cordata (Burm. f.) Borssum in Blumea 14: 182. 1966; Guha Bakshi, Fl. Murshidabad Distr. 67. 1984; Paul in B.D. Sharma & Sanjappa, 3: 283. 1993 and in Fl. W. Bengal 1: 309. 1997. *Melochia cordata* Burm. f., Fl. Ind. 143. 1768. *Sida multicaulis* Cav., Diss. 1. 10. t. 1. fig. 6. 1785; Hu, Fl. China (Malvaceae) 24. 1955. *Sida humilis* Cav., Diss. 5: 277 t. 134. fig 2. 1788; Masters in Hook. f., Fl. Brit. India 1: 322. 1874. *Sida humilis* var. *veronicaefolia* (Lamk.) Masters in Fl. Brit. India 1. 322. 1874. *S. veronicaefolia* Lamk, Encycl 1: 5. 1783; Prain, Beng. Pl. 1: 258. 1903 (Rep. ed. 1: 175. 1963) & in Rec. Bot. Surv. Ind. 3: 177. 1905; Haines, Bot. Bihar & Orissa 1: 60. 1961 (Rep. ed.); Hu. Fl. China (Malvaceae) 23. 1955.

Decumbent, ascending, suffruticose herbs, covered with stellate and simple white hairs. Leaves up to 1.5-3.5 cm, ovate-cordate, acute, crenate-serrate; petioles up to 2 cm long, slender. Flowers yellow, 1-2, axillary or loosely arranged in raceme; peduncle as long as petiole, joined near flower. Carpels-5, with 2-long, erect beak. Seeds trigonous, black.

Fl. & Fr. : Throughout the year.

Distrib. : Cosmopolitan.

Specimens examined : Daltonganj, 6.

Notes : Common, in waste places all over the district.

Common name : Beng. : *Junka*; Hindi : *Bhiunli.*

Uses : Yields a good fibre.

4. Sida cordifolia L., Sp. Pl. 692. 1753; Masters in Hook. f., Fl. Brit. India 1: 324. 1874; Haines, Bot. Bihar & Orissa 1: 61. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 91. 1977; Paul in B.D. Sharma & Sanjappa, Fl. Ind. 3: 285. 1993 and in Fl. W. Bengal 1: 309. 1997.

Erect, tomentose herbs, up to 90 cm high; stems with thin spreading hairs. Leaves ovate, acute at apex, cordate at base, crenate-serrate, up to 5 × 1.5 cm, with 5-7 basal nerves, tomentose both sides; petioles long in the lower leaves, up to 4.2 cm and gradually shorter at the upper leaves. Flowers axillary solitary, up to 1.5 cm across. Peduncles 1-2, axillary, and subcorymobose. Calyx ovate, acute, hairy, up to 4 × 3.5 mm. Corolla straw coloured. Carpels 5-10, with 2 long retrorsely hispid awns; awns up to 2 mm long. Capsule 7-8 mm across.

Fl. & Fr. : August-January.

Distrib. : Pantropical.

Specimens examined : Barwadih, 375.

Notes : Common in waste places and in the undergrowth of the forest.

Common name : Beng. : *Berela*; Hindi : *Kungyi.*

5. S. mysorensis Wight & Arn., Prodr. 59. 1834; Masters in Hook. f., Fl. Brit. India 1: 322. 1874; Borssum, Blumea 14: 180. 1966; Sald. & S. R. Ramesh in Sald., Fl. Karnataka 1: 259. 1984; Paul in B.D. Sharma & Sanjappa, Fl. Ind. 3: 286. 1993. and in Fl. W. Bengal 1: 310. 1997. *Sida glutinosa* Roxb., Fl. Ind. 3: 172. 1832, non Cav. 1785; Haines, Bot. Bihar & Orissa 1: 61. 1961 (Rep. ed.).

Erect, glandular-pubescent herbs, with spreading hairs. Stipules linear. Leaves ovate, acuminate at apex, cordate at base, 7-9 nerved from base, dentate, up to 7.5 × 5 cm, pubescent. Flowers solitary-axillary or in racemes shorter than leaves; pedicels hairy, shorter than petiole, jointed above middle. Sapals triangular subulate, up to 5 × 3 mm, with spreading setaceous hairs. Cocci 2-toothed, hairy at apex.

Fl. & Fr. : Oct.-Feb.

Distrib. : India, Bhutan, Sri Lanka, Malaysia.

Specimens examined : Garwah, 593.

Notes : Not common, in the forest.

6. **Sida rhombifolia** L., Sp. Pl. 684. 1753; Masters in Hook. f., Fl. Brit. India 1: 323. 1874; Haines, Bot, Bihar & Orissa 1: 62. 1961 (Rep. ed.); Hu, Fl. China (Malv.) 20. 1955. ssp. **rhombifolia** Borss. in Blumea 14: 195. 1966; Paul in B.D. Sharma & Sanjappa, Fl. Ind. 3: 289. 1993 and in Fl. W. Bengal 1: 310. 1997. *Sida rhombifolia* var. *rhomboidea* (DC.) Masters in Hook. f., Fl. Brit, India 1: 324. 1874. *Sida orientalis* Cav., Diss. 1: 21, t. 12, f. 1. 1785; Hu in Fl. China (Malv.) 18. 1955.

Woody, annual herbs. Leaves variable, alternate, up to 3 × 1.8 cm, elliptic-oblong, rhomboid or obovate, serrate, acute at apex, cuneate to obtuse at base, stellate hairy beneath; petioles 5-7 mm long; stipules equalling or slightly longer than the petiole, pair dissimilar, linear, subulate, hairy. Flowers axillary, solitary; pedicels 2-8 mm long, jointed above the middle. Cocci-7, acute.

Fl. & Fr. : Aug.-Dec.

Distrib. : Cosmopolitan.

Specimens examined : Daltonganj, *Sarma* 237.

Notes : Common on the waste land, in the forest and road sides.

Common name : Beng. : *Lal Berela*; Hindi : *Bhiunli*.

8. THESPESIA Soland. ex Corr.

Thespesia lampas (Cav.) Dalz. ex Dalz. & Gibs., Bombay Fl. 19. 1861; Masters in Hook. f., Fl. Brit. India 1: 345. 1874; Haines, Bot. Bihar & Orissa 1: 73. 1961 (Rep. ed.); Ramam. in Sald. & Nicol., Fl. Hassan 157. 1976; Paul in B.D. Sharma & Sanjappa, Fl. Ind. 3: 350. 1993 and in Fl. W. Bengal 1: 311. 1997. *Hibiscus lampas* Cav., Diss. 3: 154. t. 56. f. 2. 1787.

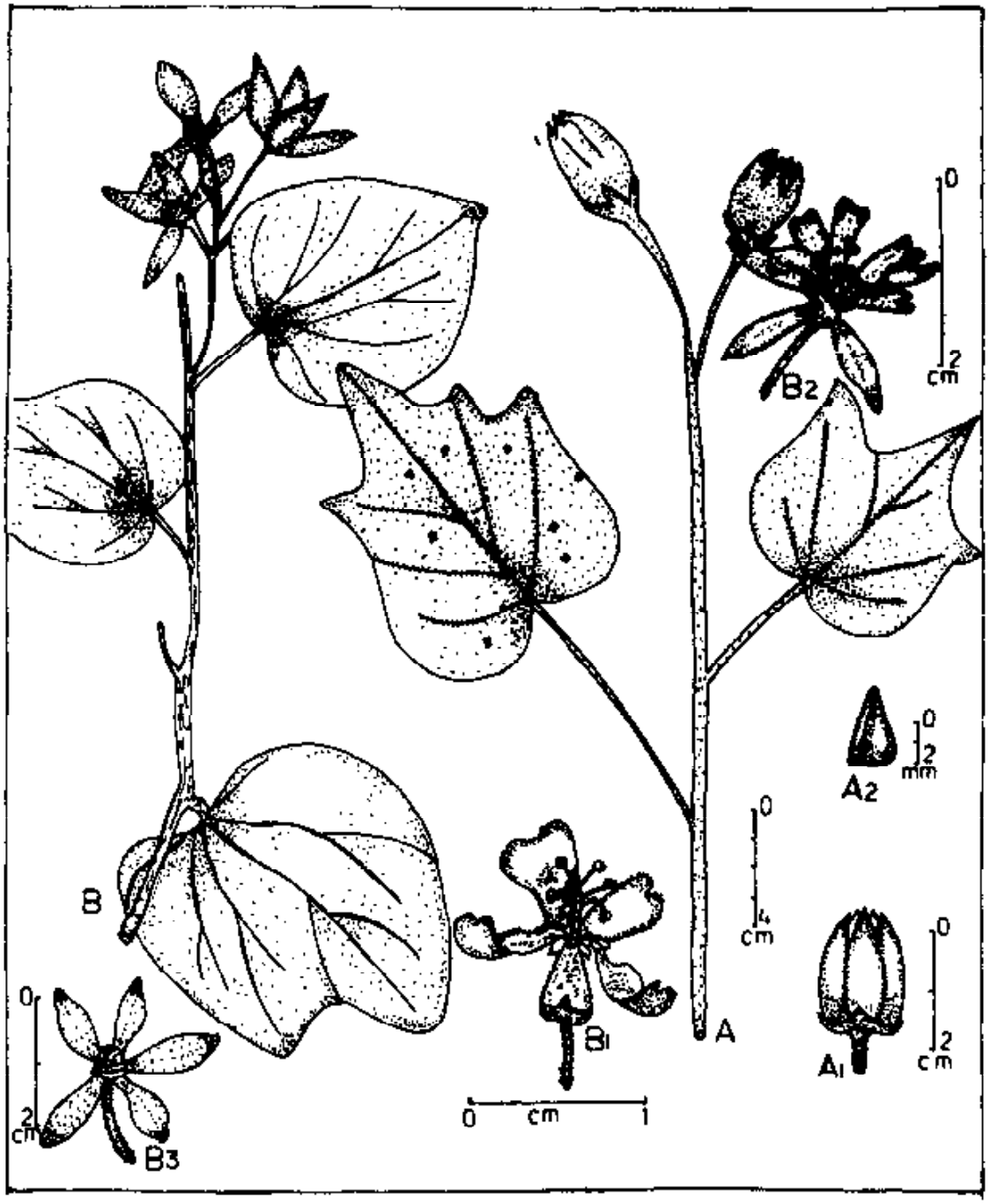


Fig. 9: Malvaceae. (A-A_2): *Thespesia lampas* (Cav.) Dalz. ex Dalz. & Gibs.: A. Fruiting twig, A_1. Fruit, A_2. Seed; (B-B_3): *Kydia calycina* Roxb.: B. Habit, B_1. Male flower, B_2. Female flower, B_3. Fruit.

Stout undershrubs, covered with stellate hairs, up to 2 m high. Leaves up to 12 × 11 cm, palmately 3-lobed or cuneate-ovate, entire, acute at apex and cordate at base, 5-7 nerved, sparingly stellate-pilose above and stellate-tomentose beneath, midrib with glandular pore at base beneath. Flowers in axillary or terminal panicle. Sepals-5, subulate, connate below middle, tomentose. Corolla campanulate, yellow with purple base. Capsule ovoid, pointed, villous, up to 3 × 2 cm, 3-5 valved, girt at base by calyx tube. Seeds glabrous, up to 5 mm long, dark brown.

Fl. & Fr. : Oct.-Dec.

Specimens examined : Barwadih, 415 & 918.

Distrib. : India, Sri Lanka, Myanmar & Trop. Africa.

Notes : Common, in the forest.

Common name : Beng. : *Bankapas* or *Ban Kapsi*; Santal : *Bir Katsom;* Hindi : *Jangli Bhindi.*

9. URENA L.

1a. Leaves shalowly lobed; epicalyx cupular in fruit .... 1. *U. lobata*

1b. Leaves deeply lobed; epicalyx spreading or reflexed in fruit .... 3. *U. sinuata*

1. Urena lobata L., Sp. Pl. 692. 1753; Masters in Hook. f., Fl. Brit. India 1: 329. 1874 (excl. *palmata*); Haines, Bot. Bihar & Orissa 1: 65. 1961 (Rep. ed.); Hu, Fl. China (Malvaceae) 73. 1955; Borssum, Blumea 14: 138. 1966; Paul in B.D. Sharma & Sanjappa, Fl. Ind. 3: 380. 1993 and in Fl. W. Bengal 1: 312. 1997.

Shrubs, 60-100 cm high, stellate-tomentose and hirsute. Leaves polymorphic, upper ones smaller, elliptic-oblong or ovate, acute or rounded at apex, lower ones larger, broadly-oblong or ovate, acute or rounded at apex, lower ones larger, broadly-orbicular, up to 7 × 7 cm, shallowly lobed, cuneate to subcordate at base, lobes triangular; stipules caducous. Flowers axillary, solitary or 2-3 clustered together; epicalyx lobes up to 6 mm long, narrowed to apex. Corolla pink, up to 1.5 cm long. Fruits up to 1 cm diam., glochidiate spines with downward pointing minute bristle.

Fl. & Fr. : Oct.-Apr.

Distrib. : Pantropical.

Specimens examined : Daltonganj, 26.

Notes : Common, along the road sides and waste places.

Common name : Beng. : *Bon-Okra*; Santal : *Bhidi-janetet.*

Uses : It yields fibre.

2. Urena sinuata L., Sp. Pl. 632. 1753; Masters in Hook. f., Fl. Brit. India 1: 329. 1874; Haines, Bot. Bihar & Orisa 1: 65. 1961 (Rep. ed.).

Fruitescent. Leaves orbicular-ovate, grey beneath, palmately lobed; lobes usually pinnatisect, up to 6 × 7 cm. Epicalyx lobes linear-oblong, 3-4 mm long. Carpels-5, rounded, stellate hairy, with many hooked bristles.

Fl. & Fr. : Nov.-Mar.

Distrib. : Pantropical.

Specimens examined : Netarhat, 51.

Notes : Common, along the road sides and waste places.

Common name : Beng. : *Kunguiya*; Santal : *Mota Bhidi janetet.*

Uses : It yields fibre.

Some cultivars of *Hibiscus rosa-sinensis* L. Commonly grown in the garden.

BOMBACACEAE

BOMBAX L.

Bombax ceiba L., Sp. Pl. 511. 1753 (excl. Syn. Bauhin); Robyns. in Taxon 10: 160. 1961 & in Bull. Jard. Bot. Brux. 33: 88. 1963 & in Rev.

Handb. Fl. Ceylon 1: 64. 1980; Nayar & Biswas in B.D. Sharma & Balakrishnan, Fl. Ind. 3: 398. 1993. *B. malabaricum* DC., Prodr. 1: 479. 1824; Mast. in Hook. f., Fl. Brit. India 1: 349. 1874; Haines, Bot. Bihar & Orissa 1: 77. 1961 (Rep. ed.). *Salmalia malabarica* (DC.) Schott & Endl., Melet. 35. 1832.

Large spreading trees, up to 40 m high; trunk buttressed; bark greyish, aculeate (when young), prickles sharp and conical. Leaves 5-7 foliolate; petioles 10-18 cm long; leaflets 7-15 x 2.5-6 cm, elliptic-oblong, to ellitpic-lanceolate, acuminate, margin entire, acute or cuneate at base; petiolules 1-2.5 cm long. Flowers many, clustered near end of branchlets. Calyx thick, cupuliform, 3 or rarely 2-lobed, up to 3.5 cm long, silky within, glabrous outside. Petals bright red, obovate, 4.5-11 cm long, tomentose outside, sparingly pubescent inside, recurved. Stamens of 3 kinds, peripheral 5 bundles with 8-20 in each, central bundle with 15 stamens of two kinds, 5 innermost are longest and filament connate at base. Ovary conical, glabrous. Capsule 9-12 cm long, ovoid or elliptic-ovoid, 5-valved; valves silky inside. Seeds many, obovoid, packed with white cotton.

Fl. & Fr. : Jan.-May. Exotic

Distrib. : Native of Malaya; commonly distributed in India, Myanmar, Sri Lanka, Java and Sumatra.

Specimens examined : Daltongang, 838.

Notes : Common, along the road sides and in the villages.

Common name : Beng. : *Simul*; Hindi : *Simal*; Kol & Santal : *Edel*.

Uses : Wood is widely used for packing boxes and match industries. Trunk yields a gum called *Mocharus*, used by the local people for diarrhoea. Cotton surrounding the seeds is extensively used for stuffing the pillows.

STERCULIACEAE

1a. Shrubs or trees :

2a. Petals present :

3a. Fruit a capsule or twisted follicles, not winged :

4a. Calyx tubular; fruit a follicle, twisted .... 3. HELICTERES

4b. Calyx deeply lobed; fruit a capsule, not twisted .... 6. PTEROSPERMUM

3b. Fruit an inflated capsule, 5-winged .... 4. KLEINHOVIA

2b. Petals absent :

5a. Inflorescence covered with orange-red tomentum; calyx elongate; follicles membranous .... 2. FIRMIANA

5b. Inflorescence not covered with orange-red tomentum, calyx short; follicles woody .... 7. STERCULIA

1b. Herbs:

6a. Petals clawed; fruit 2-valved, ovoid .... 8. WALTHERIA

6b. Petals not clawed; fruit 5-valved, globose:

7a. Flowers in axillary cymes; petals with 2-fid appendage; capsule softly spiny .... 1. BYTTNERIA

7b. Flowers in densely crowded head like axillary or terminal clusters; petals entire; capsule without spine .... 5. MELOCHIA

1. BYTTNERIA Loefl.

Byttneria herbacea Roxb., Pl. Cor. 1. 28. t. 29. 1795; Wight, Ic. t. 488. 1841; Masters in Hook. f., Fl. Brit . India 1: 276. 1876 (as *Buettneria*); Haines, Bot. Bihar & Orissa 1: 86. 1961 (Rep. ed.); Sald. & Ramesh in Sald., Fl. Karnataka 1: 228. 1984; Malick in B.D. Sharma & Balakrishnan, Fl. Ind. 3: 412. 1993 and in Fl. W. Bengal 1: 320. 1997.

Unarmed, branched herbs, stems with longitudinal groove and slighlty hairy. Leaves up to 35 × 13 mm, ovate-lanceolate, acuminate at apex and cordate at base, 3-5 nerved, margin serrate, glabrous; petioles up to 15 mm long, hairy. Flowers in axillary cymes. Sepals linear-lanceolate, relfexed. Petal limbs subulate and with 2-fid appendages, as long as sepals. Capsule globose, up to 6 mm in diam., softly spiny, 5-lobed. Seeds oblong, 3 mm long, ridged, black.

Fl. & Fr. : June-Dec.

Distrib.: Pantropical.

Specimens examined : Barwadih, 430 & 440.

Notes : Common, on the hill slope and in the forest.

Common name : Beng. : *Kambraj;* Kol: *Idel sangar*; Santal : *Deku sindur.*

Uses : Root stock used in cholera and diarrhoea.

2. FIRMIANA Marsili

Firmiana colorata (Roxb.) R. Br. in Bennet & Brown, Pl. Jav. Rar. 235. 1844; Ramam. in Sald. & Nicol. Fl. Hassan 141. 1976; Malick in B.D. Sharma & Balakrishnan, Fl. Ind. 3: 420. 1993. *Sterculia colorata* Roxb., Pl. Cor. f. 25. 1795; Masters in Hook. f., Fl. Brit. India 1: 359. 1874; Prain, Bengal Pl. 1: 187. 1963 (Rep. ed.); Haines, Bot. Bihar & Orissa 1: 80. 1961 (Rep. ed.).

Deciduous, handsome trees. Leaves palmately 3-lobed, up to 20 × 23 cm. Flowers regular in bright red panicles, resembling masses of scarlet coral. Calyx with 5-triangular, acute lobes with red tomentum outside, bearded inside, up to 2 cm long. Petals-0. Stamens with sessile anthers, situated at the tip of the elongate androgynophore. Carpels-5, free, each 2-locular, each locule with 2-ovules. Follicles membranous, green or rosy, open widely, bearing one seed on one or both margins.

Fl. & Fr. : Mar.-May.

Distrib. : Throughout India, Myanmar, Sri Lanka.

Specimens examined : Netarhat, 154.

Notes : Not common, found on the dry hills.

Uses : Yields a strong fibre.

3. HELICTERES L.

Helicteres isora L., Sp. Pl. 963. 1753; Masters in Hook. f., Fl. Brit. India 1: 365. 1874; Haines, Bot. Bihar & Orissa 1: 82. 1961 (Rep. ed.);

Ramam. in Sald. & Nicol., Fl. Hassan 141. 1976; Malick in B.D. Sharma & Balakrishnan, Fl. Ind. 3: 426. 1993 and in Fl. W. Bengal 1: 323. 1997.

Stellately tomentose, arborescent shrubs. Leaves alternate, oblong-ovovate, shallowly cordate, slightly oblique, acute or acuminate at apex, crenate-serrate, stellate hairy on both sides, up to 13.5 × 9 cm, with 4-6 basal nerves; petioles upto 1.2 cm long. Flowers scarlet, lateral; peduncle axillary or extra axillary, 2-4 together. Calyx with brown tomentum, 1-1.5 cm long, oblique. Petals reflexed, glandular on inside. Stamens-10, on gynandrophore. Carpels-5, each many ovuled; styles-5. Fruits spirally twisted follicles, up to 6 cm long, tomentose.

Fl. & Fr. : May-Jan.

Distrib. : India, Java & North Australia.

Specimens examined : Barwadih, 374.

Notes : Common, in the valley and on the hill slopes.

Common name : Hindi : *Maraphal*; Santal : *Pet Kamra*; Beng. : *Atmora.*

Uses : Bark yields fibre used for cordage. Fruit used for various intestinal troubles, such as diarrhoea, chronic dysentery etc.

4. Kleinhovia L.

Kleinhovia hospita L., Sp. Pl. ed. 2. 1365. 1763; Mast. in Hook. f., Fl. Brit. India 1: 364. 1874; Haines, Bot. Bihar & Orissa 1: 81. 1961 (Rep. ed.); Malick in B.D. Sharma & Balakrishnan, Fl. Ind. 3: 434. 1993 and in Fl. W. Bengal 1: 324. 1997.

Small trees with smooth bark. Leaves broadly ovate to suborbicular, up to 10 × 9 cm, acuminate at apex, retuse or cordate at base, 7-nerved, glabrous; petioles up to 9 cm long. Flowers up to 10 mm diam., pink, in terminal panicles. Sepals-5, narrowly-oblong, upto 6 mm long, tomentose out side, nearly free. Petals-5, unequal, upper one with longer claws, margin involute. Staminal column dilated above, into bell-shaped 5-fid cup, each division with 3 anthers. Ovary inserted in staminal cup, tomentose, 5-celled.

Capsule inflated, 5-winged, membranous, 5-valved, each cell with one seed, up to 1 × 1.2 cm, tomentose. Seeds black, tubercled.

Fl. & Fr. : Sept.-Nov.

Distrib. : India, Sri Lanka, Java, Philippines and East Trop. Africa.

Specimens examined : Daltonganj, 874.

Notes : Common, generally planted as an avenue tree.

Common name : Beng.: *Bola.*

Uses : Decoction of leaves used in skin diseases and leaf juice used as an eye-wash. Wood used for knife handles.

5. MELOCHIA L.

Melochia corchorifolia L., Sp. Pl. 675. 1753; Masters in Hook. f., Fl. Brit. India 1: 374. 1874; Haines, Bot. Bihar & Orissa 1: 85. 1961 (Rep. ed.); Santapau, Fl. Saur. Pt. 1. 63. 1962; Sald. & Ramesh in Sald., Fl. Karnataka 1: 233. 1984; Malick in B.D. Sharma & Balakrishnan, Fl. Ind. 3: 441. 1993 and in Fl. W. Bengal 1: 325. 1997.

Suffruticose herbs, up to 1 m high; stems nearly glabrous or with a row of hairs. Leaves 2-6 × 1-2.5 cm, ovate-oblong, or oblong, variable in shape, glabrous, acute at apex, base acute to truncate, margin serrate; petioles up to 1.5 cm long, hairy; stipules up to 4 mm long, lanceolate, ciliate. Flowers subsessile, in densely crowded, head-like axillary or terminal clusters; involucral bracts linear lanceolate, up to 5 mm long, hairy and ciliate. Calyx 5-toothed; teeth shorter than the tube. Petals up to 6 mm long, pinkish or white with yellow base, oblong. Capsule 4-5 mm diam., globose, hairy, 5-valved. Seeds many, up to 2.5 × 2 mm, angled, brownish-black.

Fl. & Fr. : Aug.-Oct.

Distrib. : India & Sri Lanka.

Specimens examined : Kechki, 878.

Notes : Common, in waste places, cultivated fields and along the road sides.

Common name : Beng. : *Tikiokra*; Hindi : *Bilpat*; Santal : *Thuiak.*

Uses : Leaves are eaten and decoction used in dysentery, Stems yield a fibre used for fishing-lines.

6. PTEROSPERMUM Schreb. *nom. cons.*

Pterospermum acerifolium Willd., Sp. Pl. 3: 729. 1800; Masters. in Hook. f., Fl. Brit. India 1: 368. 1874; Haines, Bot. Bihar & Orissa 1: 82. 1961 (Rep. ed.); Malick in B.D. Sharma & Balakrishnan, Fl. Ind. 3: 448. 1993 and in Fl. W. Bengal 1: 328. 1997.

Large trees, young shoot floccose-pubescent. Leaves elliptic-oblong, cordate at base, up to 22 × 13 cm, toothed near apex, palmately ribbed; petioles over 4 cm long. Peduncle 1-3 flowered; pedicels 1-3 cm long; bracteoles palmately lobed or laciniate, caducous. Sepals linear-oblong, up to 11 × 1 cm, woolly on out side. Petals linear-oblong, whitish, slightly shorter than calyx, fragrant. Staminal filaments in phalanges; staminodes club shaped. Capsule 10-15 cm long, 5-angled, furfuraceous. Seeds compressed, many in each cell.

Fl. & Fr. : Mar.-July.

Distrib. : Throughout India, Java and Continental Asia (Doubtfully native of Asia).

Specimens examined : Netarhat, 784.

Notes : Common, found as an avenue tree and planted in garden.

Common name : Beng. : *Much Kunda champa, Kanak champa*; Hindi : *Much Kund, Kanier, Katha-Champa;* Kol : *Muchu Kundi*; Santal : *Mach Kundaa.*

Uses : Wood used for planks, packing cases and turnery articles. Flowers edible, petal juice used as soft drinks, also used for ulcers, tumours and leprosy. Leaves employed for thatching and as packing material for tobacco.

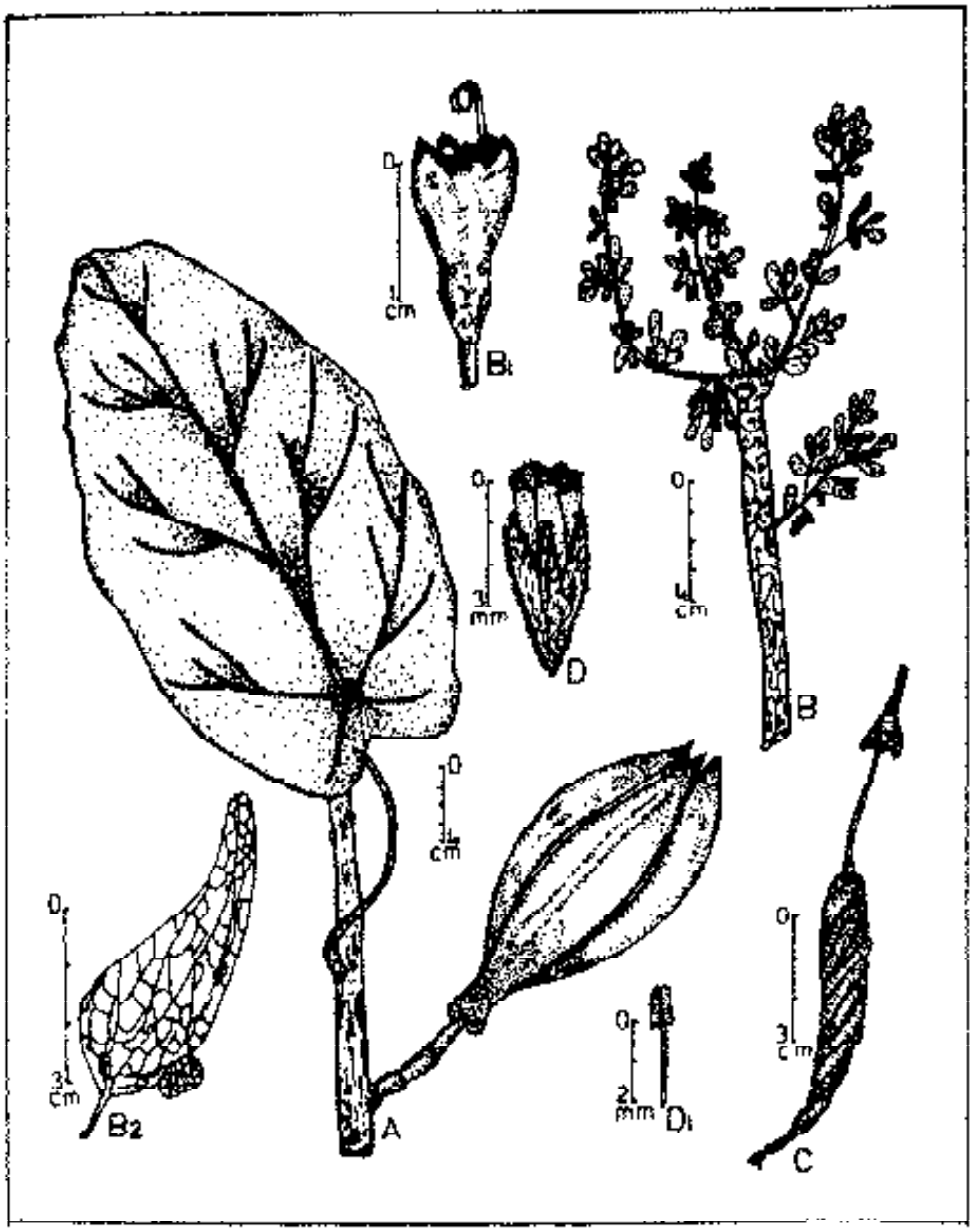


Fig.10: Sterculiaceae. A. *Pterospermum acerifolium* Willd.: Fruiting branch; (B-B_2): *Firmiana colorata* (Roxb.) R. Br.: B. Flowering twig. B_1. Flower, B_2. Fruit showing seed; C. *Helicteres isora* L.: Fruit; (D-D_1): *Waltheria indica* L.: D. Flower, D_1. Stamen.

7. STERCULIA L.

1a. Leaf without spreading hairs; calyx viscid pubescent out side, lobes glandular hairy at base inside; follicles bristly .... 1. *S. urens*

1b. Leaf with spreading haris; calyx minutely pubescent out side, glabrous within; follicles not bristly .... 2. *S. villosa*

1. Sterculia urens Roxb., Pl. Cor. 1: 25. t. 24. 1795; Haines, Bot. Bihar & Orissa 1: 79. 1961 (Rep. ed.); Malick in B.D. Sharma & Balakrishnan, Fl. Ind. 3: 470. 1993 and in Fl. W. Bengal 1: 332. 1997.

Moderate sized trees; bark peeling. Leaves 4-6 lobed, grey beneath, up to 20 × 20 cm, rounded-cordate at base. Flowers in compact panicle. Calyx thick, up to 7 mm long, glandular hairy at base. Petals-0, staminal column erect; anthers-15, crowded together on gynandrophore. Follicles up to 4 cm long, bristly.

Fl. & Fr. : Dec.-Apr.

Distrib. : India, Sri Lanka.

Specimens examined : Netarhat, 366.

Notes : Not common, on the dry hills.

Common name : Hindi : *Gulu,* Santal : *Telhee.*

2. S. villosa Roxb. ex DC., Prodr. 1: 483. 1824; Haines, Bot. Bihar & Orissa 1: 79. 1961 (Rep. ed.); Malick in B.D. Sharma & Balakrishnan, Fl. Ind. 3: 472. 1993. and in Fl. W. Bengal 1: 333. 1997.

Large trees. Leaves suborbicular, 5-7 lobed, tomentose beneath, up to 22 cm across, deeply cordate at base. Panicles flexuose, rusty-pubescent. Calyx membranous, yellow with pink centre, divided down below middle, lobes 3-nerved, glabrous inside. Petals-0. Staminal column recurved, anthers-10. Follicles beaked, villous, up to 6 × 2 cm.

Fl. & Fr. : Feb.-May.

Distrib. : Throughout India.

Specimens examined : Netarhat, 801.

Notes : Not common, in the forest.

Common name : Hindi : *Udal*; Santal : *Ganjher*.

8. WALTHERIA L.

Waltheria indica L., Sp. Pl. 673. 1753; Masters in Hook. f., Fl. Brit. India 1: 374. 1974; Haines, Bot. Bihar & Orissa 1: 85. 1961 (Rep. ed.); Prain, Beng. Pl. 1: 190. 1963 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 94. 1977; Sald. & Nicol; Fl. Hassan Dist. ed. 2. 870. 1978; Malick in B.D. Sharma & Balakrishnan, Fl. Ind. 3: 473. 1983. *Waltheria americana* L., Sp. Pl. 673. 1753; Ramam. in Sald. & Nicol., Fl. Hassan 144. 1976.

Erect, hoary-tomentose, under shrubs. leaves velvety, ovate or ovate-oblong, toothed, 3-nerved, cordate at base, apex rounded. Flowers pink in axillary sessile, dense, capitate cymes, with small lanceolate bracts and also running into leafless spikes. Calyx tube connate, campanulate, 5-cleft, hairy, 4 mm long. Petals spathulate, long-clawed, hairy at tip, up to 4.5 mm long, dichotomously veined. Staminal tube with 5 oblong anthers; staminodes absent. Stigma clavate. Capsule ovoid, villous, 2-valved with one black seed.

Fl. & Fr. : Jan.-Mar. Exotic.

Distrib. : Pantropical, native of trop. America

Specimens examined : Netarhat, 196.

Notes : Common, on the rocks and in open dry forest, on the way to Boneri.

Common name : Beng. : *Khar Dudhi*.

TILIACEAE

1a. Sepals appendaged; fruits echinate or bristly .... 3. TRIUMFETTA

1b. Sepals not appendaged; fruits neither echinate nor bristly :

2a. Lower serration of leaf often filiform; petals eglandular; fruit capsular .... 1. CORCHORUS

2b. Lower serration of leaf often glandular; petals glandular at base; fruit drupaceous, often 2-4 lobed .... 2. GREWIA

1. CORCHORUS L.

1a. Capsule elongate, not muricate :

2a. Capsule ending in 3-radiating arms, usually 3-winged .... 1. *C. aestuans*

2b. Capsule ending in erect solitary beak, not winged :

3a. Capsule about 10-12 times as long as broad, glabrous .... 4. *C. olitorius*

3b. Capsule not more than 5 times as long as broad, densely hariy .... 3. *C. fascicularis*

1. Capsule depressed globose, muricate on ribs .... 2. *C. capsularis*

1. Corchorus aestuans L., Syst. Nat. ed. 10, 2: 1079. 1759; Fawcett & Rendle in J. Bot. 59: 225. 1921; Babu, Herb. Fl. Dehra Dun 95. 1977; Daniel & Chandrabose in B.D. Sharma & Sanjappa, Fl. Ind. 3: 485. 1993. *C. acutangulus* (auct. non. Forsk.); Lamk., Encycl. 2: 104. 1786; Masters in Hook. f., Fl. Brit. India 1: 398. 1874; Prain, Beng. Pl. 1: 286. 1903 (Rep. ed. 1: 196. 1963) & in Rec. Bot. Surv. Ind. 3: 182. 1905; Haines, Bot. Bihar & Orissa 1: 90. 1961 (Rep. ed.).

Annual, erect, suffruticose herbs; branches glabrous or slightly hairy. Leaves 3-9 × 1.5-3.5 cm, sparsely hairy above & strongly hairy on nerves beneath, ovate or ovate-oblong, acute at apex, subcordate at base, serrate; petioles 0.8-1.8 cm long, strongly hairy; stipules linear-subulate. Flowers small, in cymes; bracts filiform; peduncle very short; pedicels 1-2 mm long. Capsule 2-3 cm long, slender, linear, 6-angled, of which 3 angles are alate, apex ending in 3-4 radiating segments.

Fl. & Fr. : Aug.-Dec. Exotic

Distrib. : Pantropic and probably native of Trop Asia.

Specimens examined : Barwadih, 437.

Notes : Common, in the shady area & on the rocky hills.

Common name : Beng. : *Titapat.*

2. **Corchorus capsularis** L., Sp. Pl. 529. 1753; Haines, Bot. Bihar & Orissa 1: 89. 1961 (Rep. ed.); Daniel & Chandrabose in B.D. Sharma & Sanjappa, Fl. Ind. 3: 485. 1993; Banerjee in Fl. W. Bengal 1: 336. 1997.

Erect annual, nearly glabrous, suffrutescent herbs. Leaves alternate, oblong to ovate-lanceolate, toothed, acute-acuminate, 7-10 × 1-3 cm. Flowers in leaf opposed cymes. Sepals-5, free. Petals-5, clawed. Capsule depressed globose, up to 1 cm across, 5-valved, muricate on ribs.

Fl. & Fr. : Aug.-Oct.

Distrib. : Pantropical.

Specimens examined : Garu, 553.

Notes : Cultivated, often found as road side weed.

Common name : Beng. : *Pat*; Santal : *Kaskomarau.*

Uses : Yields fibre which is used for making rope, bags, carpets etc. Leaves are eaten as vagetable.

3. **C. fascicularis** Lamk., Encycl. 2: 104. 1786; Masters in Hook. f., Fl. Brit. India 1: 398. 1874; Haines, Bot. Bihar & Orissa 1: 90. 1961 (Rep. ed.); Ramesh in Sald., Fl. Karnataka 1: 216. 1984; Daniel & Chandrabose in B.D. Sharma & Sanjappa, Fl. Ind. 3: 486. 1993; Banerjee in Fl. W. Bengal 1: 326. 1997.

Diffuse, annual under shrubs, up to 60 cm high. Leaves oblong-lanceolate, up to 4 × 1 cm, acute at apex, serrate at margin; petioles up to 5 mm long, pilose; stipules linear, up to 1.5 mm long. Sepals apiculate. Petals glabrous. Capsule in clusters of 3-6, 3-valved, densely hairy, shortly beaked, up to 1.3 × 0.2 cm. Seeds slighlty trigonous, up to 1 mm long, black, end truncate.

Fl. & Fr. : Aug.-Nov.

Distrib. : India, Sri Lanka, Trop. Australia and Africa.

Specimens examined : Seuti, 1095.

Notes : Common, in the cultivated and moist open fields.

Common name : Beng. : *Bilnalita.*

Uses : Whole plant has medicinal property and used as an astringent and restorative.

4. Corchorus olitorius L., Sp. Pl. 529. 1753; Masters in Hook. f., Fl. Brit. India 1: 397. 1874; Haines, Bot. Bihar & Orissa 1: 90. 1961 (Rep. ed.); Ramesh in Sald., Fl. Karnataka 1: 216. 1984; Daniel & Chandrabose in B.D. Sharma & Sanjappa, Fl. Ind. 3: 487. 1993; Banerjee in Fl. W. Bengal 1: 336. 1997.

Erect herbs with woody base, up to 1 m high; stems glabrous. Leaves ovate to ovate-oblong, up to 8 × 4 cm, glabrous except thinly hairy nerves beneath, acute to acuminate at apex, obtuse or rounded at base, serrate at margin; petioles 1-2 cm long, pubescent; stipule subulate, 5-12 mm long. Flower buds obovoid, beaked; flowers 2-3 on short peduncle; bracts lanceolate. Sepals caudate-acuminate. Petals pubescent on claw. Capsule up to 5 cm long, glabrous, linear, 8-10 ribbed, beak shortly 5-dentate, 5-valved. Seeds black, trigonous.

Fl. & Fr. : Sept.-Nov. Exotic.

Distrib. : Native of Old World; now pantropic.

Specimens examined : Tarhashi, 1124.

Notes : Common, on the edges of ponds.

Common name : Beng. : *Mithapat, Desipat*; Hindi : *San pat*; Santal: *Barnarcha.*

Uses : Stem yields a fibre which is a source of jute. Young leaves eaten as vegetable.

2. GREWIA L.

1a. Trees; stipule auricled; leaves ovate; fruit glabrous .... 2. *G. tiliifolia*

1b. Scandent shrubs; stipule not auricled; leaves oblong; fruit stellate hairy .... 1. *G. flavescens*

1. Grewia flavescens Juss., Ann. Mus. Par. 4: 91. 1804; Haines, Bot. Bihar & Orissa 1: 93. 1961 (Rep. ed.); Ramam. in Sald. & Nicol., Fl. Hassan 135. 1976; Daniel & Chandrabose in B.D. Sharma & Sanjappa, Fl. Ind. 3: 498. 1993. *Grewia pilosa* sensu Masters in Hook. f., Fl. Brit. India 1: 388. 1874 (non Lamk, 1833).

Large shrubs or small trees; stems covered with stellate hairs. Leaves up to 9.2 × 4.2 cm, oblong to elliptic-oblong, acute at apex, cordate at base, serrate, stellate hairy on both sides, primary nerves-3, secondary nerves prominent; petioles up to 5 mm long. Peduncle more or less equal to the petiole. Sepals linear-lanceolate, densely stellate hairy out side, up to 5 mm long. Petals yellow, spathulate. Drupe entire or slighlty 4-lobed, closely covered with hair. Seeds hard, grooved, up to 4 mm long, yellow.

Fl. & Fr.: Sept.-Jan.

Distrib. : India & Trop. Africa.

Specimens examined : Barwadih, 373 & 921.

Notes : Common, on the hill slopes.

2. G. tiliifolia Vahl, Symb. 1: 35. 1790; Bedd., Fl. Sylv. t. 108. 1871; Mast. in Hook. f., Fl. Brit. India 1: 386. 1874 (as *tiliaefolia*); Haines, Bot. Bihar & Orissa 1: 95. 1961 (Rep. ed. as *tiliaefolia*); Ramam. in Sald. & Nicol., Fl. Hassan 137. 1976; Ramesh in Sald., Fl. Karnataka 1: 224. 1984; Daniel & Chandrabose in B.D. Sharma & Sanjappa, Fl. Ind. 3: 511. 1993. *Grewia leptopetala* Brandis, Indian Trees 100. 1906. *G. tiliifolia* var. *leptopetala* (Brandis) Cooke, Fl. Bomb. 1: 142(15). 1901.

Small, glabrascent to stellate-pubescent trees. Leaves elliptic to orbicular-ovate, 7-15 × 5-9 cm, acuminate at apex, obliquely-cordate at base, serrate to crenate-dentate at margin, glabrous with age, 5-6 nerved; petioles 1.5-2.5 cm long, thickened at apex; stipules sulcate, auricled. Flowers in axillary, 3-6 flowered cymes; peduncle 1-2 cm long, shorter or

slighlty longer than petiole. Buds globose. Torus hairy at apex. Sepals lanceolate, acute, hairy out side. Corolla yellow. Drupe fleshy, globose, 2-lobed, glabrous with age, lobes up to 5 mm across, black with age.

Fl. & Fr. : May-Sept.

Distrib. : India, Myanmar, Sri Lanka and East Trop. Africa.

Specimens examined : Barwadih, 925.

Notes : Common, in the forest and slopes of the hill.

3. TRIUMFETTA L.

1a. Leaves orbicular-rhomboid, often lobed; bristle on burr not exceeding diameter of capsule :

2a. Extra-staminal glandular rim pilose; bristle on capsule hairy at base .... 3. *T. rhomboidea*

2b. Extra-staminal glandular rim obscure; bristle on capsule hairy on one side .... 1. *T. pentandra*

1b. Leaves ovate-acuminate, not lobed; bristle on burr exceeding diameter of capsule .... 2. *T. pilosa*

1. Triumfetta pentandra A. Rich. in Guillemin & Perr., Fl. Seneg. Tent. 1: 93. t. 19. 1831; Gamble, Fl. Madras 120(86), 1915; Ramesh in Saldanha, Fl. Karnataka 1: 226. 1984; Deniel & Chandrabose in B.D. Sharma & Sanjappa, Fl. Ind. 3: 519. 1993. *Triumfetta neglecta* Wight & Arnott, Prodr. 1: 175. 1834; Masters in Hook. f., Fl. Brit. India 1: 396. 1874; Haines, Bot. Bihar & Orissa 1: 89. 1961 (Rep. ed.).

Annual herbs, up to 30 cm high; stems pubescent. Leaves ovate to orbicular, up to 5 × 4 cm, simple, often slightly 3-lobed at the upper part, acute to acuminate at apex, rounded to truncate at base, margin crenate-serrate, sparsely hairy above and stellate hairy beneath; petioles up to 2.5 cm long, hairy. Flowers in terminal cymes. Buds 2 mm long; constricted in the middle, pubescent. Sepals free, linear, pubescent, up to 2 mm long. Petals spathulate, obtuse, glabrous, up to 1.8 mm long. Stamens-5. Fruits globose to ovoid, up to 5 mm across; bristles hairy on one side, apex hooked.

Fl. & Fr. : Sept.-Dec.

Distrib. : India, Sri Lanka and Trop. Africa.

Specimens examined : Kechki, 879.

Notes : Not very common, in scrub-forest.

2. **Triumfetta pilosa** Roth, Nov. Pl. Sp. 223. 1821; Masters in Hook. f., Fl. Brit. India 1: 394. 1874; Prain, Beng. Pl. 1: 196. 1963 (Rep. ed.); Haines, Bot. Bihar & Orissa 1: 88. 1961 (Rep. ed.); Daniel & Chandrabose in B.D. Sharma & Sanjappa, Fl. Ind. 3: 519. 1993; Banerjee in Fl. W. Bengal 1: 343. 1997.

Undershrubs; stems densely stellate hairy; stellate hair with red bulbous base. Leaves simple, ovate-lanceolate, subcordate, softly stellate hairy both sides, up to 7 × 4 cm; petioles up to 7 mm long; stipules linear. Fruits globose, bristly, breaking into 4-valves; bristle hooked and hairy. Seeds 2 in one cell.

Fl. & Fr. : Dec.-Mar.

Distrib. : Throughout India and Tropical Africa.

Specimens examined : Netarhat, 106.

Notes : Common, in the shady moist places.

Uses : Stem yields a white, silky fibre utilised for coir.

3. **T. rhomboidea** Jacq., Enum. Pl. Carib. 22. 1760; Masters in Hook. f., Fl. Brit. India 1: 395. 1874; Prain, Beng. Pl. 1: 285. 1903 (Rep. 1: 196. 1963) & in Rec. Bot. Surv. India 3: 182. 1905; Haines, Bot. Bihar & Orissa 1: 89. 1961 (Rep. ed.); Santapau in Bull. Bot. Surv. India 3: 21. 1961; Babu, Herb. Fl. Dehra Dun 97. 1977; Daniel & Chandrabose in B.D. Sharma & Sanjappa, Fl. Ind. 3: 520. 1993. *T. bartramia* Linn., Syst. ed. 10. 1044. 1759, (*nom. ambig. & nom. superfl.*); Lay in Ann. Misouri Bot. Gard. 37. 382. 1950; Mathew in Fl. Pl. Kurseong 18. 1981.

Much branched herbs or undershrubs, up to 1 m high. Leaves rhomboid-ovate, acuminate at apex, crenate at margin, 3-5 nerved,

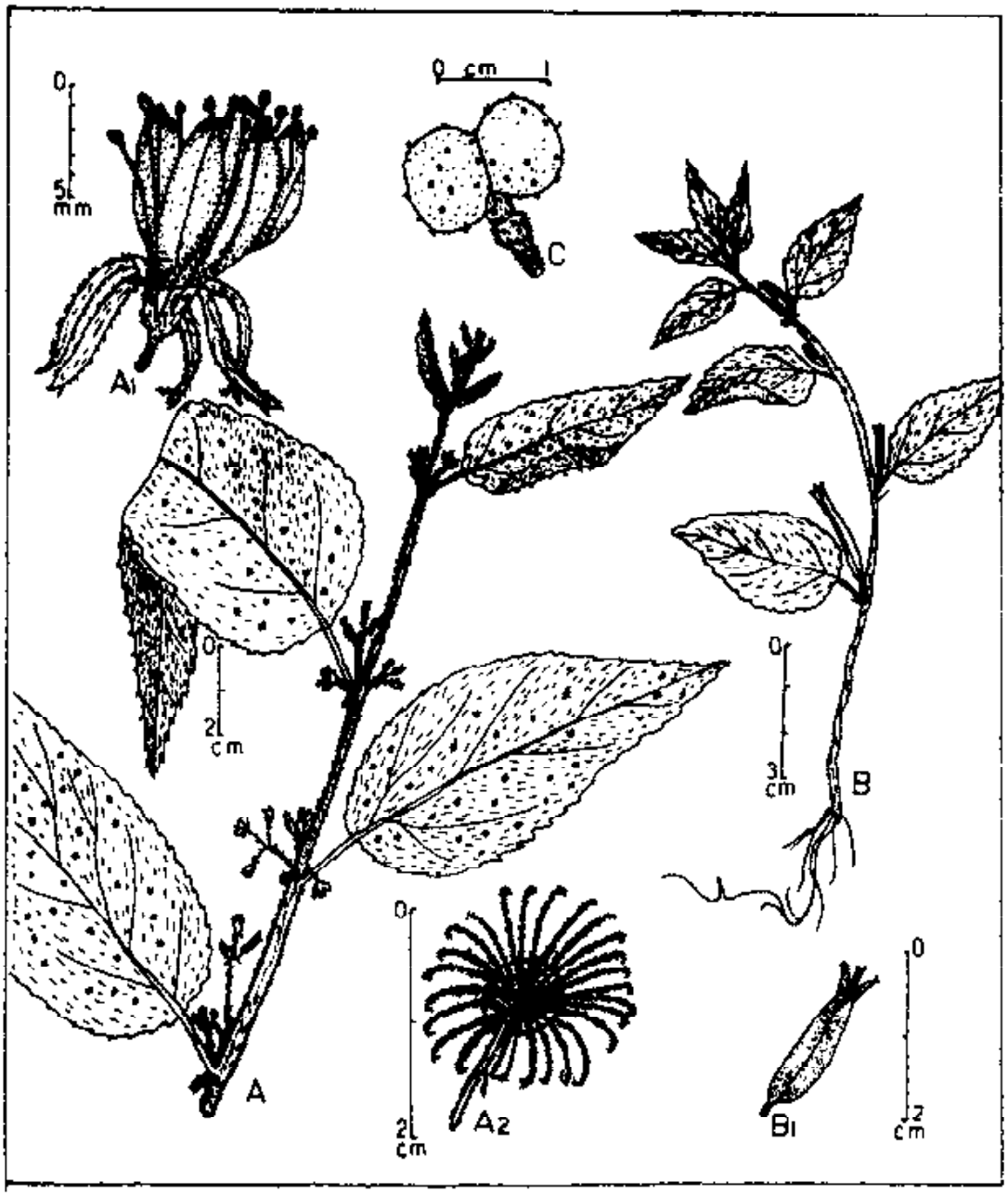


Fig. 11: Tiliaceae (A-A_2): *Triumfetta pilosa* Roth.: A. Flowering twig, A_1. Flower enlarged, A_2. Fruit; (B-B_1): *Corchorus aestuans* L.: B. Fruiting twig, B_1. Fruit; C. *Grewia tiliifolia* Vahl: Fruit.

sometimes 3-lobed, 3-9 × 2.5-7 cm, stellate hairy on both sides. Flowers in axillary clusters, golden yellow. Sepals-5 mm long, oblong, hooded. Petals 4-5 mm long, obovate-oblong. Stamens-10. Fruits 4-5 mm diam., ovoid, with glabrous hooked spines, indehiscent, tomentose.

Fl. & Fr. : Oct.-Jan.

Distrib. : Pantropical.

Specimens examined : Barwadih, 387.

Notes : Common, in waste land, road sides and in the forest undergrowth.

Common name : Beng. : *Bon Okra*; Hindi : *Chikti.*

Uses : Bark yields fibre used for cordage and also used in diarrhoea and dysentery.

LINACEAE

LINUM L.

Linum usitatissimum L., Sp. Pl. 277. 1753; Hook. f. in Hook. f., Fl. Brit. India 1: 410. 1874; Prain, Beng. Pl. 1: 289. 1903 (Rep. ed. 1: 199. 1963) & in Rec. Bot. Surv India 3: 183. 1905; Haines, Bot. Bihar & Orissa 1: 155. 1961 (Rep. ed.); Hajra in B.D. Sharma & Sanjappa, Fl. Ind. 3: 580. 1993; Paul & Das in Fl. W. Bengal 1: 348. 1997.

Annual herbs, up to 30 cm high, glabrous; stems corymbosely branched from the base, striate. Leaves sessile, linear-lanceolate, up to 3.1 × 0.3 cm, acute at apex. Flowers blue, 5-8 mm across, in corymbose leafy-panicle; pedicels up to 2.5 cm long. Capsule globose, 5-7 mm across, 5-valved. Seeds ovoid-oblong, compressed, up to 3 × 1.5 mm, acute at apex.

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

Distrib. : Throughout India and Western Asia.

Specimens examined : Netarhat, 216.

Notes : Common, cultivated, often found as an escape from the cultivation, near the river bed.

Common name : Beng. : *Masina, Tisi*; Hindi : *Alsi.*

Uses : Commercial "Linseed oil" is extracted from the seed.

ZYGOPHYLLACEAE

1a. Prostrate herbs; leaves paripinnate; cocci of the with unequal spines .... 2. TRIBULUS

1b. Shrubs; leaves 2-foliolate; fruit without cocci and spines .... 1. BALANITES

1. BALANITES Delile.

Balanites aegyptiaca (L.) Delile., Fl. Aegypt. 3: 263, 5. 28, f. 1. 1813; Bhandari, Fl. Ind. Desert 94. 1978. *Ximenia aegyptiaca* Linn., Sp. Pl. 1134. 1753. *Balanites roxburghii* Planch. in Ann. Sci. Nat. 4(2): 258. 1854; Bennett in Hook. f., Fl. Brit. India 1: 522. 1875; Haines, Bot. Bihar & Orissa 1: 160. 1961 (Rep. ed.).

Large shrubs or small trees; stems grey-green, armed with axillary or supra axillary thorns; branches puberulous, ending in very strong sharp spines. Leaves 2-foliate; leaflets obovate, coriaceous, puberulous, obtuse-apiculate at apex, tapering at base, margin entire, 1.8-3 × 0.8-1.4 cm. Flowers in 4-10 flowered axillary cymes. Sepals and petals ovate or oblanceolate, velvety pubescent. Fruits oval, up to 5 cm long, woody, slightly 5-grooved.

Fl. : Feb.- May (not seen); *Fr.* : Nov.-Dec.

Distrib. : Drier parts of India, Myanmar, Trop, and Northern Africa.

Specimens examined : Muhammadganj, 1007.

Notes : Very common, in the waste land and in low scrub jungle.

Common name : Hindi : *Hingan*; Khraw : *Engum.*

Uses : Ripe fruits are used for whooping cough and skin troubles.

2. TRIBULUS L.

Tribulus terrestris L., Sp. Pl. 387. 1753; Edgeworth & Hook. f. in Fl. Brit. India 1: 423. 1874; Keay in Hutch. & Dalz., Fl. W. Trop. Afr. ed. 2.1: 361. f. 129. 1958; Haines, Bot. Bihar & Orissa 1: 159. 1961 (Rep. ed.); Guha Bakshi, Fl. Murshidabad Dist. 76. 1984; Malick, Fl. W. Bengal 1: 355. 1997.

Small, procumbent herbs; branches pubescent, up to 30 cm long. Leaves opposite, in unequal pairs, larger leaves up to 2 cm long; leaflets 4-6 pairs, paripinnate, oblong, up to 7 × 2.5 mm, acute at apex, oblique at base, pubescent; petiolules up to 0.6 mm long, hairy. Flowers solitary, axillary or leaf opposed. Petals-5, yellow, oblong, up to 5 mm long. Fruits 5, angled, globose, hairy with 2 very sharp rigid spines and 2 shorter ones on each cocci.

Fl. & Fr. : Aug.-Nov.

Distrib. : India and hoter parts of the World.

Specimens examined : Muhammadganj, 1028.

Notes : Common, along the railway line, and dry waste places.

Common name : Beng. : *Gokhura*; Hindi : *Gokhru*.

GERANIACEAE

GERANIUM L.

Geranium mascatense Boiss., Diagn. 1: 59. 1842; Babu, Herb. Fl. Dehra Dun 100. 1977. *Geranium ocellatum* Camb. in Jacq., Voy. Bot. 33. t. 38. 1844; Edgeworth & Hook. f. in Fl. Brit. India 1: 433. 1874; Haines, Bot. Bihar & Orissa 1: 161. 1961 (Rep. ed.).

A small herb, with short, rather woody stem, hoary pubescent. Leaves alternate, cut about 3/4th into obovate or cuneate lobes, 3-5 lobed; lobules with few teeth; petioles 2.8 cm long, hairy. Peduncle among radical leaves, short, 1-2 flowered, umbellate, sometimes puduncle slender 1.5 cm long; bracts lanceolate, hairy, acuminate, strongly 3-nerved. Sepal-5, connate

below, hairy. Petals-5, alternating with 5 glands, obcordate, up to 8 mm long. Fruits 5-celled, 5-lobed capsule, splitting ventrally, beak coiling elastically, 1-5 cm long (including beak), each cell containing one ovule. Seeds black, slightly trigonous, surface rough.

Fl. & Fr. : Dec.-Apr.

Distrib. : India, Nepal, Afghanistan.

Specimens examined : Netarhat, 121.

Notes : Common, only at higher elevation.

OXALIDACEAE

1a. Leaves pinnate; capsule globose to ellipsoid .... 1. BIOPHYTUM

1b. Leaves 3-foliolate; capsule oblong .... 2. OXALIS

1. BIOPHYTUM DC.

1a. Stems short; pedicels shorter than sepals .... 2. *B. sensitivum*

1b. Stems long; pedicels longer than sepals .... 1. *B. reinwardtii*

1. Biophytum reinwardtii (Zucc.) Klotz. in Peters, Reise Mossamb. Bot. 1: 85. 1862. Edgeworth & Hook. f. in Fl. Brit. India 1: 437. 1874; Babu, Herb. Fl. Dehra Dun 102. 1977; Ghara, Fl. W. Bengal 1: 372. 1997. *Oxalis reinwardtii* Zucc. Abh. Ak. Wiss-Munich 1: 274. 1830. *Biophytum reinwardtii* var. *metziana* Edgew. & Hook. f. in Fl. Brit. Ind. 1: 438. 1874.

Erect, hairy, annual herbs, up to 14 cm high. Leaves even pinnate, rachis up to 4 cm long; leaflets 5-8 pairs, subsessile, gradually decreasing in size, very rapidly towards base, upper one up to 9 mm long and the lowest one up to 2 mm long. Flowers in pseudo-umbellate clusters, on 1-3 cm long peduncles. Sepal lanceolate acute. Petals yellow, spathulate. Capsule globose, up to 3 mm long. Seeds spiral furrowed.

Fl. & Fr. : Aug.-Dec.

Distrib. : Throughout the tropical part of India, China and Java.

Specimens examined : Barwadih, 40.

Notes : Common on the dry hill slopes and dry waste area.

Common name : Santal : *Lajauri.*

Uses : Leaves and roots used for insomnia.

2. **Biophytum sensitivum** (L.) DC., Prodr. 1: 690. 1824; Edgeworth & Hook. f. in Fl. Brit. India 1: 436. 1874; Prain, Beng. Pl. 1: 295. 1903 (Rep. ed. 204. 1963) & in Rec. Bot. Surv. India 3: 183. 1905; Haines, Bot. Bihar & Orissa 1: 161. 1961 (Rep. ed.) Ghara, Fl. W. Bengal 1: 372. 1997. *Oxalis sensitiva* Linn., Sp. Pl. 1: 434. 1753.

Annual, up to 20 cm high herbs; stems erect, simple, usually unbranched, hairy. Leaves crowded at stem apex, sensitive, closed at night, up to 7 cm long; rachis slender, hairy; leaflets 8-14 pairs, gradually becoming larger towards tip of rachis, about 10-13 × 4-5 mm, subsessile, oblong, apex rounded and apiculate, base truncate. Peduncles few to many, up to 8 cm long, hairy. Flowers in pseudoumbellate clusters at apex of peduncles, up to 8 mm across, dimorphic; pedicels 2-3 mm long, subtended by lanceolate bracts. Sepals 5 mm long, parallel nerved, lanceolate, sub-acuminate and pinkish at apex. Corolla much exceeding sepals; lobes rounded, yellow, spreading. Capsule shorter than persistent calyx, ellipsoid, apiculate. Seeds ellipsoid, 0.7 mm long, with transverse tubercled ridges.

Fl. & Fr. : Nov.-Mar.

Distrib. : India, Sri Lanka, Thailand, China, Malaysia and Tropical Africa.

Specimens examined : Daltonganj, 296.

Notes : Common, in the shady places and river bank.

Common name : Beng. : *Jhalai*; Handi : *Lakchana.*

Uses : Leaves are given to the children to induce sleep by the Kols & Santals.

OXALIS L.

1a. Stems hairy; leaflets obcordate; flowers yellow .... 1. *O. corniculata*

1b. Stems glabrous; leaflets obtriangular; flowers bluish .... 2. *O. richardiana*

1. Oxalis corniculata L., Sp. Pl. 435. 1753; Edgeworth & Hook. f., in Fl. Brit. India 1: 436. 1874; Calder in Rec. Bot. Surv. Ind. 6: 331. 1912; Haines, Bot. Bihar & Orissa 1: 162. 161 (Rep. ed.); Ghara, Fl. W. Bengal 1: 373. 1997.

Erect, ascending or creeping herbs; stems rooting, hairy. Leaves palmately 3-foliolate; petioles 2-6 cm long, hairy; stipules small, lanceolate, hairy; leaflets obcordate, subsessile, cuneate at base. Flowers yellow, 4-6 mm across, umbellate clusters; peduncle about 2-flowered, shorter than leaves; pedicels reflexed in fruit. Capsule narrowly oblong, pubescent, up to 1.5 cm long.

Fl. & Fr. : Throughout the year.

Distrib. : Cosmopolitan.

Specimens examined : Betla, 43.

Notes : Common, in waste places and wet area.

Common name : Beng. : *Amrul, Ambali;* Hindi : *Amboti;* Santal : *Tandi Chatom arak.*

Uses : Leaves used to improve appetite and digestion of dyspeptic patients.

2. O. richardiana Babu, Herb. Fl. Dehra Dun 104. 1977; Mukherjee in Fl. Pach. Bori Res. 56. 1984. *Oxalis intermedia* A. Rich., Ess. Fl. Cuba 315. 1845 (non Steud. 1841). *Oxalis latifolia* (Auct. pl. non, H.B. & K. 1821); Calder in Rec. Bot. Surv. Ind. 6: 337. 1912.

Perennial, glabrous, acaulescent herbs with bulbous rootstocks. Leaves 3-foliate; leaflets obtriangular, up to 1.8 × 3.5 cm, truncate or slightly retuse at apex, cuneate at base; petioles 10-20 cm long. Flowers in few flowered umbels; peduncles 12-30 mm long, hairy; pedicels 1-5 cm long. Sepals with 2 glands at apex. petals obovate-cuneate, purple. Style glabrous.

Fl. & Fr. : July-Nov.

Distrib. : India.

Specimens examined : Netarhat, 804.

Notes : Common, at the margins of cultivated land.

BALSAMINACEAE

IMPATIENS L.

Impatiens balsamina L., Sp. Pl. 938. 1753; Hook. f. in Fl. Brit. India 1: 453. 1874; Haines, Bot. Bihar & Orissa 1: 163. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 105. 1977; Mukherjee in Fl. Pach. Bori Res. 56. 1984; Ghara, Fl. W. Bengal 1: 361. 1997.

Annual herbs, up to 80 cm high. Leaves alternate, 4-10 × 1.5 cm, elliptic-lanceolate, acute at both ends, serrate at margin; petioles glandular. Flowers pink or rose, axillary, solitary or 3-flowered fascicled. Lateral sepals broad, ovate; lip saccate, with a short spur. Standard broad, rounded, aristate; wings unequally 2-lobed. Capsule tomentose, up to 2 cm long, ovoid-ellipsoids, elastically opening upwards by 5-valves. Seeds glabrous.

Fl. & Fr. : July-Oct.

Distrib. : Throughout India, native of S.E. Asia.

Specimens examined : Netarhat, 865.

Notes : Common, in the waste places and in the villages, escaped from garden.

Common name : Beng. : *Dopati*; Hindi : *Gul-mendhi.*

RUTACEAE

1a. Ovules 1-2 in each locule :

2a. Petals-0 .... 5. ZANTHOXYLUM

2b. Petals present :

3a. Fruit 6-8 mm diam., apiculate .... 4. MURRAYA

3b. Fruit 4-8 cm diam., not apiculate .... 3. LIMONIA

1b. Ovules many in each locule :

4a. Leaves 1-foliolate; petiole margined .... 2. CITRUS

4b. Leaves 3-foliolate; petiole not margined .... 1. AEGLE

1. AEGLE CORR.

Aegle marmelos (L.) Corr. in Trans. Linn. Soc. 5: 223. 1800; Hook. f. in Fl. Brit. India 1: 516. 1875; Haines, Bot. Bihar & Orissa 1: 173. 1961 (Rep. ed.); Prain, Beng. Pl. 1: 212. 1963 (Rep. ed.); Ghosh, Fl. W. Bengal 1: 379. 1997. *Crateva marmelos* L., Sp. Pl. 444. 1753.

A small, deciduous, glabrous tree, with up to 3 cm long, straight, axillary spines. Leaflets usually-3, elliptic or ovate-lanceolate, lateral sessile and terminal stalked, up to 7 × 4 cm, gland dotted. Flowers up to 2 cm across, greenish-white, sweet-scented. Pedicels and calyx pubescent. Filaments often fascicled. Fruits 4-7 cm in diam., globose. Seeds embedded in a clear mucilage and yellow sweet aromatic pulp.

Fl. & Fr. : May-Aug.

Distrib. : Throughout India also ascending 4000 ft. on the Western Himalaya, Myanmar, Thailand to Vietnam, Malaysia.

Specimens examined : Garu, 544.

Notes : Common, in the forest and in the dry hill slopes, also as cultivated form (in cultivated form spines often wanting).

Common name : Bengali, Hindi : *Bel*; Santal : *Sinjo*.

Uses : Medicinal properties of the fruits are well known. The pulp of the ripe fruit is eaten as food or when diluted with water it makes a refreshing drink. The root, bark and leaves are also used medicinally; a good gum exuded from the stem. Amongst the Hindus the 'Bel' is considered as one of the most sacred of Indian trees.

2. Citrus L.

Citrus limon (L.) Burm. f., Fl. Ind. 179. 1768; Bailey in Man. Cult. Pl. 609. 1963 (Rep. ed.); Press in Enum. Fl. Pl. Nep. 2: 81. 1979. *Citrus medica* ssp. *limon* L., Sp. Pl. 782. 1753. *Citrus limonum* Risso in Ann. Muss. Par. 20: 201. 1813. *Citrus medica* var. *limonum* Hook. f. in Fl. Brit. India 1: 515. 1875.

Small, glabrous shrubs, up to 1.8 m high; stems woody provided with 4-5 mm long thorn. Leaves pale green, elliptic-ovate, obtuse at apex, serrate; petioles 1-1.5 cm long, margined, articulated at top. Flowers solitary or clustered at axil, white; pedicels 5-8 mm long. Calyx campanulate with short 5, acute teeth. Petals twisted out side, slightly fleshy. Stamens-20. Ovary tapering above.

Fl. : Mar.-June.

Distrib. : Throughout Asia.

Specimens examined : Daltonganj, 8.

Notes : Common, behind the D.M. Bunglow, cultivated, often as an escape.

Common name : Beng. : *Lebu*; Hindi : *Baranibu*.

Uses : Fruits are edible.

3. Limonia L.

Limonia acidissima L., Sp. Pl. ed. 2. 554. 1762; Airy Shaw in Kew Bull. 293. 1939; Haines, Bot. Bihar & Orissa 1: 168. 1961 (Rep. ed.); Ghosh, Fl. W. Bengal 1: 383. 1997. *Schinus limonia* (L.), Sp. Pl. 389. 1753. *Feronia limonia* (L.) Swingle in J. Washington Acad. Sci. 4: 328. 1914; Tanaka in J. Indian Bot. Soc. 16: 232. 1937. *Feronia elephantum* Corr. in Trans. L. Soc. 5: 225. 1800; Hook. f. in Fl. Brit. India 1: 516. 1875.

Large trees, armed with spines. Bark grey, shallowly furrowed; spines 1.2-3 cm long, strong, straight, tips yellowish. Leaves alternate and in axil 2-4 in clusters, glabrous, rachis winged; leaflets 3-9, obovate, 2.5-4.5 × 1-

2.5 cm, tip apex slightly notched or not, cuneate at base; petiolules up to 2 mm long. Panicles many flowered. Calyx small with triangular lobes. Petals up to 5 mm long, free, elliptic-oblong. Anthers red. Fruit 4-8 cm diam., pericarp woody.

Fl. & Fr. : June-Dec. Exotic

Distrib. : Native of Europe, widely distributed throughout India, Sri Lanka and Java.

Specimens examined : Mahuamilan, 685.

Notes : Common in the forests, but often found as an avenue trees.

Common name : Beng. : *Kodbel;* Hindi : *Beli;* Santal : *Belsian.*

Uses : Wood used for cart axles and as walking sticks, also used for tool handles. Fruit occasionally used as condiment, regarded as tonic and stomachic and useful in malignant and pestilent fevers.

Remarks : *Limonia* L. (1762) is monotypic. For a long period *Limonia* L., was rejected as an orthographic variant of the Plumbagenaceous genus *Limonium* Mill. (1754). The legitimacy of *Limonia* L. is uphold by ICBN. According to Panigrahi (Taxon, 26: 576. 1977) *L. acidissima* L. should be rejected as *nomen ambiguum* and *L. elephantum* (Correa) Panigrahi should be used as a correct name.

4. MURRAYA L. *nom. cons.*

1a. Shrubs; leaflets entire, acute, not scented; fruit oblong .... 2. *M. paniculata*

1b. Trees; leaflets crenate-serrate, acuminate, strongly scented; fruit subglobose .... 1. *M. koenigii*

1. Murraya koenigii (L.) Spreng., Syst. Veg. 2: 315. 1825; Hook f. in Fl. Brit. India 1: 503. 1885; Haines, Bot. Bihar & Orissa 1: 170. 1961 (Rep. ed.); Ghosh, Fl. W. Bengal 1: 386. 1997. *Bergera koenigii* L., Mart. 1: 565. 1767.

Small trees, up to 5 m high, strong smelling. Leaves up to 30 cm long; leaflets 10-25, subopposite or alternate, 1.5-4 × 0.8-1.5 cm, elliptic-ovate

or elliptic-lanceolate or rhomboid, acuminate at apex, margin irregularly crenate-serrate, cuneate at base; petiolules up to 2 mm long. Flowers slightly fragrant, white, in much branched, terminal, short peduncled, corymbose cymes; peduncles and pedicels pubescent. Sepals pubescent, triangular, acute. Petals linear-oblong, up to 6 mm long, gland dotted. Staminal filament dilated at base. Ovary 2-celled; style cylindric; stigma capitate, grooved. Fruits ovoid or subglobose, 6-8 mm diam, apiculate, 2-seeded, surface rough due to gland, black when ripe.

Fl. & Fr. : Apr.-July.

Specimens examined : Mahuamilan, 669.

Distrib. : India, Myanmar and Sri Lanka.

Notes : Commonly cultivated for its leaves but rarely found as an escape in the forest edge.

Common name : Beng. : *Barsanga, Karrypatta*; Hindi : *Kathrim, Karrypatta.*

Uses : Leaves edible and used as a flavouring agent. Fruits edible. Leaves, roots and bark tonic, stomachic and carminative. Leaves used for diarrhoea, dysentery and for checking vomiting. Wood used for agricultural implements.

2. M. paniculata (L.) Jacq. in Mal. Misc. 1(5): 31. 1820; Tanaka in J. Indian Bot. Soc. 16: 231. 1937; Gandhi in Sald. & Nicol.; Fl. Hassan 386. 1976; Mukherjee in Fl. Pach. Bori Res. 59. 1984; Guha Bakshi in Fl. Murshidabad Dist. 82. 1984; Ghosh, Fl. W. Bengal 1: 366. 1997. *Chalcas paniculata* L., Mant. 1: 68. 1767. *Murraya exotica* L., Mant. 2: 563. 1771; Hook. f. in Fl. Brit. India 1: 502. 1875; Haines, Bot. Bihar & Orissa 1: 170. 1961 (Rep. ed.).

Large shrubs, up to 3 m high. Leaflets 5-7, up to 5.5 × 3 cm, ovate or elliptic-ovate, obtuse or acute at apex, often oblique at base, shining above; petiolules up to 3 mm long, tomentose. Flowers axillary or in terminal corymbose cymes, up to 2 cm long, white, fragrant. Calyx tomentose, lobes lanceolate, up to 3 mm long. Petals oblong lanceolate, hairy without. Fruits up to 1.5 cm long, red or orange-yellow, ellipsoid, apiculate, 1-2 seeded, seated on persistent calyx.

Fl. & Fr. : Oct.-Jan.

Distrib. : India to Malaya, Now pantropical.

Specimens examined : Palamau fort (Betla), 1120.

Notes : Common, cultivated in garden, often found as an escape.

Common name : Beng. & Hindi : *Kamini;* Santal : *Athel.*

Uses : Leaves used for diarrhoea and dysentery, and leaf juice applied to cuts.

5. ZANTHOXYLUM L.

Zanthoxylum armatum DC., Prodr. 1: 727. 1824; Harley in Journ. Arnold Arb. 47: 221. 1966; Babu in Bull. Bot. Surv. Ind. 16: 53. 1977; Ghosh, Fl. W. Bengal 1: 389. 1997. *Zanthoxylum alatum* Roxb., Fl. Ind. 3: 768. 1832; Hook. f. in Fl. Brit. India 1: 493. 1875.

Small, pungently aromatic trees, with prickles on trunks and branches. Leaves unequally pinnate; leaflets 2-6 pairs, lanceolate, up to 4.2 × 2 cm, acute at apex, cuneate at base, margin crenate-serrate, with many glands, glabrous, secondary nerves prominent; petioles and rachis broadly winged, petioles with 2 stipular spines at base. Flowers yellow, in lax panicles. Calyx with 6-8 acute segments. Petals-0. Stamens 6-8. Fruits globose, up to 1 cm across, reddish.

Fl. & Fr. : June-Oct.

Distrib. : India & Bhutan.

Specimens examined : Panki, *Sarma* 967.

Notes : Not common, in the forest.

Common name : Beng. : *Gaira*; Hindi : *Darmar.*

Uses : Fruits used for dental troubles and young branches used as tooth brush by the local people.

FLINDERSIACEAE

CHLOROXYLON DC.

Chloroxylon swietenia DC., Prodr. 1: 625. 1834; Hiern in Hook. f., Fl. Brit. India 1: 569. 1875; Haines, Bot. Bihar & Orissa 1: 179. 1961 (Rep. ed.); Prian, Beng. Pl. 1: 224. 1963 (Rep. ed.); Gandhi in Sald. & Nicol., Fl. Hassan 383. 1976.

A small, moderate-sized tree, with corky bark. Leaves paripinnate, green glaucous; leaflets 10-15 pairs, alternate, gland-dotted, up to 32 × 16 mm, oblong-lanceolate, or rhomboid-oblong, obtuse at apex, oblique at base, membranous; petiolules 2-3 mm long. Flowers white, in terminal and axillary panicles. Peduncles 6-10 cm long, with short branches. Petals spreading, clawed. Stamens-10, free, inserted in the depression of 10-lobed disc. Ovary sunk in the disc, 3-lobed. Capsule 3-gonous, ovoid or oblong, 3 × 1.5 cm.

Fl. & Fr. : Apr.-July.

Distrib. : India & Sri Lanka.

Specimens examined : Betla, 465.

Notes : Common, in the forest & hill slopes.

Common name : Hindi : *Bhira*; Santal : *Bhorhul.*

Uses : Wood resistant to the termite and used for various purposes. Fruits edible.

SIMAROUBACEAE

AILANTHUS Desf.

Ailanthus excelsa Roxb., Pl. Cor. 1. t. 23. 1795; Bennett in Hook. f., Fl. Brit. India 1: 518. 1875; Haines, Bot. Bihar & Orissa 1: 174. 1961 (Rep. ed.); Malick, Fl. W. Bengal 1: 390. 1997. *Pongelion wightii* van Tiegh in Ann. Sc. Nat. 9(4): 277. 1906.

Large trees, with stout, hoary-tomentose branchlets. Leaves up to 80 cm long; rachis hoary tomentose; leaflets up to 12 pairs, falcate, lanceolate, up to 14.5 × 5.5 cm, base unequal, apex acuminate, coarsely toothed, densely pubescent on both surfaces, secondary nerves 10-12; petiolules up to 2 cm long, hairy. Flowers whitish-yellow, in large, lax, often branched panicles. Petals ovate lanceolate, often reflexed. Filaments half the length of anthers. Samara up to 5 cm long, tapering at both end, twisted at base, strongly nerved, reddish.

Fl. & Fr.: Jan.-May.

Distrib. : India and Queensland.

Specimens examined : Garwah, 853.

Notes : Very common, throughout the district, as avenue tree and often common in the forests.

Common name : Beng : *Mahanim;* Hindi : *Maharuk, Pirnim;* Khraw : *Grar Karanj.*

Uses : Wood used for packing cases, toys and match boxes. Bark anthelmintic and also used in veterinary practices.

BURSERACEAE

1a. Flowers with a campanulate hypanthium; fruits globose .... 2. GARUGA

1b. Flowers with a small cupular calyx; fruits trigonous .... 1. BOSWELLIA

1. BOSWELLIA Roxb. ex Colebr.

Boswellia serrata Roxb. ex Colebr. in Asiat. Res. 9: 379. t. 5. 1807; Bennett in Hook. f., Fl. Brit. India 1: 528. 1875; Ramam. in Sald. & Nicol., Fl. Hassan 370. 1976; Haines, Bot. Bihar & Orissa, 1: 177. 1961 (Rep. ed.); Datta, Fl. W. Bengal 1: 395. 1997. *Boswellia serrata* var *glabra* (Roxb.) Bennett in Hook. f., Fl. Brit. Ind. 1: 528. 1875. *Boswellia glabra* Roxb., Pl. Corm. t. 207. 1811; Gamble, Fl. Pres. Madr. 168. 1915.

Deciduous trees, with reddish bark, pulling off in thin flakes. Leaves exstipulate, up to 45 cm long; leaflets opposite, sessile, oblong-ovate, coarsely crenate-serrate, 1-4 cm long. Panicles pubescent, at tip of

branches; flower 5-merous. Calyx cupular, 5-lobed, villous. Petals white, oblong-ovate, shortly clawed; disc scarlet, fleshy, papillose. Anthers sagittate, introrse. Drupes 1-1.5 cm long, 3-gonous, with 3 valves and 3 winged hard pyrenes.

Fl. & Fr. : Jan.-Mar.

Distrib. : India & Trop. Africa, also in Myanmar, Malaya and Philippines.

Specimens examined : Netarhat, 235.

Notes : Common, in the mixed forest.

Common name : Beng & Hindi: *Salai.*

Uses : The wood is used for charcoal and making newsprint and other paper. Tree yields a gum resin "Indian olibanum".

2. GARUGA Roxb.

Garuga pinnata Roxb., Pl. Cor. 3: 5, t. 208. 1819; Bennett in Hook. f., Fl. Brit. India 1: 528. 1875; Kalkman in Blumea 7: 468. 1953. Haines, Bot. Bihar & Orissa 1: 176. 1961 (Rep. ed.); Ramam. in Sald. & Nicol., Fl. Hassan 372. 1976; Dutta, Fl. W. Bengal 1: 397. 1997.

Trees, up to 10 m high. Leaves 20-45 cm long; leaflets 6-10 pairs, 2-12 x 1.5-3.5 cm, sparsely pubescent on nerves beneath, ovate-lanceolate or oblong-lanceolate, acuminate at apex, rounded at base, some times slightly oblique. Flowers yellow, in 10-15 cm long panicle. Calyx up to 6 mm long; segments ovate-oblong, obtuse. Petals up to 5 mm long, linear-oblong, tip inflexed. Drupe up to 1.8 × 1.1 cm, green, glabrous. Seeds-3, flattened, margin winged.

Fl. & Fr. : Mar.-Aug.

Distrib. : Throughout India, Myanmar, Malaysia and Philippines.

Specimens examined : Betla, 526.

Notes : Not common, in the forest.

Common name : Beng : *Jum, Dabdabe*; Hindi : *Kekar, Kharpat*, Ghogar; Santal : *Kandwer*.

MELIACEAE

1a. Ovules many in each locule; seeds winged :

2a. Stamens united into a tube; capsule more than 5 cm long .... 4. SWIETENIA

2b. Stamens not united into tube; capsule less than 5 cm long ... 5. TOONA

1b. Ovules 1-2 in each locule; seeds without wing :

3a. leaflets serrate; petals spreading :

4a. Leaves unipinnate .... 2. AZADIRACHTA

4b. Leaves bipinnate .... 3. MELIA

3b. Leaflets entire; petals not spreading .... 1. APHANAMIXIS

1. APHANAMIXIS Blume

Aphanamixis polystachya (Wall.) Parker in Indian For. 57: 486. 1931; Harms in Engler & Prantl, Pfl. Fm. 19(b)(I) : 127. 1940; Santapau in Rec. Bot. Surv. India ed. 3. 16: 37. 1967; Bennet, Fl. Howrah 199. 1979; Manna, Fl. W. Bengal 1: 399. 1997. *Aglaia polystachya* Wall. in Roxb., Fl. Ind. 2: 429. 1824. *Amoora rohituka* (Roxb.) Wt. & Arn., Prodr. 1: 119. 1834; Hiern in Hook. f., Fl. Brit. India 1: 559. 1875; Prain, Bengal Pl. 1: 316. 1963 (Rep. ed. 1: 220. 1963) & Rec. in Bot. Surv. India 3: 186. 1905; Haines, Bot. Bihar & Orissa 1: 185. 1961 (Rep. ed.). *Andersonia rohituka* Roxb. (Hort. Beng. 87. 1814. *nom. nud.*) Fl. Ind. 2: 213. 1832.

Small or medium sized trees, with low spreading, crown of large, dark-green, glabrous, pinnate leaves; leaflets up to 22 × 7 cm, slightly falcate, opposite, 4-8 pairs, elliptic-oblong, acuminate at apex. Acute to obtuse at base, nerves 12-14 pairs, impressed above. Female flower in axillary or supra-axillary, solitary spikes. Capsule 2.5-3 cm long, 3-valved. Seeds oblong with scarlet aril.

Fl. & Fr. : Dec.-Mar.

Distrib. : India, Malaya and Sri Lanka, native of India.

Specimens examined : Netarhat, 148.

Notes : Cultivated, as avenue tree, collected from the way to Netarhat Public School.

Common name : Beng: *Royna, Tiktaraj* or *Patraj*; Hindi : *Harin Hara.*

Uses : Bark used in liver disease, spleen and for abdominal complaints. Wood used for various purposes.

AZADIRACHTA A. Juss.

Azadirachta indica A. Juss. in Mem. Mus. Par. 19: 221. 1830; Haines, Bot. Bihar & Orissa 1: 182. 1961 (Rep. ed.); Santapau in Fl. Saura. Pt. 1: 87. 1962; Manna, Fl. W. Bengal 1: 399. 1997. *Melia azadirachta* Linn., Sp. Pl. 385. 1753; Hiern. in Hook. f., Fl. Brit. India 1: 544. 1875.

Medium sized trees, up to 20 m tall. Leaves 20-30 cm long, crowded at the end of branches; leaflets opposite, subopposite or alternate, falcate, oblique at base, acuminate at apex, margin crenate-serrate or toothed, lateral ones sessile to sub sessile, terminal one with long petiolule, up to 4 cm. Flowers white, up to 0.8 mm diam, fragrant, in axillary panicles. Calyx lobes obtuse. Petals up to 5 mm long, linear oblong, obtuse at apex. Drupe up to 1 cm long, oblong, yellow when ripe.

Fl. & Fr. : Mar.- July.

Distrib. : Native of Myanmar, also in India, Sri Lanka, South East Asia.

Specimens examined : Daltonganj, 833.

Notes : Commonly planted in the villages and along road sides.

Common name : Beng & Hindi : *Nim.*

Uses : Bark used in skin diseases. Leaves are eaten and considered as antiseptic. Young stems used as tooth brush. Seeds yield a oil called 'Nim oil' used in soap, and tooth paste. Wood largely used for house building purposes, musical instruments (Tabla) and plough.

3. MELIA L.

Melia azedarach L., Sp. Pl. ed. 1. 384. 1753; Hiern. in Hook. f., Fl. Brit. Ind. 1: 544. 1875; Haines, Bot. Bihar & Orissa 1: 183. 1961 (Rep. ed.); Manna, Fl. W. Bengal 1: 404. 1997.

Moderate sized, deciduous trees. Bark dark grey with longitudinal furrows; young shoots often rusty tomentose. Leaves usually bipinnate; leaflets lanceolate, acuminate, up to 5 × 1.5 cm, margin serrate, glabrous. Flowers lilac, fragrant, in axillary panicles. Calyx deeply 5-lobed. petals puberulent. Anthers-10, included on or near margin of tube. Drupe ellipsoid-globose, up to 1 cm long. Seeds-4-5.

Fl. & Fr. : May-Dec. Exotic

Distrib.: India, Myanmar, China, probably a native of W. Asia.

Specimens examined : Daltonganj, 832.

Notes : Not common, planted.

Common name : Beng : *Ghoranim*; Hindi : *Bakain*; Santal : *Bokom baha*.

Uses : Wood used for agricultural implements and in plywood industries. Leaf juice used as anthelmintic. Fruits poisonous and used in leprosy.

4. SWIETENIA L.

Swietenia mahagoni Jacq., Enum. Pl. Carib. 20. 1760; Haines, Bot. Bihar & Orissa 1: 181. 1961 (Rep. ed.); Manna, Fl. W. Bengal 1: 405. 1997.

Large trees. Bark rugose, grey-black. Leaves paripinnate; leaflets 4-8, up to 4.5 × 2 cm, subfalcate, oblique at base, acuminate at apex. Flowers in axillary or subterminal, glabrous panicles. Calyx small, lobes-5, imbricate. Petals ovate-oblong, up to 4 mm long. Staminal tube yellow, up to 3 mm long, with 10-sharp teeth; anthers-10, apiculate; disc annualr. Ovary 5-locular; style short; stigma discoid.

Fl. : Apr.-May. Exotic.

Distrib. : Central America, West Indies

Specimens examined : Bisrampur, 856.

Notes : Planted as an avenue trees.

Common name : Beng : *Mehogini.*

Uses : Wood used for decorative furniture and also used in plywood industries.

5. TOONA (Endl.) Roemer

Toona ciliata Roem., Syn. Hesp. 139. 1846; Santapau in Bull. Bot. Surv. Ind. 3: 13. 1962; Ramam. in Sald. & Nicol., Fl. Hassan 395. 1976;Deb, Fl. Tripura 453. 1981; Manna, Fl. W. Bengal 1: 406. 1997. *Cedrela toona* Roxb. ex. Rottl. & Willd. in Ges. Naturf. Fr. Neue Schr. 2: 198. 1803; Hiern in Hook. f., Fl. Brit. India 1: 568. 1875; Prain, Beng. Pl. 1: 320. 1903 (Rep. ed. 1: 224. 1963) & in Rec. Bot. Surv. India 3: 187. 1905; Haines, Bot. Bihar & Orissa 1: 179. 1961 (Rep. ed.). *Cedrela toona* var. *listeri* C. DC. in Rec. Bot. Surv. Ind. 3: 370. 1908.

Small trees; branches tomentose. Leaves 25-70 cm long, imparipinnate; leaflets 3-pairs, opposite, glabrous, lanceolate or ovate, acuminate at apex, obtuse at base or slightly oblique; petiolules 6-30 mm long, hairy. Panicle drooping, shorter than leaves. Flowers 2-4 mm long. Perianth hairy. Stamens free. Ovary hairy throughout. Capsule 10-15 mm long, obovoid, punctate with dots. Seeds winged at both ends.

Fl. & Fr. : Mar.-June.

Distrib. : Native of India, now distributd in Myanmar, Malaya & Australia.

Specimens examined : Netarhat, 185.

Notes : Common as avenue tree, also found in the forest.

Common name : Hindi & Beng : *Tun.*

Uses : It yields a good timber.

Remarks : Deb relegated var. *listeri* as a synonym of this species. Nair & Rajan (in Fl. Tamil Nadu ser. 1. 1: 68-69. 1983) recognised three varieties, e.g. var. *latifolia* (C. DC.) Chandr., var. *pilipetala* (C. DC.) Nair & Kumari & var. *pilistila* (C. DC.) Nair & Kumari. As this species is highly variable these three varieties may not stand as distinct taxa and it needs further investigation.

OLACACEAE

OLAX L.

Olax scandens Roxb., Fl. Ind. 1: 169. 1820; Masters in Hook. f., Fl. Brit. India 1: 575. 1875; Prain, Beng. Pl. 1: 226. 1963 (Rep. ed.); Haines, Bot. Bihar & Orissa, 1: 189. 1961 (Rep. ed.); Maity, Fl. W. Bengal 1: 408. 1997.

Scandent evergreen shrub stems & branches with longitudinal striation, pubescent. Leaves up to 11 × 4.5 cm, elliptic-oblong, base rounded, apex obtuse or rounded, pubescent beneath; petioles up to 8 mm long, pubescent. Flowers in solitary, axillary raceme; peduncles puberulous, double the length of the bracts. Flowers small, white. Calyx puberulous. Petals irregularly cleft. Fertile stamens 3-5; staminodes 2-fid. Ovary ovoid-oblong, 1-celled. Fruits ovoid or globose 3/4th covered by the accrescent calyx, up to 8 mm across.

Fl. & Fr. : Nov.-Feb.

Distrib. : India, Myanmar, Sri Lanka & Java.

Specimens examined : Simultarh (Daltonganj), 304.

Notes : Rare, in the forest.

Common name : Beng : *Kokoaru*; Santal : *Hund.*

CELASTRACEAE

CASSINE L.

Cassine glauca (Rottb.) Kuntze., Rev. Gen. Pl. 1: 114. 1891; Ramam. in Sald. & Nicol., Fl. Hassan 318. 1976; Mukherjee in Fl. Pach. Bori Res.

62. 1984; Dutta, Fl. W. Bengal 1: 418. 1997. *Mangifera glauca* Rottb., Nye Saml. Kongel. Norske Vidensk. Selsk. Skr. 2: 354. t. 4. f. 1. 1783. *Elaeodendron glaucum* (Rottb.) Pers., Syn. Pl. 1: 241. 1805; Lawson in Hook. f., Fl. Brit. India 1: 623. 1875; Haines, Bot. Bihar & Orissa 1: 196. 1961 (Rep. ed.).

Small trees. Leaves 5-10 × 3.5-5 cm, opposite to subopposite, orbicular-elliptic, crenate-serrate, acute or acuminate, glabrous, subcoriaceous; petioles upto 12 mm long. Flowers in axillary, dichotomous, branched cymes. Calyx 5 cleft. Petals-5, greenish-white, spreading, oblong, dorsally slightly pubescent. stamens 5, borne on lobes of disc, spreading and finally recurved. Fruits obovoid, woody, tipped at apex with persistent style, up to 12 × 7 mm, one seeded.

Fl. & Fr. : Feb.-July. Fruits often found throughout the year.

Distrib. : India, Malaysia, Sri Lanka.

Specimens examined : Mcclaskeigananj, 667.

Notes : Common, in mixed forest, and on hill slopes.

Common name : Beng : *Chikyeng. Rajjehul*; Hindi : *Jamrassi, Bakra, Dhebri, Chouri*; Kol : *Miri;* Santal : *Niuri.*

Uses : Wood useful in carpentary work. Powdered leaves employed as snuff. Bark and leaves contain tannin and used for tanning purposes. A preparation of bark is given in cholera.

RHAMNACEAE

1a. Plants without tendrils; fruiting calyx hypogynous :

2a. Armed with stipular spines; fruit drupaceous; stamens reflexed .... 4. ZIZIPHUS

2b. Unarmed; fruit samaroid; stamens not reflexed .... 3. VENTILAGO

1b. Plants with tendrils; fruiting calyx epigynous :

3a. Flowers in paniculate racemes; fruits 3-winged .... 1. GOUANIA

3b. Flowers in peduncled cymes; fruits without wing .... 2. HELINUS

1. GOUANIA L.

Gouania tiliaefolia Lam., Encycl. 3: 5. 1789, Merrill in Contr. Arn. Arb. 8: 96. 1934; Sengupta & Safui, Fl. W. Bengal 1: 426. 1997. *Gouania leptostachya* DC., Prodr. 2: 40. 1825; Lawson in Hook. f., Fl. Brit. India 1: 643. 1875; Prain, Beng. Pl. 1: 335. 1903 (Rep. ed. 1: 235. 1963) & in Rec. Bot. Surv. Ind. 3: 188. 1905; Haines, Bot. Bihar & Orissa 1: 205. 1961 (Rep. ed.).

Though climbers; stems with whitish mark. Leaves rough, up to 11 × 7 cm, ovate, acute to subacuminate at apex, coarsely crenate, glabrous above, glandular hairy beneath; nerves 6-7 pairs; petioles up to 3 cm long. Flowers in long, terminal racemes. Capsules 3-winged, broader than length, 10-12 mm broad, tip notched to emarginate.

Fl. & Fr. : Jan.-Mar.

Distrib. : Major part of India, Myanmar, Malaya Penninsula and Java.

Specimens examined : Netarhat, 179; Maromar, 539.

Notes : Common climber on the small trees.

Common name : Hindi : *Munjni*; Santal : *Bitkit Chand.*

2. HELINUS E. Mey. ex Endl.

Helinus lanceolatus Brandis in For. Fl. 574. 1874; Lawson in Hook. f., Fl. Brit. India 1: 644. 1875; Haines, Bot. Bihar & Orissa, 1: 206. 1961 (Rep. ed.); Prain, Beng. Pl. 1: 236. 1963. (Rep. ed.); Babu, Herb. Fl. Dehra Dun 107. 1977.

Slender, twining shrubs, glabrous; stems with reddish striation, ending in a tendril. Leaves oblong-lanceolate, mucronate, entire, rounded or subcordate at base, glaucous, up to 6 × 2.4 cm, gradually smaller towards apex, basally 3- nerved; stipules small ovate, rounded, hairy. Flowers pale-yellow in umbellate clusters. Calyx triangular, small. Petals-5, oblong, whitish, folded round the stamens. Stamens inserted on the free margin of the disc with exserted anthers. Ovary 3-celled; style 3-cleft. Fruits globose, with crown of small calyx, 3-seeded.

Fl. & Fr. : Jan.-May.

Distrib. : North India to Africa.

Specimens examined : Netarhat, 227.

Notes : Rare, along the sides of rocky stream, near the Koel point.

3. VENTILAGO Gaertner

Ventilago denticulata Willd. in Ges. Naturf. Fr. Neue Schr. 3: 417. 1801; Oza in J. Bombay Nat. Hist. Soc. 13(2): 455. 1966; Banerjee and Mukherjee in Ind. For. 96: 209. 1970; Sengupta & Safui, Fl. W. Bengal 1: 428. 1997. *V. maderaspatana* Roxb., Pl. Corom. 1: 55. t. 76. 1796-98, Wt. & Arn., Prodr. 164 (Non Gaertn. 1788). *V. calyculata* Tul. in Ann. Sci. Nat. Ser. 4, 8: 124. 1857; Lawson in Hook. f., Fl. Brit. India 1: 631. 1875; Haines, Botany Bihar & Orissa 1: 200. 1961 (Rep. ed.). *V. maderaspatana* Gaertn. var. *calyculata* (Tul.) King in J. As. Soc. Beng. 65(2): 579. 1896; Prain, Beng. Pl. 1: 335. 1903 (Rep. ed. 1: 235. 1963); Deb, Fl. Tripura. 1: 406. 1981.

Large, woody climbers, with tomentose branches. Leaves ovate or ovate-elliptic, crenate-serrate or nearly entire, acute at base, nerves 5-7 pair, up to 10.5 × 6 cm; petioles 5-7 mm long. Fruiting calyx slightly perigynous and cup shaped. Flowers in terminal and axillary, leafless panicles, bad smelling. Calyx 5-fid. Petals-5, cucullate. Fruit with linear-oblong wing, up to 6 × 1 cm, having a prominent midrib, pubescent, greenish-yellow, shining, rounded at apex; nut globose, 3-4 mm across, brick red.

Fr. : Feb.-April.

Distrib. : India, Sri Lanka, Myanmar and Malaysia.

Specimens examined : Netarhat, 217.

Notes : Common, climbing on the trees in the forest.

Common name : Beng : *Rakta Pita*; Santal : *Bonga Sarjom.*

Remarks : Though the name *V. maderaspatana* Roxb. is the earliest but it is illegitimate by being a latter homonym of *V. maderaspatana* Gaertn.

4. ZIZIPHUS Mill.

1a. Flowers in axillary fascicled cymes; petals present :

2a. Small trees; fruits more than 1 cm across :

3a. Peduncles of cymes absent or shorter than pedicels; styles-2; fruits yellow or red .... 1. *Z. mauritiana*

3b. Peduncles of cymes longer than pedicels; styles-3; fruits greenish .... 4. *Z. xylopyrus*

2b. Shrubs; fruits black and lessthan 1 cm across .... 2. *Z. oenoplia*

1b. Flowers in panicled cymes; petals absent .... 3. *Z. rugosa*

1. Ziziphus mauritiana Lamk., Encycl. Meth. Bot. 3: 319. 1789; Santapau in J. Bombay Nat. Hist. Soc. 58: 802. 1953; Hara in Enum. Fl. Pl. Nep. 2: 92. 1979; Sengupta & Safui, Fl.W. Bengal 1: 431. 1997. *Ziziphus jujuba* (L.) Gaertn., Fruct. 1: 203. 1788; Lawson in Hook. f., Fl. Brit. India 1: 632. 1875 (non Mill. 1768); Haines, Bot. Bihar & Orissa 1: 201. 1961 (Rep. ed.).

Large shrubs or small trees with drooping branches, armed with hooked prickles. Leaves oblong or ovate, obtuse or acute, usually serrulate, with reddish-brown tomentum beneath, shining glabrous above. Flowers small, greenish, in dense axillary tomentose cymes or fascicles. Calyx 5-fid, lobes triangular, spreading, keeled within. Petals small, spathulate, white, concave. Disc 10-lobed. Ovary 2-chambered, immersed in disc. Drupes globose or ovoid, yellow or red, fleshy.

Fl. & Fr. : Nov.-Feb.

Distrib. : Tropical Asia and Australia.

Specimens examined : Seuti, 1089.

Notes : Common, in the villages, along the road sides.

Common name : Beng : *Kul, Boroi*; Hindi : *Ber.*

Uses : Fruits are edible and bark used in diarrhoea.

2. **Ziziphus oenoplia** (L.) Mill., Gard. Dict. ed. 8, 3. 1768; Lawson in Hook. f., Fl. Brit. India 1: 634. 1875; Prian, Beng. Pl. 1: 334. 1903 (Rep. ed. 1: 234. 1963) & in Rec. Bot. Surv. India 3: 188. 1905; Haines, Bot. Bihar & Orissa 1: 203. 1961 (Rep. ed.); Ramam. in Sald. & Nicol., Fl. Hassan 354. 1976; Sengupta & Safui, Fl. W. Bengal 1: 433. 1997. *Rhamnus oenoplia* L., Sp. Pl. 194. 1753.

Straggling or semiscandent, prickly shrubs; young branches brown tomentose. Leaves up to 4 × 3 cm, ovate, acute at apex, obliquely rounded at base, entire to finely serrulate, 3-5 nerved, silky pubescent beneath; petioles 2-5 mm long, tomentose. Flowers in sessile or subsessile, brown tomentose, axillary, condensed, paniculate cymes. Petals obtriangular, white. Ovary 1-2 celled; styles-2, united above middle. Drupes up to 8 mm across, black, globose.

Fl. & Fr. : June-Dec.

Distrib. : Throughout India, Sri Lanka, Trop. Asia & Australia.

Specimens examined : Barwadih, 441.

Notes : Common, in the forest.

Common name : Beng : *Siakul*; Hindi : *Makai.*

Uses : Ripe fruit is edible and the prickly branches are used for fencing by the local people.

3. **Z. rugosa** Lamk. Encycl. 5. 319. 1789; Lawson, in Hook. f., Fl. Brit. India 1: 636. 1874; Prain, Beng. Pl. 1: 234. 1963 (Rep. ed.); Haines, Bot Bihar & Orissa 1: 203. 1961 (Rep. ed.); Ramam. in Sald. & Nicol., Fl. Hassan 354. 1976; Sengupta & Safui, Fl. W. Bengal 1: 433. 1997.

Large shrubs, young parts tomentose. Leaves alternate, elliptic, up to 10.5 × 7 cm, with 5-6 basal nerves, densely tomentose beneath, serrulate, base cordate; petioles up to 1.2 cm long; stipules modified into hard prickles,

curved downward and one deciduous. Flowers up to 5 mm across, in peduncled cymes, up to 3 m long. Calyx 5-lobed, keeled and pubescent within. Petals absent. Disc 5-lobed, hairy; ovary sunk in the disc, 2-4 celled. Drupes globose or ovoid, fleshy.

Fl. : Feb.-Mar.

Distrib. : India, Sri Lanka and Myanmar (Burma).

Specimens examined : Netarhat, 111.

Notes : Common, in the forest.

Common name : Hindi : *Churna*; Santal : *Sekra.*

Uses : The fruit is eaten. The powdered bark mixed with ghee is applied to the swollen cheek in toothache and for ulcers in the mouth.

4. Ziziphus xylopyrus (Retz.) Willd., Sp. Pl. 1: 1104. 1798; Lawson in Hook. f., Fl. Brit. India 1: 634. 1875; Haines, Bot. Bihar & Orissa 1: 202. 1961 (Rep. ed.; as *Z. xylopyra* Willd.) Ramam. in Sald. & Nicol., Fl. Hassan 354. 1976; Sengupta & Safui, Fl. W. Bengal 1: 434. 1997. *Rhamnus xylopyrus* Retz., Obs Bot. 2: 11. 1781.

Small, evergreen, thorny trees, old plant sometimes without thorn. Leaves broadly elliptic or ovate, up to 8.7 × 4.8 cm, pubescent or hairy beneath, finely serrated and serration with spinescent tip, basal nerves-3; petioles hairy, up to 2 cm long. Flowers 4-merous, in axillary peduncled cymes. Calyx glabrous within; lobes obconic, acute. Petals reflexed, spathulate, hooked, white. Ovary glabrous, 3-locular. Drupes globose, hard, up to 2 × 2 cm, green.

Fl. : April-Oct. *Fr.* : ripen in Jan.

Distrib. : India and Sri Lanka.

Specimens examined : Barwadih, 354.

Notes : Common, in the forest.

Common name : Santal : *Karkata*; Hindi : *Kat-Ber.*

VITACEAE

1a. Leaves simple :

2a. Stems fleshy, internodes with wings; inflorescence bearing tendril; flowers 4-merous .... 3. CISSUS

2b. Stems not fleshy, internodes without wings; inflorescence bearing tendril; flowers 5-merous .... 1. AMPELOCISSUS

1b. Leaves 3-foliate .... 2. CAYRATIA

1. AMPELOCISSUS Planch. *nom. cons.*

1a. Leaves tomentose; margin of the seed incurved .... 2. *A. tomentosa*

1b. Leaves glabrous; margin of the seed not incurved .... 1. *A. latifolia*

1. Ampelocissus latifolia (Roxb.) Planch. in Jour. Vigne Amer. 374. 1884 & in DC., Mon. Phan. 5(2): 370. 1887; Suessenguth in Engl. & Prantl, Pfl. fam. 20 D: 300. 1953; Mukherjee in Fl. Pach. Bori Res. 66. 1984; Bhattacharya & Paul, Fl. W. Bengal 1: 435. 1997. *Vitis latifolia* Roxb., Fl. Ind. 1: 661. 1820; Lawson in Hook. f., Fl. Brit. India 1: 652. 1875; Haines, Bot. Bihar & Orissa 1: 210. 1961 (Rep. ed.). *Vitis montana* Lawson in Hook. f., Fl. Brit. India 1: 652. 1875.

Large, glabrous climbers. Leaves up to 16 × 16 cm, simple, 5-9 angled-lobed, orbicular-cordate, dentate or denticulate; petioles 5-11 cm long. Flowers 5-merous, reddish-brown, in pyramidal, paniculate cymes on stout peduncle, with a branched tendril. Calyx small, truncate. Petals 1.8-2.2 mm long, oblong, not cohering but saccate at apex. Disc prominent, lobed. Stigma subsessile, foveolate. Berries 6-9 mm diam., globose, glabrous, 2 seeded (rarely 3-4 seeded). Seeds 5-6 mm long, ellipsoid, planoconvex, sides rugose with a strong ridge on the plain face.

Fl. & Fr. : June-Oct.

Distrib. : Major parts of India and Nepal.

Specimens examined : Maromer, 489.

Notes : Common, in the forest and hills.

Common name : Beng : *Govila*; Hindi : *Panibel;* Kol : *Oteron;* Santal : *Icewar*; Kharwari : *Khopri.*

Uses : Juice of the tender leaves used in dental troubles and as a detergent for indolent ulcers. Decoction of roots given in dysentery and wounds.

2. Ampelocissus tomentosa (Heyne ex Roth.) Planch. in Jour. Vigne Amer. 374. 1884; Ramam. in Sald. & Nicol., Fl. Hassan 358. 1976; Mukherjee in Fl. Pach. Bori Res. 66. 1984; Bhattacharya & Paul, Fl. W. Bengal 1: 436. 1997. *Vitis tomentosa* Heyne ex Roth, Nov. Pl. Sp. 157. 1821; Lawson in Hook. f., Fl. Brit. India 1: 650. 1875; Haines, Bot. Bihar & Orissa 1: 210. 1961 (Rep. ed.).

Extensive but scarcely woody climbers, covered with persistent woolly tomentum. Leaves 10-16 × 10-16 cm, orbicular, cordate, serrate, densely tomentose, drying brown below; petioles 6-10 cm long. Flowers red to dark-brown, sessile, in compact, densely woolly cymes; peduncles up to 6 cm long, stout, woody, bearing a stiff, forked tendril. Calyx 4-lobed, truncate. Petals-4. Berries, globose, black, up to 8 mm across. Seeds broadly oblong, flat, margin incurved, face with a thick rounded ridge running through middle.

Fl. & Fr. : July-Nov.

Distrib. : Major parts of India, Sri Lanka and Nepal.

Specimens examined : Boneri, 820.

Notes : Common, in the forest and hills.

Common name : Santal : *Ghoralidi;* Kol : *Oteron.*

Uses : Roots and bark used for haemorrhoids. Roots also used for swelling.

2. Cayratia Juss.

Cayratia trifolia (L.) Gangnep. in Lecomte, Notus. Syst. 1: 347. 1911; Domin in Biblioth, Bot. 89. 371. 1927; Babu, Herb. Fl. Dehra Dun 107. 1977; Mukherjee in Fl. Pach. Bori Res. 66. 1984. *Vitis trifolia* Linn., Sp. Pl. 203. 1753; Haines, Bot. Bihar & Orissa 1: 213. 1961 (Rep. ed.); Bhattacharya & Paul, Fl. W. Bengal 1: 439. 1997. *Cissus carnosa* Lamk.,

Encycl. 1: 31. 1783. *Vitis carnosa* (Lamk.) Wall., Num. List. No. 6018. 1832; Lawson in Hook. f., Fl. Brit. India 1: 654. 1875.

Slender hairy climbers; young shoots pubescent; tendrils branched. Leaves digitately 3-foliolate; petioles 3-4 cm long; leflets 4 × 2 cm, ovate-lanceolate, obovate, margin serrate-dentate, acute at apex. Flowers in branched, divaricate cymes; peduncles long, pubescent; pedicels up to 3 mm long. Calyx pubescent, funnel shaped, obscurely 4-lobed. Petals greenish, pubescent outside, oblong, rounded, hooded at apex. Disc white, cup-like, 4-lobed. Fruits subglobose. Seeds trigonous, rounded and rugose on the back.

Fl. & Fr. : Apr.-Nov.

Distrib. : India, Sri Lanka, Myanmar & Malacca.

Specimens examined : Panki, 964.

Notes : Common in the hedges and forests.

Common name : Beng : *Amal lata;* Hindi : *Amal bel, Ramchana.*

Uses : Roots are used for curing boils, tumours and pains.

3. Cissus L.

Cissus quadrangularis L., Mant. 39. 1767; Backer & Brink, Fl. Java 2: 90. 1965; Bhattacharya & Paul, Fl. W. Bengal 1: 442. 1997. *Vitis quadrangularis* Wall. ex Wight & Arn., Prodr. 125. 1834; Lawson in Hook. f., Fl. Brit. India 1: 645. 1875; Haines, Bot. Bihar & Orissa 1: 207. 1961 (Rep. ed.).

Fleshy climbers; stems jointed; internodes 4-winged; often with a tendril at nodes. Leaves broadly ovate or reniform often lobed, up to 7 cm across, cordate, crenate-serrate, glabrous; stipules foliaceous, ovate. Flowers in umbellate cymes. Berries up to 7 mm in diam, 1-seeded.

Fl. & Fr. : Aug. -Dec.

Distrib. : Pantropical.

Specimens examined : Seuti, 1078.

Notes : Not common, in the village surroundings.

Common name : Beng : *Harbhanga*; Hindi : *Harjora.*

Uses : Young shoots edible and roots used as a remedy of fractures.

LEEACEAE

LEEA Royen ex L.

1a. Leaves unipinnate; bracts linear-setaceous, caducous .... 1. *L. asiatica*

1b. Leaves bipinnate; bracts ovate-lanceonate, persistent .... 2. *L. compactiflora*

1. **Leea asiatica** (L.) Ridsdale in Manilal, Bot. Hist. Hort. Malab. 189. 1980. *Phytolacca asiatica* L., Sp. Pl. 1: 474. 1753. *Leea crispa* Royen ex L., Syst. Nat. ed. 12.2: 627. 1767 & Mant. 1: 124. 1767; Lawson in Hook. f., Fl. Brit. India 1: 655. 1875; Ridsdale in Blumea 22: 88. 1974. *Leea herbacea* Ham. in Trans. Linn. Soc. 14: 228. 1823; Brandis, India. Trees 180. 1906. *Leea aspera* Edge. in Trans. Linn. Soc. 20: 36. 1846. nom. illeg. (non Wall. ex G. Don 1831); Lawson in Hook. f., Fl. Brit. India 1: 665. 1875. *Leea pumila* Kurz in J. As. Soc. Beng. 4(2): 302. 1872; Lawson in Hook. f., Fl. Brit. India 1: 666. 1875. *Leea edgeworthii* Sant., Rec. Bot. Surv. Ind. 16: 54. 1953.

Annual, undershrubs, up to 2 m high; stems striate or furrowed. Leaves unipinnate, 5-7 foliolate; rachis glabrous; leaflets up to 17 × 8.5 cm, oblong or elliptic-oblong, finely caudate at apex, rounded or subcordate at base, margin serrate. Flowers white or greenish-white, in leaf-opposed or subterminal peduncled, corymbose cymes; bracts linear-setaceous, caducous. Calyx campanulate, 5-lobed. Petals-5, up to 2 mm long, lanceolate; lobes of staminal tube narow-oblong or lanceolate, usually 2-toothed. Fruits globose, up to 0.8 cm across; 3-6 celled. Seeds greenish, turning black when ripe.

Fl. & Fr. : July-Dec.

Distrib. : Throughout India, Myanmar, Thailand and W. China.

Specimens examined : Netarhat, 749.

Notes : Common, along the road sides and hill slopes.

Common name : Beng : *Banchalita.*

Uses : Fruits are eaten by the local people and root tubers used against guineaworms.

2. **Leea compactiflora** Kurz in J. As. Soc. Beng. 42(2): 65. 1873; Ridsdale in Blumea 22 : 88. 1974; Banerjee, Fl. W. Bengal 1: 451. 1997. *Leea trifoliata* Lawson in Hook. f., Fl. Brit. Ind. 1: 666. 1875. *Leea robusta* (Auct. non Roxb.); Lawson in Hook. f., Fl. Brit. India 1: 667. 1875 *pro parte*; Haines, Bot. Bihar & Orissa 1: 216. 1961 (Rep. ed.). *Leea bracteata* Clarke in J. Bot. 19: 164. 1881; Duthie in Fl. Up. Gange. Plain 1: 176. 1903; Mukherjee in Fl. Pach. Bori Res. 68. 1984.

Large, straggling shrubs, with more or less tomentose branchlets. Leaves 2-pinnate or upper simple pinnate; leaflets large, ovate-lanceolate, shortly caudate, hispidulous on the nerves beneath, primary nerves distant. Flowers in dense corymb; bracts ovate or lanceolate, persistent. Petals green; lobes of staminal tube subentire. Fruits brownish yellow when ripe.

Fl. & Fr. : July-Nov.

Specimens examined : Maromar, 498.

Distrib. : Throughout India.

Notes : Common, in the forest, way to Henar.

SAPINDACEAE

1a. Climbing herbs; with tendrils; leaves ternately divided .... 1. CARDIOSPERMUM

1b. Erect shrubs or trees; without tendrils; leaves not ternately divided :

2a. Shrubs; leaves simple, viscid .... 2. DODONAEA

2b. Trees; leaves pinnate, not viscid .... 3. SCHLEICHERA

1. CARDIOSPERMUM L.

Cardiospermum halicacabum L., Sp. Pl. 366. 1753; Hiern in Hook. f., Fl. Brit. India 1: 670. 1875; Prain, Beng. Pl. 1: 342. 1903 (Rep. ed. 1: 241. 1961) & in Rec. Bot. Surv. India 3: 189. 1905; Radlkofer in Engler, Pfl. Reich 98: 379. 1932; Haines, Bot. Bihar & Orissa 1: 218. 1961; Chandra, Fl. W. Bengal 1: 456. 1997.

Slender climbers, slightly pubescent; stems striated. Leaves alternately compound; leaflets up to 2 × 1 cm, coarsely dentate, acuminate. Flowers few in umbellate cymes, white, the lowest pair of pedicel developed as spiral tendrils. Sepals-4, 2 outer smaller. Petals-4, in unequal pairs. Stamens-8, 4-shorter, sometimes connate at base. Capsule 3-celled loculicidal, inflated, shortly stalked with 3-membranous valves. Seeds globose, usually arillate, up to 5 mm in diam.

Fl. & Fr. : Dec.-May.

Distrib. : Pantropical.

Specimens examined : Simultarh village (Daltonganj), 255.

Notes : Common, in the waste land, bank of the Koel river.

Common name : Beng : *Lataphatkari;* Hindi : *Kanphutki.*

Uses : Roots used as laxative and the herbs used for rheumatism and nervous diseases.

2. DODONAEA Mill.

Dodonaea viscosa (L.) Jacq., Enum. Syst. Pl. Carib. 19. 1760; Hiern in Hook. f., Fl. Brit. India 1: 697. 1875; Haines, Bot. Bihar & Orissa 1: 225. 1961 (Rep. ed.); Gandhi in Sald. & Nicol., Fl. Hassan 367. 1976; Chandra, Fl. W. Bengal 1: 459. 1997. *Ptelea viscosa* Linn., Sp. Pl. 118. 1753.

Evergreen, large shrubs. Leaves simple, elliptic-oblong, shining, subcoriaceous, up to 8 × 1.7 cm, viscid, subapiculate at apex, base cuneate-attenuate, margin slightly revolute, entire. Flowers small, in short terminal panicles with racemose branches. Sepals usually-5, about equalling the

stamens, greenish yellow, Stamens -8. Ovary 3-4 celled. Capsule up to 2 cm broad, compressed, glabrous, wings 2-3, broad, rounded, extending from base to style, viscid with resin. Seeds black.

Fl. & Fr. : Dec.-Mar.

Distrib. : Pantropical.

Specimens examined : Vandaria, 658.

Notes : Common, near the river bank and also found as hedge in villages & Forest Rest Houses.

Common name : Hindi : *Sinatha.*

Uses : Wood used for tool-handles, walking sticks and for engraving and turnery. Leaves febrifuge, also used on burns, swellings and wounds. Seeds edible.

3. SCHLEICHERA Willd.

Schleichera oleosa (Lour.) Oken, Allg. Naturgesch. 3(2): 1341. 1841; gandhi in Sald. & Nicol., Fl. Hassan 369. 1976; Chandra, Fl. W. Bengal 1: 461. 1997. *Pistacia oleosa* Lour., Fl. Cochinch. 615. 1790. *Schleichera trijuga* Willd., Sp. Pl. 4: 1096. 1806; Hiern in Hook. f., Fl. Brit. India 1: 681. 1875; Prain, Bengal Pl. 1: 243. 1963 (Rep. ed.); Haines, Bot. Bihar & Orissa 1: 221. 1961 (Rep. ed.).

Large trees. Leaves paripinnate; leaflets in 3-pairs, oblong-lanceolate, acuminate at apex, cuneate at base, coriaceous, shining above, and bright red when young. Flowers in lateral racemes. Calyx cupular, 4-6 lobed. Petals-O. Fruits 2-3 cm long with a sharp point, ellipsoid, roughly coriaceous.

Fl. & Fr. : Feb.-Aug.

Distrib. : India, Sri Lanka, Myanmar and Java.

Specimens examined : Netarhat, 155.

Notes : Common in the Forest.

Common name : Beng : *Kusum*; Santal : *Baru*.

Uses : Wood used for various purposes, fruits are edible.

Litchi chinensis (Gaertn.) Sonn. is commonly planted for its delicious fruit.

ANACARDIACEAE

1a. Leaves simple :

2a. Perfect stamen-1; drupes more than 5 cm long .... 3. MANGIFERA

2b. Perfect stamen 5-10; drupes less than 5 cm long :

3a. Drupes black, glabrous, seated on red-orange cup, without mucronate tip .... 4. SEMECARPUS

3b. Drupes red, hairy, not seated on cup, with mucronate tip .... 1. BUCHANANIA

1b. Leaves pinnate :

4. Leaflets oblong-acuminate; drupes ellipsoid, more than 2 cm long .... 5. SPONDIAS

4. Leaflets ovate-acuminate; drupes compressed, less than 2 cm long .... 2. LANNEA

1. BUCHANANIA Spreng.

Buchanania lanzan Spreng. in Schrad. J. Bot. 2: 234. 1800; Ramam. in Sald. & Nicol., Fl. Hassan 374. 1976; Malick, Fl. W. Bengal 1: 477. 1997. *Buchanania latifolia* Roxb., Fl. Ind. 2: 385. 1822; Hook. f. in Fl. Brit. India 2: 23. 1876; Haines, Bot. Bihar & Orissa 1: 229. 1961 (Rep. ed.).

Large trees, with rough bark. Leaves alternate, stiff, strongly nerved, oblong or ovate-oblong, up to 21 × 10.5 cm, secondary nerves 12-17 pairs, rounded-emarginate at apex; petioles swollen, up to 1 cm long. Flowers in dense pyramidal panicles, white, 5-6 mm across. Sepals-5, free. Petals-5, ovate elliptic, up to 3 mm long. Stamens-10, inserted at the base of the disc, erect, as long as spreading petals. Disc orbicular, 5-lobed, villous. Fruits a small fleshy drupe, globose, up to 5 mm diam., red, hairy, with mucronate tip.

Fl. & Fr. : Jan.-May.

Distrib. : Throughout India and Thailand.

Specimens examined : Netarhat, 59.

Notes : Common in the forest.

Common name : Beng. : *Piyal*; Hindi : *Piyar*; Santal : *Tarup*.

Uses : Wood used for various purposes, seeds eaten.

2. LANNEA A. Rich

Lannea coromandelica (Houtt.) Merrill in J. Arn. Arb. 19: 353. 1938; Hara & Press in Enum. Fl. Pl. Nep. 2: 101. 1979; Malick, Fl. W. Bengal 1: 480. 1997. *Dialium coromandelicum* Houtt., Nat. Hist. 2: 33. 1774. *Odina wodier* Roxb., Fl. Ind. 2: 293. 1832; Hook. f. in Fl. Brit. India 2: 29. 1876; Haines, Bot. Bihar & Orissa 1: 231. 1961 (Rep. ed.).

Small trees. Leaves pinnate, 5-9 foliolate, clustered at the end of the branches; leaflets ovate-acuminate, up to 12 cm long, base oblique, lower one smaller, upper pairs becoming sessile. Flowers yellowish green, dioecious, clustered on the rachis of racemes. Sepals oblong acute, up to 4 mm long, or more long in female flowers. Male flowers with deeply 4-lobed pistillode and female flowers with 8 staminodes. Fruits oblique, compressed, up to 12 mm long.

Fl. & Fr. : Mar.-June.

Distrib. : Pantropical.

Specimens examined : Daltonganj, 872.

Notes : Common, in open fields.

Common name : Beng. : *Jiol*; Hindi : *Jhingan*; Santal : *Doka*.

Uses : Wood used for packing cases and for house building by the local people, yields gum used as rough adhesive.

3. MANGIFERA L.

Mangifera indica L., Sp. Pl. 200. 1753; Hook. f. in Fl. Brit. India 2: 13. 1876; Haines, Bot. Bihar & Orissa 1: 228. 1961 (Rep. ed.); Malick, Fl. W. Bengal 1: 481. 1997.

Evergreen trees, up to 20 m high; bark rough, fibrous, dry-greyish. Leaves crowded at the end of the branches, 10-15 × 3-7 cm, oblong to oblong-lanceolate, acuminate at apex, margin entire or wavy, coriaceous, glabrous; petioles 1-4 cm long, swollen at the base. Flowers in terminal panicles, up to 25 cm long, pubescent; bracts elliptic, concave, deciduous. Flowers bisexuals and males, greenish-yellow, sweet-scented. Calyx 4-5 partite, segment deciduous. Petals 4-5, free or adnate to the disc. Perfect stamen-1 and larger than other 4-staminodes. Disc fleshy, 5-lobed. Drupe 7-10 cm long, sub-ovoid, subcompressed, fleshy.

Fl. & Fr. : Feb.-July.

Distrib. : Throughout India, Myanmar, Malaya, Sri Lanka and Thailand.

Specimens examined : Daltonganj, *Sarma* 830.

Notes : Common, planted but often selfgrown in the village surroundings throughout the district.

Common name : Beng. & Hindi : *Aam*; Kol : *Uli*; Santal : *Ul.*

Uses : Fruits are very delicious. Unripe fruit pickled, used for chutney, preparation of powder (*Aamchur*). Pulps are also used in the preparation of Jam, Jelly and Mango-leather (*Aamsatya*). Wood used for inferior furniture and other many pruposes.

4. SEMECARPUS L. f.

Semecarpus anacardium L. f., Suppl. 182. 1781; Hook. f. in Fl. Brit. India 2: 30. 1876; Haines, Bot. Bihar & Orissa 1: 230. 1961 (Rep. ed.); Ramam. in Sald. & Nicol., Fl. Hassan 378. 1976; Malick, Fl. W. Bengal 1: 483. 1997.

Trees. Leaves broadly-obovate-oblong, rounded-acute at apex, glabrous above, white pubescent beneath, up to 30 × 11 cm, base slighlty cuneate;

petioles up to 3.5 mm long, clothed with hairs. Panicles equalling or shorter than leaves. Flowers unisexual, yellowish, 6 mm in diam. Calyx 5-6 fid. Petals 5-6. Disc villous. Drupes up to 2.8 cm long, obliquely ovoid or oblong, smooth, shining black, seated in red-orange cup, with plenty acrid juice.

Fl. & Fr. : July-Dec.

Distrib. : Throughout the hotter parts of India, extending to the eastern Archipelago and N. Australia.

Specimens examined : Bisrampur, 656.

Notes : Common, in the hilly area and forests.

Common name : Beng. : *Bhela*; Hindi : *Bhelwa*; Santal : *Soso*.

Uses : Fleshy orange cup of the fruits is eaten when ripe. The acrid juice of the pericarp with lime is used for marking cotton and fabrics by the washerman. Wood suitable for cheap and light furniture, packing boxes, fairly good for match-boxes and spints.

5. SPONDIAS L.

Spondias pinnata (L. f.) Kurz, Prelim. Rep. For. & Veg. Pegu Append. A. 44, App. B. 42. 1875; Airy Shaw & Forman in Kew Bull. 21: 8. 1967; Malick, Fl. W. Bengal 1: 484. 1997. *Mangifera pinnata* L. Suppl. 156. 1781. *Spondias mangifera* Willd., Sp. Pl. 2: 751. 1799; Hook. f. in Fl. Brit. India 2: 42. 1876; Haines, Bot. Bihar & Orissa 1: 232. 1961 (Rep. ed.). *Spondias acuminata* Roxb., Fl. Ind. 2: 453. 1832; Hook. f. in Fl. Brit. India 2: 42. 1876. *Spondias macrophylla* Wall. ex Hook. f. in Fl. Brit. Ind. 2: 43. 1876.

A small tree, with greyish bark. Leaves up to 45 cm long; petioles slender, glabrous; leaflets oblong, acuminate at apex, up to 16 × 3.5 cm, margin entire, shining with 16-30 strong nerves, joined by a strong intramarginal one; petiolules up to 8 mm long. Flowers uni-or bisexual, in large, spreading, sparingly branched panicles, up to 60 cm long. Calyx salver shaped, with acute, 5-6 lobes. Petals 5-6, ovate-oblong, greenish-white. Drupes up to 5 cm long, stone cavernous, fibrous outside. Seed 1-3, usually one perfect.

Fl. & Fr. : Feb.-Mar. *Fr.* : Usually ripen in cold season.

Distrib. : India, Sri Lanka, Myanmar and also in Malay peninsula.

Specimens examined : Maromar, 548.

Notes : Common, in the forest.

Common name : Beng., Hindi & Santal : *Amra.*

Uses : Leaves and bark of the plant used in dysentery and the fruits are eaten by the people, it is also eaten by the deer and cattle.

MORINGACEAE

MORINGA Adans.

Moringa oleifera Lam., Encycl. 1: 398. 1785; Haines, Bot. Bihar & Orissa 2: 235. 1961 (Rep. ed.); van Steenis in Fl. Males. ser. 1. 4: 45. 1945; Manna, Fl. W. Bengal 1: 485. 1997. *Moringa pterygosperma* Gaertn., Fruct. 2: 314. 1791; Hook. f. in Fl. Brit. India 2: 45. 1876; Guha Bakshi in Fl. Murshidabad Dist. 96. 1984.

Small trees, 3-8 m tall; twigs lenticillate; bark corky. Leaves 30-50 cm long, crowded towards the tip of the branches, imparipinnately tripinnate; rachis thickened and articulated at base; pinnules up to 20 × 10 mm, lateral ones elliptic ovate or oblong, terminal one obovate and larger than laterals. Flowers in large panicles, whitish, fragrant; pedicel up to 10 mm long, articulated near tip. Calyx tube 3-4 mm long, posterior sepal up to 9 mm and anterior sepal up to 14 mm long. Petals hairy at base, posterior one up to 12 × 6 mm and anterior one up to 15 × 8 mm. Base of filaments of stamens and staminodes hairy. Ovary on gynophore, hairy. Capsule up to 40 cm long, linear, 3- angled, 9-ribbed. Seeds 3-angled and winged on the angle.

Fl. & Fr. : Jan.-May. Exotic

Distrib. : Pantropical, introduced in India from tropical Asia or Malaya.

Specimens examined : Manika, 843.

Notes : Commonly cultivated, occasionally found as an escape in the village surroundings.

Common name : Beng. : *Sajne*; Hindi : *Shajna*.

Uses : Flowers, young leaves are eaten and fruits are also eaten as vegetable. All parts used in the treatment of ascites, venomous bites and rheumatism.

MIMOSACEAE

1a. Flowers 5-merous; stamens 10 or more; pod not bristly :

2a. Stamens united below; plant unarmed :

3a. Leaflets 6-8 per pinnae; pod thin, straight .... 3. ALBIZIA

3b. Leaflets 2 per pinnae; pod turgid, coiled .... 4. PITHECELLOBIUM

2b. Stamens free; plant armed .... 1. ACACIA

1b. Flowers 4-merous; stamens-4; pod bristly .... 3. MIMOSA

1. ACACIA Miller

1a. Leaves as usual, not converted into phyllode, pods straight :

2a. Flowers in heads :

3a. Stems prickly, without stipular spines; pods not moniliform :

4a. Rachis with columnar glands between all pairs of pinnae .... 2. *A. caesia*

4b. Rachis with smaller glands between upper pairs of pinnae and one petiolar gland near base :

5a. Leaflets more than 2 mm broad, not overlapping; petiole gland conical .... 6. *A. torta*

5b. Leaflets less than 2 mm broad, overlapping; petiole gland oblong .... 5. *A. pennata*

3b. Stems with stipular spines, not prickly; pods moniliform .... 4. *A. nilotica*

2b. Flowers in elongated spikes .... 3. *A. catechu*

1b. Leaves converted into phyllodes; pods coiled .... 1. *A. auriculiformis*

1. **Acacia auriculiformis** A. Cunn. ex Benth. in Hook., Lond. Journ. Bot. 1: 377. 1842; Haines, Bot. Bihar & Orissa 2: 345. 1961 (Rep. ed.).

A tall, straight tree with smooth, white bark, glabrous and glaucous. Plyllodes oblong, up to 14 × 2.2 cm, falcate, laterally compressed, narrowed at both ends, with 4-6 principal subparallel nerves, some times confluent near the base. Flowers small, in slender, axillary spikes. Calyx broadly campanulate, minutely toothed. Petals spreading as long as the calyx. Pods hard, woody, much twisted in an irregular spire with outer edge often sinuate.

Fl. & Fr. : Almost round the year.

Distrib. : Native of N. Australia & Queensland, now widely introduced throughout India. Exotic.

Specimens examined : Garu, 523.

Notes : Common, as avenue trees, throughout the district.

Common name : Beng. : *Akashmoni.*

2. **A. caesia** (L.) Willd., Sp. Pl. 4: 1090. 1806; Haines, Bot. Bihar & Orissa 2: 342. 1961 (Rep. ed.); Kostermans in Dassanayake, Fl. Ceylon 1: 481. 1980. *Mimosa caesia* L., Sp. Pl. 522. 1753. *Acacia intsia* (auct. non Willd. 1806); Wight & Arn., Prodr. 278. 1834; Baker in Hook. f., Fl. Brit. India 2: 297. 1878.

Large, prickly straggler, with stout, 5-angled branches; young shoots tomentose. Leaves up to 15 cm long; rachis pubescent, pinnae 8-10 pairs, 5-6 cm long; leaflets 15-20 pairs, up to 7 × 2 mm, unequally truncate at base, glabrous above, glabrascent beneath. Calyx pubescent. Corolla whitish, twice as long as calyx. Pod stalked, strap-shaped with prominent suture. 8-12 cm long, flat, dark-brown, slightly falcate, acute at apex, dehiscing at both sutures, often with small prickles at base.

Fl. & Fr. : Sept.-Mar.

Distrib. : India and Malaysia.

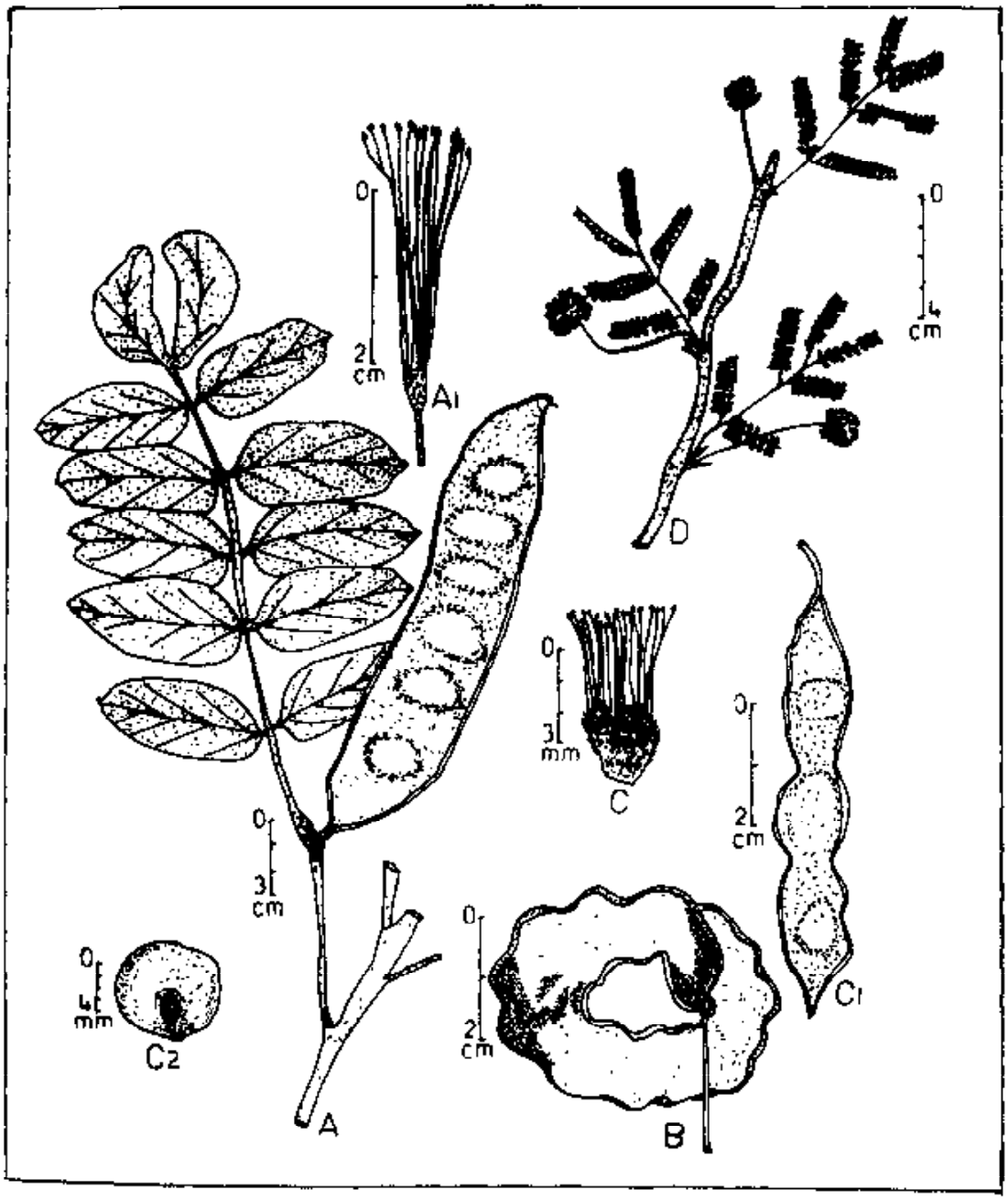


Fig. 12: Mimosaceae (A-A_1): *Albizia lebbeck* (L.) Benth.: A. Fruiting twig, A_1. Androecium; B. *Acacia auriculiformis* A. Cunn. ex Benth.: Fruit; (C-C_2): *Acacia catechu* (L.f.) Willd: C. Flower, C_1. Fruit, C_2. Seed; D. *Acacia nilotica* (L.) Willd. ex Delile subsp. *indica* (Benth.) Brenan: Flowering branch.

Specimens examined : Muhammadganj, *Sarma* 984.

Notes : Occasional, in the forest.

Common name : Hindi : *Aila.*

Uses : Bark extract used to protect the fishing net.

3. Acacia catechu (L. f.) Willd., Sp. Pl. 4: 1097. 1806; Baker in Hook. f., Fl. Brit. India 2: 295. 1878; Haines, Bot. Bihar & Orissa 2: 343. 1961 (Rep. ed.). *Mimosa catechu* L. f., Suppl. 439. 1781.

A small, deciduous trees, with black bark. Leaves bipinnate; stipules spiny; petiotes with gland; rachis pubescent; pinnae 10-30 pairs, up to 4.5 cm long; leaflets up to 50 pairs, linear, tip obtuse, base oblique, up to 4 × 0.8 mm, ciliate. Flowers in axillary, elongate, cylindric spikes. Pods flat, dehiscent, up to 9 × 1.4 cm, mucronate or beaked, base contracted into a stalk. Seeds orbicular, up to 7 mm in diam., flat, brown.

Fl. & Fr. : Sept.-Jan.

Distrib. : Throughout India, Myanmar, Nepal, Thailand and S. China.

Specimens examined : Barwadih, 449; Maromar, *Sarma* 501; Garwah, 628.

Notes: Common, in the forest and on the way to Mandal from Barwadih.

Common name : Beng., Hindi & Santal : *Khair.*

Uses: Kath or Khair is manufactured from the wood chips, and the stem is used as house posts.

4. A. nilotica (L.) Willd. ex Delile subsp. **indica** (Benth.) Brenan, Kew Bull. 12: 84. 1957; Sant., Fl. Khandala ed. 3, 83. 1967; Kostermans in Dassanayake, Fl. Ceylon 1: 488. 1980. *Mimosa nilotica* Linn., Sp. Pl. 521. 1753. *Acacia arabica* auct. non (Lam.) Willd., 1806; Baker in Hook.f., Fl. Brit. India 2: 293. 1878; Haines, Bot. Bihar & Orissa 2: 338. 1961 (Rep. ed.). *Acacia arabica* var. *indica* Benth. in Hook., London J.

Bot. 1: 500. 1842. *Acacia nilotica* var. *indica* (Benth.) Hill., Bot. Mus. Leafl. 8: 99. 1940.

Deciduous trees; young branches pubescent, stem with lenticels. Leaves up to 10 cm long; stipular spines 1-5 cm long, straight, white; rachis grey-pubescent, with a cup shaped gland at base of lowest, and generally also at the uppermost pair of pinnae; pinnae 5-7 pairs, up to 4 cm long; leaflets 18-25 pairs, subsessile, glabrous, obtuse at apex, 5 × 1.2 mm. Heads yellow, 1 cm across; peduncle up to 3 cm long. Flowers sessile. Corolla 2-3 times as long as calyx; lobes densely ciliate. Pods distinctly stalked, up to 15 cm long, grey pubescent, moniliform, 10-12 seeded.

Fl. & Fr. : Aug.-Apr.

Distrib. : Hotter parts of India, Arabia and Africa. Native of Asia.

Specimens examined : Bisrampur, 657.

Notes : Common, in the dry waste places and road sides.

Common name : Beng. : *Babla*; Hindi : *Kikar/Babul*; Santal : *Babur, Gabla*.

Uses: The wood is valuable for agricultural implements. The gum yielded by the tree, although called 'gum arabic', is actually not so, the true 'gum arabic' being the product of *A. senegal* Willd. Babul gum used for calico printing and dyeing, as sizing material for silk and cotton, and in paper manufacture; used also as a substitute for 'gum arabic' Pods used as fodder.

5. Acacia pennata (L.) Willd., Sp. Pl. 4: 1090. 1806; Baker in Hook.f., Fl. Brit. India 2: 297. 1878; Haines, Bot. Bihar & Orissa 2: 341. 1961 (Rep. ed.); Kostermans in Dassanayake, Fl. Ceylon 1: 489. 1980. *Mimosa pennata* Linn., Sp. Pl. 522. 1753.

Prickly, glabrescent, scandent or climbing shrubs or rarely small trees; branches tomentose, more or less 5-angled. Leaves up to 12 cm long; petiole gland oblong, below middle of petiole; rachis with gland between upper pairs of pinnae; pinnae 8-15 pairs, 4-6 cm long; leaflets up to 50 pairs, coriaceous, densely crowded, mucronate at tip, ciliate at margin, up

to 5.5 × 0.8 mm. Panicle 10-15 cm long. Heads up to 1.2 cm across, white. Calyx campanulate, 1-2 mm long. Corolla 2-3 mm long. Pods strap-shaped, flat, stalked, 10-15 cm long, suddenly obtusely acuminate.

Fl. & Fr. : June-Dec.

Distrib. : India, Sri Lanka, South E. Asia, China, Malaysia.

Specimens examined : Netarhat, *Sarma* 218.

Notes : Common in the forest.

6. Acacia torta (Roxb.) Craib. in Kew Bull. Misc. Inform. 410. 1915; Haines, Bot. Bihar & Orissa 2: 342. 1961 (Rep. ed.). *Mimosa torta* Roxb., Fl. Ind. 2: 566. 1832. *Acacia intsia* Willd. var. *caesia* Baker in Hook.f., Fl. Brit. India 2: 297. 1878. *Acacia caesia* auct. non Willd.; Wt. & Arn., Prodr. 278. 1834.

Prickly shrubs or small trees. Leaves 10-15 cm long; rachis with a conical petiole gland near base and smaller glands between the upper pairs of pinnae; pinnae 8-12 pairs, 5-7 cm long; leaflets 25-30 pairs, closely set but not overlapping, truncate at base, pubescent beneath, up to 8 × 2.6 mm. Heads up to 1 cm across. Calyx 2 mm long. Corolla up to 3.5 mm long. Pods up to 12 × 2 cm, flat, dry, with strong sutures, 5-7 seeded.

Fl. & Fr. : Dec.-Mar.

Distrib. : India, Sri Lanka, S.E. Asia.

Specimens examined : Maromar, 514.

Notes : Common in the forest.

2. Albizia Durazzini

Albizia lebbeck (L.) Benth. in Hook, Lond. J. Bot. 3: 87. 1844; Baker in Hook.f., Fl. Brit. India 2: 298. 1878; Haines, Bot. Bhar & Orissa 2: 346. 1961 (Rep. ed.); Kostermans in Dassannayake, Rev. Hand. Fl. Ceylon 1: 520. 1980; Sald. & Singh in Sald., Fl. Karnataka 1: 403. 1984. *Mimosa lebbeck* L., Sp. Pl. 516. 1753. *Acacia lebbeck* (L.) Willd., Sp. Pl. 4: 1066. 1806.

Deciduous trees, up to 20 m high. Rachis with gland near base of petiole and one below uppermost pair of pinnae; pinnae 2-4 pairs, up to 13 cm long; leaflets 3-4 pairs, obliquely oblong, retuse or obtuse at apex, shining with ecentric mid-vein, up to 3.8 × 1.5 cm, shortly petioluled, terminal pair obovate-oblong. Flowers white, fragrant, in globose heads, which are arranged in solitary or 2-3 together in upper axils or in umbelli form terminal racemes; peducles 5-7 long, pubescent; pedicels short, up to 2 mm long, pubescent. Calyx minutely pubescent, 3-4 mm long. Corolla twice as long as calyx. Pod flat, straw-coloured, up to 18 × 3.5 cm. Seeds elliptic-oblong, pale brown.

Fl. & Fr. : Throughout the year, chiefly in Mar.-July.

Distrib. : India, Sri Lanka, S.E. Asia and S. China.

Specimens examined : Manika, 842.

Notes : Very common, planted along road sides and villages, often self-sown.

Common name : Beng : *Sirish*; Hindi : *Siris*.

Uses : Wood used for furniture and construction purposes. Tree yields a gum used for various purposes and as an adulterant of 'Gum Arabic'.

3. Mimosa L.

Mimosa pudica L., Sp. Pl. 518. 1753; Haines, Bot. Bihar & Orissa 2: 336. 1961 (Rep. ed.).

Prickly, suffrutescent herbs. Petioles up to 4 cm long; pinnae in 1-2 subdigitate pairs, up to 4.5 cm long; leaflets up to 17 pairs, linear, acute, up to 9 × 2 mm. Heads pink, up to 1.5 cm across. Calyx minute, shortly 4-toothed. Petals-4, united. Stamens 4, exserted. Pods 2-5 jointed, up to 20 × 4 mm, margin bristly.

Fl. & Fr. : Throughout the year. Exotic.

Distrib. : Native of Tropical America, introduced in India.

Specimens examined : Daltonganj, 835.

Notes : Common, in wastelands.

Common name : Beng. : *Lajjabati;* Hindi : *Lajwati.*

4. PITHECELLOBIUM Mart.

Pithecellobium dulce (Roxb.) Benth., Lond. J. Bot. 3: 119. 1844; Baker in Hook.f., Fl. Brit. India 2: 302. 1878; Haines, Bot. Bihar & Orissa 2: 349. 1961 (Rep. ed.); Kostermans in Dassanayeke, Rev. Hand. Fl. Ceylon 1: 495. 1980. *Mimosa dulcis* Roxb., Corom. Pl. 1: 67. t. 99. 1795. *Inga dulcis* (Roxb.) Willd., Sp. Pl. 4(2): 1005. 1806.

Large trees, up to 10 m high. Leaves 2-pinnate; petioles up to 2.5 cm long, with a gland at tip; leaflets 2 per pinna, obliquely-oblong, up to 4.5 × 1.8 cm, glabrous, obtuse to sub-acute at apex; stipular thorns conical, 3-8 mm long. Flowers in dense heads on puberulous, up to 5 mm long, slender peduncles, solitary or 2-3 together in the axil of bracts; bracts lanceolate, 1-2 mm long. Calyx subcampanulate, up to 1 mm long, grey downy, shortly toothed. Corolla white, 2 times as long as calyx, densely puberulous, lobes ovate, acute. Staminal tube longer than corolla. Ovary puberulous, shortly stipitate. Pods turgid, spiral, moniliform, often curled into circle, up to 1 cm wide. Seeds ovate oblong, up to 12 × 8 mm.

Fl. & Fr. : Jan.-May. Exotic

Distrib. : Native of Mexico, now naturalised in all Tropical countries.

Specimens examined : Garwah, 855.

Notes : Common, along the road sides.

Common name : Beng : *Dekhani babul;* Hindi : *Bilaiti babul, Jeelebi.*

Uses : Suitable for hedges after prunning. Seeds are often eaten. Seeds yield a fatty oil used for soap making and edible purposes. Leaves used as fodder.

FABACEAE

1a. Leaves paripinnate :

2a. Stamens-10; seeds without black spot at hilum :

3a. Leaflets 3-10 on many pairs; antehrs uniform :

4a. Leaflets serrate; style glabrous .... 7. CICER

4b. Leaflets entire; style hairy :

5a. Staminal tube with oblique mouth :

6a. Ovules 3-many; style bearded throughout .... 36. VICIA

6b. Ovules-2; style longitudinally bearded .... 20. LENS

5b. Staminal tube with truncate mouth :

7a. Style flat and margin recurved upwards; pods turgid :

8a. Herbaceous; supported by tendrils .... 26. PISUM

8b. Small trees; without tendrils .... 31. SESBANIA

7b. Style flat but margin not recurved; pods compressed .... 19. LATHYRUS

3b. Leaflets of 1 pair; anther dimorphous .... 38. ZORNIA

2b. Stamens-9; seeds with black spot encircling the hilum .... 1. ABRUS

1b. Leaves imparipinnate (except some species of *Crotalaria*) :

9a. Hairs basifixed; anthers not apiculate :

10a. Leaf venation reticulate :

11a. Calyx teeth not bristly; pod not globose :

12a. Anthers dimorphous, alternately long and short :

13a. Climbers : keel exceeding the wing and standard; style glabrous; pod bristly .... 24. MUCUNA

13b. Herbs or shrubs; petals subequal; style bearded upwards; pods glabrous or pubescent .... 8. CROTALARIA

12b. Anthers uniform; filaments of equal length :

14a. Leaflets-5 or more ;

15a. Leaflets opposite; pod not strap shaped :

16a. Leaflets more than 1 cm broad; pod not constricted :

17a. Woody climbers; pod flattened, tomentose, more than 15 cm long .... 23. MILLETTIA

17b. Trees; pod not flattened, glabrous, less than 15 cm long .... 10. DERRIS

16b. Leaflets less than 3 mm broad; pod constricted at ventral suture .... 2. AESCHYNOMENE

15b. Leaflets alternate; pod thin, strap shaped .... 9. DALBERGIA

14b. Leaflets 1 or 3 :

18a. Leaves gland-dotted beneath :

19a. Leaves orbicular, dentate; pod indehiscent .... 27. PSORALEA

19b. Leaves or leaflets not orbicular, entire; pod dehiscent :

20a. Flowers pedicelled :

21a. Ovules 3-many; pod compressed :

22a. Shrubs; corolla caducous; seeds estrophiolate .... 6. CAJANUS

22a. Climbers; corolla persistent; seeds strophiolate .... 4. ATYLOSIA

21b. Ovules-2; pod turgid .... 29. RHYNCHOSIA

20b. Flowers sessile or subsessile in dense racemes or heads .... 15. FLEMINGIA A

18b. Leaves not gland-dotted beneath :

23a. Leaves simple or digitately 3-foliolate :

24a. Calyx oblique truncate at apex, gibbous at base .... 13. DUMASIA

24a. Calyx toothed or lobed not gibbous :

25a. Stipels gland like .... 14. ERYTHRINA

25b. Stipels subulate or 0 :

26a. Stipules scarious; pod jointed :

27a. Calyx scarious; joint of the pod turgid .... 3. ALYSICARPUS

27b. Calyx herbaceous; joint of the pod flat .... 11. DESMODIUM

26b. Stipules herbaceous; pod not jointed .... 30. ROTHIA

23b. Leaves pinnately 3-foliolate or many foliolate :

28a. Standard less than 1 cm long :

29a. Leaflets denticulate, with strong smell .... 34. TRIGONELLA

29b. Leaflets not denticulate; without any smell :

30a. Leaflets serrate; pod sub-globose, indehiscent .... 29. MELILOTUS

30b. Leaflets entire; pod not as above :

31a. Style hairy :

32a. Keel spirally beaked; style without any appendage .... 25. PHASEOLUS

32b. Keel incurved; style ending in an apical beak .... 37. VIGNA

31b. Style glabrous :

33a. Twining herbs; calyx 2-lipped .... 33. TERAMNUS

33b. Trees; calyx campanulate .... 16. GLIRICIDIA

28b. Standard more than 1 cm long :

34a. Calyx black, velvety; standard more than 3 cm long .... 5 BUTEA

34b. Calyx not as above; standard less than 3 cm long :

35a. Suberect herbs; calyx teeth setaceous .... 21. MACROTYLOMA

35b. Climbers; calyx teeth not setaceous :

36a. Calyx 2-lipped; pods glabrous :

37a. Style hairy, hairs tufted at apex .... 12. DOLICHOS

37b. Style hairy down the inner face .... 18. LABLAB

36b. Calyx 5-lobed; pods densely hairy .... 28. PUERARIA

11b. Calyx teeth bristly; pod globose .... 35. URARIA

10b. Leaf venation striate .... 32. TEPHROSIA

9b. Hairs centrifixed; anthers apiculate .... 17. INDIGOFERA

1. ABRUS Adans.

Abrus precatorius L., Syst. Nat. ed. 12. 472; 1767; Baker in Hook.f., Fl. Brit. India 2: 175. 1876; Prain, Beng. Pl. 1: 369. 1903 (Rep. ed. 1: 262. 1963) & in Rec. Bot. Surv. Ind. 3: 192. 1905; Haines, Bot. Bihar & Orissa 2: 259. 1961 (Rep. ed.); Breteler in Blumea 10: 613. 1960; Verdcourt in Kew Bull. 24: 240. 1970.

Twining shrubs with slender branches; young branches sericeous. Leaves up to 12 cm long; rachis thickened at base; stipules up to 4 mm long, hairy, linear-lanceolate, acuminate; leaflets 10-25 pairs, up to 20 × 6 mm, deciduous, oblong, rounded-apiculate at apex, rounded at base, thinly sericeous on both surfaces; petiolules up to 1 mm long. Flowers fascicled on tubercles of rachis or axillary, pale pinkish-white. Pods up to 3.5 × 1.5 cm, pubescent, turgid, slightly curved at the top. Seeds globose, 3-5, usually red with black hilum or sometimes white with black hilum.

Fl. & Fr. : Aug.-Dec.; fruits remain on the plants up to April.

Distrib. : India, cosmopolitan in the tropics.

Specimens examined : Mahuamilan, 668.

Notes : Common, in the thickets and hedges, throughout the district.

Common name : Beng : *Kunch*; Hindi : *Gunchi, rati*; Santal : *Kawet.*

Uses: Roots and leaves contain glycyrrhizin and their decoction is given for cough and colds. Bruised seeds have been used criminally for poisoning

cattle and for homicidal purposes. The seeds 'rati' used by Indian jewellers as a weight.

2. AESCHYNOMENE L.

Aeschynomene indica L., Sp. Pl. 713. 1753; Baker in Hook.f., Fl. Brit. India 2: 151. 1876; Prain, Beng. Pl. 1: 418. 1903 (Rep. ed. 1: 299. 1963) & in Rec. Bot. Surv. India 3: 202. 1905; Haines, Bot. Bihar & Orissa 2: 265. 1961 (Rep. ed.); Rudd in Reinwardtia 5: 30. 1959; Saldanha & Singh in Saldanha, Fl. Karnataka 1: 416. 1984. *A. pumila* L., Sp. Pl. ed. 2: 1061. 1763.

Erect, branched, robust herbs; stem branches; leaf rachis, scabrid due to papillae. Leaves 4-7 cm long; stipules deciduous, lanceolate, apex-acute; leaflets 18-30 pairs and terminal one, alternate and opposite, linear-oblong, 3-5 × 1.5-2 mm, mucronate. Flowers 2-4, in small, terminal racemes on axillary branches; bracts lanceolate-acuminate, margin toothed and ciliate; bracteoles-2, at the tip of the pedicel, deciduous, oblong-lanceolate. Calyx 5-7 mm long, glabrous, 2-lipped. Corolla twice as long as calyx, yellow; standard with violet veins. Pods up to 40 × 4 m, 4-8 jointed, straight or slightly curved, scabrid.

Fl. & Fr. : Sept.-Jan.

Distrib. : India, Japan and Tropics of the Old World.

Specimens examined : Simultarh (Daltonganj), 324. Helophyte & Tenagophyte.

Notes : Common, in the marshy area, pond, ditches and side of the rice field.

Common name : Beng.: *Kathsola*; Hindi : *Laugauni.*

3. ALYSICARPUS DESV. *nom. cons.*

1a. Calyx shorter or slightly exceeding the first joint of pods :

2a. Pods veined, entire to indistinctly moniliform :

3a. Stems glabrous; calyx slightly exceeding first joint of pod .... 5. *A. vaginalis*

3b. Stem pubescent with long sattered hairs; calyx never exeeding the first joint of pods ..... 3. *A. procumbens*

2b. Pods not veined, distinctly moniliform .... 2. *A. monilifer*

1b. Calyx much exceeding the first joint of pods :

4a. Pods transversely ribbed, moniliform .... 4. *A. scariosus*

4b. Pods reticulately veined, submoniliform .... 1. *A. bupleurifolius*

1. Alysicarpus bupleurifolius (L.) DC., Prodr. 2: 352. 1825; Baker in Hook.f., Fl. Brit. India 2: 158. 1876; Haines, Bot. Bihar & Orissa 2: 269. 1961 (Rep. ed.); Saldanha & Singh in Saldanha, Fl. Karnataka 1: 417. 1984. *Hedysarum bupleurifolium* L. Sp. Pl. 745. 1753.

Erect, slender herbs; stems glabrous. Leaves linear-lanceolate, glabrous above, sparsely pubescent beneath, up to 5 × 0.5 cm, primary vein prominent. Racemes up to 15 cm long. Flowers shortly pedicelled, paired. Calyx up to 7 mm long, longer than first joint of the pods, ciliate at tip only. Pods rugose, glabrous, submoliniform, joints slightly longer than broad, 2-4.

Fl. & Fr. : Sept.-Nov.

Distrib. : India, China, Malaysia, Sri Lanka, Myanmar.

Specimens examined : Muhammadganj, 996.

Notes : Common, in the wet places among the grasses.

2. A. monilifer (L.) DC., Prodr 2: 353. 1825; Baker in Hook.f., Fl. Brit. India 2: 157. 1876; Prain, Bengal Pl. 1: 427. 1903 (Rep. ed. 1: 306. 1963); Haines, Bot. Bihar & Orissa 2: 270. 1961 (Rep. ed.); Saldanha & Singh in Saldanha, Fl. Karnataka 1: 418. 1984. *Hedysarum moniliferum* L., Mant. 1: 102. 1767.

Slender, procumbent, much branched herbs, often with woody base; branches up to 30 cm long, patent hairy. Leaves unifoliate; petioles up to 8 mm long; stipules up to 7 mm long, lanceolate, scarious, striate, acuminate; leaflets up to 14 × 8 mm, oblong, or elliptic-oblong, apex

rounded, base cordate, glabrous above, slightly spreading-hairy beneath; petiolules up to 1 mm long. Calyx shorter than first joint of pod. Pods 2 cm long, turgid, moniliform, 3-6 jointed, pubescent with minute hooked hairs, surface smooth.

Fl. & Fr. : Nov.-Mar.

Distrib. : Throughout India, Myanmar, Sudan and Ethiopia.

Specimens examined : Daltonganj, 269.

Notes : Common, in the open grass fields and dry lands, throughout the district.

3. **Alysicarpus procumbens** (Roxb.) Schindler, Repert. Spec. Nov. Regni Veg. 21: 11. 1925; Saldanha & Singh in Saldanha, Fl. Karnataka 1: 418. 1984. *Hedysarum procumbens* Roxb., Fl. Ind. 3: 345. 1832. *Alysicarpus hamosus* Edgew., J. Asiat. Soc. Beng. 21: 171. 1851; Baker in Hook.f., Fl. Brit. India 2: 157. 1876; Haines, Bot. Bihar & Orissa 2: 271. 1961 (Rep. ed.).

Sparsely hairy, much branched, perennial herbs; branches often with short pubescence and long scattered hairs. Leaves simple, elliptic-ovate to orbicular, up to 3 × 2 cm, obtuse at apeax, semicordate at base, glabrous above, hairy beneath on nerves; petioles up to 5 mm long; stipules up to 1.2 cm long. Flowers in up to 8 cm long racemes. Calyx up to 4 mm long, shorter than the first joint of the pods, lobes ciliate, valvate in fruit. Pods up to 2 cm long, 2-6 jointed, falcate-oblong, reticulately veined. Seeds elliptic-oblong, up to 2 mm long.

Fl. & Fr. : Sept.-Dec.

Distrib. : Eastern, Western and Southern India.

Specimens examined : Muhammadganj, 999.

Notes : Not common, in the waste places and among the grasses.

4. **A. scariosus** (Rottl. ex Spr.) Grah. ex Thw., Enum. 88. 1858; Ali in Biologia 12: 32. 1966; Shah in J. Bombay Nat. Hist. Soc. 69: 444.

1972. *Hedysarum scariosus* Rottl. ex Spr., Syst. Veg. 3: 319. 1826. *H. glumaceum* (auct. non L.); Roth, Nov. Pl. Sr. 355. 1821. *Alysicarpus glumaceus* (Roth) Schindl. in Fedde, Repert. Sp. Nov. 21: 12. 1925, non DC. 1825; Shah in J. Bombay Nat. Hist. Soc. 60: 296. 1963. *Alysicarpus rugosus* var. *styracifolius* Baker in Hook.f., Fl. Brit. India 2: 159. 1876; Haines, Bot. Bihar & Orissa 2: 270. 1961 (Rep. ed.).

Prostrate, diffuse herbs; branches up to 60 cm long, covered with spreading hairs. Leaves elliptic to elliptic-ovate, up to 3.5 × 1.8 cm, obtuse at apex, rounded at base, pubescent beneath. Flowers in short, dense racemes, up to 2 cm long, pubescent. Calyx up to 7 mm long, imbricate in fruit, lobes ciliate and acute. Pods often slightly exserted, moniliform, 3-4 jointed, downy, transversely rugose.

Fl. & Fr. : Nov.-Feb.

Distrib. : Throughout India, Sri Lanka, Pakistan.

Specimens examined : Garwah, 603; Kechki, 880.

Notes : Occasional, in open land.

5. Alysicarpus vaginalis (L.) DC., Prodr. 2: 352. 1825; Baker in Hook.f., Fl. Brit. India 2: 158. 1876 (excl. var. *heterophyllus*); Haines, Bot. Bihar & Orissa, 2: 271. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 118. 1977. *Hedysarum vaginale* L., Sp. Pl. 746. 1753. *Alysicarpus vaginalis* var. *nummularifolius* (Willd.) Miq., Fl. Ind. Bot. 1: 232. 1855; Baker in Hook.f., Fl. Brit. India 2: 158. 1876.

A diffuse, prostrate annual herb; branches glabrous. Leaves elliptic to oblong-lanceolate, 1-5 × 0.8-2.1 cm, 1-foliolate, obtuse at apex, subcordate at base, sparsely hairy beneath, glabrous above; petioles up to 1 cm long; stipules lanceolate, up to 13 mm long, scarious. Racemes up to 5 cm long, downy; pedicels shorter than the calyx. Calyx up to 5 mm long, glabrous; teeth linear-setaceous, longer than the tube. Corolla pinkish. Pods subterate, 4-8 jointed, turgid, reticulate, slightly constricted.

Fl. & Fr. : Sept.-Mar.

Distrib. : India and Afghanistan, introduced in America.

Specimens examined : Kechki, 896.

Notes : Common, in the open field and forest under growth

4. ATYLOSIA R. Wight et Arnott

Atylosia scarabaeoides (L.) Benth. in Miq., Fl. Jung. 243. 1851; Baker in Hook.f., Fl. Brit. India 2: 215. 1876; Haines, Bot, Bihar & Orissa 2: 287. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 121. 1977; Saldanha & Singh in Saldanha, Fl. Karnataka 1: 423. 1984. *Dolichos scarabaeoides* L., Sp. Pl. 726. 1753. Prain, Bengal Pl. 1: 388. 1903. (Rep. ed. 1: 272. 1963).

Climbing or trailing herbs, with rusty pubescence. Leaves trifoliate; leaflets with 3-primary nerve, tomentose when young, elliptic, elliptic-obovate, acute at both ends, velvety pubescent, up to 2 × 0.5 cm, terminal leaflets always larger than other 2; petioles shorter than terminal leaflets. Racemes clustered on short axillary peduncles; corolla yellow, crimson externally. Calyx densely grey-silky, teeth linear, up to 7 mm long. Corolla slightly exserted. Pods oblong, densely grey-hairy, up to 2.5 × 0.7 cm, 4-6 seeded.

Fl. & Fr. : Oct.-Apr. Exotic.

Distrib. : India, Malaysia, China, native of Australia.

Specimens examined : Netarhat, 151.

Notes : Common, in the scrub jungles.

Remarks : M. Sanjappa in his "Legumes of India" (p. 103, 1991) treated this plant following 'du petit - Thow' as *Cajanus scarabaeoides* (L.) du petit- Thow, Dict. Sco. Nat. 6: 617. 1817.

5. BUTEA Roxb. ex Willd.

Butea monosperma (Lamk.) Taubert in Engler & Prantl. Pflanzenfam. 3(3): 366. 1894; Sant. in Fl. Khand. ed. 3. 66. 1967. *Erythrina monosperma* Lamk., Encycl. 1: 391. 1783. *Butea frondosa* Koenig ex Roxb., Asiat. Res. 3: 469. 1792; Baker in Hook.f., Fl. Brit. India 2: 194. 1876; Haines, Bot. Bihar & Orissa 2: 292. 1961 (Rep. ed.). *Plaso monosperma* (Lamk.) Kntz., Rev. Gen. Pl. 1: 202. 1891.

Large, deciduous, trees younger branches tomentose. Leaves 3-foliolate; leaf rachis 15-20 cm long; leaflets rhomboid or broaldy ovate, obtuse, up to 18 × 20 cm, nerves prominent beneath. Flowers densely fascicled in axillary or terminal racemes. Calyx campanulate, 2-lipped, black velvety. Corolla flame coloured; standard ovate, up to 6 cm long, tomentose without. Pods stalked, rounded at apex, up to 17 × 6 cm, oblong, velvety brown.

Fl. : Jan.-Apr.

Distrib. : India, Malaysia and Sri Lanka.

Specimens examined : Daltonganj, 11.

Notes : Very common, throughout the district, in the forest and villages.

Common name : Beng. : *Palash*; Hindi : *Dhak*; Santal : Muruk.

Uses : The leaves are used for making plates, cups etc. Bark used for piles, tumours and female diseases.

6. CAJANUS A.P. de Candolle *nom. cons.*

Cajanus cajan (L.) Millspaugh, Publ. Field. Columbian Mus. Bot. 2: 53. 1900; Saldanha & Singh in Fl. Karnataka 1: 424. 1984. *Cytisus cajan* L., Sp. Pl. 739. 1753. *Cajanus indicus* Spreng., Syst. Nat. 3: 248. 1826; Baker in Hook.f., Fl. Brit. India 2: 217. 1876; Haines, Bot. Bihar & Orissa 2: 287. 1961 (Rep. ed.). *Cajan cajan* (L.) Huth, Helios 11: 133. 1893. *Cajanus obcordifolia* Singh, Ind. J. Agric. Sci. 12: 783. 1942; Razi in Rec. Bot. Surv. Ind. 18(1): 9. 1959.

Erect shrubs, up to 2.5 m high; branches striate, silky pubescent. Leaves 3-foliolate; petioles 1-3 cm long; leaflets elliptic-oblong, chartaceous, grey-canescent beneath, up to 9 × 3 cm, acuminate at apex. Flowers yellow, in axillary or terminal, 6-10 cm long racemes. Calyx 8 mm long, pubescent. Corolla 1.8 cm long. Filaments alternately longer and shorter. Pods up to 5 cm long, pubescent and glandular, often with dark purple spot, tipped with style base.

Fl. & Fr. : Nov.-Mar. Exotic.

Distrib. : Pantropical, probably a native of Africa.

Specimens examined : Mahuamilan, 674.

Notes : Largely cultivated, occasionally found wild in open dry land.

Common name : Beng. : *Arohar*; Hindi : *Arhar*.

Uses : Dal, which is obtained by splitting the seeds is cooked with spices and vegetables. Green pods used as vegetable. Husk a useful fodder. Leaves used in Malagasy for rearing silkworms, and juice of the leaves used for jaundice by the local people.

7. Cicer L.

Cicer arietinum L., Sp. Pl. 738. 1753; Baker in Hook.f., Fl. Brit. India 2: 176. 1876; Haines, Bot. Bihar & Orissa 2: 259. 1961 (Rep. ed.).

A viscid, much branched, annual herb, up to 30 cm high, hairy throughout. Leaves up to 5 cm long, with a terminal leaflet; stipules up to 5 mm long, obliquely ovate, hairy; leaflets oblong, up to 14 × 3.5 mm, entire. Peduncles up to 2 cm long, jointed above the middle, deflexed after flowering. Flowers axillary, bluish-purple. Calyx up to 4 mm long, hairy; teeth linear. Corolla as long as calyx. Pods up to 2.5 cm long, turgid, tipped by persistent base of style. Seeds obovate or subglobose, beaked.

Fl. & Fr. : Jan.-Mar.

Distrib. : Throughout Temperate and Tropical parts of the World.

Specimens examined : Tenarbusti (Garwah), *Sarma* 601.

Notes : Widely cultivated throughout the district.

Common name : Beng. : *Chola* or *But kalai*; Hindi : *Chana*; Santal : *Bhut*.

Uses : The seed is largely eaten by the people after boiling. Horses and sheep are largely feed out it. It has also medicinal properties.

8. Crotalaria L.

1a. Leaves subsessile, 1-foliolate :

2a. Ovary and pods glabrous :

3a. Stipules prominent, ovate-lanceolate or lanceolate :

4a. Branches striate, glabrous; corolla exserted .... 8. *C. spectabilis*

4b. Branches not striate, villous; corolla included .... 3. *C. hirta*

3b. Stipule -0, if present very minute :

5a. Pods as long as or shorter than calyx :

6a. Calyx less than 1 cm long; pods globose .... 5. *C. linifolia*

6b. Calyx more than 1 cm long, pods oblong .... 2. *C. calycina*

5b. Pods longer than calyx :

7a. Branches with spreading hairs; pods 16-20 seeded .... 7. *C. prostrata*

7b. Branches appressed pubescent; pods 2-5 seeded .... 1. *C. albida*

2b. Ovary and pods velvety .... 4. *C. juncea*

1a. Leaves petiolate, 3-foliolate .... 6. *C. pallida*

1. Crotalaria albida Heyne ex Roth, Nov. Pl. Ind. Or. 333. 1821; Baker in Hook.f., Fl. Brit. India 2: 71. 1876. Haines, Bot. Bihar & Orissa 2: 242. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 123. 1977.

Copiously branched herbs, with appressed, silky-pubescent stems. Leaves shortly petioled, linear-oblong, obtuse, glabrous and pellucid-punctate abvoe, up to 3 x 0.5 cm. Flowers in terminal, 6-10 flowered racemes. Calyx up to 1.2 cm long. Corolla yellow, equalling the calyx, glabrous. Pods oblong, glabrous, up to 1.5 cm long, 2-5 seeded.

Fl. & Fr. : Oct.-Mar.

Distrib. : India, Sri Lanka, Myanmar, Malaysia, China and Phillippines.

Specimens examined : Netarhat, 63 & 104.

Notes : Very common, road sides and elsewhere in the forest under growth.

2. **Crotalaria calycina** Schrank, Pl. Rar. Hort. Monac. t. 12. 1817; Haines, Bot. Bihar & Orissa 2: 242. 1961 (Rep. ed.).

Erect, hairy herbs. Leaves variable, generally elliptic-lanceolate, 5-11 × 1-1.8 cm, acute at apex, appressed-villous beneath. Flowers in terminal, lax racemes with lanceolate bracats. Calyx densely villous, up to 2.5 cm long. Corolla yellow, shorter or as long as calyx; standard villous on back along midline. Pods glabrous, included, many seeded.

Fl. & Fr. : Aug.-Nov.

Distrib. : Paleotropical.

Specimens examined : Muhammadganj, 1025.

Notes : Common, in the hill area.

3. **C. hirta** Willd., Ges. Naturf. Freude Berlin Neue Schriften 4: 217. 1803; Baker in Hook.f., Fl. Brit. India 2: 70. 1876; Haines, Bot. Bihar & Orissa 2: 241. 1961 (Rep. ed.).

Villous herbs, up to 30 cm long; branches densely clothed with short patent, brown hairs. Leaves linear-oblong, obtuse at apex, rounded at base, pilose, up to 5 × 1 cm. Racemes terminal, closely 1-6 flowered; bracts lanceolate, foliaceous. Calyx up to 1.4 cm long, fusco-villous, teeth long, linear, acuminate. Corolla yellow, included; standard medianly hairy on out side. Pods oblong, glabrous, slightly exserted, 15-20 seeded.

Fl. & Fr. : Nov.-Mar.

Distrib. : Throughout India.

Specimens examined : Bisrumpur, 567.

Notes : Not common, in exposed situation of forests.

4. Crotalaria juncea L., Sp. Pl. 714. 1753; Roxb., Pl. Corom. t. 193. 1805; Baker in Hook.f., Fl. Brit. India 2: 79. 1876; Haines, Bot. Bihar & Orissa 2: 243. 1961 (Rep. ed.); Saldanha & Singh in Saldanha, Fl. Karnataka 1: 435. 1984.

Erect, stiff, shining, silky brown undershrubs; stems and branches furrowed. Leaves linear-oblong to oblong-lanceolate, up to 10 × 2 cm, exstipulate, obtuse, apiculate at apex, narrowed down at base, pubescent. Flowers in many flowered terminal racemes. Calyx up to 1.8 cm long, clothed with velvety hairs. Corolla yellow, exserted; standard silky without. Pods velvety, up to 3.5 cm long, 10-15 seeded.

Fl. & Fr. : Aug.-Jan.

Distrib. : India, Myanmar, Sri Lanka, Malaya & Australia.

Specimens examined : Daltonganj, 267.

Notes : Common, cultivated, often found as an escape around the forest.

Common name : Beng. : Hindi & Santal : *Shon. Son.*

Uses : Bark yields a strong fibre, used for cordage and other purposes.

5. C. linifolia L.f., Suppl. 322. 1781; Baker in Hook.f., Fl. Brit. India 2: 72. 1876; Haines, Bot. Bihar & Orissa 2: 242. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 127. 1977; Saldanha & Singh in Saldanha, Fl. Karnataka 1: 436. 1984.

Herbs, up to 40 cm high, erect or with ascending branches; stems strigosely hairy. Leaves linear-oblong to oblanceolate, up to 40 × 7 mm, silky beneath, base subcuneate, mucronate at apex; petioles short, up to 2 mm long; stipules-0. Flowers in terminal racemes; raceme up to 30 cm long, elongated, 6-20 flowered; bracts & bractoles subulate, very small. Calyx silky, up to 0.9 cm long, bilabiate, lower lip linear. Corolla pale yellow, up to 9 mm long, equalling or slightly exserted the calyx. Pods as long as calyx or included, glabrous, globose, 6-seeded.

Fl. & Fr. : Nov.-Feb.

Distrib. : India, Sri Lanka, Myanmar, Malaya, China, Philippines and North Australia.

Specimens examined : Barwadih, 386.

Notes : Not common, in the dry rock.

6. Crotalaria pallida Ait., Hort. Kew. 3: 20. 1789; Sald. & Singh in Sald. Fl. karnataka 1: 438. 1984. var. **pallida** Polhill in Kew Bull. 22(2): 262. 1968. *C. mucronata* Desv. in de. Bot. Appliq. 3: 76. 1814; de Munk in Reinwardtia 6: 209. 1962. *C. striata* DC., Prodr. 2: 131. 1825; Baker in Hook.f., Fl. Brit. India 2: 84. 1876 (excl. syn. *C. laburnoides* Klotz.) *C. striata* var. *acutifolia* Trin., Handb. Fl. Ceylon 2: 19. 1894. *C. saltiana* (non. Andr. 1811) Prain ex King in J. As. Soc. Beng. 411. 1897.

Erect, suffruticose, annual herbs, up to 1 m high; branches thinly, silky-striate. Leaves 3-foliate; petioles up to 3 cm long, puberulous; stipules very small deciduous; leaflets up to 5 × 3 cm, obovate, rounded at apex and cuneate at base, glabrous above and pubescent or silky beneath, margin entire; petiolules pubescent, 2-3 mm long. Flowers many, in up to 30 cm long lateral or terminal racemes, bracts minute; pedicels up to 4 mm long, pubescent. Calyx up to 6 mm long, pubescent outside, teeth as long as tube, lanceolate, acute. Corolla twice as long as calyx, yellow, striped with violet. Pods 3-5 cm long, deflexed, oblong, cylindric, pubescent when young, glabrescent on maturity. Seeds dark brown.

Fl. & Fr. : July-Jan.

Distrib. : Pantropical.

Specimens examined : Daltonganj, 241.

Notes : Common, in the open dry land, along the road sides and on the hill slopes.

Common name : Santal : *Sanjhanka.*

7. C. prostrata Rottl. in Willd., Enum. Hort. Berol. 744. 1809; Roxb. ex D.Don. Prodr. Fl. Nepal 241. 1825; Baker in Hook.f., Fl. Brit. India 2:

67. 1876; Haines, Bot. Bihar & Orissa 2: 240. 1961 (Rep. ed.); Saldanha & Singh in Saldanha, Fl. Karnataka 439. 1984.

Silky, pubescent herbs, up to 30 cm long, with spreading or long trailing slender branches. Leaves simple, exstipulate, oblong, or elliptic-oblong, up to 3.5 × 1.5 cm, rounded or obtuse at apex, base slightly oblique-rounded, densely silky pubescent on both surfaces. Racemes leaf-opposed, 2-5 flowered; bracats lanceolate. Calyx up to 4 mm long. Corolla as long as calyx, yellow. Pods oblong, exserted, up to 1.5 cm long, glabrous, 16-20 seeded.

Fl. & Fr. : Sept.-Dec..

Distrib. : India, Java, Sri Lanka and Malaysia.

Specimens examined : Bisrampur, *Sarma* 649.

Notes : Common, in open Sal forest and among the grasses.

Common name : Santal : *Nanha-Junka, Katie Jhunka.*

8. Crotalaria spectabilis Roth, Nov. Pl. Sp. 341. 1821; Ohashi in Fl. E. Himalaya 3: 61. 1975; Saldanha & Singh in Saldanha, Fl. Karnataka 1: 442. 1984. *Crotalaria sericea* Retz., Obs. Bot. 5: 26. 1789; Baker in Hook.f., Fl. Brit. India 2: 75. 1876; Haines, Bot. Bihar & Orissa 2: 243. 1961 (Rep. ed.); De Munk in Reinwardtia 6: 214. 1962. *Crotalaria leschenaultii* DC., Prodr. 2: 125. 1825; Baker in Hook.f., Fl. Brit. India 2: 76. 1876.

Erect herbs or undershrubs, up to 2.5 m high, branches striate, glabrous. Leaves simple, 6-12 × 2-5 cm, oblanceolate to obovate, apex rounded to obtuse, glabrous above and finely silky beneath; petioles up to 4 mm long, silky; stipules up to 10 mm long, lanceolate, persistent. Flowers in terminal, 20-30 cm long racemes; pedicels up to 2 cm long, each subtended by a large, ovate-lanceolate, persistent bract and at middle with 2 small subulate bractoles. Calyx up to 15 mm long, tube broadly campanulate, upper teeth deeply cut, larger, triangular, acute; lower 3 smaller and not deeply cut, lanceolate, acute. Corolla yellow, up to 2.5 cm long. Pods up to 5 cm long, linear-oblong, cylindric, glabrous, 20-30 seeded.

Fl. & Fr. : Nov.-Mar.

Distrib. : Pantropical.

Specimens examined : Kumendi, 716.

Notes : Common, near the stream, Beyang Pahar & Marhar pahar.

Common name : Beng. : *Jhumjhumo, Atasi*; Hindi : *Jhunjhunia*.

Uses : Source of fairly strong fibres. Plant used in scabies and impetigo.

9. DALBERGIA L.f.

Dalbergia sissoo Roxb., Fl. Ind. 3: 223. 1832; Baker in Hook.f., Fl. Brit. India 2: 231. 1876; Prain, Beng. Pl. 1: 294. 1963 (Rep. ed.); Haines, Bot. Bihar & Orissa 2: 307. 1961 (Rep. ed.); Ali in Fl. W. Pak. 100. 56: 1977; Saldanha & Singh in Saldanha, Fl. Karnataka 1: 446. 1984.

A large tree, with rough bark; young branches pubescent. Leaves imparipinnate; leaflets 3-5, broadly-ovate or suborbicular, terminal one largest, up to 4.8 × 4.5 cm, acuminate at apex, glabrous above and sparsely hairy beneath. Inflorescence of axillary-panicles of short spike with sessile or subsessile flowers; bracts pubescent, caducous. Calyx teeth ciliate, unequal, tube sparsely pubescent. Corolla yellowish white. Stamen-9, monadelphous. Pods strap shaped, glabrous, up to 8 × 1 cm, 1-4 seeded.

Fl. & Fr. : Mar.-Sept.

Distrib. : Throughout India (ascending to 5000 ft. in the central Himalaya); Afghanistan and Baluchistan.

Specimens examined : Maromar, 522.

Notes : Common, as an avenue tree, also in the forests.

Uses : A beautiful timber and yielding furniture wood.

10. DERRIS Lour.

Derris indica (Lamk.) Bennet in J. Bombay Nat. Hist. Soc. 68: 303. 1971. *Galedupa indica* Lamk., Encycl. 2: 594. 1788-1789. *Pongamia*

glabra Vent., Jard: Malm. t. 28.1: 28. 1803; Baker in Hook.f., Fl. Brit. India 2: 240. 1876; Haines, Bot. Bihar & Orissa 2: 313. 1961 (Rep. ed.). *P. pinnata* L. Pierre, Fl. Cochinch. sub. t. 385. 1899, non *Derris pinnata* L., Sp. Pl. 741. 1753.

A medium sized glabrous tree, with spreading branches. Leaves imparipinnate, up to 30 cm long; leaflets 5-7, elliptic, ovate-oblong, acute to acuminate at apex, up to 9 × 6 cm. Racemes shorter than leaves. Calyx pubescent, obscursely toothed. Corolla white, tinged-violet or pinkish; standard orbicular, silky, 2-auriculate at base. Pods obliquely oblong, woody, glabrous, 1-seeded, indehiscent, up to 4 cm long, with a short decurved point.

Fl. : Mar.-June. *Fr.* : June-Dec.

Distrib. : India, Sri Lanka, Malaya Islands, N. Australia, Polynesia and also to Seychelles.

Specimens examined : Maromar, 528.

Notes : Common, in the forest, also planted in the village.

Common name : Beng. : *Dark Karanja, Karanj*; Hindi : *Karanj/ Karanj;* Santal : *Karanj.*

Uses : The seed yields a valuable medicinal oil, the leaves and roots are also used medicinally.

Remarks : *Pongamia* Vent. (1803), *Aganope* Miq. (1855) and *Derris* Lour. (1790) are congeneric, but Thothathri & Nair (Taxon 30: 44. 1981) consider *Pongamia* and *Derris* as distinct genera.

11. DESMODIUM Desv. *nom. cons.*

1a. Flowers hidden in persistent, orbicular, bifarious bracts .... 4. *D. pulchellum*

1b. Flowers not hidden; bracats not orbicular :

2a. Flowers in short axillary umbels .... 5. *D. triangulare*

2b. Flowers in racemes or in few flowered fascicles :

3a. Trailling herbs; leaflets les than 1 cm long .... 6. *D. triflorum*

3b. Erect herbs or shrubs; leaves or leaflets more than 1 cm long :

4a. Leaves 1-foliolate; bracts subulate, up to 1 mm broad :

5a. Leaves fulvous-tomentose beneath; branches terete; pedicels 1 mm long .... 7. *D. velutinum*

5b. Leaves sparsely pubescent beneath; branches angled; pedicels more than 3 mm long .... 1. *D. gangeticum*

4b. Leaves 3-foliolate; bracts ovate to ovate-laneolate, more than 2 mm broad :

6a. Lateral leaflets much smaller than terminal; flowrs solitary in the axil of bracts; pods more than 2 cm long .... 3. *D. motorium*

6b. Leaflets subequal; flowers paired in the axil of bracts; pods up to 2 cm long .... 2. *D. heterocarpon*

1. Desmodium gangeticum (L.) DC., Prodr. 2: 327. 1825; Baker in Hook.f., Fl. Brit. India 2: 168. 1876; Prain, Bengal Pl. 1: 425. 1903 (Rep. ed. 1: 304. 1963) & in Rec. Bot. Surv. India 3: 203. 1905; Meeuwen in Reinwardtia 6: 249. 1962; Schubert in J. Arn. Arb. 44: 294. 1963; Ohashi in Ginkgoana 1: 184 t. 226. 1973; Haines, Bot. Bihar & Orissa, 2: 276. 1961 (Rep. ed.); Guha Bakshi, Fl. Murshidabad district 186. 1984. *Hedysarum gangeticum* L., Sp. Pl. 746. 1753. *Desmodium gangeticum* var. *maculatum* (L.) Baker in Hook.f., Fl. Brit. India 2: 168. 1876.

Erect or ascending, suffruticose herbs, 20-130 cm high; branches covered with whitish or brown hairs. Leaves one-foliate, highly variable in size, pubescent; leaflets up to 6 × 8 cm, ovate-oblong or obovate, acute, rounded to obtuse at base; petioles up to 7 mm long. Flowers in terminal or axillary raceme, puberulous; pedicels 2 mm long. Calyx 5-6 mm long, teeth as long as tube. Standard 5-6 mm long. Pods 1-2.5 cm long, falcate, 4-6 jointed, hairy, tip ending in a bristle, clothed with minute hooked hairs.

Fl. & Fr. : Throughout the year, during March mostly in fruiting condition.

Distrib. : India, Sri Lanka, Tropical Africa, Malaya, Philippines, China; introduced in West Indies.

Specimens examined : Daltonganj, 4.

Notes: Common, throughout the district, highly variable in habit, size and shape of the leaves.

Common name : Beng. : *Salpani*; Hindi : *Sarivan*.

2. **Desmodium heterocarpon** (L.) DC., Prodr. 2: 237. 1825, var. **strigosum**, van Meeuwen in Reinwardtia 6: 95. 1961 & 6: 251. 1962. *Hedysarum polycarpum* Poir. in Lamk. Encycl. 6: 413. 1805. *Desmodium polycarpum* (Poir.) DC., Prodr. 2: 334. 1825. *pro type et* Partim; Baker in Hook.f., Fl. Brit. India 2: 271. 1876 *pro parte*. *Hedysarum heterocarpon* L., Sp. Pl. 747. 1753. *Hedysarum siliquosum* Burm.f., Fl. India 169. t. 55. f. 2: 1768.

Undershrub, with creeping root stock, hairy throughout; stems brownish. Leaves 3-foliolate; leaflets obovate or elliptic-oblong, mucronate at apex, 3-5 × 2-2.5 cm; stipules linear subulate. Racemes 4-10 cm long. Flowers 1-2 per bract. Calyx up to 2 mm long, incised to halfway. Corolla bluish. Pods linear, pubescent on both surfaces, brown, 6-8 jointed.

Fl. & Fr. : Oct.-Jan.

Distrib. : India, Sri Lanka, Myanmar, Malaya, Philippines, China, Japan and Polynesia.

Specimens examined : Netarhat, 108.

Notes : Common, in the dry open area and sal forest.

Common name : Santal : *Baephol, Saormonra*.

3. **D. motorium** (Houtt.) Merr. in J. Arn. Arb. 19: 345. 1938; Babu, Herb. Fl. Dehra Dun 135. 1977; Saldanha & Singh in Saldanha, Fl. Karnataka 1: 453. 1984. *Hedysarum motorium* Houtt., Nat. Hist. 2(10): 246. 1779. *H. gyrans* L.f., Suppl. 332. 1781. *Desmodium gyrans* (L.f.) DC. Prodr. 2: 326. 1825; Baker in Hook.f., Fl. Brit. India 2: 174. 1876; Haines, Bot. Bihar & Orissa 2: 278. 1961 (Rep. ed.). *D. gyrans* var. *roylei* (W. & A.) Baker in Hook.f., Fl. Brit. India 2: 175. 1876. *Cadariocalyx motorius* (Houtt.) Ohashi in J. Jap. Bot. 40: 367. 1965 & in Fl. E. Himal. 145. 1966.

Erect herbs, up to 40 cm high; branches green, glabrous. Leaves 3-foliolate, with one large terminal and 2 very small lateral leaflets, terminal one oblong-lanceolate, up to 5 × 1.5 cm and lateral leaflets 12 × 3 mm, appressed hairy beneath, glabrous abvoe. Flowers in axillary or terminal racemes; bracts large, concealing the bud. Calyx shorter than the tube. Petals 5-7 mm long, pink. Pods 30-40 × 3-5 mm, slightly falcate, dehiscing along the ventral suture.

Fl. & Fr. : Aug.-Dec.

Distrib. : India, Sri Lanka, Myanmar, Malaya and Philippines.

Specimens examined : Mandal, 381.

Notes : Common on the hill slopes.

Common name : Beng. : *Gorachand/Bon charal.*

Remarks : The genus *cadariocalyx* Hassk. (1840) is congeneric with *Desmodium* Desv. (1813).

4. Desmodium pulchellum (L.) Benth., Fl. Hongk. 83: 1861; Baker in Hook.f., Fl. Brit. India 2: 162. 1876; Haines, Bot. Bihar & Orissa 2: 273. 1961 (Rep. ed.) *Hedysarum pulchellum* L., Sp. Pl. 747. 1753.

Shrubs, with grey hairy branches. Leaves 3-foliolate, terminal leaflet larger, up to 6 × 3.5 cm, elliptic or ovate-oblong, hairy beneath, glabrous above, except mid rib and secondary nerves, lateral leaflets up to 2 × 1.3 cm, oblong, with strong secondary nerves; leaf rachis 4-angular, hairy; petiolules very small. Flowers in axillary racemes; bracts orbicular, strongly nerved, up to 1 × 1 cm, hairy on the nerves, coriaceous, paired, enclosing whitish-yellow flowers. Pod 2-seeded, 1-joined, constricted at both sutures, up to 8 × 4 mm, glabrous, with reticulate venation on the surface. Seeds glabrous, orbicular, 2 mm across.

Fl. & Fr. : Sept.-Jan.

Distrib. : Throughout India, Sri Lanka, Myanmar, China, Philippines and Malaya.

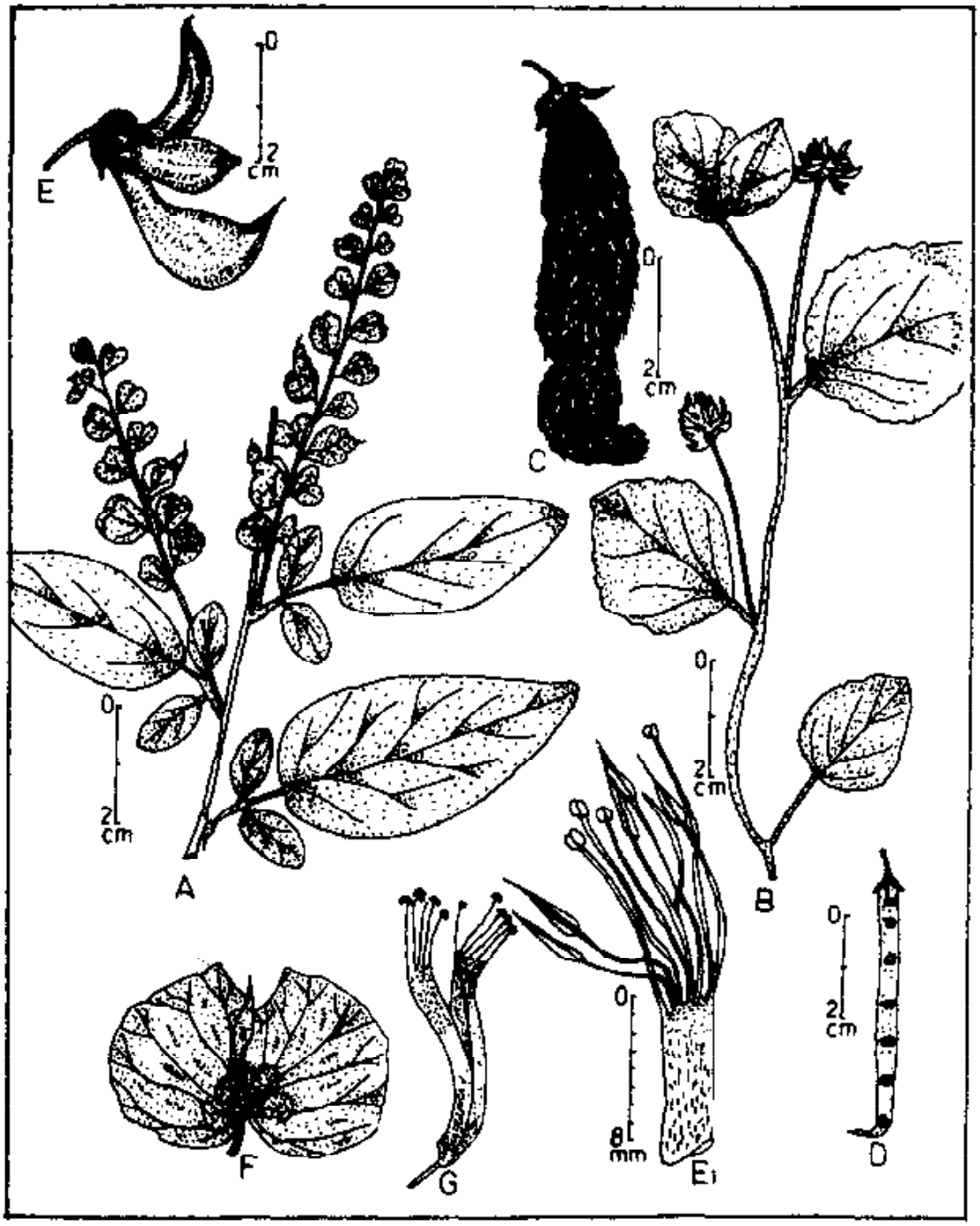


Fig. 13. Fabaceae. A. *Desmodium pulchellum* (L.) Benth.: Flowering and fruiting twig; B. *Psoralea corylifolia* Linn.: Flowering twig; C. *Mucuna pruriens* (L.) DC.: Fruit; D. *Teramnus labialis* (L.f.) Spreng.: Fruit; (E-E_1): *Crotalaria pallida* Ait.: E. Flower, E_1. Stamens; F. *Flemingia chappar* Buch. -Ham. ex Wall.: Flower with bract; G. *Aeschynomene indica* L.: Stamens and Pistil.

Specimens examined : Barwadih, 383.

Notes : Common, in the forest under growth and on the hill slopes.

Common name : Santal : *Bir Kapi.*

5. Desmodium triangulare (Retz.) Merr. in J. Arn. Arb. 23: 170. 1942; van Meeuwen in Reinwardtia 6: 261. 1962. *Hedysarum triangulare* Retz., Obs. Bot. 3: 40. 1783. *Desmodium cephalotes* (Roxb.) W. & A., Prodr. 224. 1834; Baker in Hook.f., Fl. Brit. India 2: 161. 1876; Haines, Bot. Bihar & Orissa 2: 273. 1961 (Rep. ed.). *Hedysarum cephalotes* Roxb., Fl. Ind. 3: 360. 1832. *Dendrolobium triangulare* (Retz.) Schindler in Feddl. Rep. 20: 279. 1924; Ohashi in Hara, Fl. East. Himal. 148. 1966.

1a. Branches densely white hairy; pods silky .... 5.1. var. *triangulare*

1b. Branches glabrescent; pods glabrescent .... 5.2. var. *congestum*

5.1. var. **triangulare**

Shrubs, up to 1.5 m high, branches triquetrous, densely white hairy. Leaves trifoliate, terminal leaflet slightly larger, up to 14 × 5.5 cm, elliptic-lanceolate, acuminate at apex, rounded at base, glabrous above, pubescent beneath, lateral one up to 10 × 3.5 cm; petioles up to 3.5 cm long, villous. Flowers in dense, axillary umbels; peduncles unequal; bracts linear-oblong, acute or acuminate; bracteoles setaceous. Calyx tube 3 mm long, densely villous, anterior sepal long, acuminate. Pods very silky, up to 10 × 3 mm, fulcate, joint as broad as long. Seeds oblong, 2 × 1.5 mm, straw coloured smooth.

Fl. & Fr. : Aug.-Dec.

Distrib. : Throughout India, Sri Lanka, Thailand and China to Malaya.

Specimens examined : Barwadhi, 454.

Notes : Common, in the forest.

Remarks : Genus *Dendrolobium* (W. & A.) Benth. (1825) is congeneric with the genus *Desmodium* Desv. (1813).

5.2 **Desmodium triangulare** (Retz.) Merr. var. **congestum** (W. & A.) Sant. in Kew Bull. 276. 1948. *Desmodium congestum* Wall. ex W. & A., Prodr. 224. 1834. *Desmodium cephalotes* (Roxb.) W. & A. var. *congestum* (W. & A.) Prain in J. As. Soc. Beng. 289. 1898; Haines, Bot. Bihar & Orissa 2: 273. 1961 (Rep. ed.).

Shrubs, up to 180 cm high; stems triangular, glabrascent. Leaves 3-foliolate; petioles up to 2 cm long, ventraly grooved; leaflets elliptic, acuminate at apex, terminal one larger, up to 8 × 4.2 cm, lateral up to 6.5 × 3.2 cm, with 10-20 pairs parallel silky secondary nerves. Flowers in dense, axillary, short peduncled umbels. Calyx tube up to 3 mm long, silky, anterior sepal long acuminate. Pods glabrascent, 1-2 jointed, up to 4 mm broad.

Fl. & Fr. : Sept.-Jan.

Distrib. : Throughout India.

Specimens examined : Betla, 473.

Notes : Common, in the forest and also on the hill slopes.

6. **D. triflorum** (L.) DC., Prodr. 2: 334. 1825; Baker in Hook.f., Fl. Brit. India 2: 173. 1876; Prain, Beng. Pl. 1: 424. 1903 (Rep. ed. 1: 303. 1963) & in Rec. Bot. Surv. India 2: 202. 1905; Haines, Bot. Bihar & Orissa 2: 278. 1961 (Rep. ed.); Schubert in J. Arn. Arb. 44: 293. 1963 & in Ann. Bot. Gard. 67: 660. 1980; Ohashi in Ginkgoana 1: 245. 1973. *Hedysarum triflorum* L., Sp. Pl. 749. 1753.

Small herbs, much branched from root stock; stems creeping, clothed with spreading hairs. Leaves trifoliate, pubescent; leaflets obovate, entire, emarginate at apex, cuneate at base, up to 4 × 4 mm; stipule 2-4 mm long, hairy, lanceolate, persistent; petiolules ± 1 mm long, pubescent. Flowers in 1-5 flowered fascicles; bracts persistent; pedicels 3-4 mm long. Flowers small, white to pinkish. Pods falcate, pubescent, 3-6 jointed, indehiscent.

Fl. & Fr. : Almost throughout the year, chiefly in Sept.-Dec.

Distrib. : Pantropical.

Specimens examined : Netarhat, 158.

Notes : Common, in exposed fields.

Common name : Hindi & Beng. : *Kudaliya*.

Uses : Leaves used for dysentery and diarrhoea.

7. **Desmodium velutinum** (Willd.) DC., Prodr. 2: 328. 1825; Babu, Herb. Fl. Dehra Dun 139. 1977; Saldanha & Singh in Saldanha, Fl. Karnataka 1: 456. 1984. *Hedysarum velutinum* Willd., Sp. Pl. 3(2): 117. 1803. *H. latifolium* Roxb., Fl. Ind. 3: 350. 1832. *Desmodium latifolium* (Roxb.) DC., Prodr. 2: 327. 1825; Baker in Hook.f., Fl. Brit. India 2: 168. 1878; Haines, Bot. Bihar & Orissa 2: 277. 1961 (Rep. ed.).

An erect or scandent undershrub; branches hirsute, terete. Leaves 1-foliolate, broadly-ovate, scabrous with appressed hairs on the upper surface, densely clothed with soft, short, brown haris beneath, sub obtuse at apex, truncate-subcordate at base, up to 8.5 × 6.5 cm, secondary nerves 6-8; stipules lanceolate with setaceous tip. Flowers in dense axillary or terminal racemes. Calyx up to 4 mm long, densely hairy. Pods 3-6 jointed, joint slightly longer than broad and densely hairy. Pods 3-6 jointed, joint slightly logner than broad and densely clothed with minute hooked hairs.

Fl. & Fr. : Sept.-Jan.

Distrib. : India, Myanmar, Sri Lanka, Thailand, Trop. Africa, Malagassy, Malaya, Philippines and also introduced in W. Indies.

Specimens examined : Mandal, 418 & 419.

Notes : Common, in the forest and shady waste places.

12. Dolichos L.

Dolichos trilobus L., Sp. Pl. 726. 1753; Verdc. in Taxon 17: 170. 1968 & in Kew Bull. 24: 422. 1970; Sald. & Singh in Sald., Fl. Karnataka 1: 457. 1984. *Dolichos falcatus* Willd., Sp. Pl. 3: 1047. 1802; Baker in Hook.f., Fl. Brit. India 2: 211. 1876; Meikle in Kew Bull. 5: 353. 1951; Haines, Bot. Bihar & Orissa 2: 305. 1961 (Rep. ed.).

Climbers; stems brown hairy. Leaves trifoliate; pubescent; petiolules 2-8 mm long; stipels linear, 3 mm long; upper leaflets rhomboid, entire,

acute at apex, 7.5 × 6 cm, lower 2 leaflets slightly falcate, lanceolate, acute at apex, hairy on both sides. Flwers in a few flowered racemes; pedicels hairy, 1-1.5 cm long. Calyx hairy. Pods constricted, up to 4.5 × 1.4 cm, flat, beaked, 5-7 seeds. Seeds somewhat reniform, blackish, 5 × 4 mm.

Fl. & Fr. : Sept.-Mar.

Distrib. : Pantropical.

Specimens examined : Netarhat, 178.

Notes : Rare, in the down stream of Netarhat Tourist Lodge.

13. DUMASIA A.P. De Candolle

Dumasia villosa DC., Ann. Sci. Nat. (Paris) ser. 1, 4: 96. 1825; Haines, Bot. Bihar & Orissa 2: 288. 1961 (Rep. ed.). *Dumasia congesta* Graham ex Wt. & Arn.; Prodr. 206. 1834.

Climbing herbs; branches with spreading hairs. Leaves pinnately 3-foliolate; rachis up to 7 cm long; leaflets ovate, obtuse, apiculate, up to 9 × 5 cm. Flowers in axillary, lax racemes. Calyx obliquely truncate, gibbous at base, up to 12 mm long. Corolla yellow; standard obovate, auricled, up to 1.8 cm long. Pods up to 4 × 0.5 cm, tomentose, 3-4 seeded, linear, falcate, torulose.

Fl. & Fr. : Oct.-Dec.

Distrib. : India, Sri Lanka, S.E. Asia and Africa.

Specimens examined : Netarhat, 794.

Notes : Not common, in the forest, towards Boneri.

14. ERYTHRINA L.

Erythrina variegata L., Herb. Amb. 10. 1754. var. **orientalis** (Linn.) Merrill, Interpret. Herb. Amb. 276. 1917; Maheshwari, Bull. Bot. Surv. India 3: 46. 1961. *Erythrina indica* Lamk., Encycl. 2:391. 1786; Haines, Bot. Bihar & Orissa 2: 297. 1961 (Rep. ed.).

Deciduous trees, with blackish prickles. Leaves 3-foliolate; leaflets ovate-rhomboid, acute, glabrascent, membranous, up to 13 × 15 cm. Floers in crowded, pyramidal racemes. Calyx up to 2 cm long, split on one side. Standard up to 5 × 2 cm, red; wings and keels subequal and up to 1.2 cm long. Pods up to 20 cm long, beaked, torulose, 6-8 seeded.

Fl. & Fr. : Mar.-June.

Distrib. : Pantropical.

Specimens examined : Barwadih, 928.

Notes : Common, often planted on road sides.

Common name : Beng. : *Palita Madar*; Hindi : *Mandara*.

Uses : Leaves used as laxative and anthelmintic.

15. FLEMINGIA Roxb. ex Ait. *nom. cons.*

1a. Leaves simple; flowers and pods hidden within foliaceous persistent bracts:

2a. Leaves orbicular-ovate, less than 12 cm long; petioles more than 2 cm long; bracts more than 4 cm wide .... 1. *F. chappar*

2b. Leaves lanceolate, more than 12 cm long; petioles less than 2 cm long; bracts less than 3 cm wide .... 3. *F. strobilifera*

1b. Leaves 3-foliolate; flowers and pods not hidden by bracts and the bracts caducous. .... 2. *F. macrophylla*

1. Flemingia chappar Buch.-Ham. ex Wall., Cat. no. 5757. 1849; Baker in Hook.f., Fl. Brit. India 2: 227. 1876; Prain, Beng. Pl. 2: 268. 1963 (Rep. ed.); Haines, Bot. Bihar & Orissa 2: 279. 1961 (Rep. ed.).

Erect shrubs; stems pubescent. Leaves unifoliolate, orbicular-ovate up to 9 × 10 cm, with 3 basal, hairy nerves, acute at apex, cordate at base, gland dotted beneath; petioles up to 3 cm long. Flowers in axillary racemes; flowers white, up to 1 cm long, covered by folded bracts; bracts up to 3 × 4.5 cm, cordate, emarginate, papery.

Fl. : Jan.-Mar. Bracts become dry during March.

Specimens examined : Netarhat, 110.

Distrib. : Pantropical.

Notes : Common, in the forest undergrowth, throughout the district.

Common name : Santal : *Ulu.*

Uses : Stems used as tooth brush.

2. **Flemingia macrophylla** (Willd.) Prain ex Merr., Philipp. J. Sci. Bot. 5: 130. 1910; Gandhi in Sald. & Nicol., Fl. Hassan Dist. 254. 1976; Sald. & Singh in Sald., Fl. Karnataka 1: 462. 1984. *Crotalaria macrophylla* Willd., Sp. Pl. 3: 982. 1802; *Flemingia congesta* Roxb. ex Ait., Hort. Kew. ed. 2(4): 349. 1812; Baker in Hook.f., Fl. Brit. India 2: 228. 1876; Haines, Bot. Bihar & Orissa 2: 282. 1961 (Rep. ed.). *Flemingia congesta* var. *semialata* (Roxb.) Baker in Hook.f., Fl. Brit. India 2: 229. 1876. *F. congesta* var. *wightiana* (W. & A.) Baker; Hook.f., Fl. Brit. India 2: 229. 1876. *F. stricta* Roxb., Cor. Pl. 3: t. 248. 1815; Baker in Hook.f., Fl. Brit. India 2: 228. 1876. *F. wallichii* W. & A., Prodr. 242. 1834; Baker in Hook.f., Fl. Brit. India 2: 229. 1876. *Moghania macrophylla* (Willd.) O. Kuntze, Rev. Gen. Pl. 1: 199. 1891.

Erect shrubs; stems angular, pubescent. Leaves 3-foliolate; leaflets ovate-oblong, entire, acuminate at apex, with 3-5 primary nerves; petiolules 3-7 mm long, hairy; petioles up to 7 cm long, slightly winged on both sides. Bracts small, acute, caducous. Calyx pubescent with black dots, up to 7 mm long, lowest lobe longer. Corolla purplish-yellow. Pods finely brown pubescent, 2-seeded, up to 1 cm long.

Fl. & Fr. : Nov.-Mar.

Distrib. : India, Malaya, China and Philippines.

Specimens examined : Netarhat, 107.

Notes : Common, in dry forests.

Common name : Beng. : ***Bara Salpan.***

3. **Flemingia strobilifera** (L.) R.Br. in Aiton, Hort. Kew ed. 2, 4: 350. 1812; Baker in Hook.f., Fl. Brit. India 2: 227. 1876; Gandhi in Sald. & Nicol., Fl. Hassan Dist. 255. 1976; Ohashi in Enum. Fl. Pl. Nep. 2: 121. 1979. *Hedysarum strobiliferum* L., Sp. Pl. 764. 1753. *Flemingia strobilifera* var. *bracteata* (Roxb.) Baker in Hook.f., Fl. Brit. India 2: 227. 1876. *Flemingia strobilifera* var. *fruticulosa* (Wall. ex Benth.) Baker in Hook.f., Fl. Brit. India 2: 227. 1876. *Flemingia bracteata* (Roxb.) Wt., Ic. Pl. Ind. Or. t. 268. 1840; Haines, Bot. Bihar & Orissa 2: 280. 1961 (Rep. ed.). *Flemingia fruticulosa* Wall. ex Benth., Pl. Jungh. 243. 1852. *Moghania strobilifera* (L.) St. Hill ex Jacks. in Ind. Kew. 2: 252. 1894; Noteboom in Reinwardtia 5: 443. 1960.

Erect undershrubs, up to 1 m tall; branches angled and pubescent. Leaves unifoliolate, lanceolate or oblong-lanceolate, up to 16 × 6 cm, acute or acuminate at apex, subcordate at base, glabrous above, pubescent on the nerves below; petioles short, up to 7 mm long; stipules subulate, up to 2.5 cm, long. Flowers in axillary and terminal, branched racemes, hidden by folded membranous, hairy, cordate bracats, up to 1.9 × 2.8 cm. Calyx pubescent, teeth exceeding the tube. Corolla exserted, up to 6 mm long. Pods 5-10 mm long, pubescent, 2-seeded.

Fl. & Fr. : Oct.-Feb.

Distrib. : India, Myanmar and Malaysia.

Specimens examined : Barwadih, 389.

Notes : Frequent, in the forests and dry hill slopes.

Common name : Hindi : *Kusrunt.*

Uses : Leaves used in epilepsy and hysteria.

Remarks : *Moghania* is orthographic variant of *Moughania* St. Hill (1813) which is nomenclatural synonym of *Flemingia* Roxb. ex Ait. (1812).

16. GLIRICIDIA H.B.K.

Gliricidia sepium (Jacq.) H.B.K., Nov. Gen. et. Sp. 6: 393. 1823. *Robinia sepium* Jacq., Enum. Pl. Carib. 28. 1760. *Gliricidia maculata* H.B.K., Nov. Gen. et. Sp. 6: 393. 1823.

Woody, small trees. Leaves compound, imparipinnate; leaflets 4-6 pairs, lanceolate, 14-24 × 6-10 mm, acute, entire; petiolules small, 2 mm long; leaves drop during flowering. Calyx campanulate. Flowers in racemes, rose coloured, 1.5-2 cm long.

Fl. & Fr. : Mar.-July. Exotic.

Distrib. : Central America, Columbia, Planted throughout India, Native of C. America.

Specimens examined : Betla, 45.

Notes : Common, as an avenue tree at Betla, near the forest bunglow.

Impt. : Seeds possess rodent poison and wood used for house posts and fences.

17. INDIGOFERA L.

1a. Leaves 3-many foliolate :

2a. Leaves always 3-foliolate .... 7. *I. trifoliata*

2b. Leaves 5-many foliolate :

3a. Pods 2-4 seeded, less than 1 cm long .... 6. *I. linnaei*

3b. Pods more than 5-seeded, more than 1 cm long :

4a. Racemes more than 10 cm long :

5a. Calyx hirsute; pods tetragonous, white hairy ..... 2. *I. astragalina*

5b. Calyx not hirsute, pod cylindrical, glabrous .... 3. *I. cassioides*

4b. Racemes less than 10 cm long :

6a. Leaflets oblong, more than 1 cm long; branches grooved .... 1. *I. arrecta*

6b. Leaflets obovate, less than 1 cm long; branches not grooved .... 4. *I. glabra*

1b. Leaves simple .... 5. *I. linifolia*

1. **Indigofera arrecta** Hochst. ex A. Rich., Tent. Fl. Abyss. 1: 184. 1847; Haines, Bot. Bihar & Orissa 2: 250. 1961 (Rep. ed.); Gillett in Milene-Redhead & Polhill, Fl. Trop. E. Africa (Leguminosae) 3: 307. 1791. Saldanha & Singh in Saldanha, Fl. Karnataka 1: 468. 1984.

Erect herbs; stems and branches grooved, sparsely hairy. Leaflets 3-6 pairs, hairy, longer than broad, up to 12 × 4 mm, oblong-lanceolate, mucronate at apex, tapering at base; petiolules up to 1.5 mm long. Flowers in axillary racemes, 5-7 cm long, many flowered. Calyx ferrugino-pubescent, incised to half way. Pods 2.5-3.5 cm long, linear-oblong, beaked, slightly curved upwards, deflexed, appressed hairy, produced near base of stem, 8-seeded.

Fl. & Fr. : Sept.-Mar.

Distrib.: India and Abyssinia.

Specimens examined : Netarhat, 112.

Notes : Rare, in the hill slopes and open forests.

2. **I. astragalina** DC., Prodr. 2: 228. 1825; Gillett in Kew Bull. 14: 290. 1960; Babu, Herb. Fl. Dehra Dun 142. 1977; Bhandari in Fl. Ind. Desert. 116. 1978; Mukherjee in Fl. Pach. Bori Res. 83. 1984. *Indigofera hirsuta* (auct. non. L. 1753) Baker in Hook.f., Fl. Brit. India 2: 98. 1876; Haines, Bot. Bihar & Orissa 2: 250. 1961 (Rep. ed.).

Erect, annual, suffruticose, much branched herbs, up to 1 m high, covered with grey-brown hairs; branches 4-angular. Leaflets 7-9, obovate-rounded to oblong, obtuse-apiculate, up to 2.5 × 1 cm, terminal one largest, densely hairy on both surfaces; stipules setaceous, up to 7 mm long, hairy. Flowers pink, in dense racemes. Calyx up to 4 mm long, densely hairy, incised nearly to the base. Corolla exserted, slightly pubescent without or glabrous. Pods straight, tetragonous, deflexed, covered with hairs, 4-6 seeded, up to 1.8 cm long. Seeds black, truncate at both ends, up to 2 × 1.3 mm.

Fl. & Fr. : Sept.-Dec.

Distrib. : India, Myanmar, Sri Lanka, Trop. Africa, Trop. America, Philippines and N. Australia.

Specimens examined : Muhammadganj, 980.

Notes : Common, in the rocky forests.

3. **Indigofera cassioides** Rottl. ex DC., Prodr. 2: 225. 1825; Babu, Herb., Fl. Dehra Dun 143. 1977; Saldanha & Singh in Saldanha, Fl. Karnataka 1: 469. 1984. *Indigofera pulchella* (auct. non Roxb. 1832); Baker in Hook.f., Fl. Brit. India 2: 101. 1876; Haines, Bot. Bihar & Orissa 2: 251. 1961 (Rep. ed.). *Indigofera leptostachya* DC., Prodr. 2: 225. 1825; non sensu Baker in Hook.f., Fl. Brit. India 2: 106. 1876.

Erect, much branched, hairy undershrubs. Leaves up to 20 cm long, imparipinnate; leaflets elliptic-oblong, slightly emerginate and apiculate at apex, obtuse at base; hairy, up to 3.5 × 2.5 cm, petiolules 2-3 mm long. Flowers in lax axillary racemes, purple to pink. Calyx campanulate, very oblique, densely hairy. Pods 3-4 cm long, glabrous, straight, cylindrical, 10-12 seeded.

Fl. & Fr. : Dec.-Apr.

Specimens examined : Boneri, 132; Netarhat.

Distrib. : India, Myanmar and China.

Notes : Common, throughout the district, chiefly in the forest.

Common name : Beng. : *Jirul* or *Jirahul*; Santal : *Dare Hutar*.

4. **I. glabra** L., Sp. Pl. 751. 1753; Prain & E. Baker in J. Bot. 40: 187. 1902; Gillet in Kew Bull. Add. ser. 1: 48. 1958, Saldanha & Singh in Fl. Karnataka 1: 470. 1984. *Indigofera pentaphylla* Murr., Syst. Veg. ed. 13: 564. 1774; Wight, Ic. t. 385. 1840; Baker in Hook.f., Fl. Brit. India 2: 95. 1876; Haines, Bot. Bihar & Orissa 2: 249. 1961 (Rep. ed.).

Densely caespitose, annual undershrubs, branches many, slender, ascending, glabrous or with a few scattered glandless hairs. Leaf rachis up to 3 cm long; leaflets -5, opposite, obovate, obtuse, apiculate, up to 1 × 0.6 cm, slightly appressed hairy on both surfaces. Racemes short, 2-5 flowered, axillary. Calyx up to 3 mm long, teeth long, setaceous, incised to more than halfway. Corolla red. Pods straight, cylindrical, up to 2.8 cm long, 9-12 seeded.

Fl. & Fr. : Aug.-Dec.

Distrib. : Throughout India, Sri Lanka, Trop. Africa.

Specimens examined : Daltonganj, 259.

Notes : Commonly found in the sandy soil and on the Koel river bank.

Uses : Leaves used as a bitter tonic and febrifuge, also used as an emollient in external applications.

5. Indigofera linifolia (L.f.) Retz., Obs. Bot. 4: 29. 1786; Gillett in Kew Bull. Addl. ser. 1: 35. 1958; Ali in Bot. Notis 111: 546. 1958; Baker in Hook.f., Fl. Brit. India 2: 92. 1876, Prain, Beng. Pl. 1: 431. 1903 (Rep. ed. 1: 309. 1963); Haines, Bot. Bihar & Orissa 2: 248. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 144. 1977. *Hedysarum linifolium* L.f., Suppl. 331. 1781.

Herbs, much branched from woody rootstocks; stems grey-pubescent, 4-angular. Leaves linear to linear-oblong, 8-12 mm long, apiculate, subsessile, white strigulose on both sides; stipules filiform; bracts linear-subulate. Flowers small, red, in bracteate axillary racemes. Calyx tube short. Corolla 2-3 times than calyx. Pods globose, silvery silky, mucronate at apex, 1.5 mm across, one seeded.

Fl. & Fr. : Mar.

Distrib. : India, Pakistan, Afghanistan, Sri Lanka, S.E. Asia, China, Australia & East African countries.

Specimens examined : Boneri, 200.

Notes : Common, in the grassy places and in dry exposed fields.

Uses : Roots are used as soil fertilizers.

6. I. linnaei Ali in Bot. Notiser 111: 549. 1958; Backer & Bakh., Fl. Java 1: 591. 1963; Babu, Herb. Fl. Dehra Dun 144. 1977; Saldanha & Singh in Saldanha, Fl. Karnataka 1: 472. 1984. *Hedysarum prostratum* L., Mant. 1: 102. 1767. *H. prostratum* Burm.f., Fl. Ind. 168. t. 55. f. 1.

1768. *Indigofera enneaphylla* L., Mant. Alt. 272 et append 571. 1771, *nom. superfl.*, Baker in Hook.f., Fl. Brit. India 2: 94. 1876; Haines, Bot. Bihar & Orissa 2: 249. 1961 (Rep. ed.).

Small herbs, woody at base, up to 10 cm high or prostrate, much branched, slender, pubescent. Leaves pinnate; leaflets 5-8, alternate, obovate or linear-oblanceolate, mucronulate, up to 8 × 2.5 mm, terminal one usually largest, appressed hairy on both sides, sometimes silvery beneath. Flowers small, red, clustered in dense racemes, 5-10 flowered. Calyx hairy, teeth long aristate. Pods oblong, up to 4 mm long, tip mucronate, thinly silky, 2-seeded. Seeds small, dark brown, truncate at base.

Fl. & Fr. : Aug.-Dec.

Distrib. : India, Sri Lanka, Angola, Malaya & North Australia.

Specimens examined : Simultarh village (Daltonganj), 339.

Notes : Common, in waste places, banks of the Koel river.

7. **Indigofera trifoliata** L., Cent. Pl. 11. 29:1756; Wight, Ic. t. 314. 1840; Haines, Bot. Bihar & Orissa 2: 248. 1961 (Rep. ed.); Ali, Fl. W. Pak. 100: 78. 1977.

Diffuse, branched herbs, with appressed hairs. Leaves 3-foliolate; leaf rachis up to 1 cm long; leaflets oblong, obtuse, gland-dotted beneath, up to 1.5 × 0.4 cm. Flowers in 1 cm long, 6-10 flowered racemes. Calyx divided more than halfway. Pods straight slightly tetragonous, deflexed, hoary, up to 1 cm long and 3-4 seeded.

Fl. & Fr. : Aug.-Nov.

Distrib. : India, Malayasia and China.

Specimens examined : Muhammadganj, 1026.

Notes : Occasional, in the open fields.

18. LABLAB Adans.

Lablab purpureus (L.) Sw., Hort. Brit. ed. 1: 481. 1827; Ali in Fl. W. Pak. 100: 251. 1977; ssp. **purpureus** var. **purpureus** Verdc. in Kew Bull. 24: 410. 1970. *Dolichos purpureus* L., Sp. Pl. ed. e: 1021. 1763. *Dolichos lablab* L., Sp. Pl. 725. 1753; Baker in Hook.f., Fl. Brit. India 2: 209. 1876 (excl. syn. *D. lignosus* L. & *D. benghalensis* Jacq.); Haines, Bot. Bihar & Orissa 2: 305. 1961 (Rep. ed.).

Climbing, annual herbs. Leaves stipulate, pinnately trifoliate; leaflets pubescent, specially on the nerve beneath, broadly ovate or deltoid, acuminate, 3-nerved at base, up to 6.5 × 5.5 cm. Flowers in axillary racemes, reddish to white. Calyx 2-lipped, upper lip entire, lower 3-lobed. Stamens 9+1. Styles bearded down inner face, thickened upwards, narrowed to base. Pods up to 10 cm long and up to 4 cm broad, 2-5 seeded.

Fl. & Fr. : Nov.-June.

Distrib. : Tropics of the Old World.

Specimens examined : Simultarh village (Daltonganj), 302.

Notes : Common, cultivated throughout the district, often wild as an escape.

Common name : Beng. : *Shim*, Santal : *Malhan, Melal*.

Uses : Fruits used as vegetable.

19. LATHYRUS L.

1a. Stems and petioles winged; leaflets-2 .... 2. *L. sativus*

1b. Stems and petioles not winged; leaflets reduced to tendril .... 1. *L. aphaca*

1. Lathyrus aphaca L., Sp. Pl. 729. 1753; Baker in Hook.f., Fl. Brit. India 2: 179. 1876; Haines, Bot. Bihar & Orissa 2: 261. 1961 (Rep. ed.).

Annual, with slender, wingless, much branched stems. Stipules in pairs, appressed to the stem, leaf like, hastate, entire, truncate, up to 2.3 × 1.4 cm; leaflets abortive and reduced to tendrils. Flowers 1-2, axillary on a

long peduncle. Calyx up to 5 mm long; teeth equal, lanceolate, exceeding the tube. Corolla yellow, twice the calyx. Pods linear-oblong, 4-6 seeded, up to 2.5 cm long, sub-falcate. Seeds black, smooth, compressed.

Fl. & Fr. : Dec.-Mar.

Distrib. : India, Europe, Orient and Abyssinia.

Specimens examined : Tenarbusti (Garwah), 594.

Notes : Common, in the cultivated fields.

Uses : This plant is used in some places as fodder.

2. Lathyrus sativus L., Sp. Pl. 730. 1753; Baker in Hook.f., Fl. Brit. India 2: 179. 1876; Haines, Bot. Bihar & Orissa 2: 261. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 147. 1977.

Glabrous, annual herbs, up to 40 cm high; stems winged. Leaflets-2, linear-lanceolate, up to 5 × 0.5 cm, acuminate at apex, margin entire; rachis ending with a 3-fid tendril; stipules lanceolate with a sharply lanceolate auricle, variable in size, 6-15 mm long; petioles winged, up to 2.2 cm long. Flowers solitary, axillary on slender peduncle; peduncle much longer than the petioles. Calyx teeth spreading, subequal, lanceolate, about twice as long as tube. Corolla up to 11 mm long reddish-purple. Pods up to 3.8 mm long, 3-5 seeded, upper suture broadly winged.

Fl. & Fr. : Dec.-Mar.

Distrib. : India, South W. Asia, Europe, Trop. Africa.

Specimens examined : Tenarbusti (Garwah), 609.

Notes : Cultivated, but often found as an escape near cultivated land.

Common name : Bengali & Hindi : *Khesari.*

Uses : The seeds are eaten but continuous use induces paralysis both in human beings and cattles.

20. LENS Mill.

Lens culinaris Medic. in Vorles Churpf. Phys. Ges. 2: 361. 1787; Babu, Herb. Fl. Dehra Dun 148. 1977; Ohashi in Enum. Fl. Pl. Nep. 2: 124. 1979. *Ervum lens* L., Sp. Pl. 738. 1753; Baker in Hook.f., Fl. Brit. India 2: 179. 1876.

Small, erect, hairy herbs, branched from base. Rachis ending in a short bristle or in a tendril. Leaflets 4-7 pairs, subopposite, pilose on both surfaces, oblong-lanceolate, up to 9 × 2 mm, entire, tip truncate or retuse, apiculate. Axillary peduncles bears 1-4 flowers. Calyx pilose, up to 4 mm long; teeth subequal, acute. Corolla pale purple. Pods glabrous, 2-seeded, compressed, up to 10 × 5 mm.

Fl. & Fr. : Dec.-Mar.

Distrib. : India & Europe.

Specimens examined : Tenarbusti (Garwah), 590.

Notes : Cultivated, throughout the district, often found as an escape in the open fields.

Common name : Hindi & Bengali : *Masur.*

Uses : Seed mostly used as dal (Pulse) and also used in soups. Young pods eaten as vegetable.

21. MACROTYLOMA (Wt. & Arn.) Verdc.

Macrotyloma uniflorum (Lamk.) Verdc. in Kew Bull. 24: 322, 401. 1970. var. **uniflorum**. *Dolichos uniflorus* Lamk., Encycl, Meth. Bot. 2: 299. 1786; Babu, Herb. Fl. Dehra Dun 140. 1977. *Dolichos biflorus* sensu Murray, Syst. Nat. ed. 13: 548. 1774 *Pro parte*; Baker in Hook.f., Fl. Brit. India 2: 210. 1876; Haines, Bot. Bihar & Orissa 2: 305. 1961. (Rep. ed.).

Suberect, annual, bilious herbs, with subscandent branches. Stipules oblong, basifixed. Leaflets broadly-lanceolate or ovate-lanceolate, entire, membranous, hairy on both sides and often reflexed, up to 3.5 × 2 cm;

stipels subulate. Flowers 1-3, in axil of leaves; bracts lanceolate. Calyx up to 5 mm long, downy; teeth lanceolate, setaceous, much exceeding tube. Corolla pale-yellow with a crimson spot on standard, up to 12 mm long. Pods curved, up to 4.5 cm long, linear or broadly linear, compressed, downy, tip with persistent style. Seeds 5-6, compressed, reniform, grey or reddish-brown.

Fl. & Fr. : Sept.-Dec.

Distrib. : Tropics of the Old World.

Specimens examined : Bisrampur, 568.

Notes : Frequently cultivated in the district, often found as an escape.

Common name : Beng. : *Kulathan*; Hindi : *Kulthi*; Santal : *Horce*.

Uses : The seeds often eaten by the local people, the stems and leaves are much valued as a good fodder.

22. MELILOTUS P. Miller

1a. Corolla yellow; pods 1-seeded, less than 3 mm across .... 2. *M. indica*

1b. Corolla white; pods 2-seeded, more than 3 mm across .... 1. *M. alba*

1. Melilotus alba Medic [Vorles. Churph. Phys. Ges. 2: 382. 1787, *nom. nud.*] ex Desr. in Lamk., Encycl, 4: 63. 1796; Baker in Hook.f., Fl. Brit. India 2: 89. 1876; Prain, Beng. Pl. 1: 413. 1903 (Rep. ed. 1: 295. 1963) & in Rec. Bot. Surv. Ind. 3: 201. 1905; Haines in Bot. Bihar & Orissa 2: 246. 1961 (Rep. ed.).

Herbs, up to 60 cm high, glabrous or nearly glabrous; branches striate. Petioles 2-4 cm long, slender, glabrous. Stipule up to 4 mm long, lanceolate. Leaflets oblanceolate or narrowly oblong, up to 26 × 10 mm, rounded or truncate at apex, acute or cuneate at base, serrate at margin; petiolules of the lateral leaflets up to 1 mm long, of the terminal one, up to 6 mm long. Racemes up to 10 cm long; pedicels up to 2 cm long; bracts subulate. Flowers white. Pods 1-2 seeded.

Fl. & Fr. : Dec.-Apr.

Distrib. : All parts of India; common in Europe and introduced in different parts of the World.

Specimens examined : Netarhat, 213.

Notes : Common in the cultivated land, near Koel river and also in pasture land.

Common name : Bengali : *Sada Banmethi.*

Uses : Used as a fodder and seeds yield a fatty oil, suitable for use in paints and varnishes.

2. **Melilotus indica** All., Fl. Pedem. 1: 308. 1785; Haines, Bot. Bihar & Orissa 2: 245. 1961 (Rep. ed.). *Melilotus parviflora* Desf., Fl. Atlant. 2: 192. 1800; Baker in Hook.f., Fl. Brit. India 2: 89. 1876.

Annual, slender herbs, up to 30 cm high. Leaflets obovate-oblong, glabrous or hairy beneath, up to 1.5 × 0.5 cm. Flowers in racemes. Calyx up to 1.5 mm long; teeth deltoid. Corolla yellow, slightly exserted. Pods up to 2 mm across, 1-seeded.

Fl. & Fr. : Nov.-Mar.

Distrib. : South East Asia.

Specimens examined : Muhammadganj, 1015.

Notes : Common, in the cultivated land.

23. Millettia W. & A.

Millettia extensa (Benth.) Baker in Hook.f., Fl. Brit. India 2: 109. 1876; Ohashi in Enum. Fl. Pl. Nep. 2: 125. 1979. *Otosema extensa* Benth. in Miq., Pl. Jungh. 249. 1852. *Millettia auriculata* Baker ex Brandis, For. Fl. Ind. 138. 1874; Baker in Hook.f., Fl. Brit. India 2: 108. 1876; Haines, Bot. Bihar & Orissa 2: 257. 1961 (Rep. ed.).

Large, robust, woody climbers, with downy branchlets. Leaves 30-60 cm long; petioles up to 15 cm long, slightly swollen at base; leaflets 7-9,

opposite, 10-15 × 5-8 cm, obovate-oblong, shortly acuminate at apex, membranous or subcoriaceous, nerves silky tementose; petiolules up to 5 mm long, tomentose. Flowers in dense axillary racemes. Calyx densely silky, teeth very short. Corolla whitish, three times longer than the calyx, densely silky. Pods up to 15 × 2.5 cm, flat, woody,straight, clothed with reddish-brown tomentum, suture thickened. Seeds dark brown, orbicular, flat, up to 1.9 × 1.2 cm.

Fl. : Mar.-June. *Fr.* : Jan.-Mar.

Distrib. : India, China.

Specimens examined : Netarhat, 183.

Notes : Common in the sal forest.

Common name : Hindi : *Ganj* or *Gonj*.

Uses : Bark yields fibres used for cordage. Infusion of powdered roots is rubbed on cattle to keep off flies.

24. MUCUNA Adans.

Mucuna pruriens (L.) DC., Prodr. 2: 405. 1825; Baker in Hook.f., Fl. Brit. India 2: 187. 1876; Prain, Beng. Pl. 1: 400. 1903 (Rep. ed. 1: 285. 1963); Babu, Herb. Fl. Dehra Dun 153. 1977; Saldanha & Singh in Saldanha, Fl. Karnataka 1: 478. 1984. *Dolichos pruriens* L. in Stickman, Diss. Herb. Amboin. 23. 1754. *Mucuna prurita* Hook., Bot. Misc. 2: 348. 1830-31. *nom. superfl.* Haines, Bot. Bihar & Orissa, 2: 296. 1961 (Rep. ed.).

Slender climbers. Leaves trifoliate; leaflets appressedly hairy beneath, lateral exceeding the terminal, semicordate, ovate, base oblique, up to 7 × 5 cm, with 6-7 strong lateral nerves, terminal one rhomboid, up to 6.5 × 5 cm. Flowers purple, in axillary, drooping, short peduncled racemes. Pods turgid, linear, end curved in opposite direction, up to 5 cm long, densely clothed with brown or grey, intensely irritating bristles. Seeds usually 6 in a papery endocarp, black and shining.

Fl. & Fr. : Sept.-Apr.

Distrib. : India, Sri Lanka and Myanmar..

Specimens examined : Barwadih, 409 & 922.

Notes : Common, in the dry forests.

Common name : Bengali : *Alkusi*; Hindi : *Kiwach* or *Kivach*; Santal : *Atkir, Etka.*

25. PHASEOLUS L.

Phaseolus vulgaris L., Sp. Pl. 723. 1753; Baker in Hook.f., Fl. Brit. Ind. 2: 200. 1876; Haines, Bot. Bihar & Orissa 2: 300. 1961 (Rep. ed.).

Annual, twining herbs; stems clothed with appressed hairs. Leaves 3-foliolate; laflets thinly hairy, rhomboid, tip tapering, up to 10 × 4 cm. Flowers in axillary, lax racemes, up to 20 cm long, rose or lilac, with conspicuous spreading nerves; bracteoles exceeding the calyx. Petals glabrous outsides. Pods 10-15 cm long, linear, straight, turgid, glabrous.

Fl. & Fr. : Sept.-Nov.

Distrib. : Both in temperate and tropical region of the world.

Specimens examined : Palamau fort (Betla), 1107.

Notes : Commonly cultivated in the villages, found as an escape.

Common name : Hindi : *Bakla.*

26. PISUM L.

Pisum arvense L., Sp. Pl. 727. 1753; Baker in Hook.f., Fl. Brit. India 2: 181. 1876; Haines, Bot. Bihar & Orissa 2: 261. 1961 (Rep. ed.).

Glabrous, glaucous, annual herbs. Leaf rachis ending into branched tendrils; stipules large, ovate, semicordate, irregularly toothed at base, up to 4 × 3 cm, foliaceous; leaflets 4-6, sharply toothed when young, elliptic-lanceolate, up to 3 × 1.8 cm, apiculate at apex. Peduncles longer than the stipules, 1-few flowered. Standard pink; wings deep-purple. Pods reticulate. Seeds compressed, angled, smooth, greenish-yellow, mottled with red.

Fl. & Fr. : Dec.-Feb.

Distrib. : Throughout India.

Specimens examined : Mahuamilan, 670.

Notes : Often cultivated, but widely found as wild in the villages and village surroundings.

Common name : Beng. : *Deshi mattar*; Hindi : *Chhota mattar*.

Uses : The seeds are edible and the straw is much valued for fodder.

Pisum sativum L. (pea) commonly cultivated for its seeds.

27. PSORALEA L.

Psoralea corylifolia L., Sp. Pl. 764. 1753; Baker in Hook.f., Fl. Brit. India 2: 103. 1876; Prain, Beng. Pl. 1: 429. 1903 (Rep. ed. 1: 307. 1963) & in Rec. Bot. Surv. India 3: 203. 1905; Haines, Bot. Bihar & Orissa 2: 253. 1961 (Rep. ed.).

Erect, annual herbs, up to 90 cm high; branches striate, gland dotted, sparsely hairy. Leaves simple; petioles up to 2.5 cm long, pubescent, upper surface grooved; stipules 3-4 mm long, persistent, lanceolate; leafblade broadly-ovate, up to 3-7 × 2-4 cm, rounded or obtuse at apex, rounded or subcordate at base, crenate-dentate, pubescent on both surfaces, with dark glands. Racemes long-peduncled; peduncles up to 5.5 cm long. Flowers 12-20, subsessile, congested. Calyx gland dotted, up to 5 mm long, pubescent. Corolla 7-8 mm long, bluish purple. Pods closely pitted, 5-6 mm long, slightly hairy.

Fl. & Fr. : Nov.-Mar.

Distrib. : India, Sri Lanka, Myanmar, China, Arabia, Somalia.

Notes : Rare, in waste places and near the harvested fields.

Specimens examined : Tenarbusti (Garwah), 611.

Common name : Beng. : *Bavachi*; Hindi : *Babchi*.

Uses : Seeds are laxative, diuretic, diaphoretic and aphrodisiac, specially recommended for leucoderma, leprosy, psoriasis and inflammatory diseases of skin. Seeds contain a fixed oil and an essential oil.

28. PUERARIA DC.

Pueraria tuberosa (Roxb. ex Willd.) DC. in Ann. Sci. Nat. 4: 97. 1825 et in Prodr. 2: 240. 1825; Baker in Hook.f., Fl. Brit. India 2: 197. 1876; Haines, Bot. Bihar & Orissa 2: 294. 1961 (Rep. ed.). *Hedysarum tuberosum* Roxb. ex Willd., Sp. Pl. 3: 1197. 1803.

Perennial twinners with tuberous roots; young branches pubescent. Leaves pinnately trifoliolate; leaf rachis 12-15 cm long; terminal leaflet broadly ovate, equal sided, up to 18 × 16 cm, acuminate; lateral leaflets ovate-oblong, unequal sided, acuminate, silky pubescent beneath. Flowers in axillary or terminal racemes or panicles. Calyx densley silky, 5-lobed, up to 8 mm long; teeth shorter than the tube, 2 upper teeth slightly connate. Corolla bluish-white, up to 1.5 cm long. Pods constricted, densely hairy, 3-6 seeded.

Fl. & Fr. : Feb.-May.

Distrib. : India, Pakistan, Nepal.

Specimens examined : Netarhat, 1181.

Notes : Common, in the forest.

Common name : Beng. : *Shimia batraji*; Hindi : *Ban Kumra, Sural.* Santal : *Chirra.*

Uses : Root tubers eaten raw or boiled.

29. RHYNCHOSIA Lour.

Rhynchosia minima (L.) DC., Prodr. 2: 385. 1825; Baker in Hook.f., Fl. Brit. India 2: 223. 1876; Haines, Bot. Bihar & Orissa 2: 284. 1961 (Rep. ed.) var. **minima** Meikle in Kew Bull. 9: 275. 1954; Verdc, in Kew Bull. 25: 103. 1971. *Dolichos minimus* L., Sp. Pl. 1020. 1753. *Rhynchosia minima* var. *laxiflora* (Camb.) Baker in Hook.f., Fl. Brit. India 2: 223. 1876; Haines, Bot. Bihar & Orissa 2: 284. 1961 (Rep. ed.).

Slender, twining herbs; stems grooved, angled, puberulous. Stipules minute, lanceolate, persistent, up to 2 mm long. Leaflets up to 4 × 2.3 cm, ovate-rhomboid, acute to acuminate at apex, deltoid at lower half, conspicuously gland-dotted beneath, basally 3-nerved. Racemes lax-flowered, usually elongated, exceeding the 6-12 flowered; bracts minute, linear. Calyx pubescent; teeth subulate-acuminate, lowest teeth twice the tube, setaceous. Corolla yellow, twice the calyx. Pods up to 18 × 5 mm, slightly falcate, pubescent, with 1 mm long spiny beak, mostly 2-seeded.

Fl. & Fr. : Sept.-Dec.

Distrib. : Throughout India, Sri Lanka, Myanmar and Cosmopolitan in the tropics.

Specimens examined : Barwadih, 417.

Notes : Common, in the open jungle.

30. ROTHIA Pers.

Rothia indica (L.) Druce., Bot. Exch. Club. Soc. Brit. Isles 3: 423. 1914; Saldanha in Fl. Karnataka 1: 488. 1984. *Trigonella indica* L., Sp. Pl. 778. 1753. *Rothia trifoliata* (Roth.) Pers., Syn. Pl. 2: 302. 1807; Baker in Hook.f., Fl. Brit. India 2: 63. 1876.

Much branched, hairy, diffuse, annual herbs, with slender stems, up to 40 cm long. Leaves petioled, digitately 3-foliolate; leaflets 7-12 × 3-4 mm, terminal one larger, sessile, oblanceolate-oblong, minutely mucronate, silky; petioles shorter than the leaflets; stipules free, small, half-lunate, persistent. Flowers 1-4, shortly pedicelled, axillary. Calyx 4-6 mm long, silky. Pods up to 5.5 cm long, silky. Seeds many.

Fl. & Fr. : Nov.-Jan. Exotic.

Distrib. : Indigenous to Australia, now growing in Sri Lanka and India.

Specimens examined : Daltonganj, 276.

Notes : Rare, found in the river bed (Koel).

Uses : Leaves and the pods are boiled and eaten by the poor people.

31. SESBANIA Adans.

1a. Flowers white, more than 5 cm long; pod more than 30 cm long .... 1. *S. grandiflora*

1b. Flowers yellow, less than 3 cm long; pod less than 20 cm long .... 2. *S. sesban*

1. Sesbania grandiflora (L.) Pers., Syn. 2: 316. 1807; Baker in Hook.f., Fl. Brit. India 2: 115. 1876; Duthie in Fl. Up. Gang. Plain 1: 224. 1960 (Rep. ed.); Haines, Bot. Bihar & Orissa 2: 256. 1961 (Rep. ed.). *Aeschynomene grandiflora* L., Sp. Pl. 1050. 1753.

Small trees. Leaves pinnate, 15-30 cm long; leaflets 15-30 pairs, terminal one oblong, up to 3.5 × 1.2 cm, apex mucronulate, glabrous; petiolules up to 2 mm long. Flowers in short peduncled racemes, 2-4 flowered. Calyx shallowly 2-lipped, glabrous, up to 2 cm long. Corolla white, up to 7 cm long. Pods flat, falcate slender, up to 40 cm long.

Fl. & Fr. : Sept.-Dec.

Distrib.: India, Mauritius to N. Australia.

Specimens examined : Garwah, 854.

Notes : Common, in the village, cultivated.

Common name : Beng. : *Bokful*; Hindi : *Agasti, Bak.*

Uses : Flowers are eaten as vegetable.

2. S. sesban (L.) Merrill in Philip. J. Sci. Bot. 7: 235. 1912; Gillet in Kew Bull. 17: 112. 1963. ssp. **sesban** var. **sesban**. *Aeschynomene sesban* L., Sp. Pl. 714. 1753; *Sesbania aegyptiaca* Pers., Syn. 2: 316. 1807; Baker in Hook.f., Fl. Brit. India 2: 114. 1876; Duthie, Fl. Up. Gang. Plain 1: 223. 1960 (Rep. ed.); Haines, Bot. Bihar & Orissa 2: 256. 1961 (Rep. ed.).

Perennial, glabrous, large shrubs or small trees. Leaves pinnate, up to 8-12 cm long; leaflets linear-oblong, 10-20 pairs, close-set, up to 20 × 4.5 mm, pale green; petiolules very short. Flowers yellow, 6-10, in lax axillary racemes. Calyx up to 4 mm long; teeth deltoid, up to 1 mm long. Corolla

up to 12 mm long. Stamens-10, diadelphous. Pods up to 16 × 0.4 cm, slender, torulose. Seeds oblong, up to 3.5 mm long, dark brown.

Fl. & Fr. : Oct.-Dec.

Specimens examined : Tarhashi, 1130.

Distrib. : Tropics of the Old World.

Notes : Not very common, in the village surroundings.

Common name : Beng. & Hindi : *Jainti.*

Uses : Leaves and flowers are often eaten. Bark yields fibres used for rope.

32. TEPHROSIA Pers. *nom. cons.*

1a. Leaflets more than 3 cm long; pods more than 7 cm long .... 1. *T. candida*

1b. Leaflets less than 3 cm long; pods less than 7 cm long :

2a. Flowers many, in racemes; corolla pink .... 3. *T. purpurea*

2b. Flowers 1-3 fascicled in the axil of leaves; corolla white or pale yellow .... 2. *T. pumila*

1. Tephrosia candida DC., Prodr. 2: 240. 1825; Baker in Hook.f., Fl. Brit. India 2: 111. 1876; Prain, Beng. Pl. 1: 289. 1963 (Rep. ed.); Haines, Bot. Bihar & Orissa 2: 253. 1961 (Rep. ed.). Saldanha & Singh in Saldanha, Fl. Karnataka 1: 496. 1984.

Erect, stout, much branched shrubs; stems somewhat angled and hairy. Leaflets large, up to 5.2 × 1.4 cm, 7-14 pairs, narrowly oblong, tapering at both ends, apiculate; petiolules 1-2 mm long, glabrous above but silky-hairy beneath. Flowers in long racemes. Pods falcate, 7-9 cm long, with oblique persistent calyx, surface covered by dense brown hairs, wall spirally coiled after opening. Seeds black, 3 × 4 mm.

Fl. & Fr. : Nov.-Mar.

Specimens examined : Boneri, 113.

Distrib. : Pantropical.

Notes : Common, on the road sides and dry exposed areas.

Common name : Beng. : *Bangara*; Hindi : *Lashtia.*

2. Tephrosia pumila (Lamk.) Pers., Syn. Pl. 2: 329. 1807; Haines, Bot. Bihar & Orissa 2: 255. 1961 (Rep. ed.); Shah in J. Bombay Nat. Hist. Soc. 60: 296. 1963; Brummit, Soc. Brot. Bol. ser. 2: 258. 1968; Saldanha & Singh in Saldanha, Fl. Karnataka 1: 497. 1984. *Galega pumila* Lamk., Encycl, 2: 599. 1786. *Galega procumbens* Buch.-Ham., Trans. Linn. Soc. London 13: 547. 1822. *Tephrosia purpurea* var. *pumila* (Lamk.) Baker in Hook.f., Fl. Brit. India 2: 113. 1876. *Tephrosia procumbens* (Buch.-Ham.) Gamble, Fl. Madras 320. 1918.

Diffuse, procumbent herbs; stems branched, pilose, up to 50 cm long. Leaf rachis 1-5 cm long; leaflets 5-11, oblanceolate to obcuneate, up to 3.5 × 0.4 cm, pubescent, nerves prominent beneath, acute at apex. Flowers 1-3 fascicled in the axils of leaves; peduncles up to 1 cm long. Calyx lobes setaceous, acuminate, twice as long as tube. Corolla pale yellow to whitish. Pods flat, up to 2.5 × 0.3 cm, spreading pubescent, 6-9 seeded.

Fl. & Fr. : Sept.-Dec.

Distrib. : Pantropical.

specimens examined : Muhammadganj, 978.

Notes : Not common, in the dry waste places.

3. T. purpurea (L.) Pers., Syn. Pl. 2: 329. 1807; Baker in Hook.f., Fl. Brit. India 2: 112. 1876; Prain, Beng. Pl. 1: 405. 1903 (Rep. ed. 1: 289. 1963) & in Rec. Bot. Surv. Ind. 3: 200. 1905; Haines, Bot. Bihar & Orissa 2: 255. 1961 (Rep. ed.) Saldanha & Singh in Saldanha, Fl. Karnataka 1: 497. 1984. *Cracca purpurea* L., Sp. Pl. 752. 1753.

Low shrubs, 60-70 cm high; branches slightly hairy. Stipules linear-subulate, persistent. Leaves 5-7 cm long, imparipinnate; leaflets 4-6 pairs, up to 2 × 0.5 cm, oblanceolate, obtuse or retuse mucronate at apex, hairy;

petiolules 1-2 mm long. Flowers in lax, 7-12 cm long racemes. Pods slightly curved, puberulous, ending with a beak. Seeds reniform, black at maturity.

Fl. & Fr. : Throughout the year.

Distrib. : India, Sri Lanka, S.E. Asia, Malaysia and introduced in Africa, Australia, America.

Specimens examined : Daltonganj, 18.

Notes : Very common, in the exposed area and drier parts of the district.

Common name : Beng. : *Bon-nil*; Hindi : *Sarphuka.*

33. TERAMNUS P. Brown

Teramnus labialis (L.f.) Spreng., Syst. Veg. 3: 235. 1826; Baker in Hook.f., Fl. Brit. India 2: 184. 1878 *pro parte*; Verdcourt in Kew Bull. 24: 267. 1970; Haines, Bot. Bihar & Orissa 2: 289. 1961 (Rep. ed.); *Glycine labialis* L.f., Suppl. 325. 1781.

Slender twiners; stems clothed with appressed white hairs. Leaves 3-foliolate; leaf rachis 4-7 cm long; leaflets ovate-elliptic to oblong-lanceolate, appressed pubescent beneath, sparsely so above, 4.5-7 × 2.5-4 cm. Flowrs in axillary, lax racemes, white when fresh, turning to pink on withering. Calyx 5-7 cm long, upper lip 2-lobed. Pods linear, straight or slightly bent upward, sparsely appressed pubescent, up to 6 × 0.4 cm, 8-12 seeded. Seeds dark brown, up to 4 × 2 mm.

Fl. & Fr. : Sept.-Nov.

Distrib. : Pantropical.

Specimens examined : Muhammadganj, 1000.

Notes : Common, in the hedges and fences, around the villages.

Common name : Beng. : *Mashani*; Hindi : *Mashparui.*

Uses : Herbs used in the treatment of rheumatism and tuberculosis.

34. TRIGONELLA L.

Trigonella foenum-graecum L., Sp. Pl. 777. 1753; Baker in Hook.f., Fl. Brit. Ind. 2: 87. 1876; Haines, Bot. Bihar & Orissa 2: 245. 1961 (Rep. ed.).

Erect, strong smelling, annual herbs, up to 40 cm high; stems thinly white hairy. Leaves 3-foliolate; stipules lanceolate, entire, up to 10 mm long, hairy; leaflets oblong-oblanceolate, up to 3 × 1.2 cm, margin denticulate. Flowers 1-2 axillary, sessile. Calyx up to 7 mm long, campanulate; teeth linear. Corolla much exserted. Pods with a long persistent beak, often falcate, 5-8 mm long.

Fl. & Fr. : Jan.-Mar.

Distrib. : India and South Europe.

Specimens examined : Tenarbusti (Garwah), 596.

Notes : Commonly cultivated throughout the district.

Common name : Beng. & Hindi : *Methi.*

Uses : The young plants are used as vegetable and the seed has many medicinal properties, among others they are said to prevent baldness.

35. URARIA Desv.

1a. Leaves 3-foliolate; leaflets ovate to elliptic; joints of the pods-3 .... 1. *U. lagopodioides*

1b. Leaves 5-9 foliolate; leaflets linear-lanceolate; joints of the pods 3-6 .... 2. *U. picta*

1. Uraria lagopodioides Desv., J. Bot. 1: 22. 1813; Raizada in Indian For. 92. 325. 1966; Saldanha & Singh in Saldanha, Fl. Karnataka 1: 500. 1984. *Uraria alopecuroides* Sweet, Hort. Brit. ed. 2. 148. 1830; Wight, Ic. t. 290. 1840; Haines, Bot. Bihar & Orissa 2: 268. 1961 (Rep. ed.). *Uraria repanda* Wall. ex Bentham in Miquel, Pl. Jungh. 213. 1832; Baker in Hook.f., Fl. Brit. India 2: 156. 1876.

Erect undershrubs, with spreading branches, clothed with small hooked bristles. Leaves 3-foliolate; leaf rachis up to 5 cm long; leaflets ovate to elliptic, subacute or obtuse, mucronate at apex, finely pubescent on both surfaces, up to 8 × 5 cm, lateral leaflets smaller, up to 3.5 × 2 cm, elliptic. Racemes dense, cylindrical, up to 8 cm long. Pedicels becoming incurved at their tips. Bracts rounded, cordate, cuspidate, densely ciliate. Calyx up to 8 mm long, lobes much longer than tube; teeth plumose. Corolla pinkish-blue, nearly as long as calyx. Pods glabrous, joints-2.

Fl. & Fr. : July-Dec.

Specimens examined : Bisrampur, 556.

Distrib. : India, Myanmar, S.E. Asia, China and Tropical Australia.

Notes : Common, in the forest.

Common name : Beng. : *Chakulia, Golak Chakulia*; Hindi : *Pithvan*.

Uses : Decoction of leaves used in diarrhoea. Alcoholic or aqueous extract of the herb is employed in intermittent fever and inflammation of the chest.

2. Uraria picta (Jacq.) Desv. ex DC., Prodr. 2: 324. 1825; Baker in Hook.f., Fl. Brit. India 2: 155. 1876; Haines, Bot. Bihar & Orissa 2: 267. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 169. 1977. *Hedysarum pictum* Jacq., Coll. 262. 1789.

Erect, perennial undershrubs, up to 90 cm long; branches pubescent. Leaves very variable, lower leaves 1-3 foliolate, small, suborbicular, upper 5-9 foliolate, linear-lanceolate, up to 20 × 2.5 cm; stipules lanceolate. Flowers small in dense terminal, up to 25 cm long cylindrical racemes. Bracts dry, many nerved, long acuminate, ciliate. Pedicels up to 1 cm long, with hooked hairs. Sepals with long spreading hairs. Corolla exserted, purple. Pods glabrous, 3-6 jointed, joints hard, polished, grey, folded on one another.

Fl. & Fr. : Sept.-Nov.

Distrib. : India, Sri Lanka, Malaya, Philippines and Tropical Africa.

Specimens examined : Bisrampur, 557.

Notes : Common, in the waste land and open forest.

Common name : Hindi : *Dabra*; Beng. : *Sankarjata*.

Uses : Decoction of the roots is given in cough and fiver.

36. VICIA L.

1a. Leaflets 3-8 pairs; pods 2-seeded .... 1. *V. hirsuta*

1b. Leaflets 1-3 pairs; pods 4-seeded .... 2. *V. tetrasperma*

1. Vicia hirsuta (L.) S.F. Gray, Nat. Arr. Brit. Pl. 2: 614. 1821; Baker in Hook.f., Fl. Brit. India 2: 177. 1876; Haines, Bot. Bihar & Orissa 2: 260. 1961 (Rep. ed.) *Ervum hirsutum* L., Sp. Pl. 738. 1753.

Small herbs. Leaves 2-3 cm long; leaflets 3-8 pairs, linear-oblong, 7-10 × 1-2 mm, leaves ending with a intricate tendril. Pods few on a peduncle, pubescent, 2-seeded.

Fl. & Fr. : Dec.-Apr.

Distrib. : India & Europe.

Specimens examined : Netarhat, 76.

Notes : Common, in cultivated land.

2. V. tetrasperma (L.) Schreb., Spic. 26. 1771; Baker in Hook.f., Fl. Brit. India 2: 177. 1876; Haines, Bot. Bihar & Orissa 2: 260. 1961 (Rep. ed.). *Ervum tetraspermum* L., Sp. Pl. 738. 1753.

Small herbs. Leaflets 1-3 pairs, linear to oblong, mucronate at apex, 20 × 1.5 mm to 20 × 3 mm, ending with intricate tendril. Pods axillary, one in peduncle, 20 × 4 mm, 4-seeded, subtorulose.

Fl. & Fr. : July-Mar.

Distrib. : India and Europe.

Specimens examined : Tenerbusti (Garwah), 589.

Notes : Not very common, in the cultivated land.

37. VIGNA Savi

1a. Leaflets deeply 2-7 lobed .... 1. *V. aconitifolia*

1b. Leaflets entire .... 2. *V. radiata*

1. Vigna aconitifolia (Jacq.) Marechal, Bull. Jard. Nat. Belge. 39: 160. 1969; Verdcourt, Kew Bull. 23: 464. 1969 & 24: 557. 1970; Sald. & Sing in Sald., Fl. Karnataka 1: 502. 1984. *Phaseolus aconitifolius* Jacq. Obs. Bot. 3: 2. t. 52. 1768; Baker in Hook.f., Fl. Brit. India 2: 202. 1876; Haines, Bot. Bihar & Orissa 2: 301. 1961 (Rep. ed.).

Trailing or twining, pubescent herbs. Stipule lanceolate, peltate, up to 5 mm long, hairy; petioles up to 4 cm long. Leaflets deeply 2-7 lobed; lobes linear or linear-lanceolate, acute at apex, hairy. Peduncles up to 10 cm long, hairy, 6-8 flowered; bractioles linear, setaceous, longer than the calyx, tip ciliated. Calyx lobe shorter than tube. Corolla yellow, up to 4 mm long. Pods up to 3.5 cm long, 8-seeded.

Fl. & Fr. : Sept.-Nov.

Distrib. : India, Pakistan and Sri Lanka.

Specimens examined : Kechki, 897.

Notes : Not very common, along the railway lines.

Common name : Beng. : *Kheri*; Hindi : *Birmug, Moth*; Santal : *Birmech.*

Uses : Total plant used as fodder and the seeds eaten as pulses, often tender pods consumed as vegetable.

2. V. radiata (L.) Wilezek var. **sublobata** (Roxb.) Verdc. in Kew Bull. 24: 559. 1970; Saldanha & Singh in Saldanha, Fl. Karnataka 1: 503. 1984. *Phaseolus radiatus* L., Sp. Pl. 725. 1753. *Phaseolus sublobatus*

Roxb., Fl. Ind. 3: 288. 1832; Haines, Bot. Bihar & Orissa 2: 301. 1961 (Rep. ed.); Ali, Fl. West Pak. 100: 150. 1977. *P. trinervius* W. & A., Prodr. 245. 1834; Baker in Hook.f., Fl. Brit. India 2: 203. 1876. *Vigna brachycarpa* Kurz in J. As. Soc. Beng. 43: 185. 1874; Baker in Hook.f., Fl. Brit. India 2: 206. 1876.

Twining hairy herbs. Leaves 3-foliolate; leaflets sparsely, setosely hairy beneath, terminal one ovate-lanceolate, entire, acute, up to 5.6 × 3.6 cm, lateral often sublobed, up to 4 × 2.8 cm, ovate-lanceolate; petioles up to 6 cm long. Flowers subsessile or pedicelled, in leafless, slender racemes. Bracts oblong-lanceolate. Pods up to 6 cm long, hairy, slightly falcate, about 12-seeded. Seeds dark-grey, truncate at both ends, up to 4 mm long.

Fl. & Fr. : Sept.-Nov.

Distrib. : Paleotropical.

Specimens examined : Simultarh village (Daltonganj), 311.

Notes : Common, in the forests and on the village hedges.

Common name : Beng. : *Ghora mug.*

38. ZORNIA J.F. Gmelin

Zornia gibbosa Span. in Linnaea 15: 192. 1841; Mohlenbrock in Webbia 16: 112. 1961; Wagh in J. Bombay Nat. Hist. Soc. 61. 213-215. 1964; Babu, Herb. Fl. Dehra Dun 173. 1977; Saldanha & Singh in Saldanha, Fl. Karnataka 1: 506. 1984. *Zornia diphylla* auct. non (L.) Pers. 1807; Baker in Hook.f., Fl. Brit. India 2: 147. 1876. *p.p.*; Prain, Beng. Pl. 1: 416. 1903 (Rep. ed. 1: 297. 1963); Haines, Bot. Bihar & Orissa 2: 263. 1961 (Rep. ed.).

Prostrate or decumbent herbs. Leaves bifoliate; leaflets up to 6 × 3 mm, ovate-lanceolate or linear-lanceolate, acute and apiculate at apex, margin, hairy, primary nerves-5, with black glands. Spikes axillary, solitary, peduncled. Bracts distichously arranged, up to 6 mm long, elliptic-ovate to ovate-lanceolate, acuminate at apex. Flowers yellow, small, hidden by geminate, peltately attached bracts. Pods 4-jointed, exserted, with numerous retrorsely brown hairy, 0.5-1 mm long bristles.

Fl. & Fr. : Oct.-Mar.

Distrib. : India, East to China, Malaya, Australia.

Specimens examined : Netarhat, 156.

Notes : Common, in exposed areas and near cultivated land.

Common name : Santal : *Birmoch*.

Several pulses are cultivated in the district; *Arachis hypogea* L., *Pisum sativum* L., *Vicia fava* L. are among the most common.

CAESALPINIACEAE

1a. Leaves bipinnate :

2a. Unarmed trees :

3a. Flowers red; pods more than 30 cm long, not winged .... 4. DELONIX

3b. Flowers yellow; pods less than 10 cm long, winged at both sutures .... 6. PELTOPHORUM

2b. Armed shrubs :

4a. Rachis unarmed, flat; fruits moniliform .... 5. PARKINSONIA

4b. Rachis armed, not flat; fruits falcate, oblong .... 2. CAESALPINIA

1b. Leaves unipinnate or simple :

5a. Leaves simple, deeply cleft from the apex .... 1. BAUHINIA

5b. Leaves unipinnate, not cleft :

6a. Petals-3; stamens-3, united .... 7. TAMARINDUS

6b. Petals-5; stamens 5-10, free .... 3. CASSIA

1. BAUHINIA L.

1a. Stamens 3-5 :

2a. Large climbers; leaves densely hairy .... 5. *B. vahlii*

2b. Erect trees; leaves glabrous :

3a. Buds angled; calyx coriaceous, split into 2 lobes .... 3. *B. purpurea*

3b. Buds not angled; calyx spathaceous, 5-toothed .... 6. *B. variegata*

1b. Stamens-10 :

4a. Leaves 9-13 nerved, as long as broad .... 1. *B. acuminata*

4b. Leaves 7-9 nerved, broader than long :

5a. Calyx spathaceous; petals yellow .... 4. *B. tomentosa*

5b. Calyx not spathaceous; petals white .... 2. *B. malabarica*

1. Bauhinia acuminata L., Sp. Pl. 376. 1753; Baker in Hook.f., Fl. Brit. India 2: 276. 1879; Prain, Beng. Pl. 1: 316. 1963 (Rep. ed.); Haines, Bot. Bihar & Orissa 2: 323. 1961 (Rep. ed.).

Medium sized trees; young shoot pubescent. Leaves large, up to 14 × 14, sometimes smaller, base 9-13 nerved, lobed over one-third to half-way down, into two acute lobes, sparsely pubescent beneath; petioles up to 4 cm long. Racemes axillary, short peduncled. Pedicels with linear-subulate bracts and bracteoles. Flowers white, up to 6 cm across. Calyx narrowed into a long point, cleft at the tip. Petals oblong. Pods up to 15 cm long, glabrous.

Fl. : May-Aug.; *Fr.* : Jan.-April.

Distrib. : India, Sri Lanka, China and Malay Islands.

Specimens examined : Maromar, 530.

Notes : Rare, in the forest, often planted in the village.

Common name : Santal : *Ahalad.*

Uses : Decoction of bark and leaves given in leprosy and asthma.

2. B. malabarica Roxb., Fl. Ind. 2: 321. 1832; Baker in Hook.f., Fl. Brit. India 2: 277. 1878; Haines, Bot. Bihar & Orissa 2: 322. 1961 (Rep. ed.).

Small bushy trees. Leaves broader than long, up to 5.5 × 7.5 cm, deeply cleft, hairy beneath, cordate at base, with 7-9 primary nerves; petioles up

to 3 cm long, tomentose. Flowers in short corymbose-racemes. Calyx shortly 5-lobed, up to 1 cm long. Petals-5, slightly exserted, oblong-spathulate. Pods up to 18 × 1.6 cm, flattened, straight, slightly turgid, glabrous, veined.

Fl. & Fr. : Oct.-Feb.

Distrib. : Throughout India and Myanmar.

Specimens examined : Barwadih, 416.

Notes : Common trees of the forests.

Common name : Hindi : *Ampti* or *Amli*; Santal : *Jhinjit.*

3. **Bauhinia purpurea** L., Sp. Pl. 675. 1753; Baker in Hook.f., Fl. Brit. India 2: 284. 1878; Haines, Bot. Bihar & Orissa 2: 323. 1961 (Rep. ed.).

Medium sized trees; young parts tomentose. Leaves up to 11 × 10 cm, deeply lobed, 9-11 nerved, cordate at base, subcoriaceous, glabrous, lobes subacute, reaching up to middle, inner edge often overlapping. Flowers few in axillary and terminal subcorymbose racemes; bracts very small, deltoid. Calyx up to 2.5 cm long, coriaceous, split into 2-segments, lower one emarginate, the outer 3-toothed. Petals deep rose or pink coloured, up to 5 × 1 cm, glabrous, clawed. Fertile stamens-3. Ovary long stalked, grey-downy. Pods up to 30 cm long, linear-flat, decurved, pointed, 12-15 seeded.

Fl. & Fr. : Sept.-Feb.

Distrib. : India, Sri Lanka, China.

Specimens examined : Seuti, 1076.

Notes : Common, in the forest.

Common name : Beng. : *Devakanchan*; Hindi : *Khairwal*; Santal : *Sinhara*; Khraw : *Koinar.*

Uses : Leaves and flowers buds are eaten. Bark used in diarrhoea and also yields fibre.

4. Bauhinia tomentosa L., Sp. Pl. 375. 1753; Baker in Hook.f., Fl. Brit. India 2: 275. 1878; Haines, Bot. Bihar & Orissa 2: 323. 1961 (Rep. ed.); Sald & Singh in Sald., Fl. Karnataka 1: 378. 1984.

A large shrub; young shoots tomentose. Leaves orbicular, broader than long, up to 4.5 × 8 cm, cleft less than half way down, lobes obtuse, base 7-9 nerved, glabrous above, tomentose beneath; petioles up to 2.5 cm long, swollen at both ends, slightly pubescent. Flowers usually in short-peduncled, leaf-opposed pairs; bracteoles linear, persistent. Calyx pubescent, up to 1.4 cm long, spathaceous. Petals up to 5 cm long, obovate-spathulate, yellow, upper one with red blotch on face. Stamens-10. Pods up to 15 × 2 cm, glabrous, slightly beaked.

Fl. & Fr. : Aug.-Jan.

Distrib. : India, Sri Lanka, China, Malaya, Trop. Africa.

Specimens examined : Meclaskeiganj, 692.

Notes : Not common, often planted, rarely found near the forest.

Common name : Hindi : *Kachnar.*

Uses : Decoction of root bark used in inflamation of liver.

5. B. vahlii Wt. & Arn., Prodr. 297. 1834; Baker in Hook.f., Fl. Brit. India 2: 279. 1878; Haines, Botany of Bihar & Orissa 2: 324. 1961 (Rep. ed.); Ali in Fl. W. Pak. 54: 3. 1973.

Extensive climbers, with villously, brown tomentose shoots and young parts; tendrils simple circinate, opposite to leaves. Leaves alternate, large, orbicular, up to 30 cm across, long petioled, lobed at apex and deeply cordate at base, densely hairy beneath, 11-13 nerved; stipules obtuse, falcate. Flowers in terminal subcorymbose racemes. Calyx tube cylindrical, limb splitting into 2-lobes, rusty tomentose. Corolla white, obovate, shortly clawed, hairy outside. Stamens-3. Ovary tomentose, stalk adnate to the calyx tube. Pods woody, pendulous, flat, clothed with dense rusty-tomentum, 20-30 cm long.

Fl. & Fr. : Apr.-June.

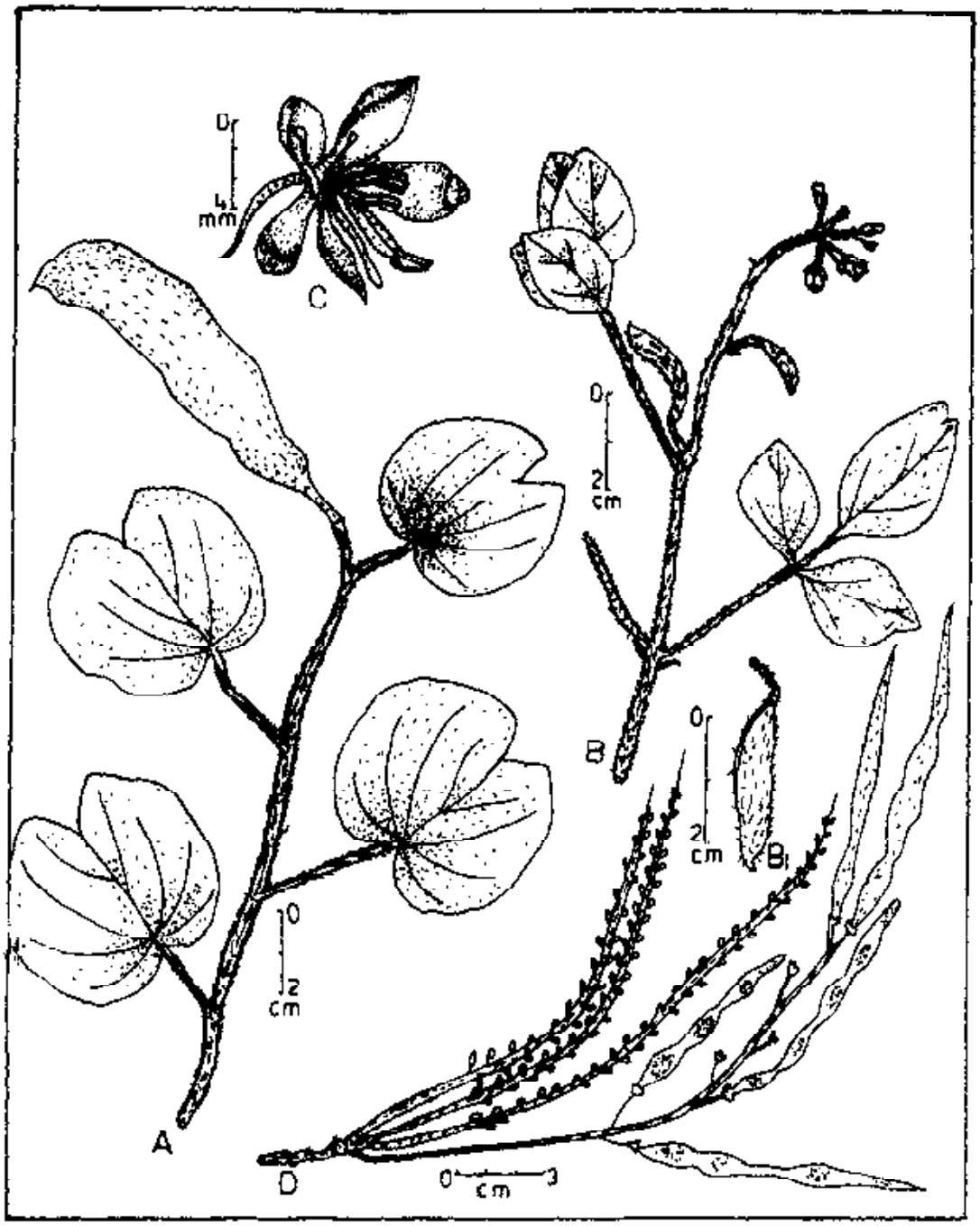


Fig. 14: Caesalpiniaceae. A. *Bauhinia tomentosa* L.: Fruiting twig; (B-B_1): *Cassia absus* L.: B. Flowering twig; B_1. Fruit; C. *Cassia occidentalis* L.: Flowers without petals; D. *Parkinsonia aculeata* L. : Fruiting branch.

Distrib. : Throughout India, Pakistan and Nepal.

Specimens examined : Bisrampur, 574.

Notes : Common in the mixed forests as an extensive climber.

Common name : Hindi : *Malian, Mahul*; Santal : *Lamaklar, Mahulan.*

Uses : The bark yields a strong fibre used for ropes. The large leaves used to prepare plates, umbrella and rain coat etc. The seeds and the leaves used medicinally and the roasted seeds also eaten as food.

6. Bauhinia variegata L., Sp. Pl. 375. 1753; Baker in Hook.f., Fl. Brit. India 2: 284. 1878; Haines, Bot. Bihar & Orissa 2: 323. 1961 (Rep. ed.); Ali, Fl. W. Pak. 54: 5. 1973; Sald. & Singh in Sald., Fl. Karnataka 1: 378. 1984.

Deciduous, medium sized trees. Leaves orbicular, up to 10 × 11 cm deeply cleft, base cordate, lobes obtuse, 11-13 nerved, glabrous above, sparsely hairy beneath. Flowers in axillary or terminal racemes. Calyx spathaceous, 5-toothed at apex, up to 3 cm long, tomentose. Petals white-purple, up to 5 × 1 cm. Fertile stamens-5. Pods flat, glabrous, up to 25 × 2 cm, dehiscent, 10-15 seeded.

Fl. & Fr. : Oct.-Feb.

Distrib. : India, Myanmar, China.

Specimens examined : Netarhat, 225.

Notes : Common, in the forests.

Common name : Beng. : *Rakta Kanchan*; Hindi : *Kachnar*; Kol : *Juruju; Barunga;* Santal : Jhinjir.

Uses : Young leaves and pods are eaten. Dried buds are used for diarrhoea, dysentery and piles. Bark used as anthelmintic and also used in ulcers and leprosy. Wood used for agricultural implements.

2. CAESALPINIA L.

Caesalpinia decapetala (Roth) Alston in Trimen, Handb. Fl. Ceylon 6: (Suppl.) 89. 1931; Gandhi in Sald. & Nicol., Fl. Hassan 218. 1976. *Reichardia decapetala* Roth., Nov. Pl. Sp. 212. 1821. *Caesalpinia sepiaria* Roxb., Fl. Ind. 2: 360. 1832; Baker in Hook.f., Fl. Brit. India 2: 256. 1878; Prain, Bengal Pl. 1: 323. 1963 (Rep. ed.); Haines, Bot. Bihar & Orissa 2: 331. 1961 (Rep. ed.).

Scandent or scrambling shrubs, pubescent, branches and leaf-rachis provided with recurved prickles; stipules ovate, acute, deciduous. Leaflets 6-10 pairs, oblong, obtuse at both ends, pubescent at both surfaces, up to 17 × 7 mm. Flowers in terminal or supra-axillary simple racemes, bright yellow, 1.5-2 cm in diam. Calyx pubescent. Filaments hairy. Pods oblong, dry, flat, brown at maturity, green and hairy when young, up to 7.5 × 2.4 cm, with caudate tip.

Fl. & Fr. : Dec.-Mar.

Distrib.: Throughout India, Sri Lanka, S.E. Asia, Malaya, China and Africa.

Specimens examined : Netarhat, 147.

Notes: Not common, found in the forest edges.

3. CASSIA L.

1a. Leaves without glands on rachis or petioles :

- 2a. Antheriferous stamens-10; pods more than 30 cm long .... 2. *C. fistula*
- 2b. Antheriferous stamens 6-7; pods less than 30 cm long ;
  - 3a. Filaments of 3 stamens with bulbous swelling; pods terete, indehiscent .... 3. *C. nodosa*
  - 3b. Filaments without bulbous swelling; pods flat, dehiscent .... 7. *C. siamea*

1b. Leaves with 1-few glands on rachis or petioles :

4a. Sepals lanceolate, acute :

5a. Branches and pods covered with viscid-glandular hairs; leaflets 2-pairs .... 1. *C. absus*

5b. Branches and pods without glandular hairs; leaflets more than 2 pairs :

6a. Petioles with a stipitate peltate gland; leaflets oblong-lanceolate, less than 1 cm long .... 6. *C. pumila*

6b. Petioles with a conical gland; leaflets obovate-oblong, more than 1 cm long .... 4. *C. obtusifolia*

4b. Sepals ovate or obovate, obtuse :

7a. Petioles with a gland at base; rachis eglandular:

8a. Pods flat, more than 10 cm long .... 5. *C. occidentalis*

8b. Pods turgid, less than 10 cm long .... 8. *C. sophera*

7b. Petioles eglandular; rachis with glands between the leaflets :

9a. Glands clavate; antheriferous stamens-10; pods flat .... 9. *C. surattensis*

9b. Glands subulate; antherifrous stamens-7; pods subtetragonous .... 10. *C. tora*

1. Cassia absus L., Sp. Pl. 376. 1753; Baker in Hook.f., Fl. Brit. India 2: 265. 1878; Duthie in Up. Gang. Plain 1: 271. 1960. (Rep. ed.); Haines, Bot. Bihar & Orissa 2: 319. 1961 (Rep. ed.); Saldanha & Singh in Saldanha, Fl. Karnataka 1: 381. 1984.

Diffuse, subglabrous, annual herbs, up to 60 cm high. Branches covered with viscid glandular hairs. Rachis with a gland between the lowest pair of leaflets. Leaflets-4, elliptic-obovate, oblique, subacute, slightly mucronate, glabrous abvoe, pubescent beneath, up to 3.5 × 2 cm. Flowers in short terminal or axillary racemes; bracts ovate, acuminate. Sepals lanceolate, bristly, up to 4 mm long. Petals reddish-yellow, up to 7 mm long. Stamens-5, equal, staminodes-0. Pods flat, covered with stiff glandular hairs, up to 30 × 6 mm, 5-7 seeded. Seeds ovoid, black, shining.

Fl. & Fr. : Aug.-Nov.

Distrib. : Pantropical.

Specimens examined : Muhammadganj, 970.

Notes : Common, in the forest under growth and dry hills.

Common name : Hindi : *Chaksu.*

Uses : Leaves used in cough and seeds used in skin diseases.

2. Cassia fistula L., Sp. Pl. 377. 1753; Baker in Hook.f., Fl. Brit. India 2: 261. 1878; Haines, Bot. Bihar & Orissa 2: 315. 1961 (Rep. ed.); Prain, Beng. Pl. 1: 314. 1963 (Rep. ed.); Gandhi in Sald. & Nicol., Fl. Hassan 219. 1976.

Medium sized deciduous trees. Leaves up to 45 cm long; leaflets 4-8 pairs, ovate, ovate-lanceolate or ovate-oblong, up to 16.5 × 8 cm, acute at apex, cuneate at base, coriaceous, shining above, clothed (when young) with caducous silvery pubescence; petiolules up to 7 mm long. Flowers bright yellow, in up to 45 cm long drooping racemes. Pedicel up to 4.5 cm long; bracts minute, caducous. Calyx 5-partite, lobes ovate obtuse, caducous, up to 10 mm long. Petals up to 2 cm long, veined, obovate, nearly equal shortly clawed. Pods cylindrical, drooping, 30-50 cm long, many seeded, indehiscent.

Fl. : May-Aug. *Fr.* : Nearly round the year.

Distrib. : Throughout India, Sri Lanka, Malaya and China.

Specimens examined : Garu, 536.

Notes : Common, as avenue trees and also in the forest.

Common name : Beng. : *Bandar Lathi.*

Uses : Wood used for house posts and other purposes.

3. C. nodosa Ham. in Roxb., Fl. Ind. 3: 336. 1832; Baker in Hook.f., Fl. Brit. India 2: 261. 1878; Haines, Bot. Bihar & Orissa 2: 316. 1961 (Rep. ed.); Prain, Beng. Pl. 1: 314. 1963 (Rep. ed.).

Medium sized trees. Leaflets oblong, or lanceolate-oblong, up to 5 × 1.5 cm, becoming smaller at base, minutely hairy on both surfaces, mucronate at apex. Flower pink or rose coloured. Pods slender, 20-25 cm long, black.

Fl. & Fr. : Dec.-Mar.

Distrib. : India, Malay-Phillippines.

Specimens examined : Netarhat, 153.

Notes : Common, as avenue trees. Throughout the district.

4. Cassia obtusifolia L., Sp. Pl. 377. 1753; Duthie in Fl. Up. Gang. Pl. 1: 270. 1960 (Rep. ed.); Malick and Krishna, Bull. Bot. Surv. India 20 (1-4): 115. 1978; Singh, Bull. Bot. Surv. India 18: 94. 1979. *Cassia tora* sensu Baker in Hook. f., Fl. Brit. India 2: 263. 1878 *pro parte* (non L.). *Cassia tora* L. var. *obtusifolia* Haines, Bot. Bihar & Orissa 304. 1922 (Rep. ed. 2: 318. 1961).

Annual undershrubs, up to 1.5 m high. Leaves up to 9 cm long, petioled; stipules linear; leaflets-6, obovate-oblong, up to 3.5 × 2 cm, broadly deltoid at apex, rounded at base, pubescent beneath; rachis puberulous, deeply grooved above, with single conical gland between the lowest pair of leaflets. Flowers-2, subsessile, axillary. Calyx 5-partite to the base. Petals yellow, up to 12 mm long. Stamens-7, 3 upper most reduced to staminodes. Pods up to 15 cm long, obliquely septate, glabrous. Seeds dark brown, shining, 5-7 × 2-3 mm, rhomboid with slight projection at hilar end, cotyledons deeply wavy.

Fl. & Fr. : June-Nov. Exotic.

Distrib. : Native of tropical America, introduced and naturalised in India, Myanmar, Singapore.

Specimens examined : Betla, 1113.

Notes : Common, in the forest, near the Palamau Fort.

Common name : Beng. & Hindi : *Chakunda*.

Uses : Leaves and roots used externally for skin disease, ringworm and itchings.

5. Cassia occidentalis L., Sp. Pl. 377. 1753; Baker in Hook.f., Fl. Brit. India 2: 262. 1878; Haines, Bot. Bihar & Orissa 2: 318. 1961 (Rep. ed.); Sald. & Singh in Saldanha, Fl. Karnataka 1: 385. 1984.

Diffuse, subglabrous undershrubs, up to 1 m high. Leaves up to 20 cm long; petioles with single gland at base; leaflets 3-6 pairs, elliptic-ovate or elliptic-lanceolate, up to 5.5 × 2 cm, acuminate at apex, rounded at base. Flowers in 2-6 flowered, axillary racemes; bracts ovate-acuminate. Sepals-5, deeply partite to the base, obtuse. Petals yellow. Antheriferous stamens-7, upper 3 reduced to staminodes. Pods flat, linear, up to 11.5 × 0.6 cm, dark brown with thick yellow margin. Seeds 20-30, arranged in a single row.

Fl. & Fr. : Sept.-Dec. Exotic.

Distrib. : Pantropical (probably of S. American origin).

Specimens examined : Panki, 952.

Notes : Common in the waste places and barren fields.

Common name : Beng. : *Kalakasunda*; Hindi : *Kasondi*; Kol : *Kaiu.*

Uses : Leaves and seeds are purgative and also used in cough and cold. Seeds also used in skin disease; roasted and ground seeds often used as a substitute for coffee in Africa and Argentina.

6. C. pumila Lamk., Encycl. 1: 651. 1785; Baker in Hook.f., Fl. Brit. India 2: 266. 1878; Haines, Bot. Bihar & Orissa 2: 320. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 177. 1977; Saldanha and Singh in Saldanha, Fl. Karnataka 1: 385. 1984.

Diffuse or prostrate herbs, 15-20 cm long. Branches crisped, pubescent. Leaves 1-3 cm long; petioles with a stipitate, peltate gland; leaflets 9-20 pairs, up to 7 × 1.5 mm, oblong-lanceolate, glabrous, excepting the hairy margin, midrib produced into short awn like structure. Flowers solitary, axillary or extra axillary, up to 4 mm across. Sepals narrow,

subaristate, outer 3 hairy on back. Corolla yellow. Stamens-5. Pods flat, pubescent, with thickened sutures, up to 2.5 cm long, 6-12 seeded.

Fl. & Fr. : Oct.-Dec.

Distrib. : India, Malaysia and Tropical Australia.

Specimens examined : Bisrampur, 646.

Notes : Common, in the waste ground and open forest.

Common name : Santal : *Ot-kondro.*

Uses : Seeds used as purgative.

7. Cassia siamea Lamk., Encycl. 1: 648. 1785; Baker in Hook.f., Fl. Brit. India 2: 264. 1878; Haines, Bot. Bihar & Orissa 2: 317. 1961 (Rep. ed.); Bennet in Fl. Howrah Dist. 184. 1979; Saldanha & Singh in Saldanha, Fl. Karnataka 1: 386. 1984. *Cassia florida* Vahl., Symb. Bot. 3: 57. 1794.

Medium sized trees. Leaves 15-25 cm long; stipules caducous; leaflets opposite, 6-12 pairs, up to 4.5 × 1.5 cm, elliptic-oblong or oblong, subcoriaceous, shining above and glaucous beneath, emarginate and mucronulate at apex, obtuse and rounded at base; petiolules 2-3 mm long. Flowers in axillary corymbs and terminal panicles, bright yellow. Pods 15-25 × 1 cm, flat, stalked, many seeded.

Fl. & Fr. : Sept.-Dec.

Distrib. : South East Asia.

Specimens examined : Garwah, *Sarma* 851.

Notes : Commonly planted as avenue trees, also often self-sown.

Uses : Mature wood used for furniture.

8. C. sophera L., Sp. Pl. 379. 1753; Baker in Hook.f., Fl. Brit. India 2: 262. 1878; deWit in Webbia 11: 265. 1955; Haines, Bot. Bihar & Orissa 2: 318. 1961 (Rep. ed.); Sald. & Singh in Sald., Fl. Karnataka 1: 386. 1984.

Shrubs, up to 1 m high. Leaves 10-20 cm long; rachis grooved with a solitary, conical or globular dark gland near base; leaflets opposite, 5-10 pairs, oblong-lanceolate to elliptic-lanceolate, 3-5 × 1.5-2 cm, acute or subacuminate at apex, base rounded; petiolules 1-2 mm long. Flowers in upper axillary few flowered corymbose racemes, passing into terminal panicles. Calyx up to 6 mm long, partite up to the base, lobes obtuse. Petals subequal, up to 1.2 cm long, yellow. Perfect stamens-7, 2-larger, staminodes-3. Pods slightly turgid, shortly apiculate, up to 9 cm long. Seeds dull olive coloured, up to 5 × 3.5 mm, ovoid, narrow at hilar end, concave.

Fl. & Fr. : Aug.-Dec.

Distrib. : Pantropical.

Specimens examined : Bisrampur, 846.

Notes : Common, in the villages and waste places.

Common name : Beng. : *Kalakasunda*; Hindi : *Kasunda.*

Uses : Juice of the leaves used for ringworm.

8.1 Cassia sophera L. ssp. **purpurea** (Edw.) Bennet, Fl. Howrah Dist. 184. 1979. *Cassia sophera* L. var. *purpurea* (Edw.) Voigt, Hort. Sub. Calc. 248. 1845; Baker in Hook.f., Fl. Brit. India 2: 263. 1878; Guha Bakshi in Fl. Murshidabad Distt. 118. 1984. *Cassia purpurea* Edw., Bot. Reg. t. 856. 1825.

Leaflets 1.5-3.5 × 0.5-1 cm; branches slender, purple-tinged. Other characters like *C. sophera* Linn.

Fl. & Fr. : Nov.-Feb.

Distrib. : Pantropical.

Specimens examined : Tarhashi, 1127.

Notes : Common in the waste places, road sides.

Common name : Beng. : *Lal Kalakasunda.*

Remarks : This plant can easily be differentiated from *C. sophera* Linn. by the smaller leaflets and purple branches.

9. Cassia surattensis N. Burman, Fl. Ind. 97. 1768; Baker & Bakh.f., Fl. Java 1: 538. 1963; Sald. & Singh in Sald., Fl. Karnataka 1: 386. 1984. *Cassia glauca* Lam., Encycl. 1: 647. 1785; Baker in Hook.f., Fl. Brit. India 2: 265. 1878; Haines, Bot. Bihar & Orissa 2: 317. 1961 (Rep. ed.).

Large shrubs or small trees; young shoot glabrous or sparsely hairy. Leaves up to 15 cm long, with clavate glands between leaflets; stipules narrow, caducous; petioles up to 6 cm long; leaflets 3-6 pairs, elliptic, up to 7 × 3 cm, subacute at apex, glaucous; petiolules up to 4 mm long. Flowers in terminal corymbose racemes; bracts ovate, acuminate, reflexed. Sepals obtuse. Corolla bright yellow. Petals subequal, elliptic-oblong, up to 2.3 × 0.9 cm. Stamens-10, 2-larger. Pods flat, up to 15 × 1 cm, dehiscent, strap-shaped, glabrous.

Fl. & Fr. : Aug.-Dec.

Distrib. : India, Malaya, Trop. Australia and Polynesia.

Specimens examined : Daltonganj, 875.

Notes : Commonly planted as avenue plant and in the forest office campus.

10. C. tora L., Sp. Pl. 376. 1753; Baker in Hook.f., Fl. Brit. India 2: 263. 1878; Prain, Beng. Pl. 1: 438. 1903 (Rep. ed. 1: 314. 1963) & in Rec. Bot. Surv. India 3: 204. 1905; deWit in Webbia 11: 276. 1955; Brenan in Kew Bull. 13. 249. 1958; Haines, Bot. Bihar & Orissa 2: 318. 1961 (Rep. ed.); Saldanha & Singh in Saldanha, Fl. Karnataka 1: 388. 1984.

Erect, glabrous or sparsely hairy, undershrub 0.5-1.5 m high. Leaves paripinnate, 6-10 cm long; leaflets 3-5 pairs, up to 3.6 × 1.7 cm, elliptic-obovate, terminal pair usually obovate, lowest pair broadly-oblong; petiolules up to 2 mm long; petiolar glands between 2 lowest pairs of leaflets. Flowers solitary or in pairs, axillary, bracteate; bracts up to 3 mm long, subulate. Calyx partite almost to the base; sepals up to 5 mm long, ovate, acute. Petals up to 8 × 3 mm long, subequal, pale yellow, oblong, obtuse. Perfect stamens-7, staminodes-3. Pods 12-20 × 0.4-0.8 cm, 4-angled, falcate,

obliquely septate. Seeds up to 3 mm long, oblong, truncate at both ends, yellowish-brown, polished.

Fl. & Fr. : Sept.-Dec.

Distrib. : India, Nepal; probably native of S. America.

Specimens examined : Mahulam basti (Garwah), 627.

Notes : Common, along the road sides, open lands, waste places and also on dry hills.

Common name : Beng. & Hindi : *Chakunda*; Santal : *Chakoara, Bheda-deren.*

Uses : Leaves purgative, used in ringworm and other skin troubles.

4. DELONIX Rafin.

Delonix regia (Bojer) Rafin., Fl. Tellur. 2: 92. 1836; Ali in Fl. W. Pak. 54: 43. 1973. *Poinciana regia* Bojer in Bot. Mag. 56. 5. 2884. 1829; Baker in Hook.f., Fl. Brit. India 2: 260. 1878; Haines, Bot. Bihar & Orissa 2: 327. 1961 (Rep. ed.).

Large handsome trees. Leaves feathery, 2-pinnate; leaflets many, linear. Flowers in terminal corymbs. Sepals-5, subequal. Petals-5, orbicular, up to 5 cm across, with a long claw, red. Stamens-10, free; anthers versatile. Pods strap-shaped, up to 35 × 5 cm, woody.

Fl. : April-June. *Fr.* : Round the year.

Distrib. : Throughout India.

Specimens examined : Daltonganj, 836.

Notes : Common as road side trees.

Common name : Beng. & Hindi : *Gulmohor.*

5. PARKINSONIA L.

Parkinsonia aculeata L., Sp. Pl. 375. 1753; Baker in Hook.f., Fl. Brit. India 2: 260. 1878; Haines, Bot. Bihar & Orissa 2: 327. 1961 (Rep. ed.); Bailey in Man. Cult. Pl. 588. 1963 (Rep.).

Glabrous, bushy shrubs or trees, armed with sharp, up to 1 cm long woody spines, with 2-6 pinnae at their axils. Pinnae up to 30 cm long; rachis flat, with numerous small elliptic-oblong, 4 × 1.5 mm leaflets. Flowers bright yellow in lax racemes. Calyx tube short, sepals lanceolate, subequal, coriaceous. Petals-5, up to 1 × 0.7 cm, upper most broader. Pods linear, up to 12 cm long, moniliform when dry. Seeds linear-oblong, up to 1 × 0.4 cm, smooth, brown.

Fl. & Fr. : Aug.-Oct. Exotic.

Distrib. : Native of Trop. America; naturalised in India.

Specimens examined : Fanki, 951.

Notes : Not common, cultivated, often found as naturalised.

Common name : Beng. : *Bilatikikar*; Hindi : *Vilaiti kikar.*

Uses : Young branches used as fodder. Bark yields a fibre used for mixing with paper pulp. Wood produce good charcoal.

6. PELTOPHORUM Vogel.

Peltophorum pterocarpum (DC.) Backer ex Heyne, Nutt. Pl. Nud. Ind. ed. 2, 2: 755. 1927; Ali in Nasir & Ali, Fl. W. Pak. 54: 42. 1973. *Inga pterocarpa* DC., Prodr. 2: 441. 1825. *Peltophorum ferrugineum* Benth., Fl. Austral. 2: 279. 1864; Baker in Hook.f., Fl. Brit. India 2: 257. 1878; Haines, Bot. Bihar & Orissa 2: 328. 1961 (Rep. ed.). *Peltophorum roxburghii* (G.Don) Degener, Fl. Haw. 1696. 1938; Blatter *et al.* Some Beaut, Indian Trees 109. 1954. *Peltophorum inerme* (Roxb.) Llanos in Blanco, Fl. Filip. ed. 3. t. 335. 1877; Deb. Fl. Trip. State 122. 1981.

Large unarmed trees. Young shoots rusty tomentose. Leaves bipinnate, up to 30 cm long; leaflets sessile, 20-30, close set, oblong, up to 14 × 5.5

mm, retuse at apex, base unequal, glabrous, coriaceous, mid vein prominent beneath. Flowers large, showy, yelow, in axillary and terminal panicled racemes. Calyx tomentose; teeth subequal. Petals oblong, spreading. Pods compressed, rigid, glabrous, indehiscent, with firm broad wing on both suture, oblong, narrowed to both ends, up to 7 × 2.4 cm, closely longitudinally veined, reddish.

Fl. & Fr. : June-Nov.

Distrib. : India, Sri Lanka, Malaysia and N. Australia.

Specimens examined : Panki, 962.

Notes : Common, as avenue trees throughout the district.

Uses : Commonly planted as avenue trees, and bark used for dysentery. Wood used in various carpentary works.

7. TAMARINDUS L.

Tamarindus indica L., Sp. Pl. 34. 1753; Baker in Hook.f., Fl. Brit. India 2: 273. 1878; Prain, Beng. Pl. 1: 444. 1903 (Rep. ed. 1: 320. 1963) & in Rec. Bot. Surv. India 3: 206. 1905; Haines, Bot. Bihar & Orissa 2: 325. 1961 (Rep. ed.); Srinivasan and Agarwal in Bull. Bot. Surv. India 10: 381-385. 1969.

Large trees. Leaves paripinnate; leaflets 10-12 pairs, linear-oblong, up to 17 × 5 mm, glabrous. Flowers small, yellow or red in lax racemes. Calyx tube turbinate; sepals lanceolate, up to 10 mm long. Three upper petals perfect, two lower reduce to filamentous sales. Stamens only 3-perfect, monadelphous below, sheath bear 3-4 small appendages. Pods curved linear, somewhat compressed thick, with thin crustaceous epicarp and thick pulpy mesocarp, indehiscent.

Fl. & Fr. : Apr.-Dec. Exotic.

Distrib. : Widespread in the Old World tropics; probably originated in Tropical Africa.

Specimens examined : Maromar, 492.

Notes : Commonly found in the villages and also found in the forest.

Uses : Ripe fruits are refrigerant, digestive, carminative and laxative. Fruit pulp is also used in making chutney.

ROSACEAE

1a. Plants armed :

2a. Hypanthium urceolate; ovary inferior .... 4. ROSA

2b. Hypanthium not urceolate; ovary superior .... 5. RUBUS

1b. Plants unarmed :

3a. Herbs; leaves pinnate or digitate .... 1. POTENTILLA

3b. Trees; leaves simple :

4a. Leaves whorled; flowers sessile; hypanthium campanulate .... 2. PRUNUS

4b. Leaves not whorled; flowers pedicelled; hypanthium not campanulate .... 3. PYRUS

1. POTENTILLA L.

1a. Leaves pinnately divided; flowers axillary solitary .... 2. *P. supina*

1b. Leaves digitately divided; flowers not solitary .... 1. *P. sundaica*

1. Potentilla sundaica (Bl.) Kntz., Rev. Gen. 1: 219. 1891; Kalkman in Blumea 16: 343. 1966. *Fragaria sundaica* Bl., Bijdr. 17: 1106. 1826. *Potentilla kleiniana* W. & A. in Wight, Ill. Ind. Bot. 1: t. 85. 1831; Hook.f. in Fl. Brit. India 2: 359. 1878; Haines, Bot. Bihar & Orissa 2: 354. 1961 (Rep. ed.).

Diffuse, annual herbs. Leaves 3-5 foliolate, radical one long petioled and cauline one short petioled; leaflets elliptic-obovate, up to 4 cm long. Flowers in corymbs. Sepals oblong-lanceolate. Petals yellow, obovate, up to 4 mm long. Achenes oblique, keeled, up to 1 mm long.

Fl. & Fr. : Mar.-July.

Distrib.: India, Myanmar & Sri Lanka.

Specimens examined : Netarhat, 862.

Notes : Not common, in the forest edges.

2. Potentilla supina L., Sp. Pl. 497. 1753; Hook.f. in Fl. Brit. India 2: 259. 1878; Haines, Bot. Bihar & Orissa 2: 354. 1961 (Rep. ed.); Babu, Herb. Fl. Derha Dun 181. 1977.

Prostrate annual herbs, up to 15 cm high, pubescent throughout. Leaves pinnate; petioles up to 2 cm long, hairy; leaflets 3-9, subsessile, obovate, cuneate, serrate-dentate, hairy, up to 7 × 4 mm. Flowers solitary, axillary, up to 5 mm diam. Calyx divided halfway down; sepals-5, ovate-lanceolate, acute, hairy. Petals-5, yellow, obovate, obtuse, up to 1 mm long. Achenes many, minute, ovoid, smooth.

Fl. & Fr. : Feb.-Apr.

Distrib. : India, Afghanistan, N. Asia and N. Africa.

Specimens examined : Kumendi, 728.

Notes : Common in the damp places, near the Barapani Nala.

Uses : Root-stocks astringent, tonic and febrifuge.

2. PRUNUS L.

Prunus persica (L.) Batsch, Beytr. Pragm. Gesch. Natur. 30. 1801; Hook.f. in Hook.f., Fl. Brit. India 2: 313. 1878; Haines, Bot. Bihar & Orissa 2: 351. 1961 (Rep. ed.). *Amygdalus persica* L., Sp. Pl. 472. 1753.

Deciduous trees. Leaves simple, whorled, oblong-lanceolate, serrate, up to 7 × 1.5 cm; stipules subulate-fimbriate, caducous. Flowers fascicled. Hypanthium campanulate. Stamens many, inserted on the throat of hypanthium. Ovary inferior. Drupes 1-2 seeded, irregularly furrowed, velvety.

Fl. & Fr. : Feb.-Aug.

Distrib. : South East Asia.

Specimens examined : Netarhat, 73.

Notes : Cultivated, rarely found as an escape.

Common name : Beng. : *Peech*; Hindi : *Aru, Saftalu.*

Uses : Fruits are edible.

3. PYRUS L.

Pyrus communis L., Sp. Pl. 479. 1753; Hook.f., Fl. Brit. India 2: 374. 1878; Haines, Bot. Bihar & Orissa 2: 356. 1961 (Rep. ed.).

Trees; young shoots pubescent. Leaves simple, oblong-ovate, acuste, serrate, glabrous, up to 12 × 9 cm; petioles up to 7 cm long, pubescent. Flowers in short terminating corymbs. Sepals oblong, acute, pubescent, 3-5 mm long. Corolla white, up to2 cm across. Fruits with a crown of persistent calyx, on 4 cm long stalk.

Fl. & Fr. : Jan.-May.

Distrib. : India and Europe.

Specimens examined : Netarhat, 75.

Notes : Cultivated, occasionally found in the villages as an escape.

Common name : Beng. : *Naspati.*

Uses : Fruits are edible.

4. ROSA L.

Rosa multiflora Thunb., Fl. Jap. 214. 1784; Backer & Bakh.f., Fl. Java 1: 520. 1963; Kalkman, Blumea 16: 287. 1973.

Scandent shrubs, with recurved prickles. Stipules pectinate. Leaflets-7, up to 3 × 2 cm, terminal one up to 6 × 3 cm, elliptic-ovate, serrate, acute or acuminate. Inflorescence corymbose. Peduncles glandular; bracts 1-2 cm long, pubescent beneath, pectinate, caducous; pedicels hairy up to

3 cm long. Sepals ovate-lanceolate, caudate, pubescent, up to 1.2 cm long. Petals many glabrous, pink.

Fl. : Dec.-Mar. Exotic.

Distrib. : Native of China and Japan, introduced in India.

Specimens examined : Netarhat, 68.

Notes : Common, in the forest edges and in hedges.

5. RUBUS L.

Rubus rugosus Smith in Rees, Cyclop. 30: Rubus n. 34. 1819; Hara, Enum. Fl. Pl. Nep. 2: 146. 1979. *Rubus moluccanus* auct. non. L., Hook. f. in Hook.f., Fl. Brit. India 2: 330. 1878 *p.p.*; Haines, Bot. Bihar & Orissa 2: 352. 1961 (Rep. ed.).

Straggling, prickly shrubs. Leaves broadly ovate or suborbicular, lobed, up to 15 × 12 cm, hoary tomentose, with 5-7 primary nerves, usually with small prickles on nerves; stipules flabellately laciniate. Flowers in terminal and axillary panicles; bracts ovate or obovate, laciniate. Sepals acuminate, reflexed. Petals obovate, up to 5 mm long.

Fl. & Fr. : Aug.-Oct.

Distrib. : India, Nepal and Malaya.

Specimens examined : Netarhat, 867.

Notes : Not common, near the streams.

DROSERACEAE

DROSERA L.

1a. All leave in basal rosette; styles-5, undivided .... 1. *D. burmannii*

1b. Some leaves cauline; styles-3, bifid to base .... 2. *D. indica*

1. Drosera burmannii Vahl., Symb. 3: 50. 1794; Clarke in Hook.f., Fl. Brit. India 2: 424. 1878; Haines, Bot. Bihar & Orissa 2: 359. 1961

(Rep. ed.); Ramam. in Sald. & Nicol., Fl. Hassan 159. 1976; Cook in Aquat. Wetland Pl. Ind. 183. 1996.

Acaulescent herbs, up to 15 cm tall, with a basal rosette of obovate or orbicular, stipulate leaves; blades up to 1 × 1 cm. Flowering scape terminal, circinate, few-many-flowered. Flowers white. Calyx 5-lobed; lobes elliptic, acute. Petals-5, obovate. Fruits 2-5 valved capsule.

Fl. : Nov.-Mar.

Distrib. : India, West Africa to North E. Australia, Nepal, Myanmar (Burma) and China.

Specimens examined : Netarhat, 85. Helophyte.

Notes : Common, near the ponds and moist sandy ground (insectivorous plants).

Common name : Hindi : *Mukha-jali.*

2. **Drosera indica** L., Sp. Pl. 282. 1753; Clarke in Hook.f., Fl. Brit. India 2: 224. 1878; Haines, Bot. Bihar & Orissa 2: 359. 1961 (Rep. ed.); Ramam. in Sald & Nicol., Fl. Hassan 159. 1976; Cook in Aquat. Wetland Pl. Ind. 183. 1996.

Slender, caulescent herbs, up to 20 cm long; stems glandular hairy. Leaves estipulate, lower leaves recurved, the upper one erect, filiform, up to 3 cm long, shortly petioled, glandular hairy. Inflorescence leaf-opposed. Flowers pink. Sepals-5, acute, thinly glandular-hairy. Petals pink, obovate. Fruits 2-5 valved capsule.

Fl. : Sept.-Jan.

Distrib. : India, Australia to Tropical Africa, Nepal and Myanmar.

Specimens examined : Tarhashi, 1137. Helophyte.

Notes : Not common, near the ponds and wet places (insectivorous plants).

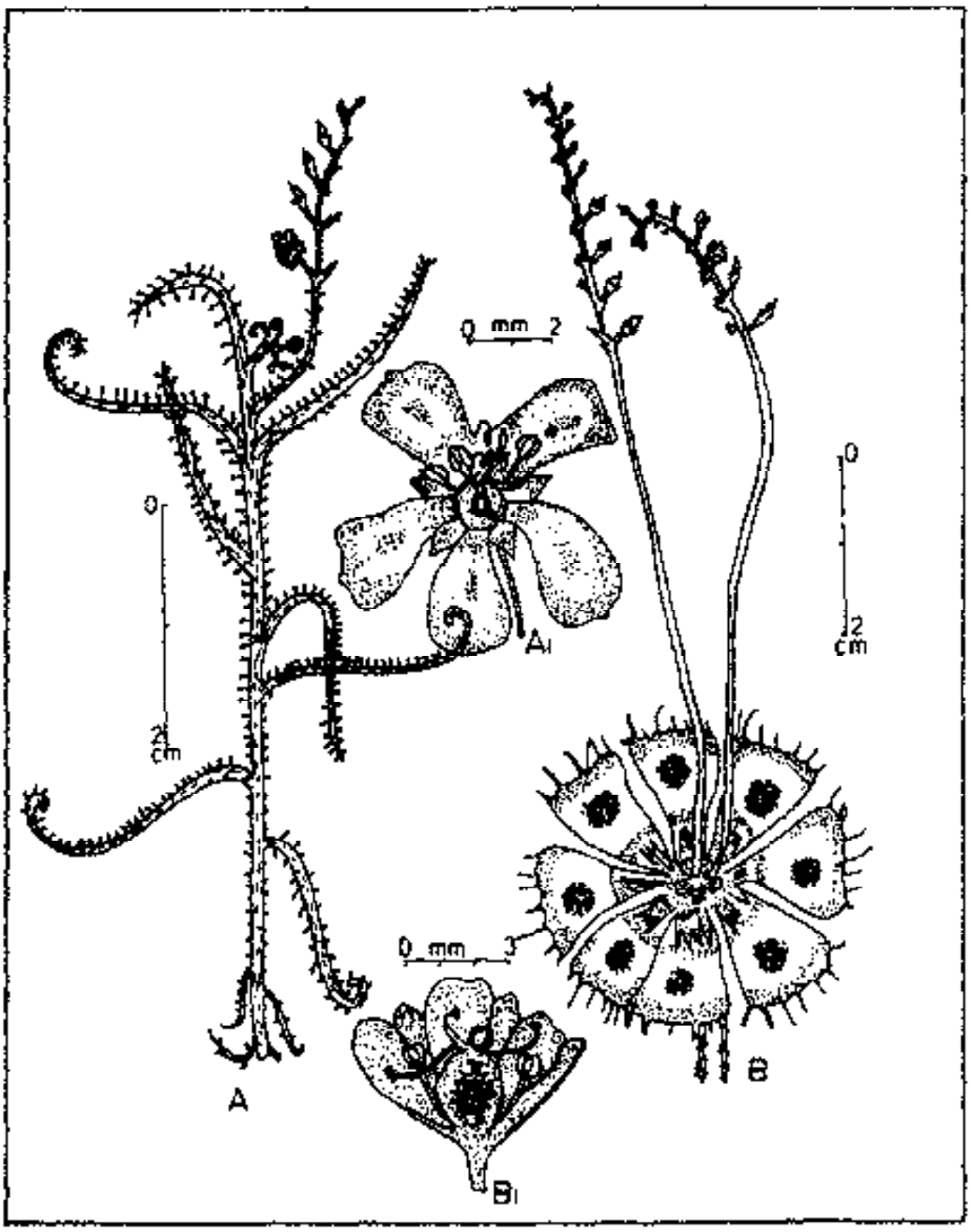


Fig. 15: Droseraceae. (A-A_1). *Drosera indica* L.: A. Habit; A_1. Flower enlarged; (B-B_1): *Drosera burmannii* Vahl: B. Habit; B_1. Dissected flower.

COMBRETACEAE

1a. Climbers; petals 4-5 .... 2. COMBRETUM

1b. Trees; petals-0 :

2a. Flowers in head; fruit compressed, beaked, less than 1 cm long .... 1. ANOGEISSUS

2. Flowers in spike; fruit not compressed, not beaked, more than 1 cm long .... 3. TERMINALIA

1. ANOGEISSUS (DC.) Wall. ex Guill., Perr. & A. Rich.

Anogeissus latifolia (Roxb. ex DC.) Wall. ex Guill., Perr. & A. Rich., Fl. Seneg. Tent. 1: 280. 1832; Clarke in Hook.f., Fl. Brit. India 2: 450. 1878; Haines, Bot. Bihar & Orissa 2: 370. 1961 (Rep. ed.); Gandhi in Said. & Nicol., Fl. Hassan Dist. 292. 1976; Scott. in Kew Bull. 33: 560. 1979. *Conocarpus latifolia* Roxb. ex DC., Prodr. 3: 16. 1828. *Anogeissus latifolia* var. *glabra* Clarke in Hook.f., Fl. Brit. India 2: 450. 1878. *A. latifolia* var. *villosa* Clarke in Hook.f., Fl. Brit. India 2: 450. 1878. *A. latifolia* var. *tomentosa* Haines, For. Fl. 364. 1910.

Deciduous, large trees, with whitish bark. Leaves alternate to subopposite, broadly elliptic to obovate, pubescent beneath, obtuse-rounded at apex, obtuse at base, up to 7 × 5 cm; petioles 1-1.3 cm, hairy, coriaceous. Flowers in heads or in short axillary cymes. Calyx tube 3 mm long. Fruits beaked and 2 winged in densely packed heads, indehiscent, beak more or less as long as fruit, up to 4 × 5 mm (including wing), reddish-yellow.

Fl. & Fr. : Jan.-Mar.

Distrib. : Throughout India, Sri Lanka.

Specimens examined : Netarhat, 188.

Notes : Common, in the forest, throughout the district.

Common name : Beng. : *Doya*; Hindi : *Dhawa* or *Dhaura*; Santal : *Hesel*.

Uses : Tree yields a gum, used in pharmaceutical preparations. Wood used for various purposes.

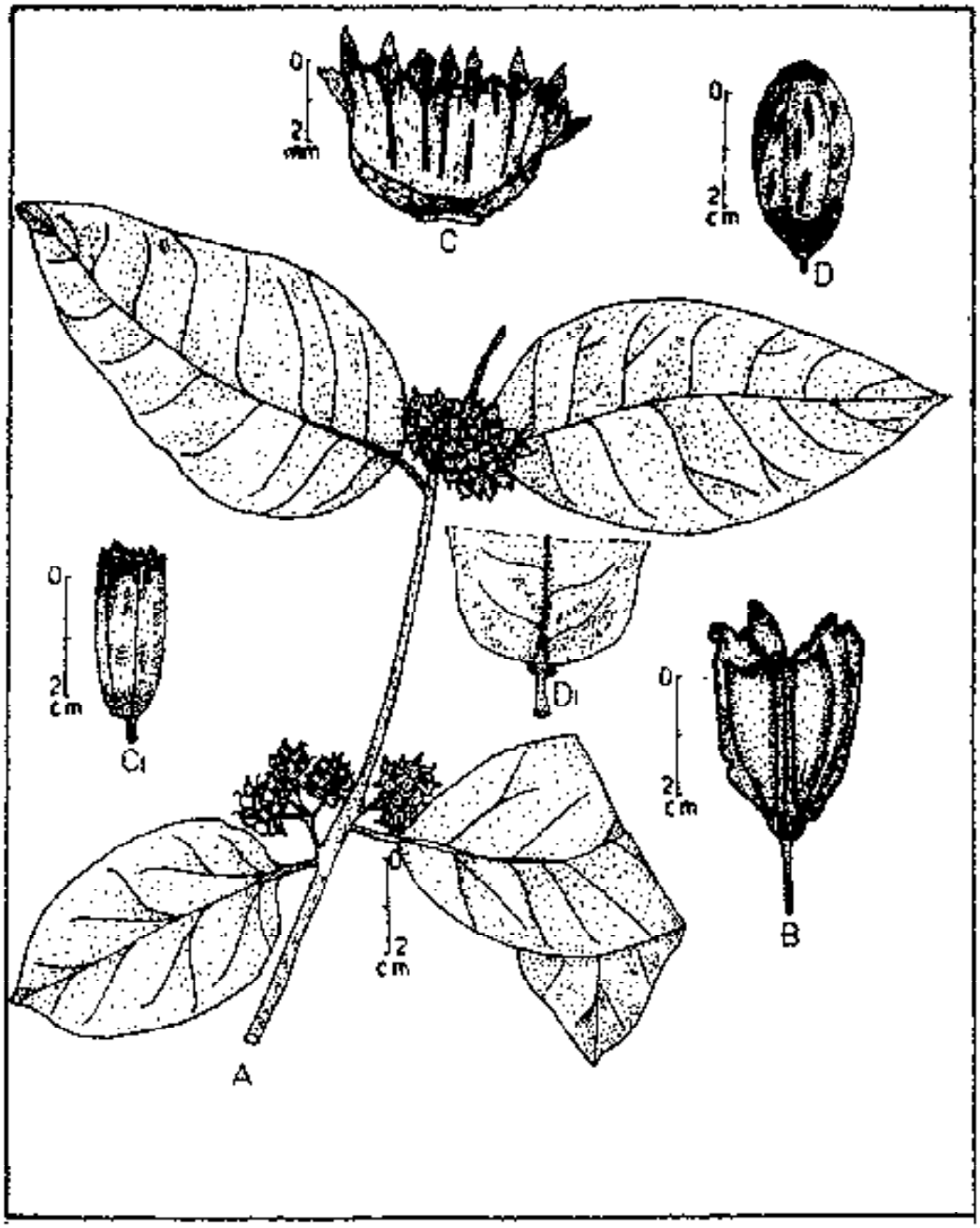


Fig. 16: Combretaceae. A. *Anogeissus latifolia* (Roxb. ex DC.) Wall. ex Guill., Perr. & A. Rich.: Fruting branch; B. *Terminalia arjuna* (Roxb. ex DC.) Wt. & Arn.: Fruit; (C-C_1): *Combretum roxburghii* Spreng.: C. Flower split open; C_1. Fruit; (D-D_1): *Terminalia chebula* Retz.: D. Fruit; D_1. Leaf base showing petiolar gland.

2. COMBRETUM Loefl.

1a. Flowers 4-merous; fruits 4-winged .... 1. *C. albidum*

1b. Flowers 5-merous; fruits 5-winged .... 2. *C. roxburghii*

1. Combretum albidum G. Don. in Trans. Linn. Soc. London. 15: 429. 1827; Chandrabose in Nair & Henry, Fl. Tamilnadu 1: 149. 1983. *Combretum ovalifolium* Roxb., Fl. Ind. 2: 226. 1832; Clarke in Hook.f., Fl. Brit. India 2: 458. 1878; Haines, Bot. Bihar & Orissa 2: 373. 1961 (Rep. ed.).

Large climbers. Leaves elliptic-ovate, up to 12 cm long, rounded at apex; petioles up to 1 cm long. Flowers in ebracteate panicle. Sepals-4, triangular-acute. Petals slightly exceeding the calyx. Fruits 4-winged, up to 2.2 × 1.2 cm.

Fl. & Fr. : Feb.-May.

Distrib. : Throughout India.

Specimens examined : Paton, 1056.

Notes : Not common, in the forest.

2. C. roxburghii Spreng., Syst. 2: 331. 1825; Exell in Fl. Males 4(5): 544. 1954; Santapau & Wagh in Bull. Bot. Surv. India 5: 106. 1964. *Combretum decandrum* Roxb., Pl. Corom. 1, t. 59. 1796 (non Jacq. 1760); Clarke in Hook.f., Fl. Brit. India 2: 452. 1878; Haines, Bot. Bihar & Orissa 2: 373. 1961 (Rep. ed.).

Scandent or scrambling climbers, sometimes covering a tree, conspicuous from the large white bract on the inflorescence; young branches rusty tomentose. Leaves coriaceous, oblong, or ovate-oblong, suddenly acuminate at apex, up to 12 × 5 cm, shining above, glabrous, secondary nerves strong beneath. Spikes rusty-villous, up to 3 cm long, in large terminal and axillary panicles. Flowers 5 merous. Calyx urceolate; sepals subaristate, 2-3 mm long, acuminate, hairy on both side. Petals ovate or ovate-oblong, acuminate, slightly exceeding the calyx. Fruits oblong, up to 3 cm long, 5-winged.

Fl. & Fr. : Nov.-June.

Distrib. : Throughout India and also in Andaman Islands, Myanmar, Thailand, W. China.

Specimens examined : Barwadih, 413.

Notes : Common, throughout the district, in the scrub jungle and on the forest trees.

Common name : Hindi : *Punk*; Santal : *Atem.*

3. TERMINALIA L. *nom. cons.*

1a. Fruit with 5 sub-equal wings :

- 2a. Leaves glabrous; fruits less than 5 cm long .... 2. *T. arjuna*
- 2b. Leaves tomentose beneath; fruits more than 5 cm long ....1. *T. alata*

1b. Fruit without wings :

- 3a. Leaves clustered at the end of the branches; petiole eglandular .... 3. *T. belerica*
- 3b. Leaves not clustered; petiole with 2 glands .... 4. *T. chebula*

1. Terminalia alata Heyne ex Roth, Nov. Pl. Sp. 379. 1821; Gandhi in Sald. & Nicol. Fl. Hassan 293. 1976. *Pentaptera tomentosa* Roxb. ex DC., Prodr. 3: 14. 1828. *Terminalia tomentosa* (Roxb. ex DC.) Wt. & Arn. Prodr. 314. 1834; Clarke in Hook.f., Fl. Brit. India 2: 447. 1878; Prain, Bengal Pl. 1: 348. 1963 (Rep. ed.); Haines, Bot. Bihar & Orissa 2: 369. 1961 (Rep. ed.).

Trees, with ash-white bark; branchlets silky pubescent. Leaves opposite to subopposite, elliptic-lanceolate to broadly oblong, acute at apex and truncate-cordate at base, provided with 2 large glands at the midrib beneath, tomentose beneath, up to 20 × 8.8 cm; petioles up to 1 cm long; nerves 15-16 pairs, impressed above. Flowers creamy, sessile in panicled spikes. Calyx pubescent. Petals absent. Fruits elliptic, woody, up to 6 × 5 glabrous, 5-winged, light brown; wing up to 1.5-2 cm broad, with horizontal striation.

Fl. & Fr. : Aug.-Mar.

Distrib. : Throughout India, Myanmar, Sri Lanka, Thailand to Vietnam.

Specimens examined : Netarhat, 159.

Notes : Very common, in the forests, throughout the district.

Common name : Beng. & Hindi : *Asan*.

Uses : Wood used for various purposes.

2. Terminalia arjuna (Roxb. ex DC.) W. & A., Prodr. 314. 1834; Clarke in Hook.f., Fl. Brit. India 2: 447. 1878; Prain, Beng. Pl. 1: 481. 1903 (Rep. ed. 1: 348. 1963); Haines, Bot. Bihar & Orissa 2: 368. 1961 (Rep. ed.); Blatter in J. Indian Bot. Soc. 8: 259. 1929. *Pentaptera arjuna* Roxb. ex DC., Prodr. 3: 14. 1828.

Moderate sized trees. Leaves usually sub-opposite, glabrous, elliptic-oblong or sometimes suborbicular, up to 11 × 6.5 cm, obtuse or rounded at apex, entire or subentire, rounded or subcordate at base; petioles up to 1 cm long with usually 2 glands at the tip. Spike terminal, paniculate or sometimes simple in upper axils. Flowers white, frgrant; bracteoles shorter than flowers, caducous; receptacle up to 4 mm long, campanulate. Fruits up to 4 cm long, glabrous, fibrous-woody, dark-brown, ovoid or obovoid-oblong, with 5-hard wing.

Fl. & Fr. : Almost round the year.

Distrib. : Native of C. & S. India, common in India and Sri Lanka.

Specimens examined : Bisrampur, 633.

Notes : Common, in the forest.

Common name : Beng. & Hindi : *Arjun*; Santal : *Kahua*.

Uses: Wood used for agricultural implements and many other purposes. Leaf juice used for ear-ache and bark for tooth ache.

3. T. bellirica (Gaertn.) Roxb., Pl. Corom. 2: 54. t. 198. 1805; (as *bellerica)*; Clarke in Hook.f., Fl. Brit. India 2: 445. 1878; Haines, Bot. Bihar & Orissa 2: 367. 1961 (Rep. ed.); Exell in Fl. Males. 4: 445. 1954;

Gandhi in Sald. & Nicol. Fl. Hassan Distt. 294. 1976. *Myrobalanus bellirica* Gaertn., Fruct. 2: 91. t. 97. 1791. *Terminalia bellirica* var. *laurinoides* Clarke in Hook.f., Fl. Brit. India 2: 445. 1878.

Large trees, with straight and stout trunk. Leaves broadly-elliptic or obovate, 18-20 × 12-15 cm, eglandular, clustered at the end of the branches; petioles up to 10 cm long. Flowers solitary, axillary or in extra-axillary spikes, upper flowers of spikes male, lower bisexual. Fruits about 2 cm in diam., grey tomentose, sub-globose, 5-ridged.

Fl. & Fr. : Oct.-Mar.

Distrib. : India, Myanmar, Sri Lanka, Thailand to Vietnam, Malaysia.

Specimens examined : Netarhat, 222 & 811.

Notes : Common, in the forest.

Common name : Beng. : *Baira*; Hindi : *Bahera*.

Uses : Fruit used as a constituent of 'Triphala'. Tree yields an oil, applied to hair and also used for rheumatic swelling. Wood used for various purposes.

4. Terminalia chebula Retz., Obs. Bot. 5: 31. 1788; Clarke in Hook.f., Fl. Brit. India 2: 446. 1878; Prain, Bengal Pl. 1: 481. 1903 (Rep. ed. 1: 348. 1963); Haines, Bot. Bihar & Orissa 2: 368. 1922; Gandhi in Sald. & Nicol., Fl. Hassan 294. 1976. *Myrobalanus chebula* (Retz.) Gaertn.; Fruct. 2: 91. t. 97. 1791.

Medium sized trees. Leaves subopposite, ovate-elliptic, acute or acuminate at apex, obtuse at base, up to 17.5 × 9.5 cm, with 2-glands on upper side of petiole, villous beneath, nerves 10-12 pairs. Flowers in terminal panicles, from axils of upper new leaves, bisexual. Calyx hairy inside. Fruits ellipsoid, 2.5-3 cm long glabrous 5-ribbed when dry, due to 5 ribbed endocarp.

Fl. : Mar.-May; *Fr.* : Nov.-Feb.

Distrib. : India, Sri Lanka and Myanmar.

Specimens examined : Netarhat, 145.

Notes : Common, in the forest.

Common name : Beng. : *Haritaki*; Hindi : *Hara*; Santal : *Rola.*

Uses : Haritaki (the fruit) is the chief myrobalan in Hindu medicine, it is also one of the constituents of 'Triphala'. Bark used as diuretic and cardiotonic. Fruits laxative, stomachic, tonic and alterative.

MYRTACEAE

1a. Fruit dry, loculicidally dehisced at top :

2a. Hypanthium urceolate; stamens red, more than 2 cm long .... 1. CALLISTEMON

2b. Hypanthium not urceolate; stamens not red, less than 2 cm long .... 2. EUCALYPTUS

1b. Fruit juicy, indehiscent :

3a. Fruit with crown of persistent calyx, yellow when ripe .... 3. PSIDIUM

3b. Fruit without persistent calyx; black when ripe .... 4. SYZYGIUM

1. CALLISTEMON R.Br.

Callistemon citrinus (Curtis) Stapf. in Bot. Mag. 150. t. 9050. 1925; Mathew in Exotic Fl. Kodai. Pal. Hills 104. 1969. *Metrosideros citrina* Curtis in Bot. Mag. 8. t. 260. 1794. *Callistemon lanceolatus* DC., Prodr. 3: 223. 1828; Gamble, Man. Ind. Timb. ed. 2: 351. 1902.

Small trees; young shoot pubescent. Leaves alternate, linear, up to 6 × 0.6 cm, sharply acuminate at apex, narrowed down at base, margin entire, pubescent on both surface, mid vein prominent, gland dotted beneath; petioles up to 3 mm long. Hypanthium urceolate, up to 4 mm long, pubescent. Petals membranous, caducous. Stamens many, up to 2.5 cm long, bright red. Capsule enclosed in calyx tube, loculicidally dehiscent at top.

Fl. & Fr. : Sept.-Dec. Exotic.

Distrib. : Native of Australia; now commonly cultivated through out India.

Specimens examined : Kundri, 944.

Notes : Common as a garden plant and often planted in front of the Forest Rest Houses.

Common name : Eng. : *Bottle brush*; Beng. : Botol burush.

2. EUCALYPTUS L'Herit

1a. Flowers in umbel :

2a. Lid of the calyx tube with acute beak .... 3. E. ROSTRATA

2b. Lid of the calyx tube with subterete or obtuse beak .... 4. E. TERETICORNIS

1b. Flowers in panicle :

3a. Leaves with prominent black dots; anther longer than broad .... 1. E. CREBRA

3b. Leaves without prominent black dots; anther as long as broad .... 2. E. CITRIODORA

1. Eucalyptus crebra Mueller in J. Linn. Soc. 3: 87. 1859; Haines, Bot. Bihar & Orissa 2: 381. 1961 (Rep. ed.).

Tall trees; branches slender, drooping. Leaves petiolate, linear-lanceolate, falcate, up to 1.6 × 1.5 cm, acuminate, with prominent black dots beneath, sweet scented; petioles up to 1.5 cm long. Flowers in panicle. Calyx tube short. Petals calyptrate. Fruits slightly attenuate at base.

Fl. & Fr. : Sept.-Mar. Exotic.

Distrib. : Native of Australia, introduced in India.

Specimens examined : Netarhat, 226.

Notes : Planted as an avenue tree.

2. E. citriodora Hook. in Mitch., J. Trop. Austral. 235. 1848; Haines, Bot. Bihar & Orissa 2: 381. 1961 (Rep. ed.); Maheshwari, Fl. Delhi 159. 1963.

Tall, evergreen trees; trunk smooth, shining-grey; branchlets slightly angular. Leaves linear-lanceolate, slightly falcate, up to 18 × 4 cm, acuminate, leathery with prominent secondary veins. Flowers in short panicle. Calyx tube short with elongated lid. Fruits globose.

Fl. & Fr. : Aug.-Feb. Exotic.

Distrib. : Native of Queensland, introduced in India.

Specimens examined : Netarhat, 1183.

Notes : Common, throughout the district, planted by forest department.

3. **Eucalyptus rostrata** Schlecht. in Linnaea 20: 655. 1847; Haines, Bot. Bihar & Orissa 2: 381. 1961 (Rep. ed.); Maheshwari, Fl. Delhi 159. 1963.

Tall trees; bark ashy grey or white; branches slender, 4-angular. Leaves linear-lanceolate, falcate, up to 15 × 1.5 cm, acuminate, black dots obscure; petioles up to 12 mm long, reddish, slightly winged. Flowers in axillary or supra axillary, 4-7 flowered umbels, on up to 12 mm long peduncle. Calyx tube semiglobose, lid longer than tube and with acute beak. Fruits subglobose.

Fl. & Fr. : Nov.-Apr. Exotic.

Distrib. : Native of Australia, introduced in India.

Specimens examined : Daltonganj, 345.

Notes : Common, as an avenue tree.

4. **E. tereticornis** Sm., Bot. N. Holl. 41. 1795 et in Trans. Linn. Soc. 3: 284. 1797; Haines, Bot, Bihar & Orissa 2: 382. 1961 (Rep. ed.); Maheshwari, Fl. Delhi 159. 1963.

Trees, bark ashy-grey or white. Leaves gland dotted, lanceolate-falcate, up to 15 × 3 cm, acuminate, with prominent secondary veins. Flowers in short peduncled, 4-8 flowered umbel. Calyx tube semiglobose, lid often much elongated in gradually tapering cones. Petals calyptrate. Fruits subglobose, with a protruding top, loculicidally splitting.

Fl. & Fr. : Aug.-Apr. Exotic.

Distrib. : Native of Australia, introduced in India.

Specimens examined : Netarhat, 1182.

Notes : Planted in forest clearings, common.

3. PSIDIUM L.

Psidium guajava L., Sp. Pl. 470. 1753; Duthie in Hook.f., Fl. Brit. India 2: 468. 1878; Merrill & Perry in Journ. Arn. Arbor. 19: 198. 1938; Haines, Bot. Bihar & Orissa 2: 380. 1961 (Rep. ed. as *P. guayava).*

Large shrubs or small trees, with smooth and thin bark. Leaves ellipitc-oblong, 7-12 × 3.5 cm, margin entire, pubescent beneath, with prominent secondary nerves. Flowers 1-3 on axillary peduncles, white, 2.5-3 cm in diam. Sepals 4-5, connate in bud. Petals free. Stamens many in several whorls. Ovary 4-5 celled. Fruits subglobose or pyriform with crown of persistent calyx, yellow when ripe. Seeds many, hard.

Fl. & Fr. : Apr.-Aug. Exotic.

Distrib. : Native of South america, now cultivated and naturalised in India and Old World.

Specimens examined : Maromar, 839.

Notes : Commonly cultivated, also naturalised throughout the district.

Common name : Beng. : *Piyara*; Hindi : *Amrut.*

Uses : Fruits are eaten and also used for jam. Leaves used as an astringent for bowel troubles.

4. SYZYGIUM Gaertn.

1a. Inflorescence rachis 4-angled; fruits globose .... 2. *S. fruticosum*

1b. Inflorescence rachis terete; fruits ellipsoid .... 1. *S. cumini*

1. **Syzygium cumini** (L.) Skells in U.S. Deptt. Agric. Bur. Pl. Ind. Bull. 248: 25. 1912; Merrill & Perry in J. Arn. Arb. 19: 108. 1938; Gandhi in Sald. & Nicol., Fl. Hassan 281. 1976. *Myrtus cumini* Linn., Sp. Pl. 471. 1753. *Eugenia jambolana* Lamk., Encycl. 3: 198. 1789; Duthie in Hook.f., Fl. Brit. India 2: 499. 1879; Prain, Beng. Pl. 1: 491. 1903 (Rep. ed. 1: 353. 1963) & in Rec. Bot. Surv. India 3: 212. 1905; Haines, Bot. Bihar & Orissa 2: 376. 1961 (Rep. ed.).

Large trees; bark ash-white, smooth; branches terete, glabrous. Leaves opposite, coriaceous, upto 15 × 6 cm, elliptic-oblong or oblong-lanceolate, abruptly acuminate at apex, cuneate at base, lateral nerves arching into an intramarginal nerve; petioles up to 2.5 cm long. Flowers fragrant, sessile in short campact or laxly paniculate, axillary cymes on old branches. Calyx shortly turbinate; limb obscurely 4-lobed. Petals usually-4, cream-coloured, calyptrate. Berry varies much in size, broadly ellipsoid, shining black when ripe.

Fl. & Fr. : Apr.- July.

Distrib. : India, Sri Lanka to Malaysia, introduced in other tropical regions.

Specimens examined : Maromar, 510.

Notes : Common, in the forest and also planted.

Common name : Beng : *Kalajam*; Hindi : *Jamun*; Santal : *So-kod.*

Uses : Fruits are edible and very delicious.

2. **S. fruticosum** DC., Prodr. 3: 260. 1828; Bennet, Fl. Howrah Dist. 264. 1979. *Eugenia fruticosa* Roxb., Fl. Ind. 2: 487. 1832; Duthie in Hook. f., Fl. Brit. India 2: 499. 1879; Haines, Bot. Bihar & Orissa 2: 377. 1961 (Rep. ed.).

Moderate sized trees, much branched. Leaves broadly-oblong to oval, acuminate at apex, finely nerved, gland dotted beneath, 7 × 2.5 cm 8 × 3.5 cm. Flowers white, in cymes, arising from old leaf-scars, on sharply 4-angled branches; bracts minute, caducous. Sepals-O. Petals calyptrate or sometimes expanding. Fruits globose, 5-8 mm across.

Fl. & Fr. : Jan.-May.

Distrib. : Throughout India.

Specimens examined : Boneri, 223.

Notes : Common, in the forest.

LECYTHIDACEAE

CAREYA Roxb.

Careya arborea Roxb., Pl. Cor. 3: 14. t. 218. 1819; Bedd., Fl. Sylv. t. 205. 1872; Clarke in Hook.f., Fl. Brit. India 8: 511. 1879; Haines, Bot. Bihar & Orissa 2: 383. 1961 (Rep. ed.); Gandhi in Sald. & Nicol., Fl. Hassan 157. 1976; Eswar Rao in Sald., Fl. Karnataka 1: 265. 1984.

Deciduous trees. Leaves up to 20 × 14 cm, obovate, slightly acuminate, cuneate at base, crenate-denticulate, glabrous. Flowers in short spike with woody peduncles. Flowers sessile; bracts-3, large, unequal. Calyx lobes deciduous, ovate, obtuse at apex. Petals yellowish-white, 4-5 cm long, elliptic-oblong, obtuse. Stamens many, 4-6 cm long. Fruits globose, fibrous, 5.5-8 cm diam., green, crowned with persistent calyx lobes, many seeded.

Fl. & Fr. : Mar.-July. Deciduous in February to the time of flowering. Old leaves often reddish.

Distrib. : India, Sri Lanka, Afghanistan and Malaya.

Specimens examined : Boneri, 816.

Notes : Not common, in the deciduous forest.

Common name : Hindi : *Kumbi*; Kol. : *Asanda*.

Uses : Timber of this plant is used for agricultural implements, cabinet, gun stocks, house posts and planks. Bark gives a fibre suitable for rough ropes, and also used for paper making.

MELASTOMACEAE

MELASTOMA L.

Melastoma malabathricum L., Sp. Pl. 390. 1753 (as '*malabathrica*'); Clarke in Hook.f., Fl. Brit. India 2: 523. 1879; Haines Bot. Bihar & Orissa 2: 388. 1961 (Rep. ed.); Prain, Beng. Pl. 1: 360. 1963 (Rep. ed.); Ramam. in Sald. & Nicol., Fl. Hassan 286. 1976.

Shrubs, about 90-150 cm high; branches 4-angled, with strigose hair. Leaves elliptic-lanceolate, shortly petioled, basally 5-nerved, acute at both ends, up to 9 × 2.6 cm, hairy on both surfaces, specially on the vein beneath. Flowers mauve-purple, in terminal racemes. Calyx lobe deciduous. Fruits bottle shaped, 1-1.5 cm long.

Fl. & Fr. : Nov.-Mar.

Distrib. : Throughout India, Sri Lanka, Myanmar, Thailand to Vietnam, Malaysia and Australia.

Specimens examined : Netarhat, 173.

Notes : Common, in the forest and on the hill slopes.

Common name : Hindi : *Phutki*.

Uses : Fruits yield a black or purple dye. Atlas silk worm feed on this plant, produce a good quality silk. Bark and leaves employed as a remedy of skin diseases.

LYTHRACEAE

1a. Herbs :

2a. Flowers solitary in the axils of the leaves or bracts; capsule valvular .... 4. ROTALA

2b. Flowers clustered or in axillary cymes; capsule not valvular .... 2. AMMANNIA

1b. Trees or shrubs :

3a. Hypanthium red; flowers irregular .... 5. WOODFORDIA

3b. Hypanthium green; flowers regular :

4a. Leaves cordate at base; sepals lanceolate, spreading .... 2. DUABANGA

4b. Leaves not cordate at base; sepals triangular, not spreading .... 3. LAGERSTROEMIA

1. AMMANNIA L.

Ammannia baccifera L., Sp. Pl. 120. 1753; Clarke in Hook.f., Fl. Brit. India 2: 569. 1879; Haines, Bot. Bihar & Orissa 2: 396. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 185. 1977. *Ammannia salicifolia* Hiern in Oliver, Fl. Trop. Afr. 2: 278. 1871 (excl. Syn.); Clarke in Hook.f., Fl. Brit. India 2: 569. 1879; Haines, Bot. Bihar & Orissa 2: 396. 1961 (Rep. ed.).

Erect herbs, up to 30 cm high; branches 4-angular. Leaves opposite, linear-oblong, or lanceolate, tapering at both ends, up to 20 × 5 mm. Flowers in dense axillary clusters. Hypanthium campanulate. Sepals-4, triangular. Petals-O. Capsule depressed globose, up to 2 mm across, exceeding the calyx, red. Seeds red, triangular.

Fl. & Fr. : Throughout the year.

Distrib. : India, Malaya, China, Australia and Tropical Africa.

Specimens examined : Netarhat, 208. Helophyte or Tenagophyte.

Notes : Common, in the marshy area.

2. DUABANGA Buch.-Ham.

Duabanga grandiflora (Roxb. ex DC.) Walp., Repert. 2: 114. 1843. Jayaweera in Journ. Arn. Arb. 48: 96. 1967. *Lagerstroemia grandiflora* Roxb. ex DC., Mem. Soc. Hist. Nat. Genere. 32. 48. 1826. *Duabanga sonneratioides* Buch.-Ham. in Trans. Linn. Soc. 17: 177. 1835; Clarke in Hook.f., Fl. Brit. India 2: 579. 1879.

Large, glabrous, trees, with square drooping branches. Leaves opposite, short petioled, up to 5 mm long, oblong, acute at apex, entire, up to 15 × 6.5 cm, cordate at base. Flowers in large terminal panicles. Calyx fleshy,

adnate to the base of the ovary; lobes 4-6, lanceolate, acute. Petals clawed, obovate, white-papery. Stamens many, inserted on the perigynous ring. Fruits globose, seated on spreading fleshy calyx.

Fl. & Fr. : Mar.-Aug.

Distrib. : Throughout India.

Specimens examined : Netarhat, 224.

Notes : Common, on the road side at Koel point.

Common name : Beng. : *Bandor hulla.*

Uses : Wood used for various purposes as battens, match splints etc.

3. LAGERSTROEMIA L.

1a. Hypanthium ribbed ..... 3. *L. speciosa*

1b. Hypanthium not ribbed :

2a. Shrubs; capsule subglobose, less than 1 cm long .... 1. *L. indica*

2b. Trees; capsule ellipsoid, more than 2 cm long .... 2. *L. parviflora*

1. Lagerstroemia indica L., Syst. Nat. ed. 10, 2: 1076. 1759; Clarke in Hook.f., Fl. Brit. India 2: 575. 1879; Koehne in Engler, Pfl. reich. 17: 259. 1903; Haines, Botany of Bihar & Orissa 2: 391. 1961 (Rep. ed.); Furtado & Srisuko in Gard. Bull. Singapore 24: 190. 1969.

Shrubs, up to 4 m high. Leaves 2.5-7.5 × 1-4 cm, subcoriaceous, elliptic to ovate-oblong, acute to obtuse at apex. Flowers many in terminal panicles, 2-3.5 cm diam., 6 or rarely 5-merous, lilac, rose-coloured or white. Calyx tube up to 6 mm long, faintly 6 or less often 5 or 7 angled but not clearly ribbed, lobes up to 4 mm long, triangular. Petals with 7-10 mm long claw and 6-11 mm long limb. Capsule subglobose, 7-10 across.

Fl. & Fr. : May-Aug. Exotic.

Distrib. : Native of Indo-Japan, cultivated elsewhere.

Specimens examined : Netarhat, 766.

Notes : Cultivated as garden ornamental, rarely found as an escape.

Common name : Beng. : *Furush*; Hindi : *Pharash*.

Uses : Bark used as stimulant and febrifuge. Bark, leaves and flowers used as purgative. Roots astringent, seeds narcotic, fruits used as a local application for aphthae of mouth. Atlas silkworm moth feeds on the plant.

2. **Lagerstroemia parviflora** Roxb., Pl. Cor. 1: 47. t. 66. 1795; Clarke in Hook.f., Fl. Brit. India 2: 575. 1879; Haines, Bot. Bihar & Orissa 2: 392. 1961 (Rep. ed.); Gandhi in Sald. & Nicol., Fl. Hassan 273. 1976.

Deciduous trees; bark white, smooth. Leaves elliptic-oblong, acute or acuminate, up to 11 × 5 cm, glabrous; petioles up to 8 mm long, slightly winged. Flowers white, fragrant, in axillary and terminal, many or few flowered panicles. Calyx smooth outside, not ribbed, cupular and embracing the capsule up to 1/4 of its length. Petals wrinkled. Capsule 3-4 valved, up to 2.5 cm long, ellipsoid, smooth, valve dehisces half of its length. Seeds winged; wing much longer than seed, glaucous.

Fl. : Apr.-May; *Fr.* : Dec.-Jan.

Distrib. : India and Myanmar.

Specimens examined : Barwadih, 357.

Notes : Common in the forest and near forest rest house.

Common name : Beng. : *Sidha*; Santal : *Sekre*.

Uses : Wood used for building construction, bridges, agricultural mplements and many other purposes.

3. **L. speciosa** (L.) Pers., Syn. 2: 72. 1807; Koehne in Engler, Pfl. - reich. 17: 259. 1903; Merrill in J. Arn. Arb. 25: 146. 1954; Furtado and Srisuko in Gard. Bull. Singapore 24: 264. 1969. *Munchausia speciosa* Linn. in Munch. Hausv. 1: 357. t. 2. 1770 et in Mant. 2: 243. 1771. *Lagerstroemia flosreginae* Retz., Obs. Bot. 5: 25. 1789; Clarke in

Hook.f., Fl. Brit. India 2: 577. 1879 *pro parte*; Haines, Bot. Bihar & Orissa 2: 391. 1961 (Rep. ed.) *Pro parte*.

Medium sized trees. Leaves elliptic-lanceolate or oblong lanceolate, up to 20 × 8 cm, glabrous, subacute at apex, rounded to acute at base, secondary nerves prominent, 7-13 pairs; petioles 5-10 mm long. Flowers in large panicles, mauve-purple, 6-merous, 5-7 cm across; pedicels pubescent, thickened upwards, articulated below the middle. Calyx up to 1.5 cm long, longitudinally 12-14 ridged; lobes spreading, triangular, acute, up to 5 mm long. Petals 2.5-4 cm long, claw 4-5 cm long, limb obovate to orbicular, crisped or undulate. Capsule 2.5-4 cm long, beaked. Seeds up to 10 x 5 mm, glabrous, pale-brown.

Fl. & Fr. : Apr.-Sept. Fruits remain on the tree till the next flowering season. Exotic.

Distrib. : Native of Myanmar; Naturalised in India, Malaya, Java.

Specimens examined : Manika, 841.

Notes : Commonly planted as an avenue tree along the road sides, often found as an escape.

Common name : Beng. & Hindi : *Jarul*.

Uses : Wood used for various purposes.

4. ROTALA L.

1a. Leaves orbicular; flowers in terminal spikes .... 4. *R. rotundifolia*

1b. Leaves not orbicular; flowers axillary :

2a. Hypanthium tubular; capsule oblong, 2-valved .... 2. *R. indica*

2b. Hypanthium campanulate; capsule subglobose, 3-valved :

3a. Stems up to 10 cm high; petals-0; stamens 2-4 .... 3. *R. mexicana*

3b. Stems up to 30 cm high; petals-5; stamens-5 .... 1. *R. densiflora*

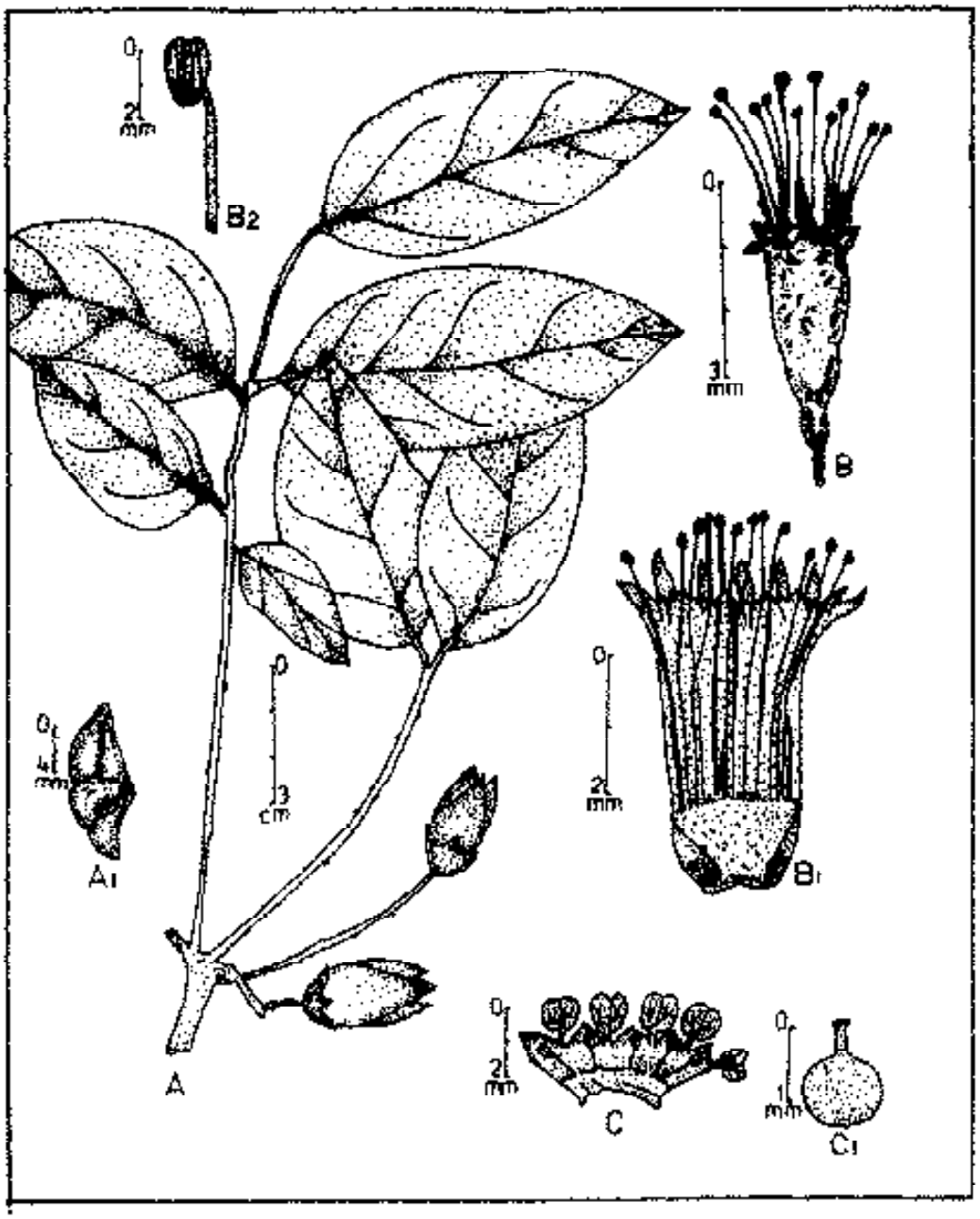


Fig. 17: Lythraceae. (A-A_1). *Lagerstroemia parviflora* Roxb.: A. Fruiting twig; A_1. Seed; (B-B_2) *Woodfordia fruticosa* (L.) Kurz: B. Flower; B_1. Same split open; B_2. Stamen; (C-C_1): *Rotala rotundifolia* (Buch.-Ham. ex Roxb.) Koehne: C. Flower split open; C_1. Gynoecium.

1. Rotala densiflora (Roth ex Roem. & Schult.) Koehne in Engl., Bot. Jahrb. 1: 164. 1881; Gandhi in Sald. & Nicol., Fl. Hassan 274. 1976; Cook in Bossiera 29: 82. 1979. *Ammannia densiflora* Roth ex Roem. & Schult., Syst. Veg. 3: 304. 1818. Haines, Bot. Bihar & Orissa 2: 395. 1961 (Rep. ed.). *Ammannia pentandra* sensu Clarke in Hook.f., Fl. Brit. India 2: 568. 1879, pp.; Haines, Bot. Bihar & Orissa 2: 395. 1961 (Rep. ed.).

Decumbent, ascending, much branched herbs; stems up to 30 cm long, 4-angled. Leaves opposite, sessile, up to 20 × 4 mm, linear-oblong, obtuse at apex, semi amplexicaul at base, upper smaller, passing into bracts. Flowers in the axil of small (bract like) floral leaves of the axillary flowering branches and upper most leaves of the main stem; bracteoles subulate. Calyx campanulate; lobes-5. Petals-5, pink, obovate. Stamens-5, equalling the calyx lobes. Capsule up to 1.8 mm long, oblong to subglobose, pink 3-valved. Seeds numerous, minute, light brown.

Fl. & Fr. : Dec.-Mar.

Distrib. : Tropical India, China, Malaya, Australia & Tropical Africa.

Specimens examined : Mahulam basti, 582. Tenagophyte or Hyperhydate.

Notes : Common, in the murshy area and near the ponds and ditches.

2. R. indica (Willd.) Koehne in Engl., Bot. Jahrb. 1: 172. 1880, & in Pfl. reich 17: 40. 1903; Blatter & Hallberg in J. Bombay Nat. Hist. Soc. 26: 711. 1918; Cook in Boissiera 29: 108. 1979. *Peplis indica* Willd., Sp. Pl. 2: 244. 1799. *Ammannia peploides* Spreng., Syst. 1: 444. 1825; Clarke in Hook.f., Fl. Brit. India 2: 566. 1879, Prain, Beng. Pl. 1: 500. 1903 (Rep. ed. 1: 353. 1963) & Rec. Bot. Surv. India 3: 213. 1905. *Ammannia indica* DC., Prodr. 3: 77. 1828; Haines, Bot. Bihar & Orissa 2: 394. 1961 (Rep. ed.).

Small, erect or decumbent, succulent herbs, 10-30 cm long, rooting from basal nodes; stem 4-angled. Leaves opposite, up to 1 × 0.3 cm, elliptic-oblong or spathulate, rounded or obtuse at apex, margin entire or slightly wavy, narrowed down at base, midvein and lateral nerves prominent beneath. Flowers pale pink, narrow, campanulate, solitary, on very short spiciform axillary branches, with reduced narrow oblong leaves or bracts;

bracteole linear, setaceous, as long as flower. Sepals lanceolate, acuminate. Capsule oblong, 2-valved, seeds abundant, narrow, oblong, curved, pink.

Fl. & Fr. : October-January.

Distrib. : Throughout India, Malaya to Philippines, Pakistan, Afghanistan to W. Asia.

Specimens examined : Simultarh village, 341.

Notes : Common in the rice field, dried ponds, bank of the river Koel.

3. **Rotala mexicana** Cham. & Schlecht., Linnaea 5: 567. 1830; Babu in Herb. Fl. Dehra Dun 186. 1977; Cook in Boissiera 29: 38. 1979. *Rotala pygmaea* (Kurz) Rajagopal & Ramayya in Kew Bull. 23(3): 465. 1969. *Ammannia pygmaea* Kurz in Seem., J. Bot. 5: 376. 1867; Clarke in Hook.f., Fl. Brit. India 2: 568. 1879; Haines, Bot. Bihar & Orissa 2: 395. 1961 (Rep. ed.). *Rotala mexicana* ssp. *pusilla* Koehne in Engl., Pfl. reich 17: 30. 1903 pp.

Very small, slender caespitose, somewhat flaccid, creeping, annual herbs, up to 6 cm in height; stems 4-angular, glabrous. Leaves opposite, sessile, up to 5 × 1.5 mm, linear to linear-oblong, obtuse at apex, one nerved. Flowers axillary, solitary, sessile. Capsules ovoid-oblong, many seeded, 2-3 valved. Seeds minute, reddish brown to black, 3-angular, ellipsoid, rounded at both ends.

Fl. & Fr. : Nov.-Jan.

Distrib. : Africa, India to East & South-East Asia, Australia, Central & South America.

Specimens examined : Barwadih, 406. Tenagaphyte, rarely vittate.

Notes : Common in waste marshy areas, sometimes in forest undergrowth, often forming a green mat in the damp beds of canals.

4. **R. rotundifolia** (Buch.-Ham. ex Roxb.) Koehne in Engl. Bot. Jahrb. 1: 175. 1881; Babu, Herb. Fl. Dehra Dun. 186. 1977. *Ammannia rotundifolia* Buch.-Ham. ex Roxb. Fl. Ind. 1: 446. 1820; Clarke in Hook.f., Fl. Brit. India 2: 566. 1879; Haines, Bot. Bihar & Orissa 2: 394. 1961 (Rep. ed.).

Glabrous herbs, up to 15 cm high; branches slightly 4-angled. Leaves opposite, sessile to subsessile, orbicular or broadly elliptic, up to 9 × 8 mm. Flowers in dense terminal or 3-4 nate spikes, in the axils of small foliaceous bracts. Sepals-5, connate in campanulate or subtubular calyx. Petals-5, inserted on the calyx tube, pink, up to 2 mm across. Fruits globose, enclosed by calyx, 4-valved.

Fl. & Fr. : Jan.-May.

Distrib. : India, Sri Lanka and China.

Specimens examined : Netarhat, 92. Tenagophyte, rarely vittate.

Notes : Common in barren cultivated fields.

5. WOODFORDIA Salisb.

Woodfordia fruticosa (L.) Kurz in J. As. Soc. Beng. 40(2): 56. 1871; Haines, Bot. Bihar & Orissa 1: 390. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun. 187. 1977. *Lythrum fruticosum* L., Sp. Pl. ed. 2: 641. 1762. *Woodfordia floribunda* Salisb., Parad. Lond. t. 42. 1806; Clarke in Hook.f., Fl. Brit. India 2: 572. 1879; Prain, Beng. Pl. 1: 364. 1963 (Rep. ed.).

Straggling shrubs, with spreading branches. Leaves opposite to subopposite, sessile, linear-lanceolate, acuminate at apex, slightly amplexicaul at base, entire, scabrid above, glabrous beneath and provided with black dots, up to 10 × 3 cm. Flowers red, in axillary cymes, often from axil of leaf scars. Sepals-6, connate in long hypanthium, 1.5 cm long. Petals-6, inserted at throat of calyx tube, subulate. Stamens-12, much exserted. Fruits a ellipsoid membranous capsule, many seeded, included in calyx tube. Seeds 0.8 mm, narrowly cuneate, smooth, brown.

Fl. & Fr. : Jan.-May.

Distrib. : Throughout India, China, Malagassy, Baluchistan and Tropical Africa.

Specimens examined : Netarhat, 164.

Notes : Common, throughout the district, usually in the rocky area.

Common name : Beng. : *Dhas* or *Dhauri*; Santal : *Icha* or *Ichak*.

Uses : The flowers yields a dye which is used in Holi. The flower is also used by the tribes for hair dressing.

PUNICACEAE

PUNICA L.

Punica granatum L., Sp. Pl. 472. 1753; Hook.f., Fl. Brit. India 2: 581. 1879; Prain, Beng. Pl. 1: 367. 1963 (Rep. ed.); Haines, Bot. Bihar & Orissa 2: 397. 1961 (Rep. ed.); Baily, Man. Cult. Pl. 721. 1963 (Rep. ed.).

Large shrubs or small trees. Leaves opposite to clustered, short petioled, oblong or obovate or oblanceolate, obtuse, entire, up to 7.5 × 1.8 cm, glabrous, shining. Flowers red, axillary, solitary or several clustered. Sepals-6, connate in a campanulate coriaceous calyx. Petals 5-7, wrinkled, inserted between calyx lobes. Stamens many, inserted round the mouth of calyx. Style long. Stigma capitate. Fruits balausta.

Fl. & Fr. : Apr.-June.

Distrib. : South Asia, natural in mediterranean region, S. America, also in India.

Specimens examined : Netarhat, 83.

Notes : Common in the villages.

Common name : Beng. : *Dalim*; Hindi : *Anar*.

Uses : Cultivated in gardens and in houses for its fruits, succulent testa is edible. Rind is also used for diarrhoea and dysentery.

ONAGRACEAE

1a. Stamens-8, one shorter, filaments hairy .... 1. FISSENDOCARPA

1b. Stamens-4, equal, filaments glabrous .... 2. LUDWIGIA

1. FISSENDOCARPA (Haines) Bennet

Fissendocarpa linifolia (Vahl.) Bennet in J. Bombay Nat. Hist. Soc. 67: 126. 1970 et in Fl. Howrah Distt. 266. 1979. *Jussiaea linifolia* Vahl., Ecolog. Am. 2: 32. 1798. *J. hyssopifolia* G.Don., Gen. Syst. 2: 693. 1832. *J. fissendocarpa* Haines, J. As. Soc. Beng. n.s. 15: 313. 1920 et in Bot. Bihar & Orissa 2: 799. 1961 (Rep. ed.). *Ludwigia hyssopifolia* (G.Don.) Exell, Garcia de Orta 5: 471. 1957. Raven in Reinwardtia 6: 385. 1963; Bennet in Ind. For. 92: 227. 1966; Sreemadhaban in Bull. Bot. Surv. India 8: 79. 1966.

Much branched herbs, up to 1 m high; young shoots and inflorescence minutely puberulous. Leaves alternate, up to 7 × 0.7 cm, lanceolate to linear-lanceolate, acute at apex; base narrowed down into very small petiole, secondary nerves many, sparsely pubescent. Flowers sessile, axillary, solitary or passing into terminal spikes. Sepals-4, 6 × 3.5 mm, ovate, acute, pubescent. Petals-4, 4 × 4.2 mm, yellow, broadly elliptic-obovate. Stemans-8, one shorter, filament sparsely hairy. style up to 1.2 mm long stigma depressed, globose, shallowly 4 lobed. Capsules 1-3.5 cm long, minutely puberulent, reddish, subterete, upper portion with multiseriate, free and lower portion with uniseriate, embeded seeds in each loculus. Seeds up to 0.7 mm long, subglobose, dark-brown.

Fl. & Fr. : Sept.-Dec.

Distrib. : India.

Specimens examined : Kechki, 911. Tenagophyte.

Notes : Not common, found on the bed of river Auranga.

Uses : Infusion of roots given in sexual diseases.

2. LUDWIGIA L.

1a. Petals more than 10 mm long; capsules more than 3 cm long .... 1. *L. octovalvis*

1b. Petals less than 10 mm long; capsule less than 3 cm long :

2a. Capsule more than 1.5 cm long; seeds arranged in a single row in each cell .... 3. *L. prostrata*

2b. Capsule less than 1.5 cm long; seeds arranged in more than one row in each cell .... 2. *L. perennis*

1. **Ludwigia octovalvis** (Jacq.) Raven in Kew Bull. 15: 476. 1962. *Oenothera octovalvis* Jacq., Enum. Syst. Pl. 19. 1760. subsp. **sessiliflora** (Mich.) Raven in Kew Bull. 15. 476. 1962. *Jussiaea suffruticosa* L., Sp. Pl. 388. 1753; Clarke in Hook.f, Fl. Brit. India 2: 587. 1879; Haines, Bot. Bihar & Orissa 2: 398. 1961 (Rep. ed.); Prain, Beng. Pl. 1: 368. 1963 (Rep. ed.). *J. octovalvis* Sw. var. *sessiliflora* Mich. in Martius, Fl. Brass. 13: 180. 1875; Babu, Herb. Fl. Dehra Dun 188. 1977.

Erect paludose herbs, usually hairy. Leaves linear or lanceolate, up to 35 × 5 mm, pubescent, subsessile or very shortly petioled, acute at apex, cuneate at base. Flowers solitary, tetramerous. Hypanthium subsessile or tapering into a very short pedicel. Sepal ovate or broadly elliptic, acuminate, up to 8 × 4 mm. Petals obovate, glabrous, yellow, up to 10 mm long. Capsules up to 3 cm long, breaking up between ribs. Seeds dark brown, rounded, grooved.

Fl. & Fr. : Aug.-Jan.

Distrib. : Warmer moist parts of the World.

Specimens examined : Simultarh (Daltonganj) 319. Helophyte.

Notes : Occasional on sandy bed of the river Koel and along streams.

Common name : Hindi : *Banlunga*; Santal : *Dakichak.*

2. **L. perennis** L. (excl. "foliis oppositis"), Sp. Pl. 119. 1753; Raven in Reinwardtia 6: 367. 1963; Sreemadhavan in Bull. Bot. Surv. India 8: 80. 1966. Babu, Herb. Fl. Dehra Dun 188. 1977. *L. parviflora* Roxb., Fl. Ind. 1: 440. 1820; Clarke in Hook.f., Fl. Brit. India 2: 588. 1879; Prain, Beng. Pl. 1: 567. 1903 (Rep. ed. 1: 169. 1963) & in Rec. Bot. Surv. India 3: 214. 1905; Haines, Bot. Bihar & Orissa 2: 339. 1961 (Rep. ed.).

Erect, glabrous herbs, with square stems. Leaves alternate, elliptic-lanceolate, or linear-lanceolate, acute, narrowed down at base. Flowers sessile, solitary, axillary, tetramerous. Calyx lobes acute. Petals yellow. Capsule up to 12 mm long, pale-brown, glabrous, irregularly dehiscent. Seeds many, 0.5 mm in diam., broadly ellipsoid, transversely straited, surface rough.

Fl. & Fr. : Mar.-July.

Distrib. : India, Sri Lanka, Malaya, Iran, Ethiopia and N. Australia.

Specimens examined : Netarhat, *Sarma* 209. Helophyte.

Notes : Common in rice field and waste marshy areas throughout the district.

Uses : Plants boiled in oil and applied to the body externally for fever.

3. Ludwigia prostrata Roxb., (Hort. Beng. 11. 1814, *nom. nud*) Fl. Ind. 1: 420. 1820; Clarke in Hook.f., Fl. Brit. India 2: 588. 1879; Haines, Bot. Bihar & Orissa 2: 399. 1961 (Rep. ed.).

Herbs, up to 60 cm high; stems prostrate or decumbent at base, erect upwards, glabrous, 4-angular. Leaves lanceolate or linear-lanceolate, up to 6.5 × 1.5 cm, acute at apex, tapering to the base, glabrous. Flowers solitary, axillary, 4-merous, sessile. Sepals narrow lanceolate, acute. Petals yellow, longer than sepals. Capsule linear, 1.5-2.5 cm long, slightly 4-angular, crowned by 4-linear-lanceolate, up to 4 mm long calyx teeth. Seeds ellipsoid up to 0.7 mm long, arranged in a single row in each cell.

Fl. & Fr. : Sept.-Nov.

Distrib. : India, Sri Lanka, Malaya and Japan.

Specimens examined : Muhammadganj, 986. Helophyte.

Notes : Not common. Found in marshy areas.

Uses : Leaves used for toothache.

Remarks : It is easily distinguishable from *L. perennis* L. by sessile flower and capsule characters.

TRAPACEAE

TRAPA L.

Trapa natans L. var. **bispinosa** (Roxb.) Makino in Linuma, Somoku-Dzusetzu, Icon. Fl. Japan ed. 3. 1: 137. 1907; Brenan in Turill & Milne-

Readhead, Fl. Trop. East Africa (Trapac) 3. 1953. *Trapa bispinosa* Roxb., Pl. Corom. 234. 1815; Clarke in Hook.f., Fl. Brit. India 2: 590. 1879; Haines, Bot. Bihar & Orissa 2: 400. 1961 (Rep. ed.); Ghazanfar in Nasir & Ali, Fl. Pak. 97: 1. 1976; Guha Bakshi, Fl. Mushidabad Distt. 136. 1984.

Aquatic, floating herbs. Leaves rhomboid, acute at apex, truncate at base, glabrous above, villous-tomentose beneath, submerged leaves up to 6 cm long, emerged one up to 5 × 5.5 cm; petioles 4-10 cm long, dilated at top, glabrous above, villous beneath. Flowers axillary-solitary, 4-merous, with cupular hypanthium. Calyx tube short, adnate to the lower part of the ovary; limb 4-partite, 2 or all segments persistent and becoming spinescent in fruits. Petals white. Fruits obovoid, up to 2.2 × 2.2 cm, 4-angular, 2 or all of which carry spines. Seeds with unequal cotyledons.

Fl. & Fr. : Aug.-Nov.

Distrib. : Asia and Tropical Africa.

Specimens examined : Tarhashi, 1132. Epihydate.

Notes : Common in the ponds.

Common name : Beng. & Hindi : *Paniphal, Singara.*

Uses : Karnel of the fruit is eaten fresh or after boiling or roasting.

PASSIFLORACEAE

PASSIFLORA L.

Passiflora foetida L., Sp. Pl. 959. 1753; Mast. in Hook.f., Fl. Brit. India 2: 599. 1879; Killip in Field Mus. Nat. Hist. Chicago 19: 474. 1938; Chakraborty in Bull. Bot. Soc. Bengal 3: 57. 1949; Haines, Bot. Bihar & Orissa 2: 402. 1961 (Rep. ed.); R. & A. Farnandes in Launert, Fl. Zambesiaca 4: 411. t. 98. 1978.

Silky pubescent, prostrate or climbing herbs. Leaves 3-lobed, up to 8 × 6 cm, silky, hairy, subcordate to cordate at base, lobe acute, margin with glandular hairs; petioles up to 4.5 cm long, with scattered glandular hairs; stipules divided into filiform clavate segments, with glandular tips.

Flowers axillary, solitary, 2-4 cm diam., whitish-pink; bracts pinnatifid or pinnatisect, segments filiform and gland tipped. Sepals 12 × 6 mm, ovate-oblong. Petals oblong or oblong-spathulate, shorter than sepals. Corona many seriate. Fruits up to 2 cm diam., globose, orange-yellow when ripe. Seeds up to 4 × 1.6 mm, ovate-cuneiform.

Fl. & Fr. : July-Dec. Exotic.

Distrib. : Native of West Indies and naturalised throughout India.

Specimens examined : Kechki, 904.

Notes : Common in the forests and along railway line.

Uses : Fruit decoction used for asthma and leaf decoction used in hysteria.

CARICACEAE

CARICA L.

Carica papaya L., Sp. Pl. 1036. 1753; Mast. in Hook.f., Fl. Brit. India 2: 599. 1879; Harms in Engler, Pfl. - fam. ed. 2. 21: 516. 1925; Haines, Bot. Bihar & Orissa 2: 402. 1961 (Rep. ed.).

Small unbranched trees; stems with large leaf scar and soft hollow pith. Leaves palmately lobed, 20-70 cm wide, glabrous, lobes pinnatipartite; petioles 25-80 cm long, hollow. Panicles axillary, consist of male flowers only or males and bisexual flowers, female flower solitary or 2-3 in axillary fascicles. Corolla tube of male flowers 1.5-2.5 cm long, narrow, pubescent within; lobes 1-1.5 × 0.4-0.5 cm, recurved. Corolla of bisexuals 3-3.5 cm long. Calyx of the female flat; petals 4-5 × 1-1.5 cm; ovary glabrous; stigma spreading. Fruits 10-25 × 7-15 cm, ellipsoid or pyriform yellow when ripe. pulp orange. Seeds black.

Fl. & Fr. : Throughout the year, specially in the rainy season. Exotic.

Distrib. : Native of West Indies; now cosmopolitan.

Specimens examined : Daltonganj, 837.

Notes : Commonly planted, often found as an escape in waste places.

Common name : Beng. : *Pepe*; Hindi : *Papita*.

Uses : Unripe fruits are eaten as vegetable, ripe ones are also eaten. Milky juice of the unripe fruit is used for digestive troubles, skin diseases and jaundice.

CUCURBITACEAE

1a. Leaves covered with round discs .... 1. CITRULLUS

1b. Leaves without any disc :

2a. Petals fimbriate .... 9. TRICHOSANTHES

2b. Petals entire :

3a. Anthers straight .... 7. MUKIA

3b. Anthers sigmoid or conduplicate :

4a. Tendrils simple :

5a. Corolla divided to less than half its length .... 2. COCCINIA

5b. Corolla divided to more than half its length :

6a. Bracts of male flowers prominent .... 6. MOMORDICA

6b. Bracts of male flowers not prominent :

7a. Anthers strongly sigmoid; seeds compressed .... 3. CUCUMIS

7b. Anthers weakly sigmoid; seeds turgid .... 8. SOLENA

4b. Tendrils 2-3 fid :

8a. Fruits cylindrical; seeds black, margined .... 5. LUFFA

8b. Fruits spherical; seeds grey, not margined ..... 4. DIPLOCYCLOS

1. CITRULLUS Schrad. ex Eckl. & Zeyh.

Citrullus colocynthis (L.) Schrad. in Linnaea 414. 1838; Clarke in Hook.f., Fl. Brit. India 2: 620. 1879; Haines, Bot. Bihar & Orissa 2: 411. 1961 (Rep. ed.). *Cucumis colocynthis* L., Sp. Pl. 1011. 1753.

Perennial, prostrate herbs, with trailing, angular, scabrous stems. Leaves up to 6 × 6 cm, pinnatifidly lobed, segments again pinnatifid, closely covered with small round disc when dry and nerves hispid. Petioles up to 3 cm long, scabrid. Petals up to 7 mm long, obovate, light yellow. Fruits up to 5 cm long, ellipsoid to subglobose, variegated, dark green.

Fl. & Fr. : Nov.-Jan.

Distrib. : Western Asia, Arabia, North & Tropical Africa and also in the Mediterranean regions.

Specimens examind : Bisrampur, 648.

Notes : Common in dry open field and waste places.

Common name : Beng. & Hindi : *Indrayan.*

Uses : Fruit pulp, 'colocynth', a drastic hydragogue cathertic, contains citrullin. Roots purgative, used in ascites, jaundice, rheumatism, and urinary troubles.

2. COCCINIA Wight et Arnott

Coccinia grandis (L.) Voigt. Hort. Suburb. Calcutta 59. 1845; Bhandari in Ann. Arid Zone 4: 229. 1965; Jeffrey in Kew Bull. 34(4): 801. 1980; Chakraborty, Fasc. Fl. Ind. 11: 23. 1982; Saldanha & Rao in Saldanha, Fl. Karnataka 1: 293. 1984. *Bryonia grandis* L., Mart. Pl. 1: 126. 1767. *Cephalandra indica* (Wt. & Arn.) Naud., Ann. Soc. Nat. ser. 5. 5: 16. 1869; Clarke in Hook.f., Fl. Brit. India 2: 621. 1879; Haines, Bot. Bihar & Orissa 2: 412. 1961 (Rep. ed.). *Coccinia indica* Wight & Arnott., Prodr. 347. 1834; *nom illeg. Coccinia cordifolia* auct. non (L.) Cogn. in A. & C. DC., Monogr. Phan. 3: 529. 1881.

Herbaceous much branched climber with perennial root stock; stems angular, glabrous; tendrils simple, slender, striate. Leaves 5-7 × 4-6 cm, bluntly angled to palmately 5-lobed, cordate at base, glandular on lower surface, rugose on both surfaces, margin denticulate mucronate at apex. Male flowers solitary; peduncles 4-5 cm long, slender; stamens-3. Peduncles of the female flowers up to 2 cm long; staminodes-3 in female flowers. Fruits up to 5 × 2.5 cm, oblong or cylindrical, rounded at both

ends, green with white stripes, red when ripe. Seeds oblong-obovoid, compressed, up to 6 × 2.7 mm.

Fl. & Fr. : Aug.-Jan.

Distrib. : India, China, Malaya, Tropical Africa and Central America.

Specimens examined : Latehar, 859.

Notes : Common in hedges and thickets.

Common name : Beng. : *Telakucha*; Hindi : *Kanduri*; Kol : *Kundri*.

Uses : The fruits are eaten by the village people.

3. CUCUMIS L.

Cucumis trigonus Roxb., (Hort. Beng. 70. 1814, *nom. nud.*) Fl. Ind. 3: 722. 1832; Clarke in Hook.f., Fl. Brit. India 2: 619. 1879; Haines, Bot. Bihar & Orissa 2: 409. 1961 (Rep. ed.).

Perennial, procumbent and trailing herbs; stems scabrid. Tendril short. Leaves suborbicular, up to 6 × 7 cm, palmately 5-7 lobed, base cordate, scabrid; lobes ovate-oblong, obtuse, toothed; petioles up to 1.8 cm long, scabrid. Male flower solitary, yellow, shortly peduncled. Ovary densely hairy, often woolly. Fruits up to 3.5 cm long, ellipsoid or obovoid, obscurely trigonous, glabrous at maturity, green with yellow streaks.

Fl. & Fr. : Aug.-Oct.

Distrib. : India, Malaya, Afghanistan and N. Australia.

Specimens examined : Kechki, 905.

Notes : Common on open fields.

Common name : Beng. : *Gomuk*; Hindi : *Bhakur, Bislamthi*; Kol : *Bing Dimbu*.

Uses : Fruit pulp used as purgative.

4. DIPLOCYCLOS (Endl.) Post & Kuntze

Diplocyclos palmatus (L.) Jeffrey in Kew Bull. 15: 352. 1962; Babu, Herb. Fl. Dehra Dun 197. 1977. *Bryonia palmata* L., Sp. Pl. 1012. 1753; (excl. Syn.). *Bryonia laciniosa* L., Sp. Pl. 1013. 1753. *pro parte* (quoad syn. cit. excl. type); Clarke in Hook.f., Fl. Brit. India 2: 622. 1879; Prain, Beng. Pl. 1: 526. 1903; (Rep. ed. 1: 382. 1963) & in Rec. Bot. Surv. India 3: 218. 1905. *Bryonopsis laciniosa* Naud. in Ann. Sc. Nat. Serv. 4. 12: 141. 1859 (*pro parte,* excl. type) et sensu auct. mult. non (L.) Naud., l.c. sensu stricto; Chakravarty in Rec. Bot. Surv. India (Monogr. Cucurbitac.) 17(1): 135. 1959; Haines, Bot. Bihar & Orissa 2: 409. 1961 (Rep. ed.).

Climbing, foetid herbs; stems slender, much branched, glabrous. Leaves up to 3 × 12 cm, scabrous above and glabrous beneath, margin undulate, crenulate or denticulate; petioles up to 6 cm long. Male flower 3-6 in fascicle; peduncle up to 1 cm long; Calyx 3-4 mm long, 4-5 mm diam., greenish yellow, slightly papillose; segment ovate, acute. Staminal filaments 1.5 mm long. Female flower fasciculate or solitary, ovary globose. Fruits spherical, brick-red, with white lines. Seeds pear shaped, up to 5 × 3 mm, grey.

Fl. & Fr. : Apr.-Dec.

Distrib. : India, China, Malaya, Australia and Africa.

Specimens examined : Baradih, 367.

Notes : Common in hedges and on bushes.

Common name : Beng. : *Mala,* Santal : *Kahubote.*

5. LUFFA Mill.

Luffa aegyptiaca Mill., Gard. Dict. ed. 8. 4: 500. 1785; Clarke in Hook.f., Fl. Brit. India 2: 614. 1879; Haines, Bot. Bihar & Orissa 2: 414. 1961 (Rep. ed.). *L. cylindrica* auct. pl., non (L.) Roem; Chakraborty in Rec. Bot. Surv. India 17(1): 75. 1959; Jeffrey in Kew Bull. 15: 355. 1962.

Climbers, with often trifid, sparsely pubescent tendrils and glabrous, 5-angular stems. Leaves up to 25 × 22 cm, scabrous, often glandular dotted,

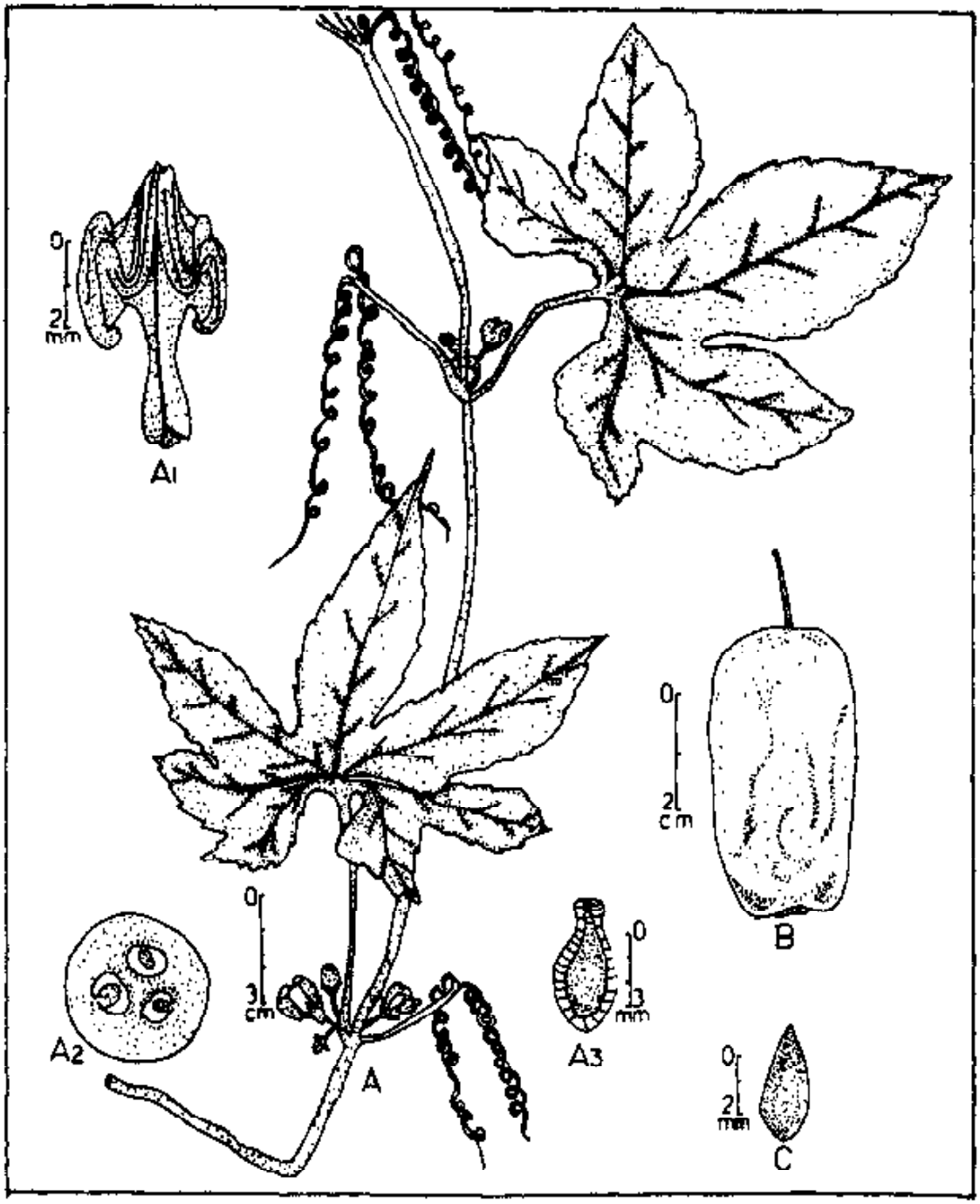


Fig. 18: Cucurbitaceae. (A-A_3) : *Diplocyclos palmatus* (L.) Jeff.: A. Flowering branch; A_1. Stamens with sigmoid anthers; A_2. T.S. of the ovary; A_3. Seed; B. *Citrullus colocynthis* (L.) Schrad.: Fruit; C. *Mukia maderaspatana* (L.) Roem.: Seed.

palmately 5-lobed; lobes triangular, acuminate or acute, distantly denticulate, puberulous, especially on nerves beneath. Male and female flowers often from same axil, yellow. Male flowers up to 15 in racemes on 10-15 cm long peduncle; pedicels 1-2 cm long. Calyx campanulate; tube up to 1 cm long; lobes lanceolate, up to 1.2 cm long. Petals up to 2.5 × 1.5 cm, oblong-cuneiform, spreading. Peduncle of the female flowers up to 7 cm long. Calyx glandular. Staminodes sometimes-5. Fruits up to 15-30 × 4-6 cm, fusiform-cylindrical or elongate clavate, fibrous, often with longitudinal black strip.

Fl. & Fr. : June-Sept.

Distrib. : Pantropical.

Specimens examined : Daltonganj, 834.

Notes : Very common, cultivated and often found as naturalised.

Common name : Beng. : *Dhundul*; Hindi : *Ghia Torui.*

Uses : Unripe fruit eaten as vegetable. The fibrous dry mesocarp used for scrubbing brushes.

6. Momordica L.

Momordica charantia L., Sp. Pl. 1009. 1753; Clarke in Hook.f., Fl. Brit. India 2: 616. 1879; Haines, Bot. Bihar & Orissa 2: 412. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 201. 1977.

Weak, monoecious climbers; young parts tomentose; stems branched, angled and grooved; tendrils simple, slender, pubescent. Leaves 3-8 × 3-8 cm, glabrous or slightly pubescent, reniform or suborbicular, pedately 5-7 lobed, lobes dentate and lobulate; petioles 2-5 cm long, pubescent, grooved. Male flowers axillary, solitary with foliaceous, 0.7-1.5 × 0.7-1.5 cm bracts. Corolla yellow, slightly irregular; segments 1.4-1.8 × 0.1-1 cm, obovate, obtuse or emarginte. Peduncle of female flowers with bract as male. Ovary fusiform, muricate. Fruits 5-18 cm long, oblong, fusiform, tuberculate, bright orange when ripe, dehisces by 3-valve from apex, pulp red, seeds arilate, 1.2-1.5 × 0.6-0.8 cm, compressed, base and apex tridentate or subtridentate, surface sculptured.

Fl. & Fr. : July-Nov.

Distrib. : Throughout India; Malaya, China and Tropical Africa.

Specimens examined : Maromar, 503.

Notes : Cultivated, often found in the villages as an escape.

Common name : Beng. : *Karala, Uchchhe*; Hindi : *Karala.*

Uses : Fruits are edible as vegetable. It is said to be stomachic and also anthelmintic.

7. MUKIA Arnott

Mukia maderaspatana (L.) Roem., Fam. Syn. Mon. 2: 47. 1846; Hara & Sutton, Enum. Fl. Pl. Nep. 2: 179. 1979; Haines, Bot. Bihar & Orissa 2: 408. 1961 (Rep. ed.); Jeffrey in Kew Bull. 34: 794. 1980. *Cucumis maderaspatana* L., Sp. Pl. 1012. 1753. *Mukia scabrella* (L.f.) Arnott in Hook.f., J. Bot. 3: 276. 1841; Clarke in Fl. Brit. India 2: 623. 1879. *Melothria maderaspatana* (L.) Cogn. in DC., Monog. Phan. 3: 623. 1881; Chakraborty in Rec. Bot. Surv. India 17: 141. 1959 & In Fasc. Fl. Ind. 11: 83. 1983. *Bryonia cordifolia* L., Sp. Pl. 1012. 1753.

Monoecious climbers. Leaves scabrid, serrate, often 3-7 lobed, up to 6.5 × 8 cm, deeply cordate at base, upper one usually smaller; petioles of upper leaves sometimes-0, of lower sometimes up to 5 cm long. Flowers small, yellow, axillary. Calyx campanulate, villous, shortly 5-lobed. Corolla deeply partite, slightly villous. Stamens 3, inserted at the base of the calyx tube; staminal filaments pilose, short; connective apiculate. Fruits 1-2 cm across. Seeds ellipsoid, turgid, often rugose.

Fl. & Fr. : Aug-Nov.

Distrib. : Throughout India, Africa, Malaysia & Australia.

Specimens examined : Seuti, 1058.

Notes : Common in the hedges near the forest edge.

Common name : Beng. : *Bilavi*; Hindi : *Agumaki.*

Remarks : Chakraborty (1983) treats *Mukia* Arnott as congeneric with *Melothria* L. While Jeffrey (1980) treats them as distinct genera.

8. Solena Lour.

Solena amplexicaulis (Lamk.) Gandhi in Sald. & Nicol., Fl. Hassan Dist. 179. 1976; Jeffrey in Kew Bull. 34: 793. 1980; Sald. & Rao in Sald., Fl. Karnataka 1: 302. 1984. *Bryonia amplexicaulis* Lamk., Encycl. 1: 496, 1785. *Zehneria umbellata* (Klein ex Willd.) Thw., Enum. 125. 1864; Clarke in Hook.f., Fl. Brit. India 2: 625. 1879. *Zehneria umbellata* var. *nepalensis* (Seringe) Clarke in Hook.f., Fl. Brit. India 2: 625. 1879; *Melothria heterophylla* (Lour.) Cogn. in DC., Mong. Phan. 3: 618. 1881; Haines, Bot. Bihar & Orissa 2: 407. 1961 (Rep. ed.).

Dioecious climbers or prostrate herbs; stems slender, furrowed, glabrous. Tendril simple, slender, glabrous. Leaves polymorphous, 6-15 cm long, coriaceous, ovate, suborbicular, oblong, or narrow-lanceolate, lobation varies, acute at apex, base deeply cordate or often clasping, margin remotely denticulate; petioles 6-12 cm long. Male flowers in short corymb; peduncle slender, 0.4-4 cm long; pedicels 3-6 mm long. Calyx up to 5 mm long, campanulate; teeth subulate, minute. Corolla yellow. Female flowers solitary; peduncle 5-8 mm long. Fruits ovoid to elliptic, smooth, up to 4 cm long. Seeds many, up to 6 × 4 mm.

Fl. & Fr. : June-Dec.

Distrib. : India, Sri Lanka, China and Java.

Specimens examined : Seuti, 1075.

Notes : Common in the thickets and hedges of the village.

Common name : Beng. : *Ban Kundri*; Hindi : *Tarali*; Kol. : *Chengor*.

Uses : Roots, leaves and fruits are eaten.

9. Trichosanthes L.

1a. Male racemes with minute bracts or ebracteate .... 1. *T. cucumerina*

1b. Male racemes with large bracts .... 2. *T. tricuspidata*

1. Trichosanthes cucumerina L., Sp. Pl. 1008. 1753; Clarke in Hook.f., Fl. Brit. India 2: 609. 1879; Haines, Bot. Bihar & Orissa 2: 405. 1961 (Rep. ed.); Chakraborty in Rec. Bot. Surv. India (Monog. Cucurbit.) 17(1): 31. 1959; Jeffrey in Kew Bull. 34(4): 796. 1980. Guha Bakshi, Fl. Murshid. Dist. 143. 1984.

Annual, monoecious climbers; stems slender, striate hairy; tendrils slender, 2-3 branched. Leaves palmately 3-5 lobed, membranous, broadly ovate, or suborbicular, up to 6 × 6 cm, sparsely hairy, margin denticulate, lobes acute or rounded, cordate at base. Male flowers in axillary racemes, 1-flowered, becoming many flowered late; bracts very small; peduncles 6-10 cm long, slender striate. Female flowers solitary, axillary; peduncle 4-9 mm long. fruits ovoid-conical, up to 6 × 4 cm. Seeds ovate-oblong, compressed, with undulate margin, up to 10 × 5 mm.

Fl. & Fr. : Aug.-Dec.

Distrib. : India, Malaya to Tropical Australia.

Specimens examined : Netarhat, 871.

Notes : Not common. Generally grows in waste places.

Common name : Beng. : *Ban Chichinga*; Hindi : *Jangli chachinda.*

Uses : Fruits are edible.

2. T. tricuspidata Lour., Fl. Cochinch. 2: 589. 1790; Cong. in DC., Monogr. 3: 374. 1881; Jeffery in Kew Bull. 34. 797. 1980; Sald. & Rao in Sald., Fl. Karnataka 1: 305. 1984. *Trichosanthes bracteata* (Lam.) Voigt, Hort. Sub. Cal. 58. 1845. *Modecca bracteata* Lam., Encycl. 4. 210. 1796. *Trichosanthes palmata* Roxb., Fl. Ind. 3: 704. 1832; Clarke in Hook.f., Fl. Brit. India 2: 606. 1879; Haines, Bot. Bihar & Orissa 2: 405. 1961 (Rep. ed.).

Deciduous, large climbers; stems robust, scabrous, puberulous or subglabrous, angled with grooves, woody below; tendrils 2-3 fid. Leaves broadly ovate, scabrous, minutely punctate, palmately 3-5 lobed, with scattered dark-green circular glands on lower surface near cordate base, lobes acute-acuminate, apiculate, margin denticulate, up to 20 × 20 cm;

petioles up to 9 cm long, with grooved upper surface. Male flower in 5-12 flowered axillary, solitary or paired racemes; bracts many nerved, fimbriate. Calyx tube 3-5 cm long, striate; teeth linear-lanceolate, up to 12 × 3 mm. Petals up to 2.5 cm long, fringed. Female flower axillary, solitary or rarely in racemes. Fruits ovoid or globose, ripened red, with longitudinal orange streaks. Seeds many, up to 10 × 5 mm, ovate-oblong, glabrous.

Fl. & Fr. : Aug.-Dec.

Distrib. : India, Indonesia, China and Japan.

Specimens examined : Bisrampur, 845.

Notes : Common on trees in the villages.

Common name : Hindi & Beng. : *Makal*; Kol. : *Kaubutki.*

Uses : Roots and fruits are used for headache and fruits are also pounded with coconut oil and applied to sore.

Benincasa hispida (Thumb.) Cong., *Cucumis melo* L., *Cucumis sativus* L., *Cucurbita maxima* Duch. ex Lam., *Cucurbita pepo* L., *Lagenaria siceraria* (Molina) Stand. and *Luffa acutangula* (L.) Roxb. are commonly cultivated throughout the district.

BEGONIACEAE

BEGONIA L.

Begonia picta J.E. Smith in Exot. Bot. 2: 5. 101. 1805; Clarke in Hook.f., Fl. Brit. India 2: 638. 1879; Haines, Bot. Bihar & Orissa 2: 418. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 206. 1977; Mukherjee, Fl. Pach. & Bori Res. 129. 1984.

Perennial herbs, 15-30 cm high, with tuberous root stock; tubers globose-ovoid; stems annual, hairy. Leaves 1-3 on each stem, broadly ovate-cordate, obtuse or acuminate at apex, margin irregularly dentate, with teeth ending in a hair, upper surface rough with tubercled based hairs, hairy beneath on the nerves, crimson beneath. Flowers in few flowered, peduncled cymes. Male and female flowers on different branches of the

inflorescence. Tepals of the male flowers 4, (2+2), scarlet or pink. Stamens many, connate at base. In female flowers, tepals-5, pinkish. Fruits trigonous, up to 2.5 cm long, winged, setose hairy. Seeds ovoid.

Fl. & Fr. : Aug.-Dec.

Distrib. : Throughout India, Bhutan, Nepal.

Specimens examined : Netarhat, 869.

Notes : Common, in shady areas and on boulders.

CACTACEAE

OPUNTIA Mill.

1a. Spines 1-2 per areole, greyish with a brown translucent tip. .... 2. *O. vulgaris*

1b. Spines 3-7 per areole; entirely translucent yellow. ....1. *O. stricta*

1. Opuntia stricta (Haw.) Haworth, Syn. Pl. Succ. 191. 1812. var. dillenii (Ker-Gawl.) Benson, Cact. & Succ. J. America 41: 126. 1969; Sald. & Nicol., Fl. Hassan 2: 869. 1978. *Cactus dillenii* Ker-Gawl., Edward's Bot. Reg. 3: 5. 255. 1818. *Opuntia dillenii* (Kar-Gawl.) Haw., Suppl. Pl. Succ. 79. 1819; Clarke in Hook.f., Fl. Brit. India 2: 657. 1879; Haines, Bot. Bihar & Orissa 2: 421. 1961 (Rep. ed.).

Erect, branched shrubs joints of the stems flat, obovate, up to 20 cm long with many areoles, bearing 3-7 flattened yellowish spines. Flowers bright yellow, up to 8 cm long. *Hypanthium turbinate*. Petals up to 2 cm long. Stamens included. Fruits globose, fleshy, areolar and glochidiate.

Fl. : June-July. Exotic.

Distrib. : Native of S. America, introduced and naturalised in India.

Specimens examined : Betla (near Palamau fort), 1117.

Notes : Common along road sides and in scrub jungles.

Common name : Beng. & Hindi : *Nagphana.*

2. **Opuntia vulgaris** Miller, Gard. Dict. ed. 8. 1.1768; Baker & Bakh.f., Fl. Java 1: 316. 1963; Singh in Saldanha, Fl. Karnataka 1: 141. 1984. *Opuntia monocantha* (Willd.) Haw., Suppl. Pl. Succ. 81. 1819; Haines, Bot. Bihar & Orissa 2: 420. 1961 (Rep. ed.). *Cactus monocanthos* Willd., Enum. Pl. Suppl. 33. 1814. *Cactus indicus* Roxb., Fl. Ind. 2: 475. 1832.

Erect shrubs, 1-2.5 m high; stems jointed, flat, ovate or obovate, 14-20 × 5-6 cm; areoles scattered, with deciduous bristles, sometimes with 2, terete, brown-tipped-translucent spines up to 3.5 cm long. Flowers bud red, when open yellow inside, up to 7.5 cm long. Corolla funnel shaped; outer few tepals sepaloid and inner petaloid, spreading. Stamens shorter than inner tepals, yellow. Style stout and stigma slightly lobed.

Fl. & Fr. : May-Sept. Exotic.

Distrib. : Native of tropical America; introduced and naturalised in India.

Specimens examined : Panki, 953.

Notes : Not common, found on open dry fields.

Common name : Beng. : *Nag phani.*

Uses : Suitable for rearing cochineal insects.

AIZOACEAE

1a. Staminodes present; seeds strophiolate .... 1. GLINUS

1b. Staminodes absent; seeds estrophiolate :

2a. Fruits a loculicidal capsule .... 2. MOLLUGO

2b. Fruits a circumscissile capsule .... 3. TRIANTHEMA

1. GLINUS L.

1a. Plants stellately pubescent; pedicels less than 1 cm long; stamens-10 .... 1. *G. lotoides*

1b. Plants glabrous; pedicels more than 1 cm long; stamens-5 .... 2. *G. oppositifolius*

1. **Glinus lotoides** L., Sp. Pl. 463. 1753; Backer in van Steenis, Fl. Males Ser. 1. 4: 269. 1951; Babu in Herb. Fl. Dehra Dun 208. 1977; Khan & Halim in Khan, Fl. Bangladesh 17: 2. 1981 *Mollugo hirta* Thunb., Prodr. Fl. Cap. 1: 24. 1794; Clarke in Hook.f., Fl. Brit. India 2: 662. 1879; *M. lotoides* (L.) Ktze., Rev. Gen. Pl. 214. 1891; Haines, Bot. Bihar & Orissa 1: 50. 1961 (Rep. ed.).

Prostrate or procumbent, diffusely branched, densely stellate-pubescent herbs; branches up to 60 cm long. Leaves small, 20 × 5 mm, obovate or spathulate, apiculate at apex, narrowed at base. Flowers 3-8 together; pedicels up to 5 mm long. Tepals 4-7 mm long, glabrous within and pubescent without, elliptic, acute, mucronate. Stamens-10. Ovary 5-locular; styles-5, very short, spreading. Capsule shorter than the tepals, oblong, loculicidally 5-valved. Seed reniform, dark brown.

Fl. & Fr. : Feb.-Apr.

Distrib. : Pantropical.

Specimens examined : Barwadih, 403.

Notes : Common in waste land, rice fields, also in sandy areas.

Common name : Beng. : *Suserasag*; Hindi : *Gandibudi*.

Uses : Tender shoots eaten as a pot herb, also used in abdominal disorders.

2. **G. oppositifolius** (L.) DC. in Bull. Herb. Boiss. ser. 2. 1: 559. 1901; Baker in van Steenis, Fl. Males. Ser. 1. 4: 270. 1951; Khan & Halim in Khan, Fl. Bangladesh 17: 3. 1981. *Mollugo oppositifolia* L., Sp. Pl. 89. 1753. *M. spergula* L., Syst. ed. 10. 881. 1759; Clarke in Hook.f., Fl. Brit. India 2: 662. 1879; Haines, Bot. Bihar & Orissa 1: 50. 1961 (Rep. ed.).

Prostrate, diffusely branched, annual herbs; stems glabrous to sparsely hairy. Leaves opposite or whorled, up to 2 × 0.5 cm, spathulate-oblanceolate to oblong-obovate, obscurely apiculate at apex, narrowed down at base; petioles up to 0.4 cm long. Flowers axillary, fascicled; pedicels up to 12 mm long. Sepals greenish-white, up to 3.5 mm long, erect, oblong, obtuse, margin often scarious. Stamens-5; staminodes-5. Ovary

3-locular. Fruits ellipsoid, shorter than the sepals. Seeds many, subreniform, dark-brown.

Fl. & Fr. : Mar.-June.

Distrib. : India (except north-west India), Myanmar, Sri Lanka, Trop. Africa & Australia.

Specimens examined : Barwadih, 403.

Notes : Common in waste places.

Uses : Leaves are eaten as vegetable. Juice of the plant applied to skin diseases.

2. MOLLUGO L.

Mollugo pentaphylla L., Sp. Pl. 89. 1753; Babu, Herb. Fl. Dehra Dun 209. 1977. *Mollugo stricta* L., Sp. Pl. ed. 2: 131. 1762; Clarke in Hook.f., Fl. Brit. India 2. 663. 1879; Haines, Bot. Bihar & Orissa 1: 49. 1961 (Rep. ed.).

Slender, small, diffuse herbs, up to 25 cm high; stems many, glabrous, dichotomously branched, 4-angled. Leaves up to 40 × 8 mm, opposite or pseudo-whorled, linear-lanceolate to obovate or oblanceolate, mucronate at apex, narrowed down at base. Flowers many, white, in lax corymbose, terminal cymes; pedicels up to 6 mm long. Sepals elliptic, acute or rounded at apex, up to 1.5 mm long. Capsule globose, as long as sepals, 3-valved. Seeds many, chestnut brown, reniform, warty.

Fl. & Fr. : Throughout the year, specially July-Dec.

Distrib. : Throughout India, Sri Lanka and Eastward to Malacca, China, Japan.

Specimens examined : Mandal, 461.

Notes : Common in the waste places.

Common name : Beng. : *Julpapra.*

Uses : Roots, leaves and fruits are eaten.

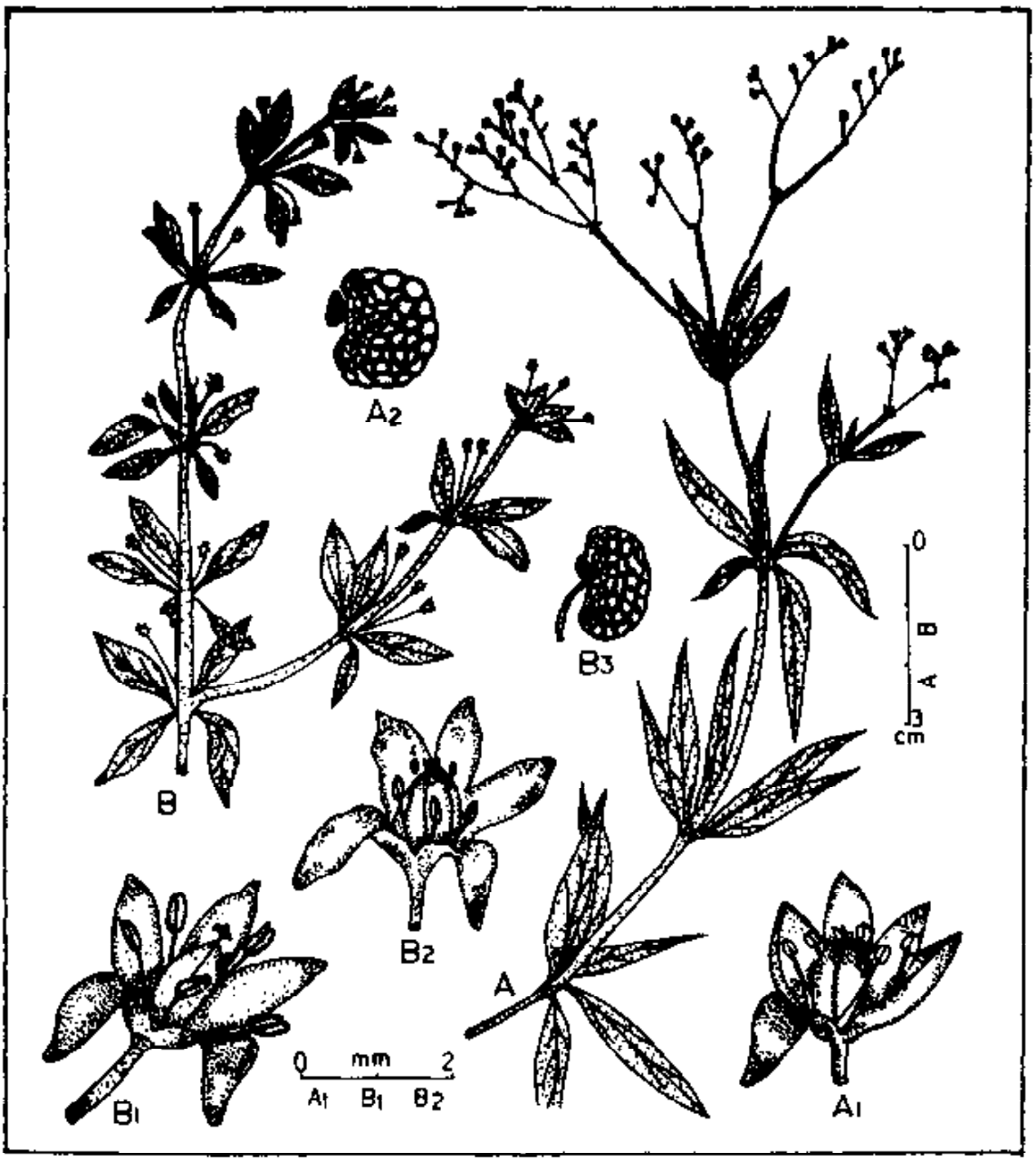


Fig. 19: Aizoaceae. (A-A_2). *Mollugo pentaphylla* L.: A. Habit; A_1. Flower split open; A_2. Seed; (B-B_3): *Glinus oppositifolius* (L.) DC.; B. Habit, B_1. Flower split open; B_2. Fruit with remnant flower; B_3. Seed.

3. TRIANTHEMA L.

Trianthema portulacastrum L., Sp. Pl. 223. 1753; Baker in van Steenis, Fl. Males. ser. 1: 274. 1951. *T. monogyna* L., Mant. Pl. 1: 69. 1767; Clarke in Hook.f., Fl. Brit. India 2: 660. 1879; Prain, Beng. Pl. 1: 533. 1903 (Rep. ed. 1: 389. 1963) & in Rec. Bot. Surv. India 3: 218. 1905; Haines, Bot. Bihar & Orissa 1: 51. 1961 (Rep. ed.).

Diffuse, prostrate, branched sub-succulent herbs, up to 60 cm long; stems pubescent at one side. Leaves opposite in unequal pairs, 2.5-3 × 2.5-3 cm, broadly obovate, base cuneate, apex apiculate, glabrous; petioles 5-10 mm long, base of the petiole sheathing with two small stipule like appendages. Flowers sunk in leaf axil, hidden by base of petiole. Sepals petaloid with an excurrent herbaceous centre, 3-5 mm long, white or pinkish. Capsule with a lower scarious or membranous portion and an upper coriaceous portion, circumscissile. Seeds black, 1-1.5 mm diam., reniform.

Fl. & Fr. : July-Oct.

Distrib. : Pantropical.

Specimens examined : Simultarh village (Daltonganj), 308.

Notes : Common in waste lands, agricultural fields, throughout the district.

Common name : Beng. : *Sabuni.*

Uses : The plant is eaten as a pot herb and said to be used in heart trouble and anaemia.

APIACEAE

1a. Leaves simple :

2a. Leaves linear .... 1. BUPLEURUM

2b. Leaves reniform :

3a. Leaves lobed, less than 2 cm across .... 4. HYDROCOTYLE

3b. Leaves not lobed, more than 2 cm across .... 2. CENTELLA

1b. Leaves pinnate :

4a. Fruits didymous, laterally compressed, commissure narrow :

5a. Fruits muricate, vittae-1 in furrows .... 8. TRACHYSPERMUM

5b. Fruits not muricate, vittae-2-3 in furrows .... 7. PIMPINELLA

4b. Fruits not didymous, dorsally compressed, commissure broad :

6a. Fruit ridges winged .... 6. PEUCEDANUM

6b. Fruit ridges without wing :

7a. Fruits with secondary ridges, commissure concave .... 3. CORIANDRUM

7b. Fruits without secondary ridges, commissure not concave .... 5. OENANTHE

1. BUPLEURUM L.

Bupleurum ramosissimum W. & A., Prodr. 370. 1834. var. **ramosissimum** Bennet in J. Econ. Tax. Bot. 5. 972. 1984. *B. mucronatum* var. *ramosissimum* (W. & A.) Clarke in Hook.f., Fl. Brit. India 2: 676. 1879. *B. mucronatum* W. & A., Prodr. 370. 1834; Haines, Bot. Bihar & Orissa 2: 424. 1961 (Rep. ed.).

Much branched herbs. Leaves linear, up to 12 cm long, mucronate at apex, attenuate at base. Flowers in panicled umbels; bracts 3-5, lanceolate, up to 5 mm long; bracteole exceeding the pedicel. Sepals 0. Petals obovate, emarginate. Fruits laterally compressed with distinct primary ridges. Seeds terete, slightly grooved on inner face.

Fl. & Fr. : Sept.-Nov.

Distrib. : Pantropical.

Specimens examined : Barwadih, 912.

Notes : Not common. Found near the hills.

2. CENTELLA L.

Centella asiatica (L.) Urb. in Mart., Fl. Brass. 11: 287. t. 78. Fig. 1. 1879; Buwalda in Blumea 2: 134. 1946 & in van Steenis. Fl. Males. ser. 1. 4: 117. 1949; Hiroe, Umbellif. Asia 1: 89. 1958 & Umbellif. World 181. 1979; Babu, Herb. Fl. Dehra Dun 213. 1977. *Hydrocotyle asiatica* L., Sp. Pl. 234. 1753; Clarke in Hook.f., Fl. Brit. India 2: 668. 1879; Prain, Beng. Pl. 1: 535. 1903 (Rep. ed. 1: 391. 1963) & in Rec. Bot. Surv. India 3: 219. 1905; Haines, Bot. Bihar & Orissa 2: 423. 1961 (Rep. ed.).

Herbs, with creeping and stoloniferous stems. Leaves in rosette, up to 3.5 × 5.2 cm, glabrous, orbicular-reniform, crenate; petioles 4-12 cm long, slender, glabrous or sparsely puberulous. Flowers in simple umbel, usually 3-together; bracts ovate, 5-7 mm long, smooth or hairy, central flower sessile, lateral shortly pedicelled; involucral bracts-2, up to 3 mm long. Fruits 3-3.5 mm long, primary and secondary ridge prominent, thinly pilose.

Fl. & Fr. : Round the year.

Distrib. : Tropical & Subtropical region of the World.

Specimens examined : Netarhat, 94 & 789. Helophyte.

Notes : Common in marshy areas, roadsides and agricultural fields.

Common name : Beng. : *Thankuni*; Hindi : *Brahma-manduki.*

Uses : Leaves are edible and used as stomachic and also used in leprosy.

3. CORIANDRUM L.

Coriandrum sativum L., Sp. Pl. 256. 1753; Clarke in Hook.f., Fl. Brit. India 2: 717. 1879; Alston in Trimen, Handb. Fl. Ceylon 6: 138. 1931; Haines, Bot. Bihar & Orissa 2: 432. 1961 (Rep. ed.).

Annual, glabrous herbs, up to 30 cm high. Basal leaves trifoliate; leaflets ovate, flabelliform, 1-2.5 × 1-2 cm, apex rounded, margins variously incised, base truncate to cuneate; cauline leaves biternately decompound,

ovate, ultimate division linear-filiform, 3-10 × 0.5-1.5 mm, obtuse at apex; petioles 1-6 cm long. Rays 3-5, 1-2.5 cm long; involucral bractlets 3-5, linear, 2-4 mm long. Rays pedicels 2-4 mm long. Sepals ovate lanceolate. Petals white, pinkish-white or rose-coloured. Fruits orbicular, terete, 2-5 × 1.5-3 mm.

Fl. & Fr. : Dec.-Mar. Exotic.

Distrib. : Native of Mediterranean region, now widespread in both the Old and New World.

Specimens examined : Garhwal, 608.

Notes : Commonly cultivated, also found as an escape near the village surroundings (Tenar busti)

Common name : Beng. : *Dhane*; Hindi : *Dhania.*

Uses : Dried fruits are widely used as spices. Young plants are also edible as vegetable.

4. HYDROCOTYLE L.

Hydrocotyle sibthorpioides Lamk., Encycl. 3: 153. 1799; Babu, Herb. Fl. Dehra Dun 215. 1977; Cook in Aquat. Wetland Pl. Ind. 45. 1996. *Hydrocotyle rotundifolia* Roxb. ex DC., Prodr. 4: 64. 1830; Clarke in Hook.f., Fl. Brit. India 2: 668. 1879; Prain, Beng. Pl. 1: 391. 1963 (Rep. ed.); Haines, Bot, Bihar & Orissa 2: 424. 1961 (Rep. ed.).

Herbs, with creeping stems. Leaves 5-6 lobed, about 1 × 1 cm, reniform, lobes or lobules crenate, with scattered short hairs beneath; petioles hairy, up to 2.2 cm; peduncle glabrous, 8-10 mm long. Flowers sessile, with minute bracts. Fruits compressed, angled, glabrous, 1-1.5 mm long.

Fl. & Fr. : In rainy season.

Distrib. : Throughout India, Malaya & Cuinea, Sri Lanka.

Specimens examined : Netarhat, 228.

Notes : Common in waste cultivated land and marshy areas, near Koel point.

Common name : Hindi : *Kulkhuri*.

Uses : Herbs used in rheumatism and digestive troubles. Roots used in liver complaints.

5. OENANTHE L.

Oenanthe javanica (Bl.) DC., Prodr. 4: 138. 1830; Buwalda in Fl. Males. 4(2): 136. 1949; Cook in Aquat. Wetland Pl. Ind. 46. 1996. *Sium javanicum* Bl., Bijdr. 15: 881. 1826. *Oenanthe stolonifera* DC., Prodr. 4: 138. 1830; Clarke in Hook.f., Fl. Brit. India 2: 696. 1879; Haines, Bot. Bihar & Orissa 2: 429. 1961 (Rep. ed.). *O. benghalensis* (DC.) Benth. & Hook.f., Gen. Pl. 1: 906. 1867; Clarke in Hook.f., Fl. Brit. India 2: 696. 1879; Haines, Bot. Prodr. 4: 138. 1830; *O. thomsoni* Clarke in Hook.f., Fl. Brit. Ind. 2: 697. 1879.

Glabrous herbs. Leaves bipinnate; pinnae 5-7 pairs; leaflets 3-5, lanceolate or rhomboid-lanceolate, cuneate at base, margin serrate. Flowers in leaf-opposed umbels; bracts-0; bracteoles-9, linear, shorter than pedicels. Sepals-5, subulate. Petals with inflexed tip. Fruits glabrous, globose, up to 2 mm long. Seeds terete.

Fl. & Fr. : June-Sept.

Distrib. : Cosmopolitan.

Specimens examined : Muhammadganj, 974. Helophyte.

Notes : Common in marshy areas.

6. PEUCEDANUM L.

Peucedanum nagpurense (Clarke) Prain, Beng. Pl. 1: 504. 1903; Haines Bot. Bihar & Orissa 2: 431. 1961 (Rep. ed.); Cannon, Enum. Fl. Pl. Nep. 2. 187. 1979. *P. glaucum* DC. var. *nagpurense* Clarke in Hook.f., Fl. Brit. India 2: 710. 1879.

Erect herbs, stems striate. Leaflets of lower leaves ovate, acuminate, serrate, up to 10 × 5 cm, upper one lanceolate to linear. Flowers in umbels. Sepals minute, truncate, mucronate. Petals oblong-lanceolate, tip inflexed. Fruits ellipsoid, cocci up to 7 mm long, broadly winged. Seeds compressed.

Fl. & Fr. : Oct.-Dec.

Distrib. : Throughout India, Nepal.

Specimens examined : Netarhat, 771.

Notes : Common, in the forest.

7. PIMPINELLA L.

Pimpinella wallichiana (Miq.) Gandhi, Fl. Hassan 417. 1976; Mukherjee in Bull. Bot. Surv. India 24: 1983. *Helosciadium wallichianum* Miq., Bot. Zeit. 7: 775. 1849. *Pimpinella monoica* Dalz. in Hook.f., Fl. Brit. India 2: 687. 1879; Haines, Bot. Bihar & Orissa 2: 427. 1961 (Rep. ed.).

Herbs, branches striate. Leaves pinnately 3-5 foliolate; leaflets ovate-lanceolate, glabrous, crenate-serrate, spinulose, up to 7 cm long. Flowers in terminal umbels. Bracts-0. Calyx teeth absent or small. Petals emarginate, ovate, acute or lanceolate-caudate. Fruits ovoid, minutely papillose, compressed, up to 1.5 mm long.

Fl. & Fr. : Nov.-Jan.

Distrib. : Cosmopolitan.

Specimens examined : Netarhat, 779.

Notes : Common in the forest.

8. TRACHYSPERMUM Link.

Trachyspermum ammi (L.) Sprague in Kew Bull. 1929. 228. 1929; Babu, Herb. Fl. Dehra Dun 218. 1977. *Sison ammi* L., Sp. Pl. 252. 1753. *Ammi copticum* Linn., Mant. 1: 56. 1767. *Carum coptium* (L.) Hiern, Fl.

Trop. Afr. 3: 12. 1871; Clarke in Hook.f., Fl. Brit. India 2: 682. 1879; Haines, Bot. Bihar & Orissa 2: 426. 1961 (Rep. ed.).

Slender, annual, erect, much branched herbs. Leaves 2-3 pinnate, the ultimate segments very linear or filiform. Bracts linear, sometimes divided. Flowers in axillary or terminal compound umbels, white; pedicels 6-20, more or less pubescent. Fruits ovoid, 2 mm or less long, muricate or densely-papillose hispid, ridges distinct.

Fl. & Fr. : Dec.-March.

Distrib. : West Asia, South Europe and North-East Africa.

Specimens examined : Simultarh village (Daltonganj), 281.

Notes : Cultivated, often found as an escape on the road sides and in the waste land.

Common name : Beng. : *Jowan*; Hindi : *Ajowan.*

Uses : The fruits are antispasmodic, carminative and used in diarrhoea and cholera. Fruits are widely used as spices.

Foeniculum vulgare Mill. and *Daucus carota* L. are widely cutlivated.

ALANGIACEAE

ALANGIUM Lamk. *nom. cons.*

Alangium salvifolium (L.f.) Wangenin in Engler, Pfl. reich 41: 9. 1910; Mukherjee in Bull. Bot. Surv. Ind. 10: 330. 1969. *Grewia salvifolia* L.f., Suppl. 409. 1781. *Alangium lamarckii* (auct. non Thw., Enum. 133. 1857); Clarke in Hook.f., Fl. Brit. India 2: 741. 1879; Prain, Beng. Pl. 1: 545. 1903 (Rep. ed. 1: 393. 1963) & in Rec. Bot. Surv. India 3. 221. 1905; Haines, Bot. Bihar & Orissa 2: 437. 1961 (Rep. ed.).

Small crooked deciduous trees. Leaves up to 12 × 4.5 cm, oblong, oblong-lanceolate or elliptic, acute or subobtuse at apex, rounded at base, sometimes with unequal base, pubescent beneath, glabrous above; petioles pubescent, up to 8 mm long. Flowers pale white, bloom when leafless, in

dense axillary fascicles or from axils of fallen leaves; peduncle and pedicels woolly. Calyx 5-10 toothed. Petals 5-10, recurved or revolute after expanding. Stamens many, villous below. Fruits up to 15 × 8 mm, subglobose or ellipsoid, pubescent, glabrous at maturity, black when ripe, crowned by calyx.

Fl. & Fr. : Mar.-July. Exotic.

Distrib. : Native of Africa and distributed in many parts of India & New Guinea.

Specimens examined : Betla, 462.

Notes : Not common, Grows in waste places and near stream.

Common name : Beng. : *Ankura* or *Ankarkata*; Hindi : *Akola*; Santal : *Dhela*.

Uses : The bark and roots are used in jaundice and the root bark is used as purgative. Fruit is eaten.

RUBIACEAE

1a. Trees or shrubs :

2a. Flowers in dense globose heads :

3a. Heads more than 2 cm across; hypanthium connate .... 12. NEOLAMARCKIA

3b. Heads less than 2 cm across; hypanthium not connate :

4a. Leaves more than 10 cm across; sepals distinct .... 1. ADINA

4b. Leaves less than 10 cm across; sepals indistinct .... 11. MITRAGYNA

2b. Flowers not in heads :

5a. Ovules more than 1 in each cell :

6a. Corolla valvate; seeds winged ....8. HYMENODICTYON

6b. Corolla imbricate; seeds not winged :

7a. Fruits less than 3 mm across, dehiscent .... 19. WENDLANDIA

7b. Fruits more than 3 mm across, indehiscent :

8a. Corolla more than 2 cm long; ovary 1 celled .... 5. GARDENIA

8b. Corolla less than 2 cm long; ovary 2 celled .... 3. CATUNAREGAM

5b. Ovule-1 in each cell :

9a. Climbers; fruit compressed .... 13. PAEDERIA

9b. Erect shrubs; fruit not compressed :

10a. Corolla twisted .... 14. PAVETTA

10b. Corolla not twisted :

11a. Calyx with gland tipped hairs ....17. SPERMADICTYON

11b. Calyx without gland tipped hairs :

12a. Flowers in axillary cymes :

13a. Ovaries 3-9 locular .... 10. MEYNA

13b. Ovaries 2-locular .... 2. CANTHIUM

12b. Flowers in terminal cymes .... 6. HAMELIA

1b. Herbs :

14a. Ovule-1 in each cell :

15a. Scabrid climbers; leaves whorled .... 16. RUBIA

15b. Prostrate to erect herbs; leaves not whorled :

16a. Flowers in 3-chotomous corymbose cymes .... 9. KNOXIA

16b. Flowers in axillary clusters :

17a. Fruits split into 2-mericarp; seeds with transverse furrow .... 18. SPERMACOCE

17b. Fruits split into 3-mericarp; seeds without transverse furrow .... 15. RICHARDIA

14b. Ovules many in each cell :

18a. Petals toothed; fruits indehisent .... 4. DENTELLA

18b. Petals entire; fruits dehiscent .... 7. HEDYOTIS

1. ADINA Salisb.

Adina cordifolia (Willd. ex Roxb.) Benth. & Hook.f. ex Brandis, For. Fl. 263. t. 33. 1874; Hook.f. in Fl. Brit. India 3: 24. 1880; Haines, Bot. Bihar & Orissa 2: 441. 1961 (Rep. ed.); Gandhi in Sald. & Nicol., Fl. Hassan 572. 1976. *Nauclea cordifolia* Willd. ex Roxb., Pl. Cor. t. 53. 1798.

Medium sized trees. Leaves ovate-orbicular, pubescent, acuminate at apex, cordate at base, up to 15 × 15 cm; petioles up to 8 cm long, hairy; stipules enclosing the terminal buds. Inflorescence 1-3 fascicled heads, axillary; peduncle stout, 3-5 cm long, 2-bracteate near middle. Flowers yellow. Sepals linear. Corolla tube up to 5 mm long, pubescent. Capsule about 4 mm long, cuneate, pubescent.

Fl. & Fr. : June-Feb.

Distrib. : Throughout India, Sri Lanka, Nepal, Thailand to Vietnam.

Specimens examined : Betla, 464.

Notes : Very common as avenue trees and in dry forests, throughout the district.

Common name : Hindi : *Karam* or *Haldu*; Beng. : *Petpuria*; Santal : *Karam*.

Uses : Wood used in plywood industries.

2. CANTHIUM Lamk.

Canthium parviflorum Lamk., Dict. 1: 602. 1797; Hook.f. in Fl. Brit. India 3: 136. 1880; Haines, Bot. Bihar & Orissa 2: 459. 1961 (Rep. ed.).

Thorny glabrous shrubs, with obtusely 4-angled branchlets; thorn slender, opposite, decussate, strong, sharp, axillary, up to 4 cm long. Leaves ovate to oboate, up to 9 × 4 cm, acute-apiculate at apex, narrowed down at base; stipules small, subulate. Flowers in short sessile cymes, below thorns. Flowers 4-merous, small. Calxy minute, toothed. Corolla campanulate with spreading ovate lobes, mouth villous. Fruits subglobose,

up to 2 cm across, apical areole often surrounded by 4 linear deciduous sepals.

Fl. & Fr. : Apr.-Nov.

Distrib. : India and Sri Lanka.

Specimens examined : Muhammadganj, 968.

Notes : Common on dry hills.

3. CATUNAREGAM Wolf.

Catunaregam spinosa (Thunb.) Tirv. in Bull. Mus. Hist. Nat. Paris 3 ser. Bot. 35: 13. 1978 & Taxon 27: 515. 1978; Verdcourt in Kew Bull. 36: 503. 1981. *Xeromphis spinosa* (Thunb.) Keay in Bull. Jard. Bot. Brux. 28: 37. 1958; Maheshwari in Bull. Bot. Surv. India 3: 91. 1962; Yamazaki in J. Jap. Bot. 45: 339. 1970. *Gardenia spinosa* Thunb., Diss. Gard. No. 7. 1780. *Randia dumetorum* (Retz.) Poir in Lam., Encyc. Suppl. 2: 829. 1811; Hook.f. in Hook.f., Fl. Brit. India 3: 110. 1880; Haines Bot. Bihar & Orissa 2: 453. 1961 (Rep. ed.).

Armed with supra-axillary, straight, strong, horizontal spines; young shoots pubescent. Leaves opposite and fascicled, 2.3-7 × 1.5-5 cm, upper surface sparsely and lower surface densely pubescent, obovate or oblanceolate, obtuse at apex, narrowed down at base; stipules ovate, acuminate. Flowers solitary or in 2-4 flowered subsessile fascicles int he axil, whitish, fragrant; pedicels 7-10 mm long. Calyx tube strigose, campanulate; lobes variable, ovate, oblong or lanceolate. Corolla up to 1 cm long, densely pubescent. Fruits subglobose, glabrous, obscurely longitudinally ribbed, crowned with calyx limb.

Fl. : Apr.-June.

Distrib. : India, Sri Lanka, South East Asia and Tropical Africa.

Specimens examined : Mcclaskieganj, 676.

Notes : Common, in open forest and in hill slopes.

Common name : Beng. : *Madan*; Hindi : *Mainphal*; Kol. : *Patua*; Santal : *Loto*.

Uses : Fruits eaten after cooking, and unripe fruits also used for fish poisoning. Bark is given for fever. Wood used for various purposes as walking sticks, umbrella handle, cotton reels etc.

4. DENTELLA Forst.

Dentella repens J.R. & G. Forst., Char. Gen. 26. Pl. 13. 1776; Hook.f. in Fl. Brit. India 3: 42. 1880; Haines, Bot. Bihar & Orissa 2: 464: 1961 (Rep. ed.); Bennet, Fl. Howrah Distt. 348. 1979; Guha Bakshi, Fl. Murshidabad Distt. 153. 1984; Cook in Aquat. Wetland Pl. Ind. 335. 1996.

Slender, profusely branched, puberulent or glabrous, annual herbs; branches 5-20 cm long. Leaves 5-10 × 2-4 mm, subsessile, oblanceolate to spathulate, obtuse at apex, margin ciliolate, narrowed down at base. Flowers 3-5 mm long. Calyx 2-2.5 mm long. Corolla up to 4.5 mm long, hairy within, white, lobes ovate, with tooth on either side. Fruits subglobose to globose, up to 2 mm long, densely covered with hyaline scale, with crown of persistent calyx lobes.

Fl. & Fr. : Throughout the year, chiefly in Sept.-Nov.

Distrib. : India, Sri Lanka, Malaya, N. Australia and Polynesia.

Specimens examined : Muhammadganj, 1031. Helophyte.

Notes : Common, in the moist areas and on river bank.

5. GARDENIA J. Ellis

Gardenia latifolia Ait., Hort. Kew 1: 294. 1789; Hook.f. in Fl. Brit. India 3: 116. 1880; Prain, Beng. Pl. 1: 413. 1963 (Rep. ed.); Gandhi in Sald. & Nicol., Fl. Hassan 576. 1976.

Deciduous small trees, leaves elliptic-ovate, or obovate, up to 15 × 10 cm, acute at apex, alternate at base, entire, glabrous; petioles up to 2 cm long. Flowers axillary, solitary, white or 2-nate. Sepals-5-9. Petals 5-9, obovate. Fruit solitary, globose, not crowned by persistent calyx, one loculed, about 3 cm in diam., placentas 4-5.

Fl. & Fr. : Dec.-Mar.

Distrib. : Throughout India, Myanmar.

Specimens examined : Netarhat, 194.

Notes : Common, in the forest.

Common name : Hindi & Santal : *Papra.*

6. HAMELIA Jacq.

Hamelia patens Jacq., Enum. Pl. Carib. 16: 1760; Baily, Man. Cult. Pl. 933. 1963 (Rep. ed.).

Shrubs, up to 3.5 m high; stems slightly 4-angled; young shoot cinereous-pubescent. Leaves opposite or whorls of 3, elliptic-ovate to oblong, up to 10 × 4 cm, acute to acuminate at apex; petioles slender, up to 2.5 cm long. Flowers in terminal cymes, sessile. Calyx up to 4 mm long, segments short triangular. Corolla up to 3 cm long, scarlet orange, tube narrowly cylindric. Stamens exceeding corolla lobes. Fruits ovoid, up to 6 mm long, dark red or purple.

Fl. & Fr. : June-Oct. Exotic.

Specimens examined : Netarhat, 781.

Distrib. : Native of tropical America, cultivated in all temperate and tropical countries of the World.

Notes : Commonly cultivated as garden plant, often found as an escape on road sides.

Uses : Fruits used in dysentery.

7. HEDYOTIS L.

1a. **Plants less than 15 cm high :**

2a. **Leaves linear, scabrid, margin revolute; capsule hispid; seeds smooth** .... 4. *H. pinifolia*

2b. Leaves elliptic-ovate, glabrous, margin not revolute; capsule glabrous; seeds pitted .... 3. *H. ovatifolia*

1b. Plants more than 15 cm high :

3a. Peduncle less than 7 mm long; capsule ribbed .... 5. *H. pumila*

3b. Peduncle more than 7 mm long; capsule not ribbed :

4a. Leaves nerveless, margin recurved .... 2. *H. herbacea*

4b. Leaves with nerves, margin not recurved .... 1. *H. corymbosa*

1. Hedyotis corymbosa (L.) Lam., Tab. Encycl. 1: 272. 1792; Rao & Hemadri in Ind. For. 9: 375. 1973. *Oldenlandia corymbosa* L., Sp. Pl. 119. 1753; Hook.f. in Fl. Brit. India 3: 64. 1880; Prain, Bengal Pl. 1: 559. 1903 (Rep. ed. 1: 409. 1963); Haines, Bot. Bihar & Orissa 2: 468. 1961 (Rep. ed.); Lewis in Ann. Missouri Bot. Gard. 53: 257. 258. 1966; Verdcourt in Polhill, Fl. Trop. Africa (Rubiac. Pt. 1) 308. 1976.

Branched, diffuse, slender, glabrous or sparsely pubescent herbs. Leaves up to 20 × 2 mm, linear, subsessile, acute at apex, tapering to obtuse at base; stipules of few bristles. Flowers mostly 4-merous, paired in the axil of leaves or terminal, rarely corymb. Peduncle 8 mm long, slender; corolla tube slightly exceeding the sepals. Capsule globose, 2-2.5 mm across.

Fl. & Fr. : Throughout the year, chiefly in Nov.-May. Exotic.

Distrib. : Pantropic. Probably native of Old World.

Specimens examined : Netarhat, 86. Helophyte.

Notes : Common on road sides, waste land and in open fields.

Common name : Beng. : *Khetpapra*; Hindi : *Pitpapra*.

Uses : Decoction of the plant used in fever, also used in jaundice and other liver troubles.

2. H. herbacea L., Sp. Pl. 102. 1753; Rao & Hemadri in Ind. For. 99:376. 1973. *Oldenlandia herbacea* (L.) Roxb., Fl. Ind. 1: 445. 1820; Haines, Bot. Bihar & Orissa 2: 469. 1961 (Rep. ed.); Gandhi in Sald. & Nicol., Fl. Hassan 586. 1976; Mukherjee in Fl. Pach. & Bori Res. 145.

1984. *Oldenlandia heynii* R.Br. ex G.Don, Gen. Syst. 3: 531. 1834; Hook.f. in Fl. Brit. India 3: 65. 1880.

Erect, corymbosely branched, annual herbs; stems 4-angular. Leaves linear-lanceolate, up to 2.3 × 0.1 cm, tapering at both ends, becoming smaller upwards, margin usually recurved, nerveless; stipules obscure, with very minute teeth. Flowers axillary, solitary on slender capillary peduncles, up to 8 mm long. Calyx teeth subulate, minute, distant. Corolla white, tube slender. Capsule loculicidal, globose, up to 1.5 × 2 mm, didymous, with protruding crown. Seeds minute, black or brown, ellipsoid, 3-angled.

Fl. & Fr. : Sept.-Dec.

Distrib. : India, Sri Lanka, Malaya and Tropical Africa.

Specimens examined : Seuti, 1067.

Notes : Rare on the forest margin.

Uses : The extract of the plant is used in Malaria.

3. Hedyotis ovatifolia Cav., Descr. Pl. Ic. 6: 52. 1802; Rao & Hemadri in Ind. For. 99: 377. 1973. *Thecagonum ovatifolium* (Cav.) Babu in Bull. Bot. Surv. India 11: 214. 1969 et Herb. Fl. Dehra Dun 231. 1977; Mukherjee in Fl. Pach. & Bori Res. 145. 1984. *Oldenlandia nudicaulis* Roth, Nov. Pl. Sp. 95. 1821; Hook.f. in Fl. Brit. India 3: 70. 1880; Haines, Bot. Bihar & Orissa 2: 471. 1961 (Rep. ed.). *Oldenlandia ovatifolia* (Cav.) DC., Prodr. 4: 427. 1830. *Gonotheca ovatifolia* (Cav.) Sant. & Wagh. Bull. Bot. Surv. India 5: 107. 1963.

Erect, annual herbs, 3-10 cm high; stems 4-angled, pubescent. Leaves in few pairs, often 4-together at apex of the stem, ovate, or elliptic-ovate, up to 2.5 × 1.5 cm, lower leaves smaller, up to 9 × 6 mm, obtuse at apex, cuneate at base, thinly hairy on lower surface. Flowers in many flowred, loose, corymbose panicles. Calyx lobes ovate-triangular, acute, 0.5 mm long. Corolla white, divided more than half way down, up to 2.5 mm long; lobes lanceolate-oblong, hairy within. Stamens inserted near top of corolla tube. Capsule hemispheric, up to 2 × 2.2 mm, with a crown of calyx lobes. Seeds dark-brown, pitted, ovoid-globose, 0.5 mm long, slightly angled.

Fl. & Fr. : Aug.-Oct.

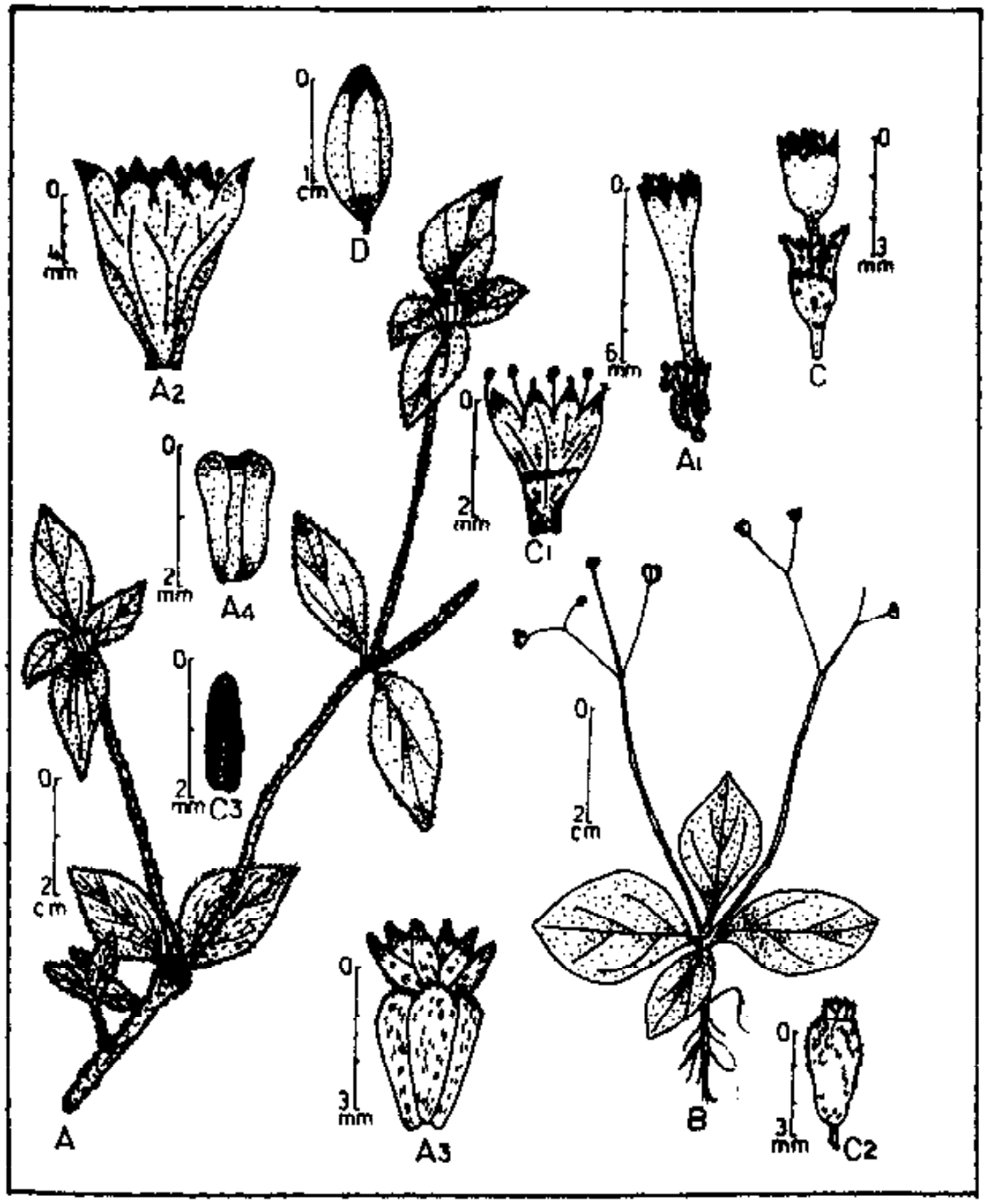


Fig. 20: Rubiaceae. (A-A_4): *Richardia scabra* L.: A. Habit; A_1. Flower; A_2. Corolla split open; A_3. Fruit; A_4. Seed showing ventral groove; B. *Hedyotis ovatifolia* Cav.: Habit; (C-C_3): *Spermacoce ramanii* Siv. & Nair.: C. Flower; C_1. Corolla split open; C_2. Fruit; C_3. Seed showing ventral groove; D. *Hymenodictyon excelsum* (Roxb.) Wall. : Fruit.

Distrib. : India, Java, Malaya, Thailand, Cambodia, Vietnam.

Specimens examined : Seuti, 1063.

Notes : Not common. Growing in waste places and open forest.

4. Hedyotis pinifolia Wall. ex G. Don., Gen. Syst. 3: 526. 1834; Hook.f. in Fl. Brit. India 3: 60. 1880; Haines, Bot. Bihar & Orissa 2: 467. 1961 (Rep. ed.).

Annual, slender, diffuse, branched, small herbs, up to 15 cm high; branches acutely 4-angled, scabrid. Leaves up to 3 cm long, fascicled, linear or acicular, acuminate, scabrous above, 1-nerved, margin revolute; stipules very short, with many rigid bristles. Flowers in axillary and terminal, sessile, capitate cymes; head up to 7 mm in diam., 3-many flowered. Calyx teeth subulate, shorter than capsule. Capsule ovoid, hispid, loculicidally dehiscent on top, up to 2 mm across. Seeds 3-angled, brown, smooth.

Fl. & Fr. : Oct.-Dec.

Distrib. : India, Myanmar, Sumatra, also in China.

Specimens examined : Seuti, 1101.

Notes : Common in forest undergrowth.

5. H. pumila L.f., Suppl. Pl. 119. 1781; Rao & Hemadri, in Ind. For. 99: 377. 1973. *Oldenlandia pumila* (Linn.f.) DC., Prodr. 4: 425. 1830; Bremekamp in Verh. Kon. Adad. Wet. ser. 2. 48(2): 250. 1952; Verdcourt in Fl. Trop. E. Africa (Rubiac. Pt. 1) 307. 1976. *Oldenlandia crustallina* Roxb., Fl. Ind. 1: 422. 1820; Hook.f. in Fl. Brit. India 3: 65. 1880; Haines, Bot. Bihar & Orissa 2: 468. 1961 (Rep. ed.).

Small, diffuse or suberect, glabrous annual herbs. Leaves opposite, 7-12 × 1-3 mm, shortly petioled, elliptic-lanceolate, acute to acuminate at apex, tapering at base, entire; stipules of few birstles. Flowers axillary, usually solitary, rarely-2; pedicels up to 6 mm long. Sepals up to 1 mm long, lanceolate, bases of the sepals touching in fruit. Capsule up to 2 mm long, glabrous, ovoid, ribbed, crowned by persistent calyx teeth.

Fl. & Fr. : Dec.-Feb.

Distrib. : Throughout India & Java.

Specimens examined : Mahuamilan, 684.

Notes : Common in waste lands and in open fields.

Common name : Beng. : *Panki.*

8. HYMENODICTYON Wall.

Hymenodictyon excelsum (Roxb.) Wall. in Roxb., Fl. Ind. 2: 149. 1824; Hook.f. in Fl. Brit. India 3: 35. 1880; Haines, Bot. Bihar & Orissa 2: 446. 1961 (Rep. ed.). *Cinchona excelsa* Roxb., Pl. Cor. 2: t. 166. 1798.

Large, deciduous trees. Leaves up to 20 × 13 cm, ovate-elliptic, obtuse or acuminate at apex, cuneate at base, glabrous above, finely pubescent beneath, membranous; petioles up to 4 mm long; stipules caducous. Panicle large, pubescent, often drooping; bracts solitary, foliaceous. Flowers small, greenish-white. Capsule ellipsoid, up to 2 × 0.7 cm, on decurved 1.5 cm long stalk. Seeds many, small.

Fl. & Fr. : Aug.-Jan.

Distrib. : India, Java.

Specimens examined : Betla, 485.

Notes : Common in the forest. Deciduous during November-May.

Common name : Hindi : *Bhaulan*; Beng. : *Latikarum.*

Uses : Good planks are made from the wood and the root is used in fever by the Kols and Santals.

9. KNOXIA L.

Knoxia sumatrensis (Retz.) DC., Prodr. 4: 569. 1830; Gandhi in Sald. & Nicol., Fl. Hassan 579. 1976; Mukherjee in Fl. Pach. & Bori Res. 142. 1984. *Spermacoce sumatrensis* Retz., Obs. Bot. 4: 23. 1786. *Knoxia corymbosa* (auct. pl. non Willd. 1798); Hook.f. in Fl. Brit. India 3: 128. 1880; Haines, Bot. Bihar & Orissa 2: 473. 1961 (Rep. ed.).

Erect, slender, annual herbs, up to 80 cm high; stems 4-angled, pubescent throughout. Leaves up to 10 × 3 cm, elliptic-lanceolate to oblong, acute to subacuminate at apex, narrowed to the base, thinly pubescent; petioles up to 1 cm long; stipular bristles up to 3 mm long. Flowers bluish or pinkish-white, in 3-chotomous corymbose-cymes, small and shortly pedicelled. Calyx teeth minute, triangular, unequal, lanceolate. Corolla 2-3 mm long, lobes ovate, obtuse, hairy within. Fruits ellipsoid, dehiscent into 2-indehiscent 3-ribbed cocci.

Fl. & Fr. : Sept.-Feb.

Distrib. : India, Sri Lanka, Myanmar, China & Tropical Australia.

Specimens examined : Beyang Pahar (Kumendi), 703.

Notes : Common in forest undergrowth and hill slopes.

10. MEYNA Roxb. ex Link.

Meyna spinosa Roxb. ex Link., Jahrb. Gewachsk. 111. 1(3): 32. 1820; Robyns in Bull. Jard. Bot. Bisux. 11(2): 230. 1928; Guha Bakshi in Fl. Murshid. Distt. 154. 1984. *Vangueria spinosa* (Roxb. ex Link.) Roxb. in Fl. Ind. 2: 175. 1824; Hook.f. in Fl. Brit. India 3: 136. 1880; pp. Haines, Bot. Bihar & Orissa 2: 460. 1961 (Rep. ed.).

Large, glabrous shrubs or small trees with straight, opposite, simple or 3-nate branches, armed with long, straight, supra-axillary spines. Leaves ovate-elliptic or oblong, acute or acuminate at apex, opposite or 3-nately whorled, up to 7.5 × 3.5 cm; petioles up to 1.2 cm long, pubescent, stipules cuspidate from a broad base, 6-8 mm long, caducous. Cymes sessile or shortly peduncled in the axil of new leaves. Flowers greenish-white, pedicelled. Calyx 5-toothed. Corolla tube subglobose; lobes triangular-ovate, spreading, mouth densely villous. Drupes subglobose or turbinate, up to 2 cm across; pyrenes 4-5.

Fl. & Fr. : Apr.-Jan.

Distrib. : India, Myanamr, Malaysia.

Specimens examined : Netarhat, 133.

Notes : Common, in the mixed forest.

Common name : Beng. : *Mayna.*

Uses : Young leaves and fruits are edible.

11. MITRAGYNA Korth.

Mitragyna parvifolia (Roxb.) Korth., Obs. Naucl. Ind. 19. 1839; Haines, Bot. Bihar & Orissa 2: 442. 1961 (Rep. ed.); Gandhi in Sald. & Nicol., Fl. Hassan 581. 1976; Ridsdale in Blumea 24: 63. 1978. *Nauclea parvifolia* Roxb., Pl. Cor. 1: 40. t. 52. 1796. *Stephegyne parvifolia* (Roxb.) Korth. in Verh. Nat. Ges. 161. 1840; Hook.f. in Fl. Brit. India 3: 25. 1880; Prain, Beng. Pl. 1: 404. 1963 (Rep. ed.).

Large deciduous trees. Leaves obovate or suborbicular, up to 8 × 7 cm, rounded to acute at apex, cuneate, rounded, or subcordate at base, coriaceous, glabrous, except axils of nerves beneath, lateral nerves 5-7 pairs; petioles up to 2 cm long; stipules large, obovate, membranous, oblong, keeled, covering buds, deciduous on their expansion. Heads solitary, on short, up to 2 cm long peduncle, up to 10 mm in diam.; bracteoles minute spathulate, caducous, up to 3 mm long, hairy above. Calyx limb very short. Petals white, sparsely pilose within. Fruits in globose heads, verrucose.

Fl. : May-June. Fruit ripens during cold season.

Distrib. : Throughout India, Myanmar & Sri Lanka.

Specimens examined : Maromar, 532.

Notes : Common on road sides and also in dry forests.

Common name : Beng. : *Guli Kadam, Keli Kudur, Mit Kunia*; Hindi : *Kaim, Mundi, Karam, Kalmi*; Santal : *Gore.*

12. NEOLAMARCKIA Bosser.

Neolamarckia cadamba (Roxb.) Bosser in Adansonia 6(3): 245-248. 1884. *Anthocephalus chinensis* Sensu A.Rich. ex Walp. Repert 2: 491. 1843. non *Cephalanthus chinensis* Lamk. Encycl. Meth. Bot. 1: 678.

1785. Ridsdale, Blumea 24: 334. 1978. *Anthocephalus indicus* A. Rich, Mem. Soc. Hist. Nat. Paris 5: 238. 1834. nom. illeg.; *Nauclea cadamba* Roxb. Fl. Indica 2: 121. 1824; *Anthocephalus cadamba* (Roxb.) Miq. Fl. Ind. Bot. 2: 135. 1856; Hook.f., Fl. Brit. India 3: 23. 1880; Haines, Bot. Bihar & Orissa 2: 441. 1961 (Rep. ed.).

Trees. Leaves elliptic-oblong or ovate, up to 20 × 11 cm. Flowers in dense, terminal, solitary globose heads; heads up to 4 cm across. Calyx 5-lobed; sepals oblanceolate, up to 3 mm long. Corolla up to 1 cm long, 5-lobed. Stamens on throat of corolla tube. Fruits with thin epicarp and 4 coriaceous cocci.

Fl. & Fr. : June-Oct.

Distrib. : India, Sri Lanka, Myanmar, Malaysia, Thailand to Vietnam and S. China.

Specimens examined : Seuti, 1085.

Notes : Common in the villages.

Common name : Beng. & Hindi : *Kadam.*

Uses : Wood is used for box making and various other purposes. Fruits eaten by the birds, rarely by human beings.

13. Paederia L.

Paederia foetida L., Mant. 1: 52. 1767; Hook.f. in Fl. Brit. India 3: 197. 1880; Haines, Bot. Bihar & Orissa 2: 463. 1961 (Rep. ed.); Hara & Gould., Enum. Fl. Pl. Nep. 2: 206. 1979.

Slender, foetid climbers. Leaves elliptic-ovate, acuminate, up to 9 × 4 cm, glabrous. Flowers in axillary and terminal cymose panicles. Sepals 4-5, triangular or obtuse, ciliolate. Petals 4-5, valvate, influxed, margin crisped. Fruits oblong up to 10 mm long, compressed.

Fl. & Fr. : Aug.-Dec.

Distrib. : Throughout India.

Specimens examined : Seuti, 1083.

Notes : Common in the forests.

Common name : Beng. : *Gandha Bhadali*; Hindi : *Gandhali.*

Uses : Leaves used in soup for bowel troubles.

14. PAVETTA L.

Pavetta indica L. ssp. **tomentosa** (Roxb. ex Smith) Bennet in Fl. Howrah Distt. 356. 1979. *Pavetta tomentosa* Roxb. ex Smith in Rees, Cyclop. 26. 1819. *Pavetta indica* L. var. *tomentosa* (Roxb. ex Smith) Hook.f. in Fl. Brit. India 3: 150. 1880; Haines, Bot. Bihar & Orissa 2: 456. 1961 (Rep. ed.).

Shrubs, up to 2 m high; young shoots tomentose. Leaves elliptic to elliptic-ovate or elliptic-oblong, up to 16 × 8 cm, obtuse acute at apex, tapering at base, lower surface densely tomentose pubescent; petioles up to 2 cm long, pubescent. Inflorescence tomentose, terminal, corymbose trichotomous cymes. Calyx up to 2.5 mm long, campanulate, teeth minute, triangular, acute. Corolla white, tube up to 1.2 cm long, lobes linear-oblong, up to 6 × 2 mm, obtuse, subacute. Anthers exserted. Style white; stigma green, narrowly clavate. Fruits globose, 5-7 mm across, black, 1-2 seeded.

Fl. & Fr. : July-Dec.

Distrib. : India, Myanmar, Sri Lanka, Malaya and N. Australia.

Specimens examined : Netarhat, 769.

Notes : Common, in the forest.

15. RICHARDIA L.

Richardia scabra L., Sp. Pl. ed. 1. 330. 1753; Asa Gray, Fl. N. Amer. 1(2): 32. 1886; Srivastava in J. Ind. Bot. Soc. 43: 102. 1969. Mann & Samadder in Bull. Bot. Surv. India 26(1 & 2): 136. 1985; Sarma et Paine, J. Econ. Tax. Bot. 13(1): 62-65. 1989. *Richardia brasiliensis* Gomez in Mem. Ipacac. 31. 1801. *R. pilosa* Ruiz & Pav., Fl. Peru 3:50. t. 2796.

1802. *Richardsonia brasiliensis* Hayne, Arzn. Gen. 8. t. 21. 1805. *R. pilosa* (Ruiz & Pav.) H.B.K. in Nov. Gen. Sp. 3: 350. 1820. *R. scabra* St. Hill. in Pl. Us. Brass. 7. t. 8. 1824; DC., Prodr. 4: 567. 1830.

Prostrate, weak herbs, hairy throughout. Leaves opposite to whorled, ovate to lanceolate, 20 × 10 mm to 35 × 9 mm, strigose on both sides, acute at apex, magin entire, provided with white hairs; stipules fimbriate. Flowers in cymose heads. Calyx lobes-6, connate at base, persistent, 4 mm long, margin hairy. Corolla lobes-6, tube 7 mm long base with ring of hairs. Stamens-6, alternate to corolla lobes, slightly exserted. Stigmas-3, capitate. Fruits 3-partite, black on maturity, crowned by calyx, surface warty.

Fl. & Fr. : Dec.-Mar.

Distrib.: Throughout India, Native of Tropical America.

Specimens examined : Netarhat, 62, 130 and 759.

Notes : Infrequent in exposed area and on the banks of the river Koel.

16. RUBIA L.

Rubia wallichiana Decne., Recher. Garance. 61. 1837; Hara in Fl. E. Himal. 315 & 652. t. 31 b. 1966. *Rubia cordifolia* (auct. non L. 1767); Wall., Num. List. No. 6209. 1831-32. pp.; Haines, Bot. Bihar & Orissa 2: 474. 1961 (Rep. ed.). Deb & Malik, Bull. Bot. Surv. Ind. 10: 6. 1968. pp.

Scrambling, scabrid climbers. Leaves whorled, ovate-lanceolate, acuminate, up to 7 × 1.7 cm, scabrid above, hairy beneath, primary nerves 5-7; petioles up to 4.5 cm long, aculeate, with small hooked prickles. Flowers in umbellae cymes, up to 2 mm across. Calyx tubes ovoid or globose. Petals 5-6, recurved, hispid. Fruits globose, felshy, up to 4 mm across, glabrous, bluish-black.

Fl. & Fr. : Oct.-Jan.

Distrib. : Paleotropical.

Specimens examined : Netarhat, 114.

Notes : Common in the forest on bushes.

Common name : Hindi : *Manjit.*

17. SPERMADICTYON Roxb.

Spermadictyon suaveolens Roxb., Pl. Cor. 3: 32. t. 236. 1815; Santapau in Fl. Khandala (ed. 3) 120. 1967. *Hamiltonia suaveolens* (Roxb.) Roxb., Fl. Ind. 1: 554. 1820; Hook.f., Fl. Brit. India 3: 197. 1881; Haines, Bot. Bihar & Orissa 2: 463. 1961 (Rep. ed.).

Spreading shrubs, with erect, terete branches. Leaves opposite, ovate, elliptic-lanceolate or elliptic-oblong, acute at apex, entire, up to 14 × 4.8 cm, hairy abvoe, pubescent beneath, with 10-15 pairs strong secondary nerves. Flowers fascicled in large panicles, with glandular hairy bracts and bracteoles. Calyx lobes 4-5, 3 mm long, with gland-tipped hairs. Corolla tube slender, 5-lobed, tube 12 mm long, hairy. Capsule ellipsoid, 1-celled, 5-valved at top.

Fl. & Fr. : Sept.-Dec.

Distrib. : India & China.

Specimens examined : Barwadih, 376.

Notes : Common on the hills & in the undergrowth of dry forests.

Common name : Santal : *Buddhi Ghassi*; Hindi : *Mahabal.*

Uses : The decoction of root is used in diarrhoea & cholera.

18. SPERMACOCE L.

1a. Stems compressed; winged along the ridges .... 2. *S. latifolia*

1b. Stems not compressed; not winged :

2a. Corolla more than 4 mm long; fruits more than 4 mm long .... 1. *S. articularis*

2b. Corolla less than 4 mm long; fruits less than 4 mm long .... 3. *S. ramanii*

1. **Spermacoce articularis** L.f., Suppl. Pl. 119-120. 1781; Sivarajan & R.V. Nair, Taxon 35: 366.f. 5-10. 1986. *Borreria articularis* (L.f.) Williams in Bull. Herb. Boiss. 2(5): 956. 1905; Shivarajan & Manilal in New Botanist 2: 8890. 1975; Babu, Herb. Fl. Dehra Dun 221. 1977. *Spermacoce hispida* (non. L., Sp. Pl. 102. 1753); Hook.f. in Fl. Brit. India 3: 200. 1881; Prain, Beng. Pl. 1: 580. 1903 (Rep. ed.); Polhill. Fl. Trop. E. Africa (Rubiae. Pt. 1) 361. 1976.

Rough, hispid, procumbent herbs; stems 12-20 cm long. Leaves obovate, spathulate, oblong or elliptic, acute or obtuse at apex, margin with hairs, tapering at base forming petiole like structure, up to 3.4 × 1 cm; stipules scarious, with few long bristle longer than stipule. Flowers within the stipular cup, sessile or subsessile; bracts as long as calyx, linear. Sepal 4, narrowly linear. Corolla salver shaped; petals-4, white, 7 mm long. Stamens-4, inserted on corolla tube. Capsule 5 mm long, ellipsoid, rounded at apex with crown of calyx teeth. Seeds 1 mm long, flat, dark brown, surface grooved, acuminate at apex.

Fl. & Fr. : Feb.-June.

Distrib.: India to China, Malaya and Nepal & Sri Lanka.

Specimens examined : Netarhat, 122.

Notes : Common in waste land. Variable in habit, hair, size and shape of the leaves.

Common name : Santal : *Pitua arak.*

2. **S. latifolia** Aubl., Hort. Pl. Guiane Frtan. 1: 55. 1775; Verdcourt, Fl. Trop. E. Afr. (Rubiac.) 364. 1976; Deb et Dutta in Bull. Bot. Surv. Ind. 18: 216. 1976 et. in J. Econ. Tax. Bot. 5(5): 1050. 1984. *Borreria alata* (Aubl.) DC., Prodr. 4: 544. 1830; Hara & Gould in Enum. Fl. Pl. Nepal 2: 200. 1979. *Borreria latifolia* (Aubl.) Schum. in Mart. Fl. Brass. 6(6): 61. 1888. *Borreria articularis* Mukherjee in Rec. Bot. Surv. India 20(2): 116. 1973 (non Schum.). *Borreria eradii* Ravi, J. Bomb. Nat. Hist. Soc. 66(3): 539. t. 1.f. 10. 1970.

Prostrate, decumbent or erect herbs, up to 100 cm long; stems with wing along ridges, compressed, pubescent. Leaves sessile to subsessile,

3.5-5 × 1.5-2.5 cm, elliptic to elliptic-lanceolate, acute at apex, narrowed down at base, margin scabrid, puberulous on both surfaces or scabrid above due to tubercle based hairs; stipular sheath up to 3 mm long, bearing 4-6 mm long papillate bristles. Flowers in axillary and terminal bracteate cymes, sessile, 6-10 mm long, bracteolate, setulose at apex. Calyx 4-lobed, up to 5 mm long, pubescent. Corolla tube up to 5.5 mm long, narrow, with a ring of hairs insides, lobes 1-1.5 mm long, ovate or triangular. Stamens-4, exserted. Style exserted, hairy above. Capsule ellipsoid, up to 4 mm long, pubescent above, glabrescent below, finely ribbed, dehiscing septicidally then loculicidally, releasing seeds apically.

Fl. & Fr. : Aug.-Dec. Exotic.

Distrib. : India, Nepal, Bhutan, Malaya Peninsula, Java, native of S. America.

Specimens examined : Kechki, 888.

Notes : Not common. Found in marshy places and rocky soil.

3. **Spermacoce ramanii** Sivarajan & R.V. Nair, Taxon 35: 367. f. 11-18. 1986; Panigrahi & Murti, Fl. Bilas. Distt. 1: 292. 1989. *Spermacoce stricta* auct. mult. non L.f. (1782); Hook.f. in Fl. Brit. India 3. 200. 1881, pp.; Haines, Bot. Bihar & Orissa 2: 472. 1961 (Rep. ed.). *Spermacoce pusilla* auct. mult. non Wall. (1820); Deb & Datta, J. Econ. Tax. Bot. 5: 1057. 1984. *Borreria stricta* auct. mult. non (L.f.) K.Schum. (1891), nec. Mayer (1818). *Borreria pusilla* auct. mult. non. (Wall.) DC. (1830); Mani & Sivar., Fl. Calicut 136. 1982.

Herb, up to 30 cm high, erect or prostrate, branching from base; stems 4-angular, retrorsely hairy. Leaves up to 3 × 0.7 cm, linear-lanceolate, sessile, acute at apex, narrowed at base, scabrid along margin; stipular sheath up to 2 mm long. Flowers in terminal or axillary heads; bracts foliaceous, reflexed; bracteoles filiform. Calyx 4-lobed; lobes unequal, scabrid along margin, lanceolate. Corolla funnel-shaped, 1-2 mm long, with a ring of hairs at base, lobes-4. Stamens alternate with corolla lobe, exserted. Capsule ellipsoid, 2-3 × 1-1.5 mm, pubescent above, both mericarps remaining coherent at base during dehiscence. Seeds 1-2 mm long, chest nut brown with a ventral groove.

Fl. & Fr. : Oct.-Dec.

Distrib. : Throughout India, Nepal, Myanmar, Tropical Asia & Africa.

Specimens examined : Daltonganj, 342.

Notes : Common, in the waste places and open land, throughout the district.

19. WENDLANDIA Bartl. ex DC.

1a. Leaves elliptic-oblong or obovate; stipules erect, more than 4 mm long .... 2. *W. tinctoria*

1b. Leaves oblong or ovate-lanceolate; stipules recuved, less then 4 mm long .... 1. *W. heynei*

1. Wendlandia heynei (Roem. & Schult.) Sant. & Merchant in Bull. Bot. Surv. India 3: 110. 1961. *Rondeletia heynei* Roem. & Schult., Syst. 5: 234. 1819. *R. exserta* Roxb. Fl. Ind. 2: 135. 1824. *Wendlandia exserta* (Roxb.) DC., Prodr. 4: 411. 1830; Hook.f. in Fl. Brit. India 3: 37. 1880; Prain, Bengal Pl. 1: 405. 1963 (Rep. ed.); Haines, Bot. Bihar & Orissa 2: 446. 1961 (Rep. ed.).

Grey-tomentose, small trees. Leaves opposite, oblong or ovate-lanceolate, acuminate at apex, obtuse at base, entire, secondary nerves 8-10 pairs; stipules ovate, acute, recurved. Flowers in tomentose pyramidal-panicle, fragrant. Calyx hairy, with ovate or subulate lobes. Corolla white, funnel shaped; petals recurved. Anthers exserted. Capsule hoary pubescent, crowned by erect hoary sepals.

Fl. & Fr. : Mar.-May.

Specimens examined : Netarhat, 147.

Distrib. : Throughout India, Sri Lanka, Nepal.

Notes : Common as avenue trees.

Common name : Beng. : *Chaulai*; Hindi : *Tilia*; Santal : *Hundru*.

Uses : Woods used for agricultural implements and bark used for urinary troubles.

2. **Wendlandia tinctoria** DC., Prodr. 4: 411. 1830; Hook.f. in Fl. Brit. India 3: 38. 1880; Haines, Bot. Bihar & Orissa 2: 447. 1961 (Rep. ed.). ssp. **tinctoria.** *W. tinctoria* DC. var. *normalis* Hook.f. in Fl. Brit. India 3: 38. 1880.

Much branched, small trees or large shrubs; branches 4-angled and young shoot pubescent. Leaves opposite, elliptic-oblong or obovate, up to 15 × 5 cm, acuminate at apex, cuneate at base, glabrous above, pubescent on the nerves beneath; petioles up to 1.8 cm long, pubescent; stipules erect up to 5 mm long, ovate, cuspidate. Panicles up to 20 cm long, tomentose Flowers sessile, fascicled, white. Calyx teeth ovate. Corolla tube slender Anthers shortly exserted. Capsule 1-1.5 mm diam., pubescent, reddish.

Fl. & Fr. : Jan.-Apr.

Distrib. : India, Myanmar, Bangladesh and Pegu.

Specimens examined : Mahuamilan, 695.

Notes : Common, in the forest.

Common name : Beng. : *Tula-lodh*; Santal : *Telai.*

Uses : Bark used as mordant in dying, also used for cholera.

ASTERACEAE

1a. Capitula of one kind only :

2a. Plants with milky juice; flowers all ligulate, 5-toothed :

3a. Achenes compressed, narrowed at both ends .... 36. SONCHUS

3b. Achenes terete or slightly compressed, narrowed and subrostrate at apex only .... 30. LAUNEA

2b. Plants without milky juice; flowers either all tubular eligulate or peripheral ones ligulate, ligule entire or 2-3 lobed :

4a. Female and hermaphrodite flowers both tubular, 3-5 lobed; capitula discoid or disciform :

5a. Capitula with one or several flowers and aggregated into glomerules or compound heads :

6a. Glomerules of one flowered capitula :

7a. Involucre spinescent and crowded into dense ball .... 16. ECHINOPS

7b. Involucre not spinescent, foliaceous, calyx like .... 28. LAGASCEA

6b. Glomerules of more than one flowered capitula :

8a. Flowers purple :

9a. Leaves simple :

10a. Marshy herbs; leaves linear; capitula axillary .... 9. CAESULIA

10b. Woody herbs; leaves oblanceolate; capitula terminal .... 12. CENTRATHERUM

9b. Leaves pinnatisect or pinnatifid :

11a. Leaves and involucral bracts spinescent .... 8. BREEA

11b. Leaves and involucral bracts not spinescent :

12a. Leaves white tomentose beneath; achenes angled and muricate .... 34. SAUSSUREA

12b. Leaves glabrous; achenes fusiform and smooth .... 15. CYATHOCLINE

8b. Flowers not purple :

13a. Leaves mostly rosulate and few smaller cauline above; stems not winged; glomerules surrounded by 3-carinate bracts .... 18. ELEPHANTOPUS

13b. Leaves not rosulate; stems narrowly winged; glomerules not surrounded by carinate bracts .... 37. SPHAERANTHUS

5b. Capitula separate, though some times in tight sessile clusters, but not surrounded by common whorl of bracts :

14a. Achenes bearing a pappus of 5-aristate scales .... 2. AGERATUM

14b. Achenes bearing a pappus of hairs :

15a. Involucral bracts uniseriate ;

16a. Capitula less than 10-flowered :

17a. Scandent herbs; involucral bracts 4-5; flowers greenish-white .... 31. MIKANIA

17b. Erect herbs; involucral bracts many; flowers yellow .... 35. SENECIO

16b. Capitula more than 10-flowered .... 19. EMILIA

15b. Involucral bracts many seriate (when uniseriate with calyculate bracts at base) :

18a. Achenes pappose :

19a. Capitula homogamous :

20a. Shrubs; leaves opposite .... 23. EUPATORIUM

20b. Herbs; leaves alternate :

21a. Involucral bracts fringed with scarious bluish teeth .... 10. CENTAUREA

21b. Involucral bracts not fringed and not as above .... 42. VERNONIA

19b. Capitula heterogamous :

22a. Pappus coroniform with a finely ciliate margin .... 26. GRANGEA

22b. Pappus of distinct bristles or hairs :

23a. Plants white-woolly .... 25. GNAPHALIUM

23b. Plants not white-woolly :

24a. Involucral bracts many seriate :

25a. Corolla of female flowers shorter than hermaphrodite flowers :

26a. Female flowers of 2-types, ligulate and eligulate .... 21. ERIGERON

26b. Female flowers of 1-type; either all eligulate or all scarcely ligulate .... 13. CONYZA

25b. Corolla of female flowers as long as hermaphrodite flowers :

27a. Leaves without amplexicaul base .... 6. BLUMEA

27b. At least upper leaves with amplexicaul base :

28a. Stems winged; anther base tailed ..... 29. LAGGERA

28b. Stems not winged; anther base not tailed ....7. BLUMEOPSIS

24b. Involucral bracts uniseriate with few calyculate bracts at base .... 22. ERECHTITES

18b. Achenes completely epappose :

29a. Prostrate herbs; leaves simply toothed .... 11. CENTIPEDA

29b. Erect herbs; leaves pinnately divided .... 3. ARTEMISIA

4b. Female flowers ligulate; hermaphrodite disc flowers tubular, 4-5 lobed; capitula radiate :

30a. Receptacle naked, without paleae :

31a. Involucral bacts 1-2 seriate and connate :

32a. Involucral bracts 1-seriate, forming a tube; ray flowers many, yellow .... 40. TAGETES

32b. Involucral bracts 2-seriate, forming a cup; ray flower-5, white .... 32. PARTHENIUM

31b. Involucral bracts many seriate, free .... 33. PENTANEMA

30b. Receptacle paleaceous :

33a. Style of the disc flower undivided; achenes covered with hooked spines .... 1. ACANTHOSPERMUM

33b. Style of the disc flower divided; achenes not covered with spines :

34a. Pappus modified into bristles or awns :

35a. Bristles retrorsely barbed :

36a. Achenes rostrate .... 14. COSMO

36b. Achenes erostrate .... 4. BIDENS

35b. Bristles without retrorse barbs :

37a. Ray flowers white :

38a. Decumbent herbs; pappus bristles many, more than 4 mm long, plumose .... 41. TRIDAX

38b. Erect herbs; pappus bristles 2-3, less than 2 mm long, smooth .... 5. BLAINVILLEA

37b. Ray flowers yellow:

39a. Capitula sessile, axillary achenes dorsally compressed, lacetate .... 39. SYNEDRELLA

39b. Capitula pedunculate; achenes laterally compressed, ciliate .... 38. SPILANTHES

34b. Pappus modified into flattened scales or absent :

40a. Pappus scaly :

41a. Erect herbs; pappus scales more than 1 mm long, fimbriate .... 24. GALINSOGA

41b. Decumbent herbs; pappus scales less than 1 mm long, not fimbriate .... 17. ECLIPTA

40b. Pappus absent :

42a. Marshy prostrate herbs; flowers white .... 20. ENYDRA

42b. Terrestrial erect herbs; flowers yellow .... 27. GRIZOTIA

1. Capitula of 2 kinds, unisexual; smaller spherical male and terminal ovoid female capitula covered with hooked bristles .... 43. XANTHIUM

1. ACANTHOSPERMUM Schrank

Acanthospermum hispidum DC., Prodr. 5: 522. 1836; Babu, Herb. Fl. Dehra Dun 237. 1977. Hara *et al.* in Enum. Fl. Pl. Nep. 3: 9. 1982; Chowdhery in Hajra *et al.*, Fl. Ind. 12:361. 1995.

Erect, dichotomously branched herbs, hairy throughout, up to 30 cm high. Leaves ovate-spathulate, acute, cuneate at base, up to 30 × 9 mm, hairy on both surfaces. Heads sessile, solitary at axil of dichotomy of branches and also at leaf axil, yellow. Achenes 5-10, triangular, with 2 large spine and with numerous lateral hooked spines.

Fl. & Fr. : July-Dec. Exotic.

Distrib. : Throughout India, native of Brazil.

Specimens examined : Simultarh village (Daltonganj), 331.

Notes : Not common. Found in barren fields and cultivated lands.

Uses : Herbs contain essential oil, has antibacterial and antifungal activity.

2. AGERATUM L.

Ageratum conyzoides L., Sp. Pl. 839. 1753; Hook.f. in Fl. Brit. India 3: 243. 1881; Prain, Beng. Pl. 1: 591. 1903 (Rep. ed. 1: 433. 1963) & in Rec. Bot. Surv. India 3: 225. 1963; Koster in Blumea 1: 484. 1935; Robinson in Pre. Amer. Acad. Arts. & Sci. 49. 460. 1903; Haines, Bot. Bihar & Orissa 2: 485. 1961 (Rep. ed.); Fosberg & Sachet in Smith. Contr. Bot. (Fl. Micronesia) 46: 18. 1980; Uniyal in Hajra *et al.*, Fl. Ind. 12: 348. 1995.

Erect herbs, 15-40 cm high, hispid throughout, much branched; stems and branches terete. Leaves ovate, subacute to acute, dentate, cuneate, 3-nerved; petioles up to 2 cm long, slender, hispid. Heads in dense terminal corymbose or panicles. Involucral bracts 2-seriate, 4 mm long, oblong, acute, scarious margined. Pappus of 5 aristate bristle, connate at base, free above. Corolla white or purple, tubular, regular, tube glandular. Achenes 2 mm long, black, ribbed.

Fl. & Fr. : Round the year, mostly in Mar.-June. Exotic.

Distrib. : Pantropical weed of American origin.

Specimens examined : Daltanganj, 23.

Notes : Common everywhere, chiefly in damp places.

Common name : Beng. : *Uchunti.*

Uses : Decoction of the herb used in diarrhoea and dysentery.

3. ARTEMISIA L.

Artemisia japonica Thumb. Fl. Jap. 310. 1784; Kitamura in Hara, Enum. Fl. Pl. Nepal 3: 13. 1982; Bennet, Name Change. Fl. Pl. Ind. Adj. Region 48. 1987; Naithani in Hajra *et al.*, Fl. Ind. 12: 28. 1995. *Artemisia parviflora* Roxb. ex D.Don, Prodr. 181. 1825; Hook.f. in Fl. Brit. India 3: 322. 1881. Haines, Bot. Bihar & Orissa 2: 513. 1961 (Rep. ed.).

Erect, perennial herbs, with grooved stems. Leaves sessile, spathulate, cuneate, acute at apex, serrate, lobed, pubescent, up to 7.5 × 1.2 cm, upper leaves linear-lanceolate, entire. Heads short peduncled, forming a dense panicle, 3-4 mm in diam.; involucral bracts 2-3 seriate, glabrous, glaucous, ovate, rounded at apex, having scarious margins.

Fl. & Fr. : Oct.-Feb.

Distrib. : Throughout India, Afghanistan, China, Iran, Japan, Myanmar.

Specimens examined : Netarhat, 134.

Notes : Common in forest undergrowth.

Remarks : Leaf size and shape highly variable.

4. Bidens L.

1a. Leaves ternate; leaflets simple serrate; ray florets 5-6 or absent. .... 2. *B. pilosa*

1b. Leaves with 3-5 deeply dentate or pinnatifid leaflets, ray florets usually-3. .... 1. *B. biternata*

1. Bidens biternata (Lour.) Merr. & Sherff ex Sherff in Bot. Gaz. 88. 293. 1929 et Publ. Field Mus. Nat. Hist. Bot. Ser. 16: 388. 1937; Grierson in Dassanayake, Rev. Handb. Fl. Ceylon 1: 229. 1980. Chowdhery in Hajra *et al.*, Fl. Ind. 12: 367. 1995. *Coreopsis biternata* Lour., Fl. Cochinch. ed. 1. 508. 1790; *Bidens pilosa* var. *bipinnata* (L.) Hook.f. in Fl. Brit. India 3: 309. 1881.

Erect, annual, glabrous, up to 60 cm tall herbs; branches angular, grooved. Leaves 5-10 cm long, on up to 2 cm long petiole; lateral leaflets ovate, 1.5-3 × 0.5-5 cm, deeply dentate or pinnatifid, acute at apex, shortly attenuate at base, terminal leaflets elliptic, 3-6 × 1-2 cm, base attenuate at base, terminal leaflets elliptic, 3-6 × 1-2 cm, base attenuate to winged petiolule. Heads on dichotomously branched peduncle. Involucre 4-7 mm broad; outer involucral bracts linear-oblanceolate, up to 5 mm long, ciliate at margin, inner involucral bracts up to 6 mm long, scarious at margin. Ray florets usually-3, whitish or yellow, up to 4 × 2 mm. Disc florets up

to 4 mm long. Achenes linear, up to 15 mm long, tetragonous, black, glabrous. Pappus bristles 3-4, 3-3.5 mm long, with reflexd hairs.

Fl. & Fr. : July-Nov.

Distrib. : India, Tropical Africa, Malaysia, Australia.

Specimens examined : Kechki, 893.

Notes : Not common. Growing in the forest.

2. **Bidens pilosa** L., Sp. Pl. 832. 1753; Hook.f. in Fl. Brit. India 3: 309. 1881; Sherff., Publ. Field. Mus. Nat. Hist. Bot. 16: 412. 1937; Grierson in Dassanayake, Rev. Handb. Fl. Ceylon 1: 227. 1980; Haines, Bot. Bihar & Orissa 2: 507. 1961 (Rep. ed.); Chowdhery in Hajra *et al.*, Fl. Ind. 3: 372. 1995.

Erect, much branched, up to 50 cm tall, glabrous herbs; stems terete, grooved. Leaves 3-foliolate; petioles up to 4 cm long; leaflets ovate, 3-7 x 1.8-3 cm, serrate, attenuate into short petiolules, acute or shortly acuminate at apex, terminal leaflets ovate lanceolate, larger, glabrous on both surfaces. Heads many in loose dichotomously branched panicles. Involucre 4-5 mm diam.; outer involucral bracts 8, spathulate, up to 3 mm long, sparsely ciliate at margin, inner involucral bracts oblong-lanceolate, up to 5 mm long, margin scarious, ciliate at apex. Rays 5-6, white, up to 6 mm long or absent. Disc flower yellow, 3-5 mm long. Achenes up to 5 mm long, black, bearing a few stiff hairs on angles in upper part. Pappus bristle-2, straw coloured, 1-2 mm long, with reflexed hairs.

Fl. & Fr. : Oct.-Mar. Exotic.

Distrib. : S.E. Asia, Central and S. America, Africa, Australia and New Zealand, Native of S. America.

Specimens examined : Netarhat, 69.

Notes : Not common, found on the hill slopes.

Uses : Young shoots are often eaten as vegetable; juice of the leaves used for eyes and ear troubles.

5. BLAINVILLEA Cass.

Blainvillea acmella (L.) Philipson in Blumea 6: 350. 1950; Babu, Herb. Fl. Dehra Dun 243. 1977; Bhandari, Fl. Ind. Desert. 194. 1978; Chowdhery in Hajra *et al.*, Fl. Ind. 13: 377. 1995. *Verbesina acmella* L., Sp. Pl. 901. 1753. *Blainvillea latifolia* (Linn.f.) DC. ex Wight in Contr. Bot. Ind. 71. 1834; Hook.f. in Fl. Brit. India 3: 305. 1881; Haines, Bot. Bihar & Orissa 2: 504. 1961 (Rep. ed.). *Eclipta latifolia* L.f., Suppl. Pl. 378. 1782. *Blainvillea rhomboidea* Cass., Dict. Sci. Nat. 29. 499. 1823.

Annual, erect, coarse herbs, up to 30 cm high; stems much branched, straw coloured, hispidly pubescent, more or less 4-angular. Leaves opposite, ovate or ovate-lanceoalte, up to 3.5 × 1.8 cm, crenate-serrate, hairy on both sides, 3-nerved at base, acute at apex, cuneate at base; petioles up to 1.5 cm long, hairy. Heads 6 mm in diam., peduncled, solitary in the fork and sub corymbose at top of branches. Involucral bracts 2-seriate, outer-5, oblong, acute, hairy outside, up to 6 mm long, inner cypselas embracing and apex fimbriate. Achenes cuneiform, triquetrous, curved, up to 6 mm long. Pappus of 2-5 unequal bristles.

Fl. & Fr. : Sept.-Jan. Exotic.

Distrib. : India, Tropical Asia, Africa, America & Australia, native of S. America.

Specimens examined : Daltonganj, 332.

Notes : Infrequent in waste lands and barren cultivated fields.

6. BLUMEA DC.

1a. Erect herbs; capitula many in dense or lax corymbose panicle :

- 2a. Receptacle densely short-hairy around the pit .... 1. *B. fistulosa*
- 2b. Receptacle glabrous :
  - 3a. Involucral bracts 4-seriate, inner most ciliate at apex :
    - 4a. Receptacle glabrous .... 2. *B. lacera*
    - 4b. Receptacle hairy (pilose) .... 3. *B. laciniata*

3b. Involcural bracts 3-seriate, inner most not ciliate at apex .... 4. *B. mollis*

1b. Decumbent herbs; capitula solitary .... 5. *B. obliqua*

1. Blumea fistulosa (Roxb.) Kurz in J. As. Soc. Bengal 46(2): 187. 1877; Randeria in Blumea 10: 256. 1960; Hu in J. Taiwan Mus. 18: 323. 1965; Babu, Herb. Fl. Dehra Dun 244. 1977; Kumar in Hajra *et al.*, Fl. Ind. 13: 124. 1995. *Conyza fistulosa* Roxb., Fl. Ind. 3. 429. 1832. *Blumea glomerata* DC. in Wight., Contrib. Bot. Ind. 15. 1834; Hook.f. in Fl. Brit. Ind. 3: 262. 1881; Prain, Beng. Pl. 1: 593. 1903 (Rep. ed. 1: 438. 1963) & in Rec. Bot. Surv. Ind. 3: 226. 1905; Haines, Bot. Bihar & Orissa 2: 492. 1961 (Rep. ed.).

Erect, branched, pubescent herbs, young shoots villous. Basal leaves oblanceolate, or elliptic-oblong or lyrate, dentate, up to 9 × 2 cm, narrowed into petiole; upper leaves smaller, sessile, passing into bracts. Heads sessile, clustered at the axil of leafy bracts, forming leafy spike. Involucral bracts campanulate, purple, hairy without, many seriate, outermost smaller, 2-3 mm long, linear-lanceolate, inner more or less flat, pubescent, subulate to lanceolate, 6-8 mm long; receptacle concave, hairy. Disc florets yellow, bisexual; ray florets female. Pappus white, longer than corolla tube. Achenes 4-angled, glabrous or sparsely hairy.

Fl. & Fr. : Dec.-Apr.

Distrib. : India, Nepal, Myanmar, China, Thailand to Vietnam.

Specimens examined : Netarhat, 184.

Notes : Common in waste lands and in forest undergrowth.

Remarks : Highly variable in size and shape of the leaves and inflorescence.

2. B. lacera (Burm.f.) DC. in Wight, Contrib. Bot. Ind. 14. 1834; Hook.f. in Fl. Brit. India 3: 263. 1881; Haines, Bot. Bihar & Orissa 2: 493. 1961 (Rep. ed.), Randeria in Blumea 10: 264. 1960; Kumar in Hajra *et al.*, Fl. Ind. 13: 126. 1995. *Conyza lacera* Burm.f., Fl. India 180. t. 59. f. 1. 1768.

Annual, slender, erect herbs, up to 75 cm tall, softly tomentose throughout. Leaves elliptic or oblanceolate, lower ones often pinnately lobed, acute or obtuse, apiculate at apex, serrate-dentate at margin, up to 6 × 3 cm. Heads up to 5 mm diam., many in axillary and terminal panicles. Involucral bracts 4-seriate, outer herbaceous, linear-lanceolate, up to 2 mm long, inner ones linear-lanceolate, scarious, up to 7 mm long, ciliate at apex. Flowers yellow. Achenes linear, brown, up to 0.5 mm long, 5-ribbed, sparsely puberulous. Pappus up to 3.5 mm long, white.

Fl. & Fr. : Sept.-Jan.

Distrib. : India, Sri Lanka, Tropical Africa, China and Malaya.

Specimens examined : Daltonganj, 290.

Notes : Common, along the road sides and in the waste lands.

Common name : Beng. : *Kukurmuta*; Hindi : *Kakranda.*

3. B. laciniata (Roxb.) DC., Prodr. 5: 436. 1836; Hook.f. in Fl. Brit. India 3: 264. 1881; Haines, Bot. Bihar & Orissa 2: 494. 1961 (Rep. ed.); Randeria in Blumea 10: 258. 1960; Kumar in Hajra *et al.*, Fl. Ind. 13: 128. 1995. *Conyza laciniata* Roxb., Fl. Ind. 3: 428. 1832.

Erect herbs, up to 1.5 m high; stems often hollow, glandular hairy or tomentose, striate. Basal leaves petioled, up to 11 × 5 cm, irregularly pinnatifid or runcinate-lyrate, upper leaves sessile, gradually smaller, less lobed and passing into bracts. Heads in terminal lax panicles; peduncle 1-1.5 cm long. Involucral bracts up to 7 mm long, purple tinged, oblong-lanceolate, inner with scarious margin. Corolla yellow, tubular, bisexual ones 4-5 mm long, pubescent, female ones 4 mm long, glabrous. Achenes 8-10 ribbed, oblong, pubescent. Pappus up to 4 mm long, white, barbellate.

Fl. & Fr. : Feb.-Aug.

Distrib. : India to China and Malaya.

Specimens examined : Barwadih, 423.

Notes : Common in waste land and shaded localities.

Remarks: According to Koster, after revision of Compositae of New Guinea, the proper taxonomic status for this taxon should be a variety under *B. lacera.*

4. Blumea mollis (D.Don) Merrill in Philip. J.Sci. (Bot.) 5: 395. 1910; Randeria in Blumea 10: 261. 1960; Kumar in Hajra *et al.*, Fl. Ind. 13: 135. 1995. *Erigeron molle* D. Don. Prodr. 172. 1825. *Blumea wightiana* DC. in Wight. Contrib. Bot. Ind. 14. 1834; Hook.f. in Fl. Brit. India 3: 261. 1881; Haines, Bot. Bihar & Orissa 2: 493. 1961 (Rep. ed.). *Blumea neilgherrensis* Hook.f., Fl. Brit. India 3: 261. 1881.

Erect herbs, 10-20 cm high, hairy throughout. Leaves alternate, rosette at base, densely villous beneath, obovate or elliptic, acute to rounded at apex, dentate, up to 4 × 2 cm, upper ones lanceolate, serrate, acute, tapering at base. Heads in dense panicles, 3-6 mm in diam. Involucral bracts 3-4 seriate, hairy, linear-lanceolate, with scarious margin. Achenes small, oblong, 0.5 mm long, 4-angled. Pappus white.

Fl. & Fr. : Dec.-Mar.

Distrib. : Malaya, China, Australia, Tropical Africa and Throughout India.

Specimens examined : Netarhat, 117.

Notes : Common in exposed areas.

5. B. obliqua (L.) Druce, Rep. Bot. Exch. Club Brit. Isles 4: 609. 1916 (1917). Randeria in Blumea 10: 286. 1960; Kumar in Hajra *et al.*, Fl. Ind. 13: 137. 1995. *Erigeron obliquum* L., Mant. 2: 573. 1771. *Blumea amplectens* DC. in Wight Contrib. Bot. Ind. 13. 1834; Hook.f. in Fl. Brit. India 3: 260. 1881; Haines, Bot. Bihar & Orissa 2: 491. 1961 (Rep. ed.). *Blumea amplectens* var. *arenaria* (DC.) Hook.f. in Fl. Brit. India 3: 260. 1881. *Blumea obliqua* var. *pubiflora* (DC.) Maheshwari in J. Bomb. Nat. Hist. Soc. 54: 805. 1956. *Blumea obliqua* var. *arenaria* (DC.) Maheshwari in J. Bomb. Nat. Hist. Soc. 54: 805. 1956.

Small herbs, villous throughout, several branches coming out from common root stock. Leaves oblanceolate to spathulate, almost amplexicaul, both surfaces hairy, lower leaves attaining up to 2 × 1 cm, gradually smaller

towards apex, remotely toothed. Heads yellow, 4-5 mm in diam. Involucral bracts 2-3 seriate, outermost smaller and inner most longer, linear-lanceolate with scarious wing, 3-6 mm long, acuminate at apex, hairy; receptacle convex. Pappus white, as long as corolla tube. Achenes minute, sparsely hairy, up to 0.5 mm long.

Fl. & Fr. : Dec.-May.

Distrib. : Central India to Western Penninsula & Sri Lanka.

Specimens examined : Netarhat, 119 & 150.

Notes : Common in dry waste places and open areas.

7. BLUMEOPSIS Gagnep.

Blumeopsis flava (DC.) Gagnep. in Bull. Mus. Hist. Nat. Paris 26: 76. 1920; Ludlow & Raven in Kew Bull. 17: 71. 1963; Babu, Herb. Fl. Dehra Dun 248. 1977; Kumar in Hajra *et al.*, Fl. Ind. 13: 145. 1995. *Blumea flava* DC., Prodr. 5: 439. 1836; Haines, Bot. Bihar & Orissa 2: 495. 1961 (Rep. ed.). *Laggera flava* (DC.) Benth. in Benth. & Hook.f., Gen. Pl. 2: 290. 1873; Hook.f. in Fl. Brit. India 3: 270. 1881; Prain, Beng. Pl. 1: 439. 1963 (Rep. ed.). *Blumeopsis falcata* Merr., J. Arn. Arb. 19: 70. 1938, non *Erigeron falcatum* D.Don. 1825.

Annual, erect, slender herbs, up to 50 cm high. Leaves rosette below, obovate-rounded, spinulose-dentate, up to 6.5 × 2.5 cm, upper one alternate, lanceolate-oblong, base amplexicaul. Heads long-peduncled, in compound corymbose panicles, golden yellow. Involucral bracats multi seriate; innermost oblong, one nerved, rounded at apex, up to 1 mm long; receptacle glabrous. Achenes very minute, up to 0.5 mm long, glabrous, oblong, black with white, 3 mm long pappus.

Fl. & Fr. : Oct.-Jan.

Distrib. : Throughout India, Bhutan and Bangladesh, Eastward to Myanmar, China.

Specimens examined : Barwadih, 405.

Notes : Common on hill slopes.

8. BREEA Less.

Breea arvensis (L.) Less., Syn. Comp. 9. 1832; Kitamura in Hara, Enum. Fl. Pl. Nepal 3: 17. 1982; Hajra in Hajra *et al.*, Fl. Ind. 12: 155. 1995. *Cirsium arvense* (L.) Scop., Fl. Carn. ed. 2. 2: 126. 1772; Hu in Quart. J. Taiwan Mus. 19: 52. 1966. *Serratula arvensis* L., Sp. Pl. 820. 1753; *Cnicus arvensis* (L.) Roth., Catalecta Bot. 1: 115. 1797; Hook.f. in Fl. Brit. India 3. 362. 1881; Haines, Bot. Bihar & Orissa 2: 515. 1961 (Rep. ed.).

Perennial, much branched, 40-60 cm high herbs; roots creeping; stems striate. Leaves sessile, white, woolly beneath, pinnatifid, oblong to linear-oblong, tip of lobes and undulate margin spinescent, up to 55 × 20 mm. Heads solitary or fascicled, 1.5-2.5 cm long, 1 cm across, campanulate, with lax involucre. Involucral bracts glabrous with villous margin; outer most triangular, ovate with spinous tip, up to 1.5 cm long; inner longer, linear-lanceolate, scarious, with slightly recurved spinous tip; corolla pinkish violet. Achenes smooth, shining. Pappus white or ashy.

Fl. & Fr. : Jan.-June.

Distrib. : Throughout India, W. Asia and Westward to the Atlantic.

Specimens examined : Daltonganj, 264.

Notes : Common in dry waste barren fields & cultivated lands.

Common name : Beng. : *Silkanta*; Hindi : *Kataila.*

Remarks : *Breea* has been segregated from *Cirsium* on account of its unisexual florets and partial dioecy (Hajra, 1995).

9. CAESULIA Roxb.

Caesulia axillaris Roxb., Pl. Corom. 1: 64. t. 93. 1798; Hook.f. in Fl. Brit. India 3: 291. 1881; Haines, Bot. Bihar & Orissa 2: 499. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 248. 1977; Pant in Hajra *et al.*, Fl. Ind. 13: 2. 1995; Cook in Aquat. Wetland Pl. Ind. 67. 1996.

Erect or decumbent, ascending, glabrous herbs. Leaves with semiamplexicaul base, lanceolate oblong, or linear-oblong, remotely dentate, acute at apex 2.5-6 × 1.5-4 cm. Heads globose, usually 3-4, connate in a common involucre. Involucral bracts 2-seriate, outer-2 larger, inner linear, both scaly. Corolla white, glabrous. Anther with sagittate base, dark brown to black. Achenes dark brown, obovoid, obcordate, winged, ribbed, up to 2.5 × 2 mm. Pappus-0.

Fl. & Fr. : Sept.-Apr.

Distrib. : Throughout India, Nepal, Myanmar.

Specimens examined : Netarhat, 202.

Notes : Common, in marshy areas and agricultural fields, throughout the district.

Remarks : Habit of the plants highly variable.

10. CENTAUREA L.

Centaurea cyanus L., Sp. Pl. 911. 1753; Hook.f. in Fl. Brit. India 3: 384. 1881. Bailey in Man Cult. Pt. 1027. 1963 (Rep. ed.); Hajra in Hajra *et al.*, Fl. Ind. 12: 165. 1995.

Slender, branched herbs, up to 30-60 cm high, woolly white when young. Leaves linear, 6-7 cm long, entire or slightly lobed lower, sometimes pinnatifid. Heads naked on slender peduncle, blue-purple; peduncle 4-5 cm long. Involucral bracts many seriate, outer most smallest, 3 mm long, margin hairy and innermost longest, 1.3 cm long, apex toothed, marginal flower enlarged to resemble ray-florets.

Fl. : Mar. Exotic.

Distrib. : Native of S.E. Europe but escaped in N. America also to India.

Specimens examined : Netarhat, 79.

Notes : Commonly planted in the gardens, rarely found as an escape.

11. CENTIPEDA Lour.

Centipeda minima (L.) A.Br. & Aschers., Ind. Sem. Hort, Berol. App. 6. 1867; Alston in Trimen, Handb. Fl. Ceylon 6: 170. 1931; Grierson in Dassanayake, Rev. Handb. Fl. Ceylon 1: 236. 1980; Naithani in Hajra *et al.*, Fl. Ind. 12: 48. 1995. *Artemisia minima* Linn., Sp. Pl. 849. 1753. *Cotula minima* (Linn.) Willd., Sp. Pl. 3: 2170. 1803. *Centipeda orbicularis* Lour., Fl. Cochinch. 493. 1790; C.B. Clarke in Comp. Ind. 151. 1876; Hook.f. in Fl. Brit. India 3: 317. 1881; Trimen, Handb. Fl. Ceylon 3: 42. 1895; *Myriogyne minura* (Forst.) Less., Linnaea 6: 219. 1831. *Cotula minuta* Forst., Prodr. 57. (no. 301) 1786.

Prostrate herbs, up to 15 cm long; stems minutely glandular papillate, otherwise glabrous. Leaves oblanceolate or spathulate, 5-11 × 2-4 mm, slightly fleshy, coarsely toothed, acute at apex, attenuate at base, slightly puberulous and glandular beneath. Heads subglobose, 2-4 mm diam., more or less sessile on leaf axils. Involucral bracts up to 1.7 mm long, glabrous. Flowers yellow; female flower numerous with small tubular corolla, up to 0.3 mm long; hermaphrodite flowers up to 0.7 mm long. Achenes narrowly oblanceolate, slightly 4-angled, up to 1 mm long, with spongy apical corona. Pappus 0.

Fl. & Fr. : Aug.-Jan.

Distrib. : India, Sri Lanka, Afghanistan, Australia, Pacific Islands and Tropical Western Asia.

Specimens examined : Mahammadganj, 1019. Helophyte.

Notes : Common near the margin of irrigation canal (North Koel Dam).

Common name : Beng. : *Mechita*; Hindi : *Nak-Chikni*.

12. CENTRATHERUM Cass.

Centratherum anthelminticum (L.) Kuntze, Rev. Gen. Pl. 1: 320. 1891; Babu, Herb. Fl. Dehra Dun 251. 1977. *Conyza anthelmintica* L., Sp. Pl. ed. 2: 1207. 1763. *Vernonia anthelmintica* (L.) Willd., Sp. Pl. 3: 1634. 1803; Hook.f. in Fl. Brit. India 3: 251. 1881; Haines, Bot. Bihar & Orissa 2: 483. 1961 (Rep. ed.).

Erect, glandular pubescent herbs; stems terete with longitudinal striation. Leaves elliptic-lanceolate, serrate, acute to acuminate at apex, cuneate at base, sessile, pubescent on both surfaces, up to 9.5 × 4 cm. Heads stout by a stout peduncle; peduncle up to 2 cm long, sometimes subcorymbose. Involucral bracts 3-seriate, outer most shorter and gradually longer, oblong-lanceolate, mucronate at apex, hairy without. Achenes brown, hairy, 10-ribbed, provided with 2 whorls of white pappus. Outer whorl shorter, paleaceous, inner whorl longer and denticulate.

Fl. & Fr. : Jan.-Mar.

Distrib. : Throughout India, from Kashmir to Sri Lanka, Malacca & Afghanistan.

Specimens examined : Netarhat, 191.

Notes : Common in the forest undergrowth.

Common name : Beng. : *Somraj*; Hindi : *Somraj, Buckshi*; Santal : *Saaraj*.

Uses : Achenes used for thread worms.

13. CONYZA Less.

1a. Capitula in corymbiform panicle :

- 2a. Plants with viscid-glandular hairs .... 4. *C. leucantha*
- 2b. Plants without viscid-glandular hairs :
  - 3a. Capitula morethan 3 mm across; achenes more than 1 mm long .... 3. *C. japonica*
  - 3b. Capitula less than 3 mm across; achenes less than 1 mm long .... 5. *C. stricta*

1b. Capitula in racemiform panicle :

- 4a. Achenes more than 1 mm long; pappus brown .... 1. *C. bonariensis*
- 4b. Achenes less than 1 mm long; pappus white .... 2. *C. canadensis*

1. Conyza bonariensis (L.) Cronq., Bull. Torrey Bot. Club. 70: 632. 1943; Grierson, Ceylon. J. Sci. Biol. Sci. 10: 53. 1972 et in Rev. Handb. Fl. Ceylon 1: 158. 1980; Kitamura & Gould in Enum. Fl. Pl. Nep. 3: 21.

1982; Hajra in Hajra *et al.*, Fl. Ind. 12: 104. 1995. *Erigeron bonariensis* L., Sp. Pl. 863. 1753. *Erigeron linifolius* Willd., Sp. Pl. 3: 1955. 1803; Hook.f. in Fl. Brit. India 3: 254. 1881. *Conyza ambigua* DC., Fl. Fr. 6 (Suppl.) 468. 1815; Haines, Bot. Bihar & Orissa 2: 488. 1961 (Rep. ed.).

Erect, annual herbs, 30-80 cm high; stems appressed hairy and with spreading trichomes. Lower leaves narrowly oblanceolate, up to 10 × 1 cm, acute at apex, attenuate at base, margin coarsely serrate-dentate or pinnatifid, pubescent on both surfaces, with few trichomes on the midrib beneath; upper leaves smaller, linear-lanceolate, with entire margin. Heads up to 4 mm across. Involucral bracts densely pubescent, with purplish tip, up to 4 mm long. Female flower yellowish, corolla 3-4 mm long, minutely ligulate at apex. Corolla of bisexual flower up to 3 mm long. Achenes up to 1.2 mm long, subglabrous. Pappus brown, as long as corolla.

Fl. & Fr. : Apr.-July.

Distrib. : Native of S. America; now introduced to S. Europe, India and other countries. Exotic.

Specimens examined : Maromar, 512.

Notes : Rare along the road sides.

2. Conyza canadensis (L.) Cronq. in Bull. Torr. Bot. Club 70: 632. 1943; Kitamura & Gould in Enum. Fl. Pl. Nep. 3: 21. 1982; Hajra in Hajra *et al.*, Fl. Ind. 12: 105. 1995. *Erigeron canadensis* L., Sp. Pl. 863. 1753; Hook.f. in Fl. Brit. India 3: 254. 1881.

Herbs, stems ribbed, hairy throughout. Leaves linear-lanceolate, sometimes pinnatifid, pubescent, 4-6 cm long, acute to apiculate. Heads combined in to large leafy panicles. Involucral bracts 2-3 seriate, linear, acuminate, pubescent, 3-4 mm long. Corolla white to light yellow. Achenes 0.5 mm long, thinly hairy with a crown of white pappus. Pappus as long as corolla.

Fl. & Fr. : Mar.-May.

Distrib. : All warm countries, probably native of N. America.

Specimens examined : Netarhat, 80.

Notes : Infrequent in forest undergrowth.

3. **Conyza japonica** (Thumb.) Less., Syn. Comp. 204. 1832; Hook.f. in Fl. Brit. India 3: 258. 1881; Haines, Bot. Bihar & Orissa 2: 489. 1961 (Rep. ed.); Hajra in Hajra *et al.*, Fl. Ind. 12: 105. 1995. *Erigeron japonicum* Thumb., Fl. Jap. 312. 1784.

Small herbs, up to 25 cm long; stems villous, with striations. Leaves small, alternate, 4-6 × 1 cm, spathulate to oblanceolate, deeply serrate, sessile, sometime amplexicaul, villous. Heads smaller, corymbosely panicled, 4-5 mm in diam., heterogamous. Involucral bracts 2-3 seriate, linear, acuminate at apex, with scarious margin; outer florets female and inner florets bisexual. Achenes very small, 0.5-1 mm long. Pappus as long as corolla.

Fl. & Fr. : Mar.-May.

Distrib. : India, Afghanistan, China & Japan.

Specimens examined : Daltonganj, 49.

Notes : Common, in the dry places.

4. **C. leucantha** (D.Don) Ludlow & Raven, Kew Bull. 17: 71. 1963; Babu, Herb. Fl. Dehra Dun 256. 1977; Hajra in Hajra *et al.*, Fl. Ind. 12: 105. 1995. *Erigeron leucanthum* D.Don., Prodr. Fl. Nep. 171. 1825. *Conyza viscidula* Wall. ex DC., Prodr. 5: 383. 1836; Hook.f. in Fl. Brit. India 3: 258. 1881; Haines, Bot. Bihar & Orissa 2: 488. 1961 (Rep. ed.).

Erect, tall, viscid herbs. Leaves elliptic-lanceolate, subpetiolate at base, acute at apex, margin serrate to subentire, up to 12 × 3.5 cm. Heads up to 4 mm across, many in corymbose panicles. Involucral bracts subequal, purplish tinged, densely glandular hairy, with few long eglandular hairs, margin scarious. Achenes compressed, glabrous, up to 0.5 mm long. Pappus reddish, up to 4 mm long.

Fl. & Fr. : Nov.-Mar.

Distrib. : India, Java, Australia, Philippines.

Specimens examined : Beyangpahar (Kumendi), 714.

Notes : Not common, on the hills.

5. Conyza stricta Willd., Sp. Pl. 3: 1922. 1803; Hook.f. in Fl. Brit. India 3: 258. 1881; Haines, Bot. Bihar & Orissa 2: 488. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 256. 1977.

Erect, hairy, annual herbs. Leaves oblanceolate to spathulate, crenate to subentire, up to 6 cm long, hairy. Heads up to 2.5 cm across, in terminal corymbose panicles. Involucral bracts 2-seriate, linear. Receptacle flat, naked. Achenes compressed, hairy, up to 1.5 mm long. Pappus silky, white, up to 1.5 mm long.

Fl. & Fr. : July-Oct.

Distrib. : Throughout India, Myanmar, Africa & West Asia.

Specimens examined : Netarhat, 758.

Notes : Not common, collected from hills and forest undergrowth.

14. COSMOS Cav.

Cosmos caudatus H.B. & K., Nov. Gen. et. Sp. 4: 188. 1820; Sherff., Field Mus. Nat. Hist. Bot. Ser. 8: 411. 1932; Haines, Bot. Bihar & Orissa 2: 508. 1961 (Rep. ed.), Grierson in Dassanayake, Rev. Handb. Fl. Ceylon 1: 225. 1980. *Cosmos bipinnatus* auct. non Cav.; Trimen in Handb. Fl. Ceylon 3: 40. 1895 in nota.

Erect, annual herbs, up to 1.5 m tall. Leaves bipinnatisect or sometimes tripinnatisect, 5-10 cm long, ultimate segments oblong-lanceolate, 1.5-3 × 3.05-5 cm, acute-apiculate at apex, margin entire, appressed spinulose ciliate; petioles up to 6 cm long. Heads solitary on 10-15 cm long peduncle, sparsely pilose. Involucre campanulate, up to 5 mm diam; outer bracts-8, linear-lanceolate, up to 1 cm long, herbaceous, inner oblong-lanceolate, membranous, erect, up to 1.3 × 0.2 cm. Ray flowers 8, basal tube up to

1.7 mm long, ligule obovate, up to 1.5 × 5 mm, 3-lobed at apex, rose or purple. Disc flowers yellow, corolla up to 8 mm long. Achenes black, up to 1.5 cm long, with up to 1 cm long beak, hispid. Pappus awn-2, retrorsely barbed, divergent, 2-4 mm long.

Fl. & Fr. : Oct.-Dec. Exotic.

Distrib. : Nataive of West Indies and Central America, now introduced in India, Sri Lanka, Mauritius, Philippines.

Specimens examined : Seuti, 1079.

Notes : Cultivated throughout the district, often found as wild in waste places and margins of cultivated fields.

15. CYATHOCLINE Cass.

Cyathocline purpurea (Buch.-Ham. ex D.Don) O. Kuntze, Rev. Gen. Pl. 333. 1891; Babu, Herb. Fl. Dehra Dun 259. 1977; Nair, Fl. Punjab Plains 139. 1978; Hajra in Hajra *et al.*, Fl. Ind. 12: 111. 1995; Cook in Aquat. Wetland Pl. Ind. 68. 1996. *Tanacetum purpureum* Buch.-Ham. ex D.Don, Prodr. Fl. Nepal 181. 1825. *Cyathocline lyrata* Cass. in Ann. Soc. Sci. Nat. Ser. 1. 17: 420. 1829; Hook.f. in Fl. Brit. India 3: 246. 1881; Haines, Bot. Bihar & Orissa 2: 486. 1961 (Rep. ed.).

Erect, much brancheld, densely hairy herbs, 25-30 cm high. Leaves sessile, alternate, lyrate or variously irregularly lobed; lobes dentate acute. Heads in dense panicles, 3-4 mm in diam., rose-purple. Involucral bracts 2-seriate, lanceolate, acute, pubescent, with scarious margin. Achenes oblong, very small, smooth. Pappus 0.

Fl. & Fr. : Nov.-Mar.

Distrib. : Throughout India, Myanmar, Nepal, Thailand to Vietnam.

Specimens examined : Netarhat, 135. Helophyte.

Notes : Common in wet lands and near stream.

16. ECHINOPS L.

Echinops echinatus Roxb. (Hort. Beng. 62. 1814, *nom. nud.*) Fl. Ind. 3: 447. 1832; Hook.f., Fl. Brit. India 3. 358. 1881; Haines, Bot. Bihar & Orissa 2: 515. 1961 (Rep. ed.); Hajra in Hajra *et al.*, Fl. Ind. 12: 178. 1995.

Much branched, spreading, rigid, annual, up to 75 cm high herbs; stems branched from the base, white cottony, pubescent. Leaves sessile, up to 12 cm long, oblong, pinnatifid, glabrous to subglabrous above, white cottony-pubescent beneath, lobes ending in up to 2 cm long rigid spines. Heads compact, globose, 2-3 cm across (excluding the spines). Involucre of each head surrounded by strong white pappus like bristles; outer involucral bracts 6-8, oblanceolate, glabrous, pungent, one or two often produced into 3 cm long spines; inner ones connate, tip ciliate and hardening. Achenes up to 4 mm long, obconic, silky. Pappus yellowish.

Fl. & Fr. : May-Nov.

Distrib.: India, Afghanistan.

Specimens examined : Muhammadganj, 1006.

Notes : Common, in the wastelands.

Common name : Hindi : *Gokru*, Santal : *Jirsa Kanta*.

17. ECLIPTA L.

Eclipta prostrata (L.) Mant. 2: 286. 1771; Moon, Cat. 58. 1824; Sant., J. Bombay Nat. Hist. Soc. 54: 475. 1957; Grierson in Dassanayake, Rev. Handb. Fl. Ceylon 1: 212. 1980; Chowdhery in Hajra *et al.*, Fl. Ind. 12: 381. 1995. *Verbesina prostrata* Linn., Sp. Pl. 902. 1753. *Verbesina alba* L., Sp. Pl. 962. 1753. *Cotula alba* Linn., Syst. 2: 564. 1767. *Eclipta erecta* L., Mant. 2: 286. 1771, *nom. illeg. Eclipta alba* (L.) Hassk., Pl. Jav. Rar. 528. 1848; Hook. f. in Fl. Brit. India 3: 304. 1881; Haines, Bot. Bihar & Orissa 2: 503. 1961 (Rep. ed.).

Diffuse or erect, much branched herbs, often rooting at nodes; stems reddish, appressed pilose. Leaves elliptic-lanceolate, up to 50 × 15 mm, acute at apex, margin entire or faintly serrate, appressed pilose on both

surfaces. Heads globose. Involucres up to 5 mm across. Rayflorets many, white. Disc florets 10-15, white, up to 1.5 mm long. Achenes up to 3 × 1.5 mm, minutely pubescent above. Pappus scales minute.

Fl. & Fr. : Aug.-Jan. Exotic.

Distrib. : Pantropial, probably native of S. America.

Specimens examined : Barwadih, 439. Helophyte.

Notes : Common, near the marshy areas.

Common name : Beng : *Kesut*; Hindi : *Babri*.

Uses : Whole plants used as medicine for hair growth.

18. ELEPHANTOPUS L.

Elephantopus scaber L., Sp. Pl. 814. 1753; Hook.f. in Fl. Brit. India 3: 242. 1881; Prain, Beng. Pl. 1: 590. 1903 (Rep. ed. 1: 433. 1963) & in Rec. Bot. Surv. Ind. 3: 225. 1905; Haines, Bot. Bihar & Orissa 2: 484. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 261. 1977; Uniyal in Hajra *et al.*, Fl. Ind. 13: 339. 1995.

Erect, subscapose, perennial herbs, up to 45 cm high; stems terete, corymbosely branched at top, pubescent. Lower leaves in basal rosette, up to 28 × 6.5 cm, obovate oblong or oblanceolate, sparsely strigose, coarsely serrate or dentate; cauline leaves smaller with somewhat amplexicaul base. Heads in fascicles, peduncled. Involucral bracts ovate, acuminate, up to 11 × 9 mm. Achenes up to 5 mm long, hairy, longitudinally 10-ribbed, cuneate. Pappus bristles-5, rarely-6, hairy, one-serrate, up to 4 mm long.

Fl. & Fr. : Sept.-Dec.

Distrib. : India, Tropical Asia, Australia, Africa.

Specimens examined : Barwadih, 450.

Notes : Common in waste lands and in forest undergrowth.

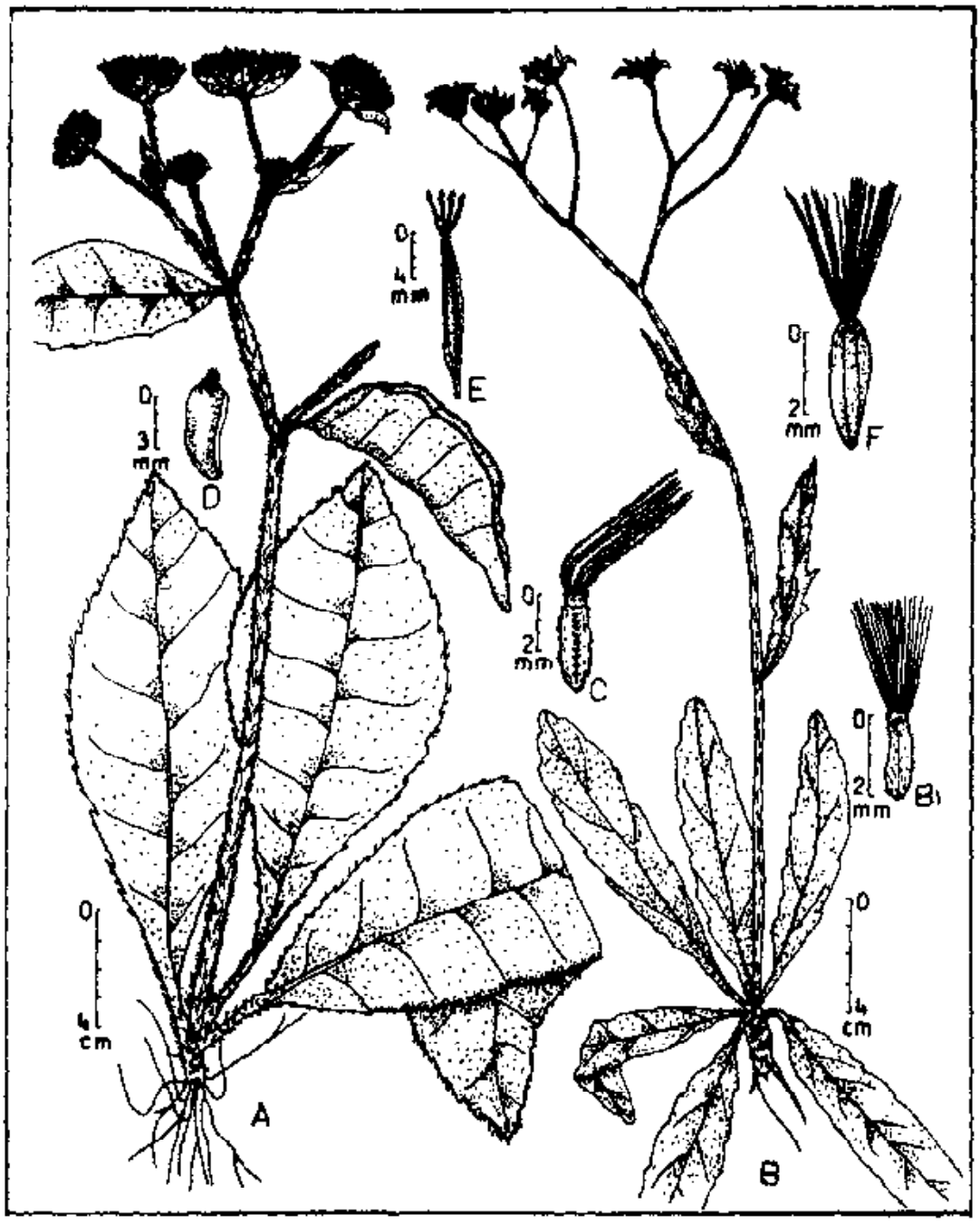


Fig. 21: Asteraceae. (A). *Elephantopus scaber* L.: Habit; (B-B_1): *Senecio nudicaulis* Buch.-Ham. ex D. Don: B. Habit; B_1. Achene; C. *Saussurea heteromalla* (D. Don) Hand.: Achene; D. *Blainvellea acmella* (L.) Philip.: Achene: E. *Bidens biternata* (Lour.) Merra. & Sherff ex Shreff: Achene; F. *Centratherum anthelminticum* (L.) Kuntze: Achene.

Common name : Beng. : *Samdulan*; Hindi : *Gobhi* or *Bajradanri*; Santal : *Manjurjuti.*

Uses : Roots used to check vomitting, and powdered with pepper used for tooth-ache.

19. EMILIA Cassini

Emilia sonchifolia (L.) DC. in Wight, Contr. Bot. Ind. 24. 1834; Fosberg & Sachet in Smithsonian Contrib. Bot. 46: 39. 1880; Hook.f. in Fl. Brit. India 3: 336. 1881; Prain, Beng. Pl. 1: 605. 1903 (Rep. ed. 1: 444. 1963) & in Rec. Bot. Surv. India 3: 227. 1905; Haines, Bot. Bihar & Orissa 2: 513. 1961 (Rep. ed.); Garabedian in Kew Bull. 141. 1924. Babu, Herb. Fl. Dehra Dun 261. 1977; Mathur in Hajra *et al.*, Fl. Ind. 13: 212. 1995. *Cacalia sonchifolia* L., Sp. Pl. 835. 1753.

Much branched, diffused or erect herbs, about 18 cm long; stems glabrous, with longitudinal striations. Lower leaves 3-4 cm long, with lyrate base, upper cauline or somewhat amplexicaul, with scattered hairs. Heads homogamous. Involucral bracts linear-oblong, with acute tip, up to 1 cm long, bracts reflexed after shedding the fruits. Peduncle up to 7 cm long. Achenes up to 3 mm long, brown, 5-ribbed, with a crown of white pappus.

Fl. & Fr. : Mar.-July. Exotic.

Distrib. : India, China, Asia, Africa, Native of Afro-Asian region.

Specimens examined : Netarhat, 174; Daltonganj, 333.

Notes : Common along road sides and barren cultivated fields.

Common name : Beng. : *Sadhimodi*; Hindi : *Hiran Khuri.*

Uses : Decoction of herbs used in bowel complaints. Juice of the leaves used in night blindness.

20. ENYDRA DC.

Enydra fluctuans Lour., Fl. Cochinch. 511. 1790; Hook.f. in Fl. Brit. India 3: 304. 1881; Prain, Beng. Pl. 1: 610. 1903 (Rep. ed. 1: 448. 1963)

& in Rec. Bot. Surv. Ind. 3: 228. 1905; Haines, Bot, Bihar & Orissa, 2: 503. 1961 (Rep. ed.); Chowdhery in Hajra *et al.*, Fl. Ind. 12: 384. 1995; Cook in Aquat. Wetland Pl. Ind. 69. 1996.

Profusely branched, annual, puberulent herbs; branches up to 50 cm long. Leaves up to 5 × 1 cm, oblong or linear-oblong, acute at apex, truncate at base, margin distantly dentate. Heads terminal, 1 cm diam., involucral bracts-4, up to 1.5 × 1.2 cm, pale yellowish-green. Ray florets female, many seriate, with 3-4 toothed ligule; disc florets bisexual. Achenes black, glabrous, up to 5 mm long.

Fl. & Fr. : Dec.-Feb.

Distrib. : India, Trop. Africa, China & Malaya.

Specimens examined : Barwadih, 404. Helophyte.

Notes : Common, along the edges of ponds, ditches and in marshy areas.

Common name : Hindi : *Hachuch*; Beng. : *Hingcha* or *Hinche*.

Uses : Leaves and stems eaten as vegetable, also used in cutaneous and nervous affections.

21. ERIGERON L.

Erigeron sublyratus DC. in Wight, Contrib. 9. 1834 et Prodr. 5: 292. 1836; Grierson in Dassanayake, Rev. Handb. Fl. Ceylon 1: 153. 1980; Hajra in Hajra *et al.*, Fl. Ind. 12: 125. 1995. *Erigeron asteroides* Roxb., Fl. Ind. 3: 432. 1832 (non Andrz. ex Besaer 1821); Hook.f. in Fl. Brit. India 3: 254. 1881; Haines, Bot. Bihar & Orissa 2: 486. 1961 (Rep. ed.).

Erect, hairy herbs, up to 45 cm tall. Leaves lanceolate or spathulate, obtuse at apex, auriculate or semiamplexicaul at base, margin coarsely toothed, puberulous on both surfaces, up to 6 × 1 cm. Heads 4-5 cm across, axillary solitary or several in loose racemes. Involucral bracts linear-laneolate, puberulous along midrib, margin scarious. Ray florets many, pink, ligulate. Eligulate female flowers up to 2 mm long. Disc flower yellow. Achenes cylindrical, up to 0.7 mm long. Pappus white, up to 3.5 mm long.

Fl. & Fr. : July-Dec.

Distrib. : India, Nepal.

Specimens examined : Netarhat, 770.

Notes : Rare, near the stream and forest edges.

22. ERECHTITES Rafin.

Erechtites valerianaefolia (Wolf.) DC., Prodr. 6: 295. 1838. Alston in Trimen, Handb. Fl. Ceylon 6: 170. 1931 et Kandy Fl. 52. 1938; Belcher, Ann. Mo. Bot. Gard. 43. 25. 1956; Baker & Bakh.f., Fl. Java 2: 424. 1965; Grierson in Dassanayake, Rev. Handb. Fl. Ceyl. 1: 243. 1980; Mathur in Hajra *et al.*, Fl. Ind. 13: 216. 1995. *Senecio valerianaefolia* Wolf., Ind. Sem. Hort. Berol. 1825, teste Reichenb., Ic. Bot. Exot. 59. t. 85. 1827.

Herbs, 30-100 cm tall; stems slightly angled, pubescent. Lower leaves petiolate, ovate-lanceolate, up to 10 × 4 cm (including 3-4 cm long petiole), dentate, mucronate at apex, middle and upper leaves pinnatisect; segments oblong-lanceolate, up to 3.5 × 1 cm, acuminate at apex, margin sharply serrate. Involucre 3-5 mm broad, campanulate, uniseriate, linear. Flowers reddish or mauve; corolla of female flowers 7-8 mm long, lobes 5, linear, acute, of bisexual flowers 8-9 mm long. Achenes up to 3 mm long, brown, finely or sparsely puberulous. Pappus hair white at base, pink above, 7-8 mm long, caducous.

Fl. & Fr. : Jan.-May. Exotic.

Distrib. : Native to Central and South America, now adventive in Malaya, Australia, Polynesia, China, Japan and India.

Specimens examined : Upper Ghagri (Netarhat), 78 & 803.

Notes : Not common, road sides.

23. EUPATORIUM L.

Eupatorium cannabinum L. ssp. **asiaticum** Kitam. var. **heterophyllum** (DC.) Kitam. in Acta Phyt. Geobot. 32: 139. 1981.

Kitamura & Gould in Hara, Enum. Fl. Pl. Nepal 3: 27. 1982; Uniyal in Hajra *et al.*, Fl. Ind. 12: 352. 1995. *Eupatorium heterophyllum* DC., Prodr. 5: 180. 1836. *E. cannabinum* auct. non L. Hook.f. in Fl. Brit. India 3: 243. 1881 *pro parte.*

Erect shrubs, up to 1 m high. Leaves simple or trisect, lanceolate, up to 6 × 2.5 cm, acuminate or slightly caudate at apex, coarsely serrated; petioles slender, up to 1 cm long. Heads in terminal corymbs, up to 1.5 × 0.5 cm. Involucral bracts many seriate, outer ones smaller, inner ones longer and oblong, up to 6 mm long, acute, scarious. Corolla tubular, 5-lobed, all equal, up to 5 mm long. Achenes 4-5 mm long, 5-angled. Pappus uniseriate, as long as corolla tube.

Fl. & Fr. : July-Sept.

Distrib. : Temperate Asia and Europe.

Specimens examined : Netarhat, 792.

Notes : Commonly planted as hedge plants, often found as an escape.

Uses : Plants diuretic, cathartic and emetic; also used as purgative.

24. GALINSOGA Ruiz. & Pav.

Galinsoga parviflora Cav., Ic. et Descr. Bl. 3: 41. t. 281. 1796; Hook.f. in Fl. Brit. India 3: 311. 1881; Prain, Bengal Plant 1: 454. 1963 (Rep. ed.); Chowdhery in Hajra *et al.*, Fl. Ind. 12: 387. 1995.

Glabrous herbs; stems striate. Leaves opposite, up to 3.5 × 2.2 cm, toothed, broadly ovate, oblong-lanceolate, acute to rounded at apex, with 3 basal nerves; petioles up to 1.5 cm long, pubescent. Heads small, terminal or axillary, heterogamous, rayed, 5 mm in diam., peduncle 1.5 cm long, hairy. Involucral bracts 2-seriate, outer ovate, acute at apex, 2.5 × 1.5 mm, 3-4 nerved, inner bracts narrow lanceolate, 3 nerved, 3 × 1 mm. Ray florets few, all female, 1-seriate; disc florets all fertile, bisexual. Receptacle conical, bracts reflexed after shedding fruits. Achenes 1-1.5 mm long, angled, tapering towards base, black, hairy, with crown of pappus. Pappus as long as corolla tube, scarious, scaly.

Fl. & Fr. : Feb.-Apr.

Distrib. : Throughout India. Cosmopolitan weed.

Specimens examined : Netarhat, 131.

Notes : Not common, found at higher elevations.

25. GNAPHALIUM L.

1a. Capitula in simple or branched spikes .... 1. *G. polycaulon*

1b. Capitula in rounded axillary or terminal clusters .... 2. *G. pulvinatum*

1. Gnaphalium polycaulon Pers., Syn. Pl. 2: 421. 1807; Grierson in Notes Roy. Bot. Gard. Edinburgh 31. 137. 1971; Pant in Hajra *et al.*, Fl. Ind. 13: 91. 1995. *Gnaphalium multicaule* Willd., Sp. Pl. 3: 3. 1888 (non Lamk.). *G. indicum* auct. non. L. Hook.f. in Fl. Brit. India 3: 289. 1881; Prain, Beng. Pl. 1: 602. 1903 (Rep. ed. 1: 442. 1963) & in Rec. Bot. Surv. India 3: 227. 1905; Haines, Bot. Bihar & Orissa 2: 498. 1961 (Rep. ed.).

Erect herbs, 7-15 cm high or decumbent, much branched from base, densely white cottony. Leaves linear-obovate or linear-spathulate, with a narrowed base, obtuse at apex. Heads up to 3 mm across, subsessile, silvery woolly, in simple or branched spikes, intermingled with narrow leaves. Involucral bracts straw coloured, linear-lanceolate, acute, woolly, inner bracts subglabrous; receptacle concave, 1-1.5 mm in diam. Achenes oblong. Pappus hairy, free.

Fl. & Fr. : Dec.-May.

Distrib. : Throughout India, Myanmar, China, Japan, Australia.

Specimens examined : Daltonganj, 27; Netarhat, 99.

Notes : Common throughout the district, in low lands and rice fields.

2. G. pulvinatum Del., Fl. Aegypt. t. 44. 1812; Hook.f. in Fl. Brit. India 3: 289. 1881; Haines, Bot. Bihar & Orissa 2: 498. 1961 (Rep. ed.); Pant in Hajra *et al.*, Fl. Ind. 13: 92. 1995.

Small, woolly, up to 10 cm high herbs; stems many, spreading from base. Leaves small, narrow, spathulate, up to 35 × 5 mm, apiculate at apex, woolly on both surfaces. Heads in rounded, axillary or terminal clusters. Involucral bracts up to 2 mm long, linear-lanceolate, hyaline, acute at apex. Achenes slender, minutely papillose. Pappus hairs free throughout, as long as corolla tube.

Fl. & Fr. : Oct.-Jan.

Distrib. : Throughout the plains of India & Egypt, Pakistan, China.

Specimens examined : Netarhat, 93.

Notes : Common in waste lands and barren cultivated fields.

26. GRANGEA Adanson

Grangea maderaspatana (L.) Poir. in Lamk., Encyl. Suppl. 2: 825. 1812; Hook.f. in Fl. Brit. India 3: 247. 1881; Prain, Beng, Pl. 1: 593. 1903; (Rep. ed. 1: 435. 1963) & in Rec. Bot. Surv. India 3: 225. 1905; Haines, Bot. Bihar & Orissa 2: 436. 1961 (Rep. ed.); Hajra in Hajra *et al.*, Fl. Ind. 12: 127. 1995. *Artemisia maderaspatana* L., Sp. Pl. 849. 1753.

Prostrate ascending herbs, branched from common root stock, sometimes suberect; stems angular, pubescent. Leaves sessile, sinuate-pinnatifid, lobes distantly toothed, basal leaves up to 5 cm long, gradually smaller towards apex. Heads solitary, 7 mm in diam., yellow; peduncle 8 mm long, hairy. Involucral bracts 2-seriate, outer oblong, acute, 2 mm long, inner elliptic-rounded. Outer florets female; disc florets bisexual. Corolla tube 1.5 mm long. Achenes 2 mm long, brown. Pappus connate into a cylindric fimbriate tube.

Fl. & Fr. : Dec.-May.

Distrib. : India, tropical and sub-tropical Asia & Africa.

Specimens examined : Daltonganj, 12. Helophyte.

Notes : Common in exposed fields, throughout the district.

Common name : Beng. : *Namuti*; Hindi : *Mustaru*; Santal : *Vedia Chim*.

27. GUIZOTIA Cass.

Guizotia abyssinica (L.f.) Cass. in Dict. Sci. Nat. 59: 248. 1829; Hook.f. in Fl. Brit. India 3: 308. 1881; Ramam. in Sald. & Nicol., Fl. Hassan 617. 1976. Haines, Bot. Bihar & Orissa 2: 507. 1961 (Rep. ed.), Prain, Beng. Pl. 1: 451. 1963 (Rep. ed.); Chowdhery in Hajra *et al.*, Fl. Ind. 12: 395. 1995. *Polymnia abyssinica* L.f., Suppl. 383. 1781.

Erect leafy, sparsely hairy herbs. Leaves opposite or upper alternate, linear or oblong-lanceolate, acute at apex, subamplexicaul at base, serrate, 7-10 cm long. Heads solitary, 1.5-2 cm across, on 2.5-4 cm long peduncle, axillary and terminal, rayed, yellow. Involucral bracts 5, sub 2-seriate, outer foliaceous, inner paleaceous, up to 5 × 3 mm. Ray florets female, uniseriate; ligule 2-3 toothed. Disc florets bisexual. Achenes of ray florets 3, of disc florets 4 angled. Pappus 0.

Fl. & Fr. : Dec.-Mar. Exotic.

Distrib. : Native of tropical Africa, cultivated in various parts of India.

Specimens examined : Netarhat, 72 & 761.

Notes : In dry exposed areas, as an escape from cultivation.

Common name : Beng. : *Ramtil*; Hindi : *Sarguja, Kalatil.*

Uses : Seeds yield an oil (Niger seed oil) used in food, paints, soap and for adulteration of Rape and Sesame oils. Seed cake used as manure or cattle feed.

28. LAGASCEA Cav.

Lagascea mollis Cav., Anal. Cienc. Nat. 6: 332. t. 44. 1803; Hook.f. in Fl. Brit. India 3: 302. 1881; Ramam. in Sald. & Nicol. Fl. Hassan 618. 1976. Chowdhery in Hajra *et al.*, Fl. Ind. 12: 397. 1995.

Much branched, annual herbs; stems grooved, pubescent above, glabrous beneath. Leaves alternate, rhomboid-ovate, up to 3.5 × 1.7 cm, pubescent on both surfaces, acuminate at apex, entire to subcrenate; petioles up to 12 mm long, pubescent. Heads 1-flowered, white, crowded

in clusters, on slender peduncle. Involucral bracts tubular of 5-connate, elliptic, silky leaves, up to 1 cm long. Receptacle hairy, tubercled. Achenes cuneate, compressed or 3-angled, up to 2.5 mm long, black. Pappus obscure, of a toothed or fimbriate rim.

Fl. & Fr. : July-Mar. Exotic.

Distrib. : Native of Central America, now introduced in many warmer countries.

Specimens examined : Mandal, 426.

Notes : Infrequent in waste places and in forest undergrowth.

29. LAGGERA Sch. - Bip. ex Koch.

1a. Stems 4-winged, from decurrent leaf bases, wing entire, pubescent, eglandular .... 1. *L. alata*

1b. Stems unwinged, covered with long, pilose hairs and shorter stipitate glands .... 2. *L. aurita*

1. Laggera alata (D.Don) Sch.-Bip. ex Oliv. in Trans. Linn. Soc. 29: 94. 1873; Hook.f. in Fl. Brit. India 3: 271. 1881; Haines, Bot. Bihar & Orissa 2: 489. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 273. 1977; Kumar in Hajra *et al.*, Fl. Ind. 13: 148. 1995.*Erigeron alatum* D. Don, Prodr. 171. 1825. *Blumea alata* (D.Don) DC., Prodr. 5: 488. 1836; Grierson in Ceylon J. Sci. 11: 12. 1974 et. in Dassanayake, Rev. Handb. Fl. Ceyl. 1: 167. 1980.

Much branched herbs; stems erect, 4-winged from decurrent leaf bases, wings entire, pubescent, eglandular. Leaves oblong, sessile, decurrent at base, acute at apex, margin serrate, pubescent on both surfaces, 2-8 × 1-1.5 cm. Heads pendulous, many in lax panicles. Involucral bracts 6-7 seriate, purple-tipped, outer one squarrose, linear-lanceolate, 2-6 mm long. Achenes linear-oblong, brown, ribbed, up to 1 mm long. Pappus white, up to 6 mm long.

Fl. & Fr. : Nov.-Mar.

Distrib. : India, Myanmar, Malaya, China, Trop. Africa etc.

Specimens examined : Netarhat, 115.

Notes : Infrequent in grasslands at higher altitude.

Common name : Santal : *Charsira dare.*

2. Laggera aurita (L.f.) Benth. ex Clarke, Comp. Ind. 92. 1876; Hook.f. in Fl. Brit. India 3: 271. 1881; Haines, Bot. Bihar & Orissa 2: 490. 1961 (Rep. ed.); Kumar in Hajra *et al.*, Fl. Ind. 13: 150. 1995. *Conyza aurita* L.f., Suppl. 367. 1781. *Blumea aurita* (L.f.) DC. in Wight, Contrib. 16. 1834 et Prodr. 5: 449. 1836; Grierson in Dassanayake, Rev. Handb. Fl. Ceyl. 1: 168. 1980.

Erect viscid herbs, strongly aromatic; stems covered with long spreading, white, pilose hairs and shorter stipitate glands. Lower leaves pinnatifid with elliptic or oblanceolate terminal segments and 2-3 oblong lateral lobes on each side; upper leaves oblong or obovate, dentate, auriculate and interruptedly decurrent at base, covered on both surface with villous hairs and many stipitate glands. Heads in terminal corymbs. Involucral bracts 3-4 seriate, linear-lanceolate, pubescent, glandular. Achenes subcompressed, brown, up to 1 mm long. Pappus white, up to 4 mm long.

Fl. & Fr. : Dec.-Mar.

Distrib. : India, Myanmar, Bangladesh, Tropical Africa.

Specimens examined : Betla, 39.

Notes : Infrequent on the walls of ruins.

30. LAUNAEA Cass.

1a. Prostrate stoloniferous herbs; pappus more than 5 mm long .... 2. *L. sarmentosa*

1b. Erect herbs, not stoloniferous; pappus less than 5 mm long .... 1. *L. asplenifolia*

1. Launaea asplenifolia (Willd.) Hook.f. in Fl. Brit. India 3: 415. 1881; Haines, Bot. Bihar & Orissa 2: 521. 1961 (Rep. ed.); Mamgain & Rao in Hajra *et al.*, Fl. Ind. 12: 306. 1995. *Prenanthes asplenifolia* Willd.,

Sp. Pl. 3: 1540; 1803. *Microrhynchus asplenifolius* (Willd.) DC., Prodr. 7: 181. 1838.

Annual herbs, glabrous, root-stock thick. Leaves subsessile or shortly petioled, up to 9 cm long, linear-obovate, sinuate-pinnatifid, acute; lobe denticulate, denticulations white. Inflorescence paniculate, arises from the root stock, few, up to 14 cm long; peduncle with few scattered bracts. Heads up to 7 mm long, 3-4 mm in diam., yellow. Involucral bracts glabrous, outer small, inner linear, as long as head, apex acute. Pappus 3-4 mm long, silky.

Distrib. : India, Andaman & Nicobar Islands.

Specimens examined : Simultarh village, (Daltonganj), 335.

Notes : Not common, found in waste places & in cultivated fields.

Common name : Beng. : *Tik-chana*; Hindi : *Titlia*; Santal : *Birmalla*.

2. Launaea sarmentosa (Willd.) Sch. Bip. ex Kuntze, Rev. Gen. Pl. 1: 350. 1891; Alston in Trimen, Handb. Fl. Ceyl. 6: 173. 1931; Grierson in Ceylon. J. Sci., Biol. Sci. 60. 1972 et in Dassanayake, Rev. Handb. Fl. Ceylon 1: 276. 1980; Mamgain & Rao in Hajra *et al.*, Fl. Ind. 12: 310. 1995. *Prenanthes sarmentosa* Willd., Phytogr. 10. t. 6. f. 2. 1794. *Launaea pinnatifida* Cass., Ann. Sci. Nat. Paris 23: 85. 1831; Hook.f. in Fl. Brit. India 3: 416. 1881; Haines, Bot. Bihar & Orissa 2: 521. 1961 (Rep. ed.).

Slender, perennial, prostrate, stoloniferous herbs, with rosettes of leaves, rooting at each rosette. Leaves rosulate, 1.5-9 × 0.4-1.5 cm, oblanceolate or spathulate, acute at apex, attenuate at base, margin denticulate, teeth indurated white, glabrous in both surfaces. Heads solitary, born on 0.5-3 cm long peduncles. Involucre urceolate, campanulate, 1-1.5 cm long, 3-4 seriate, glabrous, with pale-whitish, scarious margins, outer ones ovate, inner ones lanceolate. Flowers yellow, tubes 4-5 mm long. Achenes black, 2-6 mm long, 4-5 ribbed, glabrous, minutely wrinkled. Pappus homogeneous, white, 7-10 mm long.

Fl. & Fr. : June-Sept..

Distrib. : India, Malaysia, E. Africa, Mauritius.

Specimens examined : Upper Ghagri (Netarhat), 773.

Notes : Rare, found in the open forest.

Uses : The plants used as tonic, soporific, diuretic, and aperient, considered useful as a sand binder. Leaves consumed in times of scarcity.

31. MIKANIA Willd.

Mikania micrantha Kunth. in H.B.K, Nov. Gen. Sp. 4: 134. 1820; Uniyal in Hajra *et al.*, Fl. Ind. 12: 357. 1995. *Mikania cordata* (Burm.) Robins., Contr. Gray Herb. 104. 65. 1934; Koster in Blumea 1: 504. 1935; Grierson in Dassanayake, Rev. Handb. Fl. Ceylon 1: 146. 1980. *Eupatorium cordatum* Burm., Fl. Ind. 176. t. 58. f. 2. 1768. *Mikania scandens* auct. non. L.; Clarke in Comp. Ind. 34. 1876; Hook.f. in Fl. Brit. India 3: 244. 1881.

Extensive, twining herbs, pubescent or glabrous. Leaves deltoid-ovate, up to 10 × 6 cm, acute to acuminate at apex, cordate at base, margin undulate-dentate or entire; petioles up to 3 cm long. Heads cylindrical, many in corymb, born on short axillary branches. Involucral bracts membranous, up to 4 mm long. Corolla whitish, up to 5 mm long. Achenes narrowly oblong, up to 3 mm long, glandular, glabrous. Pappus white, up to 3 mm long.

Fl. & Fr. : Oct.-Mar.

Distrib. : Tropical Asia, Philippines, and Tropical Africa.

Specimens examined : Kumendi, 709.

Notes : Common weed at the edges of forests and villages.

32. PARTHENIUM L.

Parthenium hysterophorus L., Sp. Pl. ed. 1: 988. 1753; Aiton in Hort. Kew. 5. 180. 1813; Masters in J. Agril. Hort. Soc. Ind. 3(2): 10 and 103. 1844; Rao, J. Bombay Nat. Hist. Soc. 54: 218. 1956; Chowdhery in Hajra *et al.*, Fl. Ind. 12: 403. 1995.

Annual, much branched herbs, up to 1 m high; stems longitudinally ridged and finely pubescent. Leaves pinnatifid up to, 10 cm long. Heads in terminal panicles, up to 4 mm across. Involucral bracts 2-seriate, outer 5, ovate-acute, hairy, up to 2.3 × 1.5 mm, inner ones hyaline, orbicular, fimbriate, up to 2.5 × 2.5 mm. Ray florets-5, very small, white. Corolla of disc flower tubular, up to 2 mm long.

Fl. & Fr. : Dec.-Apr. Exotic.

Distrib. : Native of West Indies, C. & N. America, introduced in India.

Specimens examined : Daltonganj, 330.

Notes : Common weed on the Koel river bank and along the road sides.

Remarks : It is an obnoxious plant and said to be breathing alergetic.

33. PENTANEMA Cass.

Pentanema indicum (L.) Ling in Acta Phyt. Sin. 10: 179. 1965; Gould in Hara, Enun. Fl. Pl. Nepal 3: 35. 1982; Kumar in Hajra *et al.*, Fl. Ind. 13: 28. 1995. *Inula indica* L., Sp. Pl. ed. 2. 1236. 1762. *Vicoa indica* (L.) DC. in Wt., Contrib. 10; 1834; Haines, Bot. Bihar & Orissa 2: 500. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 288. 1977. *Vicoa auriculata* Cass., Ann. Sci. Nat. Paris, ser. 1. 17: 418. 1829; Hook.f. in Fl. Brit. India 3: 297. 1881.

Erect, viscid herbs, about 45-60 cm high; stems reddish-brown, terete, glabrous with age. Leaves oblong-lanceolate, acute at apex, amplexicaul at base, entire, scabrid. Heads solitary on long peduncle, 6-8 mm in diam., yellow. Involucral bracts 3-4 seriate, lanceolate, acute to acuminate; receptacle convex. Ray florets radiating. Achenes small, pubescent, with white pappus. Pappus as long as corolla tube, uniseriate.

Fl. & Fr. : Sept.-Apr.

Distrib. : Throughout drier parts of India and Sri Lanka, Pakistan, Myanmar, China, Thailand, Africa.

Specimens examined : Netarhat, 129.

Notes : Common in exposed dry waste lands and hill slopes, way to Upper Ghagri.

34. SAUSSUREA DC.

Saussurea heteromalla (D.Don) Hand. Mazz., Symb. Sin. 7: 1152. 1936; Raizada & Saxena in Ind. For. 92: 322. 1966; Hajra in Hajra *et al.*, Fl. Ind. 12: 202. 1995. *Corduus heteromallus* D.Don., Prodr. 166. 1825. (excl. syn.). *Saussurea candicans* (DC.) Sch. Bip. in Linnaea 19: 330. 1846; Clarke, Comp. Ind. 232. 1876; Hook.f. in Fl. Brit. India 3: 373. 1881; Haines, Bot. Bihar & Orissa 2: 516. 1961 (Rep. ed.).

Large herbs, 70-90 cm high. Leaves cottony or white tomentose beneath, lowest petioled, lyrate, pinnatifid, up to 18 × 3 cm; upper sinuate-pinnatifid and uppermost narrowly oblong. Heads 3 cm in diam., on long peduncle, woolly. Involucral bracts many seriate, outermost short and inner most longer, linear-subulate, acuminate, pubescent. Achenes 4-5 angled, muricate, 2-3 mm long, with a ring of deciduous long hairy pappus, as long as corolla tube.

Fl. & Fr. : Mar.-May.

Distrib. : India, Bhutan, Afghanistan, Pakistan, Nepal.

Specimens examined : Netarhat, 67.

Notes : Infrequent on way to Upper Ghagri.

Uses : Crushed leaves applied to wounds.

35. SENECIO L.

Senecio nudicaulis Buch.-Ham. ex D.Don. Prodr. Fl. Nepal 178. 1825; Hook.f. in Fl. Brit. India 3: 340. 1881; Haines, Bot. Bihar & Orissa 2: 514. 1961 (Rep. ed.); Prain, Beng.. Pl. 1: 444. 1963 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 278. 1977; Mathur in Hajra *et al.*, Fl. Ind. 13: 273. 1995.

Herbs, with fleshy root; stems terete, ribbed. Lower leaves rosette, oblaneolate to spathulate, serrate, dentate, obtuse at apex, up to 7.5 × 1.2

cm; upper cauline, oblong-lanceolate, obtuse at apex, semi amplexicaul at base. Heads in corymbiform panicle, yellow, heterogamous. Involucral bracts 3-seriate; outermost smallest, linear; inner 2 whorl lanceolate, acuminate with scarious margin. Achenes curved, glandular-hairy. Pappus white, hairy.

Fl. & Fr. : Mar.-Apr.

Specimens examined : Netarhat, 81.

Distrib. : India, Nepal.

Notes : Common in exposed dry areas on way to Upper Ghagri.

36. SONCHUS L.

1a. Achenes narrowly winged, 3-ribbed on each face; corolla tube longer than ligule .... 1. *S. asper*

1b. Achenes unwinged, with variable number of ribs on each face; corolla tube longer or shorter than ligule :

2a. Corolla tube and ligule equal in length; cauline leaves runcinate with well developed auricles .... 3. *S. oleraceus*

2b. Corolla tube twice as long as ligule; cauline leaves elliptic-lanceolate, entire or shallowly pinnatifid, auricles small .... 2. *S. brachyotus*

1. Sonchus asper (L.) Hill. Herb. Brit. 1: 47. 1756; Hook.f. in Fl. Brit. India 3: 414. 1881; Haines, Bot. Bihar & Orissa 2: 522. 1961 (Rep. ed.); Jeffrey in Kew Bull. 18: 481. 1966; Mamgain & Rao in Hajra *et al.*, Fl. Ind. 12: 318. 1995. *Sonchus oleraceus* L. var. *asper* L., Sp. Pl. 794. 1753.

Simple or branched, annual, up to 60 cm high, glabrous herbs. Leaves 7-16 × 2.5-6 cm, sessile, semi amplexicaul, ovate, ovate-lanceolate, elliptic-oblong or obovate-oblong, margin undulate and irregularly shallow or deeply spinous-toothed. Heads in subumbels. Involucral bracts glabrous, campanulate. Corolla yellow. Achenes up to 3 mm long, much compressed, elliptic. Pappus soft, white.

Fl. & Fr. : April-July.

Distrib. : All warmer countries of the World.

Specimens examined : Netarhat, 772.

Notes : Common in waste places, along road sides and in dry paddy fields.

Uses : Young shoots eaten as salad by the local people. It is pounded and applied to wounds and boils.

2. Sonchus brachyotus DC., Prodr. 7: 186. 1838; Babu, Herb. Fl. Dehra Dun 282. 1977; Mamgain & Rao in Hajra *et al.*, Fl. Ind. 12: 320. 1995. *S. wightianus* DC., Prodr. 7: 187. 1838; Boulos in Bot. Notis 126: 1860. f. 22. 1973; Ramamoorthy in Saldhana & Nicolson, Fl. Hassan 622. 1976. *S. arvensis* auct. non L. 1753; Clarke in Hook.f., Fl. Brit. India 3: 414. 1881; Prain, Beng. Pl. 1: 629. 1963 (Rep. ed.). 1: 463. 1963 & in Rec. Bot. Surv. Ind. 3: 231. 1905; Haines, Bot. Bihar & Orissa 2: 522. 1961 (Rep. ed.).

Herbs, 30-45 cm long; stems glandular hairy above. Lower leaves oblanceolate, denticulate, mucronate at apex, up to 9 × 3 cm, amplexicaul at base, glabrous; upper linear, sometime incised. Heads subumbellate. Involucral bracts 3-seriate, lanceolate, acuminate, clothed with gland tipped hair. Achenes pale brown, flat, ribbed, 2-3 mm long, crowned with white pappus.

Fl. & Fr. : Almost throughout the year.

Distrib. : India to South E. Asia, Iran, Afghanistan, Pakistan.

Specimens examined : Netarhat, 77.

Notes : Common, in waste places.

Common name : Beng. : *Ban palang*; Hindi : *Sahadev bari*; Santal : *Birbarangon*.

Uses : Roots used in cough and bronchitis. Latex used for eye troubles. Young shoots eaten as vegetable.

3. **Sonchus oleraceus** L., Sp. Pl. 794. 1753; Hook.f. in Fl. Brit. India 3: 414. 1881; Haines, Bot. Bihar & Orissa 2: 523. 1961 (Rep. ed.); Jeffrey in Kew Bull. 18: 481. 1966; Mamgain & Rao In Hajra *et al.*, Fl. Ind. 12: 321. 1995.

Simple or branched lateciferous annual herbs up to 60 cm high. Leaves 10-20 cm long, runcinate or lyrate-pinnatifid, spinulosely toothed, base of upper leaves auricled and of basal leaves narrowed into petiole. Flowers in few-headed, glandular, hispid compound corymbs. Heads up to 1 cm across. Involucral bracts 4-seriate, linear-lanceolate, acute, innermost up to 1 cm long, outermost short. Achenes up to 3.5 mm long, obovate-oblong, finely wrinkled between ribs. Pappus white, up to 8 mm long.

Fl. & Fr. : Apr.-July.

Distrib. : Throughout India and all temperate and tropical countries of the World.

Specimens examined : Netarhat, 768.

Notes : Common in waste places, under shade and near water courses.

Common name : Hindi : *Dudhi, Dodak.*

Uses : Plant used for liver troubles. Leaves and roots used in indigestion and as a febrifuge, stems given as a tonic and sedative. Herbs consumed as vegetables, also used as fodder.

37. SPHAERANTHUS L.

Sphaeranthus indicus L., Sp. Pl. 927. 1753; Ross-Craig in Hook., Ic. Pl. 36. 21. t. 3501 B. 1955; Hook.f. in Fl. Brit. India 3: 275. 1881; Prain, Bengal Pl. 1: 601. 1903 (Rep. ed. 1: 441. 1963) & in Rec. Bot. Surv. India 3: 226. 1905; Haines, Bot. Bihar & Orissa 2: 496. 1961 (Rep. ed.); Kumar in Hajra *et al.*, Fl. Ind. 13: 160. 1995; Cook in Aquat. Wetland Pl. Ind. 72. 1996.

Herbs, up to 15-30 cm high, strongly scented; stems procumbent, villous, with dentate wing. Leaves sessile, up to 4 × 1.8 cm, ovate-oblong with tapering base, rounded at apex, toothed. Heads heterogamous, globose, up to 1 cm across; peduncle with toothed wing. Involucral bracts linear,

hairy, shorter than head. Outer florets female; corolla pale violet, tubular. Disc florets bisexual, limb 4-5 toothed. Achenes oblong, subcompressed, glandular-hairy; pappus absent.

Fl. & Fr. : Nov.-Mar.

Distrib. : India, Sri Lanka, Myanmar, Nepal, Malaysia, Australia and Africa.

Specimens examined : Daltonganj, 19. Helophyte.

Notes : Common and widespread in the district, specially in wet places.

Common name : Beng. : *Murmuria, Ghork mundi*; Santal : *Belaunja*; Hindi : *Mundi.*

Uses : The juice of the plant is used as a laxative and in stomach trouble. The root is used as a stomachic and anthelmintic, seeds have the same property.

38. SPILANTHES Jacq.

Spilanthes paniculata Wall. ex DC., Prodr. 5: 625. 1836; Koster & Philip. in Blumea 6: 354. 1950; Balakrishnan in Fl. Jowai 1: 257. 1981; *Spilanthes acmella* non (L.) Murr. Chowdhery in Hajra *et al.*, Fl. Ind. 12: 410. 1995. Hook.f. in Fl. Brit. India 3: 307. 1881 excl. vars. *oleracea* & *calva*. Haines, Bot. Bihar & Orissa 2: 506. 1961 (Rep. ed.).

Herbs; stems sparsely pubescent, creeping at base. Leaves ovate, up to 5 × 2 cm, acute at apex, attenuate at base, margin entire or undulate-serrate; petioles up to 1.5 cm long. Heads up to 7 mm across, on 4-8 cm long peduncle; involucral bracts 2-seriate, ovate, up to 4 × 2 mm. Ray flower 0. Disc flowers up to 2 mm long, yellow. Achenes narrowly obovate, up to 2 × 1 mm, minutely glandular, glabrous. Pappus-0.

Fl. & Fr. : Sept.-Dec.

Distrib. : India, Malaysia, China.

Specimens examined : Barwadih, 482. Helophyte.

Notes : Not common, found near water courses.

39. SYNEDRELLA L.

Synedrella nudiflora (L.) Gaertn., Fruct. 2: 456. t. 171. 1791; Hook.f. in Fl. Brit. India 3: 308. 1881; Ramam. in Sald. & Nicol. Fl. Hassan 624. 1976; Chowdhery in Hajra *et al.*, Fl. Ind. 12: 413. 1995. *Varbesina nodiflora* Linn. in Juslenius, Cent. Pl. t. 1: 28. 1755.

Branched, annual, erect herbs. Leaves opposite, ovate, up to 7.5 × 4 cm, 3-nerved, cuneate at base, acute at apex, serrate-dentate at margin, appressed pilose on both surfaces; petioles up to 2.5 cm long, slightly winged. Involucral bracts elliptic-ovate, outer two foliaceous, pilose, up to 10 × 3 mm, inner ones membranous, up to 7 × 2 mm. Ray florets yellow, ligulate, up to 5 mm long; disc flowers up to 4 mm long. Achenes compressed, up to 4 × 1 mm, puberulous, black. Pappus awn up to 4 mm long.

Fl. & Fr. : Sept.-Dec. Exotic.

Distrib. : Native of Trop. America but introduced in India, China, Malaya, Polynesia.

Specimens examined : Kechki, 910.

Notes : Occasional along road sides and in cultivated lands.

40. TAGETES L.

Tagetes patula L., Sp. Pl. 887. 1753; Haines, Bot. Bihar and Orissa, 2: 511. 1961 (Rep. ed.); Bailey, Man. Cult. Pl. 1013. 1963 (Rep. ed.); Rao in Hajra *et al.*, Fl. Ind. 13: 329. 1995.

Herbs. Leaves compound, glabrous; segments linear-lanceolate with more or less spinulose serrature. Heads solitary, on long peduncle, heterogamous. Flowers yellow with red mark. Involucral bracts glabrous, uniseriate, tip acute, tubular. Pappus of 1-2 long awned scales & 2-3 shorter blunt one. Achenes black, glabrous, 1-1.5 cm long.

Fl. & Fr. : Dec.-Mar. Exotic.

Distrib. : Native of Mexico; now introduced in India and other countries.

Specimens examined : Betla, 41.

Notes : Common in the gardens, rarely found as an escape near cultivated places.

Common name : Beng. & Hindi : *Ganda.*

Uses : Leaf juice is applied on the cuts and wounds.

41. TRIDAX L.

Tridax procumbens L., Sp. Pl. 900. 1753; Hook.f. in Fl. Brit. India 3: 311. 1881; Prain, Beng. Pl. 1: 618. 1903 (Rep. ed. 1: 455. 1963) & in Rec. Bot. Surv. India 3: 229. 1905; Haines, Bot, Bihar & Orissa 2: 510. 1961 (Rep. ed.); Fosberg & Sachet in Smithsonian Contr. Bot. (Fl. Micronesia) 46: 56. 1980; Chowdhery in Hajra *et al.*, Fl. Ind. 12: 418. 1995.

Procumbent or straggling herbs, hirsute or slightly woolly; stems 20-55 cm long. Leaves 2.5-3 cm long, hirsute, subfleshy, ovate or ovate-lanceolate, irregularly dentate; petioles 6-10 mm long. Heads terminal, solitary, 7-10 mm in diam., yellow; peduncle up to 25 cm long. Outer involucral bracts ovate, acuminate, 4 × 3 mm, glabrous within; inner bracts longer, membranous, slightly pubescent without. Ray and disc florets 1 cm long. Pappus forming a ring of hair, as long as corolla tube. Achene 2 mm long hairy, turbinate or oblong, brown.

Fl. & Fr. : Round the year. Exotic.

Distrib. : Native of tropical America, now wide spread throughout the tropics.

Specimens examined : Daltonganj, 25.

Notes : Common in dry areas of the district. Found in the roadsides, waste places & in the fields.

Uses : Leaf juice used to check haemorrhage and wounds.

42. VERNONIA Schreb. *nom. cons.*

1a. Achenes densely hairy, obscurely ribbed; pappus biseriate with an outer whorl of shorter hairs ... 1. *V. cinerea*

1b. Achenes glabrascent; prominently 10-ribbed; pappus biseriate, both whorl equal ... 2. *V. divergens*

1. Vernonia cinerea (L.) Less. in Linnaea 4: 291. 1829; Hook.f. in Fl. Brit. India 3: 233. 1881; Prain, Beng. Pl. 1: 590. 1903 (Rep. ed. 1: 422. 1963) & in Rec. Bot. Surv. India 3: 225. 1905; Haines, Bot. Bihar & Orissa 2: 483. 1961 (Rep. ed.); Fosberg & Sachet in Smithsonian Contrib. Bot. (Fl. Micronesia) 46: 57. 1980; Guha Bakshi, Fl. Murshidabad Distt. 175. 1984; Uniyal in Hajra *et al.*, Fl. Ind. 13. 367. 1995. *Conyza cinerea* L., Sp. Pl. 862. 1753.

Erect, branched herbs, 20-70 cm high, with slender ribbed stems, pubescent. Leaves variable in size and shape, up to 2 × 1 cm, ovate, elliptic, obovate-lanceolate, with a narrowed base, acute, entire or toothed, pubescent beneath. Heads in terminal corymb, up to 8 mm in diam., peduncle up to 2 cm long, slender. Involucral bracts 2-3 seriate, inner one 5 mm and outer one 3 mm long, linear, with awned tip; receptacle convex and bracts reflexed after shedding fruits. Flowers pink. Achenes 1 mm long, not ribbed. Pappus up to 4 mm long, white.

Fl. & Fr. : Throughout the year. Exotic.

Distrib. : Native of Old World tropics, introduced in the New World.

Specimens examined : Daltonganj, 5.

Notes : Common in waste places, road sides and forests.

Common name : Beng. : *Kak-shin*; Satal : *Jhrujhuri, Baengom*; Hindi : *Sadodi.*

Uses : Infusion of the herb useful against malaria. Flowers used in fever, rheumatism and conjunctivitis.

2. V. divergens (Roxb.) Edgew. in J. As. Soc. Bengla 21: 172. 1853; Hook.f. in Fl. Brit. India 3: 234. 1881; Haines, Bot. Bihar & Orissa 2: 483. 1961 (Rep. ed.); Uniyal in Hajra *et al.*, Fl. Ind. 13: 370. 1995. *Eupatorium divergens* Roxb., Fl. Ind. 3: 415. 1832.

Erect, perennial herbs. Leaves distinctly petioled, elliptic-oblanceolate or lanceolate, acute, serrate, hispidulous above, pubescent beneath, upper leaves gradually smaller, up to 8 × 4 cm. Heads arranged in corymbose panicles. Involucral bracts few, outer short, inner oblong, acute, mucronate, glabrescent. Achenes 10-ribbed, hairy. Pappus biseriate, pale brown or dirty white.

Fl. & Fr. : Nov-Mar.

Distrib. : India, Myanmar, Thailand.

Specimens examined : Seuti, 1874.

Notes : Infrequent in the forest.

43. XANTHIUM L.

Xanthium indicum Koenig in Roxb., Fl. Ind. 3: 601. 1832; Widder in Fedde Rep. 20: 25. 1923; Majumdar in Bull. Bot. Surv. India 13: 142. 1972; Grierson in Dassanayake, Rev. Handb. Fl. Ceylon 1: 209. 1980; Chowdhery in Hajra *et al.*, Fl. Ind. 12: 427. 1995. *Xanthium strumarium* L., Sp. Pl. 987. 1753 *pro parte*; Hook.f. in Fl. Brit. India 3: 303. 1881; Haines, Bot. Bihar & Orissa 2: 502. 1961 (Rep. ed.).

Annual, erect, unarmed herbs; stems scabrous-hispid, stout, dark-violet streaked. Leaves 5-10 × 5-9 cm, broadly ovate, shallowly 3-7 lobed, margin irregularly toothed, base cordate to subcordate and strongly 3-nerved; petioles 4-8 cm long. Heads solitary or fascicled on short, lateral branches. Male head short peduncled, 2-3 mm long; involucral bracts 3-seriate. Female head involucres finally 1-2 cm long, patent hairy, with slightly incurved beaks and 3-5 long hooked, glabrous spines.

Fl. & Fr. : Jan.-Apr. Exotic.

Distrib. : India, Sri Lanka, Malaya, Indonesia, America; Native of America.

Specimens examined : Richughuta, 743.

Notes : Common in waste places, road sides, scrub jungles and around Kerang buste.

Common name : Beng. : *Bon-okra.*

Uses : Commonly used as laxative & digestive.

CAMPANULACEAE

1a. Calyx turbinate; capsules dehiscing loculicidally with 2-3 apical valves ... 2. WAHLENBERGIA

1b. Calyx campanulate; capsules dehiscing by lateral pores or by 3-basal valves ... 1. CAMPANULA

1. CAMPANULA L.

Campanula benthamii Wall. ex Kitamura, Fl. Afg. 377. 1960; Panigrahi in Phytomorph. 28: 251. 1978; Hara *et al.* in Enum. Fl. Pl. Nep. 3: 50. 1982; Mukherjee in Fl. Pach. & Bori Res. 172. 1984. *Campanula canescens* Wall. ex DC., Monogr. Campan. 292. 1830 (non Roth, 1827); Clarke in Hook.f., Fl. Brit. India 3: 439. 1881; Haines, Bot. Bihar & Orissa 2: 528. 1961 (Rep. ed.). *Campanula wallichii* Babu in J. Bomb. Nat. Hist. Soc. 65: 808. 1969 & in Herb. Fl. Dehra Dun 234. 1977, *nom. illeg Superfl.*

Erect, annual herbs, up to 40 cm high; stems patently hispid hairy. Basal leaves in a rosette, up to 3.5 × 1 cm, obovate-spathulate, acute at apex, tapering towards base; upper sessile, linear-lanceoalte, both pubescent and serrate at margin. Flowers solitary, sessile or subsessile, in spiciform panicles. Calyx campanulate, up to 3 mm, pubescent, teeth linear-lanceolate. Corolla pale-purple, up to 5 mm long, hairy outside, divided halfway down. Fruits hemispheric, hispidly hairy.

Fl. & Fr. : Jan.-May.

Distrib. : India, Sri Lanka, Myanmar, Afghanistan and China.

Specimens examined : Beyang pahar (Kumendi), 707.

Notes : Common, in the open forest and waste land.

2. WAHLENBERGIA Schrad. *ex* Roth *nom. cons.*

Wahlenbergia marginata (Thunb.) DC., Mon. Camp. 143. 1830; Moeliono & Tuyn in van Steenis, Fl. Malesiana ser. 1.6(1): 115. 1960; Ramam. in Sald. & Nicol., Fl. Hassan 569. 1976. *Campanula marginata* Thunb., Fl. Jap. 89. 1784. *Campanula gracilis* Forst., Prodr. 84. 1786. *Wahlenbergia gracilis* (Forst.) DC., Monogr. Camp. 142. 1830; Clarke in Hook.f., Fl. Brit. India 3: 429. 1881; Haines, Bot. Bihar & Orissa 2: 527. 1961 (Rep. ed.).

Erect or diffuse, perennial, glabrous or sparsely hairy herbs; stems and branches 10-20 cm long. Leaves up to 3 × 0.6 cm, sessile, linear-oblong, obtuse or acute, margin entire or slightly crenulate. Flowers in lax terminal panicles; bracts linear; pedicels 1-2 cm long. Calyx 5-7 mm long, tube turbinate, lobes up to 1.8 mm long, linear, erect, persistent. Corolla 5-8 mm long, white or slightly purple, divided to below middle, into 5 spreading, oblong-subacute lobes. Filaments pubescent at base and slightly widened. Capsule up to 7 mm long, turbinate, crowned with calyx lobes. Seed ellipsoid, slightly compressed, yellowish brown, smooth.

Fl. & Fr. : Dec.-Apr.

Distrib. : India, China, Japan through continental Asia and Malaysia to New Calendonea, Tonga, Australia and New Zealand.

Specimens examined : Mahuamilan, 686.

Notes : Common in marshy areas and rice fields.

Common name : Santal : *Dudma arxa.*

Uses : Plants crushed and used for skin diseases, also used for strengthening loose teeth. Roots used for pulmonary infections.

LOBELIACEAE

LOBELIA L.

1a. Stems 3-angular; anthers all bearded at their tips ... 1. *L. alsinoides*

1b. Stems terete; only anterior 2-anthers bearded others 3 naked ... 2. *L. chinensis*

1. **Lobelia alsinoides** Lamk., Encycl. Meth. 3: 588. 1791; Wimmer in Engler, Pfl. - Reich. 107: 571. 1953; Moeliono & Tuyn. in van Steenis. Fl. Males ser. 1.6(1): 126. 1960. *Lobelia trigona* Roxb., Fl. Ind. 2: 111. 1824; Clarke in Hook.f., Fl. Brit. India 3: 423. 1881; Haines, Bot. Bihar & Orissa 2: 524. 1961 (Rep. ed.). *L. griffithii* Hook.f. & Thoms., J. Proc. Linn. Soc. Bot. 2: 28. 1858; Clarke in Hook.f., Fl. Brit. India 3: 424. 1881. *L. microcarpa* Clarke in Hook.f., Fl. Brit. India 3: 424. 1881; *L. terminalis* Clarke in Hook.f., Fl. Brit. India 3: 424. 1881; Haines, Bot. Bihar & Orissa 2: 525. 1961 (Rep. ed.).

Erect ascending, annual, glabrous herbs; stems much branched, up to 20 cm long, 3-angular. Leaves sessile, broadly-ovate or sub-orbicular, rounded at base, acute, or obtuse at apex, crenate-dentate or entire, up to 10 × 8 mm. Flowers solitary, axillary, blue; pedicel up to 2 cm long. Calyx 5-partite. Corolla 2-lipped. Staminal tubes free, all anthers bearded at apex. Capsules 2-valved, up to 6 mm long, ellipsoid. Seeds many, up to 0.5 mm long, trigonous and ellipsoid.

Fl. & Fr. : Oct.-Jan.

Distrib. : India, Myanmar, South-East Asia and Taiwan.

Specimens examined : Daltonganj, 271. Helophyte.

Notes : Not very common. Found on low marshy land.

Common name : Santal : *Chauric arak.*

2. **L. chinensis** Lour., Fl. Coch. 514. 1790; Moeliono & Tuyn in Fl. Males. ser. 1.6(1): 130. 1960. *Lobelia radicans* Thunb. in Trans. Linn. Soc. 2: 330. 1794; Clarke in Hook.f., Fl. Brit. India 3: 428. 1881; Haines, Bot. Bihar & Orissa 2: 526. 1961 (Rep. ed.).

Small, procumbent, glabrous herbs; stems terete. Leaves alternate, oblong-lanceoalte, subsessile, up to 10 × 3 mm, narrowed at base. Flowers solitary, axillary; peduncles up to 12 mm long. Corolla tube up to 4.5 mm long, glabrous, pinkish. Stamens-5, anterior 2 only bearded at their tips and other 3 naked, filaments of bearded anthers hairy. Capsule up to 5 × 3 mm, tapering at base. Seeds many, ellipsoid, compressed.

Fl. & Fr. : Mar.-June. Exotic.

Distrib. : India, Java, South China and Japan, Native of S.E. Asia.

Specimens examined : Netarhat, 96.

Notes : Common in cultivated lands after harvesting period.

PLUMBAGINACEAE

PLUMBAGO L.

Plumbago zeylanica L., Sp. Pl. 151. 1753; Clarke in Hook.f., Fl. Brit. India 3: 480. 1882; van Steenis in Fl. Males. ser. 1.4: 103. 1949; Haines, Bot. Bihar & Orissa 2: 529. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 296. 1977; Li in Li *et al.*, Fl. Taiwan 4: 93. 1978; Singh in Saldanha, Fl. Karnataka 1: 183. 1984.

Erect or straggling; stems and branches up to 1 m long. Leaves ovate-lanceolate, 3-8 × 2-4.5 cm, glabrous, acute or subacuminate at apex, base abruptly narrowed into short amplexicaul petioles. Flowers in terminal panicled cymes, white. Calyx tube up to 1.2 cm long, narrow, persistent, with stalked glands, teeth small with membranous margin. Corolla tube up to 2 cm long, slender, lobes up to 7 mm long, ovate-oblong, acute, apiculate. Capsule oblong-acute, longitudinally 5-grooved with patent or recurved calyx.

Fl. & Fr. : Oct.-Dec.

Specimens examined : Palamau Fort, (Betla), 1108.

Distrib. : India and tropics of the Old World.

Notes : Common on road sides and near the fort.

Common name : Beng., Hindi : *Chitra.*

Uses : Roots said to be used in piles, anasarca, diarrhoea and skin diseases, also used for influenza and black water-fever.

PRIMULACEAE

ANAGALLIS L.

Anagallis arvensis L., Sp. Pl. 148. 1753; Hook.f. in Fl. Brit. India 3: 506. 1882; Haines, Bot. Bihar & Orissa 2: 530. 1961 (Rep. ed.); Taylor in Kew Bull. 1955. 329. 1955.

Erect or decumbent, ascending, glabrous herbs, 15-40 cm long, often branched from base; stems 4-angled. Leaves sessile, ovate with a cordate base, subacute to acute, entire. Pedicel 2-3.2 cm long, slender, recurved in fruits. Flowers solitary, axillary, blue. Sepal-5, lanceolate narrow, acuminate, slightly keeled, scarious at margin. Petals orbicular, narrowed below, longer than calyx, glandular hairy along margin. Filaments hairy. Capsule globose, circumscissile, 4-6 mm in diam. Seeds trigonous, straw coloured.

Fl. & Fr. : Dec.-Mar. Exotic.

Distrib. : Native of Europe, common in tropical Africa & India.

Specimens examined : Daltonganj, 24.

Notes : Common in grasslands.

Common name : Hindi : *Jonkmari.*

Uses : Plants used for dropsy, leprosy, hydrophobia and cerebral affection and also used to expel leeches from the nostrils of cattles by the local people.

MYRSINACEAE

EMBELIA N. Burman

Embelia tsjeriam-cottam (Roem. & Schult.) DC., Trans. Linn. Soc. London 17: 131. 1834. Gamble in Fl. Madras 753. 1921; Ramam. in Sald. & Nicol., Fl. Hassan 203. 1976; Sald. & Ramesh in Sald., Fl. Karnataka 1: 350. 1984. *Ardisia tsjeriam-cottam* Roem. & Schult., Syst. 4: 518. 1819. *Embelia villosa* Wall. ex Roxb., Fl. Ind. 2: 289. 1824; Gamble, Fl. Madras 753. 1921. *Embelia robusta* sensu Clarke in Hook.f., Fl. Brit. India 3:

515. 1882 (non Roxb. 1820); Haines, Bot. Bihar & Orissa 2: 533. 1961 (Rep. ed.).

Shrubs or small trees; branchlets subtended by imbricating scales, glabrous or rusty tomentose. Leaves subchartaceous, gland-dotted, elliptic-obovate, acute, subentire, often rusty-pubescent beneath, up to 13 × 7 cm; petioles up to 2 cm long, channeled above. Racemes axillary, shorter than leaves. Sepals glabrous, slightly connate at base, ovate, subacute, up to 1.5 mm long. Petals nearly free, twice as long as sepals, papillose inside, white. Capsule subglobose, red when ripe, up to 4 mm across, tipped by styles.

Fl. & Fr. : July-Nov.

Distrib. : India, Myanmar, Sri Lanka.

Specimens examined : Bisrampur, 564.

Notes : Common in the forest.

Common name : Hindi : *Baberang*; Santal : *Bhabri*.

Remarks : Gamble (Fl. Madras, 753. 1921) treats *E. villosa* & *E. tsjeriam-cottam* as distinct species based on pubescence. But, here these two species have been kept together following C.B. Clarke.

SAPOTACEAE

1a. Petals with petaloid appendages; staminodes present :

2a. Sepals-6; staminodes dentate at apex ... 2. MANILKARA

2b. Sepals-4; staminodes hairy without ... 3. MIMUSOPS

1b. Petals without petaloid appendages; staminodes absent ... 1. MADHUCA

1. MADHUCA Gmelin

Madhuca longifolia (Koenig) Macbride in Contr. Gray Herb., Harv. Univ. ns. 53: 17. 1911; van Roy in Blumea 10: 53. 1960. var. **latifolia** (Roxb.) Chevalier, Rev. Int. Bot. Appl. 23. 149. 1943. *Bassia longifolia* Koenig in L., Mart. Act. App. 563. 1771. *Madhuca indica* Gmel., Syst.

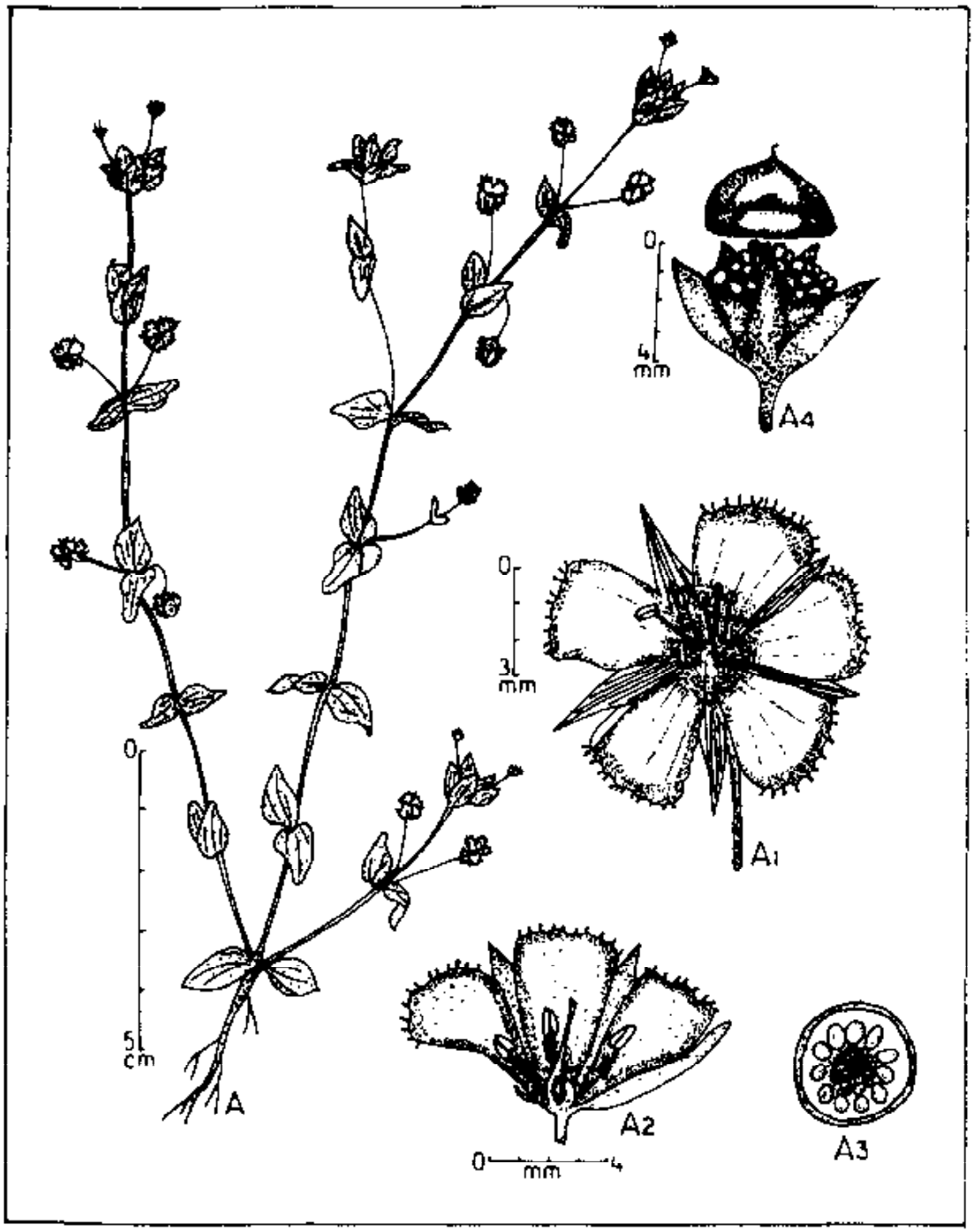


Fig. 22: Primulaceae. (A-A_4): *Anagalis arvensis* L.: A. Habit, A_1. Flower; A_2. Same in vertical section; A_3. T.S. of ovary; A_4. Fruit showing circumscissile dehiscence.

Nat. 799. 1791; Merrill in J. Arn. Arb. 29: 190. 1948. *Bassia latifolia* Roxb., Pl. Cor. 1: 20. t. 19. 1795; Clarke in Hook.f., Fl. Brit. India 3: 544. 1882; Prain, Beng. Pl. 1: 649. 1903 (Rep. ed. 1: 478. 1963); Haines, Bot. Bihar & Orissa 2: 536. 1961 (Rep. ed.). *Madhuca latifolia* (Roxb.) Macbride in Centr. Gray Herb. (35)53. 18. 1918.

Large, much branched deciduous trees. Leaves crowded near the end of branches, coriaceous, broadly elliptic or elliptic-oblong, secondary nerves 10-14 pairs, acuminate at apex, up to 13 × 8 cm, young leaves rusty tomentose, mature one glabrescent. Flowers many, clustered at end of branches; pedicels up to 2.3 cm long, stout, rusty tomentose. Sepals-4, 2-outer enclosing inner-2, ovate, acute, up to 10 × 8 mm, rusty tomentose. Corolla urceolate, fleshy. Berries ovoid, up to 4.5 cm long.

Fl. & Fr. : Mar.-July.

Distrib. : India, Myanmar.

Specimens examined : Netarhat, 204.

Notes : Very common in the forest and villages.

Uses : Succulent corolla eaten and spirit named '*Mahua*' is distilled from them by the local people. Oil is also extracted from the seeds used in burning or cooking. The wood is hard and durable.

Common name : Beng. & Hindi : *Mahua*, Santal : *Kuindi*.

2. MANILKARA Adans.

1a. Flowers in 2-6 flowered axillary fascicles; fruits oblong ellipsoid ... 1. *M. hexandra*

1b. Flowers solitary, axillary; fruits globose ... 2. *M. zapota*

1. Manilkara hexandra (Roxb.) Dubard, Ann. Inst. Bot. Geol. Colon. Marseille 23: 10. t. 2. 1915; Royen, Blumea 7: 408. 1953; Sald. & Ramesh in Sald. Fl. Karnataka 1: 332. 1984. *Mimusops hexandra* Roxb., Pl. Corom. 1: 16. t. 15. 1795; Haines, Bot. Bihar & Orissa 2: 538. 1961 (Rep. ed.).

Medium sized trees. Leaves often clustered at the end of branches; blade obovate, emerginate at apex, cuneate at base, up to 11 × 5 cm, glabrous. Flowers 5-6 mm across, white, in 2-6 flowered axillary fascicles. Sepals-6, ovate, tomentose without. Petals-6, appendages paired at each petal, slightly connate at base, ovate-lanceolate. Stamens-6. Staminodes-6, dentate at apex. Berries oblong-ellipsoid, up to 2 cm long.

Fl. & Fr. : Sept.-Apr.

Distrib. : India to South-East Asia.

Specimens examined : Panki, 965.

Notes : Not common, cultivated, often self-sown.

Common name : Hindi : *Khirui.*

2. **Manilkara zapota** (L.) van Royem in Blumea 7: 410. 1953; Moora & Stearn in Taxon 16: 383. 1967. *Achras zapota* L., Sp. Pl. 2: 1190. 1753, *Quoad typum* excl. syn. *soloanei* et *plukenetii*; Clarke in Hook.f., Fl. Brit. India 3: 534. 1882 (as *A. sapota*) Haines, Bot. Bihar & Orissa 2: 539. 1961 (Rep. ed.). *Manilkara achras* (Mill.) Fosberg in Taxon. 13: 525. 1964; Deb in Fl. Trip. 1: 429. 1981. *Nispero achras* (Mill.) Aubreville in Adans. 5: 19. 1965.

Large trees, with rough, dark-grey bark. Leaves oblong-lanceolate or elliptic-oblong, up to 9 × 4.5 cm, glabrous, entire, crowded at the end of branchlets, midrib very prominent, obtuse or subacute at apex; petioles up to 2.2 cm long. Flower axillary, solitary, white, long pedicelled. Sepals-6, in two whorls, hairy outside. Corolla urceolate with 6-lobes. Stamens-6, alternating with 6-staminodes. Fruits globose with persistent style, up to 4.5 cm in diam., with brownish epicarp and yellow-brown translucent flesh. Seeds obovate, shining black.

Fl. & Fr. : Jan.-Apr. Exotic.

Distrib. : Native of tropical America, cultivated in India.

Specimens examined : Mahuamilan, 691.

Notes : Often found as an escape in the forest edges and in village surroundings.

Common name : Beng. : *Safeda.*

Uses : Fruits are edible. Bark contains latex, 20-25% of which consists of gutta-percha like substances (chicle gum), used as a base for chewing gum. Bark also contain tannin used by fishermen for colouring sails and fishing tackles.

3. MIMUSOPS L.

Mimusops elengi L., Sp. Pl. 349. 1753; Clarke in Hook.f., Fl. Brit. India 3: 548. 1882; Haines, Bot. Bihar & Orissa 2: 538. 1961 (Rep. ed.).

Medium sized, evergreen trees. Leaves elliptic-oblong, acuminate at apex, acute at base, up to 12 × 5 cm; petioles up to 2 cm long. Flowers white, fragrant, in 2-6 flowered axillary fascicles or solitary. Sepals 2-seriate. Petals-8, outer dorsal petaloid appendages 16, slightly connate at base into pairs, forming outer series. Berries ellipsoid, up to 3 cm long, yellow or red when ripe. Seeds ellipsoid, brown, solitary.

Fl. & Fr. : Jan.-June.

Distrib. : Native of Western peninsula of India. Now common throughout India and in tropics of both hemispheres.

Specimens examined : Boneri, 167.

Notes : Commonly planted, often self-sown in village surroundings.

Common name : Beng. : *Bakul.* Hindi : *Molsuri.*

Uses : Wood used for building purposes and agricultural implements. Bark used medicinally for dental troubles.

EBENACEAE

DIOSPYROS L.

1a. Leaves glabrous; calyx lobes in male triangular; corolla-4 lobed; stamens usually-40 ... 1. *D. malabarica*

1b. Leaves pubescent; calyx lobes in male acute; corolla-5 lobed; stamens usually-20 ... 2. *D. melanoxylon*

1. Diospyros malabarica (Desr.) Kostel, Allg. Med. Pharmac. Fl. 3: 1099. 1834; Brink in Bull. Hard. Bot. Butzg. ser. 3. 15: 325. 1938; Kost., Ceylon J. Sci. 12(2): 103. 1977; Guhabakshi, Fl. Murshid. Dist. 181. 1984. *Garcinia malabarica* Desr. in Lam., Encycl. 3: 701. 1792. *Diospyros embryopteris* Pers., Syn. Plant. 2: 624. 1807; Clarke in Hook.f., Fl. Brit. India 3: 556. 1882; Haines, Bot. Bihar & Orissa 2: 543. 1961 (Rep. ed.). *Diospyros peregrina* sensu Gurke in Engler & Prantl., Pfl. Fam. 4(1): 164. 1897, non *Embryopteris peregrina* Gaertn., Fruct. 1: 145. 29. f. 2. 1788.

Trees, with spreading branches; older parts glabrous;younger shoot and inflorescence slightly brown tomentose. Leaves alternate, oblong-lanceolate, obtuse or acute, coriaceous, up to 18 × 6 cm; petioles up to 1 cm long. Inflorescence 1-many flowered cymes. Flowers 4-merous. Calyx lobes in male broadly triangular, shorter or equal to tube, fulvous pubescent without, glabrous within, in female slightly cordate. Corolla yellow, 4-lobed, lobes rounded, retuse. Stamens many in pairs, anthers hairy. Ovary 8-celled; styles-4, each lobed into many stigma. Fruits up to 4 cm across, 4-8 seeded, smooth, with large reflexed persistent calyx.

Fl. & Fr. : Apr.-July.

Distrib. : India, Sri Lanka, Malaysia and Australia.

Specimens examined : Muhammadganj, 971.

Notes : Common, in the rocky forests.

Common name : Beng. & Hindi : *Gab*; Kol : *Garatiril*; Santal : *Maka Kenda*.

Uses : Ripe fruits are edible and young fruits are used for ulcers, wounds and dysentery.

2. D. melanoxylon Roxb., Pl. Cor. 1: 96. t. 46. 1795; Clarke in Hook.f., Fl. Brit. India 3: 564. 1882; Haines, Bot. Bihar & Orissa 2: 545. 1961 (Rep. ed.); Sald. in Sald. & Nicol. Fl. Hassan 197. 1976; Kostermans in Dassanayake, Rev. Hand. Fl. Ceylon 1: 37. 1980.

Medium or large trees, with grey, rusty tomentose stems. Leaves opposite or subopposite, chartaceous, elliptic to oblong, up to 20 × 11 cm, obtuse or rounded at apex, acute at base, pubescent beneath, lower surface

with prominent mid vein, lateral veins 8-9 pairs; petioles 1-1.5 cm long, tomentose. Male flowers in dichasial cymes; peduncle woolly; pedicel of first flower up to 1.5 cm long, other shorts; bracts and bracteoles woolly. Calyx yellowish green, campanulate, 5-8 mm long. Corolla whitish, up to 12 mm long. Female flowers axillary, solitary; peduncle short, brown, tomentose. Calyx deeply lobed, woolly, 6-7 mm long. Corolla yellow, covered with silky hairs, up to 3 mm long. Fruits globose, fleshy, with a persistent calyx, up to 3 × 2 cm, yellow.

Fl. : Mar.-May. *Fr.* : Apr. (of following year).

Distrib. : India & Sri Lanka.

Specimens examined : Boneri, 192.

Notes : Common in dry deciduous forests.

Common name : Beng. & Hindi : *Kend*; Santal : *Tiril.*

Uses : Leaves are used for wrapping 'bidis' (cigarettes). Fruits edible. Decoction of bark used in diarrhoea and dyspepsia; dried flowers used in urinary and skin troubles.

SYMPLOCACEAE

SYMPLOCOS Jacq.

Symplocos racemosa Roxb. (Hort. Beng. 40. 1814) in Fl. Ind. 2: 539. 1832; Clarke in Hook.f., Fl. Brit. India 3: 577. 1882 (incl. var. *Composita* Kurz.); Haines, Bot. Bihar & Orissa 2: 547. 1961 (Rep. ed.); Ramam. in Sald. & Nichol., Fl. Hassan 200. 1976; Balakrishnan in Fl. Jowai 1: 299. 1981. *Symplocos beddomei* Clarke in Hook.f., Fl. Brit. India 3: 582. 1882.

Medium sized trees; branchlets glabrous. Leaves alternate, elliptic-oblong or elliptic-lanceolate, acuminate at apex, acute at base, crenate to serrulate at margin, coriaceous, up to 10 × 4.5 cm; petioles up to 1 cm long. Flowers in axillary racemes; peduncle hairy; pedicels 2-3 mm long. Calyx up to 2.5 mm long, glabrous, lobes ovate, minutely pubescent. Corolla white, ovate, acute,up to 4 mm long. Stamens many, several seriate, adnate to corolla tube. Drupes ellipsoid, up to 1.5 × 0.5 cm, 2-celled, with a crown of calyx tube.

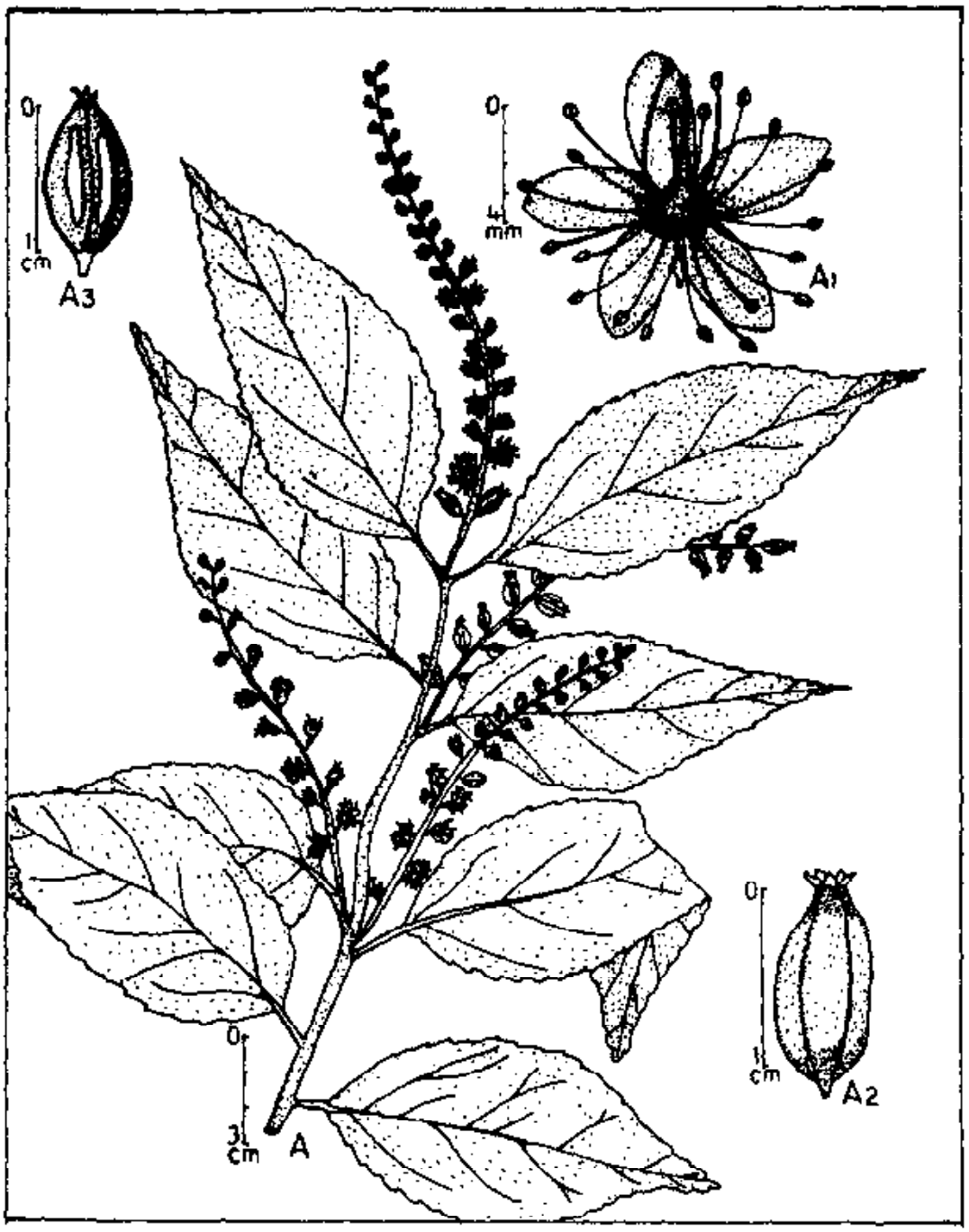


Fig. 23: Symplocaceae. (A-A_3): *Symplocos racemosa* Roxb.: A. Flowering twig; A_1. Flower enlarged; A_2. Fruit; A_3. Vertical section of the same.

Fl. & Fr. : Jan.-May.

Distrib. : India, Myanmar and China.

Specimens examined : Netarhat, 161 & 776.

Notes : Common in the forests.

Common name : Beng. & Hindi : *Lodh*; Santal : *Lodam*; Kol.: *Jujrum*.

Uses : Bark used for conjunctivitis and dysentery.

OLEACEAE

1a. Climbing or scandent shrubs; fruits globose ... 1. JASMINUM

1b. Erect shrubs; fruits not globose :

2a. Corolla tube orange-red; fruits orbicular, compressed ... 3. NYCTANTHES

2b. Corolla tube white; fruits oblong, not compressed ... 2. LIGUSTRUM

1. JASMINUM L.

1a. Climbing shrubs; leaves 3-foliolate ... 2. *J. sambac*

1b. Scandent shrubs; leaves simple, opposite ... 1. *J. auriculatum*

1. Jasminum auriculatum Vahl., Symb. Bot. 3: 1. 1794; Clarke in Hook.f., Fl. Brit. India 2: 600. 1882; Haines, Bot. Bihar & Orissa 2: 551. 1961 (Rep. ed.); Grohmann in Nasir & Ali, Fl. Pak. 59: 16. 1974; Guha Bakshi, Fl. Murshidabad Distt. 183. 1984.

Scandent shrubs; branches pubescent. Leaves simple, sometimes with 2 small stipule like lateral leaflets, ovate, entire, acute or obtuse and mucronate at apex, rounded at base, pubescent on nerves beneath; petioles 3-4 mm long. Flowers white, fragrant, in compound, many flowered, corymbose cymes; peduncle up to 15 mm long; bracts leafy, elliptic, 3-5 mm long. Sepals minute. Corolla tube 1-1.5 cm long. Fruits globose, black, up to 5 mm across.

Fl. & Fr. : Apr.-Aug.

Distrib. : Tropics of the both hemispheres.

Specimens examined : Latehar, 858.

Notes : Mainly cultivated, rarely found as an escape.

Common name : Beng. & Hindi : *Jui, Juthika.*

2. Jasminum sambac (L.) Ait., Hort. Kew. 1: 8. 1789; Clarke in Hook.f., Fl. Brit. India 3: 591. 1882; Merrill in Trans. Amer. Philo. Soc. 308. 1935; Haines, Bot. Bihar & Orissa 2: 549. 1961 (Rep. ed.); Grohmann in Nasir & Ali, Fl. Pak. 59: 20. 1974; Bennet, Fl. Howrah Distt. 273. 1979; Guha Bakshi, Fl. Murshidabad Distt. 183. 1984. *Nyctanthes sambac* L., Sp. Pl. 6. 1753.

Climbing shrubs; young shoots slightly pubescent. Leaflets up to 8 × 4 cm, membranous, glabrous, ovate or elliptic, acute or obtuse at apex, rounded at base, nerves raised beneath; petioles up to 5 mm long, pubescent. Flowers fragrant, in terminal cymes of 3 or more or solitary; bracts linear-subulate; pedicels 0-4 mm long. Calyx subulate, up to 9 mm long. Corolla white, tube up to 12 mm long; lobes-6, up to 10 mm long, oblong. Fruits up to 5 mm across, globose, blue-black.

Fl. & Fr. : Apr.-June.

Distrib. : Tropics of the both hemispheres.

Specimens examined : Netarhat, 866.

Notes : Common, in the garden, rarely found as an escape in the waste lands.

Common name : Beng. : *Belphul*; Hindi : *Banmallika.*

2. Ligustrum L.

Ligustrum robustum Bl., Mus. Bot. Lugd. Bot. 1: 313. 1856; Clarke in Hook.f., Fl. Brit. India 3: 614. 1882; Haines, Bot. Bihar & Orissa 2: 555. 1961 (Rep. ed.).

Large, erect shrubs; young shoot lenticellate and pubescent. Leaves opposite, elliptic-ovate, 5-8 × 3-4.5 cm, glabrous, narrowed at both ends, sometimes acuminate at apex; petioles up to 8 mm long, articulate at base.

Flowers in terminal panicles. Calyx small, minutely 4-toothed, up to 1.5 mm long. Corolla tube short; petals oblong, reflexed, white. Fruits oblong, up to 15 × 7 mm.

Fl. & Fr. : July-Dec.

Distrib. : India, Bangladesh, Myanmar, Malaysia.

Specimens examined : Bisrampur, 554.

Notes : Not common, in the forests.

3. NYCTANTHES L.

Nyctanthes arbor-tristis L., Sp. Pl. 6. 1753; Clarke in Hook.f., Fl. Brit. India 3: 603. 1882; Prain, Beng. Pl. 1: 660. 1903 (Rep. ed. 1: 486. 1963) & in Rec. Bot. Surv. India 3: 234. 1905; Haines, Bot. Bihar & Orissa 2: 552. 1961 (Rep. ed.); Grohmann in Nasir & Ali, Fl. Pak. 59: 7. 1974.

Small trees, roughly hairy all over, with usually drooping 4-angular branchlets. Leaves very scabrous, ovate, acuminate, opposite decussate, entire or reband-dentate along margin, up to 9.5 × 3.5 cm; petioles up to 6 mm, scabrid. Flowers fragrant, white with orange-red corolla tube, fascicled in bracteate, axillary and terminal panicled cymes. Capsules nearly orbicular, compressed, 2-celled, cells contain 1 seed, up to 1.3 × 1.3 cm.

Fl. & Fr. : Sept.-Dec.

Distrib. : Throughout India.

Specimens examined : Barwadih, 371.

Notes : In the dry forests.

Common name : Beng. : *Sephalika* or *Seuli*; Santal : *Saparom*.

Uses : Leaves used in fever and as anthelmintic.

Remarks : This species is anomalous in taxonomic position. Kundu & De (Bull. Bot. Surv. India 10: 397-408. 1969) assigned it to the family

Nyctaginaceae and A.K. Mukherjee (Fl. Pach. Bor. Resv. 1984) to the family Verbenaceae after the genus *Lantana* L.

APOCYNACEAE

1a. Anthers adhering to the stigma :

2a. Shrubs or trees :

3a. Shrubs; anther included within the corolla ... 7. NERIUM

3b. Trees; anther exserted from the corolla ... 13. WRIGHTIA

2b. Climbers :

4a. Branches rusty tomentose; anther included within the corolla ... 6. ICHNOCARPUS

4b. Branches not rusty tomentose; anther slightly exserted from the corolla ... 12. VALLARIS

1b. Anthers free from the stigma :

5a. Fruit follicle :

6a. Branches thick, fleshy and with mark of leaf scars; leaves alternate ... 8. PLUMERIA

6b. Branches not as above; leaves opposite or whorled :

7a. Plants herbaceous ... 4. CATHARANTHUS

7b. Plants woody :

8a. Climbing shrubs; flowers yellow ... 1. ALLAMANDA

8b. Erect shrubs or trees; flowers not yellow :

9a. Trees; leaves 3-8 in whorled 2. ALSTONIA

9b. Shrubs; leaves opposite :

10a. Follicles recurved, less than 7 cm long; seeds with red aril ... 10. TABERNAEMONTANA

10b. Follicles slender, more than 20 cm long; seeds without red aril ... 5. HOLARRHENA

5b. Fruit drupaceous :

11a. Plants armed with spines ... 3. CARISSA

11b. Plants unarmed :

12a. Leaves whorled; sepals eglandular ... 9. RAUVOLFIA

12b. Leaves alternate; sepals glandular within ... 11. THEVETIA

1. ALLAMANDA L.

Allamanda cathartica L., Mant. 2: 214. 1771; Prain, Beng. Pl. 2: 667. 1903 (Rep. ed. 2: 493. 1963); Haines, Bot. Bihar & Orissa 2: 559. 1961 (Rep. ed.); Baily in Man. Cult. Pl. 810. 1963 (Rep. ed.).

Glabrous, climbing or rambling shrubs. Leaves usually in whorl of 4, obovate or oblanceolate, up to 10 × 3.5 cm, acuminate at apex, cuneate at base, margin entire, glaucous; petioles very short. Flowers in few flowered axillary cymes, very large with deciduous bracts. Calyx glabrous, 5-partite, lobes up to 7 mm long, lanceolate. Corolla bright yellow, lower narrow tube 2-2.5 cm long; lobes 2.5-3.5 cm long; orbicular. Stamens-5, inserted above narrow portion of tube. (Fruits not seen).

Fl. : July-Aug. Exotic.

Distrib. : Native of tropical America, introduced in India and other countries.

Specimens examined : Netarhat, 798.

Notes : Commonly grown in the gardens.

Common name : Beng. : *Harkakra.*

Uses : Leaves used as cathartic. Ethanolic extract of roots is active against human carcinoma of nasopharynx. Roots contain an antileukemic lactone, allamandin. Extract of leaves with sodium bicarbonate solution shows high inhibition of Ehrlich ascites tumour cells. Bark and its decoction used as a hydrogoque in ascites.

2. ALSTONIA R.Br. *nom. cons.*

Alstonia scholaris (L.) R.Br. in Mem Wern. Soc. 1: 76. 1811 prepr. 1810; Hook.f. in Fl. Brit. India 3: 642. 1882; Prain, Beng. Pl. 2: 672. 1903

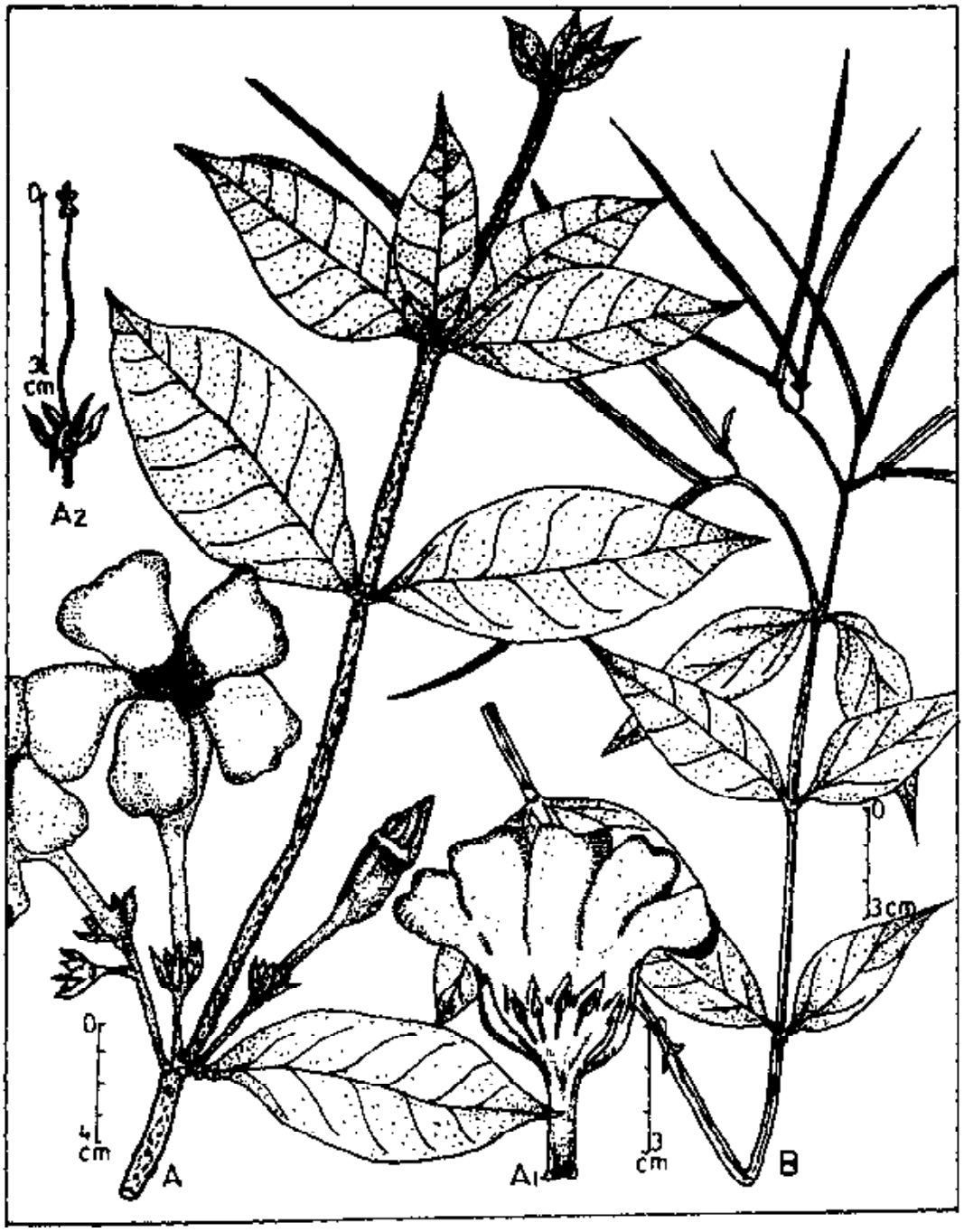


Fig. 24: Apocynaceae: (A-A_2): *Allamanda cathartica* L.: A. Flowering twig; A_1. Corolla split open; A_2. Gynoecium; B. *Ichnocarpus frutescens* (L.) R. Br. : Fruiting twig.

(Rep. ed. 2: 498. 1963); Haines, Bot. Bihar & Orissa 2: 566. 1961 (Rep. ed.); Santapau in Rec. Bot. Surv. India (Fl. Khandala 3rd ed.) 16(1): 147. 1967; Huber in Abeywickrama, Rev. Hand. Fl. Ceyl. 1(1): 12. 1973. *Echites scolaris* Linn., Mant. Pl. 1: 53. 1767.

Trees, up to 15 m high. Leaves 4-8 in whorl, up to 18 × 6 cm, coriaceous, dark-green above, pale-white beneath, oblanceolate to obovate, obtuse at apex, tapering at base; secondary nerves numerous, parallel, united into an intramarginal nerve; petioles 7-12 mm long. Flowers in puberulous, umbellately branched cymose panicles, greenish-white; peduncle 2-6 cm long, stout; pedicels very short. Calyx up to 3 mm long; lobes oblong, obtuse, ciliate. Corolla tube up to 8 mm long, throat with a ring of hairs; lobes up to 5 mm long, oblong, rounded at apex. Follicles 20-45 × 0.3-0.5 cm, cylindric, pendulous. Seeds up to 6 mm long, linear-oblong, flattened, ends rounded, with a fringe of hairs.

Fl. : Feb.-Mar.

Distrib. : India, tropical Asia and Africa through Malaya to tropical Australia.

Specimens examined : Bisrampur, 822.

Notes : Common as an avenue trees.

Common name : Beng. : *Chhatim*; Hindi : *Chatian*; Kol.: Kunumung; Santal : *Chatni*.

Uses : Bark bitter tonic, febrifuge and anthelmintic, extract is used for chronic diarrhoea, asthma and cardiac troubles. Leaves used in beri-beri, dropsy and congested liver. Latex applied to sores, ulcers, tumerous and rheumatic swellings. Bark also used in fever & skin diseases. Wood used for packing box, tea-box, minor furniture, plywoods, match-splints, wood pencil and in paper industry. Wood charcoal used for gun powder.

3. CARISSA L. *nom. cons.*

1a. Large shrubs; leaves broadly elliptic-oblong ... 1. *C. carandas*

1b. Under shrubs; leaves broadly-ovate to orbicular-ovate :

2a. Corolla tube less than 10 mm long; ovule one in each cell ... 2. *C. paucinervia*

2b. Corolla tube more than 10 mm long; ovules two in each cell ... 3. *C. spinarum*

1. Carissa carandas L., Mant. Pl. 1: 52. 1767; Hook.f. in Fl. Brit. India 3: 630. 1882 *pro parte*; Haines in Ind. For. 45: 384. 1919 and in Bot. Bihar & Orissa 2: 561. 1961 (Rep. ed.); Huber in Abeywickrama, Rev. Handb. Fl. Ceylon 1(1): 9. 1973; Guha Bakshi, Fl. Murshidabad Distt. 186. 1986.

Large glabrous shrubs, 2-3-chotomously branched, thorns 3, strong, divaricate, up to 2.5 cm long. Leaves broadly elliptic-oblong, 3-6 × 1.5-3 cm, rounded or obtuse at both ends, apiculate at apex; petioles up to 5 mm long. Flowers in terminal lax cymes; peduncle up to 1.5 cm long; pedicles up to 3 mm long. Sepals up to 2 mm long, ovate-lanceolate. Corolla tube 0.7-1.5 cm long, lobes narrowly oblong. Fruits ellipsoid, 1-3 cm long, 4-8 seeded.

Fl. & Fr. : May-Nov.

Distrib. : India, Sri Lanka, Myanmar, Malaysia & Indonesia.

Specimens examined : Seuti, 1104.

Notes : Common in the forests.

Common name : Beng. : *Karamcha*; Hindi : *Karaunda.*

Uses : Ripe and unripe fruits edible.

2. C. paucinervia DC., Prodr. 8: 333. 1840; Hook.f. in Fl. Brit. India 3: 631. 1882; Haines, Bot. Bihar & Orissa 2: 559. 1961 (Rep. ed.).

Rigid, erect shrubs, 2-3-chotomously branched, up to 2 m high, with pairs of divaricate straight thorns. Leaves elliptic-oblong to broadly-ovate, up to 5 × 3 cm, acute and apiculate at apex, acute at base, coriaceous, secondary nerves obscure, 2-3 pairs, glabrous; petioles up to 5 mm long. Flowers in 2-nate terminal lax puberulous cymes; peduncle up to 2 cm long. Corolla white, tube slender, up to 8 mm long. Ovule one in each cell. Fruits subglobose to ellipsoid, up to 9 mm long, black when ripe.

Fl. : Mar.-Apr. *Fr.* : Nov.-Dec.

Distrib. : Throughout India.

Specimens examined : Bisrampur, 558 & 655.

Notes : Common in the forests.

Common name : Hindi : *Jangli Karaunda*; Kol. : *Kanuwan*; Santal : *Karwat*.

3. Carissa spinarum L., Mant. Pl. 559. 1771; Hook. f. in Fl. Brit. India 3. 631. 1882; Prain, Beng. Pl. 2: 669. 1903 (Rep. ed. 2: 485. 1963) in Rec. Bot. Surv. Ind. 3: 233. 1905; Haines, Bot. Bihar & Orissa 4: 534. 1922 (Rep. ed. 2: 560. 1961); Huber in Abeywickrama, Rev. Hanb. Fl. Ceylon 1(1): 9. 1973.

Dichotomously branched shrubs, young shoot pubescent, thorns divaricate, straight, up to 1.8 cm long, tip reddish. Leaves ovate to orbicular-ovate, up to 4 × 2.7 cm, glaucous, glabrous, apicualte at apex, rounded or subcordate at base; slightly hairy on the midrib above; petioles up to 2 mm long. Flower in close terminal or axillary, pubescent, peduncled cymes. Calyx lobe linear lanceolate, pubescent. Corolla tube 8-12 mm long, thinly pubescent without. Fruits up to 10 mm across, ellipsoid, usually 4-seeded.

Fl. : Mar.-May. *Fr.* : Nov.-Jan.

Distrib. : Throughout the drier parts of India, Myanmar, Sri Lanka.

Specimens examined : Netarhat, 221.

Notes : Common in the forest; on the way to Boneri.

4. Catharanthus G.Don.

1a. Leaves lanceolate; flower less than 1 cm across ... 1. *C. pusillus*

1b. Leaves obovate to oblanceolate; flowers more than 1 cm across ... 2. *C. roseus*

1. Catharanthus pusillus (Mur..) G.Don. Gen. Syst. 4: 95. 1837; Babu, Herb. Fl. Dehra Dun 301. 1977. *Vinca pusilla* Murr. in Comm. Gotting 3: 66. t. 2. f. 1. 773; Hook.f. Fl. Brit. India 3: 640. 1882; Haines,

Bot. Bihar & Orissa 2: 563. 1961 (Rep. ed.). *Lochnera pusilla* (Murr.) K. Schum. in Engl. & Prantl. Pflanzenf. 4(2): 145. 1895.

Small, erect, glabrous, 20-30 cm high, annual herbs; stems acutely 4-angled. Leaves lanceolate, acuminate at apex and attenuate at base, glabrous, with minutely scabrid margin, up to 5 × 1.5 cm; petioles slender, up to 6 mm long. Flowers in 1-2 flowered cymes. Sepals filiform. Corolla white, mouth of the tube pilose within, lobes obovate, 6-8 mm long. Follicles 2, slender, glabrous, diverging, straight, up to 3.5 cm long. Seeds black, muricately ribbed.

Fl. & Fr. : Aug.-Jan.

Distrib. : Throughout India, Sri Lanka.

Specimens examined : Simultarh village (Daltonganj), 275.

Notes : Frequent in cultivated land and along Koel river banks.

Uses : Plants poisonous to cattle, used for lumbago pain.

2. Catharanthus roseus (L.) G.Don, Gen. Syst. 4: 95. 1837; Stearn in Lloydia 29: 196-200. 1966; Hubber in Abeywickrama, Rev. Handb. Fl. Ceylon 1(1): 13. 1973. *Vinca rosea* L., Syst. Nat. ed. 16. 944. 1759; Hook.f. in Fl. Brit. India 3: 640. 1882, Prain, Beng. Pl. 2: 672. 1903 (Rep. ed. 2: 497. 1963) & in Rec. Bot. Surv. India 3: 236. 1905; Haines, Bot. Bihar & Orissa, 2: 563. 1961 (Rep. ed.). *Lochnera rosea* (L.) Reichenb., Consp. Regni Veg. 134. 1828; D. Wyer in Lloydia 27: 282-285. 1964.

Beautiful herbs, 30-60 cm high. Leaves opposite up to 4 × 1.5 cm. obovate to oblanceolate, rounded or often obtuse-mucronate at apex, narrowed at base; petioles up to 5 mm long; stipules linear, forming a ring. Flowers white or deep rose coloured, usually paired in the axil, sessile. Calyx 5-partite; sepals filiform, up to 4 mm long. Corolla tube long, up to 2.5 cm long, slender. Follicles 2-2.5 cm long, ribbed, pointed at apex.

Fr. : Throughout the year, mainly in the rainy season. Exotic.

Distrib. : Native of West Indies, introduced in India & elsewhere.

Specimens examined : Betla, 40.

Notes : Cultivated, often met with as an escape in waste places.

Common name : Beng. : *Nayantara*; Hindi : *Sadabahar*.

Uses : Plants used for diabetes and infusion of leaves used in menorrhagia. The alkaloid "Vincirstine" has retarding effect on progress of leukaemia.

5. HOLARRHENA R.Br.

Holarrhena pubescens (Buch.-Ham.) Wall. (Cat. No. 1673. 1829. *nom. nud.*) ex G.Don, Gen. Syst. 4: 78. 1838; A.DC. in DC., Prodr. 8: 413. 1844; Codd. in Dyer *et al.*, Fl. South Africa 26: 263. 1963. *Echites pubescens* Buch.-Ham. in Trans. Linn. Soc. 13: 524. 1822. *Nerium antidysentericum* L., Sp. Pl. 1: 203. 1753, partly as to Rheede, 'Codaga pala', Hort. Malb. 1: t. 47. 1678, [non *Wrightia antidysenterica* (L.) R.Br.]. *Echites antidysenterica* (L.) Roxb. in Flemm. in As. Res. 11: 166. 1810 *pro parte. Holarrhena antidysenterica* (L.) Wall., Cat. No. 1672. 1829. partly as to specimen in Herb. Wall.; A.DC. in DC., Prodr. 8: 413. 1844. partly as to Wight Ic. t. 439 and the relevant part of *Echites antidysenterica* Roxb.; Hook.f. in Fl. Brit. India 3: 644. 1882; Prain, Beng. Pl. 2: 674. 1903 (Rep. ed. 2: 493. 1963); Haines, Bot. Bihar & Orissa 2: 564. 1961 (Rep. ed.).

Large shrubs or small trees. Leaves up to 11.8 × 7 cm, short petioled, broadly ovate to elliptic oblong, abruptly acuminate at apex, base rounded obtuse, sometimes unequal, margin entire, secondary nerves arching at margin. Flowers in terminal corymbose cymes, 6-12 cm in diameter. Flowers 2-3 cm in diam., white, sweet scented; bracts small. Calyx lobe up to 2.5 mm long, oblong-lanceolate, acute. Corolla tube up to 12 mm long, base slightly swollen, tubes up to 14 cm long, oblong, obtuse. Follicles-2, slender, coriaceous, with white spots, up to 40 × 1 cm. Seeds up to 1 cm long, linear-oblong, coma about twice as long as seed, brown.

Fl. & Fr. : May-Jan.

Distrib. : Major parts of India, Africa, Malay peninsula.

Speimens examined : Maromer, 508.

Notes : Very common in open forests.

Uses : The bark is used in amoebic dysentery.

Remarks : According to Codd. (loc. cit.) the correct name of this taxon should be *Holarrhena pubescens* (Buch.-Ham.) Wall. and, therefore, the author has followed him. He has given the following note on the nomenclature of this taxon.

"The nomenclature of the species is complicated by the fact that Linnaeus based his species on *Nerium antidysentericum* (Sp. Pl. ed. 1: 209) on a mixture of two entities, now included in two different genera, *Wrightia* and *Holarrhena*. The two entities are: (a) "Fl. Zeyl. 107. Mant. Med. 102"; this is represented by a specimen in Herb. Herm. Vol. 4: 76, now in the British Museum which is accepted as the type of the Linnaean epithet, combined as *Wrightia antidysenterica* (L.) R.Br. in Mem. Wern. Soc. 1: 73. 1809; and (b) the second entity, "Codaga pala, Rheede, mal. 1. p. 85. t. 47," which is the plant now under discussion, and to which Roxburgh (1810) applied the epithet *Echitis antidysenterica*. However, Roxburgh apparently did not distinguish between the two Linnaean entities, although the specimen and plate in Herb. Roxb. are equivalent to the "Codaga pala", his citation includes a reference Murray, App. Medic. 1: 828 (1790), which leads one to Linn. Sp. Pl. ed. 2: 306 and Burmann, Thes. Zeyl., etc. Thus the epithet *Echites antidysenterica* Roxb., must be regarded as a combination based on, and having the same type as, the Linnaean epithet *Nerium antidysentericum* (see above). The earliest valid epithet for the Codaga pala thus appears to be *Echites pubescens* Buch.-Ham. (1822), which was transferred to *Holarrhena* by Wallich (1829)."

6. ICHNOCARPUS R.Brown

Ichnocarpus frutescens (L.) R.Br. in Mem. Wern. Soc. 1: 62. 1809; Hook.f. in Fl. Brit. India 3: 669. 1882; Prain, Beng. Pl. 2: 680. 1903 (Rep. ed. 2: 504. 1963) & in Rec. Bot. Surv. India 3: 237. 1905; Haines, Bot. Bihar & Orissa 2: 573. 1961 (Rep. ed.). *Apocynum frutescens* L., Sp. Pl. 213. 1753.

Climbing shrubs, with rusty tomentose branches. Leaves opposite, elliptic-lanceolate, up to 5 × 1.5 cm, acute at base, acuminate at apex, glabrous above, glabrate beneath. Flower greenish-white, many, in axillary and terminal pedunculate cymes. Calyx 5-fid, lobes ovate-obtuse. Corolla tubular, twice as long as calyx, lobes 6-7 mm long. Anthers sagittate,

connivent; nectary 5 lobed. Follicles slender, up to 12 cm long, slightly flattened. Seeds linear, grooved, with coma, up to 2 cm long.

Fl. & Fr. : Sept.-Apr.

Distrib. : Throughout India, Sri Lanka, China, Indonesia and Australia.

Specimens examined : Daltonganj, 16.

Notes : Common on the bushes, along with *Capparis zeylanica* L. and in the forest.

Common name : Beng. : *Dudhi, Syamalota*; Hindi : *Kalidudhi*; Santal : *Dudhilata*; Kol.: *Onolsing.*

Uses : Branches used in basket making and as cordage.

7. NERIUM L.

Nerium indicum Mill., Gard. Dict. ed. 8. No. 2: 1786; Merrill in An Enum. Philipp. Fl. Pl. 3: 336. 1923; Bennet in Fl. Howrah Distt. 277. 1979; Guha Bakshi, Fl. Murshidabad Distt. 189. 1984. *Nerium odoratum* Sol. in Ait., Hort. Kew. 1: 297. 1789; Hook.f. in Fl. Brit. India 3: 655. 1882; Haines, Bot. Bihar & Orissa 2: 567. 1961 (Rep. ed.).

Glabrous shrubs. Leaves 3-4-nately whorled, coriaceous, dark-green and shining above, linear, entire, acuminate into a spinous tip, narrowed down at base into short petiole, secondary nerves many, spreading. Flowers up to 3 cm diam., rose to deep red, fragrant, in terminal cymes. Sepals lanceolate, acuminate. Corolla tube funnel-shaped, mouth with 5, broad fimbriate-toothed scales, lobes-5. Stamens inserted on the tip of the corolla tube; filaments very short; anthers sagittate, spurred. Follicles cylindric, straight.

Fl. : Mar.-June. *Fr.* : Sept.-Dec.

Distrib. : Native of W. Himalaya (Fl. Hassan), now naturalised in Asian Tropics.

Specimens examined : Netarhat, 861.

Notes : Commonly planted in gardens, often found in hedges.

Common name : Beng. : *Karabi*; Hindi : *Kaner*; Santal : *Rajbaha.*

Uses : Root bark used for skin diseases.

8. PLUMERIA L.

1a. Leaves less than 8 cm wide, without marginal vein ... 1. *P. alba*

1b. Leaves more than 8 cm wide; with marginal vein ... 2. *P. rubra*

1. Plumeria alba L., Sp. Pl. 209. 1753; Haines, Bot. Bihar & Orissa 2: 563. 1961 (Rep. ed.); Bailey, Man. Cult. Pl. 810. 1963. (Rep. ed.).

Shrubs; or small tree; branches thick, fleshy, marked with leaf scars. Leaves linear-oblong to oblong-lanceolate, 18-23 × 4-5 cm, coriaceous, entire, obtuse at apex, hairy beneath. Flowers in terminal peduncled cymes.Calyx 5-partite, glandular at tips. Corolla funnel-form, white with yellow throat, up to 8 cm long; petals spathulate.

Fl. : Feb.-April.

Distrib. : West Indies, planted throughout India.

Specimens examined : Barwadih, 929.

Notes : Common in the villages.

2. P. rubra L., Sp. Pl. 209. 1753; Haines, Bot. Bihar & Orissa 2: 563. 1961 (Rep. ed.); Bailey, Man. Cult. Pl. 810. 1963 (Rep. ed.).

Shrubs or small trees, leaves obovate or broadly lanceolate, tapering at base, shortly acuminate at apex, 28-33 × 8-10 cm, glabrous or pubescent beneath. Flowers in terminal cymes, red with white centre, up to 8 cm long.

Fl. : Feb.-Apr. Exotic.

Distrib. : Mexico to Venezuela, West Indies and throughout India. Native of West Indies.

Specimens examined : Netarhat, 868.

Notes : Common in the gardens.

9. RAUVOLFIA L.

1a. Leaves glabrous, more than 12 cm long; fruits blackish at maturity ... 1. *R. serpentina*

1b. Leaves pubescent beneath, less than 12 cm long; fruits reddish at maturity ... 2. *R. tetraphylla*

1. Rauvolfia serpentina (L.) Benth. ex Kurz., For. Fl. Brit. Burma 2: 171. 1877; Hook.f. in Fl. Brit. India 3: 632. 1882; Prain, Beng. Pl. 2: 671. 1903 (Rep. ed. 2: 437. 1963) & in Rec. Bot. Surv. Ind. 3: 235. 1905; Haines, Bot. Bihar & Orissa 2: 565. 1961 (Rep. ed.); Chakravarty in Bull. Bot. Soc. Beng. 3: 3. 1955; Sulochana in Ind. Bot. Soc. 38: 578. 1959. *Ophioxylon serpentinum* L., Sp. Pl. 1043. 1753.

Glabrous, sparingly branched low shrubs, up to 1 m high. Leaves in whorls of 3, up to 14 × 4 cm, smooth, shining green above and pale beneath, elliptic-lanceolate, acuminate at apex, base narrowed down, margin entire; petioles up to 1.2 cm long. Cymes 3-5 cm diam., many flowered; peduncle 4-7 cm long; pedicels 4-6 mm long; bracts up to 3 mm long; subulate. Calyx glabrous, bright red; segments 2 mm long, lanceolate. Corolla 1-1.5 cm long, pinkish, tube slender, swollen at middle; lobes 3-4 mm long, elliptic-oblong, rounded at apex. Stamens inserted at the dilated portion of corolla tube. Disc membranous, cup-shaped, obscurely lobed. Drupes single or didymous and connate, 5 mm in diam., purplish-black at maturity.

Fl. & Fr. : June-Dec.

Distrib. : Major parts of India; Sri Lanka and Java.

Specimens examined : Maromar, 498.

Notes : Not Common, occasional in the jungles and also along the road sides.

Common name : Beng. : *Sarpagandha* or *Chandra*; Hindi: *Chandrabhaga*.

Uses : The root is anthelmintic; useful in ulcers and many poisonous effects, also used for snake-bites, antidote for high blood pressure.

2. **Rauvolfia tetraphylla** L., Sp. Pl. 208. 1753; Rendle in Proc. Linn. Soc. Lond. 149: 109. 1936; Rao in Ann. Missouri Bot. Gard. 43: 285. 1956; Sulochana in J. Ind. Bot. Soc. 38: 586. 1959; Fuchs in Taxon 9: 40. 1960. *Rauvolfia canescens* L., Sp. Pl. ed. 2: 303. 1762; Prain, Beng. Pl. 671. 1903. *Rauvolfia tomentosa* Jacq., Enum. Pl. Carib. 14. 1760. *nom seminudum* & in select. Strip. Ann. Hist. 47. 1763 *cum descr.*; Fuchs in Taxon 9: 41. 1960.

Shrubs, about 120 cm high. Leaves 3-4 nately whorled, above with 2 unequal pair, elliptic-lanceolate, acute, up to 11 × 5.5 cm, entire, pubescent beneath; petioles up to 4 mm long. Flowers small, white with pink tube; pedicels up to 1.3 cm long. Drupes 2-3 at a axil, up to 7 mm diam., red.

Fl. & Fr. : Dec.-Mar. Exotic.

Distrib. : Native of West Indies, naturalised in India.

Specimens examined : Betla, 33.

Notes : Common in the forest, also cultivated in the forest nursery (Betla).

Common name : Hindi : *Barachandrika.*

Uses : Roots often used as a substitute of *R. serpentina*. Decoction of the root used against snake bites. Fruits also yield a dye.

Remarks : *R. tetraphylla* and *R. tomentosa*, are treated as conspecific by Rendle & Rao, while Fuchs treats them as distinct.

10. TABERNAEMONTANA L.

Tabernaemontana divaricata (L.) R.Br. in Roem. & Schult., Syst. 4: 427. 1819; Merrill in Contr. Arn. Arb. 8: 141. 1934; Bennet, Fl. Howrah 282. 1979. *Nerium divaricatum* L., Sp. Pl. 209. 1753. *Tabernaemontana coronaria* (Jacq.) Willd., Enum. Hort. Berol. 275. 1809; Hook.f., Fl. Brit. India 3: 646. 1882; Haines, Bot. Bihar & Orissa 2: 564. 1961 (Rep. ed.). *Ervatamia coronaria* (Jacq.) Stapf. in Thiselton-Dyer, Fl. Trop. Afr. 4. 127. 1902.

Large bushy shrubs. Leaves oblong-lanceolate, acuminate at apex, tapering at base, shining above, up to 18 × 6 cm. Flowers white, up to 4 cm diam., in axillary or terminal cymes. Calyx 5-lobed, up to 4 mm long. Corolla salver-shaped; tube up to 2.5 cm long; petals ovate-oblong, obtuse. Follicles up to 5 cm long, recurved. Seeds with red aril.

Fl. & Fr. : Aug.-Feb.

Distrib. : India.

Specimens examined : Barwadih, 938.

Notes : Common, cultivated, also in the forests as an escape.

Common name : Beng. : *Sadaphul* or *Tagar*; Hindi : *Tagar*.

Uses : Roots chewed for relief from toothache.

Remarks : The Genus *Ervatamia* DC. is congeneric with *Tabernaemontana* L.

11. THEVETIA L. *nom. cons.*

Thevetia peruviana (Pres.) K. Schum. in Pfl.-Fam. 4(2): 159. 1895; Merrill in Philip. J. Sci. (Bot.) 9: 130. 1914; Nowicke in Ann. Missouri Bot. Gard. (Fl. Panama) 57: 91 f. 12. 1970. *Cerbera peruviana* Pers., Syn. 1: 267. 1805. *C. thevetia* L., Sp. Pl. 209. 1753. *Thevetia neriifolia* Juss. ex Steud., Nom. 2: 680. 1841; Haines, Bot. Bihar & Orissa 2: 562. 1961 (Rep. ed.).

Large glabrous shrubs or small trees, up to 5 m high. Leaves crowded, linear, 8-14 × 0.5-0.8 cm, tapering at both ends, margin entire, revolute, with prominent 1-nerve. Cymes terminal or subterminal few to 1-flowered. Calyx 5-partite; segments spreading, acute, glandular inside at base. Corolla funnel-shaped, 4-5 cm diam., bright yellow, throat with pilose scales; lobes 5, overlapping to the left. Stamens 5, adnate at top of corolla tube; anthers hidden within scales. Drupes 4-5 cm across, angular, green.

Fl. & Fr. : Nov.-July. Exotic.

Distrib. : Pantropical (native of Trop. America).

Specimens examined : Daltonganj, 831.

Notes : Commonly cultivated in the gardens but often met with as an escape; throughout the distict.

Common name : Beng. : *Kalkephul*; Hindi : *Pile kaner*; Santal : *Berenjo*.

Uses : Bark is cathartic and emetic also used as febrifuge. Leaves purgative and emetic. Seeds are employed for criminal poisoning of cattle. All parts of plants (including latex) are poisonous.

12. VALLARIS N.Burm.

Vallaris solanacea (Roth.) Kuntze, Rev. Gen. 417. 1891; Mukherjee, Fl. Panch. Bori Res. 180. 1984. *Peltanthera solanacea* Roth., Nov. Sp. 132. 1821. *Vallaris heynei* Spreng., Syst. 1: 635. 1824; Hook. f. in Fl. Brit. India 3: 650. 1882; Haines, Bot. Bihar & Orissa 2: 570. 1961 (Rep. ed.).

Woody, twining shrubs. Leaves opposite, elliptic or obovate, shortly acuminate at apex, acute at base, slightly pubescent, gland-dotted beneath, up to 9 × 3.5 cm. Flowers white, fragrant, in many flowered axillary cymes. Calyx divided near base, pubescent; lobes lanceolate, tube short, longer than calyx lobes. Ovary and style hairy. Fruits oblong, fibrous, fleshy.

Fl. & Fr. : Dec.-April.

Distrib. : Throughout India.

Specimens examined : Boneri, 171.

Notes : Not common. Found in the forest on the way to Boneri from Netarhat.

13. WRIGHTIA R.Br.

Wrightia tinctoria R.Br. in Mem. Wern. Soc. 1: 73. 1809; Hook.f. in Fl. Brit. India 3: 653. 1882; Haines, Bot. Bihar & Orissa 2: 568. 1961 (Rep. ed.); Santapau in Rec. Bot. Surv. India (Fl. Khandala, 3rd ed.) 16(1): 148. 1967.

Small trees, with milky latex, 5-7 m high. Leaves up to 15.5 × 5 cm, oblong-lanceolate, coriaceous above, pubescent beneath, acuminate at apex, entire at margin, secondary nerves 8-12; petioles very short, up to 4 mm long. Flowers greenish white, in lax terminal cymes. Corolla tube twice in length of calyx. Corona of many linear scales. Follicles up to 40 cm long, terete, pendulous, slender, cohering at tip, surface with white dots. Seeds up to 2 cm long, linear-oblong, papillose.

Fl. & Fr. : Apr.-Jan.

Distrib. : In all tropical countries of the World.

Specimens examined : Betla, 470.

Notes : Common on rocky areas and in the forest under growth.

Common name : Beng. & Hindi : *Indraja.*

Uses : Bark is used for healing purpose and also used as medicine for Malaria and chronic diarrhoea.

Beaumontia grandiflora Wall., *Aganosma caryophyllata* G.Don., *Trachelospermum jasminoides* Lam. are found only in the gardens.

ASCLEPIADACEAE

1a. Pollinia pendulous :

- 2a. Erect shrubs; leaves subsessile ... 1. CALOTROPIS
- 2b. Climbers; leaves distinctly petioled ... 5. PERGULARIA

1b. Pollinia erect :

- 3a. Petal lobes overlapping :
  - 4a. Corona corolline ... 3. GYMNEMA
  - 4b. Corona staminal ... 6. TELOSMA
- 3b. Petal lobes rotate or campanulate :
  - 5a. Corona appressed to the column and with membranous tip ... 4. MARSDENIA
  - 5b. Corona not appressed to the column and with a short beak ... 2. DREGEA

1. CALOTROPIS R.Br.

1a. Corolla without purple blotch, lobes spreading ... 1. *C. gigantea*

1b. Corolla with purple blotch; lobes erect ... 2. *C. procera* ssp. *hamiltonii*

1. Calotropis gigantea (L.) R. Brown in Ait., Hort, Kew. ed. 2: 78. 1811; Hook.f. in Fl. Brit. India 4: 17. 1883; Prain, Beng. Pl. 2: 688. 1903 (Rep. ed. 2: 510. 1963) in Rec. Bot. Surv. of India 3: 238. 1905; Haines, Bot. Bihar & Orissa 2: 577. 1961; (Rep. ed.); Hubber in Abeywickrama, Rev. Handb. Fl. Ceylon 1(1): 35. 1973. *Asclepias gigantea* L., Sp. Pl. 214. 1753.

Soft lateciferous shrubs, 1-1.8 m high, young parts tomentose, whitish. Leaves sessile, ovate-oblong, entire, up to 13 × 7 cm, whitish. Flowers in unbellate cymes, light purple, up to 2 cm in diam. Corolla valvate and spreading; petals ovate-lanceolate; corona of 5-lobes adnate to gynostegium, each with recurved vesicle at base and a pair of auricles at apex. Follicles up to 9 × 3.5 cm, recurved, turgid, smooth. Seeds many, 5-6 mm long, broadly ovate, flat, slightly tomentose; coma up to 3 cm long.

Fl. : Dec.-July. *Fr.* : Feb.-June. Exotic.

Distrib. : Introduced from tropical Africa, now pantropic.

Specimens examined : Daltonganj, 13.

Notes : Common throughout the district, mainly in wastelands & exposed areas.

Common name : Beng. : *Akanda*; Hindi : *Madarakona*; Santal : *Akasna*.

Uses : Latex used in fever and as purgative by the Santals and Kols.

2. C. procera (Ait.) Ait.f. ssp. **hamiltonii** (Wight.) Ali in Notes Roy. Bot. Gard. Edinb. 38: 289. 1980. *Calotropis hamiltonii* Wight, Contrib. Bot. Ind. 53. 1834. *Calotropis procera* auct. non (Ait.) Ait.f., Hook.f. in Fl. Brit. India 4: 18. 1883; Haines, Bot. Bihar & Orissa 2: 578. 1961 (Rep. ed.).

Large shrubs, 0.9-2 m high; young parts covered with appressed, white, fluccose tomentum. Leaves sessile, thick, glaucous-green, elliptic to obovate-oblong, acute or very shortly acuminate at apex, semicordate or amplexicaul at base, appressed white, fluccose tomentose beneath, up to 15 × 9 cm. Flowers up to 1.3 cm across. Calyx lobes lanceolate, up to 4 × 2 mm, pubescent without. Corolla pink with purple blotch, lobes up to 1 × 0.6 cm, erect; corona lobes up to 6 mm long, glabrous, equalling or slightly exceeding staminal column, with obtuse muticous tip and fleshy upturned base. Follicles 6.5-9.5 × 2-5.1 cm, recurved, sausaged-shaped.

Fl. & Fr. : Throughout the year, especially during Oct.-Jan.

Distrib. : India, Pakistan, Afghanistan and Oman.

Specimens examined : Muhammadganj, 1001.

Notes : Not common. Grows in waste places.

Common name : Beng. & Hindi : *Akanda*; Santal : *Akaona*.

Remarks : In ssp. *procera* fruits are larger than in ssp. *hamiltonii*, and distributed in Africa extending to Mediterranean region, Jordan, Arabia, Palestine, Abu Dhabi, West Indies and tropical South and Central America (Bennet - 1987).

2. DREGEA E. Mey.

Dregea volubilis (L.f.) Benth. ex Hook.f. in Fl. Brit. India 4: 46. 1883; Haines, Bot. Bihar & Orissa 2: 586. 1961 (Rep. ed.); Santapau in Bull. Bot. Surv. Ind. 3: 15. 1961. *Asclepias volubilis* L.f., Suppl. P. 170. 1781. *Marsdenia volubilis* (L.f.) Cooke, Fl. Bombay 2: 166. 1904. *Wattakaka volubilis* (L.f.) Stapf in Curtis Bot. Mag. sub. t. 8976. 1923; Huber in Abeywickrama, Rev. Handb. Fl. Ceylon 1(1): 50. 1973; Bhandari in Fl. Ind. Desert. 227. 1978. *Dregea volubilis* var. *lacuna* (Ham.) Hook.f. in Fl. Brit. India 4: 46. 1883.

Stout twiner; stems attaining up to 2 cm in diam., with somewhat corky and reticulate bark; young parts brownish tomentose, old branches glabrous, lenticellate. Leaves ovate or broadly ovate, 5-12 cm long, acuminate at apex, cordate at base, usually hoary, lateral nerves 4-5 pairs; petioles 1-4 cm long. Flowers many in umbels, green or yellowish-green; peduncle

equalling or slightly longer than petiole; pedicels 1-2.5 cm long, slender. Calyx spreading, lobes lanceolate. Corolla lobes erect, oblong or ovate; corona fleshy, shining green, processes gibbous with a short beak towards stigma. Follicles 7-10 × 2.5-3.5 cm, turgid, glabrous, striate, tapering towards tip into a blunt apex. Seeds up to 1 × 0.5 cm, flat, obovoid pale-yellowish-brown, narrowly winged; coma up to 4 cm long.

Fl. & Fr. : June-Jan.

Distrib. : Major parts of India, Sri Lanka and Malaysia.

Specimens examined : Barwadih, 463.

Notes : Common in waste lands and forests.

Common name : Beng. : *Tita Kunga*; Santal : *Kongat.*

3. GYMNEMA R.Br.

Gymnema sylvestre (Retz.) R.Br. ex Schult. in Roem. & Schult., Syst. Veg. ed. 15. 6: 57. 1819; Hook.f. in Fl. Brit. India 4: 29. 1883; Haines, Bot. Bihar & Orissa 2: 583. 1961 (Rep. ed.); Stevens in Sald. & Nicol., Fl. Hassan 448. 1976. *Periploca sylvestris* Retz., Obs. Bot. 2: 15. 1781.

Slender, woody, pubescent climbers. Leaves elliptic or elliptic-lanceolate, pubescent, especially on nerves beneath, up to 5 × 3 cm. Flowers subsessile, greenish-yellow, in umbellate cymes. Calyx 5-partite; sepals ovate, hairy, with membranous margin. Petals slightly ciliate, 2-4 mm long, with fleshy corona. Follicles slender, gradually tapering from the base, up to 6 cm long. Seeds margined, with up to 3.5 cm long coma.

Fl. & Fr. : Aug.-Mar.

Distrib. : Asia, Trop. Africa & Malaysia.

Specimens examined : Mahuamilan, 689.

Notes : Frequently climbing on bushes in the forests.

Common name : Hindi : *Merasingi.*

Uses : Commonly used by the villagers in diabetes. The leaves, if chewed, the tongue temporarily loses the taste of sugar.

4. MARSDENIA R.Br.

Marsdenia tenacissima (Roxb.) Moon, Cat. Pl. Ceylon 21. 1824; Wight. & Arn. in Wight., Contrib. 41. 1834; Hook.f. in Fl. Brit. India 4: 35. 1883; Haines, Bot. Bihar & Orissa 2: 585. 1961 (Rep. ed.). *Asclepias tenacissima* Roxb., Pl. Corom. 3: 35. t. 24. 1815.

Large, stout twiner, with milky juice, densely softly pubescent or tomentose throughout. Leaves valvety, broadly ovate, acuminate to cuspidate at apex, deeply cordate at base, 7-15 × 5-10 cm. Flowers greenish, in corymbosely-branched tomentose cymes. Calyx 5-partite, lobes ellipsoid. Corolla subcampanulate, lobes ciliate-pubescent without. Follicles up to 11.5 × 2.3 cm, velvety, thick less than half way from base. Seeds flat, margined, up to 11 × 7 mm, with 5.5 cm long white coma.

Fl. : Apr.-June; *Fr.* : Jan.-Mar.

Distrib. : India, Sri Lanka, Myanmar, Java.

Specimens examined : Bisrampur, 578.

Notes : Common, in the forests and dry hill tracts.

Common name : Beng. : *Chiti*; Hindi : *Siti*; Santal : *Kongat.*

Uses : Bark yields a strong fibre used for fishing nets and cordages.

5. PERGULARIA L.

Pergularia daemia (Forssk.) Choiv., Result. Sci. Miss. Stefani-paoli Somal. Ital. 1: 115. 1916; Sant. & Irani, Univ. Bomb. Bot. Mem. 4: 74. 1962; Huber in Abeywickrama, Rev. Handb. Fl. Ceylon 1(1): 33. 1973. *Asclepias daemia* Forssk. Fl. Aeg. Arab. 51. 1776. *Daemia extensa* R.Br. Mem. Wern. Soc. 1: 50. 1810; Hook.f. in Fl. Brit. India 4: 20. 1883. *Pergularia extensa* N.E. Brown, Kew Bull. 323. 1907; Haines, Bot. Bihar & Orissa 2: 579. 1961 (Rep. ed.).

Hispidly hairy climbers, with milky juice. Leaves membranous, ovate, 4-10 × 3-8 cm, acuminate at apex, deeply cordate at base, sparsely hairy; petioles 3-7 cm long, hairy. Flowers in loose corymbose or racemose cymes, greenish-yellow or dull-white; pedicels up to 2.5 cm long; bracts minute. Sepals ovate, pubescent, with 2 glands within. Corolla campanulate, ciliate. Follicles up to 5 cm long, attenuate into a long beak. Seeds 4-7 mm long, pubescent, broadly ovate, with a rounded, crenate base.

Fl. & Fr. : Sept.-Dec.

Distrib. : India, Sri Lanka, Africa.

Specimens examined : Kundri, 940.

Notes : Common on hedges and bushes, throughout the district.

Common name : Beng. : *Chagalbati*; Kharw : *Moshiphul*; Hindi : *Sagovani, Jutuk.*

Uses : Flowers and leaves are eaten by the local people. Decoction of the leaves used in asthma and infantile diarrhoea. Plant extract used for menstrual disorders.

6. TELOSMA Coville

Telosma pallida (Roxb.) Craib in Kew Bull. 418. 1911; Haines, Bot. Bihar & Orissa 2: 584. 1961 (Rep. ed.); Sant. & Irani, Univ. Bombay Bot. Mem. 4: 83. 1962. *Asclepias pallida* Roxb., Fl. Ind. 2: 48. 1832. *Pergularia pallida* Wt. & Arn. in Wt., Contrib. 42. 1834; Hook.f. in Fl. Brit. India 4: 38. 1883.

Climbers; stems slender, subglabrous. Leaves ovate or elliptic-ovate, shortly acuminate at apex, deeply cordate at base, up to 8 × 5 cm, membranous; petioles slender, up to 3 cm long. Flowers pale-yellow, in axillary umbelliform cymes; peduncles up to 1 cm long; pedicels 5-10 mm long. Follicles, lanceolate, acuminate, up to 10 × 2 cm. Seeds glabrous, ovate-oblong, up to 8 × 5 mm, with up to 2 cm long coma.

Fl. & Fr. : July-Nov.

Distrib. : India & Myanmar.

Specimens examined : Muhammadganj, 969.

Notes : Common, in the forest on bush.

Common name : Santal : *Kongat.*

Asclepias curassavica L. and *Hoya carnosa* (L.f.) R.Br. are cultivated within the district.

PERIPLOCACEAE

1a. Flowers in terminal, 3-chotomous cymes; corolla more than 2 cm across ... 2. CRYPTOSTEGIA

1b. Flowers axillary, not as above; corolla less than 2 cm across :

2a. Corolla lobes valvate, stigmas 5-angled, crown flat ... 3. HEMIDESMUS

2b. Corolla lobes imbricate; stigmas broadly conic ... 1. CRYPTOLEPIS

1. CRYPTOLEPIS R.Br.

Cryptolepis buchananii R.Br. ex Roem. & Schult., Syst. Veg. 4: 409. 1819; Hook.f. in Fl. Brit. India 4: 5. 1883; Haines, Bot. Bihar & Orissa 2: 576. 1961 (Rep. ed.), Santapau & Irani in Univ. Bombay Bot. Mem. 4: 91. 1962; Stevens in Sald. & Nicol., Fl. Hassan 446. 1976.

Large, glabrous, twining shrubs, with milky latex. Leaves 2-12 × 2.5-5 cm, subcoriaceous, shining dark-green above and pale beneath, elliptic or elliptic-oblong, apex rounded to acute and apiculate, base rounded to acute, secondary nerves many, slender, nearly at right angle to the midnerve; petioles up to 1 cm long. Flowers whitish or yellowish-green, in axillary short paniculate cymes; peduncles up to 1.5 cm long; bracts ovate-lanceolate, up to 1.8 × 0.8 mm. Calyx glabrous, lobes 1.5-2 mm long, ovate. Petals up to 8 mm long, linear-lanceolate, subacute; coronal scales as long as anthers, clavate, fleshy, above middle of corolla tube. Pollinia minute. Follicles 5-9 in long, divaricate, tapering into a blunt point. Seeds up to 5 mm long, ovate-oblong, compressed, black; coma up to 3 cm long.

Fl. : June-Aug.; *Fr.* : Oct.-Dec.

Distrib. : India, Myanmar & Sri Lanka.

Specimens examined : Netarhat, 180 & 790.

Notes : Common in the forests and village surroundings.

Common name : Beng. & Hindi : *Karanta*; Santal : *Utridudhi.*

Uses : Bark fibre used by the tribals for making cordage.

2. CRYPTOSTEGIA R.Br.

Cryptostegia grandiflora R.Br. in Bot. Reg. t. 435. 1819; Hook.f. in Fl. Brit. India 4: 6. 1883; Prain, Beng. Pl. 2: 507. 1963 (Rep. ed.); Haines, Bot. Bihar & Orissa 2: 576. 1961 (Rep. ed.).

Scrambling glabrous shrubs. Leaves opposite, elliptic, acute, up to 7 × 3 cm, coriaceous, shining above. Flowers large, in terminal 3-chotomous cymes. Sepals lanceolate, up to 1.5 × 0.6 cm, slightly connate below. Petals light purple, connate in a funnel-shaped corolla; tube short, widened into a campanulate throat; coronal scale-5, at the base of the corolla throat, 2-cleft, up to 1.2 cm long, subulate. Anthers acute; pollinia 2-in each cell, granular with subspathulate appendages; stigma convex. Follicles thick, divaricate, hard, 3-winged.

Fl. & Fr. : July-Dec. Exotic.

Distrib. : Native of Africa or Madagascar, introduced as an ornamental plant in India.

Specimens examined : Daltonganj, 500.

Notes : Common in the gardens and also in front of forest office.

3. HEMIDESMUS R.Br.

Hemidesmus indicus (L.) R.Br. in Aiton f., Hort. Kew. ed. 2. 2: 75. 1811; Hook.f. in Fl. Brit. India 4: 5. 1883; Prain, Beng. Pl. 2: 685. 1903 (Rep. ed. 2: 508. 1963) & in Rec. Bot. Surv. Ind. 3: 238. 1905; Haines, Bot. Bihar & Orissa 2: 575. 1961 (Rep. ed.). *Periploca indica* L., Sp. Pl. 211. 1753.

Slender, glabrous, perennial, twining or rarely prostrate herbs, root stock aromatic; stems slender, terete. Leaves highly variable, opposite, up to 7 × 1.8 cm, elliptic-oblong or obovate-oblong, apex acuminate to obtuse and apiculate-rounded or truncate at base, dark-green with white streaks above, especially along nerves. Flowers in axillary cymose clusters, up to 5 mm diam., pedicels up to 1.5 mm long. Sepals-5, glandular within, acuminate, spreading. Corolla deep pinkish-brown or reddish-brown inside and yellowish-green outside; lobes ovate-acute. Follicles up to 12 × 0.7 cm, slender, striate, tapering towards apex. Seeds up to 6 × 2 mm, compressed, black, glabrous, elliptic-oblong.

Fl. & Fr. : Aug.-Nov.

Distrib. : Throughout India & Sri Lanka.

Specimens examined : Maromar, 520.

Notes : Very common in the forest and also in moist areas.

Common name : Beng. & Hindi : *Anantamul.*

Uses : Roots used in rheumatism, urinary troubles and skin diseases.

BUDDLEJACEAE

BUDDLEJA L.

Buddleja asiatica Lour., Fl. Cochinch. 72. 1790. Clarke in Hook.f. Fl. Brit. India 4: 82. 1883; Haines, Bot. Bihar & Orissa 2: 591. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 309. 1977.

Suffruticose under shrubs. Leaves lanceolate, acuminate at apex, acute at base, up to 12 × 2 cm, white tomentose beneath. Flowers in thyrsoid, densely tomentose panicles. Calyx densely white-tomentose, divided above middle; sepals triangular, acute. Corolla white, tube 2.5-4 mm long, throat tomentose; petals oblong, obtuse, hairy without. Stamens-4, inserted above middle of corolla tube. Fruits ellipsoid, up to 4 mm long, glabrous, 2-valved.

Fl. & Fr. : Dec.-Mar.

Distrib. : Indomalaysia, China.

Specimens examined : Netarhat, 767.

Notes : Not common. Found near stream.

Common name : Beng. : *Nimda.*

GENTIANACEAE

1a. Corolla regular; all stamens perfect ....2. EXACUM

1b. Corolla irregular; only 1 stamen perfect :

2a. Herbs, less than 12 cm high; flower sessile; capsules globose-ellipsoid ... 3. HOPPEA

2b. Herbs, morethan 12 cm high; flowers pedicelled; capsule oblong ... 1. CANSCORA

CANSCORA Lamk

1a. Stems winged; capsule shorter than calyx ... 1. *C. decussata*

1b. Stems not winged; capsule longer than calyx ... 2. *C. diffusa*

1. Canscora decussata (Roxb.) Roem. & Schult., Mant. 289. 1827; Clarke in Hook.f. Fl. Brit. India 4: 104. 1885; Haines, Bot. Bihar & Orissa 2: 597. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 311. 1977; Cramer in Dassanayake, Rev. Hand. Fl. Ceylon 3: 74. 1981. *Pladera decussata* Roxb., Fl. Ind. 1: 418. 1820; excl. syn.

Erect, slender, annual herbs, up to 30 cm high, glabrous, often much branched from base; stems 4-winged. Leaves ovate-lanceolate, oblong, up to 40 × 12 mm, becoming smaller and passing into bracts upwards, apex acuminate or acute, entire, with 3-nerved base. Flowers in lax paniculate leafy cymes, white; pedicels prominently winged, thickened upwards, up to 15 mm long. Calyx up to 9 mm long, 5-winged, tube swollen towards base; teeth small acute. Corolla tube as long as calyx; limb 5-6 mm diam. Capsule oblong, shorter than the calyx.

Fl. & Fr. : July-Feb.

Distrib. : Throughout India, Sri Lanka, Myanmar & Tropical Africa.

Specimens examined : Bisrampur, 576.

Notes : Common in wet shady areas and waste lands.

Common name : Beng. : *Dankuni*; Hindi : *Sankhaphuli.*

Uses : Fresh juice used in insanity, epilepsy and nervous debility.

2. Canscora diffusa (Vahl.) R.Br., Prodr. Fl. Nov. Holl. 451. 1810; Clarke in Hook.f., Fl. Brit. India 4: 103. 1883; Prain, Bengal Pl. 2: 708. 1903 (Rep. ed. 2: 525. 1963) & in Rec. Bot. Surv. India 3: 240. 1905; Haines, Bot. Bihar & Orissa 2: 597. 1961 (Rep. ed.); Cramer in Dassanayake, Rev. Handb. Fl. Ceylon 3: 71-72. 1981. *Gentiana diffusa* Vahl., Symb. Bot. 3: 47. 1794. *Exacum diffusum* Willd., Sp. Pl. ed. 4. 1(2): 637. 1798. *Canscora tenella* Wight, Icon. Pl. Ind. Or. 4: 7. t. 1327. f. 3. 1850.

Annual diffuse herbs, up to 25 cm high, branches slender, dichotomous, wingless, 4-angled. Leaves opposite, broadly ovate, acuminate or apiculate at apex, sessile, lower shortly petioled, up to 12 × 8 mm, 3-nerved, upper becoming smaller, passing into linear bracts, 2-3 mm long. Flowers pink, in lax paniculate cymes; pedicels 5-12 mm long, filiform. Calyx tube striate with setaceous teeth, as long as corolla tube. Perfect stamen larger than other three. Capsule narrowly oblong, 6 × 1.5 mm long.

Fl. & Fr. : Nov.-Mar.

Distrib. : Tropical Asia & Africa, throughout Malaya to Trop. Australia.

Specimens examined : Netarhat, 128.

Notes : Common along road sides and marshy areas.

2. EXACUM L.

Exacum pedunculatum L., Sp. Pl. 112. 1753; Griseb. in DC., Prodr. 9: 46. 1845; Clarke in Hook.f., Fl. Brit. India 4: 97. 1883; Haines, Bot. Bihar & Orissa 2: 595. 1961 (Rep. ed.).

Small, much branched, erect herbs, up to 15 cm high; stems 4-angular. Leaves subsessile, narrowly elliptic or lanceolate, acute at apex, tapering at base, 3-nerved, up to 3 × 0.6 cm. Flowers in few flowered terminal cymes; pedicels erect to suberect, rigid, up to 5 mm long. Calyx up to 5 mm long, 4-lobed, with lanceolate dorsal wing. Corolla 4-lobed; lobe up to 8 mm long, elliptic, white or pale blue. Stamens-4, anthers attenuate upwards, with pore at apex. Capsule subglobose.

Fl. : Nov.-Jan.

Distrib. : Throughout India & Sri Lanka.

Specimens examined : Barwadih, 390.

Notes : Infrequent in waste lands and hill slopes.

3. HOPPEA Willd.

Hoppea dichotoma Heyne ex Willd., Ges. Naturf. Fr. Neue Schriften 3: 435. 1801; Clarke in Hook.f., Fl. Brit. India 4: 100. 1883; Prain, Beng. Pl. 2: 707. 1903 (Rep. ed. 2: 525. 1963) & in Rec. Bot. Surv. India 3: 240. 1905; Haines, Bot. Bihar & Orissa 2: 598. 1961 (Rep. ed.).

Annual erect, small, dichotomously branched herbs, up to 8 cm high; stems 4-angled, angle slightly winged. Leaves sessile, ovate or elliptic-ovate, up to 6 × 4 mm, acute at apex, one nerved, upper one become smaller and passing into bracts. Flowers many in leafy paniculate cymes. Calyx ribbed, 4-lobed, lanceolate, acute, each lobe with 2 green nerves, uniting at tip, hyaline between the nerves, up to 2 mm long. Corolla greenish-yellow, 4-lobed, ovate-triangular, acute. Capsule 2 mm long, globose-ellipsoid, 2-valved. Seeds many, minute.

Fl. & Fr. : Nov.-Feb.

Distrib. : Throughout India only.

Specimens examined : Mandal, 401. Helophyte.

Notes : Common in open waste marshy areas and near ditches.

MENYANTHACEAE

NYMPHOIDES Seguier.

1a. Corolla lobes densely fimbriate on inner surface; seeds smooth ... 2. *N. indica*

1b. Corolla lobes with a wided longitudinal crest on inner surface; seeds tubercled ... 1. *N. hydrophyllum*

1. **Nymphoides hydrophyllum** (Lour.) Kuntze, Rev. Gen. Pl. 2: 429. 1891; Abeywick., Ceylon J. Sci. Biol. Sci. 2(2): 211. 1959; Cramer in Dassanayake, Rev. Handb. Fl. Ceylon 2: 208. 1981; Guha Bakshi, Fl. Murshidabad Dist. 201. 1984. *Menyanthes hydrophylla* Lour., Fl. Cochinch. 1: 129. 1790. *Menyanthes cristata* Roxb., Pl. Corom. 2: 3. t. 105. 1798. *Limnanthemum cristatum* (Roxb.), Griseb., Gen. Sp. Gent. 342. 1839; Clarke in Hook.f., Fl. Brit. India 4: 131. 1883; Haines, Bot. Bihar & Orissa 2: 599. 1961 (Rep. ed.).

Aquatic, floating herbs, with a short, erect rhizome; stems slender, petiole like, rooting at nodes. Leaves ovate-orbicular, 4-9 cm across, deeply cordate, hastate at base, lobes rounded, faintly crenate, pale green above, purplish beneath; petioles up to 2.5 cm long. Calyx divided near the base, lobes linear-oblong, up to 4 × 2 mm. Corolla up to 2 cm across, white with yellow centre, throat with a ring of white hairs, lobes ovate-oblong, up to 8 mm long. Capsule broadly ovoid, up to 8 × 5 mm. Seeds globose, up to 2 mm across, muriculate, pale-brown.

Fl. & Fr. : June-Oct.

Distrib. : India, Malaysia and South China.

Specimens examined : Tarhashi, 1135. Epihydate.

Notes : Common in ponds and ditches.

2. **N. indica** (L.) Kutz., Rev. Gen. Pl. 2: 429. 1891; Ramam. in Sald. & Nicol., Fl. Hassan 475. 1976; Mukherjee, Fl. Panch. & Bori Res. 192. 1984. *Menyanthes indica* L., Sp. Pl. 145. 1753. *Limnanthemum indicum* (L.) Griseb., Gen. Sp. Gent. 343. 1839 et. in DC., Prodr. 9: 139. 1845; Clarke in Hook.f., Fl. Brit. India 4: 131. 1883; Haines, Bot. Bihar & Orissa 2: 598. 1961 (Rep. ed.).

Aquatic herbs; rhizome thick, with many scale like ovate leaves. Floating leaves orbicular-peltate, deeply cordate at base, coarsely crenate, 6-25 × 3.5-20 cm, nerves obscure above, prominent beneath; petioles up to 15 cm long. Flowers in umbels. Calyx lobe ovate-lanceolate, up to 6 cm long. Corolla white with yellow throat; petals ovate-lanceolate, up to 1.5 cm long, densely fimbriate. Capsule obovoid, up to 7 × 4.5 mm. Seeds globose, smooth.

Fl. & Fr. : Round the year.

Distrib. : Indomalaysia.

Specimens examined : Tarhasi, 1141. Epihydate.

Uses : Common in stagnant pools, throughout the district.

HYDROPHYLLACEAE

HYDROLEA L. *nom. cons.*

Hydrolea zeylanica (L.) Vahl., Symb. Bot. 2: 46. 1791; Clarke in Hook.f., Fl. Brit. India 4: 133. 1883; Baker in van Steenis, Fl. Males., ser. 1.4: 207. 1951; Haines, Bot. Bihar & Orissa 2: 599. 1961 (Rep. ed.); Nasir in Nasir & Ali, Fl. Pak. 127. 1. 1753. *Nama zeylanica* L., Sp. Pl. 226. 1753.

Much branched annual or perennial herbs; stems procumbent or suberect, often rooting at lower nodes, older portion glabrous, young parts glandular hairy. Leaves 3-7 × 0.5-1.5 cm, membranous, glabrous, oblong or linear-oblong, acute at apex, narrowed down at base, becoming smaller and ultimately passing into bracts upwards; petioles up to 7 mm long. Flowers in terminal panicles or cymose in short lateral branches; pedicels up to 7 mm long, glandular hairy. Calyx up to 8 mm (including segments) long, glandular hairy without; segments lanceolate. Corolla blue, sub-rotate; tube up to 1 mm long; segments up to 6 mm long. Capsules up to 4 × 2 mm, ovoid-oblong, enclosed in enlarged persistent sepals. Seeds up to 0.3 mm long, brown, oblong or oval.

Distrib. : India, Sri Lanka, Malaya, Tropical Africa, America and Australia.

Fl. & Fr. : Oct.-Dec.

Specimens examined : Seuti, 1070. Helophyte.

Notes : Common in the marshy areas, inside the forests.

Common name : Beng. : *Kachaara, Isha-langulia.*

Uses : Leaves used as antiseptic.

BORAGINACEAE

1a. Flowers more than 1 cm across, long pedicelled ... 4. TRICHODESMA

1b. Flowers less than 1 cm across, sessile to subsessile :

2a. Prostrate herbs ... 1. COLDENIA

2b. Erect herbs :

3. Ovary deeply 4-lobed; nutlets glochidiate ... 2. CYNOGLOSSUM

3. Ovary slightly 4-lobed; nutlets smooth ... 3. HELIOTROPIUM

1. COLDENIA L.

Coldenia procumbens L., Sp. Pl. 125. 1753; Clarke in Hook.f., Fl. Brit. India 4: 144. 1883; Prain, Beng. Pl. 2: 718. 1903 (Rep. ed. 2: 534. 1963) & in Rec. Bot. Surv. India 3: 242. 1905; Haines, Bot. Bihar & Orissa 2: 606. 1961 (Rep. ed.); Johnston in J. Arnold Arb. 32: 13. 1951; van Steenis in Blumea 15: 155. 1967; Kazmi in J. Arnold Arb. 51: 143. 1970; Cook in Aquat. Wetland Pl. Ind. 75. 1996.

Much branched, prostrate-flattened, annual herbs; stems up to 40 cm long, shaggy, with white silky hairs. Leaves crisped, up to 4 × 2.5 cm, obovate-oblong, coarsely-serrate or subpinnatifid, rounded at apex, narrowed at base into shaggy petiole, hairy on both sides. Flowers small, subsessile. Calyx 4-partite, hairy; segments up to 2 mm long, ovate, acute, ciliate. Corolla as long as calyx; lobes-4, oblong, rounded. Stamens-4, hardly exserted. Fruits 4-lobed, pyramidal, glandular hairy, beaked, up to 4 mm long.

Fl. & Fr. : Aug.-May.

Distrib. : Vietnam to India, Tropical Australia, Africa and America.

Specimens examined : Mahuram busti (Garhwal), 583. Helophyte.

Notes : Common in the waste lands and sunny banks of river.

Common name : Beng. : *Tripanki.*

2. CYNOGLOSSUM L.

Cynoglossum lanceolatum Forssk., Fl. Aegypt.-Arab. 41. 1775, Clarke in Hook.f., Fl. Brit. India 4: 156. 1883; Prain, Beng. Pl. 2: 719. 1903 (Rep. ed. 2: 535. 1963); Backer in Thiselton-Dyer, Fl. Trop. Africa (4) 2: 54. 1906; Reidl in Rechinger, Fl. Iranica 68: 145. 1967; Haines, Bot. Bihar & Orissa 2: 610. 1961 (Rep. ed.) Kazmi in J. Arnold Arb. 52: 343. 1971. *C. racemosum* Roxb., Fl. Ind. 1: 456. 1820. *C. micranthum* Desf., Tab. Ecole Bot. ed. 1: 220. 1804.

Erect, hispid herbs, 45-75 cm long. Leaves lanceolate to linear or linear-lanceolate, midrib prominent beneath, upper leaves sessile, lower leaf base narrowed to form petiole like structure, up to 6 × 0.5 cm, thick. Raceme strigose, branches unequal, up to 15 cm long. Flowers up to 3 mm long, white, with a bluish or purple eyes. 4 mm in diam. Calyx campanulate, up to 2 mm long. Corolla urceolate, pink. Nutlets 4 mm in diam., densely glochidiate all over.

Fl. & Fr. : Mar.-Oct.

Distrib. : Afghanistan, Pakistan, India, Nepal, Myanmar, China, Taiwan.

Specimens examined : Netarhat, 65 & 802.

Notes : Common in the grass lands, road sides, waste lands.

3. HELIOTROPIUM L.

1a. Leaves ovate-oblong; fruits glabrous, ribbed ... 1. *H. indicum*

1b. Leaves linear-lanceolate; fruits hairy, not ribbed ... 2. *H. strigosum*

1. Heliotropium indicum L., Sp. Pl. 130. 1753; Clarke in Hook.f., Fl. Brit. India 4: 1883; Haines, Bot. Bihar & Orissa 2: 607. 1961 (Rep. ed.); Cook in Aquat. Wetland Pl. Ind. 76. 1996.

Annual herbs, up to 45 cm high; branches ascending, densely hairy with spreading hairs. Leaves ovate, or ovate-oblong, obtuse to subacute at apex, sparsely hairy above, minutely pilose beneath, undulate or subserrate, up to 10 × 5 cm. Flowers pale-violet, sessile, 2-ranked, in simple (rarely forked), usually extra-axillary, hispid, ebracteate, scorpioid spikes. Calyx 5-partite. Petals-5, small, rounded, spreading. Fruits sessile, up to 3 mm long, 3-lobed. Seeds sub-quadrate, white.

Fl. & Fr. : Round the year. Exotic.

Distrib. : Warmer parts of the World, probably Native of S. America.

Specimens examined : Netarhat, 189. Helophyte.

Notes : Common in waste lands, throughout the district.

Common name : Beng. : *Hatisur.*

Uses : Leaves applied to boils, wounds etc.

2. H. strigosum Willd., Sp. Pl. 1: 743. 1798; Clarke in Hook.f., Fl. Brit. India 4: 151. 1883; Prain, Beng. Pl. 2: 716. 1903 (Rep. ed. 2: 532. 1963) & in Rec. Bot. Surv. India 3: 242. 1905 Haines, Bot. Bihar & Orissa 2: 608. 1961 (Rep. ed.). Johnston in J. Arnold Arb. 32. 112. 1951; Kazmi in J. Arnold Arb. 51: 152. 1970.

Small, much branched, procumbent, strigose hairy herbs; branches slender, several, from the woody root stock. Leaves up to 1.5 cm long, linear-lanceolate, acute at apex, entire, densely white hairy. Flowers small, white, upper one sessile but lower pedicelled; bracts small, linear, lower bracts longer, leafy. Calyx 2 mm long, strigose. Corolla strigose. Fruits up to 1.5 mm across, globose, depressed, nutlets white hairy at apex.

Fl. & Fr. : Mar.-July.

Distrib. : Throughout India, Pakistan, N. Africa, Myanmar, Malaya, China and Australia.

Specimens examined : Netarhat, 201.

Notes : Common in waste lands & dry open fields.

Common name : Hindi : *Chitiphul.*

Uses : The root juice used as diuretic and also used for boils, wounds and ulcers.

4. TRICHODESMA R.Br.

1a. Calyx lobes hastate below; flowers white ... 1. *T. indicum*

1b. Calyx lobes not hastate below; flowers blue ... 2. *T. zeylanicum*

1. Trichodesma indicum (L.) R.Br., Prodr. 149. 1810; Clarke in Hook.f., Fl. Brit. India 4: 153. 1883; Prain, Bengal Pl. 2: 720. 1903 (Rep. ed. 2: 535. 1963); Haines, Bot. Bihar & Orissa 2: 608. 1961; (Rep. ed.) Brand in Pfl. reich 78: 38. 1921; Kazmi in J. Arnold Arb. 52: 516. 1971; Babu, Herb. Fl. Dehra Dun 318. 1977. *Borago indica* L., Sp. Pl. 137. 1753. *Trichodesma hirsutum* Edgew. in J. Asiatic Soc. Beng. 21: 175. 1853. *Pollichia indica* Medicus, Bot. Beobacht. 247. 1783. *Trichodesma perfoliatum* Wall., Cat. No. 932. 1828 (*nom. nud.*).

Erect, much branched, hispid herbs, up to 30 cm high. Leaves variable, sessile, up to 5.2 × 1 cm, cordate at base, linear-oblong, lanceolate or ovate, obtuse or subacute at apex, hairy on both surfaces. Flowers violet, in terminal or leaf opposed few flowered cymes; pedicels up to 2-4 cm long. Calyx hispid, lobes lanceolate, margin strongly ribbed, with connivent base and produce downwards into auricle or spur. Petals-5, connate in a campanulate cylindric corolla. Stamens-5, adnate to the corolla lobe, connivent in a cone. Fruits pyramidal, subtruncate at apex, 4-ribbed; nutlets white, smooth.

Fl. & Fr. : Almost round the year.

Distrib. : India, Pakistan, Sri Lanka, Afghanistan, Mauritius.

Specimens examined : Netarhat, 124.

Notes : Common in waste lands, also in cultivated fields.

Common name : Beng. : *Chotokulpa*; Santal : *Hetmudia.*

Uses : Leaves and the flowers eaten. Roots used for dysentery.

2. Trichodesma zeylanicum (Burm.f.) R.Br., Prodr. 496. 1810 (as *zeylanica*); Clarke in Hook.f., Fl. Brit. India 4: 154. 1883; Haines, Bot. Bihar & Orissa 2: 609. 1961 (Rep. ed.); Ramam. in Sald. & Nicol., Fl. Hassan 483. 1976. *Borago zeylanica* Burm.f., Fl. Ind. 41. 1768.

Erect, hispid herbs. Leaves elliptic-lanceolate, shortly petioled, up to 15 cm long, with bulbous based hairs. Flower generally solitary, drooping, upper ones in leafy racemes. Calyx lobes ovate, up to 1.7 cm long, acuminate at apex, entire at base. Corolla blue, lobes rounded, apiculate. Anthers bearded below. Nutlets smooth, ovoid, obscurely margined.

Fl. & Fr. : Dec.-Aug.

Distrib. : India, Sri Lanka, Australia.

Specimens examined : Netarhat, 170.

Notes : Not very common, in the forest under growth.

EHRETIACEAE

1a. Style dichotomously twice branched; endocarp unlobed ... 1. CORDIA

1b. Style once branched; endocarp 2-4 lobed ... 2. EHRETIA

1. CORDIA L.

Cordia dichotoma Forst.f., Prodr. 18. 1786; Naik, Fl. Osman 212. 1979; Johnston in J. Arn. Arb. 32: 8. 1951, Kazmi in J. Arn. Arb. 51: 141. 1970. *Cordia obliqua* Willd., Phytogr. 4: 5. 1794; Clarke in Hook.f., Fl. Brit. India 4: 137. 1883. *Cordia myxa* (auct. Pl. non Linn. 1753); Clarke in Hook.f., Fl. Brit. India 4: 136. 1883; Haines, Bot. Bihar & Orissa 2: 602.1961 (Rep. ed.). *Cordia lowriana* Brand., Ind. Trees 479. 1906.

Medium sized trees, with drooping branches; young parts pubescent. Leaves alternate, thinly coriaceous, up to 10 × 7 cm, ovate, elliptic or orbicular, cuneate at base, margin entire, upper surface glabrous, softly

pubescent beneath, usually 3-nerved from near the base; petioles up to 5 cm long. Flowers white, polygamous, in axillary and terminal cymose panicles. Calyx campanulate, 5-7 mm long (in fruit), irregularly 5-toothed, accrescent. Drupes pale-orange, ovoid or globose, apiculate, up to 2-5 mm long, shining with very viscose 1-seeded pulp.

Fl. & Fr. : Mar.-July.

Distrib. : Throughout India, Sri Lanka, also in Egypt, China, Malaya and in tropical Australia.

Specimens examined : Daltonganj, 547.

Notes : Common throughout the area and also in the forests.

Common name : Beng. : *Bohari*; Santal : *Buch*; Hindi : *Lasora.*

Uses : The fruits are said to be eaten.

Remarks : According to Raizada (Ind. For. 91: 849. 1965). *C. lowriana* is a distinct species in order to avoid a lengthy note on the identity of the plants going under the name *C. myxa* in India Johnston (l.c.) may be referred. According to Kazmi, *C. myxa* Linn. also occurs in Western part of India.

2. EHRETIA R.Br.

Ehretia laevis Roxb., Pl. Corom. 1: 42. t. 56. 1796; Clarke in Hook.f., Fl. Brit. India 4: 141. 1883; Prain, Beng. Pl. 2: 718. 1903. (Rep. ed. 2: 533. 1963); Riedl. in Rechinger, Fl. Iranica 48: 7. 1967; Kazmi in J. Arnold Arb. 51: 147. 1970.

Small, deciduous trees, with spreading branches; trunk whitish grey. Leaves alternate, broadly elliptic or obovate, acute at apex, obtuse at base, up to 9.8 × 6.5 cm, entire, glabrous, except nerve beneath; petioles up to 2 cm long. Flowers white in dichotomous scorpioid cymes, born laterally on bare branches. Calyx 5-lobed, campanulate, hairy. Petals-5, rotate. Stamens-5, exserted, inserted on corolla tube. Stigma capitate. Drupes orange at first, become black and wrinkled when dry, about 6 mm across; pyrenes-4, each 1-seeded.

Fl. & Fr. : Almost round the year, specially in Mar.

Distrib. : Tropics & warm temperate region of the World.

Specimens examined : Boneri, 182.

Notes : Common in the forest.

Common name : Beng. : *Tamboli*; Hindi : *Chamror, Koda.*

Uses : Leaves and young twigs used as fodder, wood used for brush handle, match boxes and splints.

CONVOLVULACEAE

1a. Corolla lobes bifid; style absent ... 3. ERYCIBE

1b. Corolla lobes entire to subentire, style present :

2a. Sepals accrescent in fruits; flowers less than 9 mm long 9. PORANA

2b. Sepals not or rarely accrescent in fruits; flowers more than 9 mm long :

3a. Style-2, free, each branch forked, with 4-filiform or slightly clavate stigma ... 4. EVOLVULUS

3b. Style-1, entire or with 2-inconspicuous branches hidden by the stigma :

4a. Stems and the leaves with stellate hairs; stigma ellipsoid to oblong ... 7. JACQUEMONTIA

4b. Stems and the leaves with bilobed or simple hairs or glabrous; stigma globose to capitate or linear :

5a. Outer 2 or 3-sepals enlarged, much longer and broader than inner ones ... 5. HEWITTIA

5b. Outer and inner sepals equal or unequal but the outer not markedly longer or broader than the inner ones :

6a. Corolla campanulate; pollen smooth, colpate :

7a. Corolla yellow; stigma globose ... 8. MERREMIA

7b. Corolla pink; stigma linear ... 2. CONVOLVULUS

6b. Corolla funnel-shaped to salver shaped, rarely campanulate; pollen spinulose, porate:

8a. Leaves silky-white pubescent beneath; fruits indehiscent, dry or leathery :

9a. Corolla white, salver shaped; stamens attached near the middle of the tube ... 6. RIVEA

9b. Corolla purple, funnel shaped; stamens attached below the middle of the tube ... 1. ARGYREIA

8b. Leaves glabrous to pubescent but not silky-white; fruits capsular, opening by valves or irregularly dehiscent ... 6. IPOMOEA

1. ARGYREIA Lour.

Argyreia nervosa (Burm.f.) Boj., Hort. Maurit. 224. 1837; van Ooststroom, Fl. Malcs. ser. 1: 4. 499. 1953; Austin in Dassanayake, Rev. Handb. Fl. Ceylon 1: 297. 1980. *Convolvulus nervosus* Burm.f., Fl. Ind. 48. t. 20. f. 1. 1768. *C. speciosus* L.f., Suppl. 137. 1781. *Argyreia speciosa* (L.f.) Swet, Hort. Brit. 289. 1827; Clarke in Hook.f., Fl. Brit. India 4: 185. 1883; Haines, Bot. Bihar & Orissa 2: 615. 1961 (Rep. ed.).

Large, climbing shrubs; stems herbaccous towards tip and woody at base; young shoots densely, silvery-white pubesent. Leaves broadly ovate, 14-25 cm long, shortly acuminate at apex, cordate at base, margin entire, densely white-pubescent beneath and glabrous above; petioles 5-15 cm long, white pubescent. Flowers in cymes, on long white tomentose peduncle; bracts ovate-lanceolate, large, caudate-acuminate. Sepals ovate to broadly ovate, 1.5-2 cm long, white-tomentose. Corolla pink-purple, 4.5-6.5 cm long, pubescent outside. Fruits subglobose, dry-baccate, 1-1.5 cm long, apiculate, yellowish-brown. Seeds dark to fairly light brown, glabrous.

Fl. & Fr. : Sept.-Apr.

Distrib. : Native of India, cultivated in other Tropical countries.

Specimens examined : Daltonganj, 873.

Notes : Commonly cultivated in the gardens, often found as an escape.

Common name : Beng. : *Bichtarak*; Hindi : *Samandar Ka pat.*

Uses : Leaves used in eczema, itch and other skin diseases. Roots applied for rheumatism and nervous diseases.

2. CONVOLVULUS L.

Convolvulus arvensis L., Sp. Pl. 153. 1753; Clarke in Hook.f., Fl. Brit. India 4: 219. 1883; Haines, Bot. Bihar & Orissa 2: 633. 1961 (Rep. ed.).

Glabrous or somewhat pubescent herbs, with slender creeping root stock; branches many, twining, slightly angular. Leaves up to 5 × 1.3 cm, oblong-lanceolate, obtuse and apiculate at apex, base auricled or hastate, margin entire or lower ones sometimes lobed; petioles up to 3 mm long. Peduncles long, solitary, slender with a pair of small, linear bracts. Sepals glabrous, unequal, elliptic, obtuse and sometimes mucronate. Corolla widely funnel-shaped, pink and white streaked. Capsule globose, 7 mm diam., glabrous. Seeds subtrigonous, dark reddish-brown.

Fl. & Fr. : Dec.-May.

Distrib. : In all temperate and subtropical regions of the world.

Specimens examined : Tenarbusti (Garhwah), 620.

Notes : Common weed of cultivated land.

Common name : Hindi : *Havanpadi*; Beng. : *Gondal.*

3. ERYCIBE Roxb.

Erycibe paniculata Roxb., Pl. Corom. 2: 31. Pl. 159. 1798; Thw., Enum. Pl. Zeyl. 213. 1860; Clarke in Hook.f., Fl. Brit. India 4: 180. 1883; Trimen, Handb. Fl. Ceyl. 3: 205. 1895; Haines, Bot. Bihar & Orissa 2: 634. 1961 (Rep. ed.); Hoogland in Blumea 7: 353. 1953; Austin, Rev. Handb. Fl. Ceyl. 1: 308. 1980. *Erycibe paniculata* var. *wightiana* (Grah.) Clarke in Hook.f., Fl. Brit. India 4: 180. 1883. *Erycibe wightiana* Grah., Cat. Bombay Pl. 137. 1839.

Large, climbing shrubs; stems woody, herbaceous at apex, young shoot covered with reddish-brown indument. Leaves oblong, elliptic-oblong, oblanceolate or obovate, up to 9.5 × 3.3 cm, acute-acuminate at apex, cuneate at base, entire, glabrous, coriaceous. Flowers in panicles, up to 15 cm long; pedicels up to 2.5 mm long. Sepals ovate to rounded, up to 3 × 2.8 mm, subequal, brown tomentose. Corolla white, campanulate rotate, up to 5 mm long. Fruits sub-baccate, ovoid to ellipsoid, leathery, up to 1 cm long, seated on a spreading calyx. Seeds solitary, glabrous.

Fl. & Fr. : June-Dec.

Distrib. : India, Sri Lanka, Myanmar, Malaya Peninsula, Australia.

Specimens examined : Barwadih, 372.

Notes : Common near Barwadih temple and along streams.

Common name : Kol. : *Hurmi*; Santal : *Kari*.

Uses : Fruits are edible and the bark used in Cholera by the Santals.

4. EVOLVULUS L.

1a. Plants ascending to trailing; stems woolly; leaves linear-oblong; corolla shallowly lobed, blue; capsule 2-locular ...1. *E. alsinoides*

1b. Plants creeping and prostrate; stems glabrous; leaves orbicular; corolla deeply lobed, white; capsule 1-locular ... 2. *E. nummularius*

1. Evolvulus alsinoides L., Sp. Pl. ed. 2: 392. 1762; Clarke in Hook.f. Fl. Brit. India 4: 220. 1883; Prain, Beng. Pl. 2: 725. 1903 (Rep. ed. 2: 539. 1963) & in Rec. Bot. Surv. India 3: 243. 1905; Haines, Bot. Bihar & Orissa, 2: 614. 1961 (Rep. ed.); Austin in Nasir & Ali, Fl. Pakistan 126: 32. 1979, & in Dassanayake, Rev. Handb. Fl. Ceylon 1: 309. 1980. *Convolvulus alsinoides* L., Sp. Pl. ed. 1: 157. 1753.

Prostrate herbs, branched from the root stock, spreading, densely hairy, 10-30 cm long. Leaves small, 5-8 mm long, linear to broadly elliptic, obtuse-apiculate at apex, acute at base, pilose on the both surfaces. Flowers in axillary, 1-2 flowered cymes, often solitary, 8-9 mm in diameter. Calyx campanulate, hairy, 5-toothed, 4 mm long. Corolla blue; petals spreading.

Capsule globose, up to 2.5 mm in diam., 4-valved, with persistent calyx. Seeds glabrous.

Fl. & Fr. : Sept.-Mar.

Distrib. : Pantropical.

Specimens examined : Netarhat, 118.

Notes : Common, in open grassland, road sides & waste lands.

Common name : Hindi : *Shyamakranta.*

Uses: Used to increase appetite and with oil to promote the growth of hair.

2. **Evolvulus nummularius** (L.) L., Sp. Pl. ed. 2. 391. 1762; Prain, Beng. Pl. 2: 726. 1903 (Rep. ed. 2: 539. 1963) & in Rec. Bot. Surv. Ind. 3: 243. 1905; Santapau in J. Bombay. Nat. Hist. Soc. 47: 341. 1947; van Ooststroom in van Steenis, Fl. Males. ser. 1.4: 438. 1953; Austin in Dassanayake, Rev. Handb. Fl. Ceylon 1: 311. 1980. *Convolvulus nummularius* L., Sp. Pl. 157. 1753.

Small, prostrate herbs; stems creeping, 10-40 cm long, rooting at nodes. Leaves up to 1.5 × 1.3 cm, orbicular, suborbicular, rounded at apex, sometimes notched, truncate or subcordate at base, hairy; petioles up to 1 cm long, pilose. Flower axillary, solitary, white; peduncles up to 3-4 mm long, recurved in fruit; bracteoles up to 1-1.5 mm long, linear-lanceolate. Calyx up to 3 mm long. Corolla up to 5 mm across. Capsules globose, equalling or slightly longer than calyx.

Fl. & Fr. : Jan.-May and almost round the year. Exotic.

Distrib. : Native of West Indies introduced in India. Tropical Africa, Malagasy, America, from Mexico to North Argentina.

Specimens examined : Betla, 38.

Notes : Common throughout the district, in exposed areas and road sides.

5. HEWITTIA Wt. & Arn.

Hewittia scandens (Milne) Mabberley in Bot. Hist. Hort. Malab. 84. 1980. *Convolvulus scandens* Milne, Descr. Cat. 2: 1773. *C. sublobata* L.f., Suppl. 135. 1781. *C. bicolor* Vahl., Symb. 3: 25. 1794, non Desr. (1791). *nom.* illegit. *Hewittia bicolor* (Vahl.) W. & A., Madras J. Sci. 1(5): 22. 1837; Clarke in Hook.f., Fl. Brit. India 4: 216. 1883; Haines, Bot. Bihar & Orissa 2: 682. 1961 (Rep. ed.). *Hewittia sublobata* (L.f.) O. Ktze., Rev. Gen. Pl. 441. 1891; van Ooststroom in van Steenis, Fl. Males. ser. 1.4: 438. 1853.

Perennial or annual, twining herbs, mostly prostrate, occasionally rooting at nodes, densely pubescent throughout. Leaves ovate to broadly ovate, highly variable, 5-9 × 5-9.5 cm, densely pubesent, apex acute and apiculate, base cordate and hastate; petioles 3-6 cm long, pubescent. Flowers axillary, solitary or in several flowered bracteate cymes, on 3-12 cm long, pubescent peduncle; bracts-2, below the calyx, 7-15 mm long, lanceolate. Calyx segments 7-15 mm long, lanceolate to ovate, pubescent, outer-3 much larger than inner-2, conspicuously nervose in fruit. Corolla pale-yellow to white, with a purple centre, campanulate, up to 2.5 cm long, softly pubescent outside. Capsules ovoid to subglobose, 6-10 mm long, pilose, surrounded by enlarged calyx. Seeds glabrous or sparsely pubescent, 4-6 mm long.

Fl. & Fr. : Sept.-Jan.

Distrib. : Throughout India, Tropical Africa, Asia through Malaya to Polynesia and naturalised in Jamaica.

Specimens examined : Kechki, 882.

Notes : Infrequent in hedges, waste lands near water sources.

6. IPOMOEA L.

1a. Corolla salver shaped; anthers exserted :

2a. Leaf blade divided more than half way to the midrib, with linear-acute lobes, the leaf appearing pinnately compound ... 9. *I. quamoclit*

2b. Leaf blade entire or 3-7 lobed, not appearing compound ... 5. *I. hederifolia*

1b. Corolla funnel-shaped; anthers included :

3a. Stems glabrous, procumbent, not twining; sepals ovate-oblong ... 1. *I. aquatica*

3b. Stems pubescent or glabrous, twining or erect, sepals acuminate to suborbicular:

4a. Sepals herbaceous; sepals, peduncles or pedicels with refleaxed or erect hairs :

5a. Leaves deeply 7-9 lobed, cut nearly to blade base ... 8. *I. pestigridis*

5b. Leaves entire or 3-5 lobed, lobes cut less than half way to the blade base :

6a. Inflorescence 3-many flowered; corolla 2 cm long ... 4. *I. eriocarpa*

6b. Inflorescence solitary, corolla more than 2 cm long ... 6. *I. nil*

4b. Sepals coriaceous or membranaceous; sepals, peduncles or pedicels glabrous or at least without reflexed hairs :

7a. Shrubs; sepals coriaceous; seeds woolly ... 3. *I. carnea*

7b. Vines; sepals membranaceous to chartaceous; seeds glabrous or atleast not woolly :

8a. Leaves deeply lobed ... 2. *I. cairica*

8b. Leaves entire :

9a. Calyx base hastate; seeds villous, margin with silky hairs ... 10. *I. sinensis*

9b. Calyx base not hastate; seeds valvety ... 7. *I. obscura*

1. **Ipomoea aquatica** Forssk., Fl. Aegypt. - Arab. 44. 1775; Clarke in Hook.f., Fl. Brit. India 4: 210. 1883; Trimen, Handb. Fl. Ceylon 3: 221. 1895; van Ooststroom in van Steenis, Fl. Males. ser. 1.4: 473. 1953; Verdcourt. Fl. Tropical E. Africa 120. 1963; Austin in Dassanayake, Rev. Handb. Fl. Ceylon 1: 318. 1980. *Ipomoea reptans* sensu auct. mult., Moon. Cat. 14. 1824; Thw., Enum. Pl. Zeyl. 211. 1860; Haines, Bot. Bihar & Orissa 2: 626. 1961 (Rep. ed.), non *Convolvulus reptans* L.

Annual or perennial, marshy or aquatic-floating herbs; stems hollow, rooting at nodes. Leaves glabrous, very variable in size and shape, linear, elliptic-oblong or ovate with a hastate or cordate base, acute or obtuse at apex, 4-12 cm long; petioles 5-18 cm long, glabrous. Flowers axillary, solitary or in few flowered cymes; peduncle 2-7 cm long; pedicles 2-3 cm long. Sepals ovate-oblong, up to 7 mm long, subequal, obtuse or subacute, mucronulate, glabrous. Corolla funnel-shaped, 4-5 long, purple or white. Capsules, 8-10 mm long, ovoid to globose. Seeds densely soft pilose or glabrous.

Fl. & Fr. : Nov.-Apr. Exotic.

Distrib. : Native of Old World tropics, now introduced in the New World.

Specimens examined : Tarhashi, 1133. Epihydate and Hyperhydate.

Notes : Common in ponds and ditches.

Common name : Beng. : *Kalmisak*; Hindi : *Karmi.*

Uses : Young shoots and leaves are eaten as pot herb.

2. Ipomoea cairica (L.) Sweet, Hort. Brit. 287. 1827; van Ooststroom in van Steenis, Fl. Males ser. 1.4: 478. 1953; Austin in Dassanayake, Rev. Handb. Fl. Ceylon 1: 322. 1980 et in Nasir & Ali, Fl. Pakistan 126: 40. 1979; Babu, Herb. Fl. Dehra Dun 324. 1977. *Convolvulus cairicus* L., Syst. Nat. ed. 10. 922. 1759. *Ipomoea palmata* Forsskal, Fl. Aegypt. Arab. 43. 1775; Clarke in Hook.f., Fl. Brit. India 4: 214. 1883; Haines, Bot. Bihar & Orissa 2: 630. 1961 (Rep. ed.). *I. pulchella* Wt., Ic. f. 156. 1839 (non Roth. 1821); Prain, Bengal Pl. 2: 737. 1903 (Rep. ed. 2: 548. 1963) & in Rec. Bot. Surv. India 3: 246. 1905.

Glabrous, much branched, slender, twining herbs; older stems somewhat woody. Leaves palmately 5-partite, 3-5 cm across, segments oblanceolate, oblong-elliptic, mucronulate at apex, finely serrated; petioles 2-4 cm long, slender. Flowers in 1-3 flowered cymes. Sepals unequal, ovate, glabrous. Corolla white to purple, with red purple inside towards the base. Stamens included; filaments papillose at base. Capsules globose, glabrous, 1 cm long, 2-4-valved, 4-seeded.

Fl. & Fr. : Throughout the year. Exotic.

Distrib. : Native of Tropical America now widely introduced in the tropical countries.

Specimens examined : Netarhat, 152.

Notes : Common in waste lands, twining on the *Lantana camara* L.

3. Ipomoea carnea Jacq. subsp. **fistulosa** (Mart. ex Choisy) D. Austin, Taxon 26: 237. 1977 et in Nasir & Ali, Fl. Pak. 126: 40. 1979; et in Dassanayake, Rev. Handb. Fl. Ceylon 1: 322. 1980. *Ipomoea fistulosa* Mart. ex Choisy in DC., Prodr. 9: 349. 1945; Raizada in Ind. For. 92: 313. 1968. *Ipomoea carnea* Jacq., Enum. Pl. Carib. 13. 1760 as to species, not subspecies; Haines, Bot. Bihar & Orissa 2: 630. 1961 (Rep. ed.). *Batatus crassicaulis* Benth.; Voy. Sulph. 5: 134. 1845. *Ipomoea crassicaulis* (Benth.), Rob., Proc. Amer. Acad. Arts. 51: 530. 1916; van. Oostroom in van Steenis, Fl. Males. ser. 1.4: 485. 1958.

Erect or ascending shrubs, up to 2.5 m high, with milky latex; stems woody at base, tip glabrous or minutely puberulent, herbaceous, hollow. Leaves ovate-lanceolate, 9-20 × 5-10 cm, acuminate at apex, cordate at base, pubecsent or glabrascent on both surfaces; petioles 4-12 mm long. Inflorescence cymose-paniculate, clustered at tip of branches, 1-several flowered; pedicels longer than the calyx. Sepals suborbicular, 5-6 mm long, subcoriaceous, glabrate or puberulent. Corolla deep pink to rose-purple, throat darker than limb, 5-8 mm long, finely tomentose outsides. Capsule ovoid to subglobose, up to 2 mm long, finely puberulent at base, mucronate, 4-valved.

Fl. & Fr. : Sept.-Nov. Exotic.

Distrib. : Native of Tropical America, introduced in tropics and various parts of India.

Specimens examined : Panki, 966. Hyperhydate and Helophyte.

Notes : Very common all over the district, in the villages and near Koel river.

Uses: Used as a hedge plant.

4. Ipomoea eriocarpa R.Br., Prodr. 484. 1810; Clarke in Hook.f., Fl. Brit. India 4: 204. 1883; Babu, Herb. Fl. Dehra Dun 324. 1977. *Convolvulus hispidus* Vahl, Symb. Bot. 3: 29. 1794. *Ipomoea hispida* (Vahl) Roem. & Schult., Syst. Veg. 4: 238. 1819 (non Zucc., 1806); Haines, Bot. Bihar & Orissa 2: 624. 1961 (Rep. ed.).

Slender, twining, annual herbs, pubescent or hispid. Leaves ovate lanceolate, acuminate at apex, cordate at base, 3-6 cm long. Flowers in capitate, subsessile, axillary cymes. Sepals ovate, acuminate, hispid-pilose, up to 8 mm long. Corolla pink, up to 9 mm long and 12 mm across. Capsule subglobose, pubescent, up to 5 mm across. Seeds black, glabrous, up to 2 mm long.

Fl. & Fr. : June-Dec.

Distrib. : India, Pakistan, Tropical Asia, Madagascar, Egypt, Tropical Africa and Tropical Northern Australia.

Specimens examined : Kumendi, 731.

Notes : Not common in waste lands, near the forests.

5. I. hederifolia L., Syst. Nat. Ed. 10. 925. 1759; Babu, Herb. Fl. Dehra Dun 325. 1977; Vickery in Enum. Fl. Pl. Nep. 3: 106. 1982. *Ipomoea angulata* Lamk., Encycl. 1: 464. 1795. *I. coccinea* sensu Clarke in Hook.f., Fl. Brit. India 4: 199. 1883 (non L. 1753). *Quamoclit coccinea* sensu Haines, Bot. Bihar & Orissa 2: 620. 1961 (Rep. ed., non Moench 1794).

Slender, annual twiners; stems weak, subscandent, slightly 3-angular. Leaves ovate, acuminate at apex, cordate at base, entire, up to 20 × 13 mm; petioles up to 11 mm long. Flowers in few to many flowered cymes; peduncles pilose, up to 10 mm long; bracts inconspicuous. Sepals awned on the back, up to 3 mm long, lanceolate. Corolla salverform, scarlet, up to 25 mm long. Stamens exserted. Ovary 4-locular. Capsule globose, up to 8 mm diameter, 4-celled.

Fl. & Fr. : July-Dec. Exotic.

Specimens examined : Daltonganj, 349.

Distrib. : Probably native of Tropical America, introduced in many warmer countries including India.

Notes : Commonly found as a garden escape in hedges,behind Daltonganj bus terminus.

6. Ipomoea nil (L.) Roth. Cat. Bot. 1: 36. 1797; Babu, Herb. Fl. Dehra Dun 326. 1977. *Convolvulus nil* L., Sp. Pl. ed. 2: 219. 1762. *Ipomoea hederacea* [auct. pl. non (L.) Jacq. 1786]; Clarke in Hook.f., Fl. Brit. India, 4: 199. 1883; Haines, Bot. Bihar & Orissa 2: 631. 1961 (Rep. ed.).

Hairy twiner, with retrorsely hirsute stems. Leaves ovate, cordate, palmately 3-lobed, side lobes acute and middle one larger, acuminate, pubescent on both sides, 5-8 cm long; petioles slender, hairy, up to 5 cm long. Flowers in few flowered umbellate cymes, bright blue or rose coloured, up to 5 cm long; bracts linear. Sepals long, equal, lanceolate, densely villous towards base, up to 2 cm long. Corolla tubular, funnel shaped, up to 5 cm long. Capsules globose, up to 1 cm diam., glabrous, 3-chambered, 6-seeded. Seeds black, smooth, up to 6 mm long.

Fl. & Fr. : Sept.-Dec. Exotic.

Distrib. : Tropical & subtropical regions of the World. Native of America.

Specimens examined : Daltonganj, 344.

Notes : Common, in the hedges and bushes.

Common name : Beng. : *Nilkalmi*; Hindi : *Kaladana.*

7. I. obscura (L.) Ker-Gawl. in Bot. Reg. 3: t. 239. 1817; Clarke in Hook.f., Fl. Brit. India 4: 207. 1883; Prain, Beng. Pl. 2: 736. 1903 (Rep. ed. 2: 547. 1963) & in Rec. Bot. Surv. Ind. 3: 246. 1905; van Ooststroom in van Steenis, Fl. Males. ser. 1.4: 471. 1958; Haines, Bot. Bihar & Orissa 2: 626. 1961 (Rep. ed.); Gandhi in Sald. & Nicol., Fl. Hassan 472. 1976; Austin in Dassanayake, Rev. Handb. Fl. Ceylon 1: 333. 1980. *Convolvulus obscurus* L., Sp. Pl. ed. 2: 220. 1762.

Annual, twining or trailing herbs; stems slender, glabrous or slightly villous. Leaves glabrous, membranous, broadly ovate, acute to shortly

acuminate at apex, deeply cordate at base, margin entire; petioles 3-6 cm long, glabrous, slender. Flowers axillary, 1-4 on glabrous peduncle; bracts small, caducous or persistent; pedicels up to 2.5 cm long. Sepals up to 5 mm long, subequal, glabrous, broadly oblong, apex obtuse or shortly apiculate. Corolla 2-2.5 cm long, glabrous, tube narrow, campanulate, whitish, lobes apiculate. Capsules up to 8 mm long, ellipsoid, glabrous, ovoid, apiculate, 2-celled, 4-valved. Seeds 4-4.5 mm long, dark brown or black, velvetty.

Fl. & Fr. : Sept.-Dec.

Distrib. : Throughout India, Tropical Asia, Africa and Malaya.

Specimens examined : Tenarbusti (Garhwal), 602.

Notes : Common, in hedges and thickets and also in waste lands.

Uses : Leaves toasted, powdered and boiled in ghee considered a useful application in aphthous affections.

8. Ipomoea pes-tigridis L., Sp. Pl. 162. 1753; Clarke in Hook.f., Fl. Brit. India 4:204. 1883; Haines, Bot. Bihar & Orissa 2:634. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 326. 1977; Mukherjee in Fl. Pach. & Bori Res. 201. 1984.

Slender, twining, annual herbs, sometimes prostrate, rigidly hairy. Leaves orbicular, palmately divided nearly to the base, lobes 5-7, oblong to elliptic-oblong, up to 4.7 × 1.5 cm, acuminate at apex, contracted at base, densely hairy; petioles up to 4 cm long, hairy. Flower in axillary, with an involucrate, cymose, few flowered heads; outer bracts linear-lanceoalte, up to 2 × 0.5 cm,fulvous hairy, inner smaller, narrower, acute. Sepals slightly unequal, lanceolate, long hairy. Corolla whitish pink, funnel shaped with spreading limb. Capsules ovoid, up to 5 mm long, 1-celled, 4-valved. Seeds-4, sparsely tomentose.

Fl. & Fr. : Sept.-Dec.

Distrib. : India, Sri Lanka, Malaya, China, Polynesia and Tropical Africa.

Specimens examined : Barwadih, 937.

Notes : Common on bushes in waste lands.

Common name : Beng. : *Langulilata.*

Uses : Used as fodder when green and roots used as purgative.

9. Ipomoea quamoclit L., Sp. Pl. 159. 1753; Clarke in Hook.f., Fl. Brit. India 4: 199. 1883; Trimen, Handb. Fl. Ceyl. 3: 215. 1895; van Ooststroom, Fl. Males. Ser. 1.4: 482. 1953; Austin in Dassanayake, Rev. Handb. Fl. Ceyl. 1: 434. 1834; Haines, Bot. Bihar & Orissa 2: 620. 1961 (Rep. ed.).

Slender climbers. Leaves pinnate, up to 5 cm long, segments linear, numerous, up to 1.5 cm long. Flowers in axillary cymes; peduncle up to 5 cm long, few flowered; pedicels up to 2.5 cm long. Sepals elliptic, up to 5 × 2.5 mm, apex rounded, apiculate, margin scarious. Corolla red. Capsules ovoid, up to 8 × 6 mm, with persistent styles. Seeds oblong-ovate, 5 × 2 mm, black, angled.

Fl. & Fr. : Aug.-Oct. Exotic.

Distrib. : Native of Tropical America, introduced in India.

Notes : Common in the gardens, often found as an escape and selfsown.

Common name: Beng.: *Kunjalata; Tarulata;* Hindi: *Kawalata.*

Uses : Leaves used for hemorrhoides and carbuncles.

10. I. sinensis (Desr.) Choisy in Mem. Phys. Soc. Geneve. 6: 459. 1834 ssp. **sinensis**; Verdcourt in Kew Bull. 13: 204. 1958. *Convolvulus sinensis* Desr. in Lamk., Encycl. 3: 557. 1791. *Ipomoea calycina* (Roxb.) Benth. ex Clarke in Hook.f., Fl. Brit. India 4: 201. 1883; Haines, Bot. Bihar & Orissa 2: 623. 1961 (Rep. ed.). *Ipomoea tropica* Sant. & Patel in J. Bombay Nat. Hist. Soc. 54: 799. 1956.

Slender, twining herbs; stems villous. Leaves ovate, acuminate to cuspidate at apex, deeply cordate at base, up to 7.5 × 5 cm, glabrascent,

nerves hairy; petioles hairy, up to 5 cm long, slender. Flowers white, axillary, solitary or in lax few flowered cymes; pedicels with a pair of narrow, lanceolate bracts. Calyx 10-15 mm long, hastate. Corolla tubular, up to 2 cm long, mouth funnel-shaped. Capsules up to 6 mm, ovoid, glabrous. Seeds villous, margin with silky hairs.

Fl. & Fr. : Aug.-Nov.

Distrib. : India and Tropical Africa.

Specimens examined : Seuti, 1065.

Notes : Rare near the forest margin on hedges.

7. JACQUEMONTIA Choisy

Jacquemontia paniculata (Burm.f.) Hall.f., in Engl., Bot. Jahrb. 16: 541. 1893; Mooney in Suppl. Bot. Bihar & Orissa 93: 1948; Duthie, Fl. Upp. Gangetic Plain 1: 584. 1960 (Rep. ed.). *Ipomoea paniculata* Burm.f., Fl. Ind. 50. t. 21. f. 3. 1768. *Convolvulus parviflours* Vahl., Symb. 3: 29. 1974; Clarke in Hook.f., Fl. Brit. India 4: 220. 1883. *Convolvulus paniculatus* Haines, Bot. Bihar & Orissa 2: 633. 1961 (Rep. ed.).

Slender, twining, puberulous herbs. Leaves ovate-cordate, up to 5 × 3 cm, acuminate at apex, entire, glabrous above, pubescent beneath; petioles up to 3 cm long, pubescent. Flowers in axillary cymes; peduncle pubescent. Sepals up to 7 × 3.5 mm, ovate or lanceolate, acuminate, pubescent. Corolla white, tubular, up to 1.3 cm long, mouth narrow, limb shortly and acutely 5-lobed. Capsule globose, up to 6 mm diameter. Seeds black, 3-angled, slightly hairy and tubercled.

Fl. & Fr. : Oct.-Jan.

Distrib. : India, Sri Lanka, S.E. Asia, Malaysia, Australia and Tropical Africa.

Specimens examined : Paton, 1055.

Notes : Not common. Found on the hedges and on bushes of the forest.

8. MERREMIA Dennstedt ex. Endl.

1a. Leaf apex emarginate; peduncle very short or absent ...1. *M. gangetica*

1b. Leaf apex not emarginate; peduncle more than 3 cm long :

2a. Leaves oblong to oblanceolate, base hastate; seeds smooth ... 2. *M. tridentata*

2b. Leaves orbicular, base not hastate; seeds tomentose ... 3. *M. tuberosa*

1. Merremia gangetica (L.) Cufo. in Bull. Jard. Bot. Brux. Suppl. 31: 743. 1961. *Convolvulus gangeticus* L., Cent. Pl. 2: 9. 1756. *Ipomoea reniformis* (Roxb.) Chois., Mem. Soc. Phys. Geneve 6: 446. 1834; Clarke in Hook.f., Fl. Brit. India 4: 206. 1833; Haines, Bot. Bihar & Orissa 2: 625. 1961 (Rep. ed.). *Convolvulus reniformis* Roxb., Fl. Ind. 2: 67. 1824. *Merremia emarginata* (Burm.f.) Hall.f., Bot. Jahrb. Syst. 16: 522. 1893; van Ooststroom in Blumea 3: 312. 1939 & in Fl. Males. 4: 444. 1953. *Evolvulus emarginatus* Burm.f., Fl. Ind. 77. t. 30. f. 1. 1768.

Perennial herbs; stems prostrate, rooting at nodes, up to 40 cm long, glabrous or appressedly pilose. Leaves 10-2.8 × 10-30 mm, reniform, emarginate at apex, cordate at base, coarsely crenate at margin or entire; petioles up to 2.5 cm long. Flowers in axillary, solitary or 2-3 flowered cymose clusters; pedicles up to 3 mm long; bracts very small. Sepals obovate to orbicular, outer one up to 3 mm long, obtuse, with a cucullate and mucronate apex, inner 3-4 mm long, emarginate at apex, all pubescent on back and ciliate. Corolla yellow, tube pale, campanulate, 4-7 mm long. Capsule subglobose, up to 5 mm long, enclosed by slightly enlarged sepals, glabrous. Seeds glabrous, dotted, up to 2.5 mm long, brown.

Fl. & Fr. : Oct.-Jan.

Distrib. : Tropical Africa, Asia & Malayasia.

Specimens examined : Muhammadganj, 1033. Helophyte.

Notes : Not common on grassy and sandy places.

Common name : Beng. : ***Bhuikamri***; Hindi : ***Musakani.***

Uses : Often eaten as a pot-herb and used in rheumatism.

2. Merremia tridentata (L.) Hall.f., Bot. Jahrb. Syst. 16: 552. 1893; van Ooststroom in Fl. Males. ser. 1.4: 445. 1953; Austin in Dassanayake, Rev. Handb. Fl. Ceylon 3: 351. 1981. ssp. **tridentata**. *Convolvulus tridentatus* L., Sp. Pl. 157. 1753. *Ipomoea tridentata* (Linn.) Roth in Roem., Arch. Bot. 1(2): 38. 1998 et. Cat. 2: 19. 1800; Clarke in Hook.f., Fl. Brit. India 4: 205. 1833; Trimen, Handb. Fl. Ceylon 3: 218. 1895; Haines, Bot. Bihar & Orissa 2: 625. 1961 (Rep. ed.). *Ipomoea angustifolia* Jacq., Ic. Pl. Rar. 2: 10. t. 317. 1786-93 et. Collect 2: 367. 1789; Clarke in Hook.f., Fl. Brit. India 4: 205. 1883; Trimen, Handb. Fl. Ceylon 3: 217. 1895.

Prostrate, perennial herbs, glabrous or pubescent. Leaves oblong to oblanceolate, up to 2.5 cm long, truncate, hastate or auriculate at base, acuminate and mucronate at apex, lobes often one-several toothed. Flowers axillary, solitary some times in few flowered cymes; peduncles slender, up to 3 cm long. Sepals oblong, ovate-oblong or lanceolate, outer-2 usually shorter, obtuse, acuminate. Corolla pale yellow or whitish, often with purplish eye, campanulate. Capsule globose, up to 8 mm long. Seeds black, smooth, 2-3 mm long.

Fl. & Fr. : Aug.-Nov.

Distrib. : Tropical & South Africa, Tropical Asia to Formosa, Malaysia, Australia and Micronesia.

Specimens examined : Muhammadganj, 1023.

Notes : Common on open grounds and near North Koel dam.

Uses : Used in rheumatism, piles and urinary disorders.

3. M. tuberosa (L.) Rendle, Fl. Tropical Africa 4(2): 104. 1905; van Ooststroom, Fl. Males. ser. 1.4: 447. 1953; Verdcurt, Fl. Tropical E. Africa 60. 1963. *Ipomoea tuberosa* L., Sp. Pl. 160. 1753; Clarke in Hook.f., Fl. Brit. India 4: 213. 1883. *Operculina tuberosa* (L.) Meisn. in Mart., Fl. Bras. 7: 212. 1869.

Lianas; stems herbaceous towards tip, woody at base, glabrous. Leaves orbicular, usually 3-7 lobed; lobes lanceolate to elliptic, 6-12 cm long, aucminate, entire, glabrous. Flowers in axillary, few to several flowered, occasionally solitary cymose; peduncle 4-18 cm long. Sepals

unequal, outer oblong, 2.5-3 cm long, obtuse, mucronate, inner 1-2 cm long, acute. Corolla yellow, campanulate, 5-6 cm long. Capsule subglobose, 1-3 cm long. Seeds black, densley short tomentose.

Fl. & Fr. : July-Nov. Exotic.

Distrib. : Native of Tropical America, introduced in India, Tropical Africa, Sri Lanka and Malaysia.

Specimens examined : Netarhat, 1184.

Notes : Not common, in the hedges and forests.

9. PORANA Burm.f.

Porana paniculata Roxb., Pl. Cor. 3: 31. t. 235. 1819 & in Fl. Ind. 1: 466. 1820; Clarke in Hook.f., Fl. Brit. India 4: 222. 1883; Haines, Bot. Bihar & Orissa 2: 619. 1961 (Rep. ed.).

Climbers; shoot densely sub-tomentose. Leaves up to 10 × 7 cm, ovate-cordate, acute to acuminate at apex, cordate at base, 5-6 nerved, white tomentose beneath; petioles 3-4 cm long, tomentose. Panicle terminating every branchlet with innumerable flowers. Calyx in flower 2 mm long; sepals linear-oblong, tomentose, 3-sepals enlarged in fruit, other 2-remain unchanged. Corolla 6 mm long, campanulate, white, hairy without. Style short; stigma obscurely 2-lobed. Capsule globose, hairy.

Fl. & Fr. : Oct.-Jan.

Distrib. : Throughout India, Sri Lanka & Myanmar.

Specimens examined : Barwadih, 421.

Notes : Common in the forests and on electric posts of the villages.

Common name : Santal : *Panjotnari.*

Uses : Stems used to making coarse baskets and as rough cordages.

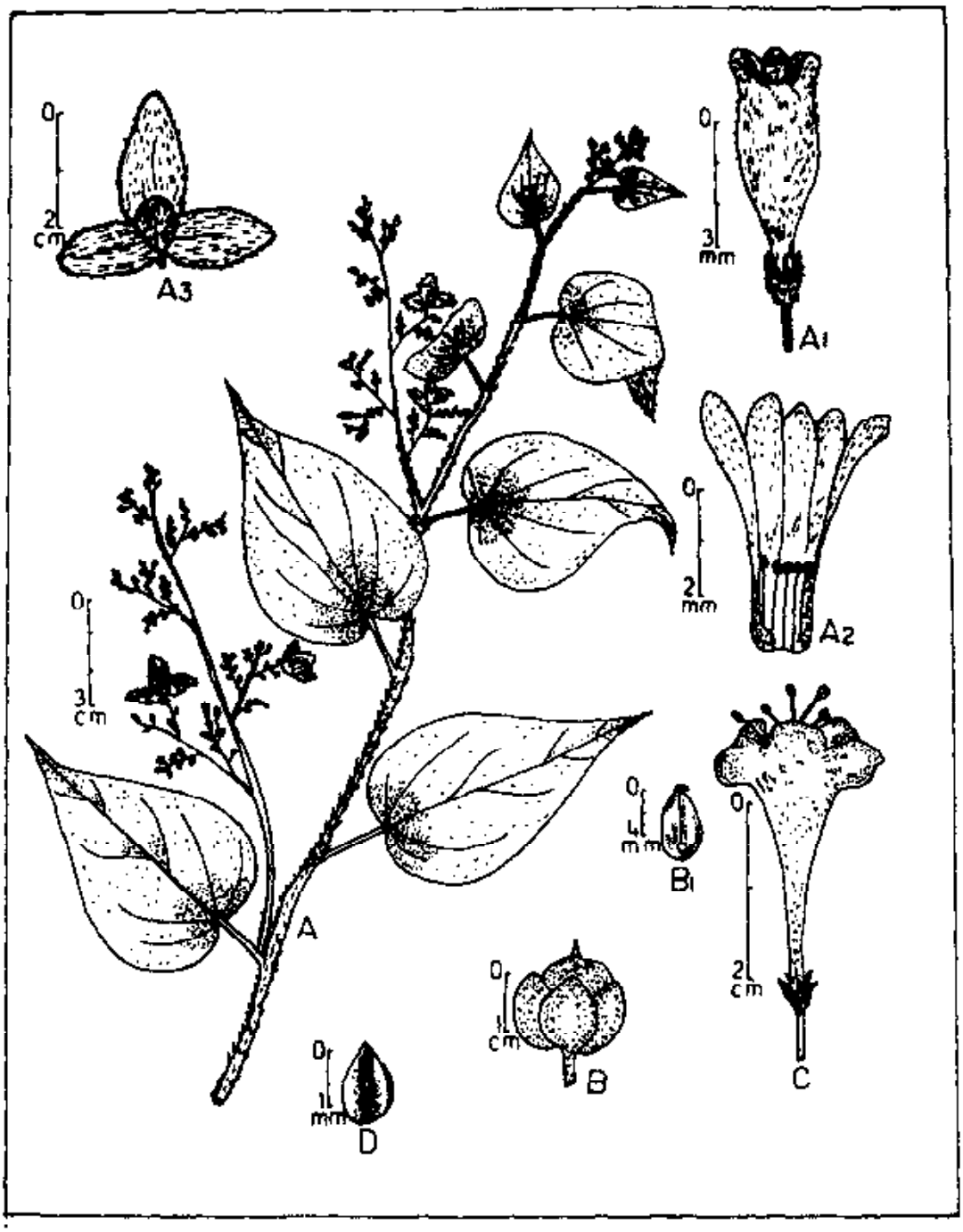


Fig. 25: Convolvulaceae (A-A_3): *Porana paniculata* Roxb.: A. Flowering twig; A_1. Flower, A_2. Corolla split open; A_3. Fruit; (B-B_1): *Rivea hypocrateriformis* Chois.: B. Fruit; B_1. Seed; C. *Ipomoea hederifolia* L.: Flower; D. *Evolvulus alsinoides* L. : Seed.

10. RIVEA Choisy

Rivea hypocrateriformis Chois., Convol. Ind. Or. 26. 1834; Clarke in Hook.f., Fl. Brit. India 4: 184. 1883; Haines, Bot. Bihar & Orissa 2: 614. 1961 (Rep. ed.).

A large climbing shrub; branches often very stout; young shoots silky-pubescent. Leaves up to 4.5 × 5 cm, orbicular, emargiante, mucronate at apex and broadly cordate at base, glabrous above but appressedly silky-hairy beneath, basal nerves 5-7; petioles up to 4.5 cm long, with an obscure gland each side at apex. Flowers white, clove scented, on axillary or terminal peduncles. Sepals ovate or elliptic-oblong, up to 10 mm long. Corolla tube long, glabrous or sparsely hairy without. Fruits globose, brown, glabrous, glaucous, up to 4 mm in diameter.

Fl. & Fr. : Sept.-Dec.

Distrib. : India & Pakistan.

Specimens examined : Barwadih, 444.

Notes : Common in the scrub jungles and forests as climber.

Common name : Beng. : *Kalmilata*; Hindi : *Phang*.

Uses : Young shoots and leaves are eaten by the local people.

CUSCUTACEAE

CUSCUTA L.

1a. Stems slender, less than 0.5 mm in diam., corolla yellowish, less than 5 mm long .... 1. C. CHINENSIS

1b. Stems coarse, more than 2 mm in diameter, corolla whitish, more than 5 mm long .... 2. C. REFLEXA

1. Cuscuta chinensis Lamk., Encycl. 2: 229. 1786; Clarke in Hook.f., Fl. Brit. India 4: 227. 1833; Haines, Bot. Bihar & Orissa 2: 635. 1961 (Rep. ed.).

Stems slender, less than 0.5 mm across, yellow, leafless. Flowers sessile or shortly pedicelled. Sepals loose around the corolla; lobes triangular-ovate. Corolla, yellowish, up to 3 mm long, coronal scale oblong, fimbriate above. Fruits capsular, depressed globose, circumscissile. Seeds up to 1 mm long.

Fl. & Fr. : Aug.-Jan.

Distrib. : India, Afghanistan and Eastward to Sri Lanka, Australia and China.

Specimens examined : Tarhasi, 1142.

Notes : Infrequent on herbaceous hosts.

2. Cuscuta reflexa Roxb., Pl. Cor. 2: 3. t. 104. 1798; Clarke in Hook.f., Fl. Brit. India 4: 225. 1883, Prain, Beng. Pl. 2: 723. 1903 (Rep. ed. 2: 537. 1963) & in Rec. Bot. Surv. India 3: 243. 1905; Yuneker in mem. Torr. Bot. Club. 18: 259. 1932; Ooststroom in Blumea 3: 70. 1938 & in van Steenis, Fl. Males. ser. 1: 4. 393. 1953; Haines, Bot. Bihar & Orissa 2: 635. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 321. 1977; Austin in Dassanayake, Rev. Handb. Fl. Ceylon 1: 306. 1980.

Branched, twining, glabrous, pale greenish-yellow, leafles herbs. Flowers white or pinkish; pedicels up to 8 mm long; bracts 2 mm long, ovate, fleshy. Calyx cupular; lobes free almost to the base, overlapping, orbicular, apex obtuse, 2 mm long. Corolla up to 9 mm long, campanulate; tube cylindric; lobes 2-3 mm long, reflexed, ovate, apex acute, with 5-epipetalous fimbriate scales along line of anthers. Anthers attached just below sinus. Ovary ovoid; style short, connate at base, 2-lobed above; stigmas-2, lanceolate, longer than the style. Capsule globose, circumscissile, seeds 4 or less, black.

Fl. & Fr. : Oct.-Jan.

Distrib. : India, Afghanistan, Thailand & Malaysia.

Specimens examined : Daltonganj, 243.

Notes : Common parasite on *Momordica charantia, Acacia nilotica & Ziziphus mauritiana.*

Common name : Beng. : *Swarnalata* or *Alghusi.*

SOLANACEAE

1a. Fruits capsular, dehiscent :

2a. Stout herbs; flowers solitary, axillary ... 2. DATURA

2b. Weak herbs; flowers in racemes, terminal ... 3. NICOTIANA

1b. Fruits berries, indehiscent :

3a. Sepals in fruits very enlarged ... 4. PHYSALIS

3b. Sepals in fruits not enlarged :

4a. Corolla rotate; anther dehisces by apical pores ... 5. SOLANUM

4b. Corolla tubular; anther longitudinally dehisces ... 1. CESTRUM

1. CESTRUM L.

Cestrum nocturnum L., Sp. Pl. 191. 1753; Franceyl. in Candollea 7: 67. 1836; Haines, Bot. Bihar & Orissa 2: 645. 1961 (Rep. ed.); D' Arey in Ann. Missouri Bot. Gard. (Fl. Panama) 60: 607. 1973; Deb in Jour., Econ. Tax. Bot. 1: 86. 1980.

Highly fragrant, glabrous herbs, 1-2 m high, much branched. Leaves up to 11 × 3.5 cm, ovate-oblong or ovate-lanceolate, acuminate at apex, rounded or obtuse at base; petioles 5-15 mm long. Flowers many, in axillary or terminal panicles, bracteate, subsessile or shortly pedicelled. Calyx campanulate, up to 4 mm long, 5-toothed; teeth very small, ovate. Corolla up to 2.5 cm long, greenish-white, tubular, 5-lobed; lobes erect. Fruits up to 4 mm diameter. subglobose, bluish-black. Seeds many, compressed.

Fl. & Fr. : July-Sept. Exotic.

Distrib. : Native of Tropical America, introduced in India.

Specimens examined : Netarhat, 807.

Notes : Common in gardens. Occasionally found as an escape along village road sides.

Common name : Beng. : *Hashnuhana*; Hindi : *Rat Ki Rani.*

2. DATURA L.

1a. Flowers more than 15 cm long; capsule ovoid, dehisced regularly by 4 valve; seeds suborbicular ... 2. *D. stramonium*

1b. Flowers less than 15 cm long; capsule globose, dehisced irregularly; seeds reniform ... 1. *D. metel*

1. Datura metel L., Sp. Pl. 179. 1753; Santapau in Journ. Bombay Nat. Hist. Soc. 47: 657. 1948; Babu, Herb. Fl. Dehra Dun 332. 1977; *Datura fastuosa* L., Syst. Nat. ed. 10, 2: 932. 1759; Clarke in Hook.f., Fl. Brit. India 4: 242. 1883; Haines, Bot. Bihar & Orissa 2: 645. 1961 (Rep. ed.). *Datura fastuosa* L. var. *alba* (Nees) Clarke in Hook.f., Fl. Brit. India 4: 243. 1983.

Large, stout herbs, up to 1.5 m high; branches divaricate, young parts minutely puberulous. Leaves 8-16 × 7-12 cm, irregularly lobed, broadly-ovate,base unequal, minutely pubescent; petioles 6-9 cm long. Flowers erect; peduncles up to 1.5 cm long. Calyx 5-6 cm long, terete; teeth up to 1.5 cm long, triangular-acuminate. Corolla up to 14 cm long, 8 cm across, light pinkish-white. Staminal filaments hairy at base. Stigma exserted. Capsule globose, up to 4 cm diam., tubercled, supported by reflexed, thickened, enlarged calyx base. Seeds compressed, reniform pale brown, up to 5 × 3 mm.

Fl. & Fr. : Sept.-Dec.

Distrib. : Pantropical.

Specimens examined : Daltonganj, 829.

Notes : Common in waste lands and along Koel river bank.

Common name : Beng. : *Dhutura*; Hindi : *Sadahdhatura.*

2. D. stramonium L., Sp. Pl. 179. 1753; Clarke in Hook.f., Fl. Brit. India 4: 242. 1883; Haines, Bot. Bihar & Orissa 2: 644. 1961 (Rep. ed.). *Datura stramonium* var. *tatula* (L.) Clarke in Hook.f., Fl. Brit. India 4: 242. 1883.

Coarse annual herbs, up to 75 cm high; young shoots puberulous. Leaves elliptic or ovate, up to 15 × 8 cm, acute to acuminate at apex, margin often sinuate, pubescent; petioles up to 5 cm long, pubescent. Flowers axillary, solitary. Calxy up to 8 cm long; lobes up to 1.5 cm long, ovate-lanceolate, pubescent. Corolla up to 18 cm long, whitish; lobes-5, cuspidate. Capsule erect, ovoid, up to 3.5 cm in diam., 4-valved, covered with rigid long and short hairy prickles, and with reflexed enlarged calyx base. Seeds suborbiclar, black, subcompressed.

Fl. & Fr. : Sept.-Dec.

Distrib. : Pantropical.

Specimens examined : Muhammadganj, 979.

Notes : Rare, in waste lands and near north Koel river dam.

Common name : Beng. & Hindi : *Dhatura.*

Uses : Leaves used in asthma. Seeds are poisonous.

3. NICOTIANA L.

Nicotiana plumbaginifolia Viv. Planch, Pl. Dinegro, 26. t. 5. 1802; Clarke in Hook.f., Fl. Brit. India 4: 246. 1883; Haines, Bot. Bihar & Orissa 2: 647. 1961 (Rep. ed.).

Erect, annual herbs. Leaves radical, sessile, up to 15 × 7 cm, obovate or spathulate, upper gradually smaller and passing into bracts, sessile, elliptic-lanceolate, oblong, acute or acuminate at apex. Flowers in racemes. Calyx up to 1.3 cm long, tubular; lobes linear-lanceolate, acuminate, unequal. Corolla salver-shaped, with slender tube, up to 4 cm long. Capsule up to 1 cm long, oval, glabrous. Seeds dark brown, slightly rugose.

Fl. & Fr. : Apr.-June. Exotic.

Distrib. : Throughout India, Native of Mexico and West Indies.

Specimens examined : Kundri, 946.

Notes : Common in waste lands, near ponds.

4. PHYSALIS L.

1a. Leaves glabrous or slightly pubescent; fruiting calyx less than 2.5 cm long ... 1. *P. minima*

1b. Leaves pubescent; fruiting calyx more than 2.5 cm long ... 2. *P. peruviana*

1. Physalis minima L., Sp. Pl. 183. 1753; Clarke in Hook.f., Fl. Brit. India 4: 238. 1883 (incl. var. *indica*); Santapau, J. Bombay Nat. Hist. Soc. 47: 657. 1948; Haines, Bot. Bihar & Orissa 2: 637. 1961 (Rep. ed., incl var. *indica* Clarke); Deb in J. Econ. Tax. Bot. 1: 43. 1980; Symon in J. Adelaide Bot. GArd. 3(2): 152. 1981.

Pubescent or glabrous, annual herbs, up to 30 cm high. Leaves up to 7 × 5 cm, elliptic-ovate, acute at apex, margin broadly toothed or shallowly sinuate-lobed, base acute or obtuse; petioles up to 4 cm long. Flowers yellow, small; peduncles filiform, up to 1 cm long. Calxy in flower up to 3 mm long, pubescent or subglabrous; teeth triangular, margin ciliate. Corolla up to 7 mm in diam., pubescent without, yellow, often with deep purple spot near base. Fruits up to 1 cm in diameter enclosed in the much enlarged, 5 or 10-ribbed, reticulately veined calyx. Seeds discoid or reniform, muriculate.

Fl. & Fr. : Aug.-Dec.

Distrib. : Pantropical.

Specimens examined : Bisrampur, 847.

Notes : Common in waste lands and near cultivated fields.

Common name : Beng. : *Bantipariya*; Hindi : *Tulatipati.*

2. P. peruviana L., Sp. Pl. ed. 2. 1670. 1763; Clarke in Hook.f., Fl. Brit. India 4: 238. 1883; Prain, Beng. Pl. 2: 750. 1903 (Rep. ed. 2: 558. 1963) & in Rec. Bot. Surv. Ind. 3: 249. 1905; Haines, Bot. Bihar & Orissa 2: 637. 1961 (Rep. ed.); Santapau in J. Bomb. Nat. Hist. Soc. 47. 657. 1948; Deb in J. Econ. Tax. Bot. 1: 44. 1980; Symon in J. Adelaide Bot. Gard. 3(2): 154. 1981.

Stout herbs, about 60-70 cm high, densely hairy throughout; stems with striations. Leaves up to 8 × 5.5 cm, broadly-ovate, acute or shortly

acuminate at apex, entire or shallowly sinuately lobed, subcordate to cordate at base; petioles up to 3.5 cm long. Pedicels hairy, 1 cm long. Fruiting calyx 4.5 × 3 cm, hairy.

Fl. & Fr. : Nov.-Mar.

Distrib. : Throughout India, Native of Tropical America, widely spread throughout Old World.

Specimens examined : Netarhat, 70 & 782.

Notes : Commonly found in cultivated lands and rarely on road sides.

Uses : Fruits are edible. Leaves used in abdominal disorders.

5. SOLANUM L.

1a. Plants unarmed, glabrous ... 2. *S. nigrum*

1b. Plants armed, stellate-tomentose :

2a. Erect under shrubs; leaves shallowly lobed ... 1. *S. anguivi*

2b. Diffuse herbs; leaves deeply lobed ... 3. *S. surattense*

1. Solanum anguivi Lam., Tab. Encycl. Meth. Bot. 2: 23. 1794; Hepper in Hawkes in Bot. J. Linn. Soc. 76(4): 290. 1978; Guha Bakshi in Fl. Murshidabad Dist. 220. 1984. *Solanum sodomeum* L., Sp. Pl. 187. 1753, *nom. ambig. Solanum indicum* auct. non L.; Clarke in Hook.f., Fl. Brit. India 4: 234. 1883; Haines, Bot. Bihar & Orissa 2: 642. 1961 (Rep. ed.).

Stellately-tomentose, prickly undershrubs, up to 1 m high. Leaves up to 11 × 7 cm, ovate or broadly oblong, sinuate, tomentose beneath, prickly on nerves, sub-scabridly stellate above, acute at base; petioles up to 2.5 cm long. Inflorescence a condensed raceme or cyme, extranodal on stems, usually 5-8 flowered; peduncle and pedicels prickly, up to 12 mm long. Calyx up to 3 mm long and prickly without lobes ovate-lanceolate. Corolla blue, up to 8 mm long; lobes ovate. Staminal filaments up to 1 mm long. Style hairy at base. Fruits globose.

Fl. & Fr. : Throughout the year but chiefly in Oct.-May.

Distrib. : India, Malaya, China to Philippines and Tropical Africa.

Specimens examined : Bisrampur, 850.

Notes : Common in dry waste lands.

Common name : Beng. : *Baiakur*; Hindi : *Barhanta*; Kol. : *Anjed.*

Uses : The fruits are commonly used by the local people in headache.

Remarks : The plant commonly known as *S. indicum* in India is not Linnanean *S. indicum* and its earliest valid name should be *S. sodomeum* L. but as the *S. sodomeum* was misapplied for a long period to a species found in Mediterranean and South Africa, so the name *S. sodomeum* is rejected as *Nomen ambiguum* (Bennet, 1987).

2. **Solanum nigrum** L., Sp. Pl. 186. 1753; Clarke in Hook.f., Fl. Brit. India 4: 229. 1883; Prain, Beng. Pl. 2: 745. 1903 (Rep. ed. 2: 554. 1963); Haines, Bot. Bihar & Orissa 2: 640. 1961 (Rep. ed.); Santapau in J. Bombay Nat. Hist. Soc. 47: 652. 1948; Symon in J. Adelaide Bot. Gard. 4: 46. 1981.

Glabrous, erect herbs, 30-90 cm high; stems branched, nearly 3-angled. Leaves lanceolate-ovate, or oblong, entire, acute to acuminate, base tapering; petioles up to 2.8 cm long. Flowers white, 0.5-0.85 cm in diam., subumbellate on extra axillary peduncle. Sepals-5, persistent. Corolla rotate, lobes-5. Stamens-5, with short filaments. Fruits globose, black, glabrous, fleshy, up to 5 mm in diam.

Fl. & Fr. : Round the year.

Distrib. : Pantropical.

Specimens examined : Daltonganj, 22.

Notes : Commonly in waste lands.

Common name : Beng. : *Gurkhi, Gurkamai*; Hindi : *Makoi.*

Uses : The fruits are eaten. The decoction of fruits and flowers is used in cough, and in cirrhosis of liver. It is also used in fever and diarrhoea.

3. **Solanum surattense** Burm.f., Fl. Ind. 57. 1768; Santapau in Bull. Bot. Surv. India 3: 20. 1961; Deb in J. Econ. Tax. Bot. 1: 51. 1980. *S. xanthocarpum* Schrad & Wendl., Sert. Hanov. 1: 8. 1795; Clarke in Hook.f., Fl. Brit. India 4: 236. 1883; Prain, Beng. Pl. 2: 746. 1903 (Rep. ed. 2: 555. 1963) & in Rec. Bot. Surv. India 3: 248. 1905; Santapau in J. Bombay Nat. Hist. Soc. 47: 653. 1948.

Spreading spinous herbs, branches numerous, densely clothed with stellate-tomentose hairs; prickle 3-12 mm long, yellow, straight. Leaves with scattered stellate hairs, up to 12 × 7 mm, ovate, oblong or elliptic, deeply lobed or subpinnatifid with the lobes again lobed or dentate; petioles 2.5-5 cm long. Flowers in extra-axillary, few flowered cymes. Calyx prickly, prickle 2-3 mm long, with stellate hairs, scarcely accrescent in fruit. Fruits globose, 1.5-2.5 cm in diam. Seeds up to 2 mm in diam., smooth.

Fl. & Fr. : Dec.-June.

Distrib. : Afghanistan, Pakistan, India, Arab. Egypt and Ehtiopia.

Specimens examined : Daltonganj, 256 & 350.

Notes : Very common in dry barren lands.

Common name : Hindi : *Ringni*; Beng. : *Kantikari*; Santal : *Rangaini janum.*

Uses : Roots expectorant, form a constituent of Ayurvedic preparation "Dasamula", they are employed in cough, asthma and in chest pain.

Capsicum annuum L., *Capsicum frutescens* L., *Solanum tuberosum* Linn., *Solanum melongena* L., *Lycopersicon lycopersicum* (L.) Karsten. etc. are commonly cultivated for vegetables.

SCROPHULARIACEAE

1a. Leaves all opposite or whorled or at least lower ones opposite :

2a. Calyx 4-cleft; corolla not 2-lipped :

3a. Stems creeping below; stamens-2 ... 4. VERONICA

3b. Stems not creeping; stamens-4 ... 7. SCOPARIA

2b. Calyx 5-cleft; corolla 2-lipped :

4a. Anthertheca separated :

5a. Filaments of anterior stamens appendiculate at base :

6a. Calyx winged; corolla more than 2 cm long, tube dilated above ... 9. TORENIA

6b. Calyx not winged; corolla less than 2 cm long, tube not dilated above ... 4. LINDERNIA

5b. Filaments of anterior stamens inappendiculate ... 5. MAZUS

4b. Anthertheca not separated :

7a. Bracts prominent :

8a. Leaves linear; calyx ribbed; anthers 1-celled ... 8. STRIGA

8b. Leaves not linear; calyx not ribbed; anther 2-celled :

9a. Flowers yellow; anther cells separated on arms ... 6. MECARDONIA

9b. Flowers white; anther cells contiguous at least in part ... 1. BACOPA

7b. Bracts not prominent :

10a. Sepals campanulate; capsules 2-valved ... 3. LINDENBERGIA

10b. Sepals deeply partite; capsules 4-valved ... 2. LIMNOPHILA

1b. Leaves all alternate ... 10. VERBASCUM

1. BACOPA Aubl. *nom. cons.*

Bacopa monnieri (L.) Pennell. Proc. Acad. Nath. Sci. Philadelphia 98: 94. 1946; Santapau in J. Bombay Nat. Hist. Soc. 49: 30. 1950; Chatterjee and Bharadwaja in Bull. Bot. Soc. Beng. 9: 133. 1955; Cramer in Dassanayake, Rev. Handb. Fl. Ceylon 3: 421. 1981. *Lysimachia monnieri* Linn., Cent. Pl. 2: 9. 1756. *Gratiola monnieria* L., Amoen. Acad. 4: 306. 1759. *Herpestis monnieria* (L.) Kunth, Nov. Gen. 2: 366. 1817; Hook.f. in Fl. Brit. India 4: 272. 1884; Haines, Bot. Bihar & Orissa 2: 652. 1961 (Rep. ed.).

Glabrous, decumbent herbs; stems and branches 10-30 cm long, rooting at nodes. Leaves sessile, up to 12 × 3 mm, obovate, obovate-oblong or spathulate, obtusely rounded at apex, narrowed at base, entire, punctate above, slightly thick, glabrous on both surfaces. Flowers solitary, axillary; pedicels up to 1.3 cm long; bracteoles subulate, up to 3 mm long. Sepals divided to the base, outer ones broadly-ovate, up to 7 × 4 mm long, inner ones linear-lanceolate, up to 5 × 1.5 mm. Corolla white or pale violet, 5-6 mm long, 2-lipped. Capsules oblong-ovoid, enclosed in persistent calyx, tipped with withered style, glabrous. Seeds ovoid-oblong, reticulate.

Fl. & Fr. : June-Dec.

Distrib. : All warm countries.

Specimens examined : Garwah, 852. Helophyte.

Notes : Common in marshy areas, near ponds.

Common name : Beng. : *Brahmi shak.*

Uses : Eaten as vegetables and the plant extract is used as purgative and also used in skin eruptions.

2. LIMNOPHILA R.Br. *nom. cons.*

Limnophila indica (L.) Druce in Rep. Bot. Exch. Club. Brit. Isles. (1913) 3: 420. 1914; Chatterjee & Bharadwaja in Bull. Bot. Soc. Beng. 9: 138. 1955; Philcox in Kew Bull. 24: 115. 1970; Datta in Bull. Bot. Soc. Beng. 29.5:1975; Babu, Herb. Fl. Dehra Dun, 343. 1977; Rechinger in Richinger, Fl. Iranca 147. 287. 1981; Cramer in Dassanayeke, Rev. Handb. Fl. Ceylon 3: 432. 1981. *Hottonia indica* L., Syst. Nat. ed. 10. 919. 1759 et. Sp. Pl. ed. 2. 208. 1762. *Limnophila gratioloides* R.Br. Prodr. 442. 1810; Hook.f. in Fl. Brit. India 4: 271. 1884; Prain, Beng. Pl. 2: 764. 1903 (Rep. ed. 2: 569. 1963) & in Rec. Bot. Surv. Ind. 3: 251. 1905; Haines, Bot. Bihar & Orissa 2: 658. 1961 (Rep. ed.).

Erect, glabrous or sparsely hairy, aromatic, aquatic herbs. Leaves whorled or divided into linear-filiform segments, upper ones less or undivided, with black dots. Flower axillary-solitary, pedicelled, up to 1 cm long. Calyx divided less than halfway down; lobes linear, puberulous. Corolla white, or pale purple, up to 8 mm long, hairy within. Stamens

didynamous. Capsule ellipsoid-ovoid, as long as calyx. Seeds many, black, rectangular, up to 0.5 mm long.

Fl. & Fr. : Sept.-Mar.

Distrib. : India, Japan, Malaya and Tropical Australia.

Specimens examined : Netarhat, 211. Hyperhydate or Vittate.

Notes : Common in rice fields and other marshy areas, throughout the district.

Common name : Beng. : *Karpur*; Santal : *Nanha Hemcha.*

Uses : Juice of the herbs used in skin diseases.

3. LINDENBERGIA Lehm.

Lindenbergia indica (L.) Vatke, Osterr. Bot. Zeitschr. 25: 10. 1875; Bruhl in J. Dept. Sci. Cal. Univ. (Bot.) 2: 26. 1920; Chatterjee & Bharadwaja in Bull. Bot. Soc. Bengal 9: 129. 1955 (excl. syn. *L. urticaefolia*); Guha Bakshi in Fl. Murshidabad Distr. 225. 1984. *Dodartia indica* L., Sp. Pl. 633. 1753. *Lindenbergia polyantha* Royle ex Benth., Scroph. Ind. 22. 1835; Hook.f., in Fl. Brit. India 4: 262. 1884; Haines, Bot. Bihar & Orissa 2: 654. 1961 (Rep. ed.).

Erect, annual herbs, 15-45 cm high, sparsely glandular villous throughout. Leaves ovate or ovate-lanceolate, up to 4 × 2 cm, subacute at apex, crenate-serrate at margin, base rounded to obtuse; petioles up to 1.5 cm long, hairy. Flowers solitary or 2-nate, axillary also in terminal leafy racemes; pedicels up to 1.5 mm long. Calyx up to 6 mm long, densely glandular-hairy, divided to 1/3 way down; lobes oblong. Corolla up to 12 mm long, hairy without, upper lip shortly 2-lobed, lower lip with oblong-rounded mid-lobe and suborbicular side lobe. Capsule up to 5 mm long, ovoid, beaked, upper half hairy. Seeds minute, elliptic-oblong.

Fl. & Fr. : Oct.-Jan.

Distrib. : Throughout India.

Specimens examined : Palamau Fort (Betla), 1112.

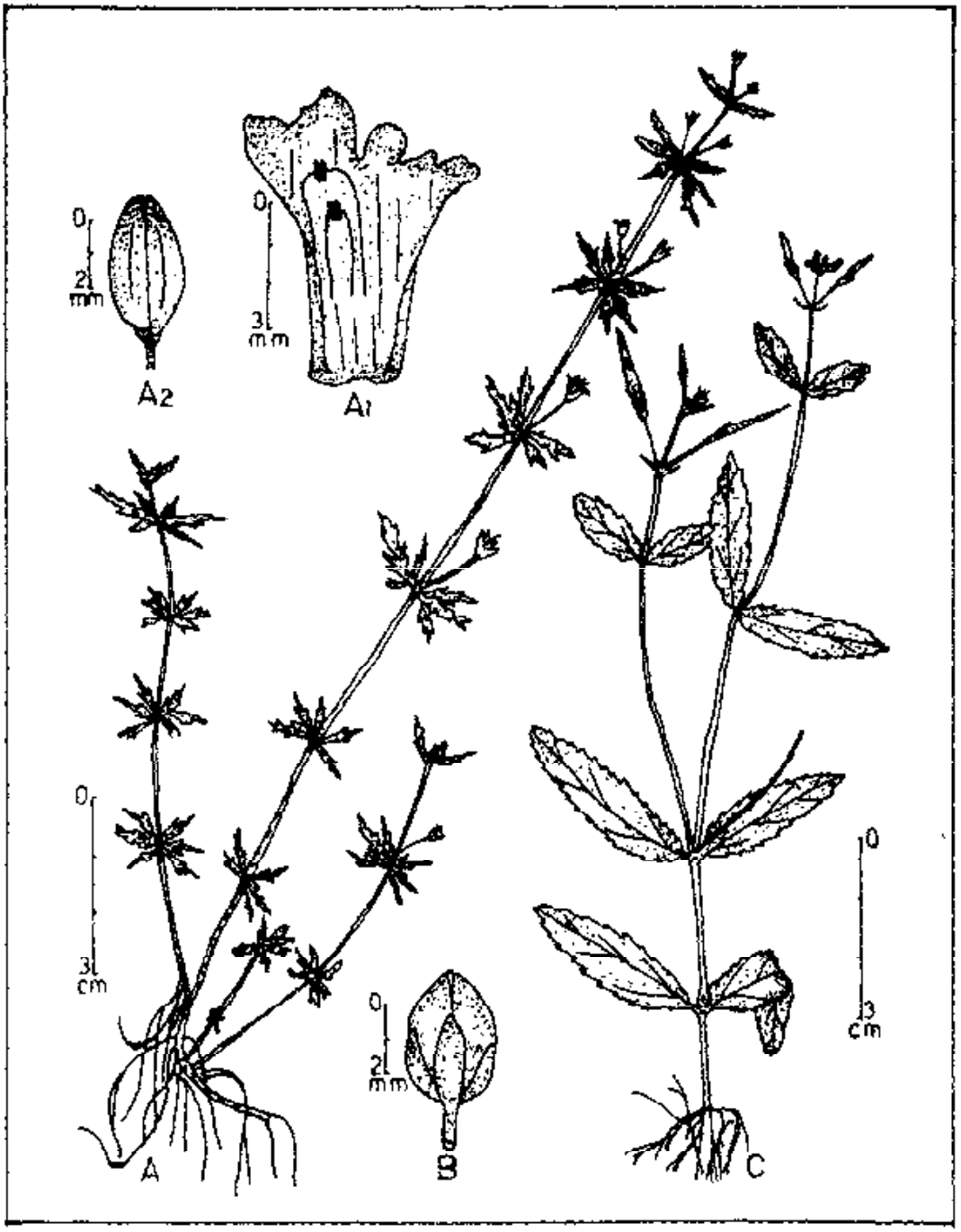


Fig. 26. Scrophulariaceae. (A-A_2): *Limnophila indica* (L.) Druce: A. Habit; A_1. Corolla split open; A_2. Fruit; B. *Verbascum chinense* (L.) Sant.: Fruit; C. *Lindernia ciliata* (Colsm.) Penn.: Habit.

Notes : Common on the walls of the fort.

Common name : Beng. : *Haldi Basanto.*

Uses : Juice applied in skin erruptions.

4. LINDERNIA All.

1a. Capsule longer than the calyx :

2a. Staminodes prominently curved ... 1. *L. antipoda*

2b. Staminodes not curved :

3a. Outer calyx lobes scaly ... 6. *L. oppositifolia*

3b. Outer calyx lobes not scaly :

4a. Flowers solitary, axillary ... 4. *L. hyssopioides*

4b. Flowers in racemes :

5a. Leaves penninerved, margin entire; calyx cleft to the base ... 7. *L. parviflora*

5b. Leaves parallel-nerved, margin aristate-serrate; calyx cleft to the middle ... 2. *L. ciliata*

1b. Capsule shorter or equalling the calyx :

6a. Calyx divided halfway down or less :

7a. Calyx lobes one-nerved; corolla more than 1 cm long ... 5. *L. molluginoides*

7b. Calyx lobes more than one nerved; corolla less than 1 cm long ... 3. *L. crustacea*

6b. Calyx divided up to the base :

8a. Flowers in racemes; capsule shorter than calyx ... 9. *L. viscosa*

8b. Flowers solitary, axillary; capsule equalling the calyx ... 8. *L. pyxidaria*

1. Lindernia antipoda (L.) Alst. in Trim. Handb. Fl. Ceylon 6: 214. 1931; Philcox in Kew Bull. 17: 484. 1964 & 22: 57. 1968; Cramer in Dassanayake, Rev. Handb. Fl. Ceylon 3: 413. 1981. *Ruellia antipoda* L., Sp. Pl. 685. 1753. *Lindernia anagallis* var. *grandiflora* (Retz.) Mukerjee in J. Ind. Bot. Soc. 24: 133. 1945. *Gratiola veronicifolia* Retz.,

Obs. 4: 8. 1786. *G. verbenaefolia* (Colsm.) Pennell in Acad. Nat. Sci. Philadelphia Monog. (Scroph. W. Himalayas) 5: 31. 1943. *Bonnaya veronicifolia* var. *grandiflora* & var. *verbenaefolia* Hook.f. in Fl. Brit. India 4: 285. 1884; Prain, Beng. Pl. 2: 770. 1903 (Rep. ed. 2: 574. 1963) & in Rec. Bot. Surv. India 3: 253. 1905.

Glabrous, prostrate or suberect herbs, stems 4-angled, sometimes rooting at basal nodes. Leaves sessile, oblong, obovate, or spathulate, acute at apex, distinctly crenate-serrate, narrowed at base, up to 28 × 7 mm. Capsule twice as long as calyx, narrowly oblong.

Fl. & Fr. : Nov.-Mar.

Distrib. : India, S.E. Asia & N. Australia.

Specimens examined : Netarhat, 88 & 230. Helophyte.

Notes : Common in waste lands, in rice fields and in marshy areas.

Remarks : *Lindernia* All (1766); *Vandellia* L. (1767); *Bonnaya* Link & Otto (1828); *Ilysanthes* Rafin (1820) are congeneric.

2. Lindernia ciliata (Colsm.) Penn., Brittonia 2: 182. 1936; Mukerjee in J. Ind. Bot. Soc. 24: 133. 1945; Chatterjee & Bharadwaja in Bull. Bot. Soc. Bengal 9: 145. 1955; Philcox in Kew Bull. 22: 51. 1968; Cramer in Dassanayake, Rev. Hand. Fl. Ceylon 3: 412. 1981. *Gratiola ciliata* Colsm., Prodr. Desc. Grat. 14. 1793. *Bonnaya brachiata* Link & Otto, Ic. Pl. Sel, 25. f. 11. 1820; Hook.f., in Fl. Brit. India 4: 284. 1884; Prain, Beng. Pl. 2: 770. 1903 (Rep. ed. 2: 573. 1963) & Rec. Bot. Surv. India 3: 253. 1905.

Glabrous herbs up to 20 cm high, erect or suberect. Leaves sessile oblong or obovate, obtuse, penninerved, serrate. Flowers in terminal raceme, bracteate; pedicels as long as calyx. Calyx 3-4 mm long, divided up to base; lobes linear-subulate. Corolla 6-7 mm long, white or light pinkish with pink throat. Stamens upper-2 only fertile; anthers not connivent; staminodes short, pubescent. Capsule up to 1 cm long, linear-oblong, cylindric, split into 2-valves leaving a replum at middle. Seeds many, dark brown, truncate at both ends.

Fl. & Fr. : Aug.-Dec.

Distrib.: India, Sri Lanka, Java, China, Philippines.

Specimens examined : Daltonganj, 254. Helophyte.

Notes : Common in moist waste lands.

Common name : Beng. : *Bhumi nim.*

3. Lindernia crustacea (L.) Fl. Mueller, Cans. Austr. Pl. 97. 1832; Mukerjee in J. Ind. Bot. Soc. 24: 130. 1945; Chatterjee & Bharadwaja, Bull. Bot. Soc. Bengal 9: 142. 1955; Philcox in Kew Bull. 22: 17. 1968; Babu, Herb. Fl. Dehra Dun 354. 1977. *Capraria crustacea* Linn., Mant. 87. 1767. *Vandellia crustacea* (L.) Benth., Scroph. Ind. 35. 1835; Hook.f. in Fl. Brit. India 4: 279. 1884; Haines, Bot. Bihar & Orissa 2: 661. 1961 (Rep. ed.).

Dichotomously much branched, suberect, decumbent or prostrate, glabrous or sparsely hairy herbs; stems 10-25 cm long, angular, sometimes rooting at the nodes. Leaves 1-2 × 0.5-1 cm, ovate to elliptic ovate, acute at apex, margin crenate serrate, sometimes entire; petioles 2-5 mm long. Flowers axillary, passing into terminal; peduncles 0.5-2.5 cm long, slender. Calyx 3-5 mm long in flower, slightly enlarged in fruit. Corolla 8 mm long; tube light pinkish-blue or pinkish-violet; limb white. Capsule oblong-ellipsoid, 2-valved. Seeds minute, oblong, muricate, pale, brownish-yellow.

Fl. & Fr. : Aug.-Dec. Exotic.

Distrib. : Native of Old World tropics, introduced in the New World.

Specimens examined : Daltonganj, 321. Helophyte.

Notes : Common in moist waste lands.

Uses : Used for bilious affections, dysentery and also used in poultices for boils, sores and ringworm.

4. L. hyssopioides (L.) Haines, Bot. Bihar & Orissa 635. 1922 (Rep. ed. 2: 666. 1961); Mukerjee in J. Ind. Bot. Soc. 24(3): 132. 1945; Santapau in J. Bombay Nat. Hist. Soc. 43: 38. 1950; Philcox in Kew Bull. 22: 50. 1968; Cramer in Dassanayake, Rev. Handb. Fl. Ceyl. 3: 414. 1981. *Gratiola hyssopioides* L., Mant. 2: 174. 1771. *Ilysanthes hyssopioides* (L.) Benth. in DC., Prodr. 10: 419. 1846; Hook.f. in Fl. Brit. India 4: 287. 1884.

Erect, annual herbs; stems 15-30 cm high, simple or diffusely branched, 4-angular, glabrous. Leaves in distant pairs, oblong, 0.7-1.5 × 0.2-0.4 cm, narrowed at base, subacute at apex, glabrous. Flowers solitary, axillary; pedicels 1-3 cm long, slender, deflexed in fruit. Calyx cleft near to the base; lobes linear-lanceolate, equal, up to 3 × 0.8 mm, glabrous. Corolla pale-blue, 5-8 mm long, upper lip 2-lobed at apex, with dark blue lines continued within tube. Perfect stamens-2, inserted at middle of corolla tube. Capsule obliquely ovoid, up to 6 × 3 mm, twice as long as calyx, glabrous, minutely striate. Seeds oblong, up to 0.4 mm long, truncate at both ends, straw coloured.

Fl. & Fr. : Aug.-Mar.

Distrib. : India, Southeast Asia, Malaysia and China.

Specimens examined : Netarhat, 176 & 231. Helophyte.

Notes : Common in marshy areas and near cultivated lands.

5. Lindernia molluginoides (Benth.) Wettst. in Nat. Pflanzen. 4(3b): 80. 1891; Mukerjee in J. Ind. Bot. Soc. 24(3): 130. 1945. *Vandellia molluginoides* Benth., Scroph. Ind. 35. 1835 and in DC., Prodr. 10: 413. 1846; Hook.f. in Fl. Brit. India 4: 279. 1884. *Vandellia crustacea* (L.) Benth. var. *verticillata* Haines, Bot. Bihar & Orissa 2: 662. 1961 (Rep. ed.).

Small erect herbs, stems much branched from base, 4-angular, sparsely hairy. Leaves subsessile, ovate-lanceolate or oblong-lanceolate, up to 14 x 6 mm, acute at apex, cuneate at base, scabrid at margin. Flowers in terminal racemes; pedicels up to 1 cm long, rigid, slender, often deflexed in fruit. Calyx up to 4 mm long, cleft up to middle, segments lanceolate, acute, 1-nerved, free in fruit. Capsules up to 3.8 × 2.6 mm, ellipsoid, equalling the calyx or shorter than calyx. Seeds suborbicular, yellow, up to 0.5 mm across.

Fl. & Fr. : Aug.-Dec.

Distrib. : India & Myanmar.

Specimens examined : Mahulan Basti (Garwah), 624. Helophyte.

Notes : Rare, near marshy places.

6. Lindernia oppositifolia (Retz.) Mukerjee in J. Ind. Bot. Soc. 24(3): 134. 1945; Mooney in Suppl. Bot. Bihar & Orissa 100. 1950, Santapau in J. Bombay Nat. Hist. Soc. 49: 40. 1950; Bennet in J. Bombay Nat. Hist. Soc. 62: 600. 1966; Guha Bakshi in Fl. Murshidabad Distt. 228. 1984. *Gratiola oppositifolia* Retz., Obs. 4: 8. 1786. *Bonnaya oppositifolia* Spreng., Syst. 1: 41. 1825; Hook.f. in Fl. Brit. India 4: 286. 1884. *Vandellia oppositifolia* (Retz.) Haines, Bot. Bihar & Orissa 634. 1922 (Rep. ed. 2: 664. 1961).

Erect, annual, glabrous herbs. Stems 5-18 cm high, 4 angular, branched. Leaves sessile or subsessile, 10-30 × 2.5-7 mm, linear-oblong or lanceolate, obtuse or subacute at apex, narrowed down at base, serrate or serrulate at margin, glabrous, penninerved. Flowers solitary, axillary, above passing into terminal racemes. Calyx up to 6 mm long, segments linear, free almost to base. Corolla up to 7 mm long. Capsule up to 12 × 1.2 mm, linear-oblong, glabrous. Seeds oblong, up to 0.4 mm long, truncate at both ends.

Fl. & Fr. : Sept.-Dec.

Distrib. : India.

Specimens examined : Muhammandganj, 1030. Helophyte.

Notes : Infrequent in moist areas.

7. L. parviflora (Roxb.) Haines, Bot. Bihar & Orissa 635. 1922 (Rep. ed. 2: 665. 1961); Pennell, Scroph, West Himal. 29. 1943; Mukerjee in J. India Bot. Soc. 24(3): 132. 1945; Santapau in J. Bombay Nat. Hist. Soc. 49: 38. 1950. *Gratiola parviflora* Roxb., Pl. Cor. 3: 3. t. 203. 1819 & Fl. Ind. 1: 140. 1820. *Ilysanthes parviflora* Benth. in DC., Prodr. 10: 419. 1846; Hook.f. in Fl. Brit. India 4: 283. 1884.

Small, erect, glabrous herbs, 6-15 cm high; stems simple or diffusely branched from base. Leaves oblong to oblong-lanceolate, 1.0-2.4 × 0.4-0.6 cm, sessile, acute, apiculate at apex, margin entire, 3-5 nerved from base. Flowers axillary and in terminal racemes; pedicels slender, up to 1 cm long. Calyx up to 3 mm long, cleft down to base; lobes linear-lanceolate, acute. Corolla twice as long as calyx, white. Perfect stamen-2. Capsule ovoid-oblong, usually exceeding the calyx. Seeds oblong, up to 0.3 mm long, truncate at one end, straw coloured, sparsely hairy.

Fl. & Fr. : July-Nov.

Distrib. : Throughout India, Thailand, Malaya Peninsula and Tropical Africa.

Specimens examined : Muhammadganj, 973 & 1032.

Notes : Common in marshy areas of the forest.

8. Lindernia pyxidaria All. in Misc. Taurin 3: 178. t. 5. 1766; Linn., Mant. Pl. 2: 252. 1775; Pennell in Acad. Nat. Sc. Phill. Monogr. 5: 25. 1943; Mukerjee in J. India Bot. Soc. 24(3): 131. 1945; Haines, Bot. Bihar & Orissa 2: 665. 1961 (Rep. ed.); Mooney in Suppl. Bot. Bihar & Orissa 98. 1950. *Vandellia erecta* Benth. in Scroph. Ind. 36. 1835 and in DC., Prodr. 10: 415. 1846; Hook.f. in Fl. Brit. India 4: 281. 1884. *Gratiola integrifolia* Roxb., Fl. Ind. 1: 137. 1820.

Small, erect, glabrous, herbs, 4-12 cm high, much branched from base. Leaves sessile or lowermost often very shortly petioled, elliptic oblong or ovate-oblong, 3-5 nerved from base, up to 15 × 8.5 mm, serrate, acute at apex, tapering at base. Flowers axillary, solitary; pedicels slender, up to 1.8 cm long. Calyx up to 3 mm long, segments linear-lanceolate, free down base. Perfect stamens-4. Capsule ellipsoid, equalling the calyx or slightly shorter.

Fl. & Fr. : July-Dec.

Distrib. : India, Eastwards to Polynesia and Westwards to Europe.

Specimens examined : Simultark village (Daltanganj), 320. Helophyte.

Notes : Common in marshy areas.

9. L. viscosa (Hornem.) Boldingh., Zakfl. Landb. Java 165. 1916; Cramer in Dassanayake, Rev. Handb. Fl. Ceyl. 3: 406. 1981. *Gratiola viscosa* Hornem., Enum. Pl. Hort. Hafn. 19. 1807. *Vandellia hirsuta* Buch.-Ham. ex Benth., Scroph. Ind. 36. 1835 et in DC., Prodr. 10: 44. 1846; Hook.f. in Fl. Brit. India 4: 280. 1885; Haines, Bot. Bihar & Orissa 2: 662. 1961 (Rep. ed.). *V. multiflora* G.Don., Gen. Syst. 4: 549. 1837; Haines, Bot. Bihar & Orissa 2: 662. 1961 (Rep. ed.).

Herbs; stems short, erect, with many long branches from base, covered with spreading hairs. Leaves ovate to oval, up to 4 cm long, tapering into wide petioles, upper leaves nearly sessile, subacute at apex, dentate-serrate at margin, hairy on both surfaces. Flowers in racemes, on long slender pedicels. Sepals linear-laneolate, acuminate, hairy, up to 2.5 mm long. Capsule ovoid, shorter than calyx.

Fl. & Fr. : Aug.-Nov.

Distrib. : India, Myanmar, Sri Lanka, Philippines.

Specimens examined : Muhammadganj, 1042. Helophyte.

Notes : Infrequent in wastelands and marshy areas.

5. MAZUS Lour.

Mazus pumilus (Burm.f.) Steenis in Nova Guinea N.S. 9: 31. 1958; Babu, Herb. Fl. Dehra Dun 358. 1977; *Lobelia pumila* Burm.f., Fl. Ind. 186. t. 60. 3. 1768. *Mazus rugosus* Lour., Fl. Cochinch. 385. 1790; Hook.f. in Fl. Brit. India 4: 259. 1884; Haines, Bot. Bihar & Orissa 2: 651. 1961 (Rep. ed.).

Erect ascending, often multicauline, annual herbs. Basal leaves in rosettee, oblanceolate-obovate to spathulate, crenate-dentate, pubescent. Flowers in lax, scapiform racemes. Calyx elongated, divided half way down, campanulate, hairy, larger than fruit, segments ovate-lanceolate, subacute. Corolla tube 2-3 mm long, white-purple. Capsule globose, acuminate at apex, 3 × 3 mm, 2-valved.

Fl. & Fr. : Aug.-Mar.

Distrib. : Afghanistan, Java, China, Japan, Philippines & throughout India.

Specimens examined : Netarhat, 97 & 98. Helophyte.

Notes : Common in rice fields & other marshy areas.

6. MECARDONIA Ruiz & Pavon

Mecardonia procumbens (Miller) Small. Fl. S.E.U.S. 1065. 1338, 1903; D' arcy in Ann. Missouri Bot. Gard. (Fl. Panama) 66: 240. 1979. *Erinus procumbens* Miller, Gard. Dict. ed. 8. No. 6. 1768. *Bacopa procumbens* (Miller) Greenm., Field Mus. Nat. Hist. Bot. ser. 2: 261. 1907. *Harpestis chamaedryoides* Kunth. in H.B.K., Nov. Gen. Sp. Pl. 2: 369. 1818; Prain, Beng. Pl. 2: 765. 1903 (Rep. ed. 2: 570. 1963), & in Rec. Bot. Surv. India 3: 251. 1905; Haines, Bot. Bihar & Orissa 2: 659. 1961 (Rep. ed.). *Lindernia dianthera* Sw., Prodr. Veg. 92. 1788. *Mecardonia dianthera* (Sw.) Pennel in Proc. Acad. Nat. Soc. Philadelphia 98: 87. 1946; Chatterjee and Bhardwaja in Bull. Bot. Soc. Beng. 9: 136. 1955.

Prostrate, glabrous herbs, rooting at lower nodes; stems 4-angled, slightly twisted. Leaves opposite, subequal or unequal, serrate, lanceolate, up to 12 × 8 mm. Flowers 1-2 in both the axils or in one axil, yellow; peduncles up to 1.4 cm long. Sepals unequal, outer-3 lanceolate, acute, 7 × 3 mm, inner-2 linear, 6 × 1 mm long. Capsule up to 6 mm long, cylindric, 2-valved.

Fl. & Fr. : Feb.-June.

Distrib. : All tropical countries.

Specimens examined : Betla, 44.

Notes : Common in shady localities, throughout the district.

7. SCOPARIA L.

Scoparia dulcis L., Sp. Pl. 116. 1753; Hook.f. in Fl. Brit. India 4: 289. 1884; Prain, Beng. Pl. 2: 772. 1903 (Rep. ed. 2: 575. 1963) & in Rec. Bot. Surv. India 3: 253. 1905; Haines, Bot. Bihar & Orissa 2: 668. 1961 (Rep. ed.); Chatterjee & Bharadwaja in Bull. Bot. Soc. Beng. 9: 132. 1955; Cramer in Dassanayake, Rev. Handb. Fl. Ceylon 3: 439. 1981.

Glabrous, suffruticose herbs, 20-50 cm high; stems angled. Leaves opposite or 3-nately whorled, ovate, ovate-lanceolate or elliptic, acute or obtuse at apex, crenate-serrate, base tapering into a short petiole, up to 6-9 × 1-3 mm. Flowers white, 3-6 in axillary cluster; pedicels 0.5-1 cm

long, slender. Corolla regular, throat provided with ring of hairs. Capsule globose, 4 mm across.

Fl. & Fr. : Throughout the year. Exotic.

Distrib. : Native of tropical S. America, now pantropic.

Specimens examined : Betla, 37.

Notes : Very common in cultivated lands and in open waste lands.

Uses : Infusion of leaves given in fever, bronchitis and also in toothache.

8. STRIGA Lour.

1a. One calyx-rib terminating at the tip of each lobe, the rest terminating at the sinuses; flowers chrome-yellow ... 2. *S. lutea*

1b. Three calyx-ribs terminating at the tip of each lobe; flowers white ... 1. *S. angustifolia*

1. Striga angustifolia (D.Don) Saldanha, Bull. Bot. Surv. India 5(1): 70. 1963; Cramer in Dassanayake, Rev. Handb. Fl. Ceylon 3: 401. 1980. *Buchnera asiatica* L., Sp. Pl. 630. 1753 *pro pate, nom. rej.*; Vahl. Sym. Bot. 3: 81. 1794 (*nom. illegit*). *Buchnera angustifolia* D.Don, Prodr. Fl. Nepal 91. 1825. *Buchnera euphrasioides* Benth., Scroph. Ind. 41. 1835 (non vahl. 1794). *Striga euphrasioides* (Benth.) Benth. in Hook., Comp. Bot. Mag. 1: 364. 1835; Hook.f. in Fl. Brit. India 4: 299. 1885; Haines, Bot. Bihar & Orissa 2: 671. 1961 (Rep. ed.). *Striga asiatica* (L.) Kuntze, Rev. Gen. Pl. 466. 1891.

Erect herbs with simple or branched stems, 15-30 cm high stems obtusely 4-angled, scabrid. Leaves, up to 18 × 2 mm, setulose on both surfaces, ciliolate at margin. Flowers in lax, erect spikes, up to 12 cm long; pedicels up to 1 mm long; bracteoles subulate, up to 2 mm long, minutely strigose without. Calyx tube up to 5 mm long, 15-ribbed, scabrid on ribs; lobes linear-lanceolate, up to 3 × 1 mm, acuminate. Corolla white; tube linear, up to 10 mm long, minutely hirstue without, upper lip broadly orbicular, slightly emarginate, up to 3 × 5 mm; lateral lobes of the lower lip up to 3 mm long, mid-one up to 6 × 3 mm. Capsule ovoid, up to 5 × 3 mm, apiculate, glabrous. Seeds cuneiform, up to 0.5 mm long, trigonous, glabrous.

Fl. & Fr. : Aug.-Dec.

Distrib. : India, Sri Lanka, Indonesia.

Specimens examined : Seuti, 1100.

Notes : Common in grass lands and in dry areas. The plant is parasitic on the roots of grasses and the common hosts are *Eragrostis tenella* (L.) P. Beauv. ex Roem. et Schult. and *Eleusine indica* (L.) Gaertn.

Remarks : After examination of the type material Saldanha has shown that *S. euphrasioides* of Vahl (1974) and of Bentham (1835) are two different plants. *Buchnera asiatica* Vahl which is Bentham's plant, cannot be called *Striga asiatica* as such it becomes a later homonym of Linnean plant. Hence Saldanha made the combination *Striga angustifolia* (Don) Sald., from the oldest legitimate epithet *Buchnera angustifolia* Don.

2. **Striga lutea** Lour., Fl. Cochinch. 22. 1790; Hook.f. in Fl. Brit. India 4: 299. 1885; Haines, Bot. Bihar & Orissa 2: 671. 1961 (Rep. ed.).

Slender, rigid herbs, up to 20 cm high; often branched. Leaves linear, rounded at base, subacute at apex, ciliolate at margin, setulose on both surfaces, up to 10 × 2 mm. Flowers in terminal, lax spikes; bracts linear-lanceolate, minutely hispid on both surfaces, up to 4 × 0.5 mm. Calyx tube up to 4 mm long, 10-ribbed, scabrid on ribs. Corolla yellow, glandular hairy without. Capsules ovoid, up to 4 × 1.5 mm. Seeds glabrous, black.

Fl. & Fr. : Oct.-Dec.

Distrib. : India, Sri Lanka, South East Asia and South Africa.

Specimens examined : Seuti, 1059.

Notes : Infrequent in grassy lands, and parasitic on the roots of grasses.

9. Torenia L.

Torenia fournieri Lind. ex Fourn. in Ill. Hortic. 23: 129. t. 249. 1876; Haines, Bot. Bihar & Orissa 2: 660. 1961 (Rep. ed.); Cramer in Dassanayake, Rev. Handb. Fl. Ceylon 3: 445. 1981.

Annual, erect herbs, up to 30 cm tall, sometimes rooting at lower nodes, strigose on angles. Leaves ovate, 2-4.5 × 1.5-2.5 cm, acute at apex, truncate or rounded at base, margin serrate, glabrous above, scabrid along nerves beneath; petioles up to 1.2 cm long. Flowers axillary and solitary below, often in terminal or axillary racemes above; bracts linear-lanceolate, pedicels up to 2 cm long, strigose. Calyx tube up to 12 mm long, wings strigose. Corolla up to 3 cm long, upper lip broadly orbicular, pale-blue, lower lip deeply purple. Capsule narrowly ovoid, 9 × 2 mm, glabrous, tipped by withered style base. Seeds orbicular-oblong, up to 0.7 mm long, foveolate, straw coloured.

Fl. & Fr. : Aug.-Nov.

Distrib. : Native of Indo-China, now naturalised in the warm tropics.

Specimens examined : Barwadih, 916.

Notes : Commonly cultivated in gardens; often found as an escape on dry rocks.

10. VERBASCUM L.

Verbascum chinense (L.) Sant., Fl. Purandhar 90. 1958; Babu, Herb. Fl. Dehra Dun 362. 1977. *Scrophularia chinensis* L., Mant. Pl. 250. 1771. *Celsia coromandeliana* Vahl., Symb. Bot. 3: 79. 1794; Hook.f. in Fl. Brit. India 4: 251. 1883; Prain, Beng. Pl. 2: 563. 1963 (Rep. ed.); Haines, Bot. Bihar & Orissa 2: 649. 1961 (Rep.). *Verbascum coromandelianum* (Vahl) O. Kuntz., Rev. Gen. Pl. 1: 468. 1891; Santapau, J. Bombay Nat. Hist. Soc. 49: 25. 1950.

Erect, pubescent herb; stems somewhat angular, unbranched. Leaves cauline, gradually smaller towards the upper parts, ultimately passing into small bracts, cordate, crenate-serrate, acute. Flowers yellow, in terminal racemes; pedicel hairy, up to 12 mm long. Calyx deeply 5-partite, hairy, segments oblanceolate, acute. Filaments hairy. Capsules globose, 4-valved, 4-5 mm long. Seeds many, black, very minute.

Fl. & Fr. : Feb.-May.

Distrib. : Throughout India, Afghanistan, China.

Specimens examined : Netarhat, 215.

Notes : Common in waste marshy areas, near the streams.

Common name : Beng. : *Kukshima*; Hindi : *Gadartambaku.*

Uses : Leaf juice used in diarrhoea and dysentery.

Remarks : Some authors treat *Celsia* L. (1753) as a distinct genus from *Verbascum* L. (1753).

11. VERONICA L.

Veronica anagallis-aquatica L., Sp. Pl. 12. 1753. *Veronica anagallis* L. var. *punctata* (Buch.-Ham. ex Don) Hook.f. in Fl. Brit. India 4: 293. 1884; Haines, Bot. Bihar & Orissa 2: 667. 1961; (Rep. ed.); Prain, Beng. 2: 576. 1963 (Rep. ed.). *Veronica punctata* Buch.-Ham. ex Don., Prodr. 93. 1825.

Erect, slightly succulent, glabrous semiaquatic herbs; stems hollow, creeping below. Leaves sessile often petioled below, upper one sub-amplexicaul, oblong to linear oblong, serrate or nearly entire, cordate at base, rounded at apex, up to 3 × 0.6 cm. Flowers in lax axillary, 4-6 cm long racemes, white; pedicels slender, longer than linear-lanceolate sepals. Calyx 4-cleft up to base, 2 mm long. Stamens-2, adnate to upper lobe of corolla. Capsules compressed, orbicular or orbicular-oblong, slightly emarginate from persistent calyx, glabrous.

Fl. & Fr. : Mar.-July.

Distrib. : Throughout India, also in Europe, North & South Africa, and North America.

Specimens examined : Netarhat, 210. Helophyte, rarely vittate.

Notes : Very common in moist places and in the cultivated lands.

LENTIBULARIACEAE

UTRICULARIA L.

1a. Flowers blue; capsules globose ... 2. *U. graminifolia*

1b. Flowers yellow; capsules ellipsoid ... 1. *U. bifida*

1. **Utricularia bifida** L., Sp. Pl. 18. 1753; Clarke in Hook.f. Fl. Brit. India 4: 332. 1884; Haines, Bot. Bihar & Orissa 2: 677. 1961 (Rep. ed.); Taylor in Fl. Males. 8(2): 281. 1977. *Utricularia ramosa* Vahl., Enum. 1: 204. 1804; Clarke in Hook.f., Fl. Brit. India 4: 335. 1884.

Slender, glabrous annual, up to 10 cm high, leafless during flowering. Leaves 5-12 mm long, linear. Flowers in racemes, yellow, up to 6 mm long; pedicels up to 2.5 mm long. Calyx lobes in fruit ovate, obtuse. Lower lip of corolla up to 4 mm long and spur curved, up to 3 mm long. Fruits ellipsoid, 4 × 3 mm. Seeds obovoid, wrinkled, up to 1 mm long.

Fl. & Fr. : Sept.-Dec.

Distrib. : India, Nepal, Sri Lanka, E. Asia, Japan and Philippines.

Specimens examined : Netarhat, 232. Helophyte.

Notes : Common in rice fields and marshy lands.

Common name : Beng. : *Chotojhangi*; Santal : *Arakjhawar.*

Uses : Used in urinary troubles.

2. **U. graminifolia** Vahl., Enum. 1: 195. 1804; Gandhi in Sald. and Nicol., Fl. Hassan 564. 1976; Cook in Aquat. Wetland Pl. Ind. 239. 1996. *Utricularia caerulea* (auct. Pl. non L. 1753) Clarke in Hook.f., Fl. Brit. India 4: 331. 1884; Haines, Bot. Bihar & Orissa 2: 676. 1961 (Rep. ed.).

Slender, terrestrial herbs. Leafless during flowering, otherwise leaves 3-nerved. Scapes erect. Scales, bracts and bracteoles basifixed. Pedicels longer than calyx. Calyx lobes subequal, acute to acuminate. Corolla blue, upper lip obovate, lower lip ovate-orbicular; spur narrowly conic, curved. Capsule depressed globose. Seeds ovoid.

Fl. & Fr. : Oct.-Feb.

Distrib. : Throughout India.

Specimens examined : Ghurki, 1143. Helophyte.

Notes : Infrequent in wet lands.

GESNERIACEAE

DIDYMOCARPUS Wall.

Didymocarpus pygmaea Clarke in Hook.f., Fl. Brit. Ind. 4: 345. 1884 et in DC., Monogr. Phan. 5: 82. 1885; Haines, Bot. Bihar & Orissa 2:. 679. 1961 (Rep. ed.); Mukherjee in Fl. Pach. Bori Res. 219. 1984.

Small pubescent herbs; stems short, straight or curved, succulent, up to 5 cm long. Leaves solitary, sessile, broadly oblong or ovate, membranous, up to 6 × 4 cm, obtuse at both ends, sinuate, pubescent. Flowers 1-4, fascicled in leaf axils; pedicels up to 7 mm long, hairy. Calyx up to 5 mm long, densely pilose with white hairs; lobes linear. Corolla tubular, shortly 5-lobed. Fertile stamens-2; staminodes-2, linear. Ovary and style villous, stigma oblique, emarginate. Capsule nearly straight, up to 2 cm long, hairy, 2-valved. Seeds ellipsoid.

Fl. & Fr. : Aug.-Nov.

Distrib. : Throughout India.

Specimens examined : Palamau Fort (Betla), 1116.

Notes : Infrequent on moist walls of the ruins and in the rock crevices.

BIGNONIACEAE

1a. Leaves once pinnate; leaflets lanceolate or elliptic, more than 7 cm long; corolla yellow; capsule linear :

2a. Young shoots glandular-tomentose; leaflets elliptic, entire; calyx 3-lobed, glandular; capsule more than 25 cm long, terete ... 2. STEREOSPERMUM

2b. Young shoots glabrous; leaflets lanceolate, serrate; calyx 5-toothed, eglandular; capsule less than 25 cm long, compressed ... 3. TECOMA

1b. Leaves twice pinnate; leaflets oblong to rhomboid, less than 3 cm long; corolla blue; capsule orbicular, flat 1. JACARANDA

1. JACARANDA JUSS.

Jacaranda mimosifolia D.Don. in Bot. Reg. t. 631. 1822 et in Edinb. N. Phill. J. 264. 1823; Haines, Bot. Bihar & Orissa 2: 691. 1961 (Rep. ed.). *Jacaranda acutifolia* (non Humb. & Bonpl.) Steenis, Bull. Jard. Bot. Btzg. 111. 10. 270. 1928.

Handsome trees, up to 15 mm high. Leaves bipinnate; pinnae 16 or more pairs; leaflets oblong-rhomboid, cuspidate, pubescent, up to 12 × 2.5 mm, terminal one long acuminate, up to 21 × 3.5 mm, 29-49 per pinnae. Flowers in terminal panicle. Calyx small, 5-toothed. Corolla blue, up to 5 cm long, 2-lipped, tube slightly curved. Pefect stamens-4, didynamous; staminodes as long as stamens, club-shaped, often bearded at top. Capsule orbicular, flat, up to 5.5 cm across, woody.

Fl. & Fr. : Mar.-July.

Distrib. : Native of Brazil, introduced in India and other countries.

Specimens examined : Netarhat, 825.

Notes : Common as an avenue tree. Exotic.

2. STEREOSPERMUM Cham.

Stereospermum chelonoides (L.f.) DC. in Bibl. Univ. Genev. 11. 17 (Rev. Bignon. 8: 125) 1838 et in Prodr. 9: 210. 1845 pp. *Quoad basionym* excl. descrip.; Haines, Bot. Bihar & Orissa 657. 1922; Chatterjee in Bull. Bot. Soc. Beng. 2(1): 69. 1948; Santisuk in Kew Bull. 28: 176. 1973. *Bignonia chelonoides* L.f., Suppl. 282. 1781. pp. *Bignonia suaveolens* Roxb., Fl. Ind. 3: 104. 1832. *Stereospermum suaveolens* (Roxb.) DC., Prodr. 9: 211. 1845; Clarke in Hook.f., Fl. Brit. India 4: 382. 1884; Chatterjee in Bull. Bot. Soc. Beng. 2(1): 70. 1948; Haines, Bot. Bihar & Orissa 2: 688. 1961 (Rep. ed.).

Large trees; young parts glandular-tomentose. Leaves large, pinnate; leaflets 5-9, broadly elliptic, 7.5-18 × 5-8 cm, entire, acuminate; petiolules up to 3.5 cm long. Flowers in large viscous-hairy panicle. Calyx 3-lobed, glandular, corolla up to 3.5 cm long, crimson-yellow, lobes crisped-crenate. Capsule up to 45 cm long, terete, slightly rough with tubercles.

Fl. : Apr.-May; *Fr.* : Oct.-Feb.

Distrib. : India, Sri Lanka.

Specimens examined : Daltonganj, 876.

Notes : Common as avenue trees.

Common name : Beng. : *Parul*; Hindi & Santal : *Pader.*

3. TECOMA Juss.

Tecoma stans (L.) Kunth., in H.B.K., Nov. Gen. Sp. 3: 144. 1819; Gandhi in Sald. & Nicol., Fl. Hassan 537. 1976. *Bignonia stans* L., Sp. Pl. ed. 2: 871. 1763.

Large shrub, with pinnate leaves. Leaflets, ovate, serrate, acute at apex; petiolules 1-5 mm long, puberulous. Flowers in terminal racemes, yellow. Calyx campanulate, 5-toothed, 6 mm long. Corolla tubular, ventricose, up to 3.5 cm long. Stamens-4, didynamous; one lobe of the anther is hairy. Stigma flat. Capsule linear, up to 22 cm long, compressed. Seeds flat, 5 × 8 mm, with scaly membranous white wing.

Fl. & Fr. : Jan.-Mar. Exotic.

Distrib. : Native of West Indies now cultivated throughout India.

Specimens examined : Netarhat, 58.

Notes : Common in the gardens, but also found in the forest edge.

Uses : Commonly used as garden ornamentals.

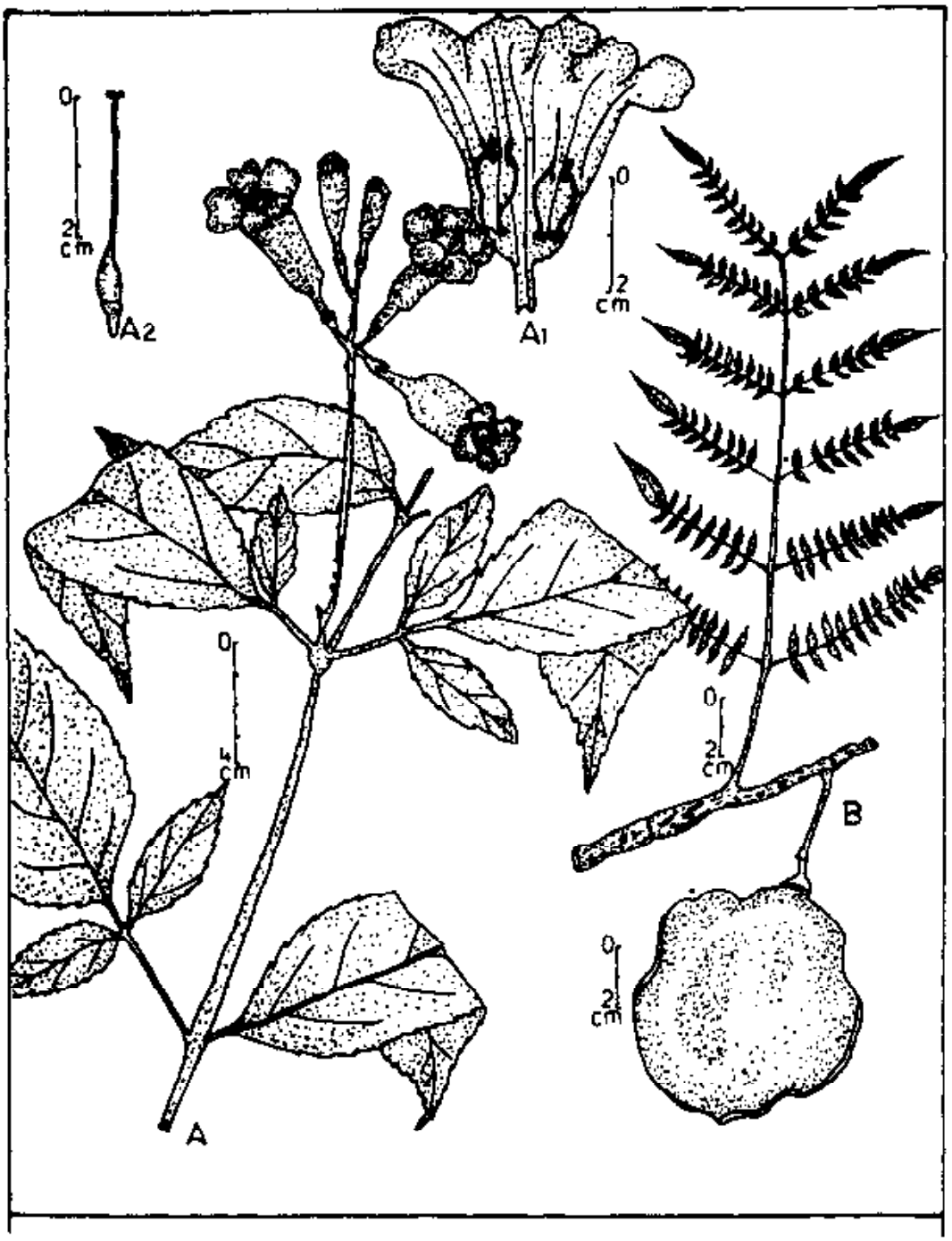


Fig. 27. Bignoniaceae. (A-A_2): *Tecoma stans* (L.) Kunth: A. Flowering twig; A_1. Corolla split open; A_2. Gynoecium; B. *Jacaranda mimosifolia* D. Don: Fruiting twig.

PEDALIACEAE

SESAMUM L.

Sesamum orientale L., Sp. Pl. 634. 1753; Baker & Bakh.f., Fl. Java 2: 544. 1965; Bennet, Fl. Howrah 333. 1979. *Sesamum indicum* L., Sp. Pl. 634. 1753; Clarke in Hook.f., Fl. Brit. India 4: 387. 1884; Trimen, Handb. Fl. Ceylon 3: 285. 1895; Bruce in Kew Bull. 8: 425. 1953; Haines, Bot. Bihar & Orissa 2: 693. 1961 (Rep. ed.); Khan & Huq in Khan, Fl. Bangladesh 2: 5. 1973.

Erect, pubescent or puberulous annual, up to 1 mm high; stems and branches obtusely 4-angled in upper part. Leaves variable, lower simple, trifoliate, 3-partite, 3-lobed or rarely entire; leaflets or lobes 5-10 × 2-3.5 cm, elliptic, elliptic-oblong or ovate; petioles 4-8 cm long; upper leaves short petioled, ovate-oblong to oblong-lanceolate or linear, 3-6 × 0.5-3 cm, margin entire or shallowly toothed. Flowers solitary, foetid; pedicels 1-4 mm long, 2-yellow glands on both sides at joints of axil. Calyx deeply divided; segments lanceolate-oblong, 3-5 mm long. Corolla white to pale pinkish-violet, pubescent, often spotted yellow within and with a yellow blotch on lower lip, 2.5-3.5 cm long. Filaments glabrous, with a ring of hairs at point of insertion. Ovary densely pubescent; style glabrous; lips of stigma lanceolate. Capsule erect, oblong, 1.5-3 cm long (including beak), villous-pubescent, apex contracted into a conspicuous subulate beak. Seeds up to 2 mm long, pale-yellow, brown or black.

Fl. & Fr. : Sept.-Dec.

Distrib. : Probably native of Africa or India; now cultivated in warmer parts of the World.

Specimens examined : Kechki, 883.

Notes : Commonly cultivated but often found as an escape and also naturalised along road sides and waste lands.

Common name : Beng. & Hindi : *Til*; Kol. : *Tilming*.

Uses : Seeds yield a fatty oil called sesame oil. Til is edible and also used in the manufacture of soaps, perfume, cosmetics, insectisides and pharmaceutical products. Oil is used as hair oil and seeds are edible.

MARTYNIACEAE

MARTYNIA L.

Martynia annua L., Sp. Pl. 618. 1753; Baker in van Steenis, Fl. Males. ser. 1.4: 221. 1951; Hevly in Taxon 18: 532. 1969; Khan & Huq. in Khan, Fl. Bangladesh 1: 8. 1972. *Martynia diandra* Glaoxin, Obs. 14. t. 1. 1785; Clarke in Hook.f., Fl. Brit. India 4: 386. 1884; Haines, Bot. Bihar & Orissa 2: 694. 1961 (Rep. ed.).

Erect viscid herbs, somewhat woody at base, up to 1 m high. Leaves opposite, broadly-ovate to deltoid in out line, 7-20 × 7-15 cm, base cordate, margin repand-dentate, acute at apex; petioles thick, fistular, 7-15 cm long, often tinged with purple. Racemes 4-10 cm long, 10-20 flowered; pedicels 0.5-2.5 cm long; bracts and bractlets pale-pink, membranous, veined; bracts broadly ovate, 1-2.5 cm long; bractlets-2, ovate-oblong, 8-12 mm long, lower-2 broadly-ovate, 10-12 mm long. Corolla glandular, tube 3-5 cm long, reddish-pink, lower lobe up to 1 cm long, marked with larger purple blutch, with a yellow blotch above another 4 smaller and each marked by red-purple blotch. Fruits ovoid, flattened somewhat dorsoventrally, densely viscid-pubescent, deciduous exocarp green, endocarp black, very hard with recurved claws.

Fl. & Fr. : Aug.-Nov. Exotic.

Distrib. : Native of Mexico and Central America; now naturalised in India, Australia and Malaysia.

Specimens examined : Kechki, 884.

Notes : Common in the villages and near the forests.

Common name : Beng. : *Baghnokh*; Hindi : *Hathajori, Bichu*; Santal : *Baglucha*; Kol. : *Bilaisarsar.*

Uses : Leaves used for epilepsi and juice used as a gargle for sore throat. Fruits are said to be used in inflammatory diseases.

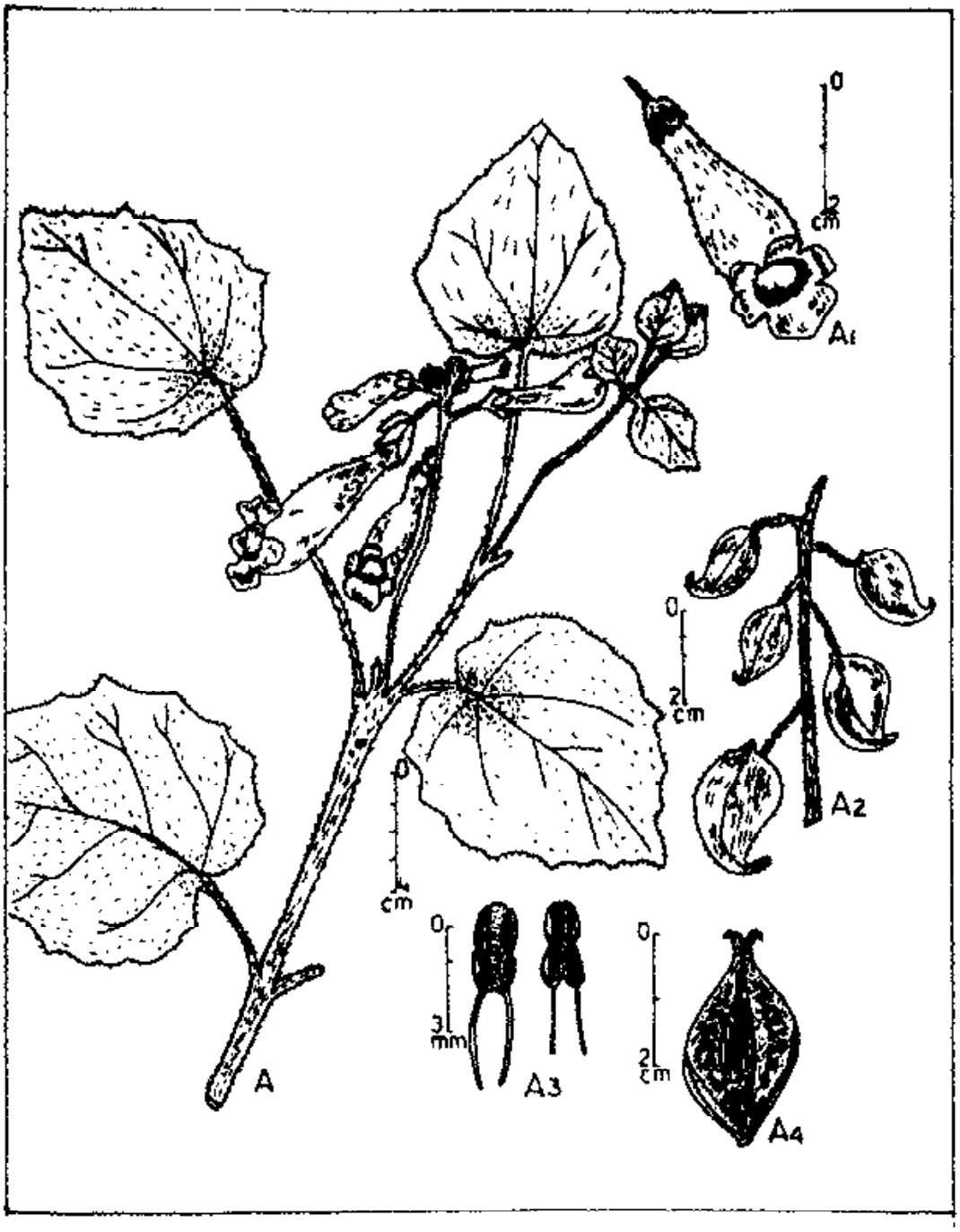


Fig. 28. Martyniaceae. (A-A_4): *Martynia annua* L.: A. Flowering twig; A_1. Flower; A_2. Fruiting branch; A_3. Stamens; A_4. Fruit.

ACANTHACEAE

1a. Capsule with retinacula :

2a. Fertile stamens-4 :

3a. Corolla lobes twisted :

4a. Corolla 2-lipped :

5a. Leaves entire; sepals less than 8 mm long ... 6. HEMIADELPHIS

5b. Leaves serrate; sepals more than 8 mm long ... 8. HYGROPHILA

4b. Corolla subequally 5-lobed :

6a. Capsule clavate, with a sterile, solid, stalk like base ... 3. DIPTERACANTHUS

6b. Capsule linear, seminiferous throughout ... 7. HEMIGRAPHIS

3b. Corolla lobes imbricate :

7a. All stamens perfect, included; corolla less than 2 cm long ... 10. LEPIDAGATHIS

7b. Two anterior stamens exserted, other two minute, included, often reduced to staminodes; corolla more than 2 cm long ... 2. BARLERIA

2b. Fertile stamens-2 :

8a. Anther cells equally placed :

9a. Ovules-2 in each locule; cells of the capsule 2-seeded :

10a. Corolla 2-lipped; capsule subspathulate ... 4. ECOBOLIUM

10b. Corolla subequally 5-lobed; capsule elliptic ... 5. ERATHEMUM

9b. Ovules-6 in each locule; cells of the capsule 6-seeded ... 1. ANDROGRAPHIS

8b. Anther cells unequally placed :

11a. One of the anther cells with a basal spur :

12a. Inflorescence axillary ... 9. JUSTICIA

12b. Inflorescence terminal :

13a. Calyx segments-4 ... 13. ROSTELLULARIA

13b. Calyx segments-5 ... 14. RUNGIA

11b. Anther cells without basal spur ... 12. PERISTROPHE

1b. Capsule without retinacula :

14a. Calyx 4-lobed; stamens-2 ... 11. NELSONIA

14b. Calyx 5-10 lobed; stamens-4 :

15a. Calyx-10 lobed; bracteoles large, enclosing the flower bud ... 16. THUNBERGIA

15b. Calyx-5 lobed; bracteoles not enclosing the flower buds ... 15. STAUROGYNE

1. ANDROGRAPHIS Wall. ex Nees

1a. Leaves sessile; pedicels-0 or below 1 mm; capsules within 1 cm long; seeds oblong, above 1 mm long ... 1. *A. echioides*

1b. Leaves petioled; pedicels above 3 mm long; capsules above 1 cm long; seeds subquadrate, within 1 mm long ... 2. *A. paniculata*

1. Andrographis echioides Nees in Wall., Pl. As. Rar. 3: 117. 1832; Clarke in Hook.f., Fl. Brit. India 4: 505. 1884; Haines, Bot. Bihar & Orissa 2: 734. 1961 (Rep. ed.).

Erect, symmetrical herbs, 18-60 cm high; stems 4-angular, hairy. Leaves sessile, oblong to subelliptic, up to 5 × 2 cm, obtuse at apex, cuneate at base, margin with patent white hairs. Flowers in axillary racemes, sessile or very shortly pedicelled, 2 cm long. Sepals linear, up to 1.5 cm long, connate at base, glandular hairy. Corolla pubescent, pink. Anthers much exserted, white bearded. Capsule ellipsoid-oblong, up to 10 × 3 mm, white hairy, equalling or slightly exserted from persistent calyx. Seeds oblong, 2 mm long, rugose.

Fl. & Fr. : Aug.-Feb.

Distrib. : Tropical parts of India.

Specimens examined : Daltonganj, 262.

Notes : Occasional in the barren fields.

Common name : Santal : *Bir Kubet.*

2. **Andrographis paniculata** (Burm.f.) Wall. ex Nees in Wall., Pl. As. Rar. 3: 116. 1832; Clarke in Hook.f., Fl. Brit. India 4: 501. 1884; Prain, Beng. Pl. 2: 809. 1903 (Rep. ed. 2: 603. 1963) & in Rec. Bot. Surv. India 3: 257. 1905; Haines, Bot. Bihar & Orissa 2: 733. 1961 (Rep. ed.); Santapau in Bot. Mem. Univ. of Bombay 2: 50. 1961. *Justicia paniculata* Burm.f., Fl. Ind. 9. 1788.

Erect, much branched herbs, 60-70 cm high, with square stems and swollen nodes. Leaves up to 10 × 3 cm., glabrous, dark green, lanceolate to elliptic-lanceolate, acute; petioles 1-1.5 cm long. Flowers in axillary and terminal panicle, pale purple; pedicels 3-5 mm long, glandular pubescent. Corolla 1 cm long, hairy within. Capsule 2 cm long, puberulous when young, becoming glabrous at maturity, linear-oblong, pointed at apex, acute at base. Seed 1 mm, yellowish, subquadrate, supported on retinacula.

Fl. & Fr. : Nov.-May.

Distrib. : India, Sri Lanka, West Indies.

Specimens examined : Daltonganj, 17.

Notes : Common in shaded places.

Common name : Beng. & Santal : *Kalmegh.*

Uses : The plant is bitter and decoction is used as medicine in fever and liver troubles. It is also used by the Santal during diarrhoea and epilepsy.

2. BARLERIA L.

1a. Armed; capsule 2-seeded ... 2. *B. prionitis*

1b. Unarmed; capsule 4-seeded ... 1. *B. cristata*

1. **Barleria cristata** L., Sp. Pl. 636. 1753; Clarke in Hook.f., Fl. Brit. India 4: 488. 1884; Haines, Bot. Bihar & Orissa 2: 716. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 378. 1977.

Shrubs; stems slightly square, blackish green; nodes swollen, strigosely hairy. Leaves elliptic-oblong or oblong-lanceolate, acute at apex, shortly petioled, up to 6 × 2.5 cm. Flowers in terminal or axillary short spikes; bracts foliaceous, hairy, serrate, acuminate at apex, 10-15 × 4-5 mm. Capsules ellipsoid, acute at both ends, black, 1.5 cm long, 4-seeded.

Fl. & Fr. : Nov.-Mar.

Distrib. : Throughout India, Malaysia & China.

Specimens examined : Upper Ghagri (Netarhat), 103.

Notes : Common on the hill slopes & near the stream as an escape from garden.

2. **B. prionitis** L., Sp. Pl. 636. 1753; Clarke in Hook.f., Fl. Brit. India 4: 482. 1884; Prain, Beng. Pl. 2: 812. 1903 (Rep. ed. 2: 605. 1963) & in Rec. Bot. Surv. Ind. 3: 257. 1905; Santapau in Bot. Mem. Univ. Bombay 2: 56. 1951; Haines, Bot. Bihar & Orissa 2: 714. 1961 (Rep. ed.); Bremekamp in Dansk. Bot. Arkiv. 23(2): 202. 1965.

Thorny and prickly undershrubs, 0.5-1.5 m high, armed with 2-4 branched axillary spikes on a short common stalk. Leaves up to 10 × 4 cm, elliptic or elliptic-lanceolate, hairy, acuminate or acute, sometimes spine tipped, cuneate at base; petioles 1-3 cm long. Flowers yellow, 1-3 together in the axils and in terminal spikes, with elliptic or linear-oblong, spine-tipped bracts, up to 1.5 cm long; bracteoles converted into linear-lanceolate spine. Capsules beaked. Seeds-2, 4-6 mm diam.

Fl. & Fr. : Dec.-June.

Distrib. : India, Sri Lanka, Malaysia, Tropical Asia & Africa.

Specimens examined : Simultarh village (Daltonganj), 257.

Notes : Common in the villages & scrub jungle.

Common name : Beng. : *Kanta jati*; Hindi : *Jhinti*; Santal: *Kantaphul*.

3. DIPTERACANTHUS Nees emend. Bremek.

Dipteracanthus prostratus (Poir.) Nees in Wall., Pl. As. Rar. 3: 81. 1832; Bremekamp in Verh. Kon. Ned. Acad. Wetensch Afd. Naturk. Tweede Sect. 45(1): 16. 1948; Santapau in Bot. Mem. Univ. Bombay 2: 24. 1951. *Ruellia prostrata* Poir. in Lam., Encycl. 6: 394. 1804; Clarke in Hook.f., Fl. Brit. India 4: 411. 1884; Haines, Bot. Bihar & Orissa 2: 706. 1961 (Rep. ed.). *R. prostrata* var. *dejecta* (Nees) Clarke in Hook.f., Fl. Brit. India 4: 412. 1884; Haines, Bot. Bihar & Orissa 2: 706. 1961 (Rep. ed.).

Prostrate or decumbent, pubescent to subglabrous herbs, up to 45 cm long, with rooting at lower nodes. Leaves up to 6 × 3 cm, ovate, or ovate-lanceolate, acute at apex, margin entire with white hairs, pubescent; petioles up to 2.5 cm long, hairy. Flowers axillary, solitary, subsessile, bracteoles-2, 1-2 cm long, broadly-elliptic or elliptic-oblong. Calxy up to 7 mm long, hairy; segments linear-subulate. Corolla up to 2.5 cm long, caducous, hairy outsides; lobes subequal and rounded, pinkish-white or purple. Capsule up to 2 cm long, clavate, pubescent, tip pointed. Seeds up to 3 mm diam., margin hairy.

Fl. & Fr. : throughout the year, specially in Sept.-Dec.

Distrib. : Throughout India.

Specimens examined : Kechki, 907.

Notes : Common in shaded lands and in the forests.

4. ECBOLIUM S. Kurz

Ecbolium viride (Forsskal) Alston var. **dentata** (Klein. ex Link) Raizada (in Indian For. 84: 482. 1958 *nom. inval.*) ex Santapau in Rec. Bot. Surv. Ind. (Fl. Khandala 3rd ed.) 16(1): 208. 1967. *Justicia dentata* Klein ex Link, Jahrb. 1(3): 48. 1820. *Ecbolium linnaeanum* Kurz var. *dentata* (Klein ex Link) Clarke in Hook.f., Fl. Brit. India 4: 545. 1885; Prain, Beng. Pl. 2: 816. 1903 (Rep. ed. 2: 609. 1963) & in Rec. Bot. Surv. Ind. 3: 288. 1905; Haines, Bot. Bihar & Orissa 2: 728. 1961 (Rep. ed.); Santapau in Bot. Mem. Univ. Bombay 2: 82. 1951.

Erect shrubs; stems square; nodes swollen. Leaves glabrous, ovate or ovate-lanceolate, acuminate at both ends; petioles 3-4 cm long. Spikes 6 cm long; bract foliaceous, sparsely pubescent beneath, ovate, caudate, dentate, midrib prominent, up to 2.5 × 0.8 cm; bracteoles 5-6 mm long, pubescent, divided up to base, acute, linear-lanceolate. Corolla with slender tube, up to 2.8 cm long. Capsule up to 2.5 mm long, puberulous, pointed at apex. Seeds broadly ovoid, compressed, up to 6 mm diameter, base notched.

Fl. & Fr. : Dec.-Apr.

Distrib. : Major parts of India, Sri Lanka, Malaysia, Arabia, Ethiopia & Malagasy.

Specimens examined : Betla, 53.

Notes : Common in waste lands, hedges.

Common name : Beng. & Hindi : *Udajati.*

Uses : Roots used in jaundice.

5. ERANTHEMUM L. emend. Radlk.

Eranthemum purpurascens Nees in Wall., Pl. As. Rar. 3: 106. 1832; Babu, Herb. Fl. Dehra Dun 383. 1977; Mukherjee in Fl. Pach & Bori Res. 227. 1984. *Daedalacanthus purpurascens* (Nees) T. Anders. in J. Linn. Soc. Bot. 9: 488. 1867; Clarke in Hook.f., Fl. Brit. India 4: 420. 1884; Haines, Bot. Bihar & Orissa 2: 713. 1961 (Rep. ed.).

Erect-ascending, perennial herbs, with woody base and 4-angled, minutely pubescent stems. Leaves ovate-elliptic, acuminate at apex, base decurrent on petiole, 15-20 × 8.5-11 cm, glabrous or some what pubescent beneath, closely lanceolate. Flowers in dense solitary, 5-8 cm long spikes; bracts glandular-pubescent, ovate-lanceolate, acuminate, up to 20 × 12 mm; nerves strong, dark-green, connected with fine reticulation, margin ciliate; bracteoles smaller, lanceolate. Calyx lobes lanceolate, acute, minutely pubescent. Corolla bluish-purple or lilac, up to 3.5 cm long, hairy outside, lobes obovate. Stamens sightly exserted. Style hairy. Capsules glabrous.

Fl. & Fr. : Dec.-Apr.

Distrib. : Throughout India.

Specimens examined : Barwadih, 377.

Notes : Common in the valleys and open forests.

Common name : Hindi : *Gulsham.*

6. HEMIADELPHIS Nees

Hemiadelphis polysperma (Heyne ex Roth) Nees in Wallich, Pl. Asiat. Rar. 3: 75. 1832; Guha Bakshi in Fl. Murshid, 238. 1984. *Ruellia polysperma* Heyne ex Roth., Nov. Sp. Ind. Or. 305. 1821. *Justicia polysperma* Roxb., Fl. Ind. 1: 119. 1832 (ed. Carey). *Hygrophila polysperma* (Roxb.) T. Anderson in J. Linn. Soc. 9: 456. 1867; Clarke in Hook.f., Fl. Brit. India 4: 406. 1884; Haines, Bot. Bihar & Orissa 2: 702. 1961 (Rep. ed.).

Erect, prostrate or decumbent-ascending, slender herbs. Leaves subsessile, elliptic-lanceolate to elliptic-ovate, acute, obtuse at apex, up to 2.8 × 1.2 cm, upper ones passing into bracts. Flowers in terminal, dense, spike; bracts leafy, ovate-lanceolate, hairy; bracteoles linear-lanceolate, up to 4 × 0.5 mm, margin ciliate. Capsules hairy at the top.

Fl. & Fr. : Oct.-Mar.

Distrib. : India, Sri Lanka, Singapore.

Specimens examined : Betla, 30. Hyperhydate or Vittate.

Notes : Common near the ditches, wet lands, all over the district.

7. HEMIGRAPHIS Nees.

Hemigraphis latebrosa (Heyne ex Roth) Nees. var. **heyneana** Bremek. in Mat. Mon. Strob. 139. 1944. *Hemigraphis latebrosa* (Heyne ex Roth) Nees. in DC., Prodr. 11: 723. 1847; Clarke in Hook.f., Fl. Brit. India 4: 423. 1884; Haines, Bot. Bihar & Orissa 2: 705. 1961 (Rep. ed.); *Ruellia latebrosa* Heyne ex Roth., Nov. Pl. Sp. 307. 1821.

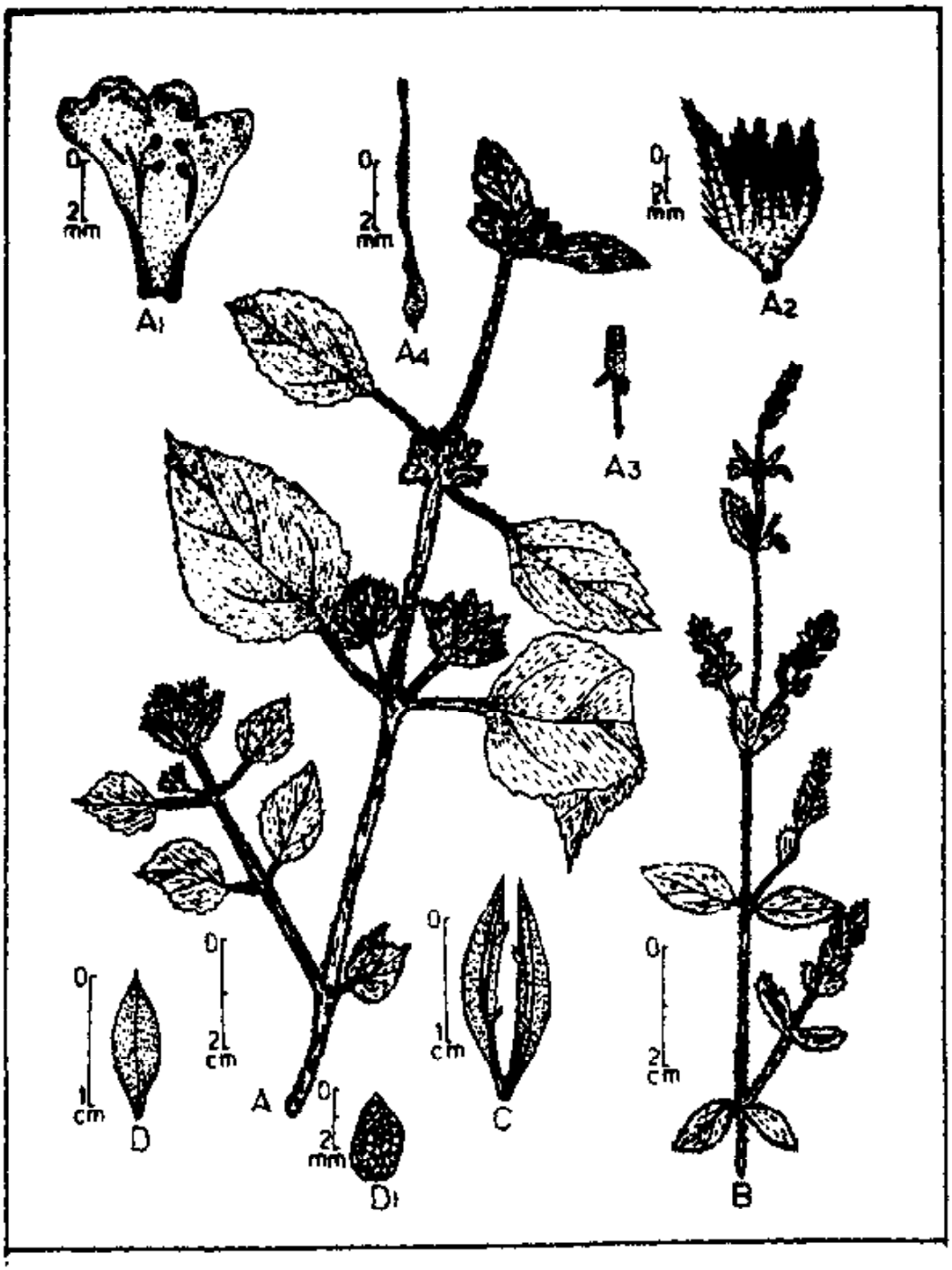


Fig. 29. Acanthaceae. (A-A_4): *Hemigraphis latebrosa* (Heyne ex Roth.) Nees var. *heyneana* Bremek.: A. Habit; A_1. Corolla split open; A_2. Calyx split open; A_3. Stamen, A_4. Gynoecium; B: *Hemiadelphis polysperma* (Heyne ex Roth) Nees: Habit; C: *Barleria cristata* L., Dehisced fruit; (D-D_1): *Andrographis echioides* Nees: D. Fruit; D_1. Seed.

Procumbent, soft-hairy herbs; stems with longitudinal striations. Leaves opposite, ovate, broadly-acuminate or acute at apex, cordate at base, serrate, pubescent on both sides, up to 4.5 × 2.6 cm; petioles 1.5-2 cm long, hairy. Flowers in axillary or terminal condensed heads; bracts foliaceous, hairy, lanceolate, hairy. Corolla blue. Staminal filaments hairy. Capsule fusiform, 4-angled, pubescent. Seeds orbicular, 1 mm in diameter flat.

Fl. & Fr. : Nov.-Mar.

Distrib. : Throughout India, pantropical.

Specimens examined : Netarhat, 82.

Notes : Common in the forests road sides.

8. HYGROPHILA R.Br.

1a. Plants armed with axillary spines ... 2. *H. schulli*

1b. Plants unarmed ... 1. *H. phlomoides*

1. Hygrophila phlomoides Nees var. **roxburghii** Clarke in Hook.f., Fl. Brit. India 4: 408. 1884; Prain, in Beng. Pl. 2: 598. 1963 (Rep. ed.).

Branched or decumbent herbs, stems square, sparsely hairy. Leaves elliptic, petioled, up to 15 × 3 mm, entire to serrate, acute at apex, slightly pubescent; petioles 4-5 mm long. Flowers in axillary whorls; bracteoles small, linear, 2-3 mm long. Calyx 13 mm long, divided half way down; teeth linear-lanceolate, hairy. Capsules not exserted from calyx tube, 4-seeded. Seeds whitish woolly, 2 × 1.5 mm, orbicular.

Fl. & Fr. : Dec.-Apr.

Distrib. : Throughout India.

Specimens examined : Upper Ghagri (Netarhat), 83. Helophyte.

Notes : Common in marshy lands and near canal.

2. Hygrophila schulli (Buch.-Ham.) M.R. et. S.M. Almeida, J. Bombay Nat. Hist. Soc. 83 (suppl.): 221-222. 1987. *Bahel schulli* Buch.-Ham., Trans. Linn. Soc. London, 14: 289. 1824. *Hygrophila auriculata* (Schumach.) Heyne in Kew Bull. 16(2): 172. 1962; Guha Bakshi, Fl. Murshidabad 2.39.1984. *Barleria auriculata* Schumach. in Schumach., Thonn. Beskr. Guin. Pl. 285. 1827. *B. longifolia* L., Cent. Pl. 2: 22. 1756 & Amoen. Acad. 4: 320. 1759 (non *Hygrophila longifolia* Nees 1847). *H. spinosa* T. Anders. in Thwaites, Enum. Pl. Zeyl. 225. 1860 & J. Linn. Soc. 7: 22. 1863; Clarke in Hook.f., Fl. Brit. India 4: 408. 1884; Prain, Beng. Pl. 2: 802. 1903 (Rep. ed. 2: 598. 1963) & in Rec. Bot. Surv. India 3: 256. 1905. *Asteracantha longifolia* (L.) Nees in Wallich, Pl. As. Rar. 3: 90.1832; Santapau in Bot. Mem. Univ. Bombay 2: 7. 1951; Haines, Bot. Bihar & Orissa 2: 704. 1961 (Rep. ed.).

Erect to suberect, procumbent, pubescent herbs; stems 4-gonous, 90-120 cm long. Leaves entire or serrated, sessile, linear-lanceolate, acute, narrowed down at base, up to 8 × 1 cm long. Flowers pink, in axillary spikes; bracts nearly 3 cm long, hispid, foliaceous, oblong-lanceolate; bracteoles near 2 cm long, linear-lanceolate. Capsules 7-10 m long, 4-8 seeded, apex pointed.

Fl. & Fr. : Jan.-Mar.

Distrib. : India, Sri Lanka.

Specimens examined : Daltonganj, 10. Tenagophyte or Helophyte.

Notes : Growing in marshy places, common in waste lands.

Common name : Beng. : *Kanta Kalika, Kulekhara.*

Remarks : *Asteracantha* Nees (1832) is congeneric with *Hygrophila* R.Br. (1810).

9. Justicia L.

Justicia adhatoda L., Sp. Pl. 15. 1753; Stearn in J. Arn. Arb. 52: 640. 1971. *Adhatoda zeylanica* Medic., Hist. & Commentat. Acad. Elect. Sci. Theod. Palat. 6: 393. 1790; Ramamoorthy in Saldanha & Nicolson, Fl. Hasan 540. 1976. *Adhatoda vasica* Nees in Wall., Pl. As. Rar., 3:

103. 1832; Clarke in Hook.f., Fl. Brit. India 4: 540. 1885; Prain, Beng. Pl. 2: 819. 1903 (Rep. ed. 2: 611. 1963) & in Rec. Bot. Surv. India 3: 258. 1905, Haines, Bot. Bihar & Orissa 2: 728. 1961 (Rep. ed.); Santapau in Bot. Mem. Univ. Bombay, 2: 92. 1951.

Shrubs, 1-2.5 m high; young parts tomentose, by age glabrate; nodes swollen. Leaves elliptic to elliptic-lanceolate, acuminate at apex, acute at base, secondary nerves 10-15 pairs; petioles up to 2.3 cm long. Bracts up to 2.5 × 1.5 cm, broadly elliptic, acsute at apex; bracteole up to 1.2 × 0.4 cm, linear-lanceolate, acuminate at apex. Fruits up to 3.5 cm long, pubescent with 4 flat seeds, supported on retinacula. Seeds elliptic, 7 × 6 mm, surface rough.

Fl. & Fr. : Feb.-Apr.

Distrib. : India, Sri Lanka, South East Asia.

Specimens examined : Upper Ghagri (Netarhat), 74.

Notes : Common as a hedge plant.

Common name : Beng. : *Basak*; Hindi : *Arusha*.

Uses : Leaf juice used in bronchial troubles, diarrhoea and dysentery. Also used as hedge plants.

10. LEPIDAGATHIS Willd.

1a. Flowers in globular heads, arising from the base of the stem; capsule 2-seeded :

- 2a. Leaves with prominent midrib and with 4-7 secondary nerves; sepals spinescent ... 1. *L. hamiltoniana*
- 2b. Leaves 3-nerved; sepals not spinescent ... 4. *L. trinervis*

1b. Flowers in axillary, solitary or clustered spike; capsule 4-seeded :

- 3a. Leaves more than 6 cm long; one sepal broader than the other 4 ... 2. *L. incurva*
- 3b. Leaves less than 6 cm long; all sepals equal ... 3. *L. rigida*

1. Lepidagathis hamiltoniana Wall., Pl. As. Rar. 3: 96. 1832; Clarke in Hook.f., Fl. Brit. India 4: 516. 1885; Haines, Bot. Bihar & Orissa 2: 720. 1961 (Rep. ed.).

Perennial herbs, with elongated, 4-angled, leafy stems. Leaves up to 9 × 0.9 cm, linear or narrowly-oblong, acute at apex, sessile, margin minutely scabrid-ciliate, midrib very strong, with 4-7 oblique secondary nerves. Spikes in globular heads, arising from the base of the stem; bracts up to 1.2 cm long, lanceolate, acuminate, spinescent, margin ciliate with long spreading white hairs. Calyx segments membranous, tough, lanceolate, acuminate, spinescent. Corolla strigose outside with white hairs, spotted with brown inside, up to 1.2 cm long, throat hairy. Capsule 2-seeded, conical, up to 7 mm long, glabrous. Seeds ovate, up to 3.5 × 2 mm, with white margin.

Fl. & Fr. : Dec.-Mar.

Distrib. : Throughout India.

Specimens examined : Bisrampur, 566.

Notes : Common on dry hill slopes, and also in forest undergrowth.

Uses : Used in skin troubles.

2. L. incurva D.Don., Prodr. 119. 1825; Yamazaki in Hara, Fl. East. Himal. 303. 1965. *L. hyalina* Nees. in Wall., Pl. As. Rar. 3: 95. 1832; Clarke in Hook.f., Fl. Brit. India 4: 521. 1885; Haines, Bot. Bihar & Orissa 2: 721. 1961 (Rep. ed.); Prain, Beng. Pl. 2: 608. 1963 (Rep. ed.).

Much branched herbs, up to 60 cm high; stems suberect, slightly hairy, reddish in colour, with 4 raised green line. Leaves long petioled, up to 16 × 6 cm, variable in shape, oblong or ovate, strongly nerved, minutely viscid-pubescent on both surfaces, acute at apex and base, margin entire or often undulate. Flowers in dense spike, 3-10 together, fascicled on short axillary peduncle and forming a dense terminal head. Spike oblong, up to 3 cm long; dorsal bract of the spike barren, lanceolate, acuminate, up to 10 × 2.5 mm, with 2-marginal nerve and one central nerve, ciliate, glandular hairy. Calyx sub 5-partite; segments linear-lanceolate, outer sepal broader,

strongly 3-nerved, margin long-ciliate and glandular. Capsules oblong, up to 5 mm long, 4-seeded.

Fl. & Fr. : Dec.-Apr.

Distrib. : India, Myanmar & South China.

Specimens examined : Barwadih, 379.

Notes : Very frequent on damp rocks and near drains.

Uses : Leaves used for cough.

3. **Lepidagathis rigida** Dalz. in Hook., Kew Journ. 2: 341. 1850; T. Anders. in Journ. Linn. Soc. 9: 495. 1867; Clarke in Hook.f., Fl. Brit. India 4: 518. 1885.

Soft hairy herbs, up to 18 cm high; stems 4-angled, reddish brown. Leaves opposite, alternate at base, unequal, linear-lanceolate, acute at apex, glandular pubescent on both surfaces, up to 4.2 × 1.5 cm. Spike 1.5-2 cm long, appearing as in terminal clusters on short lateral branches; bracats 9 ×2.5 mm, oblong-lanceolate, acuminate at apex, softly hairy; bracteoles lanceolate, hairy. Calyx 5-partite, hairy. Corolla tube hairy within. Capsule 4 mm long, 4-seeded. Seed orbicular, 1.5 mm in diameter, softly hairy, dark brown.

Fl. & Fr. : Dec.-Mar.

Distrib. : Throughout India.

Specimens examined : Upper Ghagri (Netarhat), 84.

Notes : Common in forest undergrowth.

4. **L. trinervis** Nees in Wall., Pl. As. Rar. 3: 96. 1832; Clarke in Hook.f., Fl. Brit. India 4: 517. 1885; Haines, Bot. Bihar & Orissa 2: 720. 1961 (Rep. ed.).

Diffuse, perennial herbs, 10-25 cm high, much branched, woody below; stems slender, quadrangular. Leaves linear to linear-lanceolate, sessile, up

to 3 × 0.4 cm, lanceolate above, 3-nerved, apex acute apiculate, margin scabrid. Flowers in axillary, ovoid spikes, up to 2 cm long, often 2 or more spikes closely packed together forming a single head; bracts up to 9 × 4 mm, ovate or obovate, tiped with up to 7 mm long recurved spines, ciliate. Calyx membranous, up to 9 mm long, glabrous without, hairy within, segments lanceolate. Corolla up to 1 cm long, tube up to 2 mm long, white, with brown or purple spot, not hairy. Stamens-4. Capsules up to 7 mm long, ovoid-lanceolate, 2-seeded.

Fl. & Fr. : Nov.-Feb.

Distrib. : Throughout India.

Specimens examined : Muhammadganj, 995.

Notes : Common along railway tracks.

11. NELSONIA R.Brown

Nelsonia canescens (Lam.) Spreng. in Linn. Syst. Veg. ed. 16. 1: 42. 1824; Bremecamp in Reinwardtia 3(2): 248. 1955 et. in Dansk. Bot. Arkiv. 20(1): 61. 1961; Babu, Herb. Fl. Dehra Dun 387. 1977. *Justicia canescens* Lam., Tab. Encycl. Method. Bot. 1: 40. 1791. *Nelsonia campestris* R.Br., Prodr. Fl. Nov. Holl. 1: 481. 1810; Clarke in Hook.f., Fl. Brit. India 4: 394. 1884; Prain, Beng. Pl. 2: 797. 1903 (Rep. ed. 2: 594. 1963); Haines, Bot. Bihar & Orissa 2: 700. 1961 (Rep. ed.).

Trailing or diffuse herbs. Lower leaves larger, elliptic-oblong, obtuse to rounded at apex, entire, alternate at base, up to 16 × 7 cm; petioles 4-5 cm long; upper leaves smaller subsessile, up to 2-4 × 1-2.5 cm. Flowers in terminal spikes, densely villous; bracts glandular-villous, 5-7 cm long, ovate-acute at apex and obtuse at base, silky pubescent. Calyx 4-lobed, unequal, densely pubescent, shortly connate at base, largest 2 bifid. Corolla purple blue, throat villous. Stamens-2; anthers diverging. Capsule up to 5 m long, ovoid, glabrous.

Fl. & Fr. : Jan.-May.

Distrib. : Cosmopolitan.

Specimens examined : Netarhat 175.

Notes : Common in mashy, shady lands and near streams.

Common name : Beng. : *Paramul.*

12. PERISTROPHE Nees

Peristrophe bicalyculata (Retz.) Nees in Wallich, Pl. As. Rar. 3: 113. 1832; Clarke in Hook.f., Fl. Brit. India 4: 554. 1885; Prain, Beng. Pl. 2: 820. 1903 (Rep. ed. 2: 612. 1963) & in Rec. Bot. Surv. Ind. 3: 259. 1905; Haines, Bot. Bihar & Orissa 2: 730. 1961 (Rep. ed.); Santapau in Bot. Mem. Univ. Bombay 2: 93. 1931. *Dianthera bicalyculata* Retz. in Acta Holm. 297. t. 9. 1775.

Much branched herbs, up to 70 cm high, erect to suberect, hispid; stems and branches 4-angular. Leaves up to 5 × 3 cm, ovate, acuminate, rounded at base; petioles 5-12 mm long. Flower 2-5 in cymose panicles; pedicels 1-3 cm long; bracteoles small, linear, shorter than bracats, one involucral bract larger, 1 cm long, linear-spathulate, other 4-5 mm long, linear-lanceolate. Calyx small, 6 mm long, 5-partite, hairy. Corolla hairy without. Stamens-2; anthers bilobed; filaments hairy. Capsule 8-10 mm long, ellipsoid, stalked, with narrow base, and short solid stipes, beaked, glandular-peberulous.

Fl. & Fr. : Dec.-Apr.

Distrib. : India, Sri Lanka, Tropical Africa.

Specimens examined : Betla, 48.

Notes : Common in the hedges & jungle.

Common name : Beng. : *Nasabhanger*; Santal : *Khodebaha.*

Uses : Leaf juice used in bronchial troubles, diarrhoea and dysentery. Also used as hedge plants.

13. ROSTELLULARIA Reichb.

Rostellularia diffusa (Willd.) Nees in DC., Prodr. 11: 372. 1847; Mukherjee, Fl. Panch. Bori Res. 235. 1984. *Justicia diffusa* Willd., Sp.

Pl. 1: 87. 1789; Clarke in Hook.f., Fl. Brit. India 4; 538. 1885; Haines, Bot. Bihar & Orissa 2: 726. 1961 (Rep. ed.).

Slender herbs, with more or less 4-angled and grooved stems, up to 15 cm high, pubescent. Leaves usually thin, ovate, obtuse or acute, up to 20 × 11 mm, often small, hairy on both sides; petioles up to 4 mm long. Flowers small, pinkish or white in slender spikes; spike up to 40 × 4 mm; bracts lanceolate, acute, up to 2 × 1 mm, shorter than the sepals; bracteoles linear-lanceolate, 2 mm long, both hairy. Sepals-4, linear, membranous, with green midrib, hairy, up to 2.5 mm long. Corolla up to 4.5 mm long, white with pink spot, hairy. Capsules hairy, oblong, up to 3 mm long.

Fl. & Fr. : July-January.

Distrib. : India, Sri Lanka, Myanmar & Thailand.

Specimens examined : Simultarh village (Daltonganj), 340.

Notes : Common in waste lands and forest undergrowth among the grasses.

Remarks : According to Bennet (1987), treating *Justicia* L. (1753) in broader sense including *Rostellularia* Reichb. (1837) appears to be appropriate taxonomic treatment for this group.

14. RUNGIA Nees.

1a. Barren bracts uniform; upper lip of the corolla emarginate ... 2. *R. repens*

1b. Barren bracts not uniform; upper lip of the corolla acute ... 1. *R. pectinata*

1. Rungia pectinata (L.) Nees in DC., Prodr. 11: 470. 1847; Santapau in Bot. Mem. Univ. Bombay 2: 77. 1951. *Justicia pectinata* L. in Torner, Cent. 11. Pl. 3. 1756. *Rungia parviflora* var. *pectinata* (L.) Clarke in Hook.f., Fl. Brit. India 4: 550. 1885; Prain, Bengal Pl. 2: 812. 1903 (Rep. ed. 2: 613. 1963) & in Rec. Bot. Surv. India 3: 259. 1905; Haines, Bot. Bihar & Orissa 2: 723. 1961 (Rep. ed.).

Prostrate to suberect herbs, 15-30 cm high, puberulous. Leaves opposite, up to 6 × 1.5 cm, variable in size, basal leaves small, gradually larger at apex, narrowly-lanceolate to narrowly-elliptic, narrowed at both

ends, puberulous; petioles up to 7 mm long, or indistinct. Flowers axillary, solitary and rarely in terminal spikes, up to 1.5 cm long, with 2 rows of barren imbricate, ovate to lanceolate bracts and 2 rows of suborbicular or obovate flowering bracts, 2-6 mm long and 3 mm in diam., (including the wide scarious margins), pubescent. Capsule up to 3 mm long, ovoid, acute. Seeds dull brown, ovoid.

Fl. & Fr. : Round the year.

Distrib. : India and Sri Lanka.

Specimens examined : Daltonganj, 3.

Notes : Common in grasslands and pasture. Highly variale in size, shape of the leaves and in habit.

2. Rungia repens (L.) Nees in Wall., Pl. As. Rar. 3: 110. 1832; Clarke in Hook.f., Fl. Brit. India 4: 549. 1885; Haines, Bot. Bihar & Orissa 2: 724. 1961 (Rep. ed.); Ramam. in Sald. & Nicol. Fl. Hassan 559. 1976. *Justicia repens* L., Sp. Pl. 15. 1753.

Erect or decumbent herbs, up to 30 cm high. Leaves elliptic-lanceolate, acute at apex, up to 5 × 2.3 cm; petioles up to 1 cm long. Flowers blue, in axillary or terminal spikes, up to 2 cm long; bracts orbicular, up to 4 × 2.5 mm, margin hyaline, apiculate at apex. Calyx lobes-5, linear. Capsule ovoid-oblong, acute, compressed, pubescent. Seeds small, brown, ovoid, 1 mm in diam.

Fl. & Fr. : Sept.-Dec.

Distrib. : Throughout India & Sri Lanka.

Specimens examined : Barwadih, 382.

Notes : Common in the undergrowth of forest & on hill slopes.

Common name : Hindi : *Kharmor.*

Uses : Herbs dried and used in fever.

15. STAUROGYNE Wall.

Staurogyne glutinosa (Wall. ex Clarke) O. Kuntze in Rev. Gen. Pl. 1: 499. 1891; Haines, Bot. Bihar & Orissa 2: 700. 1961 (Rep. ed.). *Ebermaiera glutinosa* Wall. ex Clarke in Hook.f., Fl. Brit. India 4: 396. 1884; Prain, Beng. Pl. 2: 798. 1903 (Rep. ed. 2: 595. 1963) & in Rec. Bot. Surv. India 3: 256. 1905.

Diffuse, trailing pubescent herbs, rooting at lower nodes. Leaves opposite, elliptic, above oblong, entire to serrate, obtuse at apex, tapering at base, 1-3 × 0.4-1 cm, subglabrous; petioles up to 3 mm long. Flowers axillary, solitary or rarely upper in short spikes; bracts-2, up to 4 mm long, oblong; pedicels up to 1 mm long. Calyx 4-5 mm long, partite almost up to the base, lobes linear, subobtuse. Corolla up to 1 cm long, campanulate, shallowly lobed, pubescent without, with a ring of red hairs at base of stamens. Staminal filament tip with reddish-brown hairs; anther lobes divaricate. Ovary oblong, glabrous; style glabrous, tip bifid, recurved.

Fl. & Fr. : June-Aug.

Distrib. : Throughout India.

Specimens examined : Kumendi, 727.

Notes : Infrequent in moist areas and along the Barapani nala (Antikheta village).

16. THUNBERGIA Retz.

Thunbergia erecta T. Anders. in Journ. Linn. Soc. 7: 18. 1864; Haines, Botany of Bihar & Orissa 2: 699. 1961 (Rep. ed.); Bailey in Man. Cult. Pl. 919. 1963 (Rep. ed.).

Erect, bushy shrubs, up to 1 m high. Leaves up to 5 × 1.8 cm, ovate-lanceolate, acuminate at apex, slightly apiculate, margin entire, glabrous. Flowers axillary, solitary; bracteoles large, enclosing flower buds, broadly ovate, up to 2.8 × 1 cm. Calyx very short, with 10 small teeth. Corolla up to 5 cm long, purple blue, with whitish tube.

Fl. : July-August.

Distrib. : Native of tropical Africa, introduced in India and other countries.

Specimens examined : Netarhat, 793.

Notes : Commonly cultivated in gardens and in front of forest rest houses. Exotic.

VERBENACEAE

1a. Flowers in spikes, opening centripetally :

2a. Flowers sessile :

3a. Perfect stamens-2 :

4a. Shrubs; branches armed with recurved prickle; sepals lobed ... 5. LANTANA

4b. Herbs; branches unarmed; sepals truncate ... 9. STACHYTERPHETA

3b. Perfect stamens-4

5a. Flowering bracts 4-ranked ... 6. LIPPIA

5b. Flowering bracts not 4-ranked :

6a. Erect herbs; leaves ovate, pinnatifid; nutlets 3-ribbed ... 11. VERBENA

6b. Creeping herbs; leaves spathulate, not pinnatifid; nutlets not ribbed ... 7. PHYLA

2b. Flowers pedicelled ... 3. DURANTA

1b. Flowers in cymes, opening centrifugally :

7a. Trees :

8a. Leaves more than 40 cm long; corolla regular ...10. TECTONA

8b. Leaves less than 40 cm long; corolla irregular ... 4. GMELINA

7b. Shrubs :

9a. Sepals regular; stamens isomerous 1. CALLICARPA

9b. Sepals irregular; stamens anisomerous :

10a. Ovary 4-locular :

11a. Leaves simple; corolla throat hairy within ... 8. PYGMAEOPREMNA

11b. Leaves digitate; corolla throat glabrous within ... 12. VITEX

10b. Ovary unilocular ... 2. CLERODENDRUM

1. CALLICARPA L.

Callicarpa candicans (Burm.f.) Hochr. in Candollea 5: 190. 1934; Meeuse in Blumea 5: 71. 1942; Moldenke in Phytologia Mem. 2: 258. 1980. *Urtica candicans* Burm.f., Fl. Ind. 197. 1768. *Callicarpa cana* L., Mant. Pl. 2: 198. 1771; Clarke in Hook.f., Fl. Brit. India 4: 568. 1885; Prain, Beng. Pl. 2: 828. 1903 (Rep. ed. 618. 1963) & in Rec. Bot. Surv. India 3: 260. 1905.

Shrubs; stems stellate-tomentose, 4-angled. Leaves up to 14 × 4.5 cm, elliptic-lanceolate, shortly acuminate at apex, cuneate at base, glabrous above, stellate-tomentose beneath, crenate-serrate; petioles up to 2 cm long, densely tomentose. Cymes 2-3 cm in diam., peduncles up to 8 mm long. Calyx in fruit stellate-tomentose. Fruits deep purple.

Fl. & Fr. : In rainy season. Exotic.

Distrib. : India, Philippines and N. Australia, Native of Malaya Peninsula.

Specimens examined : Betla, 483.

Notes : Infrequent in the forests & waste lands.

Common name : Beng. : *Arusha.*

2. CLERODENDRUM L.

1a. Leaves linear; corolla more than 8 cm long ... 1. *C. indicum*

1b. Leaves not linear; corolla less than 8 cm long :

2a. Panicles axillary; calyx lobes ovate-acuminate ... 2. *C. phlomidis*

2b. Panicles terminal; calyx lobes ovate-lanceolate ... 3. *C. viscosum*

1. **Clerodendrum indicum** (L.) Kuntze, Rev. Gen. Pl. 2: 506. 1891; Moldenke in Lilloa 4: 329. 1939; H.N. Moldenke in Dassanayake, Rev. Handb. Fl. Ceylon 4: 426. 1983. *Siphonanthus indica* L., Sp. Pl. 109. 1753. *Clerodendrum siphonanthus* R.Br. in Ait. f., Hort. Kew. 4: 65. 1812; Clarke in Hook.f., Fl. Brit. India 4: 595. 1885; Haines, Bot. Bihar & Orissa 2: 757. 1961 (Rep. ed.).

Glabrous, less branched shrubs 1-2.5 m high. Leaves 3-4 nate, up to 35 × 3 cm, subsessile, linear or narrowly lanceolate, acuminate at apex, wavy at margin, nerves 6-10 pairs, arched into an intramarginal nerve, prominent beneath. Flowers in terminal, large, lax cymose panicles; pedicels 1-3 cm long; bracts up to 1 cm long, linear or linear-lanceolate. Calyx 1-1.3 cm long, divided 3/4th way down. Corolla whitish; tube 7-10 cm long, slender. Drupes blue, seated on the reddish accrescent calyx.

Fl. & Fr. : June-Nov.

Distrib. : Throughout India, extensively cultivated in both hemispheres.

Specimens examined : Netarhat, 764.

Notes : Common in open lands near water courses.

Common name : Beng. : *Bamanhati*; Hindi : *Bharangi*.

Uses : Roots used in asthma, cough and scrofulous affections. Leaves vermifuge. Stems said to be used in jaundice.

1. **C. phlomidis** L.f., Suppl. 292. 1781; Clarke in Hook.f., Fl. Brit. India 4: 690. 1885 (as *phlomoides*); Haines, Bot. Bihar & Orissa 2: 756. 1961 (Rep. ed.).

Tall pubescent shrub with close, short-hoary cinereous branchlets. Leaves ovate or subrhomboid, up to 5.5 × 4.5 cm, obtuse or acute, coarsely crenate-dentate, glabrous above, puberulous beneath; petioles up to 4 cm long, pubescent. Flowers in dichotomous axillary cymes, forming a rounded terminal panicles; pedicels slender; bracts leaf like, obovate, acute. Calyx campanulate, divided about half way down, puberulous, lobes ovate, acutely acuminate. Corolla white, sparingly pubescent without, 1-2 cm long, lobes elliptic-obtuse. Fruits broadly obovoid, black when ripe, up to 7 mm long.

Fl. & Fr. : Sept.-Mar.

Distrib. : Throughout the drier parts of India, Sri Lanka and also in Baluchistan.

Specimens examined : Palamau Fort (Betla), 1109.

Notes : Infrequent in the forests.

Common name : Hindi : *Arni*; Santal : *Varni*.

3. Clerodendrum viscosum Vent., Jard. Malm. 1.25. t. 25. 1803; Sant. in Bull. Bot. Surv. India 3: 14. 1961; H.N. Moldenke & A. L. Moldenke in Dassanayake, Rev. Handb. Fl. Ceylon 4: 473. 1983. *Clerodendrum infortunatum* auct. mult. non. L., Clarke in Hook.f., Fl. Brit. India 4: 594. 1885; Haines, Bot. Bihar & Orissa 2: 756. 1961 (Rep. ed.).

Shrubs; branches 4-gonous, brownish-pubescent. Leaves ovate, acute or acuminate at apex, cordate at base, crenate-dentate at margin, tomentose beneath, 10-20 × 7-12 cm; petioles up to 7 cm long, pubescent. Flowers in terminal cymose panicles; peduncle and pedicels pubescent; bracts foliaceous, caducous. Calyx pubescent; segments ovate-lanceolate. Corolla white; segments obovate-oblong. Fruits up to 10 mm across, subglobose, with enlarged reddish calyx.

Fl. & Fr. : Dec.-May.

Distrib. : India, Sri Lanka, Malaya and other warmer parts of the World.

Specimens examined : Ghurki, 1146.

Notes : Common in waste lands, throughout the district.

Common name : Beng. : *Ghetu, Bhati*; Hindi : *Bhat*.

3. DURANTA L.

Duranta repens L., Sp. Pl. 637. 1753; Moldenke in Lilloa 4: 314. 1939; H.N. Moldenke & L.A. Moldenke in Dassanayake, Rev. Handb.

Fl. Ceylon 4: 278. 1983. *D. plumeri* Jacq., Select. Am. 186. t. 176. 1763; Prain, Beng. Pl. 2: 827. 1903 (Rep. ed. 2: 617. 1963) & in Rec. Bot. Surv. India 3: 260. 1905; Haines, Bot. Bihar & Orissa 2: 743. 1961 (Rep. ed.).

Small thorny shrubs, 1-3 m high, glabrous, young part pubescent, lenticellate; branches slightly angular, thorn axillary or supra-axillary, usually straight or slightly curved. Leaves obovate, elliptic or oblong, acute at apex, serrate or rarely entire, cuneate at base; petioles 0.5-1 cm long. Flowers blue or violet-blue, usually in terminal or axillary, sometime subpanicled drooping racemes; raceme about 12 cm long; pedicels 2-4 mm long, pubescent; bracts 1-2 mm long, subulate, lower one sometimes foliaceous. Drupes 5-6 mm in diam., yellow, 4-furrowed, enclosed within accrescent calyx.

Fl. & Fr. : March-July.

Distrib. : Native of Tropical America, pantropical.

Specimens examined : Netarhat, 126.

Notes : Throughout the year common all over in the district as hedge plant. Exotic.

4. GMELINA L.

Gmelina arborea Roxb., Pl. Cor. 3: 42, t. 246. 1815; Clarke in Hook.f., Fl. Brit. India 4: 581. 1885; Haines, Bot. Bihar & Orissa 2: 754. 1961 (Rep. ed.); Gandhi in Sald. & Nicol., Fl. Hassan 489. 1976.

Unarmed, large deciduous trees. Leaves ovate, acuminate at apex, subcordate, entire, chartaceous, grey-pubescent beneath, up to 14 × 12 cm; petioles slender. Flowers in terminal paniculate cymes. Calyx lobes-5, short. Corolla irregular, yellowish, tomentosely hairy without. Drupes globose.

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

Distrib. : India, Malaya, Philippines.

Specimens examined : Netarhat, 220.

Notes : Common in the forest.

Common name : Beng.: *Gamari*; Hindi : *Gambhar*; Santal & Kol. : *Kasmar*.

Uses : Costly wood used for various purposes, furniture, musical instruments etc.

5. LANTANA L.

Lantana camara L. var. **aculeata** (L.) Moldenke in Torreya 34: 9. 1934 et in Lilloa 4: 289. 1939; Santapau in Bull. Bot. Surv. India 3: 18. 1962; H.H. Moldenke and L.A. Moldenke in Dassanayake, Rev. Handb. Fl. Ceylon 4: 225. 1982. *L. aculeata* L., Sp. Pl. 627. 1753; Haines, For. Fl. Chhota Nagpur 488. 1910. *L. camara* auct. non L.; Clarke in Hook.f., Fl. Brit. India 4: 562. 1885; Prain, Bengal Pl. 2: 825. 1903 (Rep. ed. 2: 615. 1963) & in Rec. Bot. Surv. India 3: 259. 1905, Haines, Bot. Bihar & Orissa 2: 739. 1961 (Rep. ed.).

Erect shrubs, 1-2.5 m high; branches slightly hairy, with recurved prickles, 4-gonous. Leaves opposite, 3-8 × 1.8-4 cm, ovate, serrate, acute to acuminate, scabrid-pubescent, lateral veins 5-6 paris; petioles 1-1.5 cm long. Inflorescence subumbellate; peduncles 3-4 cm long; bracts 4-9 × 1 mm, pubescent, oblong-lanceolate, acute. Flower colour varies from white to purple. Corolla tube 1 cm long, hairy. Stamens-4, included. Stigma capitate. Drupe slightly triangular, 3-4 mm long, slightly hairy, black when ripe.

Fl. & Fr. : Throughout the year. Exotic.

Distrib. : Native of tropical America, now pantropical in distribution.

Specimens examined : Daltonganj, 1.

Notes : Common in the exposed fields, throughout the district, often seen in pure strands.

Common name : Hindi & Kol. : *Putus*.

Remarks : Meeuse (Blumea 5: 69. 1942) did not recognise this as a distinct taxon and completly merged it with *L. camara* L. Mathew (Fl.

Pl. Kurseong 81. 1981) follows Meeuse's treatment. However, all the Indian plants are with prickles. They may be few or many and strong. Therefore, Moldenke's treatment is better for this plant.

6. LIPPIA L.

Lippia alba (Mill.) N.E. Br. ex Britton & Wilson in Sc. Surv. Porto Rice & Virgin Islands 6: 141. 1925; Mold. in Plytol. Mem. 2: 263. 1980. *Lantana alba* Mill., Gard. Dict. ed. 8.8.1768. *Lippia geminata* Kunth in H.B.K., Nov. Gen. et Sp. 2: 214. 1817; Clarke in Hook.f., Fl. Brit. India 4: 563. 1885; Haines, Bot. Bihar & Orissa 2: 740. 1961 (Rep. ed.).

Shrubs; branches slender, erect or suberect, pubescent. Leaves opposite, ovate, elliptic-ovate, acute, crenate-serrate, up to 7 × 3.5 cm; petioles 0.5-1 cm long. Flowers in axillary heads, up to 8 mm across; bracts 3-5 mm long, pubescent, lower ones up to 3.5 mm broad, higher ones smaller and narrower. Fruit up to 2 mm in diameter globose.

Fl. & Fr. : Mar.-June. Exotic.

Distrib. : India, Tropical America and the warmer parts of the World, native of Tropical America.

Specimens examined : Ghurki, 1145.

Notes : Common near the canals.

7. PHYLA Lour.

Phyla nodiflora (L.) Greene in Pittonia 4: 46. 1899; Meeuse in Blumea 5: 69. 1942; Moldenke in Phytologia Mem. 2: 263. 1980. *Verbena nodiflora* L., Sp. Pl. 20. 1753. *Lippia nodiflora* (L.) A.Rich. in Michx., Fl. Bor. Amer. 2: 15. 1803; Clarke in Hook.f., Fl. Brit. India 4: 568. 1885; Haines, Bot. Bihar & Orissa 2: 740. 1961 (Rep. ed.).

Creeping, much branched, strigose, perennial herbs. Leaves up to 4 × 2 cm, subsessile, subfleshy, spathulate or obovate, sharply serrate at the upper half, entire towards base, apex acute, base cuneate. Heads 5-8 mm in diam., subglobose, many flowered, elongate in fruiting and up to 2 cm long; peduncles up to 7 cm long; bracts up to 2 mm long; minutely strigose,

ovate, acute. Calyx up to 1.5 mm long, deeply 2-lobed, glabrous. Corolla up to 3 mm long, light-pinkish, 2-lipped, upper lip erect, bifid, lower lip 3-lobed, middle lobe larger. Fruits up to 1-5 mm long, oblong, splitting into two 1-seeded pyrenes.

Fl. & Fr. : Throughout the year, especially Aug.-Oct.

Distrib. : Pantropical.

Specimens examined : Kechki, 899. Helophyte.

Notes : Common on river beds and moist places.

Uses : Leaves are eaten and the herbs used in bowel troubles.

8. PYGMAEOPREMNA Merr.

Pygmaeopremna herbacea (Roxb.) Moldenke in Phytologia 2: 54. 1941; Sant. & Wagh in Bull. Bot. Surv. India 5: 108. 1964; Moldenke in Dassanayake & Fossberg, Rev. Handb. Fl. Ceylon 4: 343. 1983. *Premna herbacea* Roxb., Fl. Ind. 3: 80. 1832; Clarke in Hook.f., Fl. Brit. India 4: 581. 1885; Haines, Bot. Bihar & Orissa 2: 753. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 400. 1977.

Small, almost stemless herbs, with underground runners which gives annual flowering shoots. Leaves up to 15 × 10 cm, obovate, coarsely serrate dentate, sessile, 4-6 in numbers, forming a rossete, closely appressed to the ground. Flowers in terminal trichotomous cymes which not exceeding the leaves. Calyx cup-shaped, subequally 5-toothed, up to 2 mm long, lobes ovate-obtuse. Corolla greenish-yellow, up to 5 mm long, throat hairy inside, obscurely 2-lipped, 4-lobed. Drupes globose, up to 7 mm diam., black when ripe.

Fl. & Fr. : May-July.

Distrib. : India, Bhutan.

Specimens examined : Netarhat, 755.

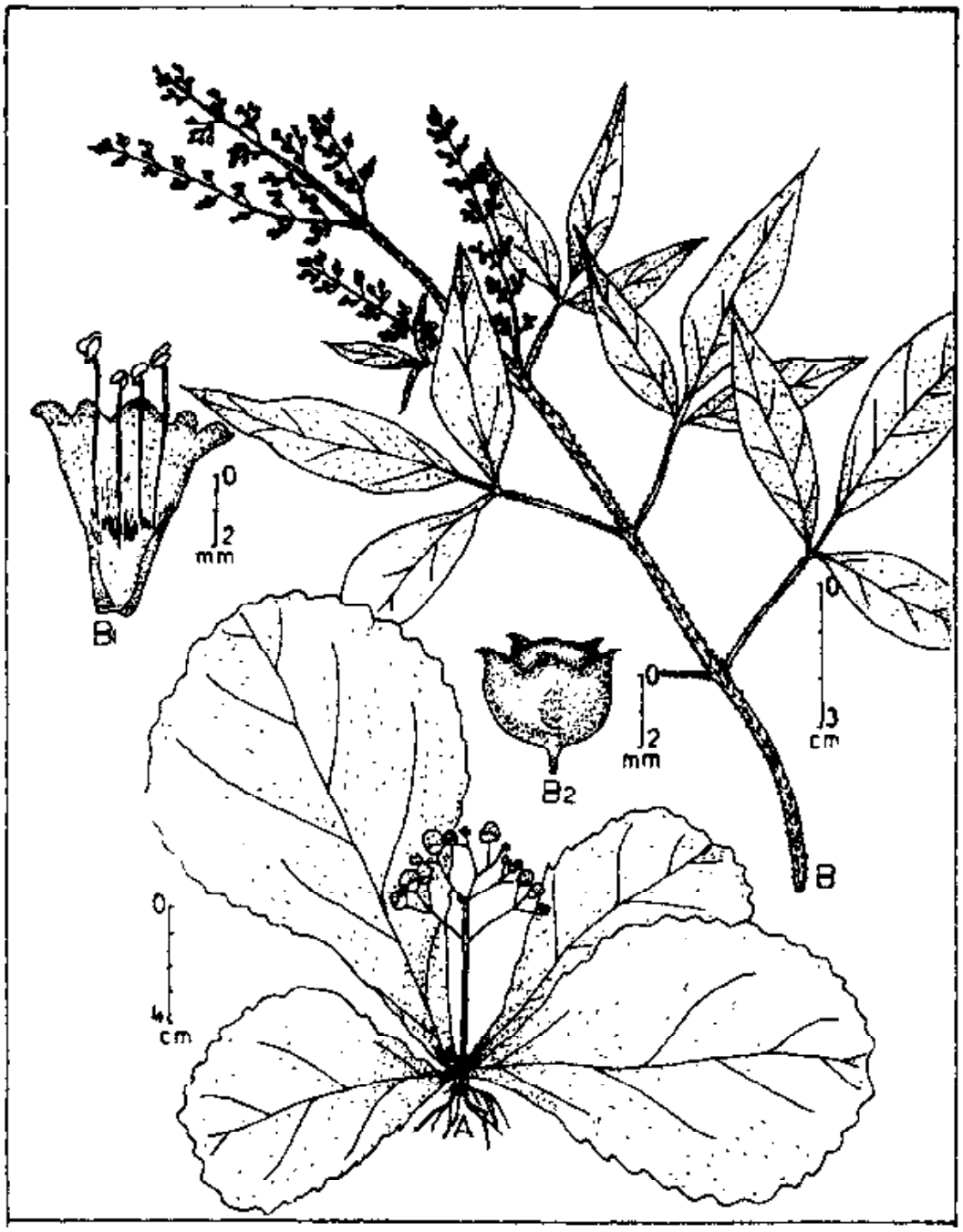


Fig. 30. Verbanaceae. A: *Pygmaeopremna herbacea* (Roxb.) Moldenke: Habit; (B-B_2): *Vitex negundo* L.: B. Flowering twig; B_1. Corolla split open; B_2. Fruit.

Notes : Common in Sal forest undergrowth and moist places.

Common name : Beng. : *Bhui-jam*; Hindi : *Bharangi*; Santal : *Phin jamur, Kada-met*; Kol : *Ote-chamba.*

Uses : Fresh rootstock and roots alongwith ginger are given in asthma, rheumatism and dropsy. Leaves used in fever, cough, rheumatism and their poultice applied to boils by the local people. Ripe fruits edible.

9. STACHYTARPHETA Vahl. *nom. cons.*

Stachytarpheta jamaicensis (L.) Vahl, Enum. 1: 206. 1804; Meeuse in Blumea 5: 70. 1942; Moldenke in Ann. Missouri Bot. Gard. (Fl. Panama) 60: 74. 1973; Bennet in Fl. Howrah Distt. 303. 1979. *Verbena jamaicensis* L., Sp. Pl. 19. 1753. *Stachytarpheta indica* auct. non Vahl. 1804; Clarke in Hook.f., Fl. Brit. India 4: 564. 1885; Haines, Botany of Bihar & Orissa 2: 741. 1961 (Rep. ed.).

Erect glabrous or slightly hairy herbs, up to 80 cm high. Leaves 4-9 × 2-4 cm, elliptic or elliptic-ovate, obtuse or acute at apex, tapering at base into a short petiole. Spikes 15-30 cm long; bracts up to 5 mm long, narrowly lanceolate. Calyx 5-6 mm long, membranous, tubular, shortly 4-toothed. Corolla bluish-white, tube up to 8 mm long, slightly curved, hairy inside. Staminal filaments hairy below. Fruits, 3-5 mm long, oblong, ribbed.

Fl. & Fr. : June-Aug. Exotic.

Distrib. : Native of Tropical America, now naturalised in all tropical countries.

Specimens examined : Netarhat, 756.

Notes : Common along road sides and in open fields.

Common name : Hindi : *Kariyartharani.*

Uses : Plants used for intestinal worms, veneral diseases, dropsy, ulcers and stomach ailments. Juice used to remove cataract. Infusion of bark used in diarrhoea and dysentery. Leaves also used in cardiac troubles.

10. TECTONA L.f.

Tectona grandis L.f., Suppl. 151. 1781; Clarke in Hook.f., Fl. Brit. India 4: 570. 1885; Haines, Bot. Bihar & Orissa 2: 744. 1961 (Rep. ed.); Gandhi in Sald. & Nicol., Fl. Hassan 403. 1976.

Large deciduous trees; branches 4-angular and densely clothed with brown tomentum. Leaves broadly elliptic or obovate, up to 50 × 25 cm, acute or acuminate at apex, tapering at base, distinctly toothed at margin, upper surface scabrid, lower surface tomentose. Flowers white, shortly pedicellate, in large terminal, tomentose, cymose panicles; pedicel up to 10 cm long, 4-angular, tomentose; bracts short, lanceolate. Calyx up to 4 mm in flower, large, inflated in fruit. Fruits subglobose, covered with hairs, somewhat 4-lobed.

Fl. & Fr. : July-Dec.

Distrib. : India, Myanmar, Sumatra and Java.

Specimens examined : Barwadih, 932.

Notes : Common in the forest, throughout the district.

Common name : Beng. : *Segun*; Hindi : *Sagwan*; Kol : *Rang*.

Uses : Valuable timber yielding plant and the wood is highly priced and used in costly furniture, plywood, and other carpentary purposes. Flowers used in bronchitis and urinary discharges.

11. VERBENA L.

Verbena officinalis L., Sp. Pl. 20. 1753; Clarke in Hook.f., Fl. Brit. India 4: 565. 1885; Haines, Bot. Bihar & Orissa 2: 742. 1961 (Rep. ed.).

Erect to decumbent herbs, up to 60 cm high; branches 4-angular, pubescent. Leaves ovate or oblong, coarsely toothed, lower pinnatifid, 6-9.5 × 1-3 cm, pubescent. Flowers in elongated spikes. Calyx small, up to 2 mm long; 4-segments oblong and other segment linear, united into a tube, with scarious margin. Corolla 2-lipped, bluish. Stamens-4, didynamous. Nutlets up to 1.5 mm long, oblong, 3-ribbed.

Fl. & Fr. : Feb.-Apr.

Distrib. : Temperate and subtropical region of the World.

Specimens examined : Netarhat, 125.

Notes : Common along the road sides and in the fields.

12. VITEX L.

Vitex negundo L., Sp. Pl. 638. 1753; Clarke in Hook.f., Fl. Brit. India 4: 583. 1885; Prain, Beng. Pl. 2: 833. 1903 (Rep. ed. 2: 622. 1963) & in Rec. Bot. Surv. India 3: 261. 1905; Haines, Bot. Bihar & Orissa 2: 746. 1961 (Rep. ed.); Gandhi in Sald. & Nicol., Fl. Hassan 494. 1976.

Large shrubs; bark grey; young branches 4-angled. Leaves 3-5 foliolate; leaflets oblong-lanceolate, up to 11 × 2.5 cm, glabrous, dark green above, tomentose beneath, acuminate or acute at apex, acute or obtuse at base, central leaflets larger, lateral nerves up to 15 pairs; petiolules tomentose, usually central one longest, up to 1.5 cm long, lateral one subsessile or shortly petioluled. Flowers in terminal or rarely axillary tomentose cymose panicles; bracts up to 2 mm long, caducous. Calyx hairy, up to 3 mm long. Corolla pale bluish-purple. Drupes up to 3 mm in diam., black when ripe, 4-seeded.

Fl. & Fr. : Throughout the year; specially in Jan.-July.

Distrib. : India to Japan, South ward through Malaya to Western Polynesia, Tropical E. Africa, Malagasy.

Specimens examined : Mandal, 422.

Notes : Common, near the streams, waste lands and in hedges.

Common name : Beng. : *Nishinda*; Hindi : *Sambhalu* or *shivari*; Santal : *Sindware*.

Uses : Plants are said to be used to promote growth of hairs. The root is tonic, febrifuge, expectorant and the leaves tonic and vermifuge. The dried leaves are used as insect repellent.

LAMIACEAE

1a. Stamens declinate :

2a. Verticils simple :

3a. Lower lip of the corolla flat :

4a. Stamens exserted; anthers 1-celled ... 11. OCIMUM

4b. Stamens included; anthers 2-celled ... 12. ORTHOSIPHON

3b. Lower lip of the corolla navicular ... 13. PLECTRANTHUS

2b. Verticils compound or flowers in heads :

5a. Lower lip of the corolla 3-fid ... 6. LAVENDULA

5b. Lower lip of the corolla 1-lobed :

6a. Corolla distinctly 2-labiate; stamens included :

7a. Flowers in terminal heads ... 1. ACROCEPHALUS

7b. Flowers in dense spike ... 2. ANISOCHILUS

6b. Corolla subbilabiate; stamens shortly exserted ... 5. HYPTIS

1b. Stamens straight :

8a. Perfect stamens-2 or 4; anthers 1-2 celled :

9a. Stamens didynamous ... 9. MICROMERIA

9b. Stamens-not didynamous :

10a. Stamens-2; anthers separated by long connectives ... 15. SALVIA

10b. Stamens-4; anthers not separated :

11a. Calyx 5-partite; segments feathery, longer than the tube ... 4. COLEBROOKEA

11b. Calyx-5-toothed; teeth neither feathery nor longer than the tube ... 14. POGOSTEMON

8b. Perfect stamens-4; anthers 2-celled :

12a. Calyx 15-nerved ... 10. NEPETA

12b. Calyx 5-10 nerved :

13a. Upper lip of the corolla hooded :

14a. Upper lip of the corolla shorter than the lower ... 8. LEUCAS

14b. Upper lip of the corolla longer than the lower ... 7. LEONOTIS

13b. Upper lip of the corolla flat, not hooded ... 3. ANISOMELES

1. ACROCEPHALUS Benth.

Acrocephalus hispidus (L.) Nicol. & Sivadasan in Taxon 29: 324. 1980. *Gomphrena hispida* L., Sp. Pl. ed. 2: 326. 1762. *Acrocephalus capitatus* (Roth.) Benth. in Bot. Reg. 15: t. 1300. 1830; Hook.f., Fl. Brit. India 4: 611. 1885; Haines, Bot. Bihar & Orissa 2: 768. 1961 (Rep. ed.). *Acrocephalus indicus* (Burm.f.) C. Kuntz., Rev. Gen. Pl. 511. 1891; Press in Enum. Fl. Pl. Nep. 3: 149. 1982.

Annual herbs, up to 45 cm tall, branched from base; stems 4-angled, glabrous or nearly so. Leaves ovate-lanceolate, up to 4 × 2.5 cm, glabrous, subacute at apex, tapering at base into long petiole, margin coarsely serrate. Flowers in dense subglobose heads; heads up to 2 × 1.2 cm; bracts broadly obovate, acuminate at apex, cuneate at base, up to 2.5 × 1.5 mm. Calxy up to 2.5 mm long, hairy, slightly elongating in fruit, upper lip oblong, rounded, lower lip shorter and 4-toothed. Corolla up to 3 mm long, pale-purple. Nutlets oblong-ellipsoid, dark-brown, up to 1 mm long, shining.

Fl. & Fr. : Oct.-Dec.

Distrib. : India, Myanmar, Bhutan, Tropical & Subtropical Asia & Africa.

Specimens examined : Barwadih, 396.

Notes : Common in the hilly areas and damp, shady places of the forest.

2. ANISOCHILUS Wall.

1. **Anisochilus carnosus** (L. f.) Wall., Pl. As. Rar. 2: 18. 1831; Hook f. in Fl. Brit India 4: 627. 1885; Haines, Bot. Bihar & Orissa 2:

769. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 405. 1977. *Lavendula carnosa* L. f., Suppl. 273. 1781.

Erect herbs, up to 70 cm high. Leaves ovate, cordate, serrate, pubescent, membranous, up to 7 × 5 cm, dotted with globose, orange-red oil globules on both surfaces; petioles up to 6 cm long, puberulous. Flowers in strobiloid heads. Calyx tubular, tube up to 2 mm long; upper lip triangular-lanceolate, up to 2.5 × 2 mm; lower lip slighly truncate. Corolla purple, up to 1 cm long. Nutlets suborbicular, smooth, brown, up to 1 mm long.

Fl. & Fr. : Oct.-Jan.

Distrib. : India, Sri Lanka & Myanmar.

Specimens examined : Ghurki, 1147.

Notes : Infrequent in the forest under growth.

3. ANISOMELES Kuntze

Anisomeles indica (L.) O.Kuntze, Rev. Gen. 512. 1891; Mukerjee in Rec. Bot. Surv. Ind. 14(1): 152. 1940; Haines, Bot. Bihar & Orissa 2: 782. 1961 (Rep. ed.); Backer & Bakh.f.; Fl. Java 2: 624. 1966; Babu, Herb. Fl. Dehra Dun 406. 1977; Keng in van Steenis, Fl. Malesiana ser. 1. 8: 329.f. 8. 1978. *Nepeta indica* L., Sp. Pl. 571. 1753. *Anisomeles ovata* R.Br. in Ait., Hort. Kew. ed. 2. 2: 364. 1811; Hook.f., Fl. Brit. India 4: 672. 1885; Prain, Beng. Pl. 2: 853. 1903 (Rep. ed. 2: 637. 1963) & in Rec. Bot. Surv. India 3: 263. 1905.

Densely pubescent or tomentose annual or perennial, up to 1.5 m high. Leaves 3-10 × 2.5-6 cm, subcoriaceous, ovate, acute or acuminate at apex, truncate at base, margin crenate serrate; petioles 1-3.5 cm long. Flowers in dense whorls, in axils near tip of branches and pass into terminal spikes by reduction of size of leaves; bracts linear, 3-5 mm long. Calyx up to 8 mm long, hirsute, teeth acuminate. Corolla up to 15 mm long, pubescent out side, 2-lipped, pink or pale-purple. Staminal filaments pink hairy above; anthers deep-violate or red. Nutlets up to 2 mm long, broadly ovoid with rounded ends, smooth, black.

Fl. & Fr. : Oct.-Jan.

Distrib. : India, China, Malaysia and native of temperate Asia.

Specimens examined : Macclaskeganj, 678.

Notes : Common in thickets and waste lands.

Uses : Used as an astringent, carminative, and the essential oil useful in uterine affections.

4. COLEBROOKEA J.E. Smith

Colebrookea oppositifolia J.E. Smith Exct. Bot. 2: 111. t. 115. 1805; Hook.f. in Fl. Brit. India 4: 462. 1885; Prain, Beng. Pl. 2: 636. 1963 (Rep. ed.); Haines, Bot. Bihar & Orissa 2: 777. 1961 (Rep. ed.); Babu Herb. Fl. Dehra Dun 407. 1977. (All exp. Hook.f. & Babu as *Colebrookia*).

Erect, aromatic, tomentose shrubs; stems 4-gonous, nodes swollen. Leaves opposite, elliptic-lanceolate, acuminate at apex and obtuse at base, serrate, up to 14.5 × 5 cm, pubescent beneath; petioles 2.5 to 3.5 cm long. Flowers small, white in panicled spikes; peduncle 1.5-2.3 cm long. Sepals-5, connate in a short tube, teeth elongated, linear, hairy. Petals connate in a small corolla, 4-lobed. Stamens-4, included. Fruits of 4 obovoid dry nutlets, with hairy tips.

Fl. & Fr. : Dec.-Apr.

Distrib. : Throughout India.

Specimens examined : Netarhat, 162.

Notes : Common in the forest.

Common name : Beng. : *Pansra*; Santal : *Bhainsa*.

Uses : A preparation of root is given in epilepsy.

5. HYPTIS N.J. Jacquin *nom. cons.*

Hyptis suaveolens (L.) Poit. in Ann. Mus. Hist. Nat. Par. 7: 472. t. 29. f. 2. 1806; Hook.f. in Fl. Brit. India 4: 630. 1885; Prain, Beng. Pl. 2:

848. 1903 (Rep. ed. 2: 633. 1963); Haines, Bot. Bihar & Orissa 2: 772. 1961 (Rep. ed.); Mukerjee in Rec. Bot. Surv. India 14(1): 63. 1940; Keng in Gard. Bull. Singapore 24: 96. 1969; Babu, Herb. Fl. Dehra Dun 499. 1977; Cramer in Dassanayake, Rev. Handb. Fl. Ceylon 3: 115. 1981. *Ballota suaveolens* L., Syst. Nat. ed. 10. 1100. 1759.

Erect, much branched, hairy, aromatic herbs, 60-80 cm high. Leaves ovate, crenate-denticulate, 3-4 × 2-2.5 cm, acuminate at apex, cordate at base. Flowers in 1-5 flowered axillary, peduncled, cymose clusters, combined into a terminal leafy panicle. Calyx campanulate, 6-7 mm long, 10 nerved, hairy without; teeth subulate, aristate strong. Corolla blue. Nutlets compressed, ovate, oblong, emarginate at apex and tapering towards base, ribbed, rugose.

Distrib. : Native of Tropical America, throughout India & widely distributed in the tropics.

Fl. & Fr. : Dec.-Mar. Exotic.

Specimens examined : Betla, 50.

Notes : Rare in exposed forests and waste lands.

Common name : Beng. : *Bilati tulsi*; Santal : *Ganga tulsi*.

Remarks : Size of the plant, size and shape of the leaves highly variable.

6. LAVANDULA L.

Lavandula bipinnata (Roth.) Kuntz., Rev. Gen. 521. 1891; Haines, Bot. Bihar & Orissa 2: 773. 1961 (Rep. ed.); Mukherjee, Fl. Pach. Bori Res. 248. 1984. *Bysteropogon bipinnatus* Roth., Nov. Sp. 255. 1821. *Lavandula burmannii* Benth., Lab. Gen. et Sp. 151. 1833; Hook.f., in Fl. Brit. India 4: 631. 1885.

Erect herbs, up to 80 cm high. Leaves sessile to subsessile, deeply divided into linear segments; segments entire, cut or toothed, obtuse or subacute, pubescent onboth surfaces. Flower in terminal simple or branched racemes; bracts broadly ovate, subulate, up to 4 mm long. Calyx up to

3.5 mm long, 15-nerved. Corolla with blue tinged, up to 7 mm long, throat hairy. Nutlets oblong-ellipsoid, smooth, with a white oblong areole on dorsal side, up to 2 mm long.

Fl. & Fr. : Oct.-Jan.

Distrib. : Throughout India.

Specimens examined : Ghurki, 1148.

Notes : Infrequent on the hill slopes.

7. LEONOTIS R.Br.

Leonotis nepetifolia (L.) R.Br., Prodr. 504. 1810; Hook.f. in Fl. Brit. India 4: 691. 1885. *Phlomis nepetifolia* L., Sp. Pl. 586. 1753 (as *nepetaefolia)*.

Handsome, 1.2-2 m tall undershrubs, with 4-angled, grooved, puberulous stems. Leaves ovate, crenate, up to 18 cm long below, become smaller and more lanceolate upwards; petioles 3-8 cm long, winged above, puberulous. Flowers in dense axillary whorls, with many slender, spine-tipped bracts. Calyx ribbed, hairy, bent above the middle, teeth 8-10, spinescent, unequal, posterior tooth longest. Corolla tube exserted, orange-brown, upper lip concave with villous crown, lower small, spreading, concave, midlobe largest. Nutlets oblong, ovoid, obliquely truncate.

Fl. & Fr. : Nov.-Mar.

Distrib. : Tropical Asia, Africa & America.

Specimens examined : Daltonganj, 260.

Notes : Common throughout the district.

Common name : Beng. & Hindi : *Hejurchei.*

Uses : Leaves used in rheumatism.

8. LEUCAS R.Br.

1a. Calyx mouth oblique :

2a. Mouth of the calyx tube villous ... 1. *L. cephalotes*

2b. Mouth of the calyx tube not villous ... 2. *L. lavendulifolia*

1b. Calyx mouth not oblique :

3a. Leaf margin entire ...4. *L. stricta*

3b. Leaf margin crenate-serrate ... 3. *L. montana*

1. **Leucas cephalotes** (Roth.) Spreng, Syst. 2: 743. 1825; Hook.f. in Fl. Brit. India 4: 689. 1885; Prain, Beng. Pl. 2: 856. 1903 (Rep. ed. 2: 639. 1963) & in Rec. Bot. Surv. India 3: 262. 1905; Mukerjee in Rec. Bot. Surv. India 14(1): 168. 1940; Haines, Bot. Bihar & Orissa 2: 787. 1961 (Rep. ed.). Babu, Herb. Fl. Dehra Dun 410. 1977. *Phlomis cephalotes* Roth, Nov. Sp. 262. 1821.

Annual, erect, stout, coarse herbs, up to 50 cm high; spreading; stems and branches quardrangular. Leaves lanceolate to elliptic-lanceolate, pubescent, up to 45 × 7 mm, crenate-serrate, tapering at base; petioles 1-1.5 mm long. Flowers in globose terminal whorls, up to 2 cm in diam., bracts foliaceous, lanceolate, acute; calyx 10-dentate, mouth oblique, throat villous, pubescent outside, up to 8 mm long, corolla white. Nutlets 3-gonous, oblong, dark-brown, 2-3 mm long, smooth.

Fl. & Fr. : Oct.-Mar.

Distrib. : India, Afghanistan, and Pakistan.

Specimens examined : Simultarh (Daltonanj), 263.

Notes : Common in barren fields and road sides, throughout the district.

Common name : Beng. : *Bara halkusa*; Hindi : *Dhurpisag*; Santal : *Andia Durap arak.*

Uses : Leaf juice is said to be used in urinary discharges and as a good remedy for stomach troubles.

2. **Leucas lavandulifolia** Sm. in Rees Cycl. 20: n. 2. 1812; Mukerjee in Rec. Bot. Surv. India 14(1): 167. 1940; Keng in Gard. Bull. Singapore 24: 103. 1969 & in van Steenis, Fl. Males. ser. 1.8: 338. 1978. *Leucas linifolia* Spreng., Syst. 2: 743. 1825; Hook.f. in Fl. Brit. India 4: 690. 1885; Haines, Bot. Bihar & Orissa 2: 788. 1961 (Rep. ed.).

Erect, branched, subglabrous or pubescent or tomentose herbs, up to 45 cm high. Leaves linear-lanceolate or linear-oblong, obtuse at apex, margin distantly crenulate or subentire, narrowed down at base, nerves 3-4 pairs; petioles 5 mm long. Flowers in axillary and terminal verticillaster; pedicles up to 1 mm long; bracts up to 5 mm long, setaceous. Nutlets up to 3 mm long, oblong, rounded at apex.

Fl. & Fr. : Jan.-June.

Distrib. : India to S. China, Mascarene Islands and Malaya.

Specimens examined : Maromar, 511.

Notes : Common in the harvested fields.

Common name : Beng. : *Halkusa.*

3. **L. montana** (Roth) Spreng., Syst. 2: 742. 1825; Hook.f. in Fl. Brit. India 4: 682. 1885; Haines, Bot. Bihar & Orissa 2: 785. 1961 (Rep. ed). *Phlomis montana* Roth, Nov. Sp. 263. 1821.

Small, woody herbs, with straggling branches; branches many from woody root stock, softly tomentosely hairy, with reflexed hairs. Leaves ovate or broadly-ovate, to ovate-lanceolate, up to 2.5 × 1.2 cm, crenate or serrate, acute at apex and rounded at base, villous on both sides; petioles up to 4 mm long. Flowers sessile in axillary whorls; bracts inconspicuous, villous, setaceous. Calyx densely hairy, mouth regular, 10-ribbed, up to 7 mm long; teeth small, linear, alternately shorter. Corolla white, annulate within.

Fl. & Fr.: Dec.-May.

Distrib. : Throughout India.

Specimens examined : Barwadih, 391.

Notes : Common on the hill slopes.

4. Leucas stricta Heyne ex Benth. in Wall., Pl. As. Rar. 1: 61. 1830; Hook.f. in Fl. Brit. India 4: 688. 1885; Haines, Bot. Bihar & Orissa 2: 786. 1961 (Rep. ed.); Mukherjee, Fl. Pach. Bori Res. 251. 1984.

Erect herbs, up to 30 cm high; stem 4-angled, clothed with long and short hairs. Leaves linear-oblong, up to 3 × 0.4 cm, pubescent, acute at apex, entire at margin. Flowers white, subsessile in solitary, terminal whorls; bracts linear-filiform, pubescent, up to 6 mm long. Calyx hairy, up to 5 mm long, mouth oblique and villous, upper calyx teeth much longer than the inner ones, teeth longer than calyx tube and villous. Nutlets oblong, up to 3 mm long.

Fl. & Fr. : Aug.-Dec.

Specimens examined : Tenarbusti (Garhwal), 592.

Distrib. : Throughout India.

Notes : Common along the road sides and near forest edges.

9. MICROMERIA Benth.

Micromeria biflora (Buch.-Ham. ex D.Don) Benth., Lab. Gen. Sp. 378. 1834; Hook.f. in Fl. Brit. India 4: 650. 1885; Haines, Bot. Bihar & Orissa 2: 779. 1961 (Rep. ed.). *Thymus biflorus* Buch.-Ham. ex D.Don, Prodr. 112. 1825.

Small pubescent perennial herbs, up to 30 cm long, branched from the woody root stock. Leaves small, opposite, entire, lanceolate; petioles very short, up to 1 mm long, with several long white hairs. Flowers axillary, 2-5 together; pedicels up to 4 mm long. Calyx hairy, connate, 5-toothed. Corolla pink, up to 8 mm long; petals-5, connate into 2-lipped corolla. Stamens-4; anther diverging, connective thick.

Fl. & Fr. : Feb.-July.

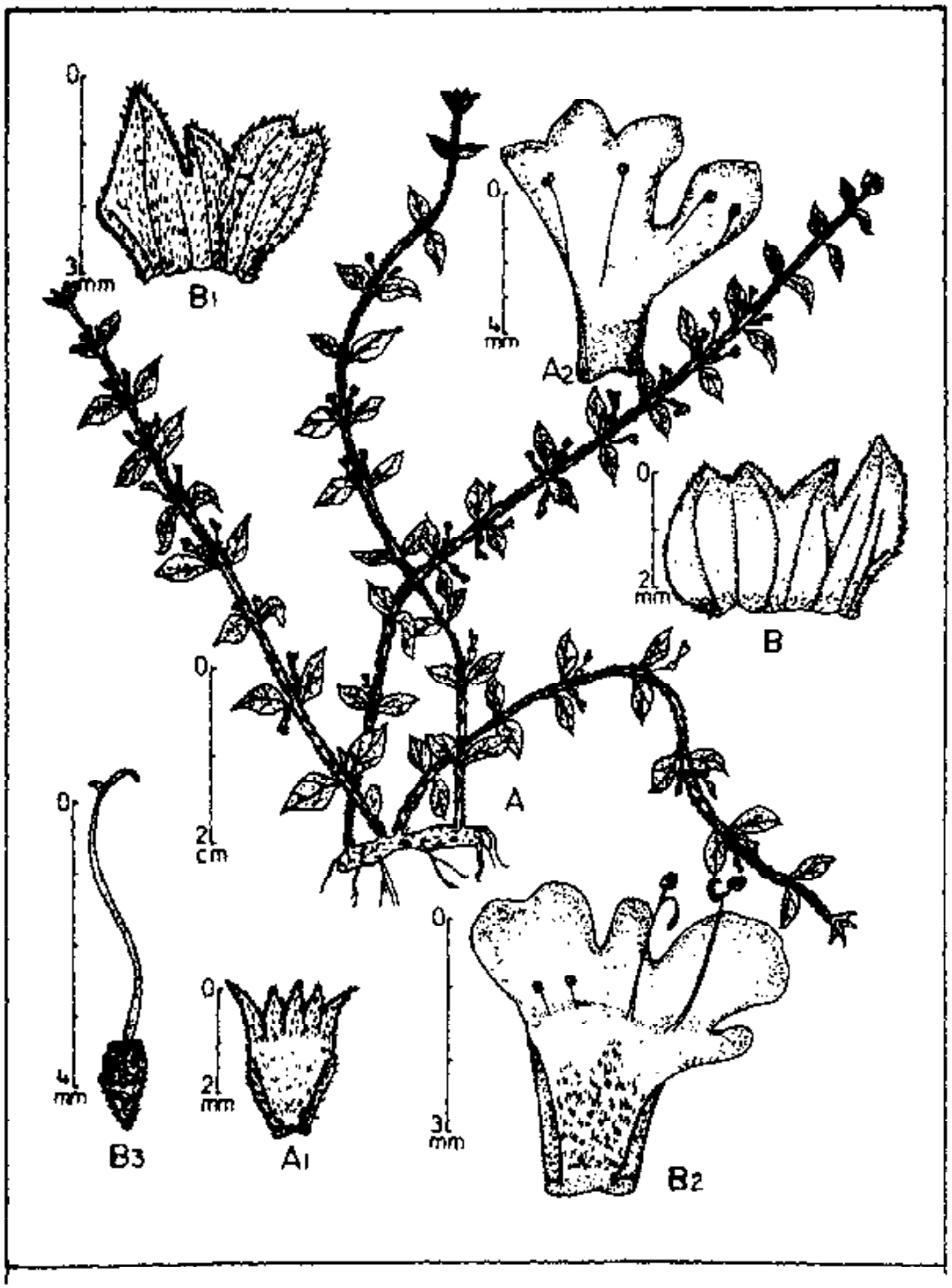


Fig. 31. Lamiaceae. (A-A_2): *Micromeria biflora* (Buch. -Ham. ex D. Don.) Benth.: A. Habit; A_1. Calyx split open; A_2. Corolla split open; (B-B_3): *Salvia plebeja* R. Br.: B. Calyx split open, showing ventral surface; B_1. Same, showing dorsal surface; B_2. Corolla split open; B_3. Gynoecium.

Distrib. : Throughout India.

Specimens examined : Netarhat, 87.

Notes : Common in dry and rocky areas.

10. NEPETA L.

1a. Bracts linear; corolla more than 4 mm long ... 1. *N. hindostana*

1b. Bracts subulate; corolla less than 4 mm long ... 2. *N. leucophylla*

1. Nepeta hindostana (Roth) Haines, Bot. Bihar & Orissa, 2: 744. 1922; Babu, Herb. Fl. Dehra Dun 414. 1977. *Glechoma hindostana* Roth Nov. Pl. Sp. 259. 1821. *Nepeta ruderalis* Buch.-Ham. ex Benth. in Wall., Pl. As. Rar. 1: 64. 1830; Hook.f. in Fl. Brit. India 7: 661. 1885; Prain, Beng. Pl. 2: 641. 1963 (Rep. ed.).

Erect, finely pubescent or hoary herbs; stems square. Leaves ovate, rounded at both ends, serrate, pubescent on both surfaces; petioles up to 1 cm long. Flowers in verticillasters combined into panicles peduncle longer than petiole, up to 2.5 cm long, hairy, slightly square; bracts linear, hairy, 4-5 mm long. Calyx 5 mm long, hairy, tooth linear-lanceolate, connate into a tube, 15-nerved, sub 2-lipped. Corolla white, 6-7 mm long, 2-lipped. Stamens-4, didynamous, upper pair longer, anther lobes diverging; style linear; stigma bifid, one linear and other spathulate. Nutlets very small, dark brown.

Fl. & Fr. : Mar.-June.

Distrib. : Throughout tropics & subtropics of India & Afghanistan.

Specimens examined : Netarhat, 168.

Notes : Common on the hill slopes and near Netarhat Tourist Lodge.

2. N. leucophylla Benth. in Lab. Gen. et Sp. 476. 1833; Hook.f. in Fl. Brit. India 4: 662. 1885.

Erect or ascending, hairy-tomentose herbs, up to 90 cm tall; branches slender, hairy. Leaves ovate, up to 3 × 1.5 cm, acute at apex, crenate-

serrate at margin, pubescent; petioles up to 1 cm long, hairy. Flowers in dense-flowered, up to 30 cm long, narrow, interrupted, shortly peduncled terminal spikes; bracts subulate. Calyx 5-toothed, pubescent, 15-nerved, up to 2.5 mm long; teeth lanceolate-subulate, subequal. Corolla 2-lipped, purple, exserted from calyx, up to 3.5 mm long. Nutlets broadly-oblong, smooth, up to 0.7 mm long.

Fl. & Fr. : Feb.-Apr.

Distrib. : Throughout India.

Specimens examined : Netarhat, 177.

Notes : Uncommon in the forest undergrowth.

1. OCIMUM L.

1a. Leaves acute at apex; calyx tube hirsute-annulate within; posterior filaments at base with a transverse hairy process ... 1. *O. basilicum*

1b. Leaves obtuse at apex; calyx tube completely glabrous within; posterior filaments at base with a hairy tuft ... 2. *O. sanctum*

1. **Ocimum basilicum** L., Sp. Pl. 587. 1753; Hook.f. in Fl. Brit. India 4: 608. 1885; Prain, Beng. Pl. 2: 843. 1903 (Rep. ed. 2: 629. 1963) & in Rec. Bot. Surv. India 3: 362. 1905; Haines, Bot. Bihar & Orissa 2: 763. 1961 (Rep. ed.); Mukerjee in Rec. Bot. Surv. India 14(1): 63. 1940; Morton in J. Linn. Soc. London (Bot.) 58(372): 232. 1962; Cramer in Dassanayake, Rev. Handb. Fl. Ceylon 3: 115. 1981.

Erect, branched hairy herbs, 15-25 cm high. Leaves up to 4 × 1.8 cm, upper leaves becoming sessile to subsessile, narrow-lanceolate to ovate, serrate to nearly entire, acute at apex; petioles up to 1 cm long. Flowers in simple verticillaster of 10-16 cm long raceme. Calyx hairy, lower lip longer than the upper lip, up to 4 mm long. Nutlets ellipsoids, black, up to 1 mm long.

Fl. & Fr. : Mar.-July.

Distrib. : Throughout India, Tropical Africa & Asia to Polynesia.

Specimens examined : Betla, 36.

Notes : Common on the road sides & waste lands.

Common name : Beng. & Hindi : *Bhuitulsi.*

Uses : Juice of the plant is used in heart disease, blood pressure and cough.

2. Ocimum sanctum L., Mant. Pl. 1: 85. 1767; Benth., Lab. Gen. Sp. 11. 1832 et in DC., Prodr. 12: 38. 1848; Hook.f. in Fl. Brit. India 4: 609. 1885; Trimen, Handb. Fl. Ceylon 3: 366. 1895; Mukerjee in Rec. Bot. Surv. India 14: 1940; Abewick, Ceylon J. Sci. Biol. Sci. 2(2): 218. 1959; Haines, Bot. Bihar & Orissa 2: 764. 1961 (Rep. ed.); Cramer in Dassanayake, Rev. Handb. Fl. Ceylon 3: 116. 1981.

Much branched, softly hairy, greenish or deep-purple, annual herbs, 30-90 cm high; stem 4-angular, hirsute above, glabrous and slightly woody below. Leaves ovate-oblong or elliptic-oblong, 1.5-3 × 1-1.8 cm, obtuse at both ends, undulate, distantly and coarsely-serrate, puberulous above, hirtellous beneath, dotted on both surfaces; petioles up to 1.5 cm long, slender with reddish-purple hairs. Racemes up to 10 cm long. Pedicels up to 3 mm long, villous. Calyx campanulate, villous without, up to 4.5 mm long, upper lip broadly orbicular, 1.5 × 2 mm, apiculate, reflexed in fruit, dull-purple, median lobes of lower lip curved upwards. Corolla tubular-campanulate, up to 4.5 mm long, reddish-pink, lobes of upper lip oblong-orbicular, puberulous on back, lower lip ovate oblong, 2.5 mm long. Posterior filament base hairy. Nutlets ellipsoid, 1-1.2 mm long, subglobose or broadly oblong, minutely warty, glabrous, brown.

Fl. & Fr. : Oct.-Mar. Exotic.

Distrib. : Pantropical, probably Old World origin.

Specimens examined : Muhammadganj, 1043.

Notes : Commonly planted in the houses and barren lands around villages.

Common name : Beng. & Hindi : *Tulshi.*

Uses : The plants are considered sacred by the Hindus. Decoction of the leaves used in bronchitis and cough, and also used in skin diseases.

Remarks : Common 2 types of plants are known, green type called *Sritulshi* and purple type called *Krishnatulshi.*

12. ORTHOSIPHON Benth.

Orthosiphon rubicandus (D.Don) Benth. in Wall., Pl. As. Rar. 2: 141. 1831; Hook.f. in Fl. Brit. India 4: 614. 1885; Haines, Bot. Bihar & Orissa 2: 766. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 416. 1977; Mukherjee, Fl. Pach. Bori Res. 253. 1984. *Plectranthus rubicanda* D.Don, Prodr. Fl. Nep. 116. 1825 (as *Plectranthes rubicanda*).

Erect, perennial herbs, up to 50 cm high, often with tuberous root stocks. Leaves sessile, or shortly petioled, ovate to ovate-lanceolate, up to 10 × 5.5 cm, rounded to subacute at apex, cuneate at base, margin crenate-serrate, coarsely puberulous or glabrate above, hispidulous on nerves beneath. Verticillaster combined to form an interrupted raceme like inflorescence, up to 30 cm long; bracts linear. Calyx hairy, up to 7 mm long, lower lip 4-toothed. Corolla twice as long as calyx, white or pink, pubescent. Nutlets suborbicular, compressed, punctate, up to 1.2 mm across.

Fl. & Fr. : May-Sept.

Distrib. : India, Nepal and upper Myanmar.

Specimens examined : Netarhat, 757.

Notes : Common in the wet forests.

13. PLECTRANTHUS L'Herit.

Plectranthus stocksii Hook.f. in Fl. Brit. India 4: 618. 1885.

Slender, simple or branched, pubescent herbs; stems square. Leaves petioled, ovate or ovate-cordate, crenate, acute. Flowers in pyramidal panicles. Calyx 3 mm long, subequally 5-toothed, scaberulous, teeth sub acute to acute.

Fl. & Fr. : Nov.-Mar.

Distrib.: Throughout India.

Specimens examined : Netarhat, 109.

Notes: Rare in the forest.

14. POGOSTEMON Desf.

Pogostemon benghalensis (Burm.f.) O. Kuntze, Rev. Gen. Pl. 2: 529. 1891; Santapau in Rec. Bot. Surv. India (Fl. Khandala 3rd. ed.) 16(1): 217. 1967; Babu, Herb. Fl. Dehra Dun 418. 1977. *Origanum benghalense* Burm.f., Fl. Ind. 128. t. 38. f. 3. 1768. *Pogostemon plectranthoides* Desf. in Ann. Mus. Nat. Hist. Nat. 2: 155. t. 6. 1803; Hook.f. in Fl. Brit. India 4: 632. 1885; Prain, Beng. Pl. 2: 849. 1903 (Rep. ed. 2: 634. 1963) & in Rec. Bot. Surv. India 3: 262. 1905; Haines, Bot. Bihar & Orissa 2: 773. 1961 (Rep. ed.). Mukerjee in Rec. Bot. Surv. India 14(1): 69. 1940.

Much branched, aromatic shrubs; branches dark purple; young parts, hairy-pubescent, square. Leaves opposite, ovate-lanceolate, serrate, cuneate at base, acute at apex, pubescent beneath; petioles 1 cm long. Flowers white in dense verticillaster, combined into terminal and axillary panicled spikes, subtended by foliar bracts; bracts ovate, acute, 8 × 5 mm, hairy. Calyx toothed, hairy. Corolla 2-lipped. Filaments exserted, purple, bearded. Nutlets ellipsoid, dark-brown, polished, 1 mm long.

Fl. & Fr. : Jan.-Apr.

Distrib. : Throughout India.

Specimens examined : Netarhat, 212.

Notes : Infrequent in the forest.

Common name : Beng. : *Jin, Juilata.*

15. SALVIA L.

1a. Leaves ovate, up to 3 × 2 cm, hairy; flowers in verticillaster form an elongated raceme ... 1. *S. coccinea*

1b. Leaves oblong-lanceolate, up to 7 × 2 cm, glabrous; flowers in compact spicate raceme ... 2. *S. plebeja*

1. **Salvia coccinea** Juss. ex Murr. in Comm. Goting 1: 86. t. 1. 1778; Haines, Bot. Bihar & Orissa, 2: 781. 1961 (Rep. ed.); Prain, Beng. Pl. 2: 642. 1963 (Rep. ed.).

Slender herbs, up to 1 m high; stems square and grooved, pubescent throughout. Leaves ovate, up to 3 × 2 cm, acute at apex, cordate at base, hairy, margin serrate. Flowers in verticillaster form an elongated raceme. Calyx 2-lipped, up to 10 mm long, 10-15 ribbed. Corolla exserted, tube long, scarlet coloured. Stamens-2. Nutlets small, oblong, up to 2 mm long.

Fl. & Fr. : Mar.-Apr. Exotic.

Distrib. : Nataive of Central and South Amrica, cultivated and naturalised in India.

Specimens examined : Netarhat, 137.

Notes : Occasional in the forest as a garden escape.

2. **S. plebeja** R.Br., Prodr. 501. 1810; Hook.f. in Fl. Brit. India 4: 655. 1885; Prain, Beng. Pl. 2: 859. 1903 (Rep. ed. 2: 642. 1963); Haines, Bot. Bihar & Orissa 2: 780. 1961; Keng in Gard. Bull. Singapore 24: 162. 1969 & in van Steenis, Fl. Malesiana ser. 1.8: 358. 1978. *Salvia brachiata* Roxb., Fl. India 1: 146. 1820.

Erect, rough-pubescent herbs, 30-60 cm high; stems stout, 4-angled, grooved, hoary-pubescent. Leaves 7 × 2 cm, oblong-lanceolate, obtuse or subacute, glabrous, base tapering into a petiole; petioles up to 2 cm long. Flowers in compact panicle, glandular-pubescent spicate racemes, small, 3.5-4 mm. Calyx 2-lipped, hairy, posterior lobe campanulate and anterior elliptic-lanceolate, 3 mm long. Corolla 2-lipped, anterior lip longer than posterior and hooded, base hairy. Perfect stamens-2, anther divaricate, 2 rudimentary stamens on posterior lobe. Stigma bifid; ovary 4-partite on a disc. Nutlets minute, ovoid, brown.

Fl. & Fr. : Sept.-Apr.

Distrib. : India (not in Sri Lanka), extended to China, Malaysia also to Australia.

Specimens examined : Betla, 46 & 57.

Notes : Common near marshy areas.

Common name : Beng. : *Bhui tulsi*; *Kakaburadi.*

Uses : Seeds used in diarrhoea and haemorrhoids.

NYCTAGINACEAE

1a. Flower less than 3 mm across; anthocarp clavate, glandular along the ribs ... 1. BOERHAVIA

1b. Flower more than 2 cm across; anthocarpovoid, eglandular ... 2. MIRABILIS

1. BOERHAVIA L.

Boerhavia diffusa L., Sp. Pl. 3. 1753; Haines, Botany Bihar & Orissa 2: 795. 1961 (Rep. ed.); Stemmerik in Fl. Males. ser. 16: 454. 1964; *B. repens* L., Sp. Pl. 3. 1753; Hook.f. in Fl. Brit. India 4: 1885. *B. procumbens* Banks ex Roxb., Fl. India 1: 148. 1820 (*nom. superfl.*). *B. repens* var. *procumbens* (Banks ex Roxb.) Hook.f. in Fl. Brit. India 4: 709. 1885.

Diffuse, glabrous herbs; stems reddish, prostrate or ascending. Leaves opposite unequal ovate, suborbicular, undulate along margin, rounded-cordate at base, acute or obtuse at apex, up to 3 × 2 cm, petioles 3-5 mm long. Inflorescence a panicle or subcapitate umbel; umbels 4-8 flowered. Perianth 1.5-2.7 mm long, pink, constricted at middle. Stamens 2-3. Anthocarp clavate, glandular along the 5-ribs, up to 2.8 mm long.

Fl. & Fr. : Throughout the year.

Distrib. : India, Sri Lanka, Malay Peninsula, also found in China, Africa and Islands of Pacific.

Specimens examined : Betla, 47.

Notes : Common in waste lands and along road sides.

Common name : Beng. : *Punarnava*; Santal : *Ohoic-arak.*

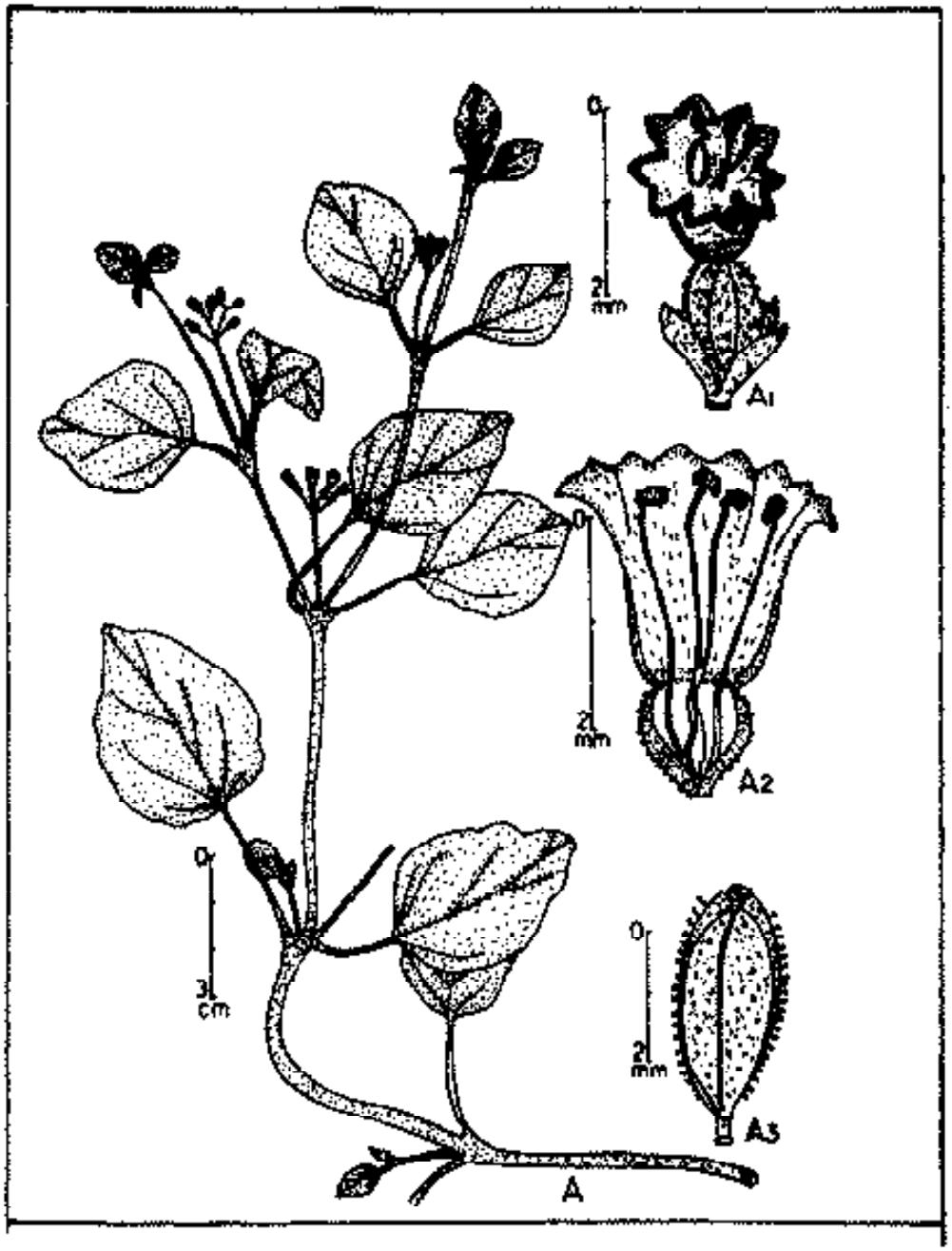


Fig. 32. Nyctaginaceae. (A-A_3): *Boerhavia diffusa* L.: A. Habit; A_1. Flower; A_2. Same, split open; A_3. Anthocarp.

Uses : Roots used as diuretic, leaves are often eaten.

Remarks : Nasir (Fl. W. Pak. 115: 4. 1977) treats *B. procumbens* Banks ex Roxb. and *B. repens* L. as distinct species from *B. diffusa* L. But Stemmerik's treatment is better in this case as this taxon is highly variable.

2. MIRABILIS L.

Mirabilis jalapa L., Sp. Pl. 177. 1753; Haines, Bot. Bihar & Orissa 2: 794. 1961 (Rep. ed.); Stemmerik in Fl. Mal. 6(3): 451. 1964.

Erect perennial, much branched herbs, up to 90 cm high. Roots tuberous; stems glabrous or minutely pubescent, nodes swollen and pinkish tinged. Leaves opposite, unequal up to 8 × 5 cm, glabrous or minutely punctate above, ovate, acuminate at apex, base truncate or slightly oblique, margin slightly wavy, entire; petioles up to 3 cm long, pubescent. Cymes 3-6 flowered. Involucre 1-1.5 cm long, glandular when young; lobes ovate, tip bristly. Perianth purple or crimson-red, tube up to 3 cm long, tip funnel-shaped, spreading. Stamens exserted. Anthocarp up to 6 mm long, ovoid or suborbicular, ribbed. Seeds black and wrinkled-tuberculate.

Fl. & Fr. : Aug.-Nov. Exotic.

Distrib. : Native of Mexico, naturalised throughout India.

Specimens examined : Vandaria, 662.

Notes : Planted in the gardens, often found as an escape in village surroundings.

Common name : Beng. : *Sandhyamalati* or *Krishnakeli* or *Sarpamani*; Hindi : *Gulabbas*.

Uses : Seeds used as an adulterant of black pepper. Juice of the leaves applied to wounds and bruises.

Bougainvillea spectabilis Willd. (from Brazl) is commonly cultivated in gardens.

AMARANTHACEAE

1a. Leaves alternate :

2a. Fertile flowers each subtended by two lateral sterile modified flowers consisting of branched hooks ... 6. DIGERA

2b. Fertile flowers not subtended by modified sterile flowers :

3a. Fruits many-seeded ... 5. CELOSIA

3b. Fruits one-seeded :

4a. Pseudo-staminodes present; flowers hermaphrodite ... 2. AERVA

4b. Pseudo-staminodes absent; flowers unisexual ... 4. AMARANTHUS

1b. Leaves opposite :

5a. Fertile flowers subtended by modified sterile flowers bearing strongly accrescent hooked or glochidiate spines ... 9. PUPALIA

5b. Fertile flowers not subtended by such modified sterile flowers :

6a. Flowers unisexual, in lax panicles; leaves variegated, orbicular to ovate-orbicular, emarginate ... 8. IRESINE

6b. Flowers bisexual, in dense heads or spikes; leaves rarely variegated, if so then the leaves narrower and never emarginate :

7a. Filaments fused almost to the top; bracteoles with a vertical dorsal crest ... 7. GOMPHRENA

7b. Filaments fused at the base only or free; bracteoles not dorsally cristate :

8a. Leaves very narrow, linear-filiform; capsule circumscissile, longitudinally split at maturity ... 10. TRICHURIELLA

8b. Leaves not linear-filiform, capsule indehiscent or irregularly rupturing :

9a. Flowers in dense, sessile axillary heads ... 3. ALTERNANTHERA

9b. Flowers in elongate, pedunculate spikes ... 1. ACHYRANTHES

1. ACHYRANTHES L.

1a. Basal wing of the spinescent bracteole adnate throughout the length of spine; staminodes fimbriate ... 1. *A. aspera*

1b. Basal wing of the spinescent bracteole adnate to the base of the spine, otherwise free; staminodes toothed, not fimbriate ... 2. *A. bidentata*

1. Achyranthes aspera L., Sp. Pl. 204. 1753; Hook.f. in Fl. Brit. India 4: 730. 1885; Haines, Bot. Bihar & Orissa 2: 805. 1961 (Rep. ed.); Babu, Herb. Fl. Derha Dun 426. 1977.

Erect, stiff, perennial herbs; stems obscurely 4-angled. Leaves elliptic, oblong or oval, acute or acuminate at apex, 3-10 × 1.2-5 cm, subglabrous abvoe and hairy beneath. Flowers in 20-40 cm long spikes; bracts lanceolate, 1.5-4 mm; bracteoles 1.5-3.5 mm long. Perianth pale green, often pink, 3-5 mm long. Staminodes with a dorsal long fringed scale just below apex. Utricle rounded at base.

Fl. & Fr. : Oct.-Jan.

Distrib. : Pantropical.

Specimens examined : Palamau fort (Betla), 1111.

Notes : Common along road sides.

Common name : Beng. : *Apang*; Hindi : *Latjiroi* or *Chirchira*, Santal: *Chipchirit*.

2. A. bidentata Blume, Bijdr. 545. 1826; Hook.f. in Fl. Brit. India 4: 730. 1885; Haines, Bot. Bihar & Orissa 2: 806. 1961 (Rep. ed.): Babu, Herb. Fl. Dehra Dun 426. 1977.

Erect-ascending annual or perennial herbs up to 90 cm high. Leaves elliptic-oblong or ovate-lanceolate, acuminate at apex, narrowed down at base, up to 10 × 6 cm, glabrous, membranous. Spikes axillary or terminal, slender; bracteoles reduced to a spine, minutely 2-auricled at base. Tepals subequal, lanceolate, acute. Stamens-5, pseudostaminodes truncate or shortly dentate at apex. Utricle 2-2.5 mm long, oblong.

Fl. & Fr. : Sept.-Dec.

Specimens examined : Barwadih, 411.

Distrib. : India, Sri Lanka, China & Japan.

Notes : Common in hilly areas and also as a forest undergrowth.

2. AERVA Forssk. *nom. cons.*

1a. Spikes all axillary, sessile, leaves orbicular obovate or spathulate ... 1. *A. lanata*

1b. Spike axillary and terminal, stalked; leaves elliptic or elliptic lanceolate ... 2. *A. sanguinolenta*

1. Aerva lanata (L.) Juss. ex Schult., Syst. Veg. ed. 15.5.564. 1819; Hook.f. in Fl. Brit. India 4: 1885; Prain, Beng. Pl. 2: 874. 1903 (Rep. ed. 2: 635. 1963) & in Rec. Bot. Surv. India 3: 266. 1905; Haines, Bot. Bihar & Orissa 2: 804. 1961 (Rep. ed.); Backer in van Steenis, Fl. Malesiana ser. 1.4: 84. 1949; Kanis in Womersley, Rev. Handb. Fl. Papua New Guinea 1: 16. 1978; Townsend in Dassanayake, Rev. Handb. Fl. Ceylon 1: 32. 1980; Guha Bakshi, Fl. Murshidabad Distr. 262. 1984. *Achyranthes lanata* L., Sp. Pl. 204. 1753.

Erect, decumbent, ascending herbs, with woolly stems. Leaves alternate, up to 15 × 9 mm, orbicular, obovate or spathulate above, obtuse or rounded at apex, narrowed at base, pubescent above and velvety beneath. Flowers in compact nodal spike, up to 12 mm long; bracts nearly 1 mm long, acuminate at apex, ovate. Seeds very small, shining black.

Fl. & Fr. : during rainy season.

Distrib. : Tropical part of India, Arabia, Tropical Africa, Java. Sri Lanka, Philippines.

Specimens examined : Daltonganj, 9 & 292.

Notes : Common in exposed fields, throughout the district.

Common name : Beng. : *Chaya*; Santal : *Lopong arak.*

Uses : Used in cough, throat sore and diabetes.

2. Aerva sanguinolenta (L.) Bl., Bijdr. 547. 1825; Hook.f. in Fl. Brit. India 4: 728. 1885; Townsend in Nasir & Ali, Fl. Pak. 71: 29. 1974. Liu and Kao in Li *et al.* Fl. Tiwan 2: 370. 1976; *Achyranthes sanguinolenta* L., Sp. Pl. ed. 2: 294. 1762. *Aerva scandens* Wall. (Cat. No. 6911. 1835, *non. nud).* ex Moq. in DC., Prodr. 13(2): 302. 1849; Hook.f. in Fl. Brit. India 4: 727. 1885; Haines, Bot. Bihar & Orissa 2: 804. 1961 (Rep. ed.).

Straggling, sub scandent herbs, hairy throughout. Leaves alternate, elliptic to elliptic-lanceolate or ovate, up to 3 × 2 cm, acute or obtuse at apex and narrowed down at base; petioles up to 1 cm long. Flowers in axillary and terminal spike, bisexual, densely white villous. Tepals with midrib excurrent into tapering mucro, up to 1.5 mm long, white woolly. Stamens united below. Stigma capitate. Seeds reniform, up to 1 mm across, shining black.

Fl. & Fr. : Oct.-May.

Distrib. : India, China, Malaysia, Philippines and Tropical Africa.

Specimens examined : Betla, 54 & 56.

Notes : Common in dry exposed areas and also along the roads.

Common name : Beng. : *Nuriya.*

Uses : Roots used in dysentery.

3. ALTERNANTHERA Forssk.

1a. Heads spinescent; tepals very dissimilar ... 3. *A. pungens*

1b. Heads not spinescent; tepals similar :

2a. Outer tepals one-nerved :

3a. Axillary heads pedunculate; pseudo-staminodes equal to or longer than the stamens ... 2. *A. philoxeroides*

3b. Heads sessile; pseudo-staminodes shorter than the stamens ... 4. *A. sessilis*

2b. Outer tepals 3-nerved in the lower half ... 1. *A. paronychioides*

1. **Alternanthera paronychioides** St. Hil., Voy. Bres. 2: 439. 1833; Sundararaj, J. Bombay Nat. Hist. Soc. 53: 525. 1956; Veldkamp, Blumea 19: 167. 1971; Cook in Aquat. Wetland Pl. Ind. 41. 1996.

Prostrate branched, perennial herbs; rooting at nodes. Leaves oblanceolate or elliptic, obtuse at apex, narrowed down into a petiole, 1-1.5 × 0.5 cm. Heads sessile, axillary, 2-3 together, up to 1 × 0.5 cm. Tepals white, subequal, oblong-lanceolate, up to 4 mm long, pilose on back, all 3-nerved. Stamens-5, alternating with pseudo-staminodes. Fruits compressed, orbicular-obcordate, up to 2 mm long.

Fl. & Fr. : May-Oct. Exotic.

Distrib. : India, Java and other parts of the Old World, native of Brazil.

Specimens examined : Garwah, 617. Helophyte.

Notes : Infrequent in barren fields.

2. **A. philoxeroides** (Mart.) Griseb. in Abh. Konigl. Ges. Wiss. Goett. 24: 36. 1879; Backer in van Steenis, Fl. Malesiana ser. 1.4: 93. 1949; Maheshwari in Bull. Bot. Surv. India 6: 313. 1965; Liu & Kao in Li *et al.*, *Fl.* Taiwan 2: 372. 1976; Saldanha & Eswar Rao in Saldanha, Fl. Karnataka 1: 165. 1984; Cook in Aquat. Wetland Pl. Ind. 42. 1996. *Bucholzia philoxeroides* Mart., Nov. Actorum Acad. Caes. Leop. Carol. Nat. Cur. 13(1): 315. 1826.

Perennial, much branched, hydrophytic decumbent herbs, up to 1 m high; stems fistular, longitudinally striate. Leaves up to 8 × 2 cm, opposite, lanceolate or narrowly obovate, acute to rounded at apex, cuneate at base; petioles up to 4 mm long. Flowers usually in solitary, axillary, pedunculate, globose-ellipsoid heads; heads also terminal and sessile; bracts up to 2.5 mm long, ovate-triangular; bracteoles up to 2.2 mm long, ovate-acuminate. Perianth segments shining, white, glabrous, 1-nerved, oblong, apex subacute to obtuse, 6-8 mm long. Stamens-5; anthers linear; staminodes equal to height of stamens. Ovary globose, compressed; style short, stigma large, globose.

Fl. & Fr. : May-Oct.

Distrib. : India, South America, Java, Malaysia, Myanmar, Native of S. America.

Specimens examined : Netarhat, 808. Hyperhydate.

Notes : Common in marshy areas and margins of ditches, ponds, nalas.

Uses : Sometimes the plants are eaten by the local people.

3. **Alternanthera pungens** Kunth. in H.B.K., Nov. Gen. et Sp. 2: 206. 1818; Raizada in Ind. For. 76: 495. 1950; Melville in Kew Bull. 13: 174. 1958; Townsend in Dasanayake, Rev. Hand. Fl. Ceylon 1: 47. 1980. *Alternanthera repens* (L.) Link, Enum. Pl. Hort. Berol. 1: 154. 1821 (non Gmelin 1791); Baker in van Steenis, Fl. Males ser. 1.4: 19. 1949.

Prostrate, much branched herbs; stems and branches 30-60 cm long, young branches pilose or white woolly. Leaves opposite, pairs very unequal, up to 2.5 × 1.7 cm, young sparsely pilose, mature one glabrous, elliptic-obovate or orbicular, apex apiculate, base narrowed down into a petiole; petioles up to 8 mm long. Heads 1-3 together in leaf axil, 10 mm long and 5-6 in diam., bracts up to 4 mm long, lanceolate, spine-tipped, upper half margin finely denticulate; bracteoles shorter and narrower than bracts, acuminate, not spine-tipped. Tepals unequal, 2 abaxial much larger than other, 4-5 mm long, spine-tipped, base trinerved, adaxial 3-4 mm long, margin near apex finely denticulate, tip mucronate, base with tuft hairs. Fruits 1.5 mm long, falling of with perianth and bracteoles, ovate, truncate or retuse. Seeds ovoid, compressed brown.

Fl. & Fr. : Oct.-May. Exotic.

Distrib. : Native of Tropical America, now introduced in various parts of tropics including India.

Specimens examined : Barwadih, 384. Helophyte.

Notes : Common in marshy areas and waste lands.

Uses : Decoction of the herbs used in gonorrhoea.

4. **A. sessilis** (L.) R.Br. ex DC., Cat. Monsp. 77. 1813; Hook.f. in Fl. Brit. India 4: 713. 1885; Prain, Beng. Pl. 2: 875. 1903 (Rep. ed. 2:

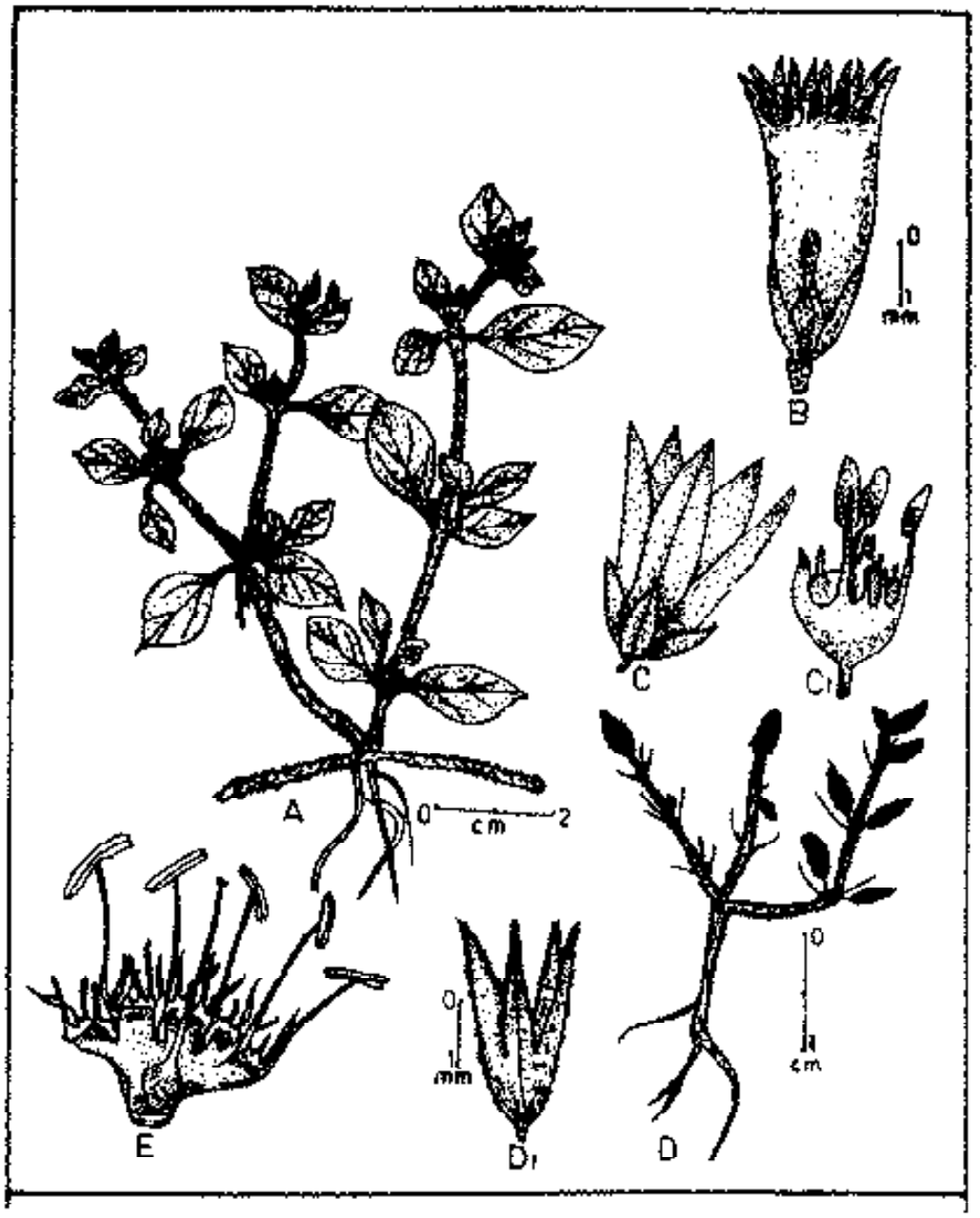


Fig. 33. Amaranthaceae. A. *Alternanthera pungens* Kunth: Habit; B. *Gomphrena serrata* L.: Flower after tepals removed and staminal tube split open showing gynoecium; (C-C_1): *Alternanthera sessilis* (L.)R. Br. ex DC.: C. Flower; C_1. Flower after tepals removed; (D-D_1): *Trichuriella monsoniae* (L. f.) Bennet: D. Habit; D_1. Flower; E. *Achyranthes aspera* L.: Flower after tepals removed and staminal tube split open showing gynoecium.

656. 1963) & in Rec. Bot. Surv. India 3: 267. 1905; Haines, Bot. Bihar & Orissa 2: 806. 1961 (Rep. ed.); Melville in Kew Bull. 13: 172. 1958; Cook in Aquat. Wetland Pl. Ind. 42: 1996. *Gomphrena sessilis* L., Sp. Pl. 225. 1753. *Alternanthera nodiflora* auct. non. R.Br., Prodr. 417. 1810; Hook.f. in Fl. Brit. India 4: 732. 1885.

Prostrate or decumbent-ascending, much branched herbs, often rooting from lower nodes. Leaves short petioled, up to 3.5 × 1 cm, lanceolate, acute, glabrous. Spike white, axillary, pink at base. Tepals glabrous, acute, 2 mm long. Stamens-5, of which 2-3 anther bearing; filaments short. Seed ovoid, brown.

Fl. & Fr. : Jan.-May.

Distrib. : Pantropical.

Specimens examined : Betla, 31. Helophyte.

Notes : Common in open fields and along road sides.

Uses : Herbs used in night blindness.

Remarks : Leaf variable in size and shape highly.

4. AMARANTHUS L.

1a Leaf axils with paired spines ... 1. *A. spinosus*

1b. Leaf axils without any spines ... 2. *A. viridis*

1. Amaranthus spinosus L., Sp. Pl. 991. 1753; Hook.f. in Fl. Brit. India 4: 718. 1885; Gamble, Fl. Pres. Madras 1170. 1925 (Rep. ed. 819. 1957); Haines, Bot. Bihar & Orissa 2: 799. 1961 (Rep. ed.); Townsend in Nasir & Ali, Fl. Pak. 71: 9. 1974 & in Rev. Handb. Fl. Ceylon 1: 9. 1980; Guha Bakshi, Fl. Murshid. Distt. 265. 1984.

Erect glabrous herbs, up to 60 cm high; stems hard often reddish. Leaves ovate to lanceolate, with 2 axillary spines, up to 6.5 × 3 cm, obtuse and spine-tipped, entire, narrowed down at base, glabrous; petioles 2-6 cm long. Flowers numerous, sessile, in dense axillary clusters in the lower part of the stems, upper flower clusters collected into terminal spikes or

panicle; bracts spinous-tipped, exceeding the tepals. Male flower tepals-5, ovate or lanceolate, up to 3 mm long, acuminate, spinous-tipped. Female flower tepals-5, oblong, up to 2 mm long, obtuse-oblong, thickened at top. Seeds 0.9 mm across, biconvex, black, shining.

Fl. & Fr. : Throughout the year.

Distrib. : Throughout India; and all tropical countries of the World.

Specimens examined : Muhammadganj, 982.

Notes : Very common in waste lands, along the road.

Common name : Beng. : *Kanta notey*; Hindi : *Katailichaulai.*

Uses : It is used as a fodder after boiling.

2. Amaranthus viridis L., Sp. Pl. ed. 2. 1405. 1763; Hook.f. in Fl. Brit. India 4: 720. 1885; Townsend in Dassanayake, Rev. Handb. Fl. Ceylon 1: 19. 1980.

Annual branched, unarmed, erect herbs, up to 75 cm high. Leaves ovate to rhomboid oblong, emarginate or rarely obtuse at apex, 2-7 × 1-5 cm, margin occasionally sinulate. Flowers green in slender, axillary or terminal paniculate spikes, up to 10 cm long. Tepals-3. Stamens-3. Fruits subglobose, 1.5 mm across. Seeds black, shining.

Fl. & Fr. : Feb.-Apr.

Distrib. : Pantropical.

Specimens examined : Bhavnathpur, 1171.

Notes : Common in waste lands and open fields.

5. Celosia L.

Celosia argentea Linn. for. **cristata** (L.) Schinz in Pfamilien, ed. 2. 160: 29. 1934; Townsend, Fl. W. Pak. 71: 6. 1974. *Celosia cristata* Linn., Sp. Pl. 235. 1753; Hook.f. in Fl. Brit. India 4: 714. 1885; Bose in Rec. Bot. Surv. India 18: 218. 1978.

Erect, annual, glabrous, up to 60 cm high herbs; stems slender, simple or branched, with striations. Leaves lanceolate or ovate, tapering into a petiole, up to 4.5 × 3 cm. Flowers pink when young, becoming white and glistening after maturation, closely imbricate and forming blunt or acute terminal spikes, 2.5 × 8 cm long; bracteoles smaller than perianth-leaves, lanceolate, acute. Fruits 35-40 mm long, ellipsoid. Seeds several, small, black, shining.

Fl. & Fr. : Sept.-Mar.

Specimens examined : Daltonganj, 306.

Distrib. : Throughout India, Sri Lanka & introduced in most tropical countries.

Notes : Commonly grown in gardens and elsewhere found as an escape.

Common name : Hindi : *Lalmurga*; Santal : *Sirgitarak.*

Uses : Flowers used in diarrhoea.

Remarks : Haines (Bot. Bihar & Orissa 2: 797. 1961. Rep. ed.) and Mullin (Enum. Fl. Pl. Nep. 3: 169. 1982) treat this as a variety i.e. *C. argentea* var. *cristata* (L.) Kuntze.

6. DIGERA Forssk.

Digera muricata (L.) Mart., Beitr. Amar. 2: 77. 1825; Backer in van Steenis, Fl. Malesiana ser. 1.4: 80. 1949; Townsend in Nasir and Ali, Fl. W. Pak. 71: 21, t. 3. A. 1974. *Achyranthes muricata* L., Sp. Pl. ed. 2. 295. 1762. *Digera arvensis* Forsskal, Fl. Aeg.-Arab. 65. 1775; Hook.f. in Fl. Brit. India 4: 717. 1885; Prain, Beng. Pl. 2: 868. 1903 (Rep. ed. 2: 649. 1963) and in Rec. Bot. Surv. India 3: 265. 1905.

Erect or ascending annual herbs, up to 50 cm high. Leaves alternate, variable, up to 6.2 × 3.8 cm, ovate or elliptic, acute or rounded at apex, glabrous, sometimes ciliolate on nerves beneath; petioles up to 2.5 cm long. Flowers pinkish, sessile, in long pedunculate, axillary, spike-like, bracteate racemes, up to 6.5 cm long; bracts and bracteoles shorter than perianth,

ovate-lanceolate, acute, submembranous, up to 2 mm long, persistent. Perianth segments-5, outer 2 larger. Stamens-5; filaments free. Fruits 2-3 mm in diameter, globose, compressed. Seeds small, yellowish-brown.

Fl. & Fr. : Feb.-July.

Distrib. : India, Sri Lanka, Pakistan and N. Africa.

Specimens examined : Tenarbuste (Garwah), 615.

Notes : Common in cultivated fields, road sides and also in the forest.

Common name : Beng. : *Luta mahuria*; Santal : *Kari gandhari.*

Uses : Young shoots eaten as vegetable. Seeds used in urinary troubles.

7. GOMPHRENA L.

Gomphrena serrata L., Sp. Pl. 224. 1753; Mears in Taxon 29: 86. 1980. *Gomphrena decumbens* Jacq., Hort. Schoenbr. t. 482. 1805; Gamble in Fl. Pres. Madras 1179. 1925. *Gomphrena celosioides* auct. non Mart.; Bennet in Fl. Howrah 142. 1979.

Prostrate to decumbent-ascending herbs, softly white-pilose. Leaves ovate-elliptic, oblanceolate to spathulate, acute to obtuse at apex, entire, base narrowed and sheathing. Heads white, 1 cm in diam., peduncle hairy; bracteoles-2, whitish, keeled, 5-6 cm long, ovate, acuminate. Stamens-5; filaments united below into a long tube, anthers 1-celled. Stigma 2-fid.

Fl. & Fr. : Jan.-June. Exotic.

Distrib. : Native, of tropical America, introduced in India, S. Africa, Australia, Malaysia.

Specimens examined : Betla, 55.

Notes : Common on road sides, waste lands, throughout the district.

Remarks : "The species to which the name *G. serrata* L. applies was renamed by Jacquin (1805) as *G. decumbens*, without reference to

Linnaean species name. *G. dispersa* Standley is a name applied to some phenotypes of the same variable species. *G. serrata* L. is the most common and most widely distributed non-cultivated species of *Gomphrena*. It is frequently misidentified as *G. celosioles* Martius, a closely related species restricted to South America except in cultivation" Mears.

8. IRESINE P. Browne

Iresine herbstii Hook. ex Lindl., Gard. Chron. 654. 1884; Dombrain. Floral Mag. 4. Pl. 219. 1865; Standley in N. Amer. Fl. ser. 1, 21(2): 167. 1917; Bailey, Man. Cult. Pl. ed. 2. 356. 1949. Townsend in Dassanayake, Rev. Handb. Fl. Ceylon 1: 57. 1980.

Erect or ascending perennial herbs, up to 1 m tall; stems and branches densely hairy. Leaves reddish or purplish, ovate-lanceolate. 3-5 × 2-3 cm, densely hairy beneath; petioles up to 1 cm long. Flowers diocious, sessile, in many flowered, branched panicles; panicle leafless or with much reduced leaves. Bract and bracteoles small, subhyaline deltoid-ovate, up to 1 mm long. Perianth segments oblong, lanate, 1-1.5 mm long. Fruits not seen.

Fl. : Oct.-Nov. Exotic.

Distrib. : Native of tropical America, now introduced in Europe and also in India, Mexico, West Indies.

Specimens examined : Seuti, 1077.

Notes : Not common, cultivated around the Seuti F.R.H.

9. PUPALIA A.L., Jussieu *nom. cons.*

Pupalia lappacea (L.) Juss., Ann. Mus. Natl. Hist. Nat. 2: 132. 1803; Hook.f. in Fl. Brit. India 4: 724. 1885; Townsend in Dassanayake, Rev. Handb. Fl. Ceylon 1: 28. 1980. *Achyranthes lappacea* L., Sp. Pl. 204. 1753. *Achyranthes atropurpurea* Lamk., Encycl. 1: 546. 1785. *Pupalia atropurpurea* (Lamk.) Moq. in DC., Prodr. 13(2): 331. 1849; Hook.f. in Fl. Brit. India 4: 723. 1885.

Annual, much branched, straggling herbs. Leaves variable in shape and size, narrowly ovate-elliptic to oblong or orbicular, 2-10 × 1-5 cm, acuminate to obtuse-apiculate at apex, above with scattered hairs, softly tomentose beneath. Inflorescence slender, spiky in appearence from the tapering, sharply acute tepals. Branches sterile, flowers terminating in 8-15 commonly purplish setae in 2-3 ranks. Perianth segments of perfect flowers-5, nearly equal. Stamens-5. Fruits ovoid, up to 2.5 mm long.

Fl. & Fr. : Sept.-Dec.

Distrib. : India, Sri Lanka, Pakistan, S.E. Africa.

Specimens examined : Bhavanthpur, 1170.

Notes : Common on open lands.

10. TRICHURIELLA Bennet

Trichuriella monsoniae (L.f.) Bennet in Ind. J. Forestry 8: 86. 1985. *Trichurus monsoniae* (L.f.) Townsend in Kew Bull. 29(3): 466. 1974 and in Dassanayake, Rev. Hand. Fl. Ceylon 1: 36. 1980; Guha Bakshi in Fl. Murshidabad Distr. 269. 1984. *Illecebrum monsoniae* L.f., Suppl. 161. 1781. *Celosia monsoniae* Retz., Obs. 2: 13. 1781. *Aerva monsoniae* (Retz.) Mart. in Nova Acta Phys. Med. Acad. Caes. Leop.-Carol. Nat. Cur. 13(1): 291. 1826; Hook.f. in Fl. Brit. India 4: 728. 1885 (as *Aerva monsonia*); Haines, Bot. Bihar & Orissa 2: 804. 1961 (Rep. ed.).

Prostrate or erect ascending, perennial herbs, up to 20 cm tall, with stout tap root; stems slender, with raised ridges, lanate to woolly. Leaves linear-filiform, up to 2.5 cm long, opposite often crowded in lower nodes, sessile, with acicular tip, 3-nerved, glabrous or lanate. Flowers in axillary or terminal, up to 5 × 12 mm spike; bracts lanceolate, up to 2 mm long, hyaline with green midrib; bracteoles similar, smaller. Tepals-4, lanceolate-subulate, hyaline with a green midrib, dorsally lanate, curving towards apex, up to 2.5 mm long, rose-coloured. Fruits up to 1 mm long. Seeds ovoid, reddish-brown, shining, up to 0.5 mm long.

Fl. & Fr. : Nov.-Jan.

Distrib. : India, Thailand, Sri Lanka.

Specimens examined : Tarhashi, 1125.

Notes : Rare, on the Barkamana river bank.

CHENOPODIACEAE

CHENOPODIUM L.

1a. Aromatic glandular herbs; stigmas-5; seed margin obtuse .... 2. *C. ambrosioides*

1b. Non-aromatic or slightly foetid herbs; stigmas-2; seed margin keeled :

2a. Odourless herbs; seeds smooth; shining .... 1. *C. ablum*

2b. Slightly foetied herbs; seeds obscurely rugose, dull .... 3. *C. murale*

1. Chenopodium album L., Sp. Pl. 219. 1753; Hook.f. in Fl. Brit. India 5: 3. 1886; Prain, Beng. Pl. 2: 879. 1903 (Rep. ed. 2: 657. 1963) and in Rec. Bot. Surv. India 3: 267. 1905; Haines, Bot. Bihar & Orissa 2: 808. 1961 (Rep. ed.); Backer in van Steenis, Fl. Malesiana ser. 1.4: 102. 1949; Brenan in Turrill and Milne-Redhead, Fl. Tropical E. Africa Clenopodiac. 6. 1954.

Annual erect herbs, up to 10-30 cm high; stems angled, glabrous. Leaves up to 2.5 × 1 cm, oblong lanceolate, entire to sinuate lobed, upper leaves smaller; petioles slender, up to 1.5 cm long. Flowers in axillary cluster, forming a panicle. Perianth lobes-5, greenish, 1 mm, with wing on both sides. Stamens-5, opposite to tepals, filaments filiform. Stamens-2. Seeds very small, shining.

Fl. & Fr. : Jan.-June. Exotic.

Distrib. : Pantropical, native of Europe.

Specimens examined : Betla, 42.

Notes : Common in waste lands chiefly near rice fields, all over the district.

Uses : The sap of the plant is used to improve appetite and also as anthelmintic. Young plants are eaten as vegetable.

Common name : Beng. : *Betusak*; *Bathuasak*; Santal : *Bhatua-arak*; Hindi : *Khartua-sag.*

2. **Chenopodium ambrosioides** L., Sp. Pl. 219. 1753; Hook.f. Fl. Brit. India 5: 4. 1886; Prain, Beng. Pl. 2: 879. 1903 (Rep. ed. 2: 657. 1963) and in Rec. Bot. Surv. India 3: 267. 1905; Baker in van Steenis, Fl. Males. ser. 1.4: 101. 1949; Haines, Bot. Bihar & Orissa 3: 808. 1961 (Rep. ed.).

Erect, much branched, pyramidal, up to 1 m high, strongly aromatic herb; stem striate, glandular hairy. Leaves oblong or lanceolate, acute at apex, lower sinuate dentate, upper entire, up to 10 × 3 cm, base tapering into petiole. Flowers minute, green, sessile, clustered and scattered along the numerous branchlets or in slender spike and in the axils of small oblanceolate leaves. Tepals-5, elliptic, acute, connate at base, up to 1.5 mm long. Stemens-6, up to 1.5 mm long, filaments hyaline, anthers square. Ovary globose, minutely papillose. Seeds small, up to 0.5 mm in diam., orbicular, smooth, deep brown.

Fl. & Fr. : Dec.-June. Exotic.

Distrib. : Native of Mexico, now Pantropical.

Specimens examined : Barwadih, 353.

Notes : Common on road sides, near ponds, canals etc.

Uses : Plants are used for the treatment of round hookworms and intestinal amoebae.

3. **C. murale** L., Sp. Pl. 219. 1753; Hook.f. in Fl. Brit. India 5: 4. 1886; Ramesh in Saldanha, Fl. Karnataka 1: 159. 1984.

Erect or ascending herbs. Leaves green, glabrous, ovate-rhomboid, 8 × 4 cm, irregularly lobed, sharply toothed; petioles 3.5-4 cm long. Flowers in axillary or terminal panicles. Perianth greenish, 5-lobed. Stamens-5. Seeds compressed, with sharp keel at margin.

Fl. & Fr. : Sept.-Feb.

Distrib. : Cosmopolitan.

Specimens examined : Garwah, 622.

Notes : Infrequent near or in cultivated lands.

Uses : Used as a pot-herb.

Basella rubra L. is a common vine cultivated as vegetable and *Beta vulgaris* Linn. is also cultivated for its edible roots.

POLYGONACEAE

1a. Plants erect :

2a. Tepals uniseriate, 4-5, never accrescent in fruiting; stigma capitate :

3a. Plants non-glandular ... 3. POLYGONUM

3b. Plants glandular ... 2. PERSICARIA

2b. Tepals biseriate, 3 of the inner whorl accrescent in fruiting, stigma fimbriate ... 4. RUMEX

1b. Plants climbers ... 1. ANTIGONON

1. ANTIGONON Endl.

Antigonon leptopus Hook. & Arn., Bot. Bech. Voy. 308 t. 69. 1841; Danser in Bull. Jard. Bot. Butzg. ser. 3.8: 242. 1927; Bailey, Man. Cult. Pl. ed. 2. 351. 1949; Haines, Bot. Bihar & Orissa 2: 821. 1961 (Rep. ed.).

Climbers with branchlets and rachis passing into tendrils. Leaves alternate, 3-10 × 3-8 cm, acuminate or subacuminate at apex, cordate at base, margin entire; petioles up to 2 cm long. Flowers in racemes. Tepals-5, showy, rose or white, outer 2-3 ovate-cordate or subcordate, inner one oblong. Stamens-8. Styles-3. Achenes 3-angled, enclosed in the enlarged papery perianth.

Fl. & Fr. : July-Dec. Exotic.

Distrib. : Native of Mexico, now naturalised throughout India.

Specimens examined : Bisrampur, 848.

Notes : Commonly grown as climbing ornamental; naturalised throughout the district.

2. PERSICARIA Mill.

1a. Stems with reflexed barbs; leaves broad ... 5. *P. strigosa*

1b. Stems without reflexed barbs; leaves narrow :

2a. Nuts angular, either 3-gonous or biconvex :

3a. Stamens 5-6; styles-3; nut mostly 3-gonous :

4a. Ochrea hairy; bracts eglandular, ciliate; perianth eglandular ... 1. *P. barbata*

4b. Ochrea glabrous; bracts glandular with caducous cilia; perianth glandular ... 3. *P. hydropiper*

3b. Stamens-8; styles-2; nut biconvex ... 2. *P. glabra*

2b. Nuts not angular, orbicular ... 4. *P. orientale*

1. Persicaria barbata (L.) Hara, Fl. E. Himal. 70. 1966; Maiti and Sikdar, Indian J. For. 8(3): 191. 1985. *Polygonum barbatum* L., Sp. Pl. ed. 1. 363. 1753; Hook.f. in Fl. Brit. India 5: 37. 1886; Haines, Bot. Bihar & Orissa 2: 816. 1961 (Rep. ed.); Hsu, Polyg. Taiwan 10. f. 6. 1976. *Polygonum barbatum* L. subsp. *gracile* Danser in Bull. Jard. Bot. Buitz. ser. 3. 8: 146. 1927. *Polygonum flaccidum* Roxb., Fl. Ind. ed. Carrey 2: 291. 1832 (non Meisn. 1856); Gage in Rec. Bot. Surv. India 2: 393. 1903. *Polygonum serrulatum* sensu Hook.f. in Fl. Brit. India 5: 38. 1886 (non Lagasc.) excl. var. *donii*. *Polygonum barbatum* L. var. *gracile* (Danser) Steward in Contr. Gray. Herb. 5(88): 55. 1930.

Erect ascending, slightly pubescent or nearly glabrous herbs, up to 50 cm high, stems often creeping below. Ochrea sheathing, apprssed hairy, with 1 cm long, filiform cilia. Leaves up to 9 × 1.5 cm, narrowly lanceolate, acute to acuminate at apex, glabrous, except the ciliate margin. Flowers in terminal, dense, branched racemes; bracts close ciliate. Perianth eglandular, up to 2.5 mm long, white. Nuts trigonous, up to 2 × 1.5 mm, black.

Fl. & Fr. : Oct.-Jan.

Distrib.: Pantropical.

Specimens examined : Barwadih, 424.

Notes : Common near streams and in marshy areas.

Common name : Beng. : *Bekh-unjubaj.*

2. Persicaria glabra (Willd.) Gomex de la Maza in Ann. Inst. Segunda Ensenanza Habana 2: 278. 1896. Maiti & Sikdar, Indian J. For. 8(3): 192. 1985. *Polygonum glabrum* Willd., Sp. Pl. 2: 447. 1799; Hook.f. in Fl. Brit. India 5: 34. 1886; Prain, Beng. Pl. 2: 886. 1903 (Rep. ed. 2: 663. 1963) and in Rec. Bot. Surv. India 3: 268. 1905; Haines, Bot. Bihar & Orissa 2: 814. 1961 (Rep. ed.).

Glabrous, erect, less branched herbs, up to 1 m high; stems reddish, up to 1 cm diam. Leaves lanceolate, acuminate, narrowed down at base, up to 18 × 2.8 cm, usually gland-dotted, entire, mid-vein prominent, secondary veins many, obscure, ochrea tubular, up to 2.5 cm long, not ciliate. Flowers in panicled racemes, up to 12 cm long (with peduncle), flowers 5-7 in axil of bracts, 2-3 mm long, truncate with oblique rounded apex, margin membranous, not ciliate, pedicels 1-2 mm long. Perianth 3-4 mm long, deep pink; segments oblong, obtuse. Nuts 3 mm in diam., suborbicular, biconvex, slightly compressed, shining black or brown.

Fl. & Fr. : Dec.-Apr.

Distrib. : India & Old World tropics.

Specimens examined : Netarhat, 233.

Notes : Very common near ditches and water courses.

Common name : Beng. : *Bihagni*; Santal : *Saurai-arak.*

3. P. hydropiper (L.) Spach., Hist. Veg. 10: 538. 1841; Hara in Fl. E. Himal. 23. 1971; Maiti & Sikdar, Indian J. For. 8(3): 192. 1985. *Polygonum hydropiper* L., Sp. Pl. 361. 1753; Hook.f. in Fl. Brit. India 5: 39. 1886.

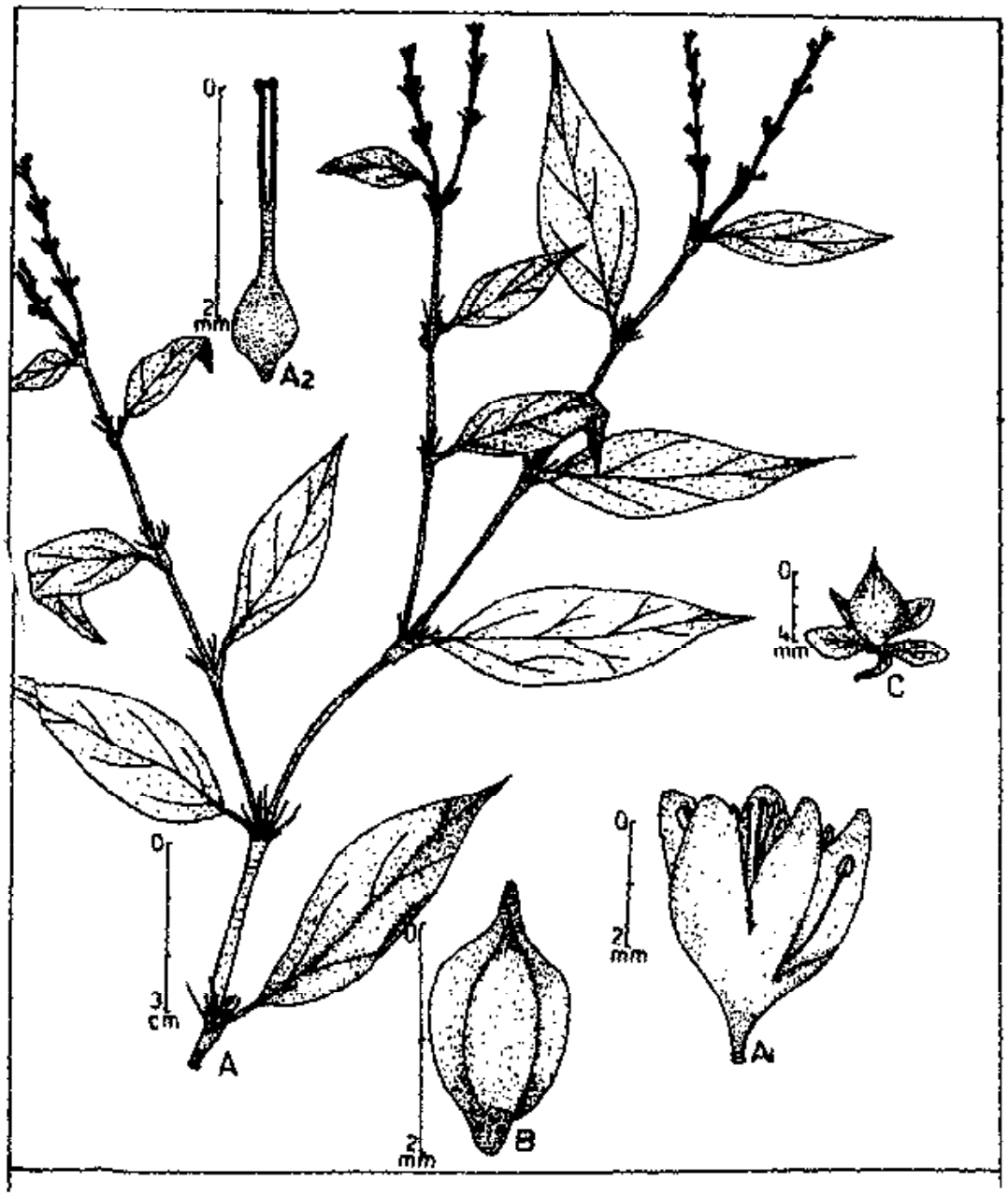


Fig. 34. Polygonaceae. (A-A_2): *Persicaria hydropiper* (L.) Spach.: A. Flowering twig; A_1. Flower enlarged; A_2. Gynoecium; B. *Persicaria barbata* (L.) Hara: Fruit; C. *Antigonon leptopus* Hook. & Arn.: Fruit.

Glabrous, erect herbs. Leaves lanceolate to elliptic-lanceolate, entire, up to 14 × 2 cm, acute to acuminate at apex, tapering at base into petiole, gland-dotted. Flowers in lax, terminal, slender racemes; bracts distant, gland-dotted, with caducous cilia. Tepals-4, gland-dotted. Stamens-5. Styles-3, connate half-way. Nuts trigonous.

Fl. & Fr. : Nov.-May.

Distrib. : Tropics and Western Europe.

Specimens examined : Bhavanathpur, 1173. Helophyte.

Notes : Common along the river bank.

4. Persicaria orientale (L.) Assenov., Fl. Reipubl. Popul. Bulgar. 3: 250. 1966; Maiti and Sikdar in Indian J. For. 8(3): 193. 1985. *Polygonum orientale* L., Sp. Pl. 362. 1753; Hook.f. in Fl. Brit. India 5: 30. 1886; Haines, Bot. Bihar & Orissa 2: 814. 1961 (Rep. ed.).

Erect, silky, villous herbs. Leaves entire, ovate, oblong, acute at apex, cordate at base, up to 18 × 7 cm, softly pubescent on both surfaces; petioles winged; ochrea sheathing, up to 1.8 cm long, membranous, truncate and dilated at mouth. Flowers white in terminal, pedunculate, cylindrical racemes, up to 11 cm long; bracts strigose-tomentose with ciliate margins. Nuts orbicular and biconvex.

Fl. & Fr. : Sept.-Feb.

Distrib. : India to Japan and Australia.

Specimens examined : Bhavnathpur, 1172. Helophyte or Hyperhydate.

Notes : Common along the margin of ponds.

5. P. strigosa (R.Br.) Nakai in Rigakkai 24: 299. 1926; Maiti & Sikdar, Indian J. For. 8(3): 194. 1985. *Polygonum strigosum* R.Br., Prodr. 420. 1810; Hook.f. in Fl. Brit. India 5: 47. 1886; Haines, Botany Bihar& Orissa 3: 818. 1961 (Rep. ed.).

Suberect herbs; stems angular, with small reflexed barbs. Leaves linear-oblong, 5-10 cm long, acute at base, acuminate at apex, midrib and margin with reflexed, small barbs; ochrea tubular, truncate, up to 2 cm long, mouth ciliate. Flowers pink, in short oblong racemes; bracts ovate or oblong, ciliate, strigose. Nuts globosely trigonous.

Fl. & Fr. : July-Sept.

Distrib. : India, Sri Lanka, Bangladesh, Malaysia and China.

Specimens examined : Kechki, 906.

Notes : Infrequent in rocky area.

3. POLYGONUM L.

1a. Leaves more than 5 cm broad and 10 cm long :

2a. Ochrea glabrous; floral bracts glabrous ... 2. *P. salicifolium*

2b. Ochrea strigose hairy; floral bracts hairy ... 3. *P. stagninum*

1b. Leaves less than 0.5 cm broad and 3 cm long ... 1. *P. plebeium*

1. Polygonum plebeium R.Br., Prodr. 420. 1810 (as *plebejum*); Hook.f. in Fl. Brit. India 5: 27. 1886; Haines, Botany Bihar & Orissa 2: 813. 1961 (Rep. ed.); Hara in Fl. E. Himal. 75. 1966.

Diffusely branched, prostrate to ascending herbs; stems slender, many from the woody root stock. Leaves linear, oblong, up to 20 × 3 mm entire, subsessile, with bulbous based hairs; ochrea hyaline, small, laciniate. Flowers axillary, 2-5 in clusters, sessile, 2-3 mm long; bracts membranous. Styles-3. Nuts trigonous, 1-1.5 mm long, brown, shining.

Fl. & Fr. : Feb.-May.

Distrib. : Tropical regions of the Old World.

Specimens examined : Daltonganj, 21. Helophyte.

Notes : Common in cultivated fields throughout the district.

Uses : Eaten as vegetable and also used in bowel complaints.

2. Polygonum salicifolium Willd., Enum. Hort. Berol. 428. 1809; Ramesh & Kumar in Saldanha, Fl. Karnataka 1: 181. 1984. *Polygonum serrulatum* Lag., Gen. & Sp. Pl. Nov. 14. 1886; Hook.f. in Fl. Brit. India 5: 38. 1886; Haines, Bot. Bihar & Orissa 2: 816. 1961 (Rep. ed.).

Slender herbs; branches glabrous. Leaves, subsessile, linear-oblong or linear-lanceolate, acute at apex, narrowed down at base, margin entire, up to 10 × 1.5 cm, glabrous, nerves hairy; ochrea up to 1.8 cm long (excluding bristles), tubular, long ciliate at mouth, cilia up to 7 mm long, ochrea somewhat strigose hairy. Flowers in terminal racemes; bracts acute with ciliated margin. Perianth lobes-5. Stamens-5-8. Styles-3, connate in half-way. Nuts trigonous, black, shining, up to 1 mm long, ellipsoid.

Fl. & Fr. : Oct.-Jan.

Distrib. : W. Asia, S. Europe, America, Australia and Africa.

Specimens examined : Tarhashi, 1126. Helophyte.

Notes : Infrequent in marshy areas, near ponds.

3. P. stagninum Buch.-Ham. ex Meisner. in Wall., Pl. As. Rar. 3: 56. 1832; Hook.f. in Fl. Brit. India 5: 37. 1886; Haines, Bot. Bihar & Orissa 2: 816. 1961 (Rep. ed.); Ramesh & Kumar in Saldanha, Fl. Karnataka. 1: 181. 1984.

Erect or ascending undershrubs, 50-90 cm high, branched above. Leaves linear-lanceolate, up to 12 × 1.5 cm, acuminate at apex, base attenuated into a short petiole, pubescent, strigosely hairy on both surfaces; ochrea up to 2 cm long, tubular, strigose hairy, cilia at mouth 1.2 cm long. Flowers in terminal racemes, up to 4 cm long; bracts glabrous with ciliated margin. Perianth lobes white, up to 3.5 mm long. Stamens-5-7. Styles-3, connate half - way. Nuts trigonous with subacute angle, ovoid, up to 2.5 mm long.

Fl. & Fr. : Oct.-Dec.

Distrib. : India, Myanmar.

Specimens examined : Paton, *Sarma* 1051. Helophyte or Hyperhydate.

Notes : Rare in moist areas and on the margins of ponds.

4. RUMEX L.

Rumex dentatus L., Mant. 2: 226. 1771; Hook.f. in Fl. Brit. India 5: 59. 1886; Haines, Bot. Bihar & Orissa 2: 820. 1961 (Rep. ed.); Maiti & Sikdar, Indian J. For. 8(3): 196. 1985.

Erect, glabrous, branched herbs, 15-90 cm high. Leaves radical or cauline, oblong, obtuse, glabrous, 8-10 × 3-3.5 cm, gradually smaller at apex, base rounded or cordate; petioles of the radical leaves up to 6 cm long. Flowers pedicelled, whorled, in axillary clusters. Tepals up to 5 mm long, inner ones broadly ovate with laciniate margins. Nuts trigonous, slightly winged.

Fl. & Fr. : Feb.-June.

Distrib. : India, China, Philippines.

Specimens examined : Daltonganj, 2.

Notes : Common in the marshy areas throughout the district.

Uses : Roots are used in cutaneous diseases.

LAURACEAE

1a. Twining, leafless parasitic herbs ... 1. CASSYTHA

1b. Leafy, autotrophic trees ... 2. LITSEA

1. CASSYTHA L.

Cassytha filiformis L., Sp. Pl. 35. 1753; Wight, Ic. t. 1847. 1852; Hook.f. in Fl. Brit. India 5: 188. 1886; Haines, Bot. Bihar & Orissa 3: 838. 1961 (Rep. ed.); Saldanha & Ramesh in Saldanha, Fl. Karnataka 1: 60. 1984.

Herbaceous, twining parasites; stems green, pubescent or nearly glabrous, attached to the host by suckers. Leaves reduced to minute scale or absent. Flowers white, small, in 1-5 cm long spike; bracts deciduous; bracteoles-3, small, ovate, margin ciliate. Perianth twice as long as bracteoles; segments-6, in two rows, outer 3 short, orbicular, ciliate, inner 3 longer, oblong, acute. Stamens-9, in 3 whorls, 3rd whorl extrose, with stipitate glands; staminodes in 4th whorl with stipitate glands. Drupes globose, smooth, enclosed by enlarged perianth and crowned by erect segments.

Fl. & Fr. : Sept.-Jan.

Distrib. : Pantropical.

Specimens examined : Muhammadganj, 991.

Notes : Common on *Carissa paucinervia* A.DC. and *Holarrhena pubescence* (Buch.-Ham.) Wall., in the forest.

Common name : Beng. : *Akashbel*; Hindi : *Amarbeli.*

LITSEA Lamk. *nom. cons.*

Litsea glutinosa (Lour.) C.B. Robinson, Philipp. J. Sci. (Bot.) 6: 321. 1911; Baker & Bakh.f., Fl. Java. 1: 125. 1963; Saldanha & Ramesh in Fl. Karnataka 1: 67. 1984. *Sebifera glutinosa* Lour., Fl. Cochinch. 638. 1790. *Litsea sebifera* Pers., Synop. 2: 4. 1807; Hook.f. in Fl. Brit. India 5: 157. 1886; Haines, Bot. Bihar & Orissa 3: 832. 1961 (Rep. ed.). *Litsea chinensis* Lamk., Encycl. 3: 574. 1791; Gamble in Fl. Pres. Madras 1235. 1925.

Moderate sized trees; shoots and leaves odorous. Leaves elliptic-lanceolate, acute to acuminate at apex, narrowed at base, up to 13 × 5 cm, grey pubescent, especially on the lower surface, secondary nerves 6-12, reaching up to margin; petioles up to 2.5 cm long, tomentose. Peduncle up to 3 cm long, grey-pubescent. Umbellules shortly pedicellate, bracteate, crowded at the tip of the peduncle. Perianth lobes-0. Stamens and staminodes hairy. Fruits globose, black.

Fl. & Fr. : June-Nov.

Distrib. : India, Malay Islands, China and Australia.

Specimens examined : Betla, 480.

Notes : Commonly found in the forest, all over the district.

Common name : Beng. : *Kukurchita, garur*; Hindi : *Maida lakri, menda*.

Uses : Wood used for house building, furniture, packing cases, and agricultural implements. Bark used in diarrhoea and dysentery. Fruits edible and seeds yield a fat used for candles and soap-making.

PROTEACEAE

GREVILLIA R.Br.

Grevillia robusta A. Cunn. in R.Br., Pro. Nov. 24. 1830; Haines, For. Fl. Chotanagpur 80 & 358. 1910 & in Bot. Bihar & Orissa 3: 839. 1961 (Rep. ed.); Baily in Man. Cult. Pl. 345. 1949.

Handsome trees; young branches hoary or rusty tomentose. Leaves bipinnatifid, secondary lobes entire or again lobed, lanceolate, acute to acuminate at apex, margin recurved, silky beneath. Flowers irregular, orange, in up to 15 cm long racemes, solitary or several together in axil of a bracts, on short leaf less branches of old stems. Perianth tube dilated at base and often recurved below limb; tepals connate. Anthers sessile. Ovary stipitate, glabrous; style long.

Fl. : Mar.-May. Exotic.

Distrib. : Native of Australia (Queensland, New S. Wales), introduced elsewhere including India.

Specimens examined : Netarhat, 160.

Notes : Common as an avenue tree on the way to Netarhat Public School.

LORANTHACEAE

1a. Flowers unisexual; leaves absent, if present then without midrib ... 3. VISCUM

1b. Flowers bisexual; leaves well-developed with midrib :

2a. Flowers regular; corolla tube not split on one side ... 1. DENDROPHTHOE

2b. Flowers irregular; corolla tube split half-way on one side ... 2. SCURRULA

1. DENDROPHTHOE Mart.

Dendrophthoe falcata (L.f.) Etting in Denkschr. Kaiserl. Akad. Wiss. Math. Naturewise Kl. 32: 52-53, 58. t. 13, f. 14. 1872; Ramam. in Sald. & Nicol., Fl. Hassan 305. 1976. *Loranthus falcatus* L.f., Suppl. 211. 1781. *Loranthus longiflorus* Desr. in Lamk., Encycl. 3: 598. 1792; Hook.f. in Fl. Brit. India 5: 214. 1886; Haines, Bot. Bihar & Orissa 3: 840. 1961 (Rep. ed.).

Semiparasites. Leaves ovate to lanceolate, or elliptic, acute at apex, cordate-amplexicaul at base, up to 9.5 × 5.5 cm, entire at margin, thick; petioles 5-7 mm long. Flowers in axillary racemes. Calyx cup-shaped, persistent. Corolla tube curved, slightly inflated upwards, orange, split at back; lobes-5, linear, reflexed. Free portion of filaments equal to length of linear anther. Style angular; stigma subglobose. Fruits ovoid-oblong, up to 1 cm long, with persistent calyx-limb.

Fl. & Fr. : Dec.-Mar.

Distrib. : India, Sri Lanka, and Malacca.

Specimens examined : Netarhat, 193.

Notes : Common in the forest on *Lagerstroemia parviflora* Roxb.

Common name : Beng. : *Baramand*; Hindi : *Banda.*

2. SCURRULA L.

Scurrula parasitica L., Sp. Pl. 110. 1753; Babu, Herb. Fl. Dehra Dun 450. 1977. *Loranthus scurrula* Linn., Sp. Pl. ed. 2.1: 472. 1762 (*nom. illeg.*); Hook.f. in Fl. Brit. India 5: 208. 1886 *pro parte*; Haines, Bot. Bihar & Orissa 3: 841. 1961 (Rep. ed.).

Small, bushy semiparasites, stems terete; young parts tomentose; bark lenticellate. Leaves opposite, ovate-elliptic to oblong, up to 6.5 × 3.8 cm, acute at apex and obtuse at base, tomentose beneath, young leaf rusty tomentose; petioles 5-8 cm long. Flowers in axillary, subracemose fascicles; bracts minute, obliquely ovate. Calyculus truncate. Perianth greenish-yellow, tomentose; lobes acute. Fruits tomentose.

Fl. & Fr. : Oct.-Jan.

Distrib. : Throughout India and Sri Lanka.

Specimens examined : Netarhat, 181.

Notes : Common in the forest on *Woodfordia fruticosa* (L.) Kurz and *Terminalia* species.

Common name : Hindi & Santal : *Banda.*

3. VISCUM L.

Viscum articulatum Burm.f., Fl. Ind. 311. 1768; Hook.f. in Fl. Brit. India 5: 226. 1886; Rao in J. Ind. Bot. Soc. 36: 152. 1957; Haines, Bot. Bihar & Orissa 3: 843. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 451. 1977. *V. nepalense* Spreng., Syst. Cur. Post. 47. 1827.

Leafless, shrubby, monoecious semiparasite; stems jointed; internodes flattened, green with longitudinal striation. Flowers 3-4 merous, subsessile, fascicle, in the axils of cupular bracts. Perianth lobes of male flower reflexed, those of female flower erect, triangular, 2-bracteolate. Fruits subglobose, up to 4 mm across, greenish-yellow.

Fl. & Fr. : Feb.-Apr.

Distrib. : India, Sri Lanka and Malaysia.

Specimens examined : Netarhat, 197.

Notes : Common in the forest on *Madhuca longifolia* (Koenig) Mac Bride.

Common name : Beng. : *Mandada*; Hindi : Badu, Bandala; Santal : *Katkomjanga.*

EUPHORBIACEAE

1a. Flowers naked, arranged in cyathia :

2a. Involucre regular, greenish ... 7. EUPHORBIA

2b. Involucre obliquely zygomorphic, greenish-red ... 13. PEDILANTHUS

1b. Flowers with perianth, not arranged in cyathia :

3a. Cells of the ovary 1-ovuled :

4a. Petals present in one or both sexes, or if absent then calyx petaloid :

5a. Leaves palmately nerved, palmately lobed :

6a. Flowers in racemes; petals absent ... 12. MANIHOT

6b. Flowers in 2-3-chotomous cymes; petals present in both sexes ... 9. JATROPHA

5b. Leaves penninered, not lobed ... 5. CROTON

4b. Petals absent in both sexes :

7a. Calyx of the male flower imbricate in bud :

8a. Capsule smooth or hispid, not echinate :

9a. Stamens-10 or more ... 3. BALIOSPERMUM

9b. Stamens less than-10 ... 18. TRAGIA

8b. Capsule echinate ... 16. SEBASTIANIA

7b. Calyx of the male flower valvate in bud :

10a. Stamens many, if few then leaves peltate :

11a. Leaves palmately lobed; stamens central, connate, repeatedly branched ... 15. RICINUS

11b. Leaves not lobed; stamens not branched :

12a. Leaves opposite; style long-linear; fruits drupaceous ... 19. TREWIA

12b. Leaves alternate; style fimbriate; fruits 2-3-coccus ... 11. MALLOTUS

10b. Stamens few, less than 10; leaves not peltate ... 1. ACALYPHA

3b. Cells of the ovary 2-ovuled :

13a. Calyx valvate in bud; petals present ... 4. BRIDELIA

13b. Calyx imbricate in bud; petals absent :

14a. Flowers monoecious :

15a. Fruits a dry capsule :

16a. Herbs; leaves less than 3 cm long, obtuse or rounded ... 14. PHYLLANTHUS

16b. Trees; leaves more than 3 cm long, obtuse to acute ... 8. GLOCHIDION

15b. Fruits a berry :

17a. Shrubs; fruits fleshy, dark-purple ... 10. KIRGANELIA

17b. Trees; fruits fleshy, pale yellow or yellowish-grey ... 6. EMBLICA

14b. Flowers dioecious :

18a. Male flowers in lax spikes ... 2. ANTIDESMA

18b. Male flowers in axillary clusters ... 17. SECURINEGA

1. ACALYPHA L.

1a. Bracts crowded, fimbriate; capsule glabrous ... 1. *A. ciliata*

1b. Bracts distant, shortly dentate; capsule hispid ... 2. *A. indica*

1. Acalypha ciliata Forssk., Fl. Aegypt. - Arab. 162. 1775; Hook.f. in Fl. Brit. India 5: 417. 1887; Haines, Bot. Bihar & Orissa 1: 117. 1961 (Rep. ed.); Mooney in Suppl. Bot. Bihar & Orissa 31. 1950.

Stout herbs, up to 75 cm high; stems erect, branches few, pubescent when young. Leaves ovate or ovate-lanceolate, up to 5 × 2.8 cm, acuminate or caudate-acuminate at apex, serrate at margin, pubescent on nerves beneath, base rounded, 5-nerved; petioles slender, up to 4 mm long. Flowers in axillary spikes; males few, minute and sessile at top of spike; females many, crowded at its base; bracts large, pale green, up to 5 × 4 mm, 1-2 flowered, exceeding the capsules, strongly nerved, many nerves ending in

long subulate hispid teeth. Capsule glabrous, cocci very thin, white. Seeds globose-ovoid, smooth, up to 1.5 mm long.

Fl. & Fr. : Aug.-Dec.

Distrib. : India, Sri Lanka, Arabia and Tropical Africa.

Specimens examined : Palamau Fort (Betla), 1114.

Notes : Infrequent on walls of the ruins of fort.

2. **Acalypha indica** L., Sp. Pl. 1003. 1753; Hook.f. in Fl. Brit. India 5: 416. 1887; Haines, Bot. Bihar & Orissa 1: 117. 1961 (Rep. ed.); Mukherjee, Fl. Pach. Bori Res. 267. 1984.

Erect, pubescent, annual herbs, up to 60 cm high. Leaves ovate or rhomboid-ovate, up to 5.5 cm long, acute or obtuse, shortly acuminate at apex, cuneate at base, serrate at margin. Flowers in axillary spikes; males small, at summit of spikes; females 3-5, surrounded by bracts. Ovary 3-lobed, hispid. Capsules small, hispid, concealed by bracts, usually 1-seeded.

Fl. & Fr. : Aug.-Dec.

Distrib. : India, Sri Lanka, Philippines and Tropical Africa.

Specimens examined : Bhavnathpur, 1176.

Notes : Common in waste lands.

2. ANTIDESMA L.

Antidesma acidum Retz., Obs. Bot. 5: 30. 1789; Fischer in Bull. Misc. Inf. Kew 1932: 65. 1932; Airy Shaw in Kew Bull. 26: 352. 1972. *A. diandrum* (Roxb.) Roth, Nov. Pl. Sp. 369. 1821; Hook.f. in Fl. Brit. India 5: 361. 1887; Babu, Herb. Fl. Dehra Dun 455. 1977; Haines, Bot. Bihar & Orissa 1: 142. 1961 (Rep. ed.). *Stilago diandra* Roxb., Pl. Cor. 2: 35. t. 166. 1798 et in Fl. Ind. 3: 759. 1832.

Large, erect dioecious shrubs; young branches rusty pubescent. Leaves 6-9 × 3-5 cm, obovate-elliptic to obovate-lanceolate, acuminate at

apex, rounded-cuneate or acute at base, entire, glabrous, except sparsely hairy on nerves beneath; petioles grooved above, rusty-tomentose, up to 4 mm long. Flowers minute in solitary racemes. Female flowers in glabrous racemes, all pedicelled; bracts ovate-acute. Perianth shortly 4-lobed. Stamens-2, in cavities of unlobed glabrous disc. Fruits subglobose to ellipsoid, red. Seeds slightly compressed, rugose.

Fl. & Fr. : June-Dec.

Distrib. : Throughout India and Sri Lanka.

Specimens examined : Barwadih, 412.

Notes : Not common. Growing near water falls (streams) and on the hill slopes.

Common name : Hindi : *Amti*; Santal : Matha arak.

3. BALIOSPERMUM Bl.

Baliospermum montanum (Willd.) Muell.-Arg. in DC., Prodr. 15(2): 1125. 1866; Haines, Bot. Bihar & Orissa 1: 119. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 455. 1977; Airy Shaw, Kew Bull. 36: 267. 1981. *Jatropha montana* Willd., Sp. Pl. 4: 563. 1805; *Baliospermum axillare* Bl., Bijdr. 604. 1825; Hook.f. in Fl. Brit. India 5: 461. 1887.

Erect, branched undershrubs; young branches strigose hairy. Leaves sinuate-toothed, lower large, ovate, often palmately 3-5 lobed, upper small, lanceolate, hairy; petioles 3-4 mm long, strigose hairy. Flowers in axillary racemes or contracted panicles, all male or few female below. Perianth lobes-5, ovate, acute, up to 2 × 1.5 mm. Capsules obovoid, usually hairy, of 3 two-valved crustaceous cocci.

Fl. & Fr. : Oct.-Apr.

Distrib. : India, Myanmar, Thailand.

Specimens examined : Betla, 32.

Notes : Common in the forest and also in exposed areas.

4. BRIDELIA Willd.

1a. Leaves broadly elliptic, secondary nerves less than 20 pairs and forked near the margin ... 1. *B. montana*

1b. Leaves ovate or elliptic-oblong, secondary nerves more than 20 pairs, not forked ... 2. *B. retusa*

1. Bridelia montana Willd., Sp. Pl. 4: 978. 1806; Hook.f. in Fl. Brit. India 5: 269. 1887; Haines, Bot. Bihar & Orissa 1: 124. 1961 (Rep. ed.).

Small or moderate-sized, glabrous, deciduous trees. Leaves membranous, variable, up to 20 × 11 cm, broadly elliptic, rounded at base, margin entire, acute or mucronate at apex, secondary nerves 8-15 pairs, forked near the margin, slightly arched, pubescent beneath; petioles up to 12 mm long, stout. Flowers small, greenish-yellow, shortly pedicelled and arranged in dense axillary clusters; bracts ciliate. Sepals triangular-ovate. Petals broadly ovate, entire. Fruits up to 8 mm in diam., globose.

Fl. & Fr. : Aug.-Dec.

Distrib. : India, Bhutan and Myanmar.

Specimens examind : Bisrampur, 654.

Notes : Common in the forest.

Common name : Hindi : *Khaja, Gondui.*

2. B. retusa (L.) Spreng., Syst. Veg. 3: 48. 1826; Hook.f. in Fl. Brit. India 5: 268. 1887; Haines, Bot. Bihar & Orissa 1: 123. 1961 (Rep. ed.). *Clutia retusa* L., Sp. Pl. 1042. 1753.

Moderate sized trees, with spines on trunk when young. Leaves ovate or elliptic-oblong, obtuse, rounded or acute at apex, rounded at base, entire, up to 18 × 7 cm, secondary nerves parallel, up to 30 pairs, ultimately meet the marginal one, pubescent beneath; petioles up to 12 mm long, slightly pubescent. Flowers small, green, in axillary clusters or in long spikes, male & female intermixed. Male flowers pedicelled and female subsessile. Sepals lanceolate. Petals of male broad, angular, toothed and of female oblong, entire, persistent. Fruits globose, seated on persistent sepals and petals, purplish black, succulent; cocci dehiscent, up to 7 mm across.

Fl. : Aug.-Oct.; *Fr.* : Nov.-Jan.

Distrib. : India, Myanmar & Sri Lanka.

Specimens examined : Barwadih, 363.

Notes : Common in the forests.

Common name : Beng. : *Kasai, Kosai*; Santal : *Kadrupala*; Hindi : *Ekdania*.

Uses : Wood used for various purposes and fruits edible.

5. CROTON L.

1a. Trees; leaves more than 10 cm long; fruits covered by flat scales ... 2. *C. oblongifolius*

1b. Suffruticose herbs; leaves less than 10 cm long fruits not covered by flat scales ... 1. *C. bonplandianum*

1. Croton boplandianum Baill. in Adansonia 4: 339. 1864; Croizat in J. Bombay Nat. Hist. Soc. 41: 573. 1940; Maheshwari in Fl. Delhi 317. 1963; Radcliffe-Smith in Kew Bull. 30(4): 675. 1975; Guha Bakshi, Fl. Murshidabad Distt. 283. 1984. *Croton sparsiflorum* Morong., Sphalm. auct. Indic. 'Morung' in Ann. N.Y. Acad. Sci. 7: 221. 1893; Haines, Bot. Bihar & Orissa 1: 109. 1961 (Rep. ed., as *C. sparsiflorus*).

Suffruticose annual herbs, up to 70 cm high, sparsely stellate hairy. Leaves lanceolate, ovate, or elliptic-ovate, 2.5-4 × 1-2.2 cm, glabrous or subglabrous above, acute or acuminate at apex, base obtuse and 3-nerved. Racemes 5-7 cm long. Male flowers fascicled above, in the axils of bracts; bracts minute, up to 3.5 mm in diam. Stamens 10-15. Female flowers at the base of racemes, solitarily arranged, with large gland. Petals-0. Disc as red glands. Ovary densely stellate hairy. Fruits up to 4 mm long. Seeds carunculate.

Fl. & Fr. : Apr.-Oct. Exotic.

Distrib. : Pantropic, native of South Paraguya.

Specimens examined : Tarhashi, 1128.

Notes : Common in waste places, often seen in pure formation.

2. Croton oblongifolius Roxb., Fl. Ind. 3: 685. 1832; Hook.f. in Fl. Brit. India 5: 386. 1887; Haines, Bot. Bihar & Orissa 1: 108. 1961 (Rep. ed.).

Trees. Leaves oblong or narrowly elliptic to elliptic, coriaceous, serrate or coarsley, obtusely or acutely toothed, up to 20 × 6 cm, crowded at the top of branchlets. Flowers monoecious, on long racemes. Male flowers at upper portion of racemes; sepals broadly oblong; petals as long as sepals; disc glands-5; stamens-12. Female flower at base of racemes; sepals oblong; petals small; styles-3. Capsules subglobose, covered with flat scales, splitting into 2-valved cocci.

Fl. & Fr. : Jan.-May.

Distrib. : India, Myanmar, Sri Lanka.

Specimens examined : Netarhat, 144.

Notes : Common in the forests

Common name : Beng. : *Putri*; Santal : *Gote*.

Uses : The bark and roots are used as purgative and also used in dysentery.

6. EMBLICA Gaertn.*

Emblica officinalis Gaertn., Fruct. 2: 122. t. 108. 1790; Haines, Bot. Bihar & Orissa 1: 132. 1961 (Rep. ed.); Ramam. in Sald. & Nicol., Fl. Hassan 336. 1976; Mukherjee in Fl. Pach. Bori Res. 270. 1984. *Phyllanthus emblica* L., Sp. Pl. 982. 1753; Hook.f. in Fl. Brit. India 5: 289. 1887.

Medium-sized trees, with greenish-grey or reddish bark; branchlets hairy. Leaves distichous, linear, closeset, imbricate when young, up to 15 × 3 mm, acute to apiculate at apex, shortly petioled, glabrous; stipules fimbriateor with hairy tip. Flowers densely fasicled on new shoot. Male

*Of late *Emblica* Gaertn. has been considered as invalid by Panigrahi and Murti, Fl. Bilaspur 1: 39. 1989 as such *Phyllanthus emblica* L. is the correct name.

on slender pedicels; female subsessile, few. Fruits globose, succulent, with 6 obscusre vertical furrows, pale-yellow, up to 2.5 cm across.

Fl. & Fr. : Mar.-Dec. Deciduous Mar.-Apr.

Distrib. : India, Sri Lanka, Malaysia and China.

Specimens examined : Netarhat, 788.

Notes : Very common in deciduous forests, throughout the district.

Common name : Beng. : *Amlaki, Amla*; Hindi : *Amla, Amlika, Aonla*; Kol. : *Miral.*

Uses : Fruits sour and astringent, cooling, diuretic, laxative. Eaten raw or cooked, also pickled; a rich source of vit. C. Fruits used also in hair dyes. Dried fruits are used for shampooing hair. Dried chopped fruits with salts are eaten as 'Mukhsuddi' for digestion.

7. EUPHORBIA L.

1a. Shrubs; stems thick, fleshy, cylindric; leaves absent ... 9. *E. tirucalli*

1b. Herbs or undershrubs; stems slender, erect, ascending or prostrate; leaf present :

2a. Undershrubs; with leaf-like coloured bracts below the involucres ... 4. *E. heterophylla*

2b. Herbs; without leaf-like coloured bracts :

3a. Leaves alternate below and opposite above :

4a. Involucre solitary, glands of the involucre without a petaloid limb; seeds tuberculate ... 2. *E. dracunculoides*

4b. Involucre 2-4, glands of the involucre with a petaloid limb; seeds reticulately pitted ... 3. *E. helioscopia*

3b. Leaves opposite throughout :

5a. Leaves more than 1 cm long :

6a. Glands with distinct limb; seeds pitted ... 7. *E. indica*

6b. Glands without or with an obscure limb; seeds rugulose ... 6. *E. hirta*

5b. Leaves less than 1 cm long :

7a. Capsule glabrous ... 5. *E. heyneana*

7b. Capsule pubescent :

8a. Capsule pubescent all over ... 8. *E. thymifolia*

8b. Capsule pubescent at the angles of the cocci only, glabrous elsewhere ... 1. *E. chamaesyce*

1. Euphorbia chamaesyce L., Sp. Pl. 455. 1753; Shah & Yogi in J. Bombay Nat. Hist. Soc. 69: 448. 1972. *Euphorbia prostrata* Ait., Hort. Kew. ed. 1.2: 139. 1789; Hook.f. in Fl. Brit. India 5: 266. 1887; Santapau in Bull. Bot. Soc. Bengal 8: 26. 1954; Babu, Herb. Fl. Dehra Dun 460. 1977; Airy Shaw in Kew Bull. 37(1): 19. 1982.

Annual herbs, prostrate to suberect, puberulous, up to 10 cm long, much branched; stems reddish. Leaves opposite, small, up to 4 × 2.5 mm, oblong or oblong-obovate, rounded at apex, margin pinkish, entire, rounded or sometimes oblique at base; petioles up to 1 mm long. Involucre short, axillary, leafy raceme like branches in only one axil of a node, 0.8 mm long, campanulate, glabrous; peduncle up to 1.5 mm long, glands-4, minute, appendaged; lobes-5. Capsules up to 1.5 mm long, globose-trigonous, angle pubescent. Seeds 1 mm long, pale-reddish, oblong, 4-angled, transversely wrinkled.

Fl. & Fr. : Dec.-Apr. Exotic.

Distrib. : Pantropical Native of W. Africa and Mauritius.

Specimens examined : Simultarh (Daltonganj), 277.

Notes : Rare along road sides, dry barren fields, and on the banks of the Koel river.

Remarks : Shaw (*Loc. cit.*) following Wild (Weed & Aliens in Africa 17. 1968) treats them as conspecific and adopts the name *E. chamaesyce* L.

2. E. dracunculoides Lamk., Dict. Bot. 1.2: 428. 1786; Hook.f. in Fl. Brit. India 5: 262. 1887; Prain, Beng. Pl. 2: 924. 1903 (Rep. ed. 2: 691. 1963) & in Rec. Bot. Surv. India 3: 272. 1905; Santapau in Bull. Bot.

Soc. Bengal 8: 11. 1954; Haines, Bot. Bihar & Orissa 1: 150. 1961 (Rep. ed.); Vickery in Enum. Fl. Pl. Nep. 3: 195. 1982. *Euphorbia angustifolia* Buch.-Ham. ex D.Don, Prodr. 62. 1825; Hook.f. in Fl. Brit. India 5: 265. 1887.

Glabrous, much branched, erect herbs, up to 40 cm high. Leaves opposite, exstipulate, up to 55 × 5 mm, linear or linear-oblong, sub-acute to acute at apex, entire, acute or obtuse at base, sessile, floral leaves shorter. Involucre solitary, up to 2 mm across, short peduncled, glabrous outside, hairy inside, campanulate; lobes ovate, ciliolate. Filaments slightly pubescent; anthers bilobed, yellow. Styles short, free, bifid at apex. Capsules 3-4 mm in diam. Seeds 2-2.5 mm long, ellipsoid, tuberculate.

Fl. & Fr. : Dec.-Mar.

Distrib. : Egypt, Arabia, Pakistan, India.

Specimens examined : Daltonganj, 337.

Notes : Common in harvested rice fields.

Common name : Beng. : *Chhagal puputi*; Santal : *Parwa.*

3. **Euphorbia helioscopia** L., Sp. Pl. 459. 1753; Hook.f. in Fl. Brit. India 5: 262. 1887.

Erect, dichotomously branched herbs, up to 60 cm high. Leaves alternate, shortly petioled or subsessile, obovate-spathulate, acute or acuminate-mucronate, 2.5-5.5 × 0.6-1.2 cm. Flowers in cyathia. Involucre orbicular or oblong, lacerate, turbinate; glands fimbriate. Stamens many in 5-groups, up to 2 mm long; disc., red. Capsules smooth, globose. Seeds reticulately pitted.

Fl. & Fr. : Feb.-Apr. Exotic.

Distrib. : Afghanisthan and Westward to Atlantic, Japan; introduced elsewhere including India from Afghanisthan.

Specimens examined : Netarhat, 11.

Notes : Common along the roads (towards Upper Ghagri).

Common name : Hindi : *Hirusecah.*

Uses : Juice of the plant used in rheumatism, roots used as anthelmintic and seeds used in cholera.

4. Euphorbia heterophylla L., Sp. Pl. 453. 1753; A.R. Smith in Kew Bull. 2: 264. 1972; Haines, Bot. Bihar & Orissa 1: 149. 1961 (Rep. ed.). *Euphorbia prunifolia* Jacq., Hort. Schoenbs. 3: 15. t. 277. 1798; Hook.f. in Fl. Brit. India 5: 266. 1887.

Herbs, up to 60-90 cm long. Leaves long petioled, oblong-obovate, up to 7 cm long, subentire or shallowly denticulate, lower alternate and upper opposite, with stipular glands. Involucre small, 2-3 mm at flowering time, campanulate, in dense corymbose cymes, 2.5 cm in diam., the subtending leaves whitish or pale near base. Male flowers numerous, without bracteoles. Anthers broadly oblong, with longitudinal dehisence. Fruits glabrous, up to 5 × 4 mm. Seeds grey, surface rough, truncate at the base, 3 mm long.

Fl. & Fr. : Aug.-Oct.

Specimens examined : Daltonganj, *Sarma* 261 & 338.

Distrib. : Throughout India.

Notes : Common in open lands and barren cultivated fields.

5. E. heyneana Sprengel, Syst. Veg. 3: 791. 1826; Panigrahi in Kew Bull. 29(4): 695. 1974; Guha Bakshi in Fl. Mursidabad Distt., 285. 1984. *E. microphylla* Heyne ex Roth, Nov. Pl. Sp. 229. 1821 (non Lam. 1788); Hook.f. in Fl. Brit. India 5: 252. 1887; Haines, Bot. Bihar & Orissa 1: 153. 1961 (Rep. ed.). *E. orbiculata* Miq., Fl. Ind. Bat. 1(2): 421. 1859 (Non H.B.K. 1817); Rajagopal & Panigrahi, Taxon 17: 547. 1968. *E. serpens* Kunth var. *indica* Engelm. ex Boiss. in DC., Prodr. 15(2): 30. 1862. *E. bombaiensis* Sant. in Bull. Bot. Soc. Beng. 8: 17. 1954 [excl. Syn. *E. thymifolia* var. *microphylla* (Lam.) Thell.].

Annual herbs, 10-40 cm tall, often prostrate at basal nodes, sparsely hairy throughout, slender. Leaves oblong, up to 3 × 1 cm, rounded at apex,

base oblique, margin toothed at the upper portion, sparsely hairy; petioles up to 1.5 cm long; stipules very small. Involucre axillary, solitary, up to 1 mm long, cup like, glabrous. Peduncles up to 0.5 mm long during anthesis, and up to 1.5 mm long in fruiting; bracts subulate; lobes triangular, acute subentire, glands stipitate. Capsules up to 2 mm in diam., oblong-trigonous. Seeds up to 1 mm long, smooth, oblong,4-angled, bluish-black.

Fl. & Fr.: Sept.-Jan.

Distrib.: India and Java.

Specimens examined : Garwah, 591.

Notes: Infrequent on the hill slopes and near the water courses.

6. Euphorbia hirta L., Sp. Pl. 454. 1753; Haines, Bot. Bihar & Orissa 1: 152. 1961 (Rep. ed.); Santapau in Bull. Bot. Soc. Beng. 5: 15. 1954; Airy Shaw in Kew Bull. 37(1): 18. 1982. *Euphorbia pilulifera* (auct. non L. 1753) Hook.f. in Fl. Brit. India 5: 250. 1887; Prain, Beng. Pl. 2: 925. 1903 (Rep. ed. 2: 692. 1963) and in Rec. Bot. Surv. India 3: 272. 1905. *Chamaesyce hirta* (L.) Millsp. in Publ. Field Mus. Bot. 2: 303. 1909.

Erect to prostrate, roughly hairy herbs, up to 60 cm long. Leaves opposite, pairs unequal, elliptic-oblong or obovate, up to 2.5 × 0.8 cm, acute, serrulate; petioles 1-3 mm long. Cyathia axillary, up to 1 m across; peduncle up to 2 mm long, puberulous. Involucres 1-1.5 mm long, campanulate. Capsules up to 1 mm long, hairy, exserted from cyathium, trigonous. Seeds up to 0.8 mm long, oblong, 4-angled, reddish.

Fl. & Fr. : Throughout the Year.

Distrib. : Pantropical.

Specimens examined : Netarhat, 120.

Notes : Very common throughout the district, in open places.

Common name : Beng. : *Bara Kerui*; Santal : *Pusi-toa.*

Uses : The roots are used by the Santal to check vomiting.

7. Euphorbia indica Lamk., Encycl. 2: 423. 1786; Raju & Rao in Ind. J. Bot. 2: 205. 1979. *Euphorbia hypericifolia* auct. non Linn.; Hook.f. in Fl. Brit. India 5: 249. 1887, *pro parte*; Haines, Bot. Bihar & Orissa 1: 151. 1961 (Rep. ed.).

Erect or spreading, glabrous or sparsely pubescent, annual herbs, with milky latex; stems and branches 10-40 cm high, slightly pinkish. Leaves opposite, elliptic-oblong, up to 2 × 0.7 cm, obtuse or rounded at apex, obliquely cordate at base, slightly serrulate at margin; petioles 0.5-2 mm long; stipules small, setaceous or sometimes divided into few fimbriate segments. Involucres up to 1 mm long, cup-shaped in axillary and terminal, usually pedunculate, many flowered cymes. Peduncle 2-8 mm long; capsules up to 1.8 long, 3-gonous, pubescent.

Fl. & Fr. : Dec.-May.

Distrib. : Pantropical.

Specimens examined : Daltonganj, 279.

Notes : Common in open lands.

Common name : Hindi : *Haksherdana.*

8. E. thymifolia L., Sp. Pl. 454. 1753; Hook.f. in Fl. Brit. India 5: 252. 1887; Prain, Beng. Pl. 2: 925. 1903 (Rep. ed. 2: 692. 1963) & in Rec. Bot. Surv. India 3: 272. 1905; Santapau in Bull. Bot. Soc. Bengal 16: 5. 1954; Haines, Bot. Bihar & Orissa 1: 152. 1961 (Rep. ed.); Airy Shaw in Kew Bull. 37(1): 20. 1982.

Annual, prostrate herbs; stems 5-15 cm long, slender, puberulous, pinkish, except greenish node. Leaves opposite, up to 6 × 3.5 mm, obliquely oblong or suborbicular, serrulate-crenulate, oblique at base, glabrous above, puberulous beneath. Involucres axillary, solitary or 2-3 in clusters, by shortening of internodes in branchlets appears as leafy raceme, sparsely puberulous. Capsules up to 1.5 mm long, puberulous all oven. Seeds 0.6 mm long, reddish, oblong, 4-angled, with few transverse furrows.

Fl. & Fr. : Throughout the year, specially in rainy season.

Distrib. : Pantropical.

Specimens examined : Simultarh (Daltonganj), 280.

Notes : Common in the wastelands.

Common name : Beng. : *Swet keruee*; Hindi : *Chotidouhi.*

Uses : Plants used in ringworm and bowel complaints of children.

9. **Euphorbia tirucalli** L., Sp. Pl. 452. 1753; Hook.f. in Fl. Brit. India 5: 254. 1887; Santapau in Bull. Bot. Soc. Beng. 8: 8. 1954; Haines, Bot. Bihar & Orissa 1: 149. 1961 (Rep. ed.); Bennet, Fl. Howrah Dist. 202: 1979; Airy Shaw in Kew Bull. 37(1): 20. 1982; Guha Bakshi, Fl. Murshidabad Dist. 288. 1984.

Erect, unarmed, glabrous fleshy shrubs or small trees, up to 6 m high; branches cylindric, spreading; branchlets smooth, whorled or clustered, erect, cylindric, sometimes deciduous. Leaves of branchlets alternate, 0.5-1.5 cm long, linear or linear-oblong, sessile, glabrous, subfleshy, acute or obtuse at apex. Involucres of sessile or subsessile clusters in forks or at ends of branchlets, up to 2 mm long, minutely puberulous outisde on upper part; glands-5, subcontiguous or separate; bracteoles many, lacerate. Capsules up to 6 mm in diam., obtuse, 3-lobed, minutely puberulous. Seeds ellipsoid, glabrous, dark brown with white caruncle and margin.

Fl. & Fr. : July-Oct. Exotic.

Distrib. : Native of Africa; now pantropical.

Specimens examined : Netarhat, 870.

Notes : Common in the villages as hedge plant, also naturalised in waste lands.

Common name : Beng. : *Lankasij*; Hindi : *Konpal sehund.*

Uses : Latex used in tooth-ache.

8. GLOCHIDION J. & G. Forst.

Glochidion velutinum Wight, Ic. 5(2): 29. t. 1907. f. 2. 1852; Hook.f. in Fl. Brit. India 5: 322. 1887; Duthie, Fl. Up. Gang. Plain 2: 195. 1960 (Rep. ed.); Haines, Bot. Bihar & Orissa 1: 135. 1961 (Rep. ed.); Mukherjee, Fl. Pach. Bori Res. 274. 1984.

Small trees or large shrubs; branches velvety pubescent. Leaves elliptic-lanceolate, up to 14 × 5.4 cm, densely pubescent beneath, base usually rounded, acuminate at apex; petioles very short; stipules triangular, cuspidate. Flowers small, greenish-yellow, in few-flowered, axillary clusters. Male flowers pedicelled; sepals 3-4 mm long, keeled and pubescent on back; petals as long as sepals; stamens-3. Female flowers sessile on slightly stalked, pubescent; sepals-6, free, pubescent; ovary tomentose; styles longer than ovary, enlarged at truncate, 4-7 toothed apex. Capsules stalked, up to 1.2 cm in diam., orbicular, depressed, 4-7 lobes, hairy.

Fl. & Fr. : Apr.-Aug.

Distrib. : India, Myanmar.

Specimens examined : Netarhat, *Sarma* 765.

Notes : Common in the forests.

Uses : Bark used in tanning and wood used as fuel.

9. JATROPHA L.

1a. Leaf margin entire and without gland tipped hairs; flowers in cymose panicle ... 1. *J. curcas*

1b. Leaf margin serrate and each serrature with gland tipped hairs; flowers in corymbose cymes ... 2. *J. tanjorensis*

1. Jatropha curcas L., Sp. Pl. 1006. 1753; Hook.f. in Fl. Brit. India 5: 383. 1887; Prain, Beng. Pl. 2: 941. 1903 (Rep. ed. 2: 705. 1963) & in Rec. Bot. Surv. India 3: 273. 1905; Pax in Engler, Pfl. -reich 42: 77. 1910; Haines, Bot. Bihar & Orissa 1: 105. 1961 (Rep. ed.); Airy Shaw in Kew Bull. 37(1): 25. 1982.

Large glabrous shrubs. Leaves 8-12 cm long and broad, papery, suborbicular, 3-5 angled, or sublobed, if sublobed, tip acute, base cordate or subcordate, 5-7 nerved; petioles 6-20 cm long. Flowers in cymose panicles, shorter than petiole; peduncle sparsely pubescent or glabrous; bracts 3-8 mm long. Sepals of male flowers 3-4.5 mm long, connate at base, ovate-elliptic. Petals up to 5 mm long, greenish-yellow, elliptic-obovate, lower half connate, pubescent inside. Stamens 8-10 outer united at base only, inner united up to half way. Sepals of female flowers slightly larger than male. Petals as in male, but free, enlarging in fruit. Disc deeply 5-lobed. Capsules 2.5-3 cm long, ellipsoid, faintly lobed. Seeds up to 2 cm long, black, ellipsoid-oblong.

Fl. & Fr. : May-Oct. Leafless during winter. Exotic.

Distrib. : Native of Tropical America, now pantropical.

Specimens examined : Boneri, 809.

Notes : Common along the village road and hedges.

Common name : Beng. : *Bagh Bherenda, Erondagachh*; Hindi : *Baghrandi, Janglierandi, Safedarand*; Kol. : *Kulajara*; Santal : *Bhernda*.

Uses : Seeds yield an oil, 'Curcas oil' a powerful purgative and also used for manufacturing candles, soaps and varnishes. It is used in sciatica, dropsy, paralysis and externally for skin diseases and rheumatism. Dry latex used as marking ink. Bark yields a blue dye used for dyeing clothes, fishing nets. Juice of the plant is used to check eczema and scabies.

2. Jatropha tanjorensis Ellis et Saroja in J. Bombay Nat. Hist. Soc. 58: 834. 1962; Bennet in Journ. Bombay Nat. Hist. Soc. 62: 329. 1965 et in Fl. Howrah Dist. 206. 1979.

Glabrous shrubs; 1.5-3 m high. Leaves 7-15 × 7-14 cm, palmately 3-5 lobe, above middle finely serrate at margin, each serrature gland tipped; petioles 6-11 cm long; stipules short ciliate. Flowers shortly pedicelled in corymbose cymes, pinkish tinged green; bracts 10-16 × 3-5 mm, lanceolate, margin glandular hairy. Sepals of male flowers up to 4 mm long, pubescent without, ovate, serrate; petals up to 4 mm long, pink, free, ovate; staminal column with disc of 5 small glands at base; stamens-8, free. Sepals of

bisexual flowers up to 6 mm long, ovate, margin serrate, serrature gland tipped; petals up to 6 mm long, ovate connate at base; ovary with disc of 5 small glands.

Fl. : Mar.-May.

Distrib. : India.

Specimens examined : Garwah, 857.

Notes : Rare, found as hedge plants in the villages along with *J. curcas* Linn.

10. KIRGANELIA JUSS.

Kirganelia reticulata (Poir.) Baill., Etud. Gen. Euph. 613. 1885; Haines, Bot. Bihar & Orissa 1: 134. 1961 (Rep. ed.); Santapau in Rec. Bot. Surv. India 16(1): 246. 1967. *Phyllanthus reticulatus* Poir. in Lamk., Encycl. 5: 298. 1804; Hook.f. in Fl. Brit. India 5: 288. 1887; Prain, Beng. 2: 935. 1903 (Rep. ed. 2: 700. 1963) & in Rec. Bot. Surv. India 3: 274. 1905.

Much branched, glabrous shrubs, up to 3 m high; branchlets slightly angled. Leaves elliptic, obtuse or rounded at both ends, up to 18 × 9 mm; petioles up to 1 mm long; stipules up to 2.2 mm long, lanceolate, acuminate at apex, truncate at base. Flowers axillary, males in fascicles of 2-6, female solitary; pedicels of male flowers 3-5 mm long, those of female flowers up to 4 mm long. Capsule up to 4 mm across, 6-seeded. Seeds up to 1.2 mm long, brownish.

Fl. & Fr. : Throughout the year, specially in Feb.-May.

Distrib. : Tropical Asia and Tropical Africa.

Specimens examined : Barwadih, 436.

Notes : Common in the hedges and along the canal (towards Mandal).

Common name : Beng. & Hindi : *Panjoli.*

Uses : Leaves diuretic, juice of the leaf used with camphor to check bleeding from the gums.

11. MALLOTUS Lour.

Mallotus philippensis (Lamk.) Muell. in Linnaea 34: 196. 1855; Hook.f. in Fl. Brit. India 5: 442. 1887 (as *philippinensis*) Haines, Bot. Bihar & Orissa 1: 110. 1961 (Rep. ed.); Ramam. in Sald. & Nicol., Fl. Hassan 344. 1976. *Croton philippense* Lamk., Encycl. 2: 206. 1786.

Medium sized trees. Leaves alternate, ovate-elliptic, acute-acuminate, entire, up to 18 × 10 cm, glaucous and red-glandular hairy beneath, base 3-nerved, secondary nerves 5-7 with prominent tertiaries; petioles up to 6 cm long, thickened at both ends. Male flowers in axillary racemes; stamens many. Female flowers in short racemes; perianth 4-fid; ovary red glandular; stigmas-3. Capsule globose, covered with red powder, up to 1.2 cm across, 3-seeded. Seeds smooth, black.

Fl. & Fr. : Nov.-Mar.

Distrib. : India, China, Malay Island and Australia.

Specimens examined : Betla, 34 & 469; Richughuta, 741; Palamau Fort (Betla), 1115.

Notes : Very common in the forest.

Common name : Beng. : *Sindur*; Hindi : *Kamala.*

Uses : Glandular hairs on fruits yield a red dye, wood used for various purposes.

12. MANIHOT Mill.

Manihot esculenta Crants, Inst. Rei. Herb. 1: 167. 1766; Shah in J. Bombay Nat. Hist. Soc. 60: 297. 1969. *Jatropha manihot* L., Sp. Pl. 1007. 1753. *Manihot utilissima* Pohl., Pl. Bras. Ic. 1: 37. t. 24. 1827; Hook.f. in Fl. Brit. India 5: 239. 1887; Haines, Bot. Bihar & Orissa 1: 106. 1961 (Rep. ed.).

Herbaceous shrubs, up to 2.5 m high, with fleshy elongated tuberous roots. Leaves deeply 3-7 parted into spathulate or linear-lanceolate, acuminate segments; segments up to 15 × 2.5 cm, glabrous, glaucous beneath and minutely puberulent on nerves. Flowers and fruits not seen.

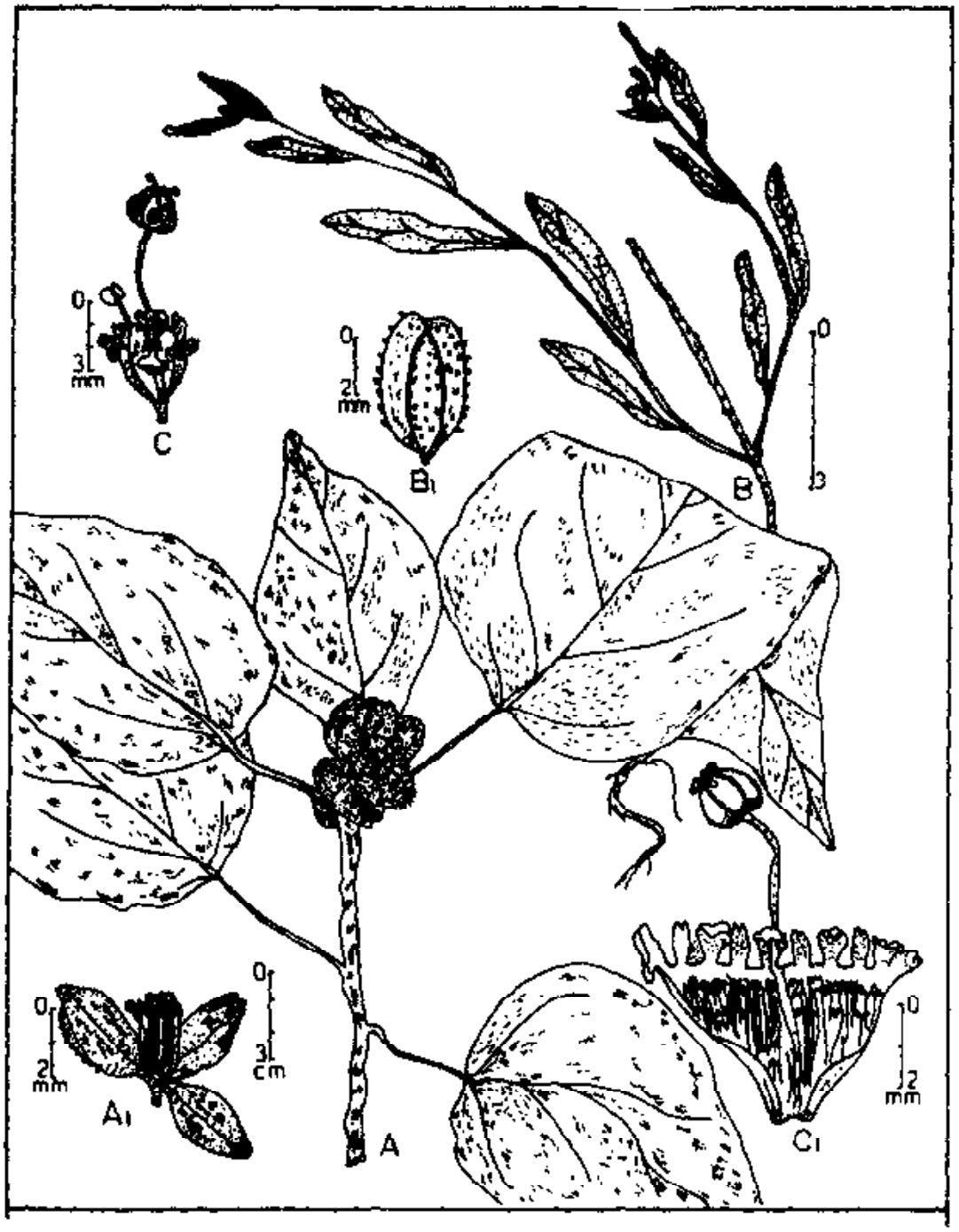


Fig. 35. Euphorbiaceae. (A-A_1): *Mallotus philippensis* (Lamk.) Muell.: A. Fruiting twig; A_1. Male flower; (B-B_1): *Sebastiania chamaelea* (L.) Muell. Arg.: B. Habit; B_1. Fruit; (C-C_1): *Euphorbia helioscopia* L.: C. Cyathium; C_1. Cyathium split open.

Distrib. : Native of Tropical Brazil, now cultivated in most tropical countries of the World.

Specimens examined : Seuti, 1060.

Notes : Commonly cultivated, rarely found as an escape in the village surroundings. Exotic.

Common name : Hindi : *Rotialu.*

Uses : Tubers are eaten after roasting or boiling or made into flour. Glue made from the starch (Tapioca) used for preparation of syrup acetone etc.

13. PEDILANTHUS Neck. ex Poit.

Pedilanthus tithymaloides (L.) Poit., Ann. Mus. Hist. Nat. Paris 19: 390. t. 19. 1812; Hook.f. in Fl. Brit. India 5: 239. 1887; Dresslar in Contrib. Gray Herb. 182. 138. 1957; Haines, Bot. Bihar & Orissa 1: 54. 1961 (Rep. ed.); Bennet, Fl. Howrah Dist. 205. 1979; Guha Bakshi, Fl. Murshidabad Dist. 291. 1984. *Euphorbia tithymaloides* L., Sp. Pl. 453. 1753.

Shrubs, up to 2.5 m high; young shoot puberulent, glabrous by age. Leaves ovate to elliptic-ovate, 3-12 × 1-7 cm, acute or obtuse at apex, truncate to cuneate at base; petioles 4-9 mm long; stipules dark brown. Flowers in cyathium. Involucral tube up to 12 mm long, glabrous without, pubescent within, greenish yellow at base and reddish above; main lobes 3-4 mm long, oblong, obtuse, margin ciliolate, accessory lobes spathulate, sparsely ciliolate; lateral lobes shorter than main lobes; median lobes shorter than lateral; spur red. Male flowers 20-34; pedicles 8-12 mm long; filaments up to 3 mm long. Female flowers; pedicels 7-11 mm long; ovary up to 1.6 mm long, trigonous. Capsule up to 5 mm in diam., deeply 3-lobe. Seeds up to 4 × 3 mm, grey to deep-brown, ovoid or subglobose, apex acute, base truncate.

Fl. & Fr. : Mar.-May. Exotic.

Distrib. : Native of Mexico. Introduced and naturalised elsewhere.

Specimens examined : Tarhashi, 1129.

Notes : Common, generally used as hedge plants but also naturalised in village-groves.

Common name : Beng. : *Rangchita, Bilati sij.*

Uses : Latex used in several diseases and also applied to leucoderma patches.

14. PHYLLANTHUS L.

1a. Anthers with vertical dehiscence :

2a. Stipule peltate ... 3. *P. maderaspatensis*

2b. Stipule not peltate :

3a. Capsule surface verrucose ... 4. *P. urinaria*

3b. Capsule surface smooth ... 5. *P. virgatus*

1b. Anthers with transverse dehiscence :

4a. Leaf apex acute; disc of the female flower subentire ... 2. *P. debilis*

4b. Leaf apex obtuse or rounded; disc of the female flower lobed ... 1. *P. amarus*

1. Phyllanthus amarus Schumacher, Beskriv. Guin Pl. 421. 1827; Webster in *J.* Arn. Arb. 37: 13. 1956 & 38: 313. 1957. *Phyllanthus niruri* (auct. non. L. 1753); Hook.f. in Fl. Brit. India 5: 298. 1887; Haines, Bot. Bihar & Orissa 1: 130. 1961 (Rep. ed.): *Phyllanthus asperulatus* Hutch. in Kew Bull. 27. 1920.

Small, annual, glabrous herbs, 5-15 cm high. Leaves oblong-elliptic, up to 8 × 3 mm, acute to obtuse at apex, rounded at base; petioles very short; stipules lanceolate, acuminate, basally attached. Flowers solitary, 5-merous; pedicels of the male flower very short; disc 6-lobed; stamens fused. Pedicels of female flower larger than male flower, disc irregularly lobed. Capsules-3 lobed, smooth, up to 2 mm across. Seeds up to 1 × 0.7 mm, minutely tubercled in concentric lines.

Fl. & Fr. : Jan.-Apr.

Distrib. : Pantropic, probably introduced in New World.

Specimens examined : Daltonganj, 14.

Notes : Common. Grows under shade.

Common name : Beng. : *Bhuiamla*; Hindi : *Jaramala.*

Uses : Leaves are said to be used in the treatment of jaundice.

Remarks : Hitherto wrongly identified it as *P. niruri* L., which is West Indian species.

2. **Phyllanthus debilis** Klein ex Willd., Sp. Pl. 4: 582. 1805; Hook.f., in Fl. Brit. India 5: 299. 1887; Haines, Bot. Bihar & Orissa 1: 131. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 462. 1977.

Erect, annual herbs; branches 3-gonous. Leaves ovate-elliptic, 1.5-2 cm long, acute at apex, glaucous beneath; petioles shorter than the leaves; stipules lanceolate-acuminate, membranous. Flowers axillary, male flowers in fascicles, female solitary, disc of female flower subentire, those of male lobed. Capsules up to 4 mm across. Seeds brown, longitudinally ribbed with transverse striate between the ribs on back side.

Fl. & Fr. : Aug.-Dec.

Distrib. : India, Bhutan and Tropical Africa.

Specimens examined : Palamau Fort (Betla), 1121.

Notes : Not common. Growing as forest undergrowth.

3. **P. maderaspatensis** L., Sp. Pl. 982. 1753; Hook.f. in Fl. Brit. India 5: 292. 1887; Haines, Bot. Bihar & Orissa 1: 129. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 462. 1977.

Erect, annual, suffruticose herbs, up to 60 cm high; stems glabrous, ascending, angled. Leaves obovate to oblanceolate, up to 15 × 6 mm, rounded-apiculate at apex, cuneate at base; petioles very short; stipules lanceolate, scarious, basifixed or peltate. Flowers whitish-green; female

flowers axillary, solitary and males in axillary sub-sessile clusters. Capsules smooth, depressed globose, up to 3 mm across, shallowly 6-lobed.

Fl. & Fr. : Aug.-Dec.

Distrib. : India, Sri Lanka, Tropical Africa, Arabia, Java, China, Australia.

Specimens examined : Muhammadganj, 992.

Notes : Common in forest undergrowth.

4. Phyllanthus urinaria L., Sp. Pl. 982. 1753; Hook.f. in Fl. Brit. India 5: 293. 1887; Haines, Bot. Bihar & Orissa 1: 129. 1961 (Rep. ed.); Webster in J. Arnold Arb. 38. 194. 1957; Airy Shaw in Kew Bull. 37(1): 34. 1982.

Annual herbs, up to 25 cm high. Leaves oblong or linear-oblong, rounded apiculate at apex, rounded at base, up to 20 × 6 mm; petioles up to 0.3 mm long; stipules triangular, lanceolate, acuminate. Flowers small, axillary, but appearing to be borne in a continuous row on under surface of branchlets. Female flowers up to 2 mm in diam., pedicels up to 0.2 mm long; disc 6-angled or obscurely crenulate. Male flowers pedicels up to 0.3 mm long; disc of 6-subglobose segments. Capsules up to 2 mm in diam., warty. Seeds up to 1 mm long, trigonous.

Fl. & Fr. : July-Dec.

Distrib. : Pantropical.

Specimens examined : Barwadih, 914.

Notes : Very common throughout the district, in waste lands.

Common name : Beng. : *Hazarmani.*

5. P. virgatus Forst.f., Fl. Ins. Austr. Prodr. 65: 1786; Airy Shaw in Kew Bull. 26(2): 325. 1972. *Phyllanthus simplex* Retz., Obs. Bot. 5: 29. 1789; Hook.f. in Fl. Brit. India 5: 296. 1887; Haines, Bot. Bihar & Orissa 1: 130. 1961 (Rep. ed.).

Small herbs, with many slender branches from woody stock. Leaves linear-oblong, up to 25 × 3 mm, apiculate at apex, obtuse at base, mid vein very prominent, subsessile, glabrous. Flowers axillary, solitary. Male flower larger than female; pedicels of male flower 0.5-1 mm long, those of female flower longer. Capsules glabrous, 1-2 mm across, globose.

Fl. & Fr. : Aug.-Mar.

Distrib. : India, S. China, Malaysia & Polynesia.

Specimens examined : Netarhat, 207.

Notes : Very common in sunny places throughout the district.

15. RICINUS L.

Ricinus communis L., Sp. Pl. 1007. 1753; Hook.f. in Fl. Brit. Ind. 5: 457. 1887; Haines, Bot. Bihar & Orissa 1: 116. 1961 (Rep. ed.).

Evergreen shrubs. Leaves alternate, palmately lobed, peltate; lobes 5-7, serrate. Flowers monoecious, in erect terminal racemes. Male flowers at the upper parts of raceme; calyx membranous; segments 3-5; stamens many. Female flowers at the lower parts of raceme; calyx of female flowers like a folding bract or spathe, deciduous. Capsule triangular, oblong, 3-valved. Seeds-3, oblong, spotted, with caruncle.

Fl. & Fr. : Throughout the year.

Distrib. : Asia and Tropical Africa.

Specimens examined : Bhavnathpur, 1175.

Notes : Common in wet places.

Common name : Beng. : *Redi, Eranda*; Hindi : *Arandi.*

Uses : Seeds yield an oil (castor oil) used as purgative, also as a lubricant and an illuminant, the leaves are used as a poultice for cure of boils.

16. SEBASTIANIA Spreng.

Sebastiania chamaelea (L.) Muell.-Arg. in DC., Prodr. 15 (2): 1175. 1825; Hook.f. in Fl. Brit. India 5: 475. 1888; Haines, Bot. Bihar & Orissa 1: 122. 1961 (Rep. ed.); Prain, Beng. Pl. 2: 716. 1963 (Rep. ed.). *Tragia chamaelea* L., Sp. Pl. 1391. 1753.

Glabrous, annual, branched, up to 45 cm high, erect or ascending herbs; stems often angular. Leaves up to 4 × 0.6 cm, linear-lanceolate or linear, obtuse or mucronate at apex, serrulate, midrib strong; petioles very short, up to 2 mm long. Flowers in terminal or lateral, slender racemes, apetalous. Male flowers minute, 1-3 in each bract. Female flowers solitary or at base of male racemes. Sepals of male flower minute, ovate, acute, ciliate and of the female flower larger, obovate, acute, lacerate, ciliate and persistent. Capsules subglobosely-oblong, up to 4 mm long, 3-lobed, each lobe with 2 lines of short blackish spines.

Fl. & Fr. : Oct.-Dec.

Distrib. : India, Sri Lanka, China, Malay Islands, tropical Australia and Africa.

Specimens examined : Betla, 474.

Notes : Common on rocks, near stream.

17. SECURINEGA Comm. ex Juss.

Securinega virosa (Roxb. ex Willd.) Pax & Hoffm. in Engl. & Prantl., Pflanzenfam. ed. 2. 19. C: 60. 1931; Ramam. in Sald. & Nicol., Fl. Hassan 348. 1976; Mukherjee in Fl. Pach. & Bori Res. 277. 1984. *Phyllanthus virosus* Roxb. ex Willd., Sp. Pl. 4: 578. 1805. *Flueggea microcarpa* Bl., Bijdr. 580. 1825; Hook.f. in Fl. Brit. India 5: 328. 1887. *F. obovata* Baill., Adansonia 2: 41. 1861; Haines, Bot. Bihar & Orissa 1: 127. 1961 (Rep. ed.).

Unarmed, glabrous shrubs, up to 1.5 mm high; branchlets angular. Leaves 3-5 × 1.5-3.5 cm, dark green above and glaucous beneath, elliptic to obovate, rounded, obtuse or shortly acuminate at apex, secondary nerves

4-8 pairs, midrib very prominent, up to the tip; petioles 2-4 mm long; stipules lanceolate. Flowers greenish-white in axillary clusters. Male flower's pedicel up to 1 cm long, filiform; sepal 1-1.5 mm long, unequal, larger obovate or obovate-oblong, smaller oblong; glands large, fleshy, exserted; stamens free. Female flower's pedicel up to 5 cm long; disc annular; ovary ovoid; styles persistent, connate at base. Fruits 3-5 mm in diam. Seeds angled, with 3 faces, one rounded, 2 flat, brown.

Fl. & Fr. : May-Sept.

Distrib. : Throughout India, Sri Lanka, China, Malaysia, Australia and Tropical Africa.

Specimens examined : Maromar, 531.

Notes : Infrequent in the forest.

Uses : Bark used in tanning and dyeing. Roots analgesic and aphrodisiac. Leaf juice used for destroying worms in the sores. Decoction of leaves used as laxative and antipyretic. Fruits eaten. Mucilaginous gum exuding from the stem used as paste. Wood used for agricultural implements and various other purposes; branches are used in thatching.

18. TRAGIA L.

Tragia involucrata L., Sp. Pl. 980. 1753; Hook.f. in Fl. Brit. India 5: 465. 1888; Haines, Bot. Bihar & Orissa 1: 119. 1961 (Rep. ed.).

Stout herbs, woody below, with a perennial stock and twining branches, puberulous and villous, with scattered pungent hairs. Leaves ovate-oblong, elliptic or rhomboid, 2.5-12 cm long, acuminate at apex, rounded at base, sharply serrate at margin, hairy on both surfaces. Flowers yellowish, in racemes. Sepals of male flowers-3; stamens-3. Sepals of female flowers-6. Capsules 3-lobed, hirsute.

Fl. & Fr. : Dec.-Apr.

Distrib. : India, Myanmar, Sri Lanka and China.

Specimens examined : Bhavnathpur, 1174.

Notes : Infrequent in waste lands. Hair causes an intense skin irritation and dilute Amonia may be used as a remedy against such painfaul stings.

19. TREWIA L.

Trewia nudiflora L., Sp. Pl. 1193. 1973; Hook.f. in Fl. Brit. India 5: 423. 1887; Pax & Hoffmann in Engler, Pfl. - reich. 63: 140. 1914; Haines, Bot. Bihar & Orissa 1: 109. 1961 (Rep. ed.); Airy Shaw in Kew Bull. 26(2): 343. 1972. Bennet in Fl. Howrah Dist. 213. 1979; Guha Bakshi, Fl. Murshidabad Dist. 296. 1984.

Large dioecious trees, 6-12 m high, deciduous; young shoots downy tomentose, older parts glabrous. Leaves 8-12 × 4-10 cm, ovate to ovate-lanceolate, acuminate at apex, cordate or rounded and 3-5 nerved at base; petioles 1-5 cm long; stipules 1-1.5 mm long, caducous, oblong-acute. Male flowers in clusters of 2-4, on axillary, solitary drooping racemes, bracteolate; pedicels 1-5 mm long; sepals usually-3, rarely 4 or 5, caducous, tomentose without and glabrous within, finally reflexed. Female flowers solitary; peduncle 3-6 cm long; ovary grey-downy. Fruits 2-2.5 cm diam., globose, woody, 3-5 celled. Seeds dark brown.

Fl. & Fr. : Dec.-June.

Distrib. : India, Sri Lanka to Thailand, Malaysia and Indonesia.

Specimens examined : Latehar, 860.

Notes : Common in the village surroundings and along river banks.

Common name : Beng. : *Pituli*; Kol. : *Garaloa*; Sanal : *Gadalopong*.

Uses : Wood used for packing cases, match boxes, agricultural implements etc.

URTICACEAE

1a. Flowers in interrupted slender spikes ... 1. BOEHMERIA

1b. Flowers in axillary sessile clusters ... 2. POUZOLZIA

1. BOEHMERIA Jacq.

Boehmeria platyphylla D.Don, Prodr. Fl. Nep. 60. 1825; Hook.f. in Fl. Brit. India 5: 578. 1888 (excl. var.); Haines, Bot. Bihar & Orissa 3: 855. 1961 (Rep. ed.).

Erect, perennial, pubescent undershrubs; branchlets rugose. Leaves opposite, unequal, ovate, crenate-serrate, 8-20 × 4-12 cm, rounded or cordate at base, acuminate at apex. Flowers clustered in interrupted spikes. Tepals of the male flower-4, ovate; stamens-4. Perianth of female flower tubular-lageniform, with a 2-dentate mouth. Fruits obovoid, compressed, hairy at top.

Fl. & Fr. : Sept.-Dec.

Distrib. : India, Sri Lanka, China, Japan, Malaysia and Africa.

Specimens examined : Netarhat, 760.

Notes : Infrequent in the forest.

2. POUZOLZIA Gaudich.

Pouzolzia zeylanica (L.) Bennet & Brown, Pl. Jav. Rar. 67. 1838; Santapau in Fl. Khandala ed. 3: 255. 1967. *Parietaria zeylanica* L., Sp. Pl. 1052. 1753. *Parietaria indica* L., Mant. 128. 1767. *Pouzolzia indica* (L.) Gaud., Voy, Uranie 503. 1826; Hook.f. in Fl. Brit. India 5: 581. 1888; Haines, Bot. Bihar & Orissa 3: 856. 1961 (Rep. ed.).

Erect herbs. Leaves alternate or opposite, lanceolate to ovate, up to 4.5 × 2.5 cm, acute or acuminate at apex, rounded or acute at base, membranous, pubescent; petioles up to 2 cm long; stipules ovate, caudate, margin ciliate. Flowers in axillary, sessile clusters. Perianth lobes-4, hairy in male; stamens-4. Fruits slightly winged or not.

Fl. & Fr. : Aug.-Dec.

Distrib. : India, Myanmar, Sri Lanka, Malaysia, China.

Specimens examined : Bhavnathpur, 1177.

Notes : Infrequent near marshy areas and margins of the ditches.

ULMACEAE

1a. Leaves pinnately vened; fruits a samara ... 2. HOLOPTELEA

1b. Leaves multicostate from base of lamina; fruits a drupe :

2a. Leaves canescent beneath; filaments inserted on hairy torus; drupes lesst han 7 mm across ... 3. TREMA

2b. Leaves glabrous or pubescent, green on both surfaces; filaments inserted on woolly torus; drupes more than 7 mm across ... 1. CELTIS

1. CELTIS L.

Celtis tetranda Roxb. (Hort. Beng. 21. 1814, *nom. nud.*) Fl. Ind. 2: 63. 1832; Hook.f. in Fl. Brit. India 5: 482. 1888; Haines, Bot. Bihar & Orissa 3: 848. 1961 (Rep. ed.). *Celtis serotina* Planch., Ann. Sci. Nat. Bot. Ser. 3. (10): 300. 1848.

Medium sized trees; young branchlets grey-pubescent. Leaves ovate or ovate-lanceolate, up to 13 × 6 cm, acuminate, serrate, triplinerved from base, with 2-4 pairs of lateral nerves. Tepals 4-5; stamens 4-5; ovary sessile. Drupes globose, up to 1 cm across.

Fl. & Fr. : Feb.-Oct.

Distrib. : India, Myanmar, Bangladesh and Malaysia.

Specimens examined : Boneri, 813.

Notes : Not common, in the forest.

2. HOLOPTELEA Planch.

Holoptelea integrifolia (Roxb.) Planch., Ann. Sci. Nat. Bot. ser. 3.10: 269. 1848; Wight, Ic. t. 1968. 1853; Hook.f. in Fl. Brit. India 5: 481. 1888. Haines, Botany of Bihar & Orissa 3: 847. 1961 (Rep. ed.). *Ulmus integrifolia* Roxb., Pl. Cor. t. 78. 1798.

Large trees. Leaves elliptic-ovate or suborbicular, up to 13 × 6.5 cm, acuminate at apex, margin entire, base rounded or often sub-cordate,

glabrous; petioles 1-2 cm long; stipules lanceolate. Flowers pubescent, in fascicles or racemes on leafless branches. Tepals linear, pubescent. Samara obliquely elliptic or round, wing membranous, emarginate at apex with persistent stigma, up to 2.5 cm in diameter.

Fl. & Fr. : Apr.-Dec.

Distrib. : India, Malaysia and China.

Specimens examined : Bisrampur, 844.

Notes : Very common throughout the district, often planted along road sides and common in the forests.

Common name : Hindi & Khraw : *Chilbil*; Santal : *Chorora.*

Uses : Wood used for cheap furniture, building purposes, packing cases and match boxes; suitable for plywood.

3. TREMA Lour.

Trema orientalis (L.) Blume, Mus. Bot. Lugd. Bat. 2: 62. 1856; Hook.f. in Fl. Brit. India 5: 484. 1888; Haines, Bot. Bihar & Orissa 3: 848. 1961 (Rep. ed.); Polhill in Kew Bull. 19. 143. 1964; Ramam. in Sald. & Nicol., Fl. Hassan 75. 1976. *Celtis orientalis* Linn., Sp. Pl. 1044. 1753, *pro parte* (excl. syn.).

Small, branched trees; young branches pubescent. Leaves ovate-lanceolate, acuminate, oblique at base, serrate, canescent beneath and scabrid above, up to 7.5 × 2 cm; petioles up to 7 mm long, pubescent; stipules white pubescent. Flowers whitish-green, small. Male cymes compact at leaf axil; tepals 4-5; stamens 4-5. Ovary sessile. Drupes subcompressed, globose, smooth, 3-4 mm across.

Fl. & Fr.: Feb.-May.

Distrib. : India, China, Australia and Polynesia.

Specimens examined : Netarhat, 219.

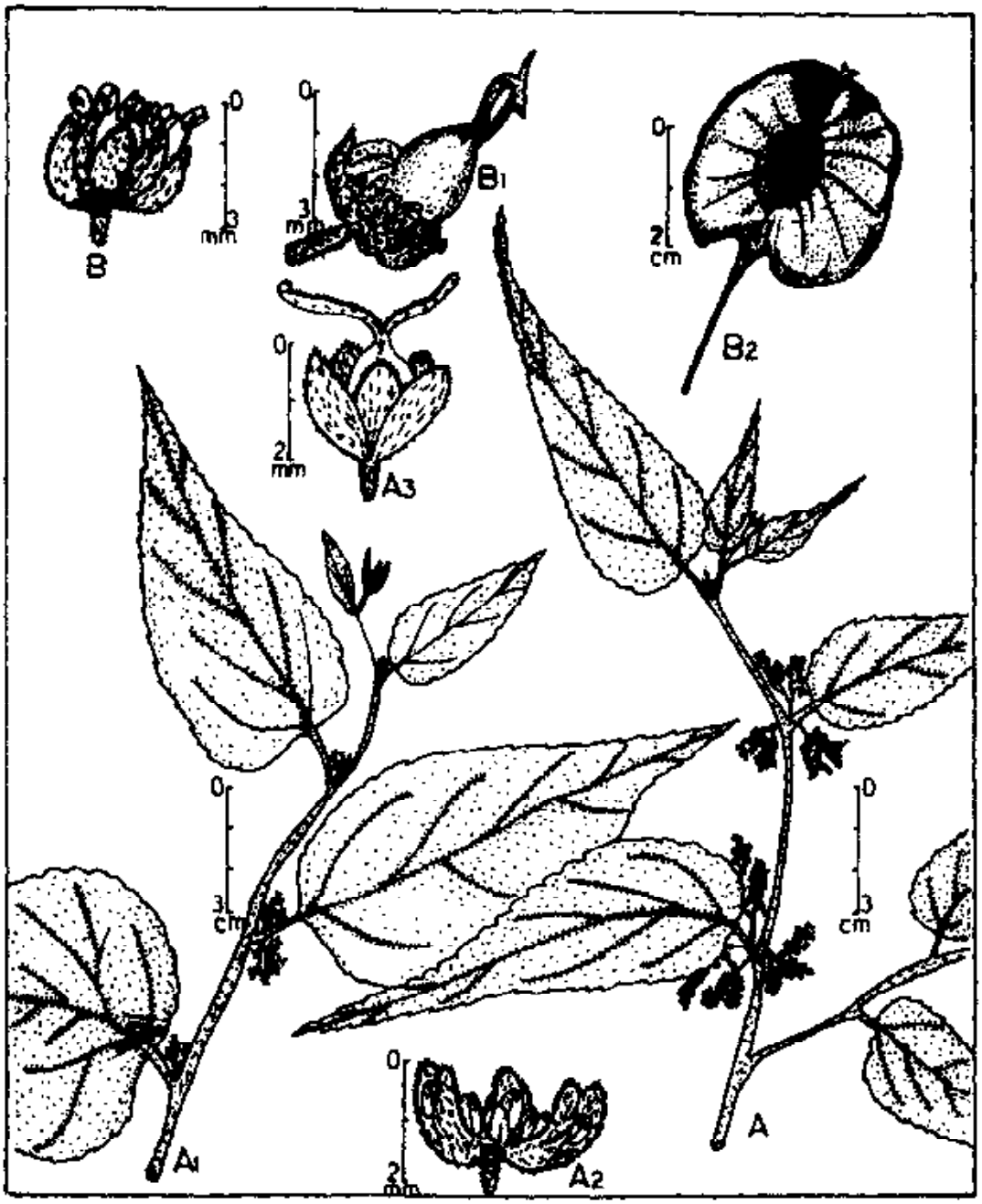


Fig. 36. Ulmaceae. (A-A_3): *Trema orientalis* (L.) Bl.: A. Male branch; A_1. Female branch; A_2. Male flower; A_3. Female flower; (B-B_3): *Holoptelea integrifolia* (Roxb.) Planch.: B. Male flower; B_1. Bisexual flower; B_2. Fruit.

Notes : Common in the forest and in wastelands.

Common name : Beng. : *Chikum, Jiban*; Hindi : *Gioc*; Santal : *Jhawar*.

Uses : Decoction of root given in diarrhoea and to check blood in urine. Bark used in rope making.

MORACEAE

1a. Flowers in syconia ... 3. FICUS

1b. Flowers not in syconia, exposed :

2a. Leaves less than 10 cm long, transverse intercostal vein absent; male flowers in capitate inflorescence ... 5. STREBLUS

2b. Leaves more than 10 cm long, transverse intercostal vein present; male flowers in spicate inflorescence :

3a. Male and female flowers in same inflorescence; stamens straight in buds 1. ARTOCARPUS

3b. Male and female flowers in different inflorescence; stamens inflexed in buds :

4a. Female flowers in globose heads ... 2. BROUSSONETIA

4b. Female flowers in slender spikes ... 4. MORUS

1. ARTOCARPUS J.R. & G. Forster *nom. cons.*

Artocarpus heterophyllus Lam., Encycl. 3: 210. 1789; Corner, Gard. Bull. Singapore 10: 56. 1939; Jarrett, J. Arnold Arbor. 40: 334. 1959; Corner in Dassanayake, Rev. Handb. Fl. Ceyl. 3: 217. 1981; Sald. & Ramesh in Sald., Fl. Karnataka 1: 110. 1984. *Artocarpus integrifolia* sensu Hook.f. in India 5: 541. 1888 (non L.f.); Haines, Bot. Bihar & Orissa 3: 865. 1961 (Rep. ed.).

Evergreen, cauliflorous trees, with reddish-brown bark. Leaves elliptic to obovate, 5-15 × 3-10 cm, obtuse to subacuminate at apex, cuneate at base, margin entire, often lobed in juvenile plant petioles up to 2.5 cm long, flowers solitary, axillary, on short stout leafy twigs from trunk and main branches. Male head narrowly clavate, covered with flowers, with few sterile bract-like perianths; perianth 2-lobed, puberulous. Female head as

like as male, more massive; perianth with projecting conical apex. Syncarp 30-60 × 20-50 cm, green, tubercled; fruiting perianth yellow, firm or soft, juicy, fleshy. Seeds up to 3.5 × 2.5 cm, cotyledons unequal.

Fl. & Fr. : Dec.-May.

Distrib. : Pantropical, especially in Southeast Asia.

Specimens examined : Maromer, 840.

Notes : Commonly cultivated, often self sown and found as an escape, throughout the district, up to Netarhat.

Common name : Beng. & Hindi : *Kanthal*; Kol. & Santal : *Kanther.*

Uses : Unripe fruits eaten as vegetable or pickled, ripe ones eaten fresh, seeds are also eaten after roasting or boiling. Wood used for various carpentery work.

2. BROUSSONETIA L'Herit. ex Vent.

Broussonetia papyrifera Vent., Table Regne Veg. 3: 547. 1799; Hook.f., Fl. Brit. India 5: 490. 1888; Haines, Bot. Bihar & Orissa 3: 862. 1961 (Rep. ed.).

Moderate sized trees, with hairy young branches. Leaves alternate, entire or 3-5 lobed, petioled, ovate-serrate, up to 15 × 8.5 cm, acuminate at apex, oblique and 3-nerved at base, scabrid above, pubescent beneath; stipules lanceolate, acuminate, 1-1.5 × 0.3-0.4 cm, caducous; petioles up to 3 cm long. Male spikes 7-15 cm long, drooping; tepals-4, valvate; stamens-4, inflexed in bud. Female flowers in heads, with short peduncle.

Fl. & Fr. : Mar.-July.

Distrib. : India, Malaya, China and Japan.

Specimens examined : Betla, 35.

Notes : Common in the forest.

Common name : Hindi : *Janglitut.*

Uses : Wood used in making plywood, cheap furniture and packing cases.

3. FICUS L.

1a. Figs cauliflorus :

2a. Leaves opposite ... 4. *F. hispida*

2b. Leaves alternate :

3a. Large buttressed trees; leaves glabrous, entire ... 8. *F. racemosa*

3b. Small trees or shrubs; without buttresses; leaves pubescent, scabrid, serrate :

4a. Leaf-bases unequally auricled (semi-sagittate) ...10. *F. semicordata*

4b. Leaf-bases not auricled :

5a. Leaves orbicular-ovate, 3-5 lobed, base cordate ... 7. *F. palmata*

5b. Leaves lanceolate, not lobed, base cuneate ... 5. *F. lanceolata*

1b. Figs not cauliflorous :

6a. Leaves with numerous, very close side veins; basal veins not elongate :

7a. Aerial roots present; leaves more than 15 cm long; stipules red; figs peduncled ... 3. *F. elastica*

7b. Aerial roots absent; leaves less than 15 cm long; stipules not red; figs sessile ... 2. *F. benjamina*

6b. Leaves with side veins distinctly spaced; basal vein elongate :

8a. Figs distinctly peduncled :

9a. Figs scabrid-hairy with small bracts at the base of the stalk ... 11. *F. tinctoria*

9b. Figs glabrous, with small bracts at the top of the stalk ... 12. *F. virens*

8b. Figs sessile :

10a. Leaf apex not caudate :

11a. Leaves white-tomentose beneath, midrib with an elongated gland at base; figs tomentose, less than 10 mm wide ... 6. *F. mollis*

11b. Leaves glabrous, mid rib eglandular; figs glabrascent, more than 10 mm wide ... 1. *F. benghalensis*

10b. Leaf apex caudate ... 9. *F. religiosa*

1. **Ficus benghalensis** L., Sp. Pl. 1059. 1753; King in Ann. Roy. Bot. Gard. (Calcutta) 1: 18. tt. 13 & 81 E. 1887-88 et in Hook.f., Fl. Brit. India 5. 499. 1888; Prain, Beng. Pl. 2: 979. 1909 (Rep. ed. 2: 735. 1963) & in Rec. Bot. Surv. India 3: 279. 1905; Haines, Bot. Bihar & Orissa 3: 874. 1961 (Rep. ed.); Corner in Gard. Bull. Singapore 21: 14. 1965; Ramam. & Gandhi in Slad. & Nicol., Fl. Hassan 80. 1976.

Large spreading trees, with numerous aerial roots; young shoot softly pubescent. Leaves coriaceous, up to 20 × 12 cm, opposite, elliptic or ovate, obtuse at apex, rounded at base, lower surface hispid-pubescent, with 5-9 basal nerves; petioles up to 4 cm long. Figs sessile in axillary pairs, 1.5-2 cm in diam., subglobose, with 3 broad, rounded coriaceous basal bracts, silky pubescent, red when ripe. Male flowers numerous near mouth of receptacle; tepals-4, lanceolate; stamen-1. Perianth of gallflower as in male; style short. Perianth of female flower shorter than male; style elongate.

Fl. & Fr. : Dec.-Mar.

Distrib. : Throughout India & Bangladesh.

Specimens examined : Vandaria, 660.

Notes : Common on road sides, in village surroundings.

Common name : Beng. : *Bot*; Hindi : *Bargat*; Santal : *Bare.*

Uses : Fruits eaten in times of scarcity. Latex applied in rheumatism and lumbago, wood suitable for paper pulp. Fibre from aerial roots made into coarse ropes.

2. **F. benjamina** L., Mant. 129. 1767; King in Ann. Roy. Bot. Gard. (Calcutta) 1: 43. Pl. 52. 1887 et in Hook.f., Fl. Brit. India 5: 508. 1888;

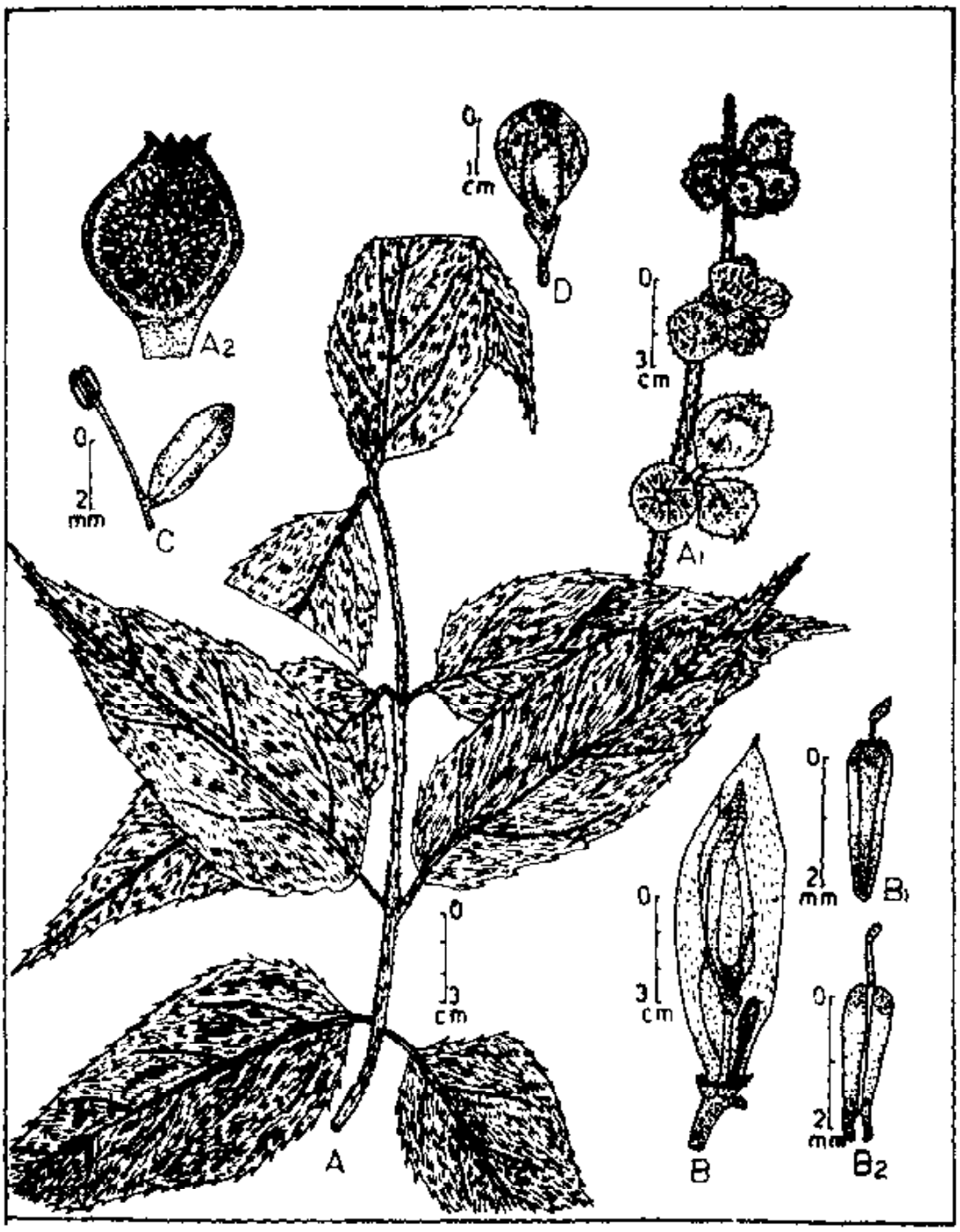


Fig. 37. Moraceae. (A-A_2): *Ficus hispida* L.; A. Sterile branch; A_1. Flowering branch; A_2. Vertical section of the fig; (B-B_2): *Artocarpus heterophyllus* Lam.: B. Female inflorescence; B_1. Female flower; B_2. Vertical section of the same; C. *Ficus racemosa* L.: Male flower; D. *Ficus palmata* Forsk.

Corner, Gard. Bull. Singapore 21: 21. 1965. *Ficus nitida* Thunb., Diss. Ficus 5, 11, 15. 1786. *F. retusa* L. var. *nitida* (Thunb.) Miq., Ann. Mus. Bot. Lugduno Batavum 3: 267. 1867; King in Hook.f., Fl. Brit. India 5: 511. 1888; Haines, Bot. Bihar & Orissa 3: 869. 1961 (Rep. ed.).

Large, evergreen trees, without any aerial roots; bark grey, smooth. Leaves 5-12 × 3-6 cm, elliptic to lanceolate, or ovate-elliptic, shining, glabrous, acuminate at apex, narrowly cuneate at base, coriaceous, lateral nerves up to 14 pairs, very close; petioles 4-18 mm long. Figs sessile, axillary, paired, become yellow at ripening, up to 12 mm across, subglobose; basal bracts 2-3, 0.5-1.5 mm long; orifice closed by 3 small flat apical scales. Tepals 3-4, free. Male flowers and gall flowers pedicelled, 0.2-2.5 mm long. Female flowers sessile.

Fl. & Fr. : Jan.-Apr.

Distrib. : India and South China to Solomon Islands, introduced in Sri Lanka.

Specimens examined : Richughuta, 744.

Notes : Not very common, probably planted at Richughuta Rly. Station.

Common name : Beng. : *Pukar.*

Uses : Wood suitable for match-boxes, and bark used in making ropes.

3. Ficus elastica Roxb. ex Hornem., Hort. Bot. Hafn. Suppl. 7. 1819; King, Ann. Roy. Bot. Gard. (Calcutta) 1: 45. t. 54. 1887 et in Hook.f., Fl. Brit. India 5: 508. 1888; Haines, Bot. Bihar & Orissa 3: 869. 1961 (Rep. ed.); Corner, Gard. Bull. Singapore 21: 24. 1965.

Large, evergreen trees. Leaves elliptic to subobovate, 15-30 × 6-18 cm, acuminate with a short tip, base cuneate to rounded, coriaceous, lateral veins 15-20 pairs; petioles up to 4 cm long; stipules very large in lower branches, shorter on upper twig, pink. Figs axillary, on twigs below leaves, paired, ellipsoid, up to 11 × 8 mm; orifice closed by 3-4 apical bracts; basal bracts-3, up to 3 mm long, caducous.

Distrib. : India, Myanmar, Java, north Malaya, introduced to Sri Lanka.

Specimens examined : Kumemdi, 736.

Notes : Cultivated in the garden.

Common name : Beng. : *Assam rubber*; Eng. : *Indian Rubber Tree.*

4. Ficus hispida L.f., Suppl. Pl. 442. 1781; King. Ann. Roy. Bot. Gard. (Calcutta) 1: 116. t. 154. 1888 et in Hook.f., Fl. Brit. India 5: 522. 1888; Haines, Bot. Bihar & Orissa 3: 878. 1961 (Rep. ed.); Corner, Gard. Bull. Singapore 21: 89. 1965. *Ficus oppositifolia* Roxb., Pl. Corom. 2: 14. t. 124. 1798. *Ficus daemonum* Koen. ex Vahl, Enum. Pl. 2: 198. 1806.

Small trees or shrubs, laxly branched; young parts hispid; internodes hollow. Leaves opposite, obovate to elliptic-oblong, up to 27 × 13 cm, acuminate at apex, truncate-cordate at base, entire or dentate at margin, scabrid; petioles up to 4 cm long. Figs axillary to cauliflorous on leafless hanging clusters of peduncles from trunk and main branches, thinly hispid, depressed globose, ripening pale yellow; basal bracts-3, scabrid; orifice closed by few bracts.

Fl. & Fr. : Throughout the year.

Distrib. : India, through Malaysia to Australia.

Specimens examined : Bhavnathpur, 1179.

Notes : Common throughout the district, in the village surroundings.

Common name : Beng. : *Dumur*; Santal : *Setapodo.*

Uses : Figs are edible.

5. F. lanceolata Buch. - Ham. ex Roxb. (Hort. Beng. 66. 1814 *nom. nud.*) Fl. Ind. 3: 557. 1832; King in Hook.f., Fl. Brit. India 5: 536. 1888; Haines, Bot. Bihar & Orissa 3: 879. 1961 (Rep. ed.).

Glabrous, semierect shrubs, with prostrate branches. Leaves membranous, narrowly lanceolate, acuminate at apex, cuneate, remotely serrate, 3-nerved at base, up to 15 × 5 cm. Figs in dense clusters on woody branchlets near the root, red with pale or white warts, up to 3 cm in

diameter top depressed, slightly constricted at base; basal bracts-3, small, ovate, acute. Male sepals 3-4, large, inflated; Gall and female perianth 3-toothed.

Fr. : May-July.

Distrib. : India, Bangladesh (Chittagong), Myanmar.

Specimens examined : Netarhat, 762.

Notes : Not common, in the rocky bed of Upper Ghagri Falls.

Uses : Figs are eaten by the local people.

6. Ficus mollis Vahl, Symb. Bot. 1: 82. 1790 et in Enum. 2: 192. 1806; Worthington, Ceylon Trees f. 410. 1959; Corner in Gard. Bull. Singapore 21: 14. 1965 et in Dassanayake, Rev. Handb. Fl. Ceylon 3: 249. 1981. *Ficus tomentosa* Roxb. ex Willd., Sp. Pl. 4: 1136. 1806; King in Ann. Roy. Bot. Gard. (Calcutta) 1: 22, Pl. 18. 1887; Hook.f., Fl. Brit. India 5: 501. 1888; Haines, Bot. Bihar & Orissa 3: 875. 1961 (Rep. ed.).

Large trees, with thin aerial roots from branches; young parts clothed with rusty grey tomentum. Leaves coriaceous, ovate-elliptic to obovate-elliptic, up to 15 × 9 cm, bluntly apiculate at apex, cordate at base, margin entire, densely tomentose beneath, glabrous above at maturity, 3-7 nerved, midribs with a elongated gland at the base. Figs sessile, paired, axillary; basal bracts-3, 4-5 mm long, ovate, acute; body up to 9 mm wide, globose, orifice closed by 3 glabrous apical bracts, grey tomentose.

Fl. & Fr. : Dec.-July.

Distrib. : India, Sri Lanka.

Specimens examined : Muhammadganj, 990.

Notes : Common in village surroundings.

Common name : Santal : *Chapakia bare.*

7. F. palmata Forsk., Fl. Aegypt. Arab. 179. 1775; King in Hook.f., Fl. Brit. India 5: 530. 1888; Haines, Bot. Bihar & Orissa 3: 879. 1961 (Rep. ed.).

Small tree or bush, up to 2 m high; young shoots tomentose. Leaves 11 × 8 cm, orbicular-ovate, 3-5 lobed, serrate at margin, scabrid above and pubescent beneath, cordate and 5-7 nerved at base; petioles up to 2.5 cm long, scabrid; stipules ovate-acute, hairy, deciduous. Figs peduncled, subglobose to pyriform, pubescent, up to 2.1 × 1.3 cm; basal bracts-3, ovate, acute, up to 3 × 3 mm, margin white-ciliate; orifice closed by small flat scales.

Fl. & Fr. : July-Dec.

Specimens examined : Netarhat, 780.

Distrib. : India, Aegypt and Abyssinia.

Notes : Infrequent on the way to Upper Ghagri and in open fields.

Common name : Hindi : *Anjiri, Bedu.*

Uses : Fruits are often eaten by the local people.

8. Ficus racemosa L., Sp. Pl. 1060. 1753; Barrett, Bull. Torrey Bot. Club 73: 312. 1946; Corner, Gard. Bull. Singapore 21: 34. 1965; Saldanha & Ramesh in Saldanha, Fl. Karnataka 1: 119. 1984. *Ficus glomerata* Roxb., Pl. Corom. 2: 13. f. 123. 1798; King, Ann. Roy. Bot. Garden (Calcutta) 2: 173. Pl. 218. 1888 et in Hook.f., Fl. Brit. India 5: 535. 1888; Haines, Bot. Bihar & Orissa 3: 880. 1961 (Rep. ed.).

Large, stout trees with milky latex, up to 20 m high; young shoots pubescent; bark pinkish-brown. Stipules 1-3 cm long and often persistent on young shoots. Leaves 6-16 × 3 cm, elliptic, subovate or lanceolate, tapering towards the apex, acute at base, glabrous, entire, lateral veins 4-8 pairs; petioles 1-3 cm long, brown scrufy. Figs in large clusters on main branches and trunk, peduncle 3-12 mm long; basal bracts-3, 1-2 mm long, ovate-triangular, obtuse. Figs 2-3 cm across, subglobose, to pyriform, orifice plain or slightly sunken closed by apical bracts. Male flowers sessile, osteolar, in 2-3 rings. Gall flowers pedicelled. Female flowers sessile to subsessile, among gall flowers; ovary red-spotted.

Fl. & Fr.: Mar.-July.

Distrib. : India, Pakistan, Myanmar, Sri Lanka, South China to New Guinea and Queensland.

Specimens examined : Maromar, 519.

Notes : Common on roadsides and forests.

Common name : Beng. : *Jaggidumur*; Hindi : *Gular, Umar*; Santal : *Loa.*

Uses : Leaves used as fodder and commonly sold in the market at Daltonganj. Roots used in diarrhoea and diabetis, fruit is eaten by the local people. Latex used in piles and diarrhoea.

9. Ficus religiosa L., Sp. Pl. 1059, 1753; Hook.f., Fl. Brit. India 5: 513. 1888; Prain, Beng. Pl. 2: 980. 1903 (Rep. ed. 2: 735. 1963) & in Rec. Bot. Surv. India 3: 280. 1905; Haines, Bot. Bihar & Orissa 3: 874. 1961 (Rep. ed.); Ramam. & Gandhi in Sald. & Nicol., Fl. Hassan 82. 1976.

Large trees. Leaves alternate broadly ovate, up to 14 × 8 cm, shining, long caudate-acuminate at apex, margin entire to wavy, base nearly cordate; petioles slender, up to 7 cm long; stipules small, ovate-acute. Figs in axillary pairs, up to 10 mm in diam., smooth, depressed globose, dark purple when ripe; basal bracts-3, suborbicular, up to 5 mm long.

Fl. & Fr. : May-Sept.

Distrib. : Throughout India and Bangladesh.

Specimens examined : Maromar, 538.

Notes : Common along road sides, in the forests and in the villages; often epiphytic on old buildings and also on other trees.

Common name Beng. : *Aswatha*; Hindi : *Pipal*; Santal : *Hesak.*

Uses : Wood used in making packing cases and in other purposes. Leaves are lopped for fodder. Bark used in ulcers and skin diseases.

10. F. semicordata Buch.-Ham. ex J.E. Smith in Rees. Cyclop. 14: n. 71. 1810; Corner in Gard. Bull. Singapore 17: 449: 1959. *Ficus cunia*

Buch.-Ham. ex Roxb., Fl. India 3: 561. 1832; King in Hook.f., Fl. Brit. India 5: 523. 1888 (excl. syn. *F. conglomerata* Roxb.); Haines, Bot. Bihar & Orissa 3: 877. 1961 (Rep. ed.).

Medium sized trees. Leaves alternate, elliptic or oblong-lanceolate, 10-26 × 5-11 cm, acute at apex, unequally semisagittate at base, scabrid above, pubescent beneath; petioles hairy, up to 2 cm long. Figs paired or clustered on long, drooping, leafless branches, often crowded near roots, pyriform-globose, tomentose, up to 14 mm wide; peduncles 3-5 mm long, pubescent; basal bracts-3.

Fl. & Fr. : Feb.-July.

Distrib. : India, Bhutan, Bangladesh and Myanmar.

Specimens examined : Netarhat, 163.

Notes : Common in forests, near the stream.

Common name : Beng. : *Bhoka-Dumbar*; Santal : *Hor-podo*.

Uses : Figs are eaten by the local people.

11. Ficus tinctoria Forst.f., Prodr. Fl. Austral. 76. 1786; Corner, Gard. Bull. Singapore 17: 475. 1960. subsp. **parasitica** (Koen. ex Willd.) Corner, Gard. Bull. Singapore 17: 476. 1960; Ramam. & Gandhi in Sald. & Nicol., Fl. Hassan 83: 1976. *Ficus parasitica* Koen. ex Willd., Mem. Acad. Roy. Sci. Hist. (Berlin) 2: 102. 1798; Haines, Bot. Bihar & Orissa 3: 876. 1961 (Rep. ed.). *Ficus gibbosa* Bl. var. *parasitica* (Koen. ex Willd.) King, Ann. Roy. Bot. Gard. (Calcutta) 1: 6 pl. 2a-b. 1887; King in Hook.f., Fl. Brit. India 5: 497. 1888.

Large straggling shrubs, with copious and anastomosing aerial roots; bark grey, glabrous to hairy. Leaves up to 10 × 6 cm, asymmetric, elliptic-lanceolate to ovate-elliptic or subrhombic, acute or acuminate at apex, narrowed or rounded at base, scabrid, lateral nerves 4-6 pairs; petioles 5-15 mm long. Figs in axillary pairs, golden-yellow at maturity, scabridulous, up to 8 mm across; pedicels 2-8 mm long, with 3 small, 1-2 mm long basal bracts; orifice close by several small apical scales. Tepals 3-5, white, puberulous, oblong or lanceolate, free. Male flowers ostiolar in 1-2 rows; stamen-1. Gall and female flowers sessile or pedicelled.

Distrib. : India, Sri Lanka, Myanmar and South China.

Specimens examined : Maromar, 509.

Notes : Occasional on *Madhuca longifolia* (Koen.) MacBride as epiphytes.

12. Ficus virens Ait., Hort. Kew. 3: 451. 1789; Corner, Gard. Bull. Singapore 21: 9. 1965; Ramam. & Gandhi in Sald. & Nicol., Fl. Hassan 83. 1976. *Ficus infectoria* Roxb., Fl. Ind. 3: 551. 1832 (non Willd. 1806); King, Ann. Roy. Bot. Gard. (Calcutta) 1: 60, t. 75 & 84Y2. 1887 et in Hook.f., Fl. Brit. India 5: 515. 1888; Haines, Bot. Bihar & Orissa 3: 871. 1961 (Rep. ed.). *Ficus lacor* Buch.-Ham. in Trans. Linn. Soc. 15: 150. 1826.

Medium sized, deciduous trees, with few aerial roots. Leaves spirally arranged, glabrous, up to 15 × 7 cm, ovate-elliptic to elliptic, shortly acuminate at apex, rounded to slightly cuneate at base, edges often sinous, thinly coriaceous, lateral veins 7-12 pairs; petioles up to 6 cm long. Figs axillary, paired on twigs just below leaves, 7-10 mm across, globose, creamy white to pink and black; peduncle up to 6 mm long; basal bracts-3, up to 3 × 4 mm, ovate, subacute or obtuse, pubescent, persistent; orifice small, closed by 3 flat, apical bracts. Male flowers ostiolar, sessile in 2-3 rings; tepals 2-3, ovate. Gall flowers shortly pedicelled or sessile, tepals 3-4, reddish, spathulate. Female flowers sessile; tepals 3-4; ovary reddish.

Fl. & Fr. : Dec.-Apr.

Distrib. : India, Sri Lanka and to Solomon Islands.

Specimens examined : Richughuta, 742.

Notes : Common in deciduous and mixed forests, throughout the district.

Common name : Beng. : *Pakur*; Hindi : *Kahimal, Keol*; Kol : *Baswesa, Pepehesa.*

Uses : Leaves are liked by cattle and fruits are eaten by local people, wood and bark suitable for paper pulp.

4. MORUS L.

1a. Style bifurcate, from near the base; fruits cylindric ... 2. *M. macroura*

1b. Style connate; fruits subglobose ... 1. *M. australis*

1. Morus australis Poir. in Lamk., Encycl. 4: 380. 1797; Nakai in J. Arn. Arb. 8: 236. 1927; Rehder in J. Arn. Arb. 10: 123. 1929. *Morus indica* (auct. non L.) Hook.f., Fl. Brit. India 5: 492. 1888; Haines, Bot. Bihar & Orissa 3: 861. 1961 (Rep. ed.).

Small trees or large shrubs. Leaves ovate, up to 15 × 12 cm, caudate-acuminate at apex, rounded to semicordate at base, coarsely and unequally serrate, often deeply lobed, pubescent or scabrous. Male spikes lax on short slender peduncles, 1.2-3 cm long, hairy all over; pedicels short; tepals ellipitc, up to 2 mm long. Female spikes short, ovoid on slender hairy peduncles; tepals-4, obovate, 2 inner flat or concave, the outer ones more or less keeled; style long, hairy, connate. Fruits ovoid or subglobose, red when ripe.

Fl. & Fr. : Nov.-July.

Distrib. : India, Myanmar, China & Japan.

Specimens examined : Maromar, 507.

Notes : Common in dry forests, on the way to Henar.

Common name : Beng. : *Tut*; Hindi : *Siah Tut*.

Uses : It is largely cultivated to feed silkworms, often seen as wild.

2. Morus macroura Miq., Pl. Jungh. 42. 1851; Ohashi in Hara, Fl. East. Himal. 55. 1966. *Morus laevigata* Wall. ex Brandis, For. Fl. Ind. 409. 1874; Hook.f. in Fl. Brit. India 5: 492. 1888; Haines, Bot. Bihar & Orissa 3: 862. 1961 (Rep. ed.).

Medium sized, deciduous trees; young parts hairy. Leaves ovate to broadly ovate, up to 13 × 10 cm, 3-lobed or entire, caudate-acuminate at apex, cordate at base, often oblique, serrulate at margin, basal nerves-3 and the nerves with whitish hairs; petioles up to 6.5 cm long. Flowers (both male and female) in 5-15 cm long, pendulous spikes. Tepals-4, ovate,

glabrous, 1.5 mm long; tepals of male flowers hairy. Ovary keeled, inner side flat; style papillose, free up to base. Fruits very small, cylindric, up to 1.5 mm long.

Fl. & Fr. : Jan.-Mar.

Distrib. : Throughout India.

Specimens examined : Netarhat, 71.

Notes : Infrequent on road sides.

5. STREBLUS Lour. emend. Cor.

Streblus asper Lour., Fl. Cochinch. 2: 615. 1790; Hook.f. in Fl. Brit. India 5: 489. 1888; Corner in Wayside Trees of Malaya 692. f. 255. 1952 et in Gard. Bull. Singapore 19: 228. 1962; Haines, Bot. Bihar & Orissa 3: 860. 1961 (Rep. ed.).

Unarmed, evergreen, bushy trees, up to 12 m high. Leaves elliptic-obovate, up to 7 × 4 cm, acuminate at apex, cuneate at base, denticulate at margin, scabrid; stipules 2-4 mm long, lanceolate, hairy, caducous. Male capitula up to 8 mm across, perianth segments-4, pubescent without, up to 1 mm long; stamens-4. Segments of female flower-4, elliptic-ovate, up to 2 mm long, embracing ovary. Drupes up to 7 mm long, globose, with persistent perianth.

Fl. & Fr. : Feb.-Apr.

Distrib. : India, Myanmar, Sri Lanka, Malaya, China, Thailand, Sumatra, Java, Philippines.

Specimens examined : Bhavnathpur, 1178.

Notes : Common in the forest and along river banks.

FAGACEAE

QUERCUS A. Camus

Quercus leucotrichophora A. Camus in Riviera Sci. 22: 66. 1935; Bahadur in India For. 101: 101. 1975; Chater in Enum. Fl. Pl. Nepal 3:

216. 1982. *Quercus incana* Roxb., Fl. Ind. 3: 642. 1832 (non Bart. 1791); Hook.f. in Fl. Brit. India 5: 603. 1888.

Evergreen, medium sized trees; young shoots hoary. Leaves lanceolate or ovate-lanceolate, 8-16 × 3-6 cm, acuminate at apex, obtuse at base, serrate at margin, densely tomentose beneath, secondary nerves 12-15 pairs, impressed above; petioles up to 1.5 cm long hairy. Male spikes softly hairy, up to 5 cm long. Female flowers sessile. Cups axillary, solitary or clustered, up to 1.5 cm across, campanulate, embracing half the conico-ovoid nuts.

Fl. & Fr. : Aug.-Mar.

Distrib. : India, Nepal and Myanmar.

Specimens examined : Netarhat, 146 & 785.

Notes : Commonly planted as avenue trees.

CERATOPHYLLACEAE

CERATOPHYLLUM L.

Ceratophyllum demersum L., Sp. Pl. 992. 1753; Hook.f. in Fl. Brit. India 5: 639. 1888; van Steenis in van Steenis, Fl. Malesiana ser. 1.4: 41. 1949; Haines, Bot. Bihar & Orissa 3: 883. 1961 (Rep. ed.); Khan & Halim in Khan, Fl. Bangladesh 10: 1. 1979; Saldanha in Saldanha, Fl. Karnataka 1: 86. 1984; Cook in Aquat. Wetland Pl. India 84. 1996.

Submerged, aquatic rootless herbs; often much branched; internodes 1-2.5 cm long. Leaves 2-4 cm long, in a whorls of 7-10, once or twice forked, segments acicular dentate. Male flowers solitary; perianth segments 6-12, narrow, apex 2-fid, white; stamens 8-24. Perianth of female flowers with entire acute apex; ovary sessile, 1-celled; style subulate. Fruits ellipsoid, 4-5 mm long, warty, with one, up to 10 mm long apical spine (persistent hardened style), and two basal, up to 8 mm long, slightly recurved spines.

Fl. & Fr. : Sept.-Dec.

Specimens examined : Mahulam busti (Garwah), 626. Plankton.

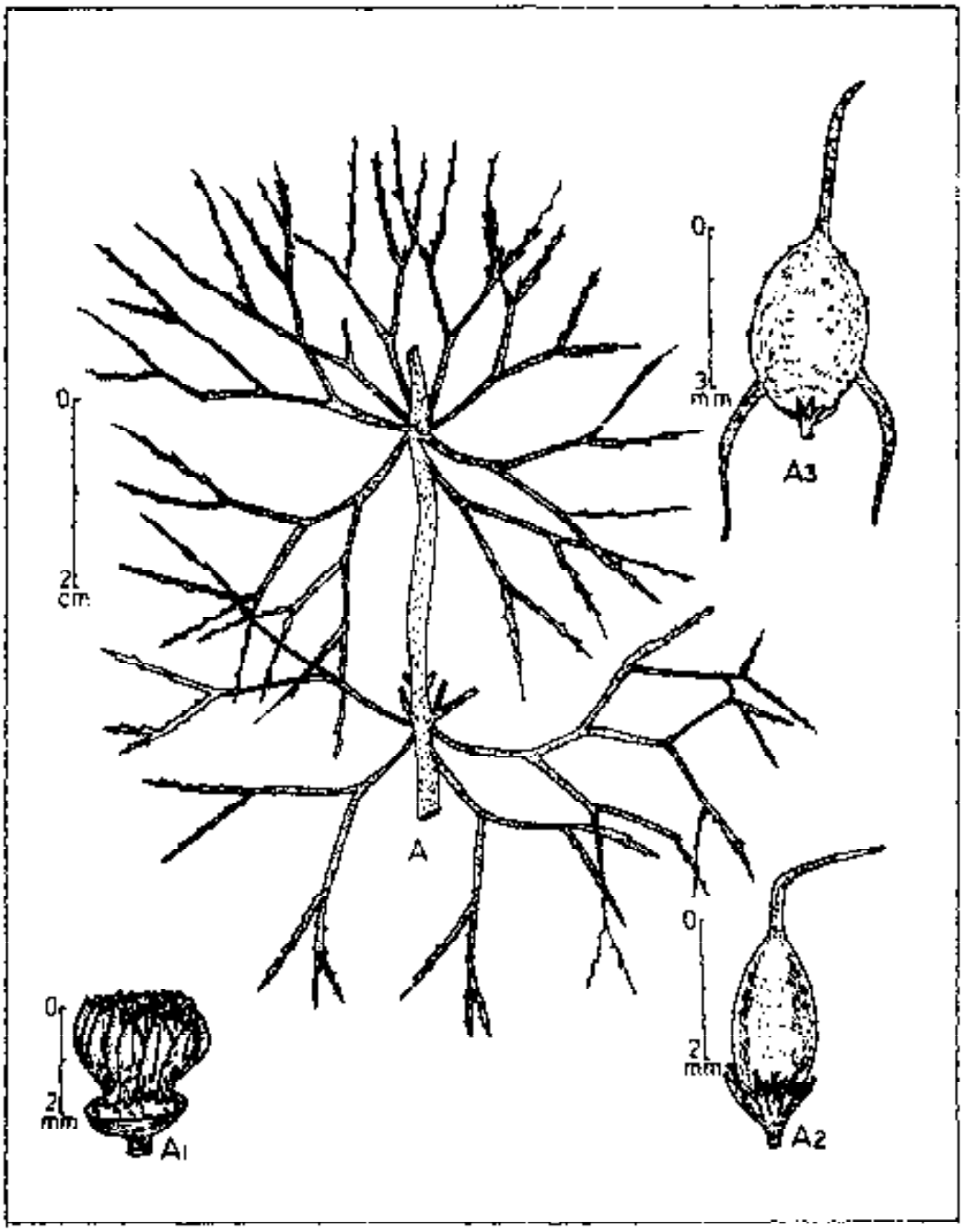


Fig. 38. Ceratophyllaceae. (A-A_3): *Ceratophyllum demersum* L.: A. Habit (portion of the stem enlarged); A_1. Male flower without tepals; A_2. Female flower; A_3. Fruit.

Distrib. : Cosmopolitan.

Notes : Common in ponds, ditches and pool, throughout the district.

Common name : Beng. : *Jhanji, Sheoyala*; Hindi : *Sivara.*

Uses : Cooling and in biliousness.

HYDROCHARITACEAE

1a. Herbs with branched stems :

2a. Leaves whorled; perianth double ... 1. HYDRILLA

2b. Leaves alternate; perianth single ... 2. NECHAMANDRA

1b. Herbs without stems :

3a. Petioles distinct; flowering spathe winged ... 3. OTTELIA

3b. Petioles indistinct; flowering spathe not winged ... 4. VALLISNERIA

1. HYDRILLA Rich.

Hydrilla verticillata (L.f.) Royle, Illus, Bot. Himal. 1. t. 376. 1839; Hook.f. in Fl. Brit. India 5: 659. 1888; Hartog in van Steenis, Fl. Males, ser. 1.5: 385. 1957; Haines, Bot. Bihar & Orissa 3: 893. 1961 (Rep. ed.); Cook in Aquat. Wetland Pl. Ind. 218. 1996. *Serpicula verticillata* Linn.f., Suppl. 416. 1781.

Aquatic, submerged herbs; stems and the branches slender. Leaves in whorls of 3-6, rarely opposite at the base of the stem, linear, rarely lanceolate, acute-apiculate at apex, margin spinulosely serrate or often subentire. Flowers unisexual, with 3 convex sepals and 3 petals. Male spathe solitary, axillary, up to 1.4 mm across, globose; pedicels 1-2 mm long. Female spathe solitary, axillary, up to 5 mm long, sessile, 1 flowered.

Fl. & Fr. : July-Dec.

Distrib. : India, Central Europe to Asia, Southward to Australia.

Specimens examined : Bhavnathpur, 1161. Vittate.

Notes : Common in ponds and ditches, throughout the district.

2. NECHAMANDRA Planc.

Nechamandra alternifolia (Roxb. ex Wight) Thw., Enum. Pl. Zeyl. 322. 1864; Subramanyam & Balakrishnan in Bull. Bot. Surv. India 3: 23. 1961; Subramanyam, Aquat. Ang. 56. 1962; Cook & Luond in Aquat. Bot. 13: 505-513. 1982; Cook in Aquat. Wetland Pl. Ind. 219. 1996. *Vallisneria alternifolia* Roxb. ex Wight in Hooker, Bot. Misc. 2(6): Suppl. 344. p. 11. 1831. *Lagarosiphon roxburghii* (Planch.) Benth. in Benth. & Hook.f. Gen. Pl. 3: 451. 1883 (nom. illeg.); Hook.f. in Fl. Brit. India 5: 652. 1888; Haines, Bot. Bihar & Orissa 3: 894. 1961 (Rep. ed.).

Submerged or floating, dioecious herbs. Leaves alternate below,crowded at the end of branches, sessile, amplexicaul, usually 3-nerved, linear or linear-lanceolate, acuminate or acute at apex, margin minutely serrulate. Flowers unisexual. Male spathe in axillary pairs, up to 6 × 4 mm, ovoid, 2-fid at the tip; flowers many, up to 0.4 mm, turbinate, densely arranged in a central axis like a condensed raceme. Female flower solitary, in scarious 2-fid spathe.

Fl. : Sept.-Nov.

Distrib. : India, Sri Lanka, Vietnam & Sudan.

Specimens examined : Ghurki, 1155. Vittate.

Notes : Occasional in stagnant waters.

3. OTTELIA Pers.

Ottelia alismoides (L.) Pers., Syn. Pl. 1: 400. 1805; Hook.f. in Fl. Brit. India 5: 662. 1888; Hartog in van Steenis, Fl. Males. ser. 1.5: 398. 1957; Haines, Bot. Bihar & Orissa 3: 897. 1961 (Rep. ed.); Cook in Aquat. Wetland Pl. Ind. 220. 1996. *Stratiotes alismoides* Linn., Sp. Pl. 535. 1753.

Submerged herbs. Leaves variable in size and shape, suborbicular, orbicular-ovate or broadly oblong, 7-15 × 6-12 cm, obtuse or rounded at apex, margin undulate, cordate or subcordate at base and 7-13 nerved; petioles trigonous, length varies much depending upon depth of water. Spathe solitary, axillary, 1-flowered, 2.2-3.2 × 1.2-1.8 cm, tubular, 5-8 winged, 2-4 wings well developed, margin of wing wavy and crisp. Flowers bisexual, sessile. Fruits ellipsoid, up to 3 cm long. Crowned with sepals.

Fl. & Fr. : Aug.-Dec.

Distrib. : India, Malaya to tropical Australia.

Specimens examined : Bhavnathpur, 31163. Rosulate.

Notes : Common in ponds and ditches.

Common name : Beng. : *Pani Kalla.*

4. VALLISNERIA L.

Vallisneria spiralis L., Sp. Pl. 1015. 1753 var. **denseserrulata** Makino in Bot. Mag. Tokyo 28: 27. 1914; Lowden in Aquat. Bot. 13: 288. 1982; Guha Bakshi, Fl. Murshid. Dist. 309. 1984. *Physkium natans* Lour., Fl. Cochinch. 663. 1790. *Vallisneria physceium* Juss. ex Spreng., Syst. 3: 900. 1826. *V. spiraloides* Roxb., Fl. Ind. 3: 750. 1832. *V. denseserrulata* (Makino) Makino, J. Jap. Bot. 2: 19. 1921. *V. natans* (Lour.) Hara (var. *natans*) in J. Jap. Bot. 42: 136. 1974.

Glabrous, submerged, tufted, stoloniferous herbs. Leaves translucent, linear, acute, minutely serrulate at margin near top, or entire, 25-75 × 1-1.3 cm. Male spathe ovoid, 3-lobed, 3-6 mm long. Female spathe on a long spiral peduncle which at time of maturity of the flowers uncoils and brings flowers to the surface of water and after fertilization again coils up and brings ovary to the bottom to ripen.

Fl. & Fr. : Feb.-Aug.

Distrib. : India, Sri Lanka, Africa, S.E. Asia to Australia.

Specimens examined : Kumendi, 704. Rosulate.

Notes : Common in ponds and ditches.

Common name : Beng. : *Seola.*

Remarks : Lowden (l.c.) has recognised two varieties viz. *spiralis* and *denseserrulata*. The Indian Plant comes under var. *denseserrulata*.

ORCHIDACEAE

1a. Plants epiphytic :

2a. Plants with distinct pseudobulbs ... 2. DENDROBIUM

2b. Plants without pseudobulbs :

3a. Spur laterally compressed ... 6. RHYNCHOSTYLIS

3b. Spur not laterally compressed ... 7. VANDA

1b. Plants terrestrial :

4a. Lip spurred, spur projecting beyond the lateral sepals :

5a. Inflorescence erect; lip with short spur, distinctly 3-lobed ... 3. EULOPHIA

5b. Inflorescence decurved; lip with a conical sac, faintly 3-lobed ... 4. GEODORUM

4b. Lip not spurred, often saccate, sac not projecting beyond the sepals :

6a. Leaves appear before the flowers; venation divergent; pollinia-2 ... 5. NERVILIA

6b. Leaves absent or rudimentary at flowering times; pollinia-4 ... 1. CYMBIDIUM

1. CYMBIDIUM Swartz.

Cymbidium macrorhizum Lindl., Gen. Sp. Orch. 162. 1833; Hook.f., in Fl. Brit. India 6: 9. 1890.

Terrestrial herbs; root stock creeping, branched; leafless during flowering. Scape short. Flowers in 6-8 flowered raceme; bracts narrow, membranous, up to 1.2 cm long; pedicels with ovary up to 2.5 cm long. Sepals linear-lanceolate, acuminate, up to 2.5 cm long. Petals white with pink striations. Lip white, spotted with crimson; lateral lobes narrow; midlobe ovate-obtuse.

Fl. & Fr. : June-Sept.

Distrib. : N.W. India.

Specimens examined : Boneri (Netarhat), 815.

Notes : Rare in the forest undergrowth.

2. DENDROBIUM Swartz.

1a. Racemes lateral; flowers more than 3 cm long ... 1. *D. formosum*

1b. Racemes terminal; flowers less than 3 cm long ... 2. *D. herbaceum*

1. Dendrobium formosum Roxb., Fl. Ind. 3: 485. 1832; Hook.f. in Fl. Brit. India 5: 721. 1890; Prain, Beng. Pl. 2: 757. 1963 (Rep. ed.); Haines, Bot. Bihar & Orissa 3: 1225, 1961 (Rep. ed.).

Handsome epiphytic orchid, without pseudobulb, but with several cylindrical fleshy somewhat furrowed stem, up to 25 cm long. Leaves subamplexicaul, ovate-lanceolate or oblong, up to 10 × 2.8 cm, slightly fleshy, with unequal apex. Flowers in solitary terminal raceme, large, up to 4 cm in diam., white with yellow palate. Sepals lanceolate or oblong-lanceolate, with acuminate apex.

Fl. & Fr. : Apr.-Sept.

Distrib. : Throughout India.

Specimens examined : Netarhat, 90.

Notes : Infrequent on forest trees.

2. D. herbaceum Lindl., Bot. Misc. 69. 1840; Hook.f. in Fl. Brit. India 5: 719. 1890; Prain, Beng. Pl. 2: 757. 1963 (Rep. ed.); Haines, Bot. Bihar & Orissa 3: 1225. 1922; Sald. in Sald. & Nicol. Fl. Hassan 820. 1976.

Epiphytic orchid having dark brown, grooved, erect, much branched stems. Leaves linear-lanceolate, acute, up to 8 × 0.5 cm, leafless during flowering. Flowers in short spike, white, 1.5 cm long. Sepals 4 petals linear-oblong, obtuse at apex, 5-nerved; bracts minute, lanceolate, scaly, lip very small, narrow and with obscure side lobe and a terminal, triangular midlobe.

Fl. & Fr. : Feb.-July.

Distrib. : Throughout India.

Specimens examined : Netarhat, 61.

Notes : Growing on *Shorea robusta, Buchanania latifolia, Toona ciliata, Terminalia chebula* in the forest.

3. EULOPHIA R.Br.

Eulophia nuda Lindl. in Gen. Sp. Orch. 180. 1833; Hook.f. in Fl. Brit. India 6: 5. 1890; Haines, Bot. Bihar & Orissa 3: 1223. 1961 (Rep. ed.).

Terrestrial herbs, up to 45 cm high. Leaves elliptic-lanceolate, 15-20 × 5-7 cm. Scape slender, stout. Flowers in many flowered, elongated raceme, greenish-white with purple nerves. Sepals linear-oblong, up to 2.5 cm long. Petals elliptic-oblong, shorter than the sepals. Lip obovate-oblong, obtuse; lateral lobes short, rounded; midlobe rounded, crenulate.

Fl. : May-June.

Specimens examined : Netarhat, 1187.

Distrib. : India, Sri Lanka, Myanmar.

Notes : Common in Sal forest undergrowth.

4. GEODORUM Jacks.

Geodorum densiflorum (Lamk.) Schltr. in Feddes Repert. Beih. 4: 259. 1929; Sant. & Kapadia in Orch. Bombay 203. 1966; Sald. & Nicol., Fl. Hassan 831. 1976. *Limodorum densiflorum* Lamk., Encycl. 3: 516. 1792. *Geodorum purpurcum* R.Br. in Ait., Hort. Kew. ed. 2.5: 207. 1813; Hook.f. in Fl. Brit. India 6: 16. 1890. *Geodorum dilatatum* R.Br. in Ait., Hort. Kew. ed. 2.5: 207. 1813; Hook.f. in Fl. Brit. India 6: 17. 1890; Haines, Bot. Bihar & Orissa 3: 1222. 1961 (Rep. ed.).

Terrestrial herbs, up to 45 cm high; pseudobulbs globular. Leaves sessile, entire, elliptic, or lanceolate, acute. Scapes up to 40 cm long. Flowers in corymbose racemes, whitish, nearly bell shaped. Bracts up to 8 cm long linear-lanceolate, acute. Petals obovate-oblong. Lip broadly corymbiform, obscurely 3-lobed, lateral lobes subentire, median one crenulate. Capsule up to 6 cm long.

Fl. & Fr. : May-Sept.

Distrib. : Throughout India.

Specimens examined : Ghurki, 1149.

Notes : Occasional on shady hill slopes.

5. NERVILIA Coum. ex Gaud.

1a. Leaf long petioled, ovate, flowers 2-5 ... 1. *N. aragoana*

1b. Leaf short petioled, orbicular; flowers solitary ... 2. *N. prainiana*

1. Nervilla aragoana Gaud. in Freycinet, Voy. Bot. 422. t. 35. 1826; Sald. in Sald. & Nicol., Fl. Hassan 837. 1976; Mukherjee in Fl. Pach. & Bori Res. 293. 1984. *Pogonia flabelliformis* Lindl., Gen. Sp. Orch. 415. 1840; Hook.f. in Fl. Brit. India 6: 121. 1890; Haines, Bot. Bihar & Orissa 3: 1215. 1961 (Rep. ed.).

Terrestrial, small herbs, with single leaf. Leaf long petioled, ovate-cordate, hastate at base, acute at apex, with undulating margin. Raceme lax, 2-5-flowered. Flowers greenish-yellow. Lip shortly 3-lobed; lateral lobes short, midlobe subacute, irregularly crenulate, nerves fleshy, purple.

Fl. & Fr. : June-Sept.

Distrib. : India and Marianne Islands.

Specimens examined : Netarhat, 1186.

Notes : Rare in forest undergrowth.

2. N. prainiana (King & Pantl.) Seidenf. & Smitim., Orch. Thailand 730. 1964; Sald. in Sald. & Nicol., Fl. Hassan 837. 1976; Mukherjee in Fl. Pach. Bori. Res. 293. 1984. *Pogonia prainiana* King & Pantl. in J. Asiat. Soc. Beng. 65(2): 129. 1896.

Terrestrial, small, herbs, up to 10 cm high. Leaf pubescent, orbicular, cordate, flat on ground, short petioled. Flowers solitary. Sepals and petals subequal, yellow. Lip 3-lobed, rounded; midlobe fimbriate, nerves fleshy, hairy.

Fl. & Fr. : June-Aug.

Distrib. : Throughout India.

Specimens examined : Boneri (Netarhat), 814.

Notes : Rare in forest undergrowth.

6. RHYNCHOSTYLIS Blume emend Hasak.

Rhynchostylis retusa (L.) Blume, Bijdr. 286. t. 49. 1825; Hook.f. in Fl. Brit. India 6: 32. 1890; Prain, Beng. Pl. 2: 1020. 1903 (Rep. ed. 2: 767. 1963); Haines, Bot. Bihar & Orissa 3: 1230. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 496. 1977. *Epidendrum retusum* L. Sp. Pl. 953. 1753.

Epiphytes; stems stout, closely covered with leaf-bases. Leaves coriaceous, linear-oblong, up to 18 × 1.8 cm, deeply channelled above, sealed beneath, bluntly unequally 2-lobed at apex. Flowers white, blotched with pink, up to 2 cm in diam., in drooping raceme; racemes up to 20 cm long, with ovate, acute, persistent, up to 4 mm long bracts. Sepals veined, lateral pair obliquely obovate-orbicular, dorsal one obovate, rounded. Petals elliptic-oblong, subobtuse. Lip dark pink with saccate flattened spur, epichile variable in shape, oblong or cuneate, oblong at base, widening towards the apex.

Fl. : May-July.

Distrib. : India, Nepal, Bhutan, extending to Myanmar, Sri Lanka and Malaya Islands.

Specimens examined : Garu, 541.

Notes : Common in the forest as epiphytes.

7. VANDA W. Jones ex R.Br.

Vanda tessellata (Roxb.) Lodd. ex G. Don in Loud., Hort. Brit. 372. 1832; Haines, Bot. Bihar & Orissa 3: 1233. 1961 (Rep. ed.); Jagaweera in Dassanayake, Rev. Hand. Fl. Ceylon 2: 218. 1981; Joshep in Rec. Bot. Surv. India (Orch. Nilgiris) 22: 130. 1982. Santapau and Kapadia in Orch. Bombay 220. 1966. *Epidendrum tessellatum* Roxb., Pl. Corom. 1: 34. t.

42: 1795. *Vanda roxburghii* R.Br. in Bot. Reg. 6: t. 506. 1820; Hook.f. in Fl. Brit. India 6: 52. 1890; Prain, Beng. Pl. 2: 1021. 1903 (Rep. ed.) 2: 767. 1963).

Stems up to 50 cm long. Leaves coriaceous, slightly recurved, strap shaped, obtusely keeled. Flowers up to 5 cm across, in 4-9 flowered raceme, on long peduncle. Capsule 3-9 × 3.8-1.5 cm, oblong, sharply winged.

Fl. & Fr. : May-Oct.

Distrib. : India & Sri Lanka.

Specimens examined : Barwadih, 477.

Notes : Common epiphytes in the villages and forest, on *Mangifera indica* & *Buchanania lanzan*.

Common name : Beng. : *Rasna*.

ZINGIBERACEAE

1a. Ovary 1-loculed, with parietal placentation ... 1. GLOBBA

1b. Ovary 3-loculed, with axile placentation ... 2. ZINGIBER

1. GLOBBA L.

Globba marantina L., Mant. Alt. 170. 1771; Baker in Hook.f. Fl. Brit. India 6: 206. 1890; Burtt & Smith in Dassanayake, Rev. Handb. Fl. Ceylon 4: 499. 1983. *Globba bulbifera* Roxb., in As. Res. 11: 358. 1810; Baker in Hook.f., Fl. Brit. India 6: 206. 1890; Haines, Bot. Bihar & Orissa 3: 1180. 1961 (Rep. ed.).

Slender herbs, with leafy stems, up to 60 cm high. Leaves distichous, shortly petioled, entire, 7-15 × 3-4 cm; sheaths long; ligule very short, ciliate. Flowers in lax spikes, fragrant, shortly pedicillate; bracts up to 2 cm long. Capsule up to 6 cm long, oblong, glabrous.

Fl. & Fr. : Rainy season (June-Aug.).

Distrib. : India and Malaysia.

Specimens examined : Ghurki, 1150.

Notes : Common in shady places of the forests.

2. ZINGIBER Boehmer apud Ladwig *nom. cons.*

Zingiber zerumbet (L.) Smith, *Escot.* Bot. 2: 105. t. 112. 1806; Baker in Hook.f., Fl. Brit. India 6: 249. 1892; Haines, Bot. Bihar & Orissa 3: 1194. 1961 (Rep. ed.).

Root stock aromatic stems up to 1 m high, glabrous. Leaves oblong-lanceolate, or oblanceolate, up to 30 × 5 cm; petioles up to 1 cm long; ligule up to 1.5 cm long; membranous. Peduncle up to 25 cm long; spikes up to 7 × 3 cm, conical; bracts up to 3 cm long, imbricate. Capsule up to 2.5 cm long, ellipsoid.

Fl. & Fr. : Aug.-Oct.

Distrib. : Pantropic.

Specimens examined : Ghurki, 1158.

Notes : Not common in the forest undergrowth.

Common name : Hindi : *Makabaribach.*

Curcuma amada Roxb., *Curcuma longa* L. and *Zingiber officinale* Roxb. are commonly cultivated for their rhizomes.

COSTACEAE

COSTUS L.

Costus speciosus (Koen.) Smith in Trans. Linn. Soc. Lond. 1: 249. 1800; Baker in Hook.f., Fl. Brit. India 6: 249. 1892; Haines, Bot. Bihar & Orissa 3: 1196. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 500. 1977; Maas in Blumea 25(2): 546. 1979. *Banksia speciosa* Koen. in Retz., Obs. Bot. 3: 1783. *Costus speciosus* var. *nepalensis* (Rose.) Baker in Fl. Brit. India 6: 250. 1892.

Erect, tuberous, perennial herbs, up to 1.5 m high; stems subwoody at base. Leaves 5-30 × 3.5-9 cm, subsessile, coriaceous, glabrous above, silky-pubescent beneath, elliptic or oblong-lanceolate, acute to acuminate at apeax. Spike compact, terminal, ovoid or ellipsoid, 5-10 × 3-6.5 cm; bracts 2-3 cm long, ovate, acuminate, often mucronate, bright red, 1-flowered; bracteole solitary, 1.2-1.5 cm long. Calyx up to 3 cm long, lobes ovate-cuspidate, up to 6 mm long, becoming red. Corolla white, lobes ovate-oblong, apiculate, dorsal lobes slightly larger than lateral, suborbicular, with a yellow entire, plicate, crisped, margin usually meeting. Disc pubescent with a tuft of hairs at base. Stamens 3.5-4 cm long, filament base with a tuft of hairs, petaloid connective up to 1 cm broad. Capsule broadly oblong or subglobosely 3-gonous, up to 2 cm long. Seeds black with white aril.

Fl. & Fr. : Aug.-Dec.

Distrib. : India, Malaysia and other tropical countries.

Specimens examined : Netarhat, 791.

Notes : Common in moist hilly areas and forests.

Common name : Beng. & Hindi : *Keu.*

Uses : Rhizomes cooked and eaten; roots used as a tonic and anthelmintic.

MUSACEAE

MUSA L.

Musa paradisiaca L., Sp. Pl. 1043. 1753; Cheesman in Kew Bull. 3: 145. 1948; Simmond & Shephard in J. Linn. Soc. London Bot. 55: 302-312. 1955; Guha Bakshi in Fl. Murshid. Distt. 314. 1984. *Musa sapientum* L., Syst. 1303. 1759; Baker in Hook.f., Fl. Brit. India 6: 262. 1982; Haines, Bot. Bihar & Orissa 3: 1177. 1961 (Rep. ed.).

Pseudostems up to 5 m high. Leaves oblong, 1-2 m long. Inflorescence, pendulous; bracts up to 30 cm long, deep red, ovate or ovate-oblong. Flowers many, 2-seriate. Fruits up to 15 cm long, oblong-triangular.

Fl. & Fr. : Throughout the year.

Distrib. : A good number of varieties are cultivated and many of them have been introduced in India from Malaya and tropical Asia.

Specimens examined : Bishrampur, 555.

Notes : Common. Cultivated throughout the district, also found as wild in the forest.

Common name : Beng. : *Kala*; Hindi : *Kela.*

Uses : Ripe and unripe fruits are edible.

Ravenala madagascariensis Gmel. of Strelitziaceae, a family allied to Musaceae, is commonly found in the garden.

CANNACEAE

CANNA L.

Canna indica L., Sp. Pl. 1: 1753; Hara *et al.*, in Enum. Fl. Pl. Nep. 1: 62. 1978; Ghazanfar in Nasir & Ali, Fl. Pak. 145. 1. 1982. *Canna orientalis* Rosc., Monandr. Pl. t. 12. 1828. *Canna indica* L. var. *orientalis* (Rosc.) Baker in Hook.f., Fl. Brit. India 6: 260. 1892; Haines, Bot. Bihar & Orissa 3: 1199. 1961 (Rep. ed.).

Perennial rhizomatous herbs, up to 1.2 m high. Leaves elliptic-oblong or ovate-oblong, acute or shortly acuminate at apex, margin entire, up to 45 × 20 cm. Flowers racemose, deep red or yellow with brown spot; bracts lanceolate, up to 1.5 cm long. Fruits up to 2.4 cm long, ellipsoid. Seeds round, black.

Fl. : May-Aug.

Distrib. : Throughout India, Sri Lanka and Malacca.

Specimens examined : Ghurki, 1154.

Notes : Common, in the village surroundings.

Common name : Beng. : *Sarbajaya.*

AMARYLLIDACEAE

ZEPHYRANTHES Herb.

Zephyranthes flava Nichols., Dict. Gard. 4: 239. 1887; Haines, Bot. Bihar & Orissa 3: 1156. 1961 (Rep. ed.).

Herbs with tunicate bulbs, up to 30 cm high. Leaves linear, up to 20 cm long, appearing with or after flowers. Flowers solitary, pedicelled. Perianth up to 4 cm long, funnel-shaped, straight, dilated upwards, yellow; lobes-6, suberect. Stamens-6, adnate to the perianth throat; anthers linear. Carpels-3, connate in a 3-celled ovary. Capsule subglobose, 3-lobed. Seeds oblong, flattened, up to 7 × 4 mm, black.

Fl. & Fr. : June-Aug. Exotic.

Distrib. : Native of Peru; introduced in other countries, including India.

Specimens examined : Netarhat, 806.

Notes : Commonly cultivated as a garden plant but often found as an escape in the open fields.

Crinum asiaticum L., *Crinum defixum* Ker-Gawler and *Polyanthes tuberosa* L. are commonly found in the garden.

HYPOXIDACEAE

CURCULIGO Gaertn.

Curculigo orchioides Gaertn., Fruct. 1: 63. t. 13. 1788; Hook.f. in Fl. Brit. India 6: 279. 1892; Prain, Beng. Pl. 2: 1059. 1903 (Rep. ed. 2: 796. 1963); Haines, Bot. Bihar & Orissa 3: 1162. 1961 (Rep. ed.); Santapau, Fl. Khand. 278. 1967; Nasir & Ali, Fl. Pak. 134. 5. 1980.

Small herbs, up to 20 cm long. Leaves few, up to 20 × 2.5 cm, glabrous, plicate, linear-lanceolate to linear-elliptic, acuminate at apex, base narrowed down into a short petiole and sheathing. Flowering scape axillary, up to the ground level. Flowers subtended by long, lanceolate hairy bracts which sheath the hypanthium. Perianth segments 0.8-1 cm long, hairy outside,

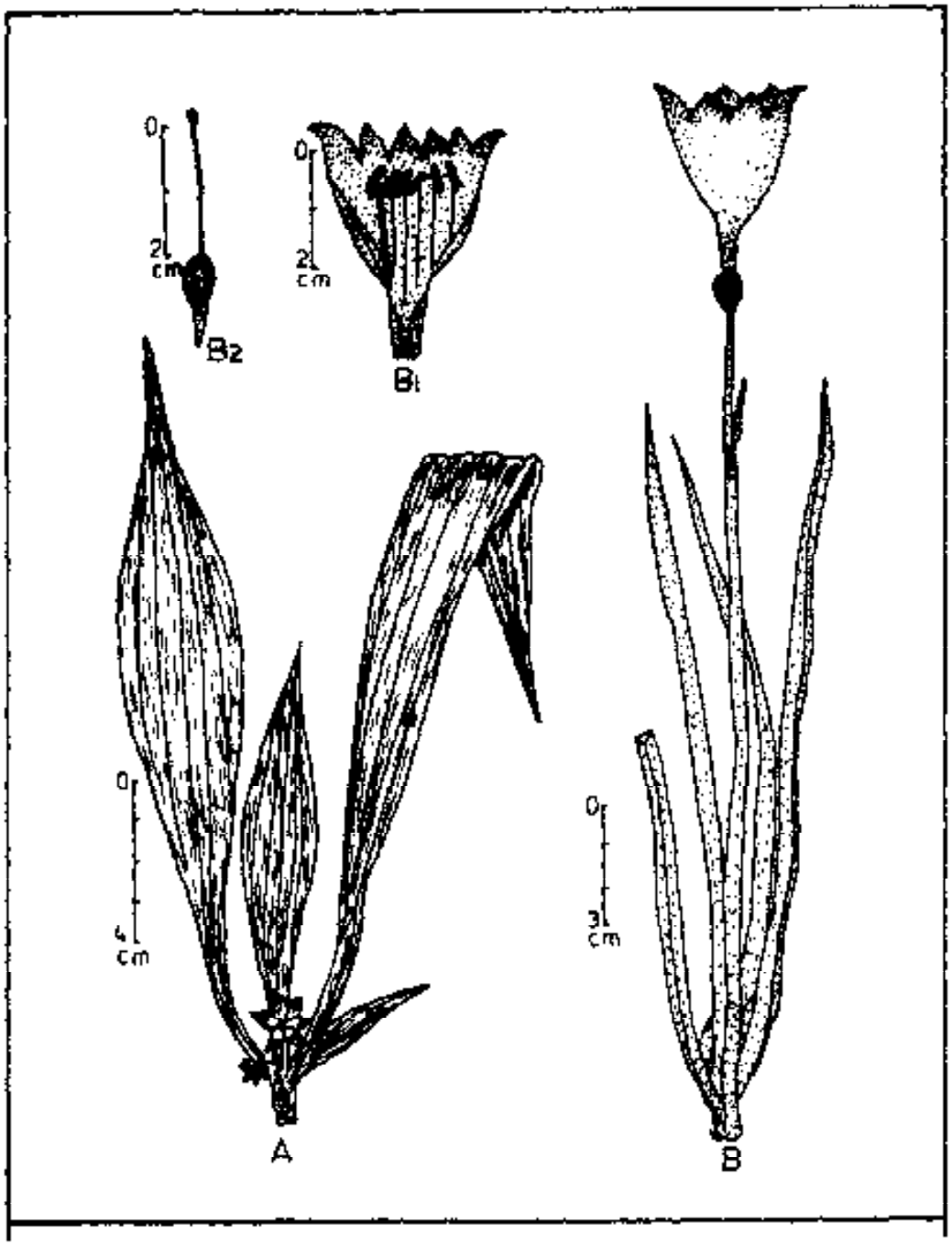


Fig. 39. Hypoxidaceae. A. *Curculigo orchioides* Gaertn: Habit; (B-B_2): Amaryllidaceae: *Zephyranthes flava* Nichols: B. Habit; B_1. Perianth split open; B_2. Gynoecium.

elliptic-oblong, acute at apex, on 2.5-3 cm long stipe. Capsule hypogynous, sessile in axil of bract, 10-12 mm long, with a slender beak.

Fl. : May-Aug.

Distrib. : India to South East Asia, Australia.

Specimens examined : Maromar, 521; Netarhat, 753.

Notes : Common in forest undergrowth.

Common name : Beng. : *Talamuli*; Hindi : *Mushali.*

Uses : Root has medicinal properties, beneficial in piles.

AGAVACEAE

AGAVE L.

Agave angustifolia Haw., Syn. Pl. Succ. 72. 1812; Jacobsen, Lexicon Succ. Pl. 41. 1970; Guha Bakshi, Fl. Murshidabad Distt. 323. 1984. *Agave wightii* Drummond & Prain in Agri-Led. 13(7): 91. 1906 & in Land Rec. & Agri. Bengal Bull. No. 8: 11. 1906; Haines, Bot. Bihar & Orissa 3: 1155. 1961 (Rep. ed.).

Trunk stout, usually conspicuous, ascending throughout or partly procumbent. Leaves up to 75 × 6 cm, glabrous, ensiform, linear-lanceolate, pale green, marginal prickle weak, up to 3.5 cm, spreading or erect. Scape stout, up to 4 m tall. Flowers many, near upper end of the scape, with bracts and bracteoles; pedicels 2-3 mm long. Capsule up to 3.5 cm long, broadly turbinate. Seeds black.

Fl. : July-Sept. Exotic.

Distrib. : Native of America, widely distributed in India.

Specimens examined : Seuti, 1092.

Notes : Common near forest.

Common name : Beng. : *Koya.*

Uses : Leaves yield a commercial fibre.

DIOSCOREACEAE

DIOSCOREA L.

1a. Stems twining to the right; seeds winged all around :

2a. Leaves 3-5 nerved; capsule broader than long ... 3. *D. oppositifolia*

2b. Leaves 7-9 nerved; capsule longer than broad ... 2. *D. glabra*

1b. Stems twining to the left; seeds winged at base only :

3a. Leaves simple 1. *D. bulbifera*

3b. Leaves 3-7 foliolate ... 4. *D. pentaphylla*

1. Dioscorea bulbifera L., Sp. Pl. 1033. 1753; Hook.f. in Fl. Brit. India 6: 296. 1892; Haines, Bot. Bihar & Orissa 3: 1172. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 515. 1977; Liu & Huang in Li *et al.*, Fl. Taiwan 5: 102. Pl. 1291. 1978. *Dioscorea sativa* Thunb., Fl. Jap. 151. 1784 (non L. 1753); Hook.f. in Fl. Brit. India 6: 295. 1892.

Stems twining to the left, unarmed, glabrous, 4-angled, ribbed, usually with bulbils in the leaf axil. Leaves alternate, 6-12 × 5.5-14 cm, broadly-cordate, margin entire, acuminate at apex, base up to 11 nerved; petioles 2.5-10 cm long, sometimes winged and with a auricle at base. Male flower pale-green or purple in slender 3-10 cm long axillary, paniculate spikes; bracts ovate-acuminate; perianth lobes linear-lanceolate, 2-3 mm long. Stamens-6. Female flowers with small bracts, axillary-solitary or fasicled, in pendulous 10-18 cm long spikes, staminodes-6. Capsule quadrately-oblong, up to 2 cm long, reflexed, wing up to 7 mm broad, rounded at both ends. Seeds winged at lower end only.

Fl. & Fr. : Aug.-Oct.

Distrib. : India to China and Malaya.

Specimens examined : Kechki, 892.

Notes : Common in the forests.

Common name : Beng. : *Gachalu, Kukuralu*; Hindi : *Ratalu*; Santal: *Bengonari*.

Uses : Tubers and bulbils are eaten as vegetable by the local people and used for ulcers, piles and dysentery.

2. Dioscorea glabra Roxb., Fl. Ind. 3: 803. 1832; Hook.f. in Fl. Brit. India 6: 294. 1892; Burkill in van Steenis, Fl. Males. ser. 1.4.331. 1951; Haines, Bot. Bihar & Orissa 3: 1168. 1961 (Rep. ed.). *Dioscorea nummularia* (non Lam.); Roxb., Fl. Ind. 3: 803. 1832.

Glabrous climbers; stems prickly at base and without bulbils. Leaves generally opposite, rarely alternate, simple, very variable in shapes, usually ovate-oblong, acuminate at apex, cordate at base; petioles 4-7 cm long. Male spikes up to 3.5 cm long. Capsule up to 2 cm long, depressed at the apex.

Fl. & Fr. : Sept.-Mar.

Distrib. : India, Myanmar and Malaya.

Specimens examined : Ghurki, 1151.

Notes : Common in the forests.

Common name : Beng. : *Shora alu*; Santal : *Baiyang*.

3. D. oppositifolia L., Sp. Pl. 1033. 1753; Hook.f. in Fl. Brit. India 6: 292. 1892; Haines, Bot. Bihar & Orissa 3: 1168. 1961 (Rep. ed.); Gandhi in Sald. & Nicol., Fl. Hassan 808. 1976.

Large climbers; stems often purplish when young, swollen at nodes, unarmed, sparingly puberulous, twining to right. Leaves opposite and alternate, very variable in shape, oblong to broadly-elliptic, apex acuminate, acute at base, 5-nerved. Male spike brownish pubescent; bracts deflexed, suborbicular, cuspidate. Sepals orbicular-oblong, concave, up to 2.2 mm long. Petals obovate, up to 2 mm long. Stamens-6, pistillodes often represented by 3-green glands. Female raceme solitary from leaf axils.

Pistil pubescent. Capsule stipitate, pendulous, broader than long, depressed at base and apex, up to 1.8 × 3.8 cm. Seeds orbicular, winged all around, up to 1.7 cm across (including wing).

Fl. & Fr. : Aug.-Mar.

Distrib. : India, Bangladesh and Sri Lanka.

Specimens examined : Richughuta, 746.

Notes : Common on bushes and trees in the forest.

4. Dioscorea pentaphylla L., Sp. Pl. 1032. 1753; Hook.f. in Fl. Brit. India 6: 289. 1892; Haines, Bot. Bihar & Orissa 3: 1173. 1961 (Rep. ed.); Burkill in van Steenis, Fl. Males. ser. 1.4: 315. 1951; A.C. Smith, Fl. Vitiensis Nova 1: 169. 1979; Guha Bakshi, Fl. Murshidabad Distt. 320. 1984. *Dioscorea jacquemontii* Hook.f. in Fl. Brit. India 6: 290. 1892.

Large, slender climbers; stems occasionally with prickles near lower internodes, tomentose. Bulbils present. Leaves alternate, 3-7 foliolate; leaflets 5-10 × 3-5 cm, median one largest, obovate, shortly acuminate at apex, cuneate at base, pubescent on both surfaces; petiolules up to 4 mm long. Male racemes combined into racemiform inflorescence. Bracts and bracteoles enclosing buds. Stamens-3, inserted at base of sepals, shorter than staminodes. Female flowers in 10-18 cm long axillary, solitary or sometimes 2-3 pendulous pubescent spikes. Capsule up to 2 cm long, oblong, wings up to 6 mm broad. Seeds 5-7 mm long, wings up to 1.5 cm long.

Fl. & Fr. : Sept.-Dec.

Distrib. : India to Yunnan, Southward through Malaya to New Guinea.

Specimens examined : Barwadih, 923.

Notes : Common in the forest.

Common name : Beng. : *Kantaalu*; Hindi : *Bhusam, Gazaria*; Kol.: *Baiom sanga*.

Uses : Tubers are edible after repeated boiling and washing.

LILIACEAE

1a. Leaves reduced to scales or spines with cladodes in their axil ... 2. ASPARAGUS

1b. Leaves well developed, without cladodes in their axil :

2a. Climbing by means of cirrhose leaf-tips; flower more than 5 cm across ... 4. GLORIOSA

2b. Erect herbs; flower less than 5 cm across :

3a. Leaves thick, fleshy :

4a. Plants without creeping rootstock; leaf margin entire ... 5. SANSEVIERIA

4b. Plants without creeping rootstock; leaf margin spiny-toothed ... 1. ALOE

3b. Leaves thin, not fleshy :

5a. Tepals pale-brown, white at margin ... 6. URGINEA

5b. Tepals white throughout ... 3. CHLOROPHYTUM

1. ALOE L.

Aloe barbadensis Mill. Gard. Dict. in 2. 1768; Rao in Fl. Goa, Diu, Daman, Dadra Nagarhaveli 2: 435. 1986. *A. perfoliata* var. *vera* L. Sp. Pl. 320. 1753. *A. vera* (L.) Webb. & Benth. non Mill. 1768; Haines, Bot. Bihar & Orissa 3: 1141. 1961 (Rep. ed.).

Acaulescent herbs. Leaves in rossete, up to 60 cm long, erect, numerous, thick, full of juice, glaucous-green, narrow-lanceolate, long acuminate at apex, margin spiny toothed. Flowers in long elongated raceme, up to 60 cm long; reddish-yellow. Perianth segments united into a cylindric or campanulate, straight or slightly curved tube, tips sometimes free, tube up to 3 cm long.

Fl. : Dec. Exotic.

Distrib. : Native of North Africa, introduced into most warmer countries.

Specimens examined : Barwadith, 484.

Notes : Common throughout the district.

Common name : Beng. : *Ghrita kumari.*

Uses : Leaves are widely used in the treatment of high blood pressure and leaf juice also used in liver, spleen and eye troubles.

2. ASPARAGUS L.

Asparagus racemosus Willd., Sp. Pl. 2. 152. 1799; Baker in J. Linn. Soc. 14: 623. 1875; Hook.f. in Fl. Brit. India 6: 316. 1892; Haines, Bot. Bihar & Orissa 3: 1137. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 517. 1977.

Perennial, climbing herbs, with fasciculate tuberous roots; stems scrambling or scandent, suffruticose with recurved spines, spines up to 1 cm long. Cladodes more or less acicular, triquetrous, fulcate, up to 2 cm long, divaricate, finely acuminate. Flowers white, in racemes; pedicels jointed at middle. Fruits scarlet, 1-3 seeded.

Fl. & Fr. : Aug.-Jan.

Distrib. : Throughout tropical & subtropical India, Myanmar, Tropical Africa, Australia.

Specimens examined : Barwadih, 362.

Notes : Common in the forest and scrub jungles.

Common name : Santal : *Kedar nari*; Hindi : *Satawar.*

Uses : Root juice mixed with honey given in dyspepsia. Roots also used in nervous and rheumatic complaints.

3. CHLOROPHYTUM Ker-Gawl

Chlorophytum arundinaceum Baker, J. Linn. Soc. 15: 323. 1876; Hook.f. in Fl. Brit. India 6: 333. 1892; Haines, Bot. Bihar & Orissa 3: 1147. 1961 (Rep. ed.).

Tuberous acaulescent herbs. Leaves crowded at base, membranous, oblanceolate, 30-60 × 3-4 cm, apex acuminate, base narrowed into a broad

petiole, many nerved. Scape 15-60 cm long, stout. Flowers in raceme or contracted panicle; bracts up to 1.2 cm long; pedicels up to 6 mm long, articulated at middle. Tepals up to 9 mm long, oblong. Capsule 1-3 at each node, up to 6 mm broad, retuse at apex. Seeds suborbicular, flat, black.

Fl. : Mar.-June. *Fr.* : Nov.-Feb.

Specimens examined : Netarhat, 1185.

Distrib. : India, Bhutan, Myanmar.

Notes : Common on the hill slopes.

Common name : Hindi : *Bis kandi, Safed musli*; Santal : *Jerenarak.*

4. GLORIOSA L.

Gloriosa superba L., Sp. Pl. 305. 1753; Hook.f. in Fl. Brit. India 6: 358. 1892; Haines, Bot. Bihar & Orissa 3: 1143. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 519. 1977; Smith, Fl. Vitiensis Nova 1: 141. 1979; Mukherjee, Fl. Pach. Bori Res. 305. 1984.

Glabrous, climbing herbs; stems 3-10 m long, slender, terete, herbaceous. Leaves, lowermost opposite or in whorls of 3, then alternate, sessile, ovate-lanceolate, 10-15 × 2-4 cm, long acuminate, tip ending in coiled tendril rounded at base, entire at margin. Flowers axillary, solitary or subcorymbose towards end of branches, showy, large yellow changing to orange and red on age, drooping. Tepals up to 8 cm long, waved and crisped. Style bent at right angle. Capsule linear-oblong, 3-5 × 1-1.5 cm.

Fl. & Fr. : July-Nov.

Distrib. : Tropical India, Sri Lanka, Malaya, China and Tropical Africa.

Specimens examined : Muhammadganj, 987.

Notes : Infrequent on hedges and bushes in the forest.

Common name : Beng. : *Bishalanguli, Ulatchandal*; Hindi : *Karihari*; Santal : *Sinic samanson.*

Uses : Tubers used in ulcers, piles and leprosy and the extract is used for arrow poisoning by the local people.

5. SANSEVIERIA Thunb. *nom. cons.*

Sansevieria roxburghiana Schultes, Syste. Veg. 7: 357. f. 12. D & E. 1829; Brown in Kew Bull. 227. 1915; Hook.f. in Fl. Brit. India 6: 271. 1892; Haines, Bot. Bihar & Orissa 3: 1140. 1961 (Rep. ed.).

Acaulescent herb, with creeping rootstock. Leaves linear-oblong, sharply narrowed at tip flat, with dark green base, lower surface slightly convex, up to 45 × 3 cm. Racemose-scapes densely flowered, shorter than leaves, sheathed at base. Flowers suberect, bracteate, arranged in 2-4 on small tubercles on racemose rachis. Perianth 1.2-1.8 cm long, tubular, split half way down into revolute lobes.

Fl. & Fr. : June-Aug.

Specimens examined : Ghurki, 1157.

Distrib. : India, Bangladesh and Sri Lanka.

Notes : Cultivated, often found as an escape in the villages.

Common name : Beng. : *Murba.*

6. URGINEA Steinh

Urginea indica (Roxb.) Kunth, Enum. 4: 333. 1843; Hook.f. in Fl. Brit. India 6: 347. 1892; Haines, Bot. Bihar & Orissa 3: 1145. 1961 (Rep. ed.); Gandhi in Sald. & Nicol., Fl. Hassan. 800. 1976. *Scilla indica* Roxb., Fl. India 2: 147. 1832. *Scilla coromandeliana* Roxb., l.c. *Urginea coromandeliana* Hook.f., l.c.

Scapigerous, bulbous herbs; bulbs globose. Leaves linear-lanceolate, up to 40 × 2 cm, ensiform, acute, glaucous. Flowers in racemes, often appear before emergence of leaves. Scape erect 30-40 cm long. Racemes erect, 15-30 cm long. Perianth segments linear-oblong, pale-brown, white at margin. Stamens with white filaments flattened below; anthers versatile, yellow. Capsule elliptic-oblong, 12-20 mm long.

Fl. & Fr. : Mar.-July.

Distrib. : India, Myanmar, Tropical Africa.

Specimens examined : Barwadih, 456.

Notes : Infrequent in the forest undergrowth.

Common name : Hindi : *Kandri*; *Jangli Piyaj*.

Uses : Bulbs used as a cardiotonic.

Allium cepa L., *A. sativum* L., are commonly cultivated.

SMILACACEAE

SMILAX L.

1a. Petiole base auricled and keeled ... 1. *S. perfoliata*

1b. Petiole base not auricled, not keeled ... 2. *S. ovalifolia*

1. Smilax ovalifolia Roxb., Fl. India 3: 794. 1832; Koyama in Fl. E. Himal. 417. 1966. *Smilax macrophylla* Roxb., Fl. India 3: 793. 1832; Hook.f. in Fl. Brit. India 6: 310. 1892 (non Willd. 1805); Haines, Bot. Bihar & Orissa 3: 1135. 1961 (Rep. ed.).

Large prickly climbers; stem smooth, armed with few distant prickles, terete, often sulcate with 4-lines, flowering branches unarmed. Leaves broadly-ovate, 8-15 cm long, acuminate at apex, glabrous, shining, main nerves 5-9, venation reticulate in between; petioles up to 3 cm long, stout, narrowly sheathing, not auriculate. Tendrils petiolar very long and slender. Umbels 1-3, rarely more, alternate with common peduncle. Pedicels of male flower up to 4 mm long. Perianth 5-7 mm long; segments linear, obtuse, reflexed with age. Perianth of female flower as in male. Pedicels elongating in fruit. Fruits globose, up to 13 mm diam., green and turning to red when ripe.

Fl. & Fr. : May-Jan.

Distrib. : India, Bangladesh, Myanmar and Java.

Specimens examined : Maromer, 537.

Notes : Very common in the forest, throughout the district.

Common name : Beng. : *Ramdatan*; Santal : *Ranpawan.*

Uses : Stem commonly used by the tribals as tooth brush and it is said that after brushing the teeth with "Ranpawan" if milk is taken, sexual activity is enhanced.

2. **Smilax perfoliata** Lour., Fl. Cochinch. 622. 1790; Koyama in Adv. Front. Pl. Sci., 4: 59. 1963 & in Hara *et al.*, Enum. Flower Pl. Nep. 1: 79. 1978. *Smilax proliferа* Wallich ex Roxb., Fl. Ind. 795. 1832; Hook.f. in Fl. Brit. India 6: 312. 1892; Haines, Bot. Bihar & Orissa 3: 1136. 1961 (Rep. ed.).

Prickly climbers; stems up to 2.5 cm diam., at base. Leaves broadly elliptic-oblong or ovate-oblong, rounded or slightly emarginate with mucronate tip, entire at margin, acute or rounded at base, 5-nerved, up to 15 × 10 cm; petioles up to 2.5 cm long,base auricled and keeled; auricles brownish ending in tendrils. Inflorescence in axillary, racemosely developing umbels, sometimes terminal. Flowers fragrant; pedicels up to 7 mm long, slender. Male perianth linear-oblong; female perianth lanceolate to ovate lanceolate. Fruit globose, red when ripe.

Fl. & Fr. : Nov.-Apr.

Distrib. : India, Sri Lanka, Myanmar to Vietnam.

Specimens examined : Ghurki, 1152.

Notes : Common in the forest.

Common name : Beng. : *Kumarika.*

PONTEDERIACEAE

MONOCHORIA Presl.

Monochoria hastata (L.) Solms in DC. Mon. Phan. 4: 523. 1883; Baker in van Steenis, Fl. Males. ser. 1.4: 256. 1951; Haines, Bot. Bihar & Orissa 3: 1150. 1961 (Rep. ed.); Subramanyam, Aquat. Ang. 69. 1962. *Pontederia hastata* Linn., Sp. Pl. 288. 1753. *Monochoria hastaefolia* Presl., Rel. Haenk. 1: 128. 1827; Hook.f. in Fl. Brit. India 6: 362. 1892; Prain, Beng. Pl. 2: 1079. (Rep. ed. 2: 812. 1963).

Marshy herbs, up to 70 cm high. Leaves 5-20 × 2-10 cm, glossy, faintly many-nerved, broad at middle, acute or acuminate at apex, hastate or sagittate at base; petioles of radical leaves 10-40 cm long, base broadly sheathing, tubular and covering stout peduncle and upper portion with 1-large groove. Flowers violet-blue; pedicels 2-3.5 cm long. Perianth segments 1-1.5 cm long, persistent, twisting in fruiting, unequal, larger obovate and smaller oblong. Capsule 5 mm diam., subglobose or oblong.

Fl. & Fr. : Apr.-Oct.

Distrib. : India, South China & Malaya.

Specimens examined : Daltonganj, 248.

Notes : Common in marshy areas, sides of canals, ditches, water courses and sides of the Koel river.

COMMELINACEAE

1a. Fertile stamens-3; staminodes present :

- 2a. Cymes 1-2, arising from a spathaceous bract ... 1. COMMELINA
- 2b. Cymes panicled, not arising from spathaceous bract ... 3. MURDANNIA

1b. Fertile stamens-6; staminodes absent :

- 3a. Flowers in axillary clusters within the inflated leaf sheaths ... 4. TONNINGIA
- 3b. Flowers in spiciform scorpioid cymes ... 2. CYANOTIS

1. COMMELINA L.

1a. All ovary cells 1-ovuled :

- 2a. Capsules 2-celled ... 7. *C. suffruticosa*
- 2b. Capsules 3-celled ... 6. *C. maculata*

1b. Two anterior ovary cells 2-ovuled, posterior one 1-ovuled :

- 3a. Capsule 2-valved :
- 3b. Capsule 3-valved :

4a. Spathe cuculate ... 1. *C. benghalensis*

4b. Spathe complicate :

5a. Seeds ovoid, appendiculate ... 5. *C. longifolia*

5b. Seeds oblong, reticulate :

6a. Leaf sheath mouth round; branches of cymes equal, 1-3 flowered ... 2. *C. diffusa*

6b. Leaf sheath mouth oblique; branches of cymes unequal, upper-2 flowered, lower 1-flowered ... 4. *C. hasskarlii*

1. Commelina benghalensis L., Sp. Pl. 41. 1753; Hook.f. in Fl. Brit. India 6: 370. 1892; Haines, Bot. Bihar & Orissa 3: 1125. 1961 (Rep. ed.); Panigrahi & Kamathy in J. Ind. Bot. Soc. 43(2): 302. 1964; Babu, Herb. Fl. Dehra Dun 526. 1977; Cook in Aquat. Wetland Pl. Ind. 86. 1996.

Erect or creeping, glabrous or sparsely pubescent herbs; stems rooting at basal nodes and bearing scale leaves and cleistogamous flower. Leaves up to 8 × 4 cm, ovate or elliptic-ovate or lanceolate, acute to subacute at apex, obtuse to rounded at base; sheath pubescent or villous, margin ciliate. Spathe 1-3 together at tip of branches and up to 12 × 12 mm, pubescent, turbinate, margin connate. Upper branches of cyme 2-3 flowered, lower 1-2 flowered. Capsule up to 6 mm long, pyriform. Seeds-5, oblong, closely pitted.

Fl. & Fr. : Aug.-Dec.

Distrib. : India, Tropical Africa, Asia to Japan and also Malaysia.

Specimens examined : Muhammadganj, 1002. Helophyta.

Notes : Common in shady moist areas.

Common name : Beng. : *Kanchira*; Hindi : *Kanchara*, Santal : *Kena.*

Uses : Herbs used in leprosy. Leaves often eaten as a pot herb in times of scarcity.

2. C. diffusa Burm.f., Fl. Ind. 18. t. 7. f. 2. 1768; Merrill in J. Arn. Arb. 18: 64. 1937; Khan & Alam in Khan, Fl. Bangladesh 4: 20. 1977;

Bennet in Fl. How. Dist. 102. 1979; Cook in Aquat. Wetland Pl. Ind. 86. 1996. *Commelina nudiflora* auct. non Linn.: Hook.f. in Fl. Brit. India 6: 369. 1892; Haines, Bot. Bihar & Orissa 3: 1123. 1961 (Rep. ed.).

Creeping or diffuse, subsucculent, subglabrous herbs, up to 60 cm long; rooting at basal nodes. Leaves lanceolate or ovate-lanceolate, sessile, up to 7 × 1.5 cm, glabrous or sparsely puberulous, acute to subacuminate at apex, rounded or truncate at base; leafsheath 1-2 cm long, glabrous with ciliate margin. Spathe 1.5-2.5 cm long, on 2 cm long slender peduncle, glabrous or sparsely pubescent, ovate or ovate-lanceolate, with cordate or rounded base. Cymes 1-3 flowered. Flowers dark-blue, 2-petals long clawed, one smaller. Capsule up to 5 mm long, broadly oblong, acuminate or apiculate. Seeds oblong-cylindric, rugose reticulate, brown.

Fl. & Fr. : July-Nov.

Specimens examined : Netarhat, 1189. Helophyte.

Distrib. : Pantropical.

Notes : Common in moist places.

3. **Commelina erecta** L., Sp. Pl. 41. 1753; Morton in J. Linn. Soc. London 60(382): 183. 1967; Khan & Alam in Khan, Fl. Bangladesh 4: 21. 1977. *Commelina undulata* R.Br., Prodr. 270. 1810; Rolla in Notes Roy. Bot. Gard. Edinb. 26(4): 352. 1965 & in Blumea 14(2): 351. 1966. *Commelina kurzii* Clarke in Journ. Linn. Soc. 6: 444. 1871; Hook.f. in Fl. Brit. India 6: 373. 1892; Haines, Bot. Bihar & Orissa 3: 1126. 1961 (Rep. ed.).

Erect to suberect herb with thick fibrous roots; stems 30-90 cm high, stout, branched. Leaves 6-15 × 2-4 cm, scaberulous or puberulous, lanceolate or narrowly-lanceolate, acuminate at apex, cuneate to rounded at base; leaf sheath margin ciliate at apex. Spathes 3-5, restricted at tip of branches with 1-3 smaller leaves in addition to the 2 normal leaves; peduncle 4-6 mm long; inner branch of the cyme sterile, outer 2-5 flowered. Flowers bluish-violet. Capsule 2-3 per spathe, obovoid, 3-gonus, 3-celled, 2-valved with a warty, indehiscent posterior cell. Seeds oval with a white membranous margin.

Fl. & Fr. : May-Sept.

Specimens examined : Netarhat, 754.

Distrib. : India, Malayasia, Tropical America to Australia through Africa.

Notes : Infrequent on the hill slopes.

Common name : Beng. : *Jata Kanchira.*

4. Commelina hasskarlii Clarke, Comm. & Cyrt. Beng. 13. t. 5. 1814; Hook.f. in Fl. Brit. India 6: 370. 1892; Haines, Bot. Bihar & Orissa 3: 1125. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 527. 1977.

Much branched, annual or perennial herbs, creeping and rooting below, glabrous. Leaves sessile, lanceolate-oblong or elliptic-oblong with a rounded base and subobtuse apex, up to 4 × 1 cm, glabrous. Sheath with an oblique mouth and ciliate margin. Spathes ovate-lanceolate, acute or acuminate, cordate at base, glabrous. Cymes with lower 1-flowered branch and 2-flowered upper one. Flowers blue. Capsule only one developing to each spathe, with 2-widely dehiscent cell and one smaller. Seeds usually-2 in each of larger cell, dark grey, smooth.

Fl. & Fr. : Sept.-Dec.

Specimens examined : Barwadih, 392 & 402. Helophyta.

Distrib. : Throughout India.

Notes : Common in shady areas and also on hill slopes.

5. C. longifolia Lam., Tabl. Encyl. 1: 129. 1783; Rolla in Taxon 10: 254. 1961; Khan & Alam & Fl. Bangladesh 4: 22. 1977. *Commelina salicifolia* Roxb., Fl. India 1: 176. 1820; Hook.f. in Fl. Brit. India 6: 370. 1892; Prain, Beng. Pl. 2: 1082. 1903 (Rep. ed. 2: 814. 1963); Haines, Bot. Bihar & Orissa 3: 1124. 1961 (Rep. ed.).

Diffuse or spreading herbs, subsucculent, rooting at basal nodes; stems glabrous with long internodes. Leaves 5-10 × 0.6-1 cm, glabrous or

subglabrous, linear-lanceolate, acute or acuminate at apex, sessile; sheath up to 1.8 cm long, cylindric, striate, mouth ciliate. Spathes axillary, up to 2.5 cm long on 1.5-2.5 cm long slender stalk, ovate, acuminate or subacuminate at apex, cordate at base. Flowers blue, 2-bisexual on a common shorter peduncle and one solitary male on a longer peduncle. Sepals ovate, obtuse, 2-inner larger and connate below. Petals broadly ovate, larger-2 with long claw and undulate margin. Stamens-3, fertile, and staminodes-3. Capsule orbicualr, 4 × 6 mm. Seeds sub-globose, smooth, appendiculate, up to 4 mm.

Fl. & Fr. : Mar.-Aug.

Distrib. : India, Java, Hong Kong and Bangladesh.

Specimens examined : Netarhat, 797.

Notes : Infrequent in marshy areas.

Uses : Used as medicine for dysentery and also as cattle feed.

6. **Commelina maculata** Edgew., Trans. Linn. Soc. 20: 89. 1846; Rolla Rao, Blumea 14: 353. 1966. *Commelina paludosa* Bl. in Enum. Pl. Java. 1: 2. 1827; Rao & Kammathy in J. Bombay Nat. Hist. Soc. 59: 60. 1962; Khan & Alam in Fl. Bangladesh 4: 23. 1977; Babu in Herb. Fl. Dehra Dun 527. 1977; Guha Bakshi, Fl. Murshid. Dist. 328. 1984. *Commelina obliqua* Buch. - Ham. ex D.Don., Prodr. 45. 1825 (non Vahl, 1805); Hook.f. in Fl. Brit. India 6: 372. 1892; Haines, Bot. Bihar & Orissa 3: 1126. 1961 (Rep. ed.).

Stout, subscandent, branched, glabrous herbs. Leaves ovate to elliptic-lanceolate, acute to acuminate at apex, often oblique at base, up to 12 × 4 cm; sheath up to 2.5 cm long, subsessile or very short peduncled. Flowers blue; pedicels 4-5 mm long. Capsules up to 9 mm, 3-valved, 3-locular. Seeds-3, ellipsoid, slightly compressed, 4-5 mm long.

Fl. & Fr. : Mar.-Sept. Exotic.

Distrib. : Throughout India, Native of Java.

Specimens examined : Ghurki, 1153.

Notes : Common in shady areas.

Common name : *Jata Kanchira.*

7. **Commelina suffruticosa** Bl., Enum. Pl. Jav. 1: 3. 1827; Hook.f. in Fl. Brit. India 6: 374. 1892; Haines, Bot. Bihar & Orissa 3: 1126. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 528. 1977; Mukherjee; Fl. Pach. Bori Res. 308. 1984.

Stout, branched, nearly glabrous herbs; stems with thickened nodes. Leaves sessile, lanceolate, acuminate at apex, scabridly pubescent; sheaths auricled, ciliate. Spathes short-peduncled, broadly ovate-cordate, clustered. Flowers white or blue. Capsule 2-seeded. Seeds ellipsoid, straw coloured, puberulous.

Fl. & Fr. : July-Dec.

Distrib. : India, Nepal, Malaya.

Specimens examined : Muhammadgang, 1038. Helophyte.

Notes : Common in moist areas of the forest.

2. CYANOTIS D.Don

Cyanotis cristata (L.) D.Don, Prodr. Fl. Nepal 46. 1825; Hook.f. in Fl. Brit. India 6: 385. 1892; Haines, Bot. Bihar & Orissa 3: 1130. 1961 (Rep. ed.); Gandhi in Sald. & Nicol., Fl. Hassan 646. 1976; Khan & Alam in Fl. Bangladesh 4: 26. 1977. Mukherjee, Fl. Pach. Bori Res. 309. 1984; Guha Bakshi, Fl. Murshid. Dist. 329. 1984. *Tradescantia cristata* L., Sp. Pl. 42. 1753.

Glabrous herbs; stems branched from base, branches slender ascending, up to 50 cm long. Leaves up to 8 × 2 cm, ovate-oblong, acute at apex, sessile, fleshy, glabrous; sheath short, margin ciliolate. Flowers blue in scorpioidly recurved cymes, in axil of leaf like spathe; peduncle up to 7 cm long; bracts 2-seriate, ovate, acute, glabrous except ciliate margin. Capsule up to 3 mm long, subglobose, oblong, trigonous, truncate. Seeds black, trigonous, with 2 pits on two of the faces, up to 0.8 × 1.2 mm.

Fl. & Fr. : Oct.-Dec.

Distrib. : India to Mauritius and Malaya.

Specimens examined : Palamau fort (Betla), 1123. Helophyte.

Notes : Infrequent in moist places of the forest.

3. MURDANNIA Royle *nom. cons.*

1a. Leaves oblong; locules of the ovary many ovuled ... 2. *M. spirata*

1b. Leaves linear; locules of the ovary 2-ovuled ... 1. *M. nudiflora*

1. Murdannia nudiflora (L.) Breman in Kew Bull. 1952: 189. 1952; Panigrahi and Kammathy in Proc. Nat. Acad. Sci. India, Sect. B. 33(4): 496. 1963. *Commelina nudiflora* L., Mant. 177. 1771 (non Sp. Pl. 41. 1753). *Aneilema nudiflorum* (L.) R.Br., Prodr. 271. 1810; Hook.f. in Fl. Brit. India 6: 378. 1892; Haines, Bot. Bihar & Orissa 3: 1128. 1961 (Rep. ed.).

Annual, suberect, often decumbent herbs; branches up to 25 cm long, slender, rooting from base and lower nodes. Leaves linear or linear-lanceolate, 2-10 × 0.3-0.5 cm, glabrous or sparsely pubescent; leaf sheath, up to 1 cm long, margin ciliate. Flowers in scorpioid cymes, terminal or in upper leaf-axils, usually 2-6 flowered; peduncle 2-7 cm long; bract persistent, ovate-acuminate, up to 4 mm long; pedicels 3-5 mm long. Sepals green. Petals greyish-violet. Capsule broadly-oblong or ellipsoid, mucronate, up to 4 mm long. Seeds-2 in each cell, brown, rugose, oblong, truncate.

Fl. & Fr. : Apr.-Sept.

Distrib. : India, Sri Lanka, China and Malaysia.

Specimens examined : Panki, 954.

Notes : Common, in the moist and shady places of the village.

2. M. spirata (L.) Bruckner in Englar & Prantl. Pflanzenfam. ed. 2. 15a: 173. 1930 (as *spiratum*); Panigrahi and Kammathy in Proc. Nat. Acad. Sci. India, Sect. B 33(4): 495. 1963; Babu, Herb. Fl. Dehra Dun

531. 1977; Hara in Enum. Fl. Pl. Nep. 3: 83. 1982. *Commelina spirata* L., Mant. 176. 1771. *Aneilema spiratum* (L.) R.Br., Prodr. 271. 1810; Hook.f. in Fl. Brit. India 6: 377. 1892; Haines, Bot. Bihar & Orissa 3: 1128. 1961 (Rep. ed.).

Procumbent, profusely branched herbs; branches up to 20 cm long, with a single line of hairs. Leaves sessile, up to 2.8 × 1 cm, glabrous, oblong, or semiamplexicaul at base; leaf sheath margin scarious. Flowers in short, slender, terminal panicle; bracts minute, persistant; pedicels 4-7 mm long, slender. Sepals greenish-brown. Petals 2-3 mm long, bluish-violet. Stamens-3, staminodes whitish; filaments and staminodes bearded at base with bluish hairs. Capsule up to 4 mm long, oblong, acutely 3-gonous, mucronate, equally 3-celled. seeds pale-brown, 3-gonous, tuberculate.

Fl. & Fr. : Aug.-Dec.

Distrib. : India to Vietnam, China & Java.

Specimens examined : Bishrampur, 639.

Notes : Rare, found near ponds and open shady places.

4. TONNINGIA Necker ex Juss.

Tonningia axillaris (L.) Kuntze., Rev. Gen. 2: 721. 1891. *Commelina axillaris* L., Sp. Pl. 42. 1753. *Cyanotis axillaris* (L.) J.A. & J.H. Schultes. Syst. Veg. 7(2): 1154. 1830; Hook.f. in Fl. Brit. India 6: 388. 1892; Haines, Bot. Bihar & Orissa 3: 1130. 1961 (Rep. ed.). *Amischophacelus axillaris* (L.) Rolla et Kammathy in J. Linn. Soc. (Bot.) 59(379): 305. 1966; Khan & Alam in Fl. Bangladesh 4: 15. 1977.

Annual, diffuse or repent herbs; stems up to 60 cm long, subsucculent, glabrous. Leaves 4-11 × 0.5-0.8 cm, thick, sparsely pubescent, narrowly linear or linear-lanceolate, acute to acuminate; sheath up to 1 cm long, pubescent, inflated in flowering, free margin ciliate. Flowers 1-6 in axillary clusters within inflated sheath, 5-8 mm diameter, up to 14 mm long. Sepals 7-8 mm long, connate below; lobes hyaline. Corolla tube 6-7 mm long; lobes light bluish-tinged violet. Staminal filaments bearded with long blue hairs. Capsule up to 5 mm long, glabrous, 3-celled, 3-valved, tip pointed. Seeds-2 in each cell, up to 2 mm long, compressed, shining, minutely pitted, dark brown, oblong, rounded at apex and truncate at base.

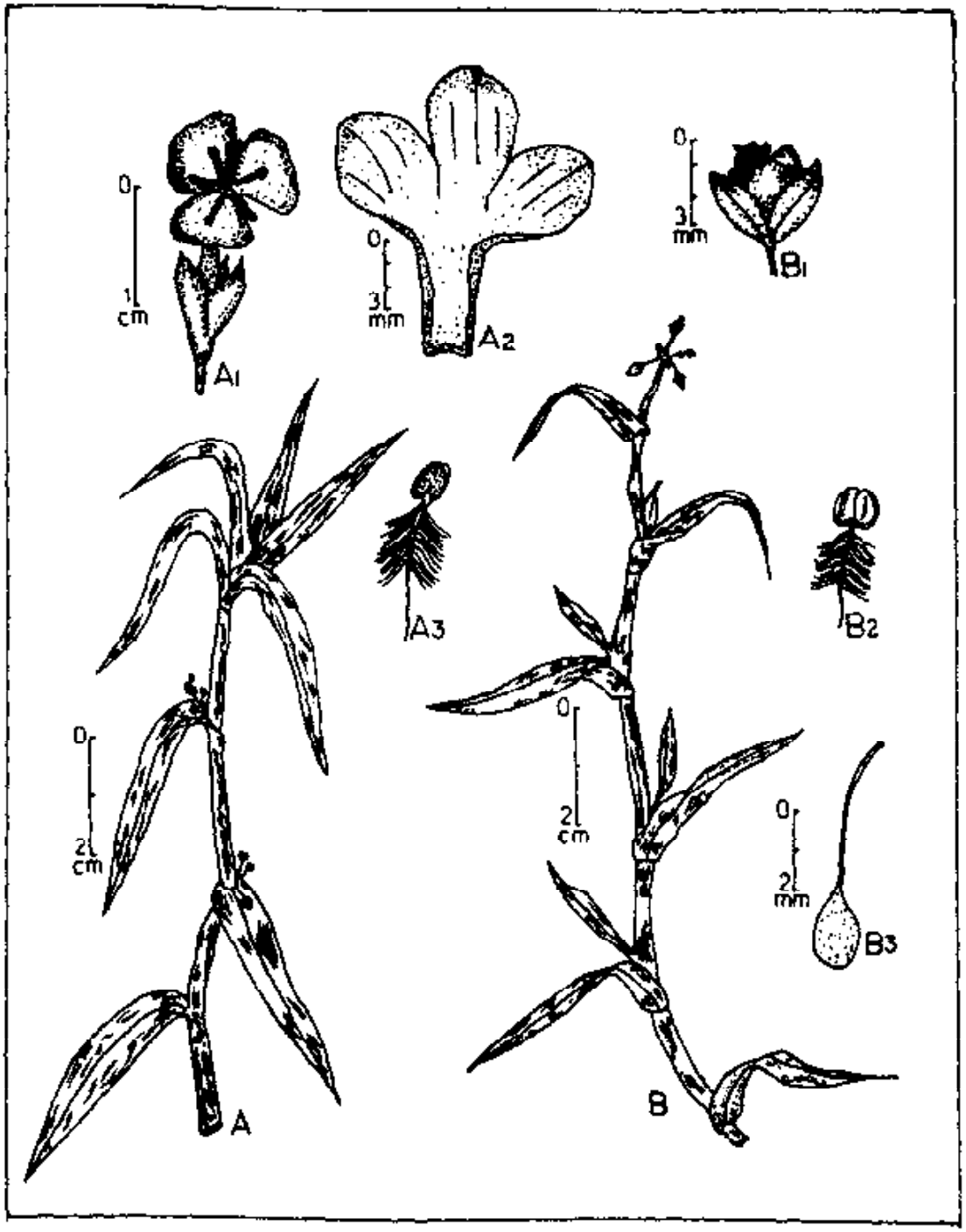


Fig. 40: Commelinaceae. (A-A_3): *Tonningia axillaris* (L.) Kuntze. : A. Habit; A_1. Flower; A_2. Corolla split open; A_3. Stamen; (B-B_3): *Murdannia nudiflora* (L.) Brenan: B. Habit; B_1. Flower; B_2. Stamen; B_3. Gynoecium.

Fl. & Fr. : July-Dec.

Distrib. : India to China through Malaya to Australia.

Specimens examined : Garu, 552.

Notes : Common in marshy places, rice field, wet lands.

Common name : Hindi : *Baghanulla, Soltraj.*

Uses : Used for tympanitis. Seeds contain starch and albuminoids and are used as food in times of scarcity.

Remarks : *Amischophacelus* Rolla et Kamathy (1966) is nomenclaturally superfluous for *Tonningia* Necker ex Juss. (1929) as the type of both is *Commelina axillaris* L. (ref. Farr *et al.*, Index Nom. Gen. Pl. 3: 1768. 1979).

JUNCACEAE

JUNCUS L.

Juncus bufonius L., Sp. Pl. 466. 1753; Hook.f. in Fl. Brit. India 6: 392. 1892; Haines, Bot. Bihar & Orissa 3: 1132. 1961 (Rep. ed.); Cook in Aquat. Wetland Pl. Ind. 223. 1996.

Slender, densely tufted, dichotomously branched herbs, up to 20 cm high. Leaves linear, chiefly near base of stem, concave above, not septate, up to 5 cm long. Flowers pale green, solitary, in the axillary cymes. Bracts scarious, less than half length of the perianth. Perianth-6, 2-seriate, margin scarious, lanceolate, acuminate, up to 4 mm long. Stamens adnate to base of perianth. Capsule oblong, shorter than and enclosed by perianth, mucronate at apex, seeds numerous, oblong, yellow, minute, finely reticulate.

Fl. & Fr. : Nov.-Mar.

Distrib. : Throughout India and all North temperate region of the world.

Specimens examined : Netarhat, 95. Helophyte.

Notes : Common in marshy areas and barren cultivated lands.

ARECACEAE

1a. Leaves simple; fruits subglobose, with fibrous pyrenes ... 1. BORASSUS

1b. Leaves compound; fruits oblong, without fibrous pyrenes ... 2. PHOENIX

1. BORASSUS L.

Borassus flabellifer L., Sp. Pl. 1187. 1753; Beccari & Hook.f. in Fl. Brit. India 6: 482. 1893 (excl. Syn. *B. aethiopum*); Blatter, Palms Brit. India and Ceylon 174. 1926; Mc Currach, Palms of World 27: 1960; Haines, Bot. Bihar & Orissa 3: 927. 1961 (Rep. ed.).

Tall, unbranched palms; stems up to 50 cm diam., marked with persistent leafsheath scars. Leaves up to 1.5 m diam., with 60-80 linear-lanceolate segments, folded along the midrib; petioles up to 1 m long, very stout, semiterete, edges spinously serrate. Flowers unisexual. Males mixed with scaly bracts, protruding one by one from cavities between large, broad, closely imbricating bracts of stout cylindric branches of spadix, up to 30 × 3 cm. Sepals imbricate, narrowly cuneate, tip inflexed. Petals shorter, imbricate, obovate-spathulate. Female flowers larger, globose, up to 2.5 cm diam. Sepals reniform. Petals smaller, convolute. Fruits subglobose drupe, up to 20 cm diameter ripening black, 3 celled with obcordate 3-fibrous pyrenes.

Fl. & Fr. : Jan.-Sept.

Distrib. : Plains of India, Myanmar, Sri Lanka and Malaya.

Specimens examined : Daltonganj, 827.

Notes : Planted and self grown, throughout the district, in dry rural areas.

Common name : Beng. : *Taal*; Hindi : *Taar*.

Uses : Yields toddy. Leaves were used as writing material in ancient times and also for palm-leaf books; commonly used for making hand fans, mats, hats, bags and also for thatching. Seeds and the pulp of ripe fruits are edible and juice of the fruits is also nutritious and delicious.

2. PHOENIX L.

1a. Shrubs; stem very short, bulbiform ... 1. *P. acaulis*

1b. Trees; stem 5-15 m high, not bulbiform ... 2. *P. sylvestris*

1. Phoenix acaulis Roxb. ex Buch.-Ham. in Trans. Linn. Soc. Lond. 15: 87. 1826; Beccari & Hook.f. Fl. Brit. India 6: 426. 1892; Haines, Bot. Bihar & Orissa 3: 924. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 533. 1977.

Stem short, sometimes bulb like, covered with persistent leaf bases. Leaves 60-150 cm long; leaflets stiff, with acicular tip, 20-40 cm long; petioles up to 30 cm long, spiny at base. Male spadix up to 60 cm long (flower not seen) with 30-40 cm long scruff spathe which split into boat-shaped valves. Fruiting spadix (not seen) up to 100 cm long. Fruits ellipsoid.

Fl. & Fr. : Apr.-July.

Distrib. : India & Myanmar.

Specimens examined : Daltonganj, 346.

Notes : Infrequent in the forest undergrowth and also in Bisrampur village surroundings.

Common name : Hindi : *Jangli Khajur.*

Uses : Young terminal leaf buds eaten as vegetables. Leaves used for thatching and making mats, brooms and ropes.

2. P. sylvestris (L.) Roxb., Fl. Indica 3: 787. 1832; Beccari & Hook.f. in Fl. Brit. India 6: 425. 1892; Blatter, Palms, Brit. India and Ceylon 3. 1926; Mc Currach, Palms of World 169. 1960, Haines, Bot. Bihar & Orissa 3: 923. 1961 (Rep. ed.). *Elate sylvestris* L., Sp. Pl. 1189. 1753.

Tall unbranched palm. Leaves up to 2 m long, pinnately compound, glabrous; leaflets up to 35 × 2.5 cm, linear, folded longitudinally, 2-4 farious, fascicled; petioles short, compressed with modified leaflets as spines. Flower unisexual, coriaceous, usually on many-branched, erect or ultimately

drooping intrafoliar spadices. Male spadix up to 80 cm long, scented, white, branches slender, peduncle compressed; spathes up to 40 cm long, separating into 2-boat shaped valves. Flowers numerous, up to 7 mm long. Female spadix up to 85 cm long, short peduncled. Flowers scattered. Drupe up to 3 cm long, orange to reddish-brown with scanty flesh. Stone up to 15 mm long.

Fl. & Fr. : Mar.-July.

Distrib. : Plains of India and Myanmar.

Specimens examined : Daltonganj, 828.

Notes : Planted and self grown, throughout the district, in dry rural areas.

Common name : Beng. : *Khejur*; Hindi : *Khajuri.*

Uses : Leaves used for thatching and for making mats, bags, brooms and fishing nets. Juice extracted by tapping the tree is a refreshing drink, after fermentation it forms toody, called "*Tari*" "*Khejur Gur*" prepared from juice, is very nutritious. Scanty pulp of the fruit is very sweet and edible. Roots used for toothache.

Caryota urens L. (commonly found in the garden), *Cocos nucifera* L. (Beng.: *Narkel,* cultivated for edible fruits), *Areca catechu* L. (Beng.: *Supari,* cultivated for fruits). *Roystonea regia* (H.B.K.) Cook are cultivatd as ornamental plants.

TYPHACEAE

TYPHA L.

Typha domingensis Pers., Syn. Pl. 2: 532. 1807; Napper in Milne-Redhead and Polhill, Fl. Trop. E. Africa - Typhac. 2. 1971. *Typha angustata* Bory and Chaub., Exp. Sci. More 3: 388. 1833; Hook.f. in Fl. Brit. India 6: 489. 1893; Prain, Beng. Pl. 2: 1102. 1903 (Rep. ed. 2: 829. 1963); Haines, Bot. Bihar & Orissa 3: 918. 1961 (Rep. ed.).

Marshy or aquatic herbs, up to 2 m high. Leaves hardly exceeding flowering stem, 1-2 cm wide, semicylindric above the sheath. Spikes up

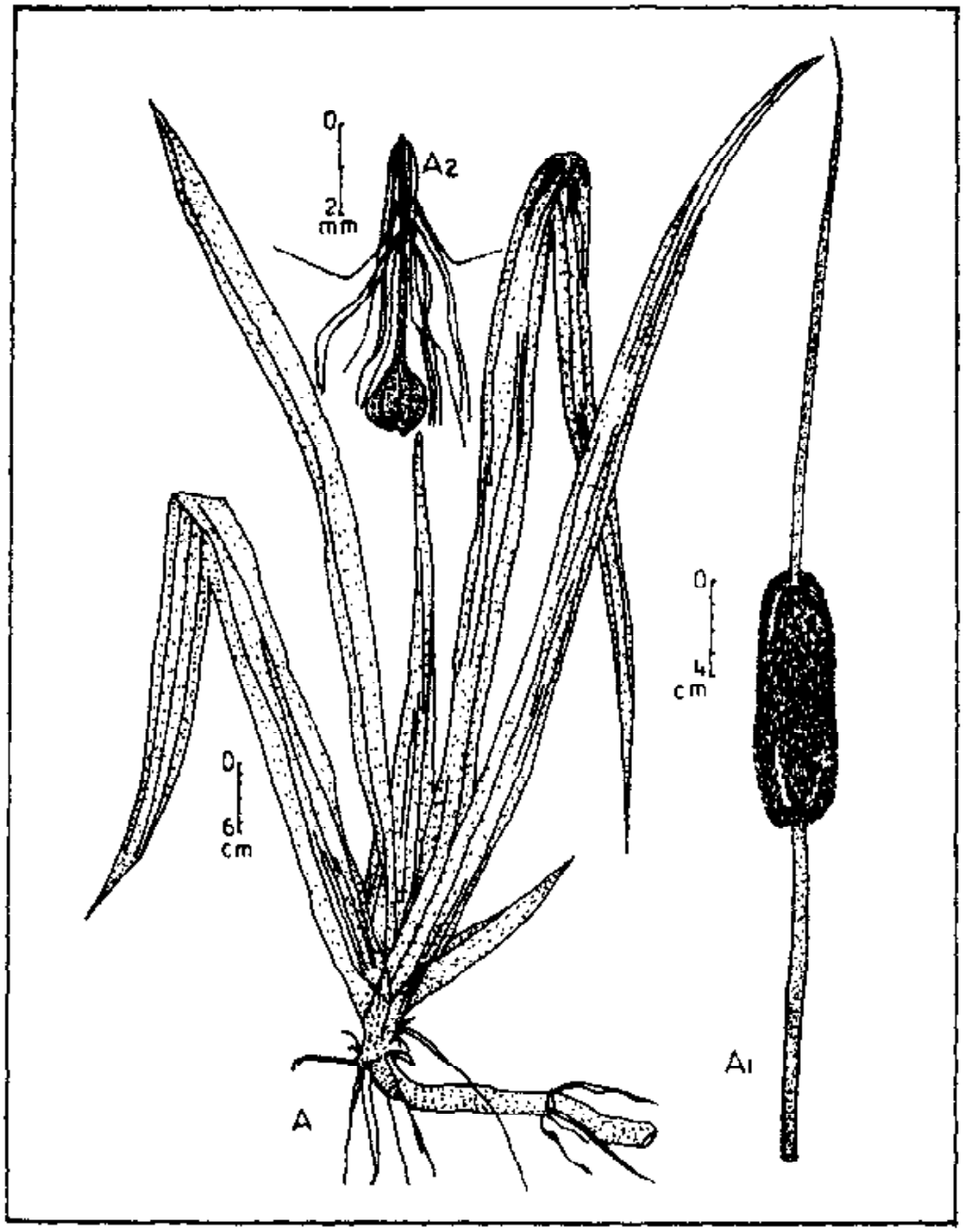


Fig. 41: Typhaceae. (A-A_2): *Typha domingensis* Pers. : A. Habit; A_1. Fruiting spike; A_2. Fruit.

to 1-5 cm diam., cylindric, male and female portion separated by considerable intervals. Female spikes pale brown in colour, bracteoles sub-spathulate. Male flowers pale than the female, mixed with clavate pistillodes.

Fl. & Fr. : Mar.-May.

Distrib. : Pantropical.

Specimens examined : Daltonganj, 327.

Notes : Common on banks of ponds, marshes and swamps.

Common name : Hindi : *Patera*; Beng. : *Hogla*.

Uses : Root stock is used as astringent and diuretic. Leaves are used for fencing roof of the hut and as mats in rural areas.

ARACEAE

1a. Plants dioecious; leaves pedatisect ... 2. ARISAEMA

1b. Plants monoecious; leaves unlobed :

2a. Leaves peltate, ovules many, parietal ... 3. COLOCASIA

2b. Leaves not peltate; ovules few, basal ... 1. ALOCASIA

1. ALOCASIA (Schott.) D.Don. *nom. cons.*

Alocasia macrorrhiza (L.) G.Don in Sweet, Hort. Brit. ed. 3: 631. 1839; Haines, Bot. Bihar & Orissa 3: 911. 1961 (Rep. ed.); Nasir in Nasir & Ali, Fl. W. Pak. 12: 8. 1978. *Arum macrorrhizon* L., Sp. Pl. 965. 1753. *Arum indicum* Lour. in Fl. Cochinch. 536. 1790. *Colocasia indica* Kunth, Enum. Pl. 3: 39. 1841. *Alocasia indica* Spach, Hist. Nat. Veg. Phan. 12: 47. 1846; Hook.f. in Fl. Brit. India 6: 525. 1893; Haines, Bot. Bihar & Orissa 3: 912. 1961 (Rep. ed.).

Stout herbs; rootstock up to 2 m long. Leaves 60-90 cm long, ovate, sagittately cordate, undulate, lobes rounded; petioles 60-90 cm long. Spathes up to 30 cm long. Fertile male inflorescence white, up to 5 cm long. Female inflorescence 2.5 cm long, yellow. Berry up to 10 mm diam.

Fl. : Apr-June.

Distrib. : India, Sri Lanka, South-east Asia to Pacific region.

Specimens examined : Kundri, 942.

Notes : Common in the village surroundings.

Common name : Beng. : *Mankachu.*

Uses : Rootstock, leaves and petioles are edible after cooking.

2. ARISAEMA Mart.

Arisaema tortuosum (Wall.) Schott in Schott & Endl., Melet. Bot. 17. 1832; Hook.f. in Fl. Brit. India 6: 502. 1893; Haines, Bot. Bihar & Orissa 3: 905. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 537. 1977. *Arum tortuosum* Wall., Pl. As. Rar. 2: 10. t. 114. 1830.

Annual herbs, up to 90 cm high. Leaves usually 2, with the central leaflet distinct and often shortly petioluled and 4 lateral on each side, pedatisect or pedate, with very short petiolule; leaflets lanceolate or oblanceolate, acuminate at apex, up to 10 × 2 cm. Spathe greenish, fading white, overlapping for 4-5 cm. Spadix sigmoid, 20-25 cm long, fertile at lower 2.5-6.5 cm long portion; lowest 1-2 cm pistillate and staminate portion 2-5 cm long, more or less separated from pistillate portion; appendage often purple.

Fl. & Fr. : June-Nov., withering away in Dec.

Distrib. : Temperate and tropical Asia.

Specimens examined : Netarhat, 796.

Notes : Infrequent in shady places of forest and hill slopes.

Common name : Santal : *Tuya-jodra.*

3. COLOCASIA Clusius ex Fabricius

Colocasia esculenta (L.) Schott in Schott & Endl., Melet. Bot. 1: 18. 1832; Merill, An Enum. Philip. Fl. Pl. 1: 186. 1925; Hara in Enum. Fl. Pl. Nep. 1: 91. 1978. *Arum esculentum* Linn., Sp. Pl. 966. 1753. *Colocasia antiquorum* Schott in Schott & Endl., Melet. 1: 18. 1832; Hook.f. in Fl. Brit. India 6: 523. 1893; Engler & Krause in Engler, Pfl. reich. 71: 66. 1920; Haines, Bot. Bihar & Orissa 3: 908. 1961 (Rep. ed.).

Rhizomes of various sizes and shapes. Leaves 14-40 × 11-25 cm, arising from the rhizomes, dark green above and light green beneath, peltate, apex subrounded and mucronate, tips of the basal lobe rounded; petioles 30-100 cm long. Spathe 20-25 cm long, glabrous, light orange-yellow or yellow, convolute; peduncle long. Spadix about 3/5 as long as the spathe, flowering portion 7-10 mm wide. Female portion at base, fertile ovaries intermixed with sterile white ones. Male portion above neuter. Synandrium lobed; cells 6 or 8. Appendage shorter than male portion.

Fl. & Fr. : Aug.-Oct.

Distrib. : Pantropical.

Specimens examined : Bishunpur, 826. Helophyte.

Notes : Common and frequently found as wild in wet places and wet hills.

Common name : Beng. : *Kachu*; Hindi : *Arvi, Kachu*; Kol : *Pichigi, Saru*.

Uses : Tubers and young leaves eaten after boiling or frying. Juice of the petioles used as an astringent and styptic.

Amorphophallus paeoniifolius (Dennst.) Nicol.; *Scindapsus officinalis* (Roxb.) Schott.; *Pothos scandens* L. etc. are common cultivated plants of the district.

LEMNACEAE

1a. Rootlets solitary; fronds flat on both sides ... 1. LEMNA

1b. Rootlets several, fronds flat above, convex below ... 2. SPIRODELA

1. LEMNA L.

Lemna perpusilla Torrey, Fl. State New York 2: 245. 1843; den Hartog & Plas in Blumea 18: 363. 1970 and in van Steenis, Fl. Males. ser. 1.7: 230. 1971. *Lemna paucicostata* Hegelm, Lemnac. 139. 1868; Hook.f. in Fl. Brit. India 6: 556. 1893; Haines, Bot. Bihar & Orissa 3: 916. 1961 (Rep. ed.). *Lemna minor* auct. non L.; Hook.f. in Fl. Brit. India 6: 556. 1893. *pro parte*.

Small, floating, aquatic herbs. Fronds 1.2-4 mm long, obovate or obovate-oblong, scale-like, asymmetric, flat on both surfaces. Root solitary, with winged root sheath and acute root cap. Flowers minute, monoecious, consist of 2 naked stamens in the male and naked 1 celled ovary in the female. Fruit a bottle-shaped utricle. Seeds ovoid, ribbed.

Fl. & Fr. : June-Oct.

Distrib. : Pantropical.

Specimens examined : Bhavnathpur, 1159. Pleustophyte.

Notes : Common in stagnant water and inundated rice fields.

Uses : Used for tympanitis. Seeds contain starch and albuminoids and are used as food in times of scarcity.

2. SPIRODELA Schleiden

Spirodela polyrhiza (L.) Schleiden in Linnaea 13: 292. 1839; Subramanyam in Aquat. Ang. 77. 1962; den Hartog & Plas in Blumea 18: 160. 1970; Plas in van Steenis, Fl. Males. ser. 1.7: 224. 1971. *Lemna polyrhiza* L., Sp. Pl. 970. 1753; Hook.f. in Fl. Brit. India 6: 557. 1893; Haines, Bot. Bihar & Orissa 3: 916. 1961 (Rep. ed.).

Aquatic-floating herbs. Fronds orbicular, or orbicular-obovate, 5-8 mm across, dark green above, purplish beneath, 7-11 nerved, flat above, convex below. Roots usually 5-10. Spathe 2-lipped, open only at top. Stamens-2. Seeds smooth or faintly reticulate.

Fl. & Fr. : Jan.-Apr.

Distrib. : Temperate and tropical region of both the hemisphere.

Specimens examined : Bhavnathpur, 1162. Pleustophyte.

Notes : Occasional in ponds.

ALISMATACEAE

SAGITTARIA L.

1a. Leaves hastate or sagittate, apex acute, basal lobes diverging ... 2. *S. sagittifolia*

1b. Leaves broadly ovate, apex rounded, basal lobes rounded ...1. *S. guyanensis*

1. **Sagittaria guyanensis** H.B. & K. ssp. **lappula** (D.Don) Bogin, Mem. New York Bot. Gard. 9: 192. f. 5. 1955; den Hartog in van Steenis, Fl. Males. ser. 1:5. 328. 1957; Subramanyam, Aquat. Ang. 87. 1962. *Sagittaria lappula* D.Don., Prodr. Fl. Nep. 22. 1825. *Sagittaria guyamensis* sensu Hook.f. in Fl. Brit. India 6: 561. 1893; Haines, Bot. Bihar & Orissa 3: 886. 1961 (Rep. ed.).

Leaves floating, broadly ovate, deeply cordate, up to 7 × 5.5 cm, rounded at apex, basal lobes obtuse, glabrous, submembranous; petioles up to 25 cm long, sparsely pubescent. Scape (with peduncle) 10-40 cm long, racemose; peduncle sparsely hairy. Flowers in 2-6 whorl and each whorl composed of 2-3 flowers; lower whorl with bisexual and upper whorl with male flowers; bracts-3 in each whorl, up to 1.5 × 0.7 cm, green, broadly elliptic, obtuse at apex; pedicels of bisexual up to 1 cm long and of males up to 2 cm long. Sepals keeled, broadly triangular-ovate, up to 9 mm long. Staminal filament papillose, dilated at base, achenes numerous, 3-4 mm long with broad toothed wing all round.

Fl. & Fr. : July-Sept.

Distrib. : India, China, Malaya, Japan, Europe, Tropical Australia and to Java.

Specimens examined : Panki, 980. Epihydate.

Notes : Common in ponds and ditches.

2. **Sagittaria sagittifolia** L., Sp. Pl. 993. 1753; Hook.f. in Fl. Brit. India 6: 561. 1893; den Hartog in van Steenis, Fl. Males. Ser. 1.5: 332. 1957; Haines, Bot. Bihar & Orissa 3: 886. 1961 (Rep. ed.), Subramanyam in Aquat. Angios. 87. 1962; Guha Bakshi, Fl. Murshidabad Distt. 342. 1984.

Aquatic herbs, with stoloniferous thick rhizome. Leaves emerged, young oblong with advancement hastate or sagittate, acute at apex, basal lobes diverging and more or less equalling to the rest of the balde, up to 12 cm long; petioles spongy, up to 40 cm long, trigonous. Scape (including peduncle) up to 25 cm long. Flowers white up to 1.5 cm across; lower female, sessile or shortly pedicelled; upper male with longer pedicels, in 3-5 whorls, each whorl with 3-5 flowers. Fruiting heads 8-10 mm diameter globular; achenes up to 4 × 2 mm, with broad dorsal and ventral wing, sides smooth. Seeds 12-15 mm long.

Fl. & Fr. : Aug.-Nov.

Distrib. : India, Europe, throughout Asia to Japan, eastwards to Java and adjacent areas.

Specimens examined : Tarhashi, 1134. Hyperhydate.

Notes : Common in marshy areas and near Barkamana river.

Common name : *Chhota kut.*

LIMNOCHARITACEAE

BUTOMOPSIS Kunth.

Butomopsis latifolia (D.Don.) Kunth, Enum. Pl. 3: 165. 1841; Hara in Enum. Fl. Pl. Nep. 1: 94. 1978. *Butomus latifolius* D.Don., Prodr. 22. 1825. *Butomopsis lanceolata* (Roxb.) Kunth, Enum. Pl. 3: 165. 1841; Hook.f. in Fl. Brit. India 6: 562. 1893; Haines, Bot. Bihar & Orissa 3: 886. 1961 (Rep. ed.). *Tenagocharis latifolia* (D.Don) Buchenau in Abh. Nat. Ver. Bremen. 2: 6. 1868; van Steenis in Fl. Males. 5: 118. 1953.

Erect, annual herbs, up to 60 cm long; rhizomes small, emitting leaves above and fibrous root below. Leaves membranous, up to 15 cm long, elliptic-lanceolate, acute at apex and narrowed down at long petiole;

petioles 10-15 cm long, enclosed by sheaths below. Scape usually longer than the leaves, stout, bearing an umbel of 3-20 flowers at its apex; bracts scarious, ovate, up to 10 × 6 mm; pedicels very variable in length, 1.5-10 cm. Sepals-3, herbaceous, elliptic, obtuse, persistent. Petals white fugaceous. Fruits shortly beaked. Seeds small, 0.5 mm long, numerous, oblong, with rounded ends, dark-brown, shining.

Fl. & Fr. : Sept.-Jan.

Distrib. : Throughout India and extending to Australia.

Specimens examined : Garwah, 579.

Notes : Very common in muddy places also in the rice fields.

Remarks : "The generic name *Butamopsis* Kunth, Enum. Pl. 3: 164. (May, 1841, fide Stafleu) has priority over *Tenagocharis* Hochst., Flora 24: 369. (28 June, 1841)" - Hara.

APONOGETONACEAE

APONOGETON L.f. *nom. cons.*

1a. Leaves oblong, floating, nerves below-5 ...1. *A. natans*

1b. Leaves linear-oblong, submerged, nerves above ... 2. *A. undulatus*

1. Aponogeton natans (L.) Engler & Krause in Engler, Pfl. - reich. 24: 11. 1906; Subramanyam in Aquat. Ang. 92. 1962; Bruggen in Blumea 18(2): 477. 1970; Guha Bakshi, Fl. Murshid. Dist. 346. 1984; Cook in Aquat. Wetland Pl. Ind. 48. 1996. *Saururus natans* Linn., Mant. Pl. 227. 1771. *Aponogeton monostachyon* Linn.f., Suppl. 214. 1781; Hook.f. in Fl. Brit. India 6: 564. 1893; Haines, Bot. Bihar & Orissa 3: 887. 1961 (Rep. ed.).

Rootstock up to 1.5 cm across. Leaves floating, up to 12 × 3 cm, oblong or linear-oblong, obtuse or acute at apex, narrowed down at base, 3-5 nerved; petioles sub-trigonous, length varies depending on the depth of water. Flowers in dense spike, up to 5 cm long; length of the peduncle varies depending on depth of water. Tepals-2, 2.5 mm long, ovate to suborbicular, bluish-pink or light-pink. Stamens-6, exceeding the perianth lobe or equalling. Fruits exceeding the tepals, glabrous, subglobose. Seed 4-8, oblong, ribbed.

Fl. & Fr. : Almost throughout the year.

Distrib. : India, Sri Lanka, Tropical Asia & Australia.

Specimens examined : Seuti, 1064. Rosulate or Ephydate.

Notes : Common in small pools and ditches.

Common name : Hindi : *Ghechu.*

Uses : Starchy root stock is edible.

2. Aponogeton undulatus Roxb., Fl. Ind. 2: 211. 1832; Bruggen in Blumea 18: 465. 1970 & in van Steenis, Fl. Males. Ser. 1.7: 213. 1971; Guha Bakshi, Fl. Murshid. Dist. 345. 1984; Cook in Aquat. Wetland Pl. Ind. 49. 1996. *Aponogeton microphyllum* Roxb., l.c.; Hook.f. in Fl. Brit. India 6: 564. 1893. *Aponogeton crispus* (non Thunb., 1781) Hook.f. in Fl. Brit. India 6: 564. 1893 *pro parte*; Haines, Bot. Bihar & Orissa 3: 386. 1961 (Rep. ed.). *Aponogeton appendiculatus* sensu Bennet in Fl. Howrah Dist. 25. 1979.

Rhizomes up to 1 cm across. Leaves submerged, linear-oblong, subacute to rounded at apex, narrowed into a petiole at base, undulate at margin, up to 20 × 3.5 cm, main nerves 5-7; petioles compressed. Spikes simple, up to 10 cm long, floating on water on long peduncles. Flowers loosely arranged, white. Tepals up to 5 mm long. Fruits shorter than the tepals, smooth, 1-2 seeded.

Fl. & Fr. : June-Sept.

Distrib. : India, Sri Lanka, Australia.

Specimens examined : Bhavnathpur, 1160. Rosulate.

Notes : Common in ponds and rice fields.

Remarks: "*Aponogeton crispus* Thunb., however has hitherto only been found in Ceylon and does not occur in India" - Bruggen. *Aponogeton appendiculatus* is distributed only in South India. (Bennet 1987).

POTAMOGETONACEAE

POTAMOGETON Linn.

1a. Leaves all submerged, oblong-lanceolate or linear ... 1. *P. crispus*

1b. Leaves at least the upper ones floating, oblong or elliptic ... 2. *P. nodosus*

1. Potamogeton crispus L., Sp. Pl. 126. 1753; Hook.f. in Fl. Brit. India 6: 566. 1893; Haines, Bot. Bihar & Orissa 3: 889. 1961 (Rep. ed.); Guha Bakshi, Fl. Murshid. Distt. 343. 1984; Cook in Aquat. Wetland Pl. India 332. 1996.

Submerged, branched, slender herbs. Leaves alternate, linear or oblong-lanceolate, up to 5.5 × 0.9 cm, semiamplexicaul, translucent, rounded at apex, crisped and serrulate at margin; stipules small,caducous. Spikes small, up to 7 mm long, on 2.5 cm long peduncle, 6-8 flowered. Flowers small. Sepals up to 2.5 mm long. Drupelets 2-2.5 mm long, obliquely-ovoid, beaked.

Fl. & Fr. : Nov.-Mar.

Distrib. : North and South temperate and subtropical regions of the World and India.

Specimens examined : Ghurki, 1156. Vittate.

Notes : Common in ponds.

2. P. nodosus Poir in Lamk., Encycl. Suppl. 4: 535. 1816; Dandy in Hara *et al.*, Enum. Fl. Pl. Nep. 1: 95. 1978; Guha Bakshi, Fl. Murshid. Dist. 544. 1984. *Potamogeton indicus* Roxb., Fl. Ind. 1: 452. 1820 (non Roth ex Roem. & Schult., 1818); Hook.f. in Fl. Brit. India 6: 565. 1893, Haines, Bot. Bihar & Orissa 3: 888. 1961 (Rep. ed.).

Slender, aquatic herbs, with submerged and floating leaves. Floating leaves sometimes opposite, elliptic-lanceolate, petiolate, 5-10 × 2.5-4 cm, submerged leaves lanceoalte, undulate; petioles 2.5-10 cm long; stipules up to 3.5 cm long. Peduncles axillary or leaf-opposed, up to 3.5 cm long. Spikes dense flowered, up to 4 cm long. Drupelets 2-2.5 mm long, obliquely-truncate, red, shortly beaked.

Fl. & Fr. : Sept.-Apr.

Specimens examined : Kundri, 943. Ephydate or Vittate.

Distrib. : India, Malaya, Sri Lanka and Sandurch Islands.

Notes : Common in the ponds.

ERIOCAULACEAE

ERIOCAULON L.

1a. Leaves green :

2a. Anthers black ... 2. *F. oryzelorum*

2b. Anthers not black :

3a. Involucral bracts toothed or lacerate ....1. *E.* cinereum

3b. Involucral bracts entire ... 4. *E. sollyanum*

1b. Leaves red or pinkish ... 3. *E. quinquangulare*

1. Eriocaulon cinereum R.Br., Prodr. 254. 1810; Babu, Herb. Fl. Dehra Dun 547. 1977. Hara *et al.*, in Enum. Fl. Pl. Nep. 1: 96. 1978. *Eriocaulon sieboldianum* Sieb. & Zucc. ex. Steud., Syn. Pl. Glum. 2: 272. 1855; Hook.f. in Fl. Brit. India 6: 577. 1893; Haines Bot. Bihar & Orissa 3: 1116. 1961 (Rep. ed.).

Small glabrous herbs, up to 8 cm high. Leaves up to 30 × 1 mm, linear, pinkish towards base. Scapes few, often solitary, 2-7 cm long, erect, slightly twisted. Heads up to 3 mm diam., globose; involucral bracts glabrous, ovate, obtuse; floral bracts shortly stipitate, hyaline, oblong, concave, apex acute. Calyx of the male flowers hyaline, spathaceous, split into-3; lobes acute, ciliolate at apex. Corolla up to 0.7 mm long, tubular, shortly lobed, glandular. Stamens-6, anthers whitish. Sepals of the female flowers 2 or 3 free, linear; petals-0.

Fl. & Fr. : Oct.-Nov.

Distrib. : India, Sri Lanka, Myanmar, China, Japan & Philippines.

Specimens examined : Muhammadganj, 1016. Tenagophyte and Rosulate.

Notes : Common in wet places and cultivated lands.

2. **Eriocaulon oryzetorum** Mart. in Wall., Pl. As. Rar. 3: 28. 1832; Hook.f. in Fl. Brit. India 6: 579. 1893; Haines, Bot. Bihar & Orissa 3: 1117. 1961 (Rep. ed.); Prain, Beng. Pl. 2: 848. 1963 (Rep. ed.); Cook in Aquat. Wetland Pl. Ind. 198. 1996.

Herbs up to 45 cm high. Leaves up to 6 × 0.4 cm, spongy, many nerved, tapering from base to apex, linear. Heads globose; 7-8 mm in diameter, blackish grey; receptacle flat, villous; involucral bracts glabrous, 2-seriate, ovate to orbicular, glaucous, dark green, 1.5 × 1.5 mm. Female flowers-3, slender, caducous, having white hair at apex; petals filiform to oblanceolate, ciliolate.

Fl. & Fr. : Jan.-Mar.

Distrib. : Throughout India.

Specimens examined : Netarhat, 165. Helophyte.

Notes : Common in water logged fields, marshy areas and cultivated lands.

3. **E. quinquangulare** L., Sp. Pl. 87. 1753; Hook.f. in Fl. Brit. India 6: 582. 1893; Haines, Bot. Bihar & Orissa 3: 1116. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 548. 1977.

Small annual herbs, up to 15 cm high, with crowded rossete leaves. Leaves linear, up to 5 cm long, red to pink, tapering from base to apex. Peduncle up to 12 cm long, ridged upwards. Heads globose or ovoid, 4 mm across, white; involucral bracts oblong, glabrous. Floral bracts obovate, acuminate, glabrous. Calyx of the male flowers spatheceous, hairy at apex; corolla lobe hairy at apex, with minute apical black gland. Sepals of the female flowers-3, hairy at apex; petals oblanceolate, ciliate, with apical black gland.

Fl. & Fr. : Oct.-Feb.

Distrib. : Tropical regions of the world.

Specimens examined : Barwadih, 408. Tenagophyte and Hyperhydate.

Notes : Common in wet rice fields, river bed and also in moist areas.

4. Eriocaulon sollyanum Royle, Illus. 409. t. 97. f. 1. 1830; Moldenke in Phytol. Mem. 2: 262. 1980; Guha Bakshi in Fl. Mushid. Dist. 348. 1984. *Eriocaulon trilobatum* Buch.-Ham. ex Kovin in Linnae 27: 645. 1856; Hook.f. in Fl. Brit. India 6: 583. 1893; Haines, Bot. Bihar & Orissa 3: 1116. 1961 (Rep. ed. as *trilobum*).

Small herbs, up to 15 cm high; stems not conspicuous. Leaves glabrous, up to 12 × 0.6 cm, gradually tapering into acute tip. Scapes many, 8-15 cm high. Heads subglobose, dark grey. Involucral bracts up to 3 mm long, glabrous, finally reflexed, linear-oblong. Floral bracts concave, obovate, up to 2 mm long, apex obtuse and ciliolate,base cuneate. Receptacle villous. Male flowers shortly pedicelled. Female flowers subsessile. Seeds ellipsoid, pale-yellow, microscopically transversely ridged.

Fl. : Oct.-Nov.

Distrib. : Throughout India.

Specimens examined : Muhammadganj, 1013. Tenagophyte.

Notes : Common in the swampy areas.

CYPERACEAE

1a. Ovaries or nuts enclosed within a sac like organ (utricle) ... 2. CAREX

1b. Ovaries or nuts not enclosed within a sac like organ :

2a. Glumes spirally arranged; hypogynous bristles present :

3a. Style base dilated and constricted or articulated with the nut :

4a. Leaves well developed :

5a. Style base articulated with ovary and caducous ... 5. FIMBRISTYLIS

5b. Style base constricted with ovary and persistent on nut ... 1. BULBOSTYLIS

4b. Leaves not at all developed ... 4. ELEOCHARIS

3b. Style base not dilated, continuous with the nut :

6a. Glumes shortly awned and that from the apex ... 7. SCHOENOPLECTUS

6b. Glumes prominently awned on the back from below the apex ... 6. FUIRENA

2b. Glumes distichous; hypogynous bristles absent ... 3. CYPERUS

1. BULBOSTYLIS Kunth. *nom. cons.*

1a. Bracts foliaceous; glumes keeled ... 1. *B. barbata*

1b. Bracts setaceous; glumes not keeled ... 2. *B. densa*

1. Bulbostylis barbata (Rottb.) Kunth. ex Clarke in Hook.f. in Fl. Brit. India 6: 651. 1893; Haines, Bot. Bihar & Orissa 3: 967. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 549. 1977; Rao & Verma in Cyper. N.E. India 40. 1982; Kern in Fl. Males. 7(3): 539. 1974. *Scirpus barbatus* Rottb., Progr. 27. 1772 et in Descr. l.c. 52.4.17.f.4. 1773. *Fimbristylis barbata* Benth., Fl. Austral. 7: 321. 1878.

Tufted annual herbs, 4-20 cm high. Leaves one-third as long as to subequalling the stem, glabrous, acuminate, margin involute; sheath white, hairy at mouth. Inflorescence hemispherical, 4-10 mm across; bracts-3, foliaceous, subequalling the capitula, sometimes exceeding the capitula. Spikelets linear-oblong, 2-7 mm long, acute; rachilla stout, strong, green, curved, mucronulate or acute. Nut obovoid, trigonous, finely reticulate by isodiametric surface cells, 0.5-0.7 mm long, pale brown.

Fl. & Fr. : Sept.-Nov.

Distrib. : Pantropical.

Specimens examined : Paton, 1054. Helophyte.

Notes : Common in moist places.

2. B. densa (Wall.) Hand. Mazz. in Karsten & Schenk, Vegetationsb. 20, 7: 16. 1930; Rao & Verma in Cyperaceae of N.E. India 40. 1982. *Scirpus densus* Wall. in Roxb., Fl. Ind. 1: 231. 1820. *Bulbostylis capillaris*

var. *trifida* (Nees) Clarke in Hook.f., Fl. Brit. India 6: 652. 1893. *Isolepis trifida* Nees in Wt., Contr. Bot. India 108. 1834.

Annual herbs, up to 40 cm high. Leaves linear, 16-30 cm long, up to 0.2 mm broad, acuminate at apex, sparsely hairy; sheath white hairy, up to 6 cm long. Inflorescence terminal, anthelate, compound; bracts setaceous. Spikelets many, sometimes reduced to one, oblong-ovoid, up to 6 × 1.8 mm; glumes laxly imbricating, up to 1.8 mm long, acute muticous, brownish. Stamens-2 or 1. Nut up to 0.9 × 0.8 mm, verruculose, transversely lanceolate, whitish-yellow.

Fl. & Fr. : June-Sept.

Distrib. : Pantropical.

Specimens examined : Maromar, 535. Helophyte.

Notes : Common in the water sources and waste lands.

2. CAREX L.

1a. Female glumes ovate; utricle ovate ... 1. *C. cruciata*

1b. Female glumes obovate-oblong, utricle ovoid ... 2. *C. royleana*

1. Carex cruciata Wahlenb., Vet. Akad. Handl. Stockh. 24: 149. 1803; Clarke in Hook.f., Fl. Brit. India 6: 715. 1894; Babu, Herb. Fl. Dehra Dun 550. 1977; Haines, Bot. Bihar & Orissa 3: 976. 1961 (Rep. ed.). *Carex condensata* Nees in Wight, Contrib. 125. 1834; Clarke in Hook.f., Fl. Brit. India 6: 716. 1894.

Perennials; rhizomes woody; stems 3-gonous, glabrous. Leaves as long as or longer than stem, glabrous, apex setaceous, scabrid, margin scabrid; sheath trigonous, glabrous. Panicle slender, compound; bracts foliaceous. Spikelets cylindrical, linear-oblong. Glumes ovate, up to 3 mm long, with a small awn. Utricle ovate, inflated, narrowed into 2-fid beak. Nuts 3-gonous, brown, up to 3.2 mm long.

Fl. & Fr. : Sept.-Dec.

Distrib. : Throughout India.

Specimens examined : Bhavnathpur, 1164.

Notes : Not very common on the river bank.

2. Carex royleana Nees in Wt., Contr. Bot. India 127. 1834; Boot, Illustr. 1: t. 19. 1858; Rao & Verma in Cyperaceae of N.E. India 88. 1982. *C. breviculmis* Clarke in Hook.f. Fl. Brit. India 6: 746. 1894 (non R.Br. 1810). *C. breviculmis* sub sp. *royleana* Kuekenth. in Engl. pflanzenrch. *heft* 38. 469. 1909 *pro parte.*

Perennial herbs, up to 30 cm high; rhizomes short, often stoloniferous; stems glabrous, trigonous. Leaves many, clustered at the base, sub-equalling or exceeding the stem, up to 3 mm broad; sheath fuscous, ultimately fibrous. Racemes up to 6 cm long; lowest bract foliaceous, upper one setaceous. Spikelets 3-5, ascending, sessile or lower one slightly pedicelled, subcylindric; terminal one male, 3.5-4 mm long; glumes oblong-lanceolate, up to 3.5 mm long; lateral spikelets female, up to 5 mm long, glumes obovate-oblong, awned, awn up to 2 mm long. Stamens-3. Utricles obliquely spreading, herbaceous, ovoid, slightly trigonous, hairy, bidentate, many-nerved, up to 2.5 × 1 mm. Nuts sessile, ovoid-oblong, up to 1.5 × 1 mm.

Fl. & Fr. : June-Aug.

Specimens examined : Upper Ghagri (Netarhat), 750.

Distrib. : India, China, Japan, Australia and New Zealand.

Notes : Common in wet lands and forest undergrowth.

3. Cyperus L.

1a. Nuts lenticular :

2a. Inflorescence capitate :

3a. Spikelets 1-flowered ... 1. *C. brevifolius*

3b. Spikelets many-flowered :

4a. Glumes more than 3 mm long; Nuts more than 1 mm long ... 13. *C. substramineus*

4b. Glumes less than 3 mm long; nuts less than 1 mm long ... 11. *C. pumilus*

2b. Inflorescence anthelate ... 7. *C. flavidus*

1b. Nuts trigonous :

5a. Inflorescence contracted into heads or capitate :

6a. Rachilla of the spikelets wingless; stamens-3 ... 4. *C. cuspidatus*

6b. Rachilla of the spikelets winged; stamens-1-2 :

7a. Glumes ovate, apex apiculate with red-brown margin ... 10. *C. pilosus*

7b. Glumes obovate, apex rounded with hyaline margin ... 6. *C. difformis*

5b. Inflorescence anthelate with distinct rays :

8a. Rhizomes stoloniferous ... 12. *C. torundus*

8b. Rhizomes not stoloniferous :

9a. Rachilla of the spikelets winged :

10a. Glumes membranaceous, tightly clasping the nuts ... 5. *C. cyperoides*

10b. Glumes not membranaceous, loosely clasping the nuts :

11a. Glumes cuspidate, greenish-yellow ... 2. *C. compressus*

11b. Glumes not cuspidate, reddish-brown ... 3. *C. corymbosus*

9b. Rachilla of the spikelets not winged :

12a. Rhizomes creeping, clothed with brown scales; spikelets terete ... 9. *C. malaccensis*

12b. Rhizomes not as above; spikelets compressed ... 8. *C. iria*

1. Cyperus brevifolius (Rottb.) Hassk., Cat. Hort. Bog. 24. 1824; Kern in Fl. Males 7(3): 656. 1974. var. **brevifolius**. *Kyllinga brevifolia* Rottb., Descr. & I.c. 13. t. 4. f. 3. 1773; Clarke Hook.f. in Fl. Brit. India 6: 588. 1893; Haines, Bot. Bihar & Orissa 3: 950. 1961 (Rep. ed.).

Perennial sedges; rhizomes long, stoloniferous, creeping, covered with brown scale-leaves; stems slender, 10-20 cm long, compressed-trigonous. Leaves distinctly shorter than stem, usually at base, linear, 1-3 mm broad, acuminate. Head solitary, up to 5 mm long, green, globose; bracts 3-4, leaf like. Spikelets up to 3 mm long, elliptic-oblong to ovate-lanceolate; lower 2-glumes minute, subequal, empty; 3rd one flower-bearing, ovate-lanceolate, with a green-mucronate keel, 3-nerved in each side, sides scarious; 4th glume empty. Stamens-2. Style long, deeply bifid. Nuts up to 1.2 mm long, obovoid-ellipsoid, slightly compressed, yellowish.

Fl. & Fr. : June-Nov.

Distrib. : In all tropical parts of the World except the mediterranean region.

Specimens examined : Netarhat, 752.

Notes : Common in the margins of cultivated lands and water courses, Upper Ghagri falls.

Uses : Liked by the cattle. Leaves used in diarrhoea.

2. Cyperus compressus L., Sp. Pl. 1: 46. 1753; Clarke in Hook.f., Fl. Brit. India 6: 605. 1893; Prain, Beng. Pl. 2: 1143. 1903 (Rep. ed. 2: 860. 1963); Kuekenthal in Engler, Pfl. - reich 101: 156. 1936; Haines, Bot. Bihar & Orissa 3: 938. 1961 (Rep. ed.); Kern in Reinwardtia 6: 56. 1961 and in van Steenis, Fl. Males. ser. 1.7: 617. 1974; Cook in Aquat. Wetland Pl. Ind. 106. 1996.

Glabrous annual herbs; roots fibrous; stems clustered, erect and diffuse, 8-24 cm high. Leaves many, longer than stem, 2 mm broad, acuminate at apex. Flowers in simple terminal 4-8 spikelets; bracts 3-7, leaf like, over-toping the inflorescence, tapering towards apex. Spikelets much compressed, many flowered (15-30), greenish-yellow in ripening; rachilla slightly winged. Glumes up to 4 mm long, ovate-lanceolate, margin hyaline, acute at apex. Nuts triquetrous, broadly-obovoid, 1-1.5 mm long, brown to dark-brown.

Fl. & Fr. : July-Dec.

Distrib. : Pantropical.

Specimens examined : Betla, 472.

Notes : Common along the sides of water courses, river banks and in waste land.

Common name : Beng. : *Chuncha.*

3. **Cyperus corymbosus** Rottb., Descr. et l.c. 42. t. 7. f. 4. 1773; Clarke in Hook.f., Fl. Brit. India 6: 612. 1893; Blatter and McCann. in J. Bombay Nat. Hist. Soc. 27: 270. 1935; Kuekenthal in Engler, Pfl. - reich. 101: 80. 1936; Haines, Bot. Bihar & Orissa 3: 942. 1961 (Rep. ed.); Kern in Reinwardtia 6: 55. 1961; Koyama in Gardens Bull. Singapore 30: 131. 1977; Rao & Verma, Cyper. E. India 18. 1982; Guha Bakshi, Fl. Murshid. Distr. 352. 1984. *Cyperus tagetiformis* Roxb. ex Arn. in Wight Contrib. 89. 1834 (in obs.); Clarke in Hook.f., Fl. Brit. India 6: 612. 1893; Haines, Bot. Bihar & Orissa 3: 942. 1961 (Rep. ed.).

Rhizomes creeping, stout, with brown scales; stems terete below, trigonous above, up to 1.5 m high. Leaves reduced to sheath or rarely with up to 12 cm long blades. Umbel compound, 8-20 cm across; bracts 3-5, small with revolute margin; rays 6-10, slender, suberect; spikelets clustered; rachilla wings linear, hyaline. Glumes straw coloured to reddish-brown, ovate-oblong, obtuse or subacute, up to 3 mm long, 3-5 nerved. Stamens-3. Stigmas-3. Nuts elliptic, obovoid-oblong, trigonous, 1-1.5 mm long, apiculate, black.

Fl. & Fr. : Throughout the year, specially in July-Aug.

Distrib. : India, Sri Lanka, Myanmar, West Africa, North Australia, West Indies, Tropical South America.

Specimens examined : Muhhammadganj, 1003. Tenagophyte and Helophyte.

Notes : Common in marshy areas, along the sides of canals.

Common name : Beng. : *Golamethi.*

Uses : Culms woven into mats.

4. **Cyperus cuspidatus** Kunth. in H.B.K., Nov. Gen. Sp. 1: 204. 1861; Clarke in Hook.f. Fl. Brit. India 6: 598. 1893; Haines, Bot. Bihar & Orissa 3: 937. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 555. 1977; Cook in Aquat. Wetland Pl. Ind. 108. 1996.

Tufted, annual, small herbs, up to 10 cm high. Leaves linear, acute or acuminate, shorter than stems. Bracts few, filiform, spreading, longer than rays. Rays few, shorts. Spikelets 5-23 in a globose head. Glumes ovate, 3-nerved, up to 1 mm long, chestnut-brown. Stamens-3. Nuts obovoid, dark brown, half length of the glume.

Fl. & Fr. : Sept.-Dec.

Distrib. : All warm regions.

Specimens examined : Barwadih, 393. Helophyte.

Notes : Common in the cultivated fields.

5. **C. cyperoides** (L.) O. Kuntze., Rev. Gen. Pl. 3(2): 333. 1898; Rao & Verma in Cyper. N.E. India 21. 1982. *Scirpus cyperoides* L., Mant. 2: 181. 1771. *Mariscus umbaliatus* Vahl. Enum. Pl. 2: 376. 1806. *pro parte. M. sieberianus* Nees in Linnaea 9: 286. 1834; Clarke in Hook.f., Fl. Brit. India 6: 622. 1893; Haines, Bot. Bihar & Orissa 3: 952. 1961 (Rep. ed.). *M. cyperoides* Urb. in Symb. Antill. 11. 1: 164. 1900.

Perennial, rigid herbs, up to 40 cm high, with trigonous stem. Leaves 3-10, shorter or equalling the stems, up to 5 mm broad. Spikelets in simple umbel; rays 5-10, up to 4.5 cm long; bracts spreading, 5-10, 10-30 cm long. Spikelets closely-spirally arranged, linear-lanceolate, 3-5 mm long, acuminate, flowering obliquely spreading, fruiting divaricate or lower deflexed, usually 2 nuts mature; rachilla winged, 4-gonous. Glumes membranaceous, ovate-oblong, tightly clasping the nuts, several nerved, up to 4 mm long. Stamens-3. Nuts linear-oblong, trigonous, slightly curved, up to 2×0.05 mm, apiculate, dark brown.

Fl. & Fr. : July-Sept.

Distrib. : Pantropical.

Specimens examined : Upper Ghagri (Netarhat), 763.

Notes : Common in waste lands, along forest margin and near streams.

Common name : Beng. : *Bara guthubi.*

6. Cyperus difformis L., Cent. Pl. 2: 6. 1756 Clarke in Hook.f., Fl. Brit. India 6: 599. 1893; Prain, Beng. Pl. 2: 1142. 1903 (Rep. ed. 2: 859. 1963); Haines, Bot. Bihar & Orissa 3: 935. 1961 (Rep. ed.); Blatter & McCann in J. Bombay Nat. Hist. Soc. 37: 259. 1935; Kern in Reinwardtia 6: 58. 1961 & van Steenis, Fl. Males. ser. 1.7: 629. 1974.

Tufted annual herbs with filiform roots; stems soft, triquetrous. Leaves 150-200 × 2-3.5 mm, generally shorter than stem, acuminate. Umbel contracted to a head; bracts-2, leaf like; spikelet many, 1.5 × 1 mm, brown; rachilla slender, winged. Glumes 0.5-1 mm long, obovate, concave, apex rounded, truncate at base, margin hyaline. Nuts 1 mm long, trigonous, obovate-elliptic.

Fl. & Fr. : Mar.

Distrib. : In the Old World tropics.

Specimens examined : Netarhat, 199.

Notes : Common in marshy areas on way to Boneri from Netarhat.

Common name : Beng. : *Behua.*

7. C. flavidus Retz., Obs. Bot. 5: 13. 1789; Haines, Bot. Bihar & Orissa 3: 936. 1961 (Rep. ed.); Kern in van Steenis, Fl. Males, 7(3): 648. 1974. *Pycreus capillaris* Nees in Linnaea 9: 283. 1834; Clarke in Hook.f., Fl. Brit. India 6: 591. 1893. *P. capillaris* var. *stricta* (Roxb.) Clarke in Hook.f., Fl. Brit. India 6: 592. 1893.

Annual caespitose sedges; roots fibrous, yellowish, without stolons; stems rigid, trigonous, glabrous. Leaves rigid, narrow, acuminate, sheath reddish brown. Inflorescence simple or subcompound; involucral bracts 2-4, obliquely erect. Spikes ovoid, with 5-20 spikelets. Spikelets spreading, linear, compressed, 20-40 flowered; rachilla wingless, persistent. Glumes sharply keeled, oblong-ovate, obtuse, minute. Stamens-2. Nuts biconvex, laterally compressed, oblong-obovate, apiculate.

Fl. & Fr. : June-Nov.

Distrib. : India.

Specimens examined : Muhammadganj, 1017. Helophyte.

Notes : Common in wet lands and rice fields.

8. Cyperus iria L., Sp. Pl. 45. 1753; Clarke in Hook.f., Fl. Brit. India 6: 606. 1893; (incl. var. *paniciformis*) Blatter and McCann in J. Bombay Nat. Hist. Soc. 37: 264. 1935; Kuekenthal in Engler, Pfl. - reich. 106: 150. 1936; Haines, Bot. Bihar & Orissa 3: 938. 1961 (Rep. ed.); Koyama in Quart. J. Taiwan Mus. 14: 172. 1961 & in Gardens' Bull. Singapore 30: 139. 1977; Kern in Reinwardtia 6: 35. 1961 & in van Steenis, Fl. Males Ser. 1.7: 616. 1974.

Annual tufted herbs; stems up to 45 cm tall, slender, compressed-trigonous. Leaves shorter than to subequalling stems, up to 5 mm broad. Umbels decompound of many 2.5-14 cm long primary rays bearing fascicled umbel of many interrupted spikes of 5-20. Spikelets 5-7 × 1-1.5 mm, compressed, greenish-brown, linear-oblong; rachilla slender, wingless. Glumes up to 1.5 × 1 mm long, loosely imbricate, obovate to suborbicular, mucronulate, keel green, 3-5-nerved. Nuts up to 1.2 mm long, broadly stipitate, obovoid-ellipsoid, triquetrous, deep brown, apiculate at apex.

Fl. & Fr. : Aug.-Dec.

Distrib. : India, Old World tropics.

Specimens examined : Muhammadganj, 998. Tenagophyte and Helophyte.

Notes : Common in rice fields and near the canal and ditches.

Common name : Beng. : *Barachuncha.*

Uses : Culms are used to make mats.

9. C. malaccensis Lamk., Illus. 1: 146. 1791; Clarke in Hook.f., Fl. Brit. India 6: 608. 1893; Haines, Bot. Bihar & Orissa 3: 941. 1961 (Rep.

ed.); Blatter & McCann, J. Bombay Nat. Hist. Soc. 37: 269. 1935; Kern in Reinwardtia 6: 55. 1961 & in van Steenis, Fl. Males. ser. 1.7: 613. 1974; Cook in Aquat. Wetland Pl. Ind. 115. 1996.

Glabrous herbs; rhizomes long, thick, creeping, clothed with brown scales; stems up to 1 m high, triquetrous, compressed. Leaves up to 15 cm long, erect, sheath enclosing stems. Umbels 2-10 cm across, simple or compound; bracts-3, rarely-5, up to 22 × 0.7 cm, flat; rays 3-10, up to 6 cm long. Spikes with 4-10 spikelets; rachis glabrous. Spikelets 4.8-11 × 1.2-1.6 mm, terete. Glumes up to 2.5 × 0.8 mm, oblong to ellipitc-oblong, obtuse, scarcely keeled. Stamens-3. Nuts up to 1.5 mm long, elliptic oblong, obtusely-trigonous, shortly apiculate.

Fl. & Fr. : Throughout the year.

Distrib. : India, major parts of Asia, Australia & Polynesia.

Specimens examined : Netarhat, 1190. Tenagophyte and Helophyte.

Notes : Common in marshy areas.

10. C. pilosus Vahl., Enum. Pl. 2: 354. 1805; Clarke in Hook.f., Fl. Brit. India 6: 609. 1893; Haines, Bot. Bihar & Orissa 3: 944. 1961 (Rep. ed.); Kern in van Steenis, Fl. Males. 7(3): 611. 1974; Babu, Herb. Fl. Dehra Dun 558. 1977. *C. pilosus* var. *obliqua* (Nees) Clarke in Hook.f., Fl. Brit. India 6: 610. 1893. *C. pilosus* var. *polyantha* Clarke in Hook.f., Fl. Brit. India 6: 610. 1893.

Perennial sedges, up to 70 cm high; rhizomes several, slender; stems triquetrous, leafy below. Leaves acuminate, with long, papery, golden sheaths. Inflorescence with few rays; bracts leafy, much exceeding rays. Spikes clustered, cylindrical. Spikelets distant, spreading, oblong, flat. Glumes distant, ovate, obtuse, up to 1.5 mm long, apiculate with sharp keel and 2-3 nerves, red brown margin. Nuts obovate-elliptic, 3-gonous, up to 1.4 mm long.

Fl. & Fr. : Aug.-Nov.

Distrib. : Throughout India.

Specimens examined : Paton, 1057. Helophyte.

Notes : Common in rice fields.

11. Cyperus pumilus L., Cent. Pl. 2: 6. 1756; Kern, Fl. Males, ser. 1.7(3): 650. 1974; Rao & Verma in Cyper. N.E. India 9. 1982. *Pycreus pumilus* Nees ex Clarke in Fl. Brit. India 6: 591. 1893 *quoad basionym* excl. *descr.*; Haines, Bot. Bihar & Orissa 3: 948. 1961 (Rep. ed.). *Pycreus nitens* (Retz.) Nees, Nov. Act. Nat. Cur. 19, Suppl. 1: 53. 1843; Clarke in Hook.f., Fl. Brit. India 6: 591. 1893.

Annual tufted herbs, up to 25 cm high; stems compressed, trigonous. Leaves shorter or as long as stems, up to 3 mm broad, acute, 1-nerved. Inflorescence simple umbel. Spikelets many, congested together in subglobose head, linear-oblong, compressed, 5-12 × 1-2 mm, many flowered; rachilla hyaline-margined. Glumes imbricating, ovate, 1-1.5 mm long, mucronate, uniformly stramineus or brown striolate, stamens 1-2. Nuts shortly stipitate, obovoid, lenticular, up to 0.5 mm long, apiculate, blackish brown.

Fl. & Fr. : Sept.-Nov.

Specimens examined : Seuti, 1086. Helophyte.

Distrib. : Warmer parts of the Old World.

Notes : Common in moist places and in the rice fields.

12. C. rotundus L., Sp. Pl. 45. 1753; Clarke in Hook.f., Fl. Brit. India 6: 614. 1893; Blatter & McCann in J. Bombay Nat. Hist. Soc. 37: 273. 1935; Keukenthal in Engler, Pfl. reich. 101: 107. 1936; Haines, Bot. Bihar & Orissa 3: 946. 1961 (Rep. ed.); Koyama in Quart. J. Taiwan Mus. 14: 170. 1961 & in Reinwardtia 6: 53. 1961; Kern in van Steenis, Fl. Malesiana ser. 1.7: 604. 1974.

Perennial herbs; stolon slender, long, with intermittent ellipsoid tubers; stems erect, 5-60 cm tall, compressed trigonous. Leaves flat, shorter or subequalling the stems, acuminate. Umbels simple or compound; bracts usually-3; rays 3-8, up to 10 cm long. Spikelets linear-lanceolate, 10-35 × 1.5-2 mm, reddish-brown, 10-40 flowered; rachilla winged. Glumes 2.8-3 mm long, imbricating, 3-5 nerved, obtuse and minutely apiculate at apex,

margin hyaline. Stamens-3. Nuts obovoid-ellipsoid, trigonous, up to 1.5 mm long, minutely apiculate, glossy-black.

Fl. & Fr. : Aug.-Dec.

Distrib. : Cosmopolitan weed, India, Sri Lanka, Mauritius and Australia.

Specimens examined : Muhammadganj, 1024.

Notes : Common everywhere, throughout the district.

Common name : Beng. & Hindi : *Motha.*

13. Cyperus substramineus Kuekenth. in Engl. Pflanzenr. *heft* 101: 398. 1936; Rao & Verma in Cyper. N.E. India 7. 1982. *C. stramineus* Nees in Wt., Contr. Bot. India 74. 1834. (non Desf. ex Link. 1820). *Pycreus stramineus* Clarke in Hook.f., Fl. Brit. India 6: 589. 1993; Haines, Bot. Bihar & Orissa 3: 947. 1961 (Rep. ed.).

Annual, tufted herbs, up to 50 cm high; stems slender, subtrigonous. Leaves linear, shorter than stems, up to 15 cm long. Flowers in simple, contracted head; bracts-2-3, foliaceous, up to 3 cm long. Spikelets 2-6 together, linear, compressed, up to 1.5 cm long, many flowered; rachilla broad, wingless. Glumes closely imbricating, ovate, up to 4 mm long, mucronulate, keeled. Stamens-2. Nuts obovoid, lenticular, up to 1.4 mm long, apiculate, dark brown.

Fl. & Fr. : July-Oct.

Distrib. : India & Sri Lanka.

Specimens examined: Upper Ghagri (Netarhat), 751. Helophyte.

Notes : Common in moist places and near the streams.

4. ELEOCHARIS R.Br.

1a. Stems stout; hypogynous bristles 6-8; nut biconvex or slightly trigonous ... 1. *E. dulcis*

1b. Stems slender; hypogynous bristles-4; nut compressed ... 2. *E. ovata*

1. **Eleocharis dulcis** (Burm.f.) Trin. ex Henschel, Vita Rumph. 186. 1833; Kern in Reinwardtia 6: 36. 1961 & in van Steenis, Fl. Males. 7(3): 529. f. 36. 1974. *Andropogon dulce* Burn.f., Fl. India 219. 1768. *Eleocharis plantaginea* R.Br., Prodr. 224. 1810; Clarke in Hook.f., Fl. Brit. India 6: 525. 1893; Haines, Bot. Bihar & Orissa 3. 954. 1961 (Rep. ed.). *Eleocharis equisetina* Presl., Rel. Haenk. 1: 195. 1828; Clarke in Hook.f., Fl. Brit. India 6: 626. 1893.

Stems up to 70 cm high and 5 mm in diam., cylindric, transversely septate. Leaf sheath 5-18 cm long, reddish brown. Spikelets up to 2.5 cm long, cylindric, base subtended by a short rounded scarious-margined bracts; rachilla stout, angled with irregular; broad, concave facet between the insertion of glumes. Glumes up to 5.5 mm long, 1-nerved, broadly oblong, or obovate, margin scarious. Hypogynous bristles 6-8, equalling or slightly exceeding nuts, retrosely scabrid. Nuts biconvex or faintly trigonous, up to 1.8 mm long.

Fl. & Fr. : Sept.-Dec.

Distrib. : India to Malaysia.

Specimens examined : Bhavnathpur, *Sarma* 1165. Hyperhydate & Tenagophyte.

Notes : Common on the margins of ponds.

2. **E. ovata** R.Br., Prodr. 224. 1810; Clarke in Hook.f., Fl. Brit. India 6: 628. 1893.

Roots fibrous; stems up to 25 cm high. Leaf sheath mouth oblique. Spikelets terminal, 4-7 mm long, straw coloured, subglobose to oblong, apex rounded; rachilla terete, pitted. Lower glumes 1.5 mm long, bractiform, ovate-oblong, obtuse; fertile glume 2.1 mm long broadly elliptic or elliptic-oblong, concave. Hypogynous bristles-4, equal to the nut, pale brown, retrosely scabrid. Nuts 1 mm long, brownish black, shining with disciform style base, obovoid, slightly compressed.

Fl. & Fr. : Sept.-Dec.

Distrib. : Tropical and Temperate regions of the World.

Specimens examined : Simultarh village, (Daltonganj), 310.

Notes : Common near the river banks and also in barren cultivated fields.

5. FIMBRISTYLIS Vahl. *nom. cons.*

1a. Nuts linear-oblong with almost parallel sides ... 5. *F. tetragona*

1b. Nuts obovoid or ellipsoid :

2a. Stigmas-3; nuts 3-gonous ... 3. *F. ovata*

2b. Stigmas-2; nuts lenticular :

3a. Nuts longitudinally ribbed ... 2. *F.dichotoma*

3b. Nuts not ribbed :

4a. Glumes spiral, keeled ... 4. *F. squarrosa*

4b. Glumes imbricate, not keeled ... 1. *F. aestivalis*

1. **Fimbristylis aestivalis** (Retz.) Vahl., Enum. 2: 288. 1806; Clarke in Hook.f., Fl. Brit. India 6: 637. 1893 (excl. Syn. *F. griffithii* Boeck.); Blatter & McCann in J. Bombay Nat. Hist. Soc. 37: 541. 1935; Haines, Bot. Bihar & Orissa 3: 963. 1961 (Rep. ed.); Kern in Reinwardtia 6: 48. 1961. *Scirpus aestivalis* Retz., Obs. Bot. 4: 12. 1784.

Small, densely tufted sedges, up to 15 cm high. Leaves filiform, up to 1 mm broad, pubescent; sheath pubescent. Umbels compound, supported by filiform bracts. Spikelets up to 8 mm long. Glumes up to 1.5 mm long, produced into a long mucro, often pubescent, without keel. Stamen-1. Nuts ellipsoid or obovoid, biconvex, smooth.

Fl. & Fr. : Apr.-July.

Distrib. : India to South Australia.

Specimens examined : Barwadih, 431. Helophyte.

Notes : Infrequent in wet lands.

2. **F. dichotoma** (L.) Vahl, Enum. Pl. 2: 287. 1806; Kern in Reinwardtia 6: 46. 1961; Babu, Herb. Fl. Dehra Dun 565. 1977. *Scirpus*

dichotomus Linn., Sp. Pl. 50. 1753. *Fimbristylis diphylla* (Retz.) Vahl, Enum. Pl. 2: 289. 1806; Clarke in Hook.f., Fl. Brit. India 6: 636. 1893; Prain, Beng. Pl. 2: 1153. 1903 (Rep. ed. 2: 868. 1963); Haines, Bot. Bihar & Orissa 3: 964. 1961 (Rep. ed.). *F. annua* (All.) R. & S. var. *diphylla* (Retz.) Kuk. in Act. Hort. Got. 5: 109. 1929.

Shortly rhizomatous, tufted perennial herbs, up to 35 cm high; stems compressed, glabrous, striate. Leaves flat with rounded spinulose teeth; sheaths hairy, brown-spotted, striate; ligule hairy. Umbels usually compound, sometimes simple; bracts leaf-like. Spikelets up to 6 mm long, ovoid or elliptic-ovoid, solitary, few, acute, red-brown; rachilla pitted. Glumes broadly ovate, up to 2 mm long, acute and apiculate. Style flat, bearded at the base of 2-stigmas. Nuts obovate or broadly elliptic, up to 0.9 mm long, shortly stipitate, straw coloured, longitudinally ribbed, trabecular.

Fl. & Fr. : May-Dec.

Distrib. : All warmer region of the World.

Specimens examined : Daltonganj, 313. Tenagophyte.

Notes : Common in marshy areas and near water sources.

3. Fimbristylis ovata (Burm.f.) Kern. in Blumea 15: 126. 1967; Koyama in Bot. Mag. Tokyo 87: 305. 1974; Rao & Verma. Cyper. N.E. India 39. 1982; Guha Bakshi, Fl. Murshid. Distt. 365. 1984. *Carex ovata* Burm.f., Fl. India 194. 1786. *Fimbristylis monostachyos* (L.) Hassk., Fl. Rar. Jav. 61. 1848 ('*monostachya*' sphalm.); Clarke in Hook.f., Fl. Brit. India 6: 649. 1893; Haines, Bot. Bihar & Orissa 3: 961. 1961 (Rep. ed.). *Cyperus monostachyos* L., Mant. 2: 180. 1771.

Glabrous, annual, densely tufted herbs, up to 20 cm high; stems erect, slender, striate, compressed. Leaves several, one third to half as long as stem; sheath short, margin scarious. Spikelets solitary, up to 11 × 5 mm, ovate or ovate-oblong, acute; rachilla slender, winged. Glumes loosely imbricate, coriaceous or subcoriaceous, broadly ovate, strongly keeled; lowermost 2-3 empty, up to 5 mm long, cuspidate, others 5.5 mm long, acute. Stamens-3. Nuts straw coloured, verrucose, broadly obovoid to subglobose, trigonous, bluntly mucronate, up to 2.5 × 2 mm, base attenuated into 0.8 mm long stipe.

Fl. & Fr. : Throughout the year.

Distrib. : Pantropical.

Specimens examined : Muhammadganj, 1018. Tenagophyte and Helophyte.

Notes : Common in wet lands and near rice fields.

4. Fimbristylis squarrosa Vahl, Enum. Pl. 2: 289. 1806; Clarke in Hook.f., Fl. Brit. India 6: 635. 1893; Haines, Bot. Bihar & Orissa 3: 963. 1961 (Rep. ed.); Rao & Verma in Cyper. N.E. India 31. 1982. *F. aestivalis* var. *squarrosa* Koyama in Journ. Fac. Sci. Univ. Tokyo III. 8: 116. 1962.

Annual herbs, up to 10 cm high, with trigonous stems. Leaves shorter than stems, up to 5 × 2 cm, acute, glabrous; sheath glabrous or ciliate, up to 2.5 cm long. Umbels compound, dense, up to 2 cm across; bracts 3-4, foliaceous; rays 7-11, slender, spreading, longest one up to 3 cm long. Spikelets solitary, linear-oblong, squarrose, up to 3 mm long; rachilla narrowly winged. Glumes spiral, ovate-oblong, keeled, aristate, up to 2.5 mm long, brownish. Stamen-1. Nuts shortly stipitate, obovoid, biconvex, up to 1 × 0.8 mm, dark-brown, glabrous.

Fl. & Fr. : Throughout the year, specially in Nov.-Feb.

Distrib. : Pantropical.

Specimens examined : Daltaonganj, 314. Tenagophyte.

Notes : Common in open marshy areas, near ditches and streams.

5. F. tetragona R.Br., Prodr. 226. 1810; Clarke in Hook.f., Fl. Brit. India 6: 631. 1893; Haines, Bot. Bihar & Orissa 3: 961. 1961 (Rep. ed.); Rao & Verma in Cyper. N.E. India 29. 1982.

Annual or perennial herbs, 15-30 cm high; stems tetragonous. Leaves absent; sheaths 2-3, pale or chestnut brown, sometimes the uppermost with very short blade, many flowered. Glumes spiral, tightly imbricating, ovate-oblong, up to 3.8 mm long, rounded at tip, brown tinged, 3-nerved. Stamens-3. Style sparsely fimbriate upwards; stigmas 2-3. Nuts linear-oblong, up to 1.8 mm long.

Fl. & Fr. : Sept.-Dec.

Distrib. : India, Sri Lanka, East Asia & Australia.

Specimens examined: Netarhat, 101. Helophyte.

Notes : Infrequent in marshy areas.

6. FUIRENA Rottb.

Fuirena ciliaris (L.) Roxb., Fl. Indica 1: 184. 1820; Blatter & McCann in Journ. Bombay Nat. Hist. Soc. 37: 772. 1935; Kern in Reinwardtia 6: 31. 1961; Koyama in Li *et al.*, Fl. Taiwan 5: 202. 1978. *Scirpus ciliaris* L., Mant. Pl. 2: 182. 1771. *Fuirena glomerata* Lam., Tabl. Encycl. Meth. Bot. 1: 150. 1791; Clarke in Hook.f., Fl. Brit. India 6: 666. 1893; Haines, Bot. Bihar & Orissa 3: 972. 1961 (Rep. ed.).

Erect, tufted, hairy annual herbs; 15-40 cm tall. Leaves grass like, 5-14 × 0.3-0.8 cm, acuminate, margin ciliolate; sheath long, close, straite, hairy. Spikelets subcapitate, 1-8, 5-10 mm long, ovoid to oblong, obtuse, greenish brown; bracts-0. Glumes 1.5-2 mm long (without arista), imbricate, sparsely hairy without, obovate, keel ending in an 1 mm long hairy apical arista. Hypogynous scale 2-seriate, outer-3 linear, inner-3 up to 1.2 mm long, membranous, 3-nerved, quadrate, with a slender claw, persistent, apex minute, acutely 3-toothed, with the slightly longer middle tooth. Nuts up to 0.8 mm long, ellipitc-obovate, light brown, minutely apiculate.

Fl. & Fr. : Oct.-Jan.

Distrib. : Throughout India and in Myanmar, Malaysia, Tropical Africa, Southeast Asia and Australia.

Specimens examined : Garwah, 551. Tenagophyte.

Notes : Common in waste lands and wet places.

Common name : Beng. : *Band Kola.*

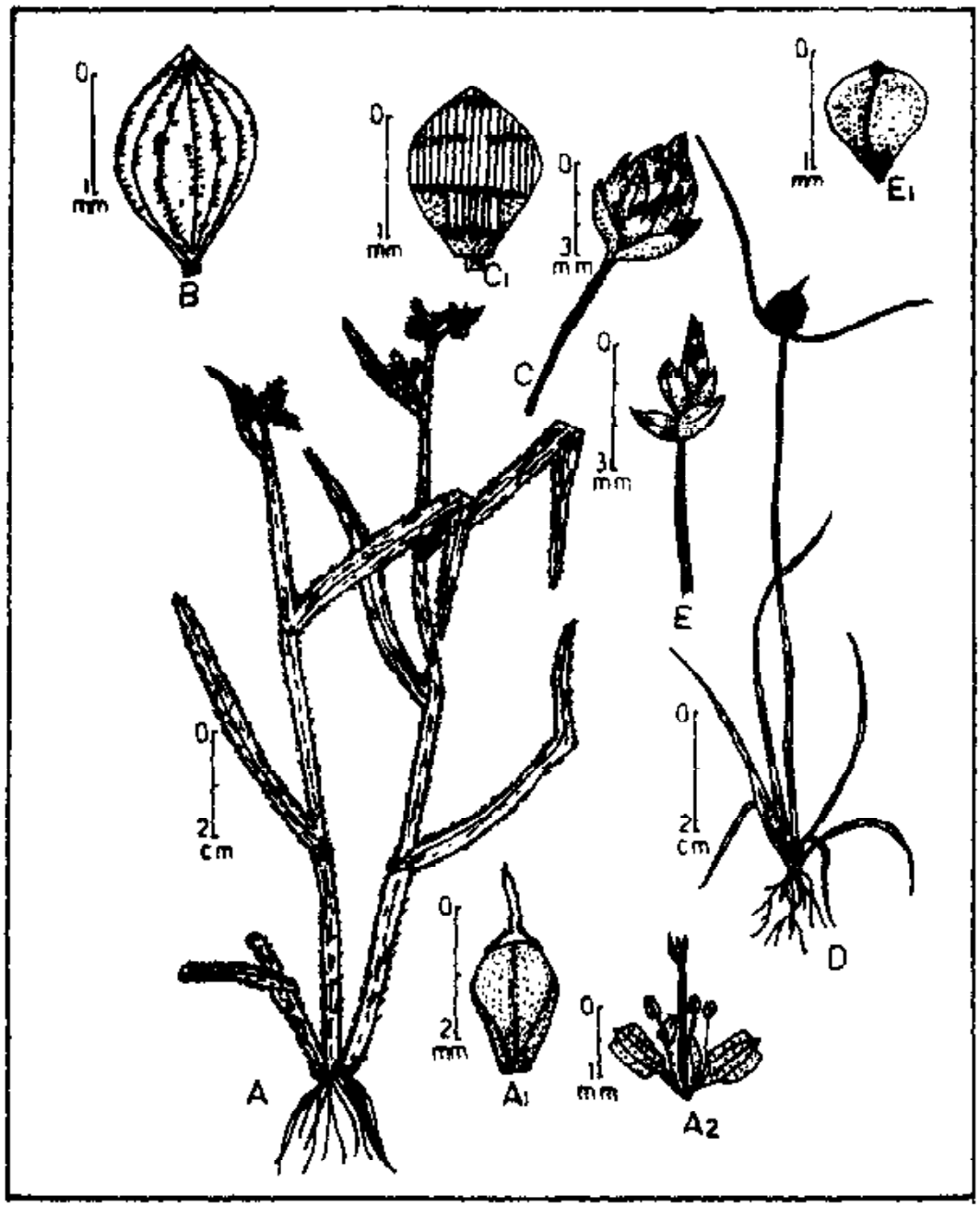


Fig. 42: Cyperaceae. (A-A_2): *Fuirena ciliaris* (L.) Roxb.: A. Habit, A_1. Glume, A_2. Flower; B. *Fimbristylis dichotoma* (L.) Vahl.: Nut; (C-C_1): *Fimbristylis tetragona* R. Br.: C. Spikelet, C_1 Nut; D. *Cyperus brevifolius* (Rottb.) Hassk. var. *brevifolius*: Habit, (E-E_1): *Bulbostylis barbata* (Rottb.) Kunth: E. Spikelet, E_1. Nut.

7. SCHOENOPLECTUS Palla

1a. Stems up to 2.5 mm across; spikelets angular; glumes keeled ... 2. *S. supinus*

1b. Stems up to 7 mm across; spikelets terete; glumes not keeled ... 1. *S. articulatus*

1. Schoenoplectus articulatus (L.) Palla in Bot. Jahrb. 10: 229. 1889; Koyama in Hara *et al.*, Enum. Fl. Pl. Nepal 1: 118. 1978. *Scirpus articulatus* Linn., Sp. Pl. 47. 1753; Clarke in Hook.f., Fl. Brit. India 6: 656. 1893; Blatter and McCann in J. Bombay Nat. Hist. Soc. 37: 767. 1935; Haines, Bot. Bihar & Orissa 3: 969. 1961 (Rep. ed.); Kern in Reinwardtia 6: 34. 1961.

Annual herbs; stems densely tufted, up to 80 cm high and 7 mm across, cylindric, striate, spongy or transversely septate within. Leaves in young stage (while under water) strap-shaped and long, when inflorescence develops dies away leaving only the sheath. Spikelets few to many on stem at different height depending upon depth of water, but usually below middle, arranged in lateral spreading clusters, 6-12 mm long, rusty brown, ebracteate, ovoid to linear oblong, acute or obtuse at apex. Glumes up to 4.5 × 4 mm, persistent, membranous, concave, broadly ovate, scarcely keeled, apex acute and mucronulate, base subcordate, margin hyaline. Nuts 1.4 mm long, black, broadly obovoid or broadly elliptic-obovoid, triquetrous, apiculate, transversely lanceolate.

Fl. & Fr. : Almost throughout the year, but chiefly in Nov.-Feb.

Distrib. : Throughout India and Old World Tropics.

Specimens examined : Garu, 550. Hyperhydate and Tenagophyte.

Notes : Very common in ditches, ponds and paddy fields.

Common name : Beng. : *Chatpati*; Hindi : *Chichora.*

Uses : Dried plants used for thatching. Tubers often used to check diarrhoea and vomiting.

2. S. supinus (L.) Palla in Stizb. Zool. Bot. Ges. Wien 38: 49. 1888, & in Bot. Hahrb. 10: 299. 1889; Koyama in Li *et al.*, Fl. Twaiwan 5: 247. 1978; ssp. **lateriflorus** (Gmelin) Koyama in Hara *et al.*, Enum. Fl. Pl.

Nepal 1: 119. 1978. *Scirpus supinus* L., Sp. Pl. 73. 1753 (Partly). *Scirpus supinus* L. var. *lateriflorus* (Gmelin) Koyama in J. Fac. Sc. Univ. Tokyo Sect. 3. 7: 302. 1958. *Scirpus lateriflorus* Gmelin, Syst. Veg. 127. 1791; Kern in Reinwardtia 6: 34. 1961 & in van Steenis, Fl. Males. ser. 1.7: 514. 1974. *Scirpus supinus* L. var. *uninoidis* Clarke in Hook.f., Fl. Brit. India 6: 656. 1893 (quad. Specim. cit. non *Isolepis uninoidis* Delile); Haines, Bot. Bihar & Orissa 3: 969. 1961 (Rep. ed.).

Annual herbs; stems tufted, up to 40 cm high, slender, faintly trigonous, striate, up to 2.5 mm across. Leaves very short of 0; sheaths short or long, mouth oblique, rarely produced into a short acute limb. Spikelets 2-7 in cluster, coming out laterally about the middle or little above middle of stem, up to 6 mm long, ovate, ellipsoid or oblong, sessile or subsessile; rachilla slender, not winged. Glumes 1.8-3 mm long, closely imbricate, membranous, ovate, acute, mucronate, prominently keeled. Hypogynous bristles-0, stamens-3. Style up to 0.6 long; stigmas-3, as long as style. Nuts 0.8-1.2 mm long, transversely lanceolate, broadly obovoid, shortly apiculate, trigonous, one face broader.

Fl. & Fr. : Sept.-Feb.

Distrib. : India, Sri Lanka, Tropical Asia, Africa, North America and Australia.

Specimens examined : Mahulanbusti (Garwah), 630.

Notes : Common in ponds, ditches and water logged paddy fields.

POACEAE

1a. Spikelets two-flowered, falling entire at maturity, articulated below the glumes, with upper floret hermaphrodite and the lower male or barren of often reduced to lemma:

2a. Spikelets all unisexual, male and female spikelets in separate inflorescence or in different parts of the same inflorescence :

3a. Cultivated grass; male and female spikelets in separate inflorescence ... 52. ZEA

3b. Wild grasses; male and female spikelets in different parts of the same inflorescence :

4a. Lower glume winged towards the apex; fruit case closed, formed by the leaf-sheath ... 12. COIX

4b. Lower glume unwinged; fruit case longitudinally open, not formed by the leaf-sheath ... 3. CHIONACHNE

2b. Spikelets all hermaphrodite or with male or barren and hermaphrodite mixed in the same inflorescence :

5a. Spikelets one or two flowered; lower glume smaller tha the spikelets; lower lemma similar to upper glume in texture and shape; upper lemma usually awnless :

6a. Spikelets surrounded by bristles :

7a. Empty glumes-2; upper lemma smooth ... 34. PENNISETUM

7b. Empty glumes more than-2; upper lemma transversely rugose ... 45. SETARIA

6b. Spikelets not surrounded by bristles :

8a. Spikelets arranged in one-sided spikes or racemes :

9a. Lower glume absent, if present then as a small hyaline, triangular scale :

10a. Spikelets solitary; lemma glabrous or shortly ciliate with simple hairs ... 33. PASPALUM

10b. Spikelets binate or ternate, if solitary then lemmas hispid with verrucose hairs ... 19. DIGITARIA

9b. Lower glume well-developed :

11a. Spikelets awned :

12a. Culms creeping and ascending; ligule membranous; glumes thinly membranous ... 29. OPLISMENUS

12b. Culms erect; ligule absent; glumes herbaceous ... 20. ECHINOCHLOA

11b. Spikelets awnless :

13a. Leaf sheaths pubescent; nodes swollen, pubescent; lower glume turned towards the rachis ... 7. BRACHIARIA

13b. Leaf sheath glabrous; nodes not swollen, glabrous; lower glume turned away from the rachis ... 32. PASPALIDIUM

8b. Spikelets arranged in panicle, not in one sided spikes and racemes :

14a. Ligule fimbriate or membranous; lower glume ovate, membranous :

15a. Panicle oblong-lanceolate, effuse; lower glume clasping at base, cuspidate acuminate at apex ... 31. PANICUM

15b. Panicle cylindric, spike-like; lower glume not clasping at base; ob'use at apex ... 43. SACCIOLEPIS

14b. Ligule a rim of hairs or ciliate; lower glume elliptic or suborbicular, not membranous :

16a. Leaf base slightly amplexicaul, surface with tubercled based hairs; panicle up to 30 cm long ... 15. CYRTOCOCCUM

16b. Leaf base not amplexicaul, surface without tubercled based hairs; panicle up to 2 cm long ... 11. COELACHNE

5b. Spikelets two or three flowered, with one sessile and other one or two pedicelled; lower glume as long as spikelets; upper glume rigid and firmer than the hyaline, membranous lower lemma; upper lemma usually awned :

17a. Raceme reduced, 1-2 noded, subtended by a spathe :

18a. Raceme 1-noded, if 2-noded than the lower node with involucral spikelets :

19a. Leaf apex tapering to a fine point; ligule chartaceous, less than 1 mm long; involucral spikelet absent ... 1. APLUDA

19b. Leaf apex acute; ligule membranous, more than 2 mm long; involucral spikelet present ... 48. THEMEDA

18b. Raceme 2-noded, lower node with one hermaphrodite and one pedicelled spikelets, the upper node with one hermaphrodite and two pedicelled spikelets ... 39. PSEUDANTHISTIRIA

17b. Racemes or spikes elongated, many noded, if 1-2 noded than not subtended by spathe :

20a. Spikelets awnless :

21a. Inflorescence a terminal, silky panicle; spikelets paired and similar :

22a. Low grass; panicle less than 10 cm long; both the spikelets pedicelled ... 27. IMPERATA

22b. Tall grass; panicle more than 10 cm long; one spikelets in a pair sessile and other pedicelled ... 42. SACCHARUM

21b. Inflorescence a solitary raceme or spike; spikelets paired, similar or dissimilar, often spikelet solitary :

23a. Sessile spikelet globose: lower glume pitted ... 25. HACKELOCHLOA

23b. Sessile spikelet linear-lanceolate; lower glume not pitted ... 41. ROTTBOELLIA

20b. Sessile or hermaphrodite spikelet awned :

24a. Aromatic grasses ... 13. CYMBOPOGON

24b. Non-aromatic grasses :

25a. Raceme solitary :

26a. All pairs of spikelets heterogamous ... 44. SCHIZACHYRIUM

26b. Lower 1-6 pairs of spikelets homogamous and differing from all above, if heterogamous then upper lemma of sessile spikelet reduced to a hyaline base of awn :

27a. Upper glume and lower lemma of sessile spikelet awned :

28a. Nodes pubescent; leaves linear; lower and upper glume of sessile spikelet ciliate at apex ... 37. POGONATHERUM

28b. Nodes glabrous; leaves filiform; lower and upper glume of sessile spikelet not ciliate at apex but upper glume 2-fid at apex ...40. PSEUDOPOGONATHERUM

27b. Only upper lemma of sessile spikelet awned :

29a. Lower 2-6 pairs of spikelets homogamous; awn more than 5 cm long ... 26. HETEROPOGON

29b. Lower 1-3 pairs of spikelets homogamous or not; awn less than 5 cm long ... 18. DICHANTHIUM

25b. Raceme not solitary :

30a. Joints and pedicel of the pedicelled spikelet with a medium longitudinal translucent groove; lower glume of sessile spikelet pitted ... 6. BOTHRIOCHLOA

30b. Joints and pedicels of the pedicelled spikelet without a medium longitudinal groove; lower glume of sessile spikelet not pitted :

31a. Raceme 1-noded; branches of the panicle whorled with terminal three laterally compressed spikelets ... 10. CHRYSOPOGON

31b. Raceme 2-many noded :

32a. Inflorescence of 2-3 racemes, appressed to one another ... 28. ISCHAEMUM

32b. Inflorescence of an effuse panicle, branches of the panicle not appressed to one another :

33a. Atleast the upper branches of the panicle alternate; spikelet dorsally compressed; lower glume of the sessile spikelet smooth ... 46. SORGHUM

33b. Branches of the panicle whorled; spikelets laterally compressed; lower glume of the sessile spikelet muricate ... 51. VETIVERIA

1b. Spikelets one-many flowered, breaking up at maturity, above the more or less persistent glumes or if falling entire then spikelets not two-flowered with upper hermaphrodite and the lower male or barren floret :

34a. Arborescent grasses; leaves articulate with sheaths; spikelets spinescent in dense globose head ... 17. DENDROCALAMUS

34b. Annual or perennial grasses; herbaceous; leaves not articulate with sheaths; spikelets not as above :

35a. Rhizomatous perennial reeds; lemmas with long silky hairs ... 4. ARUNDO

35b. Non-rhizomatous, annual or perennials; lemmas glabrous or hispid with small hairs :

36a. Spikelets more than 2 cm long, pendulous with age; lemmas awned from the back ... 5. AVENA

36b. Spikelets less than 2 cm long, if more long then not pendulous; lemmas awned from the apex or from the sinus :

37a. Lemmas indurate at maturity, terminated by three subequal scabrid awn ....2. ARISTIDA

37b. Lemmas varies in texture and shape, not as above :

38a. Glumes with broad serrated wing; lower lemma barren, scally ... 36. PHALARIS

38b. Glumes wingless or obscurely winged; lower lemma not scally :

39a. Lemma solitary, if two, then spikelet sunken into the joints of the rachis :

40a. Stamens-6 ... 30. ORYZA

40b. Stamens-3 :

41a. Inflorescence a dense to spiciform, often lobulate panicle ... 38. POLYPOGON

41b. Inflorescence otherwise, not as above :

42a. Inflorescence a simple open panicle ... 47. SPOROBOLUS

42b. Inflorescence of digitate spikes or racemes :

43a. Glumes long awned ... 35. PEROTIS

43b. Glumes acute, awnless ... 14. CYNODON

39b. Lemmas more than one; rachilla produced or not :

44a. Inflorescence a dense to spiciform, often cylindric, interrupted panicle ... 22. ELYTROPHORUS

44b. Inflorescence otherwise, not as above :

45a. Inflorescence of solitary, digitate or subdigitate spikes :

46a. Spikelets awned :

47a. Wild grasses; spike subtetragonous; grain with ventral groove ... 50. TRITICUM

47b. Wild grasses; spike not subtetragonous; grain without ventral groove :

48a. Ligule membranous, ciliate; rachis bearded at apex into a rigid, sharp, point; caryopsis globose ... 16. DACTYLOCTENIUM

48b. Ligule a rim of long hairs; rachis not as above; caryopsis oblong-lanceolate ... 9. CHLORIS

46b. Spikelets awnless :

49a. Culms compressed; ligule membranous; spikes digitate .... 21. ELEUSINE

49b. Culms terete; ligule a rim of hairs; spikes slender, not digitate ... 23. ERAGROSTIELLA

45b. Inflorescence of panicles :

50a. Spikelets awned ... 3. ARUNDINELLA

50b. Spikelets awnless :

51a. Culms reed like, more than 1 m tall; panicle up to 90 cm long ...49. THYSANOLAENA

51b. Culms not reed like, less than 1 m tall; panicle 5-15 cm long ... 24. ERAGROSTIS

Due to lack of flowering and fruiting, the two species of *Bambusa* Schreb. could not be identified. They are most probably *B. tulda* Roxb. and *B. arundinacea* (Retz.) Willd.

1. APLUDA L.

Apluda mutica L., Sp. Pl. 82. 1753; Bor, Grass. Burm. Ceyl. India Pakistan 93. 1960; Cope in Nasir & Ali, Fl. W. Pak. 143: 318. *Apluda*

aristata Linn.; Amoen. Acad. 4: 303. 1756. *Apluda varia* Hack. in DC., Monogr. Pha. 6: 197. 1889; Hook.f. in Fl. Brit. India 7: 150. 1897; Haines, Bot. Bihar & Orissa 3: 1104. 1961 (Rep. ed.).

Perennial grass. Culms terete, erect, stout, smooth, 30-150 cm tall, geniculately ascending, rambling among bushes. Leaves linear lanceolate, narrowed upward into a filiform apex, below into a slender petiole, margin finely scabrid, 5-30 × 0.3-0.8 cm; sheaths glabrous, compressed; ligule chartaceous, oblong, lacerate racemes solitary, simple, up to 1.2 cm long. Sessile spikelets awned or awnless. Lower glume linear-lanceolate, up to 5 mm long, many-nerved, 2-keeled, apex 2-toothed; upper glume boat shaped, many nerved, apex acuminate; lower lemma up to 4.5 mm long, linear lanceolate, 3-nerved; palea hyaline, equal. Lodicules-2. Stamens-3. Upper lemma similar, up to 4.5 mm long, 3-nerved, geniculate, awn up to 7 mm long from sinus; palea hyaline, up to 2 mm long, 3-toothed at apex. Lodicules-2. Stamens-3. Caryopsis oblong. Pedicelled spikelets linear lanceolate, up to 5 mm long. Terminal spikelets reduced to a broad pedicel, with a short lower glume.

Fl. & Fr. : Sept.-Dec.

Distrib. : India to South China, Malaysia, Australia, New Caledonia and Polynesia.

Specimens examined : Daltonganj, 294; Barwadih 410 & 919.

Notes : Common on the hill slopes and on bushes.

Common name : Beng. : *Chunkarki*; Santal : *Dudhia Souri*.

Uses : In young condition used as fodder.

2. Aristida L.

Aristida adscensionis L., Sp. Pl. 82. 1753; Hook.f. in Fl. Brit. India 7: 224. 1897; Prain, Beng. Pl. 2: 912. 1963 (Rep. ed.); Haines, Bot. Bihar & Orissa 3: 1022. 1961 (Rep. ed.); Bor, Grass. Bur. Ceyl. India Pak. 407. 1960. *Aristida pumila* Dcne., Ann. Sci. Nat. 2, 4: 85. 1835. *Aristida adscensionis* L. var. *pumila* (Dcne). Coss. & Dur., Fl. d' Alger. Glum. 84: 1855; Bor, Grass Bur. Ceyl. Ind. Pak. 409. 1960.

Annual herbs, up to 30 cm high. Culms terete, erect or geniculately ascending from base, much branched. Leaves linear, often convolute; sheath compressed, up to 7 cm long, glabrous; ligule reduced to fine hairs. Panicle contracted, up to 12 cm long. Spikelets pale. Lower glume membranous, narrowly oblong, 3-5 mm long, keel scabrid awnless; upper glume similar, 7-9 mm long, 3-nerved, scabrid on keels; lemma inarticulated, 8-13 mm long, 3-nerved, scabrid on keels, terminating into 3-subequal, scabrid awn, the middle one longest, up to 20 mm long; palea hyaline. Lodicules-2. Stamens-3. Caryopsis cylindric, 2.3 mm long, brownish.

Fl. & Fr. : July-Dec.

Distrib. : Widely distributed in the Old and New World.

Specimens examined : Simultarh village (Daltonganj), 252.

Notes : Not common, chiefly on sandy soils and also in waste lands, along the Koel river bank.

Common name : Santal : *Kharang Janok.*

3. ARUNDINELLA Raddi

Arundinella brasiliensis Raddi, Agrost. Bras. 37. t. 1. Fig. 3. 1823; Hook.f. in Fl. Brit. India 7: 73. 1897; Haines, Bot. Bihar & Orissa 3: 1029. 1961 (Rep. ed.). *Arundinella nepalensis* Trin., Gram. Panic. 62. 1826; Bor, Grass. Bur. Ceyl. Ind. Pak. 423. 1960.

Perennial, stout, erect herbs, 05-1.5 m tall. Nodes glabrous. Leaves flat, linear-lanceolate, up to 40 × 1.2 cm, glabrous, ciliate at margin, gradually tapering at apex; ligule a ring of soft hairs. Panicles 15-45 cm long, thyrsiform. Spikelets ovate-lanceolate, 4-6 mm long, straw-coloured at maturity. Lower glume ovate-lanceolate, up to 5 mm long, 3-nerved, acuminate at apex; upper glume ovate-lanceolate, 4.5-6 mm long, 5-nerved, acuminate at apex; lower lemma barren, elliptic, oblong-lanceolate, subequal to its lemma, acute; upper lemma elliptic, hyaline, up to 2.5 mm long, apex truncate and provide with two, 2 mm long arista; palea linear-lanceolate, as long as and enclosed in its lemma. Lodicules-2.

Fl. & Fr. : Oct.-Mar.

Distrib. : India, Myanmar, Sri Lanka, China, Japan, Australia, South Africa and Tropical America.

Specimens examined : Kumendi, 710.

Notes : Rare in the forests of Marhar hill of Kumendi.

Uses : Often eaten by cattle in times of scarcity, and used for thatching. A lotion prepared from the grass used as a vulnerary.

4. ARUNDO L.

Arundo donax L., Sp. Pl. 81. 1753; Hook.f. in Fl. Brit. India 7: 302. 1897; Bor, Grass. Bur. Ceyl. Ind. Pak. 413. 1960; Haines, Bot. Bihar & Orissa 3: 998. 1961 (Rep. ed.).

Perennial, reed-like grass, 1-3 m tall, stout, creeping and woody at base. Nodes glabrous. Leaves flat, lanceolate, 25-30 × 2-5 cm, glabrous, amplexicaul at base, apex gradually tapering; sheaths 2-10 cm long, glabrous, longer than internodes; ligule a ring of stiff hairs. Panicle large, thyrsiform, erect, 30-45 cm long, scaberulous. Spikelets laterally compressed, 10-15 mm long, straw-coloured at maturity. Lower glume herbaceous, oblong-lanceolate, up to 10 mm long, 3-nerved, glabrous; upper glume similar; lower lemma herbaceous, lanceolate, 9-10 mm long, silky hairy below middle, hairs not exceeding the lemma, 3-nerved, epaleate; upper lemma slightly shorter than lower one, palea hyaline, oblong, 4-5 mm long, scabrid, margin inflexed, truncate at apex. Lodicules-2, obovate, truncate. Stamens-3. Caryopsis oblong.

Fl. & Fr. : Oct.-Mar.

Distrib. : Tropical Asia, Mediterranean region and introduced in New World.

Specimens examined : Kumendi, 711. Helophyte.

Notes : Rare along the stream of forest and base of Marhar hill.

Uses : Used in making mats, baskets, fishing-rods and musical pipes and thatching. Stalks and leaves used in rayon manufacture and also for high grade writing paper.

5. AVENA L.

Avena fatua Linn., Sp. Pl. 80. 1753; Hook.f. in Fl. Brit. India 7: 275. 1897.

Annual grass. Culms terete, 20-30 cm tall, erect or ascending from base. Leaves flat, linear-lanceolate, scaberulous, up to 20 × 0.5 cm; sheaths compressed, smooth; ligule membranous, 2-3 mm long. Panicle contracted, simple, up to 10 cm long, terminating the culms; rachis smooth, mostly curved; pedicel slender, scabrid. Spikelets herbaceous, 2-nate, one short, the other long-pedicelled, up to 2.3 cm long, ovate-lanceolate. Lower glume ovate-lanceolate, 1.5-2 cm long, many nerved, margin hyaline, apex acute; upper glume similar, slightly longer than the lower; lemma ovate-lanceolate, up to 1.7 cm long, scaberulous, clothed below with fulvous light brown hairs, apex 2-toothed, awn up to 3.5 cm long, geniculate, from the middle or below the back; palea hyaline, lanceolate, subequal to lemma, 2-keeled,ciliate, apex 2-toothed. Lodicules-2. Stamens-3.

Fl. & Fr. : Nov.-Mar.

Distrib. : North Asia to North Africa and temperate. Europe.

Specimens examined : Netarhat, 138.

Notes : Common in dry exposed area and in cultivated lands.

6. BOTHRIOCHLOA O.Ktze.

1a. Culms more than 100 cm tall; leaves cauline; panicle more than 15 cm long, raceme whorled to semiwhorled ... 1. *B. bladhii*

1b. Culms less than 100 cm tall; leaves often basal; panicle less than 15 cm long, raceme digitate to subdigitate ... 2. *B. pertusa*

1. Bothriochloa bladhii (Retz.) Blake in Proc. Roy. Soc. Queensland 80: 62. 1969; Cope in Nasir & Ali, Fl. W. Pak. 143: 284. 1982. *Andropogon bladhii* Retz., Obs. 2: 27. 1781. *A. glaber* Roxb., Fl. India 271. 1820. *A. intermedius* R.Br., Prodr. 202. 1810; Hook.f. in Fl. Brit. India 7: 175. 1897. *Bothriochloa intermedia* (R.Br.) A. Camus in Ann. Soc. Linn. Lyon 1930, n.s. 76: 164. 1931; Bor, Grass. Burm. Ceyl. India Pak. 108. 1960. *B. glabra* (Roxb.) A. Camus is Ann. Soc. Linn. Lyon 1930, n.s. 76: 164. 1931; Bor, Grass. Burm. Ceyl. Ind. Pak. 107. 1960. *B.*

glabra (Roxb.) A. Camus in Ann. Soc.Linn. Lyon 1930, n.s. 76: 164. 1931; Bor, Grass. Burm. Ceyl. Ind. Pak. 107. 1960. *B. caucasica* (Trin.) Hubb. in Kew Bull. 1939: 101. 1939; Bor, Grass. Bur. Ceyl. Ind. Pak. 106. 1960. *Amphilophis glabra* (Roxb.) Stapf in Prain, Fl. Trop. Africa 9: 172. 1917; Haines, Bot. Bihar & Orissa 3: 1075. 1961 (Rep. ed.). *Dichanthium bladhii* (Retz.) Clayton in Kew Bull. 32: 3. 1977.

Perennial grass, up to 180 cm high. Culms simple or branched, leafy upwards. Nodes hairy. Leaves linear, up to 40 × 1 cm, sparsely hairy; sheaths terete, hairy; ligule membranous, very short, truncate. Panicle pyramidal, 10-20 cm long, erect; racemes whorled or semiwhorled or alternate, 4-7 cm long, densely covered with silky hairs. Sessile spikelets linear, up to 5.5 mm long, awned. Lower glume chartaceous, linear-lanceolate, up to 4.8 mm long, sparsely hairy, 5-7 nerved, margin sparsely ciliolate above the middle, apex acute; upper glume linear-lanceolate up to 5 mm long, 3-nerved, margin hyaline, ciliolate; lower lemma empty, hyaline, elliptic-lanceolate, up to 4.5 mm long, epaleate. Lodicules-2. Stamens-3. Caryopsis oblong. Pedicel of the pedicelled spikelets up to 3 mm long, covered with silky hairs; pedicelled spikelets up to 4 mm long, elliptic-lanceolate. Lower glume elliptic-lanceolate, up to 3.8 mm long, glabrous. Upper glume 3-5 nerved. Lemma hyaline, epaleate. Lodicules-2. Stamens-3.

Fl. & Fr. : Sept.-Jan.

Distrib. : India, China, Malaya and Tropical Africa.

Specimens examined : Barwadih, 365.

Notes : Very common in the forest.

Common name : Beng. : *Sudugan*; Hindi : *Sandhor*.

Uses: Used as fodder when young.

2. B. pertusa (L.) A. Camus in Ann. Soc. Linn. Lyon. 1930, n.s. 76: 164. 1931; Bor, Grass Bur. Ceyl. India & Pak. 109. 1960. *Holcus pertusus* L., Mant. Alt. 301. 1771. *Andropogon pertusus* (L.) Willd., Sp. Pl. 4: 922. 1806; Hook.f. in Fl. Brit. India 7: 173. 1897.

Perennial grass, 20-70 cm long, erect or decumbent, branched, leafy at base. Nodes bearded. Leaves up to 6 cm long or lower much shorter,

glabrous, apex acute to acuminate. Panicle up to 8 cm long; rachis filiform, 1-2 cm long; racemes 2-5, digitate to subdigitate, silky after drying, hairy at margin. Spikelets 2-flowered, sessile one elliptic-lanceolate, 3-4 mm long, awned, bisexual. Lower glume hairy below with one pit, 1-2 mm long, keels-2, ciliate; upper glume boat-shaped, equalling lower, faintly 2-nerved, margin ciliolate; lemma and palea hyaline, 2-3 mm long. Pedicelled spikelets elliptic-lanceolate, 3.5-4 mm long. Lower glume oblong-lanceolate 3-3.5 mm long, 2-keeled; upper glume equal to lower; lemma oblong-lanceolate, 3 mm long, apex obtuse; palea absent. Stamens-3.

Fl. & Fr. : July-Mar.

Distrib. : East World from Arabia to South East Asia, tropical Africa.

Specimens examined : Daltonganj, 20.

Notes : Common throughout in open grass lands.

7. BRACHIARIA Griseb.

1a. Ligule short, lacerate; lower glume orbicular, up to 1 mm long ... 1. *B. remota*

1b. Ligule a rim of hairs; lower glume ovate, up to 1.5 mm long ... 2. *B. subquadripara*

1. Brachiaria remota (Retz.) Haines, Bot. Bihar & Orissa 1005. 1924; Bor, Grass. Bur. Ceyl. Ind. Pak. 285. 1960. *Panicum remotum* Retz., Obs. Bot. 4: 17. 1786; Hook.f. in Fl. Brit. India 7: 38. 1897.

Slender, annual, straggling grass, up to 50 cm long, highly branched. Leaves linear-lanceolate, 3-5 cm long, pubescent, acuminate at apex; sheaths hairy; ligule short, lacerate. Racemes up to 7 cm long. Spikelets 2-3 mm long, loosely scattered; rachis triquetrous, with scaberulous margin. Lower glume orbicular, 0.5-1 mm long; upper glume ovate-apiculate, up to 2 mm long; Lemma ovate, acute to subapiculate, 5-nerved, up to 2 mm long; palea elliptic, mucronulate. Caryopsis up to 1 mm long.

Fl. & Fr. : Oct.-Feb.

Distrib. : India & Sri Lanka.

Specimens examined : Barwadih, 429.

Notes : Common in shady areas.

2. Brachiaria subquadripara (Trin.) Hitchc. in Lingnan Sci. J. 7: 214. 1931; Bor, Grass. Bur. Ceyl. Ind. Pak. 286. 1960. *Panicum subqudriparum* Trin., Gram. Panic. 145. 1826. *Panicum distachyum* Linn., Mant. 1: 138. 1767; Hook.f. in Fl. Brit. India 7: 37. 1897. *Brachiaria distachyum* (Linn.) Haines, Bot. Bihar & Orissa 3: 1050. 1961 (Rep. ed.).

Annual grass, culms terete, up to 30 cm long, decumbent, rooting at lower nodes. Leaves flat, linear-lanceolate, acuminate at apex, 5-10 × 0.5-1 cm; sheaths compressed, up to 5 cm long, ciliate; ligule a rim of hairs. Spikes up to 4 cm long. Spikelets hairy, up to 4 × 2 mm. Lower glume 3-nerved, ovate, up to 1.5 mm long; upper glume elliptic, 7-nerved, up to 4 mm long, hairy; lower lemma elliptic, 5-nerved, up to 3.8 mm long, empty and epaleate; upper lemma cartilaginous, mucronate, up to 3 mm long; palea similar, up to 2.5 mm long, obtuse. Lodicules-2. Stamens-3. Caryopsis ovoid, up to 1.8 mm long.

Fl. & Fr. : Sept.-Dec.

Distrib. : India, Myanmar, Sri Lanka, China, Malaysia and Australia.

Specimens examined : Muhammadganj, 997.

Notes : Not very common in open dry grass lands.

8. CHIONACHNE R.Br.

Chionachne koenigii (Spreng.) Thw., Enum. Pl. Zeyl. 357. 1864; Bor, Grass. Bur. Ceyl. Ind. Pak. 262. 1960; Haines, Bot. Bihar & Orissa 3: 1110. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 533. 1977. *Coix koenigii* Spreng., Syst. 1: 238. 1825. *Coix barbata* Roxb., Fl. Ind. 3: 569. 1832. *Polytoca barbata* (Roxb.) Stapf. ex Hook.f. in Fl. Brit. India 7: 102. 1897.

Perennial grass. Culms up to 1.2 m tall, erect. Nodes bearded. Leaves linear-lanceolate, hispid, up to 40 × 1.5 cm; sheaths compressed, upper boat-shaped; ligule membranous. Racemes paniculate, on slender peduncle; spathes herbaceous, margin ciliate. Male spikelets linear-lanceolate, solitary, up to 1 cm long. Lower glume 9-11 nerved, up to 9.5 mm long; upper

glume 7-nerved, 2-keeled, subequal; lower lemma hyaline, 3-nerved; palea hyaline, equal; upper lemma oblong-lanceolate, 1-nerved; palea equal, nerveless. Female spikelets sessile, up to 5.5 mm long. Caryopsis 4-5 mm long, enclosed by the hard lower glume.

Fl. & Fr. : Jan.-April.

Distrib. : India to East Australia.

Specimens examined : Netarhat, 141.

Notes : Common in the forest edge.

9. CHLORIS Sw.

1a. Spikes spreading, more than 10 cm long; empty lemma reduced to an awn ... 1. *C. dolichostachya*

1b. Spikes not spreading, less than 10 cm long; empty lemma oblanceolate, truncate ... 2. *C. virgata*

1. **Chloris dolichostachya** Lagasca, Gen. et Sp. Pl. 5. 1816; Bor, Grass. Bur. Ceyl. Ind. Pak. 466. 1960; Babu, Herb. Fl. Dehra Dun 593. 1977. *Chloris incompleta* Roth, Nov. Pl. Sp. 60. 1821; Hook.f. in Fl. Brit. India 7: 290. 1897; Haines, Bot. Bihar & Orissa 3: 1013. 1961 (Rep. ed.).

Perennial grass. Culms up to 100 cm tall, terete. Nodes glabrous. Leaves linear-lanceolate, up to 30 × 1 cm, glabrous, acuminate at apex; sheaths compressed; ligule a rim of long hairs. Spikes 2-5 digitate. Spikelets subsessile, 2-seriate, lanceolate, 6-7 cm long. Lower glume membranous, up to 2.5 mm long, 1-keeled, linear-lanceolate; upper glume 5.5 mm long, 1-nerved, keel strong, passing into an awn; lower lemma membranous, 3-nerved, up to 5.5 mm long, awn up to 12 mm long, bristle like; palea similar, 2-keeled; empty lemma reduced to 10 mm long bristle like awn. Caryopsis oblong-lanceolate, up to 4 mm long.

Fl. & Fr. : Oct.-Dec.

Distrib. : Pantropical.

Specimens examined : Kumendi, 715.

Notes : Not common in moist areas of the forest.

2. Chloris virgata Sw., Fl. Ind. Occ. 1: 203. 1797; Hook.f. in Fl. Brit. India 7: 291. 1897; Bor, Grass, Bur. Ceyl. Ind. Pak. 468. 1960; Haines, Bot. Bihar & Orissa 3: 1014. 1961 (Rep. ed.).

Tufted, leafy annual or perennial grass, up to 50 cm tall, decumbent or prostrate often rooting at lower nodes. Nodes glabrous. Leaves flat, linear-lanceolate, 5-30 × 0.3-0.5 cm, glabrous, margin scabrid, apex acuminate; sheaths compressed, keeled, up to 10 cm long; ligule of long hairs. Spikes 6-11, erect, digitate, crowded at end of peduncle, 3-6 cm long; rachis filiform, scaberulous. Spikelets subsessile, 2-seriate, 2.5-3 mm long, with lower solitary perfect floret and 1-imperfect floret above of it. Lower glume thinly membranous, oblong-lanceolate, 1-1.5 mm long, 1-nerved; upper glume same, 2.5-3 mm long, keel running into 0.6 mm long awn; lower lemma membranous, oblong, 2-2.5 mm long, 3-nerved, keeled, awn 5-7 mm long, bristle-like; palea hyaline, obovate, up to 2 mm long, keeled; empty lemma oblanceolate, up to 2 mm long, truncate with 5 mm long awn from back. Lodicules-2, obovate. Stamens-3. Caryopsis oblong, up to 2 mm long.

Fl. & Fr. : Aug.-Jan.

Distrib. : India, China, Algeria, Mongolia, South Africa and America.

Specimens examined : Bishrampur, 641.

Notes : Common in open forests and barren cultivated lands.

Uses : Liked by the cattle and decoction used during bath in rheumatism.

10. CHRYSOPOGON Trin. *nom. cons.*

1a. Upper glume of the sessile spikelets glabrous :

2a. Sessile spikelets up to 3.5 mm long; lower glume 2-3 nerved ... 1. *C. aciculatus*

2b. Sessile spikelets up to 7 mm long; lower glume 5-nerved ... 3. *C. serrulatus*

1b. Upper glume of the sessile spikelets pectinately ciliate on the keel ... 2. *C. fulvus*

1. **Chrysopogon aciculatus** (Retz.) Trin., Fund. Agrost. 188. 1822; Bor, Grass. Bur, Ceyl. Ind. Pak. 115. 1960; Haines, Bot. Bihar & Orissa 3: 1083. 1961 (Rep. ed.); Parham in Smith, Fl. Vitiensis Nova 1: 378. 1979. *Andropogon aciculatus* Retz., Obs. Bot. 5: 22. 1788; Hook.f. in Fl. Brit. India 7: 118. 1897.

Rhizome and culm bases creeping, erect portion of culm up to 45 cm tall. Leaf blades up to 12 × 0.5 cm, flat. Panicle up to 9 cm long, long-peduncled, erect; branches 4-5 nate, fragile, spreading, hairy, articulating obliquely, with the bisexual spikelet on only one joint, the same carries sessile, bisexual and 2 male or neuter spikelets, sessile spikelets linear, up to 3.5 × 1.5 mm; lower glume up to 3 × 1.2 mm, obscurely 2-3 nerved, 2-keeled; upper glume glabrous, keeled, lanceolate; lemma oblong-lanceolate, obtuse or acute, ciliate; palea small, glabrous; lower glume up to 5 × 1 mm, keels ciliate at the tip; upper glume up to 5 × 1.5 mm margin ciliate. Lower florets barren; lemma up to 4.5 × 0.5 mm; palea small cuspidate. Upper florets male; lemma up to 3 × 0.8 mm, margin ciliate; palea up to 1.6 × 0.6 mm.

Fl. & Fr. : Round the year, but mainly in May-Sept.

Distrib. : Tropical Asia, Australia and Polynesia.

Specimens examined : Netarhat, 787.

Notes : Common in the open lands and road sides.

Common name : Beng. : *Chor kanta.*

Uses : Culms used in brush industry and woven into cigarette cases.

2. **C. fulvus** (Spreng.) Choiv., Fl. Somalla 1: 327. 1929; Bor, Grass. Bur. Ceyl. Ind. Pak. 116. 1960. *Pollinia fulva* Spreng., Pugill. 2: 10. 1815; *Andropogon monticola* Roem. et Schultes, Mant. 2: 665. 1827; Hook.f. in Fl. Brit. Ind. 7: 192. 1897. *Chrysopogon montanus* Trin. ex Spreng., Neue Entdeck. 2: 93. 1821; Haines, Bot. Bihar & Orissa 3: 1084. 1961 (Rep. ed.). *Chrysopogon monticola* (Roem. et Schult.) Haines in Ind. For. 40: 495. 1914.

Perennial grass, 30-100 cm high. Culms terete, sparingly branched, leafy towards base. Nodes glabrous. Leaves linear, 7-30 × 0.4-1 cm rigid,

glabrous, or slightly hairy, margin scaberulous. Panicle up to 15 cm long. Sessile spikelets up to 7.5 mm long, awned. Lower glume chartaceous, up to 7 mm long, 5-7 nerved, scabrid on nerves; upper glume chartaceous, boat shaped, up to 6.8 mm long, 3-nerved, hispid with fulvous hairs, apically produced into 14 mm long arista; lower lemma empty, hyaline, linear, up to 6.5 mm long, epaleate; upper lemma reduced to a hyaline base of geniculate awn, up to 3 mm long; palea hyaline, linear, up to 3.5 mm long. Lodicules-2. Stamens-3. Caryopsis linear. Pedicelled spikelets 7-8 mm long. Lower glume elliptic-lanceolate, 6.5-7.5 mm long, 7-nerved, keels hairy, apically produced into 2-5 mm long arista or acute; upper glume similar, 3-nerved, margin ciliate; lower lemma empty, hyaline, lanceolate, 6.5-7 mm long, epaleate; upper lemma hyaline, lanceolate, 4.5-5 mm long, paleate. Lodicules-2. Stamens-3.

Fl. & Fr. : Oct.-Dec.

Distrib. : Tropical Asia and E. Africa.

Specimens examined : Muhammadganj, 975.

Notes : Common in open grass lands and forest edges.

Uses : This species is esteemed as fooder grass and can also be used for hay.

3. **Chrysopogon serrulatus** Trin. in Mem. Acad. Sci. Petersb. ser. 6, 2: 318. 1832; Bor, Grass. Bur. Ceyl. Ind. Pak. 118. 1960. *Andropogon monticola* Schult. var. *trinii* Hook.f., Fl. Brit. India 7: 193. 1897. *Chrysopogon montanus* Trin. var. *scabrida* Haines in Bot. Bihar & Orissa 3: 1085. 1961 (Rep. ed.).

Perennial grass, up to 90 cm tall, sparingly branched, ascending, leafy towards base. Nodes glabrous. Leaves flat, linear, up to 20 cm long, glabrous, margin scaberulous, apex acute; sheaths compressed. Panicle oblong-ovate to pyramidal, up to 15 cm long. Sessile spikelets 5-7 mm long, awned. Lower glume chartaceous, 5-6 mm long, 5-nerved, keeled, apex short aristulate; upper glume boat shaped, 5-5.7 mm long, 3-nerved, apically produced into 13 mm long arista; lower lemma hyaline, linear, up to 5.5 mm long; upper lemma reduced to hyaline base of a geniculate, 22 mm long awn; palea hyaline. Pedicelled spikelets 6-7 mm long. Lower glume

chartaceous; upper glume elliptic, 5.5-6.5 mm long, apex acute or aristate; upper and lower lemma similar, hyaline, lanceolate, nerveless, paleate or not. Lodicules-2, cuneate. Stamens-3. Caryopsis 1.5-2 mm long.

Fl. & Fr. : Aug.-Dec.

Distrib. : North West India.

Specimens examined : Bishrampur, 636.

Notes : Not very common. Found back side of the Bishrampur F.R.H.

Common name : Hindi : *Goria, Gurla, Dholu* or *Chickua.*

Uses : It is a good fooder before flowering and a sand binder.

11. COELACHNE R.Br.

Coelachne simpliciuscula (Wt. & Arn. ex Steud.) Munro ex Benth. in J. Linn. Soc. (Bot.) 19: 93. 1881; Bor, Grass. Burm. Ceyl. Ind. Pak. 576. 1960. *Panicum simpliciusculum* Wt. & Arn. ex Steud., Syn. Pl. Glum. 1: 96. 1854. *Coelachne pulchella* sensu Hook.f. in Fl. Brit. India 7: 270. 1897 (non R.Br. 1810); Haines, Bot. Bihar & Orissa 3: 999. 1961 (Rep. ed.).

Annual grass, 7-10 cm long, much branched, spreading from root. Leaves flat, linear-lanceolate, 2-3 cm long, with many parallel vein; ligule a rim of hair. Panicle up to 2 cm long. Spikelets up to 2 mm long. Lower & upper glume persistent, suborbicular, concave, 5-nerved, up to 2 mm long, obtuse at apex; lemma ovate, concave, up to 2 mm long, nerveless; palea membranous. Upper florets imperfect, pubescent, on elongated rachilla.

Fl. & Fr. : Nov.-March.

Distrib. : India to South East Asia, China & Madagascar.

Specimens examined : Netarhat, 198. Helophyte.

Notes : Common in exposed wet lands.

12. Coix L.

Coix gigantea Koenig ex Roxb., Fl. Ind. 3: 570. 1832; Bor, Grass. Burm. Ceyl. Ind. Pak. 264. 1960; Haines, Bot. Bihar & Orissa 3: 1112. 1961 (Rep. ed.). *Coix lacryma jobi* Linn., Sp. Pl. 972. 1753; Haines, Bot. Bihar & Orissa 3: 1111. 1961 (Rep. ed.) var. *gigantea* (Koen. ex Roxb.) Stapf ex Hook.f. in Fl. Brit. India 7: 100. 1897.

Erect, perennial grass, up to 4 m tall. Leaves linear-lanceolate, 20-90 × 0.5-2.5 cm, scabrous, acuminate at apex; sheaths smooth; ligule membranous. Racemes spiciform, drooping. Male spikelets 3-nate, up to 1 cm long, pinkish. Lower glume many nerved, up to 7.5 mm long, winged towards apex; upper glume as like as lower ones. Lower floret perfect; lemma shorter than spikelets; palea smaller than lemma. Upper floret barren. Female involucre up to 1.2 cm long, conical & gradually constricted at neck.

Fl. & Fr. : Oct.-Feb. Exotic.

Distrib. : Pantropic, but native of Old World.

Specimens examined : Bhavnathpur, 1168. Helophyte.

Notes : Common along the sides of water courses.

Common name : Beng. : *Danga Gurgar* or *Kunch*; Hindi : *Sankru;* Santal : *Jargadi.*

13. Cymbopogon Spreng.

Cymbopogon citratus (DC.) Stapf in Kew Bull. 1906: 357. 1906; Bor, Grass. Bur. Ceyl. Ind. Pak. 126. 1960. *Andropogon citratus* DC., Cat. Hort. Monsp. 78. 1813; Hook.f. in Fl. Brit. India 7: 210. 1897.

Sweet scented perennial grass. Culms terete, up to 120 cm tall, erect, branched from base. Nodes glabrous. Leaves flat, lanceolate, up to 60 × 1.5 cm, amplexicaul at base, glabrous, margin scaberulous, acuminate at apex; sheaths terete; ligule membranous. Panicle narrowly oblong, up to 25 cm long, compound. Racemes terminating culms and branches, binate, one sessile, other pedicelled. Spathe reddish brown with age. Sessile

spikelets lanceolate, 4-4.5 mm long, awned. Lower glume chartaceous, oblong-lanceolate, up to 4 mm long, keeled; upper glume boat shaped, as long as lower glume, keeled; lemma linear-lanceolate, 3.5-4 mm long, awned, awn up to 18 mm long; palea hyaline linear, up to 2 mm long. Lodicules-2. Stamens-3. Pedicelled spikelets linear-lanceolate, slightly longer than sessile one. Lower glume chartaceous, oblong-lanceolate, 4.5-4.8 mm long, obscurely keeled; upper glume similar; lemma hyaline, male or barren, up to 4 mm long; palea absent. Lodicules-2. Stamens-3.

Fl. & Fr. : Oct.-Mar.

Distrib. : India, South America, Africa, China.

Specimens examined : Kumendi, 718.

Notes : Not common, mainly cultivated, found in Beyang pahar as an escape.

Common name : Beng. : *Gandhabena*; Hindi : *Gandhatrina, Aginghas.*

Uses : Yields an essential oil, used in soaps for flavouring and also used in tea as a flavouring agent.

14. CYNODON Rich.

Cynodon dactylon (L.) Pers., Syn. Pl. 1: 85. 1805; Hook.f. in Fl. Brit. India 7: 288. 1897; Prain, Beng. Pl. 2: 1227. 1903 (Rep. ed. 2: 925. 1963); Haines, Bot. Bihar & Orissa 3: 1012. 1961 (Rep. ed.); Bor, Grass. Bur. Ceyl. Ind. Pak. 469. 1960; Babu, Herb. Fl. Dehra Dun 598. 1977. *Panicum dactylon* L., Sp. Pl. 58. 1753; *Digitaria dactylon* (L.) Scop., Fl. Carn. ed. 2. 1: 53. 1772. *Dactylon officinale* Vill., Hist. Pl. Dauph. 2: 69. 1787. *Paspalum dactylon* (L.) Lamk., Tab. Encycl. Meth. Bot. 1: 176. 1791. *Cynodon marittimus* H.B.K., Nov. Gen. et Sp. 1: 170. 1816. *C. tenuis* Trin., Gram. unifl. 229. 1824. *C. erectus* J.S. Presl. ex C.B. Presl., Rel. Haenk. 1: 290. 1830.

Perennial grass with creeping rhizomes. Culms up to 15 cm high. Leaves small, linear, acuminate; sheath small, smooth. Flowers in 3-4 spike. Spikelets 1.5-2 mm long. Lower glume persistent, uninerved, 1.5 mm long; upper glume uninerved, ovate, acute, keel scaberulous; lemma as long as

spikelets, ovate-oblong, margin scabrid; palea shorter than lemma, 2-nerved, linear-oblong, keel scabrid. Lodicules-2. Stamens-3. Caryopsis up to 1.5 mm long.

Fl. & Fr. : Round the year.

Distrib. : Pantropical.

Specimens examined : Netarhat, 102.

Notes : Very common throughout the district, in dry waste lands.

Common name : Beng. : *Durba*; Hindi : *Dubi*; Santal : *Dhobighas*.

Uses : Used as a pasture and lawn grass. It is a good soil binder. According to Indian customs it is considered as holy grass and used for blessings.

15. CYRTOCOCCUM Stapf

Cyrtococcum accrescens (Trin.) Stapf in Hook. Icon. Pl. Subtab. 3096. 1906; Bor, Grass. Burm. Ceyl. Ind. Pak. 291. 1960. *Panicum accrescens* Trin., Sp. Gram. Ic. 1. t. 88. 1828.

Culms stout, up to 1 m tall, terete, smooth. Leaves oblong-lanceolate, up to 14 × 2.5 cm, acuminate at apex, slightly amplexicaul at base, surface with tubercled based hairs; ligule ciliate. Panicle up to 30 cm long, lax. Spikelets 2-2.5 mm long, glabrous, broadly obovoid on slender, 15 mm long pedicel. Lower glume elliptic, acuminate, up to 2 mm long; upper glume up to 1.8 mm long; lemma of the lower floret up to 1.5 mm long, 5-nerved. Upper floret sessile; lemma coriaceous, suborbicular, subcompressed, up to 1 mm long, whitish; palea mucronulate.

Fl. & Fr. : Oct.-Jan.

Distrib. : India and tropics of the South East Asia.

Specimens examined : Barwadih, 361.

Notes : Occasional on the hill slopes.

16. DACTYLOCTENIUM Willd.

Dactyloctenium aegyptium (L.) Willd., Enum. Pl. Hort. Berol. 1029. 1809; P. Beauv., Ess. Agrost. Expl. Pl. 15. 1812; Bor, Grass. Burm. Ceyl. Ind. Pak. 489. 1960. *Cynosurus aegyptius* Linn., Sp. Pl. 72. 1753. *Eleusine aegyptia* (L.) Desf., Fl. Atlandt. 1: 85. 1798; Hook.f. in Fl. Brit. India 7: 295. 1897; Haines, Bot. Bihar & Orissa 3: 1016. 1961 (Rep. ed.; as *E. aegyptiaca*).

Annual grass, often stoloniferous. Culms terete to compressed, erect or ascending, often branched from swollen, glabrous nodes. Leaves linear-lanceolate, up to 25 × 1 cm, sparsely hispid; sheaths compressed. Sparsely hispid, ciliate at margin; ligule short, membranous, ciliate. Spikes 2-6, digitate, 1-4 cm long, terminal; rachis stout, bearded at base, produced at apex into a rigid, 2 mm long sharp point. Spikelets sessile, laterally compressed, 3-5 flowered. Lower glume ovate, 2-4 mm long, 1-nerved, keel narrowly winged, scaberulous; upper glume 1.5-3.5 mm long, ovate, 1-nerved, keel narrowly winged; lemma 2.5-3.5 mm long, ovate, membranous, 1-nerved; palea hyaline, ovate, 2.5-3 mm long, with 2, ciliate keels. Caryopsis globose, up to 1.2 mm long, rough.

Fl. & Fr. : June-Dec.

Distrib. : Tropical & Subtropical regions of the World.

Specimens examined : Simultarh village (Daltonganj), 245.

Notes : Very common in sandy areas and road sides.

Common name : Hindi : *Hakra.*

17. DENDROCALAMUS Nees

Dendrocalamus strictus (Roxb.) Nees in Linnaea 9: 476. 1834; Gamble, Ann. Roy. Bot. Gard. Cal. 7: 78. t. 68-69. 1896 et in Hook.f., Fl. Brit. India 7: 404. 1897; Haines, Bot. Bihar & Orissa 3: 992. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 600. 1977. *Bambos stricta* Roxb., Pl. Corom. 1: 58. t. 80. 1798.

Arborescent, unarmed bamboos. Culms tufted, 6-15 m tall, 2.5-7 cm across, branched; culm sheaths variable, 7-25 cm long, covered on the

back with golden-brown stiff hairs, margin ciliate, deciduous. Leaves lanceolate, 3-20 × 1-3 cm, glabrous, margin scabrid; sheath striate, hairy, ending in a short callus and short auricle; ligule membranous. Panicle branched. Spikelets in dense globose, 1.5-3.5 cm diameter head, spinescent, fertile intermixed with small barren ones. Fertile spikelets up to 13 mm long, with 2-3 fertile florets. Glumes ovate, many nerved, apex spinescent. Lemmas ovate, ending in a sharp spine, surrounded by ciliate tufts of hairs. Palea ovate, 6-8 nerved, 2-keeled, keels ciliate, apex emarginate. Lodicules absent. Stamens-6, exserted. Caryopsis brown, up to 7 mm long, beaked.

Fl. & Fr. : Dec.-Mar.

Distrib. : India, Myanmar, Java, China and Africa.

Specimens examined : Netarhat, 234.

Notes : Very common along the sides of bus routes of Netarhat, also on the hill slopes.

Common name : Beng. : *Karail*; Hindi : *Bans, Kaban.*

Uses : Culms used in making baskets, sticks, village huts etc. and also used to make paper pulp.

18. DICHANTHIUM Willem.

Dichanthium annulatum (Forssk.) Stapf. in Prain, Fl. Trop. Africa 9: 178. 1917; Bor, Grass. Bur. Ceyl. Ind. Pak. 133. 1960; Haines, Bot. Bihar & Orissa 3: 1087. 1961 (Rep. ed.). *Andropogon annulatus* Forssk., Fl. Aegypt. Arab. 173. 1776; Hook.f. in Fl. Brit. India 7: 196. 1897; Prain, Beng. Pl. 2: 1205. 1903 (Rep. ed. 2: 908. 1963).

Perennial grass. Culms 0.3-1 mm across, erect or ascending, branched. Nodes villous. Leaves 3-25 × 0.3-0.5 cm, linear, acuminate, glabrous or sparsely hairy above; sheath terete, subcarinate at top; ligule membranous, up to 2 mm long. Racemes 2-9, 2-5 cm long, pinkish; rachis long hairy, articulation oblique without appendages. Sessile spikelet up to 3 mm long, with 15 mm long awn. Lower glume 3 × 1.5 mm, 5-9 nerved, keels spinously ciliate; upper glume 3 × 1.1 mm, lanceolate, muticous; lemma of lower floret 1.5-2 mm long, with 15 mm long awn. Pedicelled spikelets

flattened, up to 2.8 mm long (excluding pedicel); lower glume 2-2.6 mm long, ciliate; glume 3-nerved, up to 2.8 mm long. Lemma of lower floret obtuse, ciliate and lemma of upper floret muticous.

Fl. & Fr. : Nov.-June.

Distrib. : India, in waste places and on open fields.

Specimens examined : Simultarh (Daltonganj), 286.

Common name : Beng. : *Lorai,* Hindi : *Jaunera, Palmara.*

Uses : It is a very good fodder.

19. DIGITARIA Heist. ex Fabric.

1a. Lower glume absent or very mintue :

2a. Lower lemma finely hairy in between marginal nerves; caryopsis more than 2 mm long .. 3. *D. ciliaris*

2b. Lower lemma covered all over with hairs; caryopsis less than 2 mm long ... 2. *D. biformis*

1b. Lower glume prominently present ... 1. *D. bicornis*

1. **Digitaria bicornis** (Lamk.) Roem. ex Schult, Syst. Veg. 2: 470. 1817; Bor, Grass. Bur. Ceyl. Ind. Pak. 299. 1960. *Paspalum bicorne* Lamk., Tab. Encycl. Meth. Bot. 1: 176. 1791. *Digitaria barbata* Willd., Enum. Pl. Berol. 91. 1809. *D. rottleri* Roem. et Schult., Syst. Veg. 2: 471. 1817. *Panicum bicorne* (Lamk.) Kunth, Enum. Pl. 1: 83. 1833. *P. heteranthum* Hook.f. Fl. Brit. India 7: 16. 1897 (non Nees et Meyon 1843, non Link. 1820).

Annual, up to 20 cm high. Leaves linear, up to 5 cm long, acuminate at apex, base sparsely hairy; ligule hairy. Spikelets heteromorphous, in elongated, up to 6 cm long raceme. Spikelets hairy, up to 3 mm long, oblong-lanceolate. Lower glume hairy, 2.5 mm long, 3-nerved, narrowly lanceolate; upper glume 3 mm long, 7-nerved, ovate-lanceolate, acuminate at apex; lemma and palea hyaline, 2 mm long, oblong-lanceolate. Caryopsis oblong, 1.5 mm long.

Fl. & Fr. : Throughout the year, especially in rainy season.

Distrib. : India & Tropical Asia.

Specimens examined : Simultarh (Daltonganj), 285.

Notes : Common along the river bank.

Uses : It is eaten by the cattle when young, at maturity the stiff racemes become unpleasant for grazing animals.

2. **Digitaria biformis** Willd., Enum. Pl. Hort. Berol. 92. 1809; Bor, Grass. Bur. Ceyl. Ind. Pak. 299. 1960. *Panicum biforme* (Willd.) Kunth., Rev. Gram. 1: 33. 1829. *P. sanguinale* L. var. *biforme* (Willd.) Hack. ex Dur. et Schinz., Consp. Fl. Afr. 5: 762. 1894. *P. sanguinale* sensu Hook.f., Fl. Brit. India 7: 13. 1897.

Annual grass. Culms terete, 30-90 cm long, erect or ascending, slender, glabrous. Leaves linear-lanceolate, 3-7 cm long, glabrous, margin glabrous or hairy; sheath compressed, mouth beared. Racemes subsessile, digitate, 2-3, up to 10 cm long; rachis narrow, trigonous, narrowly winged and scabrid at margin. Spikelets oblong, up to 3 mm long, hairy. Lower glume absent; upper glume 3-nerved, up to 2.5 mm, covered all over with hairs; lower lemma empty, elliptic-oblong, up to 3 mm long, covered all over with hairs; upper lemma thinly cartilaginous, elliptic-oblong, up to 2.8 mm long; palea similar to upper lemma, up to 2.3 mm long. Lodicles-2, stamens-3. Caryopsis oblong, up to 1.5 mm long.

Fl. & Fr. : Aug.-Dec.

Distrib. : India and all warmer countries.

Specimens examined : Panki, 950.

Notes : Common in the grass lands and near cultivated fields.

3. **D. ciliaris** (Retz.) Koel., Descr. Gram. Gallia et Germania 27. 1802; Henr., Monogr. Digitaria 129. 1950; Parham in Smith, Fl. Vitiensis Nova 1: 326. 1979; Cope in Nasir & Ali, Fl. W. Pak. 143. 228. 1982. *Panicum ciliare* Retz., Obs. Bot. 4: 16. 1786. *Paspalum sanguinale* Lamk. var. *ciliare* Hook.f., Fl. Brit. India 7: 15. 1897. *Panicum adscendens* H.B.K., Nov. Gen. 1: 80. 1816. *Digitaria adscendens*

(H.B.K.) Henr. subsp. *adscendens* var. *criniformis* Henr., Monogr. Digitaria 285. 1950; Bor, Grass. Bur. Ceyl. Ind. Pak. 239. 1960.

Perennial grass. Culms terete, 30-100 cm long, decumbent or creeping, rooting at lower nodes, branched; nodes glabrous. Leaves flat, linear-lanceolate, 8-20 cm long, glabrous or pilose, scabrid along margin and on upper surface; sheath, compressed up to 10 cm long, densley hairy; ligule membranous, 3-4 mm long. Racemes 2-9, subsessile, digitate or alternate up to 15 cm long, glabrous; rachis winged, trigonous, wing scabrid. Spikelets paired, one sessile and other pedicelled, lanceolate, 2.5-3.5 mm long. Lower glume absent; upper glume membranous, ovate, up to 2.5 mm long, 3-nerved, finely hairy along margin; lower lemma empty, membranous, ovate to elliptic, up to 3 mm long, 5-7 nerved, finely hairy in between marginal nerves, acute and epaleate; upper lemma thinly cartilaginous, elliptic-lanceolate, up to 2.8 mm long, apiculate; palea similar. Lodicules-2. Stamens-3. Caryopsis elliptic, obtuse, up to 2.8 mm long.

Fl. & Fr. : July-Dec.

Distrib. : All warmer countries.

Specimens examined : Panki, 948.

Notes : Common near bushes and hedges, also near cultivated lands.

20. ECHINOCHLOA P. Beauv.

1a. Upper glume and lower lemma acute, mid vein not prominent; spikelets cuspidate ... 1. *E. colona*

1b. Upper glume and lower lemma acuminate, mid vein prominent; spikelets awned ... 2. *E. crusgalli*

1. Echinochloa colona (L.) Link. Hort. Berol. 2: 209. 1833; Bor, Grass. Bur. Ceyl. Ind. Pak., 308. 1960; Haines, Bot. Bihar & Orissa 3. 1043. 1961 (Rep. ed.). *Panicum colonum* L., Syst. Nat. ed. 10. 2: 870. 1759; Hook.f. in Fl. Brit. Ind. 7: 32. 1897; Prain, Beng. Pl. 2: 1117. 1903 (Rep. ed. 2: 886. 1963).

Tufted annual grass. Culms 12-80 cm high, prostrate to erect and rooting at base. Leaves 3-20 × 0.5-1 cm, narrowly lanceolate or linear, glabrous, acuminate at apex; sheaths some what loose, smooth; ligule

absent. Panicle 3-10 cm long, erect, pedunculate. Spikelets crowded, 3 × 1.5 mm, sessile or subsessile. Lower glume 1.5 mm long, 3-nerved, broadly ovate, acute at apex; upper glume elliptic-ovate, concave puberulous, up to 2.2 mm, many nerved. Lower floret male; lower lemma 2-2.5 mm long and palea 1.7-2.2 mm long, hyaline, oblong. Upper floret bisexual, elliptic ovate; cuspidate; upper lemma 2.2 mm long, whitish, ovate, chartaceous, ovate to elliptic, 2.5-2.7 mm long, acuminate at apex; palea similar, slightly shorter, subcoriaceous. Caryopsis 1.5-2 mm long.

Fl. & Fr. : Throughout the year, specially in Aug.-Dec.

Distrib. : Widespread in the tropics of Asia and Africa.

Specimens examined : Daltonganj, 307.

Notes : Very common everywhere, in waste lands.

Common name : Beng. : *Shama*; Hindi : *Sawank.*

Uses : Used as cattle fodder.

2. Echinochloa crusgalli (L.) P. Beauv., Ess. Agrost. 53: 161. 1812; Bor, Grass. Bur. Ceyl. Ind. Pak. 310. 1960; Haines, Bot. Bihar & Orissa 3: 1044. 1961 (Rep. ed.); Cope in Nasir & Ali, Fl. W. Pak. 143: 193. 1982. *Panicum crusgalli* L., Sp. Pl. 56. 1753; Hook.f. in Fl. Brit. India 7: 30. 1897. *Echinochloa crusgalli* var. *breviseta* (Doell.) Neilr., Fl. Nied. Ost. 31. 1859; Bor, Grass. Bur. Ceyl. Ind. Pak. 310. 1960. *Echinochloa glabrescens* Munro ex Eggel., Ann. List grass. Uganda 16. 1847; Hook.f. in Fl. Brit. India 7: 31. 1897 (*nom. prov.*); Bor, Grass. Bur. Ceyl. Ind. Pak. 311. 1960.

Annual grass. Culms up to 90 cm high, glabrous, erect. Leaves linear, tapering at apex; sheaths loose; ligule absent. Raceme pyramidal or oblong, spikes solitary or 2-nate, 1-4 cm long; rachis stout, triquetrous, glabrous, margin scabrid. Spikelets paired, ovate to elliptic, 3-4 mm long, hispidulous, acute, cuspidate or awned. Lower glume ovate-orbicular, 1-1.5 mm long, 5-nerved; upper glume ovate, 5-nerved, 3 mm long, hispid; lower lemma barren, membranous, similar to upper glume, apex awned; palea hyaline, broadly elliptic, 2-2.5 mm long, apex obtuse; upper lemma coriaceous, ovate to elliptic, 3-3.5 mm long, obscurely nerved, acute to acuminate at

apex; palea subequal, apex acute or cuspidate. Caryopsis broadly-elliptic, 2-2.5 mm long.

Fl. & Fr. : Aug.-Jan.

Distrib. : India, Myanmar, Malaya, Sri Lanka and South East Asia extending to the subtropics of Africa.

Specimens examined : Barwadih, 446. Helophyte.

Notes : Common in waste lands.

Common name : Beng. : *Burashama*; Hindi : *Samak.*

Uses : Used as cattle fodder.

21. ELEUSINE Gaertn.

Eleusine indica (L.) Gaertn., Fruct. 1: 8. 1789; Hook.f. in Fl. Brit. India 7: 293. 1897; Prain, Beng. Pl. 2: 927. 1963 (Rep. ed.); Haines, Bot. Bihar & Orissa 3: 1015. 1961 (Rep. ed.); Bor, Grass. Bur. Ceyl. India Pak. 493. 1960. *Cynosurus indicus* L., Sp. Pl. 72. 1753.

Robust tufted annual grass, up to 75 cm high, with loose sheaths and flat leaf blades. Leaves linear, as long as culm, margin smooth; ligule membranous, slightly hairy. Spikes usually 2-7, digitate, up to 7 cm long. Spikelets 2-8 flowered, 3 mm long. Lower glume 3 mm long, acute; upper glume 2.5 mm long, uninerved; lemma 3 mm long, 7-nerved; palea 2.5 mm long, 2-nerved. Caryopsis 1 mm long, oblong, obtusely 3-gonus with oblique base, transversely rugose.

Fl. & Fr. : Sept.-Dec.

Distrib. : Tropical & Subtropical region of the World.

Specimens examined : Daltonganj, 325.

Notes : Common throughout the district.

Common name : Hindi : *Mondla.*

22. ELYTROPHORUS P. Beauv.

Elytrophorus spicatus (Willd.) A. Camus in Lecomte, Fl. Gen. de l' Indo-China 7: 547. 1923; Bor, Grass. Bur. Ceyl. India Pak. 493. 1960. *Dactylis spicata* Willd., Ges. Naturf. Freunde Berlin, Neue schrift 3: 416. 1801. *Elytrophorus articulatus* P. Beauv., Ess. Agrost. 67. t. 14. f. 2. 1812; Hook.f. in Fl. Brit. India 7: 306. 1897; Prain, Beng. Pl. 2: 918. 1963 (Rep. ed.); Haines, Bot. Bihar & Orissa 3: 1008. 1961 (Rep. ed.).

Annual erect grass. Culms 10-25 cm high, much branched from base. Nodes glabrous. Leaves up to 7 cm long, linear, glabrous; ligule membranous, very small, truncate. Spike false, narrow, cylindric, up to 6 cm long and 0.7 cm wide, continuous or ofsten interrupted towards the base, bright green; rachis scaberulous; branches erect, densely spiculate to base, forming dense globular, ovoid or oblong cluster of spikelets. Spikelets sessile, 2-4 mm long, awned. Lower glume membranous, lanceolate, 2-3 mm long; appressed hairy; upper glume slightly longer, 1-nerved, awn scaberulous; lemma lanceolate, 2-3 mm long, 3-keeled, margin ciliolate, ending into small, 1-1.5 mm long ciliolate bristle; palea oblong, 1-1.5 mm long; 2-keeled, apex lacerate. Caryopsis ellipsoid, small.

Fl. & Fr. : Nov.-Jan.

Distrib. : Tropical region of the Old World.

Specimens examined : Barwadih, 433. Helophyte.

Notes : Common in cultivated fields, on wet hill slopes and in dry ditches.

23. ERAGROSTIELLA Bor

Eragrostiella bifaria (Vahl) Bor in Indian For. 66: 270. 1940 et Grass. Bur. Ceyl. Ind. Pak. 494. 1960; Ramam. in Sald. & Nicol., Fl. Hassan 728. 1976. *Poa bifaria* Vahl, Symb. Bot. 2: 19. 1791. *Eragrostis bifaria* (Vahl.) Wight et Steud., Nom. Bot. ed. 2. 1: 562. 1840; Hook.f. in Fl. Brit. India 7: 325. 1897. *Eragrostis coromandeliana* (Koen. ex Rottl.) Trin. in Mem. Acad. Sci. Petersb. ser. 6, 1: 415. 1830; Haines, Bot. Bihar & Orissa 3: 1006. 1961 (Rep. ed.).

Tufted perennial grass, up to 80 cm tall. Nodes glabrous. Leaves mostly basal, short, narrow, rolled inwards, sparsely hairy; sheaths compressed; ligule a ciliate rim. Spike 10-30 cm long, slender. Spikelets secund, 6-9 mm long, distichously spreading, 10-30 flowered. Lower glume membranous, oblong-lanceolate, 2.5-3.5 mm long, straw coloured at maturity, 1-nerved, keel scaberulous, apex acute; upper glume similar, keel smooth; lemma firmly membranous, ovate. 2-2.5 mm long, 3-nerved, acute at apex; palea subequal, oblong, 2-keeled, keels narrowly winged, scabrid or ciliate. Lodicules-2, very small. Stamens-3. Caryopsis ellipsoid, 0.5-0.9 mm long.

Fl. & Fr. : Aug.-Jan.

Distrib. : India, Myanmar and Sri Lanka.

Specimens examined : Muhuamilan, 687.

Notes : Common in open grass lands.

Uses : A good fodder grass but the yield is poor. Roots used for flavouring Burmese cheroots.

24. ERAGROSTIS Wolf

1a. Spikelets more than 2 mm wide :

2a. Spikelets ovate to ovate-lanceolate, reddish purple; palea caducous ... 7. *E. unioloides*

2b. Spikelets oblong of ovoid-oblong, grey; palea persistent ... 1. *E. cilianensis*

1b. Spikelets less than 2 mm wide :

3a. Annual herbs :

4a. Spikelets more than 10-flowered, breaking up from base to upwards :

5a. Lemma 2-nerved, acute; caryopsis elliptic-oblong ... 2. *E. gangetica*

5b. Lemma 3-nerved, obtuse; caryopsis globose ... 6. *E. tremula*

4b. Spikelets less than 10-flowered (3-9), breaking up from above downwards ... 5. *E. tenella*

3b. Perennial herbs :

6a. Leaf sheaths mouth bearded; spikelets olive-green; lemma persistent ... 3. *E. nigra*

6b. Leaf sheaths mouth not bearded; spikelets slaty-grey; lemma caducous ... 4. *E. nutans*

1. Eragrostis cilianensis (All.) Vignolo - lutati in Malpighia 18: 386. 1904; Bor, Grass. Bur. Ceyl. Ind. Pak. 503. 1960. *Briza eragrostis* Linn., Sp. Pl. 70. 1753. *Poa cilianensis* All., Fl. Pedem. 2: 246. t. 91. f. 2. 1785. *Eragrostis major* Host., Gram. Austr. 4: 14. t. 24. 1809; Haines, Bot. Bihar & Orissa 3: 1005. 1961 (Rep. ed.).

Erect or ascending annual grass, up to 30 cm long, much branched from base. Leaves flat, acuminate at apex; ligule hairy. Panicle oblong, stiff, up to 5 cm long, greenish to purplish in colour. Spikelets suberect alternating on branches, 2 mm long, oblong or ovoid-oblong. Lower glume 3-nerved, 1.5 mm long, ovate; upper glume 3-nerved similar; lemma and palea shorter than glumes, broadly obovate, much curved. Caryopsis brown, globose.

Fl. & Fr. : May-Dec.

Distrib. : Widely distributed in the warmer region of the World.

Specimens examined : Daltonganj, 247.

Notes : Common in wet lands and on the hill slopes.

2. E. gangetica (Roxb.) Steud., Syn. Pl. Glum. 1: 266. 1854; Bor, Grass. Bur. Ceyl. Ind. Pak. 508. 1960; Haines, Bot. Bihar & Orissa 3: 1004. 1961 (Rep. ed.); Lazarides, Trop. Grasses S.E. Asia 174. 1980; Guha Bakshi, Fl. Murshid. Dist. 389. 1984. *Poa gangetica* Roxb., Fl. Ind. 1: 340. 1820; *Eragrostis stenophylla* Hochst. ex Miq. in Verh. Konink. Nederl. Inst. 3: 4, 39. 1851 *pro parte*; Stapf. in Hook.f., Fl. Brit. India 7: 318. 1897 (excl. syn. *Poa nutans* Retz.).

Erect, annual grass up to 60 cm high. Culms tufted, branched from the base. Nodes glabrous. Leaves convolute, tapering to a pointed apex,

4-10 cm long; sheaths glabrous; ligule minutely ciliolate. Panicles pyramidal, 4-10 cm long; branches alternate; rachis glabrous; pedicels short, filiform. Spikelets linear, 3-7 × 1-1.8 mm, breaking up from base upwards. Lower glume linear, 1-nerved, acuste, up to 1.5 mm long; upper glume ovate-oblong, 1-nerved, acute, up to 1.7 mm long; lemma ovate, 2-nerved, acute, 1.8-2 mm long; palea subequal to its lemma, keeled. Stamens-3. Caryopsis elliptic oblong, up to 0.7 mm long, brown.

Fl. & Fr. : Oct.-Dec.

Distrib. : India, Myanmar, Sri Lanka, Tropical Asia and Africa.

Specimens examined : Paton, 1049. Helophyte.

Notes : Rare along the margin of ponds and canals.

Remarks : In the Flora of British India (7: 318. 1897) this grass appears under the name *E. stenophylla* Hochst. Actually, the species *E. stenophylla* of F.B.I. covers two very similar species. They are *E. gangetica* (Roxb.) Steud. and *E. nutans* (Retz.) Wees ex Steud.

3. **Eragrostis nigra** Nees ex Steud., Syn. Pl. Glum. 1: 267. 1854; Stapf in Hook.f., Fl. Brit. India 7: 324. 1897; Bor, Grass. Bur. Ceyl. Ind. Pak. 511. 1960; Haines, Bot. Bihar & Orissa 3: 1312. 1961 (Rep. ed.). *E. autropurpurea* Hochst ex Steud., Syn. Pl. Glum. 1: 267. 1854. *E. paniculata* Thw., Enum. Pl. Zeyl. 373. 1964 (non Steud. 1854).

Erect, slender, perennial grass. Culms up to 45 cm tall, terete. Leaf-sheath mouth bearded. Panicle lax-flowered, up to 8 cm long, oblong to ovate; rachis 4-angled, glabrous at nodes. Spikelets olive-grey, 1.5-2 mm long, 3-9 flowered, linear to oblong. Lower and upper glumes subequal, membranous, 1-nerved, keeled, acuminate; keel scabrid; lemma ovate, acute, 3-nerved, up to 1.8 mm long; palea obtuse, denticulate, equal to lemma, persistent. Caryopsis very small, truncate at both ends.

Fl. & Fr. : Dec.-Mar.

Distrib. : India, Sri Lanka and extending to China.

Specimens examined : Netarhat, 143.

Notes : Common in waste lands and in the hilly areas.

4. Eragrostis nutans (Retz.) Nees ex Steud., Nom. Bot. ed. 2. 563. 1840; Bor, Grass. Bur. Ceyl. Ind. & Pak. 511. 1960; Cope in Nasir & Ali, Fl. W. Pakistan 143: 91. 1982. *Poa nutans* Retz., Obs. Bot. 4: 19. 1786. *Eragrostis stenophylla* sensu Stapf in Hook.f., Fl. Brit. India 7: 318. 1897. *pro parte* (non Hochst. 1851); Haines, Bot. Bihar & Orissa 3: 1004. 1961 (Rep. ed.).

Perennial, tufted, erect grass up to 60 cm tall. Nodes glabrous. Leaf-blades up to 15 × 0.3 cm, glabrous, convolute, tapering at apex; sheaths glabrous, faintly striate up to 5 cm long; ligule a narrow membranous ring. Panicle 7-12 cm long; branches distant, alternate, much divided upwards,. spreading at maturity; rachis slender. Spikelets 2-4 mm long, on slender pedicel, ovate or ovate-oblong. Lower glume ovate-oblong, up to 0.8 mm long; upper glume same, up to 1 mm long; lemma up to 1.6 mm long, overlapping, caducous, ovate-oblong, with smooth keel, subacute; palea shorter than lemma, with scabrid keel. Stamens-3. Caryopsis up to 0.6 mm long, brownish red, broadly oblong.

Fl. & Fr. : Oct.-Mar.

Distrib. : India, Myanmar, Sri Lanka, Tropical Asia & Africa.

Specimens examined : Kumendih, 722.

Notes : Common along the Garanga river banks and also in the open field.

5. E. unioloides (Retz.) Nees ex Steud., Syn. Pl. Glum. 1: 264. 1854; Bor, Grass. Bur. Ceyl. Ind. Pak. 515. 1960; Babu, Herb. Fl. Dehra Dun 614. 1977. *Poa unioloides* Retz., Obs. Bot. 5: 19. 1789. *Eragrostis amabilis* auct. non L., 1753; Stapf. in Hook.f. in Fl. Brit. India 7: 317. 1897; Prain, Beng. Pl. 2. 1222. 1903 (Rep. ed. 2: 921. 1963); Haines, Bot. Bihar & Orissa 3: 1003. 1961 (Rep. ed.).

Annual grass. Culms up to 30 cm long, erect to suberect, branched from base. Nodes glabrous. Leaves 3-15 × 0.3-0.5 cm, flat, glabrous, margin rough; sheaths glabrous; ligule a narrow rim. Panicle effuse, 5-15 cm long, spreading; rachis glabrous. Spikelets ovate to ovate-lanceolate, 4-6 × 2-3

mm, 10-30 flowered, pale-purple, breaking up from below to upwards. Glumes ovate-lanceolate 1.5-1.8 mm long, 1-nerved, pale-purple, apex acute; lemma membranous, ovate to ovate elliptic, 2 mm long, pale or reddish-purplish, 2-nerved; palea 1.8-2 mm long, hyaline, deciduous. Caryopsis ellipsoid, 0.5-0.8 mm long, somewhat laterally compressed, brown.

Fl. & Fr. : Oct.-Jan.

Distrib. : Throughout India, Myanmar, Sri Lanka.

Specimens examined : Daltonganj, 251. Helophyte.

Notes : Common in waste lands.

Common name : Beng. : *Kani.*

6. **Eragrostis tenella** (L.) P. Beauv. ex Roem. & Schult., Syst. Veg. 2: 576. 1817; Stapf in Hook.f. in Fl. Brit. India 7: 315. 1897; Bor, Grass. Bur. Ceyl. Ind. Pak. 513. 1960; Haines, Bot. Bihar & Orissa 3: 1001. 1961 (Rep. ed.). *Poa tenella* L., Sp. Pl. 69. 1753. *Eragrostis tenella* var. *plumosa* (Retz.) Stapf in Hook.f., Fl. Brit. India 7: 315. 1897; Prain, Beng. Pl. 2: 1221. 1903 (Rep. ed. 2: 921. 1963); Haines Bot. Bihar & Orissa 3: 1002. 1961 (Rep. ed.).

Erect to suberect, tufted, leafy annual grass. Culm 10-42 cm long, much branched from base. Leaves 5-10 × 0.2-0.4 cm, glabrous, flat, tapering towards apex; sheaths shorter than internodes; ligule a ciliolate rim. Panicle pyramidal, 4-12 cm long; rachis with few spreading silky-white hairs at nodes. Spikelets 1.5-4 mm long, oblong or broadly oblong, straw coloured or slightly purplish, compressed, 3-9 flowered. Lower and upper glumes subequal, 1-nerved, 0.8 × 0.4 mm, oblong; lemma 0.5-0.7 × 0.2-0.4 mm; palea as long as lemma. Caryopsis up to 0.5 mm long, oblong, dark-brown.

Fl. & Fr. : Oct.-Jan.

Distrib. : Throughout India, Myanmar and Sri Lanka, introduced into America.

Specimens examined : Daltonganj, 309.

Notes : Common everywhere, often gregarious.

Common name : Beng. : *Bharbhusi.*

7. **Eragrostis tremula** (Lamk.) Hochst. ex Steud., Syn. Pl. Glum. 269. 1854; Stapf. in Hook.f., Fl. Brit. India 7: 320. 1897; Bor, Grass. Bur. Ceyl. Ind. Pak. 514. 1960; Haines, Bot. Bihar & Orissa 3: 1005. 1961 (Rep. ed.); Prain, Beng. Pl. 2: 922. 1963 (Rep. ed.). *Poa tremula* Lamk., Tab. Encycl. Meth. Bot. 1: 185. 1791.

Annual grass. Culms densely tufted, terete, 30-90 cm high, branched from base; branches shining. Leaves narrowly linear, margin convolute, 3-10 x 0.3-0.5 cm, acuminate at apex, glabrous; sheaths compressed, mouth sparsely hairy; ligule a rim of very short hairs. Panicle very large and effuse, 10-15 × 8-10 cm; rachis glabrous, axil of rachis hairy; pedicel filiform, up to 2.5 cm long. Spikelets linear-oblong, 10-20 × 1.5-2.5 mm, 10-70 flowered, greenish-purple, breaking up from base to upwards. Glumes oblong, membranous, 1-nerved, acute at apex, up to 1.8 mm long; upper one slightly broader; lemma ovate, membranous, 3-nerved, obtuse at apex, 1.6-2 mm long; palea hyaline, oblong 1.5-1.8 mm long, obtuse at apex, persistent. Caryopsis globose to ovoid, 0.5 mm long.

Fl. & Fr. : Aug.-Dec.

Distrib. : India, Myanmar, Afghanistan to tropical Africa.

Specimens examined : Simultarh (Dalgonganj), 284.

Notes : In sandy soil and on the Koel river banks.

25. HACKELOCHLOA O. Ktze.

Hackelochloa granularis (L.) O.Ktze., Rev. Gen. Pl. 776. 1891; Bor, Grass. Bur. Ceyl. Ind. Pak. 159. 1960. *Cenchrus granularis* L., Mant. 2. App. 575. 1771. *Manisuris granularis* L.f., Nov. Gram. Gen. 40. 1779; Hook.f. in Fl. Brit. India 7: 159. 1897; Haines, Bot. Bihar & Orissa 3: 1105. 1961 (Rep. ed.).

Annual, erect, much branched grass, 15-50 cm tall. Nodes glabrous. Leaves linear-lanceolate, 6-12 × 0.3-0.8 cm, subcordate at base, hispid,

margin ciliate, acute at apex; sheaths compressed, loose, hispid; ligule membranous, short ciliate. Raceme solitary, 0.7-1.3 cm long, partly or wholly exposed from supporting spathe like sheath. Sessile spikelets globose, up to 1.5 mm long, deeply pitted, awnless. Lower glume chartaceous, ovate-oblong, 3-nerved, obtuse; lower lemma barren, ovate, epaleate; upper lemma hyaline, ovate, up to 1 mm long, obtuse; palea similar to its lemma. Lodicules-2; stamens-3. Pedicelled spikelets oblong-lanceolate, up to 2 mm long. Lower glume chartaceous, oblong-lanceolate, up to 1.8 mm long, 5-7 nerved; upper glume similar, boat-shaped; lower lemma barren, hyaline, ovate-lanceolate, 2-nerved, epaleate; upper lemma shorter, male or barren; palea hyaline.

Fl. & Fr. : Aug.-Dec.

Distrib. : Pantropical.

Specimens examined : Bishrampur, 651.

Notes : Common in wet lands.

Common name : Hindi : *Trinpali, Kangni.*

Uses : Used as a good fodder and in spleen and liver troubles.

26. HETEROPOGON Pers.

Heteropogon contortus (L.) P. Beauv. ex Roem. & Schult., Syst. Veg. 836. 1817; Bor, Grass. Burm. Ceyl. Ind. Pak. 163. 1960; Haines, Bot. Bihar & Orissa 3: 1088. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 618. 1977. *Andropogon contortus* L., Sp. Pl. 1045. 1753; Hook.f. in Fl. Brit. India 7: 199. 1897.

Annual grass. Culms tufted, terete, up to 70 cm high. Leaves mostly at base of culms, linear-lanceolate, obtuse or abruptly short acuminate, scabrid above and midrib below, 3-18 × 0.2-0.6 cm; ligule membranous, very short, ciliate. Raceme solitary, up to 4 cm long. Lower 2-6 pairs of spikelets, homogamous, awnless, male or neuter; upper one awned, heterogamous. Hermaphrodite spikelets 6-7 mm long, awned. Lower glume chartaceous, up to 6 mm long, 7-9 nerved; upper glume similar, 3-nerved; lower lemma empty, hyaline, epaleate; upper lemma passing into a geniculate awn, 7-8 mm long, epaleate. Caryopsis cylindric. Pedicelled

spikelets 8-9 mm long. Sessile spikelets of homogamous pairs like pedicelled one, more or less covered with tubercle-based hairs.

Fl. & Fr. : July-Jan.

Distrib. : Warmer parts of the World.

Specimens examined : Barwadhi, 427.

Notes : Common in the forest undergrowth.

Common name : Hindi : *Kher, Kumeria*; Santal : *Souri ghas.*

27. IMPERATA Cyr.

Imperata cylindrica (L.) P. Beauv., Ess. Agrost. 165. 1812; Bor, Grass. Burm. Ceyl. Ind. Pak. 169. 1960. *Lagarus cylindricus* L., Syst. Nat. ed. 10: 878. 1759. *Imperata arundinacea* Cyr., Pl. Rar. Neep. 2: 26. 1792; Hook.f. in Fl. Brit. India 7: 106. 1897 (*pro parte*); Haines, Bot. Bihar & Orissa 3: 1061. 1961 (Rep. ed.) var. *cylindrica* Bor, Grass. Burm. Ceyl. Ind. Pak. 170. 1960. *Imperata arundinacea* var. *europaea* (Anders.) Aschers. et Graebn., Syn. Mitteleurop. Fl. 2: 37. 1898.

Perennial grass. Culms 10-50 cm tall, erect, leafy at base. Nodes bearded. Leaves linear-lanceolate, 5-12 × 0.2-0.3 cm, margin rolled, acuminate at apex; ligule hairy. Panicle oblong, elongated, up to 8 cm long, silky. Spikelets 1-flowered, up to 4.5 mm long, covered by silvery silky hairs. Lower glume elliptic-lanceolate, dorsally hairy, 3-7 nerved, 3.5-4 mm long; upper glume similar; lower lemma empty, hyaline, oblong, 0.5-1 mm long; palea hyaline, 0.5 mm long, nerveless; upper lemma hyaline, oblong, up to 1.3 mm long, nerveless; palea hyaline, oblong, up to 1 mm long, nerveless. Lodicules absent. Stamens-2. Caryopsis up to 1.3 mm long.

Fl. & Fr. : Apr.-Aug.

Distrib. : India, extending to Iraq, Iran, Afghanistan and arid zone of U.S.S.R.

Specimens examined : Netarhat, 783.

Notes : Very common in open lands and along the river banks.

Common name : Beng. : *Oolu*; Hindi : *Dabh, Siru*; Santal : *Chero.*

Uses : Used in making ropes, brushes, mats, cowry bags and baskets. Plants also used as packing materials.

28. ISCHAEMUM L.

1a. Lower glume of sessile spikelet crustaceous with side nodules, jointed by deep or obscure ridges; racemes-2, strongly appressed, apparently solitary ... 2. *I. rugosum*

1b. Lower glume of sessile spikelet chartaceous without distinct side nodules, not jointed by ridges; racemes distinctly 2-3 ... 1. *I. indicum*

1. Ischaemum indicum (Houtt.) Merrill in Journ. Arn. Arb. 19: 320. 1938; Bor, Grass. Bur. Ceyl. Ind. Pak. 180. 1960; Ramam. in Sald. & Nicol., Fl. Hasan 737. 1976. *Phleum indicum* Houtt. Nat. Hist. 2, 13: 198. t. 90. f. 2. 1782. *Ischaemum ciliare* Retz. Obs. Bot. 6: 36. 1791; Hook.f. in Fl. Brit. India 7: 133. 1897; Haines, Bot. Bihar & Orissa 3: 1068. 1961 (Rep. ed.).

Annual grass, 20-40 cm long, prostrate or decumbent, rooting at nodes, sparingly branched. Nodes pilose. Leaves flat, linear-lanceolate, hirsute on both surfaces, acute at apex; ligule membranous. Racemes 2-3, appressed to one another, 1.5-5 cm long. Sessile spikelets oblong-lanceolate, 5.5-6 mm long, greenish or reddish, awned. Lower glume chartaceous, obovate-lanceolate, 4-4.5 mm long, involute at base, broadly winged on either side above; upper glume papyraceous, boat-shaped, 5.5-6 mm long, 5-nerved, winged towards the apex; lower lemma hyaline, linear-lanceolate, up to 4 mm long, 3-nerved; palea 2-keeled; lodicules-2, cuneate; stamens-3; upper lemma hyaline, up to 2.5 mm long, 3-nerved; lodicules-2; stamens-3. Pedicelled spikelets oblong-lanceolate, 4-4.5 mm long. Lower glume many nerved, chartaceous, up to 4 mm long, winged at apex and aristed; upper glume boat-shaped, up to 4.5 mm long, 5-nerved, crested; lower lemma hyaline, linear-lanceolate, up to 2.5 mm long, 3-nerved; palea hyaline; lodicules-2; stamens-3; upper lemma barren, hyaline, awned; palea hyaline.

Fl. & Fr. : July-Nov.

Distrib. : India and South-East Asia.

Specimens examined : Netarhat, 800. Helophyte.

Notes : Occasional near marshy lands and in forest undergrowth.

2. **Ischaemum rugosum** Salisb., Icon. Strip. Rar. 1, t. 1: 1791; Hook.f. in Fl. Brit. India 7: 127. 1897; Bor, Grass. Bur. Ceyl. Ind. Pak. 184. 1960; Haines, Bot. Bihar & Orissa 3: 1068. 1961 (Rep. ed.); Cope in Nasir & Ali, Fl. W. Pak. 143. 321. 1982.

Annual or perennial grass. Culms tufted, terete; 30-100 cm tall, erect or ascending, branched, rooting at lower nodes. Leaves linear lanceolate, 5-20 × 0.3-0.5 cm, glabrous, scabrid at margin, acuminate at apex; sheaths compressed, upper spathaceous, up to 15 cm long; ligule membranous, 5-6 mm long. Racemes 2, appressed to each other, terminating culms and branches. Sessile spikelets oblong to ovate-lanceolate, up to 5 mm long, glabrous, awned. Lower glume crustaceous, with 3-8 side-nodules, joined by deep or obscure ridges, ovate, up to 5 mm long, many nerved, keeled, narrowly winged at apex, apex entire or obscurely 2-lobed; upper glume papyraceous, up to 5 mm long; lower lemma subhyaline, linear-lanceolate, up to 4 mm long, nerveless; palea similar, 2-nerved; lodicules-2, cuneate; stamens-3; upper lemma hyaline, up to 3.5 mm long, deeply cleft at apex into 2 lobes, awn up to 15 mm long from sinus; palea hyaline. Lodicules-2; stamens-3. Caryopsis up to 2 mm long, oblong. Pedicelled spikelets shorter than sessile one. Lower glume as sessile spikelets with fewer side nodules; upper glume, lower lemma and palea as like as sessile spikelets; upper lemma hyaline, ovate oblong, up to 3 mm long, with 4-5 mm long awn; palea hyaline. Lodicules-2. Stamens-3.

Fl. & Fr. : Aug.-Dec.

Distrib. : India to China and Malaysia.

Specimens examined : Muhammadganj, 1047. Helophyte.

Notes : Occasional along the edges of rice fields, ditches and water courses.

Common name : Beng. : *moraro*; Hindi : *Dhanua*; Santal : *Marudi*.

29. OPLISMENUS P. Beauv.

1a. Awns pale, capillary, barbellate ... 1. *O. burmannii*

1b. Awns reddish, smooth, viscid, filiform, stiff ... 2. *O. compositus*

1. Oplismenus burmannii (Retz.) P. Beauv., Ess. Agrost. 54: 169. 1812; Hook.f. in Fl. Brit. India 7: 68. 1897; Prain, Beng. Pl. 2: 1173. 1903 (Rep. ed. 2: 883. 1963); Bor, Grass, Bur. Ceyl. Ind. Pak. 317. 1960; Haines, Bot. Bihar & Orissa 3: 1045. 1961 (Rep. ed.); Ramam. in Sald. & Nicol. Fl. Hassan 742. 1976; Cope in Nasir & Ali, Fl. W. Pak. 143: 185. 1982. *Panicum burmannii* Retz., Obs. Bot. 3: 10. 1783.

Slender annual grass. Culms up to 35 cm long, ascending from creeping base, branched upwards and basal nodes rooting. Leaves 19-45 × 5-9 mm, sparsely ciliate, lanceolate, acuminate at apex; sheaths loose, striate, margin ciliate; ligule a rim of hairs. Panicles of 3-7, simple or branched racemes, 0.7-1.5 cm long; rachis slender, triquetrous, usually terminated by a spikelets. Spikelets solitary or fascicled, elliptic-lanceolate, 2-2.5 mm long. Lower glume membranous, ovate, 1.5 mm long, 5-nerved, dorsally pubescent, with appressed hairs, margin ciliate, central nerve running into 4.5 mm long awn; upper glume similar, 5-7 nerved; lower lemma empty, membranous, lanceolate, 2 mm long with 1.2 mm awn; upper lemma chartaceous, oblong, 2-2.3 mm long, acute at apex; palea subhyaline, 2-keeled, up to 1.5 mm long. Caryopsis elliptic-oblong, 1-2 mm long.

Fl. & Fr. : Sept.-Jan.

Distrib. : India, Sri Lanka, Malaya, China, Japan and Tropical Africa, Tropial America & Asia.

Specimens examined : Barwadih, 360 & 434.

Notes : Common in damp/shady places, often forming a continuous mat under shade of tree or in open places.

Common name : Hindi : *Nini.*

Uses : Used as a good fodder, also yields good hay.

2. O. compositus (L.) P. Beauv., Ess. Agrost. 54: 168. 1812; Hook.f. in Fl. Brit. India 7: 66. 1897; Bor, Grass. Bur. Ceyl. Ind. Pak. 317. 1960;

Haines, Bot. Bihar & Orissa 3: 1045. 1961 (Rep. ed.); Ramam. in Sald. & Nicol., Fl. Hassan 742. 1976. *Panicum compositum* Linn. Sp. Pl. 57. 1753.

Perennial grass. Culms up to 75 cm tall. Leaves ovate or elliptic ovate, acuminate, 2-11 × 0.5-1.5 cm, often lanceolate, puberulous beneath; sheaths striate, villous to glabrous. Panicle up to 20 cm long. Spikelets up to 4 × 1 mm. Glumes up to 3 × 0.7 mm, pubescent, awned. Lemma of lower floret up to 2.7 × 1.4 mm, 7-9 nerved, hairy; palea if present hyaline, up to 2 mm long. Lemma of upper floret sub-coriaceous, apiculate, up to 2 mm long.

Fl. & Fr. : Oct.-Dec.

Distrib. : Pantropical.

Specimens examined : Netarhat, 100.

Notes : Common in damp shady places.

30. ORYZA L.

1a. Wild; ligule truncate; spikelets deciduous ... 1. *O. rufipogon*

1b. Cultivated; ligule bipartite; spikelets persistent ... 2. *O. sativa*

1. Oryza rufipogon Griff., Notul, 3: 5. Pl. 144. f. 2. 1851; Bor, Grass. Bur. Ceyl. Ind. Pak. 605. 1960; Lazarides, Trop. Grasses S.E. Asia 184. 1980; Guha Bakshi, Fl. Murshid. Dist. 398. 1984. *Oryza fatua* Koen. ex Trin., Mem. Acad. Sci. Petersb. ser. 6, 3: 177. 1839 *nom. nud. Oryza sativa* L. var. *fatua* Prain, Beng. Pl. 2: 1184. 1903 (Rep. ed. 2: 891. 1963); Chatterjee in Nature 160: 234. 1947 et in Indian J. Agr. Sci. 18: 190. 1948. *Oryza nivara* Sharma et Shastry in Indian J. Gen. Pl. Breed. 25: 161. 1965.

Erect annual grass 60-100 cm high. Culms terete, slender. Nodes glabrous. Leaves linear-lanceolate, 15-2.5 × 0.7-1 cm, scabrid on nerves and margins, apex acuminate; sheaths compressed, glabrous, up to 8 cm long; ligule membranous, 5-12 mm long. Panicle oblong, effuse, 15-20 cm long; pedicel solitary, short, dilated at apex. Spikelets deciduous, oblong, compressed, up to 9 mm long, reddish-brown. Glumes reduced to 2-small, firm, membranous scales, unequal, 1-nerved; lemma coriaceous, 8-9 mm

long, 3-nerved, ciliate all over or often on nerves and ribs and with 4-6 cm long, barbellate, straight awn at apex; palea similar, ciliate all over or on keel only, acute or apiculate at apex. Lodicules-2, oblong, many nerved. Stamens-6. Caryopsis elliptic-oblong, up to 5.5 mm long.

Fl. & Fr. : Sept.-Nóv.

Distrib. : Pantropical.

Specimens examined : Panki, 957. Hyperhydate or Helophyte.

Notes : Infrequent in marshy areas and near paddy fields as weed.

Common name : Beng. : *Busa Dhan, Uri* or *Jhara.*

2. Oryza sativa L., Sp. Pl. 333. 1753; Hook.f. in Fl. Brit. India 7: 92. 1897; Bor, Grass. Burm. Ceyl. Ind. Pak. 605. 1960; Haines, Bot. Bihar & Orissa 3: 1025. 1961 (Rep. ed.).

Annual, cultivated grass. Culms 60-100 cm tall, erect, slender. Leaves linear-lanceolate, up to 30 × 1.2 cm; scaberulous; sheaths smooth; ligule bipartite. Spikelets persistent on rachis. Caryopsis elliptic-oblong, up to 8 mm long.

Fl. & Fr. : Almost round the year, chiefly in rainy season.

Distrib. : Tropical & subtropical regions of the World.

Specimens examined : Seuti, 1097.

Notes : Very common, cultivated throughout the district.

Common name : Beng. & Hindi : *Dhan.*

Uses : Grains are edible.

31. PANICUM L.

Panicum trypheron Schult., Mant. 2: 244. 1824; Hook.f. in Fl. Brit. India 7: 47. 1897; Bor, Grass. Bur. Ceyl. Ind. Pak. 331. 1960; Cope in Nasir & Ali, Fl. W. Pakistan 143: 170. 1982.

Tufted, annual herbs, 10-60 cm tall, erect or sub-erect. Nodes glabrous. Leaves 4.5-15 × 0.3-0.6 cm, sparsely spreading hairy, linear-lanceolate, acuminate at apex; sheath loose, patently hairy. Panicle 5-15 cm long. Spikelets elliptic-lanceolate, 3-3.5 mm long, acuminate. Lower glume membranous, ovate, clasping at base, 3-5 nerved, cuspidate acuminate; upper glume membranous, elliptic-lanceolate, up to 3.5 mm long, 5-7 nerved, cuspidate to acuminate at apex; lower lemma barren, membranous; palea hyaline, elliptic, 1.5-2.2 mm long; upper lemma chartaceous, oblong-elliptic, 2-2.5 mm long, obscurely 3-nerved; palea 2-keeled. Lodicules-2. Stamens-3. Caryopsis oblong, 2.5 mm long.

Fl. & Fr. : Feb.-July.

Distrib. : India and extending to South-East Asia.

Specimens examined : Antikheta village (Kumendi), 726.

Notes : Common in open grass lands and villages.

Common name : Beng. : *Fupi Kanka*; Hindi : *Mijhri.*

Uses : Relished by the cattle and grains are often eaten in times of scarcity.

32. PASPALIDIUM Stapf.

Paspalidium punctatum (Burm.f.) A. Camus in Locomte. Fl. Gen. Indo-Chine 7: 419. 1922; Bor, Grass. Bur. Ceyl. Ind. Pak. 333. 1960; Haines, Bot. Bihar & Orissa 3: 1047. 1961 (Rep. ed.); Lazarides, Trop. Grass. S.E. Asia 131. 1980; Cope in Nasir & Ali, Fl. W. Pak. 143. 188. 1982. *Panicum punctatum* Burm.f., Fl. Ind. 26. 1768; Hook.f. in Fl. Brit. India 7: 29. 1897.

Annual or perennial grass. Culms up to 80 cm tall, glabrous, robust, spongy, rooting at lower nodes. Leaves up to 25 × 0.6 cm, glabrous, joint of the leaf blades and sheath dark-brown or reddish, acuminate at apex; sheaths longer than internodes, lax. Inflorescence 15-25 cm long, spikes 12-22, up to 4 cm long, alternate. Sessile spikelets many in 2 rows, up to 2.5 mm long, glabrous, ovate-oblong. Lower glume up to 1 × 0.8 mm, membranous, truncate, nerveless; upper glume as long as lower, ovate,

acute; lower lemma flat, 3-5 nerved, ovate, acute, epaleate, empty; upper lemma up to 2.2 × 1 mm, strongly convex, coriaceous, finely punctate, ovate-lanceolate, cuspidate; palea flat, ovate-oblong, subcuspidate. Caryopsis up to 1.2 × 0.7 mm, orbicular, compressed.

Fl. & Fr. : Aug.-Nov.

Distrib. : India, Sri Lanka, Pakistan, Indonesia and E. Africa.

Specimens examined : Seuti, 1088. Helophyte, some times Ephydate.

Notes : Common in the rice fields and along the edges of ponds and ditches.

33. PASPALUM L.

Paspalum scrobiculatum L., Mant. 1: 29. 1767; Hook.f. in Fl. Brit. India 7: 10. 1897; Bor, Grass. Burm. Ceyl. Ind. Pak. 340. 1960; Haines, Bot. Bihar & Orissa 3: 1046. 1961 (Rep. ed.); Hara *et al.*, Enum. Fl. Pl. Nep. 1: 139. 1978; Cope in Nasir & Ali, Fl. W. Pak. 143: 213. 1982. *P. orbiculare* G. Forst., Fl. Insul. Austr. Prodr. 7. 1786; Bor, Grass. Bur. Ceyl. Ind. Pak. 340. 1960. *P. commersonii* Lamk., Tab. Encyl. Meth. Bot. 1: 175. 1791; Bor, Grass. Burm. Ceyl. Ind. Pak. 335. 1960. *P. cartilagineum* Presl., Rel. Haenk. 1: 216. 1830; Bor, Grass. Burm. Ceyl. Ind. Pak. 335. 1960.

Annual grass. Culms terete, glabrous, up to 50 cm tall. Leaves linear-lanceolate, up to 30 × 0.8 cm, glabrous, keeled at base, acuminate at apex; sheaths compressed, up to 11 cm long, glabrous; ligule membranous with hairy mouth. Racemes 2-3, up to 6 cm long. Spikelets solitary, ovate-orbicular, up to 3 mm long, biseriate. Lower glume absent; upper glume membranous, ovate-orbicular, up to 2.7 mm long, 5-7 nerved; lower lemma empty, membranous, 3-nerved, similar in size to upper glume, epaleate; upper lemma coriaceous, broadly elliptic, up to 2.5 mm long, brown-red, faintly nerved, obtuse; palea similar. Lodicules-2. Stamens-3. Caryopsis elliptic, 2-3 mm long.

Fl. & Fr. : Sept.-Dec.

Distrib. : South East Asia, extending to Polynesia and Australia.

Specimens examined : Barwadih, 432. Helophyte.

Notes : Common on the hill slopes and near rice fields.

34. PENNISETUM Rich.

1a. Lemmas homomorphous; entire at apex :

2a. Inflorescence purple; spikelets 4 mm long; lemma hyaline ... 3. *P. purpureum*

2b. Inflorescence not purple; spikelets 2 mm long; lemma rigid ... 1. *P. glaucum*

1b. Lemmas heteromorphous; lower ones 3-toothed at apex :

3a. Spikelets solitary or in groups of 2-3, with one sessile and the others pedicelled; lower glume prominent, 3 mm long, silky at back ... 2. *P. pedicellatum*

3b. Spikelets solitary, sessile; lower glume absent or very minute, not silky ... 4. *P. setosum*

1. Pennisetum glaucum (L.) R.Br., Prodr. 195. 1810; Bor, Grass. Bur. Ceyl. Ind. Pak. 361. 1960. *Panicum glaucum* L., Sp. Pl. 56. 1753. *Setaria glauca* (L.) P. Beauv., Ess. Agrost. 51. 1812; Haines, Bot. Bihar & Orissa 3: 1034. 1961 (Rep. ed.).

Erect to suberect annuals. Leafblades 10-30 cm long, sparingly puberulous, acuminate to acute at apex; sheaths glabrous. Inflorescence dense, cylindric 2-7 cm long. Spikelets up to 2 mm long with a cluster of unequal, brabellate bristles. Lower glume 1.5 mm long, ovate, 3 nerved; upper glume ovate, 2 mm long, 5-nerved; lemma rigid, 1.8 mm long, transversely striated; palea 1.3 mm long, ovate, stamens-3. Lodicules-2, very small.

Fl. & Fr. : Aug.-Oct. Exotic.

Distrib. : Native of the warm temperate zones of the Old World, introduced into America, Australia, India and other countries.

Specimens examined : Simultar village (Daltonganj), 250; Kechki, 901.

Notes : Common in waste lands and villages.

Common name : Beng. : *Pinginatchi*; Hindi : *Bandra*; Santal : *Kukra*.

2. **Pennisetum pedicellatum** Trin. in Mem. Acad. Petersb. ser. 6, 3: 184. 1834; Hook.f. in Fl. Brit. India 7: 86. 1897; Bor, Grass. Bur. Ceyl. Ind. Pak. 346. 1960; Haines, Bot. Bihar & Orissa 3: 1032. 1961 (Rep. ed.).

Annual grass, up to 120 cm high; culms terete, simple or branched; nodes glabrous. Leaves linear-lanceolate, 5-30 × 0.5-1.5 cm, glabrous, margin scabrid, acuminate at apex; sheath terete, up to 10 cm long; ligule membranous, up to 1.5 m long, fimbriate. Spikes dense-flowered, 3-10 cm long, reddish-purple. Involucres sessile, bristles very unequal, inner up to 2.5 cm long, free to base and densely villous, whitish-red; pedicels of the spikelets slender, villous, 1-2 mm long. Spikelets solitary or 2-3 together, oblong-lanceolate, up to 5 mm long. Lower glume hyaline, lanceolate, up to 3 mm long, silky at back; upper glume hyaline, oblong-lanceolate, up to 5 mm long, silky at back, 5-nerved, cuspidate or acuminate at apex; lower lemma empty, hyaline-oblong, up to 4.3 mm long, pubescent, 3-toothed at apex, teeth ciliolate; palea hyaline, narrowly oblong, up to 4.2 mm long, lacerate at apex; upper lemma chartaceous, elliptic, up to 3.5 mm long, ciliolate at margin. Palea similar, 2-keeled. Lodicules-2. Stamens-3. Caryopsis oblong, up to 3 mm long.

Fl. & Fr. : Oct.-Nov.

Distrib. : India & tropical Africa.

Specimens examined : Palamau Fort (Betla), 1119.

Notes : Common along forest edges and on the ruins of Palamau Fort.

3. **P. purpureum** Schum., Besker. Guin. Pl. 44. 1827; Bor, Grass. Burm. Ceyl. Ind. Pak. 348. 1960.

Annual grass. Culms terete, glabrous, erect, tall. Leves broadly lanceolate, razor sharp at maturity; ligule hairy. Spikelets involucellate by scabrid or plumose purple bristles, 2-flowered, up to 4 mm long, not articulated to their pedicel. Lower glume and upper glume up to 3 mm long, hyaline. Lemma and palea up to 2 mm long, hyaline. Stamens-3; anthers bearded, up to 1 mm long.

Fl. & Fr. : Aug.-Jan. Exotic.

Distrib. : Native of Tropical Africa but now introduced in all tropical countries, including India.

Specimens examined : Barwadih, 364 & 369.

Notes : Common in the forest undergrowth.

Uses : Young grass is very good fodder and also used in paper industries.

4. Pennisetum setosum (Swartz.) L.C. Rich. in Press., Syn. Pl. 1: 72. 1805; Hook.f. in Fl. Brit. India 7: 87. 1897; Bor, Grass. Bur. Ceyl. Ind. Pak. 348. 1960; Haines in Bot. Bihar & Orissa 3: 1032. 1961 (Rep. ed.); Mooney in Suppl. Bot. Bihar & Orissa 180. 1959. *Cenchrus setosum* Swartz. Prodr. Veg. Ind. Oce. 26. 1788.

Erect, annual grass, up to 100 cm high. Culms terete, simple or branched; nodes glabrous. Leaves up to 30 × 1 cm, glabrous or sparsely hairy, magin scabrid, often with tubercled-based hairs at base; sheaths up to 9 cm long; ligule membranous, up to 1.2 mm long, fimbriate. Spikes up to 9 cm long, dense, purple. Involucres sessile; bristles unequal, longest one up to 1.5 cm long, close-set, ciliate below middle. Spikelet solitary, sessile, oblong-lanceolate, up to 4.5 mm long. Lower glume minute or O; upper glume oblong, 5 nerved, hyaline, up to 4 mm long; lower lemma oblong, truncate, 3-toothed, 5-nerved, empty, epaleate; upper lemma elliptic, up to 3.5 mm long, faintly 5-nerved; palea similar. Caryopsis elliptic-oblong, up to 2 mm long.

Fl. & Fr. : Oct.-Dec. Exotic.

Distrib. : Native of Tropical America and Africa; introduced in India.

Specimens examined : Seuti, 1091.

Notes : Infrequent in the forest undergrowth.

35. PEROTIS Ait.

Perotis indica (L.) O. Ktze., Rev. Gen. Pl. 2: 787. 1891; Bor, Grass. Bur. Ceyl. Ind. Pak. 611. 1960. *Anthoxanthum indicum* L., Sp. Pl. 28.

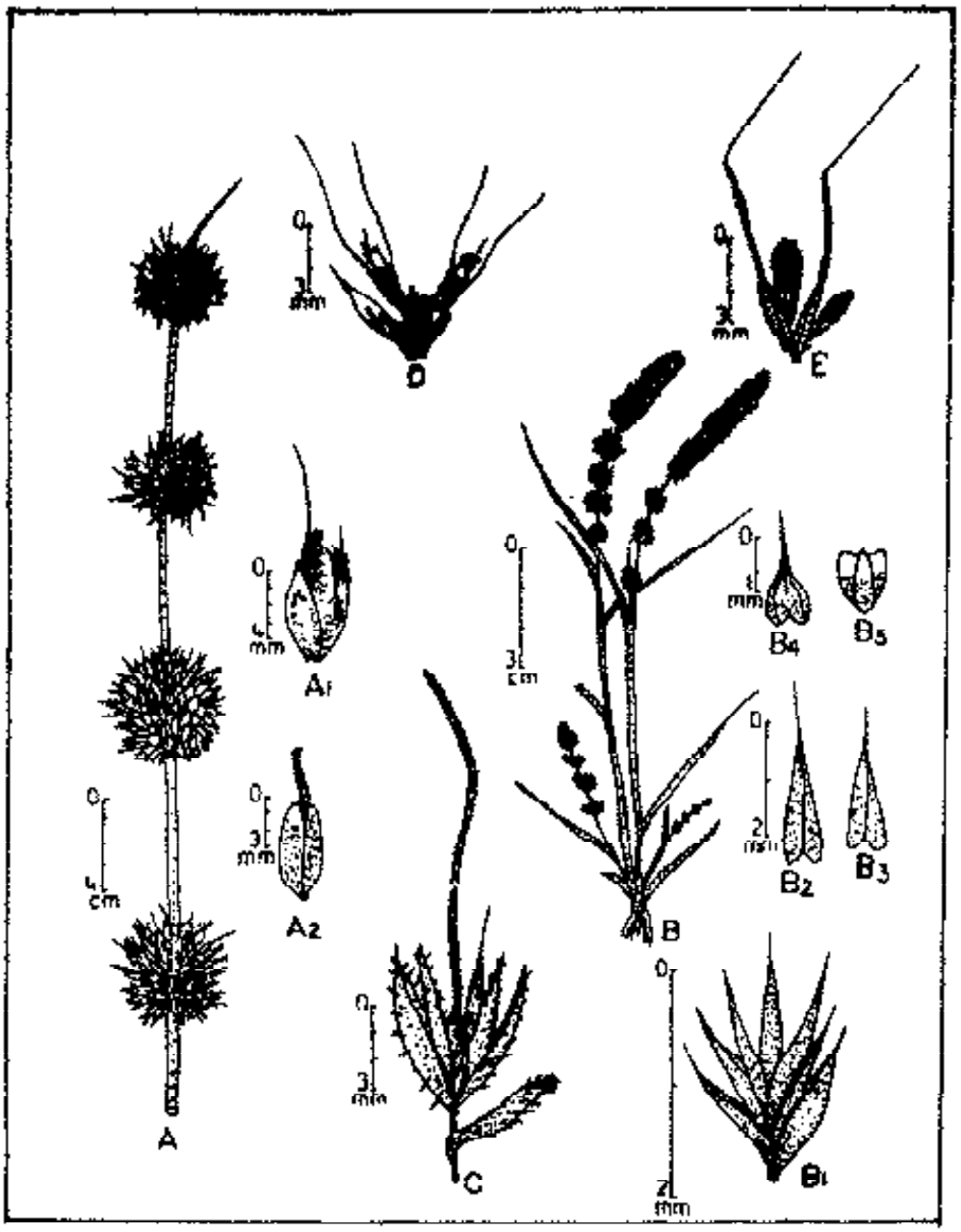


Fig. 43. Poaceae. (A-A_2): *Dendrocalamus strictus* (Roxb.) Nees: A. Flowering branch; A_1. Spikelet; A_2. Caryopsis; (B-B_5): *Elytrophorus spicatus* (Willd.) A. Camus: B. Habit; B_1.Spikelet; B_2. Lower glume; B_3. Upper glume; B_4. Lemma; B_5. Palea; C. *Themeda triandra* Forssk.: Two group of spikelets; D. *Pseudanthistiria hispida* Hook. f.: Spikelets; E. *Oplismenus burmannii* (Retz.) P. Beauv.: Spikelets.

1753. *Saccharum spicatum* L., loc. cit. 54. 1753. *Perotis latifolia* Ait., Hort. Kew 1: 85. 1789; Hook.f. in Fl. Brit. India 7: 98. 1897; Haines, Bot. Bihar & Orissa 3: 1024. 1961 (Rep. ed.).

Annual leafy grass. Culms tufted, terete, 10-40 cm tall, erect, much branched from base. Leaves ovate-lanceolate, up to 4 × 0.8 mm, rounded at base, acute at apex, margin spinulose ciliate; ligule ciliate. Raceme terminating the culms and its branches, slender, 5-10 cm long, feathery owing to the long awns. Spikelets linear, 2-2.8 mm long (excluding awns), purplish. Lower and upper glumes linear-laneolate, 2-2.8 mm long, spreading hairy, 1-nerved, awn up to 9 mm long, purple; lemma hyaline, linear-lanceolate, 1 mm long; palea same as lemma. Caryopsis narrowly oblong, 1.5-2 mm long.

Fl. & Fr. : Sept.-Dec.

Distrib. : India, Sri Lanka, Myanmar, Malaya to South Asia.

Specimens examined : Simultarh (Daltonganj), 282.

Notes : Not common, found near the Koel river banks, and on sandy soil.

36. PHALARIS L.

Phalaris minor Retz., Obs. Bot. 3: 8. 1783; Hook.f. in Fl. Brit. India 7: 221. 1987; Bor, Grass. Burm. Ceyl. Ind. Pak. 616. 1960. var. **minor.**

Annual grass. Culms tufted, subterete, up to 40 cm tall, erect, spreading from base, branched from near base; nodes glabrous. Leaves linear-lanceolate, entire, acuminate at apex, up to 15 × 0.5 cm; sheaths compressed, smooth, glabrous; ligules white, scaly, up to 5 mm long. Panicles contracted, ovoid or cylindric, greenish, up to 3 × 1.5 cm. Spikelets laterally compressed, up to 4.5 mm long, 3-flowered, with the lower two reduced and a perfect terminal floret. Lower and upper glumes up to 4.5 mm long, boat shaped, keel winged more or less above the middle, irregularly crenate or serrulate, apex acuminate; lemma hyaline, up to 3.5 mm long; palea rigid. Lodicules-2. Stamens-3. Caryopsis ovate-oblong, up to 2 mm long.

Fl. & Fr. : Jan.-Apr.

Distrib. : Plains of W. India and Himalaya, temperate region of the Europe, Asia, Africa and America.

Specimens examined : Netarhat, 140.

Notes : Not very common, found near the edges of cultivated lands.

37. POGONATHERUM P. Beauv.

Pogonatherum paniceum (Lamk.) Hack. in All. Bot. Zeit. 12. 178. 1906; Mooney in Suppl. Bot. Bihar & Orissa 185. 1950. *P. saccharoideum* Beauv., Ess. Agrost. 176. 1812; Hook.f. in Fl. Brit. India 7: 141. 1897; Haines, Bot. Bihar & Orissa 3: 1063. 1961 (Rep. ed.).

Tufted, much branched perennial grass; culms terete, slender, up to 60 cm tall; nodes hairy. Leaves linear, up to 5.5 cm long, hairy at base; sheaths up to 5 cm long, margin hairy. Spikes solitary, terminal on slender peduncle, up to 4.5 cm long. Spikelets binate, sessile and pedicelled, similar. Sessile spikelets up to 3 mm long. Lower glume oblong, faintly 2-4 nerved,ciliate at apex; upper glume 1-nerved, keel produced into a 2 cm long awn, ciliate apex; lemma ovate-oblong; palea hyaline. Lodicules absent. Stamens-2. Caryopsis oblong, up to 1.8 mm long. Pedicelled spikelets smaller than sessile one.

Fl. & Fr. : Feb.-Apr.

Distrib. : India, Myanmar, Sri Lanka.

Specimens examined : Netarhat, 136.

Notes : Not very common, found in the hill slopes.

38. POLYPOGON Desf.

Polypogon monspeliensis (L.) Desf., Fl. Atlan. 1: 67. 1798; Hook.f. in Fl. Brit. India 7: 245. 1897; Haines, Bot. Bihar & Orissa 3: 1021. 1961 (Rep. ed.); Bor, Grass. Bur. Ceyl. Ind. Pak. 403. 1960. *Alopecurus monspeliensis* Linn., Sp. Pl. ed. 1.61.1753. *Agrostis alopecuroides* Lamk.,

Tabl. Encycl. Meth. Bot. 1: 160. 1791. *Phleum monspeliensis* (L.) Koel., Descr. Gram. 57. 1802. *Polypogon flavescens* J.S. Presl ex C.B. Presl. Rel. Haenk. 1: 234. 1830.

Annual, closely tufted, small grass, 7-20 cm tall. Leaves linear, up to 6 × 0.4 cm; ligule scally, up to 6 mm long. Panicles cylindrical or oblong, up to 5 cm long. Spikelets 1-1.5 mm long. Lower and upper glumes oblong, scaberulous, tip ciliolate, obtuse or notched, awn 2-3 times longer than glumes; lemma hyaline, apex bifid and with small awn; palea hyaline, apex acuminate, notched, both 0.5-0.75 mm long. Stamens-3.

Fl. & Fr. : Jan.-Apr.

Distrib. : Tropical and temperate regions of the World.

Specimens examined : (Daltonganj), 7; Netarhat, 142. Helophyte.

Notes : Common in marshy areas and shady barren fields.

39. PSEUDANTHISTIRIA (Hack.) Hook.f.

Pseudanthistiria hispida Hook.f. in Fl. Brit. India 7: 219. 1897; Bor, Grass. Burma. Ceyl. India Pak. 204. 1960.

Annual grass. Culms tufted, terete, up to 80 cm tall, branched. Leaves linear-lanceolate, up to 16 × 0.8 cm, hirsute, scabrid along margin, acute at apex; sheaths terete, up to 5 cm long; ligule membranous, up to 1 mm long. Panicles leafy; spathes keeled, up to 10 mm long, margin hirsute. Racemes 2-jointed on short peduncle. Sessile spikelets elliptic-lanceolate, 4 mm long, awned. Lower glume chartaceous, elliptic, up to 4 mm long, hairy on back, 7-nerved; upper glume membranous, similar, 3-nerved; lower lemma absent; upper lemma reduced to a hyaline, narrow, 2.5 cm long geniculate awn, epaleate. Lodicules-2. Stamens-3. Caryopsis oblong, 3.8 mm long. Pedicelled spikelets narrowly lanceolate, 4-5.5 mm long. Lower glume herbaceous, linear-lanceolate, 4-5.5 mm long, many nerved, sparsely pilose; upper glume similar membranous, 3-nerved, margin ciliolate. Lodicules-2. Stamens-3.

Fl. & Fr. : Sept.-Jan.

Distrib. : India (Madhya Pradesh, Bihar).

Specimens examined : Betla, 566.

Notes : Common in open fields and along the hedges.

40. PSEUDOPOGONATHERUM A. Camus

Pseudopogonatherum contortum (Brongn.) A. Camus in Lecomte, Fl. Gen. de Indo-Chine 7: 255. 1922; Bor, Grass. Bur. Ceyl. Ind. Pak. 204. 1960. *Pogonatherum contortum* Brongn. in Duperr., Voy. Coq. Bot. 90. et 17. 1831. *Pollinia articulata* Trin. in Mem. Acad. Sci. Petersb. ser. 6. 2: 273. 1832; Hook.f. in Fl. Brit. India 7: 109. 1897. *Puliculum articulatum* (Trin.) Stapf ex Haines, Bot. Bihar & Orissa 1018. 1924 (Rep. ed. 3: 1065. 1961 as *P. articulata*).

Annual, erect, slender and tufted grass, up to 45 cm tall. Nodes glabrous. Leave filiform, up to 15 cm long, glabrous; ligule a ring of soft hairs. Spikes many, grey-brown, form a 2-4 cm long, dense contracted racemes. Sessile spikelets up to 2 mm long, brown; callus white hairy; rachis fragile and white hairy, awn 1.5-2 cm long, hairy. Lower glume narrow, elliptic-oblong, shining, 1.8-2 mm long, apex truncate, dorsally hairy; upper glume subequal, slight hairy, minutely 2-fid at apex, awned. Lemmas narrowly oblong, 1.5-1.8 mm long, hyaline; palea lanceolate-oblong, hyaline, nerveless, up to 1.3 mm long. Caryopsis oblong, 0.8-1 mm long. Pedicelled spikelets slightly smaller than sessile one.

Fl. & Fr. : Oct.-Dec.

Specimens examined : Bishrampur, 643.

Distrib. : Southeast Asia and extending to Australia & China.

Notes : Common in open grass lands and forest undergrowth.

41. ROTTBOELLIA L.f., *nom. cons.*

Rottboellia exaltata L.f., Nov. Gram. Gen. 40. t. 1. 1779 et in Suppl. 114. 1781; Hook.f. in Fl. Brit. India 7: 156. 1897; Bor, Grass. Bur. Ceyl. Ind. Pak. 206. 1960; Haines, Bot. Bihar & Orissa 3: 1107. 1961 (Rep. ed.); Babu, Herb., Fl. Dehra Dun 638. 1977.

Annual grass. Culms grooved to trigonous upwards, up to 1.5 m tall. Leaves linear, up to 38 × 2 cm, acuminate at apex, scabrid at margin; sheaths with bulbous-based hairs or glabrous; ligules short, hyaline, membranous. Spikes on thick peduncle, exserted from spathe. Sessile spikelets linear-lanceolate, up to 5 mm long, awnless. Lower glume oblong-lanceolate, up to 4.5 mm long; upper glume boat-shaped, 4.5 mm long; lower lemma membranous, 3-nerved; palea similar, 2-keeled. Caryopsis ellipsoid, up to 3 mm long. Pedicelled spikelets oblong-lanceolate, up to 4.5 mm long.

Fl. & Fr. : Sept.-Dec.

Distrib. : All warmer countries of the World.

Specimens examined : Netarhat, 799.

Notes : Not very common, found in moist areas of the forest.

42. SACCHARUM L.

Saccharum spontaneum L., Mant. 183. 171; Hook.f. in Fl. Brit. India 7: 118. 1897; Bor, Grass, Bur. Ceyl. Ind. Pak. 214. 1960; Haines, Bot. Bihar & Orissa 3: 1057. 1961 (Rep. ed.).

Perennial grass. Culms up to 2 m tall. Leaves linear, 30-60 × 0.3-0.5 cm, coriaceous, glabrous, margin pubescent, acuminate at apex; sheaths auricled; ligules membranous, ovate. Panicles oblong lanceolate, up to 50 cm long, silky-white. Sessile spikelets linear-lanceolate, up to 3 mm long, awnless. Lower glume subcoriaceous, lanceolate, up to 2.8 mm long, 2-nerved, margin inflexed; upper glumes similar, 1-nerved, margin ciliolate; lower lemma empty, hyaline, lanceolate, up to 2 mm long, dorsally pubescent, nerveless, epaleate; upper lemma hyaline; palea minute or absent. Pedicelled spikelets similar to sessile one. Caryopsis oblong.

Fl. & Fr. : Oct.-Feb.

Distrib. : India to S. China through Malaysia to Polynesia.

Specimens examined : Bhavnathpur, 1167. Helophyte.

Notes : Common in the river bed.

Common name : Beng. : *Kans*; Hindi : *Kansi*.

43. SACCIOLEPIS Nash.

Sacciolepis indica (L.) A. Chase, Proc. Biol. Soc. Wash. 21: 8. 1908; Bor, Grass. Burm. Ceyl. Ind. Pak. 357. 1960; Haines, Bot. Bihar & Orissa 3: 1036. 1961 (Rep. ed.). *Aira spicata* L., Sp. Pl. 64. 1753. *Aira indica* L., Sp. Pl. 1753 in '*Errata*' (Linnaeus changed the name because of *A. spicata* on page 64 of Sp. Pl.). *Panicum indicum* L., Mant. Pl. 2: 184. 1771 (non Miller 1768); Hook.f. in Fl. Brit. India 7: 41. 1897.

Annual grass. Culms terete, up to 50 cm tall, erect. Leaves linear, up to 12 × 0.4 cm, glabrous, acuminate at apex, margin scaberulous; sheaths compressed, striate; ligules membranous. Panicles cylindric, elongated, up to 7 cm long. Spikelets crowded, ovoid, glabrous or slightly hairy, up to 1.5 × 1 mm. Lower glume membranous, ovate, up to 0.7 mm long, 3-nerved, obtuse; upper glume membranous, elliptic-oblong, 7-11 nerved, up to 1 mm long; lower lemma empty, broadly ovate, 9-nerved, up to 1.3 mm long; palea hyaline, up to 0.6 mm long; upper lemma ellipsoid, acute, faintly 5-nerved, up to 1.1 mm long, chartaceous; palea similar. Lodicules-2. Stamens-3.

Fl. & Fr. : Sept.-Jan.

Distrib. : India, Trop. Asia, Polynesia to Australia, introduced in Africa and America.

Specimens examined : Daltonganj, 246; Barwadih, 395. Helophyte.

Notes : Common in wet places and waste lands.

44. SCHIZACHYRIUM Nees

Schizachyrium exile (Hochst.) Pilger in Engler, Bot. Jahn. 54: 284. 1917; Bor, Grass. Burm. Ceyl. Ind. Pak. 216. 1960; Haines, Bot. Bihar & Orissa 3: 1090. 1961 (Rep. ed.). *Andropogon exilis* Hochst. in Flora 27: 241. 1844; Hook.f. in Fl. Brit. India 7: 166. 1897.

Annual grass. Culms terete, 20-60 cm tall, erect, slender, branched. Leaves linear, 4-12 × 0.2-0.3 cm, glabrous or sparsely pilose, acuminate

at apex. Racemes slender, 2.5-4 cm long, concealed in a narrow spathes. Sessile spikelets linear-lanceolate, 4-6 mm long, awned. Lower glume chartaceous, oblong-lanceolate, up to 5.5 mm long, hispidulous on back, 2-keeled, apex 2-toothed; upper glume membranous, boat-shaped, up to 5 mm long, 3-nerved, keel strong and running into 1.5 mm arista; lower lemma empty, hyaline, linear-lanceolate, up to 3.5 mm long, nerveless, ciliolate along margin, epaleate; upper lemma hyaline, cleft near to the base, with 15 mm long geniculate awn from the sinus; palea narrowly linear, up to 2.5 mm long. Lodicules-2. Stamens-3. Caryopsis cylindric. Pedicellate spikelets reduced to aristate glume.

Fl. & Fr. : Oct.-Dec.

Distrib. : India & tropical Africa.

Specimens examined : Barwadih, 407 & 453.

Notes : Not common, found in dry waste lands.

Uses : Young grass used as fodder and also in thatching and coarse matting.

45. SETARIA P. Beauv. *nom. cons.*

1a. Involucre-bristles retrorsely barbed ... 3. *S. verticillata*

1b. Involucre-bristles introrsely barbed :

2a. Cultivated; upper glume as long as spikelet ... 2. *S. italica*

2b. Wild; upper glume shorter than spikelet :

3a. Involucre-bristles 3-6; lower glume 5-nerved ... 1. *S. glauca*

3b. Involucre-bristles 6-12; lower glume 3-nerved ... 4. *S. viridis*

1. Setaria glauca (L.) P. Beauv., Ess. Agrost. 51. 169. 1812; Hook.f. in Fl. Brit. India 7: 78. 1897; Bor, Grass. Bur. Ceyl. Ind. Pak. 360. 1960; Haines, Bot. Bihar & Orissa 3: 1034. 1961 (Rep. ed.). *Pennisetum glaucum* (L.) R.Br., Prodr. 195. 1810. *Panicum glaucum* L., Sp. Pl. 56. 1753.

Tufted grass, 15-90 cm long, glabrous, mostly branching from base. Leaves up to 15 × 0.5 cm, flat, tapering towards apex; ligules membranous,

with ciliate mouth. Panicles spiciform, cylindric, 4-7 cm long. Spikelets ovoid, 2 mm long, surrounded by 6-12 hairy, unequal bristle at base. Male & female florets separate. Lower glume ovate, 1 mm long, 3-nerved; upper glume ovate, 1.5 mm long, 5-nerved, mucronate at apex; lemma chartaceous, margin involute, 1.8 mm long, elliptic, acute at apex; palea hyaline, 1.5 mm long, boat shaped. Caryopsis ovate, up to 2 mm long.

Fl. & Fr. : Oct.-Dec.

Distrib. : Native of the warm-temperate zone of the Old World, introduced into America, Australia & other countries.

Specimens examined : Simultarh (Daltonganj), 283.

Notes : Common in grass lands and waste lands.

Common name : Beng. : *Pinginatchi*; Hindi : *Bandra*; Santal : *Kukru*.

2. Setaria italica (L.) P. Beauv., Ess. Agrost. 51: 170. 178. 1812; Hook.f. in Fl. Brit. India 7: 78. 1897; Bor, Grass. Burm. Ceyl. Ind. Pak. 362. 1960; Haines, Bot. Bihar & Orissa 3: 1034. 1961 (Rep. ed.). *Panicum italicum* L., Sp. Pl. 56. 1753.

Annual grass. Culms terete, 60-150 cm tall. Leaves linear-lanceolate, long, up to 1.8 cm broad, margin whitish, retrorsely scabrid. Panicles 5-10 cm long; rachis densely hairy. Spikelets solitary, ovate-elliptic, obtuse, up to 3 mm long.

Fl. & Fr. : July-Oct.

Distrib. : Warmer parts of the World.

Specimens examined : Bhavnathpur, 1169.

Notes : Cultivated throughout the district.

Common name : Hindi : *Kangu, Kangui*; Santal : *Erba*.

Uses : Grains used as substitute for rice.

3. S. verticillata (L.) P. Beauv., Ess. Agrost. 51: 178. 1812; Hook.f. in Fl. Brit. India 7: 80. 1897; Bor, Grass. Bur. Ceyl. Ind. Pak. 365. 1960;

Haines, Bot. Bihar & Orissa 3: 1035. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 644. 1977; Cope in Nasir & Ali, Fl. W. Pakistan 143: 179. 1982. *Panicum verticillatum* L., Sp. Pl. ed. 2. 82. 1762.

Annual tufted, ascending or erect grass, up to 50 cm tall. Nodes glabrous. Leaves flat, linear-lanceolate, 4-15 × 0.5-1 cm, base subcordate, densely pilose or hispid, margin scaberulous, apex acuminate; sheaths compressed, often keeled, 3-8 cm long, hispid, bearded at mouth; ligules hairy. Panicles narrowly oblong, 2-8 cm long; rachis slender, angular, scabrid; branches short, close, terminating into a bristle; involucral bristles retrorsely barbed, up to 1 cm long. Spikelets elliptic, 2-2.7 mm long, glabrous, palegreen. Lower glume membranous, ovate, 1-1.2 mm long, 1-nerved; upper glume membranous, 1.5-2.2 mm long, 5-nerved, acute; lower lemma barren, membranous, ovate-elliptic, 2.2-2.6 mm long, 5-nerved, palea hyaline; upper lemma elliptic-oblong, 2.2-2.5 mm long, faintly rugulose, margin incurved; palea same but more rugulose. Lodicules-2. Stamens-3. Caryopsis elliptic, 2-2.2 mm long.

Fl. & Fr. : Aug.-Jan.

Distrib. : Temperate and Tropical region of the Old World, introduced into America.

Specimens examined : Garwah, 616.

Notes : Common in Tenar busti and other villages. Caryopsis easily dispersed by means of its retrorsely barbellate bristles.

Common name : Beng. : *Dorayra*; Santal : *Birkauni.*

Uses : Young grass grazed by the cattles but on maturity it becomes unpalatable due to its bristles. Grains also consumed as food by the tribals.

4. Setaria viridis (L.) P. Beauv., Ess. Agrost. 51. 1812; Hook.f. in Fl. Brit. India 7: 80. 1897; Bor, Grass. Bur., Ceyl. Ind. Pak. 365. 1960. *Panicum viride* L., Syst. 10. 870. 1759.

Annual, leafy grass. Culm 1 m high. Leaves up to 30 × 2 cm, tapering at apex, midrib prominent, upper surface and margin scabrid; ligules membranous, 2-3 mm long. Panicles spiciform, cylindric, often interrupted, 2-5 cm long. Spikelets ovoid, 2 × 1 mm, with 3-6 unequal, minutely barbed

bristles at base. Lower glume ovate, 1.5 mm long, acute at apex, 5-nerved; upper glume elliptic-oblong, 2 mm long, acute at apex, 5-nerved; lemma chartaceous, boat-shaped, 1.8-2 mm long; palea same as lemma, 1.8 mm long.

Fl. & Fr.: Oct.-Jan.

Distrib. : Temperate and Tropical regions of the Old World, escaped and considered as a weed in the New World.

Specimens examined : Simultarh village (Daltonganj), 299.

Notes : Infrequent in the villages.

46. SORGHUM Moench.

Sorghum halepense (L.) Pers., Syn. Pl. 1: 101. 1805; Bor. Grass. Bur. Ceyl. Ind. Pak. 222: 1960; Haines, Bot. Bihar & Orissa 3: 1080. 1961 (Rep. ed.); Cope in Nasir & Ali, Fl. W. Pak. 143. 295. 1982. *Holcus halepensis* L., Sp. Pl. 1047. 1753. *Andropogon halepensis* (L.) Brot., Fl. Lusit. 1: 89. 1804; Hook.f. in Fl. Brit. India 7: 182. 1897; Prain, Beng. Pl. 2: 1204. 1983 (Rep. ed. 2: 907. 1963). *Sorghum miliaceum* (Roxb.) Snowden, J. Linn. Soc. (Bot.) 55: 205. 1955; Bor, Grass. Bur. Ceyl. Ind. Pak. 223. 1960.

Perennial grass, up to 2 m high, with stoloniferous creeping root stock. Leaves up to 60 × 3 cm, glabrous, tapering at apex, margin scabridly serrulate, midrib strong; sheaths glabrous, striate; ligules short, membranous, with hairy mouth. Panicles decompound, 15-30 cm long. Sessile spikelets up to 5 × 2.2 mm, ovate-lanceolate or elliptic, acute. Lower glume ovate-elliptic, hairy, acute margin involute; upper glumes 4.8 × 2 mm, 5-7 nerved, acuminate. Lemma of lower floret 4.2 × 2.3 mm, lanceolate, hyaline fimbriate; lemma of upper floret 4 × 2 mm, ciliate. Pedicelled spikelets: Lower glume 4.7 × 2.3 mm, 7-nerved, lanceolate, margin inflexed; upper glume 4.5 × 2 mm, 5-nerved, lanceolate. Lower floret: lemma hyaline, margin ciliate, 3 × 1.8 mm; upper floret 2.8 × 1.9 mm. Lodicules ciliate. Caryopsis dorsally compressed.

Fl. & Fr. : Aug.-Jan.

Distrib. : All warm countries.

Specimens examined : Barwadih, 358 & 924.

Notes : Not common, found near rivers & streams.

Common name : Beng. : *Kalamucha*; Hindi : *Baru*.

Uses : A good fodder grass.

47. SPOROBOLUS R.Br.

1a. Panicle effuse, more than 4 cm wide; stamens-2 ... 1. *S. indicus* var. *diander*

1b. Panicle contracted, up to 4 cm wide; stamens-3 ... 2. *S. indicus* var. *purpureosuffusus*

1. **Sporobolus indicus** (L.) R.Br. var. **diander** (Retz.) Jov. & Goed., Bull. Centre Et. Rech. Sc. Biarritz 7: 65. 1968 et in Taxon 22: 163. 1973; Patunkar, Grass. Marath. 274. 1980. *Agrostis diander* Retz., Fasc. Obs. Bot. 19. 1789. *Sporobolus diander* (Retz.) P. Beauv., Ess. Agrost. 26, 147, 178. 1812 (as *S. diandrus*), Hook.f. in Fl. Brit. India 7: 247. 1897; Bor, Grass. Bur. Ceyl. Ind. Pak. 629. 1960.

Perennial grass. Culms tufted, terete, 20-75 cm tall; nodes glabrous. Leaves often convolute, up to 20 × 0.3 cm, glabrous, acuminate at apex; sheaths compressed, up to 10 cm long, glabrous; ligules a line of hairs. Panicles effuse, pyramidal; rachis glabrous. Spikelets obovoid, up to 1.5 mm long, greyish-green. Lower glume hyaline, oblong, up to 0.6 mm long, nerveless, truncate; upper glume narrowly ovate, up to 0.9 × 0.4 mm, 1-nerved, acute at apex; lemma ovate, up to 1.5 × 0.8 mm, faintly 1-nerved; palea as long as lemma, obscurely and closely 2-nerved, acute at apex. Lodicules-2. Stamens-2. Caryopsis oblong, up to 0.7 mm long.

Fl. & Fr. : July-Dec.

Distrib. : Pantropical.

Specimens examined : Panki, 949.

Notes : Common in open grass lands and near water courses.

Common name : Beng. : *Bena-joni*; Hindi : *Chiria-ka-dana*.

Uses : It is esteemed as fodder and also as good soil binder.

2. Sporobolus indicus (L.) R.Br. var. **purpureosuffusus** (Ohwi) Koyama in J. Japanese Bot. 37: 235. 1962. *Sporobolus elongatus* var. *purpureosuffusus* Ohwi in Bot. Mag. Tokyo 55: 394. 1941. *Sporobolus indicus* var. *pallidior* Koyama in J. Japanese Bot. 37: 236. 1962. *Sporobolus indicus* var. *fertilis* (Steud.) Jov. & Goed. in Bull. Centre Et. & Rech. Sc. Biarritz. 7: 50. 1968. *nom. invalid.* & in Taxon 22: 163. 1973. *Sporobolus fertilis* (Steud.) Clayton in Kew Bull. 19: 291. 1965. *Agrostis fertilis* Steud., Syn. Pl. Glum. 170. 1855. *Sporobolus indicus* sensu Hook.f. in Fl. Brit. India 7: 247. 1897 [non (L.) R.Br. 1810], *pro parte*; Bor, Grass. Bur. Ceyl. Ind. Pak. 630. 1960; Haines, Bot. Bihar & Orissa 3: 1019. 1961 (Rep. ed.).

Perennial grass. Culms tufted, terete, up to 70 mm tall, slender; nodes glabrous. Leaves often convolute, up to 30 × 0.3 cm, acuminate, glabrous; sheaths compressed, 2-10 cm long, glabrous; ligules a rim of hairs. Panicles contracted, narrowly oblong, up to 35 cm long. Spikelets obovoid, pedicelled, up to 1.5 mm long. Lower glume hyaline, oblong, acute, obtuse, nerveless, up to 0.5 mm long; upper glume ovate, up to 0.7 mm long, 1-nerved, acute; palea as long as lemma, closely 2-nerved, acute. Lodicules-2. Stamens-3. Caryopsis oblong, up to 0.7 mm long.

Fl. & Fr. : Aug.-Dec.

Distrib. : All warm countries of the World.

Specimens examined : Muhammadganj, 1034.

Notes : Common in moist areas and hill slopes.

Remarks : In varietal rank the epithet *purpureosuffusus* has priority, hence the correct nomenclature would be as above.

48. THEMEDA Forssk.

1a. Involucral spikelets less than 6 mm long; awn less than 4 mm long; hermaphrodite spikelets solitary or geminate ... 1. *T. quadrivalvis*

1b. Involucral spikelets more than 6 mm long; awn more than 4 m long; hermaphrodite spikelets always solitary ... 2. *T. triandra*

1. **Themeda quadrivalvis** (L.) O. Ktze., Rev. Gen. Pl. 794. 1891; Bor, Grass. Bur. Ceyl. Ind. Pak. 262. 1960; Haines, Bot. Bihar & Orissa 3: 1098. 1961 (Rep. ed.); Babu, Herb. Fl. Dehra Dun 649. 1977. *Andropogon quadrivalvis* L. in Murr., Syst. Veg. ed. 13: 758. 1774. *Anthistiria ciliata* L.f., Suppl. 113. 1781; Hook.f. in Fl. Brit. India 7: 213. 1897.

Annual grass. Culms up to 2 m tall. Leaves linear-lanceolate, up to 30 × 0.5 cm, margin scabrid, acute at apex; sheaths compressed; ligules membranous, up to 2.5 mm long. Racemes enclosed by boat-shaped spathe; spathes up to 1.5 cm long, margin with tubercle based hairs. Involucral spikelets subsessile, linear lanceolate, up to 5.5 mm long. Lower glume up to 5.5 mm long, many nerved; upper glume similar, 3-nerved; lemma hyaline, epaleate. Hermaphrodite spikelets one or two on a short stipe. Caryopsis subcylindric. Pedicelled spikelets dorsally compressed, lanceolate.

Fl. & Fr. : Aug.-Jan.

Distrib. : Tropics and subtropics of the Old World.

Specimens examined : Barwadih, 447.

Notes : Common in forest under growth.

2. **T. triandra** Forssk., Fl. Aegypt. Arab. 178. 1775; Bor, Grass. Burm. Ceyl. Ind. Pak. 254. 1960; Ramam. in Sald. & Nicol., Fl. Hassan Dist. 756. 1976. *Anthistiria imberbis* Retz., Obs. Bot. 3: 11. 1783; Hook.f. in Fl. Brit. India 7: 211. 1897. *Themeda imberbis* (Retz.) Cooke, Fl. Bombay 2: 993. 1908; Haines, Bot. Bihar & Orissa 3: 1097. 1961 (Rep. ed.).

Robust annual grass. Culms tufted, terete, smooth, 1-2 m tall, erect, branched. Leaves linear, 8-25 × 0.5 cm, glabrous, margin scabrid, acute at apex; sheaths compressed, keeled; ligules membranous, hyaline, up to 2 mm long. Panicle of fascicled racemes; spathes boat-shaped, margin with tubercle based hairs. Involucral spikelets subsessile, oblong-lanceolate, up to 6 mm long, sterile or male. Lower glume oblong-lanceolate, up to 6 mm long, 2-keeled, winged, best with stiff hairs; upper glume 3-nerved, epaleate. Lodicules-2. Stamens-3. Hermaphrodite spikelets solitary, seated

on short stipe. Lower glume 7-nerved, up to 5 mm long; upper glume 3-nerved, equal; lower lemma empty, epaleate; upper lemma reduced to hyaline base of 4 cm long, hairy awn, epaleate. Lodicules-2. Stamens-3. Caryopsis subcylindric, up to 2.5 mm long. Pedicelled spikelets on short pedicel, glabrous, linear-lanceolate.

Fl. & Fr. : Sept.-Jan.

Distrib. : All warm parts of the World.

Specimens examined : Barwadih, 368.

Notes : Common on hill slopes and in the forest.

Uses : It has good fodder value before flowering.

49. THYSANOLAENA Nees

Thysanolaena maxima (Roxb.) O. Kntz., Rev. Gen. Pl. 2: 794. 1891; Bor, Grass. Burm. Ceyl. Ind. Pak. 650. 1960; Babu, Herb. Fl. Dehra Dun 650. 1977. *Agrostis maxima* Roxb., Fl. Ind. 1: 319. 1820. *Thysanolaena agrostis* Nees in Edinb., New. Phil. Journ. 18: 180. 1835; Hook.f. in Fl. Brit. India 7: 61. 1897; Haines, Bot. Bihar & Orissa 3: 1027. 1961 (Rep. ed.).

Reed-like perennial grass. Culms terete, 1-2.5 m tall, erect. Leaves lanceolate, up to 30 × 4 cm, coriaceous, cordate, semi-amplexicaul at base, acuminate at apex; sheaths compressed, mouth hairy; ligules short, membranous. Panicle effuse, decompound with filiform branches, up to 90 cm long. Spikelets 1-2 nate, greenish or purplish, 2-flowered, elliptic-lanceolate, up to 1.5 mm long, acuminate, ciliate. Lower glume and upper glume minute, concave, obtuse and nerveless; lower lemma up to 1.5 mm long, oblong, acute, 1-nerved, empty, epaleate; upper lemma membranous, shorter than lower lemma, oblong, clothed with hairs; palea mintue. Caryopsis minute.

Fl. & Fr. : Dec.-May.

Distrib. : India and East West to New Guinea.

Specimens examined : Netarhat, 127.

Notes : Common on the hill slopes and near the stream (Upper Ghagri falls).

Common name : Beng. : *Phuljharughas*; Santal : *Karsar, Bushnia.*

Uses : Panicles are used to make soft brooms.

50. TRITICUM L.

Triticum aestivum Linn., Sp. Pl. 85. 1753; Hook.f. in Fl. Brit. India 7: 367. 1897; Bor, Grass. Burm. Ceyl. Ind. Pak. 679. 1960; Babu, Herb. Fl. Dehra Dun 652. 1977.

Annual cereal grass. Culms tufted, terete, hollow, up to 1 m tall. Leaves linear-lanceolate, 15-25 × 0.8-1.2 cm, acute at apex, margin scabrid; sheaths smooth; ligules membranous, truncate. Spikes erect, curved with age, irregularly 4-sided; rachis zig-zag, tenaceous, tips flattened. Spikelets distichous, solitary, imbricate, laterally compressed, 8-10 mm long, 3-flowered, the uppermost sterile. Glumes subequal, ovate-oblong, 8-10 mm long, 5-nerved; lemmas membranous, oblong, 7-9 mm long, apex lobed; palea subhyaline. Caryopsis oblong, ventrally grooved, free within lemma and palea.

Fl. & Fr. : Dec.-Mar.

Distrib. : India, S. Asia and S. Europe.

Specimens examined : Bhavnathpur, 1166.

Notes : Commonly cultivated, often found as an escape in the villages.

Common name : Beng. : *Gom*; Hindi : *Gehun.*

Uses : Grains are edible as major food.

51. VERTIVERIA Lem. Lisanc.

Vertiveria zizanioides (L.) Nash in Small, Fl. South-East U.S. 67. 1903; Bor, Grass. Burm. Ceyl. Ind. Pak. 258. 1960; Haines, Bot. Bihar & Orissa 3: 1079. 1961 (Rep. ed.); Cope in Nasir & Ali, Fl. W. Pak. 143:

306. 1982. *Phalaris zizanioides* L., Mant. 183. 1771. *Andropogon squarosus* sensu Hook.f. in Fl. Brit. India 7: 186. 1897 (non Linn.f., 1781).

Coarse perennial grass. Rhizome thick, aromatic. Culms tufted, subcompressed, up to 1.5 m tall, leafy at base. Leaves linear-lanceolate, 40-70 × 0.3 cm, margin scabrid, acute at apex; sheaths keeled; ligules short, membranous. Panicles of whorled racemes, up to 25 cm long, contracted; rachis stout, smooth. Racemes simple, often 2 or several at node, up to 6 cm long. Spikelets 3-5 mm long, linear-lanceolate, muricate and muriculate, brown-violet or dark brown. Lower glume coriaceous, linear-lanceolate, muricate on keel, 3-4 × 0.8-1 mm, acute; upper glume 1-nerved, spinously muricate on keel, 4-4.5 × 1-1.5 mm; lower lemma equalling the glumes; palea 2-2.5 mm long; upper lemma 2-3 mm long, oblong-lanceolate, mucronulate; palea acute entire, hyaline. Lodicules-2. Stamens-3. Caryopsis oblong.

Fl. & Fr. : Throughout the year, specially during Aug.-Jan.

Distrib. : India, Myanmar, Sri Lanka, South-East Asia and tropical Africa.

Specimens examined : Barwadih, 459. Hyperhydate.

Notes : Common near water courses, along river banks and near the ponds.

Common name : Beng. : *Khaskhas*; Hindi : *Sirom*.

52. ZEA L.

Zea mays L., Sp. Pl. 971. 1753; Hook.f. in Fl. Brit. India 7: 102. 1897; Bor, Grass. Bur. Ceyl. Ind. Pak. 270. 1960; Haines, Bot. Bihar & Orissa 3: 1113. 1961 (Rep. ed.).

Stout annual grass, up to 2.5 m high. Leaves large, up to 1 m long. Male flowers in terminal speciform panicled racemes. Spikelets 2-flowered, on unequal pedicel; palea 2-nerved; lodicules fleshy; stamens-3. Female inflorescence in the axil of lower leaves of the same plant. Spikelets sessile, densely crowded in vertical series on the thick central axis; ovary obliquely ovoid; style very long, 2-fid at tip, exserted from large bracts.

Fl. & Fr. : Aug.-Nov.

Distrib. : Native of America, now cultivated in all warm countries.

Specimens examined : Netarhat, 864.

Notes : Extensively cultivated throughout the district.

Common name : Beng. : *Bhutta*; Hindi : *Makai, Bhutta.*

Uses : Maize grains are extensively used as food and also as fodder.

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INDEX

(Genera & Families)

ABELMOSCHUS Medik. 97
ABRUS Adans 175
ABUTILON Mill 98
ACACIA Miller 164
ACALYPHA L. 541
ACANTHACEAE 464
ACANTHOSPERMUM Schrank 321
ACHYRANTHES L. 514
ACROCEPHALUS Benth. 495
ADINA Salisb. 299
AEGLE Corr. 133
AERVA Forssk. *nom. cons.* 515
AESCHYNOMENE L. 176
AGAVACEAE 601
AGAVE L. 601
AGERATUM L. 322
AILANTHUS Desf. 138
AIZOACEAE 286
ALANGIACEAE 296
ALANGIUM Lamk. *nom. cons.* 296
ALBIZIA Durazzini 169
ALISMATACEAE 629
ALLAMANDA L. 379
ALOCASIA (Schott.) D.Don
nom. cons. 625
ALOE L. 605
ALSTONIA R.Br. *nom. cons.* 379
ALTERNANTHERA Forssk. 516
ALYSICARPUS Desv. *nom. cons.* 176
AMARANTHACEAE 513
AMARANTHUS L. 520
AMARYLLIDACEAE 600
AMMANIA L. 261
AMPELOCISSUS Planch. *nom. cons.* 152
ANACARDIACEAE 159
ANAGALLIS L. 366
ANDROGRAPHIS Wall. ex Nees 465
ANISOCHILUS Wall. 495
ANISOMELES Kuntze 497
ANNONACEAE 58
ANNONA L. 58
ANOGEISSUS (DC.) Wall. ex Guill.,
Perr. & A. Rich 248
ANTIDESMA L. 542
ANTIGONON Endl. 528
APHANAMIXIS Blume 141
APIACEAE 290
APLUDA L. 662
APOCYNACEAE 378
APONOGETONACEAE 631
APONOGETON L.f. *nom. cons.* 631
ARACEAE 625
ARECACEAE 621
ARGEMONE L. 68
ARGYREIA Lour. 414
ARISAEMA Mart. 626
ARISTIDA L. 663
ARTABOTRYS R.Br. 59
ARTEMISIA L. 322
ARTOCARPUS J.R. & G. Forster
nom. cons. 571
ARUNDINELLA Raddi 664
ARUNDO L. 665
ASCLEPIADACEAE 393
ASPARAGUS L. 606
ASTERACEAE 317
ATYLOSIA R.Wight et Arnott 180
AVENA L. 666
AZADIRACHTA A. Juss. 142

BACOPA Aubl. *nom. cons.* 440
BALANITES Delile 127
BALIOSPERMUM Bl. 543
BALSAMINACEAE 132
BARLERIA L. 466
BAUHINIA L. 225
BEGONIACEAE 284
BEGONIA L. 284
BERGIA L. 92
BIDENS L. 323
BIGNONIACEAE 457
BIOPHYTUM DC. 129
BLAINVILLEA Cass. 325
BLUMEA DC. 325
BLUMEOPSIS Gagnep. 329
BOEHMERIA Jacq. 567
BOERHAVIA L. 510
BOMBACACEAE 109
BOMBAX L. 109
BORAGINACEAE 407

Borassus L. 621
Boswellia Roxb. ex Colebr. 139
Bothriochloa O.Ktze. 666
Brachiaria Grisep. 668
BRASSICACEAE 70
Brassica L. 70
Breea Less. 330
Bridelia Willd. 544
Broussonetia L'Herit. ex Vent. 572
Buchanania Spreng. 159
BUDDLEJACEAE 401
Buddleja L. 401
Bulbostylis Kunth. *nom. cons.* 637
Bupleurum L. 291
BURSERACEAE 139
Butea Roxb. ex Willd. 180
Butomopsis Kunth. 630
Byttneria Loefl. 111

CACTACEAE 285
CAESALPINIACEAE 225
Caesalpinia L. 231
Caesulia Roxb. 330
Cajanus A.P. de Candolle *nom. cons.* 181
Callicarpa L. 483
Callistemon R.Br. 254
Calotropis R.Br. 394
CAMPANULACEAE 362
Campanula L. 362
CANNACEAE 598
Canna L. 598
Canscora Lamk. 402
Canthium Lamk. 299
CAPPARACEAE 71
Capparis L. 71
Cardiospermum L. 157
Carex L. 638
Careya Roxb. 259
CARICACEAE 274
Carica L. 274
Carissa L. *nom. cons.* 381
CARYOPHYLLACEAE 86
Casearia Jacq. 78
Cassia L. 231
Cassine L. 145
Cassytha L. 585
Catharanthus G.Don. 383
Catunaregam Wolf. 300
Cayratia Juss. 153
CELASTRACEAE 145
Celosia L. 521
Celtis L. 568
Centaurea L. 331
Centella L. 292
Centipeda Lour. 331
Centratherum Cass. 332
CERATOPHYLLACEAE 585
Ceratophyllum L. 585
Cestrum L. 433
CHENOPODIACEAE 526
Chenopodium L. 526
Chionachne R.Br. 669
Chloris Sw. 670
Chlorophytum Ker-Gawl. 606
Chloroxylon DC. 138
Chrysopogon Trin. *nom. cons.* 671
Cicer L. 182
Cissampelos L. 62
Cissus L. 154
Citrullus Schrad. ex Eckl. & Zeyh. 275
Citrus L. 134
Clematis L. 54
CLEOMACEAE 73
Cleome L. 73
Clerodendrum L. 483
Coccinia Wight et Arnott 276
Cocculus DC. 64
COCHLOSPERMACEAE 76
Cochlospermum Kunth. 76
Coelachne R.Br. 674
Coix L. 675
Coldenia L. 675
Colebrookea J.E. Smith 407
Colocasia Clusium ex Fabricius 627
COMBRETACEAE 248
Combretum Loefl. 250
COMMELINACEAE 611
Commelina L. 611
CONVOLVULACEAE 413
Convolvulus L. 415
Conyza Less. 333
Corchorus L. 119
Cordia L. 411
Coriandrum L. 292
Coronopus Smith 70
Cosmos Cav. 336
COSTACEAE 596
Costus L. 596

Crotalaria L. 183
Croton L. 545
Cryptolepis R.Br. 399
Cryptostegia R.Br. 400
Cucumis L. 277
CUCURBITACEAE 275
Curculigo Gaertn. 599
CUSCUTACEAE 431
Cuscuta L. 431
Cyanoglossum L. 408
Cyanotis D.Don 616
Cyathocline Cass. 337
Cymbidium Swartz. 590
Cymbopogon Spreng. 675
Cynodon Rich. 676
Cynoglossum L. 408
CYPERACEAE 636
Cyperus L. 639
Cyrtococcum Stapf 677

Dactyloctenium Willd. 678
Dalbergia L.f. 188
Datura L. 434
Delonix Rafin 239
Dendrobium Swartz. 591
Dendrocalamus Nees 678
Dendrophthoe Mart. 538
Dentella Forst. 301
Derris Lour. 188
Desmodium Desv. *nom. cons.* 189
Dicanthium Willem. 679
Didymocarpus Wall. 457
Digera Forssk. 522
Digitaria Heist. ex Fabric. 680
DILLENIACEAE 55
Dillenia L. 55
DIOSCOREACEAE 602
Dioscorea L. 602
Diospyros L. 371
Diplocyclos (Endl.) Post & Kuntze .. 278
Dipteracanthus Nees emend.
Bremek. 468
DIPTEROCARPACEAE 95
Dodonaea Mill. 157
Dolichos L. 196
Dregea E. Mey 395
Drosea L. 245
DROSERACEAE 245
Drymaria Willd. 87
Duabanga Buch.-Ham. 261
Dumasia A.P. De Candolle 197
Duranta L. 485

EBENACEAE 371
Echolium S. Kurz 468
Echinochloa P. Beauv. 682
Echinops L. 338
Eclipta L. 338
EHRETIACEAE 411
Ehretia R.Br. 412
Eleocharis R.Br. 648
ELATINACEAE 92
Elephantopus L. 339
Eleusine Gaertn. 684
Elytrophorus P. Beauv. 685
Embelia N. Burman 366
Emblica Gaertn. 546
Emilia Cassini 341
Enydra DC. 341
Eragrostiella Bor. 685
Eragrostis Wolf 686
Eranthemum L. emend. Radlk. 469
Erechtites Rafin. 343
Erigeron L. 342
ERIOCAULACEAE 634
Eriocaulon L. 634
Erycibe Roxb. 415
Erythrina L. 197
Eucalyptus L' Herit 255
Eulophia R.Br. 592
Eupatorium L. 343
EUPHORBIACEAE 540
Euphorbia L. 547
Evolvulus L. 416
Exacum L. 403

FABACEAE 172
FAGACEAE 584
Ficus L. 573
Fimbristylis Vahl. *nom. cons.* 650
Fioria Mattei 98
Firmiana Marsili 112
Fissendocarpa (Haines) Bennet 270
FLACOURTIACEAE 78
Flacourtia L'Herit. 80
Flemingia Roxb. ex Ait. *nom. cons.* 198
FLINDERSIACEAE 138
Fuirena Rottb. 653

FUMARIACEAE 69
FUMARIA L. 69

GALINSOGA Ruiz. & Pav. 344
GARDENIA J. Ellis 301
GARUGA Roxb. 140
GENTIANACEAE 402
GEODORUM Jacks. 592
GERANIACEAE 128
GERANIUM L. 128
GESERIACEAE 457
GLINUS L. 286
GLIRICIDIA H.B.K. 200
GLOBBA L. 595
GLOCHIDION J. & G. Forst 554
GLORIOSA L. 607
GMELINA L. 486
GNAPHALIUM L. 345
GOMPHRENA L. 523
GOUANIA L. 147
GRANGEA Adanson 346
GREVILLIA R.Br. 537
GREWIA L. 122
GUIZOTIA Cass. 347
GYMNEMA R.Br. 396

HACKELOCHLOA O.Ktze. 691
HAMELIA Jacq. 302
HEDYOTIS L. 302
HELICTERES L. 112
HELINUS E.Mey ex Endl. 147
HELIOTROPIUM L. 408
HEMIADELPHIS Nees 470
HEMIDESMUS R.Br. 400
HEMIGRAPHIS Nees 470
HETEROPOGON Pers. 692
HEWITTIA Wt. & Arn. 418
HIBISCUS L. *nom. cons* 99
HOLARRHENA R.Br. 385
HOLOPTELEA Planch. 568
HOPPEA Willd. 404
HYBANTHUS Jacq. *nom. cons.* 75
HYDRILLA Rich. 587
HYDROCHARITACEAE 587
HYDROCOTYLE L. 293
HYDROLEA L. *nom. cons.* 406
HYDROPHYLLACEAE 406
HYGROPHILA R.Br. 472
HYMENODICTYON Wall. 307
HYPERICACEAE 92
HYPERICUM L. 92
HYPOXIDACEAE 599
HYPTIS N.J. Jacquin *nom. cons.* 498

ICHNOCARPUS R. Brown 386
IMPATIENS L. 132
IMPERATA Cyr. 693
INDIGOFERA L. 201
IPOMOEA L. 418
IRESINE P. Browne 524
ISCHAEMUM L. 694

JACARANDA Juss. 458
JACQUEMONTIA Choisy 426
JASMINUM L. 375
JATROPHA L. 554
JUNCACEAE 620
JUNCUS L. 620
JUSTICIA L. 473

KIRGANELIA Juss. 556
KLEINHOVIA L. 113
KNOXIA L. 307
KYDIA Roxb. 101

LABLAB Adans. 206
LAGASCEA Cav. 347
LAGERSTROEMIA L. 262
LAGGERA Sch.-Bip. ex Koch 348
LAMIACEAE 496
LANNEA A.Rich 160
LANTANA L. 487
LATHYRUS L. 206
LAUNAEA Cass. 349
LAURACEAE 535
LAVANDULA L. 499
LECYTHIDACEAE 259
LEEACEAE 155
LEEA Royen ex L. 155
LEMMA L. 628
LEMNACEAE 627
LENS Mill. 208
LENTIBULARIACEAE 456
LEONOTIS R.Br. 499
LEPIDAGATHIS Willd. 474
LEUCAS R.Br. 500
LILIACEAE 605

LIMONIA L. 134
LIGUSTRUM L. 376
LIMNOCHARITACEAE 630
LIMNOPHILA R.Br. *nom. cons.* 441
LINACEAE 126
LINDENBERGIA Lehm. 442
LINDERNIA All. 444
LINUM L. 126
LIPPIA L. 488
LITSEA Lamk. *nom. cons.* 536
LOBELIACEAE 363
LOBELIA L. 363
LORANTHACEAE 538
LUDWIGIA L. 270
LUFFA Mill. 278
LYTHRACEAE 260

MACROTYLOMA (Wt. & Arn.) Verdc. ... 208
MADHUCA Gmelin 367
MALLOTUS Lour. 557
MALVACEAE 96
MALVASTRUM A. Gray *nom. cons.* 101
MANGIFERA L. 161
MANIHOT Mill. 557
MANILKARA Adans. 369
MARSDENIA R.Br. 397
MARTYNIACEAE 462
MARTYNIA L. 462
MAZUS Lour. 450
MECARDONIA Ruiz & Pavon 451
MELASTOMATACEAE 260
MELASTOMA L. 260
MELIACEAE 141
MELIA L. 143
MELILOTUS P. Miller 209
MELOCHIA L. 114
MENISPERMACEAE 62
MENYANTHACEAE 405
MERREMIA Dennstedt ex Endl. 427
MEYNA Roxb. ex Link. 308
MICROMERIA Benth. 503
MIKANIA Willd. 351
MILIUSA Leschen 60
MILLETTIA W. & A. 210
MIMOSACEAE 164
MIMOSA L. 170
MIMUSOPS L. 371
MIRABILIS L. 512
MITRAGYNA Korth. 309

MOLLUGO L. 288
MOMORDICA L. 280
MONOCHORIA Presl. 610
MORACEAE 571
MORINGACEAE 163
MORINGA Adans. 163
MORUS L. 583
MUCUNA Adans. 211
MUKIA Arnott 281
MURDANNIA Royle *nom. cons.* 617
MURRAYA L. *nom. cons.* 135
MUSACEAE 597
MUSA L. 597
MYRSINACEAE 366
MYRTACEAE 254

NECHAMANDRA Planc. 588
NELSONIA R.Brown. 477
NELUMBONACEAE 67
NELUMBO Adans. 67
NEPETA L. 504
NEOLAMARCKIA Bosser. 309
NERIUM L. 387
NERVILIA Comm. ex Gaud. 593
NICOTIANA L. 435
NYCTAGINACEAE 510
NYCTANTHES L. 377
NYMPHAEACEAE 65
NYMPHAEA L. 65
NYMPHOIDES Seguier. 405

OCIMUM L. 505
OENANTHE L. 294
OLACACEAE 145
OLAX L. 145
OLEACEAE 375
ONAGRACEAE 269
OPLISMENUS P. Beauv. 696
OPUNTIA Mill 286
ORCHIDACEAE 590
ORTHOSIPHON Benth. 507
ORYZA L. 697
OTTELIA Pers. 588
OXALIDACEAE 129
OXALIS L. 131

PAEDERIA L. 310
PANICUM L. 698
PAPAVERACEAE 68

PARKINSONIA L. 240
PARTHENIUM L. 351
PASPALIDIUM Stapf. 699
PASPALUM L. 700
PASSIFLORACEAE 273
PASSIFLORA L. 273
PAVETTA L. 311
PEDALIACEAE 461
PEDILANTHUS Neck. ex Poit. 559
PELTOPHORUM Vogel. 240
PENNISETUM Rich. 701
PENTANEMA Cass. 352
PERGULARIA L. 397
PERIPLOCACEAE 399
PERISTROPHE Nees 478
PEROTIS Ait. 703
PERSICARIA Mill. 529
Peucedanum L. 294
PHALARIS L. 705
PHASEOLUS L. 212
PHOENIX L. 622
PHYLA Lour. 488
PHYLLANTHUS L. 560
PHYSALIS L. 436
PIMPINELLA L. 295
PISUM L. 212
PITHECELLOBIUM Mart. 171
PITTOSPORACEAE 83
PITTOSPORUM Banka ex Solander 83
PLECTRANTHUS L'Herit. 507
PLUMBAGINACEAE 365
PLUMBAGO L. 365
PLUMERIA L. 388
POACEAE 656
POGONATHERUM P. Beauv. 706
POGOSTEMON Desf. 508
POLYALTHIA Blume 60
POLYCARPAEA Lamk. 87
POLYCARPON L. 88
POLYGALACEAE 85
POLYGALA L. 85
POLYGONACEAE 528
POLYGONUM L. 533
POLYPOGON Desf. 706
PONTEDERIACEAE 610
PORANA Burm.f. 429
PORTULACACEAE 90
PORTULACA L. 90
POTAMOGETONACEAE 633
POTAMOGETON Linn. 633
POTENTILLA L. 242
POUZOLZIA Gaudich. 567
PRIMULACEAE 366
PROTEACEAE 537
PRUNUS L. 243
PSEUDANTHISTIRIA (Hack.) Hook.f. 707
PSEUDOPOGONATHERUM A.Camus 708
PSIDIUM L. 257
PSORALEA L. 213
PTEROSPERMUM Schreb. *nom. cons.* 115
PUERARIA DC. 214
PUNICACEAE 269
PUNICA L. 269
PUPALIA A.L. Jussieu *nom. cons.* 524
PYGMAEOPREMNA Merr. 489
PYRUS L. 244

QUERCUS A. Camus 584

RANUNCULACEAE 54
RANUNCULUS L. 54
RAUVOLFIA L. 389
RHAMNACEAE 146
RHYNCHOSIA Lour. 214
RHYNCHOSTYLIS Blume emend Hasak. . 594
RICHARDIA L. 311
RICINUS L. 563
RIVEA Choisy 431
ROSACEAE 242
ROSA L. 244
ROSTELLULARIA Reichb. 478
ROTALA L. 264
ROTHIA Pers. 215
ROTTBOELLIA L.f., *nom. cons.* 708
RUBIACEAE 297
RUBIA L. 312
RUBUS L. 245
RUMEX L. 535
RUNGIA Nees. 479
RUTACEAE 132

SACCHARUM L. 709
SACCIOLEPIS Nash. 710
SAGITTARIA L. 629
SALVIA L. 508
SANSEVIERIA Thunb. *nom. cons.* 608
SAPINDACEAE 156
SAPOTACEAE 367

SAUSSUREA DC. 353
SCHIZACHYRIUM Nees 710
SCHLEICHERA Willd. 158
SCHOENOPLECTUS Palla 655
SCOPARIA L. 451
SCROPHULARIACEAE 439
SCURRULA L. 538
SEBASTIANA Spreng. 564
SECURINEGA Comm. ex Juss. 564
SEMECARPUS L.f. 161
SENECIO L. 353
SESAMUM L. 461
SESBANIA Adans. 216
SETARIA P. Beauv. *nom. cons.* 711
SHOREA Roxb. ex Gaertn. 95
SIDA L. 102
SIMAROUBACEAE 138
SMILACACEAE 609
SMILAX L. 609
SOLANACEAE 433
SOLANUM L. 437
SPERMACOCE L. 313
SPERMADICTYON Roxb. 313
SOLANUM L. 437
SOLENA Lour. 282
SONCHUS L. 354
SORGHUM Moench. 714
SPHAERANTHUS L. 356
SPILANTHES Jacq. 357
SPIRODELA Schleiden 628
SPONDIAS L. 162
SPOROBOLUS R.Br. 715
STACHYTARPHETA Vahl. *nom. cons.* 491
STAUROGYNE Wall. 481
STELLARIA L. 90
STEPHANIA Lour. 65
STERCULIACEAE 110
STERCULIA L. 117
STEREOSPERMUM Cham. 458
STREBLUS Lour. emend. Cor. 584
STRIGA Lour. 452
SWIETENIA L. 143
SYMPLOCACEAE 373
SYMPLOCOS Jacq. 373
SYNEDRELLA L. 358
SYZYGIUM Gaertn. 257

TABERNAEMONTANA L. 390
TAGETES L. 358
TAMARICACEAE 91
TAMARIX L. 91
TAMARINDUS L. 241
TECOMA Juss. 459
TECTONA L.f. 492
TELOSMA Coville 398
TEPHROSIA Pers. *nom. cons.* 217
TERAMNUS P. Brown 219
TERMINALIA L. *nom. cons.* 251
THEMEDA Forssk. 716
THESPESIA Soland. ex Corr. 106
THEVETIA L. *nom. cons.* 391
THUNBERGIA Retz. 481
THYSANOLAENA Nees 718
TILIACEAE 118
TONNINGIA Necker ex Juss. 618
TOONA (Endl.) Roemer 144
TORENIA L. 453
TRACHYSPERMUM Link. 295
TRAGIA L. 565
TRAPACEAE 272
TRAPA L. 272
TREMA Lour. 569
TREWIA L. 566
TRIBULUS L. 128
TRICHODESMA R.Br. 410
TRICHOSANTHES L. 282
TRICHURIELLA Bennet 525
TRIDEX L. 359
TRIGONELLA L. 220
TRITICUM L. 719
TRIUMFETTA L. 123
TRIANTHEMA L. 290
TYPHACEAE 623
TYPHA L. 623

ULMACEAE 568
URARIA Desv. 220
URENA L. 108
URGINEA Steinh 608
URTICACEAE 566
UTRICULARIA L. 456

VALLARIS N. Burm. 392
VALLISNERIA L. 589
VANDA W. Jones ex R.Br. 594
VENTILAGO Gaertner 148
VERBASCUM L. 454

VERBENACEAE 482
VERBENA L. 492
VERNONIA Schreb. *nom. cons.* 360
VERONICA L. 455
VERTIVERIA Lem.-Lisanc. 719
VICIA L. 222
VIGNA Savi 223
VIOLACEAE 75
VISCUM L. 539
VITACEAE 152
VITEX L. 493

WAHLENBERGIA Schrad. ex Roth
nom. cons. 363
WALTHERIA L. 118
WENDLANDIA Bartl. ex DC. 316
WOODFORDIA Salisb. 268
WRIGHTIA R.Br. 392

XANTHIUM L. 361

ZANTHOXYLUM L. 137
ZEA L. 720
ZEPHYRANTHES Herb. 599
ZINGIBERACEAE 595
ZINGIBER Boehmer apud
Ladwig *nom. cons.* 596
ZIZIPHUS Mill 149
ZORNIA J.F. Gmelin 224
ZYGOPHYLLACEAE 127