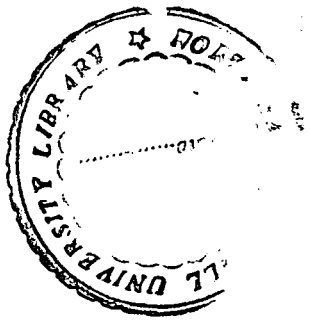
STUDIES ON FLORA AND BIODIVERSITY IN PABITORA WILDLIFE SANCTUARY OF ASSAM IN NORTH EAST INDIA

(In Two Volumes)



By
PRANAB JYOTI BORA

Thesis Submitted in Fulfilment of the requirement
of the Degree of
Doctor of Philosophy in Botany
of North-Eastern Hill University, Shillong

NORTH-EASTERN HILL UNIVERSITY

SHILLONG

CERTIFICATE

I, Mr. Pranab Jyoti Bora, hereby declare that the subject matter of the thesis entitled "Studies on Flora and Biodiversity in Pabitora Wildlife Sanctuary of Assam in North-East India" is the record of work done by me, that the contents of this thesis did not form basis of the award of any previous degree to me or to the best of my knowledge to anybody else, and that the thesis has not been submitted by me for any research degree in any other University/Institute.

This is being submitted to the North-Eastern Hill University for the award of the degree of Doctor of Philosophy in Botany.

(Head) 3/9/99

Head
Department of Botany
School of Life Science
N. E. H. U.
Shillong-793022

(Supervisor) 3/9/99

Dr. Yogendra Kumar
Botany Department
North-Eastern Hill University
Shillong-793022

(Candidate)

ACKNOWLEDGEMENTS

I express my sincere and heartfelt gratitude to my supervisor Dr. Y. Kumar, Department of Botany, NEHU, Shillong, for his able guidance, critical comments and constant encouragement throughout the study period.

I am extremely thankful to Prof. H.N. Pandey, Head, Prof. R.K. Mishra and Prof. P. Tandon, Ex heads of the dept. of Botany for providing necessary laboratory facilities.

I record my gratitude to the P.C.C.F., Wildlife, Assam, the D.F.O. Nagaon Wildlife Division, Range officer and other staff of the Pabitora Wildlife Sanctuary for their kind permission and help to undertake the present study.

Thanks are due to the Dr. T.M. Hynniewta, Deputy Director and the scientific staff of Botanical Survey of India, Eastern Circle, Shillong for their unconditional help in the identification of plants.

I am grateful to Dr. P.B. Gurung, Herbarium Curator, Botany Department, NEHU, for his help at various stages of this work. I would like to express my thanks to all my lab. mates; Dr, K.A. Joy, Dr. J. Augustine, Miss Limasenla and Mr. Lokho Mao for their help.

I am especially grateful to Dr. Babu John, Mr. S. Das Gupta and Mr. R. Kataki for their useful suggestion, discussion and much needed help to complete this work. I would like to express my thanks to Dr. (Miss) B. Bora, Mr. A. Bhattacharjee, Mr. N. Odyou, Mr. H. Choudhery, Mr. A. Jamir, Mr. K. Uppadhya, Mr. P. Law, Mr. C. Lhuid, Mr. B.P. Lyndogh, Mr. S. Goswami, Mr. N. D. Singh, Mr. S. Parida, Mr. J. Baruah, Mr. J. Sarma, Mr. K. Sarma, Mr. T. Singh, Mr. H. Samati, Miss Sangita, Mr. M. Ghos, Mr. Tanoy, Miss Dary, Miss. Mary, Miss Luckily, Miss. Easte

Miss. G. Sarma, Miss. V. Chauhan, Miss. Sangeeta and Miss. Sanghamitra for thier help and cooporation during my studies. The help which I got from Mr. Nripen Nath and his family members, during my field work is gratefully acknowledged. Thanks are also to my friends Mantu, Joyanta, Moon, Bhabadip, Anju, Tiken, Utpal, Pranab, Nitu, Mukesh, Bubu, Partha, Rajib, Sudip, Bipul, Deepan, Jiten, Mintu, Jan, Pal, Basanta and other well wishers and my relatives for their help and support at different stages of this study.

I am very grateful to Mr. Prasanta Bordoloi for providing me with his excellent photographs on wildlife in the sanctuary and Mr. Kumar, Photographer, Botany Dept., NEHU. for his heilping hand in photography work.

I would like to express my thanks to Dr. G.C. Saikia and Mrs. Saikia for their help in the typing the manuscript.

Thanks are also to Dr. U. Shukla, Mr. A.K. Baishya, Mr. Duarah, Mr. B.K. Debnath, Mr. H. Hazarika, Mr. R. Saikia, Mr. R.J. Hazarika, Mr. P.B. Das, Mr. D. Das, Mr. D. Kataki, Mrs. B. Hazarika, Mr. M. Das, Mrs. A. Das and Dr. J. Sarma for their useful suggestions and help.

My heartfelt gratitude to Shrijut K.N. Gayan and Shrijuta Bani K. Gayan for their constant encouragement and blessing.

Last but not the least, I remain gratefully obliged to my parents, brother and a sister who not only shared my difficulties but also extended their support and encouragement throughout the study period.

(Pranab Jyoti Boria)

Department of Botany

NEHU, Shillong-2

CONTENTS

	Pages
CHAPTER-I	
1. GENERAL INTRODUCTION	1
CHAPTER-II	
2. STUDY AREA:	
a) Geography	4
b) Topography	4
c) Geology and Soil	5
d) Climate	5
e) History of the area	7
CHAPTER-III	
3. BOTANICAL STUDIES:	
a) History of Botanical Exploration	8
b) Present Study and Presentation of Flora	9
CHAPTER-IV	
4. VEGETATION AND WILDLIFE:	
a) Vegetation and Forest type	12
b) Wetland vegetation	17
c) Factors affecting the vegetation	19
d) Wildlife of the sanctuary	22
e) Fodder Plants	22
CHAPTER-V	
5. SYSTEMATIC ENUMERATION	24

CHAPTER-VI

6. PHYTOGEOGRAPHY:

a) Floristic Approach: 762

i) Synopsis of the flora 762

ii) Comparison and Affinities of the flora 767

b) Phytogeographical Approach 769

CHAPTER-VII

7. IMPORTANT PLANTS:

a) Economically Important Plants 772

b) Medicinal Plants 774

c) Ornamental Plants 779

d) Wild Relatives of Cultivated Plants 779

f) Endemic and Rare Plants 779

f) Primitive Groups 780

CHAPTER-VIII

8. STATUS OF DIVERSITY 781

CHAPTER-IX

9. PHENOLOGY 788

CHAPTER-X

10. GENERAL CONCLUSION 791

11. BIBLIOGRAPHY 796

12. INDEX

CHAPTER - I

GENERAL INTRODUCTION

Biodiversity is the variety of life and its processes in a given area. It is described in terms of genetic variation within species, the variety of species within a habitat or ecosystem and variety of habitats. It is commonly used to describe the number, variety and variabilities of living organisms. Management of biodiversity require measurement. It is wide spread practice to define and measure biodiversity in terms of genes, species and ecosystem corresponding to three hiearchically related level of Biodiversity. Species diversity is generally regarded as the most natural one around which to consider whole diversity. Species diversity is commonly used as a synonym of species richness which is the number of species in a given site or habitat. Species are also primary focus of evolutionary mechanism and the origin and extinction of species are the principal agent in governing biological diversity. It represents the basic sources of our economic development by providing essential bioresources.

The recent years have witnessed the destruction of our natural vegetation, resources and the environment which would be disastrous for our existence. Therefore, it is essential to protect and conserve the biological diversity as natural resources for prosperity. The protected areas like Biosphere Reserves, National Parks, Wildlife Sanctuaries and various Reserve forests can play a vital role in the Conservation of Biodiversity and maintaining natural ecosystems. Biological diversity is so complex that its conservation can not be measured without scientific analysis on specific elements and processes. The documentation and proper assessment of the diversity is needed in the respective areas and habitat. The study of plant

genetic resources in a smaller area is more valuable in biodiversity conservation strategies.

The North Eastern region is considered as one of the richest Biodiversity centres of the Indian sub continent. According to Armen L. Takhtajan it is the primary centre of origin of Angiosperms i.e. the cradle of flowering plants. Moreover the North-East Region is considered as the home of many wild relatives of cultivated plants. Hence the taxonomic research in the natural protected areas like Wildlife Sanctuary which would represent as the local flora in this region is more essential. In this regards the publication of "Flora of British India" by J.D. Hooker (1872-1897) and the regional flora i.e." Flora of Assam" by Kanjilal *et al.* (1934-1940) has initiated the taxonomic study in our country and in North East Region in particular. Taxonomic study on smaller areas has more importance in comparison with the larger areas. Smaller areas can be explored thoroughly with critical spot observations to find the additional and exotic species which has been left out from the earlier large floras for various reasons. Due to the growing fragmentation of habitats and ecosystems because of various developmental programmes many earlier reported taxa become extinct, endemic, rare and endangered in nature. The necessity to focus the present existence, size, structures and localities of such taxa deserve more importance to study the local flora.

The taxonomic works of the smaller areas in light of revised taxonomic monographic work and recent taxonomic nomenclature it is important to establish of local herbaria. Moreover the local herbaria will be the centre of the sources of the informations for the local educational, allied research institutions and finally helpful for the revisionary work of the state, regional and national flora of our country.

Floristically, this recently declared wildlife Sanctuary is totally unexplored. The regional flora of Assam (Kanjilal *et al.* 1934-40) deal with the flora of composite Assam and it has strong bias towards woody species. Thus, herbaceous and monocot flora are almost excluded in this work (Kanjilal *et al.*) except Gramineae. Though the Eastern Circle of Botanical Survey of India has given much emphasis on the flora of North-eastern region as a whole, no collection appear to have been made from Pabitora Wildlife Sanctuary.

Keeping in mind the above facts the Pabitora Wildlife Sanctuary in Assam is selected to evaluate its plant diversity from taxonomic point of view as the main objective. The sanctuary has the immense importance in the international level for having the highest density of Indian one horned Rhinoceros in the world. The vegetation of sanctuary provides a ideal habitat for these herbivores including other wild lives. The wetlands of the sanctuary has drawn the international attraction due to its suitability for the migratory birds and other fish fauna beside Rhinoceros. As the wild lives are entirely depend on the vegetation and floristic compositions of the sanctuary, the present studies will be helpful for the management and conservation programs including the other related benefits.

PLATE-1



a) A Birds eye view of Pabitora Wildlife Sanctuary.



b) One of the watch towers inside the sanctuary.

CHAPTER - II

STUDY AREA

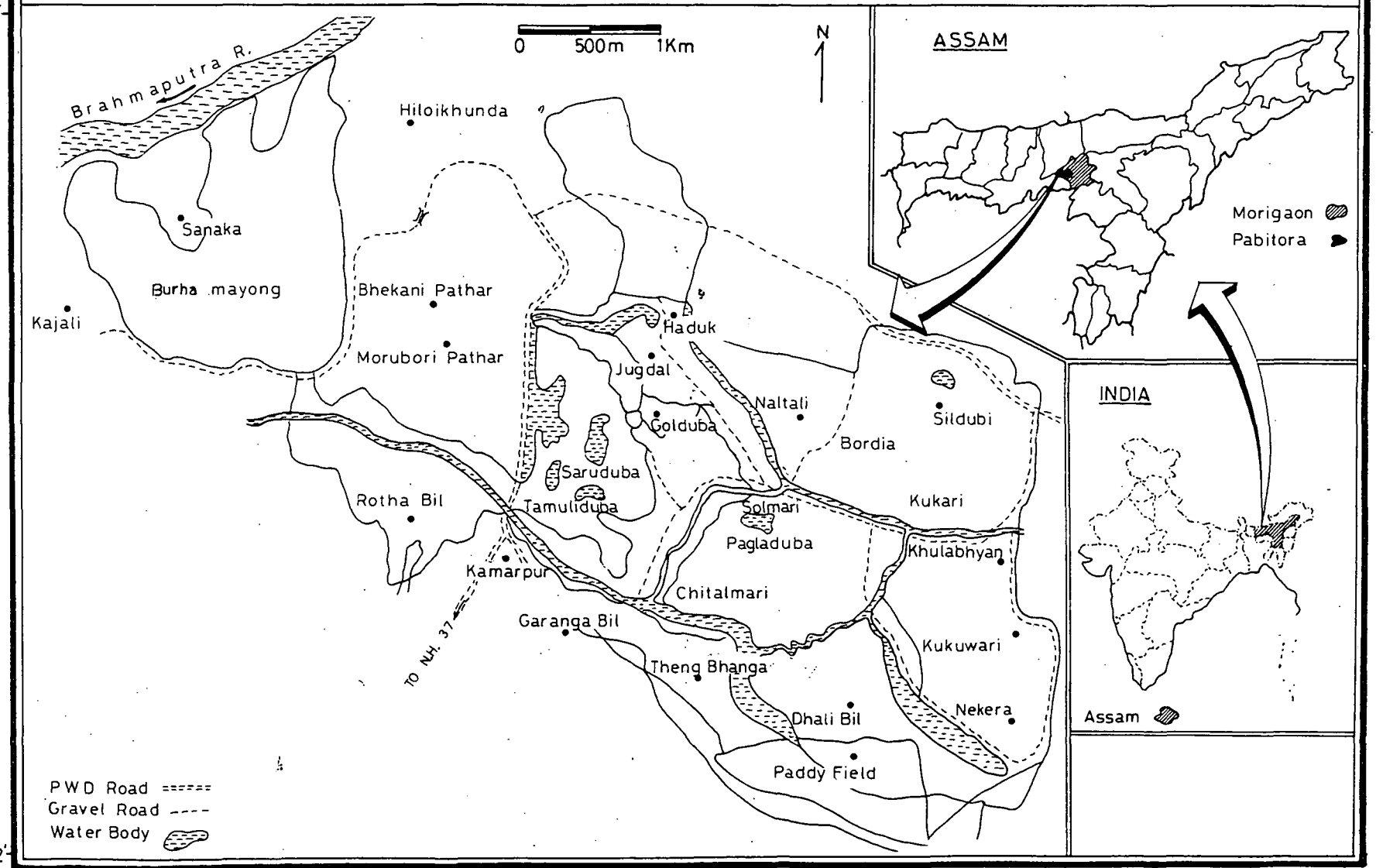
a) Geography:

The Pabitora Wildlife Sanctuary occupies a total area of 3880.62 hectares in the western corner of the Morigaon District. It lies between 26°12`- 26°15`N latitude and 92°2`- 92°5` E longitude under the jurisdiction of Nagaon Wild Life Division, Nagaon (Map 1 & 2) It is 52 km away from the capital of Assam (Dispur) towards north east and 45 km from the district head quarter Morigaon on western side. The north-east side of the sanctuary i.e. from Raja Mayong and the south-east side i.e. from Kamarpur are connected by two gravel roads to Morigaon. The only connecting road to the capital of Assam intersect the sanctuary towards north-south direction. Another gravel road from Raja Mayong side passes through the foot hill of Burha Mayong Hill area of the sanctuary towards north-west and touches the meeting place between the river Brahnmaputra and one of its tributary i.e. Kolong suti. Generally the sanctuary is surrounded by 22 revenue villages and cultivated fields.

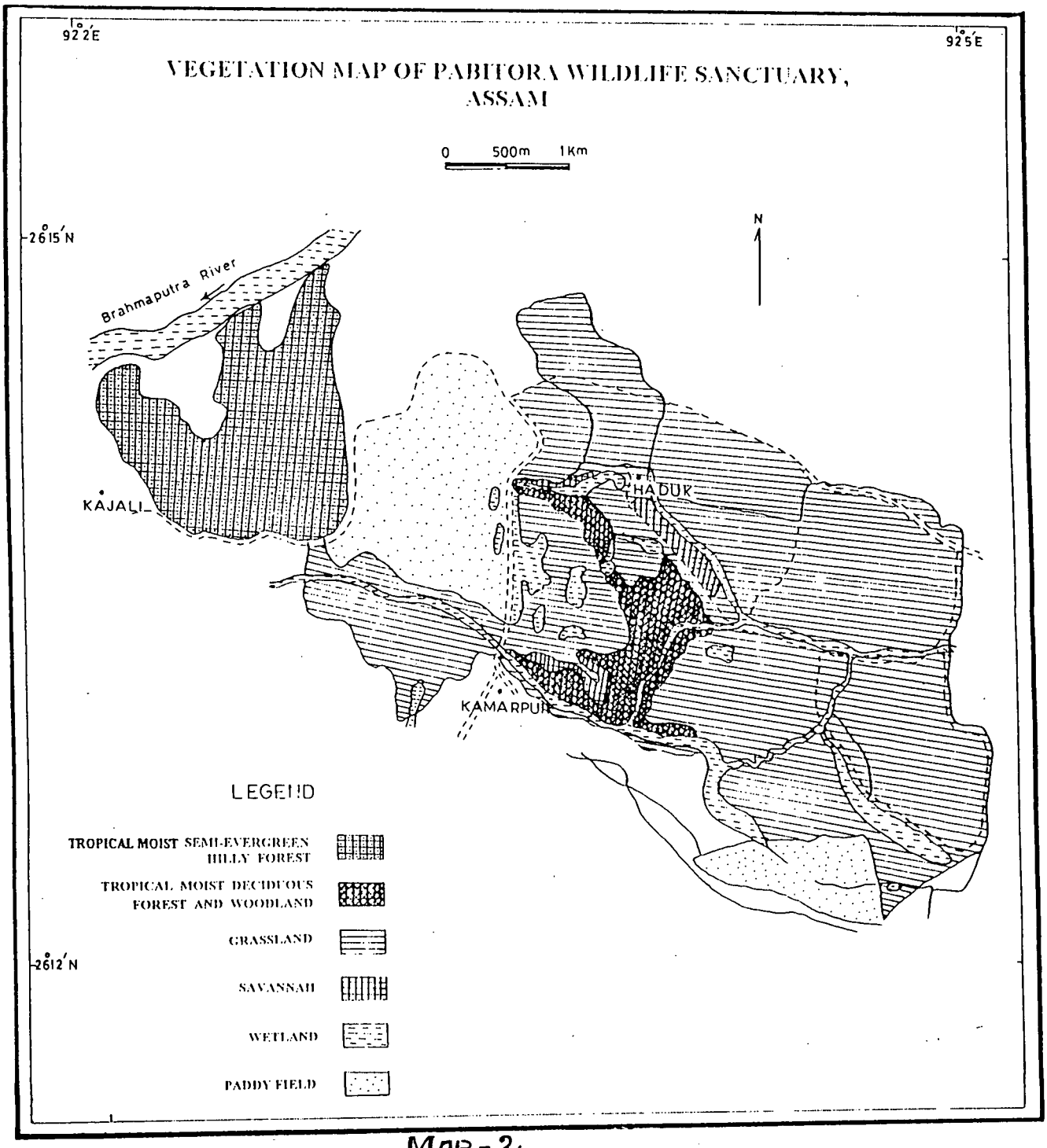
b) Topography:

The sanctuary comprises the alluvial plains and hilly range between the Mighty river Brahmaputra towards north and one of its tributary Kalong towards south of the sanctuary. The hilly range of the sanctuary is completely separated from the plains towards north-western corner. A numbers of large and small water bodies locally called as Bil, Duba, Jan viz. Haduk, Garanga, Chitalmari, Solmari etc. are running through the alluvial plains. These are filled with water during rainy season and inundating almost all area and make

PABITORA WILDLIFE SANCTUARY, ASSAM



MAP -1


92°2'E
92°5'E
VEGETATION MAP OF PABITORA WILDLIFE SANCTUARY, ASSAM
0 500m 1Km
26°15'N
N
Brahmaputra River
KAJALI
HADUK
KAMARPUR
LEGEND
TROPICAL MOIST SEMI-EVERGREEN HILLY FOREST
TROPICAL MOIST DECIDUOUS FOREST AND WOODLAND
GRASSLAND
SAVANNAH
WETLAND
PADDY FIELD
26°12'N

MAP - 2

the area flood prone. A number of high lands and small forest patrolling roads, cannels etc. are intersecting the plains. The hilly range is consisting of various undulating, small to very large masses of rocks and stones, horizontally sloping down to the east.

c) Geology and Soil:

Geologically the present study area is recent origin and belongs to the Archaean Group. The area is in the Brahmaputra Valley of Assam and present configuration of which is the result of uplift and subsidence of different blocks of the Precambrian crystalline autochthon - the remnant of which is now represented by the Mikir Hills (Assam) and Shillong Plateau (Meghalaya). The geological formation consists of Recent newer or low level alluvium of clay, sand, silt and shingle and followed by Pleistocene older or high level alluvium of clay, coarse sand, shingle, gravel and boulder deposits.

The soil is mainly alluvial in nature. The soil texture is clay loam in the plain forest and sandy loam in the hilly forest of the sanctuary. The upper horizon of entisols are of light to dark gray in colour. The inceptisols are formed from the sediments deposited by the river system. The soil of swampy and water logged area are rich in peat deposition. The soil is acidic in nature and pH varies from 5.34-5.95. Organic Carbon ranges from 2.09-3.65 percent. Total Kieldahl Nitrogen (TKN) varies from 0.39-0.47 percent. Available Phosphorus varies from 7.64-10.13 percent. The percent of Organic Carbon, TKN and Available Phosphorus are comparatively less in the hilly forest area than the plain forest area of the sanctuary.

d) Climate:

The climate is monsoonal type which creates tropical humid weather over the region. The area is warmer in summer and cool in winter. The year can be

Table 1: Monthly average temperature (°) for the period of 1995-1998

MONTHS	1995		1996		1997		1998		Average	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
JANUARY	23.1	11.8	23.3	13.4	23.6	12.4	22.3	13.0	23.1	12.6
FEBRUARY	25.9	14.1	27.3	15.7	23.9	13.7	26.7	14.5	25.9	14.5
MARCH	30.9	18.8	30.0	19.7	30.8	19.1	28.6	17.5	30.1	18.8
APRIL	31.3	21.8	34.4	25.3	29.5	20.8	30.4	22.0	31.4	22.5
MAY	31.1	25.7	30.5	23.4	30.6	23.8	33.1	25.1	31.3	24.5
JUNE	32.2	25.8	32.2	25.4	31.8	25.8	30.9	25.1	31.8	25.5
JULY	31.8	26.0	32.5	26.7	32.8	26.6	31.9	26.4	32.3	26.4
AUGUST	32.6	26.3	32.5	26.3	33.3	26.4	32.3	25.8	32.7	26.2
SEPTEMBER	31.4	25.8	34.8	25.8	31.1	25.0	32.1	25.8	32.4	25.6
OCTOBER	30.0	24.3	31.6	23.9	30.5	22.4	31.4	25.4	30.9	24.0
NOVEMBER	27.9	20.2	27.9	19.8	28.4	18.6	28.5	20.0	28.2	19.6
DECEMBER	22.4	12.9	25.5	13.6	23.1	14.5	25.3	13.6	24.0	13.6

Table 2: Monthly average Relative Humidity (%) for the period of 1995-1998

MONTHS	1995		1996		1997		1998		Average	
	Morn.	Even.	Morn.	Even.	Morn.	Even.	Morn.	Even.	Morn.	Even.
JANUARY	90	69	89	73	87	67	90	73	89	71
FEBRUARY	84	60	77	55	85	58	76	53	81	57
MARCH	64	56	72	55	71	47	68	51	69	52
APRIL	73	60	67	57	77	65	78	65	74	62
MAY	77	70	83	72	78	70	80	69	80	70
JUNE	86	81	85	75	83	77	87	79	85	78
JULY	88	82	86	80	84	79	89	81	87	81
AUGUST	85	78	82	81	81	82	87	82	84	81
SEPTEMBER	88	84	81	80	85	83	85	84	85	83
OCTOBER	86	77	80	79	81	79	84	80	83	79
NOVEMBER	86	78	84	77	86	78	85	79	85	78
DECEMBER	92	82	90	79	91	83	93	77	92	80

Table 3: Monthly average Rainfall (mm) for the period of 1995-1998

MONTHS	1995	1996	1997	1998	Average
JANUARY	000.3	000.3	000.5	000.8	000.5
FEBRUARY	000.4	001.1	000.8	000.9	000.8
MARCH	000.9	001.2	001.0	003.8	001.7
APRIL	004.5	001.5	006.6	025.3	009.5
MAY	005.0	014.5	007.8	008.8	009.0
JUNE	014.2	008.0	008.4	025.8	014.1
JULY	024.2	011.6	010.5	008.3	013.7
AUGUST	011.7	027.2	012.2	008.7	015.0
SEPTEMBER	010.2	005.4	013.1	007.3	009.0
OCTOBER	000.7	005.5	000.6	006.3	003.3
NOVEMBER	001.3	000.0	000.2	000.3	000.5
DECEMBER	000.1	000.0	001.7	000.0	000.5

broadly divided into Winter, Pre monsoon or Summer and Monsoon.

The winter season where foggy days are more and rainfall is less is considered from December to February which is followed by hot and dry summer ending by May. Monsoon i.e. the rainy season with cloudy weather, heavy rainfall, high humidity is started from June to September. During the study period (1995-1998) the mean minimum and maximum temperature were 12.6°C and 32.7°C respectively (Table 1). The mean relative humidity in morning and evening were 92% and 83% respectively (Table 2) and the mean minimum and maximum rainfall were 000.5 mm and 014.1 mm respectively (Table 3) during the study period. The number of rainy days are 164, 173, 188 and 180 in 1995-1998 accordingly.

e) History of the area:

Since the time immemorial Pabitora and its surrounding areas i.e. Mayong are famous for its indigenous magical practices with Tantra and Mantra which are generally practiced by the local medicine man i.e. "Bez". But due to various reasons these are slowly disappearing from the present society and are confined to within some Bez only for which they are dependent on the surrounding vegetation. In the historic ages the area was under the jurisdiction of Mayong Kingdom. There are many believes regarding the name PABITORA among the local people. According to some, Pabitora was the beloved daughter of one king of Mayong which died in premature age and one part of the kingdom was named as PABITORA in the memory of his beloved daughter. According to another believe Pabi-Tora means the Eastern-Star of the ancient Assam Kingdom "PRAGJYOTISHPUR". Thus the whole area has a strong historical background.

Initially the present Pabitora was the natural grazing reserve area. It was declared as the Protected Reserve Forest on 18th November 1971 covering an area of 1584.76 hectares by Govt. Notification no. For ¦ Sett ¦ 542 ¦ 65 ¦ 54. Later the area converted into a Wildlife Sanctuary covering an area 3883.00 hectares including additional proposed area with a view to protect and conserve chiefly the Indian one horned Rhinoceros and migratory birds along with other wild lives (vide Govt. Notification no. FWR ¦ IG ¦ 87 ¦ 39 and provisionally declared on 16th July 1987).

At present Pabitora Wildlife Sanctuary covers a total area of 3880.62 hectares including the proposed forest hilly area under the sanctuary and declared in the beginning i.e. March 1998 by the state government (Govt. Notification No. FWR ¦ IG ¦ 87 ¦ 39).

CHAPTER - III

HISTORY OF THE BOTANICAL EXPLORATION

The largest systematic outcome of J.D.Hooker i.e. Flora of British India (1872-1897) and the first regional flora i.e. Flora of Assam by Kanjilal *et al.* (1934-1940) had focused the floristic composition of the region. These were concerned with the national and composite Assam which included all seven states of the North-East Region. Before this many naturalist and botanist had initiated the botanical collection from this region. Buchanan-Hamilton (1820), Roxburgh (1820-24, 1832), Wallich (1820-32), Griffith (1847), Robinson (1841), Hooker (1854, 1872-97), Gustav Mann (1863-81), Clarke (1889-98) are among such collectors. N.L.Bor, a forest officer studied the grasses of Assam and published the 5th volume of the Flora of Assam in 1940.

After reorganisation of the Botanical Survey of India in 1956 and establishment of the eastern circle at Shillong, started the taxonomic studies by the prominent scientists in this region.

As far as the state flora of Assam is concerned, apart from the above works the state universities are taking keen interest to undertake the taxonomic studies. The *Flora of Majuli* has been published by M. Islam (1990). Some recent floristic studies of the state which are the outcome of Ph.D. works are *The Angiosperms of Kamrup District* by I.C. Barua (1992), *Systematic Studies on the Dicotyledonous plants of Lakhimpur District* by R. Singh (1993), *Herbaceous plants of Karbi-Anglong District* by S. Sarkar (1993), *Floristic Composition of Tinsukia District* by A.B. Gogoi (1997) etc.

So, far no plant collections record has been found in the previous floristic studies from the present study area. Therefore, as the area is concerned with conservation of natural resources, the study of floristic

composition is important and essential for their proper managment. Keeping this in view present work has been undertaken to explore the area with main emphasis on the floral biodiversity of vascular plants and fodder plants of major wild life of the area since 1995 to 1998.

PRESENT STUDY AND PRESENTATION OF THE FLORA

The present study is the outcome of the intensive field work and studies on the plant elements of Pabitora Wildlife Sanctuary for four years since 1995 to 1998. The study is based on regular field survey at different seasons for the collection and observation of the plants. The method adopted for plant collection and making herbarium are described below in brief.

Method: During collection of plant specimens, the morphological characters which can not be studied from the dried specimens like colour, scent of flowers, fruits, leaves etc. and others like nature, arrangement of plant parts, habit, habitat etc. have been recorded in the field note books in the field itself. Generally plant parts bearing flowers or fruits and along with root systems in case of herbaceous specimens are collected as herbarium specimens. After collection pressing and drying are the next steps. Blotters were used for drying the plant materials which were changed at regular intervals till they were completely dry. Dried specimens then transferred to the ordinary news papers and kept ready for poisoning and mounting by following the routine herbarium practices recommended by Jain & Rao (1977). The specimens are mounted on the standered sized hand made paper (Herbarium sheet) and finally data from field books are transferred to the herbarium labels of the sheets. Specimens were identified and confirmed with the help of Regional Herbarium (ASSAM) of Botanical Survey of India, Eastern Circle at Shillong; NEHU, taxonomy herbarium of lab of Botany Departmental herbarium, recent literatures on floristics and many specimens were confirmed at Central

National Herbarium at Howrah.

Presentation of the flora:

The following plan has been followed for presenting the present flora:

Classification: The families are arranged according to the system of Bentham and Hooker's `Genera Plantarum' (1862-63) with slight modification in splitting of certain families recognized by Hutchinson in his `The Families of Flowering Plants' (ed. 1959, 1973).

Key: For easy identification of taxa i.e. families, genera and species, the dichotomous keys based on simple macroscopic characters have been adopted and grouped as -

1. Key to the divisions
2. Key to the families
3. Key to the genera
4. Key to the species

Nomenclature and Citation: The recent `International Code of Botanical Nomenclature' (1994) and other recent monographic and revisionary works on various taxa are the sources to bring a acceptable and up-to-date nomenclature in the present flora.

Important national flora `The Flora of British India' (Hooker 1872-97) and regional flora viz. `Flora of Assam' (Kanjilal *et al.*, 1934-40), `Flora of Upper Gangetic Plain' (Duthie 1903-22), State floras viz. `The Flora of Tripura State' (Deb, 1981 & 1985), `Forest Flora of Meghalaya' (Haridasan & Rao, 1985 & 1987), Recent National, Regional and Local floras like `Flora India' vols. 1 & 2 (B.S.I. 1993) and vols. 12 & 13 (B.S.I. 1995), `Flora of Madhya Pradesh' (B.S.I. 1997), `Flora of Namdapha' (B.S.I. 1996), `Materials For The Flora of Arunachal Pradesh' (B.S.I. 1996), `Flora of Sikkim' (B.S.I. 1996), 'Flora of Majuli' (Islam, 1990) and `Name changes in Flowering Plants of India and Adjacent regions' (Bennet 1987) have been consulted and cited for the valid scientific name and important synonyms and basionyms.

Arrangement and Description: The genera under families and species under genera are arranged alphabetically in the flora. For each specimen, citation is followed by description, flowering and fruiting periods, occurrence, distribution and specimen examined including places and field no. accordingly. Important observation if any are also included under notes. Vernacular names if available are given along with the citations. The measurements of plant parts are given in the metric system.



CHAPTER - IV

VEGETATION AND WILDLIFE

VEGETATION and FOREST TYPE:

The tropical climate with high humidity and temperature during summer to autumn, heavy rainfall during monsoon period are influential on the vegetation pattern of the sanctuary. The vegetation types of this sanctuary is determined mainly by edaphic, biotic and natural factors. As a whole the area is flood prone and the flood changes the vegetation pattern time to time and even introducing new species in the sanctuary.

The vegetation of the sanctuary can be broadly grouped into two types as

A. Tropical Alluvial Plain Vegetation

B. Tropical Moist Semievergreen Hilly Forest.

The main differences between Tropical Alluvial Plain Vegetation and Tropical Moist Semievergreen Hilly Forest type are as follows:

The vegetation pattern of these two types are different. The first one is alluvial plain area, mostly dominated by grasses viz *Imperata cylindrica, Saccharum spontaneum, Slerostachya fusca, Vetiveria zizanioides* etc. and deciduous trees like *Albizia procera, Bombax ceiba, Lagerstroemia reginae, Trewia nodiflora* etc. in the woodland zones. The second one i.e. moist semievergreen forest is completely hilly area and consisting of quite mixed, divers & rich in floristic compositions. The presence of trees viz. *Careya arboreya, Celtis tetranda, Diospiros variegeta, Melia azadirach, Pterospermum acerifclium* etc. and the bamboo viz *Lendrocalumus hamiltonii* are the characteristic elements in this of forest. These both types can be described as follows:

A. Tropical Alluvial Plain Vegetation:

The altitude of this area is about 80 m above sea level. The area is inundated during monsoon and subjected to the floods. The vegetation of alluvial plain area can be grouped into -

1. Moist Deciduous forest and woodland
2. Grassland and Savannah
3. Swampy vegetation.

1. Moist Deciduous forest and woodland:

This type is dominated by many deciduous trees, whereas middle canopy is occupied by some shrubs and tall herbaceous plants. The ground vegetation becomes rich during the rainy seasons. The dominant top canopy trees are *Albizia procera, Alstonia scholaris, Bombax ceiba, Lagerstroemia reginae, Trewia nudiflora* etc. Some of these dominant tree species are also found in pure stand formation of following types-

i) **Albizia - Lagerstroemia** association: Where *Albizia procera* associates with trees viz. *Lagerstroemia reginae, Lannae coromandelica, Streblus asper, Trewia nudiflora, Zizyphus mauritiana* etc. (Plate 2: a).

ii) **Trewia - Lagerstroemia - Albizia** association: Where *Trewia nudiflora* assocites with trees viz. *Lagerstroemia reginae, Albizia procera, Litsea monopetala, Streblus asper* etc. (Plate 2: b).

iii) **Lagerstroemia - Triewa - Steblus** association: Where *Lagerstroemia raginae* associates with trees viz. *Triewa nudiflora, Streblus asper, Barringtonia acutangula, Bombax ceiba, Litsea monopetala* etc. (Plate 2: c).

iv) **Barringtonia - Lagerstroemia** association: Where *Barringtonia acutangula* associates with plants viz. *Lagerstroemia raginae, Bombax ceiba, Syzygium cumini* etc.

PLATE-2



a) A stand of ***Albizia procera*** (Roxb.) Benth., in the plain forest area of the sanctuary.



b) A stand of ***Triewa nudiflora*** Linn. , in the plain forest area of the sanctuary.

Pl - 2

PLATE-2

c)



c) A stand of ***Lagerstroemia reginae*** Roxb., in the plain forest area of the sanctuary.

The middle canopy is not very dense and continuous. It is composed of dominant shrubs like *Antidesma acidum, Ardisia sclanacea, Catunaregam uliginosa, Leea indica, Litsea monopetala, Litsea salicifolia, Polyalthia suberosa, Psidium guajava, Zizyphus mauritiana* etc. and tall rhizomatous herbs viz. *Alpinia nigra* and *Costus specisous*.

The climbers like *Cissus rependa, Ichnocarpus frutescens, Mikania micrantha, Myriopteron paniculata, Parabaena sagittata, Smilax perfoliata, Thunbergia grandiflora* etc. are climbers which climb on shrubs and trees.

The different seasons regulates the ground floras. The ground vegetation is mainly composed by the herbaceous members of the families viz. Asteraceae, Euphorbiaceae, Febaceae, Rubiaceae, Solanaceae, Poaceae etc. and with terrestrial Pteridophytic ferns and Orchids. The undershrubs growing in this stratum are *Abutilon indicum, Cassia occidentalis, Cassia tora, Melochia corchorifolia, Sida rhombifolia, Solanum myricanthum, Solanum torvum, Triumfetta rhomboidea, Urena lobata* etc.

The weeds viz. *Ageratum conyzoides, Alternanthera sessilis, Ammania multiflora, Croton bonplandianum, Eragrostris tenella, Eupatorium odoratum, Euphorbia hirta, Fimbristylis dichotoma, Gnaphalium luteoalbum, Heliotropium indicum, Mikania micrantha, Polygonum barbatum, Rotala rotundifolia, Xanthium strumarium* etc. represent the ground vegetation.

2. Grassland & Savannah:

The grassland vegetation occupies the major part and play an important role in the sanctuary. It is the ideal habitat for the one horned Rhinoceros and other herbivores. The seasonal burning under forest managment practices and browsing are keeping the grassland in a serial stage. The grasses are low to tall *ca* 3 meter long and dense. The dominant grasses are *Imperata*

cylindrica, Panicum auritum, Phragmites karka, Polytoca digitata, Saccharum spontaneum, Sclerostachya fusca, Setaria glauca, Vetiveria zizanioides etc. The dominant grasses are also found in the pure formation of following types-

i) **Vetiveria - Imperata** association: Where *Veteveria zizancides* associates with other grasses viz. *Imperata cylindrica, Neyraudia reynaudiana, Panicum repens, Sclerostachya fusca* etc. (Plate 3: b)

ii) **Sclerostachya - Vetiveria - Imperata** association: Where *Sclerostachya fusca* associates with other grasses viz. *Vetiveria zizanioides, Imperata cylindrica, Dactyloctenium aegypticum, Desmostachya bipinnata, Neyraudia reynaudiana* etc.

iii) **Imperata - Saccharum** association: Where *Imperata cylindrica* associates with other grasses viz. *Saccharum spontaneum, Cynodon dactylon, Paspalum scrobiculatum, Sclerostachya fusca, Setaria glauca, Vetiveria zizanioides* etc.

iv) **Saccharum - Phragmites** association: Where *Saccharum spontaneum* associates wiht other grasses viz. *Phragmites karka, Arundo donax, Echinochloa crusgalli, Imperata cylindrica, Paspalidium geminatum* etc. (Plate 3: c).

The flora of the grassland mainly dominated by herbaceous leguminous plants. The chief associates of the grasses are *Alysicarpus vaginalis, Ammania multiflora Atylosia goensis, Atylosia scarabaeoides, Crotolaria humifusa, Desmodium caudatum, Desmodium gangeticum, Desmodium triflorum, Flemingia lineata, Euphorbia hirta, Mimosa pudica* etc.

The shrubs viz. *Antidesma acidum, Barringtonia acutangula, Bridelia stipularis, Catunaregam uliginosa, Mallotus philippensis, Zizyphus mauritiana* etc. are scattered in the grassland and form the savannah in the sanctuary (Plate 4: a & b).

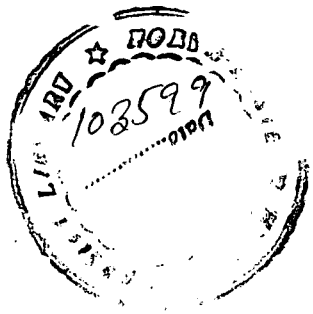


PLATE-3



a) A view of grassland vegetation in the plain alluvial area of the sanctuary.



b) ***Vetiveria zizanioides*** Nash, dominant within the grassland vegetation.

PLATE-3



c) A close view of ***Saccharum spontaneum*** Linn., within the study area.

PLATE-4



a) Photograph showing the savannah vegetation in the plain area of the sanctuary.



b) A close view of savannah vegetation within the sanctuary.

3. Swampy vegetation:

A number of low laying marshy areas localy known as Duba, Jan, Nala etc. are scattered throughout the sanctuary and forming the swampy vegetation (Plate 5: a). The area remains under water continuously for a long period. The most common trees and shrubs species in these habitats are *Antidesma acidium, Barringtonia acutangula, Ficus heterophylla, Glochidion multiloculare, Syzygium cumini* etc. The rhizomatous and tuberous plants viz *Alpinia nigra, Colocasia esculanta, Costus speciosus* etc. are some common associates of the swampy vegetation. The grasses like *Phragmites karka, Saccharum spontaneum* etc. are dominant in the swampy areas. Some common aquaqtic members like *Eichhornia crassipes, Euryale ferox, Hydrilla verticillata, Ipomoea aquatica, Ludwigia adscendens, Monochoria vaginalis, Pistia stratiotes, Trapa natans, Vallisneria spiralis* etc. are common in these water bodies.

B. Tropical Moist Semievergreen Hilly Forest:

The altitude of this area ranges from 80 m to 350 m above sea level. The mighty river Brahmaputra is passing through the northern side of this area and play a major role in the floristic composition of the forest. This type of forest is composed of deciduous trees as well as evergreen tree species. The hilly forest is quite divers and rich in floristic composition (Plate 6: a & b). The trees are clothed with epiphytes and the forest are rich with lianas. The bamboos mainly *Dendrocalamus hamiltonii* forms discontinuous patches usually on the topmost zones of the hill range. The undergrowth of the bamboo forest is commonly occupied by *Costus speciosus, Curcuma aromatica* etc. The common trees and shrubs are *Artocapus lakoocha, Careya arborea, Celtis tetranda, Lieseyrcs variegeta, Ficus benghalensis, Ficus geniculata,*

PLATE-5



a) A view of swampy vegetation in the sanctuary.



b) Photograph showing ***Phragmites karka*** Trin. ex Steud., tall grass along water bodies.

PLATE-6



a) An overview of the hilly forest of the sanctuary, extending upto the river Brahmaputra.



b) Another overview of the hilly forest of the sanctuary.

PLATE-7



a) Photograph showing a lianas (***Bauhinia scandens*** Linn.) in the hilly forest of the sanctuary.



b) A overview of bamboo forest (***Dendrocalamus hamiltonii*** Nees & Arn. ex Munro.) in the hilly forest.

PLATE-7



c) Photograph showing the epiphytes clothing the tree trunk of ***Terminalia bellirica*** (Gaertn.) Roxb.in the sanctuary.

Harpullia cupanoides, Lagerstroemia parviflora, Melia azadirach, Oroxylum indicum, Pterospermum acerifolium, Sapindus mukorossi, Sterculia villosa, Terminalia bellirica, Zanthoxylum rhatsa etc.

The woody climbers viz. *Bauhinia scandens, Butea parviflora, Byttneria grandifolia, Cayratia pedata, Combretum acuminatum, Combretum alatum, Gouania tiliaefolia, Tetrastigma lanceolarium* etc. are present which climb on shrubs, trees and over rocks. These are common and found on forest floor also of the hilly area.

The herbaceous flora is rich during the rainy season and are represented by tall rhizomatous herbs like *Phrynium capitatum, Zingiber chrysanthum, Zingiber zerumbet* etc., aroids like *Amorphophallus bulbifera, Colocasia esculenta, Rhaphidophora hookeri* etc. and other herbs viz. *Biophytum sensitivum, Chlorophytum arundinaceum, Forrestia hookeri, Linum usitatissimum, Murdannia elata, Plantago asiatica* etc.

Helixanthera ligustrina, Macrosolen cochinchinensis, Macrosolen psilanthus, Tolypanthus involucratus and *Viscum monoicum* are the common semi stemparasitic plants on trees like *Catunaregam spinosa, Dillenia indica, Ficus benghalensis, Mallotus philippensis* etc.

The epiphytes like *Dischidia benghalensis, Dischidia rafflesiana, Drynaria quercifolia, Hoya parasitica, Microsorum punctatum, Microsorum superficiale, Pyrrosia adnascens* etc. are perched over the tree trunks.

WETLAND VEGETATION

The wetlands are transitional habitats in between aquatic and terrestrial ecosystem. It includes rivers, streams, lakes, ponds, marshes etc. which may be natural or artificial and permanent or temporary. In the study area the wetland ecosystem is natural one. These wetlands support various types of flora and fauna in the sanctuary. The wetland of the area play a

major role in maintaining hydrological regimes and in flood control along with its biological diversity. The wetlands of Assam constitute 1.29 % of the total geographical area of the state. The presence of wild animals like Rhinoceros, Buffalo, Avifaunas, Fishfauna etc. proves existing of wetlands in Pabitora Wildlife Sanctuary and attract the international importance for the conservation of this keystone ecosystem.

A number of water bodies locally known as Bil, Duba, Nala etc. (Plate 8: a & b) have intersected the plain forest of the sanctuary and maintain many submerged and swampy saturated areas throughout the sanctuary. During rainy season almost all these bodies are full of water and water level decreases slowly as winter begins. These habitats are the sources of food materials for many herbivores and provide shelter as well as breeding places for the avifauna, fishfaunas and other aquatic lives.

In the wetlands hydrophytic plants growing in and around the habitats, constitute the food plants for the wildlives. Most of the plants are also source of vegetable as well as important from medicinal point of view for human beings. The flora and vegetation in wetlands of the sanctuary can be categorized as follow:

1. **Free floating association:** The plant species representing this category include like *Eichhcrnia crassipes, Lemna pauciccstata, Fistia stratiotes, Trapa natans* etc.

2. **Suspended association:** This category includes the rootless submerged plants like *Utricularia aurea.*

3. **Submerged attached association:** The plants which are submerged but attached to the ground are under this category and represented by plants like *Hydrilla verticillata, Ottelia alismoides, Potamogeton crispus, Vellisneria spiralis* etc.

4. **Floating attached association:** The plant specimens which are

PLATE-8



a) A water body (Chitalmari bil) passing through the sanctuary.



b) Another water body (Gar-kharag jan) within the sanctuary.

PLATE-8



c) Photograph showing the aquatic vegetation in the sanctuary.



d) ***Euryale ferox*** Salisb. in blooming.

floating by their upper parts constitue this category. These include plants like *Euryale ferox, Ipomoea aquatica, Ludwigia adscendens, Nymphaea nouchali, Nymphaea pubescens* etc.

5. Swampy assotiation: These plants grow in the saturated marshy or swampy areas and mainly dominated by *Aeschynomene indica, Alpinia nigra, Alternanthera philoxeroides, Fimbristylis dichotoma, Hydrolea zeylanica, Mariscus compactus, Monochoria hastata, Phragmites karka, Polygonum hydropiper, Ranunculus scleratus, Saccharum spontaneum, Veronica anagalis* etc. Moreover some shrubs or trees like *Antidesma acidum, Barringtonia acutangula, Lagerstroemia raginae* etc. are common in the swampy areas.

FACTORS AFFECTING THE VEGETATION

The vegetation of an area is greatly influenced by the various factors. The vegetation of the Pabitora Wild Life Sanctuary is mainly regulated by Natural and Biotic factors along with Abiotic factors. These are discussed in brief as below.

Natural factors: Among the natural factors Flood and Wind play important role.

1. **Flood:** Flood is one of the common and main factor which has greater influence on the vegetation of the sanctuary. During monsoon almost all the areas are inundated as the water level of all water bodies and mighty river Brahmaputra are raised due to heavy rain fall which causes the flood in the area and effect the vegetation (Plate 9: a-c). Moreover the flood play an important role in maintaining present plant community structure, disseminating propagules and introducing new species to the area. The prevention for entering some weeds like *Lantena camera* into the sanctuary is the another positive effect of the flood whereas they are growing vigorously outside of the sanctuary. It provides and support the wetland habitats in the area.

PLATE-9



a) A scene of devastating flood inundating major plain area of the sanctuary.



b) Photograph showing road communication cut off due to flood.

2. **Wind:** Due to changing temperature in the atmosphere, wind storm and occasional thunder shower occur during summer in the area. Occasionally the high velocity of wind uproots the trees, shrubs and destroy the flowers and immature fruits, thus affecting the vegetation in the area.

Biotic factors: Among biotic factors the influence of fire, browsing and grazing and humans are the major factors affecting the vegetation as well as wildlife of the sanctuary.

1. **Fire:** Seasonal forest burning practices is common in the plain grassland and forest of the sanctuary. It is practiced by the forest department mainly for getting fresh clumps of grasses for the wild herbivores. But at the same time it causes severe damage to the herbaceous flora as well as young seedlings of various shrubs and trees in the sanctuary (Plate 9: d).

2. **Browsing and Grazing:** Though the area is protected only for the wild lives, the domestic animals of the nearby villages affect the vegetation by grazing and browsing. These domestic animals prefer the young twigs, branches, tubers etc. of plant species which sometimes cause damage to particular plants.

3. **Human:** The human activities are the most affective biotic factors effecting the vegetation and wildlife of the sanctuary, as the area is surrounded by villages. The Hilly forest which is recently included under the sanctuary has badly affected due to selective illegal felling of many valuable timber plants, fire woods and over exploitation of medicinal as well as economically important plants. Likewise the wetland diversity is also gradually decreasing due to the illegal fishing in the plain areas of the sanctuary. Besides, the poaching activities chiefly for the small horn of

PLATE-9



c) Photograph showing the grassland mostly submerged under flood water.



d) Seasonal burning inside the sanctuary.

PLATE-9



e) Photograph showing the complete infestation of young vegetation by *Mikania micrantha* Kunth.

Rhinos, the giant animal is killed. This also indirectly affect the vegetation of the sanctuary.

4. **Weeds and Pests:** The weeds viz *Eupatorium odoratum, Mikania micrantha* etc. (Plate 9: e) and parasite like *Cuscuta reflexa* suppressed the growth and cause damage to the many valuable plant species in the sanctuary. Moreover various types of insects and parasitic fungi cause damage to many economically important plants.

WILDLIFE OF THE SANCTUARY

Pabitora Wildlife Sanctuary harbours the highest density of Indian one horned Rhinoceros in the world. The sanctuary is rich in avifauna (Table 3), about 211 bird species including local and migratory ones contribute to the natural beauty and attract the naturalists during winter seasons. The marshy habitats along with the micro- climate make the area suitable for avifauna. Apart from these a number of other wildlives like Buffalo (feral), Wild Boar, Leopard, Civat Cat, Python, Cobra etc. (Table 2) including various fish fauna, insects, butterflies are contributing to the richness of the biodiversity in the sanctuary. The present statistics of the three major wild animals in the sanctuary on the basis of 1995 Census, Assam Wildlife Division are given in Table-1.

The major wild animals are usually distributed in the plain area of the sanctuary. But the hilly forest area of the sanctuary could play an important role providing as an alternative refuge/site during severe flood. The population density of rhinoceros is 1.75 Rhino/sq. km. and if we consider only the plain area as their habitat than the density will be 2.5 Rhino/sq. km.

FODDER PLANTS

The sanctuary with its different habitat ecosystem provides the suitable natural habitat for wildlives. The moist deciduous woodland zone associated with the alluvial grassland, a major portion of the sanctuary is the ideal ecosystem and provide shelter for the herbivores. The grassland and swampy vegetation along with tall grasses in association with deciduous trees are the suitable habitat particularly created by nature for Rhinos. These wetlands are

Table 1: Statistics of the three major wild animal in Pabitora Wildlife Sanctuary.

Animals	Numbers
Rhinoceros (*Rhinoceros unicornis*)	68
Indian Wild Boar (*Sus scrofa*)	125
Wild Buffallo (*Babulus babulis*)	12

Table 2: Common wildlife in Pabitora Wildlife Sanctuary.

Animals	Local Name	Scientific Name
Leopard		*Panthera pardus*
Civet cat		*Viverradeae species*
Jackal	Hial	*Canis aureus*
Mongoose	Neul	*Herpestes species*
Python	Ajagar	*Python molursus*
Indian Cobra	Pheti Sap	*Naja naja*
	Tejpia	*Calotes versicolour*
Indian tree frog		*Polypedates maculatus*
Spipping frog	Jal beng	*Euphlyctis cyanophyctis*
Indian Sawback		*Kachuga tecta*

Table 3: Common birds in Sanctuary.

English Name	Local Name	Scientific Name
1. Little Cormorant	Pani Kauri	*Phalacrocorax niger*
2. Pond Heron	Kanamuchori	*Ardeola grayii*
3. Asian Openbill Stork	Xamuk Bhanga	*Anastomus oscitans*
4. Black-necked Stork	Telia Xareng	*Xenorhynchus asiaticus*
5. Greater Adjutant Stork	Bortokla	*Leptopilos dubius*
6. Lesser Adjutant Stork	Hargila	*Leptopilos javanicus*
7. Pallis's Fishing Eagle	Kura	*Haliaeetus leucoryphus*
8. White Backed Vulture	Xagun	*Gyps bengalensis*
9. Red Jungle Fowl	Jongoli Murgi	*Gallus gallus*
10. White Breasted Waterhen	Dauk	*Amaurornis phoenicurus*
11. Indian Morhan	Dhekor	*Gallinula chloropus*
12. Bronzewinged Jacana	Dolpona	*Metopidius indicus*
13. Red-wattled Lapwing	Balighora	*Vanellus indicus*
14.Yellow-leggedGreen Pigeon	Haitha	*Centropus sinensis*
15. Jungle Owlet	Fesa	*Vanellus vanellus*
16. Rose Ringed Parakeet	Tiya	*Ceryle lugubris*
17. Koel	Kuli	*Alcedo hercules*
18. Golden-backed Woodpecker	Kath Khula	*Dinopium benghalense*
19. Hill Myna	Moina	*Gracula religiosa*
20. House Crow	Kauri	*Corvus splendens*
21. Red-vented Bulbul	Bulbuli	*Pycnonotus cafer*
22. White Wagtail	Balimahi	*Motacilla alba*
23. Baya Weaver	Tokora	*Ploceus philipinus*
24. Indian Myna	Ghar Xalika	*Acridotheres tristis*
25. House Sprarrow	Ghanchirika	*Passer domesticus*
26. Indian River Tern	Gonga Silani	*Eudynamys scolopacea*
27. Spotted-billed Pelican	Chika Bhela/Xaguna Bhela	*Pelecanus philippensis*

PLATE-10



a) A Rhinoceros grazing in the plain forest area of the sanctuary



b) Wild Buffalos and birds as usualy seen in the sanctuary

PLATE-11



c) A Biack-necked Storck seen resting on the tree top.



d) A Spotted-billed Pelican on a flight.

PLATE-13



a) A brightly decorated Lentarn fly on a burned wood piece.



b) An Indian Sawback as seen on the river bank of Brahmaputra.

also ideal habitats for the avifauna, fishfauna and other aquatic lives in the sanctuary.

The major wildlives inhabit mainly in the alluvial plain forest of the sanctuary, so that the plant resources in this area have more impact on the distribution of wildlives.

The under ground corms and tubers of plants like *Alpinia nigra, Asparagus racemosus, Costus specicsus, Colocasia esculanta, Dioscorea bulbifera, Lasia spinosa* etc. are favourable usually for Wild Boar. Birds, squirrels etc. prefer the fruits of *Bridelia stipularis, Ficus benghalensis, Psidium guajava, Syzygium cumini, Ziziphus mauritiana* etc. Major herbivores prefer mainly large number of graasses and herbacious species including foliage of trees and shrubs like *Ficus hispida, Lagerstroemia raginae, Mallotus philippensis, Trewia nudiflora* etc. which are generally prefered during scarcity of other fodder plants.

The favourable food plants of Rhinoceros are grasses viz. *Arundc donax, Cynodon dactylon, Hemarthria compressus, Hymenachne interrupta, Imperata cylindrica, Leersia hexandra, Phragmites karka, Saccharum spontaneum, Sclerostachya fusca, Setaria glauca, Vetiveria zizanioides* etc. Other herbs, sedges, shrubs, climbers include *Alpinia nigra, Amaranthus spinosus, Asparagus racemosus, Chenopodium album, Cleome viscosa, Commelina benghalensis, Cyperus* spp., *Euphorbia hirta, Ipomoea* spp., *Litsea monopetala, Mimosa pudica, Polygonum plebeium, Ricinus communis, Solanum myricanthum* etc. and aquatic plants like *Hydrilla verticillata, Hygroryza aristata, Potamogeton crispus, Vallisneria spiralis* etc.

CHAPTER-V

SYSTEMATIC ENUMERATION

Key to the Divisions

1a. Vascular plants without seeds — PTERIDOPHYTA

1b. Vascular plants with seeds:

2a. Seeds remain enclosed within the mature carpellary chamber — ANGIOSPERMAE

2b. Seeds exposed on the surface of megasporophyll — GYMNOSPERMAE

Key to the classes of Angiospermae

1a. Leaves usually net veined; flowers usually 4-5 merous; embryo with 2 cotyledons; vascular bundles in a ring — A. DICOTYLEDONES

1b. Leaves usually parallel veined; flowers usually 3 merous; embryo with 1 cotyledon; vascular bundles scattered — B. MONOCOTYLEDONES

A. Key to the sub-classes of Dicotyledones

1a. Flowers complete; perianth 2 seriate :

2a. Flowers with free corolla lobes — I. POLYPETALAE

2b. Flowers with fused corolla lobes — II. GAMOPETALAE

1b. Flowers incomplete; perianth 1 or 2 seriate or absent or reduced — III. MONOCHLAMYDEAE

I. Key to the families of Polypetalae

1a. Corolla and stamens hypogynous; sepals free:

2a. Torus usually not expanded into a disk:

3a. Plants aquatic — 5. NYMPHAEACEAE

3b. Plants mostly terrestrial:

4a. Leaves reduced to scale — 13. TAMARICACEAE

4b. Leaves well developed:

5a. Stamens many:

6a. Carpels apocarpus:

7a. Plants herbaceous — 1. RANUNCULACEAE

7b. Plants woody trees or shrubs:

8a. Sepals 5, imbricate — 2. DILLENIACEAE

8b. Sepals 3, valvate — 3. ANNONACEAE

6b. Carpels syncarpus:

9a. Sepals 2; placentas parietal:

10a. Plants herbs; sepals 2-3; fruit capsular — 6. PAPAVARACEAE

10b. Plants shrubs or trees; sepals 3-6; fruit drupe or berry — 9. FLACOURTIACEAE

9b. Sepals 2-6; placentas axile or basal:

11a. Flowers usually unisexual;
staminodes present 15. CLUSIACEAE

11b. Flowers bisexual; staminodes absent:

12a. Calyx lobes imbricate
14. HYPERICACEAE

12b. Calyx lobes valvate:

13a. Stamens free:

14a. Disk present; anthers dehiscing by 2 terminal pores 21. ELAEOCARPACEAE

14b. Disk absent; anthers dehiscing by apical pores or longitudinal slits 20. TILIACEAE

13b. Stamens in bundles:

15a. Anthers 2-celled
18. STERCULIACEAE

15b. Anthers 1-celled:

16a. Stamens monodelphous; style simple
17. BOMBACACEAE

16b. Stamens polydelphous; style branched
16. MALVACEAE

5b. Stamens fewer: 9

17a. Flowers unisexual, 3 merous
4. MENISPERMACEAE

17b. Flowers usually bisexual, 4-5 merous:

18a. Ovary on gynophore 8. CAPPARACEAE

18b. Ovary not on gynophore:

19a. Plants usually woody climber 19. BYTTNERIACEAE

19b. Plants usually erect herbs, shrubs or trees:

20a. Anthers dehiscing by apical pores 10. POLYGALACEAE

20b. Anthers dehiscing by longitudinal slites:

21a. Placentas free central:

22a. Sepals 5 11. CARYOPHYLLACEAE

22b. Sepals 2 12. PORTULACACEAE

21b. Placentas parietal 7. BRASSICACEAE

2b. Torus usually expanded into a disk:

23a. Leaves gland dotted 26. RUTACEAE

23b. Leaves not gland dotted:

24a. Sepals spurred; fruits opening elastically into twisted valves 25. BALSAMINACEAE

24b. Sepals usually not spurred; fruits not opening like as above:

25a. Fruits long capsule, angled 38. MORINGACEAE

25b. Fruits not like as above:

26a. Ovule solitary in each cell:

27a. Leaves usually opposite;
stamens connate at base
23. MALPIGHIACEAE

27b. Leaves alternate or
opposite; stamens free:

28a. Leaves stipulate; stamens
4-5; ovary 2-4 celled
32. RHAMNACEAE

28b. Leaves exstipulate; stamens
more than above; ovary 1-celled
37. ANACARDIACEAE

26b. Ovules 1-more in each cell:

29a. Styles 1-5:

30a. Stamens connate at base:

31a. Leaves usually digitately
or pinnately compound;
stamens 10 24. OXALIDACEAE

31b. Leaves simple; stamens 4-5
22. LINACEAE

30b. Stamens free:

32a. Calyx united; stamens as
many as or double the petals,
often with a basal scale;
fruit a samara
27. SIMAROUBACEAE

32b. Calyx free or united; stamens 10 without basal scale; fruit of 1-3 cocci

35. SAPINDACEAE

29b. Style solitary:

33a. Stamens 4-5:

34a. Stamens alternate with the petals:

35a. Disk present; staminal filaments glabrous

31. CELASTRACEAE

35b. Disk rarely present; staminal filaments hairy below the anthers

30. ICACINACEAE

34b. Stamens opposite the petals:

36a. Plants usually climber with tendrils 33. VITACEAE

36b. Plants not climber, tendrils absent:

37a. Leaf base sheathing; flowers in corymbose cymes; calyx lobes valvate 34. LEEACEAE

37b. Leaf base not sheathing; flowers in panicles; calyx lobes imbricate

36. SABIACEAE

33b. Stamens more than above:

38a. Stamens connate into a tube; fruits capsular, drupaceous 29. MELIACEAE

38b. Stamens usually free; fruits usually drupeceous 28. BURSERACEAE

1b. Corolla and stamens epigynous; sepals united:

39a. Carpel 1; fruit a pod or legume:

40a. Flowers zygomorphic; stamens definite:

41a. Flowers papilionaceous; corolla descending imbricate

39. PAPILIONACEAE

41b. Flowers not papilionaceous; corolla ascending imbricate

40. CAESALPINACEAE

40b. Flowers actinomorphic; stamens usually many

41. MIMOSACEAE

39b. Carpels 1-more; fruit not pod or legume:

42a. Ovary superior:

43a. Plants with tendril; gynophore usually present

51. PASSIFLORACEAE

43b. Plants without tendril; gynophore absent:

44a. Plants succulent; ovary 1-celled

43. CRASSULACEAE

44b. Plants not succulent; ovary 2-many celled:

45a. Leaves in false whorls

56. MOLLUGINACEAE

45b. Leaves opposite or verticillate

47. LYTHRACEAE

42b. Ovary inferior or semi-inferior:

46a. Leaves stipulated:

47a. Plants usually succulent; flowers unisexual — 53. BEGONIACEAE

47b. Plants not succulent; flowers bisexual:

48a. Calyx tube free or adnate to ovary; stamens many — 42. ROSACEAE

48b. Calyx tube adnate to ovary; stamens as many as petals — 58. ARALIACEAE

46b. Leaves exstipulated:

49a. Plants with jointed phylloclades spiny; petals many — 55. CACTACEAE

49b. Plants without phylloclades, not spiny; petals distinct:

50a. Flowers unisexual:

51a. Plants climber with tendril; petals present — 52. CUCURBITACEAE

51b. Plants erect without tendril; petals absent — 54. DATISCACEAE

50b. Flowers usually bisexual:

52a. Plants floating herb; leaves dimorphic — 50. TRAPACEAE

52b. Plants not like as above;

leaves unimorphic:

53a. Fruits crownded by calyx limb:

54a. Ovary 1-2 celled;

ovules solitary — 59. ALANGIACEAE

54b. Ovary 1-many celled; ovules many:

55a. Leaves usually with intramarginal nerves and pellucid glands;

ovules not in 2 whorls — 45. MYRTACEAE

55b. Leaves without intramarginal nerves and glands; ovules in 2 whorls — 48. PUNICACEAE

53b. Fruit without crownd calyx limb:

56a. Flowers in umbels — 57. APIACEAE

56b. Flowers not in umbels:

57a. Fruits winged;

ovary 1-celled — 44. COMBRETACEAE

57b. Fruits not winged;

ovary 1-6 celled:

58a. Plants usually herbs or undershrubs; stamens not more than 10

49. ONAGRACEAE

58b. Plants shrubs or trees;

stamens more than 10

46. LECYTHIDACEAE

II. Key to the families of Gamopetalae

1a. Ovary inferior:

2a. Flowers in involucrate heads — 62. ASTERACEAE

2b. Flowers not in heads:

3a. Leaves usually alternate, rarely opposite:

4a. Corolla zygomorphic — 63. LOBELIACEAE

4b. Corolla actinomorphic — 64. SPHENOCLEACEAE

3b. Leaves opposite or whorled:

5a. Herbs, shrubs or trees; leaves with intrapetiolar stipules — 61. RUBIACEAE

5b. Shrubs or small trees; leaves without intrapetiolar stipules — 60. CAPRIFOLIACEAE

1b. Ovary superior:

6a. Plants leafless parasite — 76. CUSCUTACEAE

6b. Plants with leaves, non parasite:

7a. Flowers actinomorphic:

8a. Leaves opposite:

9a. Plants with milky latex; stamens 4-5; fruits follicle:

10a. Corona and gynostegium present — 71. ASCLEPIADACEAE

10b. Corona and gynostegium usually absent — 70. APOCYNACEAE

9b. Plants usually without milky latex; stamens 2; fruits drupeceous

69. OLEACEAE

8b. Leaves alternate:

(radical in Plantaginacea)

11a. Ovary 1-celled:

12a. Shrubs or small trees

66. MYRSINACEAE

12b. Herbs or undershrubs:

13a. Plants aquatic or marshy leaf base sheathing

72. MENYANTHACEAE

13b. Plants usually terrestrial; leaf base not sheathing

65. PLUMBAGINACEAE

11b. Ovary 1-more celled:

14a. Flowers unisexual

68. EBENACEAE

14b. Flowers bisexual:

15a. Flowers often in scorpioid cymes; style gynobasic

74. *BORAGINACEAE*

15b. Flowers not in scorpiod cymes; style not gynobasic:

16a. Stamens opposite to corolla lobes

67. SAPOTACEAE

16b. Stamens alternate to corolla lobes:

17a. Plants climber or twiner; bracts involucrate 75. CONVOLVULACEAE

17b. Plants usually erect or prostrate; bract not involucrate:

18a. Flowers spicate or capitate; corolla scarious; stamens 4 84. PLANTAGINACEAE

18b. Flowers not spicate or capitate; corolla not scarious; stamens 4-5:

19a. Herbs; anthers opening lengthwise; fruits loculicidal capsule; placentas parietal 73. HYDROPHYLLACEAE

19b. Herbs or shrubs; anthers opening by apical pores; fruits berry; placentas axile 77. SOLANACEAE

7b. Flowers zygomorphic:

20a. Plants usually carnivorous; stamens 2 79. LENTIBULARIACEAE

20b. Plant not carnivorous; stamens 2-4:

21a. Plants usually aromatic; style gynobasic; fruits of 4 achene like nutlets 83. LAMIACEAE

21b. Plants usually not aromatic; style terminal; fruits not like as above:

22a. Fruits elongated capsule; seeds winged — 80. BIGNONIACEAE

22b. Fruits not like as above; seeds not winged:

23a. Bracts conspicuous; stem with swollen nodes; fruits elastically dehiscent — 81. ACANTHACEAE

23b. Bracts minute or absent; stem without swollen nodes; fruits not elastically dehiscent:

24a. Ovules many in each cell; fruit a capsule, rarely berry — 78. SCROPHULARIACEAE

24b. Ovules 1-2 in each cell; fruit a drype or berry — 82. VERBENACEAE

III. Key to the families of Monochamydeae

1a. Ovary inferior or half inferior:

2a. Plants parasitic — 96. LORANTHACEAE

2b. Plants autotrophic:

3a. Plants usually climber; leaves alternate; ovary 2-4 celled — 90. ARISTOLOCHIACEAE

3b. Plants erect; leaves opposite; ovary 1-celled — 93. CHLORANTHACEAE

1b. Ovary usually superior:

4a. Perianth absent:

5a. Placentas basal; fruit a drupe — 91. PIPERACEAE

5b. Placentas parietal; fruit capsular or 1 seeded cocci — 92. SAURURACEAE

4b. Perianth present:

6a. Leaves mostly stipulate:

7a. Stipules ochreate — 89. POLYGONACEAE

7b. Stipules not ochreate:

8a. Ovary 3-celled — 97. EUPHORBIACEAE

8b. Ovary 1-celled:

9a. Style simple or 1 — 98. URTICACEAE

9b. Style branched or 2:

10a. Flowers in heads, disk or hollow receptacles; sap milky — 101. MORACEAE

10b. Flowers not arranged as like above; sap watery:

11a. Herbs or undershrubs, aromatic;

flowers not fasciculate 100. CANABACEAE

11b. Trees or shrubs, not aromatic;

flowers fasciculate 99. ULMACEAE

6b. Leaves exstipulate:

12a. Stamens in 4 whorls; anthers

opening by valves 94. LAURACEAE

12b. Stamens not arranged as

above; anthers not opening by valves:

13a. Stamens connate 86. AMARANTHACEAE

13b. Stamens free:

14a. Plants often withlepidote

or stellateindumentum;

flowers ebracteate 95. ELAEAGNACEAE

14b. Plants not like as above; flowers bracteate:

15a. Calyx lobes valvate; stamens

alternate or opposite the

perianth lobes 85. NYCTAGINACEAE

15b. Calyx lobes imbricate; stamens

opposite the perianth lobes:

16a. Erect herbs; bracteoles

free from the perianth

87. CHENOPODIACEAE

16b. Tiwing herbs; bracteoles

adnate to the perianth

88. BASELLACEAE

B. Key to the families of Monocotyledones

1a. Ovary usually superior:

(Sometimes inferior in Agavaceae and half inferior in Stemonaceae)

2a. Plant body thalloid, minute 119. LEMNACEAE

2b. Plant body diffferentiated into stem and leaves, larger than above:

3a. Perianth absent or reduced to scales:

4a. Inflorescence speadix, fleshy 118. ARACEAE

4b. Inflorescence not like as above:

5a. Flowers subtended by glumaceous bracts:

6a. Culms triquetrous or terete; leaves not ligulate 122. CYPERACEAE

6b. Culms cylindrical or compressed; leaves ligulate 123. POACEAE

5b. Flowers not subtended by glumes:

7a. Plants aquatic herbs 121. POTAMOGATONACEAE

7b. Plants terrestrial shrubs or trees:

8a. Plant often suported by silt roots; stamens many 117. PANDANACEAE

8b. Plants not suported by silt roots; stamens usually 6 — 116. ARECACEAE

Perianth petaloid, at least in part:

9a. Flowers in umbels — 113. SMILACACEAE

9b. Flowers not in umbels:

10a. Inflorescence subtended by spath like leaf sheath — 114. PONTEDERIACEAE

10b. Inflorescence not subtended by spath like leaf sheath:

11a. Perianth mostly petaloid:

12a. Leaves crowded on or at the base of stem, spiny at the apex and on margins — 109. AGAVACEAE

12b. Leaves not arranged and like as above:

13a. Perianth segments 4; stemens 4; ovary 1-celled — 111. STEMONACEAE

13b. Perianth segments 6, rarely 4; stamens 6; ovary 3-celled, rarely 1-celled — 112. LILIACEAE

11b. Perianth usually inner petaloid, outer sepaloid:

14a. Aquatic or marshy herbs; leaf sheath not tubular; placentas basal — 120. ALISMATACEAE

14b. Mostly terrestrial herbs; leaf sheath tubular; placentas axil — 115. COMMELINACEAE

1b. Ovary inferior:

15a. Flowers actinomorphic:

16a. Plants aquatic; ovary 1-celled — 102. HYDROCHARITACEAE

16a. Plants terrestrial; ovary 3-celled:

17a. Plants climber; flowers unisexual; fruits winged — 110. DIOSCOREACEAE

17b. Plants erect; flowers bisexual; fruits not winged — 108. AMARYLLIDACEAE

15b. Flowers zygomorphic:

18a. Median petal modifiedinto labellum; ovary twisted — 103. ORCHIDACEAE

18b. Petals not modified into labellum; ovary not twisted:

19a. Inflorescence mixed spadix; perfect stamens 5 — 107. MUSACEAE

19b. Inflorescence not like as above; perfect stamens 1 or 2:

20a. Anthers 2-celled. — 104. ZINGIBERACEAE

20b. Anthers 1-celled:

21a. Petaloid staminodes shortly connate; ovules many in each cell — 106. CANNACEAE

21b. Petaloid staminodes more or less connate; ovules 1 in each cell — 105. MARANTACEAE

1. RANUNCULACEAE

A. L. de Juss., Gen. Pl. 231. 1789.

Herbs with leaves radical and alternate or shrubs or climbers with opposite leaves. Flowers bisexual, rarely dioecious, actinomorphic, solitary or paniculate, sometimes subtended by an involucre of leaves. Sepals 5-8, sometimes petaloid. Petals 5-more, free, mainly with a nectariferous claw. Stamens many, free, usually in several series. Carpels usually many. Fruit achene, rarely berry like.

The family comprises about 50 genera and 1900 species, distributed mostly in North Temperate and Alpine regions, some in tropical or subtropical areas; 28 genera and 191 species in India; 2 genera and 3 species in the study area.

Key to the genera

1a. Climbing herbs or shrubs; leaves opposite; sepals valvate ..... 1. ***Clematis***

1b. Erect herbs; leaves alternate or whorled; sepals imbricate ..... 2. *Ranunculus*

1. *Clematis* Linn.

Linn., Sp. Pl. 543. 1753 & Gen. Pl. ed. 5. 242. 1754.

About 250 species distributed in subtropical and temperate regions; 32 species in India; one species in the study area.

Clematis cadmia Buch.-Ham. ex Hook. f. & Th. in Fl. Ind. 5. 1855 & in Hook. f., Fl. Brit. Ind. 1: 2. 1872; Rao in Sharma *et al.*, Fl. Ind. 1: 60. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 50. 1996. Fig. 1

Climbing herb. Leaves pinnately compound; leaflets 3-5, *ca* 1.4-4.5 x 0.2-0.8 cm, ovate-oblong to narrow lanceolate, acute, obtuse, oblique at base, entire. Flowers creamy white, axillary, solitary, *ca* 6 cm long, pedicelate; bracts 2, leafy. Sepals *ca* 2 cm long, petaloid, linear oblong, acute, spreading. Petals absent. Stamens *ca* 0.5 cm long. Achenes ovate with long beak.

Fls. & Frts.: February - April.

Occurrence: Rare, in the hilly forest of the sanctuary.

Distribution: North East India, West Bengal, Tropical Himalayas; Myanmar.

Specimen examined: Hiloikhunda; *Bora* 15189 (NEHU).

Notes: Confined to Indo-Burmese region.

2. *Ranunculus* Linn.

(Tourn.) Linn., Syst. ed. 1. 1735.

Herbs; terrestrial or aquatic. Leaves whorled or alternate. Flowers actinomorphic, solitary or few in corymbose panicles. Sepals 3-5. Petals usually 5 with basal gland. Ovule 1. Fruits a head or spike of achenes, smoth, tubercled or spinous.

About 400 species distributed in temperate regions; about 37 species in India; 2 species in the study area.

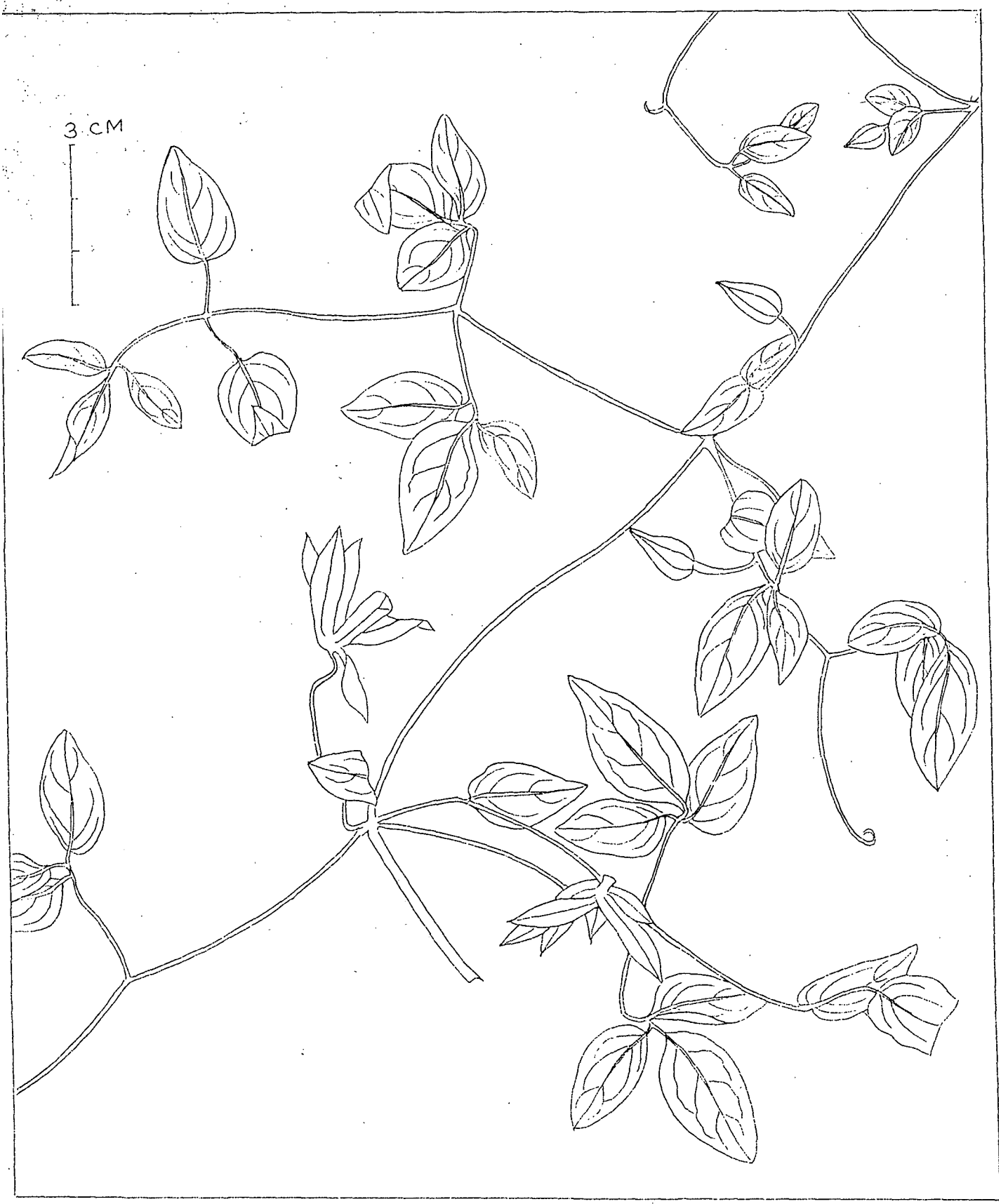


Fig. 1: ***Clematis cadmia*** Buch.-Ham. ex Hook. f. & Th. (Ranunculaceae)

Key to the species

1a. Glabrous herbs; stem succulent; achenes turgid ..... 2. *R. scleratus*

1b. Pubescent herbs; stem not succulent achenes flattened ..... 1. *R. cantoniensis*

1. *Ranunculus cantoniensis* DC., Prodr. 1: 43. 1824; Rao in Sharma *et al.*, Fl. Ind. 1: 117. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 57. 1996. *R. pensylvanicus* Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1: 19. 1872; Kanjilal *et al.*, Fl. Assam 1: 9. 1934.

Erect pubescent herb. Uppermost leaves sessile with sheathing base; radical ones long petiolate, 3 partite; leaflets hairy, lobed and coarsely serrate. Flowers yellow, solitary. Sepals 5, reflexed, hairy. Petals 5, *ca* 0.5 cm long, yellow. Achenes flattened in globose or oblong heads.

Fls. & Frts.: April - June.

Occurrence: Rare, on moist hilly slopes of the area.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Sikkim, Uttar Pradesh; America, China, Nepal.

Specimen examined: Sanaka; *Bora* 15401 (NEHU).

2. *Ranunculus scleratus* Linn., Sp. Pl. 776. 1753; Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1: 19. 1872; Kanjilal *et al.*, Fl. Assam 1: 8. 1934; Rao in Sharma *et al.*, Fl. Ind. 1: 128. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 60. 1996. *R. indicus* Roxb., Fl. Ind. 2: 657. 1832.

Erect succulent glabrous herb; stem hollow, ribbed. Leaves 3 partite, sessile or stalked above; upper ones simple, linear; lower ones obtusely toothed segmented. Flowers yellow, *ca* 1 cm long, solitary, terminal. Sepals 5, elliptic, spreading. Petals 5, yellow. Achenes turgid, many on an oblong head.

Fls. & Frts.: January - March.

Occurrence: Common, in marshy places of the sanctuary.

Distribution: Arunachal Pradesh, Assam, West Bengal, North India; North Temperate countries.

Specimen examined: Haduk, Jugdal; *Bora* 14825 (NEHU).

2. DILLENIACEAE

Salisbury in W. Hook., Parad. Lond. 2(1): t. 73. 1807.

Trees, shrubs or twiners. Leaves mostly alternate, usually with many prominent parallel lateral nerves. Flowers bisexual, actinomorphic. Sepals 5, persistent. Petals 5 or fewer, imbricate. Stamens many, free or connate at base, usually persistent. Carpels free, rarely one. Fruiting carpels dehiscent or baccate.

The family comprises 14 genera and about 400 species, distributed in tropics and subtropical regions; 3 genera and 12 species in India; one genus and two species in the study area.

Dilllenia Linn.

Linn., Sp. Pl. 1: 535. 1753 & Gen. Pl. ed. 5: 239. 1754.

Trees. Leaves broad with channelled petioles. Flowers large, solitary or fascicled. Petals 5, caducous. Anthers linear. Carpels 5-20; ovules many. Pseudocarp indehiscent, enclosed within fleshy sepals. Seeds exarillate.

About 60 species are in Indo-Malayan regions; 7 species in India; 2 species in the study area.

Key to the species

1a. Evergreen tree; flowers white; fruits large, *ca* 6-8 cm in diam. ..... 1. *D. indica*

1b. Deciduous tree; flowers yellow; fruits small, *ca* 2 cm in diam. ..... 2. *D. pentagyna*

1. ***Dillenia indica*** Linn., Sp. Pl. 535. 1753; Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1: 36. 1872; Kanjilal *et al.*, Fl. Assam 1: 10. 1934; Haridasan & Rao, For. Fl. Meghalaya 1: 52. 185; Majumdar in Sharma *et al.*, Fl. Ind. 1: 55. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 62. 1996. "Ou tenga".

Tree; branches spreading. Leaves *ca* 10-30 x 4.0-11.5 cm, elliptic to oblanceolate, acute or acuminate, serrate-dentate, cuneate at the base, nerves prominent beneath: Flowers creamy white, solitary, terminal. Sepals *ca* 5 cm long, ovate fleshy. Petals *ca* 8 cm long, obovate, white. Stamens *ca* 1.5-2.0 cm long in 2 series. Pseudocarps *ca* 6-8 cm in diam., globose or subglobose.

Fls. & Frts.: July - January.

Occurrence: Common, along roadside and near water sources of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Tripura, East India, South India, West Bengal; Malaysia, Myanmar, South China, Sri Lanka, Thailand.

Specimen examined: Burha Mayong, Haduk; *Bora* 15402 (NEHU).

Uses: Fruits edible and timber used for making agricultural implements.

2. *Dillenia pentagyna* Roxb., Pl. Corom. 1: 21. t. 20. 1795; Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1: 38. 1872; Deb, Fl. Tripura 1: 102. 1981; Haridasan & Rao, For. Fl. Meghalaya 1: 53. 1985; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 101. 1996. "Bajiou, Oxi".

Deciduous tree. Leaves *ca* 8-28 x 3.5-11.0 cm, oblanceolate, serrate, coriaceous, glabrous above, glabrescent beneath, shortly petioled. Flowers yellow, clustered in the deciduous branches. Fruits *ca* 2 cm in dim., small, subglobose.

Fls. & Frts.: March - September.

Occurrence: Rare, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Meghalya, Tripura, Uttar Pradesh, West Bengal; China, Malaysia, Myanmar, Sri Lanka.

Specimen examined: Rangamati; *Bora* 15403 (NEHU).

Notes: Timber used for miscellaneous purposes.

3. ANNONACEAE

A. L. de Juss., Gen. Pl. 283. 1789.

Trees, shrubs or climbers. Leaves alternate. Flowers mostly bisexual, variously arranged. Sepals usually 3. Petals often 6 in 2 series, rarely 4 or 3. Stamens many, spirally arranged. Carpels many or few, often free, stipitate in fruit. Seeds arillate.

The family comprises about 122 genera and 1200 species, distributed in lowland evergreen tropical forest of America, Australia and Asia; 24 genera and about 120 species in India; 3 genera and 4 species in the study area.

Key to the species

1a. Carpels confluent into a large syncarpous fleshy fruit; ovules 1 ..... 1. *Annona*

1b. Carpels not confluent into a fruit; ovules 1 or more:

2a. Inner petals bend over the stamens and ovaries; ovules 4 or more .... 2. *Mitrephora*

2b. Inner petals spreading; ovules 1 or 2 ..... 3. *Polyalthia*

1. Annona Linn.

Linn., Sp. Pl. 536. 1753 & Gen. Pl. ed. 5. 241. 1754.

About 120 species distributed in warm regions; 3 species in India; one species in the study area.

Annona squamosa Linn., Sp. Pl. 537. 1753; Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1: 78. 1872; Kanjilal *et al.*, Fl. Assam 1: 43. 1934; Deb, Fl. Tripura 1: 82. 1981; Mitra in Sharma *et al.*, Fl. Ind. 1: 207. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 86. 1996. "Atlash kothal".

Small tree; branches spreading. Leaves *ca* 5-12 x 1.5-2.5 cm, oblong-lanceolate, acute. Flowers yellow, *ca* 2-3 cm long, axillary, solitary or few together. Sepals 3. Petals 6, narrowly oblong, fleshy. Staminal filaments short. Carpels subconnate, confluent into an oviod or globose syncarpus fruit. Fruits tubercled; pulp sweet.

Fls. & Frts.: June - September.

Occurrence: Usually planted along the foot hill, also found as escap.

Distribution: Throughout India; Tropical America.

Specimen examined: Rangamati; *Bora* 15354 (NEHU).

Uses: Fruits edible.

2. *Mitrephora* Hook. f. & Th.

Hook. f. & Th. Fl. Ind. 1: 112. 1855.

About 25 species mainly distributed in tropical Asia; 5 species in India; one species in the study area.

Mitrephora tomentosa Hook. f. & Th., Fl. Ind. 113. 1855 & in Hook. f., Fl. Brit. Ind. 1: 76. 1872; Kanjilal *et al.*, Fl. Assam 1: 38. 1934; Haridasan & Rao, For. Fl. Meghalaya 1: 74. 1985; Mitra in Sharma *et al.*, Fl. Ind. 1: 244. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 95. 1996.

Small tree; branches tomentose. Leaves *ca* 5-18 x 2.5-7.5 cm, oblong-ovate or oblong-lanceolate, acuminate, rounded at base, tomentose beneath; bracts orbicular. Sepals 3, *ca* 0.5 cm long, ovate, connate below. Petals 6 in 2 series, *ca* 3 cm long, laceolate, browny tomentose. Stamens *ca* 1.5 cm long, few. Carpels ventrally furrowed; stigma capitate. Fruits subglobose, tomentose, stalked, 2 seeded.

Fls. & Frts.: May - October.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Meghalaya; Bangladesh.

Specimen examined: Rangamati; *Bora* 15366 (NEHU).

Notes: Probably confined to North-east India and extend upto Bangladesh.

3. *Polyalthia* Bl.

Bl., Jav. Anon. 68. 1830.

Shrubs or trees. Flowers bisexual, axillay or extra-axillary, bracteate, solitary or few together. Sepals 3, valvate. Petals 6 in 2 series. Stamens cuneate. Carpels many; ovules 1 or 2-5. Fruits many carpels berries, stalked, 1-5 seeded.

About 120 species distributed in palaeotropical regions; 12 species in India; 2 species in the study area.

Key to the species

1a. Shrubs; bark rough, corky; leaf obtuse

~~leaf obtuse~~ ..... 2. *P. suberosa*

1b. Trees; bark not rough and corky;

leaf acuminate ..... 1. *P. simiarum*

1. ***Polyalthia simiarum*** (Hook. f. & Th.) Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1: 63. 1872; Kanjilal *et al.*, Fl. Assam 1: 31. 1934; Mitra in Sharma *et al.*, Fl. Ind. 1: 276. 1993; Chowdhery *et al* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 97. 1996. *Guatteria simiarum* Hook. f. & Th., Fl. Ind. 142. 1855.

Tree; branches horizental. Leaves *ca* 15-26 x 6-9 cm, ovate or oblanceolate, acuminate, entire, nerves prominante beneath. Flowers pale yellow, axillary fascicled. Sepals recurved, pubescent outside. Petals linear-lanceolate. Fruits obovoid orang red when ripe.

Fls. & Frts.: July - April.

Occurrence: Rare, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Tripura, Eastern Himalayas, Andamans; Bangladesh, Myanmar.

Specimen examined: Rangamati; *Bora* 15404 (NEHU).

Notes: Probably confined to North-east India and extend upto Bangladesh and Myanmar.

2. ***Polyalthia suberosa*** (Roxb.) Thwaites. Enum. Pl. Zeyl. 398. 1864; Hook. f. & Th. in Hook. f., Brit. Ind. 1: 65. 1872.

Shrub; bark rough, corky, greyish black. Leaves *ca* 2.5-7.5 x 1.0-3.5 cm, oblong-lanceolate, obtuse, entire. Flowers pale yellow, axillary; bracts ovate pubescent. Sepals *ca* 0.2 cm long, ovate, pubescent outside. Petals *ca* 0.5 cm

long, ovate, silky outside. Stamens *ca* 0.1 cm long. Fruits *ca* 0.5 cm in dim., subglobose.

Fls. & Frts.: April - September.

Occurrence: Common, in shady places throughout the sanctuary.

Distribution: Assam, West Bengal, Western Peninsula; Philippines.

Specimen examined: Kamarpur, Thengbhanga; *Bora* 14818 (NEHU).

Uses: Young branches used for tooth brushing.

4. MENISPERMACEAE

A. L. de Juss., Gen. Pl. 328. 1789.

Twining or rarely erect shrubs or trees. Leaves alternate, exstipulate. Inflorescence cymose, paniculate, fasciculate or rarely solitary. Flowers unisexual, dioecious or monoecious, actinomorphic. Male flowers: Sepals in 2-4 series, imbricate; petals 2-3 merous, usually 6, smaller than sepals or absent; stamens usually 6 or 3 or more. Female flowers: Staminodes present or absent; carpels 3 or 6 or 1, free. Ovary superior, 1-celled. Fruit a drupe or achene.

The family comprises about 73 genera and 350 species, distributed in tropical and temperate regions; 20 genera and 43 species in India; 6 genera and 7 species in the study area.

Key to the genera

1a. Carpel 1; staminodes absent:

2a. Sepals 4; petals connate ... 1. *Cissampelos*

2b. Sepals 6-10; petals free ... 5. *Stephania*

1b. Carpels 3 or more; staminodes usually present:

3a. Flowers usually in axillary fascicles or sometimes in short panicles; stamens 9 ..... 4. *Pycnarrhena*

3b. Flowers in cymes or racemes; stamens 6:

4a. Leaves ovate-cordate; style-scar terminal ..... 6. *Tinospora*

4b. Leaves oblong or oblong-lanceolate or peltate; style-scar not terminal:

5a. Leaves oblong-lanceolate, sagittate at base; style recurved ..... 2. *Parabaena*

5b. Leaves peltate or subpeltate; style 2 partite ..... 3. *Pericampylus*

1. *Cissampelos* Linn.

Linn., Sp. Pl. 1031. 1753 & Gen. Pl. ed. 5. 455. 1754.

About 25 species distributed in pantropical regions; one species in India and collected from the study area.

Cissampelos pariera Linn. var. *hirsuta* (Buch.-Ham. ex DC.) Forman in Kew Bull. 22: 356. 1968; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 99. 1996. *C. hirsuta* Buch.-Ham. ex DC., Syst. Nat. 1: 535. 1817. *C. pariera* Linn., Sp. Pl. 1031. 1753; Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1: 103. 1872; Kanjilal *et al.*, Fl. Assam 1: 52. 1934.

Climber; branchlets tomentose. Leaves *ca* 3-12 x 3.5-11.2 cm, ovate-orbicular, acuminate, mucronate, pubescent, palmately nerved; petiole *ca* 3-12

cm long. Flowers greenish yellow, in pendulous cymes. Male flowers: axillary, bracteate, bracteolate; sepals 4, free, hairy; petals 4, *ca* 0.2 cm long; stamens 4. Female flowers: in the axils of bracts; sepals connate below; carpel 1; stigma 3 fid. Fruit a drupe, obovoid, hirsute.

Fls. & Frts.: December - July.

Occurrence: Common, climbing on bushes throughout the sanctuary.

Distribution: North East India India, North and South India; Pantropic.

Specimen examined: Burha Mayong, Thengbhanga; *Bora* 15405 (NEHU).

Uses: Root used for the treatment of snake bite.

2. *Parabaena* Miers

Miers in Ann. Mag. Nat. Hist. II. 7: 39. 1851.

About 6 species distributed in South East Asia; one species in India which occurs in the study area also.

Parabaena sagittata Miers ex Hook. f. & Th., Fl. Ind. 181. 1855; Hook. f., Fl. Brit. Ind. 1: 96. 1872; Kanjilal *et al.*, Fl. Assam 1: 58. 1934; Pramanik in Sharma *et al.*, Fl. Ind. 1: 346. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 102. 1996.

Pubescent climber. Leaves *ca* 10-17 x 4.5-6.0 cm, sagittate or ovate-cordate, acuminate, entire or serrate, tomentose beneath. Flowers white, in axillary dichotomous cymes. Sepals 6, *ca* 0.2 cm long. Petals 6, *ca* 0.3 cm long, obovate, cuneate. Stamens 6. Carpels 3. Drupes globose.

Fls. & Frts.: April - September.

Occurrence: Occasionally, in hilly forest of the sactuary.

Distribution: Arunachal Pradesh, Assam, Tripura, Himalayas; China, Malaysia, Myanmar, Vietnam.

Specimen examined: Dhekiabari; *Bora* 15235 (NEHU).

3. *Pericampylus* Miers

Miers in Ann. Mag. Nat. Hist. II. 7: 40. 1851.

About 3 species distributed in tropical and subtropical Aisa; 2 species in India; one species in the study area.

Pericampylus glaucus (Lamk.) Miers, Interpr. Rumph. Herb. Amboin. 219. 1817; Pramanik in Sharma *et al.*, Fl. Ind. 1: 330. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 102. 1996. *Menispermum glaucum* Lamk., Encycl. Meth. 4: 100. 1797. *Fericampylus incanus* (Colbr.) Miers in Ann. Nat. Hist. ser. 7, 2: 40. 1851; Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1: 102. 1872; Kanjilal *et al.*, Fl. Assam 1: 52. 1934.

Climber; branchlets tomentose. Leaves *ca* 5-10 x 2-8 cm, ovate, orbicular or suborbicular, acute, pubescent, palmately 5 nerved, petiolate. Flowers in 2-3 chotomous cymes. Male flowers: Sepals 6, hairy outside; petals 6, *ca* 0.5 cm long, cuneate; stamens 6, free. Female flowers: Sepals and petals as in male; staminodes 6; carpels 3, *ca* 0.5 cm long. Drupes subglobose.

Fls. & Frts.: April - September.

Occurrence: Common, throughout the sanctuary.

Distribution: Arunachal Pradesh, Assam, Tripura, Eastern Himalayas; China, Malaysia, Myanmar, Vietnam.

Specimen examined: Burha Mayong, Thengbhanga; *Bora* 14767 (NEHU).

4. *Pycnarrhena* Miers

Miers in Ann. Nat. Hist. II. 7:44. 1851.

About 9 species distributed in China, Indo-Malaysia to North Australia; 2 species in India; one species in the study area.

Pycnarrhena pleniflora Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1: 106. 1872; Kanjilal *et al.*, Fl. Assam 1: 58. 1934; Deb, Fl. Tripura 2: 131. 1981; Gangopadhyay in Sharma *et al.*, Fl. Ind. 1: 342. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 104. 1996.Fig. 2

Woody climber. Leaves *ca* 10-15 x 4.5-6.5 cm, ovate-elliptic, bluntly acuminate, entire, nerves prominent beneath. Flowers white, dioecious, in axillary fascicles. Male flowers: Sepals 6 in 2 whorls; petals, 6 deltoid; stamens 6, sessile. Female flowers: Sepals 3; petals 6. Drupes oblong, glabrous.

Fls. & Frts.: April - September.

Occurrence: Rare, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Tripura; Bangladesh.

Specimen examined: Sanaka; *Bora* 15390 (NEHU).

Notes: Probably confined to North-east India and extend upto Bangladesh.

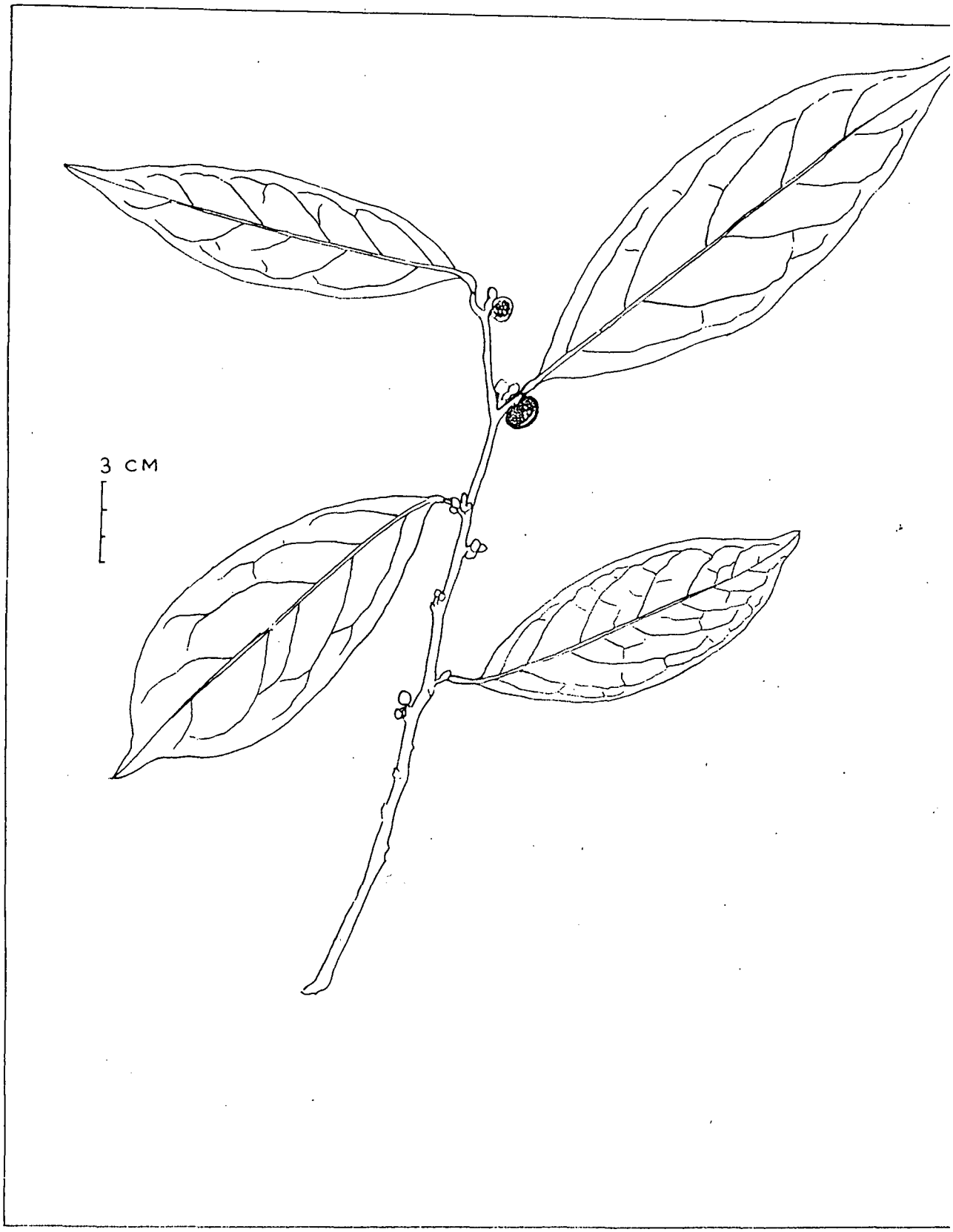


Fig. 2: ***Pycnarrhena pleniflora*** Hook. f. & Th. (Menispermaceae)

5. *Stephania* Lour.

Lour., Fl. Cochinch. 2: 608. 1790.

Climbers. Leaves peltate, palmately nerved. Flowers in axillary umbelliform cymes. Male flowers: Sepals 5-8 in whorls, free, imbricate; petals 3-5, free; stamens 2-6, connate. Female flowers: Sepals 1-8; petals 2-5; staminodes absent; carpel 1; style 3-6 partite. Fruits fleshy drupe, ovoid or obovoid. Seeds curved.

About 35 species distributed in tropical regions; 8 species and 2 varietes in India; 2 species in the study area.

Key to the species

1a. Leaves orbicular, obtuse or subacute; flowers in axillary cymose umbels .... 1. *S. glandulifera*

1b. Leaves ovate, acute; flowers in axillary capitate umbels .... 2. *S. japonica*

1. ***Stephania glandulifera*** Miers in Contrib. Bot. 3: 220. 1871 et Pflanzenr. IV. 94 (Heft 91): 271. 1910; Kanjilal *et al.*, Fl. Assam 1: 52. 1934; Deb, Fl. Tripura 2: 132. 1983; Gangopadhyay in Sharma *et al.*, Fl. Ind. 1: 334. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 105. 1996. *S. rotunda* Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1: 103. 1872.

Climber; root tuberous, yellow inside. Leaves *ca* 3.0-12.5 x 1.5-8.0 cm, orbicular, peltate, obtuse or subacute, mucronate, slightly whitish grey beneath; petiole *ca* 2-9 cm long. Flowers pale yellow, *ca* 0.2-0.3 cm long, in

axillary cymose umbels. Sepals and petals 5 each. Drupes globose, *ca* 0.4 cm in diam., red when mature.

Fls. & Frts.: April - November.

Occurrence: Common, throughout the sanctuary.

Distribution: Arunachal Pradesh, Assam, Manipur, Nagaland, Tripura, Tropical Himalayas, Western Peninsula.

Specimen examined: Burha Mayong, Kamarpur, Thengbhanga; *Ecra* 15005 (NEHU).

2. *Stephania japonica* (Thunb.) Miers, Contrib. Bot. 3: 213. 1871; Gangopadhyay in Sharma *et al.*, Fl. Ind. 1: 335. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 105. 1996. *Cissampelos hernandifolia* Willd., Sp. Pl. 4:861. 1806. *Stephania hernandifolia* (Willd.) Walp., Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1: 103. 1872; Kanjilal *et al.*, Fl. Assam 1: 51. 1934.

Climber; roots tuberous. Leaves *ca* 4.0-12.5 x 4.0-10.5 cm, ovate or deltoid, peltate, acute, mucronate, rounded at base, pubescent beneath, long pedicellate. Flowers greenish yellow, in axillary capitate umbels. Male flowers: Sepals 6, obovate; petals 3, *ca* 0.8 cm long, orbicular; stamens 6. Female flowers: Sepals 3, obovate; petals 3; carpel 1; style 3 lobed. Drupes ovoid or subglobose, *ca* 0.3 cm in diam.

Fls. & Frts.: April - December.

Occurrence: Common, throughout the sanctuary.

Distribution: North East India; Australia, China, Malaysia.

Specimen examined: Burha Mayong, Kamarpur; *Bora* 14801 (NEHU).

Uses: Stem used to cure dislocation of waist.

6. *Tinospora* Miers

Miers in Ann. Hist. Nat. II. 7:38. 1851.

About 40 species distributed in tropical regions; 4 species in India; one species in the study area.

Tinospora cordifolia (Willd.) Miers ex Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1: 97. 1872; Kanjilal *et al.*, Fl. Assam 1: 54. 1934. Pramanik in Sharma *et al.*, Fl. Ind. 1: 347. 1993. *T. palminervis* Wall. ex Miers Contrib. Bot. 3: 31. 1971. *Menispermum cordifolium* Willd., Sp. Pl. 4: 826. 1806. "Shaguni lota".

Deciduous succulent climber; stem with scattered lenticels. Leaves *ca* 3.5.-12.5 x 3-11 cm, ovate or orbicular, acute or acuminate, cordate at the base. Flowers greenish yellow, in axillary or terminal racemes. Male flowers: Fascicled; sepals 6 in 2 series; petals 6, *ca* 0.2 cm long; stamens 6, free. Female flowers: Solitary; staminodes 6; carpels 3. Drupes globose.

Fls. & Frts.: January - May.

Occurrence: Common, in the hilly forest and occasionally scattered in the plain forest of the sanctuary.

Distribution: Throughout India; Myanmar.

Specimen examined: Hiloikhunda, Thengbhanga; *Bora* 15406 (NEHU).

Notes: Probably confined to Indo-Burmese region.

Uses: Stem used for the treatment of bone fracture.

5. NYMPHAEACEAE

Salisbury in C. Konig and Sims, Ann. Bot. 2: 70. 1805.

Aquatic herbs. Flowers bisexual, actinomorphic, solitary, large. Sepals 4-6, free or adnate to torus. Petals many, imbricate. Stamens many. Carpels 8 or more. Ovules 1-many. Fruits follicles or nutlets or berry.

The family comprises 5 genera and about 70 species, distributed in tropical and temperate regions of the world; 2 genera and 7 species in India; 2 genera and 3 species in the study area.

Key to the genera

1a. Plants prickly; leaves elliptic orbicular

..... 1. *Euryale*

1b. Plants not prickly; leaves polymorphic

..... 2. *Nymphaea*

1. *Euryale* Salisb.

Salisb. in Koen. & Sims, Ann. Bot. 2: 73. 1806.

Monotypic genus, distributed in India, Bangladesh, China, Japan, Russia, Taiwan.

Euryale ferox Salisb. in Koen. & Sims, Ann. Bot. 2: 74. 1805; Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1: 115. 1872; Kanjilal *et al.*, Fl. Assam 1: 65. 1934; Deb, Fl. Tripura 2: 123. 1983; Mitra in Sharma *et al.*, Fl. Ind. 1: 427. 1993. *E. indica* Planch. Enum. in Ann. Sc. Nat. III. 19:29. 1853. "Nishor".

Densely prickly aquatic herb. Leaves *ca* 20-120 cm across, orbicular, prickly along veins, pinkish beneath, floating; petioles long, prickly. Flowers pinkish on long prickly peduncles. Sepals 4, concave, erect, prickly out side. Petals oblong. Stamens epigynous. Carpels 8; ovary 8 celled. Berries spongy with crown of persistent sepals.

Fls. & Frts.: August - December.

Occurrence: Common, floating on water bodies of the sanctuary.

Distribution: Assam, Bihar, Kashmir, Manipur, Tripura, Uttar Pradesh, West Bengal; China.

Specimen examined: Tamuliduba; *Bora* 15068 (NEHU).

Uses: Seeds edible.

2. *Nymphaea* Linn.

Linn., Sp. Pl. 510. 1753 & Gen. Pl. ed. 5. 227. 1754.

Aquatic herbs; root stock stoloniferous, creeping. Leaves peltate or subpeltate, long petiolate. Flowers on long peduncles, floating. Sepals 4, free. Petals in many series. Stamens many; outer filaments petaloid with reduced anthers; innermost ones narrow with longer anthers. Carpels many; ovules many; Fruits spongy berry. Seeds enclosed in fleshy aril.

About 50 species distributed in tropical and temperate regions at low altitudes; 6 species in India; 2 species in the study area.

Key to the genera

1a. Leaves glabrous; stamens with sterile appendage ..... 1. *N. nouchali*

1b. Leaves pubescent beneath; stamens without sterile appendage ..... 2. *N. pubescens*

1. *Nymphaea nouchali* Burm. f., Fl. Ind. 120. 1768; Deb, Fl. Tripura 2: 126. 1983; Mitra in Sharma *et al.*, Fl. Ind. 1: 430. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 115. 1996. *N. stellata* Willd., Sp. Pl. 2: 1153. 1799; Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1: 114. 1872; Kanjilal *et al.*, Fl. Assam 1: 64. 1934. Fig. 3

Aquatic herb; corm oviod. Leaves *ca* 9.0-26.3 x 6.5-22.5 cm, elliptic or orbicular, entire or irregularly sinuate toothed, glabrous; petiole *ca* 30-50 cm long, fleshy. Flowers whitish purple on long peduncles. Sepals *ca* 2.0-7.5 x 1.0-5.5 cm, ovate. Petals *ca* 2.0-6.5 x 0.7-1.8 cm, oblong lanceolate. Stamens 20-30 with sterile appendage. Berries globose.

Fls. & Frts.: July - November.

Occurrence: Common, floating on water bodies of the sanctuary.

Distribution: Throughout warmer parts of India; Tropical Asia, Africa, Malaya.

Specimen examined: Tamuliduba; *Bora* 15314 (NEHU).

Uses: Seeds edible.

2. *Nymphaea pubescens* Willd., Sp. Pl. 2: 1154. 1798; Deb, Fl. Tripura 2: 127. 1983; Mitra in Sharma *et al.*, Fl. Ind. 1: 431. 1993. *N. lotus auct. non.* Linn.(1753); Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1: 114. 1872; Kanjilal *et al.*, Fl. Assam 1: 64. 1934.

Aquatic herb; corm nodular. Leaves *ca* 10-35 x 7.2-26.0 cm, ovate elliptic, dentate, pubescent beneath; petiole *ca* 30-50 cm long. Flowers white

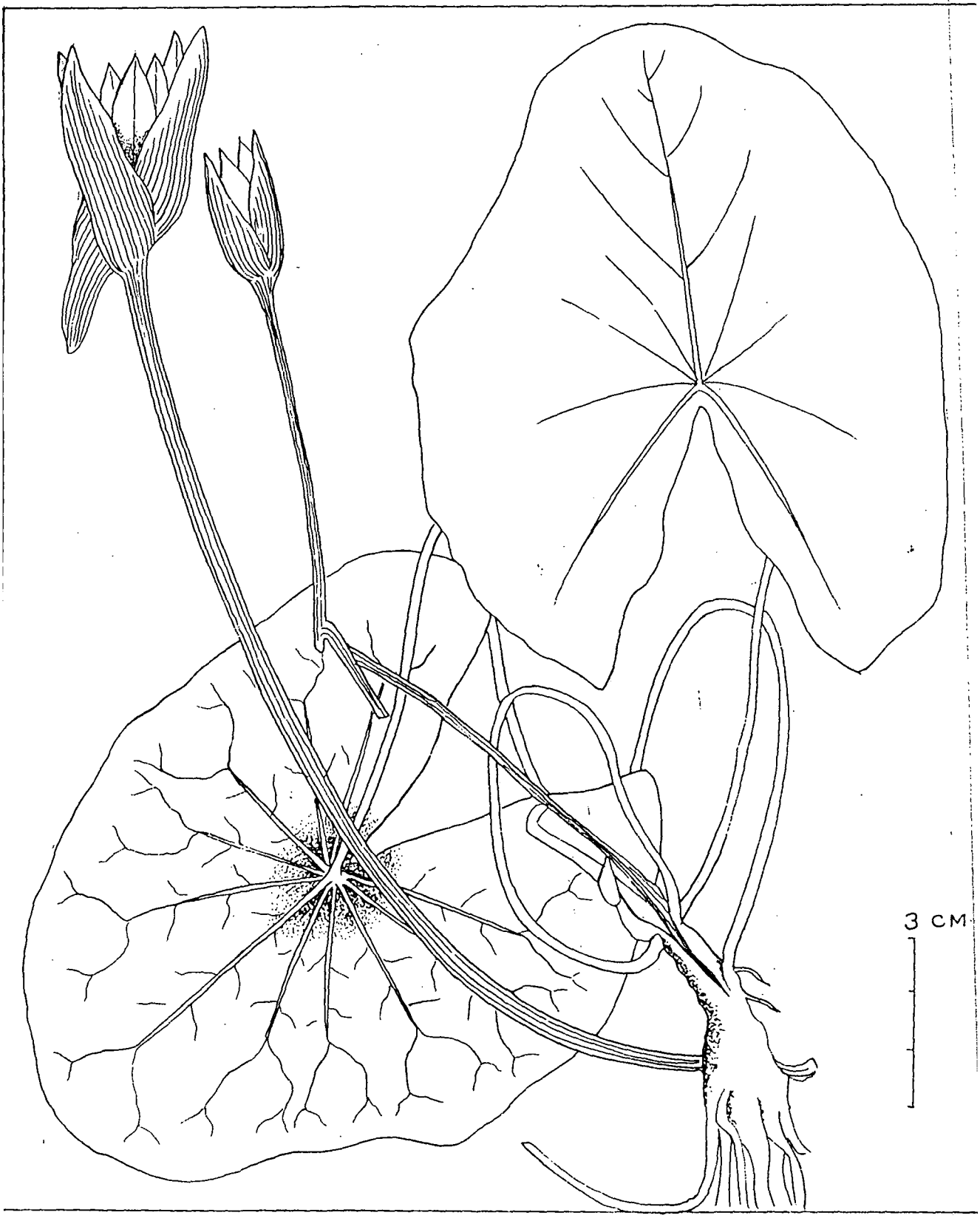


Fig. 3: ***Nymphaea nouchali*** Burm. f. (Nymphaeaceae)

on long peduncles. Sepals ovate-lanceolate, greenish and yellowish strips alternating with each other outside. Petals 10-16, ovate-oblong. Stamens 20-28, *ca* 0.6-2.5 cm long. Berries globose.

Fls. & Frts.: July - November.

Occurrence: Common, floating on the water bodies of the sanctuary.

Distribution: Throughout warmer parts of India; Tropical Asia to Malaya.

Specimen examined: Tamuliduba; *Bora* 15313 (NEHU).

Uses: Seeds edible.

6. PAPAVERACEAE

A. L. de Juss., Gen. Pl. 235. 1789.

Herbs, rarely shrubs or trees, with coloured juice. Leaves alternate, exstipulate. Flowers bisexual, actinomorphic, mostly solitary. Sepals 2-3. Petals 4-6 or more, free, biseriate. Stamens many, free. Ovary superior, usually 1-celled. Stigmas as many as carpels. Fruit a capsule.

The family comprises 26 genera and about 200 species, distributed in temperate and subtropical North America, Aisa, Australia, Europe, South Africa; 5 genera and 27 species in India; one genus and one species in the study area.

Argemone Linn.

Linn., Sp. Pl. 508. 1753 & Gen. Pl. ed. 5. 225. 1754.

An American genus, comprises about 22 species; 3 species in India; one species in the study area.

Argemone mexicana Linn., Sp. Pl. 508. 1753; Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1: 117. 1872; Kanjilal *et al*, Fl. Assam 1: 66. 1934; Debnath & Nayar in Sharma *et al*., Fl. Ind. 2: 2. 1993; Chowdhery *et al*. in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al*.) 1: 117. 1996.

Erect prickly herb; juice yellow. Leaves *ca* 3.0-15.5 x 1.8-6.5 cm, cauline, elliptic-obovate, sessile, pinnatifid, lobes dentate, spiny. Flowers yellow, solitary, sessile; bracts 3, foliaceous. Sepals 2, concave, prickly outside. Petals 4 *ca* 2.5-3.0 cm long, obovate, caducous. Stamens *ca* 0.3 cm long, yellow; anthers basifixed. Stigma lobed. Fruits oblong prickly capsule, *ca* 3 cm long.

Fls. & Frts.: January - July.

Occurrence: Common, along roadside of the area.

Distribution: Native to tropical America; naturalized in tropics.

Specimen examined: Haduk, Kamarpur; *Bora* 15195 (NEHU).

7. BRASSICACEAE

Burnett, Outl. Bot. 854. 1123. 1835; *nom. alt. Cruciferae*.

Herbs rarely shrubs. Leaves alternate, exstipulate. Flowers bisexual, actinomorphic, typically racemose. Sepals 4, free, imbricate in 2 series. Petals 4, rarely absent, crusiform, clawed; glands mostly present on torus. Stamens usually 6, tetradynamous. Ovary superior, 1-celled. Fruit siliqua or nut.

The family comprises about 340 genera and 3350 species, distributed throughout the world; 64 genera and 207 species in India; 2 genera and 2

species in the study area.

Key to the genera

1a. Flowers yellow; ovary 1 to many ovuled; stigma slightly bilobed; fruits dehiscent ..... 2. *Rorippa*

1b. Flowers white; ovary 2 ovuled; stigma capitate; fruits indehiscent ..... 1. *Coronopus*

1. *Coronopus* Linn.

Rupp. ex Linn., Syst. ed. 1. 1735.

About 10 species chiefly Eurasian; one species in India which occurs in the study area also.

Coronopus didymus (Linn.) Sm., Fl. Britain 2: 691. 1800; Bhaumic in Sharma *et al.*, Fl. Ind. 2: 192. 1993. *Lepidium didymum* Linn., Mant. Pl. 1: 92. 1767. *Senebiera pinnatifide* DC. in Mem. Soc. Hist. Nat. Paris 144, t. 9. 1799.

Erect herb. Leaves pinnatisects; segments acute. Flowers white, in axillary racemes. Sepals *ca* 0.3 cm long, ovate. Petals *ca* 0.4 cm long, linear. Stamens 4. Ovary 2 ovuled; stigma sessile. Fruits indehiscent, apically notched, divided into 2 one seeded nutlets.

Fls. & Frts.: Most part of the year.

Occurrence: Occasionally, in moist places in the plain forest of the sanctuary.

Distribution: Native of South America; naturalized in India.

Specimen examined: Haduk; *Bora* 15407 (NEHU).

2. *Rorippa* Scop.

Scop., Fl. Carn. 520. 1760.

About 70 species distributed in northern temperate zones; 7 species in India; one species in the study area.

Rorippa indica (Linn.) Hiern. Cat. Afr. Pl. Welw. 1: 26 add. et 2: 481, errata 1899; Hajra & Chowdhery in Sharma *et al.*, Fl. Ind. 2: 129. 1993. *Sisymbrium indicum* Linn., Mant. Pl. 1: 93. 1767. *Nasturtium indicum* (Linn.) DC., Syst. Nat. 2: 199. 1821; Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1: 134. 1872; Kanjilal *et al.*, Fl. Assam 1: 70. 1934.

Erect glabrous or pubescent herb. Leaves alternate, radical, pinnatified; lobes toothed; upper ones lyrate. Flowers yellow, in terminal racemes. Sepals 4, *ca* 0.3 cm. Petals 4, *ca* 0.5 cm long, altenating with sepals. Stamens 4, free; filaments filiform. Siliqua *ca* 2 cm long, cylindric.

Fls. & Frts.: February - August.

Occurrence: Common, in moist shady places of the area.

Distribution: Throughout the moist parts of India; Tropical Asia, Malaysia, Philippines.

Specimen examined: Haduk; *Bora* 14798 (NEHU).

8. CAPPARACEAE

A. L. de Juss., Gen. Pl. 242. 1789.

Trees, shrubs or rarely herbs, sometimes scandent. Leaves mostly alternate. Flowers mostly bisexual and actinomorphic, variously arranged.

Sepals usually 4. Petals 4-many or absent. Stamens few to many. Ovary sessile or usually on gynophore, 1-celled. Fruit a drupe or berry.

The family comprises 40 genera and 700 species, distributed in tropical and subtropical regions; 10 genera and 45 species in India; 3 genera and 5 species in the study area.

Key to the genera

1a. Herbs .... 2. *Cleome*

1b. Shrubs or trees:

2a. Leaves palmately trifoliate; stipular thorn absent .... 3. *Crataeva*

2b. Leaves unifoliate; stipular thorn present .... 1. *Capparis*

1. *Capparis* Linn.

About 240 species pantropic in distribution; 29 species in India; one species in the study area.

Capparis tenera Dalz. in Hook. J. Bot. Kew Gard. Misc. 2: 41. 1850; Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1: 179. 1872; Kanjilal *et al.*, Fl. Assam 1: 78. 1934; Raghavan in Sharma *et al.*, Fl. Ind. 2: 297. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 141. 1996.

Straggling small shrub; stipular thorns recurved, paired. Leaves *ca* 3-10 x 2.5-6.5 cm, ovate-elliptic or obovate-oblong, acute to abruptly acuminate, rounded or subcordate at base. Flowers white, in 2-4 flowered axillary rows.

Sepals *ca* 0.4 cm long, ovate. Petals 4. *ca* 0.6 cm long, ovate-oblong. Stamens 8-15. Gynophore *ca* 1.2 cm long, stigma sessile. Berries subglobose with long stalk.

Fls. & Frts.: May - July.

Occurrense: Common, in the hilly forest and occasionally in the plain area of the sanctuary.

Distribution: Arunachal Pradesh, Assam; Myanmar, Sri Lanka.

Specimen examined: Hiloikhunda, Thengbhanga; *Ecra* 15408 (NEHU).

2. *Cleome* Linn.

Linn., Sp. Pl. 671. 1753 & Gen. Pl. ed. 5. 302. 1754.

Herbs. Leaves simple oe digitately 3-9 foliolate. Flowers in racemes. Sepals spreading. Petals 4. Stamens 4-many, sessile on the disk. Ovary sessile or subsessile; ovules many on 2 parietal placentas. Capsule 2 valved.

About 150 species distributed in tropical regions; 15 species in India; 3 species in the study area.

Key to the species

1a. Ovary on a long androgynophore

..... 1. *C. gynandra*

1b. Ovary sessile:

2a. Flowers light bluish pink; stamens 6

..... 2. *C. rutidosperma*

2b. Flowers yellow; stamens more than 6

..... 3. *C. viscosa*

1. *Cleome gynandra* Linn., Sp. Pl. 671. 1753; Raghavan in Sharma *et al.*, Fl. Ind. 2: 309. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 141. 1996. *C. pentaphylla* Linn., Sp. Pl. ed. 2: 938. 1763. *Gynandropsis pentaphylla* (Linn.) DC., Prodr. 1: 238. 1824; Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1: 171. 1872; Kanjilal *et al.*, Fl. Assam 1: 73. 1934.

Erect glandular, pubescent herb. Leaves digitately 3-5 foliolate; leaflets *ca* 4-7 cm long, obovate, acute, entire or serrulate, sessile. Flowers purplish white, in corymbose racemes; bracts 3 foliolate. Sepals *ca* 0.4 cm long, ovate elliptic. Gynophore present. Capsule *ca* 5-1 cm long, striated, viscid. Seeds brownish black.

Fls. & Frts.: June - September.

Occurrence: Occasionlly, along roadside of the area.

Distribution: Warm parts of India; Tropical regions.

Specimen examined: Kamarpur; *Bora* 14707 (NEHU).

2. *Cleome rutidosperma* DC., Prodr. 1: 241. 1828; Iltis in Brittonia 12: 290. 1960; Srivastava, Fl. Gorakhpurensis 42. 1976. *C. ciliata* Schum & Thonn. Dansk VId. Selsk. Afh. 4: 68. 1828.

Erect herb; stem angular, sparsely pubescent. Leaves digitately 3 foliolate; leaflets 3, oblong-obovate, acute, thinly pubescent, petiolate. Flowers light bluish pink, in leafy terminal racemes. Calyx hairy. Petals *ca* 1.0-1.5 cm long. Stamens 6. Capsules linear, *ca* 5-8 cm long, more or less curved, glabrous.

Fls. & Frts.: August - November.

Occurrence: Common in moist places of the area.

Distribution: Assam, North India.

Specimen examined: Haduk; *Bora* 14788 (NEHU).

3. *Cleome viscosa* Linn., Sp. Pl. 672. 1753; Roxb., Fl. Ind. 3: 128. 1832; Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1: 170. 1872; Kanjilal *et al.*, Fl. Assam 1: 72. 1934; Raghavan in Sharma *et al.*, Fl. Ind. 2: 317. 1993. *Polanisia viscosa* DC., Prodr. 1: 242. 1824.

Erect glandular pubescent herb. Leaves digitately 3-5 foliolate; leaflets 1-4 cm long, ovate-lanceolate or obovate, acute, sessile, viscid pubescent. Flowers yellow, solitary axillary or in terminal racemes. Sepals *ca* 0.4 cm long, ovate. Petals *ca* 0.6-0.8 cm long, clawed. Stamens 12-24. Capsules *ca* 8 cm long, linear, glandular, pubescent.

Fls. & Frts.: August - October.

Occurrence: Common, in grassland, forest floors and along roadside of the area.

Distribution: Warmer parts of India; Tropics and subtropics.

Specimen examined: Haduk, Naltali; *Bora* 15410 (NEHU).

3. Crataeva Linn.

Linn., Sp. Pl. 1: 444. 1753 & Gen. Pl. ed. 5. 303. 1754.

About 8 species pantropical in distribution; 4 species in India; one species in the study area.

Crataeva magna (Lour.) DC., Prodr. 1: 243. 1824; Raghavan in Sharma *et*

al., Fl. Ind. 2: 324. [illegible] Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Ho[illegible] *et al.*) 1: 141. 1996. *Capparis magna* Lour., Fl. Cochinch. 1: 331. 1790. *Crataeva nurvala* Buch.-Ham. in Trans. Linn. Soc. 15: 121. 1827; Kanjilal *et al.*, Fl. Assam 1: 74. 1934. *C. religiosa* var. *nurvala* (Buch.-Ham.) Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1: 172. 1872. "Barun gach".

Middle sized deciduous tree. Leaves palmately 3 foliolate, long petiolate; leaflets *ca* 4-15 x 1.5-4.5 cm, ovate-lanceolate, acuminate, entire, glabrous. Flowers creamy, in terminal corymbose racemes. Sepals lanceolate. Petals 4, *ca* 1-1.5 cm long, ovate or oblong, clawed. Stamens many, *ca* 3.5-5 cm long. Gynophore *ca* 3-5 cm long; stigma sessile. Berries globose, on a woody gynophore, foetid smelling.

Fls. & Frts.: April - July.

Occurrence: Common, throughout the sanctuary.

Distribution: Throughout India; China, Myanmar, South East Asia.

Specimen examined: Burha Mayon, Kamarpur; *Bora* 14796 (NEHU).

Uses: Fruits used as insect repellent.

9. FLACOURTIACEAE

DC., Prodr. 1: 255. 1824.

Trees or shrubs. Leaves alternate; stipules often soon falling off. Flowers often dioecious or polygamous, variously arranged, bracteate. Sepals 3-6, mostly persistent. Petals 3-8, rarely more or absent. Stamens many, rarely few. Ovary superior, 1-celled. Fruit mostly a berry or drupe.

The family comprises about 89 genera and 1250 species, distributed in tropics and subtropics; 6 genera and 24 species in India; 2 genera and 3 species in the study area.

Key to the genera

1a. Stem usually thorny; unisexual flowers in condensed axillary or terminal racemes ..... 2. *Flacourtia*

1b. Stem not thorny; bisexual flowers in axillary fascicles ..... 1. *Casearia*

1. *Casearia* Jacq.

Jacq., En. Pl. Carib. 4. 1760.

Shrubs or trees. Leaves distichous. Flowers bisexual, axillary, fascicled; pedicels jointed. Calyx 4-5 lobed, persistent. Petals absent. Stamens double the calyx lobes, united in a tube with the staminodes. Ovary 1-celled; stigma capitate or 3 fid. Fruit a capsule. Seeds arillate.

About 160 species distributed in tropics; 10 species in India; 2 species are collected from the study area.

Key to the species

1a. Small to medium sized trees; flowers yellow .... 1. *C. glomerata*

1b. Shrubs; flowers greenish white ... 2. *C. vareca*

1. *Casearia glomerata* Roxb. ex DC., Prodr. 2: 49. 1825; Clarke in Hook.

f., Fl. Brit. Ind. 2: 5[illegible]79; Kanjilal *et al.*, Fl. Assam 1: 92. 1934; Haridasan & Rao, For. Fl. [illegible]alaya 1: 90. 1985; Mitra in Sharma *et al.*, Fl. Ind. 2: 393. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 151. 1996.

Deciduous tree; branches spreading. Leaves broadly elliptic-lanceolate, abruptly acuminate, truncate, serrate. Flowers yellowish, in axillary fascilces. Calyx pubescent. Stamens 10; staminodes pubescent. Fruits ellipsoid, pulpy.

Fls. & Frts.: March - July.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Tripura; Bangladesh, Myanmar.

Specimen examined: Rangamati; *Bora* 15411 (NEHU).

Notes: Probably confined to Indo-Burmese region and extend upto Bangladesh.

2. **Casearia vareca** Roxb., Fl. Ind. 2: 418. 1832; Clarke in Hook. f., Fl. Brit. Ind. 2: 593. 1879; Kanjilal *et al.*, Fl. Assam 1: 93. 1934; Haridasan & Rao, For. Fl. Meghalaya 1: 90. 1985; Mitra in Sharma *et al.*, Fl. Ind. 2: 398. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 151. 1996.

Shrub. Leaves ca 5-12 x 1.8-4.5 cm, elliptic-oblong or oblanceolate, acute, cuneate, serrate. Flowers greenish white, in axillary fascicles. Capsules *ca* 0.8 cm long, ellipsoid, orange-yellow, few seeded.

Fls. & Frts.: May - October.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: North East India.

Specimen examined: Dhekiabari; *Bora* 15215 (NEHU).

2. *Flacourtia* Commers.

L'Herit. Stirp. Nov. 3: 59. t. 30-31. 1785.

About 60 species distributed in tropical Africa and Asia; 3 species in India; one species in the study area.

Flacourtia jangomas (Lour.) Reausch. Nom. Bot. ed. 3: 290. 1797; Mitra in Sharma *et al.*, Fl. Ind. 2: 403. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 152. 1996. *Stigmarota jangomas* Lour., Fl. Cochinch. 2: 634. 1790. *Flacourtia cataphracta* Roxb. ex Willd., Sp. Pl. 4: 830. 1806; Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1: 193. 1872; Kanjilal *et al.*, Fl. Assam 1: 89. 1934.

Medium sized tree, spiny; young parts pubescent. Leaves *ca* 3.5-10.0 x 2.0-4.5 cm, ovate or ovate-lanceolate, acuminate, crenate-serrate. Flowers yellow, unisexual in axillary lax racemes. Sepals 5, small, hairy. Petals absent. Stamens many, filiform. Ovary flask shaped. Fruits globose, dark purple, 4-6 seeded.

Fls. & Frts.: March - September.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Throughout India, South East Asia, East Africa.

Specimen examined: Burha Mayong; *Bora* 15412 (NEHU).

Uses: Fruits edible.

10. POLYGALACEAE

A. L. de Juss., Ann. Mus. Paris 14: 389. 1809.

Herbs, shrubs, climbers or rarely small trees. Leaves mostly alternate. Flowers bisexual, zygomorphic, subtented by bract and bracteoles. Sepals 5, free. Petals 3-5, hypogynous. Stamens 8, rarely 4-5, usually monadelphous; anthers opening by apical pore. Ovary superior, usually 2-celled. Sigmas as many as carpels. Fruit usually a capsule, rarely drupaceous.

The family comprises 12 genera and about 800 species, widely distributed throughout the world; 2 genera and 21 species in India; one genus and one species in the study area.

Polygala Linn.

Linn., Sp. Pl. 710. 1753 & Gen. Pl. ed. 5. 315. 1754.

About 500 species distributed in tropical, subtropical and temperate regions; 27 species in India; one species in the study area.

Polygala arvensis Willd., Sp. Pl. 3, 2: 376. 1802; Banerjee in Sharma *et al.*, Fl. Ind. 2: 460. 1993; *P. chinensis* Linn., Sp. Pl. 704. 1753; Bennett in Hook. f., Fl. Brit. Ind. 1: 204. 1887. *P. glomerata* Lour., Fl. Cochinch. 426. 1790; Kanjilal *et al.*, Fl. Assam 1: 98. 1934.

Diffuse herb; branches slightly pubescent; root stock woody. Leaves *ca* 1.5-3.5 x 0.4-0.8 cm, linear-lanceolate, entire, obtuse or nearly acute. Flowers yellow, *ca* 0.9 cm long, pendulous in short axillary racemes; bracts minute, persistent. Sepals ovate, oblique, acuminate; lateral ones winged. Petals 3, *ca* 0.5 cm long, connate below. Stamens 8. Capsules oblong, notched,

ciliate on the margins. Seeds hairy.

Fls. & Frts.: May - August.

Occurrence: Occasionally, in grassland and along roadside of the sanctuary.

Distribution: Throughout India; Myanmar, Philippines, Sri Lanka.

Specimen examined: Haduk; *Bora* 14718 (NEHU).

11. CARYOPHYLLACEAE

A. L. de Juss., Gen. Pl. 299. 1789.

Herbs. Leaves opposite. Flowers mostly bisexual, actinomorphic, solitary or in cymes. Sepals 5, imbricate. Petals as many as sepals. Stamens upto 10, free. Ovary superior, 1-celled. Fruit a capsule or utricle.

The family comprises about 70 genera and 1750 species, cosmopolitan in distribution; about 25 genera and 122 species in India; 2 genera and 2 species in the study area.

Key to the genera

1a. Stipules scarious; styles connate .... 1. *Drymaria*

1b. Stipules absent; styles free ... 2. *Stellaria*

1. *Drymaria* Willd.

Willd. ex Roem. & Schult., Syst. 5: 406. 1819.

About 48 species distributed in tropical and subtropical regions; 2 species in India; one species in the study area.

Drymaria diandra Bl., Bijdr. 62. 1825; Majumdar in Sharma *et al.*, Fl. Ind. 2: 533. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 171. 1996. *D. cordata sensu* Edgew. & Hook. f., Fl. Brit. Ind. 1: 244. 1872, *non* (Linn.) Roem. & Schultes 1819. **"Laijabori"**

Diffuse or suberect herb; rooting at the nodes. Leaves *ca* 0.5-2.5 x 0.4-1.8 cm, ovate-cordate, elliptic or orbicular, mucronate, sessile, sparsely pubescent; stipules bristly. Flowers white, *ca* 0.5 cm long, in axillary or terminal long peduncled cymes; bracts linear, membranous. Sepals *ca* 0.3 cm long, pubescent outside. Petals *ca* 0.3 cm long, each deeply 2 partite. Stamens 5, *ca* 0.2 cm long. Capsules ovoid, trigonous.

Fls. & Frts.: March - September.

Occurrence: Common in moist placesof the sanctuary.

Distribution: Tropical and subtropical India; Australia, China, Malayasia, Tropical Africa, America.

Specimen examined: Haduk, Jugdal; *Bora* 14898 (NEHU).

Uses: Plant used as wild vegetable; leaf extract taken in menstruation trouble.

2. *Stellaria* Linn.

Linn., Sp. Pl. ed. 1. 421. 1753.

About 120 species distributed in tropical, subtropical and temperate regions; 17 species in India; one species in the study area.

Stellaria wallichiana Benth. ex Haines in Bull. Misc. Inf. Kew 1920: 66. 1920; Majumdar in Sharma *et al.*, Fl. Ind. 2: 591. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 176. 1996. *S.*

media (Linn.) Villars, Hist. Pl. Dauph. 3: 615. 1789, p.p.; Edgew. & Hook. f. in Hook. f., Fl. Brit. Ind. 1: 230. 1874.

Diffuse herb with 2 lines of glandular hairs. Leaves *ca* 0.8-4.0 x 0.4-1.3 cm, ovate, acuminate, cordate at base; lower ones long petioled; upper sessile. Flowers white, *ca* 1 cm long, axillary. Sepals *ca* 0.3 cm long, ovate. Petals *ca* 0.4-0.6 cm long, ovate, 2 fid. Stamens hypogenous. Capsules oviod, 6 valved.

Fls. & Frts.: March - September.

Occurrence: Common in moist shady places, forest floors of the sanctuary.

Distribution: Throughout India; Cosmopolitan.

Specimen examined: Jugdal, Kamarpur; *Bora* 15053 (NEHU).

12. PORTULACACEAE

A. L. de Juss., Gen. Pl. 312. 1789.

Herbs or undershrubs, often succulent. Leaves simple, with scarious or setose stipular appendages. Flowers bisexual, actinomorphic, solitary or variously cymose or racemose. Sepals 2. Petals 4-6, imbricate, caducous. Stamens as many as and opposite to petals or more, free. Ovary superior or half inferior, 1-celled. Fruit a capsule.

The family comprises about 19 genera and 50 species, cosmopolitan in distribution; 2 genera and 6 species in India; one genus and one species in the study area.

Portulaca Linn.

Linn., Sp. Pl. 445. 1773 & Gen. Pl. ed. 5. 204. 1754.

About 200 species distributed in tropical and subtropical regions; 7 species in India; one species in the study area.

Portulaca oleracea Linn., Sp. Pl. 445. 1753; Dyer in Hook. f., Fl. Brit. Ind. 1: 246. 1874; Deb, Fl. Tripura 2: 150. 1983; Rao in Sharma *et al.*, Fl. Ind. 3: 4. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 176. 1996. "Malbhug sak".

Prostrate succulent herb; stem reddish. Leaves opposite, *ca* 1.2-3.0 x 0.4-1.5 cm, oblong, fleshy, subsessile, glistering beneath. Flowers yellow, nearly sessile, in terminal heads. Sepals *ca* 0.4 cm long, acute, persistent. Petals 5, *ca* 0.5 cm long, each 2 lobed at apex. Stasmens 8-18, *ca* 0.3 cm long, yellow. Style 5 fid. Capsules obovoid, many seeded.

Fls. & Frts.: May - September.

Occurrence: Common, growing in moist places of the sanctuary.

Distribution: Throughout India; Pantropic.

Specimen examined: Haduk, Jugdal; *Bora* 15414 (NEHU).

Uses: Plant used as wild vegetable.

13. TAMARICACEAE

St. Hilaire, Mem, Mus. Paris, 2: 205. 1815.

Shrubs or trees. Leaves scale like, alternate. Flowers usually bisexual, actinomorphic, in catkin like spikes or racemes. Sepals 4-5, free. Petals as many as sepals, free. Stamens 5-10, free or connate as base. Ovary superior,

1-celled. Styles 3-4. Fruit a capsule.

The familly comprises about 4 genera and 120 species, distributed in temperate and warm regions of the Northern Hemisphere and South Africa; one genus and one species in the study area.

Tamarix Linn.

Linn., Syst. ed. 1. 1735.

About 65 species distributed in Africa, Aisa, Europe; 7 species in India; one species in the study area.

Tamarix dioica Roxb. ex Roth, Nov. Pl. Ind. Or. 185. 1821; Roxb., Fl. Ind. 2: 101. 1832; Dyer in Hook. f., Fl. Brit. Ind. 1: 249. 1874; Kanjilal *et al.*, Fl. Assam 1: 99. 1934; Shetty & Pandey in Sharma *et al.*, Fl. Ind. 3: 24. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 178. 1996.

Shrub; branches drooping, spreading. Leaves minute, exstipulate, appressed, sheathing, acuminate. Flowers pinkish, small, in dense panicled spikes, bracteate. Petals linear-oblong, free. Stamens 5; filaments inserted in the notches of a 5 lobed disk. Staminodes present in female flowers. Capsules oblong, 3 valved.

Fls. & Frts.: July - October.

Occurrence: Occurs mainly on sandy palces in the northern side of the Burha Mayong Hill.

Distribution: Arunachal Pradesh, Assam, Panjub, W. Peninsula; Myanmar.

Specimen examined: Hiloikhunda; *Bora* 15415 (NEHU).

Notes: Confined to Indo-Burmes region.

14. HYPERICACEAE

A. L. de Juss., Gen. Pl. 254. 1789.

Trees to herbs. Leaves opposite or verticillate. Flowers bisexual, actinomorphic, solitary or cymose paniculate. Sepals 4-5, imbricate. Petals 4-5, free. Stamens many, often united into a bundles. Ovary 1 or 3-5 celled. Styles mostly free. Fruit a caspsule or berry.

The family comprises about 8 genera and 440 species, distributed in temperate and warm regions; 2 genera and 24 species in India; one genus and one species in the study area.

Hypericum Linn.

Linn., Sp. Pl. ed. 5. 341. 1754.

About 400 species distributed in temperate and tropical regions; 22 species in India; one species in the study area.

Hypericum japonicum Thunb. ex Murray, Syst. Veg. ed. 14: 702. 1787; Dyer in Hook. f., Fl. Brit. Ind. 1: 256. 1874; Kanjilal *et al.*, Fl. Assam 1: 102. 1934; Biswas in Sharma *et al.*, Fl. Ind. 3: 69. 1993; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 113. 1996. *H. laxum* (Bl.) Koidzumi in Bot. Mag. Tokyo 40: 344. 1926.

Small diffuse herb; stem quadrangular. Leaves *ca* 0.4-1.0 cm long, ovate-elliptic, subacute, spathulate. Flowers yellow, in terminal and axillary solitary cymes; pedicels *ca* 0.8 cm long. Sepals 5, *ca* 0.3 cm long, elliptic-

lanceolate. Petals 5, *ca* 0.5 cm long. Capsules subcylidrical, septicidal with persistent styles.

Fls. & Frts.: June - December.

Occurrence: Occasionally growing in moist places.

Distribution: North East India, Uttar Pradesh; Australia, Japan, New Zealand.

Specimen examined: Haduk; *Bora* 15067 (NEHU).

15. CLUSIACEAE

Lindl., Nat. Syst. ed. 2: 74. 1836, *nom. alt. Guttiferae.*

Trees or shrubs with resinous juice. Leaves opposite. Flowers unisexual and polygamous or dioecious, rarely bisexual, actinomorphic. Sepals 2-6, rarely more, imbricate. Petals as many as sepals. Stamens mostly many free or connate. Staminodes present in female flowers. Ovary superior, 2-many celled. Stimas 2. Fruit baccate.

The family comprises 40 genera and about 1000 species, distributed in tropical regions; one genus and 3 species in the study area.

Garcinia Linn.

Linn., Sp. Pl. 443. 1753.

Shrubs or trees. Leaves coriaceous. Flowers polygamous, in axillary or terminal, solitary, fascicles or panicled. Sepals 4-5. Petals 4-5. Male flowers: Stamens many with pistillode; anthers 2 or 4 celled. Female flowers: Ovary 2-12 celled; ovule 1 in each cell; staminodes minute. Fruits berry,

pulpy.

About 435 species distributed in tropical regions; 22 species in India; 3 species are collected from the study area.

Key to the species

1a. Leaves oblong or linear-lanceolate;
flowers pentamerous; ... 3. *G. xanthochymus*

1b. Leaves lanceolate or elliptic-lanceolate;
flowers tetramerous:

2a. Leaves elliptic-lanceolate:
berries ovoid or globose, grooved
to the tip ... 1. *G. cowa*

2b. Leaves lanceolate; berries
obovoid, not grooved ... 2. *G. lanceaefolia*

1. *Garcinia cowa* Roxb. ex DC., Prodr. 1: 561. 1824; Anderson in Hook. f., Fl. Brit. Ind. 1: 262. 1874; Kanjilal *et al.*, Fl. Assam 1: 105. 1934; Deb, Fl. Tripura 1: 363. 1981; Haridasan & Rao, For. Fl. Meghalaya 1: 106. 1985; Islam, Fl. Majuli 56. 1990; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 113. 1996. "Kuji thekera".

Middle sized evergreen tree; bark greyish brown. Leaves *ca* 5-14 x 1.8-6.0 cm, elliptic-lanceolate, acute to acuminate; young ones reddish. Flowers pinkish-yellow, *ca* 3 cm long, dioecious, tetramerous, in terminal or axillary 1 or few flowered cymes. Sepals ovate. Petals twice the length of sepals. Stigma 6-8 lobed. Staminodes in a ring in female flowers. Berries ovoid, globose, acidic, orange inside when ripe, 4-8 seeded.

Fls. & Frts.: March - September.

Occurrence: Occasionally, along roadside and forest margins in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Tripura, Andaman Islands, Bihar, Orissa, West Bengal; China, Myanmar, Thailand.

Specimen examined: Burha Mayong; *Bora* 15325 (NEHU).

Uses: Fruits edible and taken to cure stomach trouble.

2. *Garcinia lanceaefolia* (G. Don) Roxb., Fl. Ind. 2: 623. 1832; Anders. in Hook. f., Fl. Brit. Ind. 1: 263. 1874; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds Hajra *et al.*) 1: 185. 1996. *Stalagmitis lanceaefolia* G. Don. Gen. Syst. 1: 621. 1831.

Shrub. Leaves lanceolate, acute, narrowed down to the base. Flowers creamy pinkish red, dioecious, tetramerous, in few flowered cymes. Perianth thick, fleshy. Berries obovoid, orange yellow.

Fls. & Frts.: April - November.

Occurrence: Occasionally, in hilly forest margins.

Distribution: Arunachal Pradesh, Assam, Eastern Bengal; Bangladesh.

Specimen examined: Burha Mayong; *Bora* 15547 (NEHU).

2. *Garcinia xanthochymus* Hook. f. ex T. Anders. in Hook. f., Fl. Brit. Ind. 1: 269. 1874; Kanjilal *et al.*, Fl. Assam 1: 104. 1934; Deb, Fl. Tripura 1: 364. 1981; Islam, Fl. Majuli 57. 1990. *Xanthochymus pictorius* Roxb., Corom. Pl. 2: 51. t. 196. 1805. *X. tictorius* DC., Prodr. 1: 562. 1824. "Tepor tenga".

Middle sized evergreen tree; branches drooping; latex yellow. Leaves *ca* 12-35 x 3-8 cm, linear-oblong, acute, cuneate at base. Flowers whitish, in axillary fascicles. Fruits globose, *ca* 3 cm in diam. with persistent calyx.

Fls. & Frts.: March - September.

Occurrence: Common, in the hilly forest of the area.

Distribution: Nearly throughout India; China, Malaya Peninsula, Myanmar, Thailand.

Specimen examined: Rangamati; *Bora* 15368 (NEHU).

Uses: Fruits edible and also taken in dysentery.

16. MALVACEAE

A. L. de Juss., Gen. Pl. 271. 1789.

Herbs, shrubs or small trees with mucilaginous juice; stem often fibrous. Leaves alternate, stipulate. Flowers bisexual, actinomorphic, basically in cymes, often solitary in axils. Sepals 5, more or less united, sometimes subtended by epicalyx. Petals 5, free. Stamens many, monadelphous; anthers 1-celled. Ovary superior, 2-many celled. Fruit usually a capsule, sometimes berry or samara.

The family comprises 75 genera and about 1000 species, widely distributed in warm and temperate regions; 17 genera and 88 species in India; 6 genera and 8 species in the study area.

Key to the genera

1a. Epicalyx absent:

2a. Mericarp 1 seeded ... 5. *Sida*

2b. Mericarp 2-many seeded ... 2. *Abutilon*

1b. Epicalyx present:

3a. Seeds with dense covering of long woolly hairs ... 3. *Gossypium*

3b. Seeds without woolly hairs:

4a. Fruits glochidiate, indehiscent ... 6. *Urena*

4b. Fruits not glochidiate, dehiscent:

5a. Pedicels not jointed; calyx 5 toothed, spliting on one side, adnate to the corolla .... 1. *Abelmoschus*

5b. Pedicels usually jointed; calyx 5 lobed, not spliting, free from the corolla .... 4. *Hibiscus*

1. *Abelmoschus* Medik.

Medik. Malv. 45. 1787.

About 15 species distributed in South and South East Asia and North Australia; about 6 species in India; one specis in the study area.

Abelmoschus moschatus Medik., Malv. 46. 1787; Paul in Sharma *et al.*, Fl. Ind. 3: 308. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 207. 1996. *Hibiscus abelmoschus* Linn., Sp. Pl. 696.

1753; Mast. in Hook. f., Fl. Brit. Ind. 1: 342. 1874; Kanjilal *et al.*, Fl. Assam 1: 143. 1934. "Bon Bhendi". Fig. 4

Hispid undershrub. Leaves angular or palmately 3-7 lobed, cordate at base; lobes triangular; upper ones usually hastate or sagittate at base. Flowers yellow, *ca* 5-6 cm long, solitary, axillary. Epicalyx segments 6-10, linear-lanceolate. Calyx *ca* 2 cm long, pubescent. Corolla *ca* 4 cm long, yellow with dark purple centre. Staminal column *ca* 2.5 cm long. Capsules ovoid-oblong, densely hairy.

Fls. & Frts.: August - November.

Occurrence: Common, along forest margins, roadside and grassland in the plain forest of the sanctuary.

Distribution: Hotter parts of India; Malaysia, South China, Vietnam.

Specimen examined: Haduk, Tuplung; *Bora* 14893 (NEHU).

Notes: Fibre can be obtained from the bark.

2. *Abutilon* Mill.

Mill., Gard. Dict. ed. 4. 1: AB. 1754.

About 170 species distributed in all warm regions; 11 species in India; one species in the study area.

Abutilon indicum (Linn.) Sw., Hort. 1: 54. 1826; Mast. in Hook. f., Fl. Brit. Ind. 1: 326. 1874; Kanjilal *et al.*, Fl. Assam 1: 140. 1934. *Sida indica* Linn., Gen. Pl. 2: 26. 1754; Roxb., Fl. Ind. 3: 179. 1832. *S. populifolia* Lamk., Encycl. 1: 7. 1783. "Junuka gach".

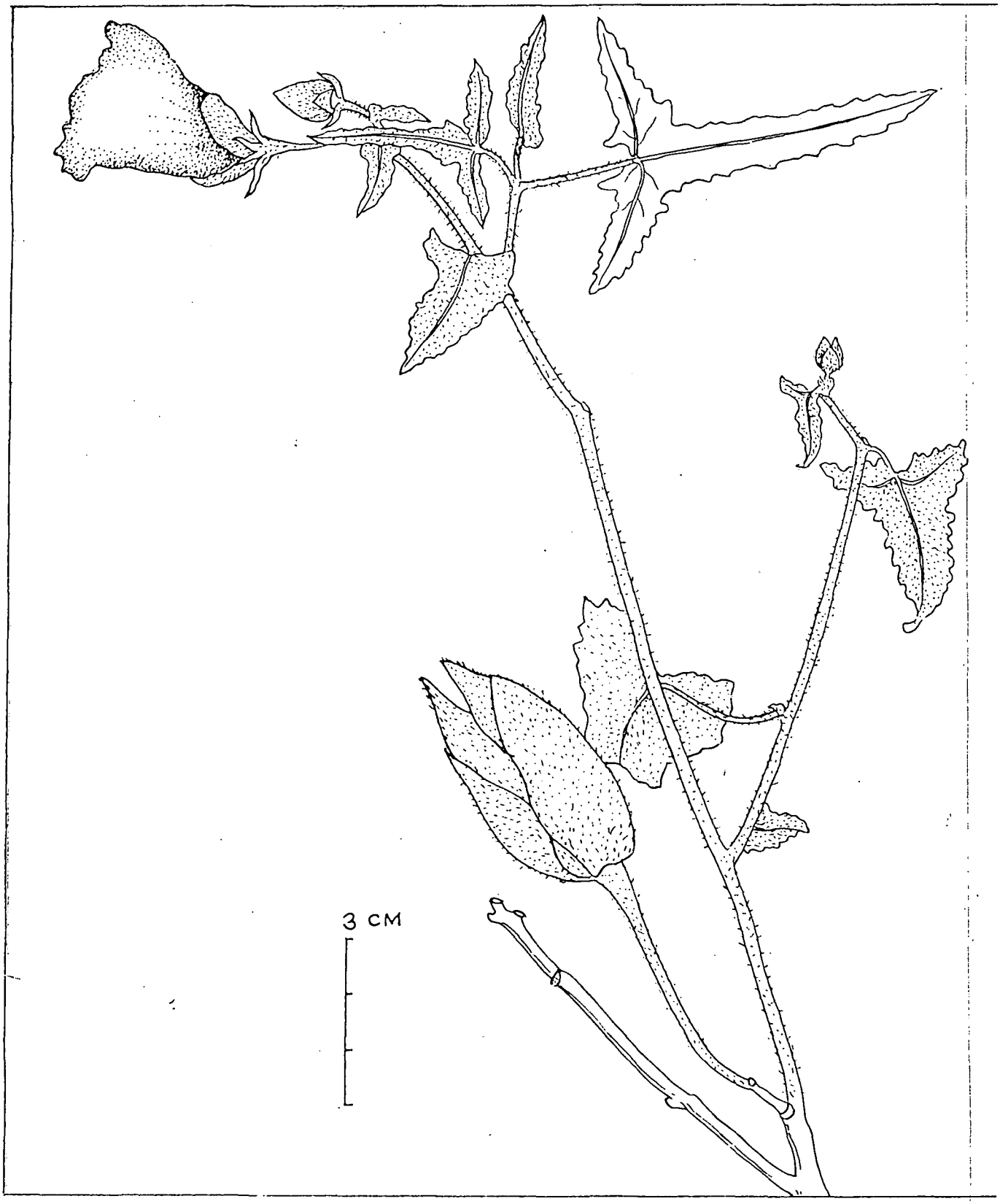


Fig. 4: ***Abelmoschus moschatus*** Medik. (Malvaceae)

Pubescent undershrub. Leaves broadly cordate or ovate-orbicular, coarsely toothed, acute, long petiolate; stipulate. Flowers yellow, axillary, solitary, on long peduncles. Epicalyx absent. Calyx *ca* 1.2 cm long, segments ovate, acute. Corolla *ca* 2 cm long, spreading, yellow. Staminal tube hairy. Carpels many, awned. Capsules subglobose, *ca* 2 cm in diam., many seeded.

Fls. & Frts.: April - September.

Occurrence: Common, along forest margins and roadside of the sanctuary.

Distribution: Throughout tropical India; Tropical and subtropical countries.

Specimen examined: Burha Mayong; *Bora* 14797 (NEHU).

3. *Gossypium* Linn.

Linn., Sp. Pl. 693. 1753 & Gen. Pl. ed. 5. 764. 1754.

About 20 species distributed in tropical and subtropical regions as wild or cultivers; 3 species in India; one species in the study area.

Gossypium arboreum Linn., Sp. Pl. 693. 1753; Mast. in Hook. f., Fl. Brit. Ind. 1: 347. 1874; Paul in Sharma *et al.*, Fl. Ind. 3: 313. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 211. 1996. *G. herbaceum* var. *obtusifolium* (Roxb.) Mast. in Hook. f., Fl Brit. Ind. 1: 347. 1874. *G. indicum* Lamk., Encycl. 2: 134. 1786. "Kapah gach".

Shrub. Leaves ovate or orbicular, 3-7 lobed, pubescent, cordate at base, palmately 5-7 nerved; stipules linear-lanceolate. Flowers solitary, axillary. Epicalyx *ca* 3 cm long, cordate at base. Calyx *ca* 0.5 cm long. Corolla pale yellow, *ca* 2.5 cm long. Capsules subglobose. Seeds densely clothed with long woolly hairs.

Fls. & Frts.: April - January.

Occurrence: Planted around Forest campus and also found as escape.

Distribution: India.

Specimen examined: Haduk; *Bora* 15169 (NEHU).

Uses: Fibre obtained from fruit.

4. *Hibiscus* Linn.

Linn., Sp. Pl. 693. 1753 & Gen. Pl. ed. 5. 310. 1754, *nom. cons.*

About 250 species distributed in tropics and subtropics; 30 species in India; one species in the study area.

Hibiscus surattensis Linn., Sp. Pl. 696. 1753; Mast. in Hook. f., Fl. Brit. Ind. 1: 334. 1874; Kanjilal *et al.*, Fl. Assam 1: 144. 1934; Paul in Sharma *et al.*, Fl. Ind. 3: 327. 1993; Chowdhery *et al.*, in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 211. 1996. **Fig. 5**

Prickly trailing herb. Leaves *ca* 3-8 cm long, ovate, palmately lobed, serrate; stipules ciliate. Flowers yellow, axillary, solitary. Epicalyx segments 10, persistent. Calyx campanulate. Corolla large, yellow. Staminal column antheriferous throughout. Carpels bristly. Fruits ovoid, hispid capsule.

Fls. & Frts.: October - January.

Occurrence: Occasionally, on hilly slopes and trailing over rocks.

Distribution: Hotter parts of India; Tropical Africa, Asia, Australia.

Specimen examined: Sanaka; *Bora* 15269 (NEHU).

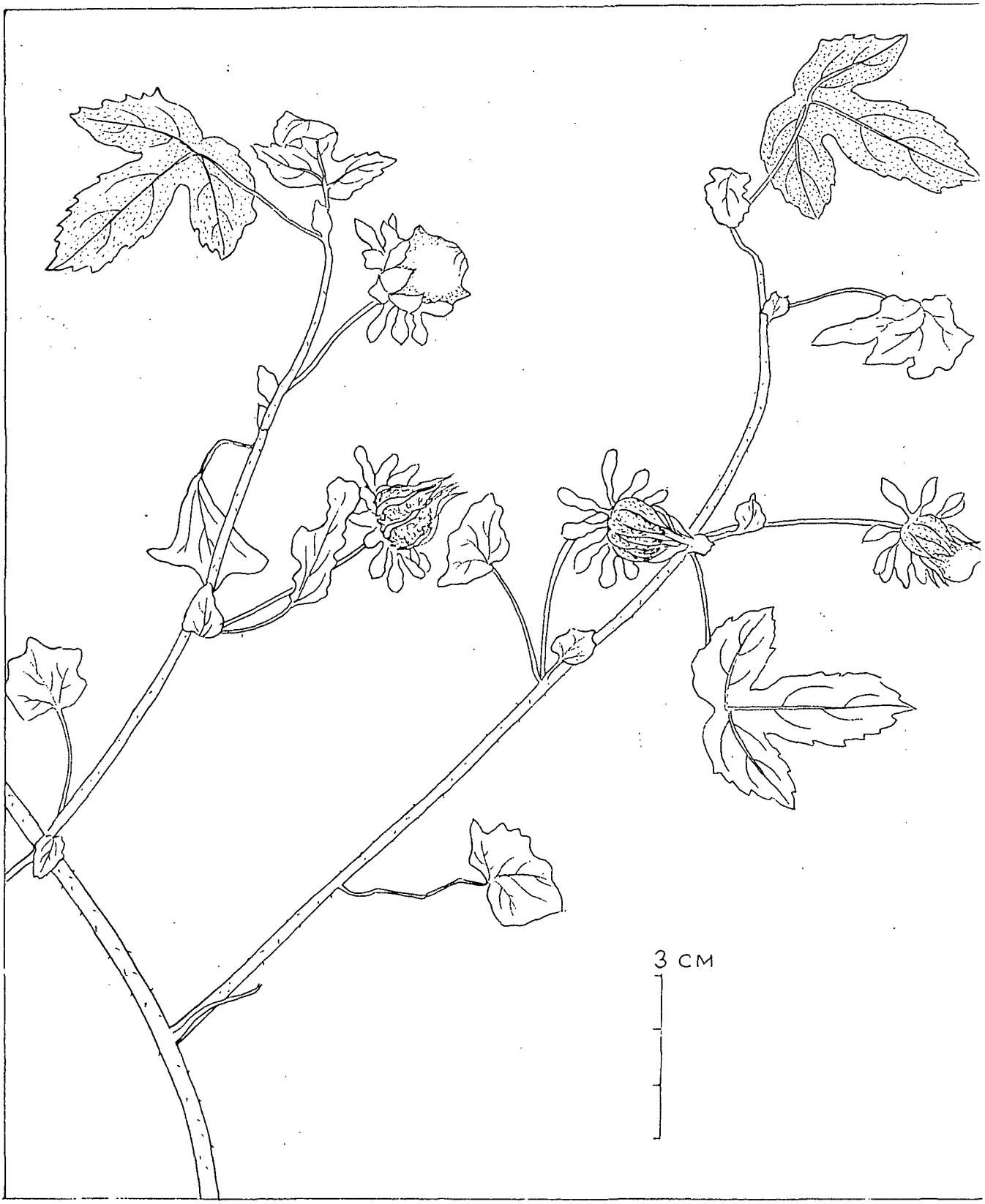


Fig. 5: ***Hibiscus surattensis*** Linn. (Malvaceae)

5. *Sida* Linn.

Linn., Sp. Pl. 683. 1753 & Gen. Pl. ed. 5. 306. 1754.

Herbs or undershrubs. Leaves simple, often lobed. Sepals tubular below. Petals adnate to the staminal tube below. Staminal tube dividing into many anther bearing filaments. Carpels 5-10; styles as many as the carpels; stigma terminal. Fruit a schizocarp.

About 120 species distributed in the warmer parts of the globe; 9 species in India; 3 species in the study area.

Key to the species

1a. Leavea ovate-orbicular, cordate, palmately nerved; mericarps awnless ... 2. *S. cordata*

1b. Leaves linear-lanceolate, ovate-oblong, or rhomboid, pinnately nerved; mericarps awned:

2a. Leaves linear-lanceolate; paired stipules dissimilar; mericarp tetrahedral ... 1. *S. acuta*

2b. Leaves rhomboid or ovate-oblong; paired stipules similar; mericarps trigonous ... 3. *S. rhombifolia*

1. *Sida acuta* Burm. f., Fl. Ind. 147. 1768; Deb, Fl. Tripura 1: 306. 1981; Paul in Sharma *et al.*, Fl. Ind. 3: 281. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 214. 1996. *S. carpinifolia* Mast. in Hook. f., Fl. Brit. Ind. 1: 323. 1874, *non* Linn. f.: Kanjilal *et al.*, Fl. Assam 1: 140. 1934.

Sparsely hairy undershrub. Leaves *ca* 2-7 x 0.5-1.5 cm, linear-lanceolate, acute, serrate; stipules paired, unequal. Flowers yellow, *ca* 1 cm long, axillary, solitary or in 2-3 flowered clusters. Calyx lobes acute. Petals obovate. Mericarps 6-10, rugose, 2 awned at apex.

Fls. & Frts.: August - May.

Occurrence: Common, in open places, along roadside and forest floors in the sanctuary.

Distribution: Hotter parts of India; Pantropical.

Specimen examined: Burha Mayong, Haduk; *Bora* 15416 (NEHU).

2. *Sida cordata* (Burm. f.) Borss. in Blumea 14: 182. 1966; Deb, Fl. Tripura 1: 306. 1981. *Melochia cordata* Burm. f., Fl. Ind. 143. 1768. *Sida veronicifolia* Lamk., Encycl. 1: 5. 1783. *S. humilis* Cav., Diss. 5, t. 134. f. 2. 1788; Mast. in Hook. f., Fl. Brit. Ind. 1: 322. 1874. *S. humilis* var. *veronicifolia* (Lamk.) Mast. in Hook. f., Fl. Brit. Ind. 1: 322. 1974.

Fig. 6

Suberect or decumbent, stellate hairy herb. Leaves *ca* 2-5 x 1.0-4.5 cm, ovate-cordate, acute, serrate. Flowers yellow, solitary on long, slender peduncles. Calyx *ca* 0.5 cm long, hairy; lobes acute. Corolla *ca* 0.7 cm long. Mericarps 5, glabrous.

Fls. & Frts.: June - November.

Occurrence: Common, on hilly slopes, along roadside and open places of the area.

Distribution: Tropical Asia from India to Philippines.

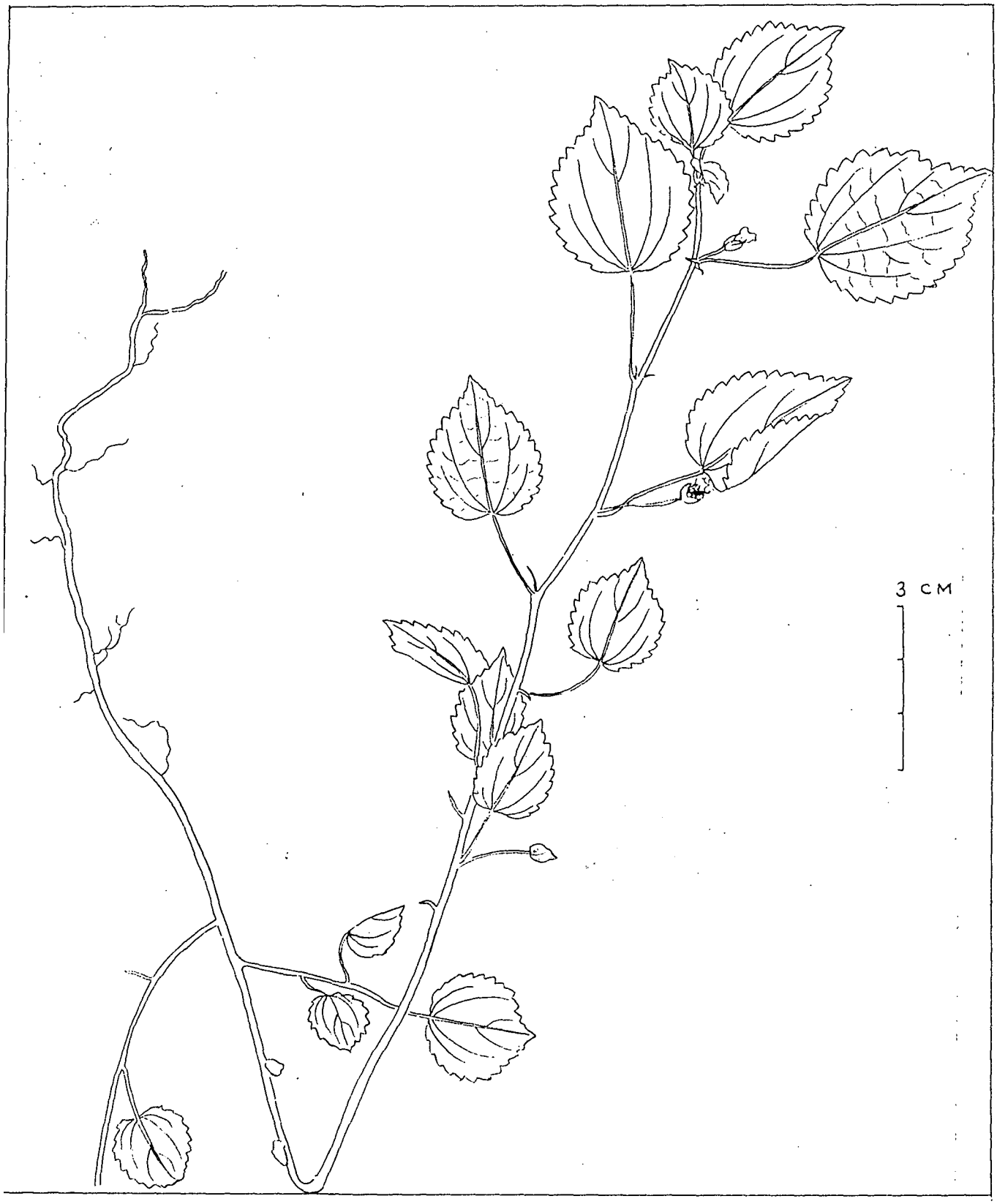


Fig. 6: ***Sida cordata*** (Burm. f.) Borss. (Malvaceae)

Specimen examined: Haduk; *Bora* 15012 (NEHU).

3. *Sida rhombifolia* Linn., Sp. Pl. 684. 1753; Mast. in Hook. f., Fl. Brit. Ind. 1: 323. 1874; Kanjilal *et al.*, Fl. Assam 1: 140. 1934; Paul in Sharma *et al.*, Fl. Ind. 3: 289. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 216. 1996. *S. rhomboidea* Roxb. ex Fleming in Asiat. Res. 6: 178. 1810.

Erect or diffused, stellate hairy undershrub. Leaves *ca* 1.5-6.0 x 0.8-4.0 cm, oblong, elliptic-oblong, rhomboid or obovate, serrate, cuneate or obtuse at base, 5 nerved; stipules linear. Flowers yellow, solitary and in pseudo clasteres. Calyx lobes acute. Corolla *ca* 1 cm long. Mericarps flattened, trigonous, 2 awned.

Fls. & Frts.: November - April.

Occurrence: Common, in open places, along road side and forest floors of the sanctuary.

Distribution: Throughout India; China.

Specimen examined: Haduk, Tuplung; *Bora* 14856 (NEHU).

Uses: Branches used for making brooms.

6. *Urena* Linn.

Linn., Sp. Pl. 692. 1753 & Gen. Pl. ed. 5. 764. 1754.

About 10 species distributed in tropical and subtropical regions; about 3 species in India; one species in the study area.

Urena lobata Linn., Sp. Pl. 692. 1753; Mast. in Hook. f., Fl. Brit. Ind. 1: 329. 1874; Kanjilal *et al.*, Fl. Assam 1: 141. 1934; Paul in Sharma *et al.*, Fl. Ind. 3: 380. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal

Prad. (eds. Hajra *et al.*) 1: 216. 1996.

Stellate hairy undershrub. Leaves variable; upper ones small, elliptic-oblong, ovate, acute, serrate; lower ones large, orbicular, 3-5 lobed; stipules linear. Flowers bright pink, axillary, solitary. Epicalyx adnate to the base of calyx. Calyx *ca* 0.5 cm long; lobes lanceolate, hairy. Corolla *ca* 1.2-1.8 cm long, pinkish with a purple centre. Fruits globular, glochidiate, indehiscent.

Fls. & Frts.: October - April.

Occurrence: Common, in shady places of the sanctuary.

Distribution: Throughout India; Pantropical.

Specimen examined: Burha Mayong, Haduk; *Ecra* 14858 (NEHU).

17. BOMBACACEAE

Kunthin H. B. and K., Nov. Gen. 5: 294. 1822.

Trees. Leaves alternate, simple or dagitate. Flowerrs bisexual, large. Calyx valvate in bud, often subtended by an epicalyx. Petals often elongated or sometimes absent. Stamens free or united into a tube; anther 1-celled. Ovary superior, 2-5 celled. Fruit usually capsule. Seeds often embedded in hairs from the wall of the fruit.

The family comprises 22 genera and about 140 species, mostly distributed in tropical America; one genus and one species in the study area.

Bombax Linn.

Linn., Sp. Pl. 511. 1753 & Gen. 5: 294. 1822.

60 species mostly tropical American; 2 species in India; one species in the study area.

Bombax ceiba Linn., Sp. Pl. 511. 1753, p.p.; Deb, Fl. Tripura 1: 293. 1981; Islam, Fl. Majuli 66. 1990. *Bombax malabaricum* DC., Prodr. 1: 4779. 1824; Hook. f., Fl. Brit. Ind. 1: 349. 1874; Kanjilal *et al.*, Fl. Assam 1: 147. 1934. *Salmalia malabarica* (DC.) Schott & Endl. Melet. 35. 1832. "Simolu".

Large, deciduous tree; branches whorled, spreading; trunk butressed at base, often prickly. Leaves digitately 5-7 foliolate; leaflets elliptic-lanceolate, acuminate, entire, glabrous. Flowers bright red and orange yellow, large, *ca* 7-8 cm long, solitary or clustered at the ends of branches. Calyx leathery, cupshaped. Petals obovate or oblong. Stamens many, connate below. Fruits oblong-ovoid capsule, 6 valved. Seeds many, white silky hairy.

Fls. & Frts.: January - May.

Occurrence: Common, throughout the sanctuary and one of the dominante species in the Plain forest.

Distribution: Hotter parts of India; Bangladesh, Java, Myanmar, South China.

Specimen examined: Haduk, Kamarpur; *Bora* 14716 (NEHU).

Uses: Cotton fibre obtained from woolly seeds and used for stuffing beds and pillows.

Notes: Two types of flower colour i.e. reddish and orange yellow have been observed where the fruit size is smaller in case of orange yellow ones.

18. STERCULIACEAE

Ventenat, Jard. Malm. 2: sub t. 91. 1830.

Trees or shrubs, rarely herbs. Leaves mostly alternate, usually stipulate. Flowers bisexual or unisexual, actinomorphic, variously arranged. Sepals 3-5, valvate. Petals 5 or absent. Stamens many, often connate into a tube with as many staminodes. Ovary superior, 2-4 celled. Fruit leathery or fleshy, sometimes carpels splitting into cocci.

The family comprises about 68 genera and 1600 species, mostly distributed in tropics and subtropics; 23 genera and about 75 species in India; 6 genera and 7 species in the study area.

Key to the genera

1a. Herbs or undershrubs:

2a. Flowers clustered or loosely panicled; staminodes absent ..... 2. *Melochia*

2b. Flowers solitary or paired; staminodes present ..... 3. *Pentapetes*

1b. Shrubs or trees:

3a. Flowers unisexual or polygamous; petals absent:

4a. Follicles woody or coriaceous:

5a. Leaves simple; seeds winged ..... 4. *Pterygota*

5b. Leaves simple, lobed or digitate ..... 6. *Sterculia*

2. *Melochia* Linn.

Linn., Sp. Pl. 675. 1753 & Gen. Pl. ed. 5. 304. 1754.

About 54 species distributed in tropical regions; 2 species in India; one species in the study area.

Melochia corchorifolia Linn., Sp. Pl. 675. 1753; Mast. in Hook. f., Fl. Brit. Ind. 1: 374. 1874; Deb, Fl. Tripura 1: 287. 1981; Malick in Sharma *et al.*, Fl. Ind. 3: 441. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 221. 1996.

Erect sparsely stellate hairy herb; stem nearly hollow. Leaves *ca* 2.5-11.0 x 0.8-3.8 cm, oblong-ovate, rounded or truncate and 5 nerved at base; stipules linear, ciliate. Flowers pinkish white, nearly sessile, in dense terminal or axillary clusters with many hispid bracteoles. Sepals 5, *ca* 0.3 cm long, lanceolate, pubescent. Petals 5, *ca* 0.6 cm long, obovate. Stamens 5, connate below. Capsules small, globose, hispid.

Fls. & Frts.: July - September.

Occurrence: Common, occurs in moist shady places.

Distribution: Hotter parts of India; Pantropic.

Specimen examined: Haduk, Thengbhanga; *Bora* 14737 (NEHU).

3. *Pentapetes* Linn.

Linn., Sp. Pl. 698. 1753 & Gen. Pl. ed. 5. 310. 1754.

Monotypic genus, widely distributed in tropical Asia.

4b. Follicles membranous ... 1. *Firmiana*

3b. Flowers bisexual; petals present

..... 5. *Pterospermum*

1. *Firmiana* Marsigli

Marsigli in Saggi Padv. 1: 106. 1786.

An Asiatic genus and consisting of 10 species.

Firmiana colorata (Roxb.) R.Br. in Bennett & Brown, Pl. Jav. Rar. 235. 1824; Malick in Sharma *et al.*, Fl. Ind. 3: 420. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 219. 1996. *Sterculia colorata* Roxb., Pl. Corom. 1: 26. t. 25. 795, quad. t. 25. descr. excl. 1795; Mast. in Hook. f., Fl. Brit. Ind. 1: 359. 1875.

Medium sized tree; branches spreading. Leaves *ca* 15-32 cm long, orbicular, palmately 3-5 lobed, cordate at base; lobes acute; petiole *ca* 7-25 cm long, base swollen. Flowers unisexual, in short tomentose panicles. Calyx *ca* 2 cm long, 5 lobed, brown tomentose outside, hairy below inside. Carpels 5 *ca* 2.5 cm long; stigma capitate. Follicles stipitate, shining black.

Fls. & Frts.: March - October.

Occurrence: Occasionally, found towards Dhekiabari in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, W. Peninsula; Sri Lanka, Vietnam.

Specimen examined: Dhekiabari; *Bora* 15371 (NEHU).

Pentapetes phoenicea Linn., Sp. Pl. 698. 1753; Roxb., Fl. Ind. 3: 157. 1832; Mast. in Hook. f., Fl. Brit. Ind. 1: 371. 1874; Deb, Fl. Tripura 1: 288. 1981.

Undershrub. Leaves *ca* 2-15 x 0.5-1.4 cm long, linear to hastate, crenate-serrate, stellate hairy beneath, 3 nerved at base; stipules linear. Flowers reddish, axillary, solitary or paired; bracteoles filiform. Sepals 5, lanceolate, hairy, persistent. Petals 5, obovate. Stamens many, connate below. Style spirally twisted. Capsules subglobose with persistent calyx.

Fls. & Frts.: August - October.

Occurrence: Occasionally occurs along roadside and grassland in the plain forest of the sanctuary.

Distribution: South-East Asia.

Specimen examined: Haduk; *Bora* 14739 (NEHU).

4. *Pterigota* Schott.

Schott. & Endl. Melet. 32. 1832.

About 20 species distributed in the old world; one species in India which occurs in the study area also.

Pterigota alata (Roxb.) R. Br. in Bennett & Brown, Pl. Jav. Rar. 234. 1844; Malick in Sharma *et al.*, Fl. ind. 3: 455. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 222. 1996. *Sterculia alata* Roxb., Pl. Corom. 3: 84. t. 287. 1820; Mast. in Hook. f.,Fl. Brit. Ind. 1: 360. 1874; Kanjilal *et al.*, Fl. Assam 1: 153. 1934.

Evergreen tree. Leaves *ca* 10-25 x 7-13 cm, ovae, acute, codate and 5-7 nerved at base, glabrous. Flowers yellow, in axillary panicles. Calyx campanulate, tomentose outside. Staminal column short. Follicles woody, shortly beaked.

Fls. & Frts.: December - March.

Occurrence: Rare, found in the hilly forest of the sanctuary.

Distribution: Eastern, North Eastern and Paninsular India; **Myanmar, Sri Lnaka.**

Specimen examined: Satbasti: *Bora* 15419 (NEHU).

5. *Pterospermum* Schreb.

Schreb., Gen. 2: 461. 1791, *nom. cons.*

About 40 species distributed in tropical Asia; 12 species in India; one species in the study area.

Pterospermum acerifolium Willd., Sp. Pl. 3: 792. 1802; Mast. in Hook. f., Fl. Brit. Ind. 1: 368. 1874, p.p.; Kanjilal *et al.*, Fl. Assam 1: 157. 1934; Chandra in Sharma *et al.*, Fl. Ind. 3: 448. 1990; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 222. 1996. *Pentapetes acerifolia* Linn., Sp. Pl. 698. 1753.

Large evergreen tree. Leaves *ca* 15-40 x 12-23 cm, cordate or peltate, often lobed, glabrous above, grey tomentose beneath. Flowers white, fragrant, *ca* 14 cm long, axillary on short thick peduncles. Calyx fleshy, deeply 5 linear-lanceolate segmented, brown tomentose outside. Petals *ca* 11 cm long, linear or obliquely cuneate. Staminal column adnate to the gynophore. Ovary

brown tomentose. Capsules 5 angled, woody, brown tomentose. Seeds winged.

Fls. & Frts.: March - July.

Occurrence: Occasionally, scattered in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Tripura, Bihar, West Bengal; Myanmar, Thailand.

Specimen examined: Hiloikhunda; *Bora* 15191 (NEHU).

Notes: Timber used for various construction works.

6. *Sterculia* Linn.

Linn., Sp. Pl. 1007. 1753 & Gen. Pl. ed. 5. 438. 1754.

Shrubs or trees. Leaves pamately lobed or digitate. Flowers polygamous in panicles. Calyx tubular, 4-5 partite. Petals absent. Staminal column bearing a head or ring of sessile anthers. Carpels 1-7, sessile or on a gynophore. Follicles woody or membranous. Seeds winged, sometimes arillate.

About 200 species distributed in tropics and warm temperate regions; 12 species in India; 2 species in the study area.

Key to the species

1a. Leaves digitate, glabrescent beneath

..... 1. *S. versicolor*

1b. Leaves palmately lobed, tomentose beneath

..... 2. *S. villosa*

1. *Sterculia versicolor* Wall., Pl. Asiat. Rar. 1: 48. t. 59. 1830; Mast. in Hook. f., Fl. Brit. Ind. 1: 355. 1874; Kanjilal *et al.*, Fl. Assam 1: 150. 1934; Deb, Fl. Tripura 1: 291. 1981. "Jali Udal".

Deciduous tree; branches spreading. Leaves digitately compound; leaflets *ca* 10-28 x 3.5-9.5 cm, elliptic-lanceolate or oblong-lanceolate, acuminate, whitish grey beneath. Flowers yellow, in terminal panicles. Calyx lobes oblong. Follicles woody 5-7, brownish tomentose outside.



Fls. & Frts.: March - December.

Occurrence: Common, in the hilly forest of the sanctuary.

Distribution: Assam, Tripura; Myanmar.

Specimen examined: Hiloikhunda; *Bora* 15280 (NEHU).

Notes: Probably confined to North-east India and extend upto Myanmar.

2. *Sterculia villosa* Roxb. ex Sm. in Cycl. 34: no. 16. 1816; Roxb., Fl. Ind. 1: 355. 1874; Kanjilal *et al.*, Fl. Assam 1: 151. 1934; Malick in Sharma *et al.*, Fl. Ind. 3: 472. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 227. 1996. "Udal".

Medium sized tree; young parts rusty tomentose. Leaves *ca* 14-40 cm long, crowded at the ends of branches, deeply palmately 5-7 lobed, cordate, tomentose beneath; lobes ovate-oblong, acuminate; petioles *ca* 8-20 cm long. Flowers yellow, polygamous. Calyx *ca* 1 cm long, campanulate, brown tomentose outside. Follicles 2-7, sessile, brownish stellate tomentose outside.

Fls. & Frts.: March - July.

Occurrence: Common, in the hilly forest and occasionally in the plain forest of the area.

Distribution: North East India, South India, Tropical Himalayas.

Specimen examined: Hiloikhunda; *Bora* 15114 (NEHU).

Uses: Barks used for making ropes.

19. BYTTNERIACEAE

R. Br. in Flinders. Voy. Terra Austr. 2: 540. 1814.

Mostly climbing shrubs. Flowers bisexual, actinomorphic, pentamerous. Sepals 5 connate below. Petals 5. Stamens usually 10, connate below, some reduced to staminodes. Ovary superior, 5-celled. Fruit a capsule.

Byttneria Leefl.

Leefl., Iter Hisp. 313. 1758, *nom. cons.*

About 75 species distributed in tropics and subtropics; 5 species in India; one species in the study area.

Byttneria grandifolia DC., Prodr. 1: 486. 1824; Haridasan & Rao; For. Fl. Meghalaya 1: 141. 1985; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 120. 1996. *B. aspera* Colebr. ex Wall. in Roxb., Fl. Ind. 2: 383. 1824; Mast. in Hook. f., Fl. Brit. Ind. 1: 377. 1874; Kanjilal *et al.*, Fl. Assam 1: 160. 1934. **Fig. 7**

Woody climber. Leaves *ca* 9-18 x 5.0-9.5 cm, ovate-orbicular, abruptly acuminate, cordate at base; stipules linear-lanceolate, deciduous. Flowers purplish, in axillary subumbellate cymes. Sepals 5, lanceolate, tomentose. Petals 5 fid, shorter than sepals. Staminal column cupshaped. Fruits globose, spiny capsule.

Fls. & Frts.: May - November.

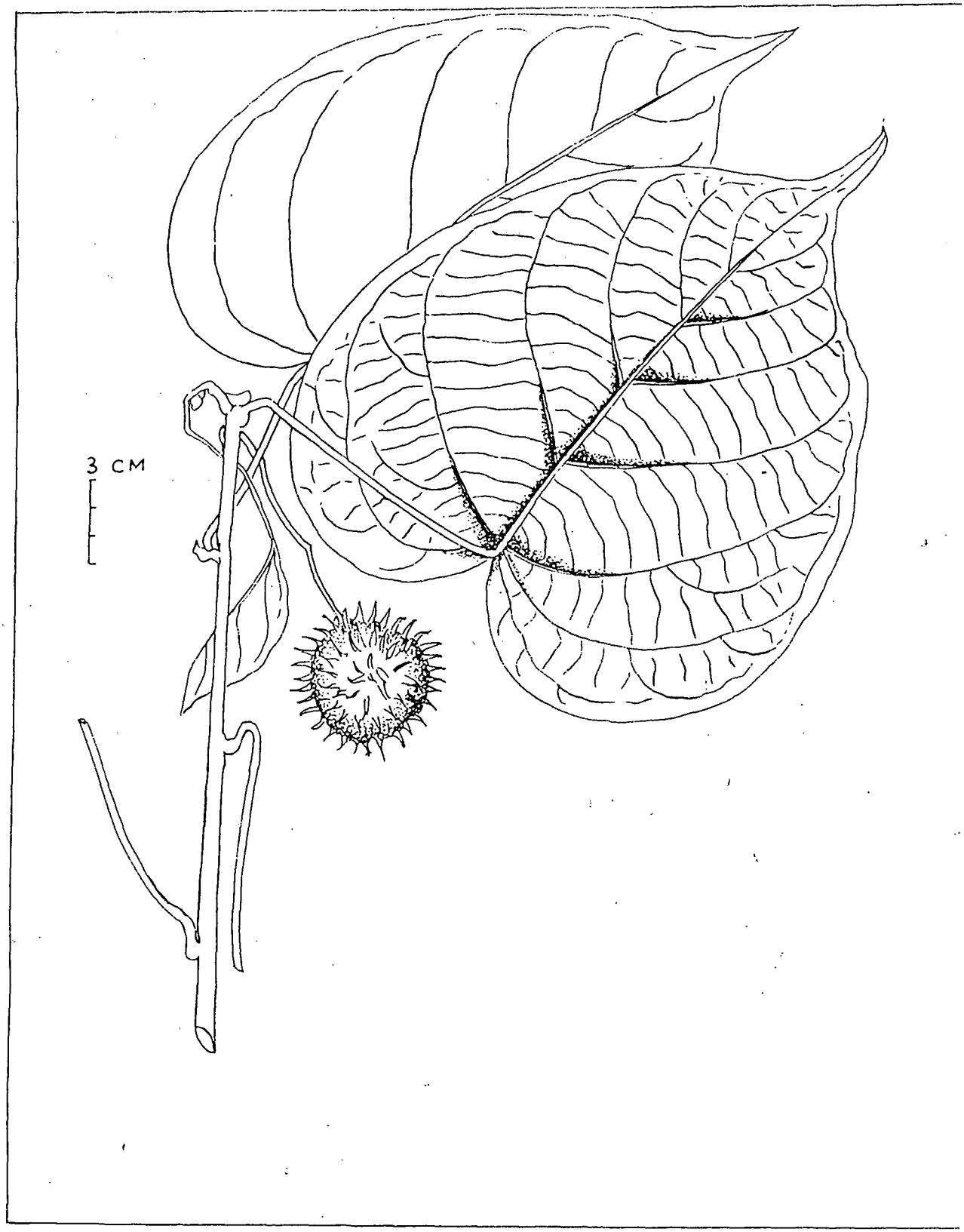


Fig. 7: ***Byttneria grandifolia*** DC. (Byttneriaceae)

Occurrence: Occasionally, climbing on trees in the hilly forest of the sanctuary.

Distribution: Arunacal Pradesh, Assam, Meghalaya, Sikkim; Bhutan, China, Nepal.

Specimen examined: Burha Mayong; *Bora* 15420 (NEHU).

20. TILIACEAE

A. L. de Juss., Gen. Pl. 289. 1789.

Trees or shrubs, rarely herbs. Leaves mostly alternate, usually stipulate. Flowers mostly bisexual, actinomorphic. Sepals usually 5, valvate. Petals as many as sepals, free. Stamens mostly many, free or connate. Ovary superior, sessile, 2-10 celled. Fruit fleshy or dry, various.

The family comprises about 50 genera and over 450 species, distributed in tropics and temperate regions; 8 genera and 64 species in India; 3 genera and 9 species in the study area.

Key to the genera

1a. Shrubs or trees .... 2. *Grewia*

1b. Herbs or undershrubs:

2a. Leaves simple to lobed; fruits spinous

..... 3. *Triumfeta*

2b. Leaves simple; fruits not spinous

..... 1. *Corchorus*

1. *Corchorus* Linn.

Linn., Sp. Pl. 1:529. 1753 & Gen. Pl. ed. 5. 234. 1754.

About 100 species pantropical in distribution; 8 species India; one species in the study area.

Corchorus aestuans Linn., Syst. ed. 10. 1079. 1759, *non* Forst; Deb, Fl. Tripura 1: 274. 1981; Islam, Fl. Majuli 69. 1990. *C. acutangulus* Lamk., Encycl. 2: 104. 1786; Hook. f., Fl. Brit. Ind. 1: 398. 1874. *C. fuscus* Roxb., Hort. Beng. 42. 1814.

Erect or ascending pubescent herb. Leaves ovate-oblong, acuminate, serrate, hairy; stipules linear, subulate. Flowers yellow, in 2-3 flowered axillary peduncles. Sepals *ca* 0.4 cm long, linear-oblong. Petals *ca* 0.5 cm long, spathulate. Capsules linear, 6 angled.

Fls. & Frts.: June - October.

Occurrence: Common, growing in moist places of the sanctuary.

Distribution: Hotter parts of India; China, Malaysia, Vietnam.

Specimen examined: Haduk; *Bora* 14738 (NEHU).

2. *Grewia* Linn.

Linn., Sp. Pl. 964. 1753.

Shrubs or trees; bark fibrous. Leaves simple. Flowers in cymes or panicled cymes. Sepals 5, free. Petals 5, usually with a basal gland. Anthers dorsifixed. Ovary 2-4 celled; ovules 2-8 in each cell; stigma shortly lobed. Fruit a drupe; pyrenes 1-4, 1-many seeded.

About 150 species distributed in tropics of Africa, Asia and Australia; 42 species in India; 6 species in the study area.

Key to the species

1a. Plants trees:

2a. Leaves elliptic-lanceolate, 3 nerved at base .... 2. *G. disperma*

2b. Leaves obliquely ovate; 5 nerved at base .... 3. *G. elastica*

1b. Plants shrubs:

3a. Leaves broadly ovate, densely tomentose beneath .... 1. *G. abutifolia*

3b. Leaves ovate-lanceolate, elliptic-lanceolate or oblanceolate; not densely tomentose:

4a. Leaves 5 nerved at base; stipules 2 partite .... 5. *G. paniculata*

4b. Leaves 3 nerved at base; stipules not 2 partite:

5a. Flowers polygamous; drupe 4 lobed .... 6. *G. polygama*

5b. Flowers bisexual; drupe 2 lobed .... 4. *G. multiflora*

1. **Grewia abutifolia** Vent. ex Juss. in Mus. Nat. Hist. Paris 4: 92. 1804; Mast. in Hook. f., Fl. Brit. Ind. 1:390. 1874; Kanjilal *et al.*, Fl. Assam 1: 166. 1934. *G. macrophylla* G. Don, Gen. Syst. 1: 549. 1831.

Stellately pubescent shrub. Leaves *ca* 9-22 x 7.0-15.5 cm, broadly ovate or suborbicular, acuminate, subcordate or rounded, 3 nerved at base, irregularly serrate, stellately pubescent on both surfaces; stipules adpressed

hairy. Flowers in axillary, 3-4 flowered clustered, short peduncled cymes. Sepals *ca* 0.5 cm long, oblong. Petals shorter than sepals. Drupe 2-4 lobed, minutely pubescent, *ca* 0.8 cm in diam.

Fls. & Frts.: June - December.

Occurrence: Common, in the hilly forest of the sanctuary.

Distribution: Assam, Tripura, West Bengal, S. India; Bangladesh, Myanmar.

Specimen examined: Dhekiabari; *Bora* 15121 (NEHU).

2. *Grewia disperma* Rottl. ex Spreng. Syst. 2: 579. 1925; Santapau in Rec. Bot. Surv. Ind. 16(1): 29. 1953. *G. laevigata* Vahl, Symb. Bot. 1: 34. 1790; Mast. in Hook. f., Fl. Brit. Ind. 1: 389. 1874; Kanjilal *et al.*, Fl. Assam 1: 164. 1934.

Small tree; young parts pubescent. Leaves: *ca* 6-12 x 2.2-5.0 cm, elliptic-lanceolate, acuminate, acute and 3 nerved at base, serrate. Flowers creamy white, 2-6 together on axillary peduncles. Sepals linear, pubescent. Petals obtuse-oblong. Drupes 1-4 lobed, globose.

Fls. & Frts.: June - November.

Occurrence: Occasionally, throughout the hilly forest of the sanctuary.

Distribution: Eastern and South India; Australia, Malaya Islands, Tropical Africa.

Specimen examined: Dhekiabari; *Bora* 15421 (NEHU).

3. *Grewia elastica* Royle. Illus. Bot. Himal. 1: 104. t. 22. 1839; Kanjilal *et al.*, Fl. Assam 1: 103. 1934; Chauhan *et al.* in Fl. Namdapha (edt.

Hajra) 121. 1996. *G. asiatica* Linn. var. *vestita* Mast. in Hook. f., Fl. Brit. Ind. 1: 387. 1874. **Fig. 8**

Medium sized tree; young parts, inflorescences stellate pubescent. Leaves *ca* 4.5-11.5 x 3.5-9.0 cm, obliquely ovate, acuminate, more or less cordate or rounded at base, serrate, usually 5 nerved at base. Flowers yellow, on 3 flowered axillary peduncles. Sepals whitish tomentose outside, yellowish inside. Petals emarginate. Style equalling the stamens. Drupes obscurely lobed, pillose with 1-2 nuts.

Fls. & Frts.: May - September.

Occurrence: Occasionally, throughout the hilly forest of the sanctuary.

Distribution: North East India, Uttar Pradesh; Sri Lanka.

Specimen examined: Dhekiabari; *Bora* 15359 (NEHU).

Uses: Timber used for making agricultural implements.

4. **Grewia multiflora** Juss. in Ann. Mus. 4, 89. t. 47. f.1; Mast. in Hook. f., Fl. Brit. Ind. 1: 388. 1874; Kanjilal *et al.*, Fl. Assam 1: 165. 1934; Islam, Fl. Majuli 70. 1990. *G. sepiria* Roxb., Hort. Beng. 42. 1814.

Straggling shrub; branches appressed hairy. Leaves *ca* 3.5-9.5 x 1.5-3.5 cm, elliptic-lanceolate or ovate-lanceolate, acute to acuminate, serrate, 3 nerved at base. Flowers pale yellow, in 2-3 flowered axillary peduncled cymes. Sepals oblong, hairy. Petals *ca* 0.4 cm long, ovate, glandular. Drupes 2-4 lobed, globose, fleshy.

Fls. & Frts.: August - December.

Occurrence: Common, throughout the sanctuary.

Distribution: Assam, Meghalaya, Sikkim, West Bengal, Western Peninsula;



Fig. 8: ***Grewia elastica*** Royle. (Tiliaceae)

South East Asia, Tropical Africa.

Specimen examined: Burha Mayong, Thengbhanga; *Bora* 15099 (NEHU).

Uses: Bark used for making rope.

5. *Grewia paniculata* Roxb., Fl. Ind. 2: 591. 1832; Miq., Fl. Ind. Bat. 1. pt. 2: 203; Mast. in Hook. f., Fl. Brit. Ind. 1: 393. 1874.

Shrub. Leaves oblong, acuminate, cuneate at base, pubescent beneath, serrate; stipules 2 partite. Flowers in terminal panicles, bracteate. Drupes 1-4 lobed, obovoid.

Fls. & Frts.: June - September.

Occurrence: Common, in the hilly forest of the sanctuary.

Distribution: Assam; Java, Philippines.

Specimen examined: Dhekiabari; *Bora* 15100 (NEHU).

6. *Grewia polygama* Roxb., Hort. Beng. 42. 1814. *nom. nud.* et Fl. Ind. 2: 588. 1824; Mast. in Hook. f., Fl. Brit. Ind. 1: 391. 1874. *G. lanceaefolia* Roxb., Fl. Ind. 2: 586. 1832.

Shrub; young branches grey tomentose. Leaves *ca* 6-10 cm long, lanceolate, acuminate, rounded and 3 nerved at base, serrate, subsessile. Flowers polygamous on 2 flowered axillary 1-5 peduncles. Drupes 4 lobed.

Fls. & Frts.: July - November.

Occurrence: Occasionally, scattered in the hilly forest of the sanctuary.

Distribution: Assam, North West India; North Australia, Pegu, Sri Lanka.

Specimen examined: Dhekiabari; *Bora* 15263 (NEHU).

3. *Triumfetta* Linn.

Linn., Sp. Pl. 1: 444. 1753 & Gen. Pl. ed. 5. 203. 1754.

About 40 species mostly distributed in tropical regions; 8 species in India; one species in the study area.

Triumfetta rhomboidea Jacq, Enum. Pl. Carib. 22. 1760; Hook. f., Fl. Brit. Ind. 1: 395. 1874; Kanjilal *et al.*, Fl. Assam 1: 168. 1934; Islam, Fl. Majuli 71. 1990. *T. bartramia* Linn., Syst. ed. 10. 1044. 1759. *Bartramia indica* Linn., Sp. Pl. 389. 1753.

Pubescent undershrub. Leaves variable, often 3 lobed, rhomboid or orbicular-ovate, acuminate, cordate or rounded and 3-7 nerved at base, irregularly serrate; upper ones simple. Flowers yellow, in dense lateral terminale cymes. Sepals 5, oblong. Petals 5, oblong, hairy below. Stamens 8-15. Receptacles glandular; apex cupshaped, ciliate. Fruits globose capsule, hooked spiny.

Fls. & Frts.: August - December.

Occurrence: Common, throughout the sanctuary.

Distribution: Throughout tropical India; South East Aisa.

Specimen examined: Haduk, Tuplung; *Bora* 14855 (NEHU).

21. ELAEOCARPACEAE

Juss. ex DC., Prodr. 1: 519. 1824.

Trees or shrubs. Leaves alternate or opposite, stipulate. Flowers bisexual, actinomorphic, in racemes, panicles or dichasia. Sepals 4-5,

valvate. Petals 4-5, sometimes absent. Stamens many, arising from a disk. Disk intrastaminal. Ovary superior, 2-many celled. Fruits capsule or drupaceous.

The family comprises about 13 genera and 300 species, distributed in tropics; 3 genera and about 21 species in India; one genus and one species in the study area.

Elaeocarpus Linn.

Linn., Sp. Pl. 514. 1753 & Gen. Pl. ed. 5. 230. 1754.

About 200 species distributed in East Asia, Indo-Malaya, Australia, and Pacific Islands; 26 species in India; one species in the study area.

Elaeocarpus floribundus Bl., Bidjr. 120. 1825; Mast. In Hook. f., Fl. Brit. Ind. 1: 401. 1874; Kanjilal *et al.*, Fl. Assam 1: 173. 1934; Deb, Fl. Tripura 1: 281. 1981; Murti in Sharma *et al.*, Fl. Ind. 3: 536. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 235. 1996. "Jalphai".

Small to medium sized tree. Leaves alternate, *ca* 8.0-16.5 x 4.0-8.5 cm, ovate-elliptic, acute, cuneate or rounded at base, serrate. Flowers white, *ca* 1.5 cm long, pedicellate, in axillary racemes. Sepals 5, *ca* 0.6 cm long, free. Petals 5, free, upper half finely disected into hairs like segments. Ovary sessile. Drupes oblong, smooth, green.

Fls. & Frts.: June - November.

Occurrence: Occasionally, throughout the sanctuary.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Tripura, North India; Malaysia, Myanmar.

Specimen examined: Haduk: *Bora* 15422 (NEHU).

Uses: Fruits edible and mostly used for prickle.

22. LINACEAE

S. F. Gray, Nat. Arr. Brit. Pl. 2: 639. 1821.

Herbs or sometimes shrubs. Leaves simple, stipulate or exstipulate. Flowers bisexual, actinomorphic. Sepals 4-5, imbricate. Petals 4-5, often clawed. Stamens 5, alternating with petals or 10 or more, basally connate or some reduced to staminodes. Ovary superior, 3-5 celled. Fruit a septicidal capsule or drupe.

The family comprises 12 genera and 290 species, distributed in temperate regions; about 3 genera and 8 species in India; one genus and one species in the study area.

Linum Linn.

Linn., Sp. Pl. 277. 1753 & Gen. Pl. ed. 5. 135. 1754.

About 80 species distributed in Mediterranean regions; 4 species in India; one species in the study area.

Linum usitatissimum Linn., Sp. Pl. 277. 1753; Hook. f., Fl. Brit. Ind. 1: 410. 1874; Hajra in Sharma *et al.*, Fl. Ind. 3: 580. 1993; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 242. 1996. *L. trinervium* Roth, Nov. Pl. Sp. 187. 1821.

Erect hispid herb, corymbosely branched above. Leaves *ca* 1.8-3.0 x 0.2 cm, linear or lanceolate, sessile, 3 nerved at base. Flowers blue, in corymbose leafy panicles. Sepals 5, ovate, acuminate, 3 nerved. Petals 5, rounded at apex. Stamens alternating with minute staminodes. Capsules oblong, mucronate. Seeds dark brown.

Fls. & Frts.: December - January.

Occurrence: Occasionally, in grassland and along road side of the study area.

Distribution: Throughout India; Westwards to the Atlantic.

Specimen examined: Haduk; *Bora* 14859 (NEHU).

23. MALPIGHIACEAE

A. L. de Juss., Gen. Pl. 252. 1789.

Trees, shrubs or climbers. Leaves mostly opposite, stipulate or exstipulate. Flowers bisexual, actinomorphic or zygomorphic, usually bracteate. Sepals 5, often biglandular outside. Petals 5, clawed, often fimbriate. Stamens mostly 10, connate at base, unequal. Ovary superior, 3-celled. Fruits fleshy or woody drupes, often winged.

The family comprises about 65 genera and 1280 species, distributed in tropical and subtropicl regions; 2 genera and about 17 species in India; 2 genera and 2 species in the study area.

Key to the genera

1a. Flowers actinomorphic; calyx eglandular; petals not clawed; seeds oblong .... 1. *Aspidopterys*

1b. Flowers zygomorphic; calyx glandular; petals clawed; seeds subglobose .... 2. *Hiptage*

1. *Aspidopterys* Juss.

Juss., Ann. Sci. Nat. II. 13: 266. 1840.

About 32 species distributed in South East Asia; 9 species in India; one species in the study area.

Aspidopterys nutans (Roxb. ex DC.) Juss., Ann. Sci. ser. 2, 13: 267. 1840; Hook. f., Fl. Brit. Ind. 1: 421. 1874; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 244. 1996. *Hiraea nutans* Roxb. ex DC., Prodr. 1: 585. 1824.

Twining shrub. Leaves *ca* 6-18 x 3.5-12.0 cm, ovate-elliptic or orbicular, abruptly acuminate, silky pubescent beneath, entire. Flowers yellow, *ca* 0.7 cm long, in axillary or terminal panicles, bracteate. Calyx 5 partite, small. Petals *ca* 0.4 cm long. Stamens 10. Fruits ovate-oblong, winged.

Fls. & Frts.: August - January.

Occurrence: Common, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Sikkim; Bangladesh, China, Malaysia, Vietnam.

Specimen examined: Dhekiabari; *Bora* 15373 (NEHU).

2. *Hiptage* Gaertn.

Gaertn., Fruct. 2: 169. 1791.

About 30 species distributed in West China, subtropical Asia, Formosa, Malaya and Pacific Islands; 3 species in India; one species in the study area.

Hiptage benghalensis (Linn.) Kurz, J. Asiat. Soc. Bengal 43 (2): 136. 1874; Islam, Fl. Majuli 72. 1990; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 244. 1996. *Banisteria benghalensis* Linn., Sp. Pl. 437. 1753. *Hiptage madablota* Gaern., Fruct. 2: 169, t. 116. 1791; Hook. f., Fl. Brit. Ind. 1: 418. 1874; Kanjilal *et al.*, Fl. Assam 1: 188. 1934. "Madhabi lota Fig. 9

Woody climbing shrub; branches spreading. Leaves *ca* 5-17 x 3.0-5.5 cm, elliptic or ovate-lanceolate, acuminate, coriaceous, entire. Flowers white, fragrant, *ca* 3 cm long, in axillary or terminal racemes. Calyx 5 partite, *ca* 0.5-0.8 cm long, silky outside. Petals unequal, clawed, silky. Stamens 10, connate below. Ovary 3 lobed. Samara 1-3, oblanceolate, winged.

Fls. & Frts:. January - June.

Occurrence: Occasionally, on northern side in the hilly forest of the sanctuary.

Distribution: Hotter parts of India; China, South East Asia, Sri Lanka.

Specimen examined: Hiloikhunda; *Bora* 15179 (NEHU).

Notes: Plant can be used for ornamental purpose.

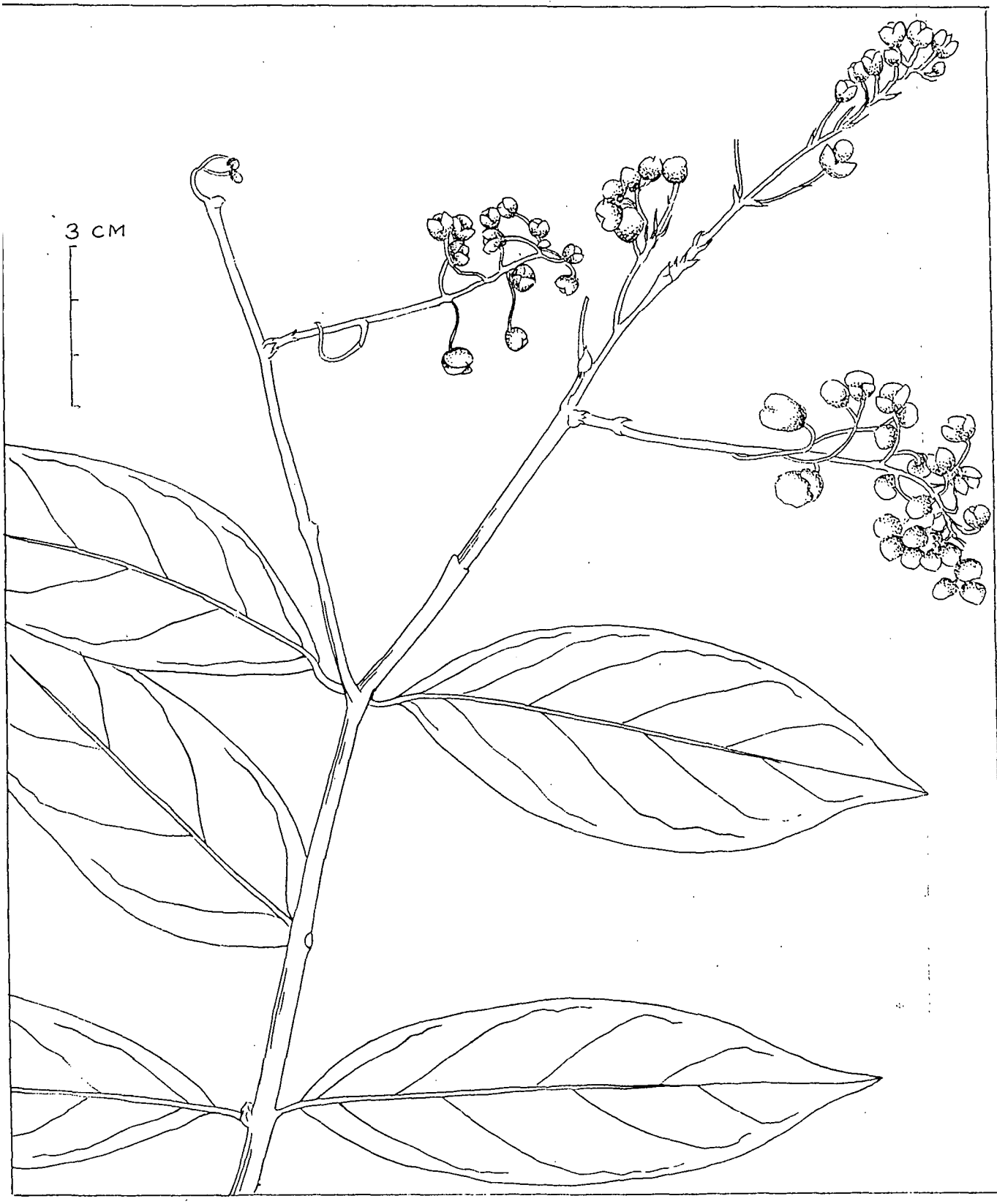


Fig. 9: ***Hiptage benghalensis*** (Linn.) Kurz (Malpighiaceae)

24. OXALIDACEAE

R. Br. in Tuckey, Narr. Exped. Congo 433. 1819.

Herbaceous or suffrutescent. Leaves alternate or radical, compound; leaflets usually folded at night. Flowers bisexual, actinomorphic, solitary or subumbellate, rarely racemose or cymose. Calyx 5 fid or partite. Petals 5, shortly clawed. Stamens 10, connate at the base. Ovary superior, 5-celled. Styles 5. Fruit a capsule.

The family comprises about 3 genera and 900 species, distributed in tropical and subtropical regions; 2 genera and over 12 species in India; 2 genera and 3 species in the study area.

Key to the species

1a. Leaves pinnately compound; flowers in terminal umbels ..... 1. *Biophytum*

1b. Leaves palmately compound; flowers in axillary pseudoumbels ..... 2. *Oxalis*

1. *Biophytum* DC.

DC., Prodr. 1: 689. 1824.

About 70 species mainly distributed in tropical regions; 4 species in India; one species in the study area.

Biophytum sensitivum (Linn.) DC., Prodr. 1: 690. 1824; Edgew & Hook. f. in Hook. f., Fl. Brit. Ind. 1: 436. 1874; Deb, Fl. Tripura 2: 306. 1983; Islam, Fl. Majuli 74. 1990. *Oxalis sensitivum* Linn., Sp. Pl. 434. 1753.

Erect pubescent herb. Leaves pinnately compound, crowded at the top of the stem; leaflets 5-15 pairs, *ca* 0.5-1.5 cm long, oblong, elliptic to obovate, sensitive. Flowers yellow, in terminal umbels; pedicels glandular hairy. Sepals *ca* 0.4 cm long, lanceolate, glandular, hispid. Corolla *ca* 0.7 cm long, hispid; lobes rounded. Stamens 10. Capsules elliptic, apiculate, loculicidally splitting into 5 persistent valves.

Fls. & Frts.: August - December.

Occurrence: Common, growing in shady places, usually on hilly slopes of the sanctuary.

Distribution: Hotter parts of India; Pantropic.

Specimen examined: Hiloikhunda; *Bora* 15117 (NEHU).

Uses: Leaf past applied on forehead to get relieve from headache.

2. *Oxalis* Linn.

Linn., Sp. Pl. 433. 1753 & Gen. Pl. ed. 5. 198. 1754.

Herbs. Leaves palmately 3 foliolate. Flowers in axillay 1-more flowered pseudoumbels. Sepals 5, free. Petals 5, contorted. Stamens 10 in two rows. Styles distinct. Fruits loculicidal capsule.

About 800 species cosmopolitan in distribution; 9 species in India; 2 species in the study area.

Key to the species

1a. Plant without creeping stem; leaflets broadly obcordate or obovate; flowers pink .... 1. *O. debilis*

1b. Plant with creeping stem; leaflets obcordate but smaller than above; flowers yellow

.... 2. O. corniculata

Oxalis corniculata Linn., Sp. Pl. 435. 1753; Edgew. & Hook. f. in Hook. f., Fl. Brit. Ind. 1: 436. 1874; Deb, Fl. Tripura 2: 306. 1983; Islam, Fl. Majuli 75. 1990; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 258. 1996. "Tengechi tenga".

Diffused herb; stem creeping, rooting at nodes. Leaflets obcordate, acute at base, ciliate at margins; petioles *ca* 3-7 cm long, pubescent. Flowers yellow, in axillary subumbels. Sepals *ca* 0.4 cm long, lanceolate. Petals *ca* 0.8 cm long, oblanceolate, notched at apex. Capsules subcylindrical, *ca* 1 cm long, pubescent.

Fls. & Frts.: June - December.

Occurrence: Common, in moist places of the area.

Distribution: Throughout the warmer parts of the world.

Specimen examined: Haduk; *Bora* 15042 (NEHU).

Uses: Leaves used as vegetable and decoction taken in stomach trouble also.

2. *Oxalis debilis* H.B.K var. *corymbosa* (DC.) Lour. in Ann. Miss. Bot. Gard. 67: 840. 1980; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 125. 1996. *O. corymbosa* DC., Prodr. 1: 696. 1824.

Acaulescent herb; root stock bulbous. Leaflets obcordate, deeply notched at apex, cuneate at base; petioles *ca* 7-20 cm long. Flowers pinkish, in 2-many

subumbellate corymbs; peduncles long, hairy. Petals *ca* 1.5 cm long, pubescent outside. Capsules subcylindric.

Fls. & Frts.: April - October.

Occurrence: Occasionally, in moist places of the area.

Distribution: Throughout India; South America.

Specimen examined: Burha Mayong; *Bora* 15423 (NEHU).

25. BALSAMINACEAE

A. Richard, Dict. Class. Hist. Nat. 2: 173. 1822.

Succulent herbs, rarely shruby. Leaves exstipulate. Flowers bisexual, zygomorphic, solitary or subumbellate. Sepals 3, rarely 5, lowermost form tubular spur. Petals 5, lateral ones united. Stamens 5; filaments connate to the top; anthers connate around the ovary. Ovary superior, 5-celled. Fruit a succulent capsule, opening elastically into 5 twisted valves, rarely berry.

The family comprises about 4 genera and 600 species, cosmopolitan in distribution; 2 genera and 176 species in India; one genus and one species in the study area.

Impatiens Linn.

Linn., Sp. Pl. 937. 1753 & Gen. Pl. ed. 5. 403. 1754.

About 500 species widely distributed; about 175 species in India; one species in the study area.

Impatiens tripetala Roxb. ex DC., Prodr. 1: 687. 1824; Hook. f., Fl. Brit. Ind. 1: 470. 1874; Chowdhery *et al.* in Materials for the Fl. Arunachal

Prad. (eds Hajra *et al.*) 1: 256. 1996.

Erect herb; stem swollen at nodes. Leaves *ca* 3-10 x 1.5-5.0 cm, elliptic-lanceolate, acuminate, cuneate at base, serrate. Flowers pinkish, axillary, solitary or fascicled. Sepals 3. Petals free. Capsules linear-ellipsoid, 5 valved, loculicidal.

Fls. & Frts.: February - August.

Occurrence: Common, in moist shady places.

Distribution: Tropical and subtropical India; **China, Malaysia**.

Specimen examined: Rangamati; *Bora* 14756 (NEHU).

26. RUTACEAE

A. L. de Juss., Gen. Pl. 296. 1789.

Shrubs or trees, rarely herbs. Leaves mostly gland dotted. Flowers bisexual, rarely unisexual, mostly actinomorphic. Sepals 4-5, imbricate. Petals imbricate, mostly free. Stamens as or double the number of petals, rarely many. Ovary superior, often 4-5 celled. Fruit baccate, drupaceous, rarely capsular.

The family comprises about 140 genera and 1300 species, widely distributed in temperate and tropical regions; about 24 genera and 86 species in India; 8 genera and 10 species in the study area.

Key to the genera

1a. Plants spiny:

2a. Leaves simple:

3a. Stamens 20-60; ovary many celled

..... 2. *Citrus*

3b. Stamens 8-10; ovary 3-5 celled

..... 7. *Paramignya*

2b. Leaves 3 foliolate or imparipinnate:

4a. Leaves 3 foliolate; stamens many

..... 1. *Aegle*

4b. Leaves imparipinnate; stamens 3-5

..... 8. *Zanthoxylum*

1b. Plants not spiny:

5a. Leaves 1-5 foliolate ... 4. *Glycosmis*

5b. Leaves imparipinnate:

6a. Leaflets subopposite; stamens 8-10, filaments dialated ... 3. *Clausena*

6b. Leaflets alternate; stamens 10, filaments subulate:

7a. Ovary 2-celled .... 6. *Murraya*

7b. Ovary 5-celled .... 5. *Micromelum*

1. *Aegle* Correa

Correa in Trans. Linn. Soc. 5: 222. 1800, *nom. cons.*

About 3 species distributed in Indo-Malayan region; one species in India which occurs in the study area also.

Aegle marmelos (Linn.) Correa in Trans. Linn. Soc. London 5: 222. 1800; Hook. f., Fl. Brit. Ind. 1: 516. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 215. 1936; Haridasan & Rao, For. Fl. Meghalaya 1: 180. 1985; Chowdhery *et al.* in

Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 260. 1996.

Crateva marmelos Linn., Sp. Pl. 444. 1753. "Bel".

Middle sized deciduous, spinous tree; spines straight axillary. Leaves alternate, 3 foliolate; leaflets *ca* 4-13 x 2.2-5.0 cm, acuminate, subcrenulate or entire; terminal ones petioled. Flowers greenish white, *ca* 1.4 cm long, fragrant, on few flowered axillary cymose panicles. Calyx small, pubescent. Petals 4, *ca* 1.2 cm long, oblong. Stamens many, *ca* 0.6 cm long. Fruits globose, oblong or pyriform. Pulp orange, sweet.

Fls. & Frts.: April - August.

Occurrence: Common, throughout the sanctuary.

Distribution: Throughout India; Tropical Asia, Africa.

Specimen examined: Burha Mayong; *Bora* 15424 (NEHU).

Uses: Fruits edible and taken to cure stomach trouble.

2. *Citrus* Linn.

Linn., Sp. Pl. 782. 1753 & Gen. Pl. ed. 5. 341. 1754.

Shrubs or trees; spinous. Leaves simple. Flowers axillary, solitary, fascicled or in cymes. Calyx 3-5 fid. Petals 4-8. Stamens 20-60; filaments connate. Ovary many celled; style stout; stigma capitate. Fruit a fleshy berry.

About 15 species distributed in Asia and Australia; 11 species in India; 2 species are collected from the study area.

Key to the species

1a. Leaves beneath and young shoot pubescent; fruits *ca* 12-14 cm in diam. .... 2. *C. maxima*

1b. Leaves and young parts glabrous; fruits *ca* 5.5-7.0 cm in diam. .... 1. *C. aurantium*

1. **Citrus aurantium** Linn., Sp. Pl. 782. 1753; Hook. f., Fl. Brit. Ind. 1: 515. 1875; Kanjilal *et al.*, Fl. Assam 1: 214. 1934; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 261. 1996. **"Kamala tenga"**.

Shrub or small tree. Leaves *ca* 4.0-8.5 x 2-4 cm, elliptic or ovate, acute, petiole winged. Flowers white, axillary. Berries *ca* 5.5-7.0 cm in diam., globose; pulp sweet, yellow.

Fls. & Frts.: July - December.

Occurrence: Occasionally, along the foot hill of the sanctuary.

Distribution: Assam, Meghalaya, foot hills of Himalaya.

Specimen examined: Guvali; *Bora* 15425 (NEHU).

Uses: Fruits edible.

Basionym

2. **Citrus maxima** (Merr.) Merr., Sp. Blancoanae 1918. / *C. decumina* Murr. in Linn., Syst. ed. 13. 580. 1774; Hook. f., Fl. Brit. Ind. 1: 516. 1875. **"Robab tenga"**.

Small tree. Leaves alternate, *ca* 4.0-11.5 x 2-6 cm, ovate-oblong, cuneate; petiole winged. Flowers white, solitary or in axillary clusters. Petals linear-oblong. Berries *ca* 12-14 cm in diam., globose, spongy.

Fls. & Frts.: June - November.

Occurrence: Occasionally, along the foot hill of the sanctuary.

Distribution: Warm countrise.

Specimen examined: Guvali; *Bora* 15341 (NEHU).

Uses: Fruits edible.

3. *Clausena* Burm. f.

Burm. f., Fl. Ind. 243. 1768.

About 30 species distributed in tropical regions of Asia, Africa and Australia; 7 species in India; one species in the study area.

Clausena excavata Burm. f., Fl. Ind. 87, t. 29. f. 2. 1768; Hook. f., Fl. Brit. Ind. 1: 504. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 206. 1936; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 262. 1996. **Fig. 10**

Aromatic shrub; young parts and inflorescence tomentose. Leaves imparipinnate, alternate; leaflets *ca* 1.5-7.0 x 0.3-2.5 cm, obliquely oblong or ovate lanceolate, acute, pubescent beneath. Flowers pale white, *ca* 0.4 cm long, subsessile, in axillary or terminal cymose panicles. Calyx 5 lobed, pubescent. Petals oblong, subacute. Fruits oblong or obovate berry.

Fls. Frts.: March - July.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Tropical Himalayas, Eastern Peninsula; Bangladesh, Java, Peru.

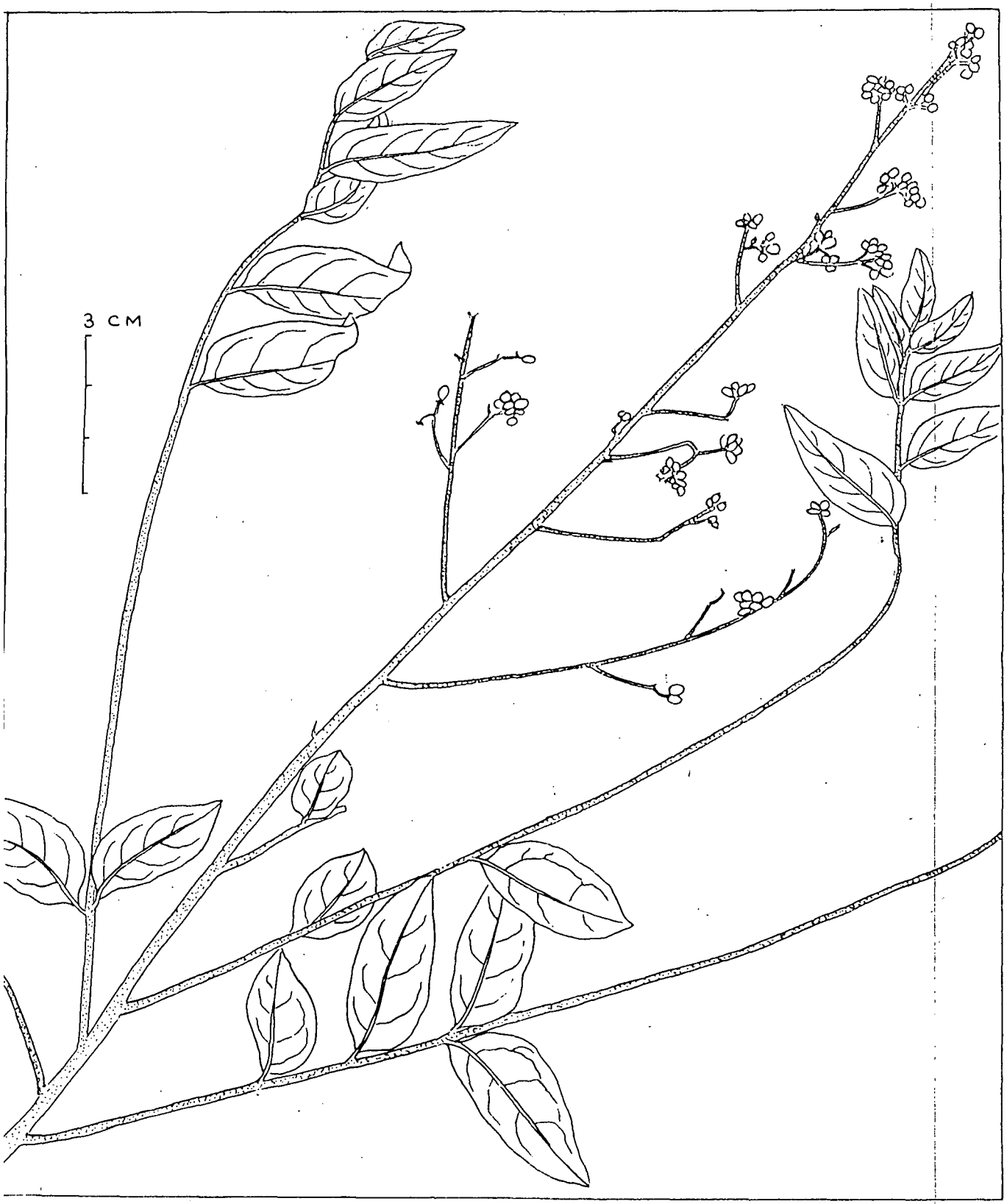


Fig. 10: ***Clausena excavata*** Burm. f. (Rutaceae)

Specimen examined: Hiloikhunda; *Bora* 15426 (NEHU).

4. *Glycosmis* Correa

Correa in Ann. Mus. Paris 6: 384. 1805.

Shrubs or trees. Leaves 1 foliolate or imparipinnate. Flowers in axillary or rarely terminal panicles. Calyx 4-5 partite. Petals 4-5. Stamens 8-10; filaments dialated. Ovary 2-5 celled. Fruits berry.

About 50 species distributed in tropics; 7 species in India; 2 species in the study area.

Key to the species

1a. Flowers in axillary or terminal cymes;
Berries elliptic ... 1. *G. cymosa*

1b. Flowers in erect terminal or lateral panicles;
berries subglobose ... 2. *G. pentaphylla*

1. *Glycosmis cymosa* (Kurz) Narayan. in Rec. Bot. Surv. Ind. 14(2): 26. 1941; Deb, Fl. Tripura 1:438. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 265. 1996. *G. cyanocarpa* var. *cymosa* Kurz. in J. Bot. 14: 34. 1876.

Shrub. Leaflets 3-5, *ca* 6-20 x 2.0-6.5 cm, alternate or subopposite, ovate-elliptic to linear-lanceolate, acute or obtusely acuminate, acute or cuneate at base. Flowers white, in axillary or terminal cymes. Calyx segments ovate. Petals *ca* 0.3 cm long, oblong. Berries elliptic.

Fls. & Frts.: February - June.

Occurrence: Rare, occurs in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Tripura; Bangladesh, Myanmar.

Specimen examined: Dhekiabari; *Bora* 14760 (NEHU).

Notes: Endemic to North-east India

2. *Glycosmis pentaphylla* (Retz.) Correa in Ann. Mus. Nat. Hist. Paris 6: 386. 1805; Hook. f., Fl. Brit. Ind. 1: 499. 1875; Chowdhery *et al.*, in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 265. 1996. *Limonia pentaphylla* Retz., Obs. Bot. 5: 24. 1788. *Glycosmis arborea* (Roxb.) DC., Prodr. 1: 538. 1824. "Mati bel, Chauldhua".

Small shrub. Leaves 3-5 foliolate; leaflets alternate, *ca* 4-16 x 1.5-4.8 cm, ovate-lanceolate, acute or acuminate. Flowers white, fragrant, small, in erect terminal or lateral panicles. Calyx lobes ovate-orbicular. Petals *ca* 0.3 cm long, ovate, obtuse. Berries *ca* 0.5 cm in diam., subglobose.

Fls. & Frts.: Nearly throughout the year.

Occurrence: Common, along roadside and shady forest floors.

Distribution: Arunachal Pradesh, Assam, Tripura, Himalayas; Australia, China, Philippines Islands.

Specimen examined: Haduk, Thengbhanga; *Bora* 14730 (NEHU).

Uses: Fruits edible and leaf decoction taken in dysentery.

5. *Micromelum* Bl.

Bl., Bijdr. 137. 1825, *nom. cons.*

About 10 species distributed in tropics, largely in Indo-Malayan region;

3 species in India; one species in the study area.

Micromelum minutum (Forst. f.) Wight & Arn., Prodr. Fl. Pen. Ind. Or. 1: 448. 1834; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 266. 1996. *Limonia minuta* Forst. f., Fl. Ins. Austr. Prodr. 33. 1784. *Micromelum pubescens* Bl., Bijdr. 128. 1825; Hook. f., Fl. Brit. Ind. 1: 501. 1875.

Small tree. Leaves imparipinnate; leaflets 9-15, alternate, *ca* 2.5-15.0 x 1.8-6.5 cm, oblique, ovate or lanceolate, acuminate. Flowers pale yellow, *ca* 1.4 cm long, in terminal decompound cymes. Calyx 5 lobed. Petals 5, *ca* 0.6 cm long, narrow oblong, tomentose outside. Stamens 10, *ca* 0.4 cm long. Ovary hairy. Berries *ca* 0.4 cm in diam., ovoid or oblong.

Fls. & Frts.: December - April.

Occurrence: Occasionally, along the foot hill of the sanctuary.

Distribution: North East India, Tropical Himalayas; Bangladesh, China, Java, Pacific Island, Sri Lanka.

Specimen examined: Rangamati; *Bora* 15092 (NEHU).

6. *Murraya* Koenig ex Linn.

Koenig ex Linn., Mant. 2: 554. 1771, *nom. cons.*

About 15 species distributed in tropical Asia; 2 species in India; one species in the study area.

Murraya koenigii (Linn.) Spreng., Syat. Veg. 2: 315. 1825; Hook. f., Fl. Brit. Ind. 1: 503. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 207. 1936; Islam,

Fl. Majuli 78. 1990; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 268. 1996. *Bergera koenigii* Linn., Mant. Pl. 2: 563. 1771. "Narasingha".

Deciduous pubescent, strongly scented shrub. Leaves imparipinnate; leaflets 9-25, alternate, *ca* 0.5-4.3 x 0.2-1.8 cm, ovate-lanceolate, oblique at base, pubescent beneath. Flowers white, *ca* 0.9 cm long, in terminal corymbose panicles. Calyx segments 5, small. Petals 5, *ca* 0.4 cm long. Stamens 10. Stigma capitate. Berries ovoid.

Fls. & Frts.: March - June.

Occurrence: Common, usually in shady hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Garwhal, Sikkim, South India, West Bengal; Sri Lanka.

Specimen examined: Hiloikhunda; *Bora* 15076 (NEHU).

Uses: Leaves used for preparing cury and extract taken to cure dysentery trouble.

7. *Paramignya* Wight

R. Wight, Ill. 1: 108. t. 42. 1938.

About 20 species distributed in Indo-Malayan region; about 20 species in India; one species in the study area.

Paramignya griffithii Hook. f., Fl. Brit. Ind. 1: 510. 1875: Kanjilal *et al.*, Fl. Assam 1(2): 211. 1936; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 268. 1996. Fig. 11

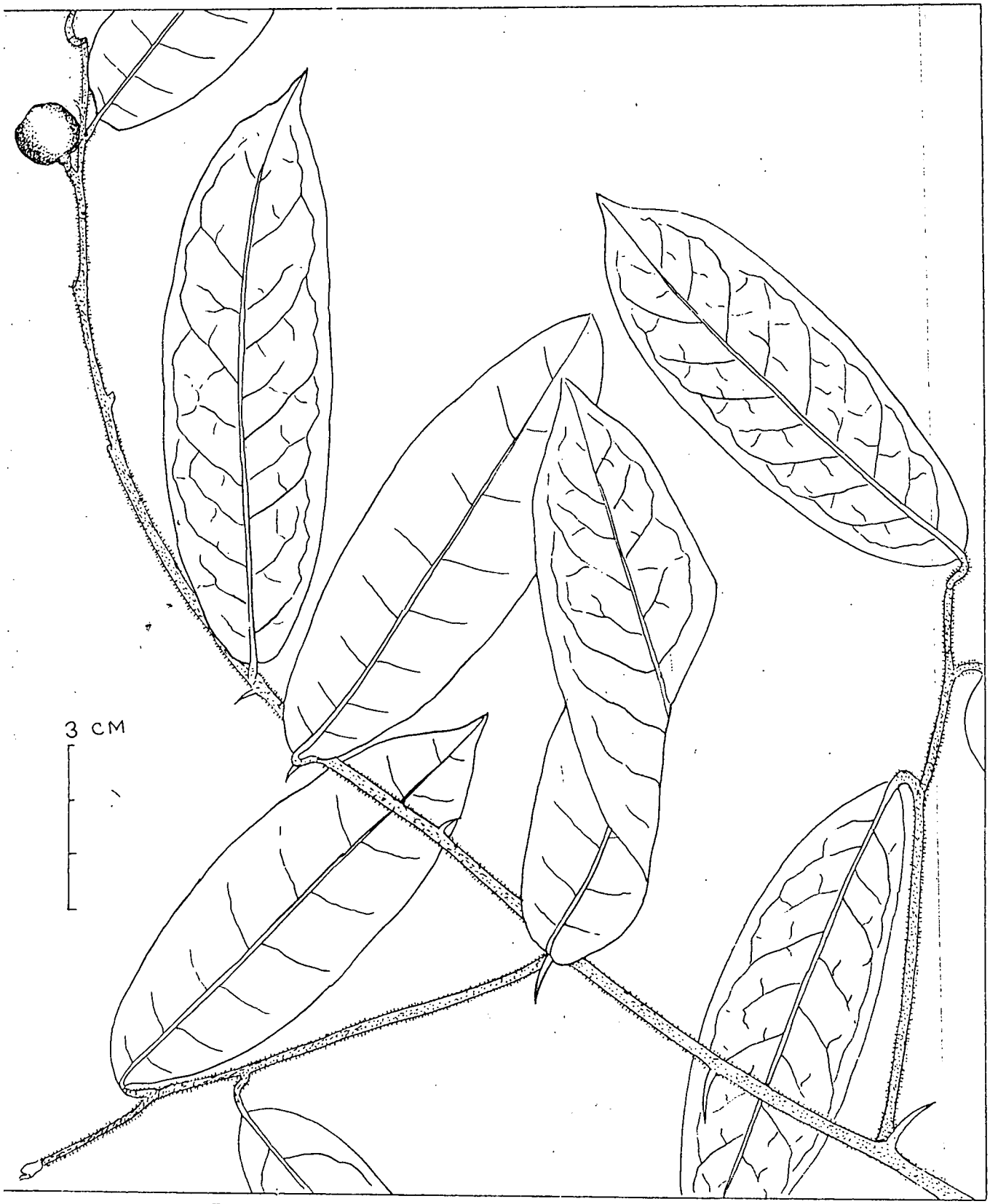


Fig. 11: ***Paramignya griffithii*** Hook. f. (Rutaceae)

Scandent shrub; young parts tomentose; spines recurved, axillary. Leaves *ca* 5-15 x 2.0-4.5 cm, oblong or elliptic with translucant dots, acute or acuminate, tomentose beneath. Flowers white, solitary or in axillary cymes. Calyx 5 teethed. Petals 5, lanceolate. Stamens 10. Ovary pillose. Fruits baccate, *ca* 1.5 cm in diam., globose, rugose.

Fls. & Frts.: June - December.

Occurrence: Occasionally, in shady hilly forest of the sanctuary.

Distribution: North East India; Myanmar.

Specimen examined: Rangamati; *Bora* 15349 (NEHU).

Notes: Confined to Indo-Burmese region.

8. *Zanthoxylum* Linn.

Linn., Sp. Pl. 270. 1753 & Gen. Pl. ed. 5. 130. 1754.

About 80 species distributed in tropical & subtropical regions; 10 species in India; one species in the study area.

Zanthoxylum rhetsa (Roxb.) DC., Prodr. 1: 728. 1824; Hook. f., Fl. Brit. Ind. 1: 495. 1875; Kanjilal *et al.*, Fl. Assam 1 (2): 197. 1936; Haridasan & Rao, For. Fl. Meghalaya 1: 193. 1985; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 272. 1996. *Fagara rhetsa* Roxb., Fl. Ind. 1: 430. 1820. "Bajranali".

Tree; branches spreading; bark spiny. Leaves imparipinnate, crowded at tips of the twigs; leaflets *ca* 3-13 x 2.0-5.5 cm, oblong-lanceolate, acuminate, oblique, serrate. Flowers polygamous, pale yellow, *ca* 0.3-0.5 cm long, in dense axillary cymes. Calyx minute, linear. Petals ovate. Fruits

globose, 1 seeded cocci.

Fls. & Frts.: March - October.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Western Peninsula; Malaysia.

Specimen examined: Rangamati; *Bora* 15427 (NEHU).

Notes: Confined to Indo-Malayan region.

27. SIMAROUBACEAE

DC., Ann. Mus. Hist. Nat. Paris 17: 422. 1811.

Trees or shrubs. Leaves mostly alternate and pinnate. Flowers unisexual or polygamous, actinomorphic, rarely bisexual. Calyx 3-4 lobed. Petals 3-4, rarely absent. Disk present. Stamens equal to or double the number of petals. Ovary superior, 1-5 celled. Fruit usually indehiscent, sometimes samaroid.

The family comprises about 30 genera and 200 species, distributed in tropical and subtropical regions; 6 genera and 12 species in India ; one genus and one species in the study area.

Picrasma Bl.

Bl., Bijdr. 247. 1825.

About 6 species distributed in Western Himalayas to Japan, Malaysia, Fiji; 2 species in India; one species in the study area.

Picrasma javanica Bl., Bijdr. 5. 1825; Bennett in Hook. f., Fl. Brit. Ind. 1: 520. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 218. 1936; Haridasan & Rao, For. Fl. Meghalaya 1: 196. 1985; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 275. 1996. *P. nepalensis* Bennett in Fl. Jav. Rar. 201. 1844 & in Hook. f., Fl. Brit. Ind. 520. 1875.

Middle sized tree. Leaves imparipinnate; leaflets ovate or elliptic-lanceolate, acuminate, cuneate at base. Flowers greenish white, in axillary corymbose panicles. Calyx teeths 4, small, rounded. Petals 4, acute. Stamens 4; filaments hairy. Berries subglobose, fleshy.

Fls. & Frts.: April - October.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Tripura, Sikkim, Andaman; Malaysia, Myanmar.

Specimen examined: Burha Mayong; *Bora* 15428 (NEHU).

28. BURSERACEAE

Kunth, Ann. Sci. Nat. 2: 346. 1824.

Trees or shrubs, secreting resin or oil. Leaves alternate, mostly compound. Flowers bisexual or unisexual. Sepals 3-5. Petals 3-5. Disk present. Stamens equal or double the number of petals, free. Ovary superior, 2-5 celled. Fruit a drupe or tardily dehiscent.

The family comprises about 16 genera and 200 species, distributed in tropics; 6 genera and 22 species in India; 2 genera and 2 species in the study

area.

Key to the genera

1a. Inflorescence axillary panicles; flowers hermophrodite ..... 1. *Bursera*

1b. Inflorescence crowded at the ends of branches or terminal; flowers polygamous .. 2. *Garuga*

1. *Bursera* Jacq.

Jacq. ex Linn., Sp. Pl. ed. 2. 471. 1762.

About 80 species distributed mostly in tropical America; 2 species in India; one species in the study area.

Bursera serrata Wall. ex Colebr. in Trans. Linn. Soc. 15: 316. t. 4. 1827; Bennett in Hook. f., Fl. Brit. Ind. 1: 528. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 223. 1936. "**Mirtenga**".

Tree; young parts tomentose; bark grey. Leaves imparipinnate, *ca* 25 cm long; leaflets opposite, *ca* 4-13 x 2.0-3.5 cm, oblong-lanceolate, acuminate, rounded at base, distantly serrulate or entire. Flowers greenish, in lax axillary panicles. Drupes globose, 2-3 ferrowed, 1-2 cm in diam., 1-3 seeded.

Fls. & Frts.: April - July.

Occurrence: Common throughout the area.

Distribution: Assam, Bihar, Western Himalayas, Central India.

Specimen examined: Burha Mayong; *Bora* 15362 (NEHU).

Uses: Fruits edible.

2. Garuga Roxb.

Roxb., Fl. Corom. 3: 5. t. 208. 1811, *nom. cons.*

4 species distributed in South East Asia and North East Australia; 2 species in India; one species in the study area.

Garuga pinnata Roxb., Hort. Beng. 33. 1814. *nom. nud.* et Pl. Corom. 3: 5, t. 208. 1819; Bennett in Hook. f., Fl. Brit. Ind. 1: 528. 1875; Kanjilal *et al.*, Fl. Assam 1 (2): 221. 1936; Deb, Fl. Tripura 1: 443. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 276. 1996. "Jiya Kuhir".

Deciduous tree. Leaves imparipinnate, *ca* 35 cm long; leaflets opposite, 6-9 pairs, *ca* 4-19 x 2.5-7.0 cm, ovate-lanceolate, acuminate, oblique, crenate. Flowers greenish yellow, in long pubescent panicles. Calyx lobes ovate-oblong, tomentose outside. Petals 5, *ca* 0.4 cm long, linear-oblong. Stamens 10. Style hairy. Drupes globose, with 2-3 pyrenes.

Fls. & Frts.: April - October.

Occurrence: Common, throughout the study area.

Distribution: Throughout India; Bangladesh, China, Myanmar, Thailand.

Specimen examined: Haduk; *Bora* 15312 (NEHU).

Uses: Timber used for various construction works

29. MELIACEAE

A. L. de Juss., Gen. Pl. 263. 1789.

Trees or shrubs. Leaves alternate, mostly pinnate, exstipulate. Flowers

mostly bisexual, actinomorphic, in panicles. Sepals 4-5, basally connate. Petals 4-5, free or partially connate. Stamens 8-10, rarely 5 or more, mostly connate. Ovary superior, 3-5 celled. Fruit berry or capsule, or rarely drupe. Seeds often winged.

The family comprises about 40 genera and 800 species, pantropical in distribution; 5 genera and 5 species in the study area.

Key to the genera

1a. Staminal filaments almost free; ovules many in each cell .... 5. *Toona*

1b. Staminal filaments united; ovules 1-2 in each cell:

2a. Fruits drupe:

3a. Leaves 1 pinnate; drupe 1-celled ..... 2. **Azadirachta**

3b. Leaves 2-3 pinnate; drupe 5-celled ..... 4. **Melia**

2b. Fruits capsule:

4a. Stigma subsessile, 3 lobed ..... 1. *Aphanamixis*

4b. Stigma on elongated style, peltate ..... 3. *Dysoxylum*

1. *Aphanamixis* Bl.

Bl., Bijdr. 1: 165. 1825.

About 25 species distributed in tropics; 3 species in India; one species in the study area.

Aphanamixis polystachya (Wall.) Parker in Ind. For. 57. 486. 1931; Haridasan & Rao, For. Fl. Meghalaya 1: 205. 1985; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 279. 1996. *Agalia polystachya* Wall. in Roxb., Fl. Ind. 2: 429. 1824. *Amoora rohituka* (Roxb.) Wight & Arn., Prodr. Fl. Pen. Ind. 119. 1834; Hiern. in Hook. f., Fl. Brit. Ind. 1: 559. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 236. 1936.

Tree; branches spreading; bark rough greyish brown. Leaves crowded at the end of branchlets, 7-11 foliolate; leaflets *ca* 6-20 x 2.5-6.5 cm, oblong, ovate-oblong or lanceolate, acuminate, oblique at base. Flowers pale white, polygamous, in axillary racemes. Calyx 5 partite. Petals 3, connate. Stamens 6. Capsules ovoid or obovoid, 3-celled.

Fls. & Frts.: October - March.

Occurrence: Common, in the hilly forest of the sanctuary.

Distribution: Throughout India; Indo-Malayan.

Specimen examined: Sanaka; *Bora* 15378 (NEHU).

2. *Azadirachta* Juss.

Juss. in Mem. Mus. Paris 19: 220. t. 2. 1830.

2 species distributed in Eastern India, Java and Sri Lanka; one species in the study area.

Azadirachta indica Juss. in Mem. Mus. Par. 19: 221. 1830; Kanjilal *et al.*, Fl. Assam 1(2): 227. 1936; Islam, Fl. Majuli 79. 1990; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 274. 1996.

Melia azadirachta Linn., Sp. Pl. 385. 1753; Roxb., Hort. Beng. 33. 1814; Hiern in Hook. f., Fl. Brit. Ind. 1: 544. 1875. "Neem".

Deciduous tree. Leaves imparipinnate, crowded at the end of the branches; leaflets 5-15, sub-opposite, lanceolate, acuminate, serrate, oblique. Flowers white, fragrant, in lax axillary panicles. Calyx lobes 5, obtuse or rounded. Petals 5, *ca* 0.5 cm long, linear-oblong, obtuse. Staminal tube laciniate at apex; anther sessile. Sigma 3 toothed. Drupes oblong, *ca* 1.5 cm long, 1 seeded.

Fls. & Frts.: March - July.

Occurrence: Occasionally, scattered in the sanctuary.

Distribution: Throughout India; Java, Sri Lanka.

Specimen examined: Haduk; *Bora* 15429 (NEHU).

Uses: Leaves taken raw to protect from epidemic diseases and decoction for the treatment of skin diseases.

3. *Dysoxylum* Bl.

Bl., Bijdr. 1: 172. 1825.

About 200 species distributed in tropics and subtropics; 10 species in India; one species in the study area.

Dysoxylum binectariforum (Roxb.) Hook. f. ex Bedd. in Trans. Linn. Soc. Lond. 25: 212. 1866; Hiern in Hook. f., Fl. Brit. Ind. 1: 546. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 232. 1936; Islam, Fl. Majuli 80. 1990; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 282. 1996. "Bandardima".

Meddium sized tree. Leaves paripinnate, *ca* 35 cm long; leaflets 6-8, alternate, *ca* 6-22 x 3-9 cm, obliquely ovate-oblong, abruptly acuminate, cuneate at base. Flowers white, in large axillary panicles. Calyx 5 partite. Petals 5. Staminal tube dentate at mouth. Ovary hairy. Capsules obovoid , 4-celled.

Fls. & Frts.: April - December.

Occurrence: Occasionally, throughout the area.

Distrbution: Throughout India; Sri Lanka.

Specimen examined: Burha Mayong; *Bora* 15430 (NEHU).

Uses: Timber used for miscellaneous purposes.

4. *Melia* Linn.

Linn., Sp. Pl. 384. 1753 & Gen. Pl. ed. 5. 576. 1754.

About 15 species distributed in tropics; 2 species in India; one species in the study area.

Melia azedarach Linn., Sp. Pl. 384. 1753; Hiern in Hook. f., Fl. Brit. Ind. 1: 544. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 228. 1936; Deb, Fl. Tripura 1: 451. 1981; Haridasan & Rao, For. Fl. Meghalaya 1: 210. 1985; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 283. 1996. "Ghura Neem".

Medium sized deciduous tree. Leaves 2-3 pinnate; leaflets 2.0-4.5 x 1.0-2.2 cm, ovate-lanceolate, acuminate, cuneate at base, oblique, serrate. Flowers light purple, in axillary paniculate cymes. Calyx lobes 5, pubescent.

Petals 5, linear-oblong, puberulous. Staminal tube ribbed. Overy 5 celled. Drupes fleshy, 1 seeded.

Fls. & Frts.: March - December.

Occurrence: Common, throughout the hilly forest.

Distribution: Throughout India; China.

Speciemn examined: Burha Mayong; *Bora* 15431 (NEHU).

Uses: Leaf decoction for the treatment of skin diseases.

5. *Toona* Roem.

(Endl.) Roem., Synops. Monogr. 1: 131. 1846.

About 16 species distributed in Indo-Malayan region to West Australia, North China; 4 species in India; one species in the study area.

Toona ciliata Roem., Syn. Hesp. 139. 1846; Santapau in Rec. Bot. Surv. Ind. 16(1): 45. 1953; Haridasan & Rao, For. Fl. Meghalaya 1: 212. 1985; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 133. 1996; *Cedrela toona* Roxb. ex Rottle., Ges. Natur. F. Freunde Berlin News Schrifter 2: 198. 1803; Hook. f., Fl. Brit. Ind. 1: 568. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 242. 1936. "Poma".

Large deciduous tree. Leaves long, paripinnate; leaflets 5-25, *ca* 4-14 x 1.8-4.2 cm, obliquely ovate or lanceolate, acuminate, entire or undulate, glabrous and shining. Flowers white, *ca* 0.8-1.0 cm long, in drooping terminal panicles. Calyx lobes 5, obtuse, ciliate. Petals 5, free, oblong ciliate. Stamens 5. Ovary hairy; stigma 5 lobed. Capsule oblong, *ca* 3.0 x 0.5 cm. Seeds membranous winged at ends.

Fls. & Frts.: January - June.

Occurrence: Common, throughout the area.

Distribution: North East India, North West Himalayas; Bangladesh, Myanmar, West Australia.

Specimen examined: Haduk; *Bora* 15093 (NEHU).

Uses: Timber used for various miscellaneous works.

30. ICACINACEAE

( )

Miers, Ann. Mag. Nat. ser. 2, (9): 211. 1852.

Trees, shrubs or climbers. Leaves mostly alternate, exstipulate. Flowers mostly bisexual, actinomorphic. Calyx inferior, 4-5 lobed. Petals 4-5, valvate, rarely absent. Stamens as many as petals and alternate with them. Ovary superior, 1-celled. Fruit drupaceous, 1 seeded.

The family comprises about 38 genera and 225 species, distributed in tropics and subtropics; 7 genera and 14 species in India; one genus and one species in the study area.

Natsiatum Buch.-Ham.

Buch.-Ham. in Wall. Cat. n. 4252. 1831.

One species in India which occurs in the study area also.

Natsiatum herpecticum Buch.-Ham. ex Arn. in Edinbergh New Philos. J. 16: 314. 1834; Mast. in Hook. f., Fl. Brit. Ind. 1: 595. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 253. 1936; Chowdhery *et al.* in Materials for the Fl. Arunachal

Prad. (eds. Hajra *et al.*) 1: 291. 1996.

Climbing shrub. Leaves ovate or sub-orbicular, acute, serrate, hairy, palmately nerved. Flowers dioecious, pale yellow, in axillary or supra-axillary hirsute racemes. Calyx lobes 5, hairy. Petals 5, lanceolate, hairy. Staminal filaments short; anthers sagittate. Staminodes present, pubescent; style 2-3 fid. Drupes ovate, compressed.

Fls. & Frts.: November - February.

Occurrence: Rare, occurs in few particular pockets in the hilly forest.

Distribution: North East India; China, Myanmar, Nepal.

Specimen examined: Dhekiabari; *Bora* 15432 (NEHU).

31. CELASTRACEAE

R. Br. in Flinders, Voy. Terra. Austr. 2: 554. 1814.

Trees, shrubs or climbers. Leaves alternate or opposite. Flowers often bisexual, actinomorphic, mostly cymose or fasciculate. Calyx 4-5 lobed, imbricate. Petals 5, rarely absent. Stamens 4-5, rarely more, alternate with petals. Disk usually present. Ovary superior, 1-5 celled. Fruit various.

The family comprises about 55 genera and 850 species, distributed in tropical and subtropical regions; 10 genera and about 65 species in India; one genera and one species in the study area.

Celastrus Linn.

Linn., Sp. Pl. 196. 1753 & Gen. Pl. ed. 91. 1754.

About 30 species distributed throughout the tropics; 6 species in India; one species in the study area.

Celastrus paniculatus Willd., Sp. Pl. 1: 1125. 1797; Lawson in Hook. f., Fl. Brit. Ind. 1: 617. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 268. 1936; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 295. 1996. Fig. 12

Woody climber. Leaves alternate, ovate or obovate, acute, serrate, crenate. Flowers unisexual, greenish white, in lax terminal, pubescent, compound panicled cymes. Calyx campanulate; lobes 5. Petals 5, obovate-oblong. Disk cupular. Stamens 5. Style short; stigmas 3. Capsules globose, 3-valved, 3-6 seeded, orange-yellow when ripe.

Fls. & Frts.: May - October.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Tropical and subtropical Himalayas; Philippines, Sri Lanka.

Specimen examined: Satbasti; *Bora* 15385 (NEHU).

32. RHAMNACEAE

A. L. de Juss., Gen. Pl. 376. 1789.

Trees, shrubs, sometimes scandent, rarely herbs. Leaves alternate or



Fig. 12: ***Celastrus paniculatus*** Willd. (Celastraceae)

opposite, mostly stipulate. Flowers bisexual, rarely polygamo-dioecious, mostly cymose. Calyx tubular, 4-5 lobed. Petals 4-5 or absent. Stamens 4-5, opposite to petals. Disk mostly present. Ovary sessile, 2-4 celled. Fruit various, often drupaceous.

The family comprises about 58 genera and 900 species, distributed in tropical, subtropical and temperate regions; 12 genera and 51 species in India; 3 genera and 4 species in the study area.

Key to the genera

1a. Plants unarmed climbing shrubs with tendrils .... 1. *Gouania*

1b. Plants armed or unarmed erect shrubs or trees without tendrils:

2a. Leaves oblique at base, with 3-5 basal nerves; stipular prickles present ..... 3. *Ziziphus*

2b. Leaves symmetrical at base, without basal nerves; stipular prickles absent ..... 2. *Rhamnus*

1. *Gouania* Jacq.

Jacq., Select. Strip. Ann. Hist. 263. 1763.

About 70 species pantropic in distribution; 3 species in India; one species in the study area.

Gouania tiliaefolia Lamk., Encycl. Meth. Bot. 3: 5. 1789; Haridasan & Rao, For. Fl. Meghalaya 1: 234. 1985; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 302. 1996. *G. laptostachya* DC., Prodr. 2: 40. 1825; Lawson in Hook. f., Fl. Brit. Ind. 1: 643. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 286. 1936.

Woody climbing shrub; tendrils at the end of branchlets. Leaves alternate, ovate-elliptic, acuminate, crenate, subcordate or rounded at base. Flowers white, minute, in axillary or terminal racemose spikes. Calyx 5 fid. Petals 5. Disk 5 angled. Stamens 5. Style 3 cleft. Fruit 3 angled or winged, 3 seeded, crowned by persistent calyx.

Fls. & Frts.: August - November.

Occurrence: Common, in the hilly forest of the sanctuary.

Distribution: North East India, North India; Malaysia, Vietnam.

Specimen examined: Hiloikhunda; *Bora* 15162 (NEHU).

2. *Rhamnus* Linn.

Linn., Sp. Pl. 193. 1753 & Gen. Pl. ed. 5. 89. 1754.

About 160 species distributed in temperate and tropical regions; 9 species in India; one species in the study area.

Rhamnus napalensis (Wall.) Lawson in Hook. f., Fl. Brit. Ind. 1: 640. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 285. 1936; Islam, Fl. Majuli 82. 1990; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*)

1: 305. 1996. *Ceanothus nepalensis* Wall. ex Roxb., Fl. Ind. 2: 369. 1824.

Fig. 13

Straggling shrub. Leaves *ca* 4-13 x 2.5-6.5 cm, oblong or elliptic-ovate, acuminate, rounded at base, serrate. Flowers greenish white, in axillary fascicled panicles. Calyx 5 lobed. Petals 5, concave. Stamens 5; filaments short. Style 3-4 cleft at apex. Drupes obovoid.

Fls. & Frts.: August - November.

Occurrence: Occasionally, in the hilly forest of the sancuary.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Sikkim, Tripura; Nepal.

Specimen examined: Sanaka; *Bora* 15136 (NEHU).

3. *Zizyphus* Miller

Miller, Gard. Dict. Abr. ed. 4. 1754.

Shrubs or trees; often armed. Leaves alternate. Flowers fascicled or in sessile or peduncled cymes. Calyx 5 fid. Petals 5, rarely absent, deflexed. Disk 5-10 lobed. Stamens 5. Ovary 2-4 celled; style 2-4. Fruit fleshy or dry with hard 1-4 celled and seeded stone.

About 100 species mainly distributed in Tropical Asia and temperate regions; 17 species in India; 2 species in the study area.

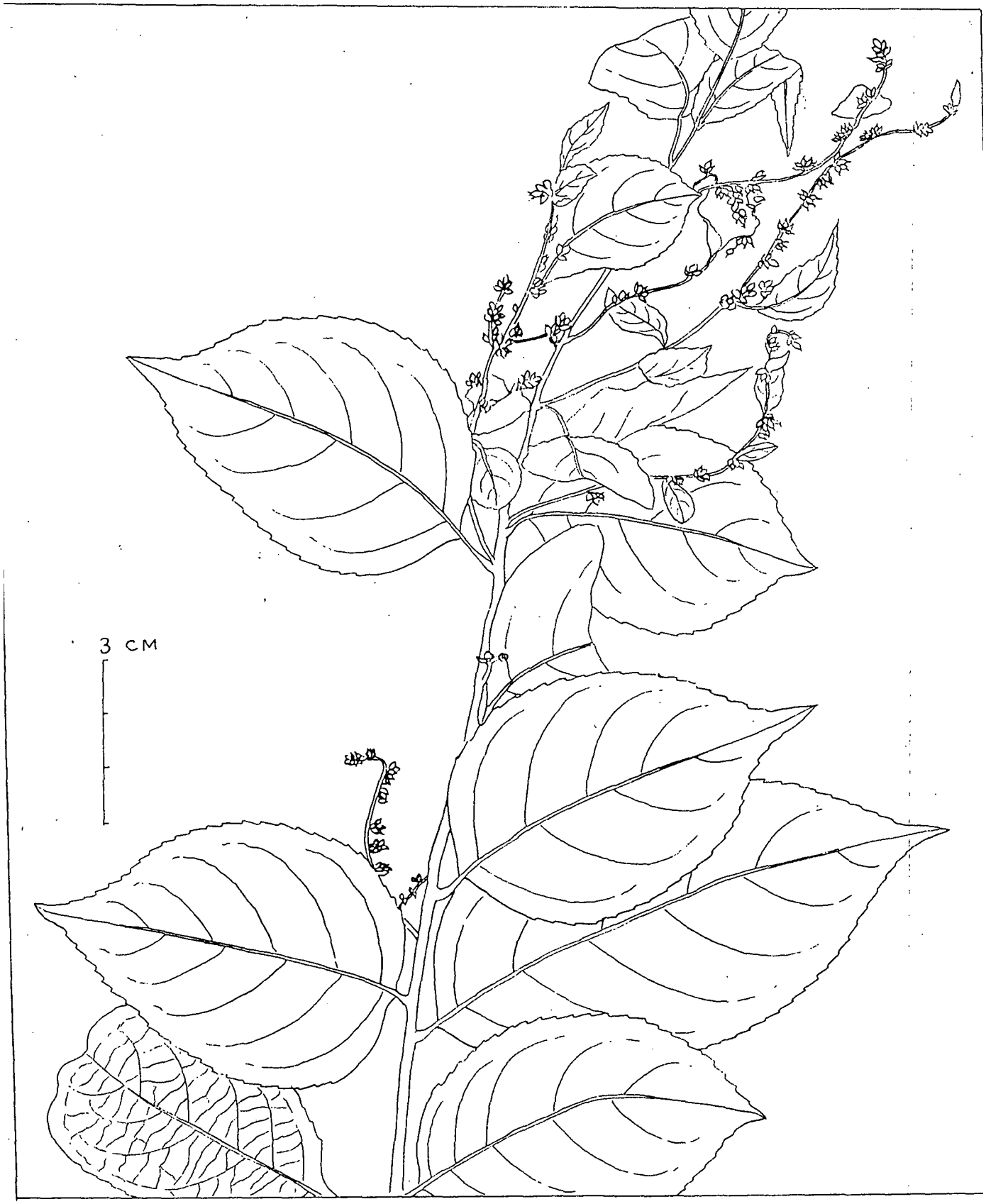


Fig. 13: ***Rhamnus napalensis*** (Wall.) Lawson (Rhamnaceae)

Key to the species

1a. Plant small to middle sized tree; leaves glabrous above, woolly beneath; drupe *ca* 1-2 cm in diam. ..... 1. *Z. mauritiana*

1b. Plant straggling shrub; leaves softly pubescent above, pilose beneath; drupe less than 0.5 cm in diam. ..... 2. *Z. oenopila*

1. *Zizyphus mauritiana* Lamk., Encycl. 3: 318. 1789; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 308. 1996. *Z. jujuba* Lamk., Encycl. 3: 318. 1789; Roxb., Fl. Ind. 1: 611. Lawson in Hook. f., Fl. Brit. Ind. 1 : 632. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 280. 1936. "Bagori".

Armed shrub or small tree; branches tomentose. Leaves *ca* 3-6 x 2.0-3.5 cm, ovate-oblong or suborbicular, acute or obtuse, entire or crenate, tomentose beneath, 3 nerved at base; stipules modified into spines. Flowers greenish yellow, in axillary fascicled cymes. Calyx glabrous within. Petals clawed. Disk 10 lobed. Drupes *ca* 1-2 cm in diam., globose or ellipsoid, orange-red when ripe.

Fls. & Frts.: October - February.

Occurrence: Common, dominant in the plain forest of the sanctuary.

Distribution: Throughout India; Afghanistan, Africa, Australia, China, Malaysia.

Specimen examined: Haduk; *Bora* 14887 (NEHU).

Uses: Fruits edible.

2. *Zizyphus oenopila* (Linn.) Mill. Gard. Dict. ed. 8: 3. 1768; Lawson in Hook. f., Fl. Brit. Ind. 1: 634. 18745; Kanjilal *et al.*, Fl. Assam 1(2): 280. 1936; Deb, Fl. Tripura 1: 408. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 309. 1996. *Rhamnus oenoplia* Linn., Sp. Pl. 194. 1753.

Straggling, prickly shrub. Leaves ovate-lanceolate, acuminate, oblique at base, entire or silky tomentose beneath. Flowers minute, in short axillary subsessile cymes. Calyx tomentose outside, ovate, acute. Corolla greenish, hooded. Disk 10 lobed. Drupe small, *ca* 0.3-0.5 cm in diam., globose.

Fls. & Frts.: April - October.

Occurrence: Common, in the hilly forest of the sanctuary.

Distribution: Hotter parts of India; Tropical Asia, Australia.

Specimen examined: Hiloikhunda; *Bora* 15182 (NEHU).

33. VITACEAE

A. L. de Juss., Gen. Pl. 267. 1789.

Mostly climbing shrubs with tendrils or sometimes herbaceous or rarely small trees, nodose or jointed. Leaves mostly alternate, often pellucid dotted. Flowers bisexual or unisexual, actinomorphic in leaf-opposed spikes, racemes, cymes or panicles. Calyx 4-5 lobed or toothed. Petals 4-5, valvate. Stamens 4-5, opposite the petals. Disk intrastaminal. Ovary 2-6 celled. Fruit baccate.

The family comprises 12 genera and 700 species, distributed in tropics

and subtropics; 8 genera and over 61 species in India; 4 genera and 8 species in the study area.

Key to the genera

1a. Flowers polygamous:

2a. Inflorescence with tendrils; flowers monoecious ..... 1. *Amplelocissus*

2b. Inflorescence without tendrils; flowers dioecious ..... 4. *Tetrastigma*

1b. Flowers bisexual:

3a. Leaves pedately lobed; berry 2-4 seeded .... 2. *Cayratia*

3b. Leaves not lobed ; berry 1 seeded ..... 3. *Cissus*

1. *Ampelocissus* Planch

Planch. Vigne Arn. 8: 371. 1884, *nom. cons.*

About 95 species distributed in tropical regions of Asia, Africa, America and Australia; 10 species in India; one species in the study area.

Ampelocissus barbata (Wall.) Planch. in DC., Monogr. Phan. 5: 375. 1887; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 309. 1996. *Vitis barbata* Wall. in Roxb., Fl. Ind. 2: 478. 1824; Lawson in Hook. f., Fl. Brit. Ind. 1: 651. 1875; Kanjilal *et al.*, Fl. Assam 1: 292. 1934.

Large climber; stem brown hairy. Leaves *ca* 10-25 x 12-20 cm, ovate-cordate, acute, serrate, pubescent beneath; petiole *ca* 10-20 cm long, hairy; tendrils stout, leaf-opposed, hairy. Flowers creamy white, small, in axillary paniculate cymes. Fruits ellipsoid berry, *ca* 0.4 cm in diam., 1-2 seeded.

Fls. & Frts.: April - August.

Occurrence: Occasionally, in moist places in the hilly forest of the sanctuary.

Distribution: Throughout India; Bangladesh, Myanmar.

Specimen examined: Guvali; *Bora* 15433 (NEHU).

2. *Cayratia* Juss.

Juss. Dict. Sci. Nat. 10: 103. 1818, *nom. cons.*

Climbing shrubs; tendrils leaf-opposed. Leaves 3 foliolate or pedate; stipules 2. Flowers bisexual, tetramerous, in long peduncled, corymbiform or umbellate cymes. Calyx cupular. Petals 4, free. Stamens 4, inserted round the disk. Ovary 2-celled; ovules 2 in each cell. Berries 2-4 seeded. Seeds obcordate.

About 45 species distributed in India to New Guinea, Australia, Africa and Madagascar; 7 species in India; 3 species in the study area.

Key to the species

1a. Leaves 3-7 foliolate:

2a. Woody climber; flowers in corymbose cymes ..... 2. *C. pedata*

2b. Herbaceous climber; flowers in subcorymbose cymes ..... 1. *C. japonica*

1b. Leaves 3 foliolate ..... 3. *C. trifolia*

1. *Cayratia japonica* (Thunb.) Gagn. in Lecomte, Notul. Syst. (Paris) 1: 349. 1911; Deb, Fl. Tripura 1: 410. 1981; Chowdhery *et al.* in Materials for the Arunachal Prad. (eds Hajra *et al.*) 1: 310. 1996. *Vitis japonica* Thunb., Fl. Jap. 104. 1784; Kanjilal *et al.*, Fl. Assam 1 (2): 301. 1936. 1936. *V. mollis* Wall. ex Lawson in Hook. f., Fl. Brit. Ind. 1: 660. 1875.

Climber; tendrils simple. Leaves pedately 3-5 foliolate; leaflets *ca* 3-5 x 1.8-3.8 cm, ovate, acute or acuminate, crenate serrate. Flowers whitish green, in axillary subcorymbiform cymes. Berries globose.

Fls. & Frts.: May - November.

Occurrence: Common, throughout the sanctuary.

Distribution: Arunachal Pradesh, Assam, Tripura, West Bengal, Eastern Himalayas; Bangladesh.

Specimen examined: Haduk; *Bora* 15331 (NEHU).

2. Cayratia pedata (Lamk.) Juss. ex Gagn. in Lecomte, Notul. Syst. (Paris) 1: 346. 1911; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 311. 1996. *Cissus pedata* Lamk., Encycl. Meth. Bot. 1: 31. 1783. *Vitis pedata* Vahl ex Lawson in Hook. f., Fl. Brit. Ind. 1: 661. 1875.

Woody climber. Leaves pedately 5-7 foliolate; leaflets *ca* 5-18 x 2.8-6.8 cm, elliptic or oblong-lanceolate, acuminate. Flowers greenish white, in axillary corymbose cymes. Berries depressed, globose, 4 seeded.

Fls. & Frts.: April - December.

Occurrence: Occasionally, throughout the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Meghalaya, West Bengal, Western Peninsula; Bangladesh, Malaya, Sri Lanka.

Specimen examined: Hiloikhunda; *Bora* 15142 (NEHU).

3. ***Cayratia trifolia*** (Linn.) Domin in Bibl. Bot. 89. 371. 1927; *Vitis trifolia* Linn., Sp. Pl. 1: 203. 1753. *Vitis carnosa* (Lamk.) Wall. ex Wight & Arn., Prodr. 127. 1834; Lawson in Fl. Brit. Ind. 1: 654. 1875.

Climber; stem flattened; young parts pubescent. Leaves 3 foliolate; leaflets *ca* 3.0-5.5 x 1.5-3.9 cm, ovate to elliptic, acute or acuminate, crenate serrate; lateral ones nearly sessile; tendrils simple. Flowers whitish green, in axillary trichotomous compound cymes on long peduncles. Berries *ca* 0.5 cm in diam., globose.

Fls. & Frts.: May - November.

Occurrence: Common, throughout the sanctuary.

Distribution: Arunachal Pradesh, Assam, Tripura, West Bengal, Tropical Himalayas; Bangladesh.

Specimen examined: Haduk; *Bora* 15125 (NEHU).

3. Cissus Linn.

Linn., Sp. Pl. 117. 1753 & Gen. Pl. ed. 5. 53. 1753.

Climbing shrubs; tendrils leaf-opposed. Leaves simple or lobed or 3 foliolate, dentate. Flowers bisexual, tetramerous, in umbellate cymes. Calyx cupular. Petals 4 lobed. Stamens 4. Ovary 2-celled; ovules 2 in each cell; style subulate. Fruits 1 seeded fleshy berry.

About 350 species pantropic in distribution; 7 species in India; 2 species in the study area.

Key to the species

1a. Stem woody; leaves rusty tomentose beneath; stipules adnate ..... 1. *C. adnata*

1b. Stem soft; leaves sparsely pubescent beneath; stipules free ..... 2. *C. repanda*

1. **Cissus adnata** Roxb., Fl. Ind. 2: 423. 1824; Momiyama in Hara & Will., Enum. Fl. Pl. Nep. 2: 94. 1979; Deb, Fl. Tripura 1: 412. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 312. 1996. *Vitis adnata* (Roxb.) Wall. ex Lawson in Hook. f., Fl. Brit. Ind. 1: 649. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 291. 1936.

Woody pubescent climber. Leaves simple, *ca* 5-18 x 2.8-8.5 cm, ovate cordate or orbicular, shortly acuminate, 3-5 nerved at base, rusty tomentose beneath; petiole *ca* 2.5-12.0 cm long; stipules adnate; tendrils forked. Flowers creamy, in axillary umbelliform cymes. Berries *ca* 0.3 cm in diam.,

obovoid, bluish black.

Fls. & Frts.: June - October.

Occurrence: Common, throughout the sanctuary.

Distribution: Hotter parts of India; India to Vietnam, Malaysia.

Specimen examined: Thengbhanga; *Bora* 14838 (NEHU).

2. ***Cissus repanda*** Vahl, Symb. 3: 18. 1794; Deb, Fl. Tripura 1: 413. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 313. 1996. *Vitis repanda* Wight & Arn., Prodr. 125. 1834; Lawson in Hook. f., Fl. Brit. Ind. 1: 648. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 292. 1936.

Soft wooded climbing shrub. Leaves *ca* 3.5-22.0 x 2-15 cm, ovate to orbicular, acuminate, cordate at base, serrate or sublobed, often repand, sparsely pubescent beneath; petiole *ca* 3-15 cm long; stipules free; tendrils forked. Flowers reddish brown, in leaf-opposed, lax subcorymbiform cymes. Berries pyriform, purplish black.

Fls. & Frts.: April - August.

Occurrence: Common, throughout the sanctuary.

Distribution: Throughout India; Nepal.

Specimen examined: Thengbhanga: *Bora* 15434 (NEHU).

4. *Tetrastigma* Planch.

Planch. in DC., Monogr. Phaner. 5: 423. 1887.

Climbing shrubs; stems often flattened; tendrils simple or forked.

Leaves pedately 5-7 foliolate. Flowers polygamo-dioecious, in 2-3 chotomous corymbose cymes. Calyx cupular. Petals 4. Stamens 4, reduced in female flowers. Ovary 2-celled; ovules 2 in each cell; stigma 4 lobed. Fruits 1-4 seeded berry.

About 93 species distributed in South East Asia, Indo-Malayas, Tropical Australia; 7 species in India; 2 species in the study area.

Key to the species

1a Branches often warty; leaves coriaceous, glabrous ..... 1. *T. lanceolarium*

1b. Branches not warty; leaves not coriaceous, pubescent beneath ..... 2. *T. obovata*

1. ***Tetrastigma lanceolarium*** (Roxb.) Planch. in DC., Monogr. Phan. 5: 423. 1887; Deb, Fl. Tripura 1: 415. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 314. 1996. *Cissus lanceolaria* Roxb., Fl. Ind. 2: 412. 1824. *Vitis lanceolaria* (Roxb.) Lawson in Hook. f., Fl. Brit. Ind. 1: 660. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 300. 1936.

Large woody climbing shrub. Leaves 3-5 foliolate; leaflets *ca* 6-15 x 3.0-5.5 cm, elliptic or lanceolate, acuminate, distantly cuspidate-serrate, coriaceous; petiole *ca* 6-12 cm long; tendrils simple stout, leaf-opposed. Flowers yellow, in axillary subcorymbose compound cymes. Berries globose, *ca* 1.0-1.5 cm in diam., yellowish when ripe.

Fls. & Frts.: April - November.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Tripura, Western Peninsula; Bangadesh, Myanmar, Sri Lanka, South East Asia.

Specimen examined: Sanaka; *Bora* 15435 (NEHU).

2. *Tetrastigma obovatum* (Lawson) Gagn. in Lecomte, Notul. Syst. 1: 266. 1911; Deb, Fl. Tripura 1: 415. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 315. 1996. *Vitis obovata* Lawson in Hook. f., Fl. Brit. Ind. 1: 658. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 298. 1936.

Climbing shrub. Leaves 3-5 foliolate; leaflets *ca* 8-18 x 4-8 cm, obovate or elliptic, acuminate, crenate serrate, pubescent beneath; petiole 5-12 cm long; tendrils simple. Flowers greenish white, in corymbose, trichotomously branched cymes. Berries *ca* 1.5 cm in diam., globose or oblong, black.

Fls. & Frts.: June - November.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Tripura.

Specimen examined: Sanaka; *Bora* 15436 (NEHU).

34. LEEACEAE

(DC.) Dumort., Anal. Fam. Pl. 21, 27.1829.

Herbs, shrubs or small trees. Leaves alternate, usually pinnately compound or simple; petioles with sheathing base. Flowers in peduncled terminal or leaf-opposed corymbose cymes. Calyx 5 lobed. Corolla 5 lobed, hooded at apex. Stamens 5, inserted on a hypanthium, connate at base. Ovary 3-

6 celled; ovules 1 in each cell. Fruits 3-6 seeded berry.

A monotypic family with about 70 species, distribution in paleotropics; about 20 species in India; 3 species in the study area.

Leea Linn.

D. Royen ex Linn., Syst. Nat. ed. 12. 2: 627. 1767, *nom. cons.*

Key to the species

1a. Leaves usually 3 foliolate ... 2. *L. compactiflora*

1b. Leaves 2-3 pinnate:

2a. Leaflets glabrous; base cuneate .... 3. *L. indica*

2b. Leaflets pubescent; base acute or rounded .... 1. *L. aequata*

1. ***Leea aequata*** Linn., Syst. Nat. ed. 12. 2: 627. 1767; Ridsdale in Blumea 22:90. 1974; Kanjilal *et al.*, Fl. Assam 1(2): 307. 1936; Haridasan & Rao, For. Fl. Meghalaya 1: 248. 1985; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 315. 1996. *L. hirta* Roxb. ex Homem. Hort. Hafn. 1: 231. 1813; Lawson in Hook. f., Fl. Brit. Ind. 1: 668. 1875.

Small pubescent shrub. Leaves 2 pinnate; leaflets ca 8-22 x 2.5-6.0 cm oblong-lanceolate, acuminate, acute or rounded at base, serrate, pubescent. Flowers greenish white, in leaf-opposed hairy umbels. Berries depressed globose, 5-6 lobed.

Fls. & Frts.: April - November.

Occurrence: Common, in shady places in the hilly forest, occasionally in the plain forest also.

Distribution: North East India, West India; Bangladesh, Malayasia, Myanmar, Philippines.

Specimen examined: Guvali; *Bora* 15158 (NEHU).

2. *Leea compactiflora* Kurz in J. Asiat. Soc. Beng. 42(2): 65. 1875; Haridasan & Rao, For. Fl. Meghalaya 1: 249. 1985; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 318. 1996. *L. trifoliata* Lawson in Hook. f., Fl. Brit. Ind. 1: 667. 1875. *L. bracteata* Cl. in J. Bot. 19: 164. 1881; Kanjilal *et al.*, Fl. Assam 1(2): 308. 1936. **Fig. 14**

Small shrub. Leaves 3 foliolate; leaflets elliptic-ovate or obovate, acuminate, serrate, pubescent beneath; stipules winged, narrow. Flowers creamy, in pubescent terminal or subterminal corymbose cymes. Berries depressed globose, 1-5 seeded and lobed.

Fls. & Frts.: April - December.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Tripura, Sikkim; Bhutan, China, Myanmar, Nepal.

Specimen examined: Dhekiabari; *Bora* 15396 (NEHU).

3. *Leea indica* (Burm. f.) Merr. in Philipp. J. Sci. Bot. 14: 245. 1919; Ridsdale in Blumea 22: 95. 1974; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 319. 1996. *L. sambucina* (Linn.) Willd.,

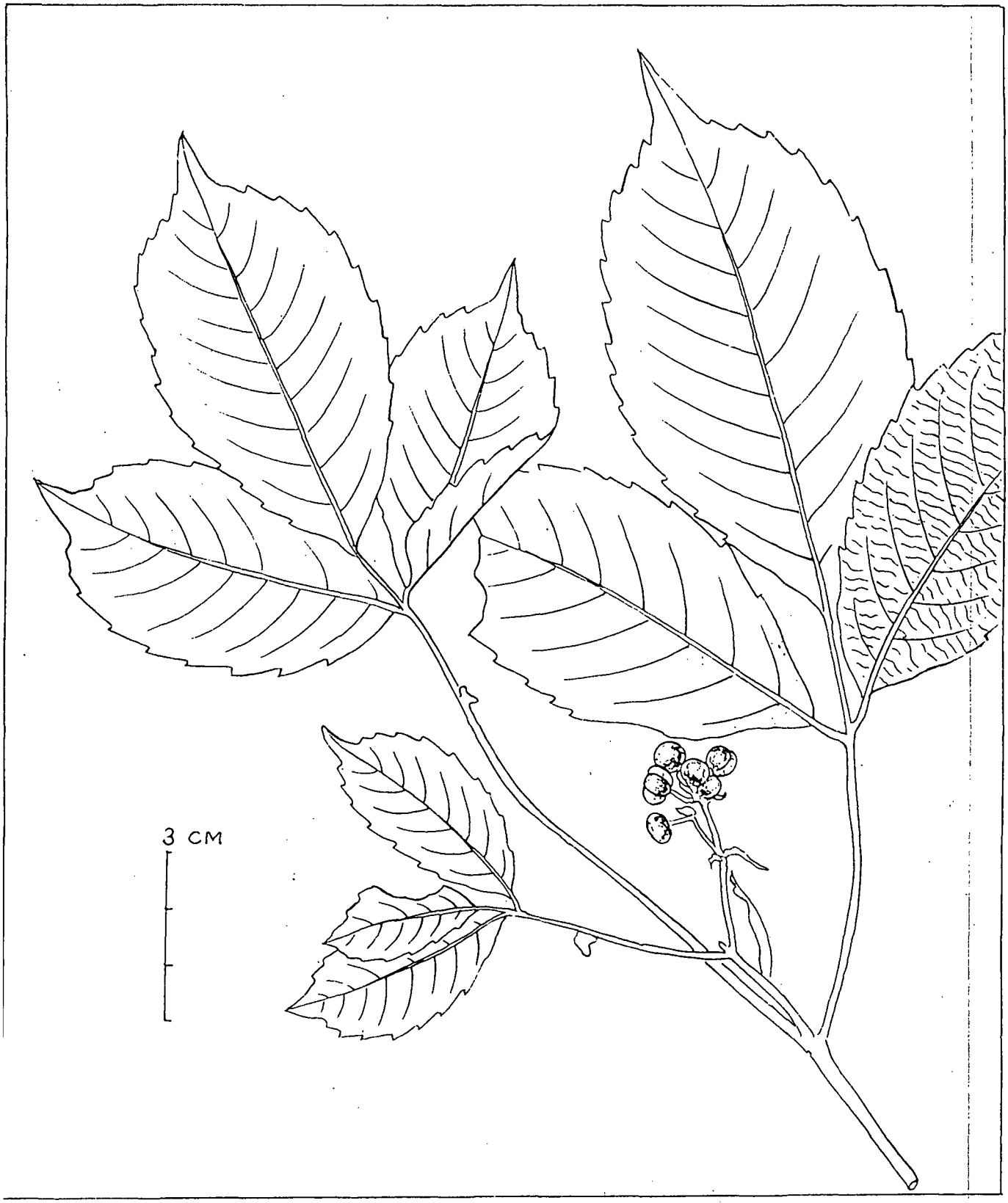


Fig. 14: ***Leea compactiflora*** Kurz (Leeaceae)

Sp. Pl. 1: 1177. 1797; Lawson in Hook.f., Fl. Brit. Ind. 1: 666. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 307. 1936. "Kukura thengia".

Tall shrub. Leaves 2-3 pinnate; leaflets *ca* 5-15 x 2-7 cm, ovate-lanceolate, acuminate, cuneate at base, serrate; stipules obovate. Flowers white, in axillary corymbose cymes. Berries subglobose, 3-6 lobed and seeded.

Fls. & Frts.: June - December.

Occurrence: Common, in shady places of the sanctuary.

Distribution: Hotter parts of India; Australia, China, Malaysia, Philippines.

Specimen examined: Thengbhanga; *Bora* 15054 (NEHU).

Uses: Root paste applied for healing cut and wound.

35. SAPINDACEAE

A. L. de Juss., Gen. Pl. 246. 1789.

Trees, shrubs or climbers, rarely herbs. Leaves mostly alternate. Flowers bisexual or unisexual, actinomorphic or zygomorphic, in racemose to paniculate unilateral cymes. Sepals usually 5, free. Petals absent or 3-5. Stamens often 8 or reduced or many, inserted within the disk or unilateral. Ovary superior, 1-4 celled. Fruit various. Seeds often arillate.

The family comprises about 130 genera and 1100 species, distributed in tropics and subtropics; 19 genera and 50 species in India; 4 genera and 4 species in the study area.

Key to the genera

1a. Climbing herbs ..... 1. *Cardiospermum*

1b. Shrubs or trees:

2a. Stamens and staminodes glabrous; fruit a capsule; seeds arillate ..... 2. *Harpullia*

2b. Stamens and staminodes pubescent; fruit not capsule; seeds exarillate:

3a. Petals each with 2 scales ..... 3. *Lepisanthes*

3b. Petals without scales ... 4. *Sapindus*

1. *Cardiospermum* Linn.

Linn., Sp. Pl. 366. 1753 & Gen. Pl. ed. 5. 171. 1754.

About 14 species distributed in tropical and subtropical regions of India, Africa and America; 2 species in India; one species in the study area.

Cardiospermum halicacabum Linn., Sp. Pl. 366. 1753; Hiern in Hook. f., Brit. Ind. 1: 670. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 313. 1936; Islam, Fl. Majuli 85. 1990; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 322. 1996. "Kopalphuta".

Climbing herb; tendril axillary. Leaves 2-pinnate; leaflets inciso-dentate, acuminate. Flowers white, polygamous on long slender peduncled cymes with a pair of opposite tendrils bellow. Sepals 4, *ca* 0.2 cm long. Petals 4, *ca* 0.4 cm long. Stamens 8; filaments hairy. Staminodes 8 in female flowers.

Fruits trigonous capsule, bladder like, angles winged.

Fls. & Frts.: June - November.

Occurrence: Common, along roadside, grassland, forest floors in the plain forest of the sanctuary.

Distribution: Throughout India; Pantropic.

Specimen examined: Haduk; *Bora* 14769 (NEHU).

2. *Harpullia* Roxb.

Roxb., Hort. Beng. 86. 1814.

One species in India which occurs in the study area also.

Harpullia arborea (Blanco) Radlk, Sitzungsber, Math-Phys. Cl. Koenig. Bayer Akad. Wiss. Muenchen 16: 404. 1890; *H. imbricata* Thw. Enum. 56. 1858; *H. cupanoides sensu* Hiern in Hook. f., Fl. Brit. Ind. 1: 692. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 318. 1936.

Deciduous tree. Leaves paripinnate; leaflets elliptic-ovate, acute, entire. Flowers pale yellow, polygamous in axillary to subterminal panincles. Sepals 5, imbricate. Petals 5, narrowly obovate. Stamens 5. Ovary tomentose; stigma twisted. Capsules inflate, 2 lobed.

Fls. & Frts.: April - August.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Assam, Andamans, Western Peninsula; Bangladesh, Java, Sri Lanka.

Specimen examined: Hiloikhunda; *Bora* 15270 (NEHU).

3. *Lepisanthes* Bl.

Bl., Bijdr. 237. 1825.

About 40 species distributed in tropical Asia; 6 species in India; one species in the study area.

Lepisanthes senegalensis (Juss. ex Poir.) Leenh. in Blumea 17: 85. 1969; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 324. 1996. *Sapindus senegalensis* Juss. ex Poiret, Encycl. 6: 666. 1805. *S. attenuatus* Wall. ex Hiern in Hook. f., Fl. Brit. Ind. 1: 684. 1875. **Fig. 15**

Small tree. Leaves paripinnate; leaflets *ca* 8-18 x 2.0-6.5 cm, ovate-lanceolate or elliptic, acuminate. Flowers reddish green, in axillary or terminal panicles. Sepals 5. Petals 5. Stamens 8, free, short. Sigma 2 lobed. Fruits ellipsoidal, 2 lobed, dark-purple when ripe.

Fls. & Frts.: October - January.

Occurrence: Common, in the hilly forest of the sanctuary.

Distribution: North East India; Myanmar, Nepal, South East Asia.

Specimen examined: Rangamati; *Bora* 15178 (NEHU).

4. *Sapindus* Linn.

Tourn. ex Linn., Gen. Pl. ed. 1. 359. 1737.

About 13 species distributed in tropics and subtropics; one species in the study area.

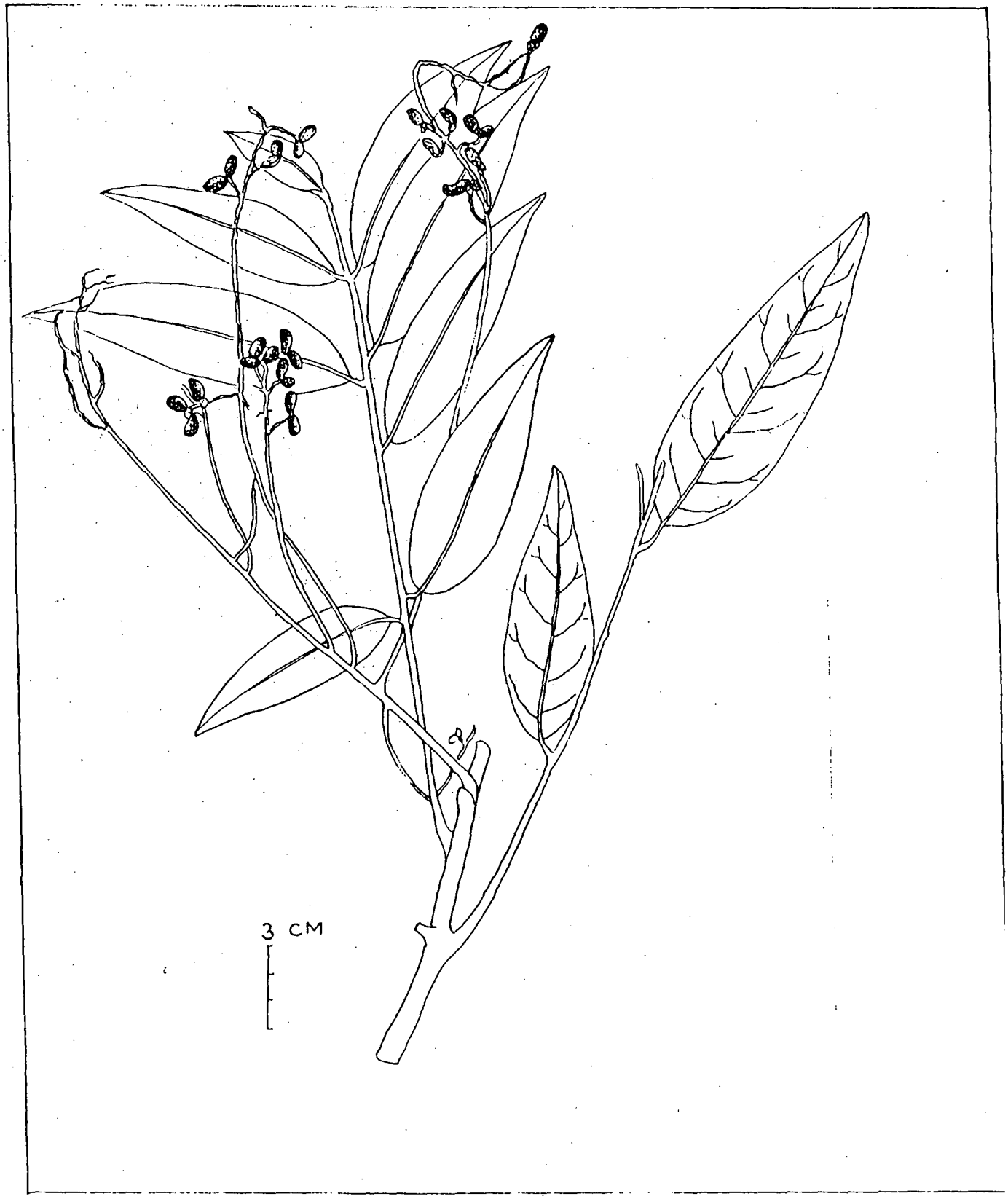


Fig. 15: *Lepisanthes senegalensis* (Juss. ex Poir.) Leenh. (Sapindaceae)

Sapindus mukorossi Gaertn., Fruct. & Sem. 1: 342. t. 70. f. 3g, h. 1788; Hiern. in Hook. f., Fl. Brit. Ind. 1: 683. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 320. 1936; Islam, Fl. Majuli 87. 1990; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra) 1: 326. 1996. **"Manishal".**

Tree. Leaves paripinnate; leaflets *ca* 5-15 x 2-5 cm, oblong-lanceolate, acuminate, oblique at base. Flowers white, small, subsessile in axillary or terminal panicles. Sepals 5, *ca* 0.2 cm long, ovate. Petals 5, *ca* 0.3 cm long, ovate-lanceolate, clawed. Stamens 8-10. Staminodes present in female flowers. Fruit a globose drupe, 1-seeded with 2 small aborted carpels at base.

Fls. & Frts.: April - December.

Occurrence: Common, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, North West India, West Bengal; Bangladesh, China, Japan.

Specimem examined: Burha Mayong; *Bora* 15175 (NEHU).

Uses: Fruits used as the substitute of soap.

36. SABIACEAE

Blume, Mus. Bot. 1: 368. 1851.

Trees or shrubs. Leaves alternate. Flowers bisexual or polygamo-dioecious, often paniculate. Calyx 4-5 partite, imbricate. Petals 4-5, imbricate. Stamens 4-5, opposite the petals. Ovary superior, 2-3 celled. Fruit dry or drupaceous.

The family comprises about 3 genera and 160 species, distributed in tropical and subtropical regions; 2 genera and 19 species in India; one genus and one species in the study area.

Meliosma Bl.

Cat. Gew Buitenz. 10. 1823.

About 100 species distributed in Indo-Malayan region; 9 species in India; one species in the study area.

Meliosma simplicifolia (Roxb.) Walp. Rep. 1: 423. 1842; Baker in Hook. f., Fl. Brit. Ind. 2: 5. 1876; Kanjilal *et al.*, Fl. Assam 1(2): 327. 1936; Haridasan & Rao, For. Fl. Meghalaya 1: 266. 1985; Islam, Fl. Majuli 87. 1990; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 333. 1996. **Fig. 16**

Small evergreen tree. Leaves *ca* 12.5-25.0 x 5-10 cm, obovate or oblanceolate, acute or subacuminate, cuneate at base. Flowers pale yellow, sessile in long panicles. Sepals 5, ovate, hairy. Petals 5, unequal, inner 2 bified. Stamens 5, 2 fertile. Drupes 1 seeded, obliquely globose.

Fls. & Frts.: April - July.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Tripura, Tropical Himalayas; China, Myanmar, Sri Lanka, Vietnam.

Specimen examined: Burha Mayong; *Bora* 15438 (NEHU).

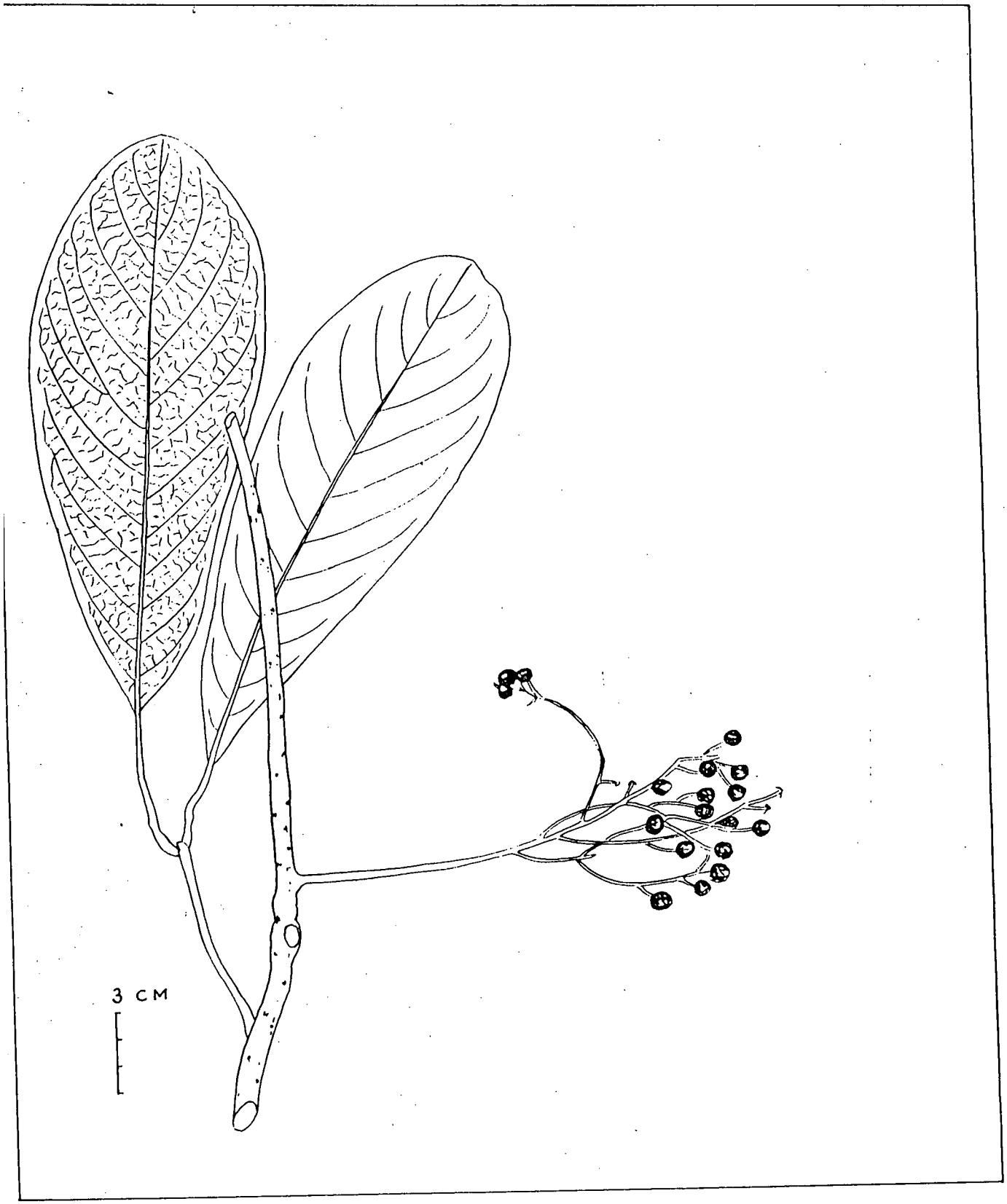


Fig. 16: ***Meliosma simplicifolia*** (Roxb.) Walp. (Sabiaceae)

37. ANACARDIACEAE

Lindl., Introd. Nat. Syst. 127. 1830.

Trees or shrubs, often resinous. Leaves alternate. Flowers bisexual or unisexual, mostly actinomorphic, in panicles. Sepals 3-5, basally connate. Petals 3-7 or absent, adnate to the torus. Stamens often double the number of petals, free or basally connate. Ovary superior, usually 1-celled. Styles 1-3. Fruit mostly a drupe.

The family comprises about 70 genera and 600 species, distributed in tropics and subtropics; about 21 genera and 40 species in India; 4 genera and 4 species in the study area.

Key to the genera

1a. Plants evergreen; leaves simple .... 2. *Mangifera*

1b. Plants not evergreen; leaves compound:

2a. Flowers unisexual; anthers dorso-basifixed .... 1. *Lannea*

2b. Flowers polygamous; anthers dorsifixed:

3a. Stamens 5; filaments subulate; drupe 1-celled .... 3. *Rhus*

3b. Stamens 8-10; filaments filiform; drupe 4-5 celled .... 4. *Spondias*

1. *Lannea* A. Rich.

A. Rich. in Gaillemin, Perrottet et Rich., Fl. Seneg. Tent. 1: 153. 1831, *nom. cons.*

About 70 species distributed in tropics; one species in India and collected from the study area also.

Lannea coromandelica (Houtt.) Merr. J. Arn. Arb. 19: 353. 1939; Deb, Fl. Tripura 1: 463. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 338. 1996. *Dialium coromandelium* Houtt., Nat. Hist. Ser. 2, 2: 39. t. 5. f. 2. 1774. *Odina wodier* Roxb., Fl. Ind. 2: 293. 1832; Hook. f., Fl. Brit. Ind. 2: 29. 1876. *Lannea grandis* (Dennst) Engl. in Engl. & Prantl, Nachtr. 213. 1898; Kanjilal *et al.*, Fl. Assam 1(2): 338. 1936. **"Kuhimola"**.

Deciduous tree. Leaves imparipinnate, crowded; leaflets opposite, *ca* 4-13 x 1.3-5.0 cm, ovate-oblong, acuminate, base inequilateral. Flowers greenish yellow, dioecious, sessile, *ca* 0.2-0.3 cm long, in terminal fascicled panicles. Calyx ovate-obtuse, hairy. Corolla ovate-oblong, obtuse. Stamens 6-8, reduced to staminodes in female flowers. Drupes oblong, reniform.

Fls. & Frts.: February - May.

Occurrence: Common, throughout the study area.

Distribution: Tropical regions of India; **Malaysia, Myanmar, Sri Lanka.**

Specimen examined: Haduk; *Bora* 15196 (NEHU).

Notes: Stem bark yields gum.

2. *Mangifera* Linn.

Linn., Sp. Pl. 200. 1753 & Gen. Pl. ed. 5. 93. 1754.

Trees. Leaves alternate and crowded at the ends of branches, coriaceous. Flowers polygamous in terminal panicles. Calyx 4-5 partite. Petals 4-5, imbricate. Stamens 4-5. Pistil monocarpellary; ovary 1-celled. Fruits drupe.

About 30 species chiefly Malayan; 4 species in India; 2 species in the study area.

Key to the species

1a. Panicles pubescent; flowers sessile

.... 1. ***M. indica***

1b. Panicles glabrous; flowers pedicelled

.... 2. ***M. sylvatica***

1. ***Mangifera indica*** Linn., Sp. Pl. 200. 1753; Roxb., Fl. Ind. 2: 641. 1832; Hook. f., Fl. Brit. Ind. 2: 13. 1876; Kanjilal *et al.*, Fl. Assam 1(2): 355. 1936; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 339. 1996. "Am".

Evergreen tree; branches spreading. Leaves *ca* 9-28 x 2.2-8.0 cm, oblong-lanceolate, acuminate or acute, coriaceous, margins undulate. Flowers creamy, in terminal panicles; bracts elliptic, concave. Sepals 5, oblong, concave. Petals 5, imbricate. Stamen 1 fertile. Drupes *ca* 6-7 cm in diam., ovoid.

Fls. & Frts.: March - June.

Occurrence: Common, throughout the sanctuary.

Distribution: Tropical Himalayas, Western Peninsula; Tropical Asia.

Specimen examined: Kamarpur; *Bora* 15193 (NEHU).

Uses: Fruits edible, mostly used for prickle and timber for miscellaneous purposes.

2. ***Mangifera sylvatica*** Roxb., Fl. Ind. 1: 644. 1820; Hook. f., Fl. Brit. Ind. 2: 15. 1876; Kanjilal *et al.*, Fl. Assam 1(2): 336. 1936; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 146. 1996. "Bon am".

Evergreen tree. Leaves *ca* 20-30 x 6-8 cm, oblong-lanceolate. Flowers whitish, in long panicles, pedicelled. Calyx 5 lobed. Petals 5, oblong. Stamen 1 fertile. Drupes obliquely tapering, acuminate.

Fls. & Frts.: January - June.

Occurrence: Rare, in the hilly forest of the sanctuary.

Distribution: North East India, Andaman & Nicobar Islands; Bangladesh, Nepal.

Specimen examined: Dhekiabari; *Bora* 15441 (NEHU).

Notes: Wild relative of cultivated Mango fruits and timber used for miscellaneus purposes.

3. *Rhus* Linn.

(Tourn.) Linn., Gen. ed. 1. 84. 1737.

About 120 species distributed in temperate, tropical and subtropical regions; 13 species in India; one species in the study area.

Rhus succedanae Linn., Mant. Pl. 2: 221. 1767; Hook. f., Fl. Brit. Ind. 2: 12. 1876; Kanjilal *et al.*, Fl. Assam 1(2): 332. 1936; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 341. 1996. *R. succedanea* Linn. var. *acuminata* (DC.) Hook. f., Fl. Brit. Ind. 2: 12. 1876.

Small tree. Leaves crowded at the end of branchlets, 6-12 foliolate; leaflets *ca* 3.5-10.0 x 1.5-3.5 cm, ovate-lanceolate or oblong-elliptic, caudate-acuminate. Flowers pale yellow, in axillary drooping panicles. Drupes orbicular, compressed.

Fls. & frts.: March - December.

Occurrence: Occasionally, occurs in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Sikkim, Temperate Himalayas; Japan.

Specimen examined: Rangamati; *Bora* 15439 (NEHU).

4. *Spondias* Linn.

Linn., Sp. Pl. 371. 1753 & Gen. Pl. ed. 5. 174. 1754.

About 10 species distributed in Indo-Malayasian and American tropics; 4 species in India; one species in the study area.

Spondias pinnata (Linn. f.) Kurz. Pegn. Rep. A. 44. 1875; Deb, Fl. Tripura 1: 466. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 343. 1996. *Mangifera pinnata* Linn. f., Suppl. 156. 1781. *Spondias mangifera* Willd., Sp. Pl. 2: 751. 1799; Baker in Hook. f., Fl. Brit. Ind. 2: 42. 1876; Kanjilal *et al.*, Fl. Assam 1(2): 340. 1936. "Amora".

Medium sized deciduous tree. Leaves imparipinnate; leaflets 3-6 pairs, subopposite, *ca* 7-16 x 4-6 cm, elliptic-oblong, shortly acuminate, entire. Flowers greenish white, in terminal panicles. Calyx 5 lobed, *ca* 0.2 cm long. Corolla 5. Staminal filaments filiform. Drupes *ca* 4-5 x 2.0-2.5 cm, ovoid, fleshy.

Fls.: March - May & Frts.: April - December.

Occurrence: Common, occurs in the hilly forest of the sanctuary.

Distribution: Throughout India; Tropical Asia.

Specimen examined: Hiloikhunda; *Bora* (NEHU).

Uses: Fruits edible.

38. MORINGACEAE

R. Br. in Denham and Clapperton, Trav. N. and Cent. Africa, 238. 1826.

A monotypic family, 14 species distributed from South Angola and South West Africa acrossing Madagascar and India; 2 species in India; one species in the study area.

Moringa Burm.

Burm., Thes. Zeyl. 162. t. 75. 1737.

Moringa oliefera Lamk., Encycl. 1: 398. 1785; Bullock in Kew Bull. 1960; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 344. 1996. *Guilandia moringa* Linn., Sp. Pl. 381. 1753. *Moringa pterygosperma* Gaertn., Fruct. 2: 314. t. 147. 1791; Baker in Hook. f., Fl.

Brit. Ind. 2: 45. 1876; Kanjilal *et al.*, Fl. Assam 1(2): 342. 1936. "Sajana".

Deciduous tree; bark corky. Leaves 3 pinnate on long greenish rachis; pinna opposite; pinnules opposite, *ca* 0.6-2.5 cm long, elliptic-obovate. Flowers greenish white, *ca* 3 cm long in pubescent panicles. Calyx lobes 5, linear-lanceolate. Petals 5, *ca* 1.2 cm long, spathulate, unequal. Stamens inserted on the edge of the disk. Fruit a capsule, *ca* 45 cm long, pendulous, 9 ribbed. Seeds winged.

Fls. & Frts.: January - June.

Occurrence: Common, along foot hill of the sanctuary.

Distribution: Planted throughout the tropics; indigenous to North West India.

Specimen examined: Guvali; *Bora* 15440 (NEHU).

Uses: Flowers and fruits used as vegetable. Bark and root used for the treatment of snake bite.

39. PAPIIONACEAE

Giseke, Prael. Ord. Nat. Pl. 415. Apr. 1792, *nom. alt. Fabaceae*.

Herbs, shrubs, trees or climbers. Leaves alternate, simple or compound. Flowers bisexual, zygomorphic. Calyx usually unequally lobed. Petals 5, vexilary in aestivation, the upper exterior and forming the standard, the two lateral (wings) more or less parallel, the lower two interior and connate by their lower margins into a keel. Stamens often 10, mostly all perfect. Pistil monocarpellary, 1-celled. Fruit usually a legume or indehiscent.

The family comprises about 482 genera and 12000 species, cosmopolitan in distribution; about 100 genera and 748 species in India; 21 genera and 43 species in the study area.

Key to the genera

1a. Leaves even pinnate .... 1. ***Abrus***

1b. Leaves odd pinnate, digitate or unifoliolate:

2a. Stamens free .... 9. ***Dalhousia***

2b. Stamens in bundles:

3a. Leaflets 1 or 3:

4a. Leaves simple or digitately 3 foliolate:

5a. Leaflets gland dotted beneath:

6a. Flowers in pairs on lax racemes; pods 3 or more seeded 4. ***Atylosia***

6b. Flowers in dense racemes or heads; pods 2 seeded ... 13. ***Flemingia***

5b. Leaflets not gland dotted:

7a. Pods jointed:

8a. Calyx scarious; pod joints turgid .... 3. ***Alysicarpus***

8b. Calyx herbaceous; pod joints flat ... 11. ***Desmodium***

7b. Pods not jointed:

9a. Pods 1-seeded .... 5. *Butea*

9b. Pods 2-many seeded:

10a. Plants herbs or undershrubs .... 6. *Crotolaria*

10b. Plants climber or twiners:

11a. Style beardless; stigma capitate ... 19. *Pueraria*

11b. Style beard; stigma terminal ... 15 *Lablab*

4b. Leaves pinnately 3 foliolate:

12a. Plants trees ... 12. *Erithrina*

12b. Plants climbers:

13a. Stamens monadelphous; pods without irritating bristles .... 6. *Canavalia*

13b. Stamens diadelphous; pods with irritating bristles ... 17. *Mucuna*

3b. Leaflets 5-many:

14a. Pods jointed:

15a. Leaflets many; stamens 5+5; pods exserted .... 2. *Aeschynomene*

15b. Leaflets usually 3-9; stamens 9+1; pods folded within the calyx ... 21. *Uraria*

14b. Pods not jointed:

16a. Plants with centrifixed hairs; anthers mucronate or gland tipped ... 14. *Indigofera*

16b. Plants with basifixed hairs or glabrous; anthers not as above:

17a. Pods dehiscing by both the sutures :

18a. Leaflets closely parallel veined; pods thin .... 20. *Tephrosia*

18b. Leaflets reticulately veined; pods thik .... 16. *Milletia*

17b. Pods indehiscent or opening along ventral sutures:

19a. Leaflets alternate .... 8. *Dalbergia*

19b. Leaflets opposite:

20a. Pods winged ... 10. *Derris*

20b. Pods wingless ... 18. *Pongamia*

1. *Abrus* Adans.

Adans. Fam. 2: 327. 1763.

About 12 species distributed in tropical regions; 2 species in India; one species in the study area.

Abrus precatorius Linn., Syst. ed. 2, 2: 472. 1767; Baker in Hook. f., Fl. Brit. Ind. 2: 175. 1876; Kanjilal *et al.*, Fl. Assam 2: 62. 1938; Deb, Fl. Tripura 1: 143. 1981; Islam, Fl. Majuli 93. 1990; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 345. 1996.

Woody climbing shrub. Leaves paripinnate; leaflets 10-18 pairs, *ca* 0.4-1.8 x 0.4-0.5 cm, opposite, oblong, blunt, nearly sessile. Flowers reddish white, clustered, in dense axillary pedunculate racemes. Calyx campanulate, teeths short. Petals ovate, acute, narrowed into a short claw; wings oblong. Stamens 10, connate in a sheath. Stigma capitate. Pods *ca* 1.0-2.5 x 0.2-0.5 cm flat, coriaceous, oblong, sparsely pubescent. Seeds subglobose polished, red with black tips.

Fls. & Frts: October - January.

Occurrence: Common, in the hilly forest and occasionally in the plain forest of the sanctuary.

Distibution: Tropical Himalayas; Tropical Asia.

Specimen examined: Hiloikhunda; *Bora* 15018 (NEHU).

Uses: Seeds paste used for the treatment of skin diseases.

2. *Aeschynomene* Linn.

Linn., Sp. Pl. 713. 1753 & Gen. Pl. ed. 5. 319. 1754.

About 150 species distributed in tropical and sub tropical regions; 3 species in India; one species in the study area.

Aeschynomene indica Linn., Sp. Pl. 713. 1753; Baker in Hook. f., Fl.Brit. Ind. 2: 151. 1876; Kanjilal *et al.*, Fl. Assam 2: 37. 1938; Deb. Fl.

Tripura 1: 144. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad.(eds. Hajra *et al.*) 1: 345. 1996. *A. pumila* Linn., Sp. Pl. ed. 2: 1061. 1762. *Smithia aspera* Roxb., Hort. Beng. 56. 1814, *nom. nud.* & Fl. Ind. 3: 343. 1832. "Kuhila".

Erect herb. Leaves imparipinnate, stipulate; leaflets 30-65, *ca* 0.2-0.6 x 0.1-0.2 cm, linear-oblong, mucronulate. Flowers yellow, in axillary racems; bracts and bracteoles lanceolate. Callyx *ca* 0.5 cm long, deeply 2 lipped. Corolla *ca* 1 cm long. Stamens 10, diadelphous. Pods 5-10 jointed, *ca* 2.0-3.5 x 0.2-0.5 cm.

Fls.& Frts.: September - January.

Occurrence: Common, occurs in marshy places.

Distribution: Tropical, subtropical and warm temperate Africa, Asia and Australia.

Specimen examined: Haduk, Naltoli; *Bora* 14790 (NEHU).

Uses: Pith used for handicraft work.

3. *Alysicarpus* Desv.

Desv. Journ. Bot. Desv. II. 1: 120. 1813, *nom. con.*

Herbs. Leaves usually 1-foliolate; stipules scarious; stipels subulate. Flowers in terminal or axillary racemes; bracts scarious; bracteoles absent. Sepals 5, connent below, subequal. Petals 5; standard narrowed to a claw; wings oblique. Stamens 10, diadelphous, 9+1. Fruit a lomentum with one seeded joints.

About 25 species distributed in Africa, Asia, Australia, America; 15 species in India; 2 species in the study area.

Key to the species

1a. Flowers white; calyx glumaceous

..... 1. *A. glumaceous*

1b. Flowers bluish-violat; calyx not glumaceous

..... 2. *A. vaginalis*

1. *Alysicarpus glumaceous* (Vahl) DC., Prodr. 2: 353; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 346. 1996. *Hedysarum glumaceous* Vahl, Symb. Bot. 2: 106. 1791. *Alysicarpus wallichii* Wight & Arn., Prodr. Fl. Pen. Ind. Or. 234. 1934; Kanjilal *et al.*, Fl. Assam 2: 43. 1938.

Erect or diffuse herb. Leaves 1-foliolate, *ca* 1.5-8.5 x 0.3-1.4 cm, linear-lanceolate, acute. Flowers white, *ca* 0.8 cm long. Calyx glumaceous. Pods 5-6 jointed, compressed, turgid.

Fls. & Frts: September-November.

Occurrence: Occasionally, occurs in grassland of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Himalayas; Myanmar, Sri Lanka.

Specimen examined: Naltoli; *Bora* 15115 (NEHU).

Notes: Wild relative of pulses.

2. *Alysicarpus vaginalis* (Linn.) DC., Prodr. 2: 353. 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 158. 1876; Santapau in Rec. Bot. Surv. Ind. 16(1):

69. 1953; Deb, Fl. Tripura 1: 145. 1981; Islam, Fl. Majuli 95. 1990. *Hedysarum vaginalis* Linn., Sp. Pl. 764. 1752.

Diffuse glabrous herb. Leaves *ca* 0.5-2.1 x 0.4-0.6 cm, linear-oblong, acute, entire; stipules acuminate. Flowers bluish violate. Calyx linear-lanceolate, acuminate, segments 4. Corolla obicular. Pods *ca* 1.2 cm long, turgid.

Fls. & Frts.: September-Decemeber.

Occurrence: Common, grows in grassland and along the roadside of the sanctuary.

Distribution: Tropical and subtropical Africa, Asia, Australia.

Specimen examined: Haduk; *Bora* 14789 (NEHU).

Notes: Wild relative of pulses.

4. *Atylosia* Wight & Arn.

Wight & Arn., Prodr. 257. 1834.

Herbs. Leaves 3 foliolate, stipulate; leaflets gland dotted beneath. Flowers in long peduncled racemes. Calyx tube cup shaped. Corolla exserted. Stamens 10, diadelphous. Pods more or less turgid.

About 20 species distributed in tropical Africa, Asia and Australia; 12 species in India; 2 species in the study area.

Key to the species

1a. Leaflets stipellate; flowers in long peduncled racemes ... 1. **A. *goensis***

1b. Leaflets exstipellate; flowers in short racemes ... 2. **A. *scarabaeoides***

1. ***Atylosia goensis*** (Dalz.) Dalz. in J. Linn. Soc. Bot. 13: 186. 1873; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 346. 1996. *Cajanus goensis* Dalz. in Kew J. BOt. 2: 264. 1850. *Atylosia barbata* (Benth.) Baker in Hook. f., Fl. Brit. Ind. 2: 216. 1876; Kanjilal *et al.*, Fl. Assam 2: 97. 1938.

Pubescent woody climber. Leaflets *ca* 1.8-10.0 x 0.8-6.5 cm, orbicular, acuminate, subcoriaceous, pubescent beneath. Flowers yellow, *ca* 2.0-2.5 cm long, in terminal or axillary racemes. Calyx lobes *ca* 0.3-0.5 cm long, ovate, acute, unequal. Corolla *ca* 2 cm long. Pods compressed, 5-6 seeded, hairy.

Fls. & Frts.: November - March.

Occurrence: Common, in grassland of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Himalayas; Java

Specimen examined: Haduk, Naltoli; *Bora* 15120 (NEHU).

Notes: Fodder plant.

2. ***Atylosia scarabaeoides*** (Linn.) Benth. in Miq. Pl. Jungh. 245. 1852; Baker in Hook. f., Fl. Brit. Ind. 2: 215. 1876; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 347. 1996. *Dolichos scarabaeoides* Linn., Sp. Pl. 726. 1753.

Climbing pubescent herb. Leaflets *ca* 1.5-3.0 x 0.5-1.2 cm, elliptic-obovate, hairy 3 nerved. Flowers yellow, in axillary peduncles. Calyx *ca* 0.6 cm long, pubescent. Corolla *ca* 0.8 cm long, orbicular; keel obtuse. Pods *ca* 1.6-2.2 x 0.3-0.5 cm, straight, furrowed between seeds, densely brownish hairy.

Fls. & Frts.: August - January.

Occurrence: Common, in grassland of the sanctuary.

Distribution: Throughout India; China, Malaysia, Myanmar, Vietnam.

Specimen examined: Haduk, Naltoli; *Bora* 14704 (NEHU).

Notes: Fodder plant.

5. *Butea* Koening. ex Roxb.

Koening. ex Roxb., Pl. Corom. 1: 22. t. 21. 1795.

About 30 species distributed in Indo-Malaya and China; 3 species in India; one species in the study area.

Butea parviflora Roxb., Hort. Beng. 54. 1814, *nom. nud.* et Fl. Ind. 3: 248. 1832; Deb, Fl. Tripura 1: 147. 1981; Santapau in Rec. Bot. Surv. Ind. 16(1): 76. 1953; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 348. 1996. *Spatholobus roxburghii* Benth. in Miq. Pl. Jungh. 283. 1852; Baker in Hook. f., Fl. Brit. Ind. 2: 193. 1876; Kanjilal *et al.*, Fl. Assam 2: 75. 1938.

Large woody climber, young parts and inflorescence silky tomentose. Leaves 3 foliolate; leaflets *ca* 7-18 x 4-11 cm, obovate-elliptic, lateral ones

oblique, acute or acuminate, hairy beneath. Flowers creamy white, in large terminal pubescent panicles. Calyx companulate, velvety. Corolla subequal, *ca* 0.6 cm long, emerginate. Stamens diadelphous, 9+1. Style incurved. Pod *ca* 14 x 3 cm, oblong, one seeded, brownish tomentose.

Fls. and Frts.: July - January.

Occurrence: Common, throughout the hilly forest and occasionally in the plain forest of the sanctury.

Distribution: Western and Eastern Himalayas; Myanmar, China, Vietnam.

Specimen Examined: Hiloikhunda; *Bora* 15160 (NEHU).

6. *Canavalia* DC.

DC., Mem. Legum. 375. 1875. & Prodr. 2: 403. 1825.

About 50 species distributed in tropical and subtropical regions; 8 species in India; one species in the study area.

Canavalia ensiformis (Linn.) DC., Prodr. 2: 404. 1825; Islam, Fl. Majuli 96. 1990; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 349. 1996. *C. maxima* Thou in Journ. Bot. 1: 78. 1813; Baker in Olivver Fl. Trop. Afr. 2: 190. 1871 & in Hook. f., Fl. Brit. Ind. 2: 195. 1876; Kanjilal *et al.*, Fl. Assam 2: 77. 1938. *Dolichos ensiformis* Linn., Sp. Pl. 725. 1753.

Large twiner. Leaves 3 foliolate, stipulated; petioles *ca* 10 cm long; leaflets *ca* 8-15 x 5.0-10.5 cm, acute or acuminate; terminal ones large, ovate-orbicular; latelal ones oblong-ovate, oblique. Flowers purplish white, solitary, in long axillary racemes. Calyx *ca* 1 cm long, 2 lipped; lower lip 3

lobed. Corolla *ca* 2.5-4.5 cm long, exserted; keel incurved. Stamens 10, monadelphous, ovary silky; style incurved. Pods *ca* 10-18 x 2.5-4.8 cm, linear-oblong, turgid, flat, upper suture 2 ribbed.

Fls. & Frts.: August-December.

Occurrence:: Common, on trees throughout the sanctuary.

Distribution: Arunachal Pradesh, Assam, Himalayas; Trtopical countries.

Specimen examined: Thengbhanga; *Bora* 15024 (NEHU).

Uses: Fruits edible.

7. Crotolaria Linn.

Linn., Sp. Pl. 714. 1753 & Gen. PL. ed. 5. 320. 1754.

Herbs or shrubs. Leaves simple or 3 foliolate, stipulate. Flowers in terminal or leaf opposed racemes. Calyx tube short, subequal or connate into 2 lips. Corolla clawed; wings narrower; keel incurved, beaked. Stamens 10, monadelphous; anthers alternately shorter, dorsifixed and longer, basifixed. Ovules many; style long, incurved at the base. Pods turgid or inflated, many seeded.

About 550 species distributed in tropical and subtropical regions; 86 species in India; 3 species in the study area.

Key to the species

1a. Leaves 1 foliolate:

2a. Leaves oblong; flowers yellow ... 1. *C. humifusa*

2b. Leaves linear-lanceolate:

. flowers bluish ... 3. *C. sessiliflora*

1b. Leaves 3 foliolate ... 2. *C. pallida*

1. *Crotolaria humifusa* Grah. ex Benth. in Hook. Lond. J. Bot. 2: 478. 1843; Baker in Hook. f., Fl. Brit. Ind. 2: 67. 1876; Kanjilal *et al.*, Fl. Assam 2: 11. 1938.

Slender herb, brownish silky hairy. Leaves *ca* 0.5-2.2 x 0.2-1.0 cm, oblong, sessile, entire, pubescent; stipules *ca* 0.1-0.4 cm long. Flowers yellow, in leaf opposed racemes, bracteate. Pods *ca* 0.6-1.0 cm long, glabrous, few seeded.

Fls. & Frts.: November-March.

Occurrence: Common, in grassland of the sanctuary.

Distribution: North East Inida; Sri Lanka.

Specimen examined: Haduk, Naltoli; *Bora* 14723 (NEHU).

2. *Crotolaria pallida* Ait., Hort. Kew 3: 20. 1789; Polhill in Kew Bull. 22(2): 262. 1968; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 353. 1996. *C. striata* DC., Prodr. 2: 131. 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 84. 1876; Kanjilal *et al.*, Fl. Assam 2: 16. 1938.

Erect suffruticose herb; branshes striate. Leaves 3 foliolate; stipules deciduous; leaflets *ca* 2.0-4.5 x 0.8-2.2 cm, obovate, obtuse or acute, mucronate, cuneate at base, entier. Flowers yellow, in long terminal racemes; bracts *ca* 0.3 cm long. Calyx *ca* 0.5 cm long, pubescent outside; teeths lanceolate. Corolla *ca* 1.5 cm long, yellow. Pods *ca* 3-6 cm long, oblong-cylindric, glabrous.

Fls. & Frts.: June - December.

Occurrence: Common, along roadside and grassland.

Distribution: A native of tropical Central America; introdused in tropical Africa, Asia, Australia.

Specimen examined: Haduk, Kamarpur; *Bora* 14810 (NEHU).

3. *Crotolaria sessiliflora* Linn., Sp. Pl. ed. 2. 1004. 1763; Baker in Hook. f., Fl. Brit. Ind. 2: 73. 1876; Kanjilal *et al.*, Fl. Assam 2: 12. 1938; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 354. 1996.

Erect pubescent herb. Leaves *ca* 4.5-15.5 x 0.8-2.0 cm, linear-lanceolate; stipules minute. Flowers bluish, in racemes. Calyx silky. Pods oblong, few to many seeded.

Fls. & Frts.: August - December.

Occurrence: Occasionally, in grassland of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Himalayas; China, Japan, Philippines.

Specimen examined: Haduk; *Bora* 15444 (NEHU).

8. *Dalbergia* Linn.

Linn. f. Suppl. 52. 1881, *nom. cons.*

Trees or climbing shrubes. Leaves imparipinnate, exstipulate. Flowers in terminal or axillary panicles; bracts small, bracteoles 2. Calyx campanulate, 5 dentate, Corolla exserted; standard broad; keel joined at the obtuse tip.

Stamens 9-10, monadelphous or diadelphous. Ovules few. Pods flat, indehiscent. Seeds 1-4, reniform, compressed.

About 300 species distributed in tropical and subtropical regions; 25 species in India; 3 species in the study area.

Key to the species

1a. Trees; leaflets 3-5; common petiole zigzag ... 2. *D. sissoo*

1b. Shrubs or small trees; leaflets 5-more; common petiole not zigzag:

2a. Leaflets 5-9; flowers white; stamens monadelphous ... 1. *D. rimosa*

2b. Leaflets 17-25; flowers purplish; stamens diadelphous ... 3. *D. stipulacea*

1. ***Dalbergia rimosa*** Roxb., Fl. Ind. 3: 233. 1832; Baker in Hook. f., Fl. Brit. Ind. 2: 232. 1876; Kanjilal *et al.*, Fl. Assam 2: 104. 1938; Deb, Fl. Tripura 1: 156. 1981; Haridasan & Rao, For. Fl. Meghalaya 1: 287. 1985; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 357. 1996. Fig. 17

Scandent shrub. Leaflets 5-9, elliptic-obovate, acute, acute or rounded at base, pubenscent beneath. Flowers white, small, in axillary and terminal dichotomous panicles. Calyx teeths obtuse, pubescent. Corolla *ca* 0.4 cm long. Stamens 10, monadelphous. Pods *ca* 4.5-9.5 x 2.0-4.5, strap shaped, 1 seeded.

Fls. & Frts.: April - October.

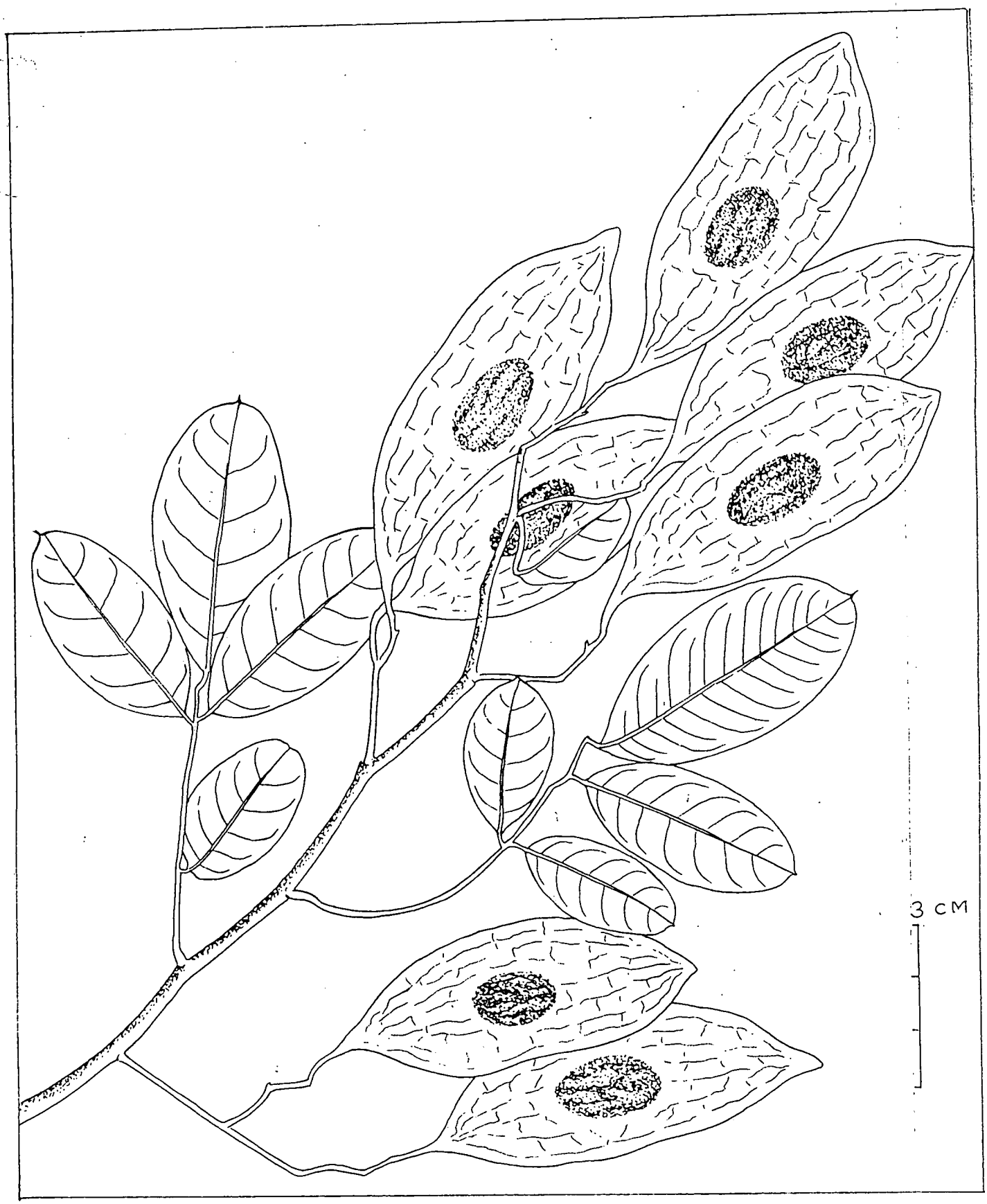


Fig. 17: ***Dalbergia rimosa*** Roxb. (Papilionaceae)

Occurrence: Occasionally, throughout the sanctuary.

Distribution: Assam, Meghalaya, Eastern Himalayas; Tropical countries.

Specimen examined: Hiloikhunda, Kamarpur; *Ecra* 15375 (NEHU).

2. ***Dalbergia sissoo*** Roxb. ex DC., Prodr. 2: 416. 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 231. 1876; Kanjilal *et al.*, Fl. Assam 2: 100. 1938; Deb, Fl. Tripura 1: 156. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad.(eds. Hajra *et al.*) 1: 358. 1996. "Sishu".

Deciduous tree; bark rough. Leaves 8-18 cm long; petiole zigzag; leaflets 3-5, *ca* 1.5-5.8 x 0.6-4.2 cm, alternate, ovate, acuminate. Flowers yellowish white, shortly pedicelled, in axillary panicles. Calyx *ca* 0.3-0.4 cm long; teeths short, obtuse. Corolla *ca* 0.6-0.8 cm long; standard clawed. Stamens 9, united into a sheath. Ovary pubescent. Pods *ca* 4-7 x 0.4-0.8 cm, linear-lanceolate, strap shaped, 1-2 seeded, indehiscent.

Fls.: March - April. & Frts.: August - January.

Occurrence: Occasionally, occurs along roadside.

Distribution: Sub-Himalayan regions; Afghanistan.

Specimen examined: Haduk; *Bora* 15274 (NEHU).

Uses: Timber used for construction works.

3. ***Dalbergia stipulacea*** Roxb., Fl. Ind. 3: 233. 1832; Baker in Hook. f., Fl. Brit. Ind. 2: 237. 1876; Kanjilal *et al.*, Fl. Assam 2: 107. 1938; Deb, Fl. Tripura 1: 157. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 358. 1996. "Dat bijuli".

Small tree; branches spreading. Leaves imparipinnate; leaflets 17-23, *ca* 1.5-4 x 0.5-1.5 cm, elliptic-oblong, nearly oblique at base, glabrescent. Flowers purple, in axillary panicles. Calyx teeths minute. Stamens 10, diadelphous. Pods oblong flate, 1-seeded.

Fls. & Frts.: April - December.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Eastern Himalaya to Myanmar, China, Malaysia, Vietnam.

Specimen examined: Hiloikhunda; *Bora* 15445 (NEHU).

9. *Dalhousia* R. Grah.

R. Grah. ex Benth & Hook. f., Gen. Pl. 1: 552. 1865.

2 species dristributed in Eastern Himalayas and Tropical Africa; one species in the study the area.

Basionym 9

Dalhousia bracteata (Roxb.) R. Grah. ex Wt. Ic. t. 265. 1840; Baker in Hook. f., Fl. Brit. Ind. 2: 248. 1878; Kanjilal *et al.*, Fl. Assam 2: 116. 1938; Haridasan & Rao, For. Fl. Meghalaya 1: 240. 1985; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 358. 1996.

Fig. 18

Woody climber; young branches pubescent. Leaves 1 foliolate, *ca* 3.5-16.5 x 2-11 cm, ovate-oblong or suborbicular, acute, rounded or subcordate at base. Flowers white, in axillary corymbs; bracts and bractioles ovate-orbicular. Calyx campanulate, pubescent outside. Corolla *ca* 0.5 cm long, exserted; wings oblique. Stamens 10, free. stigma capitate. Pods *ca* 5-10 x 2.5-4.5 cm,

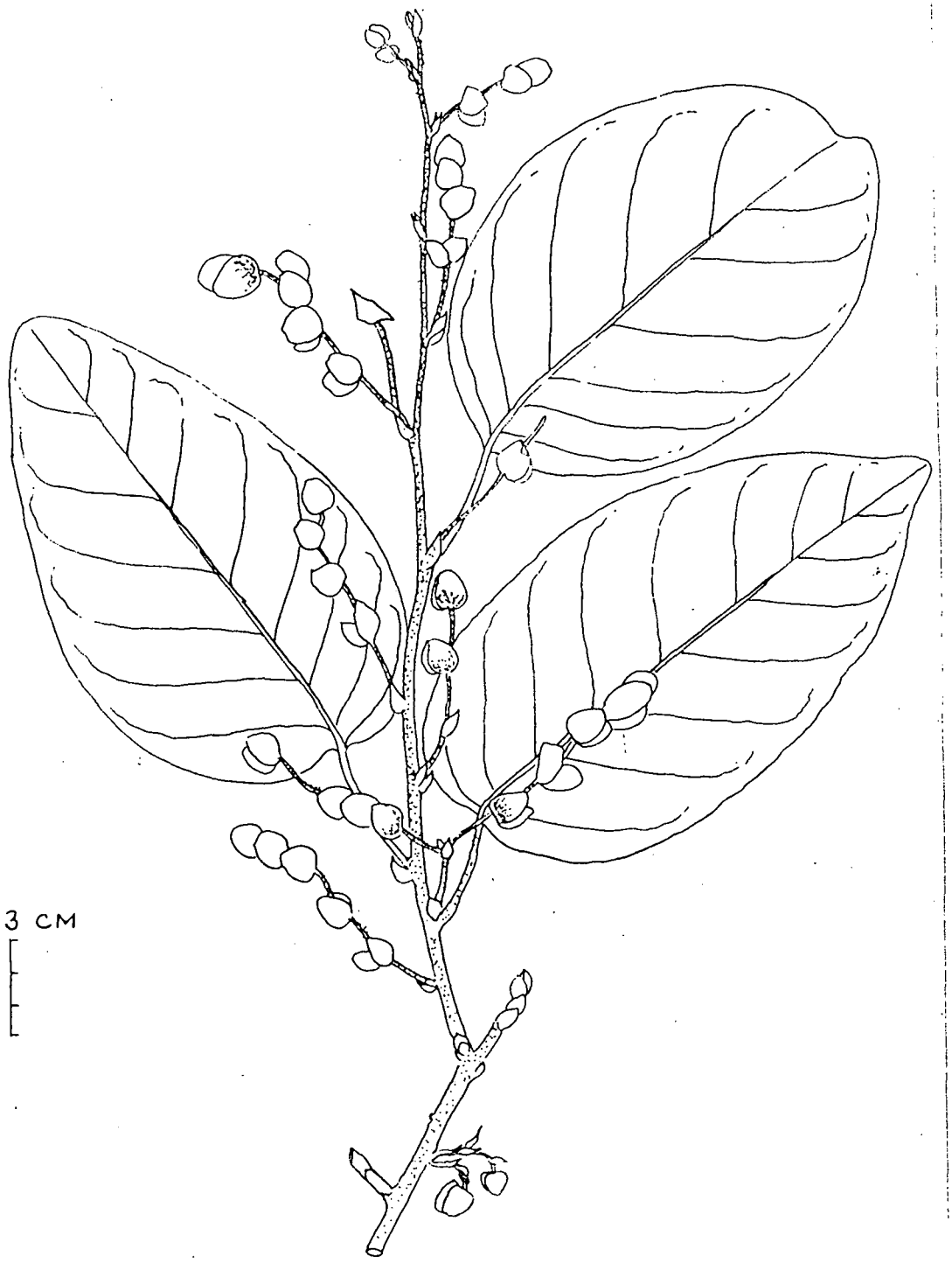


Fig. 18: ***Dalhousia bracteata*** (Roxb.) R. Grah (Papilionaceae)

compressed, both ends narrowed, 1-3 seeded.

Fls. & Frst.: May - January.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Assam, Meghalaya, Eastern Himalaya; Bangladesh.

Specimen examined: Dhekiabari; *Bora* 15446 (NEHU).

Notes: Probably confined to Eastern Himalaya and extend upto Bangladesh.

10. *Derris* Lour.

Lour., Fl. Cochinch. 2: 432. 1790, *nom. con.*

Climbing shrubs or trees. Leaves imparipinnate, exstipulate; leaflets opposite. Flowers in axillary or terminal racemes or panicles; bracts and bracteoles caducous. Calyx campanulate. Corolla exserted; standard broad ovate to orbicular; wings obliquely oblong; keel incurved. Stamens 10, monadelphous or diadelphous. Ovules few; style incurved; stigma capitate. Pods flat, winged along the upper or both the sutures, indehiscent. Seeds compressed.

About 80 species distributed in tropical regions; 25 species in India; 2 species in the study area.

Key to the species

1a. Clmbing shrubs; leaflets bluntly acuminate; stamens monadelphous ... 1. **D. cuneifolia**

1b. Trees; leaflets subacute mucronate; stamens diadelphous ... 2. *D. robusta*

1. *Derris cuneifolia* Benth. in Miq., Pl. Jungh. 1: 253. 1852; Baker in Hook. f., Brit. Ind. 2: 243. 1878; Kanjilal *et al.*, Fl. Assam 2: 113. 1934; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 359. 1996.

Large climbing shrub; young parts tomentose. Leaves *ca* 9-20 cm long; leaflets 5-11, *ca* 2.5-10.5 X 1.2-5.0 cm, elliptic-ovate, entire, bluntly acuminate. Flowers purple, *ca* 1.5 cm long, in long axillary racemes. Calyx *ca* 0.3 cm long. Corolla *ca* 1.2 cm long, purlish white. Stamens monadelphous *ca* 1 cm long. Carpels *ca* 1.2 cm long. Pods *ca* 3.5-7.5 X 1.8-3.0 cm elliptic-ovate, flat, 1-seeded.

Fls. & Frts.: April - November.

Occurrence: Common, throughout the sanctuary.

Distribution: Assam, Eastern Himalaya, Eastern Peninsula; *Bangladesh, Nepal.*

Specimen examined: Thengbhanga; *Bora* 15021 (NEHU).

2. *Derris robusta* (Roxb. ex DC.) Benth. in J. Linn. Soc. Bot. 4(suppl.): 104. 1860; Baker. in Hook. f., Fl. Brit. Ind. 2: 241. 1878; Kanjilal *et al.*, Fl. Assam 2: 111. 1938; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 360. 1996. *Dalbergia robusta* Roxb. ex Dc., Prodr. 2: 417. 1825. "Sitkora".

Middle sized tree. Leaflets 7-23, *ca* 1.5-4.0 x 0.5-1.8 cm, elliptic, mucronate, subacute, oblique at base. Flowers white, *ca* 1 cm long, clustered in axillary long racemes. Calyx *ca* 0.2 cm long; teeths pubescent. Corolla *ca*

0.6 cm long, orbicular. Stamens diadelphous. Pods *ca* 5-8 X 0.5-0.6 cm, narrow towards the both ends, winged along the upper suture, 1-5 seeded.

Fls. & Frts.: April - October.

Occurrence: Common, in the hilly forest of the sanctuary.

Distribution: Assam, Eastern Himalaya, Tripura; Sri Lanka.

Specimen examined: Dhekiabari; *Bora* 15447 (NEHU).

Notes: Confined to Indo-Sri Lanka region.

11. *Desmodium* Desv.

Desv. Journ.de Bot.1: 12. t. 5. 1813, *nom. cons.*

Herbs or shrubs. Leaves 1 or 3 foliolate; stipellate. Flowers in simple or panicled racemes, umbels or fascicles; bracts striate or subulate. Calyx campanulate or turbinate, two upper teeth often subconnate. Corolla exserted; standard clawed; wings obliquely oblong, adnate to the obtuse keel. Stamens 10, connate in a tube or the vexillary free and the others connate. Ovary 2-many ovuled; style incurved; stigma capitate. Fruits jointed seperating into 1-seeded portions. Seeds compressed.

About 450 species distributed in tropical and subtropical regions; 42 species in India; 9 species in the study area.

Key to the species

1a. Leaves 1 foliolate:

2a. Petiole winged ... 8. *D. triquetrum*

2b. Petiole not winged:

3a. Branchlets slightly angular; leaflets glabrescent above .... 2. *D. gangeticum*

3b. Branchlets terete; leaflets adpressed hairy above .... 9. *D. velutinum*

1b. Leaves 3 foliolate:

4a. Prostrate herbs; flowers 1-3 together axillary .... 7. *D. triflorum*

4b. Undershrubs; flowers in racemes:

5a. Leaflets oblong obtuse ... 3. *D. gyroides*

5b. Leaflets elliptic or ovate-lanceolate:

6a. Branches angular; flowers light pinkish or reddish:

7a. Flowers in lax axillary or terminal racemes ... 4. *D. laxiflorum*

7b. Flowers in axillary umbels ... 6. *D. triangulare*

6b. Branches slender or terete; flowers white or creamy:

8a. Flowers creamy; Pods hidden by bracts ... 5. *D. pulchellum*

8b. Flowers white; Pods not hidden by bracts ... 1. *D. caudatum*

1. *Desmodium caudatum* (Thunb.) DC., Prodr. 2: 337. 1825; Deb, Fl. Tripura 1: 161. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 362. 1996; Chauhaan *et al.* in Fl. Namdapha (edt. Hajra) 150. 1996. *D. laburnifolium* (Pior.) DC., Prodr. 2: 337. 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 163. 1876; Kanjilal *et al.*, Fl. Assam 2: 47.1938.

Shrubs; branches terete. Leaves 3 foliolate, stipulate; leaflate *ca* 5-10 x 1-4 cm, oblong-lanceolate, acute, pubescent beneath, terminal one larged. Flowers whitish, in long racemes. Calyx pubescent, teeths lanceolate. Corolla white. Pods compressed, hairy, 6-8 jointed.

Fls. & Ftrs.: June - December.

Occurrence: Occasionally, in grassland of the sanctuary.

Distribution: Central and Eastern Himalayas, Assam, Tripura; China, Japan, Malaysia, Sri Lanka.

Specimen examined: Haduk; *Bora* 15137 (NEHU).

2. *Desmodium gangeticum* (Linn.) DC., Prodr. 2: 327. 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 168. 1876; Kanjilal *et al.*, Fl. Assam 2: 55. 1938; Deb, Fl. Tripura 1: 161. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 363. 1996. *Hedysarum gangeticum* Linn., Sp. Pl. 746. 1753.

Pubescent undershrub. Leaves 1 foliolate, *ca* 1.5-6.5 x 1.0-3.2 cm, ovate-lanceolate or elliptic-lanceolate, acute, rounded at base, grey puberulous beneath; stipules linear, acuminate, persistent. Flowers purplish white, *ca* 0.8 cm long, in long terminal or axillary racemes. Calyx *ca* 0.2 cm

long, hairy; teeths deltoid, lanceolate. Corolla *ca* 0.5 cm long. Pods *ca* 0.8-0.1 x 2-0.2 cm, falcate, 3-8 jointed, slightly hairy.

Fls. & Frts.: June - October.

Occurrence: Common, in grassland of the sanctuary.

Distribution: Tropical regions of India; Tropical Africa, China, Malaysia, Philippines.

Specimen examined: Haduk, Naltoli; *Bora* 14791 (NEHU).

3. *Desmodium gyroides* (Roxb. ex Link.) DC., Prodr. 2: 326. 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 175. 1876; Kanjilal *et al.*, Fl. Assam 2: 59. 1938.; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 363. 1996; *Hedysarum gyroides* Link., Enum. Alt. 2: 247. 1822.

Undershrub. Leaves 1-3 foliolate; leaflets *ca* 1.2-5.5 x 0.8-2.8 cm, oblong or obovate-oblong, obtuse, truncate at base; stipules linear, acuminate; stipels filiform. Flowers purplish pink, in axillary or terminal racemes; bracts ovate. Calyx *ca* 0.2 cm long. Corolla *ca* 0.5 cm long. Pods *ca* 4-5 cm long, linear, hairy, 3-10 jointed.

Fls. & Frts.: September - January.

Occurrence: Common, throughout the study area.

Distribution: Assam, Meghalaya, Central Himalaya; Malaysia, Sri Lanka.

Specimen examined: Haduk; *Bora* 15025 (NEHU).

4. *Desmodium laxiflorum* DC., Prodr. 2: 335. 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 164. 1876; Kanjilal *et al.*, Fl. Assam 2: 48. 1938; Deb, Fl.

Tripura 1: 163. 1981; Haridasan & Rao, For. Fl. Maghalaya 1: 296. 1985.

Fig. 19

Undershrub; branches angular, pubescent. Leaves 3 foliolate; leaflets *ca* 3.5-10.0 x 1.5-5.0 cm, ovate or lanceolate, mucronate, base narrowed, rough above; terminal ones largest. Flowers light pinkish, clustered in lax axillary or terminal racemes. Calyx pubescent. Corolla pinkish. Pods slender, hooked hairy, 6-8 jointed.

Fls. & Frts.: June - December.

Occurrence: Common, in grassland and along roadside.

Distribution: Throughout India; China, Malaysia.

Specimen examined: Haduk, Naltoli; *Bora* 14888 (NEHU).

5. *Desmodium pulchellum* (Linn.) Benth., Fl. Hongk. 83. 1861; Baker in Hook. f., Fl. Brit. Ind. 2: 162. 1876; Kanjilal *et al.*, Fl. Assam 2: 47. 1938; Deb, Fl. Tripura 1: 164. 1981; Hridasan & Rao, For. Fl. Meghalaya 1: 297. 1985. *Hedysarum pulchellum* Linn., Sp. Pl. 747. 1753.

Shrub; branches terete, pubescent. Leaves 3 foliolate, stipulate; petiole channelled; leaflets elliptic-oblong, subacute, rounded at base; terminal ones largest. Flowers creamy, shortly stalked, clustered in axillary and terminal racemes; bracts *ca* 0.3-1.2 x 0.2-1 cm, orbicular, 2 foliolate, enclosing each cluster. Calyx *ca* 0.1 cm long, teeths short. Corolla *ca* 0.5 cm long. Pods *ca* 0.8 x 0.3 cm, hidden by the bracts, 2 jointed.

Fls. & Frts.: July - January.

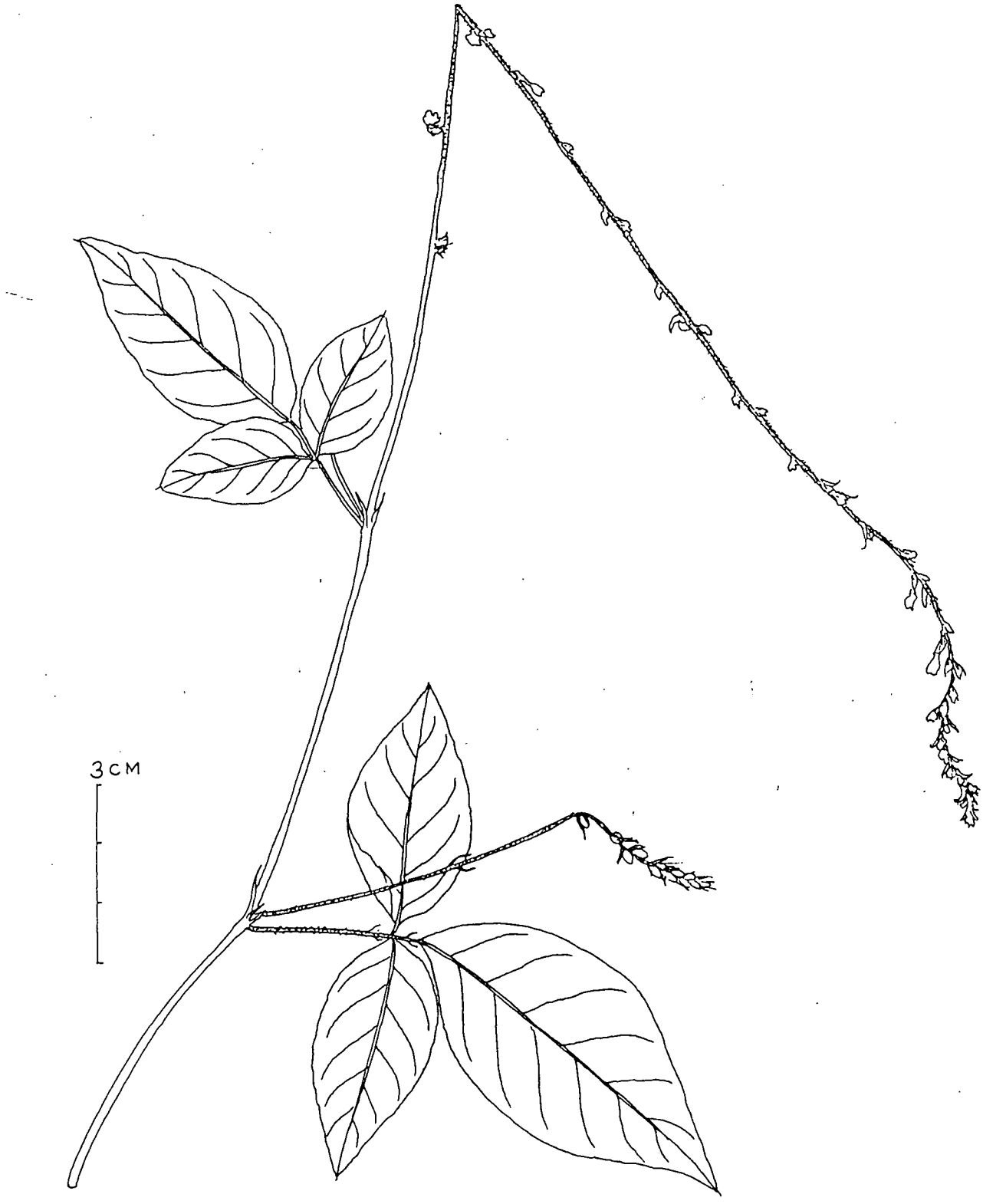


Fig. 19: ***Desmodium laxiflorum*** DC. (Papilionaceae)

Occurrence: Occasionally, in grassland of the sanctuary.

Distribution: Assam, Eastern Himalaya, Meghalaya, Tripura; China, Malaysia, Myanmar, North Australia, New Caledonia.

Specimen examined: Haduk, Naltoli; *Bora* 15026 (NEHU).

6. *Desmodium triangulare* (Retz.) Merr. in J. Arn. Rb. 23: 170. 1942; Chowdehry *et al.* in Materials for the Fl. Arunachal Prad. 1: 367. 1996. *Hedysarum triangulare* Retz., Obs. Bot. 3: 40. 1783. *H. cephalotes* Roxb., Fl. Ind. 3: 360. 1832. *Desmodium cephalotes* (Roxb.) Wight & Arn., Prodr. 224. 1834; Baker in Hook. f., Fl. Brit. Ind. 2: 161. 1876.

Undershrub; branches angular. Leaves 3 foliolate, leaflets *ca* 4-6 x 1.8-4.2 cm, elliptic-lanceolate or oblong-elliptic, grey silky beneath, acute. Flowers reddish yellow, in axillary umbels. Podes 2-4 jointed, grey silky hairy.

Fls. & Frts.: June - November.

Occurrence: Occasionally, in hilly forest margins.

Distribution: Assam, Eastern Himalaya; Bangladesh, China, Sri Lanka, Nepal.

Specimen examined: Dhekiabari; *Bora* 15112 (NEHU).

7. *Desmodium triflorum* (Linn.) DC., Prodr. 2: 334. 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 173. 1876; Kanjilal *et al.*, Fl. Assam 2: 60. 1938; Deb, Fl Tripura 1: 164. 1981; Islam, Fl. Majuli 99. 1990; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 367. 1996. *Hedysarum triflorum* Linn., Sp. Pl. 749. 1753.

Prostrate herb; branches tomentose, rooting at nodes. Leaves 3 foliolate; leaflets *ca* 0.2-1.0 x 0.1-0.8 cm, obovate-obcordate, sparsely hairy beneath; bracts linear, acuminate. Flowers purplish, 1-3 together, axillary. Calyx *ca* 0.1 cm long, hairy. Corolla *ca* 0.3 cm long. Pods *ca* 1.2 x 0.2 cm, curved, flat, pubescent, 3-5 jointed.

Fls. & Frts.: July - January.

Occurrence: Common, in grassland and open places of the sanctuary.

Distribution: Throughout India; Pantropical.

Specimen examined: Haduk; *Bora* 15118 (NEHU).

8. **Desmodium triquetrum** (Linn.) DC., Prodr. 2: 326. 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 163. 1876; Kanjilal *et al.*, Fl. Assam 2: 56. 1938; Deb, Fl. Tripura 1: 165. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 368. 1996. *Hedysarum triquetrum* Linn., Sp. P. 746. 1753.

Undershrub; branches angular. Leaves 1 foliolate, *ca* 3.0-10.5 x 0.6-0.3 cm, oblong-lanceolate, acute, rounded at base; petiole winged; stipules acuminate, striate. Flowers purplish pink, in axillary or terminal racemes. Calyx *ca* 0.3 cm long, hairy outside; teeths linear deltoid. Corolla *ca* 1.2 cm long. Pods *ca* 2.5-4.0 x 0.5 cm, flat, hairy, 5-7 jointed.

Fls. Frts.: October - January.

Occurrence: Common, in grassland and along roadside of the sanctuary.

Distribution: Throughout India; China, Malaysia, Myanmar, North Australia, New Caledonia.

Specimen examined: Haduk, Naltoli; *Bora* 15027 (NEHU).

9. *Desmodium velutinum* (Willd.) DC., Prodr. 2: 228. 1825; Deb, Fl. Tripura 1: 165. 1981. *Hedysarum velutinum* Willd., Sp. Pl. 3: 2. 1803. *Desmodium latifolium* DC., Prodr. 2: 328. 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 168. 18976; Kanjilal *et al.*, Fl. Assam 2: 56. 1936.

Undershrub; branches terete, tomentose. Leaves 1 foliolate, broadly ovate, mucronate, adppresed hairy above, brown tomentose beneath; stipules subulate; stipels setaceous. Flowers purplish in axillary panicled racemes. Pods hooked hairy.

Fls. & Frts.: June - November.

Occurrence: Occasionally, in grassland of the area.

Distribution: Assam, Madhaya Padesh, Sikkim, Tripura; Tropical Africa, America, Malaya, New Guinea, Philippines.

Specimen examined: Tuplung; *Bora* 15548.

12. *Erythrina* Linn.

Linn., Sp. Pl. 706. 1753 & Gen. Pl. ed. 5. 316. 1754.

Trees; branches prickly. Leaves 3 foliolate; stipules glandular. Flowers in peduncled axillary or terminal racemes. Calyx spathaceous or campanulate, oblique; teeths short. Corolla exserted; petals unequal. Stamens 10, long and short, alternate. Ovules many; style curved; stigma capitate. Pods falcate, turgid, torulose.

About 100 species distributed in tropical and subtropical regions; 8

species in India; 2 species in the study area.

Key to the species

1a. Petioles armed; leaflets ovate-oblong, obtuse or subacute; calyx campanulate ... 1. *E. fusca*

1b. Petioles unarmed; leaflets broadly ovate to rhomboid ovate; calyx spathaceous ... 2. *E. variegata*

1. *Erythrina fusca* Lour., Fl. Cochinch. 427. 1790; Deb, Fl. Trpura 1: 168. 1981. *E. ovalifolia* Roxb., Fl. Ind. 3: 254. 1876; Baker in Hook. f., Fl. Ind. 2: 189. 1876; Kanjilal *et al.*, Fl. Assam 2: 71. 1938. "Pani Modar".

Prickly shrub to middle sized tree. Leaflets *ca* 5-15 x 2.5-8.0 cm, ovate-oblong, obtuse or subacute, cuneate at base. Flowers scarlet, in terminal racemes. Calyx campanulate. Standard obcordate. Pods *ca* 15 cm long, 6-8 seeded.

Fls. & Frts.: January - August.

Occurrence: Occasionally, along roadside of the area.

Distribution: Assam, Tripura; Bangladesh, Malaysia, Myanmar, Sri Lanka.

Specimen examined: Burha Mayong, Haduk; *Ecra* 15449 (NEHU).

2. *Erythrina variegata* Linn., in Stickn. Herb. Amboin. 10: 1754; Deb, Fl. Tripura 1: 168. 1981; Islam, Fl. Majuli 100. 1990. *E. indica* Lamk., Encycl. 2: 391. 1786; Baker in Hook. f., Fl. Brit. Ind. 2: 188. 1876. "Modar".

Medium sized deciduous prickly tree. Leaflets broad ovoid to rhomboid-ovoid, *ca* 7-20 x 4.5-18.0 cm, acuminate, cuneate at base. Flowers deep red, in terminal dense racemes. Calyx spathacious. Pods *ca* 15-20 cm long, curved, torulose, 6-10 seeded.

Fls. & Frts.: February - June.

Occurrence: Common, in the hilly forest and occasionally in the plain forest of the sanctuary

Distribution: Assam, Meghalaya, Tripura, Foot hills of Himalayas; Java, Myanmar, Sri Lanka.

Specimen examined: Burha Mayong; *Bora* 15192 (NEHU).

13. Flemingia Roxb.

Roxb. ex Aiton, Hort. Kew. ed. 2, 4: 349. 1812.

Shrubs or undershrubs, rarely herbs. Leaves 1 or 3 foliolate, gland dotted beneath, stipulate. Flowers in axillary or terminal racemes or panicles; bracts foliaceous or scarious. Standard auricled at base; wing adhering to the beaked keel. Stamens 10, diadelphous. Ovules 2; stigma capitate. Pods oblong inflated, turgid, 2 valved, 2 seeded.

About 35 species distributed in the Indo-Malayas and North Australia; 26 species in India; 2 species in the study area.

Key to the species

1a. Branches angular; leaves 3 foliolate; bracts linear ... 1. *F. lineata*

1b. Branches terete; leaves 1 foliolate; bracts rounded cordate, folded ... 2. *F. strobilifera*

1. *Flemingia lineata* Roxb., Hort. Beng. 56, *nom. nud.* 1814; Baker in Hook. f., Fl. Brit. Ind. 2: 228. 1876; Kanjilal *et al.*, Fl. Assam 2: 92. 1938. *Moghania lineata* (Linn.) O.Kuntge, Rev. Gen.Pl. 1: 199. 1891. *Hedysarum lineatum* Linn., Sp. Pl. 1054. 1753.

Erect or diffuse undershrub; branches angular. Leaves 3 foliolate; petioles channelled; stipules linear-lanceolate, pubescent; leaflets obovate-lanceolate, apex cuspisate, base 3 nerved. Flowers purple, in axillary and terminal panicles; bracts linear, hairy. Calyx *ca* 0.2 cm long. Corolla *ca* 0.5 cm long. Pods pubescent.

Fls. & Frts.: December - April.

Occurrence: Common, in grassland and along water bodies of the sanctuary.

Distribution: Assam, Plains of Himalayas; **Malaya, Myanmar, North Australia, Sri Lanka.**

Specimen examined: Haduk, Naltoli; *Bora* 14809 (NEHU).

2. *Flemingia strobilifera* (Linn.) R.Br. ex Aiton, Hort. Kew. ed. 2, 4: 350. 1812; Baker in Hook. f., Fl. Brit. Ind. 2: 227. 1876; Kanjilal *et al.*, Fl. Assam 2: 88. 1938; Deb, Fl. Tripura 1: 177. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 370. 1996. *Hedysarum strobiliferum* Linn., Sp. Pl. 746. 1753. "Makhioti". Fig. 20



Fig. 20: ***Flemingia strobilifera*** (Linn.) R. Br. ex Aiton (Papilionaceae)

Erect shrub; branches terete, pubescent. Leaves 1 foliolate, *ca* 4.5-10.0 x 2.0-4.5 cm, oblong to ovate-lanceolate, acute or acuminate, rounded at base, pubescent; stipules lanceolate, acuminate. Flowers in short cymes on terminal and hairy racemes; bracts *ca* 0.5-2.0 cm long, rounded, folded, cordate, acuminate, pubescent. Calyx teeths linear. Corolla white, exserted. Pods oblong, turgid, 2 seeded, enclosed by bracts, pubescent.

Fls. & Frts.: February - July.

Occurrence: Common, throughout the study area.

Distribution: Throughout India, Sri Lanka to Philippines, West Indies.

Specimen examined: Haduk; *Bora* 14750 (NEHU).

Uses: During 'Rangali Bihu' festival (Assames new year) plants are used to beat the domestic animals chiefly cows to protect them from skin diseases for the whole year.

14. *Indligofera* Linn.

Linn., Sp. Pl. 751. 1753 & Gen. PL. ed. 5. 333. 1754.

About 700 species distributed in tropical and subtropical regions; about 50 species in India; one species in the study area.

Indigofera arrecta Hochst. ex Rich., Tent. Fl. Abyss. 1. 184. 1847; Sanjapa in Fasc. Fl. Ind. (eds Hajra *et al.*) 15. 1995; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1:371. 1996.

Shrub. Leaves imparipinnate; leaflets *ca* 1.0-2.5 x 0.4-0.6 cm, opposite, obovate-oblong, obtuse, mucronate; stipules small. Flowers violate, in axillary racemes. Calyx campanulate, 5 teethed. Standard ovate; wings oblong. Pods *ca* 2 x 0.2 cm, linear, reflexed.

Fls. & Frts.: July - September.

Occurrence: Rare, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Andaman & Nicobar Islands, Bihar, Karnatak, Uttar Pradesh, West Bengal; **Saudi Arabia, South Africa, Tropical Asia.**

Specimen examined: Satbasti; *Bora* 15398 (NEHU).

15. *Lablab* Adans.

Adans. Fam. 2. 325. 1763.

One species native to tropical Africa and widely cultivated in the tropics.

Lablab purpureus (Linn.) Sw., Hort. Brit. ed. 1: 481. 1827; Deb, Fl. Tripura 1: 171. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 374. 1996. *Dolichos lablat* Linn., Sp. Pl. 725. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 209. 1876; Kanjilal *et al.*, Fl. Assam 2: 86. 1938.*D. purpureus* Linn., Sp. Pl. ed. 2: 1021.

Twining shrub; branches terete. Leaves 3 foliolate; stipules lanceolate; leaflets broadly ovate, acute, cuneate or deltoid at base, entire. Flowers purplish white, in axillary or terminal elongated racemes. Calyx campanulate; teeths deltoid. Corolla exserted. Stamens diadelphous, 9+1. Style bearded.

Pods *ca* 7-10 x 1-4 cm, flat, oblong, 2-4 seeded. Seeds reddish.

Fls. & Frts.: October - February.

Occurrence: Occasionally, along forest margins of the sanctuary.

Distribution: Throughout India; Cultivated in the tropics.

Specimen examined: Haduk; *Bora* 14872 (NEHU).

Uses: Fruits used as vegetable.

16. *Millettia* Wight & Arn.

Wight & Arn., Prodr. 263. 1834.

Trees, shrubs or woody climbers. Leaves imparipinnate; leaflets opposite. Flowers in axillary solitary or fascicled racemes and in terminal panicles. Calyx campanulate. Corolla much exserted; petals long clawed; standard broad; wings oblong; keel incurved, obtuse. Stamens diadelphous or monadelphous. Ovary silky; ovules few; style filiform; stigma capitate. Pods woody, flat or turgid.

About 180 species distributed in tropical and subtropical regions; 12 species in India; 3 species in the study area.

Key to the species

1a. Leaves acuminate:

2a. Leaflets 5; pods tomentose ... 2. ***M. cinerea***

2b. Leaflets 5-11; pods glabrous ... 3. ***M. pachycarpa***

1a. Leaves long caudate ... 1. ***M. caudata***

1. *Millettia caudata* Baker in Hook. f., Fl. Brit. Ind. 2: 109. 1876; Kanjilal *et al.*, Fl. Assam 2: 29. 1938; Deb, Fl. Tripura 1: 175. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 377. 1996.

Straggling shrub. Leaflets 7-9, *ca* 7-14 x 2.5-5.5 cm, oblong-laceolate, long caudate, rounded at base, glaucous beneath. Flowers reddish, in axillary racemes. Calyx *ca* 0.4 cm long, silky. Corolla *ca* 1 cm long, silky. Stamens diadelphous. Pods *ca* 7-10 x 1.5-2.0 cm, oblong, 3-5 seeded, adpressed hairy.

Fls. & Frts.: April- January.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Tripura; **Bangladesh**.

Specimen examined: Dhekiabari; *Bora* 15167 (NEHU).

Notes: Confined to North-east India and extend upto Bangladesh.

2. *Millettia cinerea* Benth. in Miq., Pl. Jungh. 249. 1852; Baker in Hook. f., Fl. Brit. Ind. 2: 106. 1876; Kanjilal *et al.*, Fl. Assam 2: 28. 1938; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 377. 1996.

Woody climbing shrub; young parts pubescent. Leaflets 5, *ca* 2.5-10.0 x 1.4-5.2 cm, elliptic-ovate, abruptly acuminate; stipels setaceous. Flowers pinkish, in long terminal pubescent panicles; bracts and bracteoles caducous, *ca* 0.5 cm long, silky. Corolla *ca* 1.8 cm long, silky. Stamens diadelphous. Pods *ca* 5-8 x 1.8-2.2 cm, turgid, tomentose.

Fls. & Frts.: May - December.

Occurrence: Common, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Sikkim, Tripura; Bangladesh, China, Myanmar.

Specimen examined: Rangamati; *Bora* 15346 (NEHU).

3. ***Millettia pachycarpa*** Benth. in Miq. Pl. Jungh. 250. 1852; Baker in Hook. f., Fl. Brit. Ind. 2: 106. 1876; Kanjilal *et al.*, Fl. Assam 2: 27. 1938; Deb, Fl Tripura 1: 175. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 378. 1996.

Large woody climbing shrub; young parts brownish velvety. Leaflets 5-11, *ca* 4.2-15.5 x 2.2-5.5 cm, ovate-oblong or oblong-lanceolate acuminate, cuneate at base, brown tomentose beneath. Flowers mauve, in axillary racemes. Calyx *ca* 0.3 cm long, brown tomentose. Corolla *ca* 2 cm long. Stamens monadelphous. Pods *ca* 4-10 x 2.5-3.0 cm, glabrous, 1-3 seeded.

Fls. & Frts.: April - November.

Occurrence: Common, throughout the sanctuary.

Distribution: Arunachal Pradesh, Assam, Sikkim, Tripura, West Bengal; Bangladesh, Myanmar.

Specimens examined: Thengbhanga; *Bora* 15184 (NEHU).

Uses: Root used for fish poisoning.

17. *Mucuna* Adans.

Adans. Fam. 2:325. 1763.

About 120 species distributed in tropical and subtropical regions; 15

species in India; one species in the study area.

Mucuna *nigricans* (Lour.) Steud, Nom. Bot. ed. 2, 163. 1841; Deb, Fl. Tripura 1: 178. 1981; Chowdhery *et al.*in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 379. 1996. *M. imbricata* DC., Prodr. 2: 406. 1825; Baker in Hook. f., Fl. Brit. Ind.2: 185. 1876; Kanjilal *et al.*, Fl. Assam 2: 185. 1938. "Makori ghila".

Large woody climber. Leaves 3 foliolate; stipules linear; petioles long; leaflets *ca* 8-18 x 4.5-8.0 cm, ovate-oblong, acuminate, sparsely hairy beneath. Flowers purple, in long peduncled, drooping racemes; bracts large. Calyx campanulate; teeths 4, upper two connate, silky bristly outside. Corolla *ca* 4 cm long. Stamens diadelphous. Carpels *ca* 4.5 cm long; style incuved; stigma capitate. Pods oblong, bristly hairy, 2-4 seeded.

Fls. & Frts.: July - November.

Occurrence: Occasionally, in shady hilly forest of the sacntuary.

Distribution: Arunachal, Assam, Sikkim, Eastern Himalaya; Bangladesh, Malaysia, Taiwan, Vietnam.

Specimen examined: Haduk, Rangamati; *Bora* 15450 (NEHU).

18. *Pongamia* Vent.

Vent. Jard. Malm. t. 28. 1803, *nom. cons.*

Monotypic genus distributed in the Indo-Malayan region.

Pongamia pinnata (Linn.) Pierre, Fl. For. Cochinch. Sub. t. 385. 1899; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 383. 1996.*P. glabra* Vent. Jard. Malm. 1: 28. 1803; Baker in Hook. f., Fl.

Brit. Ind. 2: 240. 1878; Kanjilal *et al.*, Fl. Assam 2: 109. 1938. *Cytisus pinnata* Linn., Sp. Pl. 741. 1753. *Galedupa indica* Lamk., Encycl. 2: 594. 1788. "Korosh".

Medium sized tree; branches spreading. Leaves imparipinnate; leaflets 5-7, ovate-elliptic or oblong, acute or acuminate, dark green above, stipulate. Flowers pinkish white, in peduncled axillary racemes. Calyx subtruncate, pubescent. Corolla *ca* 1.2 cm long; standard silky. Stamens monadelphous. Style incurved. Pods *ca* 3.5-5.5 x 2.4-3.0 cm, obliquely oblong, compressed, woody, 1-seeded.

Fls. & Frts.: May - December.

Occurrence: Common, along roadside of the study area.

Distribution: Throughout India; North Australia, Malaysia, Polynesia, Sri Lanka.

Specimen examined: Haduk; *Bora* 15133 (NEHU).

19. *Pueraria* DC.

DC. in Ann. Sci. Nat. 9: 97. 1825.

Twining herbs or shrubs. Leaves 3 foliolate, stipellate. Flowers in long axillary or terminal racemes; bracts and bracteoles caducous. Calyx camapanulate; teeths two upper lobes connate. Corolla exserted; standard spurred at base; wings connate to the incurved keel. Stamens usually monadelphous, 10. Ovules many; style filiform; stigma capitate. Pods flat or subterete.

About 35 species distributed in Himalayas to Japan, South East Asia and Malaysia; 7 species in India; 2 species in the study area.

Key to the species

1a. Hairy climber; leaflets usually 2-3 lobed

.... 1 *P. phaseoloides*

1b. Glabrous climber; leaflets not lobed

.... 2. *P. wallichii*

1. *Pueraria phaseoloides* (Roxb.) Benth. in J. Linn. Soc. Bot. 9: 125. 1867; Baker in Hook. f., Fl. Brit. Ind. 2: 199. 1876; Deb, Fl. Tripura 1: 182. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 384. 1996. *Dolichos phaseoloides* Roxb., Fl. Ind. 3: 316. 1832. *Pueraria subspicata* Benth. in J. Linn. Soc. Bot. 9: 125. 1967.

Hairy climbing herb. Leaves pinnately 3 foliolate; stipules lanceolate hairy; leaflets broadly ovate or rhomboid, 2-3 lobed, acuminate, 3 nerved at base; laterals oblique. Flowers bluish violet, in long peduncled racemes. Calyx *ca* 0.6 cm long, hairy outside; lobes acuminate. Corolla *ca* 2 cm long. Pods *ca* 8-12 cm long, linear, sub-terrate, hairy, 10-20 seeded.

Fls. & Frts.: August - September.

Occurrence: Common, throughout the sanctuary and usually climbing over *Ixora* spp.

Distribution: Tropical India;South China, Malaysia.

Specimen examined: Haduk; *Bora* 15132 (NEHU).

2. *Pueraria wallichii* DC., Prodr. 2: 240. 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 199. 1876; Kanjilal *et al.*, Fl. Assam 2: 80. 1938.

Climbing herb. Leaves 3 foliolate; leaflets *ca* 5.8-15.0 x 3.5-6.5 cm, broadly ovate, acuminate, 3 nerved at base; laterals oblique. Flowers purple, in long axillary, peduncled racemes. Calyx *ca* 0.3 cm long; lobes acute, glabrous. Corolla *ca* 1.3 cm long. Pods *ca* 8.0 x cm, linear.

Fls. & Frts.: October - December.

Occurrence: Common, throughout the sanctuary.

Distribution: Assam, Meghalaya, Tropical Himalaya; Bangladesh, Myanmar, Nepal.

Specimen examined: Thengbhanga; *Bora* 14816 (NEHU).

20. *Tephrosia* Pers.

Pers. Sun. 2:328. 1807, *nom. con.*

Herbs, undershrubs or shrubs. Leaves imparipinnate; stipules setaceous; lesaflets opposite, lateral veins parallel. Flowers in leaf-opposed or terminal racemes or solitary or paired in the leaf axil. Calyx campanulate. Corolla clawed; standard suborbicular; wings slightly adnate to the incurved keel petals. Stamens 10, diadelphous. Ovules many; style incurved; stigma penicillate. Pods flattened.

About 300 species distributed in warm regions; about 25 species in India; 2 species in the study area.

Key to the species

1a. Erect shrubs; flowers white, *ca* 2.5 cm long ... 1. **T. candida**

1b. Diffuse undershrubs; flowers purple *ca* 1 cm long ... 2. *T. purpurea*

1. ***Tephrosia candida*** DC., Prodr. 2. 249. 1825; Baker in Hook. f., Fl. Ind. 2: 111. 1876; Kanjilal *et al.*, Fl. Assam 2: 31. 1938; Deb, Fl. Tripura 1: 187. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 386. 1996. *Robina candida* Roxb., Fl. Ind. 3: 327. 1832.

Shrub; branches velvety tomentose, grooved. Leaflets 15-23, *ca* 1.5-6.0 x 0.8-1.3 cm, narrowly elliptic, mucronate, silky pubescent beneath. Flowers white, *ca* 2.5 cm long, in terminal and axillary racemes. Calyx *ca* 0.5 cm long, pubescent. Corolla *ca* 2 cm long, silky outside. Pods *ca* 6-10 x 0.4-0.6 cm, linear-oblong, recurved, silky hairy, 10-12 seeded.

Fls. & Frts.: August - December.

Occurrence: Occasionally, along forest margins.

Ditribution: Tropical Himalayas; **Bangladesh, Malaysia, Myanmar.**

Specimen examined: Haduk; *Bora* 15286 (NEHU).

2. ***Tephrosia purpurea*** (Linn.) Pers., Syn. Pl. 2: 329. 1807; Baker. in Hook. f., Fl. Brit. Ind. 2: 112. 1876; Kanjilal *et al.*, Fl. Assam 2: 31. 1938. *T. hamiltonii* Drumm. ex Gamble, Fl. Madras Pres. 1: 320. 1918. *Cracea purpurea* Linn., Sp. Pl. 752. 1753.

Diffuse undershrub. Leaflets 9-21, oblanceolate, obtuse or retuse, mucronate, cuneate at base, hairy beneath. Flowers purple, *ca* 1 cm long, in leaf-opposed racemes; stipules subulate. Calyx *ca* 0.2-0.3 cm long, silky; teeths acuminate. Corolla *ca* 0.6 cm long; standard sparsely pubescent outside. Pods *ca* 2.5-4.0 cm long, slightly curved, sparsely pubescent, 6-9 seeded.

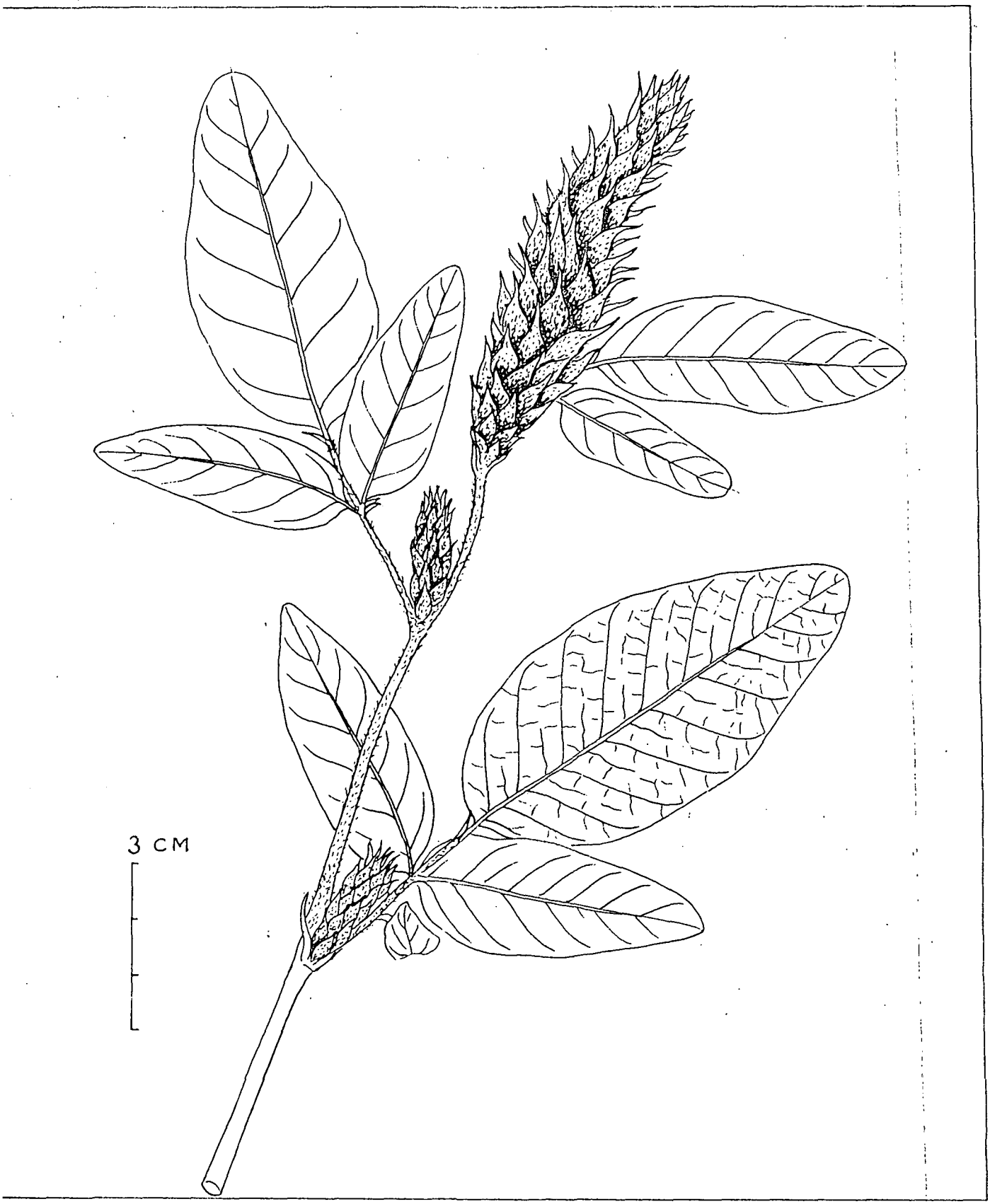


Fig. 21: ***Uraria neglecta*** Prain (Papilionaceae)

Fls. & Frts.: September - January.

Occurrence: Common, in grassland and along roadside.

Distribution: Assam, Tropical Himalayas; Malacca, Sri Lanka.

Specimen examined: Burha Mayong, Haduk; *Bora* 15369 (NEHU).

21. *Uraria* Desv.

Desv. Journ. de Bot. 1: 122. t. 5. f. 19. 1813.

Herbs or undershrubs. Leaves 1 foliolate or pinnately 3-9 foliolate; stiples striate; leaflets stipellate. Flowers in terminal racemes, bracteate. Calyx 2 lipped; tube short, teeth subulate. Corolla wing adherent to the obtuse keel. Stamens diadelphous, 9+1. Ovules many; style filiform; stigma terminal. Pods turgid, folded on one another within the calyx.

20 species distributed in tropical Africa, Asia and Australia; 10 species in India; 2 species in the study area.

Key to the species

1a. Leaves 3 foliolate; leaflets ovate, obtuse, mucronate; pods hairy ... 1. *U. neglecta*

1b. Leaves 1 foliolate; leaflets linear, acute; pods smooth ... 2. *U. picta*

1. *Uraria neglecta* Prain in Asiat. Soc. Beng. 66: 382. 1897; *U. lagopus sensu* Baker in Hook. f., Fl. Brit. Ind. 2: 156. 1876. *U. alopecuroides* Wight Kanjilal *et al.*, Fl. Assam 2: 40. 1938. Fig. 21

Erect pubescent undershrub. Leaves 3 foliolate; stipules cuspidate acuminate, broad cordate at base; leaflets *ca* 2.5-7.0 x 1.2-3.5 cm, ovate, obtuse, mucronate, pubescent beneath. Flowers purple, *ca* 0.6 cm long, in cylindric terminal racemes; bracts ovate, acuminte, ciliate. Calyx *ca* 0.2 cm long. Corolla *ca* 0.4 cm long. Pods 2-6 jointed, hairy.

Fls. & Frts.: July - October.

Occurrence: Common, in grassland of the sanctuary.

Distribution: Assam, Himalayas; China, Malaysia, North Australia.

Specimen examined: Haduk, Naltoli; *Bora* 14806 (NEHU).

2. *Uraria picta* (Jacq.) Desv. in Journ. Bot. 1: 123, t. 5. f. 19. 1813; Baker in Hook. f., Fl. Brit. 2: 155. 1876; Kanjilal *et al.*, Fl. Assam 2: 39. 1938. *Hedysarum pictum* Jacq., Coll. Bot. 2: 262. 1788.

Erect pubescent undershrub. Leaves 3-7 foliolate, lowermost simple; stipules *ca* 1.2 cm long, lanceolate; leaflets *ca* 7.5-18.0 x 0.5-1.0 cm, linear, nerves prominent beneath; stipels linear. Flowers purple, *ca* 0.6 cm long, in long cylindric, terminal racemes; bracts ovate-lanceolate. Crolla exserted. Pods 3-6 jointed, glabrous.

Fls. & Frts.: June - October.

Occurrence: Common, in grassland of the sanctuary.

Distribution: Assam, Himalayas; Philippines, Sri Lanka, Tropical Africa.

Specimen examined: Haduk, Naltoli; *Bora* 14880 (NEHU).

40 CAESALPINIACEAE

R. Br. in Tuckey, Narrat. Exped. Congo. 430. 1818.

Trees, shrubs or herbs. Leaves pinnate or 2 pinnate, rarely simple or 1 foliolate. Flowers mostly zygomorphic, racemose, spicate, or cymose. Sepals 5 or 2 upper ones connate. Petals 5 or few or absent, the upper one innermost, others variously imbricate. Stamens mostly 10. Ovary superior, 1-celled. Fruit a legume or indehiscent, often winged.

The family comprises about 152 genera and over 2800 species distributed in tropics and subtropics; 23 genera and 80 species in India; 5 genera nad 13 species in the study area.

Key to the genera

1a. Leaves simple, shallowly or deeply cleft at apex, palmately ribbed ... 1. ***Bauhinia***

1b. Leaves compound, not cleft and palmately ribbed:

2a. Leaves uni-pinnate:

3a. Fertile stamens 10, sometimes 3 sterile; anther basifixed ... 3. *Cassia*

3b. Fertile stamens 3, others sterile; anther versatile .... 5. *Tamarindus*

2b. Leaves bi-pinnate:

4a. Plants armed; calyx deeply claft nearly to the base .... 2. *Caesalpinia*

4b. Plants unarmed; calyx not claft .... 4. *Delonix*

1. **Bauhinia** Linn.

Linn., Sp. Pl. 374. 1753 & Gen. Pl. ed. 5. 177. 1754.

Shrubs, trees or climbers; tendrils circinate. Leaves simple consisting of two lobes, palmately nerved. Flowers in simple or panicled often corymbose racemes. Calyx 5 teethed or lobed. Petals 5, clawed. Stamens 10 or reduced to 5 or 3. Ovules many; stigma peltate. Pods woody, flattened. Seeds compressed.

About 200 species ditributed in tropical regions; 2 species in the study area.

Key to the species

1a. Woody climbers; flowers small; pods 1-2 seeded .... 1. ***B. scandens***

1b. Trees; flowers large; pods 10-15 seeded .... 2. ***B. variegata***

1. ***Bauhinia scandens*** Linn. var. *horsfieldii* (Miq.) Ohashi in Hara *et al.*, Enum. Fl. Pl. Nep. 2: 108. 1979; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 393. 1996. *B. anguina* Roxb., Pl. Corom. 3: 82, t. 285. 1819; Baker in Hook. f., Fl. Brit. Ind. 2: 284. 1878; Kanjilal *et al.*, Fl. Assam 2: 147. 1938. "Sitajakhola".

Large woody twisted climbing shrub. Leaves *ca* 4-12 x 3-10 cm, ovate, deeply lobed, acuminate, cordate at base. Flowers white, small, in terminal panicled racemes, bracteate. Calyx 5 lobed. Corolla hairy. Staminodes 3. Pods obliquely oblong, flat, 1-2 seeded.

Fls. & Frts.: November – December.

Occurrence: Common, in the hilly forest and occasionally in the plain forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Sikkim, Western Himalayas, Eastern and Western Peninsula; Bangladesh, Malaysia.

Specimen examined: Burha Mayong; *Bora* 15154 (NEHU).

2. ***Bauhinia variegata*** Linn., Sp. Pl. 375. 1753; Roxb., Hort. Beng. 31. 1814; Baker in Hook. f., Fl. Brit. Ind. 2: 284. 1878; Kanjilal *et al.*, Fl. Assam 2: 141. 1938; Islam, Fl. Majuli 111. 1990; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 394. 1996. **"Kural"**.

Middle sized tree; young shoots tomentose. Leaves as long as broad, subcoriaceous, cordate at base; lobes obtuse or rounded. Flowers large, variegated, white, purple veined, in lateral corymbs. Calyx pubescent, spathaceous. Petals *ca* 4 cm long. Pods *ca* 18 x 2 cm, flat, slightly curved, 10-15 seeded.

Fls. & Frts.: December - August.

Occurrence: Common, in the hilly forest of the sanctuary.

Distribution: North East India, Western Himalayas; China, Myanmar.

Specimen examined: Burha Mayong; *Bora* 15328 (NEHU).

2. *Caesalpinia* Linn.

Linn., Sp. Pl. 380. 1753 & Gen. Pl. ed. 5. 178. 1754.

Shrubs, trees or climbers, usually prickly. Leaves 2 pinnate. Flowers in

lax racemes in the upper axillary or terminal panicles; bracts caducous. Calyx deeply cleft; lobes 5. Petals 5. clawed. Stamens 10, free; filaments villose or glandular at base. Ovary sessile; ovules few; style filiform. Pods prickly or not.

About 60 species widely distributed in tropics; 9 species in India; 2 species in the study area.

Key to the species

1a. Leaflets *ca* 1.5-3.5 x 1-2 cm, puberulous; pods prickly ... 1. **C. bonduc**

1b. Leaflets *ca* 3.5-8.5 x 1.8-4.0 cm, glabrous; pods winged ... 2. *C. cucullata*

1. *Caesalpinia bonduc* (Linn.) Roxb., Fl. Ind. 2: 362. 1824; Islam, Fl. Majuli 112. 1990; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 395. 1996. *C. bonducella* (Linn.) Flem. in As. Res. 11: 159. 1810; Baker in Hook. f., Fl. Brit. Ind. 2: 254. 1878; Kanjilal *et al.*, Fl. Assam 2: 120. 1938. "Letagoti gach".

Scandent prickly shrub. Leaf rhachis pubescent; leaflets opposite, *ca* 1.5-3.5 x 1-2 cm, oblong or elliptic, mucronate, puberulous. Flowers yellow, *ca* 1 cm long, in dense axillary peduncled racemes; bracts linear-lanceolate. Calyx tomentose. Petals *ca* 0.6 cm long. Pods *ca* 4-6 x 2.5-4.0 cm, oblong-elliptic, prickly.

Fls. & Frts.: August - January.

Occurrence: Common, along roadside of the area.

Distribution: Throughout India; Pantropic.

Specimen examined: Burha Mayong, Thengbhanga; *Bora* 15230 (NEHU).

2. *Caesalpinia cucullata* Roxb., Fl. Ind. 2: 358. 1832; Hattink in Reinwardtia 9: 22. 1974; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 395. 1996. *Mezoneurun cucullatum* (Roxb.) Wight & Arn., Prodr. 283. 1834; Baker in Benth. & Hook. f., Fl. Brit. Ind. 2: 258. 1878; Kanjilal *et al.*, Fl. Assam 2: 123. 1938.

Straggling shrub; branches dark brown, prickly. Leaflets 3-6 pairs, *ca* 3.5-8.5 x 1.8-4.0 cm, ovate-elliptic, shortly acuminate, shining above. Flowers yellow, in terminal or axillary racemes. Calyx lobes obtuse. Petals yellow. Pods *ca* 7-10 x 2.5-3.5 cm, obliquely oblong, flat, 1 seeded.

Fls. & Frts.: November - June.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Bihar, North East India, Sikkim, South India, West Bengal, Andaman and Nicobar Islands; Bhutan, China, Malaysia, Myanmar, Thailand, Vietnam.

Specimen examined: Burha Mayong; *Bora* 15456 (NEHU).

3. *Cassia* Linn.

Linn., Sp. Pl. 376. 1753 & Gen. Pl. 1: 371. 1865.

Herbs, shrubs or trees. Leaves even pinnate. Flowers in axillary racemes or terminal panicles; bracts and bracteoles various. Calyx lobes 5. Petals 5, subequal. Stamens 10, unequal, somtimes 3 sterile. Ovules many. Fruits terete woody lomentum or flattened pod. Seeds compressed or subtetragonous.

About 450 species distributed in warm regions; 24 species in India; 7 species in the study area.

Key to the species

1a. Trees; leaf rhachis without glands:

2a. Leaflets 4-8 pairs; pods indehiscent .... 1. *C. fistula*

2b. Leaflets 6-12 pairs; pods dehiscent .... 5. *C. siamea*

1b. Herbs or undershrubs; leaf rhachis with glands:

3a. Plants densely hirsute .... 2. *C. hirsuta*

3b. Plants not densely hirsute:

4a. Leaf rhachis with 2 glands between lower pair of leaflets .... 7. *C. tora*

4b. Leaf rhachis with 1 gland at the base:

5a. Leaflets 3-12 pairs; ovate lanceolate or oblong-lanceolate:

6a. Leaflets 3-5 pairs .... 4. *C. occidentalis*

6b. Leaflets 5-12 pairs .... 6. *C. sophera*

5b. Leaflets 30-40 pairs, linear .... 3. *C. mimosoides*

1. *Cassia fistula* Linn., Sp. Pl. 377. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 261. 1876; Kanjilal *et al.*, Fl. Assam 2: 128. 1938; Deb, Fl. Tripura 1: 118. 1981; Islam, Fl. Majuli 113. 1990; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 397. 1996. "Sonaru".

Deciduous small tree. Leaflets 4-8 pairs, opposite, *ca* 7-15 x 5-7 cm, ovate, oblong-laceolate, acuminate, cuneate or rounded at base, shining above. Flowers yellow, *ca* 4 cm long, in axillary drooping racemes. Stamens all fertile. Pods *ca* 25-60 x 1.8-2.3 cm, cylindric, indehiscent, dark brown when ripe. Seeds flat, ovate.

Fls. & Frts.: April - January.

Occurrence: Common, along roadside and forest margins.

Distribution: Central and Eastern Himalayas; China, Malaysia

Specimen examined: Burha Mayong, Haduk; *Bora* 15309 (NEHU).

Uses: Plant used for ornamental purpose.

2. **Cassia hirsuta** Linn., Sp. Pl. 379. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 263. 1878; Kanjilal *et al.*, Fl. Assam 2: 131. 1938; Islam, Fl Majuli 114. 1990; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 399. 1996.

Small hirsute shrub. Leaf rachis with a basal gland; leaflets 3 pairs, ovate-oblong, acuminate, entire, hairy. Flowers yellow, in axillary or terminal racemes. Calyx hirsute. Petals yellow, obtuse, hairy. Stamens 10, 3-4 reduced to staminodes. Pods *ca* 20-35 cm long, cylindric, hairy.

Fls. & Frts.: October - January.

Occurrence: Common, along roadside of the area.

Distribution: A native of Tropical America.

Specimen examined: Burha Mayong; *Bora* 14802 (NEHU).

Uses: Root extract taken in stomach trouble.

3. **Cassia mimosoides** Linn., Sp. Pl. 379. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 266. 1878; Kanjilal *et al.*, Fl. Assam 2: 133. 1938. *C. angustissima* Lamk., Encycl. 1: 650. 1785.

Erect or diffuse herb. Leaflets 30-40 pairs, linear, sessile, obliquely mucronate. Flowers yellow, *ca* 0.5-0.8 cm long, solitary or paired; bracts paired. Calyx *ca* 0.3-0.5 cm long. Petals elliptic obtuse. Stamens alternately long and short. Pods *ca* 2.5-5.0 cm long, flat, hairy.

Fls. & Frts.: April - November.

Occurrence: Common, along marshy places and grassland of the sanctuary.

Distribution: Assam, Himalayas, Kumaon, Meghalaya, Tripura; Malacca, Sri Lanka.

Specimen examined: Haduk; *Bora* 15458 (NEHU).

4. *Cassia occidentalis* Linn., Sp. Pl. 377. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 262. 1878; Kanjilal *et al.*, Fl. Assam 2: 129. 1938; Deb, Fl. Tripura 1: 119. 1981; Islam, Fl. Majuli 115. 1996; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 400. 1996. *C. planisiliqua* Linn., Sp. Pl. 377. 1753. *Senna occidentalis* Roxb., Fl. Ind. 2: 343. 1832.

Erect undershrub. Leaves glandular at base; stipules obliquely cordate; leaflets 3-5 pairs, *ca* 3-7 x 1.6-2.5 cm, ovate or elliptic-lanceolate, acuminate. Flowers orange yellow, in short axillary corymbose racemes. Pods *ca*

8-12 x 0.5-0.6 cm, compressed, slightly recurved, septate, 20-30 seeded.

Fls. & Frts.: April - October.

Occurrence: Common, along roadside of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Himalayas, Tripura; Pantropic.

Specimen examined: Kamarpur; *Bora* 15023 (NEHU).

5. *Cassia siamea* Lamk., Encycl. 1: 648. 1785; Baker in Hook. f., Fl. Brit. Ind. 2: 264. 1878; Deb, Fl. Tripura 1: 119. 1981; Islam, Fl. Majuli 115. 1990. *C. sumatrana* Roxb., Hort. Beng. 31. 1814. *nom. nud.*. *Senna sumatrana* Roxb., Fl. Ind. 2: 343. 1832.

Medium sized tree. Leaves without glands; leaflets 6-14 pairs, *ca* 3-7 x 0.8-3.0 cm, elliptic-oblong, obtuse, apiculate. Flowers yellow, in large terminal panicles of corymbose racemes. Pods 12-20 x 1.2-1.5 cm, flat, posterior end slightly curved.

Fls. & Frts.: June - February.

Occurrence: Common, along roadside of the sanctuary.

Distribution: Native of South East Tropical Asia; introduced into India, China, Malaysia.

Specimen examined: Haduk; *Bora* 15459 (NEHU).

Uses: Planted as avenue tree.

6. *Cassia sophera* Linn., Sp. Pl. 379. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 262. 1878; Kanjilal *et al.*, Fl. Assam 2: 130. 1938; Deb, Fl. Tripura 1: 120. 1981; Islam, Fl. Majuli 115.1990. *Senna sophera* Roxb., Fl. Ind. 2: 347. 1832.

Undershrub. Leaf rhachis with a conical basal gland; leaflets 4-18 pairs, opposite, lanceolate, acute or acuminate, cuneate at base. Flowers yellow, in terminal or axillary corymbose racemes. Pods *ca* 5-10 x 0.5 cm, slightly curved, tranversely septate.

Fls. & Frts.: June - December.

Occurrence: Common, along roadside of the study area.

Distribution: Assam, Tripura, Himalayas; American origin and Pantropic.

Specimen examined: Kamarpur; *Bora* 15088 (NEHU).

7. **Cassia tora** Linn., Sp. Pl. 376. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 263. 1878; Kanjilal *et al.*, Fl. Assam 2: 131. 1938; Deb, Fl. Tripura 1: 120. 1981; Islam, Fl. Majuli 116. 1990. **"Medelua".**

Foetid herb. Leaves rhachis with 2 glands between two lower pairs of leaflets; stipules linear; leaflets 3 pairs, opposite, *ca* 2.5-6.0 x 1.3-3.0 cm, obovate-oblong, obtuse or subulate, unequal at base, pubescent beneath. Flowers yellow, in subsessile pairs, in the leaf axils. Stamens 7 fertile. Pods *ca* 10 cm, obliquely septate.

Fls. & Frts.: July - November.

Occurrence: Common, along roadside and forest floors.

Distribution: Himalayas; Pantropic.

Specimen examined: Haduk; *Bora* 15461 (NEHU).

Uses: Leaf past used in skin diseases.

4. *Delonix* Raf.

Raf. Fl. Tellur. 2: 92. 1836.

3 species distributed in tropical Africa, Madagascar and Asia; 2 species are cultivated in India; one species in the study area.

Delonix regia (Boj.) Raf., Fl. Tellur. 2: 92. 1836; Deb, Fl. Tripura 1: 121. 1981. *Poinciana regia* Boj. in Curtis's Bot. Mag. 1828: 56. t. 288. 1829; Baker in Hook. f., Fl. Brit. Ind. 2: 260. 1878; Kanjilal *et al.*, Fl. Assam 2: 137. 1938.

Medium sized tree; branches spreading. Leaves 2 pinnate; leaflets many, *ca* 0.4-0.8 x 0.1-0.2 cm; stipules small. Flowers reddish yellow, large, in terminal corymbes. Calyx lobes 5, unequal. Petals 5, *ca* 4 cm long, spreading. Stamens 10, free. Ovary subsessile; style filiform; stigma capitate. Pods *ca* 30-40 x 3.5 cm, flat, woody, dehiscent.

Fls. & Frts.: April - September.

Occurrence: Common, along roadside of the area.

Distribution: A native of Madagascar, now extentively cultivated as avenue tree.

Specimen examined: Haduk; *Bora* 15462 (NEHU).

Uses: Planted as avenue tree.

5. *Tamarindus* Linn.

Linn., Sp. Pl. 34. 1753 & Gen. Pl. ed. 5. 21. 1754.

Monotypic genus, widely cultivated.

Tamarindus indica Linn., Sp. Pl. 34. 1753; DC., Prodr. 2: 488. 1825; Baker in Hook.f., Fl. Brit. Ind. 2: 273. 1878; Kanjilal *et al.*, Fl. Assam 2: 135. 1938; Deb, Fl. Tripura 1: 123. 1981; Islam, Fl. Majuli 117. 1990; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 402. 1996. "Teteli".

Large tree; branches spreading. Leaves paripinnate; stipules linear-lanceolate; leaflets 10-20 pairs, small, linear-oblong, obtuse, subsessile. Flowers yellow, in lax few flowered terminal racemes. Calyx tube lanceolate. Petals 3, *ca* 1.5 cm long, yellow streak with red. Stamens 3. Style filiform; stigma capitate. Pods *ca* 7-18 x 1.8-2.2 cm, compressed, linear falcate, indehiscent. Seeds dark brown.

Fls. & Frts.: April - January.

Occurrence: Common, along roadside and forest margins.

Distribution: Throughout India; Probably a native of Tropical Africa and Pantropic.

Specimen examined: Burha Mayong, Haduk; *Bora* 14803 (NEHU).

Uses: Fruits edible and also taken in hypertension.

41. MIMOSACEAE

R. Br. in Flinders, Voy. Terra. Austr. 2: 551. 1814.

Trees or shrubs, rarely herbs. Leaves mostly 2 pinnate. Flowers bisexual, actinomorphic, spicate, racemose or capitate. Calyx tubular, 5 lobed or toothed. Petals valvate. Stamens as many as sepals or more; anthers often with a deciduous gland at apex. Ovary superior, 2-celled. Fruit a legume or

indehiscent.

The family comprises about 56 genera and 2800 species, distributed in tropics and subtropics; 15 genera and 72 species in India; 6 genera and 12 species in the study area.

Key to the genera

1a. Stamens definite:

2a. *Flowers in panicled racemes* .. 2. ***Adenanthera***

2b. Flowers in heads:

3a. Unarmed shrubs or trees; stamens 10 .... 4. ***Leucaena***

3b. Armed undershrubs or shrubs; stamens 4-8 .... 5. ***Mimosa***

1b. Stamens indefinite:

4a. Plants armed with spines or prickles; stamens free .... 1. ***Acacia***

4b. Plants unarmed; stamens monadelphous:

5a. Pods dehiscent, not septate between seeds .... 3. ***Albizia***

5b. Pods indehiscent, septate between seeds .... 6. ***Samanea***

1. Acacia Mill.

Mill. Gard. Dict. ed. 4. 1: 1754.

Spinous or prickly shrubs, trees or climbers. Leaves 2 pinnate; petiolar glands often present. Flowers in cylindric spikes or globose heads; bracts 2.

Calyx campanulate, 4-5 toothed. Petals 4-5, connate below. Stamens indefinite, usually free, exserted. Ovary 2-many ovuled; style filiform; stigma capitate. Pod compressed.

About 500 species distributed in tropics and subtropics of Africa and Australia; 25 species in India; 4 species in the study area.

Key to the species

1a. Erect shrubs; flowers in axillary fascicled heads .... 2. *A. farnesiana*

1b. Straggling or climbing shrubs; flowers in panicled heads:

2a. Flowers pinckish white .... 4. *A. rugata*

2b. Flowers creamy white:

3a. Leaflets sharply acute; base rounded or subternate .... 1. *A. caesia*

3b. Leaflets obliquely mucronate; base truncate .... 3. *A. gagaena*

(L.) Willd.

1. Acacia caesia var. *subnuda* (Craib) Nielson in Adansonia 2, 19: 348. 1980; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 403. 1996. *A. oxyphylla* var. *subnuda* Craib, Fl. Siam. Eum. 1: 550. 1928. *A. oxyphylla* Grah. ex Benth. in London J. Bot. 1: 514. 1842; Kanjilal *et al.*, Fl. Assam 2: 157. 1938. *A. intsia* var. *oxyphylla* (Grah. ex Benth.) Baker in Hook. f., Fl. Brit. Ind. 2: 297. 1878.

Woody prickly climber. Leaflets 40-50, *ca* 0.5-1.0 x 0.2-0.3 cm, obliquely oblong, shraply acute, rounded or subtruncate at base. Flowers white, in globose heads arranged in terminal panicles. Pods *ca* 18.0 x 2.8 cm,

compressed, dark brown.

Fls. & Frts.: August - February.

Occurrence: Common, in the hilly forest and occasionally in the plain forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Eastern and Western Peninsula, Tropical Himalayas; Sri Lanka.

Specimen examined: Dhekiabari, Hiloikhunda; *Bora* 15122 (NEHU).

2. *Acacia farnesiana* (Linn.) Willd., Sp. Pl. 4: 1083. 1905; Baker in Hook. f., Fl. Brit. Ind. 2: 292. 1878; Kanjilal *et al.*, Fl. Assam 2: 154. 1938; Deb, Fl. Tripura 1: 127. 1981; Islam, Fl. Majuli 119. 1990; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 404. 1990. *Mimosa farnesiana* Linn., Sp. Pl. 521. 1753. "Taruakadom".

Thorny shrub; spines stipular straight. Pinnae 4-8 pairs; pinnules 10-20 on each pinna, *ca* 0.4-6.0 x 0.1 cm, linear-oblong, acute, oblique at base, sessile. Flowers yellow, fragrant, in axillary fascicled globose heads. Pods *ca* 3-8 x 0.8-1.2 cm, cylindric, tip hooked.

Fls. & Frts.: September - March.

Occurrence: Occasionally, along roadside and inside the forest of the sanctuary.

Distribution: Himalayas; A native of Tropical America and Pantropic.

Specimen examined: Burha Mayong, Haduk; *Bora* 15113 (NEHU).

Uses: Root paste used in skin diseases and bark juice taken in stomach trouble.

3. *Acacia gageana* Craib. Kew Bull. 409. 1915; Kanjilal *et al.*, Fl. Assam 2: 157. 1938.

Prickly cimber. Pinnea 7-14 pairs; pinnules 20-30 pairs, *ca* 0.7 x 0.1 cm, oblong, obliquely mucronate, truncate at base, hairy on nerves beneath. Flowers creamy white, in panicled heads. Pods *ca* 5-12 x 1.8-2.2 cm.

Fls. & Frts.: September - January.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Assam.

Specimen examined: Dhekiabari; *Bora* 15217 (NEHU).

Notes: Probably confined to Assam.

4. *Acacia rugata* (Lamk.) Voigt, Hort. Suberb. Calcut. 263. 1845; Ohashi in Hara *et al.* Enum. Fl. Pl. Nep. 2: 104. 1979; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 406. 1996. *Mimosa rugata* Lamk., Encycl. 1: 20. 1783. *M. concinna* Willd., Sp. Pl. 4: 1039. 1806. *Acacia concinna* (Willd.) DC., Prodr. 2: 464. 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 296. 1878; Kanjilal *et al.*, Fl. Assam 2: 159. 1938. "Kuchiakata".

Large prickly straggling shrub. Leaflets 20-30, *ca* 1.3 x 0.4 cm, linear-oblong, unequal at base, subsessile. Flowers pinkish white, in globose panicled heads. Calyx *ca* 0.2 cm long, funnel shaped. Corolla *ca* 0.3-0.5 cm long. Pods *ca* 8-12.0 x 1.2 cm, fleshy, 6-10 seeded.

Fls. & Frts.: August - January.

Occurrence: Common, in the hilly forest and occasionally in the plain

forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Western and Eastern Peninsula;South China, Malaya, Sri Lanka.

Specimen examined: Burha Mayong; *Bora* 15102 (NEHU).

2. *Adenanthera* Linn.

Linn., Sp. Pl. 384. 1753 & Gen. Pl. ed. 5. 181. 1754.

4 species distributed in tropical Asia; one species in India and collected from the study area.

Adenanthera pavonina Linn., Sp. Pl. 384. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 287. 1878; Kanjilal *et al.*, Fl. Assam 2: 150. 1938; Deb, Fl. Tripura 1: 128. 1981. "Chandan".

Medium sized deciduous tree. Pinnae 3-6 pairs; pinnules alternate, ovate-oblong, slightly unequal at base, puberulous beneath. Flowers yellow, in axillary or terminal panicles. Sepals 5, connate, pubescent outside. Petals 5, lanceolate, connate bellow. Stamens 10, free; anther tip glanded. Ovary sessile; style filiform. Pods *ca* 15.0 x 1.2 cm, flat, curved. Seeds bright red.

Fls. & Frts.: April - September.

Occurrence: Rare, towards Sanaka in the hilly forest of the sanctuary.

Distribution: Probably Indian origin, now Pantropic.

Specimen examined: Sanaka: *Bora* 15463 (NEHU).

3. *Albizia* Durazz.

Durazz. in Mag. Toscan 3(4): 11. 1772.

Unarmed shrubs or trees. Leaves 2-pinnate. Flowers in globose heads, sessile or pedicellate; bracts 2 or absent. Calyx campanulate, 5 toothed. Corolla funnel shaped, 5 lobed. Stamens many, exserted, connate at base. Ovary sessile or shortly stipitate; style filiform, stigma capitate. Pods strap shaped, flat, dehiscent. Seeds compressed.

About 50 species distributed in Africa, Asia, Australia and America; 14 species in India; 3 species in the study area.

Key to the species

1a. Leaflets 2-3 pairs, *ca* 5-14 x 2.0-2.5 cm .... 1. *A. lucidior*

1b. Leaflets more than 3 pairs, size less than above:

2a. Leaflets 6-24 pairs, *ca* 1-2 x 0.4-0.6 cm; calyx pubescent .... 2. *A. odoratissima*

2b. Leaflets 4-16 pairs, *ca* 2-5 x 0.8-1.5 cm; calyx glabrous .... 3. *A. procera*

1. ***Albizia lucidior*** (Steud.) Nielson in Adansonia 19: 222. 1979; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 409. 1996. *A. lucida* (Roxb.) Benth. in Hook. f., London J. Bot. 3: 86. 1844; Baker in Hook. f., Fl. Brit. Ind. 2: 299. 1878; Kanjilal *et al.*, Fl. Assam 2: 162. 1938. "Moj".

Evergreen tree. Leaf rhachis with a lage basal cupshaped gland; leaflets 2-3 pairs, *ca* 5-14 x 2.0-2.5 cm, oblong-lanceolate, acuminate, oblique at

base. Flowers creamy white, in heads in corymbose on terminal panicles. Calyx teeths short. Corolla lanceolate, puberulous. Pods *ca* 18 x 2 cm, thin, brown, shining, 6-8 seeded.

Fls. & Frts.: April - January.

Occurrence: Common, along roadside and forest margins.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Tripur; Myanmar, Thailand, West China.

Specimen examined: Burha Mayong, Haduk; *Bora* 15157 (NEHU).

Uses: Timber used for making agricultural and weaving implements.

2. **Albizia odoratissima** (Linn.) Benth. in Hook. f., London J. Bot. 3: 88. 1844; Baker in Hook. f., Fl. Brit. Ind. 2: 299. 1878; Kanjilal *et al.*, Fl. Assam 2: 164. 1938; Haridasan & Rao, For. Fl. Meghalaya 1: 336. 1985; Chowdhery *et al* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 410. 1996. *Mimosa odoratissima* Linn. f. Suppl. Pl. 437. 1781. "Hiharu".

Deciduous tree; branches spreading. Leaf rhachis with a basal gland, stipulate; pinnea 2-5 pairs; leaflets 6-24 pairs, *ca* 1-2 x 0.4-0.6 cm, elliptic or obliquely oblong. Flowers pale yellow, sessile in solitary or panicled heads. Calyx pubescent. Corolla hairy outside. Pods *ca* 8-18 x 1.3 2.5 cm, thin, reddish brown, 8-12 seeded.

Fls. & Frts.: April - August.

Occurrence: Common, throughout the study area.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Central Himalayas; Malacca, Sri Lanka.

Specimen examined: Burha Mayong; *Bora* 15464 (NEHU).

3

2. *Albizia procera* (Roxb.) Benth. in Hook. f., London J. Bot. 3: 89. 1844; Baker in Hook. f., Fl. Brit. Ind. 2: 299. 1878; Kanjilal *et al.*, Fl. Assam 2: 163. 1938; Deb, Fl. Tripura 1: 131. 1981; Chowdhery *et al.* in Materials for the Fl Arunachal Prad. (eds. Hajra *et al.*) 1: 410. 1996. *Mimosa procera* Roxb., Pl. Corom. 2: 12. t. 121. 1798. "Korai".

Large, tall deciduous tree; bark light brownish. Leaf rhachis with a large basal gland; leaflets 4-16 pairs, *ca* 2-4 x 0.8-1.5 cm, obliquely oblong, obtuse, appressed pubescent beneath. Flowers pale yellow, sessile in heads in large lax terminal panicles. Calyx small, tubular, teeths acute. Corolla lobes lanceolate, pubescent outside. Pods *ca* 4-15 x 1.0-2.5 cm, reddish brown, shortly stalked, 8-12 seeded.

Fls. & Frts.: August - December.

Occurrence: Dominant mostly in the plain forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Central and Eastern Himalayas, Western Peninsula; China, Malaya, Philippines.

Specimen examined: Haduk; *Bora* 15338 (NEHU).

Uses: Timber used for various construction works.

4. *Leucaena* Benth.

Benth. in Hook. f., J. Bot. 4: 416. 1842.

About 20 species distributed in Tropical America and Pacific Islands; 8 species in India; one species in the study area.

Leucaena leucocephala (Lamk.) de Wit in Taxon 10(2): 54. 1961; Deb, Fl. Tripura 1: 133. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal

Prad. (eds. Hajra *et al.*) 1: 376. 1996. *Mimosa leucocephala* Lamk., Encycl. Meth. Bot. 1: 12. 1783. *Leucaena glauca* Benth. in Hook. f., Fl. Brit. Ind. 2: 290. 1878.

Small tree. Pinnae 4-8 pairs; leaflets 10-16 pairs, oblong, acute, sessile. Flowers white, in globose heads. Calyx campanulate, 5 toothed, hairy. Petals 5, *ca* 1 cm long, free, spathulate, hairy. Stamens 10, exserted. Style filiform. Pods *ca* 15-20 x 1.5-2.0 cm, strap shaped, many seeded. Seeds ovate, compressed.

Fls. & Frts.: July - January.

Occurrence: Occasionally, along roadside of the area.

Distribution: Throughout India; Pantropic.

Specimen examined: Burha Mayong, Haduk; *Bora* 15022 (NEHU).

5. *Mimosa* Linn.

Linn., Sp. Pl. 516. 1753 & Gen. Pl. ed. 5. 233. 1754.

Herbs, shrubs or trees with or without prickles. Leaflets small, often sensitive, ligulate, caducous. Flowers in globose heads or cylindric spikes, mostly tetramerous. Calyx campanulate, 4 toothed. Petals 4, connate below. Stamens as or twice the number of petals, exserted. Ovary stipitate; ovules 2-many; style filiform. Pods flat, jointed.

About 400 species distributed in Africa, America and Asia; 8 species in India; 2 species in the study area.

Key to the species

1a. Undershrub; pinnae digitately arranged .... 1. *M. pudica*

1b. Straggling shrub; pinnae pinnately arranged .... 2. *M. rubicaulis*

1. *Mimosa pudica* Linn., Sp. Pl. 518. 1753; Baker in Hook. f., Fl. Brit. Ind. 2: 291. 1878; Kanjilal *et al.*, Fl. Assam 2: 152. 1938; Islam, Fl. Majuli 121. 1990; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 411. 1996. "Lajuki bon".

Spreading, prickly undershrub. Pinnae 4, digitately arranged, sensitive; pinnules 12-20 pairs, *ca* 0.5 x 0.1 cm, obliquely narrow oblong; stipules *ca* 0.5-0.7 cm long, linear-lanceolate, acuminate. Flowers pinkish purple, in axillary peduncled globular heads. Stamens 4. Pods *ca* 1.2-2.5 cm long, prickly, 3-4 jointed.

Fls. & Frts.: July - December.

Occurrence: Common, in grassland, open places and along roadside of the sanctuary.

Distribution: Hotter parts of India; Pantropic, originally from Tropical America.

Specimen examined: Haduk, Naltoli; *Bora* 15465 (NEHU).

Uses: Leaf past applied in skin diseases.

2. *Mimosa rubicaulis* Lamk. subsp. *himalayana* (Gamble) Ohasi in EFPN 2: 216. 1979; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 411. 1996. *M. rubicaulis* Baker in Hook. f., Fl. Brit. Ind. 2:

291. 1878. *M. himalayana* Gamble in Kew Bull. 1920: 4. 1920; Kanjilal *et al.*, Fl. Assam 2: 151. 1938.

Straggling prickly shrub; branches ribbed, reddish. Pinnae 8-12 pairs; pinnules *ca* 0.4-0.8 x 1.0-0.3 cm, obliquely oblong, obtuse, mucronate; stipules linear. Flowers pinkish white, in fascicled heads on terminal panicles. Calyx campanulate. Corolla tubular. Stamens 8. Pods *ca* 6-10 x 1.0-1.2 cm, falcate, oblong, slightly curved, jointed, tip tailed, blackish brown.

Fls. & Frts.: July - January.

Occurrence: Common, in the hilly forest and occasionally in the plain forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Tripura, Western Himalayas; Afganistan, Bhutan.

Specimen examined: Burha Mayong, Thengbhanga; *Bora* 15467 (NEHU).

7. *Samanea* Merr.

(Benth.) Merr. in Philip. J. Sci. Bot. 12: 235. 1917.

About 30 species distributed from Mexico to Tropical South America and Tropical Africa; one species in the study area.

Samanea saman (Jacq.) Merr. in J. Wash. Acad. Sci. 6: 47. 1916; Deb, Fl. Tripura 1: 137. 1981; 1990. *Mimosa saman* Jacq., Fragm 15. t. 8. 1800. *Inga saman* Willd., Sp. Pl. 4: 1024. 1806. *Pithecolobium saman* Benth. in Hook. f., Lond. J. Bot. 3: 216. 1844. *Enterolobium saman* (Jacq.) Prain. ex King in J. Asiat. Soc. Beng. 66(2): 252. 1897; Kanjilal *et al.*, Fl. Assam 2: 175. 1938.

Large evergreen tree; branches spreading; bark blackish, rough. Pinnae 2-10 pairs; pinnules *ca* 2-5 x 1-3 cm, ovate-oblong, obtuse, pubescent beneath, shining above. Flowers pinkish, in solitary globose heads. Calyx tomentose. Corolla tube *ca* 1 cm long. Stamens 20, connate below. Pods *ca* 12-20 x 0.5 cm, flat, indehiscent.

Fls. & Frts.: April - December.

Occurrence: Common, along roadside and forest campus.

Distribution: Throughout India; Pantropic.

Specimen examined: Haduk; *Bora* 15466 (NEHU).

Uses: Planted as avenue tree.

42. ROSACEAE

A. L. de Juss., Gen. Pl. 334. 1789.

Trees, shrubs or herbs. Leaves stipulate. Flowers mostly bisexual and actinomorphic. Calyx mostly 5 lobed. Petals as many as calyx lobes, free. Stamens many, rarely definite, usually free. Carpels 1-many. Ovary superior or inferior. Fruits achenes, follicles or drupes rarely capsules.

The family comprises about 100 genera and 2000 species, cosmopolitan in distribution; 30 genera and about 215 species in India; 3 genera and 4 species in the study area.

Key to the genera

1a. Herbs, not prickly .... 1. *Potentilla*

1b. Shrubs or trees, prickly:

2a. Ovary inferior; calyx enclosing the ripe carpels .... 2. *Rosa*

2b. Ovary superior; calyx not enclosing the ripe carpels .... 3. *Rubus*

1. *Potentilla* Linn.

Linn., Syst. ed. 1. 1735 & Gen. ed. 1. 147. 1737.

About 500 species cosmopolitan in distribution; 40 species in India; one species in the study area.

Potentilla indica (Andr.) Wolf. in Asch. & Graebn., Syn. Mitt. Eur. Fl. 6(1): 661. 1904; *Fragaria indica* Andr. Bot. Rep. 7. t. 479; Hook. f., Fl. Brit. Ind. 2: 343. 1878; Kanjilal *et al.*, Fl. Assam 2: 203. 1938.

Prostrate pubescent herb. Leaflets 3, *ca* 1-3 x 0.8-1.3 cm, obovate, crenate; stipules foliaceous. Flowers yellow, solitary on long axillary peduncles. Calyx *ca* 0.4 cm long, hairy. Petals *ca* 0.5 cm long. Stamens in 3 series. Fruits globose, oblong, bright red, spongy, fleshy.

Fls. & Frts.: August - December.

Occurrence: Common, in moist shady forest floors.

Distribution: Assam, Meghalaya, South India, Temperate and subtropical Himalayas; Afghanistan, Japan.

Specimen examined: Haduk; *Bora* 14745 (NEHU).

Uses: Fruits edible.

2. *Rosa* Linn.

Linn., Sp. PL. 491. 1753 & Gen. Pl. ed. 5. 217. 1754.

About 100 species distributed in temperate regions of Northern hemisphere; 10 species in India; one species in the study area.

Rosa involucrata Roxb., Hort. Beng. 38. 1814; Hook. f., Fl. Brit. Ind. 2: 365. 1879.

Scandent prickly shrub. Leaves alternate, pinnately compound; leaflets 7-9, *ca* 0.6-4.2 x 0.3-1.5 cm, elliptic-lanceolate, acute, serrate, tomentose beneath. Flowers white, solitary on terminal corymbs. Sepals silky beneath. Petals *ca* 2.8 cm long, 2 lobed at apex. Stamens *ca* 1.2 cm long. Fruits globose, tomentose.

Fls. & Frts.: February - August.

Occurrence: Occasionally, along roadside of the area.

Distribution: Assam, Bihar, Orissa, Uttar Pradesh; Myanmar.

Specimen examined: Hiloikhunda; *Bora* 15190 (NEHU).

3. *Rubus* Linn.

Linn., Sp. Pl. 492. 1753 & Gen. Pl. ed. 5. 218. 1754.

Shrubs, often prickly. Leaves simple or compound. Flowers solitay or in panicled racemes. Calyx 5 lobed. Petals 5. Stamens many. Carpels many; style filiform. Fruits an aggregate of fleshy drupelets.

About 250 species widely distributed in the world; about 50 species in

India; 2 species in the study area.

Key to the species

1a. Leaves ovate or suborbicular, lobed; carpels glabrous; fruits succulent .... 1. *R. alceifolius*

1b. Leaves ovate-lanceolate, not lobed; carpels hairy; fruits not succulent .... 2. *R. assamensis*

1. ***Rubus alceifolius*** Poir., Encycl. Meth. Bot. 6: 247. 1804; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 435. 1996. *R. molucanus auct. non.* Linn. 1753; Hook. f., Fl. Brit. Ind. 2: 330. 1878; Kanjilal *et al.*, Fl. Assam 2: 194. 1938.

Subscandent prickly shrub. Leaves *ca* 4-14 cm long, ovate or suborbicular, lobed or angled, obtuse, serrate, pubescent beneath; stipules lobed. Flowers white, *ca* 1.5 cm long in few flowered axillary or terminal pubescent racemes. Calyx lobes ovate-lanceolate, silky outside. Fruits globose scarlet, succulent.

Fls. & Frts.: May - November.

Occurrence: Occasionally, in the hilly forest.

Distribution: Throughout India; **Australia, Malaysia.**

Specimen examined: Sanaka; *Bora* 15467 (NEHU).

2. ***Rubus assamensis*** Focke in Bromen, Add. Nat. Ver. 4: 197. 1874; Hook. f., Fl. Brit. Ind. 2: 328. 1878; Kanjilal *et al.*, Fl. Assam 2: 192. 1938; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 435. 1996. Fig. 22



Fig. 22: ***Rubus assamensis*** Focke (Rosaceae)

Prickly climbing shrub. Leaves *ca* 3.5-10 x 1.8-5.0 cm, oblong-ovate to ovate-lanceolate, subacute, truncate, pubescent beneath. Flowers yellowish white, *ca* 1.3 cm long in axillary or terminal panicles. Calyx silky outside; lobes acuminate. Carpels hairy. Fruits globose.

Fls. & Frts.: May - September.

Occurrence: Rare, in the hilly forest of the area.

Distribution: Arunachal Pradesh, Assam, Meghalaya.

Specimen examined: Sanaka; *Bora* 15395 (NEHU).

Notes: Confined to North-east India.

43. CRASSULACEAE

DC. in Lamk. and DC., Fl. Franc. edn. 3, 4(1): 382. 1805.

Herbs or undershrubs, usually succulent. Leaves exstipulate. Flowers bisexual, actinomorphic, usually cymose. Sepals 4-5. Petals as many as sepals, hypogynous. Stamens as many or twice as many as petals, free. Carpels superior, as many as petals, free or united below, 1-celled. Fruit follicular, membranous or leathery.

The family comprises about 35 genera and 1500 species, cosmopolitan in distribution; 6 genera and 69 species in India; one species in the study area.

Kalanchoe Adans.

Adans., Fam. 2: 248. 1763.

About 200 species distributed in tropics of South Africa to China and Java; 10 species in India; one species in the study area.

Kalanchoe pinnata (Lamk.) Pers., Syn. 1: 446. 1805; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 458. 1996. *Bryophyllum calycinum* Salisb. Parad. Lond. t. 3. 1865; Clarke in Hook. f., Fl. Brit. Ind. 2: 413. 1878. *B. pinnatatum* Kurz. in J. Asiat. Soc. pt. 2. 309. 1876. "Dupar tenga, pate gaja".

Succulent herb. Leaves ovate or elliptic, crenate. Flowers purplish, in long panicles. Calyx greenish with purple tinge. Corolla reddish purple in upper half; lobes triangular. Stamens 8, 2-seriate. Carpels 4. Follicles 4 membranous.

Fls. & Frts.: November - March.

Occurrence: Occasionally, on rocky slopes in the hilly forest of the sanctuary.

Distribution: Tropical plains of India; Tropical regions.

Specimen examined: Hiloikhunda; *Bora* 15348 (NEHU).

Uses: Leaf decoction taken in gastric trouble and leaf past applied in insect bite.

44. COMBRETACEAE

R. Br., Prodr. 351. 1810.

Trees or shrubs, often scandent. Leaves alternate or opposite. Flowers mostly bisexual, bracteate, spicate, racemose or paniculate. Calyx tube adnate to the ovary; limbs 4-8 fid or lobed. Petals 4-5 or absent. Stamens usually 4-

10. Ovary inferior, 1-celled. Fruit leathery, drupaceous, usually winged.

The family comprises about 19 genera and 600 species, distributed in tropical and subtropical regions; 3 genera and 6 species in the study area.

Key to the genera

1a. Woody climbers or scandent shrubs; petals present:

2a. Calyx tube long above the ovary; petals large .... 2. *Quisqualis*

2b. Calyx tube short above the ovary; petals small .... 1. *Combretum*

1b. Trees; petals absent .... 3. *Terminalia*

1. *Combretum* Loefl.

Loefl., Iter Hispan. Append. 308. 1758, *nom. cons.*

Woody climbers or dwarf shrubs. Inflorescence spicate, simple or panicled. Flowers polygamo-dioecious. Calyx limb 4-5 lobed. Stamens twice as many as petals. Disk intrastaminal. Fruits 4-5 angled or winged, 1 seeded.

About 250 species distributed throughout the tropics; 10 species in India; 2 species in from the study area.

Key to the species

1a. Flowers pale yellow; fruits ridged .... 1. *C. acuminatum*

1b. Flowers greenish white; fruits winged .... 2. *C. alatum*

1. *Combretum acuminatum* Roxb., Fl. Ind. 2: 228. 1832; Clarke in Hook. f., Fl. Brit. Ind. 2: 455. 1878; Kanjilal *et al.*, Fl. Assam 2: 255. 1938; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 464. 1996. Fig. 23

Woody climber. Leaves ovate-lanceolate, acuminate, glandular, punctate beneath. Flowers pale yellow, in axillary and terminal panicled racemes. Fruits ellipsoid, narrow at both ends, ridged.

Fls. & Frts.: March - July.

Occurrence: Occasionally, along foot hill of the area.

Distribution: Arunachal Pradesh, Assam, Madras Peninsula; Malaysia, Philippines.

Specimen examined: Hiloikhunda; *Bora* 15183 (NEHU).

C. album

2. Combretum alatum Pers., Syn. Pl. 411. 1805; Gang & Chakrab. in J. Eco. Tax. Bot. 14(1): 223. 1990; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 464. 1996. *C. decandrum* Roxb., Pl. Corom. 1: t. 59. 1795; Clarke in Hook. f., Fl. Brit. Ind. 2: 452. 1878; Kanjilal *et al.*, Fl. Assam 2: 250. 1938. "Dhunashali lota". Fig. 24

Woody climber; bark reddish brown. Leaves oblong-obovate or ovate-lanceolate, acuminate. Flowers greenish white, *ca* 0.4 cm long in terminal dense panicled spikes. Petals inserted between the calyx lobes. Fruits winged, 1 seeded.

Fls. & Frts.: December - April.

Occurrence: Common, throughout the area.

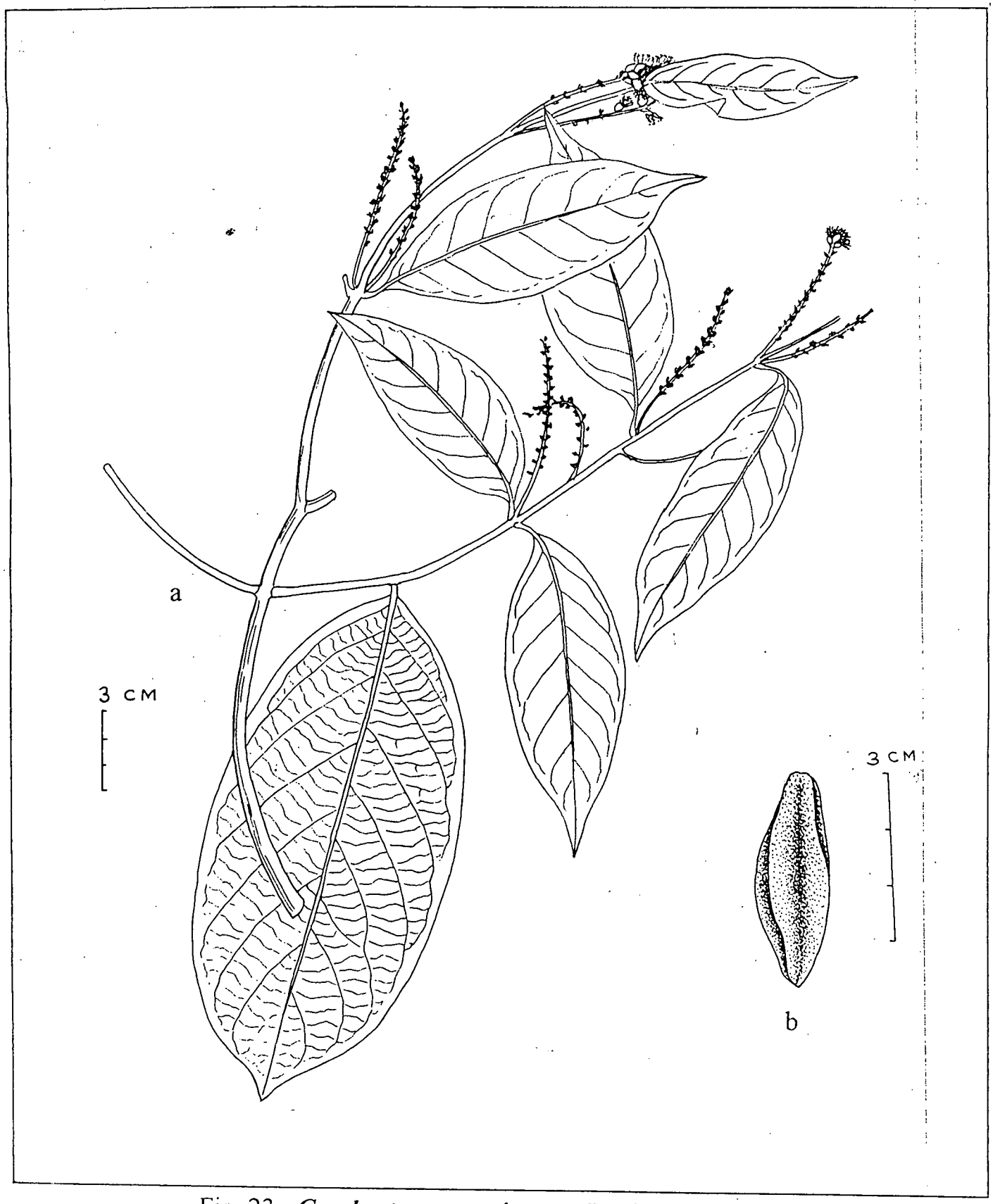


Fig. 23: ***Combretum acuminatum*** Roxb. (Combretaceae)
(a) Flowering twig, (b) Fruit.

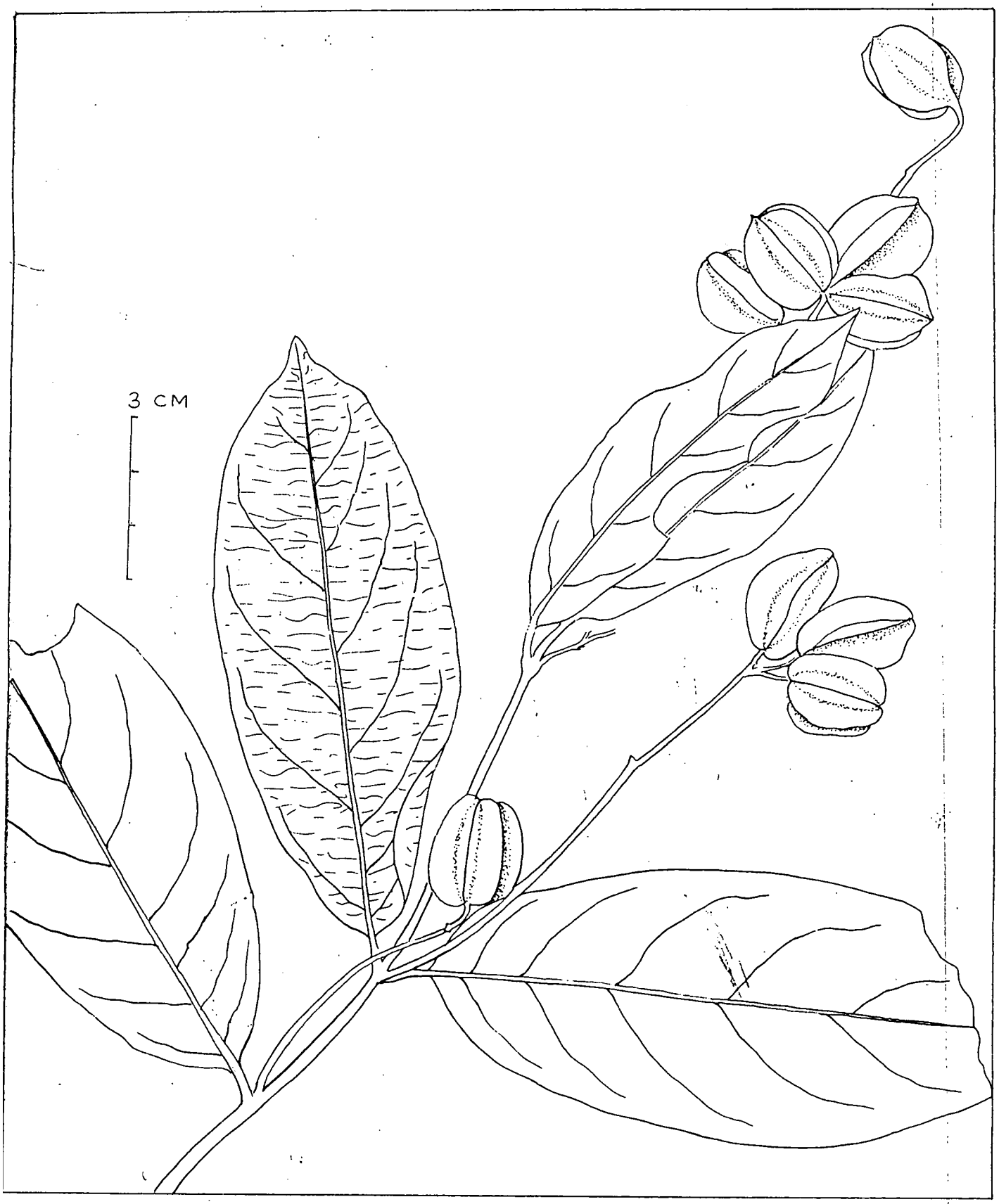


Fig. 24: ***Combretum alatum*** Pers. (Combretaceae)

Distribution: Arunachal Pradesh, Andamans, Assam, Punjub, West Bengal; Tropics of America, Africa, Asia.

Specimen examined: Rangamati; *Bora* 15073 (NEHU).

2. *Quisqualis* Linn.

Linn., Sp. Pl. ed. 2. 1:556. 1762.

17 speciec distributed in Tropical South Africa and Tropical Asia; 2 species in India; one species in the study area.

Quisqualis indica Linn., Sp. Pl. ed 2. 1: 556. 1762; Clarke in Hook. f., Fl. Brit. Ind. 2: 459. 1878; Kanjilal *et al.*, Fl. Assam 2: 256. 1938; Islam, Fl. Majuli 128. 1990; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 466. 1996.

Woody climbing shrub. Leaves opposite, oblong-lanceolate to ovate-elliptic, acuminate, pubescent. Flowers pinkish white, fragrant, in axillary and terminal drooping spikes; bracts leafy. Calyx lobes 5, ovate-acute; tube long. Petals 5, *ca* 2 cm long. Stamens 5+5. Fruits ovate-elliptic, coriaceous, shortly 5 winged.

Fls. & Frts.: March - August.

Occurrence: Occasionally, along forest margins in the plain forest of the sanctuary.

Distribution: Throughout India; Tropical countries.

Specimen examined: Haduk; 14871 (NEHU).

Uses: Plant used for ornamental purpose.

3. *Terminalia* Linn.

Linn., Syst. Nat. ed. 12. 2: 674. 1767.

Trees. Leaves usually glandular on petioles or midrib beneath. Inflorescence spicate, simple or branched. Flowers bisexual, bracteate. Petals absent. Stamens 10, exserted. Disk intrastraminal. Fruits angular, entire or winged.

About 250 species distributed in Indo-Malayan region and tropics; 12 species in India; 3 species in the study area.

Key to the species

1a. Leaves clustered at the end of branches; spikes simple fruits smooth .... 2. *T. bellirica*

1b. Leaves not clustered; spikes panicled; fruits winged or ridged:

2a. Leaf apics obtuse or rounded; fruits 5 winged .... 1. *T. arjuna*

2b. Leaf apics acute or shotly acuminate; fruits faintly 5 riged .... 3. *T. chebula*

T. arjuna

1. *Terminalia arjuna* (Roxb. ex DC.) Wight & Arn., Prodr. 314. 1834; Clarke in Hook. f., Fl. Brit. Ind. 2: 447. 1878; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 466. 1996. *Pentaptera arjuna* Roxb., Hort. Beng. 34. 1814, *nom. nud. T. glabra* Wight & Arn., Prodr. 314. 1834. "Arjun".

Tree. Leaves sub-opposite, *ca* 7.5-14.5 x 3-9 cm, oblong, elliptic-

oblong, coriaceous with 2 glands at base, obtuse or rounded at apex. Flowers yellowish white, in pendulous, axillary and terminal spikes; bracteoles linear. Fruits ovoid or oblong, fibrous, woody, 5 winged.

Fls.: March - May & Frts.: August - February.

Occurrence: Rare, along forest margins.

Distribution: Throughout India; Sri Lanka.

Specimen examined: Haduk; *Bora* 15300 (NEHU).

Uses: Bark extract taken in hypertension.

2. ***Terminalia bellirica*** (Gaertn.) Roxb., Pl. Corom. 2. 54. t. 198. 1798; Clarke in Hook. f., Brit. Ind. 2: 445. 1878; Kanjilal *et al.*, Fl. Assam 2: 243. 1938; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 466. 1996. *Myrobalanus bellirica* Gaertn. Fruct. 2: 9. t. 97. 1790. "Bhumora".

Large deciduous tree. Leaves crowded at the ends of the branches, alterante, *ca* 7.5-23.0 x 4.5-12.0 cm, elliptic or ovate-orbicular, acute, long petiolate. Flowers greenish yellow, foetid in slender interrupted spikes. Calyx villous within. Drupes ovoid or ellipsoid, grey velvety.

Fls.: March - May & Frts.: August - February.

Occurrence: Common, throughout the sanctuary.

Distribution: Throughout India; Malaysia, Myanmar, Nepal, Sri Lanka, Thailand.

Specimen examined: Burha Mayong; *Bora* 15185 (NEHU).

Uses: Fruits edible and powder used as laxative; timber used for various

construction works.

3. *Terminalia chebula* Retz., Obs. 5: 31. 1789; Kanjilal *et al.*, Fl. Assam 2: 244. 1938; Deb, Fl. Tripura 1: 385. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 468. 1996. *Myrobalanus chebula* Gaertn. Fruct. 2: 91. t. 97. 1791. "Silikha".

Deciduous tree. Leaves alternate or subopposite, *ca* 7.0-16.5 x 3.5-9.5 cm, elliptic-oblong or ovate-elliptic, acute, coriaceous; petioles short with 2 glands. Flowers creamy, sessile in terminal panicled cymes. Calyx lobes ovate-deltoid, hairy within. Drupes ovoid-ellipsoid, faintly ridged.

Fls.: April - June. & **Frts.**: November - January.

Occurrence: Occasionally, in the hilly forest.

Distribution: Throughout India; Malaysia, Myanmar, Nepal, Sri Lanka, Vietnam.

Field no.)

Specimen examined: Dhekiabari; *Bora* (NEHU).

Uses: Fruits edible and powder used as purgative; timber used for miscellaneous works.

45. MYRTACEAE

A. L. de Juss., Gen. Pl. 322. 1789.

Shrubs or trees. Leaves usually opposite, pellucid dotted. Flowers bisexual, actinomorphic, cymose, corymbose or rarely solitary. Sepals 4-5. Petals mostly 4-5. Stamens many. Ovary inferior, 1-many celled. Fruit usually a berry or loculicidal capsule.

The family comprises about 100 genera and 3000 species, distributed in tropical regions; 10 genera and 100 species in India; 3 genera and 4 species in the study area.

Key to the genera

1a. Fruits capsule .... 1. *Eucalyptus*

1b. Fruits berry:

2a. Flowers on axillary peduncles; ovary 4-5 celled .... 2. *Psidium*

2b. Flowers in corymbose cymes; ovary 2-celled .... 3. *Syzygium*

1. *Eucalyptus* L' Herit.

L' Herit. Sert. Angl. 18. 1788.

About 500 species mostly Australian; about 80 species cultivated in India; one species in the study area.

Eucalyptus maculata Hook. Ic. Pl. 619. 1844; Kanjilal *et al.*, Fl. Assam 2: 286. 1938; Deb, Fl. Tripura 1: 367. 1981.

Tall tree. Leaves alternate, *ca* 8-15 x 1.5-2.8 cm, linear-lanceolate, falcate. Flowers white, pedicelled, in groups of 3 or more flowered umbels in panicles. Petals united with calyx lobes. Stamens many. Fruits ovoid capsule.

Fls. & Frts.: January - March.

Occurrence: Occasionally, along roadside and forest campus.

Distribution: Throughout India; Australia.

Specimen examined: Haduk; *Bora* 15236 (NEHU).

Uses: Planted as avenue tree.

2. *Psidium* Linn.

Linn., Sp. Pl. 470. 1753 & Gen. Pl. ed. 5. 211. 1754.

About 140 species mainly distributed in tropical America and West Indies; 3 species in India; one species in the study area.

Psidium guajava Linn., Sp. Pl. 470. 1753; Duthie in Hook. f., Fl. Brti. Ind. 2: 468. 1878; Kanjilal *et al.*, Fl. Assam 2: 287. 1938; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 473. 1996. **"Madhuri-am".**

Small tree; young branchlet quadriangular. Leaves opposite, *ca* 5.5-15.5 x 3.6-8.2 cm, elliptic-oblong, entire, acute or obtuse. Flowers white, 1-2 in axillary peduncles. Calyx urceolate. Petals free. Berries globose, ovoid or pyriform, fleshy. Seeds many in sweet pulp.

Fls. & Frts.: April - November.

Occurrence: Common, in the plain forest of the sanctuary.

Distribution: Throughout India; Pantropic, introduced from Tropical America.

Specimen examined: Haduk; *Bora* 15056 (NEHU).

Uses: Fruits edible and tender leaf extract taken to get relieve from vomiting tendency.

3. Syzygium Gaertn.

Gaertn. Fruct. 1: 166. t. 33. 1788, *nom. cons.*

Shrubs or trees. Inflorescence cymes or umbels, usually panicled. Calyx tube turbinate or funnel shaped. Petals 4-5. Stamens many, free. Ovary 2-celled; ovules many in each cell. Fruits berry, crownded with calyx limbs.

About 500 species palaeotropical in distribution; over 50 species in India; 2 species in the study area.

Key to the species

1a. Fruits 1-2 cm in diam. ..... 1. *S. cumini*

1b. Fruits 0.5 cm in diam. ..... 2. *S. fruticosum*

1. ***Syzygium cumini*** (Linn.) Skeels in U.S. Deptt. Agr. Bur. Pl. Ind. Bull. 248: 25. 1912; Haridasan & Rao, For. Fl. Meghalaya 1: 394. 1985; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 474. 1996. *Myrtus cumini* Linn., Sp. Pl. 471. 1753. *Eugenia jambolana* Lamk., Encycl. Meth. Bot. 3: 198. 1789. "Jamuk".

Evergreen tree; bark grey. Leaves *ca* 5-15 x 2.5-7.5 cm, oblong-elliptic to ovate, acuminate or acute, narrowed at base, glabrous. Flowers greenish white, in lateral or terminal trichotomous panicles. Calyx campanulate, 4 lobed. Petals 4, concave, rounded. Berries *ca* 1-2 cm in diam., oblong purple black, 1 seeded.

Fls. & Frts.: March - July.

Occurrence: Common, throughout the sanctuary.

Distribution: Throughout India; China, Malaysia.

Specimen examined: Haduk; *Bora* 15055 (NEHU).

Uses: Fruits edible and timber used for making agricultural implements and other construction purposes.

2. *Syzygium fruticosum* DC., Prodr. 3: 260. 1828; Deb, Fl. Tripura 1: 372. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 475. 1996. *Eugenia fruticosa* Roxb., Fl. Ind. 2: 487. 1832; Duthie in Hook. f., Fl. Brit. Ind. 2: 499. 1878; Kanjilal *et al.*, Fl. Assam 2: 279. 1938. "Kutahi jamuk".

Tree. Leaves *ca* 4-14 x 2-6 cm, elliptic-oblong or oblong-lanceolate, acuminate. Flowers white, small in lateral cymose panicles. Calyx lobes 4. Petals 4, calyptrate. Berries *ca* 0.5 cm in diam., globose or ovoid.

Fls. & Frts.: December - June.

Occurrence: Occasionally, in the sanctuary.

Distribution: Arunachal Pradesh, Assam, Tripura, West Bengal; Bangladesh, China, Myanmar, Thailand, Vietnam.

Specimen examined: Dhekiabari; *Bora* 15238 (NEHU).

46. LECYTHIDACEAE

Poiteau, Mus. Hist. Nat. Paris, 13: 143, tt. 2-8. 1825.

Trees or shrubs. Leaves alternate, exstipulate. Flowers bisexual, actinomorphic or zygomorphic. Calyx 4-6 lobed. Petals 4-6. Stamens many, in several series. Ovary inferior, 2-more celled; placentas axil. Fruit woody,

fibrous or fleshy.

The family comprises about 7 genera and distributed in tropics and subtropics; 3 genera and 8 species in India; 2 genera and 2 species in the study area.

Key to the genera

1a. Racemes drooping; fruits angled .... 1. *Barringtonia*

1b. Racemes erect; fruits globose ..... 2. *Careya*

1. *Barringtonia* Forst.

J.R. et G. Forst., Char. Gen. Pl. 75. t. 38. 1776, *nom. cons.*

About 39 species distributed in East Africa, East and South East Asia, Pacific Islands and Australia; 5 species in India; one species in the study area.

Barringtonia acutangula (Linn.) Gaertn., Fruct. 2: 97, t. 101. 1790; Clarke in Hook. f., Fl. Brit. Ind. 2: 508. 1878; Kanjilal *et al.*, Fl. Assam 2: 289. 1938; Deb, Fl. Tripura 1: 374. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 479. 1996. "Hijal".

Small tree. Leaves crowed near the tip of branches, *ca* 10-15 x 3-6 cm, elliptic, acute, narrowed to base, denticulate. Flowers reddish, in long terminal pendulous racemes. Calyx *ca* 0.3 cm long, 4 lobed, persistent. Petals 4, *ca* 0.6 cm long. Stamens many, *ca* 0.8 cm long; inner whorls reduced to bristle like staminodes. Stigma small. Fruits ovoid, bluntly quadrangular.

Fls. & Frts.: June - October.

Occurrence: Common, along the marshy places in the sanctuary.

Distribution: Throughout India; **Malaya, Tropical Australia.**

Specimen examined: Haduk; *Bora* 14795 (NEHU).

Uses: Young twig used for tooth brushing.

2. Careya Roxb.

Roxb., Pl. Coron. 3: 13. 1811, *nom. cons.*

5 species distributed in South Tropical Asia; one species in India and collected from the study area also.

Careya arborea Roxb., Pl. Corom. 3: 14. t. 218. 1811; Clarke in Hook. f., Fl. Brit. Ind. 2: 511. 1879; Kanjilal *et al.*, Fl. Assam 2: 280. 1938; Deb, Fl. Tripura 1: 375. 1981; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 479. 1996. **"Kum".**

Deciduous tree; bark warty dark grey. Leaves *ca* 10-30 x 5-15 cm, broadly oblanceolate or obovate, shortly acute, crenate dentate. Flowers pinkish white, sessile in short terminal spikes. Calyx campanulate. Petals 4, *ca* 5-7 cm long. Staminal filaments spreading. Berries globose, crownded with persistent calyx segments and style.

Fls. & Frts.: March - August.

Occurrence: Common, throughout the sanctuary.

Distribution: Throughout India; **Thailand, Vietnam.**

Specimen examined: Dhekiabari; *Bora* 15187 (NEHU).

47. LYTHRACEAE

Jaume St. Hilaire, Expos. Fam. 2: 175. 1805.

Herbs or rarely shrubs. Leaves mostly opposite or verticillate. Flowers bisexual, usually actinomorphic, solitary to paniculate. Sepals united into a tube, often appendages between the lobes. Petals present or absent. Stamens usually 4 or 8; filaments variable in length. Ovary superior, 1-6 celled. Fruit usually a capsule.

The family comprises about 25 genera and 550 species, distributed widely; 8 genera and 58 species in India; 4 genera and 5 species in the study area.

Key to the species

1a. Herbs; flowers small:

2a. Stems glabrous:

3a. Capsules unilocular, circumsciss ..... 1. *Ammania*

3b. Capsules 2–4 valved with one valve crownded by the style ..... 4. *Rotala*

2b. Stems glandualr hairy .... 2. *Cuphea*

1b. Trees; flowers large .... 3. *Lagerstroemia*

1. *Ammania* Linn.

Linn., Sp. Pl. 119. 1753 & Gen. Pl. ed. 5. 55. 1754.

About 30 species cosmopolitan in distribution; 18 species in India; one species in the study area.

Ammania multiflora Roxb., Hort. Beng. 11. 1814. nom. et Fl. Ind. 1: 447. 1820; Clarke in Hook. f., Fl. Brit. Ind. 2: 570. 1879; Kanjilal *et al.*, Fl. Assam 2: 316. 1938; Islam, Fl. Majuli 134. 1990.

Erect herb. Leaves *ca* 3-7 x 1-2 cm, opposite, sessile, linear-lanceolate, auriculate at base. Flowers axillary, solitary, 3-many flowered, simple or compound cymes. Calyx campanulate; lobes 4. Petals 4, ovate-suborbicular, *ca* 0.7 cm long. Stamens 4. Capsules red, globose, turgid.

Fls. & Frts.: November - February.

Occurrence: Common, in moist and marshy places of the sanctuary.

Distribution: Throughout India; Australia.

Specimen examined: Tuplung; *Bora* 14702 (NEHU).

2. Cuphea R. Br.

R. Br., Hist. Jamaica. 216. 1756.

About 250 species distributed in America; one species in the study area.

Cuphea carthagensis (Jacq.) Marchride in Publ. Field. Mus. Nat. Hist. Chicago, Bot. ser. 8: 124. 1930; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 496. 1996. *Lythrum carthagensis* Jacq., Strip. Amer. Hist. 148. 1763.

Erect or prostrate herb, glandular hairy. Leaves *ca* 0.8-2.8 cm long elliptic. Flowers pinkish, in axillary or terminal fascicles.

Fls. & Frts.: August - December.

Occurrence: Occasionally, in grassland and along roadside of the sanctuary.

Distribution: Arunachal Pradesh, Assam.

Specimen examined: Haduk; *Bora* 15399 (NEHU).

3. *Lagerstroemia* Linn.

Linn., Syst. ed. 10. 1076.

Shrubs or trees. Flowers in axillary or terminal panicles, 4-9 merous, bi-bracteate and bi-bracteolate. Calyx campanualte or turbinate. Stamens many, unequal. Ovary 3-7 celled; ovules many. Capsules loculicidally 3-7 valved. Seeds winged at apex.

Key to the species

1a. Flowers purple; hypanthium ribbed

.... 2. *L. reginae*

1b. Flowers white; hypanthium not ribbed

.... 1. *L. parviflora*

1. ***Lagerstroemia parviflora*** Roxb., Pl. Corom. 1: 46. t. 66. 1795; Clarke in Hook. f., Fl. Brit. Ind. 2: 575. 1879; Kanjilal *et al.*, Fl. Assam 2: 310. 1938; Haridasan & Rao, For. Fl. Meghalaya 1: 415. 1985; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 497. 1996. "Sidha".

Tall deciduous tree. Leaves *ca* 3-12 x 2-5 cm, opposite, elliptic-oblong or ovate, acute, rounded at base. Flowers white, in axillary and terminal panicles. Calyx 6 teethed, persistent. Petals clawed. Capsules ovoid or ellipsoid with basal woody calyx.

Fls. & Frts.: April - Dedcember.

Occurrence: Common, throughout the sanctuary.

Distribution: Tropical Himalayas, North East India; Myanmar.

Specimen examined: Burha Mayong; *Bora* 15188 (NEHU).

Uses: Timber used for various construction works.

2. *Lagerstroemia raginea* Roxb., Pl. Corom. 1: 46. t. 65. 1795; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 497. 1996. *L. speciosa auct. p.p., non* (Linn.) Pers. *L. flos-reginae* Wall. ex Clarke in Hook. f., Fl. Brit. Ind. 2: 577. 1879. "Ajar".

Deciduous tree. Leaves *ca* 3-18 cm long, opposite, oblong-elliptic or oblong-lanceolate, subacute, coriaceous. Flowers purple, in terminal panicles. Calyx *ca* 1.5 cm long, thicked, ribbed. Petals *ca* 2-4 cm long, clawed, obovate or orbicular, undulate. Capsules woody, ellipsoid or subglobose.

Fls.: April - May & Frts.: October - December.

Occurrence: Common, along water bodies, marshy places and roadside of the sanctuary.

Distribution: Tropical Himalayas; China, Malaysia, Tropical Australia.

Specimen examined: Thengbhanga; *Bora* 15303 (NEHU).

Uses: Plant used for ornamental purpose; timber for making boat and

other construction works.

Notes: Dominant species in the plain forest.

4. *Rotala* Linn.

Linn., Mant. 175. 1771.

About 50 species distributed in tropical and subtropical regions; 14 species in India; one species in the study area.

Rotala rotundifolia (Buch.-Ham.) Koehne in Bot. Jahrb. 1: 175. 1881; Islam, Fl. Majuli 137. 1990. *Ammannia rotundifolia* Buch.-Ham. in Don. Prodr. 220. 1825; Clarke in Hook. f., Fl. Brit. Ind. 2: 566. 1828; Kanjilal *et al.*, Fl. Assam 2: 316. 1936.

Small herb. Leaves opposite, *ca* 0.5-1.5 cm long, elliptic-ovate, rounded, sessile. Flowers pinkish, sessile, in terminal spikes. Calyx tube scarious. Corolla lobes alternating with calyx lobes. Stamens opposite the corolla lobes. Fruits ellipsoid capsule, 2-4 valved with one valve crownded by the style.

Fls. & Frts.: November - April.

Occurrence: Common, in moist and swampy places of the sanctuary.

Distribution: Throughout the plains of India; China.

Specimen examined: Burha Mayong; *Bora* 15147 (NEHU).

48. PUNICACEAE

Horaninow, Prim. Linn. Syst. Nat. 81. 1834.

Shrubs or small trees. Leaves exstipulate. Flowers bisexual, actinomorphic, solitary or clustered. Calyx adnate to the ovary, 5-7 lobed. Petals 5-7. Stamens many, free. Ovary inferior, many celled. Fruit a berry crownded by calyx limb. Seeds many, pulpy.

The family comprises one genus and two species, distributed in South East Europe to the Himalayas; one species in the study area.

Punica Linn.

Linn., Sp. Pl. 472. 1753 & Gen. Pl. ed. 5. 212. 1754.

One species cultivated throughout India which occurs in the study area also.

Punica granatum Linn., Sp. Pl. 676. 1753; Clarke in Hook. f., Fl. Brit. Ind. 2: 581. 1879; Kanjilal *et al.*, Fl. Assam 2: 315. 1938; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 500. 1996. "Dalim".

Deciduous shrub. Leaves *ca* 1.5-8.0 x 0.5-2.0 cm, opposite, oblong-lanceolate, obtuse. Flowers reddish, axillary, solitary or somewhat clustered. Calyx lobes persistent. Petals *ca* 1.5 cm long, obtuse. Berries globose. Seeds juicy.

Fls. & Frts.: May - January.

Occurrence: Occasionally, along foot hill of the area.

Distribution: Widely cultivated in warm regions.

Uses: Fruits edible.

49. ONAGRACEAE

A. L. de Juss., Gen. Pl. 317. 1789.

Herbs or rarely shrubs, often aquatic. Flowers bisexual, actinomorphic, often solitary. Calyx adnate to the ovary, 4-5 lobed. Petals 2-5, free. Stamens as many or twice as many as calyx lobes. Ovary inferior or semi-superior. Fruit a capsule, berry or nut.

The family comprises about 18 genera and 640 species, cosmopolitan in distribution; 4 genera and 40 species in India; one genus and 4 species in the study area.

Ludwigia Linn.

Linn., Sp. Pl. 118. 1753 & Gen. Pl. ed. 5. 55. 1754.

Herbs. Flowers solitary or clustered, axillary or in inflorescence. Calyx tubes scarcely produced above ovary, persistent. Petals caducous. Disk flat or conical. Stamens epipetalous. Ovary inferior. Fruits capsule, 4-5 valved.

About 75 species distributed throughout the world; 6 species in India; 4 species in the study area.

Key to the species

1a. Prostrate herbs; flowers creamy white

..... 1. *L. adscendens*

1b. Erect herbs; flowers yellow:

2a. Seeds uniseriate ..... 4. *L. prostrata*

2b. Seeds multiseriate:

3a. Leaves spherical; stamens 8

..... 2. *L. octovalis*

3b. Leaves ovate; stamens 4

..... 3. *L. perensis*

1. ***Ludwigia adscendens*** (Linn.) Hara in J. Jap. Bot. 28: 291. 1953; Raven in Reinw. 6(4): 387. 1963; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 503. 1996. *Jussiaea adescendens* Linn., Mant. Pl. 1: 69. 1767. *J. repens* Linn., Sp. Pl. 388. 1753.

Aquatic or semiaquatic herb; stem creeping and floating, rooting at nodes. Leaves *ca* 1.0–4.5 x 1–2 cm, alternate, obovate to oblanceolate, obtuse, narrowed at base. Flowers creamy white, *ca* 4.2 cm long, solitary, axillary, stalked. Sepals 5, deltoid. Petals 5, *ca* 1.5 cm long, obovate, obtuse, clawed at base. Stamens 10. Ovary pubescent. Capsules cylindric.

Fls. & Frts.: August - November.

Occurrence: Common, in water bodies and marshy places.

Distribution: Throughout India; Malaysia to Australia.

Specimen examined: Tamuliduba; *Bora* 14843 (NEHU).

2. *Ludwigia octovalis* (Jacq.) Raven subsp. *sessiliflora* (Mich.) Raven in Reinw. 6: 362. 1963; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 504. 1996. *Jussiaea suffruticosa* Linn., Sp. Pl. 388. 1753; Clarke in Hook. f., Fl. Brit. Ind. 2: 587. 1879.

Erect herb. Leaves *ca* 2-10 x 0.5-2.0 cm, sessile, linear-lanceolate, acute or acuminate, sessile. Flowers yelllow, axillary, solitary. Sepals 4, ovate-lanceolate. Petals 4, obovate, cuneate. Stamens 8. Capsules cylindric, 8 ribbed.

Fls. & Frts.: Almost throughout the year.

Occurrence: Common, in marshy places of the sanctuary.

Distribution: Throughout India except western desert; Warmer moist parts of the world.

Specimen examined: Haduk; *Bora* 14722 (NEHU).

3. *Ludwigia perensis* Linn., Sp. Pl. 1: 119. 1753; Raven in Reinw. 6: 367. 1964; Islam, Fl. Majuli 139. 1990. *L. oppositifolia* Linn., Syst. Nat. ed. 12. 125. 1767. *L. parviflora* Roxb., Hort. Beng. 11. 1814, *nom. nud.* & Fl. Ind. 1: 440. 1820.

Erect herb. Leaves linear-lanceolate or elliptic, narrowed down into a short petiole. Flowers yellow, axillary, solitary or paired. Sepals 4, deltoid. Petals 4, elliptic. Stamens 4. Capsules linear-oblong, *ca* 1 cm long.

Fls. & Frts.: August - December.

Occurrence: Common, in moist places of the sanctuary.

Distribution: Tropical Asia to Australia.

Specimen examined: Haduk; *Bora* 15468 (NEHU).

4. *Ludwigia prostrata* Roxb., Fl. Ind. 1: 441. 1820; Clarke in Hook. f., Fl. Brit. Ind. 2: 588. 1879; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 504. 1996. *Jussiaea prostrata* (Roxb.) H. Lev. in Fedde Rep. Sp. Nov. 8: 138. 1910.

Herb; stem prostrate, decumbent or erect. Leaves elliptic or lanceolate, narrowed down into a petiole. Flowers yellow, sessile, axillary, solitary. Sepals 4, *ca* 1.2 cm long, lanceolate. Petals 4, *ca* 1.5-2.0 cm long, narrowly spathulate. Stamens 4. Capsules linear, slightly 4 angled.

Fls. & Frts.: August - November.

Occurrence: Common, in moist places of the sanctuary.

Distribution: Throughout India; China, Java, Malaysia, Nepal, Philippines, Sri Lanka.

Specimen examined: Haduk; *Bora* 15469 (NEHU).

50. TRAPACEAE

Dumortier, Anal. Fam. Pl. 36, 39. 1829.

Aquatic herbs. Leaves of two kinds; submerged ones pinnatisect, resembling roots. Flowers bisexual, actinomorphic, axillary, solitary. Calyx tube short; limb 4 partite, persistent. Petals 4, free. Stamens 4. Ovary semi-inferior, 2-celled. Fruit turbinate, surrounded by calyx limb or with 2-4 spines, 1 seeded.

Family with one genus and about 30 species, distributed throughout the world; one species in the study area.

Trapa Linn.

Linn., Sp. Pl. 120. 1753 & Gen. Pl. ed. 5. 56. 1754.

Trapa natans Linn. var. *bispinosa* (Roxb.) Makino in Linuma Somuko-Dzeusetz ed. 3. 1: 137. 1907; Deb, Fl. Tripura 1: 180. 1981; Islam, Fl. Majuli 140. 1990. *T. bispinosa* Roxb., Pl. Corom. 234. 1798; Clarke in Hook. f., Fl. India 2: 590. 1879; Kanjilal *et al.*, Fl. Assam 2: 319. 1938.

Aquatic floating herb. Floating leaves in rosettes, rhomboid, crowded in the upper part of stem; submerged ones dissected. Flowers white, solitary, axillary. Calyx lanceolate, acute, pubescent. Petals obovate, crenulate on margins. Stamens 4. Fruits angled nuts, 2 horned.

Fls. & Frts.: August - December.

Occurrence:: Common, in water bodies of the sanctuary.

Distribution: Throughout India; South East Asia, Sri Lanka, Tropical Africa.

Specimen examined: Tuplung; *Bora* 14711 (NEHU).

51. PASSIFLORACEAE

A. L. de Juss., Ann. Mus. Paris, 6: 102. 1805.

Trees, shrubs or herbaceous climbers with tendril. Leaves alternate, often with glands on the petiole. Flowers unisexual or bisexual. Sepals 5,

persistent. Petals 5. Stamens 5 or more. Ovary superior, sometimes on a gynophore. Fruit a capsule or berry.

The family comprises about 12 genera and 600 species, distributed in tropical and warm temperate regions; 2 genera and about 28 species in India; one species in the study area.

Passiflora Linn.

Linn., Sp. Pl. 955. 1753 & Gen. Pl. ed. 5. 410. 1754.

About 500 species distributed in tropics and subtropics; 23 species in India; one species in the study area.

Passiflora foetida Linn., Sp. Pl. 595. 1753; Kanjilal *et al.*, Fl. Assam 2: 322. 1938; Islam, Fl. Majuli 140. 1990; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 507. 1996.

Climbing tendrilar herb. Leaves 3 lobed; lobes acute, hispid, glandular hairs on margins, cordate at base. Flowers white, solitary, axillary; bracts and bracteoles *ca* 2.5 cm long, pinnatisect, glandular pubescent. Calyx lobes ovate-lanceolate. Petals shorter than calyx lobes. Stamens adnate to gynophore; filaments flat. Ovary pilose. Berries globose, enfolded by bracts.

Fls. & Frts.: March - November.

Occurrence: Occasionally, along roadside of the sanctuary

Distribution: Tropical American origin; naturalised throughout the world.

Specimen examined: Burha Mayong; *Bora* 15471 (NEHU).

52. CUCURBITACEAE

A. L. de Juss., Gen. Pl. 393. 1789.

Herbs or undershrubs, climbing by means of tendril. Leaves alternate. Flowers unisexual, monoecious or dioecious, rarely bisexual, solitary, panicled or umbellate. Male flowers: Calyx tubular, 5 lobed; corolla gamopetalous or polypetalous; stamens usually 3 or rarely 1-5; one anther 1 locular. Female flowers: Calyx and corolla as in male; ovary inferior; stigmas 3. Fruits usually pepo, rarely dehiscent by valves.

The family comprises about 110 genera and 640 species, distributed in tropics; 37 genera and about 97 species in India; 7 genera and 10 species in the study area.

Key to the genera

1a. Petals fimbriate .... 7. *Trichosanthes*

1b. Petals entire:

2a. Anther cells conduplicate or sigmoid:

3a. Calyx tube of the male flowers elongate .... 3. *Gymnopetalum*

3b. Calyx tube of the male flowers short:

4a. Flowers white; stamens inserted at the base of calyx tube .... 1. Coccinia

4b. Flowers usually yellow; stamens inserted below the mouth of calyx tube .... 6. *Momordica*

2b. Anther cells not conduplicate or sigmoid:

5a. Flowers dioecious, in axillary diffuse panicles .... 4. *Gymnostemma*

5b. Flowers monoecious, usually not in diffuse panicles:

6a. Stamens 5 .... 2. *Gomphogyne*

6b. Stamens 3 .... 5. *Melothria*

1. *Coccinia* Wight & Arn.

Wight & Arn., Prodr. 347. 1834.

About 30 species mainly distributed in tropical Africa; one species in India and is reported from the study area also.

Coccinia grandis (Linn.) Voigt, Hort. Suburb. Cak. 59. 1845; Deb, Fl. Tripura 1: 254. 1981; Islam, Fl. Majuli 142. 1990. *C. cordifolia sensu* Cogn. in DC., Mon. Phan. 3. 529. 1881. *Bryonia grandis* Linn., Mant. Pl. 1: 126. 1767. *Cephalandra indica* Naud. in Ann. Sci. Nat. ser. 5. 5: 16. 1886; Kanjilal *et al.*, Fl. Assam 2: 329. 1938.

Climbing herb; tendrils simple. Leaves angled or lobed. Flowers dioecious, white, solitary, peduncled. Calyx campanulate, 5 lobed. Corolla campanulate, villous within. Stamens 5 in male flowers. Staminodes 3 in females. Fruits elliptic or ovoid, reddish when ripe.

Fls. & Frts.: April - August.

Occurrence: Common, along roadside of the area.

Distribution: Throughout India; America, China, Myanmar, Tropical Africa.

Specimen examined: Burha Mayong; Bora 15283 (NEHU).

2. *Gomphogyne* Griff.

Griff., Pl. Cantor. 26. t. 4. 1837.

3 species in Indo-Malayan region; 2 species in India; one species in the study area.

Gomphogyne cissiformis Griff., Pl. Cantor. 26. t. 4. 1837; Clarke in Hook. f., Fl. Brit. Ind. 2: 632. 1879; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 513. 1996.

Herbaceous weak climber; tendrils filiform. Leaves pedate, petioled; leaflets 5-7, lanceolate, serrate. Flowers monoecious, small. Male flowers in racemes and felmale in axillary fascicles. Calyx 5 partite. Corolla 5 partite, rotate. Stamens 5, connate at base. Fruits trigonous, obovoid, crownded by the persistent styles.

Fls. & Frts: September - November.

Occurrence: Common, in the hilly forest of the area.

Distribution: Arunachal Pradesh, Assam, Kumaon, Sikkim.

Specimen examined: Rangamati; *Bora* 15206 (NEHU).

Notes: Probably confined to Himalayas.

3. *Gymnopetalum* Arn.

Arn. in Joum. Bot.. 3: 278. 1841.

9 species distributed in South China and Indo-Malayan region; 4 species in India; one species in the study area.

Gymnopetalum cochinchinense (Lour.) Kurz in J. Asiat. Soc. Bengal 40: 59. 1871; Clarke in Hook. f., Fl. Brit. Ind. 2: 611. 1879; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 513. 1996. *Bryonia cochinchinensis* Lour., Fl. Cochinch. 595. 1790. *Momordica tubiflora* Roxb., Fl. Ind. 3: 711. 1832.

Twining herb; stem angular, pubescent; tendrils simple. Leaves ovate, angular or lobed, minutely glandular beneath. Flowers white, large, monoecious. Male flowers solitary on long peduncles. Calyx lobes spreading, linear-subulate. Petals *ca* 2.5 x 1.0 cm, oblong, ovate, acute, pilose outside. Fruits ovoid-oblong, ribbed, orange red.

Fls. & Frts.: August - December.

Occurrence: Common, in the study area.

Distribution: Throughout India; Bangladesh, China, Malaysia, Myanmar.

Specimen examined: Thengbhanga; *Bora* 14822 (NEHU).

4. *Gymnostemma* Bl.

Bl., Bijdr. 23. 1825.

About 5 species distributed in Indo-Malayan region; 2 species in India;

one species in the study area.

Gymnostemma pedata Bl., Bijdr. 23. 1825; Clarke in Hook. f., Fl. Brit. Ind. 2: 633. 1879; Chakravarty, Fasc. Fl. India 11: 56. 1982; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 514. 1996.

Slender climbing herb; tendrils simple. Leaves pedately compound; leaflets ovate-lanceolate. Flowers greenish white, dioecious in lax axillary panicles. Male and female corolla rotate, 5 partite. Stamens 5, connate below. Fruits berry, globose, 1-3 seeded.

Fls. & Frts.: August - December.

Occurrence: Common, along roadside of the sanctuary.

Distribution: Throughout India; **Bangladesh, China, Japan, Malaysia, Myanmar, Nepal.**

Specimen examined: Burha Mayong; *Bora* 15473 (NEHU).

5. *Melothria* Linn.

Linn., Sp. Pl. 35. 1753 & Gen. Pl. ed. 5. 21. 1754.

Prostrate or climbing herbs; monoecious rarely dioecious; tendrils simple. Male flowers in racemes, corymbs or clusters. Calyx campanulate, 5 toothed. Corolla 5 partite. Stamens 3. Femals solitary, fascicled or corymbose. Fruits berry.

About 60 species distributed in tropical regions; 2 species in the study area.

Key to the species

1a. Leaves polymorphous, hastate; tendrils glabrous; flowers dioecious .... 1. ***M. heterophylla***

1b. Leaves ovate, cordate; tendrils sparsely hairy; flowers monoecious .... 2. ***M. maderaspatana***

1. ***Melothria heterophylla*** (Lour.) Cogn. in DC., Monogr. Phan. 3: 628. 1881; Chakravarty, Fasc. Fl. India 11: 79. 1982; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 516. 1996. *Sclena heterophylla* Lour., Fl. Cochinch. 1: 514. 1790. *Zehneria umbellata* Thwaites, Enum. Pl. Zeyl. 125. 1853; Clarke in Hook. f., Fl. Brit. Ind. 2: 625. 1879.

Herbaceous climber; stems angular; tendrils simple. Leaves polymorphous, hastate, short petioled. Flowers white, dioecious; male in axillary corymbs; female solitary. Calyx 5 teethed. Corolla 5 lobed. Style cylindric. Fruits oblong bright red.

Fls. & Frts.: April - October.

Occurrence: Common, in the study area.

Distribution: Throughout India; Bangladesh, China, Malaysia.

Specimens examined: Tuplung; *Bora* 15204 (NEHU).

2. **Melothria maderaspatana** (Linn.) Cogn. in DC., Monogr. Phan. 3: 623. 1881; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 518. 1996. *Cucumis maderaspatanus* Linn., Sp. Pl. 1012. 1753; *Bryonia scabrella* Linn. f., Suppl. Pl. 424. 1781.

Herbaceous hispid climber; stem angular; tendrils slender. Leaves *ca* 4.5-10.5 x 3.0-8.5 cm, 3-7 angled, ovate, cordate, dentate, sparsely hairy. Flowers small, yellow, monoecious; male in clusters, nearly sessile; female solitary. Calyx tube villous; teeth subulate. Corolla pubescenct outside. Berries globose, orange red.

Fls. & Frts.: July - October.

Occurrence: Common, in grassland of the sanctuary.

Distribution: Throughout India; Australia, Bangladesh, China, Malaysia, Myanmar, New Zealand.

Specimen examined: Tuplung; *Bora* 14761 (NEHU).

6. *Momordica* Linn.

Linn., Sp. Pl. 1009. 1753 & Gen. Pl. ed. 5, 506. 1754.

Prostrate or climbing herbs. Flowers often bracteate. Males flowers solitary, crymbose or racemes. Calyx campanulate, 5 lobed. Corolla rotate or campanulate, 5 partite. Stamens 3. Female flowers solitary. Fruits oblong, fusiform or cylindric.

About 60 species cosmopolitan in distribution; 7 species in India; 2 species in the study area.

Key to the species

1a. Leaves lobed or sub-pinnatified;

flowers monoecious .... 1. *M. charantia*

1b. Leaves ovate-cordate;

flowers dioecious .... 2. ***M. dioica***

1. ***Momordica charantia*** Linn., Sp. Pl. 1009. 1753; Clarke in Hook. f., Fl. Brit. Ind. 2: 616. 1879; Kanjilal *et al.*, Fl. Assam 2: 330. 1938; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 519. 1996. *M. indica* Linn. in Stichm. Herb. Amb. 24. 1754. "Tita kerala".

Herbaceous, puberulous climber; tendrils simple. Leaves reniform or suborbicular, deeply lobed or sub-pinnatified. Flowers yellow, unisexual; male solitary on long peduncles. Corolla segments obovate, obtuse or emerginate. Ovary fusiform, rostrate in female flowers. Fruits oblong or fusiform, tapering to both ends, many ribbed with tubercles.

Fls. & Frts.: March - October.

Occurrence: Common, along roadside and forest margins.

Distribution: Throughout India; China, Malaysia, Tropical Africa.

Specimen examined: Haduk; *Bora* 14891 (NEHU).

Uses: Fruits used as vegetable.

2. ***Momordica dioica*** Roxb. ex Willd., Sp. Pl. 4: 605. 1805; Clarke in Hook. f., Fl. Brit. Ind. 2: 617. 1879; Chakravarty, Fasc. Fl. India 11: 94. 1982; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 520. 1996. "Bhaat kerala".

Herbaceous climber; tendrils simple. Leaves ovate, cordate, acute, entire or denticulate, mucronate. Flowers yellow, dioecious. Male flowers solitary on long bracteate peduncles. Sepals linear-lanceolate, villose. Corolla *ca* 2 cm long; lobes oblong, obtuse. Female flowers on ebracteate penduncles. Frutis ovoid, ellipsoid, *ca* 3 cm long.

Fls. & Frts.: June - October.

Occurrence: Common, along roadside and forest margins.

Distribution: Throughout India; Bangladesh, China, Myanmar, Sri Lanka.

Specimen examined: Tuplung; *Bora* 15207 (NEHU).

Uses: Fruits used as vegetable.

7. *Trichosanthes* Linn.

Linn., Sp. Pl. 1008. 1753 & Gen. Pl. ed. 5. 439. 1754.

Scandent herbs, usually dioecious. Male flowers bracteate, racemose; calyx tube cylindric; corolla lobes fimbriate; stamens 3. Female flowers solitary; calyx and corolla as in male. Fruits globose, ovoid or fusiform, fleshy. Seedes in pulp.

About 24 species distributed in Indo-Malayan region; 15-24 species in India; 2 species in the study area.

Key to the species

1a. Calyx lobes entire .... 2. *T. wallichiana*

1b. Calyx lobes dentate or laciniate .... 1. *T. tricuspidata*

1. *Trichosanthes tricuspidata* Lour., Fl. Cochinch. 589. 1790; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 523. 1996. *T. palmata* Roxb., Fl. Ind. 3: 704. 1832; Clarke in Hook. f., Fl. Brit. Ind. 2: 606. 1879. *Modecca bracteata* Lamk., Encycl. Meth. Bot. 4: 210. 1796.

Large climber; tendrils 3 fid. Leaves palmately 3-5 lobed, ovate, cordate, denticulate, scabrous; petioles 3-10 cm long; bracts conspicuous. Male racemes few flowered with large bract. Calyx tube *ca* 4 cm long, striate, villose. Corolla 5 lobed. Staminal filaments villose. Fruits globose, bright red with longitudinal orange streaks.

Fls. & Frts.: July - November.

Occurrence: Occasionally, throughout the sanctuary.

Distribution: Throughout India; Australia, China.

Specimen examined: Sanaka; *Bora* 15205 (NEHU).

Notes: Wild relative of cultivated 'Patol' (*T. dioica*).

2. *Trichosanthes wallichiana* (Seringe) Wight in Ann. & Mag. Nat. Hist. 8: 270. 1842; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 524. 1996. *T. multiloba auct. non.* Mig; Clarke in Hook. f., Fl. Brit. Ind. 2: 607. 1879. *T. palmata* var. *scotanthes* Clarke in Hook. f., Fl. Brit. Ind. 2: 607. 1879.

Scandent climber; tendrils 3 fid. Leaves palmately 3-9 lobed. Flowers white. Male racemes with large ovate bracts; peduncles paired. Corolla lobes 5, obovate. Fruits ovoid-oblong.

Fls. & Frts.: July - November.

Occurrence: Occasionally, throughout the sanctuary.

Distribution: Throughout India; Malaysia, Myanmar.

Specimen examined: Sanaka; *Bora* 15131 (NEHU).

Notes: Wild relative of cultivated 'Patol' (*T. dioica*).

53. BEGONIACEAE

C. A. Agardh, Aphor. 200. 1825.

Undershrubs or herbs, mostly succulent. Leaves alternate; stipules deciduous. Flowers monoecious, mostly in axillary cymes. Male flowers: Sepals 2 or 5, valvate; petals 5-2 or absent; stamens many. Female flowers: Perianth more or less as in male; staminodes absent or very small; ovary inferior; stlyle 2-5. Fruit a capsule or berry.

The family comprises 5 genera and about 920 species, distributed in tropics; one genus and 45-50 species in India; 2 species in the study area.

Begonia Linn.

Linn., Sp. Pl. 1056. 1753 & Gen. Pl. ed. 5. 475. 1754.

Herbs or udershrubs, often tuberous. Leaves unequal sided; stipules 2. Flowers in axillary cymes. Ovules many; stigma spreading or twisted. Friuts loculicidal capsule. Seeds many.

About 900 species distributed in tropics and subtropics; about 45-50 species in India; 2 species in the study area.

Key to the species

1a. Fruits dry, winged; ovary 2-celled

... 1. *B. hatacoa*

1b. Fruits succulent, not winged; ovary 4-celled

... 2. *B. roxburghii*

1. *Begonia hatacoa* Buch.-Ham. ex D. Don, Prodr. Fl. Nep. 223. 1825; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 528. 1996. *B. rubro-venia* Hook. f. in Bot. Mag. 79: t. 4689. 1853; Clarke in Hook. f., Fl. Brit. Ind. 2: 645. 1879.

Succulent herb. Leaves elliptic-lanceolate, acuminate, slightly angular, subcordate or rounded at base, pinkish beneath. Flowers pinkish white. Sepals and petals 2 each in male flowers. Tepals 5 in female flowers. Ovary 2-celled. Capsules winged, recurved.

Fls. & Frts.: June - September.

Occurrence: Occasionally, on moist shady hilly slopes.

Distribution: Arunachal Pradesh, Assam, Tripura, Eastern Himalayas; Bangladesh, Myanmar.

Specimen examined: Rangamati; *Bora* 15477 (NEHU).

Notes: Probably confined to Eastern Himalayas and extend upto Bangladesh, Bhutan and Myanmar.

2. *Begonia roxburghii* (Miq.) DC., Prodr. 15(1): 398. 1864; Clarke in Hook. f., Fl. Brit. Ind. 2: 635. 1879; Kanjilal *et al.*, Fl. Assam 2: 333. 1938; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et*

al.) 1: 532. 1996. *B. malabarica* Roxb., Fl. Ind. 3: 648. 1832. *non* Lamk. 1785.

Succulent herb. Leaves broadly ovate, obliquely cordate, toothed. Flowers pinkish red in axillary dichotomously branched cymes. Sepals and petals 2 each in male and female flowers. Stamens monadelphous. Ovary 4 celled. Capsules 4 lobed, succulent.

Fls. & Frts.: June - September.

Occurrence: Occasionally, on moist shady hilly slopes.

Distribution: Arunachal Pradesh, Assam, Tripura, Eastern Himalayas; Bangladesh, Myanmar, Nepal.

Specimen examined: Rangamati; *Bora* 15216 (NEHU).

Notes: Can be used for ornamental purpose.

54. DATISCACEAE

Lindl., Nat. Srst. ed 2: 82. 1847.

Trees or herbs. Leaves alternate. Flowers mostly unisexual, actinomorphic, spicate or racemose. Male flowers: Calyx 3-9 lobed; petals 8 or absent; stamens 4-25, opposite the calyx lobes. Female and bisexual flowers: Calyx adnate to the ovary; stamens similar to male or reduced to staminodes; ovary 1-celled. Fruit a capsule, many seeded.

4 species natives of the Mediterranean, Central Asia, Java, North Western America; one species in the study area.

Tetrameles R. Br.

R. Br. in Denh. & Cllapp. Trav. 2. 230. 1826.

Tetrameles nudiflora R. Br. in Benn. Pl. Jav. Rar. 79. 17; DC., Prodr. 15(1): 411. 1820; Clarke in Hook. f., Fl. Brit. Ind. 2: 657. 1879; Kanjilal *et al.*, Fl. Assam 2: 335. 1938.

Large tall, deciduous tree; much buttressed at base. Leaves *ca* 7.5-20.5 x 7-15 cm, ovate, more or less rounded at base, serrate, pubescent, 5 nerved at base. Flowers pale yellow, sessile, tetramerous, apetalous, dioecious in pubescent racemes and panicles. Calyx deeply 4 segmented. Capsules obovoid, with persistent calyx lobes.

Fls. & Frts.: March - July.

Occurrence: Rare, in the hilly forest of the area.

Distribution: Assam, Darjeeling, Western Ghats, Andamans; **Java, Myanmar.**

Specimen examined: Dhekiabari; *Bora* 15329 (NEHU).

Uses: Timber used for construction works.

55. CACTACEAE

A. L. de Juss., Gen. Pl. 310. 1789.

Succulent herbs or shrubs, often spiny and with much reduced leaves. Flowers bisexual, actinomorphic, solitary. Calyx usually petaloid. Petals in several series. Stamens many. Ovary inferior, 1-celled. Fruit a berry often spiny or bristly, many seeded.

The family comprises about 150 genera and 2000 species, mainly distributed in drier regions of tropical America to Brtish Columbia; 2 genera and 5 species in India; one genus and one species in the study area.

Opuntia Mill.

Mill. Gard. Dict. ed. 4. 1754.

About 250 species distributed in America and Galapagos; 2-3 species in India; one species in the study area.

Opuntia monacantha (Willd.) Haw., Suppl. Pl. Succ. 81. 1819; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 533. 1996. *Cactus monacanthus* Willd., Enum. Pl. Berol. Suppl. 33. 1813. *Opuntia dillenii auct. non* Haw. 1819; Wight & Arn., Prodr. Fl. Pen. Ind. Or. 363. 1834, p.p.; Clarke in Hook. f., Fl. Brit. Ind. 2: 657. 1879.

Thorny succulent shrub. Phylloclades obovate, jointed; spines divericating. Flowers yellow, *ca* 5-6 cm long, solitary, sessile. Perianth obovate, spreading, yellow with median reddish stripes. Stamens many, yellow. Berries subglobose, reddish.

Fls. & Frts.: April - July.

Occurrence: Occasionally, on rocky slopes in the hilly forst of the sanctuary.

Distribution: A native of America; naturalised in India.

Specimen examined: Burha Mayong; *Bora* 15479 (NEHU).

Uses: Used as hedge plant.

56. MOLLUGINACEAE

Wight, Ill. Ind. Bot. 2: 42. 1850.

Herbs. Flowers bisexual, actinomorphic, solitary or cymose. Sepals persistent, imbricate. Petals small or absent. Stamens definite or indefinite. Styles and stigmas as many as the cells. Ovary superior, usually many celled. Fruit dry, dehiscing loculicidally or by transverse slits.

The family comprises about 15 genera and 150 species, mostly distributed in tropics; 2 genera and 2 species in the study area.

Key to the genera

1a. Plants diffusely branched; leaves ovate, obovate; flowers in axillary fascicles .... 1. *Glinus*

1b. Plants not diffusely branched; leaves linear-lanceolate; flowers in terminal cymes ..... 2. *Mollugo*

1. *Glinus* Linn.

Linn., Sp. Pl. 463. 1753 & Gen. Pl. ed. 5. 537. 1754.

About 12 species distributed in tropical and subtropical regions; 2 species in India; one species in the study area.

Glinus lotoides Linn., Sp. Pl. 463. 1753; Deb, Fl. Tripura 2: 189. 1983. *Mollugo hirta* Thunb., Prodr. Pl. Cap. 24. 1794; Clarke in Hook. f., Fl. Brit. Ind. 2: 662. 1879; Kanjilal *et al.*, Fl. Assam 2: 338. 1938.

Prostrate much branched pubescent herb. Leaves opposite or in whorls of 3-5, suborbicular or spathulate, obtuse or apiculate, cuneate at base. Flowers greenish, 2-3 in sublateral fascicles, subsessile. Sepals acute, hairy. Stamens 5. Styles 5. Capsules ovoid, 5 valved with elongated calyx.

Fls. & Frts.: August - October.

Occurrence: Common, in moist sandy soils, along dry ditches and other water bodies.

Distribution: Throughout India; **America, Australia, Malaysia, South East Asia, Tropical Africa.**

Specimen examined: Haduk; *Bora* 15051 (NEHU).

2. *Mollugo* Linn.

Linn., Sp. Pl. 1: 468. 1753 & Gen. Pl. ed. 5. 39. 1754.

About 20 species distributed in tropical and subtropical regions; 4 species in India; one species in the study area.

Mollugo pentaphylla Linn., Sp. Pl. 89. 1753; Kanjilal *et al.*, Fl. Assam 2: 337. 1938; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 533. 1996. *M. stricta* Linn., Sp. Pl. ed. 2. 131. 1762; Clarke in Hook. f., Fl. Brit. Ind. 2: 663. 1879.

Erect glabrous herb. Leaves whorled or opposite, subsessile, linear-lanceolate, acute. Flowers white, in terminal cymes. Sepals 5, ovate-oblong, persistent. Stamens 3, free. Styles 3. Capsules globose, 3 lobed.

Fls. & Frts.: August - October.

Occurrence: Occasionally, in moist sandy places of the sanctuary.

Distribution: Throughout India; Tropical and subtropical regions.

Specimen examined: Haduk; *Bora* 15050 (NEHU).

57. APIACEAE

Lindl., Nat. Syst. edn. 2: 21. 1836, *nom. alt. Umbelliferae.*

Herbaceous, rarely woody. Leaves alternate, sheathing at base. Flowers mostly bisexual, in simple or compound umbels or rarely capitate. Calyx adnate to the ovary, 5 lobed. Petals 5, free. Stamens 5, alternate with petals. Ovary inferior, 2-celled. Styles 2. Fruit schizocarp, composed of 2 mericarps.

The family comprises about 275 genera and 3000 species, cosmopolitan in distribution; 53 genera and 198 species in India; 4 genera and 5 species in the study area.

Key to the genera

1a. Flowers in simple heads .... 2. *Eryngium*

1b. Flowers in simple or compound umbels:

2a. Leaves and umbels compound .... 4. Oenanthe

2b. Leaves and umbels simple:

3a. Mericarps 3 ribbed .... 3. Hydrocotyle

3b. Mericarps 5-many ribbed .... 1. Centella

1. *Centella* Linn.

Linn., Pl. Rar. Afr. 28. 1760.

About 40 species distributed in moist tropical and temperate regions; one species in India and collected from the study area also.

Centella asiatica (Linn.) Urban in Mart., Fl. Bras. 11: 287. 1879; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 535. 1996. *Hydrocotyle asiatica* Linn., Sp. Pl. 234. 1753; Clarke in Hook. f., Fl. Brit. Ind. 2: 669. 1879; Kanjilal *et al.*, Fl. Assam 2: 340. 1938. **"Manimuni"**.

Prostrate creeping herb; rooting at nodes. Leaves suborbicular or reniform, long petiolate, crenate or dentate, stipulate. Flowers red, in axillary solitary umbels. Petals ovate, acute. Fruits ovate to orbicular, laterally compressed.

Fls. & Frts.: April - September.

Occurrence: Common, in moist shady places of the area.

Distribution:-Throughout India; Tropical and subtropical regions.

Specimens examined: Haduk; *Bora* 15480 (NEHU).

Uses: Plant extract taken in aneamia and stomach trouble.

2. *Eryngium* Linn.

(Tourn.) Linn., Syst. ed. 1. 1753.

About 230 species in tropical and temperate regions; 3 species in India;

one species in the study area.

Eryngium foetidum Linn., Sp. Pl: 232. 1753; Kanjilal *et al.*, Fl. Assam 2: 340. 1938; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 537. 1996.

Diffuse aromatic herb. Leaves upper ones spinulosely serrate to pinnatipartite; basal ones oblong-lanceolate, spathulate, spinous toothed. Flowers white, in umbelate, peduncled heads; bracts spinulose. Calyx lobes lanceolate to ovate. Petals oblanceolate. Fruits ellipsoid.

Fls. & Frts.: May - November.

Occurrence: Occasionally, on moist sandy soils.

Distribution: Throughout India; Tropical and subtropical regions, indigenous to Tropical America.

Specimen examined: Burha Mayong; *Bora* 15134 (NEHU).

Uses: Leaves used for flavouring the curry.

3. *Hydrocotyle* Linn.

Linn., Sp. Pl. 1: 234. 1753 & Gen. Pl. ed. 5. 109. 1754

About 100 species distributed in tropical and temperate regions; 4 species in India; one species in the study area.

Hydrocotyle sibthorpioides Lamk., Encycl. Meth. Bot. 3: 153. 1789; Cannon in Hara *et al.*, Enum. Fl. Pl. Nep. 2: 186. 1979; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 538. 1996. *H. rotundifolia* Roxb., Fl. Ind. 2: 38. 1824; Clarke in Hook. f., Brit. Ind. 2:

668. 1879; Kanjilal *et al.*, Fl. Assam 2: 340. 1938. "Soru manimuni".

Prostrate diffuse herb; rooting at nodes. Leaves orbicular, cordate, crenate. Flowers sessile, many in umbels. Stipules ovate-rounded. Calyx teeth minute. Petals *ca* 0.3 cm long, red, lanceolate, valvate, acute. Fruits orbicular, reddish brown.

Fls. & Frts.: May - November.

Occurrence: Common, in moist places of the sanctuary.

Distribution: North East India, North and Western Himalayas, West Bengal; Malaysia, Tropical Africa.

Specimen examined: Haduk; *Bora* 15481 (NEHU).

Uses: Plant extract taken in stomach trouble.

4. *Oenanthe* Linn.

(Tourn.) Linn., Syst. ed. 1. 1753.

Marshy herbs. Roots fusiform, tuberous. Leaves 1-3 pinnate, sheathing at base; bracteoles linear. Inflorescence compound umbel. Calyx teeth small. Petals emerginate. Fruits glabrous, ridges corky.

About 40 species distributed in Asia, Europe, South Africa, North and South America, Tropical Australia; 5 species in India; 2 species in the study area.

Key to the species

1a. Erect herbs; umbels sessile or shortly peduncled .... 1. *O. benghalensis*

1b. Erect or ascending herbs; umbels long peduncled .... 2. *O. javanica*

1. ***Oenanthe benghalensis*** Benth. in Gen. Pl. 1: 906. 1862; Clarke in Hook. f., Fl. Brit. Ind. 2: 696. 1879; Kanjilal *et al.*, Fl. Assam 2: 342. 1938. *Seseli benghalensis* Roxb., Hort. Beng. 22. 1814.

Erect herb. Leaves 2-pinnate; pinnae lanceolate or ovate-lanceolate. Flowers white, in nearly sessile umbels. Fruits ellipsoid or globose.

Fls. & Frts.: May - October.

Occurrence: Common, in marshy places of the area.

Distribution: Assam, West Bengal.

Specimen examined: Haduk; *Bora* 14743 (NEHU).

Notes: Confined to Assam, Tripura and West Bengal.

2. ***Oenanthe javanica*** (Bl.) DC., Prodr. 4: 138. 1830; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 538. 1996. *Oenanthe stolonifera* Wall. ex DC., Prodr. 4: 138. 1830; Clarke in Hook. f., Fl. Brit. Ind. 2: 696. 1879; Kanjilal *et al.*, Fl. Assam 2: 341. 1938.

Erect or ascending herb; rooting at lower nodes. Leaves pinnate; pinnae lanceolate, serrate or lobed; upper leaves ternate. Flowers white, in terminal or leaf-opposed compound umbels. Fruits oblong, subquardrate.

Fls. & Frts.: March - October.

Occurrence: Common, in marshy places of the area.

Distribution: Arunachal Pradesh, Assam, North India; China, Japan, Java.

Specimen examined: Tamuliduba; *Bora* 15232 (NEHU).

58. ARALIACEAE

A. L. de Juss., Gen. Pl. 217. 1789.

Mostly woody, sometimes climber. Leaves mostly alternate and stipulate. Flowers bisexual, actinomorphic, polygamous or dioecious, racemose, umbellate or capitate. Calyx small. Petals often 5. Stamens as many as petals and alternate with them. Ovary superior. Fruit a berry or drupe.

The family comprises about 86 genera and 920 species, mostly distributed in tropics; 18 genera and 62 species in India; 3 genera and 3 species in the study area.

Key to the genera

1a. Ovary 2-celled .... 1. *Eleutherococcus*

1b. Ovary 4-10 celled:

2a. Leaves usually digitately compound; fruits angled .... 2. *Schefflera*

2b. Leaves usually palmatifid or palmatisect fruits not angled .... 3. *Trevesia*

1. *Eleutherococcus* Maxim.

Maxim., Prim. Fl. Amur. 132. 1859.

About 50 species distributed in tropics; 2 species in India; one species in the study area.

Eleutherococcus trifoliatus (Linn.) Hu. in J. Arn. Arb. 61. 110. 1980; Daniel in Ind. J. For. 6: 245. 1983; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 547. 1996. *Zanthoxylum trifoliatum* Linn., Sp. Pl. 270. 1753. *Acanthopanax aculeatum* (Aiton) Seem. in J. Bot. 5: 238. 1867; Clarke in Hook. f., Fl. Brit. Ind. 2: 726. 1879.

Prickly climbing shrub. Leaves 3-5 foliolate; leaflets elliptic, acuminate, cuneate, serrate. Flowers greenish, in globose umbels. Calyx 5 toothed. Petals 5. Stamens 5. Ovary 2-celled. Fruits subglobose.

Fls. & Frts.: October - January.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Meghalaya; China, Japan.

Specimen examined: Dhekiabari; *Bora* 15138 (NEHU).

2. *Schefflera* Forst.

J.R. & G. Forst., Char. Gen. Pl. 45. t. 23. 1776, *nom. cons.*

About 200 species distributed in tropics; 15 species in India; one species in the study area.

Schefflera venulosa (Wight & Arn.) Harm. in Engler & Prantl, Pflanzenfam 3(8): 39. 1894; Haridasan & Rao, For. Fl. Meghalaya 1: 440. 1985; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 553. 1996. *Heptapleurum venulosum* (Wight & Arn.) Seem in J. Bot. 3: 80. 1865; Clarke in Hook. f., Fl. Brit. Ind. 2: 729. 1879; Kanjilal *et al.*, Fl. Assam 2: 353. 1938. "Jokhini gach".

Scandent, epiphytic or terrestrial shrub. Leaves digitately 3-7 foliolate; leaflets elliptic-oblong, obtuse or acuminate. Flowers pale yellow, polygamous in terminal panicled umbels or racemes. Calyx truncate, lobed. Petals nearly connate. Fruits subglobose, angled, fleshy.

Fls. & Frts.: March - November.

Occurrence: Occasionally, throughout the study area.

Distribution: Throughout India; China, Vietnam.

Specimen examined: Burha Mayong; *Bora* 15150 (NEHU).

3. *Trevesia* Vis.

Vis. in Giorn. Tosc. Sci. Med. Fis. Nat. 1: 72. 1840.

About 10 species distributed in Indo-Malayan region; 2 species in India; one species in the study area.

Trevesia palmata (Roxb.) Vis. in Mem. Acad. Torin. 2. 4: 262. 1842; Clarke in Hook. f., Fl. Brit. Ind. 2: 732. 1879; Kanjilal *et al.*, Fl. Assam 2: 363. 1938; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 554. 1996. *Gastonia palmata* Roxb., Fl. Ind. 2: 107. 1824.

Unbranched prickly shrub. Leaves orbicular, palmatified or palmatisect; lobes oblong-elliptic, acuminate, serrate. Flowers pale yellow, polygamous in terminal panicled umbels. Petlas *ca* 0.5 cm long, thick, ovate. Fruits fleshy, crownded by persistent calyx.

Fls. & Frts.: March - June.

Occurrence: Common, in the hilly forest of the area.

Distribution: Eastern India; Bangladesh, China, Nepal.

Specimen examined: Dhekiabari; *Bora* 15059 (NEHU).

Notes: Confined to Eastern Himalaya and extend upto Bangladesh, China and Nepal.

59. ALANGIACEAE

DC., Prodr. 3L 203. 1828.

Trees or shrubs. Leaves alternate. Flowers bisexual, in axillary cymes; pedicels articulate. Calyx truncate or 4-10 teeth. Petals 4-10. Stamens as many as petals or more. Ovary inferior, 1-2 celled. Fruit a drupe crownded by sepals and disk, 1 seeded.

Family with one genus and 17 species, distributed in tropics and subtropics; 3 species in India; one species in the study area.

Alangium Lamk.

Lamk., Encycl. Bot. 1: 174. 1783, *nom. cons.*

Alangium chinense (Lour.) Harm. in Ber. Deutsch. Bot. Ges. 15: 24. 1897; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 557. 1996. *Stylidium chinense* Lour., Fl. Cochinch. *Marlea begoniaefolia* Roxb., Pl. Corom. 3: 80. t. 283. 1820; Clarke in Hook. f., Fl. Brit. Ind. 2: 743. 1879. **"Maroli gach".**

Small tree. Leaves ovate, ovate-orbicular, acuminate, angled or shortly lobed, rounded or subcordate at base. Flowers creamy white, *ca* 2 cm long, in axillary dichotomous cymes. Calyx teeth acute. Corolla *ca* 1.3 cm long, 5 partite, tubular. Stamens 8, *ca* 1.2 cm long, basally connate around the ovary. Drupes ovoid, slightly ribbed.

Fls. & Frts.: May - October.

Occurrence: Common, in the hilly forest and occasionally scattered in the plain forest of the area.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Tripura, North India; China, Japan, Myanmar.

Specimen examined: Guvali; *Bora* 15070 (NEHU).

60. CAPRIFOLIACEAE

Adans., Fam. 2: 133. 1763.

Shrubs, rarely herbs. Leaves opposite. Flowers bisexual, mostly cymose. Calyx adnate to ovary, 5 fid or toothed. Corolla gamopetalous, lobes imbricate. Stamens inserted on the corolla tube and alternate with lobes. Ovary inferior, 2-5 celled. Fruit a fleshy berry.

The family comprises 16 genera and about 400 species, distributed in temperate regions; 6 genera and about 67 species in India; 2 genera and 2 species in the study area.

Key to the genera

1a. Leaves pinnate; style 3 partite ... 1. *Sambucus*

1b. Leaves simple; style 3 lobed .... 2. *Vibrunum*

1. *Sambucus* Linn.

Linn., Sp. Pl. 269. 1753.

About 40 species distributed in temperate and subtropical regions; 3 species in India; one species in the study area.

Sambucus javanica Bl., Bijdr. 657. 1827; Clarke in Hook. f., Fl. Brit. Ind. 3: 2. 1880; Kanjilal *et al.*, Fl. Assam 3: 1. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 455. 1987.

Shrub. Leaves imparipinnate; leaflets 3-9, ovate to linear-lanceolate, acuminate. Flowers yellowish white, in terminal 3-5 rayed corymb... Corolla 5

partite, rotate; lobes spreading. Stamens 5. Fruits globose.

Fls. & Frts.: June - December.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Assam, Meghalaya, Sikkim; Bangladesh, China, Japan, Java.

Specimen examined: Sanaka; *Bora* 15392 (NEHU).

2. *Viburnum* Linn.

Linn., Sp. Pl. 267. 1753.

About 200 species mostly distributed in Northern Hemisphere and S. Ameica; 17 species in India; one species in the study area.

Viburnum colebrookianum Wall. ex DC., Prodr. 4: 325. 1830; Clarke in Hook. f., Fl. Brit. Ind. 3: 5. 1880; Kanjilal *et al.*, Fl. Assam 3: 4. 1939; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 562. 1996. Fig. 25

Shrub; branches spreading. Leaves oblong-lanceolate or elliptic-oblong, acuminate, serrate, sparsely hairy. Flowers purplish white, in corymbose cymes on short axillary hairy branches. Calyx 5 teethed. Corolla 5 lobed, spreading. Stamens 5. Fruits ellipsoid.

Fls. & Frts.: March - September.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Sikkim, Subtropical Himalayas; Bhutan.



Fig. 25: ***Viburnum colebroochianum*** Wall. ex DC. (Caprifoliaceae)

Specimen examined: Sanaka; *Bora* 15400 (NEHU).

Notes: Confined to North-east India, subtropical Himalayas and Indo-Bhutan region.

61. RUBIACEAE

A. L. de Juss., Gen. Pl. 196. 1789.

Trees, shrubs or infrequently herbs. Leaves opposite or verticillate; stipules inter- or intra-petiolar, sometimes leafy. Inflorescence basically a dichasial cymes, sometimes aggregated into globose heads. Flowers mostly bisexual. Calyx adnate to the ovary, 4-5 lobed. Corolla epigynous, tubular; lobes 4-10. Stamens equal to corolla lobes and alternate with them. Ovary inferior. Fruits capsule, berry or drupe.

The family comprises about 500 genera and 6000 species, distributed in tropical and subtropical regions; about 76 and 274 species in India; 20 genera and 29 species are reported from the study area.

Key to the genera

1a. Ovules 1 in each cell:

2a. Plants usually climber ... 14. *Paederia*

2b. Plants not climber:

3a. Plants herbs ... 19. *Spermacoce*

3b. Plants shrubs or small trees:

4a. Corolla lobes valvate in bud:

5a. Plants armed; ovary 5-celled

.... 9. *Meyna*

5b. Plants unarmed; ovary usually 2-celled:

6a. Stipules intrapetiolar;
seeds planoconvex
... 17. *Psychotria*

6b. Stipules interpetiolar;
seeds obovoid or reniform
... 10. *Morinda*

4b. Corolla lobes twisted in bud:

7a. Flowers solitary or clustered
.... 3. *Coffea*

7b. Flowers not solitary or clustered:

8a. Flowers pentamerous;
fruits 1 pyrenous
... 15. *Pavetta*

8b. Flowers tetramerous;
fruits 2-4 pyrenous
.... 8. *Ixora*

1b. Ovules 2-many in each cell:

9a. Herbs:

10a. Flowers pentamerous:

11a. Flowers axillary, solitary
.... 4. *Dentella*

11b. Flowers in terminal panicles or
dichotomous cymes:

12a. Flowers in panicles; capsules
subglobose ... 16. *Polyura*

12b. Flowers in dichotomous cymes; capsules compressed, obcordate ... 12. *Ophiorrhiza*

10b. Flowers usually tetramerous .... 6. *Hedyotis*

9b. Trees:

13a. Flowers in globose heads:

14a. Heads lateral; receptacles glabrous seeds winged .... 5. *Haldinia*

14b. Heads terminal; receptacles hairy; seeds not winged .... 1. *Anthocephalus*

13b. Flowers fascicled, panicled or in corymbose cymes:

15a. Fruit a capsule:

16a. Bracts foliaceous; calyx lobes deciduous; seeds winged .... 7. *Hymenodictyon*

16b. Bracts narrow; calyx lobes persistent; seeds usually not winged ... 20. *Wedlandia*

15b. Fruit a berry:

17a. Calyx with one sepal petaloid ... 11. *Mussaenda*

17b. Calyx without petaloid sepal:

18a. Calyx lobes exceeding the corolla

... 12. *Myroneuron*

18b. Calyx lobes not exceeding the corolla:

19a. Stipules interpetiolar;

flowers 5-8 merous .... 2. **Catunaregam**

19b. Stipules intrapetiolar;

flowers 5 merous ... 18. *Randia*

1. *Anthocephalus* A. Rich.

A. Rich. in Mem. Soc. Hist. Nat. Paris 5: 23. 1834.

About 3 species are distributed in Indo-Malayan region; one species in India which occurs in the study area also.

Anthocephalus chinensis (Lamk.) A. Rich. ex Walp. Repret. 2: 491. 1843; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds Hajra *et al.*) 1: 565. 1996. *Cephalanthus chinensis* Lamk., Encycl. Meth. Bot. 1: 678. 1785. *Anthocephalus cadamba* (Roxb.) Miq., Fl. Ind. Bot. 2: 135. 1856; Hook. f., Fl. Brit. Ind. 3: 23. 1880; Kanjilal *et al.*, Fl. Assam 3: 18. 1939. "Kadcm".

Deciduous tree; branches spreading, horizental. Leaves *ca* 10-25 × 5-10 cm, ovate-elliptic or ovate-lanceolate, acute, coriaceous; stipules lanceolate. Flowers orange yellow, in terminal peduncled, solitary globose heads. Corolla funnel shaped, *ca* 0.7 cm long. Stamens 5. Pseudocarps fleshy, *ca* 4-6 cm in diam.

Fls. & Frts.: December - May.

Occurrence: Common, along roadside of the area.

Distribution: Throughout India; China, Malaysia.

Specimen examined: Haduk; *Bora* 15483 (NEHU).

Uses: Timber used for making various household materials.

2. *Catunaregam* Adans.

Adans., Fam. 2: 85. 1763.

Shrubs or small trees, armed or unarmed. Stipules interpetiolar, caducous. Inflorescence an umbel or fascicle on apex of branchyblasts. Flowers 5-8 merous. Calyx shortly lobed. Corolla campanulate. Anthers exserted. Ovary 2 celled. Fruits berry.

About 6 species distributed in tropical Africa and Asia; 2 species in the study area.

Key to the species

1a. Flowers large; berry crowned with persistent calyx .... 2. *C. uliginosa*

1b. Flowers smallar than above; berry without persistent calyx .... 1. *C. spinosa*

1. *Catunaregam spinosa* (Thunb.) Tirven. in Taxon 27: 515. 1978 et in Bull. Mus. Hist. Nat. (Paris) ser. 3. 35: 13. 1978; Khanna in Verma *et al.*, Fl. M. P. 1: 530. 1993. *Randia dumetorum* (Retz.) Poir. in Lamk., Encycl. Suppl. 2: 829. 1812; Hook. f., Fl. Brit. Ind. 3: 110. 1880. *Xeromphis spinosa*

(Thunb.) Keay in Bull. Jard. Bot. Elat 28: 37. 1958. "Mayon".

Spiny shrub; spines axillary. Leaves fasciculated on branchlets, *ca* 3-11 x 1.5-4.0 cm, obovate, acute or obtuse, narrowed down into a petiole. Flowers creamy white, solitary or 2-3 together. Berries globose, fleshy.

Fls. & Frts.: May - October.

Occurrence: Common, along roadside and forest margins.

Distribution: Assam, Meghalaya, Subtropical Himalayas, W. Peninsula; Bangladesh, Sri Lanka.

Specimen examined: Rangamati; *Bora* 15140 (NEHU).

Uses: Fruits used for fish poisoning.

2. **Catunaregam uliginosa** (Retz.) Sivarajan, Fl. Calicut 132. 1982; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 567. 1996. *Randia uliginosa* (Retz.) Poir. in Lamk., Encycl. Meth. Bot. Suppl. 2: 829. 1811; Hook. f., Fl. Brit. Ind. 3: 110. 1880. *Xeromphis uliginosa* (Retz.) Maheshwari in Bull. Bot. Surv. Iind. 3: 92. 1961. "Bon Bengana".

Shrub; bark rusty dark; branchlets quadrangular. Leaves obovate-oblong, crowded at the end of branches; stipules triangular. Flowers white, solitary axillary. Corolla large, *ca* 2.5-3.0 cm long, showy; limb broad spreading; lobes obtuse. Berries spherical, crownded with persistent calyx.

Fls. & Frts.: May - September.

Occurrence: Common, dominant shrub in the plain forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Central and South India.

Specimen examined: Thengbhanga; *Bora* 15485 (NEHU).

3. *Coffea* Linn.

Linn., Sp. Pl. 172. 1753 & Gen. Pl. ed. 5. 80. 1754.

About 40 species distributed in tropics; 5 species in India; one species in the study area.

Coffea benghalensis Heyne ex Roem. & Schult., Syst. Veg. 5: 200. 1819; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 570. 1996. *C. bengalensis* Roxb., Fl. Ind. 1: 540. 1820; Hook. f., Fl. Brit. Ind. 3: 153. 1880; Kanjilal *et al.*, Fl. Aassm 3: 75. 1939.

Shrub. Leaves elliptic to ovate-lanceolate, acuminate; stipules interpetiolar. Flowers white, 1-3 at the ends of small branchlets. Calyx 5 teethed, persistent. Corolla twisted. Stamens 5. Ovary 2-celled. Drupes subglobose, *ca* 0.5-0.8 cm long, black.

Fls. & Frts.: March - October.

Occurrence: Common, in shady hilly forest floors.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Tripura, S. India, Madhaya Pradesh; Myanmar, Thailand.

Specimen examined: Dhekiabari; *Bora* 15358 (NEHU).

Notes: Wild relative of cultivated Coffea plant.

4. *Dentella* Forst.

J.R. & G. Forst., Char. Gen. Pl. Ins. Mar. Austr. 25. 1776.

About 10 species distributed in South East Asia and Australia; 2 species in India; one species in the study area.

Dentella repens (Linn.) J.R. & G.Forst., Char. Gen. Pl. 26. t. 13. 1776: Hook. f., Fl. Brit. Ind. 3: 42. 1880; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 1996. *Oldenlandia repens* Linn., Mant. Pl. 1: 40. 1767. *Hedyotis repens* Lamk., Encycl. Meth. Bot. 1: 171. 1791.

Prostrate herb; rooting at nodes. Leaves *ca* 0.3-1.0 x 0.2-0.3 cm, oblanceolate or oblong-elliptic, spathulate, subsessile. Floweers white, axillary, solitary. Calyx 5 toothed, persistent. Corolla *ca* 0.4 cm long, funnel shaped. Stamens 5. Fruits globose or subglobose, hispid.

Fls. & Frts.: June - December.

Occurrence: Common, in moist places of the area.

Distribution: Throughout India; China, Malaya, Tropical Australia.

Specimen examined: Haduk; *Bora* 15486 (NEHU).

5. *Haldinia* Ridsd.

Monotypic genus, distributed in Asia.

Haldinia cordifolia (Roxb.) Ridsd. in Blumea 24. 361. 1978; Chowdhery *et al.* Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 573. 1996. *Nauclea cordifolia* Roxb., Pl. Coram. 1: 40. 1795. *Adina cordifolia* (Roxb.)

Hook. f. ex Brandis, For. Fl. N.W. & C. India 263. 1874; Hook. f., Fl. Brit. Ind. 3: 24. 1880; Kanjilal *et al.*, Fl. Assam 3: 20. 1939. Fig. 26

Tree. Leaves ovate, cordate, acuminate, pubescent beneath; stipules broadly ovate or orbicular, deciduous. Flowers yellow, in globose axillary pedunculate heads. Calyx lobes oblong, pubescent. Corolla lobes ovate. Stamens inserted in the upper part of corolla tube. Styles exserted. Fruits aggregate of free capsules. Seeds winged.

Fls. & Frts.: May - December.

Occurrence: Rare, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Kumaon, Sikkim; Sri Lanka.

Specimen examined: Dhekiabari; *Bora* 15273 (NEHU).

Uses: Timber used for making agricultural implements.

6. *Hedyotis* Linn.

Linn., Sp. Pl. 101. 1753 & Gen. Pl. ed. 5. 44. 1754.

Herbs, shrubs or rarely climbers. Leaves opposite; stipules interpetiolar. Flowers in axillary or terminal paniculate cymes, rarely solitary. Calyx turbinate, 4 lobed. Corolla campanulate, 4 lobed. Stamens 4-5. Ovary 2-celled; ovules many. Fruit a capsule, usually crownded by calyx limb.

About 450 species distributed in subtropical regions; about 70 species in India; 5 species in the study area.

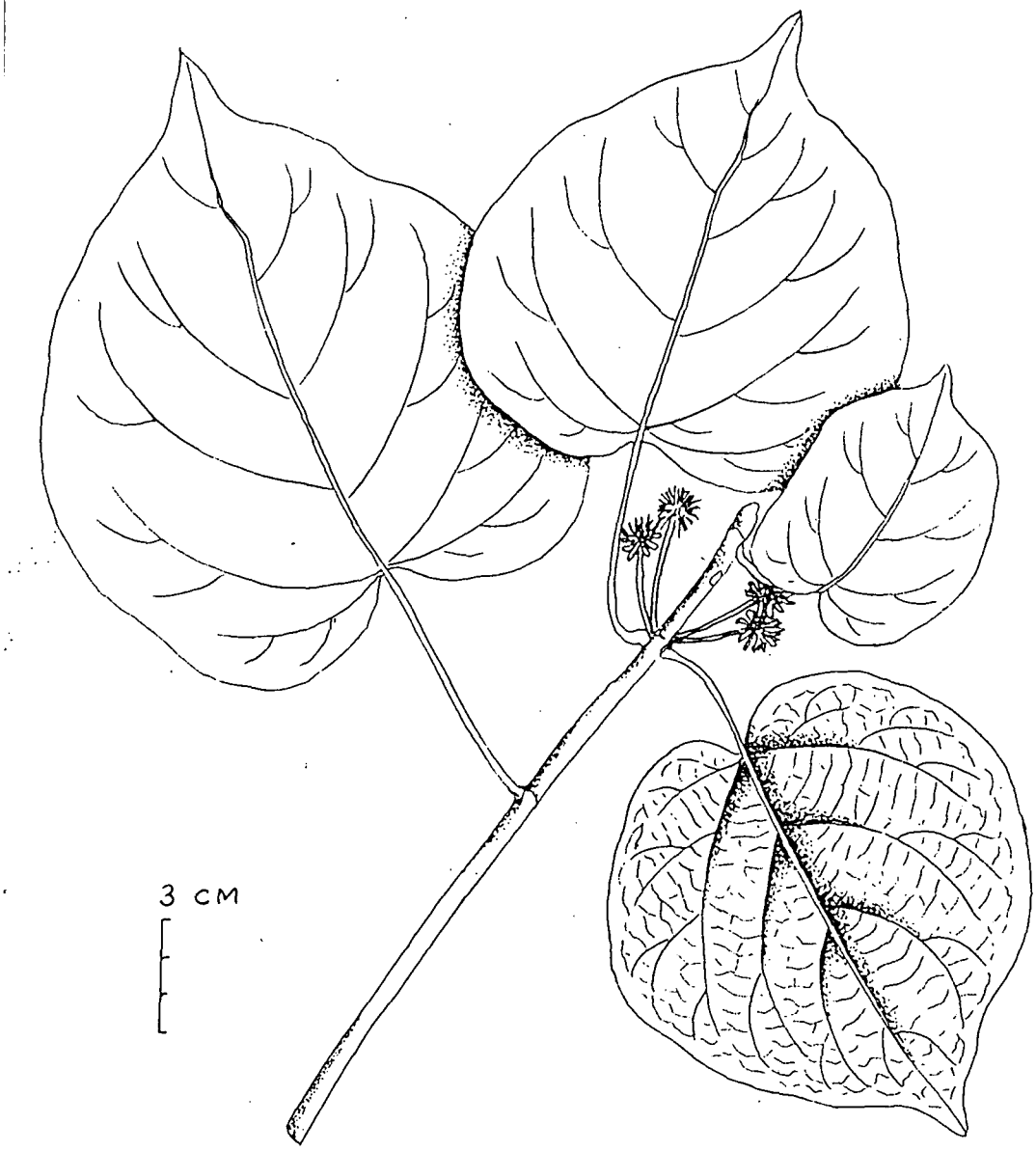


Fig. 26: ***Haldinia cordifolia*** (Roxb.) Ridsd. (Rubiaceae)

Key to the species

1a. Plants scandent; stipules connate into a bicuspidate cup .... 3. *H. scandens*

1b. Plants erect or diffuse; stipules not forming bicuspidate cup:

2a. Capsules didymous; calyx teeth more or less shorter than capsule:

3a. Flowers pedicelled, in pairs or three .... 1. *H. corymbosa*

3b. Flowers sessile or shortly pedicelled, solitary .... 2. *H. diffusa*

2b. Capsules not didymous; calyx teeth equalling the capsule:

4a. Capsules glabrous .... 4. *H. tenelliflora*

4b. Capsules hispid .... 5. *H. verticillata*

1. *Hedyotis corymbosa* (Linn.) Lamk., Encycl. Meth. Bot. 1: 272. 1791; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 574. 1996. *Oldenlandia corymbosa* Linn., Sp. Pl. 119. 1753; Hook. f., Fl. Brit. Ind. 3: 64. 1880.

Decumbent herb; stem quadrangular, thinly hairy. Leaves narrowly linear-lanceolate, acute; stipules sheathing. Flowers white, in 1-3 flowered pedunculate, axillary cymes or fascicles. Capsules ovoid, didymous.

Fls. & Frts.: June - December.

Occurrence: Common, in moist places of the sanctuary

Distribution: Throughout India; Pantropic.

Specimen examined: Haduk; *Bora* 15487 (NEHU).

2. ***Hedyotis diffusa*** Willd., Sp. Pl. 1: 566. 1797; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 575. 1996. *Oldenlandia diffusa* (Willd.) Roxb., Fl. Ind. 1: 444. 1820; Hook. f., Fl. Brit. Ind. 3: 65. 1880; Kanjilal *et al.*, Fl. Assam 3: 39. 1939.

Diffusely prostrate herb. Leaves linear or linear-lanceolate, scabrid, subsessile; stipules short, scabrid. Flowers white, sessile or shortly pedicelled, solitary, axillary. Capsules didymous, ovoid.

Fls. & Frts.: April - November.

Occurrence: Common, in moist places of the sanctuary.

Distribution: Throughout India; Tropical and subtropical East and South East Asia, Philippines.

Specimen examined: Haduk; *Bora* 14768 (NEHU).

3. ***Hedyotis scandens*** Roxb. ex D. Don, Prodr. Fl. Nep. 134. 1825; Hook. f., Fl. Ind. 3: 57. 1880; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 576. 1996. *Oldenlandia scandens* (Roxb.) Kuntze, Rev. Gen. Pl. 1: 292. 1891.

Scandent herb. Leaves *ca* 5-10 x 1.5-2.5 cm, elliptic-oblong or lanceolate, acuminate; stipules connate into a bicuspidate cup, ciliolate. Flowers white, in terminal subumbellate or trichotomous cymes. Calyx lobes scabrid. Corolla lobes oblong. Style hairy. Capsules obovoid.

Fls. & Frts.: November - March.

Occurrence: Common, on shady hilly slopes of the area.

Distribution: Arunachal Pradesh, Assam, Tripura, Tropical and subtropical Himalayas; Bangladesh, Myanmar, Nepal, Thailand.

Specimen examined: Haduk; *Bora* 14812 (NEHU).

Uses: Leaf paste used externally in skin diseases.

4. *Hedyotis torneflora* Bl., Brijdr. 971. 1826; Hook. f., Fl. Brit. Ind. 3: 60. 1880; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 576. 1996.

Diffuse quadriangular undershrub. Leaves linear-lanceolate, sessile. Flowers white, in few flowered clusters or solitary. Calyx teeth equalling the capsules. Capsules ovoid, glabrous.

Fls. & Frts.: April - November.

Occurrence: Occasionally, in moist places of the area.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Nicobar Island, Sikkim; South China, Philippines.

Specimen examined: Burha Mayong; *Bora* 15037 (NEHU).

5 *Hedyotis verticillata* (Linn.) Lamk., Encycl. Meth. Bot. 1: 271. 1791; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 577. 1996. *H. hispida* Retz., Obs. Bot. 4: 23. 1786; Hook. f., Fl. Brit. Ind. 3: 60. 1880. *Oldenlandia verticillata* Linn., Mant. Pl. 1: 40. 1767.

Prostrate, diffuse, hispid herb. Leaves *ca* 2.0-6.5 x 0.3-1.3 cm, linear-

lanceolate, sessile, acute, hispid beneath; stipules ciliate. Flowers white, in axillary clusters. Calyx hispid, shortly tubular. Capsules ovoid, hispid.

Fls. & Frts.: May - December.

Occurrence: Common, in moist places of the sanctuary.

Distribution: Throughout India; China, Malaysia, Thailand, Vietnam.

Specimen examined: Burha Mayong; *Bora* 15034 (NEHU).

7. *Hymenodictyon* Wall.

Wall. in Roxb. Fl. Ind. 2: 149. 1824.

About 20 species distributed in tropical Asia and Africa; 3 species in India; one species in the study area.

Hymenodictyon excelsum (Roxb.) Wall. in Roxb. Fl. Ind. 2: 149. 1824; Hook. f., Fl. Brit. Ind. 3: 35. 1880; Kanjilal *et al.*, Fl. Assam 3: 26. 1939; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 577. 1996. *Cinchona thyrsiflora* Roxb., Fl. Ind. 2: 151. 1824.

Middle sized deciduous tree. Leaves *ca* 12-18 x 5-10 cm, ovate-elliptic, acuminate, pubescent. Flowers white, in terminal drooping panicles. Calyx 5, ovate. Corolla 5 lobed. Stamens 5. Fruits ellipsoid, loculicidal capsule.

Fls. & Frts.: May - December.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Throughout India; Bangladesh, Malaysia, Myanmar.

Specimen examined: Rangamati; *Bora* 15357 (NEHU).

8. Ixora Linn.

Linn., Sp. Pl. 110. 1753 & Gen. Pl. ed. 5. 48. 1754.

Shrubs or small trees. Leaves opposite; stipules interpetiolar. Flowers in terminal corymbosely paniculate cymes. Calyx limb persistent. Corolla lobes spreading. Stamens inserted on throat. Ovary 2-celled. Berry with 1-2 pyrenes.

About 400 species distributed in tropical regions; 330 species in India; 3 species in the study area.

Key to the species

1a. Undershrubs; flowers in compact corymbose, nearly sessile cymes .... 1. *I. acuminata*

1b. Shrubs or small trees; flowers in short or long pedunculate cymes:

2a. Calyx teeth as long as the ovary .... 3. *I. undulata*

2b. Calyx teeth longer than the ovary .... 2. *I. subsessilis*

1. ***Ixora acuminata*** Roxb., Fl. Ind. 1: 383. 1832; Hook. f., Fl. Brit. Ind. 3: 137. 1880; Kanjilal *et al.*, Fl. Assam 3: 68. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 479. 1987; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 578. 1996.

Undershrub; branches ribbed. Leaves *ca* 15-30 x 7-15 cm, obovate-oblong or obovate-oblanceolate, elliptic, acuminate. Flowers white, fragrant in corymbs. Corolla tube slender; lobes oblong, spreading; [illegible] ovoid or

ellipsoid with persistent calyx tube.

Fls. & Frts.: April - December.

Occurrence: Common, in shady forest floors of the area.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Sikkim, Tripura; Bangladesh.

Specimen examined: Kamarpur; *Bora* 15489 (NEHU).

Notes: Confined to North-east India and extend upto Bangladesh. Ornamentally important wild plant.

2. *Ixora subsessilis* Wall. ex G. Don, Gen. Syst. 3: 573. 1834; Hook. f., Fl. Brit. Ind. 3: 139. 1880; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 580. 1996.

Small tree. Leaves *ca* 4-22 x 2-6 cm, elliptic-lanceolate; stipules sheathing. Flowers white with pinkish tinge, in terminal subsessile corymbiform cymes. Calyx teeth longer than ovary. Corolla tube *ca* 2.5 cm long. Drupes oblong, *ca* 0.8 x 0.4 cm.

Fls. & Frts.: April - August.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: North East India.

Specimen examined: Hiloikhunda; *Bora* 15490 (NEHU).

Notes: Confined to North-east India.

3. *Ixora undulata* Roxb., Fl. Ind. 1: 385. 1832; Hook. f., Fl. Brit. Ind. 3: 147. 1880; Kanjilal *et al.*, Fl. Assam 3: 71. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 481. 1987; Chowdhery *et al.* in Materials for the Fl.

Arunachal Prad. (eds. Hajra *et al.*) 1: 582. 1996.

Shrub. Leaves *ca* 5-15 x 1.5-5.5 cm, elliptic to linear-lanceolate, acute, margin undulate. Flowers white, in corymbose panicles; bracts and bracteoles subulate. Calyx teeth lanceolate. Corolla lobes reflexed. Fruits ellipsoid with 2 plano-convex pyrenes.

Fls. & Frts.: April - October.

Occurrence: Occasionally, throughout the area.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Tripura, Tropical Himalayas; Bangladesh, Nepal.

Specimen examined: Haduk; *Bora* 15035 (NEHU).

Notes: Confined to Eastern Tropical Himalayas and extend upto Bangladesh and Nepal. Ornamentally important wild plant.

9. *Meyna* Roxb. ex Link.

Roxb. ex Link. in Jahrb. Gewachsk 1(3): 32. 1820.

About 11 species distributed in tropical Asia to S.E. Asia; 2 species in India; one species is in the study area.

Meyna spinosa Roxb. ex Link. Jahrb. Bot. 1(3): 32. 1820; Chauhan *et al.* in Fl. Namdapha (eds. Hajra *et al.*) 188. 1996. *Vanguria spinosa* Roxb., Fl. Ind. 2: 172. 1824; Hook. f., Fl. Brit. Ind. 3: 66. 1939. "Kutkura".

Small tree, spiny; branches busy; spines axillary, straight. Leaves *ca* 4-15 x 2-7 cm, ovate-elliptic, acute, slightly pubescent beneath; stipules connate. Flowers greenish white, in axillary cymes. Calyx 5 teethed Corolla 5

lobed. Stamens 5. Ovary 5-celled. Fruits globose or obovoid drupe.

Fls. & Frts.: April - October.

Occurrence: Occasionally, along roadside of the area.

Distribution: North East India, East and South India; Bangladesh, China, Malaya, Myanmar.

Specimen examined: Burha Mayong; *Bora* 15491 (NEHU).

Uses: Fruits edible.

10. *Morinda* Linn.

Linn., Sp. Pl. 250. 1753 & Gen. Pl. ed. 5. 81. 1754.

About 80 species distributed in tropics; 8 species in India; one species in the study area.

Morinda angustifolia Roxb., Pl. Corom. 3(2): t. 237. 1815 & Fl. Ind. 1: 547. 1820; Hook. f., Fl. Brit. Ind. 3: 157. 1880; Kanjilal *et al.*, Fl. Assam 3: 79. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 488. 1987; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 587. 1996. **"Aashu gach".**

Shrub. Leaves *ca* 8-25 x 3-12 cm, elliptic-oblong to oblanceolate, acuminate, narrowed down into a petiole. Flowers white, in axillary cymes or leaf-opposed globose heads. Corolla funnel shaped; tube *ca* 2 cm long. Stamens inserted in throat. Stigma hairy. Fruits fleshy syncarp of 1 seeded pyrenes.

Fls. & Frts.: February - October.

Occurrence: Occasionally, throughout the study area.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Tripura; Tropical Himalayas; Bangladesh, Myanmar, Nepal.

Specimen examined: Burha Mayong; *Bora* 14752 (NEHU).

Uses: Yellow dye extracted from the root.

Notes: Confined to Tropical Himalayas, North-east India and extend upto Bangladesh, Myanmar and Nepal.

11. *Mussaenda* Linn.

Linn., Sp. Pl. 1: 177. 1753 & Gen. Pl. ed. 5. 82. 1754.

About 200 species distributed in tropics; 14 species in India; one species in the study area.

Mussaenda roxburghii Hook. f., Fl. Brit. Ind. 3: 87. 1880; Kanjilal *et al.*, Fl. Assam 3: 46. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 491. 1987; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (ed. Hajra *et al.*) 1: 589. 1996.

Shrub. Leaves *ca* 4.5-18.0 x 2.5-6.0 cm, ovate to oblong-lanceolate, hairy beneath; stipules ovate-lanceolate. Flowers orange yellow, in terminal dense subcapitate cymes. Calyx with one white petaloid sepal. Corolla tube *ca* 2-3 cm long, silky pubescent outside. Stamens 5, included. Berries globose, crownded by calyx lobes.

Fls. & Frts.: April - November.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Tripura, Tropical Himalayas; Bangladesh, Myanmar, Nepal.

Specimen examined: Rangamati; *Bora* 15492 (NEHU).

Notes: Confined to Indo-Nepal, Indo-Burmes and Indo-Bangladesh regions. Ornamentally important wild plant.

12. *Myrioneuron* R. Br.

R. Br. ex Hook. f. in Benth. & Hook. f., Gen. Pl. 2: 69. 1873.

About 15 species distributed in Indo-Malayan regions; 2 species in India; one species in the study area.

Myrioneuron nutans Wall. ex Kurz., For. Fl. Brit. Burma 2: 55. 1877; Hook. f., Brit. Ind. 3: 96. 1880; Kanjilal *et al.*, Fl. Assam 3: 50. 1939; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 592. 1996.

Small shrub. Leaves *ca* 10-30 x 6-15 cm, elliptic-ovate, abruptly acuminate, subscabrid beneath; stipules large, oblong-lanceolate. Flowers white, in terminal or axillary condensed corymbose cymes. Calyx lobes 5, exceeding corolla. Corolla throat villose. Stamens 5, included. Stigma 6 fid. Berries globose, crownded by calyx segments.

Fls. & Frts.: June - February.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Tripura; **Bangladesh.**

Specimen examined: Rangamati; *Bora* 15036 (NEHU).

Notes: Confined to North-east India and extend upto Bangladesh.

13. *Ophiorrhiza* Linn.

Linn., Sp. Pl. 150. 1753 & Gen. Pl. ed. 5. 75. 1754.

About 150 species distributed in tropical Asia, Australia, Polynasia; 33 species in India; one species in the study area.

Ophiorrhiza succirubra King ex Hook. f., Fl. Brit. Ind. 3: 82. 1880; Deb, Fl. Tripura 2: 75. 1983; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 599. 1996.

Herb. Leaves *ca* 5-12 cm long, elliptic-lanceolate or oblong-lanceolate, acuminate, reddish beneath. Flowers white, in terminal cymes or corymbs; bracteoles linear-lanceolate. Calyx lobes 5, persistent. Corolla lobes 5, ovate, acute. Stamens 5, included. Friuts obcordate capsule, puberulous.

Fls. & Frts.: June - October.

Occurrence: Common, in moist shady hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Sikkim, Tripura; **Myanmar, Nepal.**

Specimen examined: Rangamati; *Bora* 15493 (NEHU).

Uses: Leaves as vegetable.

Notes: Confined to Indo-Nepal and Indo-Burmes regions.

14. *Paederia* Linn.

Linn., Syst. Nat. ed. 10. 189. 1759 & Mant. 7. 52. 1776, *nom. cons.*

About 50 species distributed in tropics; 4 species in India; one species in the study area.

Paederia foetida Linn., Mant. Pl. 7: 52. 1767; Hook. f., Fl. Brit. Ind. 3: 195. 1880; Kanjilal *et al.*, Fl. Assam 3: 77. 1939; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 602. 1996. "Bhebeli lota".

Twining foetid smelling herb. Leaves *ca* 3.5-10.0 x 2.0-4.5 cm, ovate-lanceolate, acuminate, rounded or subcordate at base. Flowers purplish, in axillary or terminal paniculate cymes. Corolla funnel shaped; tube glandular hairy within. Stamens 5, included. Fruits ellipsoid, compressed.

Fls. & Frts.: May - November.

Occurrence: Common, throughout the study area.

Distribution: Throughout India; China, Japan, Malaya.

Specimen examined: Burha Mayong; *Bora* 14733 (NEHU).

Uses: Leaf extract taken in dysentery and stomach trouble; leaf paste used for massaging in muscular pain.

15. *Pavetta* Linn.

Linn., Sp. Pl. 110. 1753 & Gen. Pl. ed. 5. 49. 1754.

About 400 species distributed in tropics; 3 species in India; one

species in the study area.

Pavetta indica Linn., Sp. Pl. 110. 1753; Hook. f., Fl. Brit. Ind. 3: 150. 1880; Kanjilal *et al.*, Fl. Assam 3: 72. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 495. 1987.

Shrub. Leaves *ca* 4-18 x 1.5-7.0 cm, elliptic-lanceolate, acuminate, narrowed down into a petiole. Flowers bluish white, in corymbose panicles. Calyx *ca* 0.3 cm long. Corolla tube *ca* 1.2 cm long; lobes linear-oblong, obtuse. Anthers blackish, exserted. Fruits globose drupe, 1-2 seeded.

Fls. & Frts.: April - October.

Occurrence: Occasionally, throughout the study area.

Distribution: Throughout India; China, Malaya, Tropical Australia.

Specimen examined: Rangamati; *Bora* 15494 (NEHU).

16. *Polyura* Hook. f.

Hook. f. in Hook. Ic. Pl. t. 1049. 1868.

Monotypic genus and reported from the study area also.

Polyura geminata Hook. f., Ic. Pl. ser. 3. 11. t. 1049. 1868 & Fl. Brit. Ind. 3: 77. 1880; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 604. 1996.

Puberulous herb. Leaves elliptic-lanceolate; stipules filiform. Flowers white, in axillary peduncled, scorpoid cymes; bracts leafy. Calyx 5 lobed. Corolla 5 lobed, valvate in bud. Stamens 5. Fruits subglobose capsule.

Fls. & Frts.: April - December.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Meghalaya.

Specimen examined: Burha Mayong 15038 (NEHU).

Notes: Confined to North-east India.

17. *Psychotria* Linn.

Linn., Syst. Nat. ed. 10. 924. 1364. 1759, *nom. cons.*

Shrubs or small trees, somtimes herbs. Stipules interpetiolar. Flowers in axillary or terminal, opposite or subopposite, pedunculate cymes or racemes. Calyx teeth short. Corolla lobes 5, valvate in bud. Stamens at the throat of corolla. Ovules 2 in each cell. Drupe 2 pyrenes.

About 700 species distributed in tropics and subtropics; 40 species in India; 2 species in the study area.

Key to the species

1a. Calyx teeth obscure; pyrenes plano-convex

.... 1. *P. denticulata*

1b. Calyx teeth lanceolate; pyrenes dorsally 4 riged

.... 2. *P. monticola*

1. *Psychotria denticulata* Wall. in Roxb., Fl. Ind. 2: 166. 1824; Hook. f., Fl. Brit. Ind. 3: 173. 1880; Kanjilal *et al.*, Fl. Assam 3: 83. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 498. 1987; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 607. 1996. *P.*

nervosa D. Don, Prodr. Fl. Nep. 137. 1825.

Shrub. Leaves broadly elliptic to oblanceolate, puberulous beneath, denticulate; stipules large, 2 cuspidate. Flowers greenish in axillary or terminal corymbose cymes. Corolla lobes incurved. Fruits globose. Pyrenes plano-convex.

Fls. & Frts.: April - December.

Occurrence: Occasionally, in shady hilly forest.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Tripura, Tropical Himalayas; Myanmar.

Specimen examined: Burha Mayong; *Bora* 15386 (NEHU).

Notes: Confined to Indo-Burmese region.

2. *Psychotria monoticola* Kurz in J. Asiat. Soc. Beng. 2: 315. 1872; Haridasan & Rao, For. Fl. Meghalaya 2: 499. 1987; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 608. 1996. *P. fulva* Hook. f., Fl. Brit. Ind. 3: 85. 1939; Knajilal *et al.*, Fl. Assam 3: 85. 1939. Fig. 27

Undershrub. Leaves elliptic-ovate or broadly elliptic-lanceolate, shortly acuminate; stipules 2 cuspidate. Flowers greenish white, in axillary or subterminal peduncled cymes. Calyx lobes ovate, persistent. Corolla lobes spreading. Fruits ellipsoid. Pyrenes dorsally 4 ridged.

Fls. & Frts.: May - December.

Occurrence: Occasionally, in shady hilly forest.

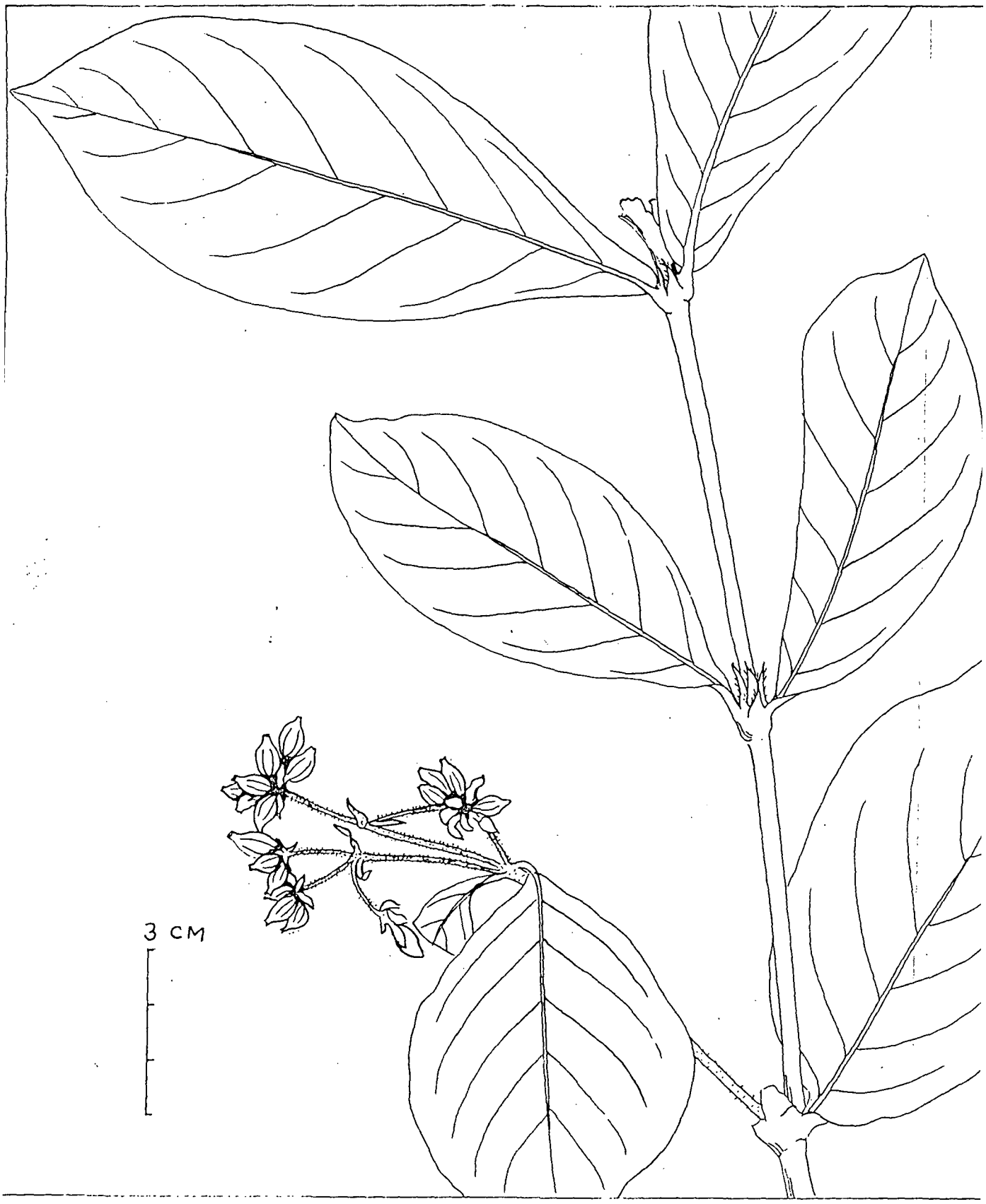


Fig. 27: ***Psychotria monticola*** Kurz (Rubiaceae)

Distribution: Arunachal Pradesh, Assam, Meghalaya, Tripura, Tropical Himalayas; Bangladesh, Myanmar.

Specimen examined: Burha Mayong; *Bora* 15389 (NEHU).

Notes: Confined to Tropical Himalayas, North-east India and extend upto Bangladesh, Myanmar.

18. *Randia* Linn.

Linn., Sp. Pl. 1192. 1753 & Gen. Pl. ed. 5. 74. 1754.

About 200 species distributed in tropical regions; 10 species in India; one species in the study area.

Randia fasciculata (Roxb.) DC., Prodr. 4: 386. 1830; Hook. f., Fl. Brit. Ind. 3: 109. 1880; Kanjilal *et al.*, Fl. Assm 3: 59. 1939. *Oxyceros fasciculata* (Roxb.) Yamazaki in J. Jap. Bot. 45. 340. 1970. **Fig. 28**

Spiny shrub; branches spreading, drooping, pubescent; spines axillary. Leaves *ca* 4-10.5 x 1.5-3.5 cm, elliptic or ovate, acute, entire. Flowers white, bracteate in axillary fscicles. Fruits globose.

Fls. & Frts.: April - January.

Occurrence: Occasionally, throughout the study area.

Distribution: Arunachal Pradesh, Assam, Tripura, Tropical Himalayas; Bagladesh, Bhutan, Myanmar, Nepal.

Specimen examined: Rangamati; *Bora* 15231 (NEHU).

Notes: Confined to Indo-Bangladesh, Indo-Bhutan, Indo-Burmese and Indo-Nepal regions.

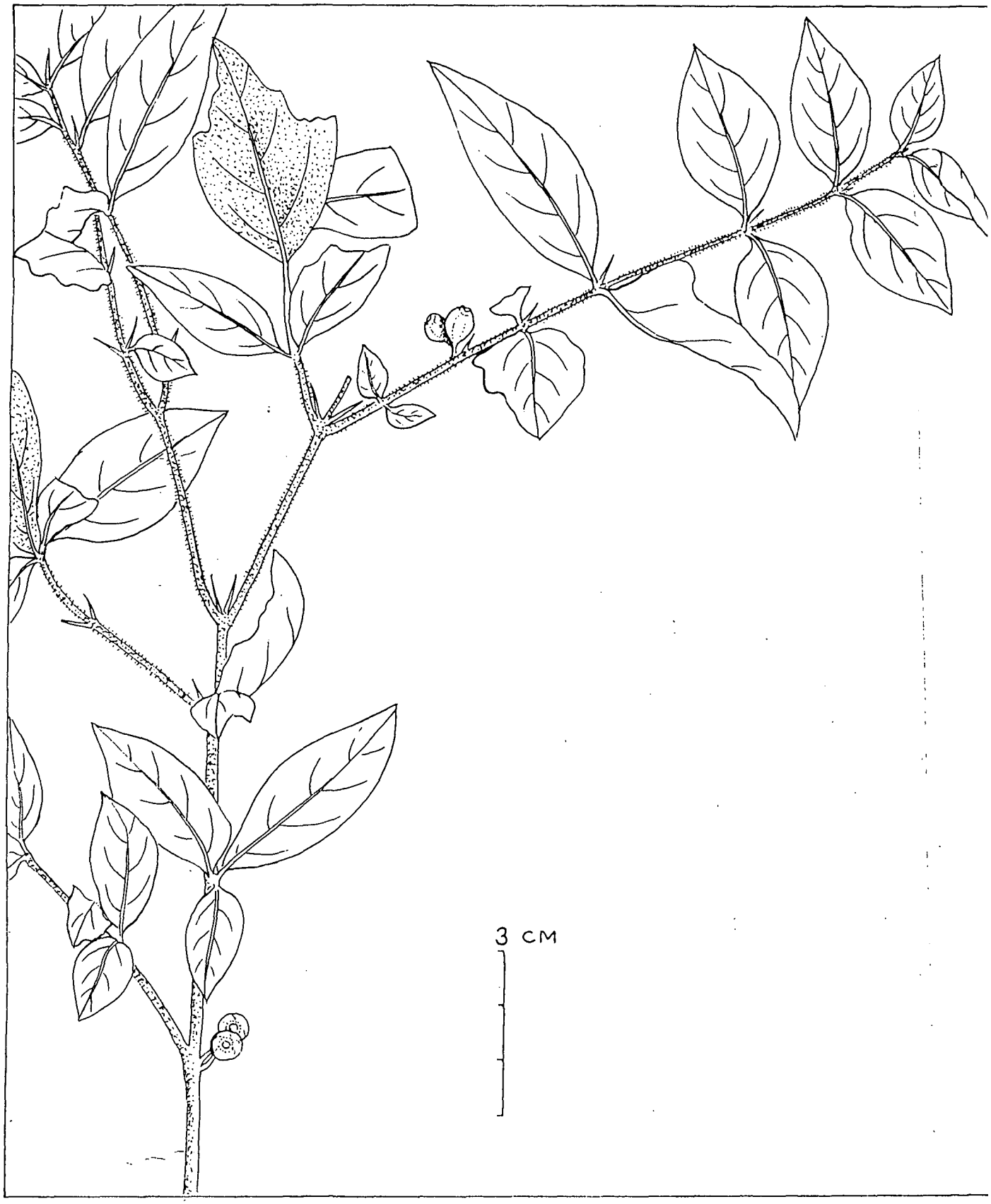


Fig. 28: ***Randia fasciculata*** (Roxb.) DC. (Rubiaceae)

19. *Spermacoce* Linn.

Linn., Sp. Pl. 102. 1753 & Gen. Pl. ed. 5. 44. 1754.

About 150 species distributed in the warmer regions; 8 species in India; one species in the study area.

Spermacoce latifolia Aubl., Hist. Pt. Guiane Fr. 55. t. 194. 1775; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 612. 1996. *Borreria eradii* Ravi in J. Bom. Nat. Hist. Soc. 66(3): 589. 1970.

Erect hirsute herb. Leaves elliptic to lanceolate; stipules connate with petioles forming a sheath, dividing into hairs. Flowers white, in axillary 4-5 flowered clusters. Calyx 4 lobed. Corolla funnel shaped. Stamens 4 on the throat of corolla. Fruits ellipsoid.

Fls. & Frts.: April - September.

Occurrence: Common, in the hilly forest of the area.

Distribution: Arunachal Pradesh, Assam.

Specimen examined: Burha Mayong; *Bora* 15495 (NEHU).

Notes: Probably confined to North-east India,

20. *Wendlandia* Bart. ex DC.

Bart. ex DC., Prodr. 4:441. 1830, *nom. cons.*

About 70 species mostly distributed in tropical Asia; 20 species in India; one species in the study area.

Wendlandia puberula DC., Prodr. 4: 412. 1830; Hook. f., Fl. Brit. Ind. 3: 37. 1880; Chowdhery *et al.* in Materials for the Fl. Arunachal Prad. (eds. Hajra *et al.*) 1: 617. 1996. *W. sikkimensis* Cowan in Notes Roy. Bot. Gard. Edinburgh 16: 246. t. 232. f. 4. 1932. Fig. 29

Small tree; young parts puberulous. Leaves elliptic-oblong, acuminate, narrowed into a short petiole, pubescesnt along nerves beneath. Flowers white, in terminal or axillary panicles. Corolla tube funnel shaped. Stamens 5, alternating with corolla lobes. Capsules globose, glabrous.

Fls. & Frts.: March - August.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Tropical Himalayas.

Specimen examined: Dhekiabari; *Bora* 15032 (NEHU).

Notes: Confined to Eastern Himalayas.

62. ASTERACEAE

Dumortier, Comment. 55. 1822.

The family comprises about 900 genera and 1300 species, distributed throughout the world; about 138 genera and 708 species in India; 19 genera and 24 species in the study area.

Key to the genera

1a. Head homogamous:

2a. Involucral bracts 2-many seriate:

3a. Pappus absent .... 9. *Ethulia*



Fig. 29: ***Wendlandia puberula*** DC. (Rubiaceae)

3b. Pappus present:

4a. Leaves and Involucral bracts spinous; receptacle mostly bristly .... 3. *Cirsium*

4b. Leaves, Involucral bracts and receptacle not like as above:

5a. Leaves usually opposite; achenes 5 angled or ribbed:

6a. Pappus of 5 awned scales .... 1. *Ageratum*

6b. Pappus of slender hairs ... 10. *Eupatorium*

5b. Leaves usually alternate; achenes 10 ribbed:

7a. Heads compound; pappus rigid .... 6. *Elephentopus*

7b. Heads simple; pappus not rigid ... 18. *Vernonia*

2b. Involucral bracts uniseriate:

8a. Plants climber; leaves opposite, ... 14. *Mikania*

8b. Plants erect; leaves alternate ... 13. *Gynura*

1b. Heads heterogamous:

9a. Outer florets filiform; inner stoute tubular:

10a. Pappus absent or insignificant; anther bases not sagittate:

11a. Pappus minute, cupular; achenes without thickened border ... 12. *Grangea*

11b. Pappus absent; achenes with thickened border .... 4. *Dichrocephala*

10b. Pappus distinct; anther bases usually sagittate:

12a. Involucral bracts herbaceous; style arms of bisexual flowers filiform .... 2. *Blumea*

12b. Involucral bracts scarious or hyaline; style arms of bisexual flowers truncate ... 11. *Gnaphalium*

9b. Outer florets ligulate; inner tubular;

13a. Receptacles not paleacous .... 8. *Erigeron*

13b. Receptacles paleaceous:

14a. Leaves alternate; fruits armed with spines ... 19. *Xanthium*

14b. Leaves opposite; fruits without spines:

15a. Ray florets many seriate .... 7. *Enhydra*

15b. Ray florets 1-2 seriate:

16a. Achenes silky; pappus of aristate, feathery bristles ... 17. *Tridax*

16b. Achenes not silky; pappus
absent or not like as above:

17a. Receptacle convex, elongate
... 15. *Spilanthes*

17b. Receptacle flate or nearly so:

18a. Involucre broadly campanulate;
flowers usually white .. 5. *Eclipta*

18b. Involucre ovoid or oblong;
flowers yellow ... 16. *Synedrella*

1. *Ageratum* Linn.

Linn., Sp. Pl. 839. 1753 & Gen. Pl. ed. 5. 363. 1754.

Herbs or shrubs. Heads homogamous. Involucre campanulate; bracts 2-3 seriate. Corolla all tubular, 5 cleft. Anthers appendaged. Style armes elongate. Achenes 5 angled. Pappus of 5 short or 10-20 narrow scales.

About 60 species are distributed in tropical America and all warm countries; 2 species in India which occur in the study area also.

Key to the species

1a. Corolla white, light blue or violate;
involucral bracts linear, sparsely hairy
... 1. *A. conyzoides*

1b. Corolla blue or violate; involucral bracts
linear setaceous, densely hairy
... 2. *A. houstonianum*

1. *Ageratum conyzoides* Linn., Sp. Pl. 839. 1753; Hook. f., Fl. Brit. Ind. 3: 243. 1881; Santapau in Rec. Bot. Sur. Ind. 116(1): 141. 1953; Haridasan & Rao, For. Fl. Meghalaya 2: 516. 1987; Islam, Fl. Majuli 167. 1990; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 199. 1996. *A. hirta* Lamk., Dict. 1: 54. 1783.

Erect hispid herb. Leaves *ca* 3.0-6.5 x 2.0-3.5 cm, ovate-rhomboid, acute, truncate at base, hairy. Heads in terminal dense corymbs. Involucral bracts linear, sparsely hairy. Corolla white or pale blue or violate, *ca* 0.8 cm long, hairy along angles. Pappus scales 5, connate at base, *ca* 1 cm long, lanceolate.

Fls. & Frts.: Most part of the year, mostly in January - May.

Occurrence: Common, along roadside and forest floors.

Distribution: Throughout India; Pantropic.

Specimen examined: Naltoli, Thengbhanga; *Bora* 15116 (NEHU).

2. ***Ageratum houstonianum*** Mill., Gard. Dict. ed. VIII. n. 2. 1868; Robinson. Proc. Amer. Acad. Arts & Sci. 49: 454-483. 1913; Babu, Herb. Fl. D. Dun 238-239. 1977; Pradhan *et al.* in J. Eco. Tax. Bot. 13(2): 413-415. 1989.

Erect herb; stem white hairy. Leaves opposite, *ca* 2.5-7.5 x 1.3-4.2 cm, deltoid ovate, subcordate or truncate at base, obtuse or subacute at apex. Heads in terminal or axillary corymes. Involucral bracts linear setaceous, densely hairy. Pappus scales 5.

Fls. & Frts.: Most part of the year.

Occurrence: Common, in forest floors and along roadside

Distribution: Dehra Dun, Nilgiri and Pulney Hills, North East India; Afghanistan, Africa, China, Malaya, North East Australia, Philippines, South America, Sri Lanka, Thailand.

Specimen examined: Haduk, *Bora* 15560 (NEHU).

2. *Blumea* DC.

DC. in Guillemin, Arch. Bot. 2:514. 1833, *nom. cons.*

Herbs, undershrubs or shrubs, glandular-pubescent or woolly. Heads heterogamous. Involucre campanulate or urceolate; bracts many seriate. Disk florets bisexual; ray florets female. Calyx limb bristly. Female corolla filiform; bisexuals tubular. Pappus uniseriate.

About 50 species distributed in tropical South Africa, India to East Asia, Australia, Pacific Islands; 30 species in India; 2 species in the study area.

Key to the Species

1a. Erect herbs; heads in compact globose, clusters in interrupted spikes .... 1. *B. fistulosa*

1b. Prostrate or decumbent herbs; heads in terminal or axillary corymbs .... 2. *B. oxyodonta*

1. *Blumea fistulosa* (Roxb.) Kurz in J. Asiat. Soc. Bengal 47(2): 187. 1877. *Conyza fistulosa* Roxb., Fl. Ind. 3: 429. 1832. *B. glomerata* DC. in Wight, Contrib. Bot. Ind. 15. 1834; Hook. f., Fl. Brit. Ind. 3: 262. 1881 ; Kanjilal *et al.*, Fl. Assam 3: 113. 1939.

Erect pubescent herb. Leaves *ca* 3-10 x 0.8-3.0 cm, oblong-lanceolate or elliptic-oblong, serrate-dentate, tomentose puberulous; upper ones smaller. Heads *ca* 0.5 in diam., sessile in compact globose clusters in interrupted spikes. Involucral bracts 2-3 seriate, linear, pubescent. Receptacle pubescent. Ray Florets *ca* 0.3 cm long, lobed glabrous. Disk florets 5 lobed, pubescent. Achenes oblong, puberulous, 4 angled. Pappus white.

Fls. & Frts.: December - April.

Occurrence: Common, along roadside of the study area.

Distribution: Assam, Sikkim, Tripura, Tropical Himalayas; Bangladesh, China, Java, Malaya, Philippines.

Specimen examined : Haduk; *Bora* 14783 (NEHU).

2. **Blumea *oxyodonta*** DC. in Wight, Contrib. Bot. Ind. 15. 1834; Hook. f., Fl. Brit. Ind. 3: 266. 1881. *Conyza oxyodonta* Wall., Cat. no. 3015 Comp-125. 1831, *non nud.*

Prostrate or decumbent, tomentose herb. Leaves *ca* 1-3 x 0.3-0.5 cm, elliptic-obovate or obovate-oblong, acute, white silky hairy, serrate-dentate, often crowded at base. Heads in terminal or axillary corymbs, *ca* 0.5 cm in diam. Involucral bracts biseriate, linear, villose. Disk florets tubular, teeth pubescent, *ca* 0.4 cm long. Ray florets *ca* 0.4 cm long. Achenes oblong, pubescent. Pappus white.

Flr. & Frts.: February - January.

Occurrence: Common, along roadside of the study area

Distribution: Assam, Bihar, Tropical Himalayas, West Bengal; China, Philippines.

Specimen examined : Haduk, Kamarpur; *Bora* 15496 (NEHU).

3. *Cirsium* Adans.

(Tourn.) Adans., Fam. 2. 116. 1763.

About 150 species distributed throughout the world; 3 species in India; one species in the study area.

Cirsium arvense (Linn.) Scop., Fl Carn. 2: 126. 1772; DC., Prodr. 6: 643. 1837; Islam, Fl. Majuli 171. 1990. *Serratula arvensis* Linn., Sp. Pl. 820. 1753. *Chicus arvensis* Hoffn., Deutschl. Fl. 1(2): 130. 1804.

Erect herb. Leaves alternate, *ca* 3-10 x 1.0-3.3 cm, linear or obovate, sinuate or pinnatifid, scabrid above, white tomentose beneath; lobes spiny. Flowers pinkish purple, in solitary or corymbose heads. Involucral bracts many seriate, spinescent. Receptacle densely bristly. Calyx limb hirsute. Corolla limb 5 fid . Stamens 5, syngenesious. Achenes obovoid, 4 angled. Pappus hairy.

Flr. & Frts: January - May.

Occurrence: Occasionally, occurs along roadside.

Distribution: Assam, Gangetic Plains; America, North Asia.

Speciman examined: Khulabhuyan; *Bora* 14708 (NEHU).

4. *Dichrocephala* DC.

L. Herit. ex DC. in Guillemin, Arch. Bot. 2: 517. 1833 & Prodr. 5. 371. 1836.

Above 10 species distributed in warmer parts of Africa, Mandagascer, India, China, Java; 4 species in India; one species in the study area.

Dichrocephala integrifolia (Linn. f.) O. Ktze., Rev. Gen. Pl. 1: 333. 1891; Hara, Fl. E. Himal. 338. 1966. *Hippia integrifolia* Linn. f., Suppl. Pl. 389. 1781. *Dichrocephala latifoila* DC. in Wight, Contrib. 11. 1834; Hook. f., Fl. Brit. Ind. 3: 245. 1881. Fig. 30

Erect pubescent herb. Leaves *ca* 3-11 cm long, obovate, alternate, pinnatisect or lyrate, serrate-dentate. Heads *ca* 0.3 cm in diam., globose in panicles. Involucral bracts 2 seriate, linear. Ray florets yellow, bilobed. Disk florets 4 lobed. Achenes compressed. Pappus with 2 bristles.

Fls. & Frts: July - October.

Occurrence: Common, in moist forest floors of the area.

Distribution: Assam, Meghalaya, Tropical and subtropical Himalaya, Western Peninsula; Tropical Asia, Africa.

Specimen examined: Naltoli, Thengbhanga; *Bora* 14813 (NEHU).

5. *Eclipta* Linn.

Linn., Mant. 2: 157, 286. 1771, *nom. cons.*

About 4 species distributed in warmer parts of America, Africa, Asia and

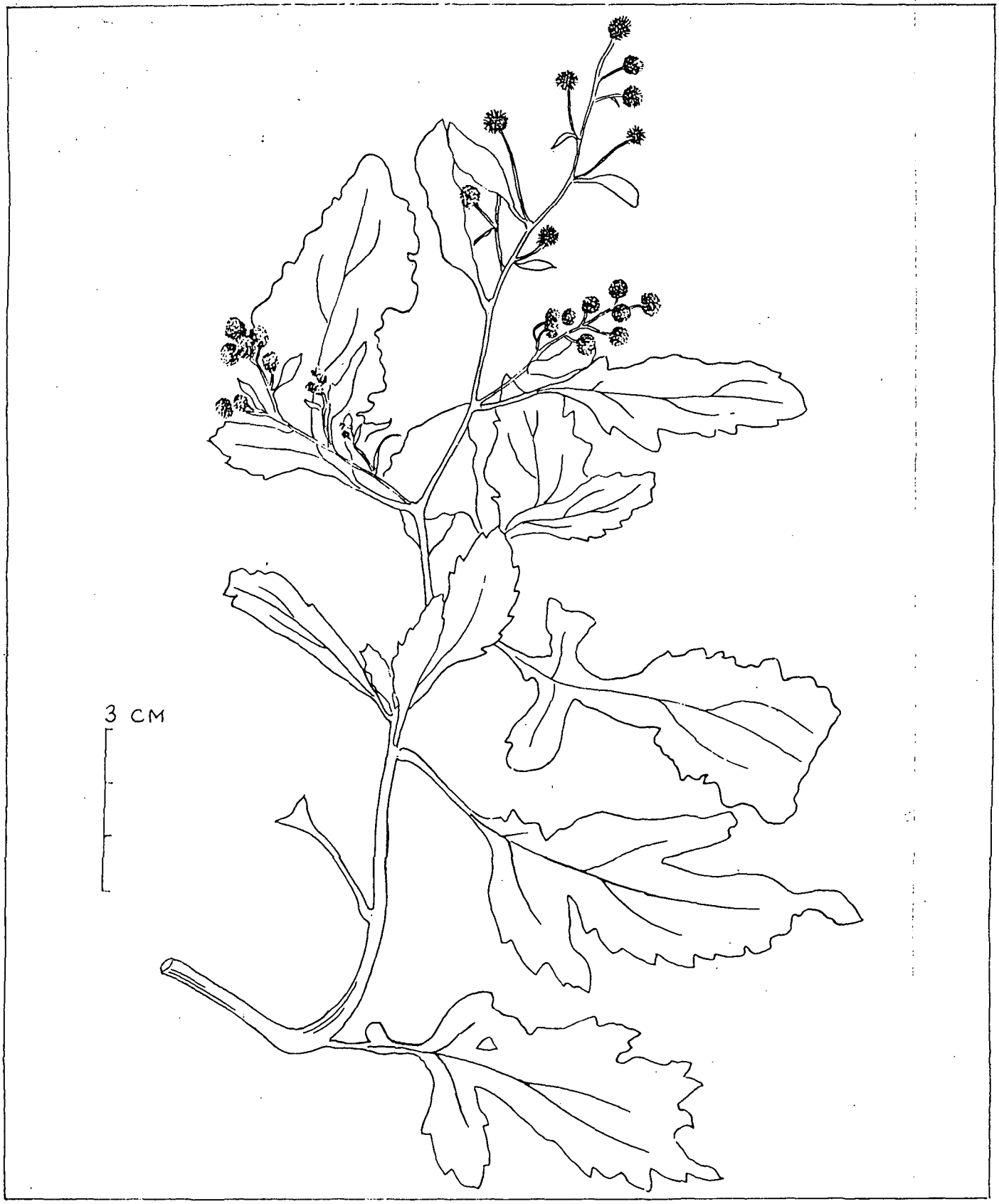


Fig. 30: ***Dichrocephala integrifolia*** (Linn. f.) O. Ktze. (Asteraceae)

Australia; one species in India which occurs in the study area also.

E. prostrata (Linn.) Linn., Mant. 286. 1771; Chowdhery *et al.* in Fl. Ind. (eds. Hajra *et al.*) 12: 381. 1995; *Verbesina prostrata* Linn., Sp. Pl. 902. 1753.*Eclipta alba* Hassk., Pl. Jav. Rar. 528. 1848, Hook. f., Fl. Brit. Ind. 3: 304. 1881; Kanjilal *et al.*, Fl. Assam 3. 117. 1932; Islam, Fl. Majuli 147. 1990. "Kehraj".

Erect or prostrate hairy herb. Leaves opposite, *ca* 2.0-5.5 x 0.3-1.0 cm, linear-oblong, lanceolate, acute, hirsute on both surfaces. Heads white, in terminal and axillary, solitary on *ca* 1-3 cm long peduncles. Involucral bracts *ca* 0.5 cm long, ovate, acute, hairy . Ray florets ligulate. Disk florets tubular, 4-5 lobed. Achenes winged on the margins. Pappus absent.

Fls. & Frts.: Most part of the year.

Occurrence: Common, in moist places and forest floors.

Distribution : Throughout India; Pantropic.

Specimen examineed: Haduk; *Bora* 15497 (NEHU).

Uses: Leaf paste applied in cut and wound.

6. *Elephantopus* Linn.

Linn., Sp. Pl. 814. 1753 & Gen. Pl. ed. 5. 355.1754.

About 32 species distributed in tropics; one species in India which occurs in the study area also.

Elephantopus scaber Linn., Sp. Pl. 814. 1753; Hook. f., Fl. Brit. Ind. 3: 242. 1881; Kanjilal *et al.*, Fl. Assam 3: 107. 1939; Islam, Fl. Majuli 174.

1990. "Bon lai"

Erect stigose dichotomously branched herb. Leaves radical, *ca* 3-18 x 1.0-4.5 cm, ovate-oblong or oblanceolate, serrate, crenate scabrous. Heads pinkish, *ca* 1.5 in diam., surrounded by three ovate-cordate, acuminate leafy bracts. Involucral bracts 2 seriate, linear, acuminate. Corolla deeply 5 cheft, tubular. Style much exserted. Achenes ribbed. Pappus 1 seriate, 4-5 bristles, white.

Fls. & Frts.: September - January.

Occurrence: Common, in shady forest floors, on hilly slopes and along roadside of the sanctuary.

Distribution: Throughout India; Tropical and subtropical Asia, Africa, Australia.

Specimen examined: Burha Mayong, Thengbhanga; *Bora* 14824 (NEHU).

Uses: Root extract taken in dysentery.

7. *Enhydra* Lour.

Lour., Fl. Cochinch. 510. 1790 (Enhydra).

About 10 species distributed in warm regions; one species in Eastern India and North Western Himalaya.

Enhydra fluctuans Lour., Fl. Cochinch. 511. 1790; Hook. f., Fl. Brit. Ind. 3: 304. 1881; Kanjilal *et al.*, Fl. Assam 3: 126. 1939; Islam, Fl. Majuli, 195. 1990. *Hingtsha repens* Roxb., Hort. Beng. 62.

Prostrate herb; rooting at nodes. Leaves opposite, oblong or linear-oblong, sessile, acute, dentate. Heads yellow, axillary and terminal, sessile, *ca* 1 cm in diam. Involucral bracts 4, foliaceous. Ray florets ligulate, 3–4 toothed. Disk florets tubular, limb campanulate, 5 fid. Achenes, compressed. Pappus absent.

Fls. & Frts.: November - January.

Occurrence: Common, along canals and marshy places.

Distribution: Assam, Eastern Bengal, Tripura; Bangladesh, China, Malaysia, Tropical Africa, Asia.

Specimen examined: Haduk, Naltoli; *Bora* 15098 (NEHU).

8. *Erigeron* Linn.

Linn., Sp. Pl. 863. 1753.

Herbs. Heads heterogamous peduncled, 1-many in axillary or terminal panicles. Involucral bracts 2-many seriate. Ray florets female. Disk florets bisexual tubular. Anthers obtuse. Style hairy. Achenes small, narrow, compressed. Pappus 1 or 2 rows of bristles.

About 200 species cosmopolitan in distribution; 10 species in India; 2 species in the study area.

Key to the species

1a. Leaves obovate-oblong; pappus reddish ..... 1. *E. aesteroides*

1b. Leaves linear; pappus white ..... 2. *E. bonariensis*

1. *Erigeron aesteroides* Roxb., Fl. Ind. 3: 432. 1832; Hook. f., Fl. Brit. Ind. 3: 254. 1881; Islam, Fl. Majuli 176. 1990. *E. hispidum* DC., Prodr. 5: 292. 1836.

Erect coarse herb; stem branched, hairy. Leaves radical, obovate-oblong, coarsely toothed, hairy. Heads pinkish, solitary, subcorymbose. Involucral bracts 1-2 seriate. Achenes compressed. Pappus hairs reddish.

Fls. & Frts.: April - August.

Occurrence: Common, along water bodies of thr area.

Distribution: Assam, West Bengal, Tropical Himalayas, Western Peninsula; Nepal.

Specimen examined: Kamarpur; *Bora* 15498 (NEHU).

2. *Erigeron bonariensis* Linn., Sp. Pl. 863. 1753; Burt, Kew Bull. 1948: 371. 1948; Babu, Herb. Fl. Dehra Dun 263. 1977. *E. linifolius* Willd., Sp. Pl. 3: 1955. 1804. *Conyza ambigua* DC., Fl. France. Suppl. 6: 468. 1815.

Erect herb; stem appressed hairy, ribbed. Leaves *ca* 2-6 cm long, linear-lanceolate, subacute. Involucral bracts 3 seriate, linear, pilose. Ray florets *ca* 0.3 cm long, filiform. Achenes sparsely hairy. Pappus white.

Fls. & Frts.: April - December.

Occurrence: Common, along roadside and canals of the sanctuary.

Specimen examined: Tuplung; *Bora* 14772 (NEHU).

9. *Ethulia* Linn.

Linn., Sp. Pl. ed. 2. 1171. 1763.

About 10 species distributed throughout the world; one species in India which occurs in the study area also.

Ethulia conyzoides DC., Prodr. 5: 12. 1836; Hook. f, Fl. Brit. Ind. 3: 227. 1881; Islam, Fl. Majuli 176. 1990. *E. ramose* Roxb., Fl. Ind. 3: 413. 1832.

Erect puberulous herb. Leaves alternate, *ca* 1-8 x 0.3-2.0 cm, narrowly elliptic or elliptic-lanceolate, acuminate, distantly serrate. Heads purplish, globose, small corymbose on 0.8-1.0 cm long peduncles. Achenes ribbed. Pappus absent.

Fls. & Frts.: December - June.

Occurrence: Common, along canals of the sanctuary.

Distribution: Assam, West Bengal; Eastern Tropical Africa, Madagascar.

Specimen examined: Haduk; *Bora* 14785 (NEHU).

10. Eupatorium Linn.

Linn., Sp. Pl. 836. 1753 & Gen. Pl. ed. 5. 1754.

About 1200 species cosmopolitan in distribution; 8 species in India; one species in the study area.

Eupatorium obdoratum Linn., Syst. ed. 10: 1205. 1759; Hook. f., Fl. Brit. Ind. 3: 244. 1881; Kanjilal *et al.*, Fl. Assam 3: 108. 1939; Islam, Fl. Majuli 177. 1990.

"Jarmoni bon".

Erect aromatic shrub. Leaves opposite, *ca* 5.0-11.5 x 2.0-5.5 cm, ovate or ovate-lanceolate, acute or acuminate, serrate, puberulous beneath. Flowers white, in terminal and axillary corymbose heads. Involucral bracts ovate-lanceolate, 4-5 seriate. Corolla *ca* 0.5 cm long. Achenes ribbed, base narrowed. Pappus 5, white.

Fls. & Frts.: November - February.

Occurrence: Common, along roadside and forest margins.

Distribution: A native of America, tropical regions.

Specimen examined: Haduk; *Bora* 14781 (NEHU).

Uses: Leaf paste applied in cut and wound.

11. *Gnaphalium* Linn.

Linn., Sp. Pl. 850. 1753 & Gen. Pl. ed. 5. 368. 1754.

Herbs, tomentose. Leaves alternate. Heads heterogamous. Involucral bracts many seriate. Ray florets female. Disk florets bisexual, few. Corolla filiform in female and tubular in bisexual flowers, 5 toothed. Anther bases sagittate. Style branches capitate. Achenes often angular oblong or obovoid. Pappus 1 seriate.

About 200 species cosmopolitan in distribution; 8 species in India;

species in the study area.

Key to the species

1a. Heads subsessile or short peduncled, in terminal leafless corymbose clusters .... 1. *G. luteo-album*

1b. Heads sessile, in leafy spikes .... 2. *G. polycaulon*

1. *Gnaphalium luteo-album* Linn, subsp. *affine* (D.Don) Koster in Blumea 4: 484. 1941. *G. affine* D. Don, Probr. Fl. Nep. 173. 1826. *G. luteo-album* Linn. var. *multiceps* Hook. f., Fl. Brit. Ind. 3: 288. 1881.

Woolly herb. Leaves *ca* 2-5 x 0.2-0.5 cm, linear-oblong or lanceolate, obtuse, entire, sessile. Heads golden yellow, *ca* 0.5 in diam. in dense or branched corymbs. Involucral bracts 3 seriate. Ray florets *ca* 0.2 cm long. Disk florets *ca* 0.2 cm long, 5 lobed. Achenes oblong, pappilose.

Fls. & Frts: February - April.

Occurrence: Common, in moist forest floors.

Distribution: Throughout India; Warm temperate countries.

Specimen examined: Thengbhanga; *Bora* 15500 (NEHU).

2. *Gnaphalium polycaulon* Pers., Syn. Pl. 2: 421. 1807; Hajra *et al.* in Fl. Ind. (eds. Hajra *et al.*) 13: 91. 1995. *Gnaphalium indicum auct. non.* Linn., Sp. Pl. 852. 1753; Hook. f., Fl. Brit. Ind. 3: 289. 1881. *G. strictum* Roxb., Fl. Ind. 3: 424. 1832.

species in the study area.

Key to the species

1a. Heads subsessile or short peduncled, in terminal leafless corymbose clusters .... 1. *G. luteo-album*

1b. Heads sessile, in leafy spikes .... 2. *G. polycaulon*

1. *Gnaphalium luteo-album* Linn, subsp. *affine* (D.Don) Koster in Blumea 4: 484. 1941. *G. affine* D. Don, Probr. Fl. Nep. 173. 1826. *G. luteo-album* Linn. var. *multiceps* Hook. f., Fl. Brit. Ind. 3: 288. 1881.

Woolly herb. Leaves *ca* 2-5 x 0.2-0.5 cm, linear-oblong or lanceolate, obtuse, entire, sessile. Heads golden yellow, *ca* 0.5 in diam. in dense or branched corymbs. Involucral bracts 3 seriate. Ray florets *ca* 0.2 cm long. Disk florets *ca* 0.2 cm long, 5 lobed. Achenes oblong, pappilose.

Fls. & Frts: February - April.

Occurrence: Common, in moist forest floors.

Distribution: Throughout India; Warm temperate countries.

Specimen examined: Thengbhanga; *Bora* 15500 (NEHU).

2. *Gnaphalium polycaulon* Pers., Syn. Pl. 2: 421. 1807; Hajra *et al.* in Fl. Ind. (eds. Hajra *et al.*) 13: 91. 1995. *Gnaphalium indicum auct. non.* Linn., Sp. Pl. 852. 1753; Hook. f., Fl. Brit. Ind. 3: 289. 1881. *G. strictum* Roxb., Fl. Ind. 3: 424. 1832.

double page 334

Erect branched woolly herb. Leaves *ca* 1.5-5.0 x 0.2-0.6 cm, linear-obovate or spathulate, apiculate, white woolly on both surfaces. Heads yellow, *ca* 0.3 in diam., sessile in simple or branched, leafy spikes or ovoid clusters. Achenes ovoid, pappilose.

Fls. & Frts: October - April.

Occurrence: Common, along water bodies and shady forest floors.

Distribution: Throughout India; China, Japan.

Specimen examined : Tuplung; *Bora* 14754 (NEHU).

12. *Grangea* Adans.

Adans., Fam. 2: 121. 1763.

About 4 species distributed throughout the world; one species in India which occurs in the study area also.

Grangea maderaspatana (Linn.) Poir., Encycl. Suppl. 2: 825. 1812; Hook. f., Fl. Brit. Ind. 3: 247. 1881; Islam, Fl. Majuli 178. 1990. *Artemisia maderaspatana* Linn., Sp. Pl. 849. 1753.

Prostrate, pubescent herb. Leaves alternate, sessile, pinnatifid, lobes crenate. Heads yellow, 0.5 cm in diam., heterogamous in terminal leaf-opposed peduncles. Involucral bracts 2-3 seriate, elliptic, obtuse, hairy. Ray florets *ca* 0.3 cm long, 4-5 lobed. Disk florets *ca* 0.2 cm long. Achenes glandular, compressed. Pappus cupular.

Fls. & Frts: November - March.

Occurrence: Common, in marshy places of the sanctuary.

Distribution: Throughout India; Tropical and subtropical Asia, Africa.

Specimen examined: Haduk; *Bora* 14773 (NEHU).

13. *Gynura* Cass.

Cass. in Dict. Ss. Nat. 34. 391. 1825.

About 20 species distributed in warm regions of Asia, Africa and Australia; one species is collected from the study area.

Gynura nepalensis DC., Prodr. 5: 330. 1836; Hook. f., Fl. Brit. Ind. 3: 333. 1881; Kanjilal *et al.*, Fl. Assam 3: 127. 1939.

Succulent herb. Leaves alternate, obovote-oblong or lanceolate acuminate, sinuate-toothed or subpinnatifid. Heads reddish yellow, homogamous, solitary or corymbose. Involucral bracts *ca* 0.5-0.8 cm long, pubescent, 1 seriate. Receptacle flat. Achenes narrow, ribbed. Pappus white, many seriate.

Fls. & Frts.: July - September.

Occurrence: Occasionally, in moist places of the area.

Distribution: Assam, Temperate Himalayas; Bhutan.

Specimen examined: Haduk; *Bora* 14771 (NEHU).

14. *Mikania* Willd.

Willd., Sp. Pl. 3: 1742. 1803.

About 250 sp[illegible] distributed in tropical America, Africa and Asia; one species in India which occurs in the study area also.

Mikania micrantha Kunth in H.B.K., Nov. Gen. Sp. 4: 134. 1820; Choudhery *et al.* in Fl. Ind. (eds. Hajra *et al.* 12: 357. 1995. *M. scandens* Willd. *sensu* Clarke, Comp. Ind. 34. 1876 & in Hook. f., Fl. Brit. Ind. 3: 244. 1881.

Twining herb. Leaves opposite, *ca* 3-12 x 1-6 cm, ovate or ovate-cordate, acute or acuminate, long petioled. Heads white, homogamous, corymbose. Involucral bracts 4, oblong. Receptacle narrow nacked. Florets *ca* 0.4 cm long, tubular. Achenes 5 angled truncate. Pappus connate below.

Fls. & Frts.: October - January.

Occurrence: Common, twining over the bushes, trees.

Distribution: Throughout India; China, Malaysia.

Specimen examined: Pagladuba; *Bora* 14850 (NEHU).

Uses: Leaf paste applied in cut and wound.

15. *Spilanthes* Jacq.

Jacq., Enum. Pl. Carib. 8. 1760.

About 60 species distributed in tropical America, Africa, Aisa , Malaya, North Australia; 2 species in India; one species in the study area.

Spilanthes paniculata Wall. ex. DC., Prodr. 5: 625. 1836, Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 205. 1996. *S. acmela sensu* Hook. f, non 2. 1753; Hook. f., Fl. Brit. Ind. 3: 307. 1881; Kanjilal *et al.*, Fl. Assam 3: 118. 1939.

Erect or ascending herb. Leaves opposite, *ca* 2-7 x 0.5-2.5 cm. ovate or ovate-lanceolate, acute, entire or crenate-serrate. Heads yellow, heterogamous, *ca* 0.5 cm in diam. on *ca* 3-8 cm long terminal peduncles. Involucral bracts *ca* 0.4 cm long, sub 2 seriate, ciliate. Florets tubular. Corolla yellow. Achenes obovoid, black, laterally compressed, ciliate.

Fls. & Frts: Most part in the year.

Occurrence: Common, in moist places of the study area.

Distribution: Throughout India; Pantropical.

Specimen examined: Haduk; *Bora* 14770 (NEHU).

16. *Synedrella* Gaertn.

Gaertn., Fruct. 2: 456. t. 171. 1791.

About 150 species distributed in tropical America, Africa, Madagascar and India; one species in India which occurs in the study area also.

Synedrella nodiflora (Linn.) Gaertn., Fruct 2: 456. t, 171. f. 7. 1791; Hook. f., Fl. Brit. Ind. 3: 308. 1881; Deb, Fl. Tripura 2: 226. 1983; Islam, Fl. Majuli 183. 1990. *Verbesina nodiflora* Linn., Cent. Pl. 1: 28. 1755 & Amoen. Acad 4: 290. 1759.

Erect pubescent herb. Leaves opposite, *ca* 2-9 x 0.5-4.0 cm, ovate or ovate-lanceolate, acute, base 3 nerved, serrate, scaberulous. Heads yellow, heterogamous, sessile, axillary and terminal. Involucral bracts *ca* 0.5 cm long, linear-lanceolate. Ray florets female, 1-2 seriate. Disk florets bisexual, tubular. Achenes black, compressed.

Fls. & Frts.: August - December.

Occurrence: Common, in moist places, along roadside and in forest floors of the sanctuary.

Distribution: Originally American, now Pantropic.

Specimen examined: Kamarpur; 15271 *Bora* (NEHU).

17. *Tridax* Linn.

Linn., Hort. Cliff. 418. 1737.

About 26 species distributed from Mexico to tropical S. Africa; one species in India which occurs in the study area also.

Tridax procumbens Linn., Sp. Pl. 900. 1753; DC., Prodr. 5: 679. 1836; Hook. f., Fl. Brit. Ind. 3: 311. 1881; Islam, Fl. Majuli 184. 1990.

Procumbent hispid herb. Leaves opposite, ovate or lanceolate, acute, dentate. Heads yellow, solitary on long penduncles. Involucral bracts 2-3 seriate. Ray florets *ca* 0.4 cm long, yellow. Disk florets *ca* 0.5 cm long, 5 lobed yellow. Achenes brown, obscurely angular. Pappus unequal, feathery bristled.

Fls. & Frts.: Throughout the year.

Occurrence: Common, along roadside and on rocky slopes of the study area.

Distribution: Throughout India; introduced from South America.

Specimen examined: Hiloikhunda; *Bora* 15019 (NEHU).

18. *Vernonia* Schreb.

Schreb., Gen. Pl. 2:541. 1791, *nom. cons.*

Herbs or shrubs, rarely small trees. Leaves alternate, entire or toothed. Heads homogamous. Involucral bracts many seriate. Receptacle naked or pitted or shortly hairy. Corolla tubular, 5 lobed. Anther base obtusely auricled. Style branches subulate, puberulous. Achenes striate, ribbed or angled. Pappus bristly.

About 1000 species distributed in America, Asia and Australia; 45 species in India; 2 species in the study area.

Key to the species

1a. Leaves usually *ca* 1.5–4.5 x 0.5–1.8 cm; achenes 4–5 angled; pappus white .... 1. *V. cinerea*

1b. Leaves usually *ca* 3–13 x 0.5–3.0 cm; achenes 1 ribbed; pappus reddish white .... 2. *V. saligna*

1. ***Vernonia cinerea*** (Linn.) Less. in Linnaea 4: 291. 1829; Hook. f., Fl. Brit. Ind. 3: 233. 1881; Kanjilal *et al.*, Fl. Assam 3: 104. 1939; Islam, Fl. Majuli 185. 1990. *Conyza cinerea* Linn., Sp. Pl. 862. 1753.

Erect pubescent herb. Leaves *ca* 1.5–4.5 x 0.5–1.8 cm, ovate to lanceolate, acute, crenate-serrate, pubescent. Heads pinkish, in terminal corymbs. Involucral bracts *ca* 0.5 cm long, many seriate, linear-lanceolate,

mucronate. Corolla *ca* 0.5 cm long. Achenes obcurely 4-5 angled. hairy. Pappus white.

Fls. & Frts.: Most part of the year.

Occurrence: Common, in moist forest floors and open places of the study area.

Distribution: Throughout India; Tropical Asia, Africa.

Specimen examined: Haduk; *Bora* 15501 (NEHU).

2. ***Vernonia saligna*** DC., Prodr. 5: 33. 1836; Hook. f., Fl. Brit. Ind. 3: 235. 1881; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 206. 1996.

Tall sparsely pubescent herb. Leaves *ca* 3-13 x 0.5-3.0 cm, lanceolate or oblanceolate, acuminate, corsely serrate. Heads purplish white, 6-12 flowered in terminal branched corymbs. Involucral bract *ca* 0.5 cm long, linear-oblong, acuminate. Achenes compressed, 10 ribbed. Pappus redish-white.

Fls. & Frts: November - January.

Occurrence: Occasionally, on hilly slopes of the area.

Distribution: North East India, Tropical Himalayas; Bangladesh, Bhutan, Myanmar, Nepal, South West China.

Specimen examined: Hiloikhunda; *Bora* 14829 (NEHU).

19. *Xanthium* Linn.

Linn., Sp. Pl. 987. 1753 & Gen. Pl. ed. 5. 424. 1754.

About 30 species cosmopolitan in distribution; 2 species in India; one species in the study aera.

Xanthium strumarium Linn., Sp. Pl. 987. 1753; Hook. f., Fl. Brit. Ind. 3: 303. 1881; Kanjilal *et al.*, Fl. Assam 3: 116. 1939; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 206. 1996. *X. indicum* Koenig in Roxb., Fl. Ind. ed. 2. 3: 601. 1832. "Ogora".

Scabrous undershrub. Leaves ovate-triangular, palmately lobed or angled, dentate, cuneate at base. Heads monoecious. Male heads many flowered; involucral bracts 1 seriate, prickly. Female heads 2 flowered in axillary racemes; involucral bracts connate; corolla absent. Achenes within the spinecent involucre. Pappus absent.

Fls. & Frts.: September - June.

Occurrence: Common, along roadside and canals of the sanctuary.

Distribution: Throughout India; Sri Lanka.

Specimen examined: Thengbhanga; *Bora* 14755 (NEHU).

63. Lobeliaceae

R. Br., Trans. Linn. Soc. London, 12: 133. 1817.

Herbs, sometimes woody below. Leaves alternate, exstipulate. Flowers mostly bisexual. Calyx adnate to the ovary, 5 lobed. Corolla zygomorphic; lobes valvate. Stamens 5, alternate with corolla lobes; anthers cohering into a tube around style. Ovary more or less inferior. Fruit fleshy or capsular.

The family comprises about 200 species, cosmopolitan in distribution; 22 species in India; one species in the study area.

Lobelia Linn.

Linn., Sp. Pl. 929. 1753 & Gen. Pl. ed. 5. 401. 1754.

Lobelia angulata Forst., Fl. Ins. Austr. Bod. 58: n. 309. 1786. *Pratia begonifolia* (Wall.) Lindle. in Bot. Reg. t. 1373; Clarke in Hook.f., Fl. Brit. Ind. 3: 422. 1881. *P. nummularia* Kurz in J. Asiat. Soc. 2: 210. 1877. *Lobelia nummularia* Lamk., Dict. 2: 589.

Prostrate herb; rooting at nodes. Leaves *ca* 0.3-2.0 x 0.2-1.8 cm, ovate, acute, serrate. Flowers pinkish white, solitary axillary. Sepals linear, persistent. Corolla 2 lipped, oblique. Stamens syngenesious. Stigma 2 lobed. Berries subglobose, crownded with calyx teeth.

Fls. & Frts.: June - August.

Occurrence: Occasionally, on moist hilly slopes.

Distribution: Assam, Meghalaya, Sikkim; Bhutan, Nepal.

Specimen examined: Rangamati; *Bora* 14885 (NEHU).

64. SPHENOCLEACEAE

Martius ex A. P. DC. 1839.

Herbs, laticiferous. Leaves spirally arranged, exstipulate. Flowers bisexual, actinomorphic, bracteate, bractelioate, in dense spikes. Calyx adnate to the ovary, 5 partite. Corolla campanulate, 5 lobed. Stamens 5, alternating with corolla lobes. Ovary semiinferior, 2-celled. Fruit a capsule. Seeds many.

The family comprises only one genus and 2 species, pantropical in distribution; one species in India and occurs in the study area also.

2. *Sphenoclea* Gaetrn.

Gaertn., Fruct. 1: 113. t. 24. f. 5. 1788, *nom. cons.*

Sphenoclea zeylanica Gaertn., Fruct. 1: 113, t. 24, f. 5. 1788; Roxb., Fl. Ind. 1: 507; Clarke in Hook. f., Fl. Brit. Ind. 3: 438. 1881. **Fig. 31**

Herb; stem hollow, base and roots spongy. Leaves *ca* 3.0-6.5 x 0.5-1.8 cm, linear-lanceolate, acute, base narrowed. Flowers white, in terminal or axillary peduncled spikes; bracts and bracteoles subspathulate. Clayx segments deltoid, obtuse. Corolla *ca* 0.3 cm long, white; lobes acute or obtuse. Stamens inserted at about the middle of the corolla. Capsules *ca* 0.4-0.5 cm in diam.

Fls. & Frts.: June - January.

Occurrence: Occasionally, along ditches and canals.

Distribution: Throughout India; warm regions.

Specimen examined: Guvali; *Bora* 15351 (NEHU).

65. PLUMBAGINACEAE

A. L. de Juss., Gen. Pl. 92. 1789.

Herbs or shrubs. Leaves alternate, exstipulate. Flowers bisexual, actinomorphic, bracteate, bracteolate, in reduced cymes arranged in spikes, racemes or panicles. Calyx gamosepalous, 5 lobed. Corolla 5 lobed. Stamens 5, opposite the petals. Styles 5. Ovary superior, 1-celled. Fruits indehiscent or

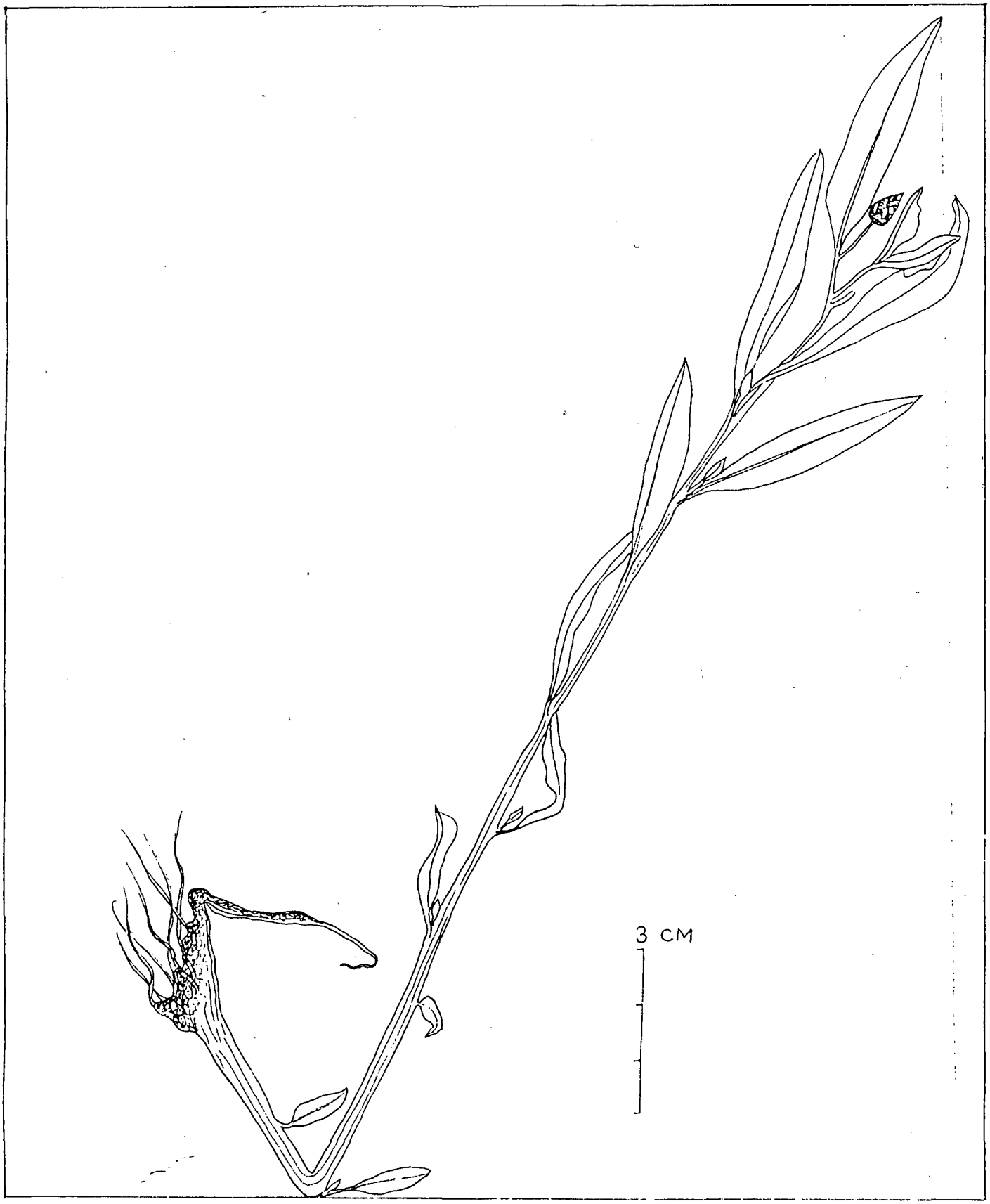


Fig. 31: ***Sphenoclea zeylanica*** Gaertn. (Sphenocleaceae)

calyptrately dehiscent.

The family comprises about 19 genera and 775 species, cosmopolitan in distribution; 6 genera and 8 species in India; one species in the study area.

Plumbago Linn.

Linn., Sp.Pl. 151. 1753 & Gen. Pl. ed. 5. 75. 1754.

About 12 species distributed in the tropics; 3 species in India; one species in the study area.

Plumbago zeylanica Linn., Sp. Pl. 151. 1753; Clarke in Hook. f., Fl. Brit. Ind. 3: 480. 1882; Kanjilal *et al.*, Fl. Assam 3: 158. 1939; Islam, Fl. Majuli 187. 1990.

Undeshrub. Leaves *ca* 3.0-6.5 x 1.8-3.0 cm, ovate, acute, entire, glabrous. Flowers white, in long spiciform racemes. Calyx tubular, *ca* 1 cm long, glandular sticky, 5 ribbed. Corolla *ca* 2.5 cm long; lobes spreading, obovate. Capsules oblong, within persistent calyx.

Fls. & Frts.: August - March.

Occurrence: Occasionally, on hilly slopes of the area.

Distribution: Throughout India; Tropical regions.

Specimen examined: Burha Mayong, Kamarpur; *Bora* 14747 (NEHU).

66. MYRSINACEAE

R. Br., Prodr. 532. 1810.

Trees or shrubs. Leaves usually alternate, exstipulate. Flowers unisexual or bisexual, actinomorphic, bracteate, in racemes or panicles. Sepals 4-6, persistent. Corolla 4-6 lobed. Stamens as many as petals and opposite to them. Ovary superior, 1-celled. Fruit a drupe or berry.

The family comprises about 39 genera and 1250 species, distributed in tropical and subtropical to temperate regions; 10 genera and 108 species in India; 3 genera and 5 species in the study area.

Key to genera

1a. Fruits many seeded .... 3. **Maesa**.

1b. Fruits one seeded:

2a. Anthers longer than filaments; stigma indistinct .... 1. **Ardisia**.

2b. Anthers not longer than filament; stigma capitate .... 2. **Embellia**.

1. *Ardisia* Sw.

O. Swartz, Prodr. 3: 48.178, *nom. cons.*

Shrubs or small trees. Leaves simple. Inflorescence axillary or terminal umbels, racemes or panicles. Flowers 5 merous, pedicellate. Calyx 5 lobed or partite, persistent. Corolla 5 lobed, fleshy. Staminal filaments short, free. Style filiform. Drupes 1 seeded with persistent calyx.

About 250 species distributed in tropical and subtropical regions; 45 species in India; 3 species in the study area.

Key to the species

1a. Flowers in axillary corymbose racemes .... 2. *A. solanacea*

1b. Flowers in axillary or terminal panicles :

2a. Leaves oblanceolate; panicles terminal .... 1. *A. paniculata*

2b. Leaves narrowly elliptic or oblong-lanceolate; panicles axillary or terminal .... 3. *A. thyrsiflora*

1. *Ardisia paniculata* Roxb., Fl. Ind. 1: 580. 1832; Clarke in Hook. f., Fl. Brit. Ind. 3: 519. 1882; Kanjilal *et al.*, Fl. Assam 3: 181. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 553. 1987.

Small shrub or undershrub. Leaves *ca* 15-35 x 5-11 cm, oblanceolate, acute, entire, narrowed to the base. Flowers pinkish, in terminal panicles. Calyx *ca* 0.1 cm long, acute. Corolla *ca* 0.4 cm long. Stamens 5. Drupes subglobose *ca* 0.5 cm in diam., longitudinally ribbed.

Fls. & Frts.: March - December.

Occurrence: Common, in shady forest floors of the area.

Distribution: Assam, Meghalaya; Bangladesh.

Specimen examined: Burha Mayong, Kamarpur; *Bora* 15075 (NEHU).

Notes: Confined to Indo-Bangladesh region.

2. *Ardisia solanacea* Roxb., Fl. Corom. Pl. 1: 27. t. 27. 1795; Haridasan & Rao, For. Fl. Meghalaya 2: 554. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 209. 1996. *A. humilis non.* Vahl. Clarke in Hook. f., Fl. Brit. Ind. 3: 529. 1882; Kanjilal *et al.*, Fl. Assam 3: 175. 1939.

Shrub. Leaves *ca* 6-18 x 2-5 cm, obovate-lanceolate, acuminate, cuneate. Flowers *ca* 1.5 cm long, stalked, pinkish, in axillary corymbose racemes. Calyx *ca* 0.3 cm long, ovate, acute. Corolla thick, *ca* 0.8 cm long. Drupes *ca* 0.5 cm in diam., globose.

Fls. & Frts.: April - December.

Occurrence: Common, in shady forest floors of the area.

Distribution: Throughout India; Malaya, China.

Specimen examined: Burha Mayong, Thengbhanga; *Bora* 14735 (NEHU).

3. *Ardisia thyrsiflora* D. Don, Prodr. Fl. Nep. 148. 1825; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 210. 1996. *A. floribunda* Wall. in Roxb., Fl. Ind. 2: 272. 1824; Kanjilal *et al.*, Fl. Assam 3: 179. 1939; *A. nerifolia* DC. in Trans. Linn. Soc. Bot. 17: 118. t. 8. 1934; Clarke in Hook. f., Fl. Brit. Ind. 3: 522. 1882.

Shrub. Leaves *ca* 6-20 x 1.2-3.2 cm, narrowly elliptic or oblong-lanceolate, acute, cuneate. Flowers pinkish, in axillary or terminal panicular cymes. Calyx lobes ovate, spreading. Corolla lobes ovate. Drupes globose, 4 angled.

Fls. & Frts.: May - November.

Occurrence: Rare, occurs in shady hilly forest of the sanctuary.

Distribution: North East India, Subtropical Himalaya; Bhutan.

Specimen examined: Dhekiabari; *Bora* 15503 (NEHU).

Notes: Confined to Subtropical Himalaya and Indo-Bhutan region.

2. *Embelia* Burm. f.

Burm. f., Fl. Ind. 62. 1768, *nom. cons.*

About 130 species distributed in tropical and subtropical regions; 16 species in India; one species in the study area.

Embelia basal (Roem. & Schult.) DC. in Trans. Linn. Soc. Bot. 17: 131. 1837; Vaish in Mudgal *et al.*, Fl. M. P. | *E. robusta auct. non* Roxb., 1820; Clarke in Hook. f., Fl. Brit. Ind. 3: 515. 1882; Kanjilal *et al.*, Fl. Assam 3: 169. 1939. **Fig. 32**

Small tree. Leaves *ca* 4-11 x 2.5-5.5 cm, ovate-oblong or elliptic-orbicular, abruptly acuminate, rounded or cuneate at base, more or less puberulous beneath. Flowers greenish white, in axillary racemes, bracteate. Calyx segments 5, glandular, persistent. Corolla lobes 5, slightly connate below. Stamens 5. Ovary superior. Drupes globose with persistent style.

Flrs. & Frts.: July - December.

Occurrence: Occasionally, along roadside of the study area.

Distribution: Throughout India; Myanmar, Sri Lanka.

Specimen examined: Guvali; *Bora* 15377 (NEHU).

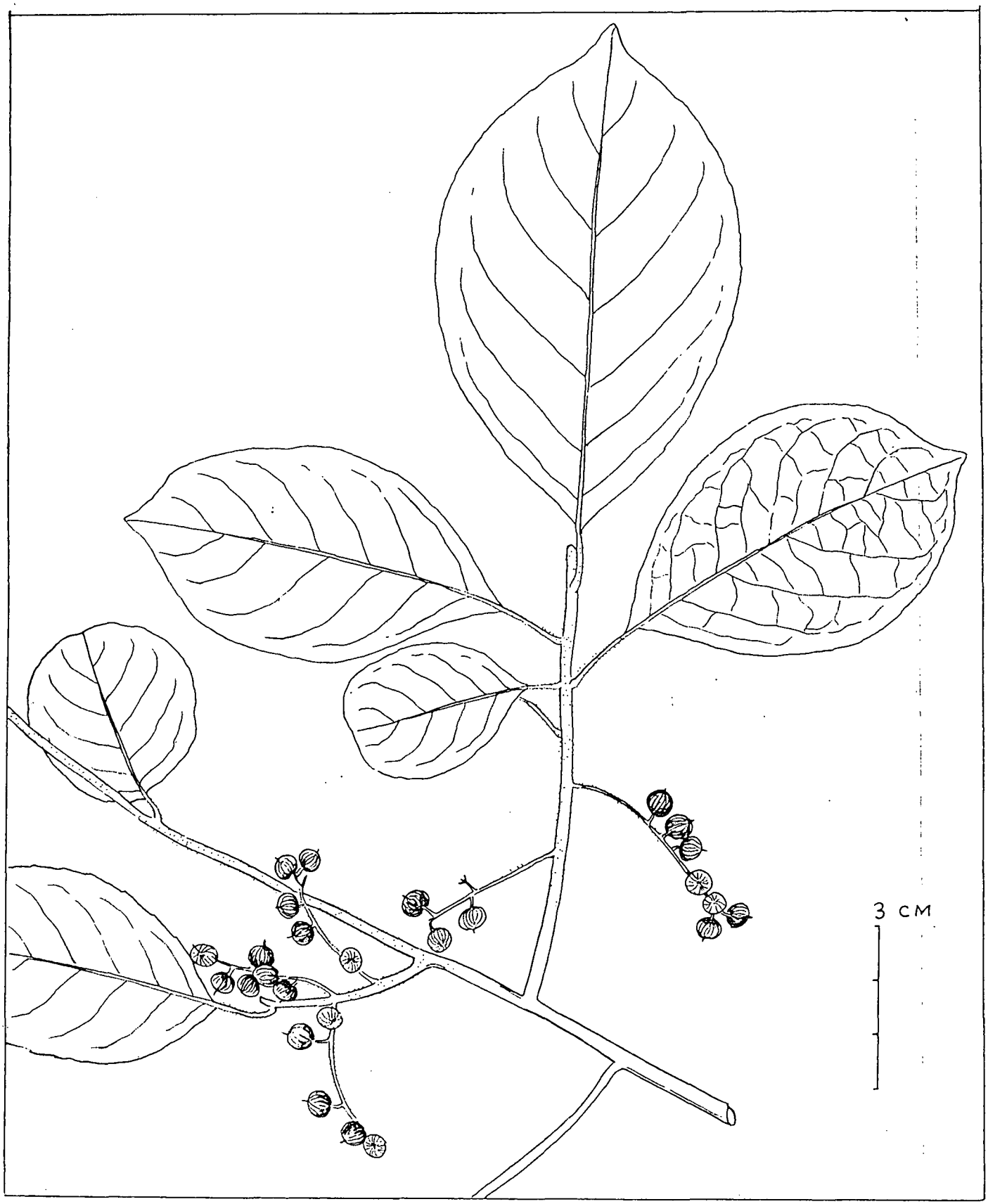


Fig. 32: ***Embelia basal*** (Roem. & Schult.) DC. (Myrsinaceae)

3. Maesa Forsk.

Forsk., Fl. Aeg.-Arab. 66. 1775.

About 200 species distributed in tropics; 25 species in India; one species in the study area.

Maesa indica (Roxb.) DC. in Trans. Linn. Soc. Lond. 17: 134. 1834; Clarke in Hook. f., Fl. Brit. Ind. 3: 509. 1882; Kanjilal *et al.*, Fl. Assam 3: 163. 1939; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 211. 1996. *Baeobotrya indica* Roxb., Fl. Ind. 2: 230. 1824.

Shrub. Leaves *ca* 5-17 x 2.0-5.5 cm, elliptic-oblong, ovate-lanceolate or elliptic-lanceolate, acute or acuminate, dentate with distant teeth. Flowers white, *ca* 0.3 cm long pedicelled in simple or compound, nearly sessile axillary racemes. Calyx lobes 5, obtuse, slightly pubescent. Corolla lobes 5. Stamens 5. Berries *ca* 0.3 in diam., globose, brownish.

Fls. & Frts.: February - November.

Occurrence: Occasionally, along roadside of the sanctuary.

Distribution: Throughout India; Africa, S. China.

Specimen examined: Burha Mayong, Kamarpur; *Bora* 15074 (NEHU).

67. SAPOTACEAE

A. L. de Juss., Gen. Pl. 151. 1789.

Trees or shrubs. Leaves mostly alternate. Flowers bisexual, actinomorphic, bracteolate, solitary or cymose. Calyx 4-8 lobed. Corolla

gamosepalous. 4-8 lobed. Stamens epipetalous, in 2-3 whorls, only inner whorls fertile. Ovary superior. Fruit a berry.

The family comprises about 116 genera and 1100 species, distributed in tropical to temperate regions; about 10 genera and 28 species in India; one genus and one species in the study area.

Mimusops Linn.

Linn., Sp. Pl. 349. 1753.

About 57 species distributed in tropics; 2 species in India; one species in the study area.

Mimusops elengi Linn., Sp. Pl. 349. 1753; Clarke in Hook. f., Fl. Brit. Ind. 3: 548. 1882; Kanjilal *et al.*, Fl. Assam 3: 197. 1939; Islam , Fl. Majuli 188. 1990. "Bakul, Gakul".

Middle sized evergreen tree; young parts rusty. Leaves *ca* 5.0-1.5 x 3.0-5.5 cm, elliptic-oblong or lanceolate, shortly acuminate, subcoriaceous. Flowers creamy white, fragrant, axillary, solitary or in fasciles of few. Calyx lobes 8, rusty tomentose outside. Corolla *ca* 1 cm long; lobes linear-oblong or narrow lanceolate. Stamens 8; staminodes 8. Berries ovate or ellipsoid, one seeded.

Fls. & Frts.: May - September.

Occurrence: Planted in forest campus, along roadside.

Distribution: Indo-Malayan region.

Specimen examined: Haduk; *Bora* 15001 (NEHU).

68. EBENACEAE

Ventenat, Tab. Regene. Veget. 2: 443. 1799.

Trees or shrubs. Leaves alternate, exstipulate. Flowers unisexual, actinomorphic, axillary, solitary or in cymes. Calyx gamosepalous, 3-6 lobed, persistent. Corolla 3-7 lobed. Stamens epipetalous, 1-4 times of corolla lobes. Styles 2-8. Ovary superior. Fruit a berry.

The family comprises 2 genera and about 485 species, distributed in tropical and subtropical to temperate regions; one genus and about 457 species in India; one species in the study area.

Diospyros Linn.

Linn., Sp. Pl. 1057. 1753

About 475 species distributed in tropical regions; 44 species in India; one species in the study area.

Diospyros variegata Kurz. in J. Asiat. Soc. 2: 73. 1871; Hook. f., Fl. Brit. Ind. 3: 557. 1882; Kanjilal *et al.*, Fl. Assam 3: 205. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 574. 1987. "Koliari, Kotholua".

Fig. 33

Tree; bark blackish. Leaves *ca* 12-22 x 3.8-7.0 cm, oblong-lanceolate or elliptic-oblong, acute, coriaceous. Flowers pale yellow, unisexual; male flowers in axillary corymbose clusters; females solitary. Corolla tubular,

campanulate. Stamens multiples of corolla lobes. Berries subglobose.

Fls. & Frts.: May - October.

Occurrence: Common, in the hilly forest, occasionally in the plain forest of the sanctuary.

Distribution: North East India; Myanmar.

Specimen examined: Burha Mayong; *Bora* 15155 (NEHU).

Notes: Confined to North East India and extend upto Myanmar

69. OLEACEAE

Hoffmannsegg and Link, Fl. Portug. 1: 385. 1813-20.

Trees, shrubs or climbers. Leaves mostly opposite, exstipulate. Flowers usually bisexual, actinomorphic, in racemose cymes or panicles. Calyx 4-5 lobed, rarely absent. Corolla 4-5 lobed. Stamens 2. Ovary superior, 2-celled. Fruits capsule, berry or drupe.

The family comprises about 29 genera and 900 species, distributed in temperate and tropical regions; 10 genera and 85 species in India; 2 genera and 2 species in the study area.

Key to the genera

1a. Erect shrubs or trees; fruit a capsule

..... 2. *Nyctanthes*

1b. Climbing shrubs; fruit a berry

..... 1. *Jasminum*

1. *Jasminum* Linn.

Linn., Sp. Pl. 7. 1753. & Gen. Pl. ed. 5. 7. 1754.

About 450 species distributed in tropical and temperate regions; 40 species in India; one species in the study area.

Jasminum dispermum Wall. in Roxb., Fl. Ind. 1: 99. 1820; Clarke in Hook. f., Fl. Brit. Ind. 3: 602. 1882; Kanjilal *et al.*, Fl. Assam 3: 232. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 586. 1987.

Scandent shrub. Leaves unifoliolate or imparipinnate; leaflets lanceolate or ovate-lanceolate with 3 or 5 basal narves, *ca* 2.5-12.0 x 1.5-4.0 cm, acute or acuminate. Flowers pale yellow, *ca* 2 cm long in axillary pedunculate, few flowered cymes. Calyx 5 teethed. Corolla tube *ca* 1.2 cm long, stout; lobes 5, ovate. Berries *ca* 0.4 - 0.6 cm in diam., subglobose, 2 seeded.

Fls. & Frts.: April - December.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Assam, Meghalaya, Himalayas; Bhutan.

Specimen examined: Rangamati; *Bora* 15135 (NEHU).

Notes: Confined to Indo-Bhutan region.

2. *Nyctanthes* Linn.

Linn., Sp. Pl. 6. 1753 & Gen. Pl. ed. 5. 7. 1754.

Monotypic genus, distributed in Indo-Malaysian regions.

Nyctanthes arbor-tristis Linn., Sp. Pl. 6. 1753; Clarke in Hook. f., Fl. Brit. Ind. 3: 603. 1882; Kanjilal *et al.* Fl. Assam 3: 234. 1939; Deb, Fl. Tripura 2: 112. 1983. "Sewali Phul".

Shrub; branches 4 angled. Leaves *ca* 5-15 x 2.5-7.5 cm, ovate, acuminate, entire or dentate, scabrous. Flowers white, fragrant, in trichotomous cymes, bracteate. Calyx 5 lobed. Corolla salver shaped; lobes 5-7; tube *ca* 1 cm long. Capsules flat, suborbicular, 1 seeded.

Fls. & Frts.: September - January.

Occurrence: Occasionally, along foot hill of the area.

Distribution: Indo-Malaysia.

Specimen examined: Burha Mayong; *Bora* 15499 (NEHU).

Uses: Flowers used for preparing curry.

70. APOCYNACEAE

A. L. de Juss., Gen. Pl. 143. 1789.

Trees, shrubs or climbers, rarely perennial herbs, often with milky juice. Leaves mostly opposite or whorled. Flowers bisexual, regular in cymes. Calyx often glandular inside, 4-5 lobed. Corolla 5 lobed. Stamens 4-5, alternating with corolla lobes; pollen granular. Ovary superior, 1-celled. Fruit follicle, capsule, berry or drupaceous. Seeds mostly comose or with a papery wing.

The family comprises about 215 genera and 2100 species, distributed in tropical regions; 29 genera and 60 species in India; 9 genera and 9 species in the study area.

4 Genus ?

Key to the genera

1a. Scandent or climbing shrubs:

2a. Stamens inserted at the top of corolla tube; anthers exserted .... 9. *Vallaris*

2b. Stamens inserted near the middle of corolla tube; anthers included .... 3. *Ichnocarpus*

1b. Shrubs or trees:

3a. Leaves usually alternate:

4a. Calyx eglandular; fruit a follicle .... 5. *Plumeria*

4b. Calyx glandular at base inside; fruit a drupe .... 7. *Thevetia*

3b. Leaves opposite or whorled:

5a. Leaves whorled:

6a. Fruit a follicle; floral disk absent .... 1. *Alstonia*

6b. Fruit a drupe; floral disk present .... 5. *Rauvolfia*

5b. Leaves opposite:

7a. Anthers adherent to stigma; cells sagittate at base .. 9. *Wrightia*

7b. Anthers free from the stigma; cells rounded at base :

8a. Calyx eglandular; seeds comose .... 2. *Holarrhena*

8b. Calyx glandular; seeds ecomose .... 6. *Tabernaemontana*

1. *Alstonia* R. Br.

R. Br. on Asclepiad. 64. 1810, *nom. cons.*

About 43 species distributed in Africa, C. A America, China. Indo-Malaysia and West Pacific regions; 6 species in India; one species in the study area.

Alstonia scholaris (Linn.) R. Br. in Mem. Werner. Soc. 1: 76. 1811; Hook. f., Fl. Brit. Ind. 3: 642. 1882; Kanjilal *et al.*, Fl. Assam 3: 253. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 599. 1987; Deb, Fl. Tripura 2: 12. 1983. *Echites scholaris* Linn., Mant. Pl. 53. 1767. "Sotiona".

Evergreen tree. Leaves 3-7 in whorls, *ca* 7-18 x 2-5 cm, oblong-lanceolate or obovate, acute to obtuse, narrowed at base, coriaceous, lateral nerves parallel. Flowers white, in terminal pubescent, umbeliform cymes. Calyx tubular, *ca* 0.2 cm long, pubescent, lobes oblong. Corolla tubular, *ca* 0.7 cm long; lobes obovate, villous inside. Follicles *ca* 10-50 cm, linear, drooping.

Fls. & Frts.: Novemmber - May.

Occurrence: Common, throughout the study area.

Distribution: Assam, Meghalaya, Western Himalayas; Tropical Australia, Africa.

Specimen examined: Haduk; *Bora* 15209 (NEHU).

Uses: Bark decoction mixed with the seed powder of *Piper nigrum* and taken in malaria.

2. *Holarrhena* R. Br.

R. Br. in Mem. Werner. Soc. 1: 62. 1811.

About 20 specis distributed in tropics of Africa and Asia; one species in India which occurs in the study area also.

Holarrhena pubescens (Buch.-Ham.) Wall. ex G. Don, Gen. Hist. 4: 78. 1837-1838; Panigrahi in Taxon 36: 464. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 218. 1996. *Echites pubescens* Buch.-Ham. in Trans. Soc. Lond. 13: 524. 1822. *Holarrhena antidysenterica* Hook. f., Fl. Brit. Ind. 3: 644. 1882; Kanjilal *et al.*, Fl. Assam 3: 254. 1939. **"Dudhkhiri".**

Large deciduous shrub. Leaves opposite, *ca* 7.5- 2.5 x 9-8 cm, ovate to elliptic-oblong, acuminate, entire, rounded or tapering at base. Flowers creamy white, fragrant in terminal cymes. Calyx lobes 5, *ca* 0.2 cm long, lanceolate, acute. Corolla slightly swollen at base; throat glabrous; lobes *ca* 1.2 cm long, oblong; tube pubescent. Follicles two, slender, *ca* 20 cm long, curved; coma brown.

Fls. & Frts.: July- December

Occurrence: Common, in the hilly forest of the area.

Distribution: North East India, Uttar Pradesh, Sikkim, West Bengal; China, Malaya, Myanmar, Nepal.

Specimen examined: Burha Mayong; *Bora* 15011 (NEHU).

Uses: Bark extract taken in dysentery.

3. *Ichnocarpus* R. Br.

R. Br. Mem. Werner. Soc. 1: 61. 1811, *non cons.*

About 8 species distributed in Indo-Malaysia to S. China and Tropical Australia; 3 species in India; one species in the study area.

Ichnocarpus frutescens (Linn.) R. Br. in Mem. Werner. Soc. 1: 62. 1811 & in W. T. Aiton, Hortus Kew ed. 2. 2: 69. 1811; Hook. f. , Fl. Brit. Ind. 3: 669. 1882; Kanjilal *et al.*, Fl. Assam 3: 273. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 603. 1987.

Twining shrub; branchlets, inflorescence and leaves beneath rusty tomentose; bark reddish brown. Leaves opposite, *ca* 2-9 x 1.0-3.5 cm, ovate or elliptic lanceolate, acuminate, petiolate. Flowers white, in axillary and terminal pubescent cymes. Calyx lobes minute ovate, pubescent. Corolla lobes *ca* 0.2 cm long, spreading, lanceolate, pubescent along margin. Follicles *ca* 8 cm long, linear.

Fls. & Frts.: August - December.

Occurrence: Common, throughout the sanctuary.

Distribution: Throughout India; China, Malaysia, Myanmar, Vietnam.

Specimen examined: Burha Mayong; *Bora* 14734 (NEHU).

4. *Plumeria* Linn.

Linn., Sp. Pl. 1:209. 1753 & Gen. Pl. ed. 5. 99. 1754.

About 40 species native of tropical America; one species is collected

from the study area.

Plumeria rubra Linn., Sp. Pl. 209. 1753; Lal in Mudgal *et al.*, Fl. M. P. 2: 56. 1997. *P. acuminata* R. Br. in W. T. Aiton, Hortus Kew ed. 2. 2: 70. 1811. *P. acutifolia* Poir in Lamk., Encycl. Suppl. 2. 667. 1812; Hook. f., Fl. Brit. Ind. 3: 641. 1882; Kanjilal *et al.*, Fl. Assam 3: 252. 1939.

Small deciduous tree with milky juice; branching dichotomous. Leaves *ca* 20–35 x 6–8 cm, obovate or oblong lanceolate, shortly acuminate, acute at base; marginal nerves conspicuous. Flowers white with yellow centre, fragrant, in umbelliform cymes. Corolla lobes *ca* 2–3 cm long, broadly ovate, imbricate to left, tube 1–2 cm long. Follicles linear-oblong, rigid. Seeds winged.

Fls. & Frts.: June - December.

Occurrence: Planted along roadside and also found as escape in the hilly forest of the sanctuary.

Distribution: Many parts of India; Tropical.

Specimen examined: Hiloikhunda; *Bora* 15503 (NEHU).

Uses: Plant used for ornamental purpose.

5. *Rauvolfia* Linn.

Linn., Sp. Pl. 208. 1753 & Gen. Pl. ed. 5. 98. 1754.

About 110 species distributed in tropical regions; 5 species in India; one species in the study area.

Rauvolfia serpentina (Linn.) Benth. ex Kurz, For. Fl. Burma 2: 171. 1877; Hook. f., Fl. Brit. Ind. 3: 632. 1882; Kanjilal *et al.*, Fl. Assam 3:

251. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 606. 1987. *Ophioxylon serpentinum* Linn., Sp. Pl. 1043. 1753. "Arokshon".

Undershrub. Leaves 3 whorled, *ca* 7.5-14.5 x 2.5-5.5 cm, elliptic-lanceolate, acute or shortly acuminate, Flowers pinkish white, in long peduncled or lateral corymbose cymes. Calyx segments 5, lanceolate, red. Corolla *ca* 1.2 cm long; tube slender swollen about the middle; lobes elliptic oblong. Stamens 5. Disk cupular. Drupes *ca* 0.5 cm in diam., dark purple when ripe.

Fls. & Frts.: April - September.

Occurrence: Rare, occurs in shady forest floors and hilly slopes.

Distribution: North East India, Bihar, Uttar Pradesh, West Bengal, Western Ghats; **Malaysia, Myanmar**, Vietnum.

Specimen examined: Burha Mayong, Haduk; *Bora* 14753 (NEHU).

Uses: Root extract taken in malaria.

6. *Tabernaemontana* Linn.

Linn., Sp. Pl. 210. 1753 & Gen. Pl. ed. 5. 100. 1754.

About 100 species distributed in tropical regions; 5 species in India; one species in the study area.

Tabernaemontana divaricata (Linn.) R. Br. in Roem. & Schult., Syst. Veg. 4: 427. 1819; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 219. 1996. *Nerium divaricatum* Linn., Sp. Pl. 209. 1753. *Tabernaemontana coronaria* (Jacq.) Willd., Enum. Pl. 275. 1809; Hook. f., Fl. Brit. Ind. 3: 646. 1882; Kanjilal *et al.*, Fl. Assam 3: 255. 1939. "Kathona".

Small shrub. Leaves *ca* 3.5-11.5 x 1.5-3.5 cm, elliptic-lanceolate or ovate-lanceolate, acuminate, entire, base narrowed. Flowers fragrante, white, in axillary corymbose cymes. Calyx lobes 5, ovate, acute. Corolla lobes 5, ovate, *ca* 2.3 cm long. Follicles divarricate, *ca* 2.0-4.5 cm long, 3 ribbed, 3-6 seeded.

Fls. & Frts.: May - November.

Occurrence: Common, in shady forest area.

Distribution: North East India, South India; China, Myanmar.

Specimen examined: Burha Mayong; *Bora* 15282 (NEHU).

Uses: Flower juice applied to cure eye diseases.

7. *Thevetia* Linn.

Linn., Opera Varia. 212. 1758, *non cons.*

About 8 species distributed in tropical America and West Indies; one species in India and collected from the study area also.

Thevetia peruviana (Pers.) K. Schum. in Engl. & Prantl, Nat. Pflan. 4(2): 159. 1895; Santapau in Rec. Bot. Surv. Ind. 16(1): 150. 1967; Deb, Fl. Tripura 2: 23. 1983. *Cerbera peruviana* Pers., Syn. Pl. 1: 267. 1867. *Thevetia nerifolia* Juss. ex. Stend., Nomencl. Bot. 2. 2: 680. 1841; Kanjilal *et al.*, Fl. Assam 3: 257. 1939.

Shrub. Leaves alternate, *ca* 7.5-13.0 x 0.5-5.0 cm, linear or linear-lanceolate, both ends narrowed. Flowers fragrant, yellow, in subterminal

cymes. Calyx lobes 5, acute glandular inside at base. Corolla campanulate above, *ca* 5-6 cm long. Stamens 5, adnate at the top of tube. Carpels 2. Drupes bluntly 4 angled, subglobose.

Fls. & Frts.: April - October.

Occurrence: Planted as ornamental tree, also found as escape in the sanctuary.

Distribution: Native of tropical America; naturalised in tropics.

Specimen examined: Haduk; *Bora* 14892 (NEHU).

8. *Vallaris* Burm. f.

Burm. f., Fl. Ind. 51. 1768.

About 10 species distributed in the Indo-Malayan region; 3 species in India; one species in the study area.

Vallaris solanacea (Roth.) Kantze, Revs. Gen. Pl. 417. 1891; Haridasan & Rao, For. Fl. Meghalaya 2: 610. 1987. *Peltanthera solanacea* Roth, Nov. Pl. Sp. 132. 1821. *Vallaris heynei* Spreng., Syst. Veg. 1: 635. 1824; Hook. f., Fl. Brit. Ind. 3: 650. 1882; Kanjilal *et al.*, Fl. Assam 3: 256. 1939.

Climbing shrub; branches lanticular. Leaves opposite, *ca* 6.0-12.5 x 1.8-3.0 cm, elliptic or oblong-lanceolate, acuminate, acute at base. Flowers creamy white, fragrant, in axillary, pubescent cymes. Calyx lobes 5, pubescent. Corolla lobes 5, obovate. Stamens inserted at the top of corolla tube. Disk 5 lobed. Carpels 2. Fruit oblong, 2 connate tapering follicles, *ca* 16 x 2 cm long.

Fls. & Frts.: July - December.

Occurrence: Occasionally, in the study area.

Distribution: Throughout India; Bangladesh, China, Malaysia, Myanmar, Sri Lanka.

Specimen examined: Govali; *Bora* 15504 (NEHU).

9. *Wrightia* R. Br.

R. Br. in Mem. Werner Soc. 1: 73. 1811.

About 25 species distributed in Asian tropics; 5 species in India; one species in the study area.

Wrightia arborea (Dennst.) Mabberley in Taxon 26: 533. 1977; Haridasan & Rao, For. Fl. Meghalaya 2: 611. 1987. *Periploca arborea* Dennst., Schlussel Hortus Malab. 13. 23. 25. 1818. *Wrightia tomentosa* Roem. & Schult., Syst., Veg. 4: 414. 1819; Hook. f., Fl. Brit. Ind. 3: 653. 1882; Kanjilal *et al.*, Fl. Assam 3: 258. 1939. "Dudh gach".

Small deciduous tree; branchlets and leaves tomentose. Leaves opposite, *ca* 7-17 x 2.5-7.0 cm, elliptic-oblong or elliptic-oblanceolate, acuminate, tomentose beneath. Flowers creamy white, in subsessile corymbose cymes. Calyx lobes 5, *ca* 0.2 cm lon,g pubescent outside, glandular inside. Corolla tube *ca* 0.4 cm; lobes *ca* 1.5 cm long, spreading; corona lobes unequal, oblong. Follicles subcylindric, *ca* 18-25 cm long, densely white lenticellate, drooping.

Fls. & Frts.: April - December.

Occurrence: Common, throughout the hilly forest and occasionally in the plain forest of the sanctuary.

Distribution: Tropical parts of India; Myanmar, Sri Lanka.

Specimen examined: Burha Mayong; *Bora* 15159 (NEHU).

71. ASCLEPIADACEAE

R. Br. on the Asclepiadeae 19. 1810.

Climbing, twining or erect shrubs, or shrublets, herbs, rarely trees, with milky juice. Leaves opposite or whorled. Inflorescence mostly cymose. Flowers bisexual, actinomorphic. Calyx 5 lobed. Corolla 5 lobed; corona usually present. Stamens 5; filaments united into a tube; pollen granular or form pollinia. Carpels 2, free at the ovary. Fruit of 2 fpllicles. Seeds mostly crowned with a coma of long silky hairs.

The family comprises about 348 genera and 2900 species, distributed in tropical and subtropical regions; 39 genera and 196 species in India; 6 genera and 8 species in the study area.

Key to genera

1a. Erect undershrubs or shrubs .... 1. *Calotropis*

1b. Climbing, twining or trailing herbs or shrubs:

2a. Plants often epiphytic:

3a. Corolla urceolate corona erect

.... 3. *Dischidia*

3b. Corolla rotate; corona spreading

.... 5. *Hoya*

2b. Plants terrestrial:

4a. Corona adnate to staminal tube

.... 6. *Myriopteron*

4b. Corona adnate to corolla tube:

5a. Filaments usually free; pollinia granular .... 2. *Cryptolepis*

5b. Filaments connate; pollinia waxy

.... 4. *Gymnema*

1. *Calotropis* R. Br.

R. Br. in Mem. Wermer. Soc. 1: 39. 1811.

6 species distributed in tropical and subtropical regions; 3 species in India; one species in the study area.

Calotropis gigantea (Linn.) R. Br. in W. T. Aiton, Hortus Kew. ed. 2. 2: 78. 1811; Hook. f., Fl. Brit. Ind. 4: 17. 1883; Kanjilal *et al.*, Fl. Assam 3: 282. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 614. 1987. *Asclepias gigantea* Linn., Sp. Pl. 214. 1753. "Akon".

Hoary tomentose shrub. Leaves *ca* 5-16 x 4.5 cm, elliptic, ovate to obovate, sessile or subsessile, acute,. base cordate or amplexicaul at base, tomentose beneanth. Flowers purplish white, in umbellate lateral cymes. Calyx segments ovate acute, glandular inside. Corolla lobes spreading, deltoid, ovate. Corona 1 seriate. Follicles *ca* 5-10 cm long, recurved. Coma white silky.

Fls. & Frts.: April - September.

Occurrence: Occasionally, along roadside of the area.

Distribution: Tropical Himalayas to China, Malaysia.

Specimen examined: Burha Mayong; *Bora* 15211 (NEHU).

Uses: Slightly heated leaves used for massaging in muscular pain.

2. *Cryptolepis* R. Br.

R. Br., Mem. Werner. Soc. 1: 69. 1811.

About 12 species distributed in tropical regions; 3 species in India; one species in the study area.

Cryptolepis buchanani Roem. & Schult, Syst . Veg. 4: 409. 1819; Hook. f., Fl. Brit. Ind. 4: 5. 1883; Kanjilal *et al.*, Fl. Assam 3: 277. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 616. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 219. 1956.

Twining shrub; latex milky. Leaves *ca* 5-17 x 1.5-5.0 cm, oblong, ovate or oblong acuminate or apiculate, cuneat at base. Flowers dull yellow, in axillary, short, pendunculate cymes; bracts ovate-lanceolate. Calyx lobes *ca* 0.2 cm long, ovate, glandular inside. Corolla *ca* 1 cm long; lobes linear-lanceolate. Corona adnate to corolla tube. Follicles *ca* 8.0 x 1.4 cm, lanceolate, tapering, pointed. Seeds compressed black; coma 2.5 cm long.

Fls. & Frts.: May - December.

Occurrence: Common, throughout the sanctuary.

Distribution: Throughout India; Bangladesh; China, Myanmar.

Specimen examined: Haduk, Kamarpur; *Bora* 15007 (NEHU).

3. *Dischidia* R. Br.

R. Br. in Mem. Werner. Soc. 1: 32. 1811.

Herbs or undershrubs, epiphytic. Leaves opposite, fleshy. Flowers in axillary fascicles, umbels or racemes. Calyx 5 partite, glandular inside. Corolla campannulate. Corona of 5 erect scales. Stamens adnate to base of corolla tube. Fruit of 2 small follicle. Seeds minute; coma long.

About 80 species distributed in India, China, Malaysia and Australia; 4 species in India; 2 species in the study area.

Key to the Species

1a. Leaves not modified to pitchers .... 1. *D. benghalensis*

1b. Some leaves modified to pitchers .... 2. *D. rafflesiana*

1. *Dischidia benghalensis* Coleb in TLS 12: 357. 1855; Dona in DC. Prodr. 8: 631. 1831; Hook. f., Fl. Brit. Ind. 4: 50. 1883; Kanjilal *et al.*, Fl. Assam 3: 299. 1939; Islam, Fl. Majuli 199. 1990.

Epiphytic undershrub. Leaves *ca* 1-5 x 0.5-1.0 cm, linear or linear-lanceolate, fleshy, subsessile, entire. Flowers white, in axillary clusters. Follicles thick, acuminate, *ca* 6.0 x 0.3 cm., straight.

Fls. & Frts.: June - November.

Occurrence:. Common, on tree trunks throughout the area.

Distribution: North East India; Nepal, Java.

Specimen examined: Burha Mayong; *Bora* 15058 (NEHU).

2. *Dischidia rafflesiana* Wall., Pl. Asia. Rar. 2: 35. t. 142. 1831; Hook. f., Fl. Brit. Ind. 4: 50. 1883; Kanjilal *et al.*, Fl. Assam 3: 298. 1939; Deb, Fl. Tripura 2: 32. 1983.

Epiphytic creeper; branches pendulous. Leaves ovate or orbicular, fleshy, abnormaly fews modified to fleshy oblong pitchers. Flowers yellow, in axillary umbrellate cymes on stout pendunclse. Follicles divaricate.

Fls. & Frts.: May - September.

Occurrence: Occasionally, on moist tree trunk.

Distribution: Assam, Tripura; Australia, Malaysia, Myanmar.

Specimen examined: Burha Mayong, Thengbhanga; *Bora* 15105 (NEHU).

4. Gymnema R. Br.

R. Br. in Mem. Wern. Soc. 1. 1809.

Climbing shrubs. Leaves opposite. Flowers in lateral umbelliform cymes. Corolla campanulate; lobes valvate or imbricate, ciliate. Corona 1 seriate, 5 fleshy lobed. Staminal filaments shortly connate. Follicles terete, tapering at apex. Seeds comose.

About 25 species distributed in tropical regions; 10 species in India; 2 species in the study area.

Key to the species

1a. Corolla tube short; leaves not tomentose beneath

.... 1. *G. acuminatum*

1b. Corolla tube long; Leaves tomentose beneath

.... 2. *G. tingens*

1. *Gymnema acuminatum* Wall., Tent. Fl. Nep. 50; Hook. f., Fl. Brit. Ind. 4: 30. 1883; Kanjilal *et al*, Fl. Assam 3: 287.1939.

Climbing shrub. Leaves *ca* 5-15 x 13.0-6.5 cm, ovate or ovate-elliptic, acuminate, white tomentose beneath, turning brown when dry, petiolate, rounded at base. Flowers pale yellow, in axillary subcapitate cymes. Calyx lobes *ca* 0.2 cm long, tomentose outside, ovate, obtuse. Corolla lobes *ca* 0.2 cm long, acute, spreading. Anthers alternating with corolla lobes. Stigma creamy. Follicles woody tomentose, ribbed.

Fls. & Frts.: August - December.

Occurrence: Occasionally, climbing over large rocks in the hilly forest of the snactuary.

Distribution: Assam; Bangladesh, Malacca.

Specimen examined: Hiloikhunda; *Bora* 15505 (NEHU).

2. *Gymnema tingens* Wight & Arn., Contri. 45; Hook. f., Fl. Brit. Ind. 4: 31. 1883; Kanjilal *et al*., Fl. Assam 3: 288. 1939.

Twining shrub. Leaves *ca* 5-13 x 3.0-5.5 cm, ovate- elliptic, shortly acuminate, cordate to truncate at base, petiolate. Flowers creamy, in *ca* 3 cm

long axillary corymbiform racemose cymes. Calyx segments pubescent outside. Corolla *ca* 2 cm long. Stamens 5, *ca* 0.4 cm long. Follicles 1, tip pointed, narrowed to the base.

Fls. & Frts.: July - August.

Occurrence: Rare, climbing over bushes in the hilly forest of the sanctuary.

Distribution: Assam, Tropical Himalayas, South India; China, Philippines.

Specimen examined: Rangamati; *Bora* 15350 (NEHU).

5. *Hoya* R. Br.

R. Br. in Mem. Werner. Soc. 1: 26. 1811.

Usually epiphytic climbers, rooting at nodes. Leaves opposite, thick, fleshy, or coriaceous. Flowers in sessile clusters or pendunculate, umbelliform cymes. Calyx with 5 grandular scales. Corolla rotate, lobes valvate, adnate to the staminal column; pollinia erect. Style apex 5 angled. Follicles slender. Seeds comose.

About 90 species distributed in Malaysia to Pacific regions; 25 species in India; one species in the study area.

Hoya parasitica Wall. in Wight, Contrib. Bot. Ind. 37. 1837; Hook. f., Fl. Brit. Ind. 4: 57. 1883; Kanjilal *et al.*, Fl. Assam 3: 305. 1939; Haridasan & Rao, For. Fl. Maghalaya 2: 621. 1987.

Epiphytic climbing shrub. Leaves *ca* 7-16 x 3-7 cm, thick fleshy, ovate-

elliptic or ovate-lanceolate, acute. Flowers white with pinkish centre, in densely umbellate cymes; stalk *ca* 2 cm long. Calyx lobes *ca* 0.2 cm long, acuminate. Corolla rotate. Follicles lanceolate, reflexed, *ca* 10 cm long.

Fls. & Frts.: March - October.

Occurrence: Rare, in the hilly forest of the sanctuary.

Distribution: Andaman Islands, North East India; Bangladesh, Malacca, Singapore.

Specimen examined: Burha Mayong; *Bora* 15393 (NEHU).

6. *Myriopteron* Griff.

Griff. in Cal. J. Nat. Hist. 4: 385. 1844.

Monotypic genus of the Indo-Malayan region.

Myriopteron paniculatum Griff. in Cal. J. Nat. Hist. 4: 385. 1814; Hook. f., Fl. Brit. Ind. 4:11. 1883; Haridasan & Rao, For. Fl. Meghalaya 2: 621. 1987. *M. extensum* (Wight) K. Schum in Engl. & Prantl Nature. Pflan. 4(2): 215. 1895; Kanjilal *et al.*, Fl. Assam 3: 279. 1939.

Climbing shrub. Leaves *ca* 5-15 x 3-1 cm, ovate-orbicular or elliptic, abruptly acuminate, rounded or cordate at base, pubescent beneath, long petioled. Flowers white, in lax axillary panicles. Corolla rotate; lobes *ca* 0.4 cm long. Follicles straight, winged, *ca* 6.0 x 1.8 cm.

Fls. & Frts.: January - December.

Occurrence: Common, in the hilly forest of the area.

Distribution: North East India; Indo-Malayan region.

Specimen examined: Burha Mayong; *Bora* 15277 (NEHU).

72. MENYANTHACEAE

Dumortier, Anal. Fam. 20. 25. 1829.

Aquati or marshy herbs. Leaves alternate with sheathing base. Flowers bisexual, variously arranged. Calyx 5 lobed or partite. Corolla lobes 5. Stamens 5; anthers sagittate and versatile. Ovary superior, 1-celled. Fruit a capsule, 4 or 2 valved.

The family comprises 5 genera and 33 species, distributed in North and South temperate regions and Tropical South Asia; one genus and one species in the study area.

Nymphoides Hill.

J. Hill, Brit. Herb. 77. 1756.

About 20 species cosmopolitan in distribution; 5 species in India; one species in the study area.

Nymphoides hydrophylla (Kuntze, Revis. Gen. Pl. 2: 429. 1891; Deb, Fl. Tripura 2: 182. 1983. *Menyanthes hydrophylla* Lour., Fl. Cochinch. 1: 129. 1790. *M. cristata* Roxb., Pl. Corom. 2: 3. t. 105. 1799. *Limnanthemum cristatum* (Roxb.) Griseb., Gen. Sp. Gent. 342. 1839; Clarke in Hook. f., Fl. Brit. Ind. 4: 131. 1883; Kanjilal *et al.*, Fl. Assam 3: 326. 1940.

Aquatic floating herb; rhizome slender. Leaves orbicular, deeply cordate, smooth above, purplish and verrucose beneath. Flowers white,

clustered at nodes. Calyx lobes lanceolate. Corolla lobes linear-oblong, rotate with yellow base; throat hairy. Capsules ovoid-ellipsoid, 5-10 seeded.

Fls. & Frts.: June - December.

Occurrence: Common, floating in water bodies of the sanctuary.

Distribution: Throughout India; Tropical Africa, Asia, Australia, China.

Specimen examined: Tamuliduba; *Bora* 14805 (NEHU).

73. HYDROPHYLLACEAE

R. Br. ex Edwards, Bot. Reg. 3: sub t. 242. 1817.

Herbs. Leaves alternate or opposite. Flowers bisexual, actinomorphic, cymose, sometimes solitary. Calyx 5 lobed, often with appendages between. Corolla 5 lobed. Stamens 5, epipetalous. Ovary superior, 1-celled. Fruit usually a loculicidal capsule.

The family comprises about 18 genera and 250 species, distributed mostly in America, few in Africa and Asia; one species in the study area.

Hydrolea Linn.

Linn., Sp. Pl. ed. 2. 328. 1763, *nom. cons.*

About 20 species distributed in tropical regions; one species in India and collected from the study area also.

Hydrolea zeylanica (Linn.) Vahl, Symb. Bot. 2: 46. 1791; Clarke in Hook. f., Fl. Brit. Ind. 4: 133. 1883; Deb, Fl. Tripura 2: 310. 1983; Chauhan *et al.*

in Fl. Namdapha (edt. Hajra) 224. 1996. *Nama zeylanica* Linn., Sp. Pl. 226. 1753.

Erect or procumbent herb; rooting at lower nodes; younger parts glandular hairy. Leaves *ca* 1.0-5.5 x 0.4-0.8 cm, linear-lanceolate, acute, membranous. Flowers blue, in short racemes or cymes. Calyx *ca* 0.4 cm long, glandular. Corolla *ca* 0.6-0.8 cm long; lobes ovate. Capsules ovoid-oblong, enclosed within persistent calyx.

Fls. & Frts.: November - March.

Occurrence: Common, in muddy and marshy places of the sanctuary.

Distribution: Throughout India; Malaysia, Sri Lanka.

Specimen examined: Haduk; *Bora* 14736 (NEHU).

74. BORAGINACEAE

A. L. de Juss., Gen. Pl. 128. 1789.

Herbs, shrubs or trees. Leaves exstipulate, mostly alternate. Flowers usually bisexual, actinomorphic, usually in scorpioid cymes. Calyx lobes 5. Corolla 5 lobed. Stamens as many as corolla lobes and alternate with them. Pistil bicarpellary. Ovary superior. Fruit of 4 nutlets.

The family comprises about 156 genera and 2500 species, distributed in tropical and temperate regions; 35 genera and 117 species in India; 6 genera and 8 species in the study area.

Key to the genera

1a. Herbs or undershrubs:

2a. Styles 2; stigmas punctate .... 2. *Coldenia*

2b. Styles 1; stigmas capitate, peltate or conical:

3a. Styles terminal; stigmas peltate or conical .... 6. *Heliotropium*

3b. Styles gynobasic; stigmas more or less capitate:

4a. Flowers in unilateral racemes or paniculate cincinni; fruits glochidiate spiny .... 4. *Cynoglossum*

4b. Flowers usually solitary; fruits without spines .... 1. *Bothriospermum*

1b. Shrubs or trees:

5a. Style 4 fid; fruits 1 pyrenous .... 3. *Cordia*

5b. Style 2 fid or 2 lobes; fruits 2-4 pyrenous:

6a. Flowers in terminal dichotomous scorpioid cymes; style 2 lobed .... 7. *Tournefortia*

6b. Flowers in terminal or axillary panicled cymes; style 2 fid .... 5. *Ehretia*

1. *Bothriospermum* Bunge

Bunge, Enum. Pl. Chin. Bor. 47. 1832.

About 5 species distributed in tropical regions; one species in India which occurs in the study area also.

Bothriospermum tenellum (Hornem.) Fisch. and C.A. Mey., Index Sem. Hort. Petrop. 1: 24. 1835; Clarke in Hook. f., Fl. Brit. Ind. 4: 167. 1883; Khanna in Mudgal *et al.*, Fl. M.P. 2: 115. 1997.

Prostrate much branched hairy herb. Leaves alternate, *ca* 0.5-2.5 x 0.3-1.0 cm, ovate-lanceolate, acute, hairy; upper ones sessile; lower petiolate. Flowers white, axillary, solitary. Calyx lobes hairy. Corolla lobes rounded. Stamens adnate to corolla tube, included. Ovary 4 lobed; stigma capitate, ellipsoid.

Fls. & Frts.: December - March.

Occurrence: Occasionally, grows in moist places.

Distribution: Assam, Meghalaya, Madhay Pradesh, North Western Himalayas; China, Japan, Myanmar.

Specimen examined: Haduk; *Bora* 15199 (NEHU).

2. *Coldenia* Linn.

Linn., Diss. Dass 9. 1747; Amoem. Acad. 1: 393. 1747.

About 250 species distributed in tropical regions; one species in India which occurs in the study area also.

Coldenia procumbens Linn., Sp. Pl. 125. 173; Clarke in Hook. f. , Fl. Brit. Ind. 4: 144. 1883; Khanna in Mudgal *et at.*, Fl. M.P. 2: 117. 1997.

Procumbent, scabrous, white hairy herb. Leaves alternate obvate-oblong, apex acute to rounded, base narrowed, coarsely toothed, pubescent. Flowers small, pale yellow, axillary, solitary, 4 merous, subsessile. Calyx densely pubescent. Corolla lobes 4, oblong, pale yellow. Drupes *ca* 0.3 cm long, 4 lobed.

Fls. & Frts.: September - March

Occurrence: Common, in moist places, along dry ditches, canals etc.

Distribution: Throughout tropical India; Africa, America, Asia, Australia.

Specimen examined: Haduk; *Bora* 15039 (NEHU).

3. *Cordia* Linn.

Linn., Gen. Pl. ed. 1:52. 1737.

About 250 species distributed in tropical regions; 16 species in India; one species in the study area.

Cordia dichotoma Forst., Fl. Ins. Austr. 18. 1786; Kanjilal *et al.*, Fl. Assam 3: 330. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 630. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 224. 1996. *C. indica* Lamk., Encycl. 7: 49. 1806. *C. myxa auct. non* Linn. 1753; Clarke in Hook. f. Fl. Brit. Ind. 4: 136. 1883. "Bowal".

Middle sized deciduous tree; branches drooping. Leaves alternate, *ca* 6-18 x 3.5-9.0 cm, elliptic or ovate, apex acute to obtuse, glabrescent or slightly pubescent. Flowers white, males and bisexual in dichotomous, lax, terminal and axillary pedunculate cymose panicles. Calyx pubescent inside, campanulate. Corolla lobes narrow oblong recurved. Dropes globose, yellowish purple when ripe, supported by the saucer shaped accrescent calyx; juice sticky.

Fls. & Frts.: August - January.

Occurrence: Common, along forest edges of the sanctuary.

Distribution: Throughout India; China, Egypt, Sri Lanka, Tropical Australia.

Specimen examined: Haduk; *Bora* 14819 (NEHU).

Uses: Fruit juice used as gum.

4. *Cynoglossum* Linn.

(Tourn.) Linn., Syst. ed. 1. 1735.

About 55 species distributed in temperate and subtropical regions; 13 species in India; one species in the study area.

Cynoglossum glochidiatum Wall. ex Benth. in Royle, Illus. Bot. Himal. 306. 1836; Clarke in Hook. f., Fl. Brit. Ind. 4: 156. 1883; Kanjilal *et al.*, Fl. Assam 3: 337. 1939; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 224. 1996. *C. vesiculosum* Wall. ex G. Don, Gen. Syst. 4: 354. 1838. *C. denticulatum* A. DC. in DC., Prodr. 10: 150. 1946.

Erect hispid herb. Leaves *ca* 2-8 x 0.6-2.0 cm, ovate-lanceolate, acute,

denticulate, hairy. Flowers white, in capitate cymes. Calyx lobes bristly hairy. Corolla lobes rounded, spreading. Stamens included. Nutlets glochidiate.

Fls. & Frts.: July - December.

Occurrence: Common, along roadside and in grassland.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Nagaland; Malaya.

Specimen examined: Haduk; *Bora* 14774 (NEHU).

Notes: Confined to North-east India and Indo-Malayan regions.

5. *Ehretia* Linn.

Linn., Syst. ed. 10: 936. 1759.

Shrubs or trees. Leaves alternate. Flowers in the terminal or axillary cymes, corymbs or panicles, bisexual; bracts small. Calyx lobes persistent. Corolla lobes spreading. Stamens 5, inserted on corolla tube. Ovary 2-4 celled; style 2 fid; stigma 2, capitate. Fruits drupe, 2-4 pyrenous.

About 50 species distributed in tropical and subtropical regions; 8 species in India; 2 species in the study area.

Key to the species

1a. Leaves serrate; flowers in dense compound panicles .... 1. ***E. acuminata***

1b. Leaves entire; flowers in corymbose cymes .... 2. ***E. laevis***

1. *Ehretia acuminata* R. Br., Prodr. 497. 1810; Clarke in Hook. f. Fl. Ind. 4: 141. 1883; Kanjilal *et al.*, Fl. Assam 3: 333. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 632. 1987. *E. serrata* Roxb., Hort. Beng. 17 *nom. nud* & Fl. Ind. ed. Careg & Wall. 2: 340. Fig 34

Medium sized deciduous tree. Leaves *ca* 5-15 x 2.5-6.0 cm, elliptic or ovate-oblong, acuminate, serrate. Flowers white, small, fragrant, fascicled in dense compound panicles. Calyx ciliate. Corolla rotate; lobes *ca* 0.2 cm long, oblong. Drupes small ovoid, with 1 or 2 seeded pyrense.

Fls. & Frst.: May - November.

Occurrence: Occasionally, along roadside and forest edges of the sanctuary.

Distribution: Assam, Meghalaya, Subtropical Himalayas; Australia, Japan, Myanmar.

Specimen examined: Haduk; *Bora* 15040 (NEHU).

2. *Ehretia laevis* Roxb., Pl. Corom. 1: 42. t. 56. 1796. Clarke in Hook. f., Fl. Brit. Ind. 4: 141. 1883; Kanjilal *et al.*, Fl. Assam 3: 333. 1939. *E. lavies* var. *floribunda* (Benth.) Brandis, For. Fl. N. W. India 340. 1874; Clarke in Hook. f., Fl. Brit. Ind. 4: 142. 1883.

Small deciduous tree; bark white smooth. Leaves *ca* 5-15 x 2.0-7.5 cm, elliptic or ovate-elliptic, shortly acuminate. cuneate at base, entire. Flowers small, white, in terminal and axillary corymbose cymes, subsessile. Calyx hairy. Corolla lobes oblong. Stigma discoid. Drupes globose, one seeded pyrenes, orange when ripe.

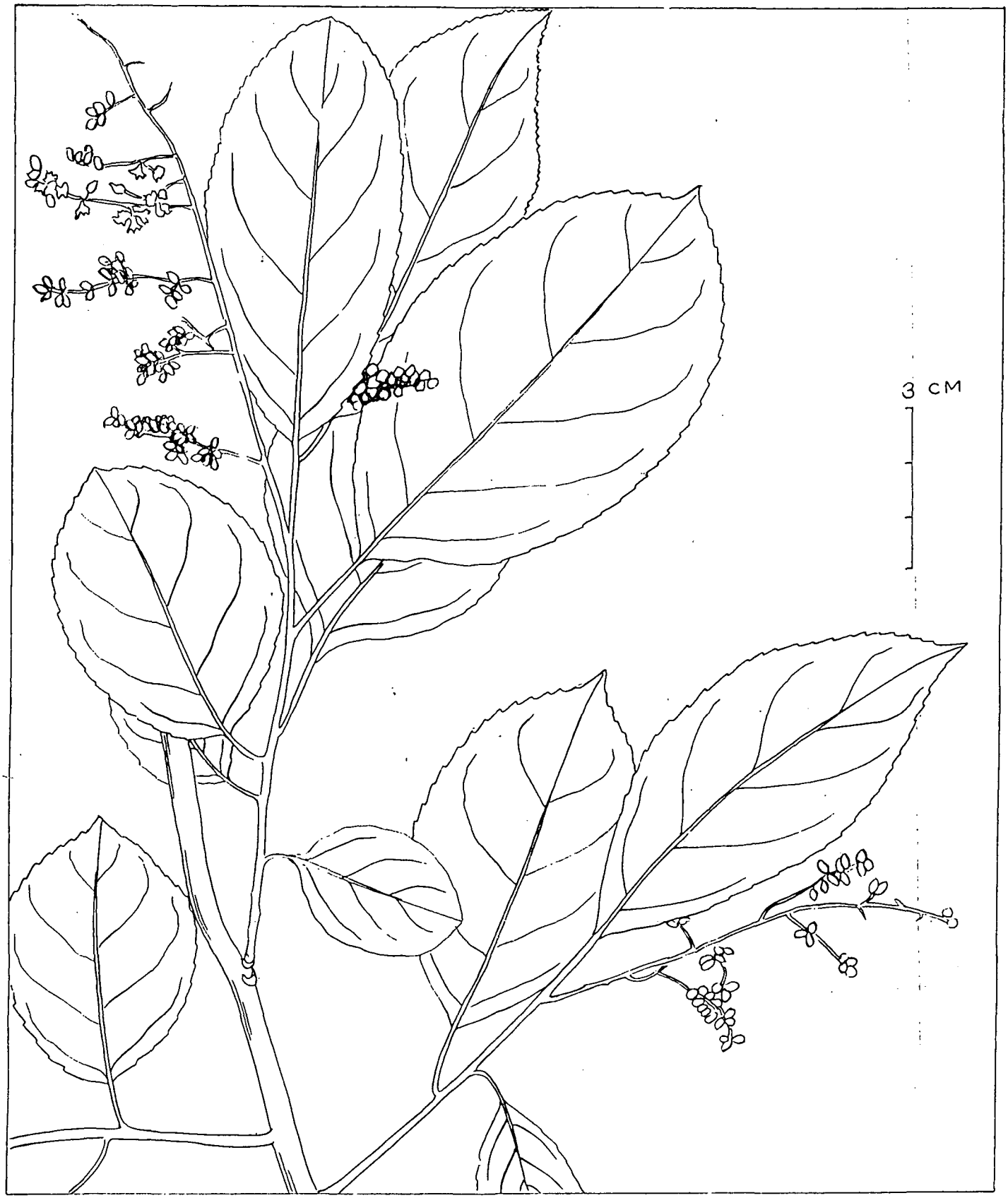


Fig. 34: ***Ehretia acuminata*** R . Br. (Boraginaceae)

Fls. & Frts.: April - August.

Occurrence: Occasionally, in the hilly forest and rarely in the plain forest of the sanctuary.

Distribution: Tropical and subtropical regions of India; Australia, China, Polynesia, Tropical Africa.

Specimen examined: Haduk; *Bora* 15200 (NEHU).

6. *Heliotropium* Linn.

Linn., Sp. Pl. 130. 1753 & Gen. Pl. ed. 5. 63. 1754.

About 250 species distributed in tropical and temperate regions; 18 species in India; one species in the study area.

Heliotropium indicum Linn., Sp. Pl. 130. 1753; Clarke in Hook. f, Fl. Brit. Ind. 4: 152. 1883. *Tiaridium indicum* Lehm., Pl. Asperif. Nacif. 14. 1818. "Hatishuria bon".

Scabrous herb. Leaves usually lower ones opposite; upper ones alternate or subopposite, *ca* 3-10 x 0.8-4.0 cm, ovate or ovate-oblong, acute or subacute, serrate or undulate, sparsely hairy. Flowers whitish blue, sessile in extra axillary spike like long scorpiod cymes. Calyx lobes linear, *ca* 0.2 cm long, hairy. Corolla funnel shaped, *ca* 0.5 cm long; tube hairy outside. Drupes deeply 2 lobed, ovoid, nutlets compressed, 4 ribbed.

Fls. & Frts.: April - August.

Occurrence: Common, along roadside and canals of the sanctuary.

Distribution: Throughout India; America, Tropical Africa, Malaysia.

Specimen examined: Haduk; *Bora* 14854 (NEHU).

7. *Tournefortia* Linn.

Linn., Sp. Pl. 140. 1753 & Gen. ed. 5. 68. 1754.

About 150 species are distributed in tropical and subtropical regions; 11 species in India; one species in the study area.

Tournefortia viridiflora Wall. in Roxb., Fl. Ind. 1: 5. 1820; Clarke in Hook. f., Fl. Brit. Ind. 4: 146. 1883; Kanjilal *et al.*, Fl. Assam 3: 336. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 634. 1987; Chauhan *et al.* in Fl. Nandapha (edt. Hajra) 225. 1996. **Fig. 35**

Scandent shrub; young parts pubescent. Leaves *ca* 4.5-10.5 x 1.2-4.5 cm, alternate, oblong-lanceolate or lanceolate, acuminate, sparsely hairy beneath. Flowers greenish white, *ca* 1 cm long, tubular in cymes. Calyx lobes spreading. Stamens inserted on corolla throat. Drupes ovoid with persistent style.

Flrs. & Frts.: April - December.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Assam, Meghalaya; Bangladesh.

Specimen examined: Sanaka; *Bora* 15387 (NEHU).

Notes: Confined to Indo-Bangladesh region.



Fig. 35: ***Tournefortia viridiflora*** Wall. (Boraginaceae)

75: CONVOLVULACEAE

A. L. de Juss., Gen. Pl. 132. 1789.

Herbaceous or woody, often climbing; juice usually milky. Leaves alternate, exstipulate. Flowers bisexual, usuallay actinomorphic, mostly cymose; bracts often forming an involucre. Sepals free, persistent. Corolla 5 lobed. Stamens 5, epipetalous, alternating with corolla lobes. Ovary superior, 1-4 celled. Fruit capsule, berry or nut like.

The family comprises about 58 genera and 1650 species, distributed in tropical and temperate regions of the world; 20 genera and 158 species in Inda; 7 genera and 16 species in the study area.

Key to the genera

1a. Prostrate herbs; styles 2; stigmas 4 .... 3. *Evolvulus*

1b. Erect or climbing herbs or shrubs; style 1; stigmas 2:

2a. Fruits indehiscent .... 2. *Argyreia*

2b. Fruits dehiscent:

3a. Stems winged; fruits dehiscing by circumscisile epicarp .... 5. *Operculina*

3b. Stems not winged; fruits dehiscing by valves or irregularly:

4a. Sepals accrescent in fruit; fruits 1 seeded .... 7. *Porana*

4b. Sepals not or slightly accrescent in fruit; fruits 2–4 seeded:

5a. Pollen grains spinulose; corolla pink, purple or blue .... 4. *Ipomoea*

5b. Pollen grains not spinulose; corolla usually white; sometimes yellow or orange:

6a. Flowers solitary, axillary; sepals decurrent on the peduncle; stigma globose .... 1. *Aniseia*

6b. Flowers solitary or in few flowered cymes; sepals not decurrent; stigma biglobose .... 5. *Merremia*

1. *Aniseia* Choisy

Choisy in Mom. Soc. Genev. 6: 481. 1833.

About 5 species distributed throughout the world; one species in India which occurs in the study area also.

Aniseia martinicensis (Jacq.) Choisy in Mom. Soc. Phys. Genev. 8: 66. 1838; Clarke in Kanjilal *et al.*, Fl. Assam 3: 355. 1939. *Ipomoea uniflora* (Burm. f.) R. & S., Syst. Veg. 4: 147. 1819; Clarke in Hook. f., Fl. Brit. Ind. 4: 201. 1883. *Convolvulus uniflorus* Lamk., Encycl. 3. 544.

Wiry twiner. Leaves alternate, *ca* 2.8-8.0 x 0.8-2.5 cm, lanceolate or ovate-lanceolate, obtuse, mucronate. Flowers white, *ca* 4 cm long, solitary, axillary; bracts 3, leafy, ovate, acute. Calyx segments 5, unequal. Corolla campanulate, *ca* 2.5 cm long. Stamens included. Style filiform; stigmas 2. Capsules ovoid, 4 valved.

Fls. & Frts.: September - January.

Occurrence: Occasionally, twining over undershrubs, shrubs throughout the sanctuary.

Distribution: Throughout India; Malaya to Fiji, Tropical Africa.

Specimen examined: Thengbhanga; *Bora* 15506 (NEHU).

2. Argyreia Lour.

Lour., Fl. Cochinch. 134. 1790.

About 90 species distributed in Indo-Malaysia to Australia; 50 species in India; one species in the study area.

Argyreia capitata (Vahl) Arn. ex. Choisy in Conv. Or. 41. 1834; Haridasan & Rao, For. Fl. Meghalaya 2: 636. 1987. *Convolvulus capitatus* Vahl, Symp. Bot. 3: 28. 1794. *Lettsomia strigosa* Roxb., Fl. Ind. 2: 80. 1824; Clarke in Hook. f., Fl. Brit. Ind. 4: 193. 1883; Kanjilal *et al.*, Fl. Assam 3: 345. 1939.

Large laticiferous, stigose climber. Leaves *ca* 5-15 x 3.0-8.5 cm, ovate or obovate-orbicular, acuminate, cordate at base, pubescent; petioles *ca* 1.5-5.5 cm long. Flowers purplish pink, *ca* 3.4 cm long, sessile in pedunculate bracteate pubescent heads; bracts *ca* 1.6 cm long, ovate acute, hairy. Sepals

5, hairy. Corolla campanulate. Fruits 2-4 seeded capsule.

Fls. & Frts.: September - March.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Assam, Meghalaya, Tripura, West Bengal; Bangladesh, Malaysia, Thailand, Vietnam.

Specimen examined: Dhekiabari; *Bora* 15507 (NEHU).

3. *Evolvulus* Linn.

Linn., Sp. Pl. ed. 2:391. 1762.

About 100 species distributed in subtropical and tropical regions; 2 species in India; one species in the study area.

Evolvulus nummularius (Linn.) Linn., Sp. Pl. ed. 2: 391. 1762; Deb, Fl. Tripura 2: 254. 1983. *Convolvulus nummularius* Linn., Sp. Pl. 157. 1753. *Volvulopsis numularia* (Linn.) Roberty in Candollea 14: 28. 1952.

Prostrate herb; rooting at nodes. Leaves *ca* 0.4-1.5 x 0.3 cm, ovate to orbicular, base rounded or cordate, apex rounded. Flowers white, *ca* 0.8 cm long, axillary, solitary or paired; bracteoles linear-lanceolate. Sepals 5, *ca* 0.3 cm long, elliptic-ovate, pubescent. Corolla salver shaped, *ca* 0.5 cm long. Staminal filaments adnate to corolla tube. Styles 2 fid. Capsules globose, 4 valved.

Fls. & Frts.: March - December.

Occurrence: Common, in shady places and grassland of the sanctuary.

Distribution: Throughout India;, Tropical Africa, Madagascar, Malaya

Peninsula, Mexico, West Indies.

Specimen examined: Haduk; *Bora* 15219 (NEHU).

4. *Ipomoea* Linn.

Linn., Sp. Pl. 159. 1753 & Gen. Pl. ed. 5. 76. 1754.

Usually twining herbs or shrubs, sometimes prostrate or floating. Flowers axillary, solitary or few to many flowered simple or rarely paniculate cymes; bracts often foliaceous or involucrate. Corolla funnel shaped or tubular campanulate. Stamens inserted near the base of the corolla tube. Style filiform. Capsules usually 4 valved.

About 500 species distributed in tropical and temperate regions; 60 species in India; 9 species in the study area.

Key to the species

1a. Plants erect shrub .... 4. *I. carnea*

1b. Plants twining or climbing herb:

2a. Leaves pinnatisect; segments filiform, linear .... 9. *I. quamoclit*

2b. Leaves entire or palmately lobed; lobes ovate-lanceolate, lanceolate or elliptic-lanceolate:

3a. Plants aquatic .... 2. *I. aquatica*

3b. Plants terrestrial:

4a. Corolla *ca* 2 cm long, yellow .... 7. *I. obscura*

4b. Corolla more than 2 cm long;
pink, purple or blue:
5a. Leaves entire or 3 lobed:
6a. Leaves entire; corolla
ca 13 cm long .... 1. I alba
6b. Leaves usually 3 lobed; corolla
ca 3-5 cm long .... 6. *I. nil*
5b. Leaves deeply divided into 5-9 lobes:
7a. Calyx *ca* 1 cm long; ovary
4-celled ... 5. *I. mauritiana*
7b. Calyx *ca* 0.2-0.5 cm long;
ovary 2-celled:
8a. Corolla campanulate;
sepals glabrous
.... 3. *I cairica*
8b. Corolla funnel
shaped, sepals hairy
.... 8. *I. pes-tigrids*

1. *Ipomoea alba* Linn., Sp. Pl. 161. 1753; Haridasan & Rao, For. Fl. Meghalaya 2: 641. 1987. *I.bona-nox* Linn., Sp. Pl. ed. 2: 228. 1762; Clarke in Hook. f., Fl. Brit. Ind. 4: 197. 1883. *Calonyction bona-nox* (Linn.) Boj., Host. Maurit. 227. 1837; Clarke in Kanjilal *et al.*, Fl. Assam 3: 351. 1939.

Climbing shrub. Leaves *ca* 10-22 x 6.0-13.5 cm, broadly ovate or ovate-orbicular, acuminate, cordate at base; petioles *ca* 3-13 cm long. Flowers white, in many flowered cymes; peduncles *ca* 15 cm long. Sepals *ca* 0.2 cm long,

subequal. Corolla salver shaped, *ca* 13 cm long. Capsules ovoid, 4 valved.

Fls. & Frts.: October - December.

Occurrence: Occasionally, throughtout the sanctuary.

Distribution: Tropical regions of India; Native of Tropical America.

Specimen examined: Satbasti; *Bora* 15382 (NEHU).

2. *Ipomoea aquatica* Forsk., Fl. Aegypt-Arab. 44. 1775; Clarke in Hook. f., Fl. Brit. Ind. 4: 210. 1883 & in Kanjilal *et al.*, Fl. Assam 3: 348. 1939; Islam, Fl. Majuli 206. 1990. *I. reptants* Poir. in Lamk., Encycl. Suppl. 3: 460. 1814. "Kalmou".

Aquatic trailing herb; rooting at nodes; stem hollow. Leaves *ca* 4-10 x 1.0-3.5 cm, usually hastate, ovate-oblong, acute to acuminate. Flowers pale purple, *ca* 6 cm long, solitary or in few flowered peduncled cymes. Sepals *ca* 0.6 cm long, ovate-oblong. Corolla *ca* 4-5 cm long. Capsules ovoid, glabrous.

Fls. & Frts.: August - February.

Occurrence: Common, in muddy places and water bodies.

Distribution: Throughout India; Tropical Asia, Australia, Africa.

Specimen examined: Haduk, Tuplung; *Bora* 15091 (NEHU).

Uses: Leaves used as vegetable.

3. *Ipomoea cairica* (Linn.) Sw., Hort. Brit. 2. 287. 1827; Clarke in Kanjilal *et al.*, Fl. Assam 3: 349. 1939; Santapau in Rec. Bot. Surv.Ind. 16(1): 193. 1953 *Convolvulus cairicus* Linn., Syst. Nat. ed. 10. 922. 1759. *Ipomoea palmata* Forsk., Fl. Aegypt.- Arab. 43. 1775; Clark in Hook. f., Fl. Brit. Ind. 4: 214. 1883.

Climbing shrub. Leaves ovate or orbicular, palmately divided into 5-7 lobes up to base; lobes elliptic-lanceolate, acute, mucronate. Flowers pale purple, in long penduncled, one to many flowered cymes. Sepals *ca* 0.5 cm long, ovate, glabrous. Corolla campanulate, *ca* 3-5 cm long. Capsules subglobose. Seeds tomentose.

Fls. & Frts.: June - December.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Assam, Deccan Peninsula; Tropical Asia, Africa, Australia, America.

Specimen examined: Rangamati; *Bora* 14778 (NEHU).

4. *Ipomoea carnea* Jacq., Enum. Syst. Pl. 1760; Verma & Srivastava in J. Eco. Tax. Bot.4: 903-907. 1983. *I. fistulosa* Mart. ex Choisy in DC., Prodr. 9: 349. 1845. *I. carnea* Jacq. subsp. *fistulosa* (Mart. ex. Choisy) Austin in Taxon 26: 237. 1977. "Pani Bhatora".

Shrub with milky juice; stem stout, fistular; young parts puberulent. Leaves *ca* 6-24 x 4-8 cm, ovate- lanceolate, acuminate, cordate at base; petioles *ca* 4-11 cm long. Flowers pinkish purple, in many flowered axillary and terminal cymes. Calyx *ca* 0.7 cm long, funnel shaped. Staminal filaments hairy at the dilated base. Ovary pubescent. Capsules ovoid, *ca* 1.5 cm long.

Fls. & Frts.: August - March (Almost throughout the year)

Occurrence: Common, along roadside and in marshy places.

Distribution: Native of America; Throughtout India.

Specimen examined: Haduk; *Bora* 15089 (NEHU).

5. *Ipomoea mauritiana* Jacq., Coll. 4: 216. 1791 & in Hort. Schoenbr 2: 39. t. 200. 1797. *I. digitata* auct. non Linn.; Clarke in Hook. f., Fl. Brit. Ind. 4: 202. 1883; Clarke in Kanjilal *et al.*, Fl. Assam 3: 347. 1939. *I. paniculata* R. Br., Prodr. 486. 1810. *Convolvulus paniculatus* Linn., Sp. Pl. 223. 1753.

Climbing shrub. Leaves *ca* 10-18 cm long, palmately deeply 5-7 lobed; lobes lanceolate or elliptic, acute or acuminate; petioles *ca* 7-11 cm long. Flowers pinkish purple, large, *ca* 4.5-7.0 cm long, in axillary pedunculate corymbose cymes. Calyx *ca* 1.1 cm long, ovate, concave. Corolla *ca* 3-4 cm long, funnel shaped. Capsules ovoid, 4 celled. Seeds hairy.

Fls. & Frts.: June - August.

Occurrence: Occasionally, in moist shady places in the hilly forest of the area.

Distribution: Assam, West Bengal; Tropical Asia, Africa, America, Australia.

Specimen examined: Rangamati; *Bora* 15508 (NEHU).

6. *Ipomoea nil* (Linn.) Roth, Cat. Bot. 1: 36. 1797; Islam, Fl. Majuli 208. 1990. *Convolvulus nil* Linn., Sp. Pl. ed. 2: 219. 1762. *Ipomoea hederacea* Clarke in Hook. f., Fl. Brit. Ind. 4: 199. 1883 & in Kanjilal *et al.*, Fl. Assam 3: 346. 1939.

Climbing pubescent herb. Leaves ovate-cordate, entire or 3 lobed; lobes acute, pubescent. Flowers bluish purple, 1-5 together on long penduncles. Corolla funnel shaped. Staminal filaments hairy below. Ovary 3-celled,

glabrous. Capsules ovoid.

Fls. & Frts.: November - January.

Occurrence: Occasionally, in the hilly area of the sanctuary.

Distribution: Tropical Africa, Asia.

Specimen examined: Hiloikhunda; *Bora* 15509 (NEHU).

7. **Ipomoea obscura** (Linn.) Ker., Gawl. Bot. Reg. 3: t. 239.1817; Clarke in Hook. f., Fl. Brit. Ind. 4: 207. 1883. *Convolvulus obscurus* Linn., Sp. Pl. ed. 2: 220. 1762.

Slender twiner. Leaves *ca* 2-8 x 1-5 cm, ovate-cordate, acuminate, entire. Flowers yellow, *ca* 2.2 cm long, in axillary, 1-3 flowered peduncled cymes. Sepals *ca* 0.5 cm long, ovate-obtuse. Corolla campanulate, *ca* 2 cm long; tube narrow; lobes apiculate. Capsules globose. Seeds velvety.

Fls. & Frts.: October - December.

Occurrence: Common, twining over bushes, grasses throughout the sanctuary.

Distribution: Throughout India; Eastern Africa, Malaysia.

Specimen examined: Haduk, Pagladuba; *Bora* 14701 (NEHU).

8. **Ipomoea pes-tigridis** Linn., Sp. Pl. 162. 1753; Clarke in Hook. f., Fl. Brit. Ind. 4: 204. 1883; Deb, Fl. Tripura 2: 260. 1983; Islam, Fl. Majuli 208. 1990. *I. hepaticifolia* Linn., Sp. Pl. 161. 1753.

Pubescent climber. Leaves *ca* 7-15 cm long, orbicular palmately 5-9 lobed; lobes ovate, acuminate, pubescent; petioles *ca* 4-10 cm long. Flowers

purplish white, in involucrate cymes. Sepals *ca* 0.2 cm long, lanceolate, pubescent. Corolla funnel shaped, *ca* 2.5-3.0 cm long. Capsules ovoid, globose, within persistent calyx. Seeds sparsely pubescent.

Fls. & Frts.: August - December.

Occurrence: Occasionally, climbing over bushes, trees in the hilly forest of the sanctuary.

Distribution: Throughout India; Tropical Asia, Africa, Malaysia.

Specimen examined: Dhekiabari; *Bora* 14777 (NEHU).

9. *Ipomoea quamoclit* Linn., Sp. Pl. 159. 1753; Clarke in Hook. f., Fl Brit. Ind. 4: 199. 1883; Santapau in Rec. Bot. Surv. Ind. 16(1): 191. 1953; Deb, Fl. Tripura 2: 261. 1983; Islam, Fl. Majuli 208. 1990. *Quamoclit pinnata* (Desr.) Boj., Hort. Maurit. 224. 1837; Clarke in Kanjilal *et al.*, Fl, Assam 3: 350. 1939.

Slender twiner. Leaves deeply pinnatisect; segments linear, acute. Flowers red, *ca* 4-5 cm long, solitary in few flowered peduncled cymes. Sapals *ca* 0.6 cm long. Corolla funnel shaped, *ca* 3-4 cm long. Capsules ovoid, globose.

Fls. & Frts.: July - December.

Occurrence: Common, twining over bushes in the hilly forest of the sanctuary.

Distribution: Throughout India; Malaysia.

Specimen examined: Sanaka; *Bora* 14776 (NEHU).

4. *Merremia* Dennst. ex Endl.

Dennst. in Schliiss. Hort. Malab. 34. 1818.

Herbaceous climber. Leaves lobed or palmately compound. Flowers axillary, solitary or few flowered cymes. Sepals 5, subequal, enlarged in fruit. Corolla funnel shaped or included. Disk often annular. Ovary 2–4 celled; style filiform; stigma 2, globular. Capsules usually 4 valved.

About 70 species distributed in tropical regions; about 15 species in India; 2 species in the study area.

Key to the Species

1a. Corolla white, salver shaped; seeds pubescent

.... 1. ***M. umbellata***

1b. Corolla yellow, campanulate; seeds glabrous

.... 2. ***M. vitifolia***

1.***Merremia umbellata*** (Linn.) Hall. f. in Engler, Bot. Jahrb. Syst. 16: 552. 1893; Haridasan & Rao, For. Fl. Meghalaya 2: 643. 1987; *Convolvulus umbellatus* Linn., Sp. Pl. 155. 1753. *Ipomoea cymosa* (Desr.) Roem. & Schult., Syst. Veg. 4: 241. 1819; Clarke in Hook. f., Fl. Brit. Ind. 4: 211. 1883 & in Kanjilal *et al.*, Fl. Assam 3: 357. 1939.

Climber. Leaves *ca* 2.5–8.5 x 0.5–2.2 cm, oblong lanceolate, mucronate to acuminate, entire, cordate at base. Flowers white, *ca* 3.5 cm long, in umbelliform cymes. Sepals *ca* 0.8 cm long, oblong. Corolla salver shaped, *ca* 2.5 cm long. Capsules ovoid, *ca* 1 cm long. Seeds pubescent.

Fls. & Frts.: February - September.

Occurrence: Common, throughout the study area.

Distribution: Throughout India; China, Thailand, Malaysia, Vietnam.

Specimen examined: Burha Mayong; *Bora* 15090 (NEHU).

2. ***Merremia vitifolia*** (Burm. f.) Hall. f. in Engler, Bot. Jahrb. 16: 552. 1893; Kanjilal *et al.*, Fl. Assam 3: 357. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 643. 1987. *Convolvulus vitifolius* Burm. f., Fl. Ind. 45. t. 18. f. 1. 1768. *Ipomoea vitifolia* (Burm. f.) Bl., Bijdr. 709. 1826; Clarke in Hook. f., Fl. Brit. Ind. 4: 213. 1883.

Hairy herbaceous twiner. Leaves *ca* 2.5-10.0 cm long, broadly ovate, palmately 5-7 lobed, cordate at base; lobes acute or acuminate, hairy. Flowers yellow, *ca* 5 cm long in axillary 1-many flowered cymes. Sepals *ca* 1.2 cm long, ovate-oblong, sparsely pubescent. Corolla yellow, campanulate; lobes spreading. Capsules subglobose with enlarged calyx, 4 seeded. Seeds glabrous.

Fls. & Frts.: September - March.

Occurrence: Common, throughout the sanctuary.

Distribution: Throughout India; Vietnam, Malaysia, Sri lanka.

Specimen examined: Burha Mayong; *Bora* 15202 (NEHU).

6. *Operculina* Manso

S. Manso, Enum, Subst. Bras. 16. 1836.

About 15 species distributed in tropical regions; 2 species in India; one species in the study area.

Operculina turpethum (Linn.) Manso, Enum. Subst. Bras. 16: 49. 1836; Kanjilal *et al.*, Fl. Assam 3: 359. 1939. *Convolvulus turpethum* Linn., Sp. Pl. 155. 1753. *Ipomoea turpethum* (Linn.) R. Br., Prodr. 485. 1810; Clarke in Hook. f., Fl. Brit. Ind. 4: 212. 1883.

Climbing herb; stem winged, twisted, angled. Leaves *ca* 6-13 x 1.5-9.0 cm, orbicular or broadly ovate-lanceolate. Flowers white, *ca* 8 cm long, in few flowered cymes. Sepals 5, *ca* 2 cm long, unequal, ovate, pubescent outside. Corolla *ca* 4-5 cm long, tubular, campanulate. Stamens unequal. Capsules depressed globose enclosed in enlarged calyx. Seeds black, glabrous.

Fls. & Frts.: October - March.

Occurrence: Occasionally, along the roadside of the sanctuary.

Distribution: Throughout India; Tropical Asia, Africa, Malaysia.

Specimen examined: Haduk, Khulabhuyan; *Bora* 14775 (NEHU).

7. *Porana* Burm. f.

Burm. f., Fl. Ind. 51. t. 21. f. 1. 1768.

About 25 species distributed in tropics; 5 species in India; one species in the study area.

Porana paniculata Roxb., Pl. Corom. 3: 31. t. 235. 1815; Clarke in Hook. f., Fl. Brit. Ind. 4: 222. 1883 & in Kanjilal *et al.*, Fl, Assam 3: 353. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 644. 1987.

Climber. Leaves *ca* 4-15 x 1-8 cm, ovate, acuminate, cordate at base,

tomentose, 5-7 nerved at base. Flowers white, *ca* 0.8 cm long, in lateral or terminal panicles. Sepals 5, linear pubescent, much enlarged in fruits. Corolla *ca* 0.6 cm long, salver shaped. Capsules indehiscent, ovoid-globose, shortly apiculate, one seeded.

Fls. & Frts.: November - March.

Occurrence: Common, in the hilly forest and occasionally in the plain forest of the sanctuary.

Distribution: Throughout India; Sri Lanka, Java.

Specimen examined: Burha Mayong; *Bora* 15307 (NEHU).

76. CUSCUTACEAE

Dumortier, Anal. Fam. 20: 25. 1825.

Leafless or rootless parasitic herbs. Flowers bisexual, actinomorphic, in clusters. Sepals 4-5. Corolla gamopetalous, 4-5 lobed. Stamens alternate with corolla lobes; scales between the stamens lobed or fimbriate. Ovary superior. Fruit a capsule, dry or fleshy.

A monogeneric family and comprises about 170 species, distributed in warm and temperate regions; 7 species in India; one species in the study area.

Cuscuta Linn.

Linn., Sp. Pl. 124. 1753 & Gen. Pl. ed. 5: 60. 1754.

Cuscuta reflexa Roxb., Pl. Corom. 2: 3. t. 104. 1799; Clarke in Hook. f., Fl. Brit. Ind. 4: 225. 1883 & in Kanjilal *et al.*, Fl. Assam 3: 362. 1939;

Haridasan & Rao, For. Fl. Meghalaya 2: 646. 1987 *C. hookeri* Sw., Hort. Brit. ed. 2: 373. 1830. "Aakasi lota".

Twiner; branches fleshy yellow. Flowers white, in clustered racemes. Calyx cupular; lobes ovate, obtuse. Corolla lobes narrowly ovate, reflexed. Staminal filaments short. Capsules depressed, globose.

Fls. & Frts.: November - February.

Occurrence: Common, parasite on shrubs and trees along roadside of the study area.

Distribution: Throughout India; Malaysia, Sri Lanka.

Specimen examined: Haduk; *Bora* 14897 (NEHU).

77. SOLANACEAE

A. L. de Juss., Gen. Pl. 124. 1789.

Herbs, shrubs or trees. Leaves exstipulte. Flowers bisexual, mostly actinomorphic, in cymes or panicles. Calyx 4-6 lobed, persistent. Corolla gamopetalous, usually 5 lobed. Stamens 4-5, epipetalous; anthers opening lengthwise or by apical pores. Ovary superior, 2-celled; ovules axile. Fruit a capsule or berry.

The family comprises about 90 genera and 2600 species, distributed in tropical and temperate regions of the world; 15 genera and 88 species in India; 6 genera and 12 species in the study area.

Key to the genera

1a. Calyx enlarged, enclosing the fruits .... 5. *Physalis*

1b. Calyx not enclosing the fruits:

2a. Fruits capsule:

3a. Calyx much shorter than the fruits; fruits spinous .... 3. **Datura**

3b. Calyx nearly covering the fruits; fruits smooth .... 4. *Nicotiana*

2b. Fruits berry:

4a. Corolla tubular; berries 1 seeded .... 2. **Cestrum**

4b. Corolla rotate or campanulate; berries many seeded:

5a. Staminal filaments longer than anthers; style linear .... 1. **Capsicum**

5b. Staminal filaments shorter than anthers; style columnar .... 6. *Solanum*

1. *Capsicum* Linn.

Linn., Sp. Pl. 188. 1753 & Gen. Pl. ed. 5. 188. 1754.

About 10 species distributed in Tropical America; 4 species cultivated in India; one species in the study area.

Capsicum frutescens Linn., Sp. Pl. 189. 1753; Roxb., Fl. Ind. 1: 574. 1832; Clarke in Hook. f., Fl. Brit. Ind. 4: 239. 1883; Kanjilal *et al.*, Fl. Assam 3: 365. 1939.

Much branched undershrub. Leaves *ca* 2-10 x 1.0-4.5 cm, elliptic-ovate, acuminate, entire. Flowers white, *ca* 1.5 cm long, axillary, 2-5 together, pedicelate. Calyx 5 toothed, *ca* 0.3 cm long, cupular. Corolla *ca* 1 cm long. Stamens 5. Style simple; stigma subcapitate. Berry *ca* 1.0-2.5 x 0.3-0.5 cm, many seeded.

Fls. & Frts.: August - January.

Occurrence: Common, in shady places in the hilly forest of the area.

Distribution: Native to tropical America; cultivated in the warmer parts of the globe.

Specimen examined: Hiloikhunda; *Bora* 14833 (NEHU).

Uses: Fruits used as spice.

2. *Cestrum* Linn.

Linn., Sp. Pl. 191. 1753 & Gen. Pl. ed. 588. 1754.

About 175 species distributed in Tropical America and West Indies; 6 species in Inda; one species in the study area.

Cestrum diurnum Linn., Sp. Pl. 191. 1753; Francy in Candollea 6: 234. 1935; Deb, Fl. Tripura 2: 237. 1983; Islam, Fl. Majuli 212. 1990; Srivastava & Dixit in Fl. M.P. 2: 177. 1997.

Shrub: young shoots sparsely puebscent. Leaves *ca* 5-10 x 1.8-4.0 cm, oblong, acute, rounded at base. Flowers white, in axillary fascicles or in pedunculate cymes. Calyx cupshaped; lobes 5, obtuse, reflexed. Corolla funnel shaped, *ca* 1.3 cm long; lobes obtuse. Stamens 5; anthers dorsifixed. Berries subglobose, dark purple when ripe.

Fls. & Frts.: May - December.

Occurrence: Rare, along roadside in the hilly forest of the sanctuary.

Distribution: Native to West Indies; Tropical.

Specimen examined: Guvali; *Bora* 15234 (NEHU).

3. Datura Linn.

Linn., Sp. Pl. 179. 1753 & Gen Pl. ed. 5. 83. 1754.

Herbs or undershurbs. Leaves alternate. Flowers solitary, peduncled. Calyx tubular, 5 toothed. Corolla tubular-funnel shaped, 5-10 lobed or toothed. Stamens 5, included. Style filiform; stigma 2 lobed. Capsules spinous, many seeded. Seed compressed.

About 15 species distributed in S. & N. America; 10 species in India; 2 species in the study area.

Key to the species

1a. Flowers purplish white; capsules dehiscing irregularly .... 1. ***D metel***

1b. Flowers white; capsules dehiscing by 4 valves .... 2. ***D stramonium***

1. ***Datura metel*** Linn., Sp. Pl. 179. 1753; Roxb., Fl. Ind. 1: 561. 1832; Deb, Fl. Tripura 2: 238. 1983; Islam, Fl. Majuli 213. 1990. *D. fastuosa* Linn., Syst. Nat. ed. 10: 932. 1732; Clarke in Hook. f., Fl. Brit. Ind. 4: 242. 1883; Kanjilal et al., Fl Assam 3: 373. 1939.

Undershurb. Leaves *ca* 10-22 x 5-11 cm, ovate-lanceolate, acute, sinuate or obtusely lobed or toothed. Flowers white, *ca* 17 cm long, axillary, solitary. Calyx *ca* 6 cm long; lobes acuminate. Corolla tube *ca* 12-14 cm long; lobes acuminate. Stamens *ca* 12 cm long. Style *ca* 10 cm long. Capsules *ca* 3 cm in diam., globose, spinous.

Fls. & Frts.: November - March.

Occurrence: Common, along roadside of the sanctuary.

Distribution: Throughout India; **Malaya, Tropical Africa.**

Specimen examined: Kamarpur; *Bora* 14706 (NEHU)

2. ***Datura stramonium*** Linn., Sp. Pl. 179. 1753; Clarke in Hook. f., Fl. Brit. Ind. 4: 242. 1883; Kanjilal et al., Fl. Assam 3: 373. 1939; Deb, Fl. Tripura 2: 239. 1983; Islam, Fl. Majuli 213. 1990. *D. tatula* Linn., Sp. Pl. ed. 2. 256. 1762. "Dhatura"

Undershurb. Leaves *ca* 9-25 cm long, ovate-oblong, deeply toothed, acuminate, oblique at base. Flowers white, axillary, solitary. Calyx 5 angled, *ca* 5 cm long. Corolla white, *ca* 12 cm long, teeth linear. Stamens, *ca* 11 cm long. Capsules *ca* 2.5 cm in diam., ovoid, prickly.

Fls. & Frts: August - April.

Occurrence: Common, along roadside of the sanctuary.

Distribution: Assam, Meghalaya, Tripura, Kashmir to Sikkim; Throughout temperate regions.

Specimen examined: Kamarpur; *Bora* 15302 (NEHU).

Uses: Slightly heated leaves used for massaging in muscular pain.

4. *Nicotiana* Linn.

Linn., Sp. Pl. 180. 1753 & Gen. Pl. ed. 5. 84. 1754.

About 67 species distributed in Australia, South West Africa, North and South America; 3 species in India; one species in the study area.

Nicotiana plumbaginifolia Viv., Elench. Pl. 26. t. 5. 1802; Clarke in Hook. f., Fl. Brit. Ind. 4: 246. 1883; Kanjilal et al., Assam 3: 374. 1939; Islam, Fl. Majuli 214. 1990. "Bon Dhopat".

Erect, pubescent, sticky glandular herb. Leaves *ca* 4-12 x 0.5-4.0 cm, rosette at base, obovate or spathulate, obtuse or rounded; upper ones becoming smaller, oblong or elliptic-ovate, sessile, acute or acuminate, hairy. Flowers white, in terminal lax racemes. Calyx 5 fid, *ca* 1.2 cm long, glandular. Corolla salver shaped, *ca* 3 cm long; lobes spreading. Stamens 5. Style filliform. Capsules ovoid. Seeds dark brown.

Fls. & Frts.: March - October.

Occurrence: Common, in moist places, along roadside and canals of the

sanctuary.

Distribution: Assam, West Bengal; Native to Mexico and West Indies.

Specimen examined: Haduk; *Bora* 14867 (NEHU).

4. *Physalis* Linn.

Linn., Sp. Pl. ed. 5. 85. 1754 & Gen. Pl. ed. 5. 85. 1754.

Herbs. Leaves entire, lobed or sinuate. Flowers axillary, solitary, pedicellate. Calyx campanulate, 5 toothed, acrescent in fruits. Corolla campanulate, 5 lobed. Stamens 5, adnate near the base of the corolla. Overy 2 celled, ovules many; stigma minutely 2 lobed. Berries enclosed within bladder like calyx. Seeds compressed.

About 80 cosmopolitan in distribution; 6 species in India; 2 species in the study area.

Key to the species

1a. Plants villose; corolla with purple patches inside;

.... 2. *P. peruviana*

1b. Plants not villose; corolla without patches inside;

.... 1. *P. minima*

1. *Physalis minima* Linn., Sp .Pl. 183. 1753; Clarke in Hook. f., Fl. Brit. Ind. 4: 238. 1883; Deb. Fl. Tripura 2: 242. 1983; Islam, Fl. Majuli 215. 1990. *P. indica* Lamk., Encycl. 2: 102. 1786. *P. parviflora* R. Br., Prodr. 447. 1810. *P. minima* Linn. var. *indica* (Lamk.) Clarke in Hook. f., Fl. Brit. Ind. 4: 238. 1883.

Erect spreadingly branched herb. Leaves *ca* 1-12 x 0.5-6.0 cm, ovate, acute or obtuse, rounded at base, broadly toothed, or sinuate or lobulate. Flowers pale yellow, solitary, axillary. Calyx pubescent, acute. Corolla *ca* 0.6 cm long, yellow, pubescent outside. Stamens *ca* 2 cm long. Berries globose.

Fls. & Frts: October - March.

Occurrence: Common, in moist shady places of the area.

Distribution: Throuhgout Inida; Tropical Asia, Africa, Australia.

Specimen examined: Haduk; *Bora* 14765 (NEHU).

2. ***Physalis peruviana*** Linn., Sp. Pl. ed. 2: 1670. 1763; Clarke in Hook. f., Fl. Brit. Ind. 4: 238. 1883; Kanjilal et al., Fl. Assam 3: 364. 1939; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 228. 1996.

Villose herb. Leaves *ca* 1.5-12.0 x 1-6 cm, ovate, acuminate, cordate-cuneate at base, entire or shallowly sinnualetly lobed or angled, pubescent. Flowers pale yellow, axillary, solitary. Calyx pubescent outside. Corolla *ca* 1 cm long, yellow with purple patches inside. Berries ellipsoid.

Fls. & Frts.: August - November.

Occurrence: Rare, occurs in shady moist places in the hilly forest of the sanctuary.

Distribution: Throughout India; Native to Tropical America.

Specimen examined: Sanka; *Bora* 15384 (NEHU).

6. *Solanum* Linn.

Linn., Sp. Pl. 184. 1753 & Gen. Pl. ed. 5. 85. 1754.

Herbs, shrubs, rarely small trees or climbers. Flowers solitary or in lateral or terminal cymes or panicles. Calyx 5 toothed, campanulate or tubular. Corolla tube short, usually 5 lobed. Stamens 5, adnate at the throat of corolla, anthers connivent into a short cone around style, opening by apical pores. Ovary 2-celled. Fruits Berry. Seeds many.

About 1700 species distributed throughout the world; 40 species in India; 5 species in the study area.

Key to the species

1a. Plants unarmed :

2a. Glabrous herbs .... 3. *S. nigrum*

2b. Tomentose shrubs .... 1. *S. erianthum*

1b. Plants armed with prickles:

3a. Corolla violet; prickles hooked .... 5. *S. violaceum*

3b. Corolla white; prickles straight:

4a. Leaves stellate-tomentose and prickly on both surfaces ..... 2. *S. myriacanthum*

4a. Leaves stellate-tomentose beneath and sparsely prickly on mibrib ..... 4. *S. torvum*

1. *Solanum erianthum* D. Don, Fl. Nep. 96. 1825; Haridasan & Rao, For. Fl. Meghalaya 2: 647. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 229. 1996. *S. verbascifolium auct. non* Linn., Sp. Pl. 184. 1753; Clarke in Hook. f., Fl. Brit. Ind. 4: 253. 1883; Kanjilal *et al.*, Fl. Assam. 3: 367. 1939.

Erect tomentose shurb. Leaves *ca* 7-20 x 2.0-7.5 cm, elliptic, ovate-oblong, entire, acute, tomentose on both surfaces. Flowers creamy white, in woolly terminal corymbose cymes. Calyx teeth *ca* 0.2 cm long. Corolla *ca* 1.2 cm long, tomentose outside; lobes acute. Ovary hairy. Berries *ca* 0.6 cm in diam., globose, stellately tomentose.

Fls. & Frts.: February - September.

Occurrence: Common, along roadside in the hilly forest.

Distribution: Throughout tropical and subtropical zones of India; Malaya, North Australia, South East Asia, Tropical America.

Specimen examined: Guvali; *Bora* 14836 (NEHU).

2. *Solanum myriacanthum* Dunal, Hist. Solan. 218. t. 19. 1813 & DC., Prodr. 13. 243. 1852; Haridasan & Rao, For. Fl. Meghalaya 2: 648. 1987; Chauhan *et al.* in Fl. Namdapha (eds. Hajra) 230. 1996. *S. khasianum* Clarke in Hook. f., Fl. Brit. Ind. 4: 234. 1883; Kanjilal *et al.*, Fl. Assam 3: 371. 1939. "Hati bhekuri".

Prickly undershrub. Leaves *ca* 5-18 cm long, ovate, lobed or angled, hirsute and prickly on both surfaces and petioles. Flowers white, in few flowered lateral cymes, *ca* 1.5 cm long. Berries *ca* 1.5-2.0 cm in diam., globose.

Fls. & Frts.: May - November.

Occurrence: Common, along roadside and forest floors.

Distribution: North East India, Western Ghats; Native of South America.

Specimen examined: Burha Mayong, Kamarpur; *Bora* 15201 (NEHU).

Uses: Fruit paste applied to cure tooth-ache and in leech bite also.

3. *Solanum nigrum* Linn., Sp. Pl. 186. 1753; Clarke in Hook. f., Fl. Brit. Ind. 4: 229. 1883; Kanjilal *et al.*, Fl. Assam 3: 366. 1939. *S. rubrum* Mill., Gard. Dict. ed. 8. 4. 1768. *S. purpurcilineatum* Sabnis & Bhatt. Bull. Bot. Surv. Ind. 12: 158. 1970.

Erect, glabrous, much branched herb. Leaves *ca* 2-12 x 0.5-4.5 cm, ovate-oblong or oblong-lanceolate, toothed or lobed, acute or acuminate. Flowers white, in extra axillary drooping umbellate cymes. Calyx *ca* 0.3 cm long. Corolla *ca* 0.5 cm long; lobes oblong. Staminal filaments hairy at base. Berries *ca* 0.4 cm in diam., globose, black when ripe.

Fls. & Frts.: May - November.

Occurrence: Common, in shady moist places of the area.

Distribution: Throughout India; Tropical Africa, South East Asia, Australia, America.

Specimen examined Haduk, Tuplung; *Bora*, 15262 (NEHU).

4. *Solanum torvum* Sw., Prodr. 47. 1788; Clarke in HooK. f., Fl. Brit. Ind. 4: 234. 1883; Kanjilal *et al.*, Fl. Assam 3: 369. 1939; Deb, Fl. Tripura 2: 249; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 231. 1996. "Bor bhekuri".

Stellate tomentose shurb, *ca* 2.5 m high; prickles scattered. Leaves *ca* 6-20 x 3-10 cm, ovate-elliptic to oblong, acute or acuminate, broadly sinuate lobed, tomentose, midrib sparsely prickly. Flowers white, in many flowered corymbose cymes. Calyx *ca* 0.3 cm long, ovate-lanceolate. Corolla *ca* 0.8 cm long, white, tomentose outside. Berries globose, *ca* 0.8 cm in diam.

Fls. & Frts.: May - September.

Occurrence: Common, in shady places, along roadside and forest floors.

Distribution: Throughout tropical India except western arid regions; China, Malaya, Philippines, Tropical America.

Specimen examined: Haduk, Jugdal; *Bora* 14705 (NEHU).

Uses: Fruits edible.

5. *Solanum violaceum* Ortega, Nov. Pl. Descr. Dec. 56. 1798; Nicolson *et al.*, in Regnum Vege. 119. 252. 1988. Srivastava & Dixit in Mudgal *et al.*, Fl. M.P. 2: 194. 1997. *S. anguivi auct. non* Lamk., 1794. *S. indicum auct. non* Linn., 1753; Clarke in Hook. f., Fl. Brit. Ind. 4: 234. 1883; Kanjilal *et al.*, Fl. Assam 3: 369. 1939. "Bhekuri tita".

Much branched stallately tomentose, prickly undershrub. Leaves *ca* 4-18 x 2-9 cm, ovate-oblong, sinuate or lobed, acute, prickly along nerves. Flowers violet, in extra axillary short cymes. Calyx *ca* 0.3 cm long, tomentose outside. Corolla *ca* 1 cm long, violet, ovate, acute. Style hairy at base. Berries *ca* 0.5-0.8 cm in diam., globose.

Fls. & Frts.: May - November.

Occurrence: Common, along roadside of the sanctuary.

Distribution: Throughout tropical India, China to Malaya, Philippines.

Specimen examined: Haduk; *Bora* 14705 (NEHU).

Uses: Fruits edible.

78. SCROPHULARIACEAE

A. L. de Juss., Gen. Pl. 117. 1789.

Herbs or shrubs, rarely small trees. Leaves exstipulate. Flowers bisexual, mostly zygomorphic. Calyx usually deeply 4-5 lobed. Corolla gamopetalous, often 2 lipped. Stamens epipetalous, usually 4, didynamous or 2. Pistil bicarpellary. Ovary superior, 2-celled. Fruit a capsule or rarely berry.

The family comprises about 222 genera and 4500 species, cosmopolitan in distribution; 57 genera and over 350 species in India; 7 genera and 12 species in the study area.

Key to the genera

1a. Corolla rotate; stamens exserted:

2a. Corolla pilose; stamens 4 .... 5. *Scoparia*

2b. Corolla not pilose; Stamens 2 .... 7. *Veronica*

1b. Corolla 2-lipped; stamens not exserted:

3a. Calyx winged or keeled .... 6. *Torenia*

3b. Calyx not winged or keeled:

4a. Anther lobes divergent:

5a. Capsules loculicidal .... 4. *Mezus*

5b. Capsules septicidal

.... 3. *Lindernia*

4b. Anther lobes parallel:

6a. Submerged leaves divided into filiform segments; style deflxed at top .... 2. *Limnophila*

6b. Submerged leaves absent; style dilated at top .... 1. *Bacopa*

1. *Bacopa* Aubl.

Aubl. Pl. Guniane 128. 1775, *nom. cons.*

About 56 species distributed in subtropical regions; 3 species in India; one species in the study area.

Bacopa procumbens (Mill.) Greenm. Field Columb. Mus. Bot. Ser. 2: 261. 1907. *Erinus procumbens* Mill., Gard. Dict. ed. 8. n. 6. 1768. *Lindernia dianthera* Sw., Prodr. Sci. Philad. Monogr. 1 (Scroph E. N. Amer.): 69. 1935.

Prostrate herb; rooting at lower nodes. Leaves opposite, decussate, ovate-lanceolate, serrate, glandular beneath, subsessile. Flowers greenish yellow, solitary, axillary; bracteoles linear. Calyx segments 5, unequal. Corolla throat pubescent. Stamens 4, included. Capsules cylindrical, 2 valved.

Fls. & Frts.: September - January.

Occurrence: Common, in moist shady places of the area.

Distribution: Throughout India; Tropical Africa, Australia.

Specimen examined: Haduk; *Bora* 15079 (NEHU).

2. *Limnophila* R. Br.

R. Br., Prodr. 442. 1810, *nom. cons.*

Herbs; aquatic or marshy. Leaves submeraged ones wholled divided into filiform segments; aerial ones opposite or whorled, entire, serrate or pinnately divided. Flowers axillary, solitary or in terminal or axillary racemes or spike. Calyx 5 partite or lobed. Corolla tubular, 5 lobed, 2 lipped. *Stamens 4; anther lobes parallel. Ovules many; style deflexed at tip.* Fruits capsule.

About 36 species distributed in tropical regions; 20 species in Inda; 3 species in the study area.

Key to the species

1a. Leaves aerial, 1 nerved; flowers pedicellate .... 1. *L. chinensis*

1b. Leaves aerial and submerged, 3-5 nerved; flowers sessile or subsessile:

2a. Plants glabrous; flowers solitary or in leafy spikes .... 2. *L. heterophylla*

2b. Plants hirsute; flowers solitary .... 3. *L. sessiflora*

1. *Limnophila chinensis* (Obs.) Merr. in Amer. J. Bot. 3: 581. 1916; Kanjilal *et al.*, Fl. Assam 3: 379. 1939; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 231. 1996. *Columnea chinensis* Osb., Dagb Ostind. Resa 230. 1757. *Limnophila hirsiuta* (Heyne ex Benth.) Benth. in DC., Prodr. 10: 388. 1846;

Hook. f., Fl. Brit. Ind. 4: 268. 1884.

Erect hirsut herb; stem hollow; rooting at nodes. Leaves opposite and whorled, *ca* 1.0-3.5 x 0.4-0.8 cm, linear-oblong, serrate, subsessile. Flowers violet, *ca* 1.5 cm long, pedicellate, axillary. Calyx *ca* 0.6 cm long, hirsute, lobes lanceolate, acuminate, persistent. Corolla *ca* 1 cm long, violet, hairy outside, tubular. Capsules ellipsoid.

Fls. & Frts.: November - January.

Occurrence: Common, in moist places of the area.

Distribution: Throughout India; South China.

Specimen examined: Jugdal, Tuplung; *Bora* 14844 (NEHU).

2. *Limnophila heterophylla* (Roxb.) Benth., Scroph. Ind. 25. 1835; Hook. f., Fl. Brit. Ind. 4: 270. 1884; Islam Fl. Majuli 223. 1990, *Columnea heterophylla* Roxb., Fl. Ind. 3: 97. 1832. *Limnophila reflexa* Benth., Scroph, Ind. 25. 1835.

Aquatic, glabrous herb. Leaves aerial ones sessile, oblong lanceolate, semiamplexicaule; lowermost ones whorled, pinnatisect; submerged ones whorled, *ca* 2.5 cm long pinnatified into filiform segments. Flowers pinkish blue, axillary, solitary or in terminal leafy spikes, sessile or subsessile. Calyx *ca* 0.3 cm long, lobes acuminate, glandular. Corolla *ca* 0.6 cm long, tubular, hairy inside. Capsules broadly ellipsoid.

Fls. & Frts.: September - January.

Occurrence : Common, in marshy places of the area.

Distribution: Throughout India; China, Japan, Malaysia, Myanmar, Sri

Lanka.

Specimen examined: Tamuliduba; *Bora* 15078 (NEHU).

3. *Limnophila sessiflora* (Vahl) Bl., Bijdr.750. 1826; Hook. f., Brit. Ind. 4: 270. 1884; Kanjilal *et al.*, Fl. Assam 3: 379. 1939. Islam, Fl. Majuli 224. 1990. *Hottonia sessiflora* Vahl, Symb. Bot. 2: 36. 1791.

Slender pubescent herb. Leaves whorled, sessile, lobulate or pinnatisect; upper ones opposite elliptic-lanceolate, acute, crenate-serrate. Flowers pale purple, *ca* 1.2 cm long, sessile, axillary, solitary, bracts linear. Calyx *ca* 0.4 cm long, hirsute; lobes acuminate. Corolla *ca* 1.1 cm long, cylindrical. Capsules subglobose.

Fls. & Frts.: September - February.

Occurrence: Common, in marshy places of the area.

Distribution: Throughout India; Japan, Java, Sri Lanka.

Specimen examined: Jugdal, Tuplung; *Bora* 14845 (NEHU).

3. *Lindernia* Allioni

Allioni in Misc. Taurin. 3: 178. t. 5. 1766.

Herbs. Leaves opposite. Flowers axillary, solitary or in terminal racemes, bracteolate. Calyx 5 toothed or partite. Corolla 2 lipped; tube cylindrical. Stamens 4, all perfect or reduced to staminodes; anther lobes divergent. Stigma bilamellate; ovules many in each cell. Capsules septicidal. Seeds many.

About 50 species distributed in subtropical regions; 28 species in

India; 5 species in the study area.

Key to the species

1a. Capsules about equalling the calyx or shorter:

2a. Plants glabrous; calyx cleft to the middle .... 3. *L. crustacea*

2b. Plants pubescent; calyx cleft to the base .... 4. *L. montana*

1b. Capsules about twice as long as the calyx or longer:

3a. Flowers white, in racemes .... 5. *L. ruelloides*

3b. Flowers bluish or violet; axillary solitary :

4a. Perfect stamens 4 .... 1. *L. anagallis*

4b. Perfect stamens 2 .... 2. *L. antipoda*

1. *Lindernia anagallis* (Burm. f.) Pennell in J. Arnold Arb. 24: 252. 1943; Mukerjee in J. Ind. Bot. Soc. 24: 133. 1945. *Ruellia anagallis* Burm. f., Fl. Ind. 135. 1768. *Lindernia cordifolia* (Colsm.) Merr., Enum. Phil. Fl. Pl. 3: 437. 1923. *Vandellia pedunculata* Benth., Scroph. Ind. 37. 1835; Hook. f., Fl. Brit. Ind. 4: 282. 1884.

Prostrate glabrous herb; rooting at nodes. Leaves opposite, *ca* 0.8-2.5 x 0.4-1.0 cm, elliptic or ovate- lanceolate, subsessile, acute, slightly serrate. Flowers bluish pink, *ca* 2.3 cm long, sessile, axillary, solitary. Calyx *ca* 0.4 cm long; segments lanceolate, acuminate. Corolla *ca* 1.1 cm long, tubular. Capsules linear, cylindrical, *ca* 1.1 cm long.

Fls. & Frts.: September - January.

Occurrence: Common, in moist places of the area.

Distribution: Throughout India; Australia, Malaya, Sri Lanka.

Specimen examined: Haduk, Jugdal; *Bora* 15080 (NEHU).

2. *Lindernia antipoda* (Linn.) Alston in Trimen, Handb. Fl. Ceylon Suppl. 6. 214. 1931; Deb, Fl. Tripura 2: 274. 1983; Islam, Fl. Majuli 225. 1990. *Ruellia antipoda* Linn., Sp. Pl. 635. 1753. *Bonnaya veronicifolia* (Retz.) Spreng., Syst. Veg. 1: 41. 1824; Hook. f., Fl. Brit. Ind. 4: 285. 1884. *Lindernia vercnicifclia* (Retz.) F. v. Muell. Fragm 6: 101. 1867. *L. verbenifolia* (Colsm.) Pennel in Acad. Nat. Sci. Philad. Monogr. 5: 131. 1943.

Prostrate glabrous herb; stem quadrangular; branches ascending. Leaves *ca* 1.3-3.5 x 0.3-0.6 cm, linear-oblong or oblanceolate, acute or obtuse. Flowers bluish violate, *ca* 1.8 cm long, axillary, solitary, bracteate. Calyx *ca* 0.4 cm long; segments linear-lanceolate, acute. Corolla *ca* 0.8 cm long. Stamens and staminodes 2 each. Capsules linear, *ca* 1.1 cm long.

Fls. & Frts.: November - March.

Occurrence: Common, in moist places of the area.

Distribution: Throughout India; China, Java, Philippines.

Specimen examined: Haduk, Jugdal; *Bora* 15081 (NEHU).

3. *Lindernia crustacea* (Linn.) F.v. Muell., Syst. Census Austral. Pl. 97. 1882; Fischer in Rec. Bot. Surv. Ind. 16(1): 303. 1967; Islam , Fl. Majuli 226. 1990. *Capraria crustacea* Linn., Ment. Pl. 87. 1767. *Vandellia crustacea* (Linn.) Benth., Scroph. Ind. 35. 1835; Hook. f., Fl. Brit. Ind. 4: 279. 1884.

Suberect decumbent herb; stem quadriangular, often dichotomously branched. Leaves opposite *ca* 0.5-1.5 x 0.8 cm, ovate, acute or obtuse, margin shallow teethed. Floweres pale purple or blue violet, *ca* 1.4 cm long, pedicelled, axillary. Calyx *ca* 0.3 cm long; segments lanceolate, acute. Corolla *ca* 0.8 cm long. Capsules oblong-ovoid, 2 valved.

Fls. & Frts.: September - January.

Occurrence: Common, in moist places of the sanctuary.

Distribution: Throughout India; Tropics of the old world.

Specimen examined: Jugdal, Tuplung; *Bora* 15510 (NEHU).

4. ***Lindernia montana*** (Bl.) Koord., Exkurs. Fl. Java 3: 178. 1912; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 232. 1996. *Diceros montanus* Bl., Bijdr. 752. 1826. *Vandellia mollis* Benth., Scroph. Ind. 37. 1835; Hook. f., Fl. Brit. Ind. 4: 281. 1884. *Lindernia mollis* (Benth.) Wettst. in Engler & Prantl, Nat. Pflan. IV. 3b: 80. 1891. **Fig. 36**

Creeping, pubescent herb. Leaves opposite, *ca* 1.0-3.2 x 0.6-1.9 cm, ovate-oblong. serrate, tomentose, shortly petiolate. Flowers yellow, *ca* 1.8 cm long, axillary, solitary. Calyx *ca* 0.5 cm long, pubescent. Corolla *ca* 0.8 cm long. Capsules *ca* 0.5 x 0.2 cm, oblong.

Fls. & Frts.: November - March.

Occurrence: Common, in moist places of the area.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Sikkim Himalaya; South China.

Specimen examined: Thengbhanga; *Bora* 15397 (NEHU).

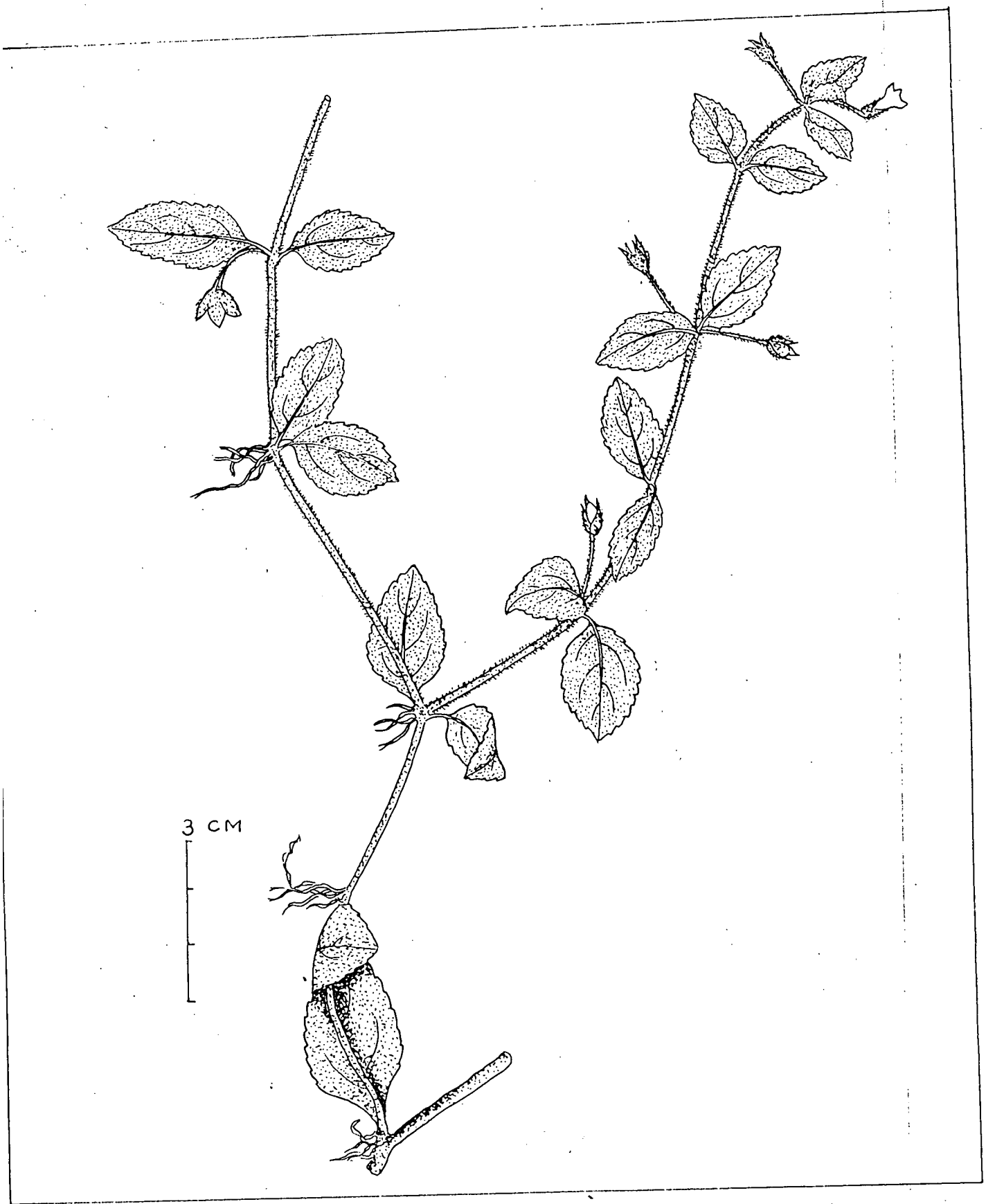


Fig. 36: ***Lindernia montana*** (Bl.) Koord. (Scrophulariaceae)

5. *Lindernia ruellioides* (Colsm.) Pennell in Brittonia 2: 1182. 1936; Deb, Fl. Tripura 2: 276. 1983; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 233. 1996. *Gratiola ruellioides* Colsm., Prodr. Dese, Gratiola 12. 1793. *Bonnaya reptans* Spreng., Syst. 1: 410. 1825; Hook. f., Fl. Brit. Ind. 4: 284. 1884; Kanjilal *et al.*, Fl. Assam 3: 380. 1939.

Prostrate herb. Leaves opposite, *ca* 1.5-5.0 x 0.6-2.0 cm, obovate-oblong, serrate. Flowers white, in racemes; bracts *ca* 0.4 cm long. Calyx *ca* 0.5 cm long; segments linear, acuminate. Corolla *ca* 1.5 cm long. Staminodes 2, hairy. Capsules slender, *ca* 2-3 cm long.

Fls. & Frts.: October - February.

Occurrence: Common, in moist places of the area.

Distribution: North East India, East and South India; Java, Myanmar, Philippines.

Specimen examined: Haduk, Tuplung; *Bora* 15082 (NEHU).

4. *Mazus* Lour.

Lour., Fl. Cochinch. 385. 1790.

About 30 species distributed in Asia to Australia; 8 species in India; one species in the study area.

Mazus pumilus (Burm. f.) Steenis in Nova Guinea (n.s) 9: 31. 1958; Backer & Bakh. f., Fl. Java 2: 505. 1965; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 233. 1996. *Lobelia pumila* Burm. f., Ind. 186. t. 60. f. 3. 1768. *Lindernia japonica* Thunb., Fl. Jap. 253. 1784. *Majus rugosus* Lour., Fl.

Cochinch. 385. 1790; Hook. f., Fl. Brit. Ind. 4: 259. 1884; Kanjilal *et al.*, Assam 3: 377. 1939.

Erect or prostrate herb. Leaves mostly radical, oblanceolate, obovate to spathulate, *ca* 1.2-5.0 x 0.4-1.2 cm, crenate or dentate. Flowers bluish white, in terminal lax racemes. Calyx *ca* 0.4 cm long, ovate-lanceolate. Corolla *ca* 1.1 cm long, ridges of lower lip hairy. Stamens 4; anther lobes divergent. Capsules subglobose with persistent calyx.

Fls. & Frts.: September - February.

Occurrence: Common, in moist shady places of the area.

Distribution: North East India, Himalayas; Afganisthan, Bhutan, China, Japan, Philippines.

Specimen examined: Haduk, Jugdal; *Bora* 15511 (NEHU).

5. *Scoparia* Linn.

Linn., Sp. Pl. 166. 1753 & Gen. Pl. ed. 5. 52. 1754.

About 20 species distributed in tropical America; one species in India which occurs in the study area also.

Scoparia dulcis Linn., Sp. Pl. 116. 1753; Hook. f., Fl. Brit. Ind. 4: 289. 1884; Kanjilal *et al.*, Fl. Assam 3: 380. 1939; Islam, Fl. Majuli 227. 1990.

Erect herb: branches angled, subglabrous. Leaves whorled, *ca* 0.5-3.0 x 0.2 cm, ovate-lanceolate, rhomboid or elliptic, acute, narrowed to the base, serrate. Flowers white, 3-6 in axillary whorls. Calyx persistent; segments 4,

free, oblong. Corolla rotate; lobes 4, pilose. Capsules *ca* 0.3 cm in diam., globose, within calyx lobes.

Fls. & Frts.: Throughout the year.

Occurrence: Common, along roadside, grassland and forest floors of the sanctuary.

Distribution: Throughout India; Pantropic.

Specimen examined: Haduk; *Bora* 14857 (NEHU).

Uses: Leaf decoction taken in stomach trouble.

6. *Torenia* Linn.

Linn., Sp. Pl. 619. 1753 & Gen. Pl. ed. 270. 1754.

About 50 species mostly distributed in tropical regions; 12 species in India; one species in the study area.

Torenia vagans Roxb., Fl. Ind.3: 96. 1832; Hook. f., Fl. Brit. Ind. 4: 277. 1884; Islam, Fl. Majuli 227. 1990. *T. diffusa* D. Don, Prodr. 86. 1825.

Diffusely branched herb; rooting at lower nodes. Leaves opposite, *ca* 1.0-3.5 x 0.5-1.5 cm, ovate, acute, serrate, shortly petiolate. Flowers light blue, solitary, axillary. Calyx linear-oblong. Corolla 2 lipped. Stamens 4, didynamous. Fruit a linear, septicidal capsule.

Fls. & Frts.: August - November.

Occurrence: Common, in moist places of the area.

Distribution: Assam, Tripura, Central and Eastern Himalayas, South India; Bangladesh, China.

Specimen examined: Burha Mayong; *Bora* 15512 (NEHU).

7. *Veronica* Linn.

(Tourn.) Linn., Syst. ed. 1. 1735.

About 250 species distributed in North temperate regions to tropical mountains; 32 species in India; one species in the study area.

Veronica anagallis-aquatica Linn., Sp. 12. 1753; Hook. f., Fl. Brit. 4: 293. 1884; Chatterjee & Bhardwaja Ioc. cit. 148. 1955.

Erect glabrous herb; stem hollow, rooting at nodes below, glandular pubescent below. Leaves opposite, *ca* 1.5-6.0 x 0.2-12.0 cm, oblong-lanceolate, serrate, acute, sessile. Flowers pinkish white, in axillary bracteate racemes; bracts linear. Calyx 4 lobed, *ca* 0.2 cm long, ovate, acute. Corolla rotate, 4 lobed. Capsules oblong-orbicular.

Fls. & Frts.: December - April.

Occurrence: Common, in marshy places of the area.

Distribution: North East and North West India; Asia, Europe, North and South Africa, North America.

Specimen examined: Haduk; *Bora* 15077 (NEHU).

79. LENTIBULARIACEAE

L. C. Richard in Poiteau and Turpin, Fl. Paris, 1: 26. 1808.

Herbs; marshy, aquatic or epiphytic, often insectivorous. Flowers bisexual, zygomorphic, bracteate, racemose or spicate. Calyx persistent. Corolla 2 lipped, 5 lobed, spurred at back. Stamens 2. Staminodes 2. Pistil bicarpellary. Ovary superior, 1-celled. Fruit a capsule.

The family comprises about 4 genera and about 245 species, cosmopolitan in distribution; 2 genera and 29 species in India; one genus and one species in the study area.

Utricularia Linn.

Linn., Sp. Pl. 18. 1753 & Gen. Pl. ed. 5. 11. 1754.

About 120 species distributed in tropical and temperate regions; about 28 species in India; one species in the study area.

Utricularia aurea Lour., Fl. Cochinch. 26. 1790; Deb, Fl. Tripura 2: 304. 1983; Ismal, Fl. Majuli 229. 1990. *U. flexuosa* Vahl, Fnum. Pl. 1: 198. 1804; Clarke in Hook. f., Fl. Brit. Ind. 4: 329. 1884.

Aquatic floating herb; stolons much branched. Leaves submerged, whorled, multifid into filiform segments, interspersed with bladders. Flowers yellow, pedicelled in erect slender racemes; bracts basifixed. Calyx lobes ovate, enlarged in fruits. Corolla *ca* 1 cm long, yellow. Capsules globose.

Fls. & Frts.: September - January.

Occurrence: Common, in stagnant water bodies of the sanctuary.

Distribution: Throughout India; China, Malaysia to Tropical Australia.

Specimen examined: Tuplung; *Bora* 14779 (NEHU).

80. BIGNONIACEAE

A. L. de Juss., Gen. Pl. 137. 1789.

Trees or shrubs, often scandent, rarely herbs. Leaves mostly compound. Flowers bisexual, zygomorphic, bracteate, bracteolate, usually in dichasial cymes. Calyx campanulate. Corolla usually 2 lipped, with 5 imbricating lobes. Stamens epipetalous, 4 or 2 perfect. Disk hypogynous. Ovary superior, 2-celled. Fruit capsular or fleshy and indehiscent. Seeds often winged, without endosperm.

The family comprises about 112 genera and 725 species, distributed in tropical regions; 20 genera and 37 species in India; 3 genera and 3 species in the study area.

Key to the genera

1a. Leaves 2-3 pinnate ... 2. *Oroxylum*

1b. Leaves 1-pinnate:

2a. Inflorescence often drooping; corolla bilabiate ... 3. *Stereospermum*

2b. Inflorescence erect; corolla not bilabiate ... 1. *Heterophragma*

1. *Heterophragma* DC.

2 species distributed in South East Asia; one species in India which occurs in the study area also.

Heterophragma adenophyllum Seem. ex Benth. in Hook. f., Gen. Pl. 2: 1047. 1876; Clarke in Hook. f., Fl. Brit. Ind. 4: 381. 1884, *Haplophragma adenophyllum* (Wall. ex G. Don) P. Don, in Bull. Soc. Bot. France 72: 890. 1925; Kanjilal *et al.*, Fl. Assam 3: 402. 1939.

Middle sized deciduous tree. Leaves opposite, 1 pinnate; leaflets 5-10, obovate, subsessile, pubescent beneath. Flowers pale brown, large in panicles. Calyx *ca* 2.5 cm long, campanulate, tomentose. Corolla *ca* 6 cm long, yellowish brown tomentose outside; lobes unequal. Stamens 4, didynamous. Stigma 2 lobed. Capsules cylindrical, ribbed, loculicidally 2 valved.

Fls. & Frts.: January - August.

Occurrence: Common, in the hilly forest of the sanctuary.

Distribution: Assam, Tripura, Andamans; Malaysia, Myanmar, Thailand.

Specimen examined: Dhekiabari; *Bora* 15110 (NEHU).

2. *Oroxylum* Vent.

Vent., Dec. Gen. Nov. Paris 8. 1808.

Monotypic genus, distributed in Indo-Malaysian region.

Oroxylum indicum (Linn.) Vent., Dec. Gen. Nov. 8. 1808; Clarke in Hook. f., Fl. Brit. Ind. 4: 378. 1884; Kanjilal *et al.*, Fl. Assam 3: 40. 1939; Deb,

Fl. Tripura 2: 95. 1983; Haridasan & Rao, For. Fl. Meghalaya 2: 656. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 238. 1996. *Bigonia indica* Linn., Sp. Pl. 625. 1753. *E. pentandra* Lour., Fl. Cochinch. 2: 379. 1790. "Bhatghila, Thukuna gach".

Small deciduous tree. Leaves opposite, large, long 2-3 pinnate; leaflets *ca* 1-12 x 4-9 cm, ovate-elliptic, acuminate, obliquely rounded or obtuse at base. Flowers purplish green, in erect long racemes. Calyx *ca* 3 cm long, campanulate, fleshy. Corolla *ca* 5.5 long, fleshy, sparsely toothed, glandular inside. Disk 5 lobed. Stamens 5; filaments woolly below. Capsules flat, 30-85 x 4.5 cm, oblong, septicidally 2 valved, drooping.

Fls.: January - August & Frts.: November - March.

Occurrence: Common, in the hilly forest and occasionally in the plain forest of the sanctuary.

Distribution: Throughout India; Myanmar, South East Asia, Sri Lanka.

Specimen examined: Burha Mayong; *Bora* 15513 (NEHU).

Uses: Root extract taken in menstruation trouble, young leaf and bark decoction taken in dysentery.

3. *Stereospermum* Cham.

Cham. in Linnaea 7: 720. 1832.

About 24 species distributed in tropical Africa and Asia; 4 species in India; one species in the study area.

Stereospermum colais (Buch.-Ham. ex Dillw.) Mabber. in Taxon 27: 553. 1978; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 239. 1996. *Bignonia colais*

Buch.-Ham. ex Dillw., Rev. Ref. Hort. Mal. 28. 1839. *S. chelonoides sensu* Clarke in Hook. f., Fl. Brit. Ind. 4: 382. 1884; Kanjilal *et al.*, Fl. Assam 3: 404. 1939. "Dhapatita".

Tree. Leaves imparipinnate; leaflets 7-9, *ca* 6-12 x 3.5-6.8 cm, ovate-lanceolate, acuminate, serrate and entire. Flowers yellowish, in lax terminal panicles. Calyx *ca* 0.7 cm long. Corolla *ca* 1.8 cm long, yellowish with purplish tinge at throat. Capsules *ca* 30-50 cm long, spirally twisted.

Fls. & Frts.: April - August.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Throughout moist parts of India; Myanmar, Sri Lanka, South East Asia.

Specimen examined: Hiloikhunda; *Bora* 15514 (NEHU).

81. ACANTHACEAE

A. L. de Juss., Gen. Pl. 102. 1789.

Herbs or shrubs. Leaves opposite, decussate, often cystoliths. Inflorescence various, mostly cymose or racemes. Flowers bisexual, zygomorphic, often bracteate and bracteolate. Calyx 4-5 lobed. Corolla 5 lobed, mostly 2 lipped. Stamens 4, didynamous or 2, epipetalous. Disk present. Ovary superior, 2-celled. Fruit a capsule.

The family comprises about 250 genera and over 2500 species, pantropical in distribution; about 44 genera and 400 species in India; 14 genera and 18 species in the study area.

Key to the genera

1a. Plants usually climber, rarely erect; calyx many toothed ... 14. *Thunbergia*

1b. Plants erect or prostrate; calyx 4-5 partite or lobed:

2a. Stamens 2:

3a. Flowers in clusters .... 3. *Dicliptera*

3b. Flowers in spikes; panicles or heads:

4a. Ovules more than 2 in each cell:

5a. Ovules 3–6 in each cell; seeds supported on retinacula .... 2. *Andrographis*

5b. Ovules 8–10 in each cell; seeds not supported on retinacula .... 9. *Nelsonia*

4b. Ovules 2 in each cell:

6a. Bracts dimorphic ... 13. *Rungia*

6b. Bracts homomorphic:

7a. Corolla subequally 5 lobed .... 4. *Eranthemum*

7b. Corolla 2 lipped:

8a. Anther cells spured at base:

9a. Both anther cells appendaged .... 5. *Gendarussa*

9b. Only one anther cell appendaged

.... 4. *Justicia*

8b. Anther cells not spured at base:

10a. Bracts exceeding the calyx

.... 1. *Adhatoda*

10b. Bracts not exceeding the calyx

... 11. *Phlogocanthus*

2b. Stamens 4:

11a. Flowers solitary or in cymes;

bract absent ... 12. *Ruellia*

11b. Flowers in spikes, heads or whorled;

bract present:

12a. Corolla 5 lobed; bracteoles

absent ... 10. *Phaulopsis*

12b. Corolla 2 lipped; bracteoles

present:

13a. Stamens exserted; ovules

4-many in each cell

.... 6. *Hygrophila*

13b. Stamens included; ovules

1-2 in each cell

.... 8. *Lepidagathis*

1. *Adhatoda* Nees

Nees in Wall., Pl. Asiat. Rar. 3: 102. 1832.

About 20 species distributed in Tropical Africa and Asia; 3 species in

India; one species in the study area.

Adhatoda zeylanica Medik. in Hist., Comment. Acad. Theod. Palat. 6: 393. 1790; Deb, Fl. Tripura 2: 284. 1983. *Justicia adhatoda* Linn., Sp. Pl. 15. 1753. *Adhatoda vasica* Nees in Wall., Pl. Asiat. Rar. 3: 102. 1832; Clarke in Hook. f., Fl. Brit. Ind. 4: 540. 1885; Kanjilal *et al.*, Fl. Assam 3: 455. 1939. **"Bahaka tita".**

Evergreen shrub; branches diffused. Leaves opposite, *ca* 7-20 x 2-8 cm, ovate or elliptic-lanceolate, acuminate, entire. Flowers white with purple stripes in dense axillary leafy spikes; bracts elliptic-ovate, pubescent, acute. Calyx campanulate, 5 lobed. Corolla *ca* 2-3 cm long, 2 lipped; upper lip notched at tip; throat villous. Capsules clavate, 4 seeded.

Fls. & Frts.: November - April.

Occurrence: Occasionally, along the foot hill of Burha Mayong.

Distribution: Throughout India; Malaya, Vietnam.

Specimen examined: Burha Mayong; *Bora* 15086 (NEHU).

Uses: Leaf extract taken with honey in cold and cough.

2. *Andrographis* Wall. ex Nees

Wall. ex Nees in Wall., Pl. Asiat. Rar. 3: 77. 1832.

About 20 species distributed in tropical Asia; 18 species in India; one species in the study area.

Andrographis paniculata (Burm. f.) Wall. ex Nees in Wall., Pl. Asiat. Rar. 3: 116. 1832; Clarke in Hook. f., Fl. Brit. Ind. 4: 501. 1884; Kanjilal

et al., Fl. Assam 3: 440. 1939. *Justicia paniculata* Burm. f., Fl. Ind. 9. 1768. "Chirata".

Erect much branched herb; stem quadrangular. Leaves opposite, *ca* 1.5-7.5 x 0.8-1.8 cm, linear or elliptic-lanceolate, entire, acute, narrowed to the base. Flowers white, in axillary or terminal paniculate racemes; bracts *ca* 0.2 cm long, lanceolate. Calyx *ca* 0.3 cm long, pubescent; segments linear-lanceolate. Corolla white, *ca* 0.8 cm long, 2 lipped, glandular pubescent outside. Capsules *ca* 1.8 cm long, linear-oblong, pubescent.

Fls. & Frts.: November - May.

Occurrence: Common, on the hilly slopes of the area.

Distribution: Throughout India; Sri Lanka, East and West Indies.

Specimen examined: Burha Mayong; *Bora* 15083 (NEHU).

3. *Dicliptera* Juss.

A. L. Juss., Ann. Mus. Hist. Nat. Paris 9: 267. 1907. *nom. cons.*

About 150 species distributed in tropical and subtropical regions; 8 species in India; one species in the study area.

Dicliptera roxburghiana Nees in Wall., Pl. Asiat. Rar. 3: 111. 1832; Clarke in Hook. f., Fl. Brit. Ind. 4: 555. 1885; Kanjilal *et al.*, Fl. Assam 3: 451. 1939; Deb, Fl. Tripura 2: 288. 1983.

Sparsely pubescent herb. Leaves opposite, *ca* 1-8 x 0.8 cm, elliptic or ovate, acute at base. Flowers pinkish, in axillary and terminal 2-4 flowered capitate cymes; bracts *ca* 1 cm long, obovate, pubescent; bracteoles linear,

pubescent. Calyx 5 partite; sagments linear, pubescent. Corolla *ca* 1.5 long, 2 lipped. Stamens 2. Stigma 2 fid. Capsules clavate glabrescent.

Fls. & Frts.: January - June.

Occurrence: Common, in shady forest as under growth.

Distribution: North East India; Vietnum.

Specimen examined: Thengbhanga; *Bora* 14834 (NEHU).

4. *Eranthemum* Linn.

Linn., Sp. Pl. 9. 1753 & Gen. Pl. 5. 9. 1754.

About 30 species distributed in tropical Asia; 10 species in India; one species in the study area.

Eranthemum nervosum (Vahl) R. Br., Prodr. 477. 1810; Kanjilal *et al.*, Fl. Assam 3: 438. 1939 *Justicia nervosa* Vahl, Enum. Pl. 1: 164. 1804. *Daedalacanthus nervosus* Anderson in J. Linn. Soc. Bot. 9: 487. 1867; Clarke in Hook. f., Fl. Brit. Ind. 4: 418. 1884.

Undershrub; stem and branches quadrangular. Leaves *ca* 4.5–19.5 x 2.0–6.8 cm, ovate–elliptic, acuminate, narrowed to the base, entire or crenulate. Flowers light blue, *ca* 2.4 cm long in terminal, panicled spikes; bracts *ca* 1.2 cm, ovate or elliptic, acuminate; bracteoles 2, *ca* 0.4 cm long, lanceolate. Corolla lobes 5, rounded, spreading. Stamens 2. Carpels *ca* 2 cm long. Capsules oblong, *ca* 1.5 cm long.

Fls. & Frts: January - June.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Himalayas; Tropical countries

Specimen examined: Hiloikhunda; *Bora* 15085 (NEHU).

5. Gendarussa Nees

Nees in Wall., Pl. As. Rar. 3. 71. 1832.

2 species distributed in Indo-Malaysian regions; one species in the study area.

Gendarussa vulgaris Nees in Wall., Pl. Asiat. Rar. 3: 104. 1832; Islam, Fl. Majuli 234. 1990. *Justicia gendarussa* Burm. f., Fl. Ind. 10: 1768; Clarke in Hook. f., Fl. Brit. Ind. 4: 532. 1885; Kanjilal *et al.*, Fl. Assam 3: 454. 1939.

Undershrub. Leaves opposite, *ca* 5-12 x 0.8-2.0 cm, linear-lanceolate, bluntly acuminate, cunneate at base, shortly petioled. Flowers white, in terminal paniculate or axillary spikes; bracts small. Calyx segments 5, *ca* 0.5 cm long. Corolla *ca* 1.5 cm long, 2 lipped; upper lip deltoid. Stamens 2, inserted at the base of corolla tube. Capsules clavate, *ca* 1.0-1.5 cm long, 4 seeded.

Fls. & Frts.: March - August.

Occurrence: Common, as hedge plant, also found as escap along roadside.

Distribution: Throughout India; China, Malaysia, Philippines.

Specimen examined: Burha Mayong; *Bora* 15515 (NEHU).

6. *Hygrophila* R. Br.

R. Br. Prodr. 47. 1810.

Herbs; branches quadriangular. Leaves opposite. Flowers sessile in terminal heads, spikes or whorls, bracteate, bracteolate. Calyx 4-5 partite. Corolla 2 lipped. Stamens 4, didynamous, adnate at the throat. Ovary 2-celled; ovules 4-many in each cell; style hairy. Fruit a capsule. Seeds compressed, white hairy.

About 100 species distributed in tropical regions; 11 species in India, 2 species in the study area.

Key to the species

1a. Leaves oblong, ovate or elliptic; flowers in terminal dense spikes .... 1. *H. polysperma*

1b. Leaves linear-lanceolate, flowers in axillary whorls .... 2. *H. salicifolia*

1. *Hygrophila polysperma* (Roxb.) Anderson in J. Linn. Soc. Bot. 9: 456. 1867; Clarke in Hook. f., Fl. Brit. Ind. 4: 406. 1884. *Justicia polysperma* Roxb., Fl. Ind. 1: 119. 1832. *Hemiadelphis polysperma* (Roxb.) Nees in Wall., Pl. Asiat. Rar. 3: 80. 1832. *Ruellia polysperma* Heyne ex Roth, Nov. Pl. Sp. 305. 1821. **Fig. 37**

Erect or procumbent, pubescent herb; rooting at lower nodes. Leaves *ca* 0.4-2.2 x 0.2-1.2 cm, oblong to ovate or elliptic, acute. Flowers pinkish, in terminal dense spikes; bracts *ca* 0.5 cm long, elliptic-oblong, pubescent;

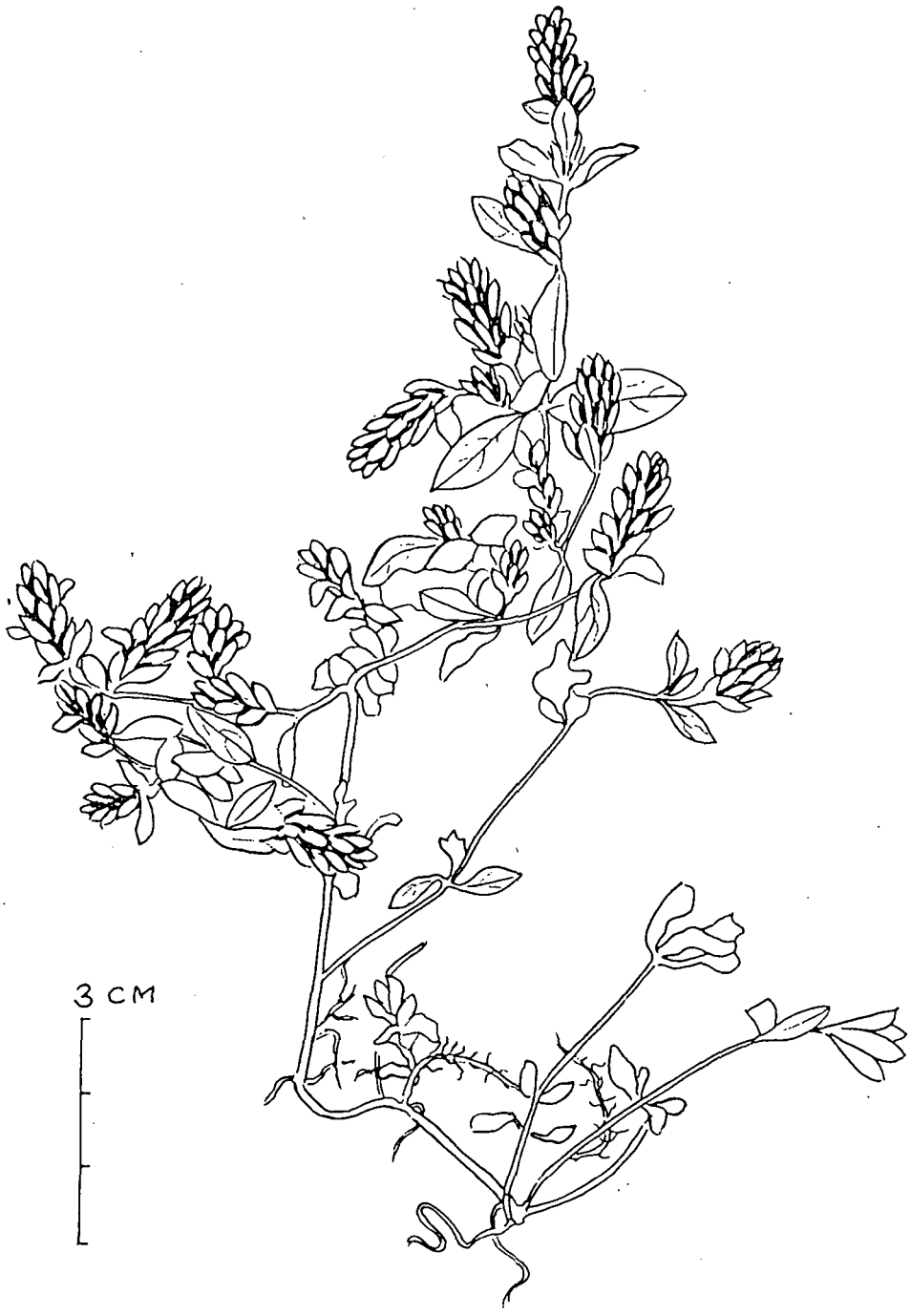


Fig. 37: ***Hygrophila polysperma*** (Roxb.) Anderson (Acanthaceae)

bracteoles linear-lanceolate. Calyx 5 partite, *ca* 0.4 cm long, pubescent; segments linear. Corolla *ca* 0.7 cm long, pubescent. Capsules linear-oblong, *ca* 0.7 cm long, pubescent.

Fls. & Frts.: November - May.

Occurrence: Common, in moist places of the area.

Distribution: Throughout India; Bhutan, Vietnum.

Specimen examined: Haduk; *Bora* 14842 (NEHU).

2. *Hygrophila salicifolia* (Vahl) Nees in Wall., Pl. Asiat. Rar. 3: 81. 1832; Clarke in Hook. f., Fl. Birt. Ind. 4: 407. 1887; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 241. 1996. *Ruellia salicifolia* Vahl, Symb. 3: 84. 1794. *Hygrophila angustifolia auct. non*, R. Br. *sensu* Fl. Brit. Ind. 4: 407.

Erect herb. Leaves *ca* 2.5-5.5 x 0.4-1.8 cm, linear-lanceolate, acute, narrowed to the base. Flowers purple, *ca* 1.5 cm long in dense axillary whorls; bracts *ca* 0.5 cm long, ovate, acute hispid; bracteoles linear hispid. Calyx *ca* 0.8 cm long, 5 partite, lanceolate, hispid. Corolla *ca* 1.2 cm long. Capsules linear, *ca* 1.2 cm long, many seeded.

Fls. & Frts: October - January.

Occurrence: Commonl, in moist places and shady forest floors of the sanctuory.

Distribution: Throughout India; China, Japan, Malaysia, Philippines.

Speciment examined: Thengbhanga; Bora 15130 (NEHU).

7. Justicia Linn.

Linn., Sp. Pl. 15. 1753 & Gen. Pl. ed. 5. 10. 1754.

Herbs, undershurbs or shurbs. Flowers in spikes, bracteate. Calyx 4 or 5 partite. Corolla 2 lipped. Stamens 2. Ovary 2-celled; ovules 2 in each cell; style filiform; stigma minutely 2 fid. Capsules 4 seeded. Seeds more or less compressed.

About 420 species distributed in tropical and temperate regions; about 20 species in India; 2 species in the study area.

Key to the species

1a. Bracts and bracteoles as long as or longer than calyx segments .... 2. *J. simplex*

1b. Bracts and bracteoles shorter than calyx segments .... 1. *J. prostrata*

1. *Justicia prostrata* (Clarke) Gamble, Fl. Madras 2: 1081. 1924. *J. diffusa* Willd. var.*prostrata* Clarke in Hook. f., Fl. Brit. Ind. 4: 538. 1885.

Prostrate herb; branches spreading. Leaves ovate-elliptic, *ca* 1-3 x 0.5-1 cm, obtuse, rounded at base. Flowers in axillary or terminal spikes; bracts and bracteoles pubescent. Calyx segments 4, lanceolate, ciliate. Corolle *ca* 0.5-0.6 cm long. Capsules oblong-ellipsoid, small.

Fls. & Frts.: August - March.

Occurence: Common, in shady forest as under growth.

Distribution: Assam, Kumaon, Punjab terai; Sri Lanka.

Specimen examined: Haduk, Thenghanga, Bora 14851 (NEHU).

2.*Justicia simplex* D.Don, Prodr. Fl. Nep. 118. 1825; Clarke in Hook. f., Fl. Brit. Ind. 4: 539. 1885; Kanjilal *et al.*, Fl. Assam 3: 455. 1939; Islam, Fl. Majuli 235. 1990. *J. japonica* Thunb., Fl. Jap. 20. 1784.

Erect or prostrate pubescent herb; rooting at nodes; branches swollen above the nodes. Leaves *ca* 1.5-4 x 0.5-2 cm, ovate or ovate-lanceolate, subacute. Flowers pinkish white, in terminal or axillary spikes; bracts and bracteoles slightly longer than calyx. Calyx segments 4, *ca* 0.3 cm long, ciliate. Corolla *ca* 0.5 cm long. Capsules oblong, pubescent at apex.

Fls. & Frts.: August - January.

Occurrence: Commonl, in moist places of the area.

Distribution: North East India, East, Central and West India; Malaysia, Nepal.

Specimen examined: Haduk, Thengbhanga; *Bora* 15516 (NEHU).

8. *Lepidagathis* Willd.

Willd., Sp. Pl. 3: 400. 1800.

About 100 species distributed in tropical and subtropical regions; about 25 species in India; one species in the study area.

Lepidagathis incurva Buch.-Ham. ex D. Don, Prodr. Fl. Nep. 119. 1825; Kanjilal *et al.*, Fl. Assam 3: 451. 1939; Deb, Fl. Tripura 2: 293. 1983; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 241. 1996. *L. mucronata* Nees in

Wall., Pl. Asia. Rar. 3: 95. 1832. *L. hyalina* Nees in Wall., Fl. Aiiat. 3: 95. 1832; Clarke in Hook. f., Fl. Brit. Ind. 4: 521. 1885.

Prostrate much branched herb. Leaves variable, *ca* 3-15 x 0.6-4.5 cm, ovate-oblong or linear, acute, entire or undulate, pubescent on the nerves beneath. Flowers white, in terminal and axillary dense spikes; bracts *ca* 1 cm long, lanceolate; bracteoles linear. Calyx segments linear, lanceolate, hairy. Corolla *ca* 0.6 cm long, white with brown spots. Stamens 4, adnate at the base of throat. Capsules oblong, 4 seeded.

Fls. & Frts.: September - March.

Occurrence: Common, in grassland of the sanctuary.

Distribution: North East and North India; China, Malaysia, Myanmar, Vietnam.

Specimen examined: Haduk, Tuplung; *Bora* 15084 (NEHU).

9. *Nelsonia* R. Br.

R. Br., Prodr. 480. 1810.

2 species distributed in tropical regions; one species in the study area.

Nelsonia canescens (Linn.) Spreng., Syst. Veg. 1: 42. 1825; *Justicia campestris* R. Br., Prodr. 481. 1810; Clarke in Hook. f., Fl. Brit. Ind. 4: 394. 1884.

Erect or diffused villous herb. Leaves *ca* 2.5-5.5 x 2.4 cm, elliptic-oblong, acute, entire, pubescent; upper ones sessile; lower ones long

petiolate. Flowers purple, in terminal and axillary woolly spikes; bracts *ca* 0.6 cm long, ovate, acute, woolly; bracteoles 2. Calyx *ca* 0.4 cm long, segments acute, hairy. Corolla *ca* 0.6 cm long. Capsules ovoid, 2 valved.

Fls. & Frts.: November - April.

Occurrence: Common, in moist shady forest floors.

Distribution: Throughout India; Africa, America, Australia, South East Aisa, Sri Lanka.

Specimen examined: Thengbhanga; *Bora* 14782 (NEHU).

10. *Phaulopsis* Willd.

Willd., Sp. Pl. 3: 342. 1800.

About 20 species distributed in Tropical Africa, Mascarine Islands and India; one species in India which occurs in the study area also.

Phaulopsis dorsiflora (Retz.) Santapau in Kew Bull. 276. 1948; Deb, Fl. Tripura 2: 294. 1983. *Ruellia dorsiflora* Retz., Observ. Bot. 6: 31. 1791. *Micranthus oppositifolius* J. C. Wendl., Bot. Beob. 39. 1798; Kanjilal *et al.*, Fl. Assam 3: 414. 1939. *Phaulopsis parviflora* Willd., Sp. Pl. 3: 342. 1800, "Phaylopsis"; Clarke in Hook. f., Fl. Brit. Ind. 4: 417. 1884.

Diffuse, prostrate, much branched herb. Leaves opposite, *ca* 2-8 x 0.8-2.5 cm, unequal, ovate-elliptic, acute or acuminate, sparsely pubescent beneath; petioles 1.5-4.5 cm long. Flowers white, in terminal hispid spikes or 1-3 in clusters; bracts *ca* 0.7-1.2 x 0.4-1.3 cm, reniform or broadly orbicular, cordate, hairy. Calyx *ca* 0.5-0.8 cm long, glandular hairy; larger elliptic-ovate; smaller linear. Corolla *ca* 0.9 cm long, white, slightly 2

lipped. Stamens 4. Style hairy. Capsules clavate, compressed.

Fls. & Frts.: November - April.

Occurrence: Common, in grassland and forest floors.

Distribution: Throughout India except North West India; **Africa, Madagascar, Vietnam.**

Specimen examined: Thengbhanga; *Bora* 14766 (NEHU).

11. *Phlogacanthus* Nees ex Wall.

Nees ex Wall., Pl. Aisat. Rar. 3: 76. 1832.

Shrubs or undershrubs. Flowers in racemes of thyrsoid panicles; bracts and bracteoles persistent. Calyx deeply 5 lobed. Corolla curved; limbs 2 lipped. Stamens 2. Ovary 2 celled; style filiform. Capsules 4-8 seeded.

About 30 species distributed in Indo-Malayan region; 10 species in India; 2 species in the study area.

Key to the species

1a. Leaves oblanceolate or elliptic-oblong, glabrous; corolla *ca* 2 cm long .... 1. ***P. thyrsiflorus***

1b. Leaves ovate-elliptic, pubescent; corolla *ca* 2.5-3 cm long .... 2. ***P. tubiflorus***

1. ***Phlogacanthus thyrsiflorus*** (Roxb.) Nees in Wall., Pl. Asiat. Rar. 3: 99. 1832; Clarke in Hook. f., Fl. Brit. Ind. 4: 512. 1885; Kanjilal *et al.*, Fl. Assam 3: 443. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 665. 1987. *Justicia thyrsiflora* Roxb., Fl. Ind. 1: 114. 1820. "Tita phul".

Shrubs; branches quadrangular. Leaves opposite, *ca* 10-28 x 1.5-6.5 cm, elliptic or oblanceolate, acuminate, narrowed to the base, entire. Flowers deep red, slightly curved, in thyrsoid, elongated, terminal panicles; bracts linear, pubescent. Calyx segments *ca* 0.6 cm long, linear- lanceolate. Corolla *ca* 2 cm long. Capsules linear, clavate, *ca* 4 cm long.

Fls. & Frts.: January - May.

Occurrence: Common, in forest margins and foot hill of the sanctuary.

Distribution: North East India, Himalayas.

Specimen examined: Burha Mayong; *Bora* 15087 (NEHU).

Uses: Flowers used for prepearing curry.

Notes: Confiend to Eastern Himalayas.

2. *Phlogacanthus tubiflorus* Nees in Wall., Pl. Asiat. Rar. 3: 99. 1832; Clarke in Hook. f., Fl. Brit. Ind. 4: 511. 1884; Kanjilal *et al.*, Fl. Assam 3: 443. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 665. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 234. 1996.

Shrub; young parts tomentose. Leaves opposite, *ca* 10-28 x 5-11 cm, ovate-elliptic, acuminate, pubescent along nerves beneath. Flowers deep red, in thyrsoid terminal panicles. Calyx segments *ca* 0.9 cm long, acuminate. Corolla *ca* 2.5-3.0 cm long, slightly curved. Capsules *ca* 3-4 cm long.

Fls. & Frts.: December - May.

Occurrence: Restricted to few particular pockets in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Tripura.

Specimen examined: Dhekiabari; *Bora* 15374 (NEHU).

Notes: Endemic to North East India.

12. *Ruellia* Linn.

Linn., Sp. Pl. 634. 1753, p.p. & Gen. Pl. ed. 5. 283. 1754.

About 5 species distributed in tropical America; one species in India which occurs in the study area also.

Ruellia tuberosa Linn., Sp. Pl. 635. 1753; Prain, Beng. Pl. 803. 1903; Yamazaki in Hara, Fl. E. Himal. 303. 1966; Deb, Fl. Tripura 2: 297. 1983.

Herb; roots producing tubers. Leaves opposite, *ca* 3-10 x 1.0-4.5 cm, elliptic-ovate, acute, narrowed down to a petiole, margin undulate. Flowers light blue, in axillary and terminal cymes, bracteate, bracteolate. Calyx segments 5 linear-lanceolate. Corolla tubular, ventricose, *ca* 3-4 cm long; lobes rounded. Stamens 4, didynamous. Style linear, hairy. Capsules cylindric, *ca* 2-3 x 0.3 cm.

Fls. & Frts.: July - September.

Occurrence: Rare, in moist places, along roadside of the area.

Distribution: A native of tropical America; naturalised in East and North East India.

Specimen examined: Guvali; *Bora* 15372 (NEHU).

13. *Rungia* Nees

Nees in Wall., Pl. Asist. Rar. 3: 77. 1852.

About 50 species distributed in tropical regions; about 13 species in India; one species in the study area.

Rungia pectinata (Linn.) Nees in DC., Prodr. 11: 470. 1847; Deb, Fl. Tripura 2: 297. 1983. *Justicia pectinata* Linn., Cent. Pl. 11: 3. 1756 & Amoen. Acad. 4: 299. 1759. *Rungia parviflora* (Retz.) Nees var. *pectinata* (Linn.) Clarke in Hook. f., Fl. Brit. Ind. 4: 550. 1885.

Procumbent much branched herb. Leaves opposite, *ca* 0.8-3.5 x 0.4 cm, elliptic-oblong or linear-lanceolate, acute, serrulate. Flowers purplish blue, in terminal or axillary, dense unilateral, spikes; fertile bracts orbicular, pubescent. Calyx *ca* 0.2 cm long, segments acuminate, linear-lanceolate, ciliate. Corolla *ca* 0.5 cm long. Stamens 2. Capsules ovoid, acute.

Fls. & Frts.: November - April.

Occurrence: Common, in moist, dry places of the area.

Distribution: Throughout India; Myanmar, Sri Lanka.

Specimen examined: Haduk; *Bora* 14792 (NEHU).

14. *Thunbergia* Retz.

Retz., Phys. Saelsk. Handb. 1(3): 163. 1780, *non. cons.*

Usually climbing shrubs. Leaves 3-5 nerved from base. Flowers solitary or in racemes; bracts 2 foliaceous; bracteoles large, spathaceous, enclosing calyx. Calyx 10- many fid. Corolla funnel shaped; lobes 5 , subequal. Stamens

4, didynemous; anther cells spurred below. Ovules 2 in each cell. Capsules breaked at tip.

About 100 species distributed in tropical regions; 10 species in India; 2 species in the study area.

Key to the species

1a. Flowers solitary; bracts small

.... 1. *T. fragrans*

1b. Flowers in racemes; bracts larger than above

.... 2. *T. grandiflora*

1. *Thunbergia fragrans* Roxb., Pl. Coromon. 1: 47. t. 67. 1796; Clarke in Hook. f., Fl. Brit. Ind. 4: 390. 1884. *T. volubilis* Pers., Syn. Pl. 2: 179. 1806.

Climbing herb. Leaves *ca* 5-12 x 3-5 cm, scabrous; petioles *ca* 2-5 cm long. Flowers white, solitary, axillary; bracts small; bracteoles ovate, acuminate. Calyx pubescente. Corolla lobes orbicular, *ca* 3-4 cm long. Capsules conical.

Fls. & Frts.: August - December.

Occurrence: Occasionally, occurs in the hilly forest of the sanctuary.

Distribution: Assam, Himalayas; North America.

Specimen examined: Rangamati; *Bora* 15333 (NEHU).

2. *Thunbergia grandiflora* (Roxb. ex Rottl.) Roxb. in Lodd. Bot. Cab. t.

324. 1819 & Fl. Ind. 3: 34. 1832; Clarke in Hook. f., Fl. Brit. Ind. 4: 392. 1884; Kanjilal *et al.*, Fl. Assam 3: 410. 1939; Deb, Fl. Tripura 2: 299. 1983; Haridasan & Rao, For. Fl. Meghalaya 2: 670. 1987.

Woody climbing shrub. Leaves opposite, *ca* 10-20 x 5-11 cm, ovate, or deltoid ovate, deep cordate, whitish blue, in terminal racemes; bracts large, foliaceous brownish silky outside. Calyx *ca* 2.5 cm long. Corolla whitish blue, *ca* 5 cm long, campanulate. Capsules with 4 quetrous beak.

Fls. & Frts.: September - January.

Occurrence: Common, in the hilly forest of the sanctuary.

Distribution: North East India; Malaysia, South China, Vietnum.

Specimen examined: Burha Mayong; *Bora* 15104 (NEHU).

82. VERBENACEAE

Jaume St. Hilaire, Expos. Fam. 1: 245. 1805.

Herbs to trees. Leaves usually opposite or whorled. Inforescence usually a dichasial cymes in modified form. Flowers bisexual, more or less zygomorphic. Calyx persistent. Corolla gamopetalous, tubular, 4-5 lobed. Stamens 4, didynamous or 5 or 2. Ovary superior. Fruit drupe or berry.

The family comprises about 91 genera and 1900 species, distributed in tropical to termperate regions; 17 genera and over 96 species in India; 12 genera and 20 species in the study area.

Key to the genera

1a. Flowers in spikes or racemes:

2a. Flowers pedicellate in racemes

.... 3. *Duranta*

2b. Flowers sessile in spikes:

3a. Ovary 4-celled; stigma 2 lobed; fruits of four 1 seeded schizocarps

... 11. *Verbena*

3b. Ovary 2-celled; stigma capitate or oblique:

4a. Fertile stamens 2

.... 9. *Stachytarpheta*

4b. Fertile stamers 4:

5a. Usually creeping herbs; leaves often fleshy

.... 7. *Phyla*

5b. Undershrubs or shrubs; leaves not fleshy

.... 6. *Lippia*

1b. Flowers in racemes:

6a. Leaves palmately 3–4 foliolate

... 12. *Vitex*

6b. Leaves simple:

7a. Flowers actinomorphic:

8a. Flowers in axillary or supra-axillary cymes; fruiting calyx not inflated .... 1. *Callicarpa*

8b. Flowers in terminal panicles;

fruiting calyx inflated

... 10. **Tectona**

7b. Flowers zygomorphic:

9a. Drupes with 1 to 4 celled endocarp:

10a. Inflorescence paniculate cymes; corolla large; tube infundibuliform ..... 4. **Gmelina**

10b. Inflorescence centrifugal cymes or corymbs; corolla small; tube cylindrical

.... 8. *Premna*

9b. Drupes with 4-pyrenes or druplets:

11a. Calyx campanulate; drupes not within persistent calyx

.... 2. **Clerodendrum**

11b. Calyx cupuliform or rotate; drupes within persistent calyx

.... 5. *Holmskioldia*

1. *Callicarpa* Linn.

Linn, Sp. Pl. 111. 1753 & Gen. Pl. ed. 5. 50. 1754.

Shrubs or trees. Leaves opposite. Flowers in axillary or supra axillary cymes. Calyx tubular or campanulate, truncate or minutely 4 lobed. Corolla tube short, spreading. Stamens 4, inserted above the middle of tube. Ovary 4-celled; style capillary. Fruit a drupe, pyrenes 4, 1 seeded.

About 140 species in tropical and subtropical regions; 10 species in

India; 2 species in the study area.

Key to the species

1a. Leaves entire; fruits purple .... 1. *C. arborea*

1b. Leaves crenate-serrate; fruits white .... 2. *C. macrophylla*

1. *Callicarpa arborea* Roxb., Fl. Ind. 1: 390; Clarke in Hook. f., Fl. Brit. Ind. 4: 567. 1885; Kanjilal *et al.*, Fl. Assam 3: 463. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 672. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 245. 1996.

Small tree. Leaves *ca* 8-28 x 4-11 cm, elliptic- lanceolate or ovate, tomentose beneath, glabrous above. Flowers purple, in dichotomous corymbose cymes. Calyx tomentose. Corolla lobes 4. Drupes *ca* 0.2-0.5 cm in diam., globose, purple.

Flrs. & Frts.: July - December.

Occurrence: Occassionally, in the hilly forest of the sanctuary.

Distribution: North East India, Himalayas; China, Myanmar, Vietnum.

Specimen examined: Dhekiabari; *Bora* 15066 (NEHU).

2. *Callicarpa macrophylla* Vahl, Symb. Bot. 3: 13. t. 53. 1794; Clarke in Hook. f., Fl. Brit. Ind. 4: 568. 1885; Kanjilal *et al.*, Fl. Assam 3: 469. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 673. 1987.

Shrub; young parts stellately tomentose. Leaves *ca* 8-28 x 3-9 cm, ovate

or ovate-lanceolate, acuminate or acute, crenate-serrate, cuneat at base, tomentose beneath. Flowers pinkish, in axillary, lax dichotomous cymes. Calyx campanulate, 4 toothed. Corolla lobes 4, ovate. Drupes *ca* 0.1 -0.2 in diam., globose, white.

Fls. & Frts.: August - December.

Occurrence: Occassionally, in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Tripura, Himalayas; China, Myanmar, Vietnum.

Specimen examined: Guvali; *Bora* 14847 (NEHU).

2. *Clerodendrum* Linn.

Linn., Sp. Pl. ed. 5. 285. 1754.

Herbs, shrub or trees. Flowers zygomorphic, in axillary cymes or in terminal panicles. Calyx campanulate, 5 lobed, often accrescent. Corolla salver shaped, obliquely 5 fid; tube slender; limb spreading. Stamens 4, exserted, alternate with corolla lobes. Ovary imperfectly 4-celled; ovules 1 in each cell; stigma shortly 2 fid. Fruits drupe, 4 lobed and separating into 4 pyrenes.

About 400 species distributed in tropical and subtropical regions; 18 species in India; 4 species in the study area.

Key to the species

1a. Leaves pubescent .... 4. *C. viscosum*

1b. Leaves glabrous:

2a. Leaves lanceolate; corolla tube more than

5 cm long .... 2. *C. indicum*

2b. Leaves ovate or elliptic; corolla tube less than 5 cm long:

3a. Leaves ternately whorled, serrate, sessile; flowers bluish white .... 3. *C. serratum*

3b. Leaves opposite, entire, petiolate; flowers white .... 1. *C. colebrookianum*

1. *Clerodendrum colebrookianum* Walp., Rep. 4: 114. 1845; Clarke in Hook. f., Fl. Brit. Ind. 4: 594. 1885; Kanjilal *et al.*, Fl. Assam 3: 488. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 676. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 246. 1996.

Shrub. Leaves opposite, *ca* 10-20 x 6-15 cm, ovate, acute, cordate at base. Flowers white, in terminal corymbose cymes. Corolla tube slender. Drupes globose with acrescent cupular calyx.

Pls. & Frts.: August - December.

Occurrence: Occassionally scattered throughout the sanctuary.

Distribution: North East India; Malaya, Myanmar, West China, Vietnum.

Specimen examined: Guvali; *Bora* 15381 (NEHU).

Uses: Leaf extract taken in hypertension.

2. *Clerodendrum indicum* (Linn.) Kuntze Revis. Gen. Pl. 2: 586. 1891; Deb, Fl. Tripura 2: 107. 1983; *Siphonanthus indica* Linn., Sp. Pl. 109. 1753. *Clerodendrum siphonanthus* R.Br. in W.T. Aiton, Hortus Kew ed. 2. 4: 65. 1812;

Clarke in Hook. f., Fl. Brit. Ind. 4: 595. 1885; Kanjilal *et al.*, Fl. Assam 3: 492. 1939.

Tall herb; stem ridged hollow. Leaves ternately whorled, *ca* 7-32 x 0.6-2.0 cm, linear or lanceolate, acute. Flowers creamy white, in axillary and terminal paniculate cymes; bracts linear, *ca* 1 cm long. Calyx lobes *ca* 0.4 cm long, ovate, acute. Corolla tube *ca* 6-10 cm long, slender, lobes obvate-oblong, obtuse. Drupes 4 lobed with persistent calyx.

Fls. & Frts.: September - December.

Occurrence: Common, in grassland and along roadside of the sanctuary.

Distribution: Assam, Tripura, Himalayas; Malaya, Myanmar, South China, Vietnum.

Specimen examined: Naltoli, Tuplung; *Bora* 14863 (NEHU).

3. *Clerodendrum serratum* (Linn.) Moon, Cat. Pl. Ceylon 1: 46. 1824; Clarke in Hook. f., Fl. Brit. Ind. 4: 592. 1885; Kanjilal *et al.*, Fl Assam 3: 490. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 677. 1987. *Volkameria serrata* Linn., Ment. Pl. 90. 1767.

Erect undershrub; stem 4 angled. Leaves opposite or whorls of 3, *ca* 6-28 x 2.5-9.0 cm, ovate-elliptic, sub-sessile, sharply serrate, acute or acuminate. Flowers bluish white, in elongated terminal pyrammidal panicles. Calyx lobes dentate. Corolla bluish white, limb 2 lipped. Drupes broadly obovoid or subglobose, 1-4 lobed.

Fls. & Frts.: August - October.

Occurrence: Occasionally, in the hilly forest of the sanctuary

Distribution: North East India; Malaysia, Sri Lanka, Vietnum.

Specimen examined: Sanaka; *Bora* 15171 (NEHU).

Uses: Leaf decoction taken in dysentery.

4. *Clerodendrum viscosum* Vent. Jard. Malmaison 1: t. 25. 1803; Deb, Fl. Tripura 2: 109. 1983; Haridasan & Rao, For, Fl. Meghalaya 2: 678. 1987. *C. infortunatum auct. non* Linn. 1753; Clarke in Hook .f., Fl. Brit. Ind. 4: 594. 1885; Kanjilal *et al.*, Fl. Assam 3: 487. 1939. "Bhataitita".

Undershrub, softly tomentose; branches 4 angled. Leaves opposite, *ca* 5-20 x 4-14 cm, ovate-cordate, acuminate, dentate, tomentose. Flowers white, tinged with pink in terminal subcorymbose panicles; bracts foliaceous. deciduous, pubescent. Calyx *ca* 0.5 cm long; segments broadly lanceolate, acuminate, hairy. Corolla white, pubescent outside; lobes oblong, obtuse, *ca* 1 cm long; tube slender, *ca* 1.2 cm long. Drupes globose, within persistent calyx, black when mature.

Fls. & Frts.: March - July.

Occurrence: Common along road side and grassland in the sanctuary.

Distribution: Throughout India; Malaysia, South China, Sri Lanka, Vietnum.

Specimen examined: Haduk; *Bora* 15517 (NEHU).

Uses: Root extract taken in dysentery.

3 Duranta Linn.

Linn., Sp. Pl. 637. 1753 & Gen. Pl. ed. 5: 284. 1754.

About 30 species distributed in Carribean to South America; one species in the study area.

Duranta repens Linn., Sp. Pl. 637. 1753; Deb, Fl. Tripura 2: 110. 1983. *D. erecta* Linn., Sp. Pl. 637. 1753. *D. plumieri* Jacq., Select. Strip. Amer. Hist. 186. t. 176. 1763; Kanjilal *et al.*, Fl. Assam 3: 462. 1939.

Evergreen spiny shrub; spines axillary or supra axillary, straight. Leaves opposite, *ca* 2-5 x 1.0-2.5 cm, ovate-elliptic, serrate, acute, cuneate, Flowers violet blue, in axillary and terminal panicles; bracts pubescent. Calyx *ca* 0.4 cm long, tubular, 5 toothed, pubescent. Corolla *ca* 1.2 cm long, unequally 5 lobed; limb spreading. Drupes globose, orange yellow, succulent, *ca* 0.5 in diam.

Fls. & Frts.: May - July, however flowers throughout the year.

Occurrence: Common, as hadge plant in nearby forest areas, also found as escape.

Distribution: A native of Central America; naturalised in India.

Specimen examined: Burha Mayong, Haduk; *Bora* 15288 (NEHU).

4. Gmelina Linn.

Linn., Sp. Pl. 626. 1753 & Gen. Pl. ed. 5. 274. 1754.

About 35 species mainly distributed in tropics; 4 species in India; one species in the study area.

Gmelina arborea Roxb., Pl. Corom. 3: 41. 42. t. 246. 1815 & Fl. Ind. 3: 84. 1832; Clarke in Hook. f. , Fl. Brit. Ind. 4: 581. 1885; Kanjilal *et al.*, Fl. Assam 3: 466. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 679. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 248. 1996. "Gamari".

Deciduous tree. Leaves *ca* 6-20 x 3-9 cm, ovate, acute or acuminate, entire, cuneate at base, long petiolate with two basal glands. Flowers yellow, in axillary or terminal panicles. Calyx broadly campanulate, 5 toothed. Corolla *ca* 3 cm long, yellow, campanulate, pubescent outside, 2 lipped. Drupes obovoid-pyriform, *ca* 2.0-2.3 cm in diam., orange yellow when ripe.

Fls. & Frts.: March - June.

Occurrence: Occasionally, in the hilly forest and planted near the Haduk forest campus.

Distribution: Throughout India; Malaysia.

Specimen examined: Haduk: Bora 15308 (NEHU).

Uses: Timber used for furniture, agricultural and weaving implements and other construction purposes.

5. *Holmskioldia* Retz.

Retz., Obs. Bot. 6: 31. 1791.

About 10 species distributed in tropical Africa to India; one species in India which occurs in the study area also.

Holmskioldia sanguinea Retz., Obs. Bot. 6: 31. 1791; Clarke in Hook. f., Fl. Brit. Ind. 4: 596. 1885; Kanjilal *et al.*, Fl. Assam 3: 493. 1939; Deb, Fl.

Tripura 2: 111. 1983; Haridasan & Rao, For. Fl. Meghalaya 2: 680. 1987.

Straggling shrub; branches angular, drooping. Leaves opposite, *ca* 5-10 x 2.5-5.0 cm, ovate, acuminate, crenate-serrate. Flowers reddish, in short axillary or terminal cymes. Calyx orange red, salver shaped, acrescent. Corolla tubular, reddish, oblique, *ca* 2 cm long, 2 lipped. Stamens 4, didynamous. Ovary 4-celled; style 2 fid. Drupes globose, 4 lobed.

Fls. & Frts.: September - March.

Occurrence: Common, in the hilly forest of the sanctuary.

Distribution: Assam, Tripura, Meghalaya, Sub-Himalayas.

Specimen examined: Burha Mayong; Bora 15210 (NEHU).

6. *Lippia* Linn.

Linn., Sp. Pl. 633. 1753 & Gen. Pl. ed. 5. 282. 1754.

About 200 species distributed in tropical Africa and America; 4 species in India; one species in the study area.

Lippia javanica (Burm. f.) Spreng., Veg. 2: 752. 1885; Srivastava in Mudgal *et al.* Fl. M.P. 2: 380. 1997. *Verbena javanica* Burm. f., Fl. Ind. 12. t. 6. f. 2. 1768 *Lantana alba* Mill., Gard. Dict. ed. 8. 8. 1768. *Lippia geminata* Humb., Bonpl. & Kunth, Nov. Gen. Sp. 2: 266. 1818; Clarke in Hook. f., Fl. Brit. Ind. 4: 563. 1885; Kanjilal *et al.*, Fl. Assam 3: 461. 1939. "Pahukuta".

Aromatic weak shrub; branches procumbent, pubescent. Leaves opposite, *ca* 2-9 x 0.4-2.5 cm, lanceolate or elliptic-oblong, acute, rounded at base,

crenate-serrate, velvety beneath, rough above, shortly petioled. Flowers pink, *ca* 0.7 cm long, in capitate spikes on axillary, *ca* 2 cm long peduncles; bracts *ca* 0.4 cm long, lanceolate, pubescent. Calyx campanulate; lobes lanceolate. Corolla 2 lipped, hairy. Stamens 4, didynamous, included. Stigma subcapita. Fruits subglobose drupe.

Fls. & Frts.: June - September.

Occurrence: Common, in grassland and along water bodies of the sanctuary.

Distribution: Tropical parts of India; Native of Tropical Africa.

Specimen examined: Pagladuba, Thengbhanga, Tuplung; *Bora* 15065 (NEHU).

Uses: Leaves used for flavouring the curry.

7. *Phyla* Lour.

Lour., Fl. Cochinch. 66. 1790.

About 15 species distributed in tropical and subtropical regions; one species in India which occurs in the study area also.

Phyla nodiflora (Linn.) Greene, Pittonia 4: 46. 1899; Santapau in Rec.Bot. Surv. Ind. 16(1): 237. 1953; Islam, Fl. Majuli 244. 1990. *Verbena nodiflora* Linn., Sp. Pl. 20. 1753. *Lippia nodiflora* (Linn.) Rich. in Michx., Fl. Bor. Amer. 2: 15. 1803; Clarke in Hook. f., Fl. Brit. Ind. 4: 563. 1885.

Fig. 38

Prostrate herb; rooting at nodes. Leaves opposite, obovate, spathulate, obtuse, cuneate at base, serrate towards apex from the middle. Flowers purplish white, sessile in dense globose, axillary, *ca* 5-7 cm long penduncled

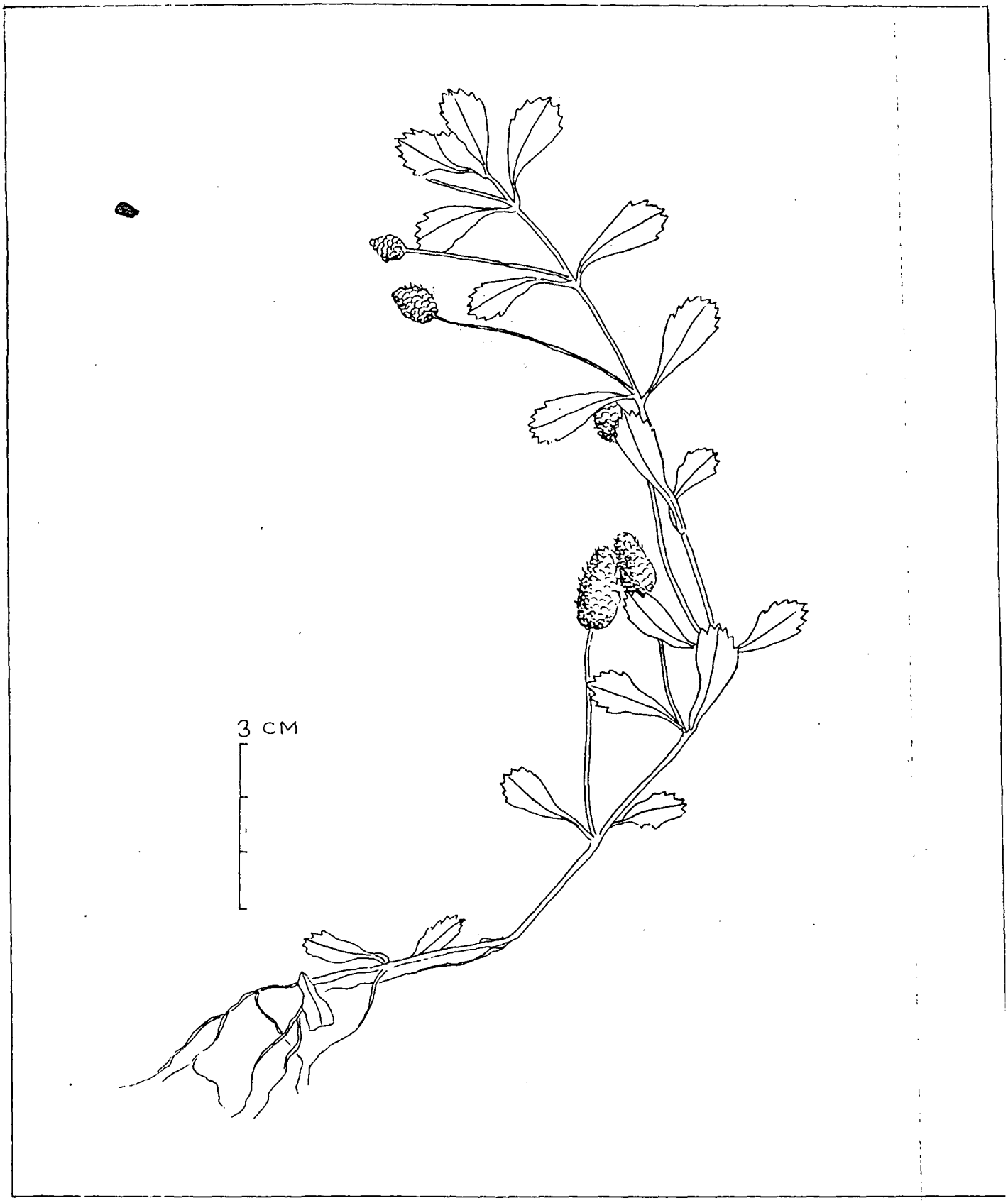


Fig. 38: ***Phyla nodiflora*** (Linn.) Greene (Verbenaceae)

spikes; bracts ovate, acute. Calyx small, deeply 2 lobed, lanceolate. Corolla pale purple, 2 lipped. Drupes globose, oblong, splitting into 2 one seeded pyrenes.

Fls. & Frts.: April - August.

Occurrence.: Common, in moist places, grassland and along ditches of the study area.

Distribution: Throughout India; Tropical and warm temperate regions.

Specimen examineed: Haduk, Jugdal; *Bora* 14717 (NEHU).

8. *Premna* Linn.

Linn., Mant. 2: 154. 1771.

Shurbs or trees. Leaves opposite. Flowers hypogynous in determinate, centrifugal cymes or corymbs. Calyx cup shaped, 3-5 toothed, persistent. Corolla tube short; throat hairy; limb 2 lipped. Stamens 4, didynamous. Ovary 2-4 celled; ovules 2 in each cell; stigma shortly 2 fid. Fruits drupe.

About 200 species distributed in tropical and sub tropical regions; 25 species in India; 2 species in the study area.

Key to the species

1a. Leaves entire; calyx bilabiate .... 1. *P. latifolia*

1b. Leaves serrate, calyx campanulate .. 2. *P. pinguis*

1. *Premna latifolia* Roxb., Fl. Ind. 3: 76. 1832; Clarke in Hook. f., Fl. Brit. Ind. 4: 577. 1885; Kanjilal *et al.*, Fl. Assam 3: 475. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 684. 1987.

Small tree. Leaves *ca* 8-17 x 4-7 cm, elliptic or ovate, acuminate, rounded or subtruncate at base, entire, slightly pubescent beneath. Flowers white, in terminal corymbs. Calyx obscurely 2 lipped. Corolla white. Drupes *ca* 0.3-0.4 cm in diam., subglobose, black when ripe.

Fls. & Frts.: May - September.

Occurrence: Occasionally, scattered throughout the sanctuary.

Distribution: Assam, Meghalaya, Tripura, Himalayas, West Bengal; Bangladesh.

Specimen examined: Kamarpur; *Bora* 15293 (NEHU).

2. *Premna pinguis* Clarke in Hook. f., Fl. Brit. Ind. 4: 579. 1885; Kanjilal *et al.*, Fl. Assam 3: 477. 1939; Deb, Fl. Tripura 2: 114. 1983; Haridasan & Rao, For. Fl. Meghalaya 2: 685. 1985.

Shrub. Leaves *ca* 8-18 x 3.5-8.0 cm, ovate, acuminate, serrate. Flowers white, in terminal corymbose cymes. Calyx campanulate, teeths subequal, glabrescent. Corolla white. Drupes *ca* 0.3 cm in diam., obovoid, reddish brown when mature.

Fls. & Frts.: May - August.

Occurrence: Occasionally, scattered in the hilly forest of the sanctuary.

Distribution: Assam, Meghalaya, Tripura; Myanmar.

Specimen examined: Dhekiabari; *Bora* 15518 (NEHU).

Notes: Confined to Indo-Burmes region.

9. *Stachytarpheta* Vahl

Vahl, Enum. 1: 205. 1804, *non. cons.*

About 100 species mostly distributed in America; 4 species in India; one species in the study area.

Stachytarpheta jamaicensis (Linn.) Vahl, Enum. Pl. 1: 206. 1804; Kanjilal *et al.*, Fl. Assam 3: 461. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 689. 1987. *Stachytarpheta indica auct. non* Vahl, 1804; Clarke in Hook. f., Fl. Brit. Ind. 4: 564. 1885.

Erect herb; stem quadriangular. Leaves opposite, *ca* 2-6 x 0.8-3.0 cm, elliptic or ovate-elliptic, obtuse or acute, cuneat, serrate. Flowers bluish, in linear, cylindric spikes. Calyx *ca* 0.4 cm long, shortly 4 toothed, tubular. Corolla bluish, *ca* 0.6 cm long, slightly curved, hairy inside. Capsules oblong, *ca* 0.4 cm long.

Fls. & Frts.: June - October.

Occurrence: Occasionally, along roadside in the hilly forest of the sanctuary

Distribution: Tropical parts of India; **Native of Tropical America**; now Pantropic.

Specimen examined: Burha Mayong; *Bora* 15519 (NEHU).

10. *Tectona* Linn.

Linn. f., Suppl. 20 (Tektona). 151. 1781.

4 species distributed in South East Aisa to Malaysia; one species in

India which occurs in the study area also.

Tectona grandis Linn. f., Suppl. Pl. 151. 1782; Clarke in Hook. f., Fl. Brit. Ind. 4: 570. 1885; Kanjilal *et al.*, Fl. Assam 3: 466. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 689. 1987. "Segun".

Large deciduous tree; young parts tomentose; branches quadriangular. Leaves large, *ca* 12-60 x 6-35 cm, broadly ovate, ovate-elliptic, acute, cuneate at base, entire, stellate tomentose beneath. Flowers white, in large terminal panicles. Calyx *ca* 0.4 cm long; lobes 5, obtuse. Corolla white; tube cylindrical; lobes obovate-elliptic. Drupes globose, enclosed by the inflated calyx.

Fls. & Frts.: August - January.

Occurrence: Planted throughout the area by the Forest department.

Distribution: Throughout India; Myanmar, South East Asia.

Specimen examined: Guvali; *Bora* 15520 (NEHU).

Uses: Timber used for various construction purposes.

11. *Verbenea* Linn.

Linn., Sp. Pl. 1753 & Gen. Pl. ed. 5. 12. 1754.

About 250 species distributed in tropical and temperate America; about 4 species in India; one species in the study area.

Verbena officinalis Linn., Sp. Pl. 20. 1753; Clarke in Hook. f., Fl. Brit. Ind. 4: 565. 1885; Kanjilal *et al.*, Fl. Assam 3: 462. 1939.

Erect or decumbent herb; branches quadrangular. Leaves variously lobed, *ca* 4-10 cm long, scabrous; lower ones pinnatifid or coarsely dentate; upper ones sessile, deeply dentate or 3 partite, hairy. Flowers bluish white, in dense bracteate long spikes. Calyx *ca* 0.2 cm long, campanulate, 5 toothed. Corolla *ca* 0.5 cm long, tubular. Pyrenes 4 subcylindric, ribbed.

Fls. & Frts.: April - October.

Occurrence: Common, along roadside and grassland of the sanctuary.

Distribution: Assam, Himalayas; Temperate and subtropical regions.

Specimen examined: Haduk, Kamarpur; *Bora* 14720 (NEHU).

12. Vitex Linn.

Linn., Sp. Pl. 638. 1753 & Gen. Pl. ed. 5. 285. 1754.

Shrub or trees. Leaves usually opposite, palmately 3-4 folialate, rarely 1 foliolate. Flowers zygomorphic in cymes, bracteate. Calyx campanulate; truncate or shortly 5 or 3 toothed or 5 fid. Corolla tube short; limb 2 lipped, oblique, 5 lobed. Stamens 4, didynamous. Overy 4-celled; ovule one in each cell; stigma shortly 2 fid. Fruits drupe.

About 250 species distributed in tropical to temperate regions; 13 species in India; 4 species in the study area.

Key to the species

1a. Leaves 3 foliolate; petioles often winged

.... 4. *V. peduncularis*

1b. Leaves 3-5 foliolate; petioles not winged:

2a. Leaflets tomentose or pubescent beneath; fruits *ca* 0.4-0.5 cm in diam., globose:

3a. Shrubs; leaflets *ca* 3.0-8.5 x 0.5-2.4 cm, lanceolate; flowers purple white .... 3. ***V. negundo***

3b. Trees; leaflets *ca* 6.5-20.5 x 2.5-7.0 cm, ovate-lanceolate; flowers dull white .... 1. ***V. canescens***

2b. Leaflets glabrous or nearly so beneath; fruits more than 0.5 cm in diam., oblong ovoid .... 2. ***V. glabrata***

1. ***Vitex canescens*** Kurz in J. Asiat. Soc. 2: 101. 1873; Clarke in Hook. f., Fl. Brit. Ind. 44: 586. 1885; Kanjilal *et al.*, Fl. Assam 3: 481. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 691. 1987. **"Teta"**.

Deciduous tree; bark pale brown. Leaves digitately 3-5 foliolate, opposite, long peduncled; leaflets *ca* 6.5-2.0 x 2.5-7 cm, ovate or ovate-lanceolate, acuminate, cuneate, tomentose beneath. Flowers dull white, *ca* 0.8 cm long, in terminal or axillary panicles. Calyx *ca* 0.2 cm long, 5 toothed. Corolla *ca* 0.6 cm long, tubular, pubescent above; lobes spreading. Drupes *ca* 0.5 cm in diam., ovoid-globose.

Fls. & Frts.: April - October.

Occurrence: Common, throughout the sanctuary.

Distribution: Assam, Meghalaya.

Specimen examined: Burha Mayong; *Bora* 15521 (NEHU).

2. *Vitex glabrata* R. Br., Prodr. 512. 1810; Clarke in Hook. f., Fl. Brit. Ind. 4: 558. 1885; Kanjilal *et al.*, Fl. Assam 3: 485. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 691. 1987.

Deciduous tree; bark greyish. Leaves digitately 3-5 foliolate, opposite decussate; leaflets *ca* 8.5-18.5 x 1.8-6.0 cm, obvote, elliptic-lanceolate, acuminate, cuneate. Flowers white, in axillary cymes, *ca* 1.2 cm long, bracteate. Calyx *ca* 0.3 cm long, 5 toothed. Corolla *ca* 0.8 cm long, lobes spreading, hairy inside. Drupes oblong-ovoid, *ca* 1.5 cm long, purplish when ripe.

Fls. & Frts.: April - September.

Occurrence: Common, throuhgout the sanctuary.

Distribution: Assam, Meghalaya; China, Malaya, North Australia.

Specimen examined: Burha Mayong, Jugdal, Thengbhanga; *Bora* 15264 (NEHU).

3. *Vitex negundo* Linn., Sp. Pl. 638.1753; Clarke in Hook. f., Fl. Brit. Ind. 4: 583. 1885; Kanjilal *et al.*, Fl. Assam 3: 480. 1939; Deb, Fl. Tripura 2: 117. 1983; Haridasan & Rao, For. Fl. Meghalaya 2: 692. 1987. "Pashatia".

Aromatic shrub; branches spreading, quadrangular. Leaves digitately 3-5 foliolate, opposite decussate; leafelets *ca* 3.0-8.5 x 0.5-2.4 cm, lanceolate, acuminate, pubescent beneath; terminal ones long petioled. Flowers purplish blue, in clusters in terminal long panicles, *ca* 1 cm long. Calyx *ca* 0.3 cm long, 5 toothed, grey pubescent above. Corolla *ca* 0.9 cm long, tomentose outside. Staminal filaments hairy below. Drupes *ca* 0.4 - 0.5 cm in diam.,

globose, black when ripe.

Fls. & Frts.: June - December.

Occurrence: Common, in the hilly forest of the sanctuary.

Distribution: Throughout India; **East Asia, Sri Lanka.**

Specimen examined: Hiloikhunda; *Bora* 15014 (NEHU).

Uses: Leaf and root paste applied in skin diseases.

4. *Vitex peduncularis* Wall. ex Schauer in DC., Prodr. 11: 687. 1847; Clarke in Hook. f., Fl. Brit. Ind. 4: 587. 1885; Kanjilal *et al.*, Fl. Assam 3: 484. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 692. 1987.

Tree; bark dark grey. Leaves 3 foliolate, opposite, long petioled; leaflets *ca* 4.0-18.5 x 2-5 cm, oblanceolate, acuminate, cuneate, glaucous beneath; petioles often winged. Flowers creamy, *ca* 0.6 cm long, in axillary long narrow panicles. Calyx *ca* 0.2 long, 5 toothed. Corolla *ca* 0.5 cm long, creamy; lobes spreading, *ca* 0.3 cm long, ovate-obtuse. Drupes *ca* 0.6 cm in diam., obovoid, globose, black when ripe.

Fls. & Frts.: April - October.

Occurrence: Common, in the hilly forest of the sanctuary.

Distribution: Assam, Meghalaya, Tripura, Himalayas; **Malaysia, Myanmar, Vietnum.**

Specimen examined: Burha Mayong; *Bora* 15327 (NEHU).

83. LAMIACEAE

Lindl., Nat. Syst. ed. 2: 275. 1836; *nom. alt.* Labiatae.

Herbs, shrubs, rarely trees, mostly aromatic. Leaves opposite or whorled, exstipulate. Flowers bisexual, usually zygomorphic in axillary or whorled scorpioid cymes or forming spikes or racemes. Calyx gamosepalous, usually 5 lobed, persistent. Corolla usually 2 lipped, 4-5 lobed. Stamens 4, didynamous or 2. Disk present. Ovary superior. Fruit of 4 achene like nutlets.

The family comprises about 224 genera and 4600 species, cosmopolitan in distribution; 64 genera and 100 species in India; 10 genera and 10 species in the study area.

Key to the genera

1a. Stamens declinate or ascending:

2a. Nutlets fleshy; anther celles parallel .... 4. *Gomphostemma*

2b. Nutlets dry; anther cells confluent:

3a. Lower lip of corolla flat or nearly so:

4a. Uppper corolla lip 2 fid .... 10. *Teucrium*

4b. Upper corolla lip 3–4 fid:

5a. Corolla tube not exceeding the calyx; stigma 2 fid .... 7. *Ocimum*

5b. Corolla tube exceeding the calyx; stigma entire .... 9. *Orthosiphon*

3b. Lower lip of corolla concave or boat-shaped:

6a. Corolla bilabiate; lower lip longer than upper .... 1. *Anisochilus*

6b. Corolla obscurely bilabiate; lower lobe shorter or equaling the others .... 5. *Hiptis*

1b. Stamens straight or descending:

7a. Stamens 2; staminodes 2 .... 8. *Orthodon*

7b. Stamens 4; staminodes absent:

8a. Calyx 8-10 toothed; upper corolla lip hooded .... 6. *Leucus*

8b. Calyx 5 toothed; uppper lip not hooded:

9a. Anthers 1-celled; cells confluent .... 3. *Dysophylla*

9b. Anthers 2-celled; celles diverging at length .... 2. *Anisomeles*

1. *Anisochilus* Wall.

Wall., Pl. Asiat. Rar. 2: 18. 1831.

About 20 species distributed in tropical regions; 13 species in India; one species in the study area.

Anisochilus carnosus (Linn. f.) Wall. ex Benth. in Wall., Pl. Asiat. Rar. 2: 18. 1830; Hook. f., Fl. Brit. Ind. 4: 627. 1885. *Lavandula carnosa* Linn. f., Suppl. Pl. 273. 1782.

Erect herb; stem angular, reddish. Leaves *ca* 1.8- 5.5 x 1.0-4.5 cm, broadly ovate, nearly acute, rounded or sub cordate at base, serrate. Flowers pinkish purple, in spikes in panicles. Calyx 2 lipped; tube *ca* 0.2 cm long. Corolla *ca* 1.5 cm long; lobes orbicular. Nutlets suborbicular, compressed.

Fls. & Frts.: July - November.

Occurrence: Common, on moist hilly slopes of the area.

Distribution: Assam, Central and South India, Western Himalaya; Sri Lanka.

Specimen examined: Hiloikhunda; *Bora* 15522 (NEHU).

2. *Anisomeles* R. Br.

R. Br., Prodr. 503. 1810.

About 6 species distributed in tropical regions; 3 species in Southern India, with one extending upto the Himalayas which occurs in the study area also.

Anisomeles indica Linn., Sp. Pl. 571. 1753. *A. ovata* R. Br. in Ait. f., Hort. Kew 3: 364. 1811; Hook. f., Fl. Brit. Ind. 4: 672. 1885; Kanjilal *et al.* Fl. Assam 3: 521. 1939.

Erect pubescent herb. Stems quadrangular. Leaves *ca* 2.5-8.5 x 2-6 cm, ovate, acute, subcordate at base, pubescent, petiolate. Flowers bluish purple, in axillary whorls; bracts *ca* 0.4 cm long, linear, hairy, Calyx *ca* 0.5 cm long, hirsute; teeth acuminate. Corolla *ca* 1.5 cm long, pubescent outside. Nutlets broadly ovoid, black shining.

Fls. & Frts.: September - March.

Occurrence: Occasionally, along roadside of the area.

Distribution: Tropical and subtropical India; China, Malaya, Philippines.

Specimen examined: Kamarpur; *Bora* 14759 (NEHU).

3. *Dysophylla* Bl.

Bl., Bijdr. 826. 1826;

25 species distributed in temperate Aisa and Australia; 17 species in India; one species in the study area.

Dysophylla auricularia Bl., Bijdr. 826. 1826; Benth., Lab. Gen. Sp. 158. 1832; Hook. f., Fl. Brit. Ind. 4: 638. 1885; Fisher in Rec. Bot. Surv. Ind. 12(2): 124. 1938; Kanjilal *et al.*, Fl. Assam 3: 513. 1939; Deb, Fl. Tripura 2: 320. 1983. **Fig. 39**

Erect pubescent herb. Leaves opposite, *ca* 1.8-7.2 x 0.4-2.0 cm, elliptic-oblong, acute, rounded at base, serrate, pubescent. Flowers pink, in dense terminal spicate racemes. Calyx 5 toothed, minute, hairy. Corolla lobes 4, ovate. Stamens 4; filaments beared. Style 2 fid. Nutlets ellipsoid, smooth.

Fls. & Frts.: June - January.

Occurrence: Common, in moist places of the sanctuary.

Distribution: Assam, Sikkim, Tripura, North and South India; Bangladesh, China, Malaysia, Philippines, Sri Lanka.

Specimen examined: Haduk, Rangamati; *Bora* 15029 (NEHU).

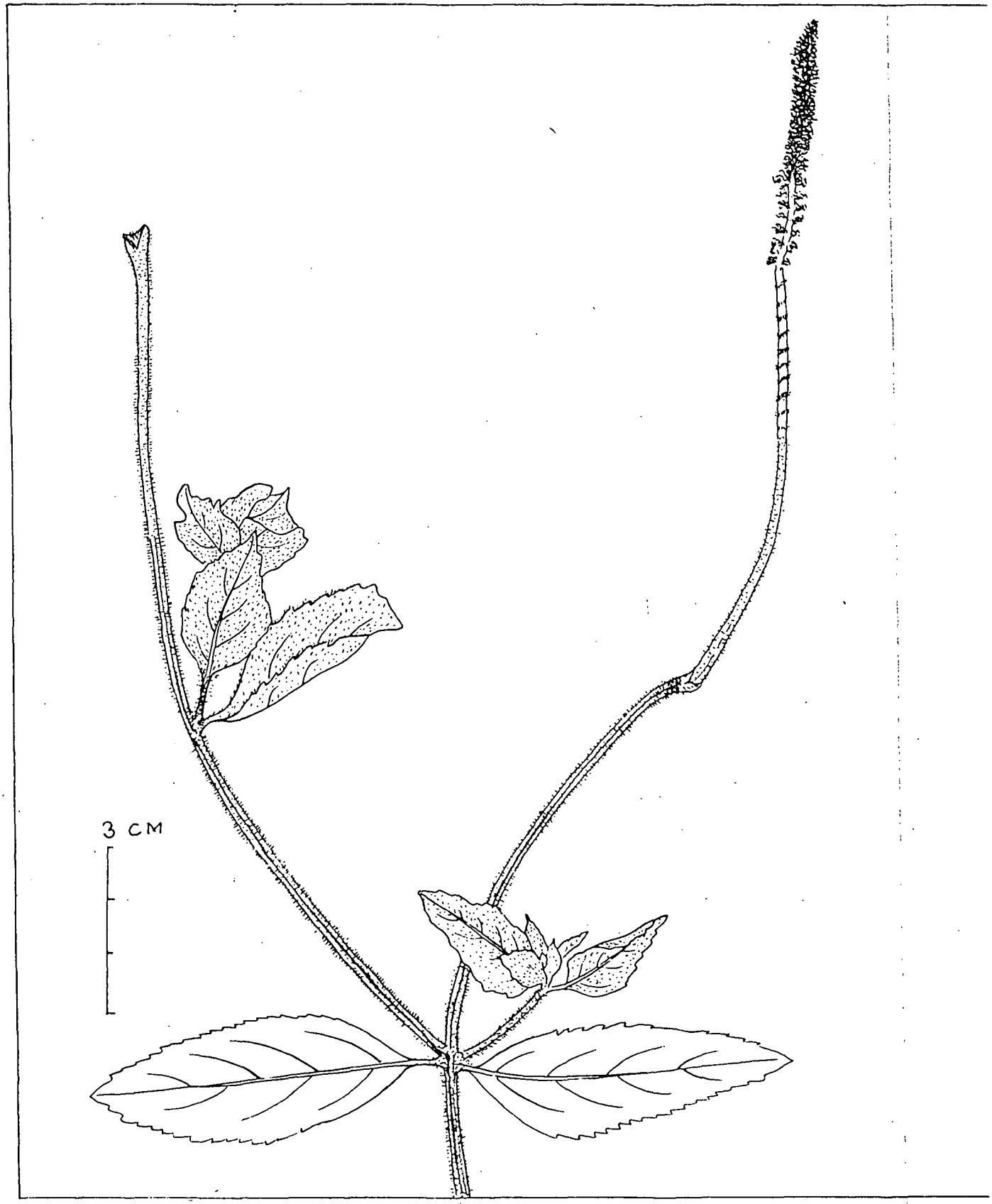


Fig. 39: ***Dysophylla auricularia*** Bl. (Lamiaceae)

Gomphostemma Wall. ex Benth.

Wall. ex Benth. in Wall., Pl. Asiat. 2: 12. 1831.

About 40 species distributed in the Indo-Malyan region; 17 species in India; one species in the study area.

Gomphostemma parviflorum Wall. ex Benth. in Wall., Pl. Asiat. Rar. 2: 12. 1831; Hook. f., Fl. Brit. Ind. 4: 697. 1885; Kanjilal *et al.*, Fl. Assam 3: 528. 1939; Deb, Fl. Tripura 2: 322. 1983; Haridasan & Rao, For. Fl. Meghalaya 2: 698. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 250. 1996. **Fig. 40**

Undershrub. Leaves opposite, *ca* 4.5-20.0 x 1.8-8.5, elliptic-ovate or elliptic-lanceolate, acute or acuminate, cuneat at base, serrate, tomentose beneath. Flowers yellow, in axillary cymes, *ca* 2.2 cm long, bracteate. Calyx 5 toothed, *ca* 0.6 cm long, tomentose. Corolla yellow; upper lip hooded; lower 3 fid. Stamens 4, didynamous. Style 2 fid. Nutlets solitary, glabrous.

Fls. & Frts.: August - December.

Occurrence: Common, in shady hilly forest floors of the sanctuary as undergrowth.

Distribution: Assam, Manipur, Meghalaya, Tripura; Bangladesh, Malaysia, Myanmar.

Specimen examined: Rangamati; *Bora* 15345 (NEHU).

5. *Hyptis* Jacq.

Jacq., Coll 1: 101, 103, 1787, *non. cons.*

About 400 species distributed in subtropical and tropical regions; 4

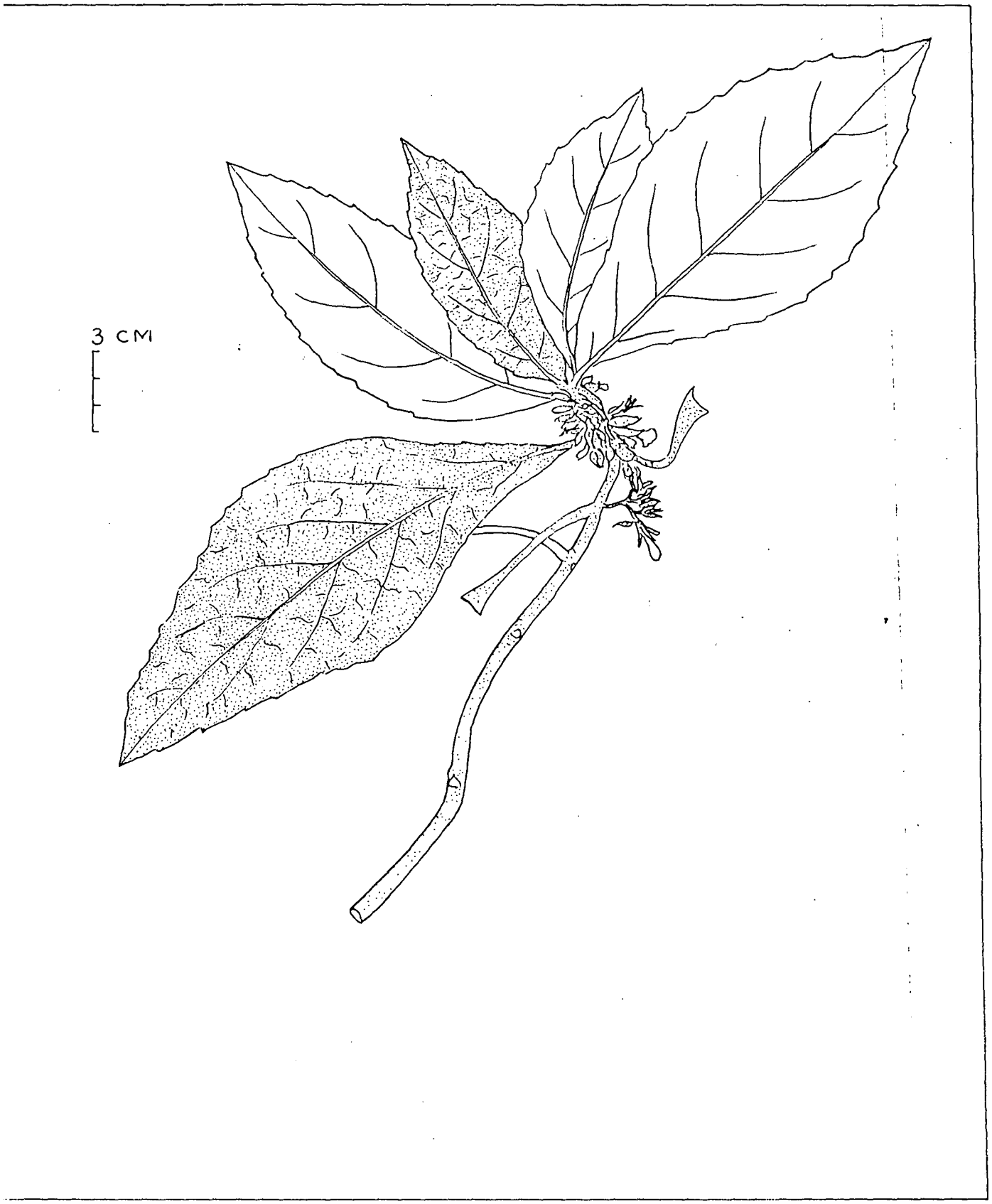


Fig. 40: ***Gemphostemma parviflorum*** Wall. ex Benth. (Lamiaceae)

species in India; one species in the study area.

Hyptis suaveolens (Linn.) Poit. in Ann. Mus. Hist. Nat. 7: 472. t. 29. f. 2. 1806; Hook. f., Fl. Brit. Ind. 4: 630. 1885; Mukerjee in Rec. Bot. Surv. Ind. 14(1): 63. 1940; Deb, Fl. Tripura 2: 323. 1983; Haridasan & Rao, For. Fl. Meghalaya 2: 698. 1987. *Ballota suaveolens* Linn., Syst. Nat. ed. 10. 1100. 1759. "Tukmah".

Sweet smelling, hairy undershrub; stem, branches quadrangular. Leaves opposite, *ca* 2-12 x 1-9 cm, broadly ovate or ovate-elliptic, acute, cuneate or rounded at base, shallowly serrulate, pubescent. Flowers blue, in 2-4 together in axillary peduncled or racemiform cymes. Calyx subequally 5 toothed, 10 nerved, hispid outside. Corolla upper lip 4 lobed. Nutlets 2, flat, ovoid.

Fls. & Frts.: September - February.

Occurrence: Common, along roadside and grassland of the sanctuary.

Distribution: Assam, Meghalaya, Tripura, Bihar, South India, West Bengal, Andaman & Nicobor Islands; Africa, Malaysia, Myanmar, Tropical America.

Specimen examined: Haduk; *Bora* 14749 (NEHU).

Uses: Seeds soaked in water and taken in urinary trouble.

6. *Leucas* R. Br.

R. Br., Prodr. 504. 1810.

About 150 species distributed in Africa to Indo-Malaya; 43 species in India; one species in the study area.

Leucas aspera (Willd.) Link, Enum. Hort. Berol, Alt. 2: 113. 1822; Hook. f., Fl. Brit, Ind. 4: 690. 1885; Mukerjee in Mudgal *et al.* Fl. M.P 2: 409. 1997. *Phlomis aspera* Willd. in Link, Enum. Pl. Hort. Berol 2: 621.1832. *P. esculanta* Roxb., Fl. Ind. 3: 10. 1832. "Drun".

Erect pubescent herb. Leaves *ca* 3.0-6.5 x 0.5-1.5 cm, linear or narrowly oblong-lanceolate, distantly crenate, obtuse, narrowed to the base, sub-sessile. Flowers white, in terminal and axillary whorls; bracts linear, ciliate. Calyx tube *ca* 0.8 cm long, curved, ribbed, hispid outside. Corolla *ca* 1 cm long, white; upper lip hooded, hirsute outside. Nutlets oblong smoth, brown.

Fls. & Frts.: Most part of the year.

Occurrence: Common, along roadside and in forest floors of the sanctuary.

Distribution: Assam, Tripura, Bihar, West Bengal, Central and West India; Myanmar, Philippines, Vietnum.

Specimen examined: Haduk; *Bora* 15028 (NEHU).

Uses: Leaf extract taken in pneumonia and stomach trouble.

7. Ocimum Linn.

Linn., Sp. Pl. 597. 1753 & Gen. Pl. ed. 5. 259. 1754.

About 150 species distributed in tropical and warm temperate regions; 5 species in India; one species in the study area.

Ocimum basilicum Linn., Sp. Pl. 597. 1753; Hook. f., Fl. Brit. Ind. 4: 608. 1885; Kanjilal *et al.*, Fl. Assam 3: 501. 1939; Deb, Fl. Tripura 2: 330. 1983. *O. hispidum* Lamk., Encycl. 1: 384. 1784. **"Bon tuloshi".**

Erect, aromatic; pubescent herb. Leaves *ca* 2-5 x 0.4-2.0 cm long, ovate-lanceolate, acute, narrowed to the base, entire or toothed. Flowers white, in whorls on simple or branched racemes. Calyx *ca* 0.3 cm long, hairy; upper lip rounded, recurved; lower lip 4 toothed. Corolla *ca* 1 cm long; upper lip 4 lobed; lower entire. Stamens 4; 2 staminal filaments villous at base. Nutlets ellipsoid, black.

Fls. & Frts.: Most part of the year.

Occurrence: Common, in open field and along roadside.

Distribution: Throughout India; China, Malaysia.

Specimen examined: Haduk; *Bora* 15030 (NEHU).

8. *Orthodon* Benth. et Oliv.

Benth. et Oliv. in J. Linn. Soc. 9: 167. 1867.

About 10 species distributed in Himalaya to Japan; one species in India which occurs in the study area also.

Orthodon scaber (Thunb.) Hand.-Mazz. Symb. Sin. Pt. 7. 933. 1936; Deb, Fl. Tripura 2: 333. 1983. *Ocimum scabrum* Thunb. in Trans. Linn. Soc. 2: 338. 1794. *Orthodon diantherus* (F. Ham. ex Roxb.) Hand.-Mazz. l.c. *Mosla dianthera* Maxim. in Bull. Acad. Petersb. 20: 457. 1866; Hook. f., Fl. Brit. Ind. 4: 647. 1885; Kanjilal *et al.*, Fl. Assam 3: 517. 1939.

Erect pubescent herb. Leaves opposite, *ca* 1-3 x 0.5-1.5 cm, ovate, acute, cuneate at base, serrate. Flowers purplish white, in whorls on terminal racemes, bracteate. Calyx 2 lipped, campanulate; throat villose. Corolla upper lip notched. Stamens 4, didynamous. Style 2 fid. Nutlets globose.

Fls. & Frts.: June - October.

Occurrence: Rare, along roadside in the sanctuary.

Distribution: Assam, Meghalaya, Tripura, North Bengal, Himalayas; Bhutan, China, Myanmar, Vietnam.

Specimen examined: Burha Mayong; *Bora* 15523 (NEHU).

9. *Orthosiphon* Benth.

Benth., Bot. Reg. Sub. t. 1300 & in Benth. Hook. f., Gen. Pl. 2: 1174. 1876.

About 40 species distributed in tropical regions; 12 species in India; one species in the study area.

Orthopsiphon stamineus Benth. in Wall. Pl. Asiat. Rar. 2. 15; Hook. f., Fl. Brit. Ind. 4: 615. 1885. *Ocimum grandiflorum* Bl., Bijd. 835.

Herb; stem quadrangular. Leaves opposite, ovate, acuminate, narrowed down into petiole, coarsely toothed. Verticillasters few flowered, in terminal lax racemes. Calyx campanulate, 5 toothed. Corolla white; tube slender. Stamens 4, exserted. Nutlets oblong.

Fls. & Frts.: August - December.

Occurrence: Occasionally, scattered along roadside of the sacntuary.

Distribution: Assam, Deccan Peninsula, Nicobar Islands; Australia, Malaysia, Myanmar, Philippines.

Specimen examined: Burha Mayong; *Bora* 15336 (NEHU).

10. *Teucrium* Linn.

(Tourn.) Linn., Syst. ed. 1. 1735.

About 300 species distributed throughout the world; 15 species in India; one species in the study area.

Teucrium stoloniferum Roxb., Hort. Beng. 44. 1814 & Fl. Ind. ed. Carey 3: 3. 1832; Hook. f., Fl. Brit. Ind. 4: 700. 1885; Islam, Fl. Majuli 252. 1990.

Erect pubescent, stoloniferous herb; stem angular. Leaves *ca* 1.8-6.0 x 0.5-2.8 cm, ovate-oblong, subacute at base, serrate. Flowers pinkish purple, in axillary or terminal spikes, *ca* 0.7 cm long, shortly pedicelled. Calyx *ca* 0.3 cm long. Corolla *ca* 0.5 cm long. Nutlets ovoid.

Fls. & Frts.: November - May.

Occurrence: Common, in grassland of the sanctuary.

Distribution: Assam, Meghalaya, Sikkim, West Bengal; Bangladesh, China, Java.

Specimen examined: Haduk; *Bora* 14748 (NEHU).

84. PLANTAGINAGEAE

A. L. de Juss., Gen. Pl. 89. 1789.

Herbs or undershrubs. Leaves exstipulate, often sheathing at base. Flowers bisexual, actinomorphic, bracteate, bracteolate, capitate or spicate. Calyx tubular, 4 lobed or parted. Corolla gamopetalous, 4 lobed or toothed. Stamens mostly 4, alternating with corolla lobes. Ovary superior. Fruit circumscissile capsule or bony nut.

The family comprises 3 genera and about 270 species, cosmopolitan in distribution; one genus and 10 species in India; one species in the study area.

Plantago Linn.

Linn., Sp. Pl. 112. 1753 & Gen. Pl. ed. 5. 52. 1754.

About 250 species cosmopolitan in distribution; 10 species in India; one species in the study area.

Plantago erosa Wall. in Roxb., Fl. Ind. 1: 423. 1820; Kanjilal *et al.*, Fl Assam 3: 531. 1939; Chauhan *et al.* in Fl Namdapha (edt. Hajra) 252. 1996. *P. major* Linn., Sp. Pl. 112. 1753; Hook. f., Fl. Brit. Ind. 4: 705. 1885. *P. asiatica* Linn., Sp. Pl. 163. 1753. "Singa bon".

Herb. Leaves radical, *ca* 5-20 x 1.5-5.5 cm, ovate- oblong, obtuse, subentire, long petioled. Flowers greenish white, dense in long slender axillary spikes. Calyx segments, *ca* 0.2 cm long, ovate, obtuse, persistent. Corolla lobes ovate. Staminal filaments filiform. Style filiform. Fruit a 2-

celled capsule. Seeds minute, black.

Fls & Frts.: April - July.

Occurrence: Common, in moist places of the sanctuary.

Distribution: North East India, Temperate and Alpine Himalaya, South India; Malay Islands, Myanmar, Singapore, Sri Lanka.

Specimen examined: Haduk: *Bora* 15524 (NEHU).

Uses: Leaf decoction taken in pneumonia.

85. NYCTAGINACEAE

A. L. de Juss., Gen. Pl. 90. 1789.

Herbs, shrubs or trees. Leaves exstipulate. Flowers bisexual or unisexual, usually cymose. Calyx gamophyllous, often petaloid; lobes 3-5, valvate. Petals absent. Stamens 1-many, hypogynous. Pistil monocarpellary. Ovary superior, 1-celled. Fruit an achene enclosed by persistent perianth tube.

The family comprises about 34 genera and 350 species, distributed in tropical and subtropical regions; one genus and one species in the study area.

Boerhavia Linn.

Linn., Sp. Pl. 3. 1753 & Gen. Pl. ed. 5. 4. 1754.

About 40 species distributed in subtropical regions; 8 species in India; one species in the study area.

Boerhavia diffusa Linn., Sp. Pl. 3. 1753; Kanjilal *et al.*, Fl. Assam 4: 1. 1940. *B. repens* Linn. var. *diffusa* (Linn.) Hook. & f., Fl. Brit. Ind. 4: 709. 1885. *B. procumbens* Banks ex Roxb., Fl. Ind. 1: 148. 1820.

Diffuse, mush branched herb; branches swollen at nodes, pinkish. Leaves opposite, *ca* 1.5-7.5 x 0.4-3.5 cm, ovate-oblong, unequal, puberulous. Flowers pink, bracteate in terminal and axillary panicled umbels; bracts and bracteoles ovate, puberulous. Perianth *ca* 0.2 cm long, pink, 5 lobed, glandular hairy. Stamens exserted. Fruits clavate, 5 ribbed.

Fls. & Frts.: June - November.

Occurrece.: Common, on shady hilly slopes.

Distribution: Throughout India; Pantropical.

Specimen examined: Burha Mayong; *Bora* 15003 (NEHU).

Uses: Root extract taken in asthmatic trouble; leaf extract applied in eye diseases.

86. AMARANTHACEAE

A. L. de Juss., Gen. Pl. 87. 1789.

Herbs, rarely undershrubs or climbers. Leaves exstipulate. Flowers actinomorphic, usually bisexual, in spikes, heads or racemes often with scarious bracts and bracteoles. Sepals 3-5, mostly free. Petals absent. Stamens mostly 5; filaments mostly united into a short tube; anthers opening by longitudinal slits. Ovary superior, 1-celled. Fruit dehiscing by a lid or indehiscent.

The family comprises about 71 genera and 800 species, distributed in tropical and subtropical to temperate regions; about 17 genera and 47 species in India; 7 genera and 10 species in the study area.

Key to the genera

1a. Leaves alternate:

2a. Ovary 1 ovuled :

3a. Stamens free; pseudostaminodes absent

.... 4. *Amaranthus*

3b. Stamens monadelphous at base; pseudostaminodes present .... 2. ***Aerva***

2b. Ovary 2-many ovuled:

4a. Erect or decumbent herbs .... 5. ***Celosia***

4b. Scandent or climbing shrubs .... 7. ***Deeringia***

1b. Leaves opposite:

5a. Anthers 1-celled .... 3. ***Alternanthera***

5b. Anthers 2-celled:

6a. Flowers bisexual .... 1. ***Achyranthes***

6b. Flowers polygamous .... 6. ***Cyathula***

1. *Achyranthes* Linn.

Linn., Sp. Pl. 1:20. 1753. & Gen. Pl. ed. 5. 96. 1754.

About 100 species distributed in tropical and subtropical regions; 4 species in India; one species in the study area.

Achyranthes aspera Linn., Sp. Pl. 204. 1753; Hook. f., Fl. Brit. Ind. 4: 730. 1885; Kanjilal *et al.*, Fl. Assam 4: 6. 1940; Deb, Fl. Tripura 2: 162. 1983; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 252. 1996. *A. canescens* R. Br., Prodr. 417. 1810. *A. grandiflora* Moq. in DC., Prodr. 13(2): 313. 1849. "Ubhuta shat".

Erect or subscandent herb; glabrous or pubescent. Leaves opposite, *ca* 3.5-14.0 x 1.5-5.0 cm, ovate-elliptic, acute or subacute, rounded or narrowed

down into base, glabrous or pubescent. Flowers greenish white, pink in elongated terminal spike; bracts *ca* 0.3 cm long, ovate-lanceolate, acuminate; bracteoles ovate, winged at base. Tepals *ca* 0.5 cm long, white, ovate-oblong. Stamens 5; staminodes fimbriate. Urticles oblong, enclosed in the perianth.

Flrs. & Frts.: October - March.

Occurrence: Common, along roadside, forest floors throughtout the sanctuary.

Distribution: Throughout India; Tropical Africa.

Specimen examined: Burha Mayong, Haduk; *Bora* 14811 (NEHU).

Uses: Root extract taken in tonsillitis.

2. *Aerva* Forsk.

Forsk., Fl. Aegypt. Arab. 170. 1775, non.cons.

About 20 species distributed in tropical and subtropical regions; 7 species in India; one species in the study area.

Aerva sanguinolenta (Linn.) Bl., Bijdr. 547. 1826; Mukherjee in Mudgal *et al*. Fl. M.P 2: 451. 1997. *Achyranthes sanguinolenta* Linn., Sp. Pl. ed. 2. 294. 1762. *Aerva scandens* (Roxb.) Wall. ex Moq. in DC., Prodr. 13(2): 302. 1849; Hook. f., Fl. Brit. Ind. 4: 727. 1885.

Erect or straggling pubescent herb. Leaves alternate and opposite, *ca* 2-9 x 0.6-2.5 cm, elliptic-ovate or ellipitic, acute or obtuse, hairy. Flowers white, in axillary or terminal, often paniculate spikes; bracts and bracteoles ovate, acuminate. Tepals *ca* 0.2 cm long, ovate-lanceolate, villous. Stamens 5; staminodes scale like. Stigma capitate. Urticles broadly ovate, acute.

Fls. & Frts.: December - April.

Occurrence: Common, along roadside and on hilly slopes.

Distribution: Assam, Bihar, Central India, West Bengal, Kumaon, Pannjub; China, Philippines.

Specimen examined: Burha Mayong, Kamarpur; *Bora* 14837 (NEHU).

3. *Alternanthera* Forsk.

Forsk., Fl. Aegypt. Arab. 23. 1775.

Herbs. Leaves opposite. Flowers bisexual, in axillary or terminal, solitary or clustered heads or short spikes, bracteate, bracteolate. Tepals 5, free. Stamens 2-5, connate below, alternating with pseudostaminodes; anther 1-celled. Ovule solitary; stigma capitate. Urticles indehiscent.

About 80 species distributed in tropical and subtropical regions; 6 species in India; 3 species in the study area.

Key to the species

1a. Flowers in sessile heads;
tepals *ca* 0.2-0.3 cm long:
2a. Utricles orbicular .... 1. **A. paronychoides**
2b. Utricles obcordate .... 3. **A. sessilis**

1b. Flowers in peduncled heads;
tepals *ca* 0.5-0.7 cn long
.... 2. **A. philoxeroides**

1. **Alternanthera paronychoides** St., Hill. Voy. Distr. Diam. 2: 439. 1833; Santapau in JBNHS 54: 476. 1956-57; Mukherjee in Mudgal *et al.*, Fl. M.P. 2: 454. 1997.

Prostrate, creeping herb; rooting at nodes. Leaves *ca* 0.5-2.0 x 0.2-0.6 cm, elliptic, ovate or obovate, entire, sparsely hairy beneath, acute, narowed down into base. Flowers white, in dense, sessile, globose or ovoid axillary heads; bracts *ca* 0.2 cm long, membranous; bracteoles *ca* 0.2 cm long. Tepals white, *ca* 0.3-0.4 cm long, oblong- lanceolate, unequal. Urticles orbicular, compressed.

Fls. & Frts.: Throughout the year (Mostly January-May)

Occurrence: Common, in moist places of the sanctuary.

Distribution: Tropical parts of India; Tropical countries.

Specimen examined: Haduk; *Bora* 14719 (NEHU).

2. **Alternanthera philoxeroides** (Mart.) Griseb. in Abh. Koen. Ges. Wiss. Goett. Phys. Cl. 24: 36. 1879; Maheshw. Bull. Bot. Surv. Ind. 6: 313. 1966; Deb, Fl. Tripura 2: 163. 1983. *Euchelzia philoxeroides* Mart., Beitr. Amarantac. 107. 1825 & in Nova Acta Leop. 13: 315. 1826.

Herb; stem fistular; base creeping; rooting at nodes; internodes long. Leaves *ca* 0.2-8 x 0.6-1.8 cm, linear-oblong or obovate, spathulate, acute, narrowed down into base, entire. Flowers white, in axillary, solitary, globose pendunculate heads; bracts *ca* 0.4 cm long, deltoid, ovate; bracteoles *ca* 0.5 cm long, ovate, acuminate. Tepals *ca* 0.4 cm long. Urticles compressed.

Fls. & Frts.: May - August.

Occurrence: Common, in swampy places of the area.

Distribution: Tropical and warm regions.

Specimen examined: Haduk; *Bora* 15306 (NEHU).

3. **Alternanthera sessilis** (Linn.) R. Br. ex DC., Cat Pl. Hort. Monsp. 4: 77. 1813; Hook. f., Fl. Brit. Ind. 4: 731. 1885; Deb, Fl. Tripura 2: 164. 1983; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 253. 1996. *Gomphrena sessilis* Linn., Sp. Pl. 225. 1753 *Alternthera nodiflora* R. Br., Prodr. 417. 1810. *A. triandra* Lamk., Encycl. 1: 95. 1783. **"Maticaduri".**

Prostrate herb; rooting at nodes. Leaves opposite, *ca* 1.0-6.5 x 0.2-2.0 cm, ovate or linear-lanceolate, entire. acute or obtuse. cuneate at base. Flowers white, in axillary, globose or cylindrical sessile heads; bracts ovate; bracteoles *ca* 0.1 cm long, persistent. Tapals *ca* 0.2 cm long, white, ovate-elliptic. Utricles obcordate.

Fls. & Frts.: Throughout the year.

Occurrence: Common, in moist places and marshy places of the area.

Distribution: Hotter parts of India; Throughout the warm countries.

Specimen examined: Haduk; *Bora* 14751 (NEHU).

Uses: Plant used as wild vegetable.

4. *Amaranthus* Linn.

Linn., Sp. Pl. 989. 1773 & Gen. Pl. ed. 5 427.1754.

Annual herbs. Leaves alternate. Flowers unisexual, in sessile, dense clusters or lax axillary clusters or terminal or axillary panicled spikes;

bracteate, bracteolate. Tapals 2-5, free or connate at base. Stamens as many as tepals, free. Ovary 1 ovuled; stigmas 2-3. Urticles laterally compressed. Seeds black.

About 60 species mostly distributed in tropical and temperate regions; 10 species in India; 2 species in the study area.

Key to the species

1a. Plants with axillary paired spines

.... 1. ***A. spinosus***

1b. Plants without axillary paired spines

.... 2. ***A. viridis***

1. ***Amaranthus spinosus*** Linn., Sp. Pl. 991. 1753; Hook. f., Fl. Brit. Ind. 9: 718. 1885; Kanjilal *et al.*, Fl. Assam 4: 8. 1940; Deb, Fl. Tripura 2: 165. 1983; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 253. 1996.
Hati khutoria".

Erect or diffuse spinous herb; spines axillary, paired. Leaves *ca* 1.5-9.0 x 0.8-3.5 cm, ovate-elliptic or ovate-lanceolate, mucronate, cuneate at base, petiolate. Flowers greenish white, sessile, in dense, axillary clusters or in terminal spikes; bracts and bracteoles awned. Tepals 5, *ca* 0.3 cm long, ovate-lanceolate, tips spinous. Stamens 5. Styles pubescent. Utricles ovoid.

Fls. & Frts.: Throughout the year.

Occurrence: Common, along roadside, forest floors and open places of the sanctuary.

Distribution: Throughout India; Tropical countries.

Specimen examined: Haduk; *Bora* 15530 (NEHU).

2. **Amaranthus viridis** Linn., Sp. Pl. ed. 2. 1405. 1763; Hook. f., Fl. Brit. Ind. 4: 720. 1885; Mukherjee in Mudgal *et al.*, Fl. M.P. 2: 460. 1997. *A. gracilis* Desf., Tabl. Ecole Bot. 43. 1804; Deb, Fl. Tripura 2: 165. 1983. *A. polystachyus* Willd., Sp. Pl. 4: 385. 1805. "Khutoria".

Erect or ascending herb. Leaves *ca* 2-7 x 1.0-4.5 cm, ovate or deltoid-ovate to rhomboid-oblong, entire, shortly mucronate, cuneate at base, petiolate. Flowers greenish white, in small axillary clusters in axillary and terminal panicled spikes; bracts and bracteoles ovate-lanceolate. Tepals 3, *ca* 0.3 cm, ovate-oblong. Stamens 3. Urticles subglobose.

Fls. & Frts.: Usually throughout the year.

Occurrence: Common, along roadside, in forest floors.

Distribution: Throughout India; Tropical countries.

Specimen examined: Haduk; *Bora* 15531 (NEHU).

Uses: Plant used as wild vegetable.

5. *Celosia* Linn.

Linn., Sp. Pl. 1: 205. 1753 & Gen. Pl. ed. 5. 96. 1754.

About 50 species distributed in subtropical regions of America and Africa; 4 species in India; one species in the study area.

Celosia argentea Linn., Sp. Pl. 205. 1753; Hook. f., Fl. Brit. Ind. 4: 714. 1885; Kanjilal *et al.*, Fl. Assam 4: 9. 1940; Chauhan *et al.* in Fl.

Namdapha (edt. Hajra) 253. 1996. *C. cristata* Linn., Sp. Pl. 205. 1753.

Erect herb; stem angular. Leaves alternate, *ca* 2.5-14.0 x 0.6 cm, linear or ovate-lanceolate, narrowed down into a short petiole, entire, acute. Flowers pinkish white, in terminal, dense spikes; bracts and bracteoles *ca* 0.3 cm long. Tepals 5, *ca* 0.6 cm long, elliptic-oblong. Stamens 5. Capsules ellipsoid-ovoid. Seeds black.

Fls. & Frts.: September - March.

Occurrence: Common, in shady places of the area.

Distribution: Throughout India; Tropical countries.

Specimen examined: Burha Mayong; *Bora* 14787 (NEHU).

6. Cyathula Bl.

Bl., Bijdr. 11: 548. 1825, *non cons.*

About 25 species distributed in Africa, China, Madagascar, Malaysia, Sri Lanka; 3 species in India; one species in the study area.

Cyathula prostrata (Linn.) Bl., Bijdr. 549. 1825; Hook. f., Fl. Brit. Ind. 4: 723. 1885; Kanjilal *et al.*, Fl. Assam 4: 5. 1940; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 254. 1996. *Achyranthes prostrata* Linn., Sp. Pl. 2: 296. 1762.

Erect herb. Leaves opposite, *ca* 1.5-7.5 x 0.8-2.5 cm, ovate-oblong, acute, pubescent, tinged red when young. Flowers polygamous, bluish red, in clusters in simple or paniculate branched spikes. Tepals 5, *ca* 0.2 cm long, ovate, acute.

Fls. & Frts.: October - January.

Occurrenc: Common, in shady places of the sanctuary.

Distribution: Throughout India; Africa, China, Malaysia, Sri Lanka.

Specimen examined: Haduk; *Bora* 15532 (NEHU).

7. *Deeringia* R. Br.

R. Br., Prodr. 413. 1810.

About 7 species distributed in tropical regions; one species in India which occurs in the study area also.

Deeringia amaranthoides (Lamk.) Merr., Bur. Sci. Publ. Manila 9: 247. 1917; Kanjilal *et al.*, Fl. Assam 4: 3.1990, Deb. fl. Tripura 2: 188.19937; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 254. 1996. *Achyranthes amaranthoides* Lamk., Encycl. 1: 548. 1785. *Deeringia celosioides* R. Br., Prodr. 413. 1810; Hook. f., Fl. Brit. Ind. 4: 714. 1885.

Scandent shrub; branches drooping. Leaves alternate, *ca* 3-12 x 2.0-4.5 cm, ovate or lanceolate, acuminate, truncate or rounded at base, entire. Flowers greenish-yellow, in long terminal or axillary racemes or panicles; bracts acute. Tepals 5, *ca* 0.2 cm long, elliptic-oblong. Stigma 3. Berries globose, *ca* 0. 4 cm in diam., bright red. Seeds black.

Fls. & Frts.: August - December.

Occurrence: Common, drooping from trees in the hilly forest of the sanctuary.

Distribution: Throughout India; China, Australia.

Specimen examined: Dhekiabari; *Bora* 15145 (NEHU).

87. CHENOPODIACEAE

Ventenat, Tabl. Regene Veg. 2: 253. 1799.

Herbs or shrubs. Leaves usually alternate, exstipulate. Flowers actinomorphic, bisexual or unisexual, often bracteate. Calyx lobes 3-5, imbricate. Petals absent. Stamens equal to calyx lobes and opposite to them. Ovary superior or immersed in the base of calyx, 1-celled. Fruit utricle, rarely operculate.

About 120 genera and 1300 species, cosmopolitan in distribution; one genus and 2 species in the study area.

Chenopodium Linn.

Linn., Sp. Pl. 218. 1753 & Gen. Pl. ed. 5. 103. 1754.

Herbs. Leaves variable in shape. Flowers bisexual, solitary or in axillary clusters, spikes or cymes. Tepals 3-5, free or connate. Stamens 1-5, inserted at base of the perianth or free. Stigma 2-5. Urticles enclosed in the perianth.

About 150 species distributed in temperate regions; 7 species in India; 2 species in the study area.

Key to the species

1a. Plants aromatic; stigma 3-5;
seeds orbicular .... 2. **C. ambrosioides**

1b. Plants non aromatic; stigma 2;
seeds lanticular .... 1. *C. album*

1. *Chenopodium album* Linn., Sp. Pl. 219. 1753; Hook. f., Fl. Brit. Ind. 5: 3. 1886; Kanjilal *et al* ., Fl. Assam 4: 10. 1940; Deb, Fl. Tripura 2: 160. 1983. "Bhatua sak, Jilmil sak".

Erect herb; stem ribbed; young parts white mealy. Leaves *ca* 1.5-10.5 x 0.4-2.0 cm, oblong-lanceolate or rhombic-lanceolate, acute or obtuse, entire, toothed or lobed. Flowers white, in terminal, paniculate clusters. Tepals *ca* 0.2 cm long, ovate, obtuse, mealy outside, connate at base. Stamens *ca* 0.2 cm long. Stigma 2. Urticles depressed globose.

Fls. & Frts.: November - April.

Occurrence: Common, in moist and shady places .

Distribution: Throughout India; Africa, Australia, Malaysia.

Specimen examined: Haduk; *Bora* 15069 (NEHU).

Uses: Leaves used as vegetable.

2. *Chenopodium ambrosioides* Linn., Sp. Pl. 219. 1753; Hook. f., Fl. Brit. Ind. 5: 4. 1886; Kanjilal *et al* ., Fl. Assam 4: 10. 1940; Deb, Fl. Tripura 2: 161. 1983.

Erect aromatic herb; stem ribbed, sparsely pubescent. Leaves *ca* 2.5-10.0 x 0.3 cm, oblong or lanceolate, acute or obtuse, entire, lobed or sinuate toothed. Flowers greenish white, clustered, axillary forming interrupted terminal and paniculate spikes. Tepals 5, *ca* 0.1 cm long, free, hairy. Stigma

3-5. Urticles depressed globose. Seeds black, shining.

Fls. & Frts.: March - September.

Occurrence: Common, in moist places and along roadside.

Distribution: Tropical regions of India; Native of Tropical America.

Specimen examined: Hiloikhunda; *Bora* 15020 (NEHU).

88. BASELLACEAE

Moquin-Tandon, Chenopod. Monogr. Enum. 10. 1840.

Twiner; stem usually fleshy. Leaves altenate, exstipulate. Flowers actinomorphic, bisexual, in spikes, racemes or panicles; bracteoles often united to the perianth at base. Sepals 5, imbricate. Petals absent. Stamens 5. Ovary superior, 1-celled. Fruits indehiscent, within persistent calyx or winged bracteoles.

The family comprises 4 genera and about 15 species, distributed in tropical and subtropical regions; one species in the study area.

Basella Linn.

(Rheede) Linn., Diss. Dass. 12. 1747.

6 species distributed in Tropical Africa, Madagascar; one species in the study area.

Basella alba Linn., Sp. Pl. 272. 1753. *B. rubra* Linn., Sp. Pl. 272. 1753; Hook. f., Fl. Brit. Ind. 5: 20. 1886; Kanjilal *et al.*, Fl. Assam 4: 11. 1940. *B. cordifolia* Lamk., Encycl. 1: 382. 1785.

Fleshy twining herb; stems greenish pink. Leaves *ca* 2.5-10.5 x 1.0-5.5 cm, ovate-elliptic to oblanceolate, acute, entire, petiolate. Flowers pinkish green, in lax axillary pendunculate spikes; bracts ovate, acute; bracteoles 2, *ca* 0.1 cm long , fleshy, concave. Perianth *ca* 0.3 cm long, pinkish green. Urticles ovoid, *ca* globse 0.4 cm diam., juice purple.

Fls. & Frts.: August- October.

Occurrence: Common, twining on bushes in the hilly forest of the sanctuary.

Distribution: Throughout India; Tropical Asia, Africa.

Specimen examined: Rangamati; *Bora* 15380 (NEHU).

Uses: Leaves used as vegetable.

89. POLYGONACEAE

A. L. de Juss., Gen. Pl. 82. 1789.

Herbs, shrubs or climbers. Leaves usually alternate with ochreate stipules. Flowers actinomorphic, often in cymes, arranged in racemes, panicles, spikes or heads. Sepals 3-6. Petals absent. Stamens 6-9. Pistil syncarpous. Ovary superior, 1-celled. Fruit a trigonous or 2 sided nut.

The family comprises about 40 genera and 800 species, mostly distributed in Northern temperate regions; 8 genera and above 100 species in India; 2 genera and 10 species in the study area.

Key to the genera

1a. Perianth 6 in 2 series with inner much enlarged whorls; stigma fimibriate .... 2. **Rumex**

1b. Perianth 3-5 in 1 series without inner whorls; stigma capitellate .... 1. *Polygonum*

1. *Polygonum* Linn.

Linn., Sp. Pl. 359. 1753 & Gen. Pl. ed. 5. 170. 1754.

Herbs. Leaves alternate; stipules ochreate. Flowers bisexual, in sessile clusters in capituliform or paniculate racemes. Perianth 3-5 lobed. Stamens 5-8, perigynous; filaments dilated at base. Ovules solitary; styules 2-3; stigma capitate. Fruits nutlets.

About 300 species cosmopolitan in distribution; 80 species in India; 9 species in the study area.

Key to the species

1a. Inflorescence capitate:

2a. Petioles auricled; peduncles hairy .... 2. *P. chinense*

2b. Petioles winged; peduncles glabrous .... 4. *P. microcephalum*

1b. Inflorescence in racemes, spikes or axillary cluster:

3a. Stems armed .... 9. *P. strigosum*

3b. Stems unarmed:

4a. Inflorescence in axillary clusters .... 6. *P. plebeium*

4b. Inflorescence in elongated racemes or spikes:

5a. Plants densely hairy; nuts biconvex

.... 5. *P. orientale*

5b. Plants glabrous or sparsely hairy;
nuts trigonous:

6a. Flowers pinkish white .... 3. *P. hydropiper*

6b. Flowers white:

7a. Stipular cilia as long as tube

.... 8. *P. serrulatum*

7b. Stipular cilia longer than tube:

8a. Stems usually creeping below;
leaves linear-lanceolate

.... 1. *P. barbatum*

8b. Stems usually erect;
leaves elliptic-lanceolate

.... 7. *P. posumbu*

1. *Polygonum barbatum* Linn., Sp. Pl. 362. 1753; Hook. f., Fl. Brit. Ind. 5: 37. 1886; Srivastava *et al.* in Mudgal *et al.*, Fl. M.P. 2: 478. 1997. *P. stagninum* Buck.-Ham., ex Meisn. in Wall., Pl. Asiat. Rar. 3: 56. 1832.

Erect or ascending herb. Leaves *ca* 5.5-17.5 x 1.5 cm, linear-lanceolate or elliptic, oblong, acuminate, ciliate on margins, subsessile. Stipules tubular, long ciliated. Flowers white, in short stout spiciform panicles; bract glabrous. Perianth eglandular. Nutlets trigonous

Fls. & Frts.: Setptember - March.

Occurrence: Occasionally, in moist and marshy places.

Distribution: Throughout India; Africa, Afghanisthan, China, Japan,

Malaysia.

Specimen examined: Haduk, Jugdal; *Bora* 14728 (NEHU).

2. *Polygonum chinense* Linn., Sp. Pl. 363. 1753; Hook. f., Fl. Brit. Ind. 5: 44. 1886; Kanjilal *et al.*, Fl. Assam 4: 16. 1940; Deb, Fl. Tripura 2: 154. 1983. *Persicaria chinensis* (Linn.) H. Gross in Engl. Bot. Jahrb. 49: 269. 193.

Climbing herb. Leaves ovate or oblong-lanceolate, acute, truncate or subcordate at base. Flowers pinkish white, in terminal corymbose peduncled heads; bracts scarious. Tepals 5, subequal. Nuts trigonous.

Fls. & Frts.: September - March.

Occurrence: Occasionally, in moist places of the area.

Distribution: Subtropical and temperate Himalaya; China, Malaysia, Myanmar.

Specimen examined: Burha Mayong; *Bora* 14727 (NEHU).

3. *Polygonum hydropiper* Linn., Sp. Pl. 361. 1753; Hook. f., Fl. Brit. Ind. 5: 39. 1886; Kanjilal *et al.*, Fl. Assam 4: 21. 1940; Deb, Fl. Tripura 2: 155. 1983.

Erect or decumbent glabrous herb. Leaves *ca* 7.0-16.5 x 1.5-2.0 cm, linear-lanceolate or oblong-lanceolate, acute or acuminate, entire; stipules bristly, glandular. Flowers pinkish white, in lax slender filiform racemes; bracts truncate, ciliate on upper margins. Nutlets *ca* 0.3 cm long, trigonous.

Fls. & Frts.: September - March.

Occurrence: Common, in marshy places of the sanctuary.

Distribution: North East India, North West and South India; Warmer places of the world.

Specimen examined: Haduk; *Bora* 14725 (NEHU).

4. *Polygonum microcephalum* D. Don, Prodr. Fl. Nep. 72. 1825; Hook. f., Fl. Brit. Ind. 5: 42. 1886; Kanjilal *et al.*, Fl. Assam 4: 18. 1940; Deb, Fl. Tripura, 2: 155. 1983. *Persicaria microcephala* (D.Don) H. Gross. in Engl. Bot. Jahrb. 49. 227. 1913.

Procumbent herb. Leaves *ca* 2.5–12.0 x 1–4 cm, ovate- lanceolate, acute to acuminate, hastate at base, narrowed down to the winged petiole. Flowers white, *ca* 0.2 cm long, in axillary or subterminal, peduncled small heads. Stamens 8 styles basally connate.

Fls. & Frts.: November - March.

Occurrence: Occasionally, in moist places of the area.

Distribution: North East India, Eastern Himalaya; Bangladesh, China.

Specimen examined: Haduk; *Bora* 15320 (NEHU).

Notes: Probably confined to Indo-Bangladesh and Indo-China regions.

5. *Polygonum orientale* Linn., Sp. Pl. 1753; Hook. f., Fl. Brit. Ind. 5: 30. 1886; Fisher in Rec. Bot. Suev. Iind. 12: 127. 1938; Kanjilal *et al*, Fl. Assam 4: 21. 1940; Deb, Fl. Tripura 2: 155. 1983.

Erect tall pubescent herb; stem hollow. Leaves *ca* 4-20 x 1-8 cm, ovate, acuminate, abruptly attenuated at base, pubescent, long petiold; ochrea short ciliate. Flowers white, *ca* 0.3 cm long, in terminal panicled racemes. Nutlets

orbicular, compressed.

Fls. & Frts.: May - September.

Occurrence: Common, in marshy places and along water bodies.

Distribution: Throughout India; Australia, Bangladesh, Japan.

Specimen examined: Haduk; *Bora* 14724 (NEHU).

6. *Polygonum plebeium* R. Br., Prodr. 420. 1810 (*Plebejum*); Hook. f., Fl. Brit. Ind. 5: 27. 1886. Gage in Rec. Bot. Surv. Ind. 2: 383. 1903; Kanjilal *et al.*, Fl. Assam 4: 15. 1940; Deb, Fl. Tripura 2: 156. 1983; Srivastava *et al.* in Mudgal *et al.*, Fl. M.P. 2: 484. 1997.

Prostrate diffusely branched herb. Leaves *ca* 0.4-1.5 x 0.2 cm, linear-oblong or elliptic-oblong, subsessile, acute, narrowed to the base; stipules fimbriate, hyaline. Flowers pink, axillary, solitary or few together. Tepals broad or narrow, *ca* 0.2 cm long. Nutlets trigonous, black.

Fls. & Frts.: November - May.

Occurrence: Common, in moist places of the area.

Distribution: Throughout tropical India; Tropical and subtropical Asia, Africa, Australia.

Specimen examined: Haduk; *Bora* 14709 (NEHU).

7. *Polygonum posumbu* Ham. ex D. Don, Prodr. 71. Feb. 1825; Hook. f., Fl. Brit. Ind. 5: 38. 1896. *P. caespitosum* Bl., Bijdr. 532. Dec. 1825.

Sparsely hairy herb; stem creeping below. Leaves *ca* 1.5-5.2 x 0.5-1.8 cm, elliptic-lanceolate, acuminate, pubescent; stipules purplish, ciliate.

Flowers white, *ca* 0.2 cm long, in racemose lax spikes. Nuts trigonous, small.

Fls. & Frts.: June-November

Occurrence: Common, in moist shady places.

Distribution: Assam, Meghalaya, Sikkim; Bangladesh, China, Japan, Nepal.

Specimen examined: Burha Mayong; *Bora* 15535 (NEHU).

8. *Polygonum serrulatum* Lag., Gen. Sp. Pl. 14. 1816, *P. babatum* Woodr. in J. Bom. Nat. Hist. Soc. 12. 214. 1899, *non* Linn. 1753; Srivastava *et al.* in Mudgal *et al.*, Fl. M.P. 2: 487. 1997. *Persicaria salicifolia* (Brouss. ex Wild.) Munshi & Javeid in J. Eco. Tax. Bot. Ser. 2: 73. 1986.

Slender herb. Leaves *ca* 4-9 x 0.6-1.3 cm, linear- lanceolate or elliptic-oblong, acute, runded at base, sparsely hairy, subsessile; truncate, ciliate *ca* 1.0-1.8 cm long. Flowers greenish white, *ca* 0.3 cm long, in slender racemose spikes; bracts membranous hairy. Perianth lobes ovate. Styles 3, basally connate. Nutlets trigonous.

Fls. & Frts.: May -November

Occurrence: Occasionally, in moist places of the area.

Distribution: Assam, North India, West Bengal; Africa, America, Australia, West Asia, South Europe.

Specimen examined: Haduk, Jugdal; *Bora* 14726 (NEHU).

9. *Polygonum strigosum* R.Br., Prodr. 420. 1810; Hook. f., Fl. Brit. Ind. 5. 47. 1886; Deb, Fl. Tripura 2: 157. 1983. *P. horridum* Roxb., Hort. Beng 29. 1814. *Perisicaria strigosa* (R. Br.) Nakai in Rigakkai 24. 299. 1926.

Creeping prickly herb; dark pinkish. Leaves *ca* 3.0-11.5 x 0.5-1.8 cm, linear-oblong, acute to acuminate, truncate or cordate at base, prickly on nerves beneath; stipules *ca* 2 cm long, ciliate. Flowers pink, in paniculate racemes; bracts stigose. Perianth *ca* 0.3 cm long; lobes obtuse. Stamens 8. Styles basally connate. Nutlets globosely trigonous.

Fls. & Frts.: September - March.

Occurrence: Occasionally, in moist shady places, along water bodies in the plain forest of the sanctuary.

Distribution: Tropical parts of India; **Malaysia, Myanmar, Sri Lanka.**

Specimen examined: Haduk, Thengbhanga; *Bora* 14715 (NEHU).

2. *Rumex* Linn.

Linn., Sp. Pl. 333. 1753 & Gen. Pl. ed. 5. 156. 1754.

About 200 species cosmopolitan in distribution; 13 species in India; one species in the study area.

Rumex maritimus Linn., Sp. Pl. 335. 1753; Hook. f., Fl. Brit. Ind. 5: 59. 1986; Deb, Fl. Tripura 2: 1983. *R. wallichii* Meissn. in DC. Prodr. 14(1): 48. 1856. *R. acutus* Roxb., Fl. Ind. 2: 208. 1824.

Erect herb; stem deeply groved. Leaves lanceolate, acute, narrowed to the base; lower leaves oblong-lanceolate; stipules tubular. Flowers greenish white, bisexual, in racemose whorls. Perianth in 2 whorls, 3 each. Stamens 6. Nutlets ovate-oblong within the perianth.

Flr. & Frt.: December - April.

Occurrence: Common, in moist, shady places, along roadside and forest floors of the sanctuary.

Distribution: Assam, Tripura, West Bengal; Asia, Europe, North Africa, North and South America.

Specimen examined: Haduk; *Bora* 14808 (NEHU).

90. ARISTOLOCHIACEAE

A. L. de Juss., Gen. Pl. 72. 1789.

Climbing shrubs or herbs, sometimes erect. Leaves alternate. Flowers bisexual, mostly zygomorphic, solitary or racemose. Calyx often enlarged and petaloid. Petals usually absent. Stamens 6-many. Pistil syncarpous. Ovary inferior, 4-6 celled. Fruits mostly capsular.

The family comprises 7 genera and about 410 species, distributed in tropical and subtropical regions; 3 genera and 13 species in India; one genus and 2 species in the study area.

Aristolochia Linn.

Linn., Sp. Pl. 960. 1753 and Gen. Pl. ed. 410. 1754.

Climbing herbs or shrubs. Flowers zygomorphic, solitary or in short racemes, bracteate. Perianth tubular, tube inflated at base; limb obliquely 1-2 lipped. Stamens 6, adnate to style; anthers 4 celled. Ovary 6-celled; stigma 6 lobed. Fruits capsule, 6 valved. Seeds flat, winged.

About 300 species distributed in tropical and subtropical regions; 2

species in the study area.

Key to the species

1a. Leaves tomentose beneath .... 1. ***A. cathcartii***

1b. Leaves glabrous .... 2. ***A. tagala***

1. ***Aristolochia cathcarti*** Hook. f., Fl. Brit. Ind. 5: 77. 1886; Kanjilal *et al.*, Fl. Assam 4: 29. 1940; Haridasan & Rao, For. Fl. Meghalaya 2: 705. 1987.

Woody climber. Leaves *ca* 9-22 x 6-15 cm, ovate, acuminate, cordate at base, entire, tomentose beneath. Flowers pale brown, *ca* 6 cm long, in axillary hairy racemose cymes. Perianth tubular, mouth circular, pale brown, silky, villous. Capsules linear-oblong, ribbed.

Fls. & Frts.: March - December.

Occurrence: Rare, on shady hilly slopes.

Distribution: Assam, Meghalaya, Sikkim Himalaya.

Specimen examined: Haduk; *Bora* 15239 (NEHU).

2. ***Aristolochia tagla*** Cham. in Linnaea 7: 207. 1832; Kanjilal *et al.*, Fl. Assam 4: 28. 1940; Haridasan & Rao, For. Fl. Meghalaya 2: 706. 1987. *A. roxburghiana* klotz. in Monatsb. Berl. Akad. 596. 1859; Hook. f., Fl. Brit. Ind. 5: 75. 1886.

Climbing herb. Leaves *ca* 5.5-17.5 x 3.5-10.5 cm, ovate-oblong or ovate-lanceolate, acuminate, cordate at base, 5-7 nerves from base. Flowers dark brown, in axillary racemes. Perianth *ca* 5 cm long, constricted in the middle,

inflated at base, lip villous. Capsules oblong, *ca* 5 cm long, ribbed.

Fls. & Frts.: April - December.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: North East India, Eastern Himalaya; Bangladesh, Malaysia, Sri Lanka.

Specimen examined: Burha Mayong; *Bora* 15146 (NEHU).

91. PIPERACEAE

C. A. Agardh, Aphor. 201. 1825.

Herbs or shrubs, erect or scandent. Leaves usually alternate. Flowers bisexual or unisexual, in dense fleshy simple or umbellate spikes. Perianth absent. Stamens 1-10. Ovary superior, 1-celled, 1-ovuled. Fruits small drupe.

The family comprises about 15 genera and 2000 species, distributed in tropical and subtropical regions; 2 genera and 55 species in India; 2 genera and 5 species in the study area.

Key to the genera

1a. Plants succulent, monoecious;
stigma penicillate .... 1. *Peperomia*

1b. Plant not succulent, dioecious;
stigma not penicillate .... 2. *Piper*

1. *Peperomia* Ruiz. & Pav.

Ruiz. & Pav., Prodr. 8. 1974.

Herbs, usually succulent. Leaves pellucid-punctate. Flowers in terminal leaf-opposed or axillary spikes or solitary, sessile or sunken in the rhachis. Stamens 2; anther cells confluent. Stigma penicillate. Fruits berry or nutlet.

About 1000 species distributed in tropical and subtropical regions; about 22 species in India; 2 species in the study area.

Key to the species

1a. Plants usually epiphyte; leaves broadly ovate-cordate, acute .... 1. *P. heyneana*

1b. Plants terrestrial; leaves ovate to obovate, obtuse .... 2. *P. pellucida*

1. *Peperomia heyneana* Mig., Pip. 123. 1843; Hook. f., Fl. Brit. Ind. 5: 99. 1886; Kanjilal *et al.*, Fl. Assam 4: 39. 1940; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 258. 1996.

Small epiphytic herb. Leaves *ca* 0.5-2.0 x 0.5-1.0 cm, ovate, obtuse, acute at base. Flowers greenish, in axillary or terminal panicular spikes. Fruits indehiscent.

Fls. & Frts.: August - December.

Occurrence: Occasionally, on moist tree trunk in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Himalayas; Bhutan, Nepal.

Specimen examined: Dhekiabari; *Bora* 15394 (NEHU).

2. *Peperomia pellucida* (Linn.) H. B. & K. Nov., Gen. Sp. 1: 64. 1816; Kanjilal *et al.*, Fl. Assam 4: 39. 1940; Deb, Fl. Tripura 2: 135. 1983. *Piper pellucidum* Linn., Sp. Pl. 30. 1753.

Erect or diffuse succulent herb; stem pellucid. Leaves alternate, *ca* 1-3 x 0.5-2.5 cm, broadly ovate, acute, subtruncate or cordate at base, 5-7 neved. Flowers minute, unisexual, in axillary terminal or leaf-opposed short spikes; bracts pellate. Fruits globose, apically pointed, ribbed.

Fls. & Frts.: September - January.

Occurrence: Common, in moist places of the sanctuary.

Distribution: Assam, Tripura.

Specimen examined: Haduk; *Bora* 15536 (NEHU).

2. *Piper* Linn.

Linn., Sp. Pl. 28. 1753 & Gen. Pl. ed. 5. 18. 1754.

Herbs or shrubs, usually climbing by adventitious roots from swollen nodes. Flowers dioecious or polygamous, usually in leaf opposed spikes. Stamens 2-4; anthers 2-celled. Stigma 2-6. Fruits one seeded berry.

About 2000 species distributed in tropical regions; about 50 species in India; 3 species in the study area.

Key to the species

1a. Leaves pubescent .... 1. *P. aurantiacum*

1b. Leaves glabrous:

2a. Leaves ovate-cordate .... 2. *P. longrum*

2b. Leaves ovate-lanceolate .... 3. *P. thomsonii*

1. *Piper aurantiacum* Wall., Cat. 6658 A; Hook. f., Fl. Brit. Ind. 5: 86. 1886; Kanjilal *et al.*, Fl. Assam 4: 35. 1940.

Stout climber. Leaves alternate, *ca* 10-22 x 7-14 cm, broadly ovate-lanceolate or elliptic-ovate, acuminate, rounded or acute at base, pubescent beneath. Flowers densely crowded in leaf-opposed drooping spikes. Fruits globose.

Fls. & Frts.: July - November.

Occurrence: Rare, in shady hilly forest floors.

Distribution: Assam; Nepal.

Specimen examined: Rangamati; *Bora* 15537 (NEHU).

Notes: Confined to Indo-Nepal region.

2. *Piper longrum* Linn., Sp. Pl. 29. 1753; Hook. f., Fl. Brit. Ind. 5: 83. 1886; Kanjilal *et al.*, Fl. Assam 4: 34. 1940; Deb, Fl. Tripura 2: 138. 1983.

Creeping herb; rooting bellow. Leaves alternate, *ca* 4.5-10.0 x 3.0-7.5 cm, ovate-rounded or suborbicular, acute, cordate at base, glabrous. Flowers greenish yelow, unisexual, in spikes. Fruits crowded on fleshy spikes.

Fls. & Frts.: August - December.

Occurrence: Occasionally, in moist shady places in hilly forest of the sanctuary.

Distribution: Hotter parts of Inida; Sri Lanka.

Specimen examined: Dhekiabari; *Bora* 15538 (NEHU).

3. *Piper thomsonii* (DC.) Hook. f., Fl. Brit. Ind. 5: 87. 1886; Kanjilal *et al.*, Fl. Assam 4: 36. 1940; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 261. 1996.

Creeping epiphytic herb; stem rooting at nodes. Leaves *ca* 5-12 x 2-6 cm, ovate-oblong or ovate-lanceolate, acuminate, truncate to acute at base. Flowers greenish white, in *ca* 3.5-6.0 cm long spikes.

Fls. & Frts.: June - December.

Occurrence: Common, in moist shady places.

Distribution: North East India, Sikkim Himalaya.

Specimen examined: Jugdal; *Bora* 15356 (NEHU).

92. SAURURACEAE

E. Meyer, De Houttuynia atque Saurureis, 20. 1827.

Herbs. Leaves alternate, stipulate. Flowers bisexual, actinomophic, in spikes or racemes. Perianth absent. Stamens 3-8. Pistil syncarpous. Ovary 1-celled. Fruit a capsule opening at top or indehiscent 1 seeded cocci.

The family comprises 5 genera and 7 species, distributed in East Asia, California and Atlantic, North America; one species in the study area.

Houttuynia Thunb.

Thunb., Corr. Fl. Jap. 12. 234. 1784, *nom. cons.*

Monotypic genus, distributed from India, China, Vietnum to Japan.

Houttuynia cordata Thunb., I.C. ; Hook. f., Fl. Brit. Ind. 5: 78. 1886; Fischer in Rec. Bot. Surv. Ind 12(2): 127. 1938; Kanjilal *et al.*, Fl. Assam 4: 31. 1940; Deb, Fl. Tripura 2: 139. 1983. *Polypara cochinchinensis* Lour., Fl. Cochinch. "Masondori".

Diffuse, prostrate, aromatic herb. Leaves *ca* 3.0-9.5 x 2.0-5.2 cm, ovate, acuminate, cordate at base, gland dotted, pubescent on nerves beneath; stipules lanceolate. Flowers in dense axillary spikes subtended by an involucre; involucral bracts white. Stamens 3, *ca* 0.3 cm long, anthers yellow. Styles 3. Fruits subglobose capsule.

Fls. & Frts.: June - August.

Occurrence: Occasionally, in moist places of the area.

Distribution: Arunachal Pradesh, Assam, Tropical Himalaya, Tripura; China, Thailand, Japan.

Specimen examined: Haduk; *Bora* 15539 (NEHU).

Uses: Plant extract taken in stomach trouble.

93. CHLORANTHACEAE

R. Br. ex Lindl., Collect. Bot. sub. t. 17. 1821.

Herbs, shrubs or trees. Leaves opposite. Flowers actinomorphic, bisexual or unisexual, bracteate in spikes, cymes, panicles or heads. Calyx absent from

male flowers. Stamens 1-3, connate into a mass. Pistil 1. Ovary inferior, 1-celled. Fruit a small drupe.

The family comprises 5 genera and about 65 species, distributed in tropics and temperate regions; 2 genera and 3 species in India; one genus and one species in the study area.

Chloranthus Sw.

Swartz. in Phil. Thrans. 77: 357 & Prodr. 84. 1788.

About 15 species mostly distributed in Eastern Asia and Indo-Malyasia; 2 species in India; one species in the study area.

Chloranthus elatior R. Br. in Bot. Mag. t. 2190. 1820; Haridasan & Rao, For. Fl. Meghalaya 2: 709. 1987: Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 261. 1996. *C. officinalis* Bl., Enum. Pl. Jav. 79. 1827; Hook. f., Brit. Ind. 5: 100. 1886; Kanjilal *et al.*, Fl. Assam 4: 40. 1940.

Erect undershrub. Leaves opposite, *ca* 5-13 x 2-7 cm, elliptic or elliptic-lanceolate, acuminate, narrowed down to the base, serrate, glandular. Flowers white, bisexual, in terminal panicles; bracts sheathing. Stamens 3, confluent. Stigma subsessile. Berries white, succulent.

Fls. & Frts.: June - December.

Occurrence: Occasionally, in moist shady places in hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Andaman Islands, Assam, Meghalaya; Bangladesh, Philippines.

Specimen examined: Burha Mayong; *Bora* 15041 (NEHU).

94. LAURACEAE

A. L. de Juss., Gen. pl. 80. 1789.

Trees or shrubs, usually aromatic. Leaves usually alternate. Flowers regular, bisexual or unisexual in axillary or subterminal cymose clusters, racemes or umbellules. Perianth biseriate, 6 partite. Stamens typically in 4 whorls, the innermost suppressed or reduced to staminodes. Pistil monocarpellary. Ovary 1-celled. Fruits drupe or berry.

The family comprises about 45 genera and 2200 species, distributed in tropical and subtropical regions; 17 genera and over 175 species in India; 4 genera and 6 species in the study area.

Key to the genera

1a. Flowers in umbellules .... 3. ***Litsea***

1b. Flowers not in umbellues:

2a. Anthers 2-celled; perianth deciduous in fruits .... 2. ***Beilschmiedia***

2b. Anthers 4-celled; perianth persistent in fruits:

3a. Stamens with introrse anthers; ovary ovoid; stigma dilated .... 1. ***Actinodaphene***

3b. Stamens 3rd series with extrorse anthers; ovary globular; stigma discoid. .... 4. ***Phoebe***

1. *Actinodaphne* Nees

Nees in Wall., Pl. Asiat. Rar. 2: 68. 1831 & 3: 31. 1832.

About 70 species distributed in Eastern Asia; 15 species in India; one species in the study area.

Actinodaphne obovata (Nees) Bl., Mus. Bot. 1: 342. 1851; Hook. f., Fl. Brit. Ind. 5: 153. 1886; Kanjilal *et al.*, Fl. Assam 4: 77. 1940; Haridasan & Rao, For. Fl. Meghalaya 2: 716. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 263. 1996.

Evergreen tree. Leaves *ca* 10-30 x 6-12 cm, broadly ovate-elliptic, shortly acuminate, narrowed down to the base. Flowers yellow, *ca* 0.5 cm long, dioecious, in fascicles on extra axillary racemes. Perianth silky outside, subequal. Stamens 9 in 3 series; inner most glandular. Staminodes present in female flowers. Fruits *ca* 0.8-1.0 cm in diam., ellipsoid.

Fls. & Frts.: March - August.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: North East India, Sikkim; **Bangladesh**.

Specimen examined: Sanaka; *Bora* 15540 (NEHU).

Uses: Confined to Indo-Bangladesh region.

2. *Beilschmiedia* Nees

Nees in Wall., Pl. Asiat. Rar. 2: 61. 1831.

About 20 species are distributed in tropics; 7 species in India; one

species in the study area.

Beilschmiedia fagifolia Nees in Wall., Pl. Asiat. Rar. 2: 69. 1831; Hook. f., Fl. Brit. Ind. 5: 122. 1886; Kanjilal *et al.*, Fl. Assam 4: 52. 1940; Haridasan & Rao, For. Fl. Meghalaya 2: 718. 1987. **Fig. 41**

Small evergreen tree; branches spreading. Leaves *ca* 6.0-14.5 x 2.5-5.5 cm, elliptic-lanceolate, shortly acuminate, narrowed down to the base. Flowers in small panicles, within silky scales in bud. Perianth 6 lobed. Stamens 9 in 3 series; inner most glandular. Fruits ovoid.

Fls. & Frts.: June - December.

Occurrence: Occasionally, scattered in the hilly forest of the sanctuary.

Distribution: Assam, Manipur, Meghalaya; Bangladesh.

Specimen examined: Burha Mayong; *Bora* 15109 (NEHU).

3. Litsea Lamk.

Lamk., Encycl. 3: 574. 1789, *non. cons.*

Shrubs or trees. Leaves peninerved, rarely 3 nerved. Flowers unisexual, in fascicles or umbels; involucral bracts 4-6, concave. Perianth 4 to 6 lobed, campanulate. Male flowers usually 6-20; stamens in 3-4 whorls; inner whorl with 2 glands; anthers 4-celled, introse. Fruit a drupe or berry, inserted in cupular perianth tube.

About 400 species mostly distributed in subtropical and tropical regions; 46 species in India; 3 species in the study area.

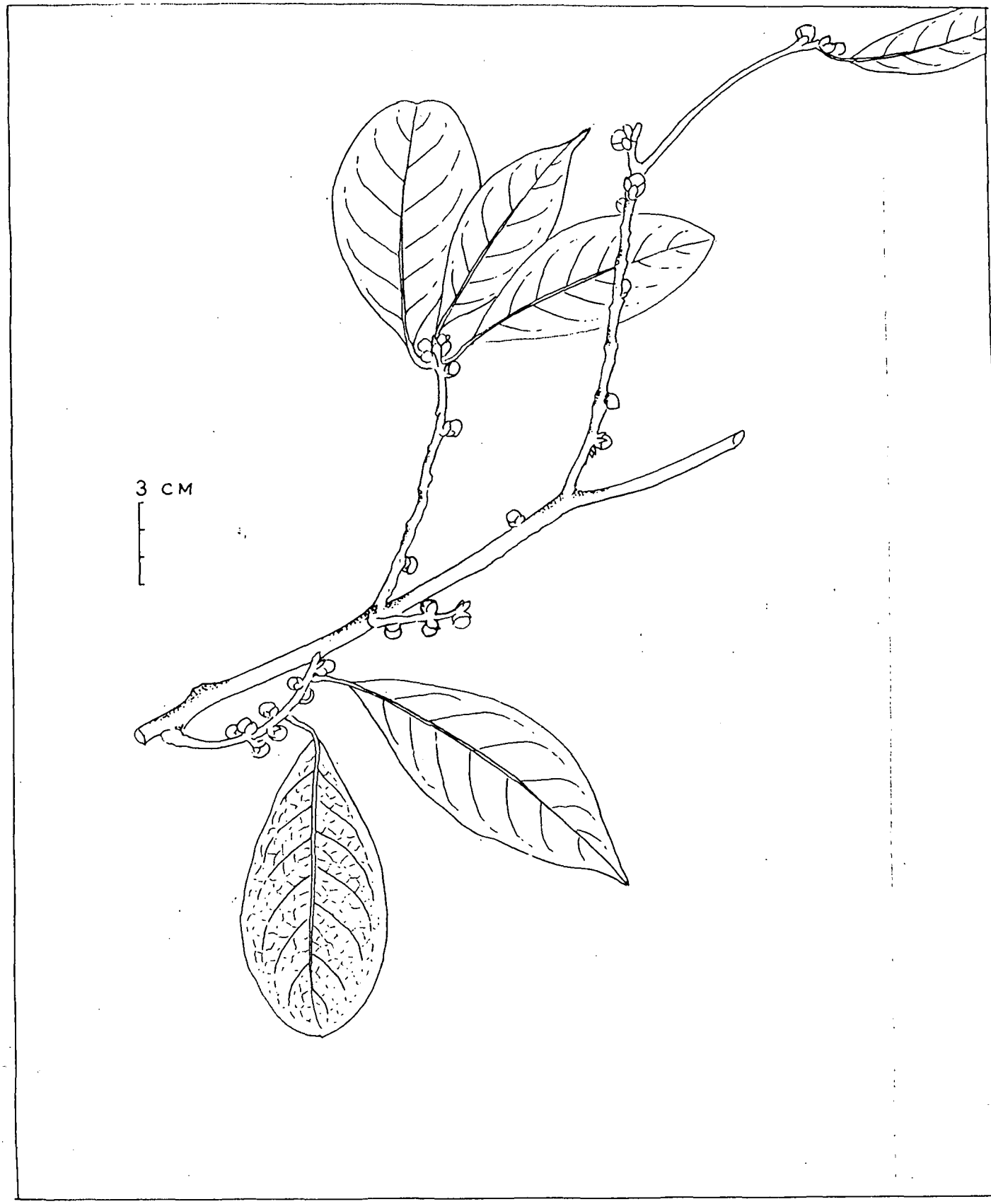


Fig. 41: ***Beilschmiedia fagifolia*** Nees (Lauraceae)

Key to the species

1a. Shrubs; perianth segments enlarged in fruits; fruits elongated .... 3. ***L. salicifolia***

1b. Middle sized tree; perianth segments not enlarged in fruits; fruits globose or subglobose:

2a. Leaves ovate-lanceolate or elliptic-oblanceolate .... 2. ***L. glutinosa***

2b. Leaves broadly elliptic .... 1. ***L. monopetala***

1. *Litsea glutinosa* (Lour.) Robinson in Philipp. J. Sci. Bot. 6: 321. 1911; Hanfi in Mudgal *et al.*, Fl. M.P. 2: 501. 1997. *Sebifera glutinosa* Lour., Fl. Cochinch. 2: 638. 1796. *Litsea sebifera* Pers., Syn. Pl. 2: 4. 1806; Hook. f., Fl. Brit. Ind. 5: 157, Kanjilal *et al.*, Fl. Assam 4: 82. 1940. "Baghnala". **Fig. 42**

Middle sized tree. Leaves *ca* 7-20 x 3-9 cm, ovate-lanceolate or elliptic-oblanceolate, acute, rounded or cuneate at base. Flowers greenish yellow, in compound umbels; peduncles pubescent. Perianth tube pubescent outside. Stamens many, *ca* 0.3 cm long; filaments pubescent. Fruits *ca* 0.6 cm in diam., subglobose.

Fls. & Frts.: May - November.

Occurrence: Common, in the hilly forest and occassionally in the plain forest of the sanctuary.

Distribution: India; Australia, Malaya, S. China.

Specimen examined: Hiloikhunda; *Bora* 15281 (NEHU).

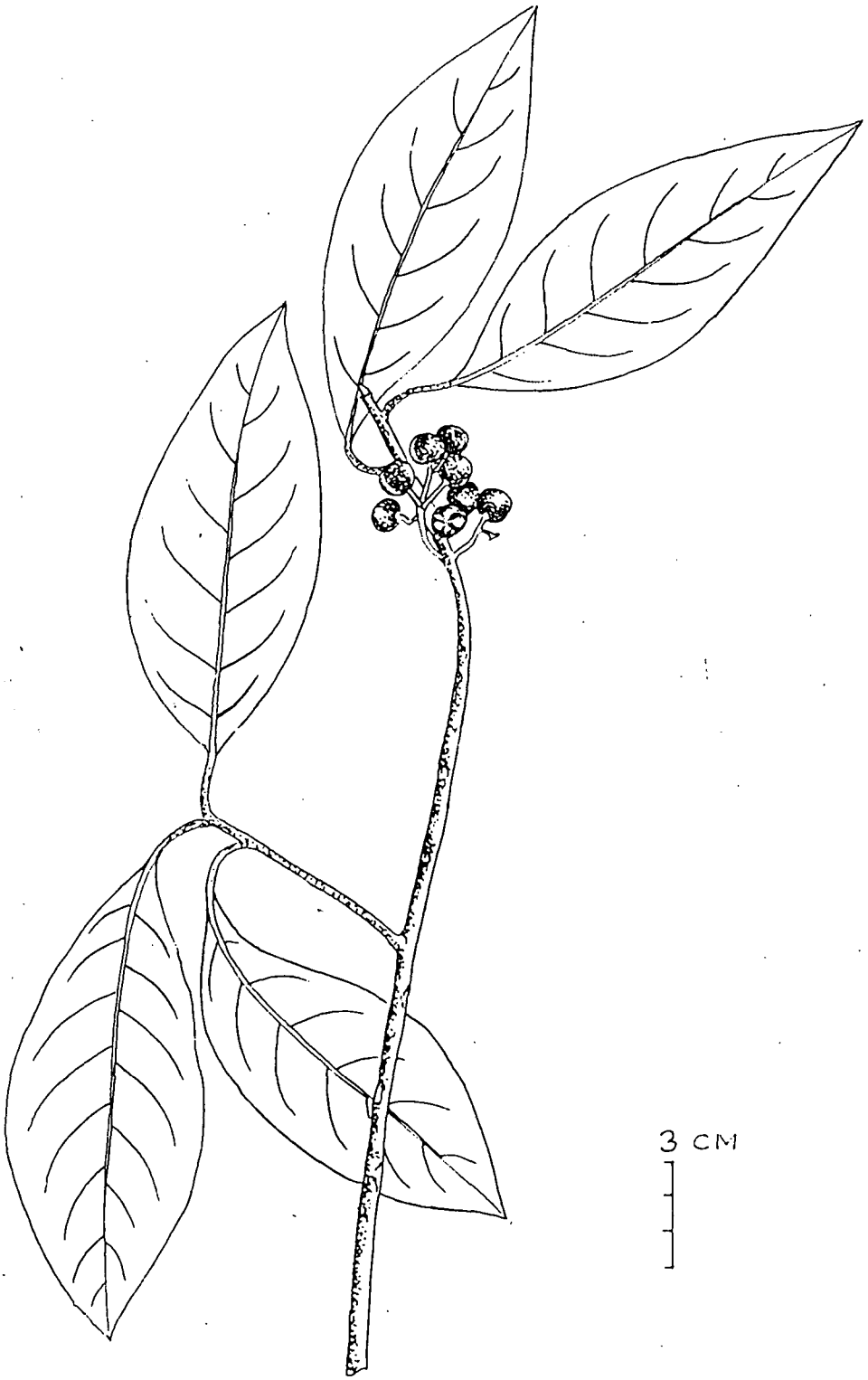


Fig. 42: ***Litsea glutinosa*** (Lour.) Robinson (Lauraceae)

2. *Litsea monopetala* (Roxb.) Pers., Syn. Pl. 2: 4. 1806; Haridasan & Rao, For. Fl. Meghalaya 2: 732. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 256. 1996. *Tetanthera monopetala* Roxb., Pl. Coromandel. 2: 26. t. 148. 1800. *Litsea polyantha* Juss. in Ann. Mus. Hist. Nat. 6: 211. 1805; Hook. f., Fl. Brit. Ind. 5: 162. 1886; Kanjilal *et al.*, Fl. Assam 4: 83. 1940. "Sowalu".

Middle sized evergreen tree. Leaves *ca* 9-20 x 5.0-10.5 cm, broadly elliptic, ovate or obovate, acute or rounded at apex, entire, tomentose beneath. Flowers greenish yellow, axillary in umbellate silky heads. Perianth 5 partite, oblong. Stamens 9-12. Fruits *ca* 0.5 cm long, ovoid.

Fls. & Frts.: May - November.

Occurrence: Common, throughout the sanctuary.

Distribution: North East India, Sikkim, Uttar Pradesh; Bangladesh, Bhutan, China, Malaya, Myanmar, Nepal.

Specimen examined: Haduk; *Bora* 15052 (NEHU).

Uses: Leaves used for rearing silk worms and timber for makingagricultural implements.

3. *Litsea salicifolia* (Roxb. ex Nees) Hook. f., Fl. Brit. Ind.. 5:1 67. 1886: Kanjilal *et al.*, Fl. Assam 4: 87. 1940; Haridasan & Rao, For. Fl. Meghalaya 2: 732. 1987. *Tetranthera salicifolia* Nees in Wall., Pl. Asiat. Rar. 2: 6. 1831. "Digloti".

Shrub; branches silky pubescent. Leaves alternate, *ca* 8-20 x 2.0-5.5 cm, elliptic or narrow lanceolate, acuminate, cuneate at base, entire, pubescent beneath. Flowers greenish yellow, in axillary clustered umbels. Stamens 6-9;

filaments villous. Fruits *ca* 0.5 x 0.5 cm, black, ellipsoid.

Fls. & Frts.: February - June.

Occurrence: Common, in shady places in the plain forest of the sanctuary.

Distribution: North East India; Bangladesh, China, Myanmar, Nepal.

Specimen examined: Haduk, Jugdal; *Bora* 14703 (NEHU).

Uses: During 'Rangali Bihu' festival (Assamese new year) twigs are used to beat the domestic animals chiefly the cows to protect them from skin diseases for the whole year.

4. *Phoebe* Nees

Nees, Syst. Laur. 98. 1836.

About 150 species distributed mostly in subtropical Asia and America; 15 species in India; one species in the study area.

Phoebe lanceolata (Nees) Nees, Syst. Laur. 109. 1836; Hook. f., Fl. Brit. Ind. 5: 141. 1886; Kanjilal *et al.*, Fl. Assam 4: 71. 1940; Haridasan & Rao, For. Fl. Meghalaya 2: 743. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 267. 1996. *P. angustifolia* Meissn. in DC., Prodr. 15(1): 34. 1864.

Small tree; branches spreading. Leaves *ca* 4.0-17.5 x 0.5-2.8 cm, linear-lanceolate, acuminate, narrowed down to the base. Flowers creamy, in panicles, bracteate. Perianth segments 6, ovate, pubescent inside; tube short. Stamens 9 in 3 series; inner most glandular, extrose. Fruit an ellipsoid berry, *ca* 1.2 x 0.4 cm.

Fls. & Frts.: April - November.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: North East, Sikkim, Uttar Pradesh, South India; Myanmar.

Specimen examined: Rangamati; *Bora* 15226 (NEHU).

95. ELAEAGNACEAE

A. L. de Juss., Gen. Pl. 74. 1789.

Trees or shrubs with lepidote or stellate indumentum. Leaves usually alternate. Flowers often dioecious, solitary, faciculate, spicate, or racemose. Perianth uniseriate, forming hypanthium; lobes usually 4. Stamens arising from the hypanthodium. Pistil monocarpellary. Ovary superior, 1-celled. Fruit achene enclosed by the fleshy persistent perianth.

The family comprises 3 genera and about 60 species, distributed in temperate and subtropical regions of Northern Hemisphere; 2 genera and 10 species in India; one genus and one species in the study area.

Elaeagnus Linn.

Linn., Sp. Pl. 121. 1753 & Gen. Pl. ed. 5. 57. 1754.

About 50 species distributed in Europe, North America, South Asia; 8 species in India; one species in the study area.

Elaeagnus conferta Roxb., Fl. Ind. ed. Carey & Wall. 1: 460. 1820; Haridashan & Rao, For. Fl. Meghalaya 2: 752. 1987; Kumar, in Mudgal *et al.*, Fl. M.P. 2: 506. 1997. *E. latifolia auct. non.* Linn. 1753; Hook. f., Fl. Brit.

Ind. 5: 202. 1886; Kanjilal *et al.*, Fl. Assam 4: 114. 1940.

Scandent spiny shrub. Leaves *ca* 3.2-11.5 x 1.5-6.2 cm, elliptic-oblong to obovate, obtuse to acute, cuneat at base, silvery white shining beneath. Flowers yellow, *ca* 0.6 cm long, in 1-5 flowered axillary clusters. Perianth silvery outside; lobes 4, ovate. Stamens 4. Drupes elliptic-oblong, *ca* 3 cm long, ribbed.

Fls. & Frts.: November - March.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Assam, Meghalaya, Tripura; **Malyasia**.

Specimen examined: Rangamati; *Bora* 15541 (NEHU).

Notes: Confined to Indo-Malayan region.

96. LORANTHACEAE

A. L. de Juss., Ann. Muss. Nat. Paris, 12: 293. 1808.

Parasitic shrubs. Leaves exstipulate, sometimes reduced to scales or absent. Flowers bisexual or unisexual, in racemes, spikes or fascicles. Perianth sepaloid or petaloid. Stamens as many as perianth lobes. Staminodes present in female flowerrs. Ovary inferior. Fruits berry or drupe.

The family comprises about 36 genera and 1300 species, distributed in tropical and temperate regions; 11 genera and 50 species in India; 4 genera and 5 species in the study area.

Key to the genera

1a. Leaves absent or when present without midrib; flowers unisexual .... 4. *Viscum*

1b. Leaves well developed with midrib; flowers bisexual:

2a. Bracts involucrate .... 3. *Tolypanthus*

2b. Bracts not involucrate:

3a. Flowers 6 merous, subtended by 2-3 bracts .... 2 *Macrosolen*

3b. Flowers 4-5 merous, subtended by 1 bract .... 1. *Helixanthera*

1. *Helixanthera* Lour.

Lour., Fl. Cochinch. 142. 1790.

About 50 species are distributed in Tropical Africa, Indo-Malaysia; 2 species in India; one species in the study area.

Helixanthera ligustrina (Wall.) Danser in Bull. Jard. Bot. Btzg. III. 16(1): 20. 1938; Kanjilal *et al.*, Fl. Assam 4: 121. 1940; Deb, Fl. Tripura 1: 400. 1981; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 269. 1996. *Loranthus ligustrinus* Wall. in Roxb., Fl. Ind. 2: 219. 1824; Hook. f., Fl. Brit. Ind. 5: 207. 1886.

Semi stemparasite; young parts puebescent. Leaves opposite, *ca* 1.5-7.0 x 0.8-2.8 cm , elliptic-ovate or elliptic-lanceolate, nearly acute or obtuse. Flowers reddish, *ca* 2.5 cm long. in axillary, short racemes. Calyx cupular. Corolla 4 lobed. Anther basifixed. Style dark purple, slender. Fruits small.

Fls. & Frts.: June - January.

Occurrence: Common, parasite on *Ficus* spp.

Distribution: Arunachal Pradesh, Assam, Tripura, Tropical Himalaya; Bangladesh.

Specimen examined: Burha Mayong; *Bora* 15156 (NEHU).

2. *Macrosolen* Bl.

Bl. in Schult. f., Syst. 7: 1731. 1830.

Stemparasite. Inflorescence spicate racemose or umbellate. Flowers bracteate, regular. Corolla 6 merous, lobes keeled. Staminal filaments straight; anthers basifixed. Ovary 4-celled; style articulate above the base. Fruits globose or ellipsoid.

About 40 species in the tropic; 5 species in India; 2 species in the study area.

Key to the species

1a. Petioles short; flowers in racemes

.... 1. ***M. cochinchinensis***

1b. Petioles longer than above; flowers in spikes

.... 2. ***M. psilanthus***

1. *Macrosolen cochinchinensis* (Lour.) Van. Tiegh. in Bull. Soc. Bot. France 41: 122. 1894; Kanjilal *et al.*, Fl. Assam 4: 127. 1940; Haridasan & Rao, For. Fl. Meghalaya 2: 759. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 269. 1996. *Loranthus cochinchinensis* Lour., Fl. Cochinch. 1: 195. 1990 *L. ampullaceous* Roxb., Fl. Ind. 2: 189. 1824; Hook. f., Fl. Brit. Ind. 5: 220. 1886.

Dropping parasitic shrub. Leaves *ca* 5-12 x 2.5-4.0 cm, elliptic-lanceolate, acute or acuminate. Flowers greenish, clustered, *ca* 1.8 cm long, in axillary racemes. Calyx lanceolate. Corolla campanulate. Fruits globose.

Fls. & Frts.: June - December.

Occurrence: Common, parasite on trees.

Distribution: Nearly throughtout India; Malaysia

Specimen examined: Burha Mayong; *Bora* 15315 (NEHU).

2. ***Macrosolen psilanthus*** (Hook. f.) Danser in Blumea 2: 36. 1936; Kanjilal *et al.*, Fl. Asssam 4: 128. 1940; *Loranthus psilanthus* Hook. f., Fl. Brit. Ind. 5: 222. 1886.

Shruby semi stemparasite. Leaves *ca* 4-12 x 2.0-4.5 cm, ovate or elliptic-lanceolate, subacute or acuminate, rounded or subcuneate at base. Flowers reddish, *ca* 3 cm long, solitary or paired in axillary spikes; bracts ovate acute. Fruits obovoid.

Fls. & Frts.: June - December.

Occurrence: Occasionally, parasite on trees.

Distribution: North East India.

Specimen examined: Burha Mayong; *Bora* 15180 (NEHU).

3. *Tolypanthus* Bl.

Bl. in Schult. Syst. 7(2): 1731. 1830.

4 species distributed in India, South East China, Sri Lanka; 2 species in India; one species in the study area.

Tolypanthus involucratus (Roxb.) Van Tiegh. in Bull. Soc. France 42: 248. 1895; Danser in Bull. Jard. Bot. Btzg. III. 10(3): 355. 1929; Deb, Fl. Tripura 1: 402. 1981. *Loranthus involucratus* Roxb., Fl. Ind. 2: 208. 1824; Hook. f., Fl. Brit. Ind. 5: 218. 1886; Kanjilal *et al.*, Fl. Asssam 4: 126. 1940.

Shruby semi stemparasite, young parts brown tomentose. Leaves opposite, *ca* 3-14 x 1.8-5.5 cm, elliptic-ovate or lanceolate, nearly acute or obtuse, cordate or rounded at base. Flowers *ca* 1.2 cm long, sessile fascicles of 4, subtended by the involcre of 4 foliaceous, ovate, acute bracts. Corolla 5 lobed, linear. Fruits small.

Fls. & Frts.: November - March.

Occurrence: Common, parasite on trees like *Catunaregma* spp.

Distribution: Assam, Tripura, Himalayas; Bangaladesh.

Specimen examined: Rangamati; *Bora* 15543 (NEHU).

4. *Viscum* Linn.

Linn., Sp. Pl. 1023. 1753 & Gen. Pl. ed. 5. 1754.

About 100 species distributed in tropical regions of old world to temperate regions; 15 species in India; one species in the study area.

Viscum monoicum Roxb. ex DC., Prodr. 4: 278. 1830; Hook. f., Fl. Brit. Ind. 5: 224. 1886; Kanjilal *et al.*, Fl. Assam 4: 118. 1940; Haridasan & Rao,

For. Fl. Maghalaya 2: 762. 1987; Islam, Fl. Majuli 276. 1996. *V. falcutum* DC., Prodr. 4: 278. 1830. *V. confertum* Roxb., Fl. Ind. Brit. 3: 764. 1832.

Slender drooping parasitic shrub. Leaves opposite, *ca* 3-9 x 1-5 cm, obliquely ovate-lanceolate, acute or acuminate, narrowed down to the base, cuneate. Flowers greenish, minute, in axillary, sessile or shortly penduncled, fascicled. Perianth 4 lobed. Stamens 4. Fruits oblong-ellipsoid berry.

Fls. & Frts.: June - December.

Occurrence: Parasite on trees like *Ficus benghalensis* and *Mallotus philippensis*.

Distribution: Nearly Throughout India; **Myanmar**.

Specimen examined: Haduk; *Bora* 15227 (NEHU).

Notes: Probably confined to Indo-Burmese region.

97. EUPHORBIACEAE

A. L. de Juss., Gen. Pl. 384. 1789.

Herbs, shrubs or trees. Leaves mostly stipulate. Inforescence various. Flowers unisexual, monoecious or dioecious. Perianth sepaloid, rarely petaloid. Stamens 1-many. Female flowers usually pedicelled. Ovary superior, 3-celled. Fruit a capsule or drupe.

The family comprises about 326 genera and 7750 species, cosmopolitan in distribution; 61 genera and about 336 species in India; 20 genera and 38 species in the study area.

Key to the genera

1a. Flowers arranged in cyathia

.... 4. *Euphorbia*

1b. Flowers not in cyathia:

2a. Leaves palmately lobed or 3 foliolate:

3a. Leaves 3 foliolate; stamens 5

.... 5. *Bischofia*

3b. *Leaves lobed; stamens more than 5:*

4a. Perianth 1 seriate; stamens many

... 16. *Ricinus*

4b. Perianth 2 seriate; stamens 5-15:

5a. Flowers in racemes

.... 8. *Chrozophora*

5b. Flowers in corymbose cymes

... 13. *Jatropha*

2b. Leaves simple, not as above:

6a. Ovary cells each 1 ovuled:

7a. Petals present in both sexes

... 10. *Croton*

7b. Petals absent in both sexes:

8a. Stamens few .. 17. *Sapium*

8a. Stamens many:

9a. Calyx imbricate in bud:

10a. Disk present in male flowers; capsule dry crustaceous

.... 4. *Baliospermum*

10b. Disk absent in male flowers; capsule leathery ... 19. ***Suregada***

9b. Calyx valvate in bud:

11a. Anther 4-celled .... 9. ***Cleidion***

11b. Anther 2-celled:

12a. Male flowers clustered .... 1. ***Alchorne***

12b. Male flowers in axillary spikes:

13a. Ovary glandular; styles fimbriate; fruit a capsule ... 14. ***Mallotus***

13b. Ovary eglandular; styles linear; fruit a drupe ... 20. ***Trewia***

6b. Ovary cells each 2 ovuled:

14a. Male flowers in axillary spikes or racemes:

15a. Ovary 1-celled; seeds without aril .... 2. ***Antidesma***

15b. Ovary 2-3 celled; seeds with aril .... 3. ***Baccaurea***

14b. Male flowers axillary, solitary or clustered:

16a. Disk absent:

17a. Leaves smaller, *ca* 3 cm long; ovary 3-celled .... 6. ***Breynia***

17b. Leaves larger than above;

ovary 3-15 celled ... 12. ***Glochidion***

16b. Disk present:

18a. Petals present; ovary

2-celled .... 7. ***Bridelia***

18b. Petals absent; ovary 3-celled:

19a. Plants dioecious;

pistillode present ... 18. ***Securinga***

19b. Plants monoecious;

pistillode absent ... 15. ***Phyllanthus***

1. *Alchornea* Sw.

Sw., Prodr. Veg. Ind. Occ. 98. 1788.

About 70 species in tropical regions; 3 species in India; one species in the study area.

Alchornea tiliaefolia (Benth.) Muell. Arg. in Linnaea 34: 168. 1865; Hook. f., Fl. Brit. Ind. 5: 421. 1887; Kanjilal *et al.*, Fl. Assam 4: 211. 1940; Haridasan & Rao, For. Fl. Meghalaya 2: 768. 1987.

Small tree. Leaves *ca* 8-20 x 4-13 cm, ovate-elliptic, acuminate, rounded or subcordate at base, serrate, glandular, pubescent along nerves beneath. Flowers in racemes or panicles, minute. Tepals 4. Capsules ovoid, *ca* 1 cm long, pubescent.

Fls. & Frts.: July - October

Occurrence: Common, in the hilly forest of the sanctuary.

Distribution: Andaman Islands, Assam, Meghalaya, Sikkim; Bangladesh, Myanmar.

Specimen examined: Dhekiabari; *Bora* 15278 (NEHU).

2. *Antidesma* Linn.

Linn., Sp. Pl. 1027. 1753 & Gen. Pl. ed. 5. 451. 1754.

Shrubs or small trees. Leaves alternate, stipulate. Flowers dioecious in axillary or terminal slender spikes or racemes, bracteate, bracteolate. Tepals 3-7. Stamens 2-5, opposite the tepals, exserted. Pistillode minute. Ovary 1 celled; ovules 2 in each cell; stigma 2 fid. Fruits drupe.

About 160 species distributed in tropical and subtropical regions; 15 species in India; 2 species in the study area.

Key to the species

1a. Leaves coriaceous; perianth pubescent; stamens 3 .... 2. ***A. bunius***

1b. Leaves not coriaceous; perianth glabrous; stamens usually 2 .... 1. ***A. acidum***

1. ***Antidesma acidum*** Retz., Observ. Bot. 5: 30. 1788; Airy Shaw in Kew Bull. 26. 352. 1992; Haridasan & Rao, For. Fl. Meghalaya 2: 769. 1987. *A. diandrum* (Roxb.) Henye ex Roth, Nov. Pl. Sp. 369. 1821; Hook. f., Fl. Brit. Ind. 5: 361. 1887; Kanjilal *et al.*, Fl. Assam 4: 167. 1940. *Stilagc diandra* Roxb., Pl. Corom. 2: 35. t. 166. 1802. **"Pani Heloch".**

Deciduous shrub or small tree. Leaves *ca* 3-11 x 15-3 cm, obovate-elliptic to oblong-lanceolate, acute or acuminate, cuneat at base, pubescent along nerves beneath. Flowers greenish white, pedicellate in long racemes; bracts ovate, acute. Tepals 5, *ca* 2 cm long, basally connate. Stamens 2. Drupes *ca* 0.4 cm in diam., globose or ovoid, red.

Fls. & Frts.: June - October.

Occurrence: Common, along water bodies, in grassland in the plain forest of the sanctuary.

Distribution: Tropical Himalaya; **Malaysia, Myanmar, South Chian, Sri Lanka.**

Specimen examined: Haduk, Tuplung; *Bora* 15063 (NEHU).

2. ***Antidesma bunius*** (Linn.) Spreng., Syst. Veg. 1: 826. 1825; Hook. f., Fl. Brit. Ind. 5: 358. 1887; Kanjilal *et al* Fl. Assam 4: 166. 1940; Haridasan & Rao, For. Fl. Meghalaya, 2: 770. 1887; Chauhan *et al*. in Fl. Namdapha (edt. Hajra) 273. 1996. *Stilago bunius* Linn., Mant. Pl. 122. 1767.

Small tree; young parts hairy. Leaves *ca* 5-18 x 2-6 cm, elliptic-oblong on oblanceolate, shortly acuminate, acute or subcordate at base, entire, coriaceous. Flowers greenish, in stout racemes or in spikes. Perianth 4 lobed, pubescent. Stamens 3. Drupes ellipsoid with persistent tepals.

Fls. & Frts.: April - September.

Occurrence: Occasionally, scattered throughout the area.

Distribution: Throughout India; **Australia, Bhutan, China, Malaysia, Myanmar, Nepal, Sri Lanka.**

Specimen examined: Haduk; *Bora* 15069 (NEHU).

3. Baccaurea Lour.

Lour., Fl. Cochinch. 651. 1790.

About 80 species distributed in tropical regions; 2 species in India; one species in the study area.

Baccaurea ramiflora Lour., Fl. Cochinch. 661. 1790; Airy Shaw in kew Bull. 26(3): 221. 1972; Haridasan & Rao, For. Fl. Meghalaya 2: 774. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 275. 1996. *B. sapida* (Roxb.) Muell- Arg. in DC., Prodr. 15(2): 459. 1866; Hook. f., Fl. Brit. Ind. 5: 371. 1887; Kanjilal *et al.*, Fl. 4: 161. 1940. **"Leteku".**

Small tree. Leaves alternate, *ca* 10-22 x 3.5-9.0 cm, elliptic-oblong or oblanceolate-elliptic, acuminate, narrowed to the base, long petiolate. Flowers yellow, dioecious in densely fascicled racemes, bracteate. Calyx 4 lobed. Stamens 4. Pistillode pubescent. Ovary tomentose. Fruits *ca* 2.5 cm in diam., ovoid-globose, fleshy.

Fls. & Frts.: April - August.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: North East India; Bhutan, China, Malaysia, Myanmar, Nepal.

Specimen examined: Burha Mayong; *Bora* 15213 (NEHU).

Uses: Fruits edible.

4. *Baliospermum* Bl.

Bl., Brijdr. 603. 1826.

About 10 species in India, South East Asia, Malaysia; 6 species in India; one species in the study area.

Baliospermum montanum (Willd.) Muell-Aug. in DC., Prodr. 15(2): 1125. 1866; Kanjilal *et al.*, Fl. Assam 4: 202. 1940; Shukla in Mudgal *et al.*, Fl. M.P. 2: 528. 1997. *Jatropha montana* Willd., Sp. Pl. 4: 563. 1805. *Baliospermum axillare* Bl., Bijdr. 604. 1826; Hook. f., Fl. Brit. Ind. 5: 461. 1887. "Sandah bakhola".

Undershrub. Leaves alternate, *ca* 5-20 x 3-9 cm, elliptic-oblong or lanceolate, palmately lobed; upper lanceolate, smaller, sinuate toothed; apex acute or acuminate, rounded or cuneate at base, pubescent beneath, petiolate. Flowers monoecious, yelloish green, in axils of bracts on proliferous shoots. Male flowers globose; stamens 10-20. Female calyx ovate-lanceolate; style 2 fid. Capsules *ca* 0.6-1 cm in diam., obovoid, hairy.

Fls. & Frts.: September - December.

Occurrence: Common, along foot hill of the forest.

Distribution: Assam, Tropical and subtropical Himalaya; Bangladesh, Java.

Specimen examined: Guvali; *Bora* 14826 (NEHU).

Uses: Leaf paste used in skin diseases and root extract taken in stomacl constipation.

5. *Bischofia* Bl.

Bl., Bijidr. 1168. 1827.

A monototypic genus, distributed in Tropical Asia, Malaysia, Pasific Islands.

Bischofia javanica Bl., Bijdr. 1168. 1827; Hook. f., Fl. Brit. Ind. 5: 345. 1887; Kanjilal *et al.*, Fl. Assam 4: 141. 1940; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 282. 1996.

Deciduous tree; branches spreading. Leaves alternate, 3 foliolate; leaflets *ca* 8-18 x 3-7 cm, elliptic-ovate, acuminate, serrate. Flowers greenish, dioecious in panicled racemes. Sepals 5. Petals absent. Stamens 5. Ovary 3-4 celled. Fruits *ca* 0.7 cm in diam., globose.

Fls. & Frts.: April - December.

Occurrence: Rare, occurs along roadside.

Distribution: Arunachal Pradesh, Assam, Tropical Himalaya, Western Ghats; Malaya, Pacific Islands.

Specimen examined: Haduk; *Bora* 15064 (NEHU).

6. *Breynia* Forst.

J. R. et G. Forster, Char. Gen. Pl. 145. t 3: 1776, *non. cons.*

About 25 species distributed in Tropical Asia; 2 species in India; one species in the study area.

Breynia retusa (Dennst.) Alston in Ann. Roy. Bot. Gard. 11: 204. 1929; Airy Shaw in kew Bull. 26: 227. 1972; Haridasan & Rao, For. Fl. Meghalaya 2: 776. 1987. *Phyllanthus retusus* Dennst., Schluessel Hourts Malab. 31. 1818. *Breynia paterns* (Roxb.) Rolfe. in J. Bot. 20: 359. 1882; Hook. f., Fl. Brit. Ind. 5: 329. 1887; Kanjilal *et al.*, Fl. Assam 4: 174. 1940.

Shrub. Leaves *ca* 1-4 x 0.8-2.0 cm, elliptic or ovate- elliptic, obtuse, cuneate or rounded at base, sparsely pubescent beneath, entire, bracteate. Flowers yellow, axillary on filiform pedicels. Male flowers in facicles; perianth 6, *ca* 0.4 cm long; Stamens 3. Female flowers solitary; perianth fleshy. Ovary 6 lobed; style 3 fid. Fruits *ca* 0.5 cm in diam., depressed, globose capsule.

Fls. & Frts.: March - September.

Occurrence: Common, along roadside in the hilly forest of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Manipur, Meghalaya, Sikkim; Sri Lanka.

Specimen examined: Burha Mayong, Kamarpur; *Bora* 15153 (NEHU).

7. *Bridelia* Willd.

Willd., Sp. Pl. 4(2): 178. 1805.

Shrubs or trees. Leaves often with more or less parellel veines. Flowers in axillary fascicles. Tepals 10, 2-seriate; inner 5 free, clawed. Disk cupular. Stamens 5 8inserted on a stalk like gynandrophore bearing a pistillode at tip. Ovary 2-celled; ovules 2 in each cell; styles 2; stigma 2 fid. Drupes of 2-1 seeded pyrenes.

About 60 species distributed in tropical regions; 14 species in India; 2 species in the study area.

Key to the species

1a. Plants scandent, tomentose shrub ... 2. ***B. stipularis***

1b. Plants erect, glabrous shrub ..... 1. ***B. monoica***

1. ***Bridelia monoica*** (Lour.) Merr. in Phillip. J. Soc. Bot. 13: 142. 1918; Haridasan & Rao, For. Fl. Meghalaya 2: 777. 1987. *B. tomentosa* Bl., Bijdr. 597. 1827; Hook. f., Fl. Brit. Ind. 5: 271. 1887; Kanjilal *et al.*, Fl. Assam 4: 146. 1940. **"Hekoti gach".**

Shrub. Leaves *ca* 3.5-7.0 x 1.0-2.5 cm, elliptic, oblong-lanceolate, acute, cuneate at base, entire. Flowers greenish yellow, in axillary clusters. Petals broadly ovate or suborbicular. Drupes *ca* 0.5 cm in diam., globose with persistent calyx.

Fls. & Frts.: September - January.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Andaman, North East India; Bangladesh; China, Malaya, North Australia, Philippines.

Specimen examined: Rangamati; *Bora* 15537 (NEHU).

2. ***Bridelia stipularis*** (Linn.) Bl., Brijdr. 597. 1825; Hook. f., Fl. Brit. Ind. 5: 270. 1887; Kanjilal *et al.*, Fl. Assam 4: 147. 1940; Haridasan & Rao, For. Fl. Meghalaya 2: 779. 1987. *Chutia stipularis* Linn., Mant 1: 127.

1767. *Bridelia scandens* (Roxb.) Willd., Sp. Pl. 4: 979. 1805. "Shagoli lota".

Scandent, climbing shrub; branches pubescent. Leaves *ca* 3–13 x 1.5–6.8 cm, elliptic–oblong or oblanceolate, subacute, truncate or rounded at base, tomentose beneath. Flowers greenish yellow, *ca* 0.5 cm long, unisexual, in dense axillary clusters or spikes; bracts ovate-acuminate. Calyx acute. Petals 3 toothed. Drupes *ca* 0.8–1 x 0.4 cm, oblong, purplish red.

Fls. & Frts.: December - March.

Occurrence: Common, throughout the sanctuary.

Distribution: Assam, Meghalaya, Tripura, Tropical Himalaya; Bangladesh, China, Malaysia, Myanmar, Philippines, Thailand.

Specimen examined: Haduk; *Bora* 14721 (NEHU).

Uses: Fruits edible.

8. *Chrozophora* Neck.

Neck. Elem. 2: 337. 1790.

About 12 species in Mediterranan region from Tropical Africa to India; one species in the study area.

Chrozophora rottleri (Geiseler) Adr. Juss. ex Spreng., Syst. Veg. 3: 850. 1826; Shukla in Mudgal *et al.*, Fl. M.P. 2: 536. 1997. *Croton rottleri* Geilseler, Croton. Monogr. 54. 1807. *Chrozophora tinctoria auct. non.* Adr. Juss. 1824: Hook. f., Fl. Brit. Ind. 5: 408. 1887.

Erect stellately hairy herb. Leaves alternate, *ca* 3.0-8.5 x 2.0-4.5 cm, ovate or suborbicular, obtuse-rounded, subcordate, entire or 3 lobed, palmately nerved, stellately hairy. Flowers yellow, unisexual, in axillary or terminal racemes; bracts linear. Tepals 10, 2 seriate, *ca* 0.2-0.4 cm long, ovate-lanceolate; outer ones hairy. Stamens 15. Styles 3, 2 fid. Capsules *ca* 0.8 cm in diam., subglobose, tomentose.

Fls. & Frts.: March - May.

Occurrence: Common, along road side and open sandy palces of the sanctuary.

Distribution: Assam, Madhay Pradesh, Panjab, Uttar Pradesh; Afghanistan.

Specimen examined: Thengbhanga; *Bora* 14780 (NEHU).

9. *Cleidion* Bl.

Bl., Bijdr. 612. 1826.

About 25 species distributed in tropics; 2 species in India; one species in the study area.

Cleidion spiciflorum (Burm. f.) Merr. Inter. Herb. Amb. 322 in Nota 1917; Haridasan & Rao, For. Fl. Meghalaya 2: 780. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 276. 1996. *Acallypha spiciflora* Burm. f., Fl. Ind. 203. f. 61. 1768. *Cleidion javanicum* Bl. in Hook. f., Fl. Brit. Ind. 5: 444. 1887; Kanjilal *et al.*, Fl. Assam 4: 220. 1940.

Middle sized tree; bark greyish white. Leaves elliptic, acuminate, obtuse or rounded at base. Flowers white, *ca* 0.5 cm long, uni or bisexual, in long axillary racemes, drooping. Male calyx globose, 4 partite; stamens many.

Female flowers axillary solitary. Fruit a capsule, didymous on long peduncle.

Fls. & Frts.: January - June.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Andaman, North East India, Western Ghats; China, Malaysia, Nepal.

Specimen examined: Rangamati; *Bora* 15361 (NEHU).

10. Croton Linn.

Linn., Sp. Pl. 1004. 1753 & Gen. Pl. ed. 5. 436. 1754.

Herbs, shrubs or trees, stellately hairy or scaly. Leaves glandular at base. Flowers in terminal racemes; female in lower and male in upper parts. Tepals 10 in 2 series. Stamens 20, free. Disk 5 lobed. Ovary 3-celled; ovules 1 in each cell; style 3. Fruit a schizocarp of 3 cocci. Seeds caruculate.

About 750 species distributed in tropical and subtropical regions; 14 species in India; 4 species in the study area.

Key to the species

1a. Herbs or undershrubs .... 1. *C. bonplandianum*

1b. Shrubs or trees:

2a. Plants scandent shrub; leaves pubescent .... 2. *C. caudatus*

2b. Plants not scandent; leaves glabrous:

3a. Leaves oblanceolate-elliptic; base narrowed .... 3. *C. joufra*

3b. Leaves ovate or elliptic-oblong;
base rounded .... 4. *C. triglium*

1. *Croton bonplandianum* Baill. in Adansonia 4: 339. 1863-1864; Croizat in J. Bom. Nat. Hist. Soc. 41. 573. 1940; Deb, Fl. Tripura 1: 328. 1981. *C. sparsiflorous* Morong in Ann. N. Y. Acad. Sci. 7: 221. 1893; Kanjilal *et al.*, Fl. Assam 4: 196. 1940.

Erect much branched, sparsely hairy herb. Leaves *ca* 2.0-6.5 x 1.2-2.4 cm, ovate-lanceolate, or elliptic-ovate, acute, obtuse or subtruncate at base, serrate, 3 nerved. Flowers white, unisexual, in terminal erect spikes. Male flowers fascicled above female in the axil of minute bracts of the racems. Tepals obovate, lanceolate. Capsules *ca* 0.5 cm long, 3 angled, stellate-hairy.

Fls. & Frts.: Most parts of the year.
Occurrence: Common, along roadside of the sanctuary.
Distribution: Throughout India; Native of America;
Specimen examined: Haduk; *Bora* 14849 (NEHU).

2. *Croton caudatus* Geisel., Croton Monogr. 73. 1807; Haok. f., Fl. Brit. Ind. 5: 389. 1887; Kanjilal *et al.*, Fl. Assam 4: 194. 1940; Haridasan & Rao, For. Fl. Meghalaya 2: 782. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 276. 1996.

Scandent shrub, pubescent. Leaves *ca* 6-22 x 3-9 cm, ovate-orbicular, acute, cordate at base. Flowers pale yellow, unisexual, in long terminal pubescent racemes. Stamens many, exserted. Female sepals ovate, hairy

tomentose; ovary woolly. Capsules *ca* 2.5 cm long, oblong, trigonous.

Fls. & Frts.: April - October.

Occurrence: Common, in the hilly forest, occasionally in the plain forest of the sanctuary.

Distribution: North East India, South India; China, Malaysia, Nepal, Sri Lanka.

Specimen examined: Hiloikhunda; *Bora* 15008 (NEHU).

Uses: Watery latex applied in skin diseases.

3. **Croton joufra** Roxb., Fl. Ind. 3: 685. 1832; Hook. f., Fl. Brit. Ind. 5: 387. 1887; Kanjilal *et al.*, Fl. Assam 4: 193. 1940; Haridasan & Rao, For. Fl. Meghalaya 2: 783. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 277. 1996.

Small tree; bark white or greenish white. Leaves *ca* 8-25 x 2.5-9.0 cm, oblanceolate-elliptic, acuminate, narrowed down to the base, distantly serrate. Flowers yellow, *ca* 0.3-0.4 cm long, in terminal or axillary racemes. Stamens 12. Ovary pubescent. Capsules ovoid, slightly 3 lobed.

Fls. & Frts.: January - June.

Occurrence: Common, in the hilly forest of the sanctuary.

Distribution: North East India; Bangladesh, Myanmar.

Specimen examined: Rangamati; *Bora* 15186 (NEHU).

Notes: Confined to North East India and extend upto Bangladesh and Myanmar.

4. *Croton triglium* Linn., Sp. Pl. 1004. 1753; Hook. f., Fl. Brit. Ind. 5: 393. 1887; Kanjilal *et al.*, Fl. Assam 4: 194. 1940; Haridasan & Rao, For. Fl. Meghalaya 2: 784. 1987.

Small tree; younger parts hairy. Leaves *ca* 7-20 x 3-8 cm, ovate or elliptic-oblong, acuminate, rounded at base, serrate. Flowers pale yellow, unisexual, in terminal erect racemes. Petals woolly in male and absent in female flowers. Capsules *ca* 1.3 x 0.5 cm, ovoid, trigonous.

Fls. & Frts.: June - December.

Occurrence: Rare, along the foot hill of the sanctuary.

Distribution: Assam, Meghalaya; West Bangal; China, Myanmar, Sri Lanka.

Specimen examined: Rangamati; *Bora* 15537 (NEHU).

11. *Euphorbia* Linn.

Linn., Sp. Pl. 450. 1753 & Gen. ed. 5. 208. 1754.

Herbs, shrubs or small trees with milky juice. Flowers in cyathia, solitary, or combined into cymes, umbels or corymbs. Involucre glandular. Male flowers as a stalked stamens, without floral envelope. Female flowers of more or less 3 lobed ovary at the centre of the involucre; styles 3. Capsules of 3, 2 valved cocci.

About 1600 species distributed mostly in subtropical regions; 60 species in India; 4 species in the study area.

Key to the species

1a. Plants erect shrub, succulent

..... 3. ***E. neriifolia***

1b. Plants erect or prostrate herb, non succulent:

2b. Leaves *ca* 0.3-1.0 cm long,

usually reddish-brown ..... 4. ***E. thymifolia***

2b. Leaves *ca* 1-3 cm long, usually green:

3a. Involucre glands with a distinct

petaloid limb ..... 2. ***E. hypericifolia***

3b. Involucre glands with an

inconspicous limb ..... 1. ***E. hirta***

1. *Euphorbia hirta* Linn., Sp. Pl. 454. 1753; Kanjilal *et al.*, Fl Assam, 4: 141. 1940; Chauhan *et al.*, Fl. Namdapha (edt. Hajra) 278. 1996. *E. pilulifera sensu* Hook. f., Fl. Brit. Ind. 5: 250. 1887. **"Gakhiroti bon".**

Procumbent hairy herb. Leaves opposite, *ca* 1-3 x 0.8-1.2 cm, elliptic or ovate-oblong, subobtuse, oblique, serrulate, hairy. Cyathia axillary and terminal in capitate cymes. Involucres campanulate; lobes 5, hairy. Capsules depressed globose, 3 lobed pubescent.

Fls. & Frts.: Most part of the year.

Occurrence: Common, in grassland, forest floors, along the roadside of the sanctuary.

Distribution: Hotter parts of India; Tropical and subtropical regions.

Specimen examined: Haduk, Tuplung; *Bora* 14860 (NEHU).

Uses: Leaf extract along with seed powder of *Piper nigrum* taken in asthmatic trouble.

2. *Euphorbia hypericifolia* Linn., Sp. Pl. 454. 1753; Hook. f., Fl. Brit. Ind. 5: 249. 1887; Airy Shaw in Kew Bull. 26(2): 265. 1972. *E. parviflora* Linn., Syst. (ed. 10) 2: 1047. 1759.

Erect or decumbent glabrous herb. Leaves opposite, *ca* 0.1-2.5 x 0.4-1.3 cm, elliptic-ovate or elliptic-oblong, obtuse or rounded at apex, obliquely rounded at base, serrulate. Cyathia in axillary cymes. Involucres cupular minute, pubescent, *ca* 0.1 cm long; lobes cilliate. Capsules subglobose, 3 angled, pubescent.

Fls. & Frts.: January - October.

Occurrence: Common, in moist and shady places.

Distribution: Throughout the warm regions of India; Tropics of both hemisphere.

Specimen examined: Haduk, Tuplung; *Bora* 14861 (NEHU).

3. *Euphorbia neriifolia* Linn., Sp. Pl. 451. 1753; Hook. f., Fl. Brit. Ind. 5: 255. 1887; Kanjilal *et al.*, Fl. Assam 4: 140. 1940; Shukla in Mudgal *et al.*, Fl. M.P. 2: 551. 1997. *E. ligularia* Roxb., Fl. Ind. 2: 465. 1832. "Siju".

Succulent shrub; branches 5 angled; spines stipular, arising from thick tubercles. Leaves alternate, *ca* 8-15 x 3.5-5 cm, obovate-oblong, fleshy, rounded at apex, narrowed down to the base. Involucres yellowish, forming 3 flowered cymes; lateral ones shortly pedicellate, bisexual; central ones male sessile; lobes large. Capsules *ca* 1 cm in diam., 3 lobed.

Fls. & Frts.: December - May.

Occurrence: Rare, occurs in rocky hilly slopes.

Distribution: Assam, Deccan Peninsula, Meghalaya, Tripura, West Bengal; Malaysia, Myanmar.

Specimen examined: Sanaka; *Bora* 15474 (NEHU).

Uses: Milky latex applied in skin diseases.

4. *Euphorbia thymifolia* Linn., Sp. Pl. 454. 1753; Hook. f., Fl. Brit. Ind. 5: 252. 1887; Kanjilal *et al.*, Fl. Assam 4: 141. 1940; Deb, Fl. Tripura 1: 334. 1981.

Prostrate herb, usually reddish brown in colour. Leaves *ca* 0.3-1.0 x 0.2-0.5 cm, oblong, obtuse, oblique, crenulate, glaucous beneath. Involucres axillary, solitary or few together, pinkish. Capsules obtusely keeled, pubescent.

Fls. & Frts.: Most part of the year.

Occurrence: Common, in shady forest floors, grassland.

Distribution: Throughout India; Pantropic.

Specimen examined: Tuplung; *Bora* 15476 (NEHU).

12. *Glochidion* Forst.

J. R. et G. Forst. Char. Gen. Pl. 113. t. 57. 1776, *non. cons.*

Shrubs or trees. Leaves alternate. Flowers monoecious in axillary fascicles. Male tepals 5-6, usually 2 seriate, imbricate. Stamens connate into a column; pistilode absent. Female tepals 6, tubular, often dentate. Disk

absent. Ovary 3-15 celled; ovules 2 in each cell; style connate. Fruits schizocarp.

About 300 species distributed in tropics; 30 species in India; 2 species in the study area.

Key to the species

1a. Leaves oblong-lanceolate; fruits much depressed .... 2. ***G. multiloculare***

1b. Leaves elliptic-oblong; fruits not much depressed .... 1. ***G. assamicum***

1. *Glochidion assamicum* Hook. f., Fl. Brit. Ind. 5: 319. 1887; Kanjilal *et al.*, Fl. Assam 4: 187. 1940; Haridasan & Rao, For. Fl. Meghalaya 2: 790. 1987. *Phyllanthus assamicus* Muell. Arg. in Flora 48: 378. 1865.

Fig. 43

Small evergreen tree. Leaves *ca* 5-13 x 3.0-6.5 cm, elliptic or elliptic-oblong, acuminate, rounded or oblique at base, entire. Flowers greenish white, in axillary fascicles. Male flowers pedicellate; tepals 6, pubescent outside; stamens 3. Female flowers subsessile; ovary pubescent. Capsules *ca* 0.6 cm in diam., globose, lobed.

Fls. & Frts.: June - September.

Occurrence: Common, in the hilly forest, occasionally in the plain forest of the sanctuary.

Distribution: Assam, Meghalaya, Tripura, Himalayas; Bangladesh, China, Myanmar, Vietnum.

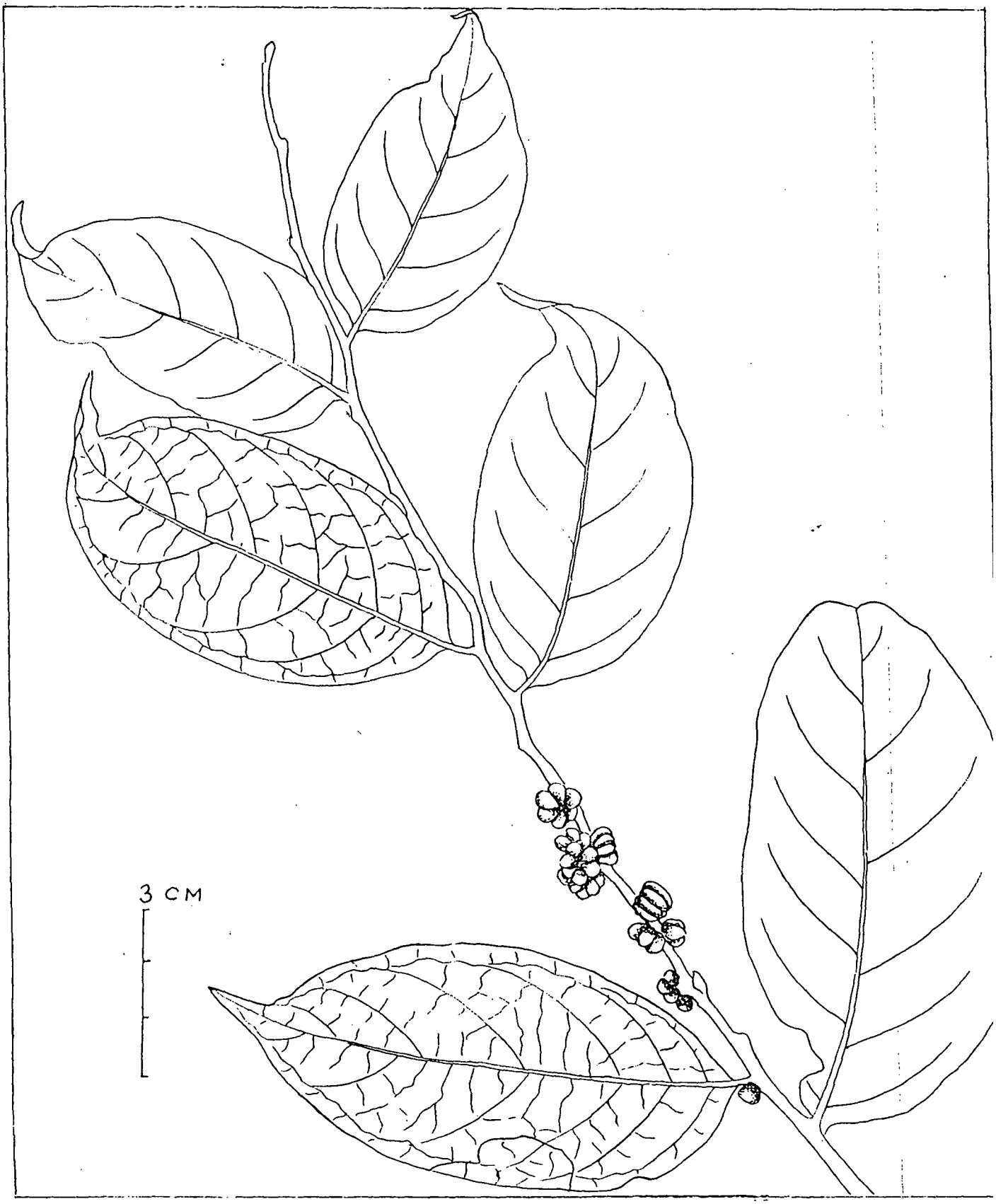


Fig. 43: ***Glochidion assamicum*** Hook. f. (Euphorbiaceae)

Specimen examined: Sanaka; *Bora* 15388 (NEHU).

2. ***Glochidion multiloculare*** Voight, Hort. Suburb. Calc. 152. 1845; Hook. f., Fl. Brit. Ind, 5: 307. 1887; Kanjilal *et al.*, Fl. Assam 4: 181. 1940; Deb, Fl. Tripura 1: 337. 1981. **Fig. 44**

Evergreen small shrub. Leaves *ca* 3-7 x 1.5-3.0 cm, linear-oblong or oblong-lanceolate, obtuse or subacute, purplish beneath. Flowers greenish white, in axillary clusters on stout pedicels. Male tepals 6 in 2 series, *ca* 0.3 cm long, oblong. Stamens 4-12. Female tepals unequal. Ovary lobed. Capsules *ca* 2.5 cm in diam., depressed globose or orbicular.

Fls. & Frts.: April - December.

Occurrence: Common, along roadside and forest margins of the sanctuary.

Distribution: Assam, Gangetic Plain, Tripura, Himalayas; **Bangladesh, Myanmar**.

Specimen examined: Haduk; *Bora* 14762 (NEHU).

13. *Jatropha* Linn.

Linn., Sp. Pl. 2006. 1753 & Gen. Pl. ed. 5. 437. 1754.

Herbs, shrubs or trees, often glandular. Leaves often palmately partite or lobed. Flowers monoecious in terminal corymbose cymes. Perianth 10, 2 seriate; outer sepaloid; inner petaloid. Stamens 8-10. Ovary 3-celled; ovules 1 in each cell; styles 3. Fruits capsule, 3 valved.

About 170 species distributed in tropical and subtropical regions; 10

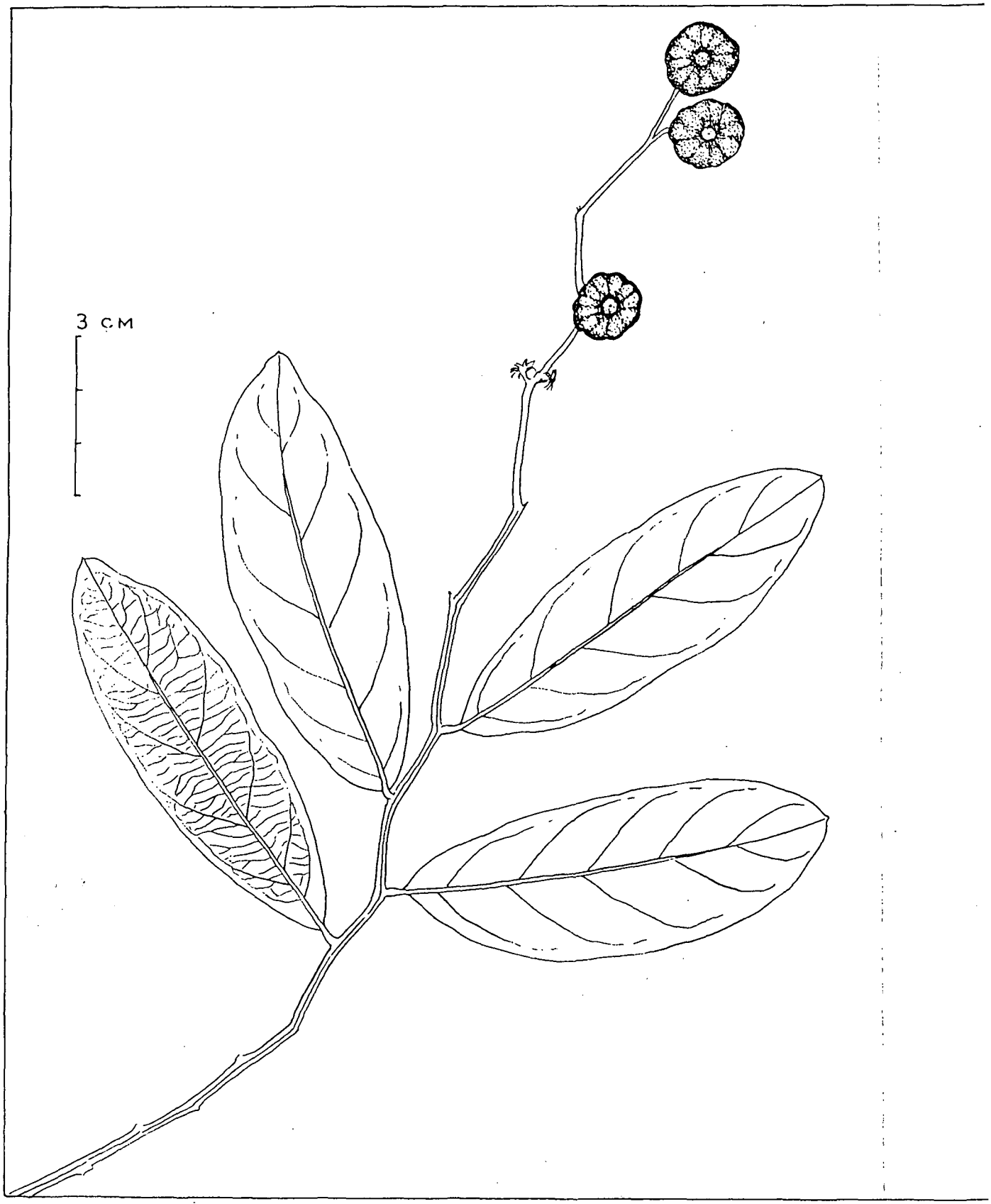


Fig. 44: ***Glochidion multiloculare*** Voight (Euphorbiaceae)

species in India; 2 species in the study area.

Key to the species

1a. Young parts usually reddish purple; flowers purplished; stipules glandular .... 2. *J. gossypifolia*

1b. Young parts usually greenish; flowers yellow; stipules eglandular .... 1. *J. curcas*

1. *Jatropha curcas* Linn., Sp. Pl. 1006. 1753; Hook. f., Fl. Brit. Ind. 5: 383. 1887; Kanjilal *et al.*, Fl. Assam 4: 190. 1940; Deb, Fl. Tripura 1: 339. 1981. "Bongali-ara".

Shrub with watery latex. Leaves *ca* 5-15 x 5-12 cm, broadly ovate, slightly 3-5 lobed, acute, cordate at base, long petiolate. Flowers yellow, in panicled cymes. Male sepals *ca* 0.4 cm long, connate basally, ovate; petals *ca* 0.6 cm long, yellow, elliptic-obovate. Stamens 10, 2 seriate; filaments *ca* 0.3 cm long. Female sepals and petals as in male. Stigma 2 lobed. Disk deeply 5 lobed. Capsules *ca* 3 cm in diam., subglobose faintly lobed.

Fls. & Frts.: May - November.

Occurrence: Common, along roadside of the sanctuary.

Distribution: Throughout India; Pantropic.

Specimen examined: Burha Mayong; *Bora* 15149 (NEHU).

Uses: Twigs used for tooth brushing to cure tooth-ache and watery latex used in skin diseases.

2. *Jatropha gossypifolia* Linn., Sp. Pl. 1006. 1753; Hook. f., Fl. Brit. Ind. 5: 383. 1887; Kanjilal *et al.*, Fl. Assam 4: 190. 1940; Deb, Fl. Tripura 1: 340. 1983. "Bhute-ara".

Small shrub; young parts reddish purple, Leaves alternate, *ca* 6-13 x 5-12 cm, palmately lobed; cordate or subcordate at base; lobes elliptic, acute; margins, petioles and stipules glandular hairy. Flowers purplish red, in subcorymbose cymes; bracts lanceolate. Sepals *ca* 0.4 cm long, glandular hairy, persistent. Petals *ca* 0.5 cm long, ovate-elliptic. Stamens basally connate. Capsules *ca* 1.5 in diam, oblong, 3 lobed.

Fls. & Frts.: August - December.

Occurrence: Occassionally, along roadside of the area.

Distribution: Assam, Tripura, West Bengal; **Native of Brazil.**

Specimen examined: Guvali; *Bora* 14741 (NEHU).

14. *Mallotus* Lour.

Lour., Fl. Cochinch. 635. 1790.

Shrubs or trees. Leaves often glandular below. Flowers monoecious or dioecious in terminal or axillary, simple or panicled racemes. Male flowers clustered in the axil of bracts; calyx 3-5 partite, valvate; stamens many, exserted. *Female flowers solitary; calyx 3-6 lobed or partite; ovary 3-4* celled; ovules 1 in each cell; styles 3. Fruit a capsule of 3 or 4 cocci.

About 140 species distributed in Indo-Malaysia to E. Asia, Fiji, East Australia, Tropical Africa, Madagascar; 20 species in India; 3 species in the study area.

Key to the species

1a. Plants large scandent shrub .... 2. ***M. repandus***

1b. Plants small or middle sized tree:

2a. Leaves ovate-lanceolate; capsules covered with red granules .... 1. ***M. philippensis***

2b. Leaves ovate-orbicular; capsules spiny .... 3. ***M. roxburghianus***

1. **Mallotus philippensis** (Lamk.) Muell. Arg. in Linnaea 34: 196. 1865-66; Hook. f., Fl. Brit. Ind. 5: 442. 1887; Kanjilal *et al.*, Fl. Assam 4: 216. 1940; Haridasan & Rao, For. Fl. Meghalaya 2: 796. 1987. Croton philippense Lamk., Encycl. 2: 206. 1786. "Luchan".

Small, evergreen tree, young parts pubescent, bark dark grey. Leaves *ca* 5-18 x 3-85 cm, ovate-lanceolate, acuminate, rounded or cuneat at base, 3 nerved, entire, glandular beneath. Flowers whitish yellow, unisexual, in axillary racemes or spikes. Calyx 4, *ca* 0.3-0.5 cm long, ovate-lanceolate. Ovary glandular; styles papillose. Capsule *ca* 0.8 cm in diam., globose, 3 lobed, red granulated outside.

Fls. & Frts.: October - May.

Occurrence: Common, throughout the sanctuary.

Distribution: Throughout tropical India; **Australia, China, Malaya.**

Specimen examine Haduk, Kamarpur; *Bora* 14712 (NEHU).

Uses: Fruits used for preparing red dye.

2. **Mallotus repandus** (Willd.) Muell. Arg. in Linnaea 34: 197. 1865; Hook. f., Fl. Brit. Ind. 5: 442. 1887; Kanjilal *et al.*, Fl. Assam 4: 216. 1940; Deb, Fl. Tripura 1: 343. 1981. *Croton repandus* Willd. in Neue Schrift. Naturf. Freurtde Berlin 4: 206. 1803. **Fig. 45**

Large scandent deciduous shrub; young parts tomentose. Leaves alternate, *ca* 4-16 x 3-9 cm, ovate, acute truncate or rounded at base, 3 nerved, tomentose beneath. Flowers unisexual in paniculate racemes; bracts *ca* 0.2 cm long, peristent. Male flowers *ca* 0.6 cm long; sepals 5, *ca* 0.4 cm long, ovate; staminal filaments filiform. Styles 2, basally connate. Capsules stellately tomentose.

Fls. & Frts.: December - April.

Occurrence: Common, in the hilly forest and occasionally in the plain forest of the sanctuary.

Distribution: Throughout India; Bhutan, China, Malay, New Caledonia, North East Australia.

Specimen examined: Burha Mayong, Thengbhanga; *Bora* 14817 (NEHU).

3. *Mallotus roxburghianus* Muell. Arg. in Linnaea 34: 188. 1865; Hook. f., Brit. Ind. 5: 428. 1887; Kanjilal *et al.*, Fl. Assam 4: 214. 1940; Haridasan & Rao, For. Fl. Meghalaya 2: 796. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 278. 1996.

Small tree, bark greyish brown. Leaves *ca* 10-28 x 5-15 cm, broadly ovate-orbicular, acuminate, rounded at base, tomentose beneath. Flowers yellow, unisexual, in terminal panicled racemes. Calyx 5 partite. Capsules *ca*



Fig. 45: ***Mallotus repandus*** (Willd.) Muell. (Euphorbiaceae)

0.8-1.0 cm in diam., 3 lobed, spiny.

Fls. & Frts.: October - April.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: North East India, Sikkim Himalaya; Bangladesh, Myanmar.

Specimen examined: Dhekiabari; *Bora* 15062 (NEHU).

Notes: Probably confined to Eastern Himalaya and North East India and extent upto the neighbouring countries.

15. *Phyllanthus* Linn.

Linn., Sp. Pl. 981. 1753 & Gen. Pl. ed. 5. 422. 1754.

Herbs, shrubs or trees. Leaves alternate, penninerved, stipulate. Flowers monoecious, axillary clustered or solitary. Sepals 4-6, free or basally connate. Stamens 2-5. Ovary usually 3-celled; styles 3. Disk cupular or glandular. Fruits loculicidal capsule, drupe or berry. Seeds triquetrous without caruncle.

About 600 species distributed in tropical and sub-tropical regions; 40 species in India; 7 species in the study area.

Key to the species

1a. Plants herb or undershrub:

2a. Leaves elliptic-ovate, acute .... 1.*P. airy-shawii*

2b. Leaves obovate-oblong or linear-oblong, mucronate:

3a. Anthers didymous; silts very short

.... 6. *P. virgatus*

3b. Anthers erect; silts vertical

.... 7. *P. urinaria*

1b. Plants shrub or tree:

4a. Trees; stamens 3 .... 2. *P. emblica*

4b. Shrubs; stamens 4 or 5:

5a. Plants often spiny; stamens in 2 series

.... 5. *P. reticulatus*

5b. Plants not spiny; stamens in 1 series:

6a. Stamens 5, free

.... 3. *P. glaucus*

6b. Stamens 4, connate into a column

.... 4. *P. hamiltonianus*

1. *Phyllanthus airy-shawii* Brunel ex Roxb. in Taxon 37(2): 469. 1988; *P. debilis* Klein ex Willd., Sp. Pl. 4: 582. 1805; Hook. f., Fl. Brit. Ind. 5: 299. 1887; Kanjilal *et al.*, Fl. Assam 4: 155. 1940.

Erect herb or undershrub. Leaves *ca* 1.0-2.5 x 0.5-15 cm, elliptic-ovate, acute, rounded at base. Flowers pale yellow, in axillary clusters. Sepals 6, *ca* 0.2 cm long, obtuse. Stamens 3, connate. styles 2 fid. Capsules *ca* 0.3 cm in diam., 3 valved.

Fls. & Frts.: June - October.

Occurrence: Common, in moist shady places.

Distribution: Assam, Meghalaya, Sikkim, North and West India; Trpocal

Africa.

Specimen examined: Guvali; *Bora* 15474 (NEHU).

2. ***Phyllanthus emblica*** Linn., Sp. Pl. 982. 1753; Hook. f., Fl. Brit. Ind. 5. 289. 1887; Shukla in Mudgal *et al.*, Fl. M.P. 2: 572. 1997. ***Emblica officinalis*** Gaertn., Fruct. Sem. Pl. 2: 122. t. 108. 1790; Kanjilal *et al.*, Fl. Assam 4: 159. 1940. **"Amlakhi".**

Deciduous tree; bark greyish. Leaves *ca* 0.6-1.2 x 2.3-0.3 cm, oblong, obtuse to subacute, obliquely subcordate at base; stipules *ca* 0.1 cm long, ovate. Flowers greenish yellow, in axillary clusters. Sepal 6, *ca* 0.1 cm long oblong. Stamens 3, connate. Styles basally connate. Drupes *ca* 2 cm in diam., globose. Seeds 3 angled.

Fls. & Frts.: December - April.

Occurrence: Common, in the hilly forest and occasionally in the plain forest of the sanctuary.

Distribution: Throughout India; China, Malaysia, Sri Lanka.

Specimen examined: Haduk; *Bora* 15275 (NEHU).

Uses: Fruits edible and taken in indigestion also; root extract taken in asthmatic trouble.

3. ***Phyllanthus glaucus*** Wall. ex Muell. Arg. in Linnaea 32: 14. 1863; Hook. f., Fl. Brit. Ind. 5: 288. 1887; Haridasan & Rao, For. Fl. Meghalaya 2: 798 1987. *Flueggeopsis glauca* (Wall.) Das in Kanjilal *et al.*, Fl. Assam 4: 158. 1940.

Shrub. Leaves *ca* 1.0-4.5 x 0.8-2.5 cm, elliptic-obovate or obovate-oblong, acute, rounded or narrowed at base. Flowers greenish yellow, axillary. Calyx segments 5. Stamens 5, free. Berries *ca* 0.4 cm in diam., globose, 3 seeded.

Fls. & Frts.: May - September.

Occurrence: Common, along roadside and forest margins of the sanctuary.

Distribution: Assam, Meghalaya, Central and Eastern Himalaya; Bhutan, China, Nepal.

Specimen examined: Kamarpur; *Bora* 15061 (NEHU).

4. *Phyllanthus haimiltonianus* Muell. Arg. in Linnaea 34: 75 & DC., Prodr. 15. 2. 424; Hook. f., Fl. Brit. Ind. 5: 304. 1887. *Reidia Hamiltoniana* (Muell.) Cour.; Kanjilal *et al.*, Fl. Assam 4: 156. 1940.

Shrub. Leaves *ca* 15-6 x 1-3 cm, elliptic-ovate, obtuse or acute, rounded at base; stipules caducous. Male flowers in axillary clusters; sepals 4 toothed; stamens 4, connate into a short column. Female flowers axillary, solitary; sepals slightly toothed; ovary 4-celled; styles 4. Fruits *ca* 0.3 cm in diam., globose, pubescent.

Fls. & Frts.: May - August.

Occurrence: Common, along roadside in the hilly forest, occasionally in the plain forest of the sanctuary.

Distribution: Assam, Tripura Sikkim Himalaya.

Specimen examined: Rangamati, Thengbhanga; *Bora* 14758 (NEHU).

Notes: Confined to Eastern Himalaya.

5. *Phyllanthus reticulatus* Poir. in Lamk., Encyl. 5: 298. 1804; Hook.f., Fl. Brit. Ind. 5: 288. 1887; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 280. 1996. *Kirganelia reticulata* (Poir.) Baill., Etude. Gen. Euphorb. 613. 1858; Kanjilal *et al.*, Fl. Assam 4: 159. 1940.

Straggling shrub; stem spinescent. Leaves *ca* 1.5-5.0 x 0.5-3.0 cm, elliptic-oblong, obtuse to acuminate at base, canescent beneath; stipules *ca* 1.2 cm long, lanceolate. Male flowers pedicelate; sepals *ca* 0.2 cm long, unequal; stamens 5 in 2 serries with inner connate. Female flowers solitary. Barries *ca* 0.5 cm in diam., globose, dark purple.

Fls. & Frts.: March - September.

Occurrence: Common, in the hilly forest of the sanctuary.

Distribution: Throughout India; Africa, China, Malaysia, Sri Lanka.

Specimen examined: Rangamati; *Bora* 15472 (NEHU).

6. *Phyllanthus urinaria* Linn., Sp. Pl. 982. 1753; Hook. f., Fl. Brit. Ind. 5: 293. 1887; Kanjilal *et al.*, Assam 4: 155. 1940; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 280. 1996. *P. leprocarpus* Wight, Icon. Pl. Ind. Orient. 5(2): t. 1895. 1852.

Erect herb. Leaves *ca* 5-2 x 0.2 0.6 cm, obovate-oblong, obtuse-mucronate, unequal at base, sessile; stipules *ca* 0.5 cm long, lanceolate. Male flowers in clusters; sepals *ca* 0.6 cm long, oblong-obovate; stamens 3. Female flowers solitary: sepals *ca* 0.7 cm long, linear-oblong. Capsules *ca* 0.2 in diam., verrucose, globose.

Fls. & Frts.: June - November.

Occurrence: Common, in grassland, along roadside and forest floors of the sanctuary.

Distribution: Throughout India; Pantropic.

Specimen examined: Haduk; *Bora* 14746 (NEHU).

7. *Phyllanthus virgatus* G. Forst., Fl. Ins. Austr. 65. 1786; Shukla in Mudgal *et al.*, Fl. M.P. 2: 575. 1997. *P. simplex* Retz., Observ. Bot. 5: 29. 1788; Hook. f., in Fl. Brit. 5: 295. 1887; Kanjilal *et al.*, Fl. Assam 4: 153. 1940.

Erect or ascending herb. Leaves *ca* 1.0-2.5 x 0.3-0.6 cm, linear-oblong, mucronate, rounded at base. Flowers white, in axillary clusters or solitary. Male flowers shortly pedicelate; sepals 6, *ca* 0.7 cm long oblong; stamens 3; anthers didymous, free. Females larger and longer than male; sepals as in male. Capsules *ca* 0.2 cm in diam., globose, long stalked.

Fls. & Frts.: June - November.

Occurrence: Common, along roadside and grassland.

Distribution: Throughout India; Tropical and subtropical Asia.

Specimen examined: Haduk, Jugdal; *Bora* 14757 (NEHU).

16. *Ricinus* Linn.

Linn., Sp. Pl. 1007. 1753 & Gen. Pl. ed. 437. 1754.

Monotypic genera, distributed throughout the tropics.

Ricinus communis Linn., Sp. Pl. 1007. 1753; Hook. f., Fl. Brit. Ind. 5: 457. 1887; Fisher in Rec. Bot. Surv. Ind. 12(2): 130. 1938; Kanjilal *et al.*, Fl. Assam 4: 221. 1940; Deb, Fl. Tripura 1: 349. 1983; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 280. 1996. "Eragach".

Small to large evergreen shurb. Leaves alternate, long petiolate, 6-11 lobed; lobes ovate-lanceolate, acuminate, serrate. Flowers pale yellowish, monoecious, in terminal, pyramidal, leaf-opposed panicles. Male flowers *ca* 1 cm long; tepals *ca* 0.5 cm long, ovate-lanceolate, glandular; stamens many in branched fascicles. Female tepals *ca* 0.8 cm long. Capsules 3-lobed, echinate.

Fls. & Frts.: Major part of the year.

Occurrence: Throughout India; Native of tropical Africa.

Specimen examined: Haduk; *Bora* 15301 (NEHU)

Uses: Leaves used for rearing silk worms and leaf paste applied in skin diseses.

17. *Sapium* P. Br.

P. Br., Hist. Jamaica 338. 1756.

About 120 species distributed in tropical and subtropical regions; 4 species in India; one species in the study area.

Sapium baccatum Roxb., Fl. Ind. 3: 694. Hook. f., Fl. Brit. Ind. 5: 470. 1887; Kanjilal *et al.*, 4: 206. 1940; Deb, Fl. Tripura 1: 350. 1983; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 281. 1996. *Exoecaria baccata* Muell.-Arg. in DC., Prodr. 15(12): 1211. 1866. "Seleng". Fig. 46

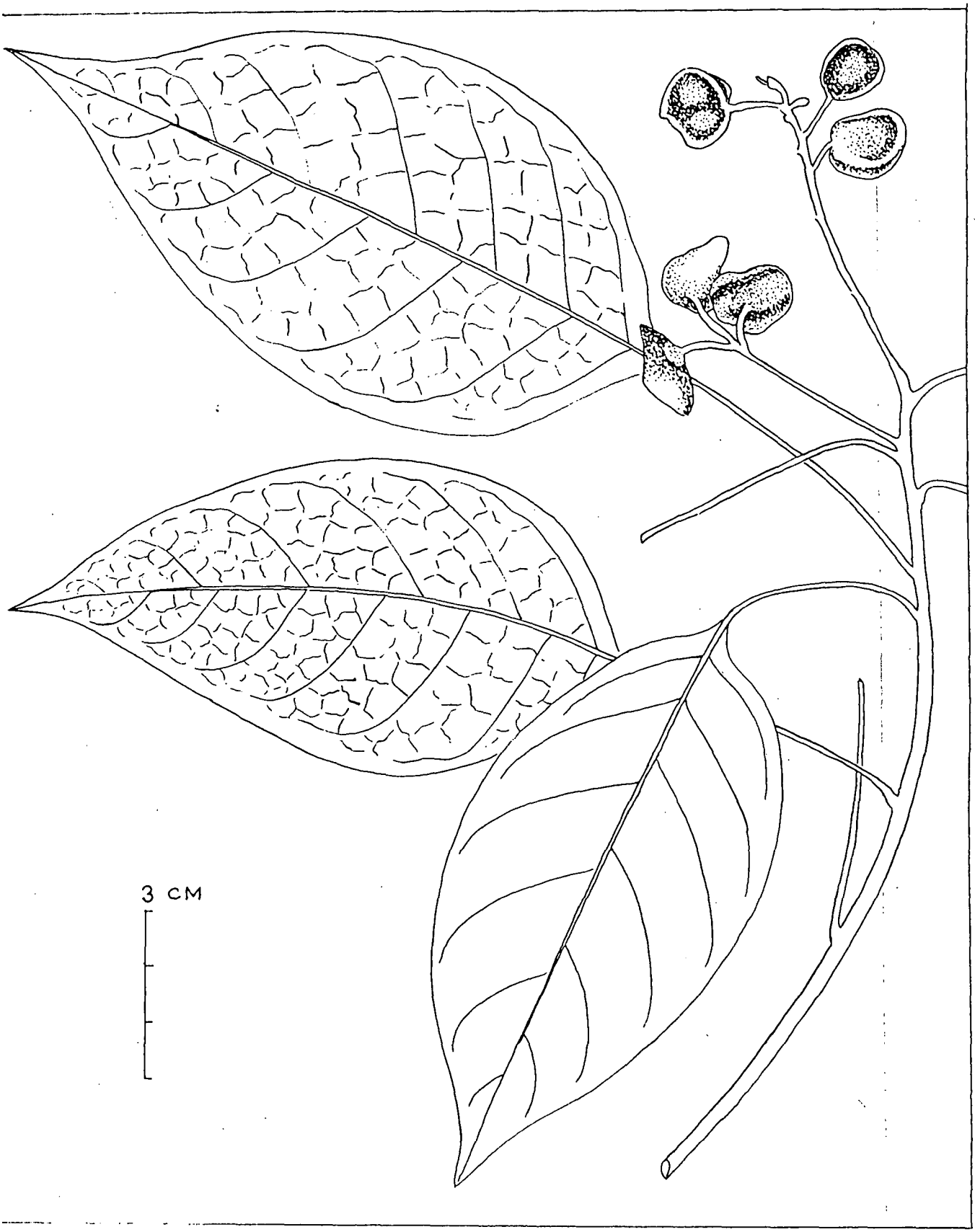


Fig. 46: ***Sapium baccatum*** Roxb. (Euphorbiaceae)

Middle sized deciduous tree. Leaves alternate, *ca* 4.5-16.0 x 2.5-9.5 cm, ovate or ovate-lanceolate, acuminate, rounded at base, entire, long petiolate. Flowers pale yellow, monoecious, in panicled spikes, bracteate. Calyx 3 toothed, unequal. Stamens 2, didynamous. Style 3 fid. Fruits globose, purplish-black when mature.

Fl. & Frt.: April - September.

Occurrence: Common, in the hilly forest and occasionally in the plain forest of the sanctuary.

Distribution: North East India; Bhutan, China, Malaya, Myanmar, Nepal.

Specimen examined: Dhekiabari; *Bora* 15383 (NEHU).

18. *Securingea* Comm.

Comm. ex Juss., Gen. 388. 1789, *nom. cons.*

About 20 species in tropical and subtropical regions; 3 species in India; one species in the study area.

Securingea virosa (Roxb. ex Willd.) Baill. in Adansonia 6: 334. 1866; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 281. 1996. *Phyllanthus virosus* Roxb. ex Wild., Sp. Pl. 4: 578. 1805. *Flueggea microcarpa* Bl., Bijdr. 580. 1825; Hook. f., Fl. Brit. Ind. 5: 328. 1887. *F. virosa* (Willd.) Baill., Etudes Gen. Euphorb. 593. t. 39. 1850; Kanjilal *et al.*, Fl. Assam 4: 160. 1940.

Shurb, glabrous; branchlets angular. Leaves *ca* 2-6 x 1.2-3.0 cm, ovate, rounded at apex, mucronate, acute at base, entire; stipules lanceolate. Flowers greenish yellow, in axillary clusters. Male flowers pedicelate; sepals

ca 0.1 cm long, concave; stamens 5, free. Female flowers shortly pedicelate; styles persistent. Capsules *ca* 0.4 cm in diam., globose, flesy, white.

Fls. & Frts.: July - September.

Occurrence: Common, along roadside in the hilly forest of the sanctuary.

Distribution: Throughout India; Australia, China, Malaya, Tropical Africa.

Specimen examined: Burha Mayong; *Bora* 14807 (NEHU).

19. *Suregada* Roxb. ex Rottl.

Roxb. ex. Rottl. in Gesell. Nat. Freun. 11. 4: 206. 1803.

About 40 species distributed in tropical Africa, Madagascar, South East Asia; 3 species in India; one species in the study area.

Suregada multiflora (Juss.) Baillon, Etud. Gen. Euphorb. 396. 1858. *Gelonium multiflorum* Juss., Euphorb Tent 3: t. 10. f. 31 A. 1824; Hook. f., Fl. Brit. Ind. 5: 459. 1887; Kanjilal *et al.*, Fl. 4: 200. 1940.

Small tree. Leaves alternate, *ca* 6.0-12.5 x 2.1-5.5 cm, elliptic or elliptic-oblong, acute, cuneate at base. Flowers clustered in the nodes. Male flowers many in axillary sessile clusters; tepals *ca* 0.4 cm long, concave; stamens many. Female flowers few in axillary clusters; sepals *ca* 0.3 cm long, pubescent. Fruits trigonous, 3 groved.

Fls. & Frts.: March - July.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Eastern India; **Bangladesh, China, Myanmar, Thailand.**

Specimen examined: Burha Mayong; *Bora* 15173 (NEHU).

20. Trewia Linn.

Linn., Sp. Pl. 1193. 1793 & Gen. Pl. 500. 1754.

About 5 species distributed in tropical Asia; 2 species in India; one species in the study area.

Trewia nudiflora Linn., Sp. Pl. 1193. 1753; Hook. f., Fl. Brit. Ind. 5: 423. 1887; Kanjilal *et al.*, Fl. Assam, 4: 212. 1940; Airy Shaw in Kew Bull. 26(2): 343. 1972; Deb, Fl. Tripura 1: 354. 1983; Haridasan & Rao, For. Fl. Meghalaya . "Bhelkor".

Deciduous tree; young parts pubescent. Leaves opposite broadly ovate, acuminate, subcordate-truncate at base, entire, 3-5 nerved. Flowers greenish white, in long racemes. Male flowers *ca* 0.5 cm long; tepals *ca* 0.2 cm long, ovate, caducous, tomentose outside; stamens *ca* 0.3 cm long. Female flowers *ca* 0.8 cm long; styles 2. Drupes *ca* 2.5 cm in diam., globose.

Fls.: February - April & Frts.: May - October.

Occurrence: Common, along roadside, forest margins and water sources of the sanctuary; one among dominant trees in the plain forest of the sanctuary.

Distribution: Throughout India; **Malaysia, Sri Lanka, Thailand.**

Specimen examined: Haduk; *Bora* 14710 (NEHU).

Uses: Timber used for making agricultural implements and other construction purposes.

98. ULMACEAE

Mirbel, Elem. Phys. Veg. Bot. 2: 905. 1815.

Trees or shrubs. Leaves alternate, oblique, stipulate. Flowers usually bisexual, fascicled. Petals absent. Calyx 4-8 lobed, persistent. Stamens equal and opposite to calyx lobes. Pistil bicarpellary. Ovules solitary. Fruits compressed, dry or thinly fleshy, often winged or appendiculate.

The family comprises 15 genera and about 200 species, distributed in tropical and temperate regions; 5 genera and 18 species in India; 2 genera and 2 species in the study area.

Key to the genera

1a. Trees; leaves almost glabrous;
flowers pedicellate .... 1. *Celtis*

1b. Shrubs or small trees; leaves tomentose;
flowers subsessile .... 2. *Trema*

1. *Celtis* Linn.

Linn., Sp. Pl. 1043. 1753 & Gen. Pl. ed. 5. 1143. 1754.

About 80 species distributed in tropical and temperate regions; 8 species in India; one species in the study area.

Celtis tetrandra Roxb., Fl. Ind. 2: 63. 1832; Hook. f., Fl. Brit. Ind. 5: 482. 1888; Kanjilal *et al.*, Fl. Assam 4: 51. 1940; Hanidasan & Rao, For. Fl. Meghalaya 2: 806. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 282.

1996. *C. napalensis* Planch. in Ann. Sci. Nat. Bot. ser 3. 10: 298. 1848. "Mirsukuta".

Large tree; bark dark grey. Leaves *ca* 3.5-11.5 x 2.0-6.5 cm, ovate, ovate-elliptic, acute, oblique at base, serrate, pubescent beneath; stipules linear. Flowers greenish, *ca* 0.5 cm long, in tomentose cymes. Tepals 4, ciliate. Stamens 4. Drupes *ca* 0.6 cm in diam., globose.

Fls. & Frts.: January - August.

Occurrence: Occasionally, scattered in the hilly forest of the sanctuary.

Distribution: Throughout India; China, Malaysia, Myanmar, Nepal.

Specimen examined: Dhekiabari; *Bora* 15364 (NEHU).

2. Trema Lour.

Lour., Fl. Cochinch. 562. 1790.

About 30 species distributed in tropical and subtropical regions; 4 species in india; one species in the study area.

Trema orientalis (Linn.) Bl., Mus. Bot. 2: 62. 1856; Hook. f., Fl. Brit. Ind. 5: 484. 1888; Kanjilal *et al.*, Fl. Assam 4: 230. 1940; Deb, Fl. Tripura 1: 206. 1983; Haridasan & Rao, For. Fl. Meghalaya 2: 808. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 283. 1996. *Celtis orientalis* Linn., Sp. Pl. 1044. 1753.

Shurb; branches spreading or scandent; bark fibrous. Leaves *ca* 3.8-13.5 x 1.5-4.5 cm, ovate or elliptic- lanceolate, acuminate, obliquely subcordate

at base, serrate, scabrous above, silky tomentose beneath. Flowers white, unisexual, in axillary subsessile cymes. Tepals 5, *ca* 0.2 cm long, hairy. Stamens 5. Style hairy. Drupes *ca* 0.4 cm in diam., subglobose.

Fls. & Frts.: March - August.

Occurrence: Occasionally, scattered throughout the sanctuary.

Distribution: North East India, South India; Australia, China, Malaysia, Tropical Africa.

Specimen examined: Dhekiabari; *Bora* 15455 (NEHU).

99. CANNABACEAE

Endl., Gen. Pl. 286. 1837.

Erect or scandent herbs. Leaves stipulate. Flowers dioecious, axillary. Male flowers: Paniculate; calyx 5 partite; stamens 5; anthers erect in buds. Female flowers: sessile, crowded or strobilate with persistent bracts; calyx closely enveloping the ovary; style 2 partite; ovary 1-celled; ovule solitary. Fruit an achene within persistent perianth.

The family comprises 2 genera and 3 species, mostly distributed in northern temperate zones; 2 genera and 2 species in India; one species in the study area.

Cannabis Linn.

Linn., Sp. Pl. 1027. 1753 & Gen. Pl. ed. 5. 1115. 1754.

Monotypic genus, native of Central Asia.

Cannabis sativa Linn., Sp. Pl. 1027. 1753; Hook. f., Fl. Brit. Ind. 5: 487. 1888; Kanjilal *et al.*, Fl. Assam 4: 278. 1940. "Bhang".

Aromatic herb. Leaves alternate; upper ones often 1-3 and lower ones 5-11 foliolate; leaflets *ca* 5-12 x 0.2 -1.5 cm, lanceolate, serrate, acuminate, sessile, pubescent; stipules lateral. Flowers white, small. Male flowers in axillary panicled cymes; tepals ciliate; stamens exserted. Female flowers axillary, solitary; bracts leafy, glandular, pubescent; tepals absent. Fruits compressed crustaceous nut.

Fls. & Frts.: April - December.

Occurrence: Occasionally, along roadside throughout the sanctuary.

Distribution: Throughout India; Africa, America, Malaysia, Myanmar.

Specimen examined: Kamarpur; *Bora* 15057 (NEHU).

100. MORACEAE

Link, Handb. 2: 444. 1831.

Trees, shrubs or rarely herbs, with milky or watery latex. Leaves stipulate. Flowers unisexual, in heads, disks or hollow receptacles. Perianth segments 4. Stamens equal to perianth segments or less. Pistil bicarpellary; ovule solitary, pendulous. Fruit a small achene, nut or drupe.

The family comprises about 75 genera and about 1850 species, distributed in tropical and subtropical regions; 9 genera and about 104 species in India; 6 genera and 17 species in the study area.

Key to the genera

1a. Plants armed .... 2. *Cudrania*

1b. Plants unarmed:

2a. Flowers on or within a fleshy receptacle:

3a. Flowers exposed on the receptacle .... 1. *Artocarpus*

3b. Flowers enclosed within the receptacle .... 3. *Ficus*

2b. Flowers in spikes or heads:

4a. Flowers in heads .... 5. *Poikilospermum*

4b. Flowers in spikes or heads:

5a. Female flowers in spikes; perianth fleshy in fruits .... 4. *Morus*

5b. Female flowers solitary; perianth perianth not fleshy in fruits .... 6. *Streblus*

1. *Artocarpus* Forst.

J. R. et G. A. Forst., Char. Gen. Pl. 101. 1776, *nom. cons.*

Trees, monoecious. Flowers unisexual, densely crowded on axillary, solitary, receptacles. Male perianth 2–4 lobed; stamen 1; pistillode absent. Female perianth tubular confluent below with the receptacle; ovary 1-celled. Fruit a syncarp, fleshy.

About 110 species distributed in tropics; 18 species in India; 2 species

in the study area.

Key to the species

1a. Leaves glabrous; syncarp large, cylindric tubercled .... 1. ***A. heterophyllus***

1b. Leaves pubescent beneath; syncarp smallar than above, subglobose .... 2. ***A. lakoocha***

1. *Artocarpus heterophyllus* Lamk., Encyl. 3: 209. 1789; Haridasan & Rao, For. Fl. Meghalaya 2: 814. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 284. 1996. *A. integrifolia auct. non*, Linn. f., 1782; King in Hook. f., Fl. Brit. Ind. 5: 541. 1988; Kanjilal *et al.*, Fl. Assam 4: 268. 1940. "Kathal".

Evergreen tree. Leaves *ca* 5-18 x 4-9 cm, elliptic or obovate, coriaceous, cuneate at base, dark green above, stipules large, caducous. Flowers in cylindrical axillary and terminal heads, embraced by leathery, caducous sheath. Perianth 2 lobed. Stigma spathulate in female heads. Fruits oblong, tubercled.

Fls. & Frts.: March - August.

Occurrence: Common, along roadside and foot hill.

Distribution: Throughout India; Malaysia.

Specimen examined: Guvali; *Bora* 15453 (NEHU).

Uses: Fruits edible. Timber used for making agricultural and weaving implements and other construction purposes.

2. *Artocarpus lakoocha* Roxb., Fl. Ind. 3: 524. 1832; King in Hook. f, Fl. Brit. Ind. 5: 543. 1889; Kanjilal *et al.*, Fl. Assam 4: 268. 1940; Khanna

et al. in Mudgal *et al.*, Fl. M.P. 2: 606. 1997.

Deciduous tree; bark dark brown; young parts tomentose. Leaves *ca* 10-25 x 6-15 cm, elliptic-ovate or oblong, entire or denticulate, acute to acuminate, pubescent beneath; stipules caducous. Flowers orange yellow, in axillary globose or ovoid, shortly stalked heads. Male heads ovoid. Female heads subglobose with exserted style. Fruits *ca* 6 cm in diam., subglobose, irregularly lobulate.

Fls. & Frts.: March - August.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: North East India, North India, Sub-Himalayan regions, Andaman; Bangladesh, China, Myanmar.

Specimen examined: Hiloikhunda; *Bora* 15363 (NEHU).

Uses: Timber used for agricultural and waeving implements and other construction purposes.

2. *Cudrania* Trec.

Trec. in Ann. Soc. Nat. Ser. 3. 8: 122. t. 3. 1847.

About 8 species distributed in tropic of the old world; 2 species in India; one species in the study area.

Cudrania cochinchinensis (Lour.) Kudo-Masam. in Ann. Rep. Taihoku Bot. Gard. 2: 27. 1932; Haridasan & Rao, For. Fl. Meghalaya 2: 815. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 284. 1996. *C. javanensis* Trec. in Ann. Sci. Nat. Ser. 3, 8: 123. 1847; King in Hook. f., Fl. Brit. Ind. 5: 538. 1888; Kanjilal *et al.*, Fl. Assam 4: 270. 1940.

Scandent, thorny shrub. Leaves alternate, *ca* 4-11 x 2-5 cm, elliptic-obovate or oblong-elliptic, acute or obtuse. Flowers greenish yellow, dioecious, in heads. Fruiting calyx with enlarged bracts, densely crowded into a syncarp. Fruits globose.

Fls. & Frts.: April - December.

Occurrence: Rare, occurs along water bodies in the plain forest.

Distribution: North East India, Sikkim, Uttar Pradesh; Africa, Australia, Bangladesh, Malaysia, Myanmar, Sri Lanka.

Specimen examined: Haduk; *Bora* 15478 (NEHU).

3. *Ficus* Linn.

Linn., Sp. Pl. 1059. 1753 & Gen. Pl. ed. 5. 483. 1759.

Shrubs or trees, staggling or erect, often epiphytic, juice milky. Flowers monoecious in hypanthodium; mouth closed by imbricate bracts; flowers as male, female, gall and nuter type. Male tepals 2-7, free or connate; stamens 1-7. Female tepals as in male; ovules 1-celled. Gall flowers dispersed; tepals as male. Nuter flowers presence or absent. Fruit an achene, enclosed in the receptacle.

About 1000 species distributed in tropical and subtropical regions; 70 species in India; 11 species in the study area.

Key to the species

1a. Plants scandent or trailing shrub

.... 6. *F. heterophylla*

1b. Plants not scandent:

2a. Leaves opposite .... 7. *F. hispida*

2b. Leaves alternate:

3a. Receptacles enclosed in a calyptrate involucre .... 1. *F. altissima*

3b. Receptacles not enclosed in calyptrate involucre:

4a. Male, female and gall flowers in the same receptacle:

5a. Male perianth gamophylous .... 5. *F. geniculata*

5b. Male perianth 2-4 partite:

6a. Receptacles peduncled .... 8. *F. nervosa*

6b. Receptacles sessile:

7a. Leaf obtuse or bluntly acuminate; stipules rusty tomentose:

8a. Receptacles *ca* 2-3.5 cm in diam. ..... 4. *F. drupacea*

8b. Receptacles *ca* 1-2 cm in diam. .... 2. *F. benghalensis*

7b. Leaves apex acuminate; stipules glabrous:

9a. Leaves caudate acuminate;
stipules ovate ... 10. ***F. religiosa***

9b. Leaves acuminate;
stipules lanceolate .... 3. ***F. benjamina***

4a. Male, female and gall flowers
not in the same receptacle:

10a. Leaf base rounded or acute;
male flowers diandrous .... 9. ***F. racemosa***

10b. Leaf base unequal or cordate;
male flowers monandrous ... 11. ***F. semicordata***

1. ***Ficus altissima*** Bl., Bijdr. 444. 1825; King in Hook. f., Fl. Brit. Ind. 5: 504. 1888; Kanjilal *et al.*, Fl. Assam 4: 241. 1940; Haridasan & Rao, For. Fl. Meghalaya 2: 820. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 284. 1996.

Large tree. Leaves *ca* 8-16 x 4-8 cm, ovate-elliptic, obtuse, rounded at base; stipules lanceolate. Receptales *ca* 2.5 cm in diam., globose, sessile in pairs.

Fls. & Frts.: October - June.

Occurrence: Common, in the hilly forest.

Distribution: North East India, South India; **China, Malaysia, Myanmar,** Nepal.

Specimen examined: Burha Mayong; *Bora* 14840 (NEHU).

2. ***Ficus benghalensis*** Linn., Sp. Pl. 1059. 1753; King in Hook. f., Fl. Brit. Ind. 5: 499. 1888; Kanjilal *et al.*, Fl. Assam 4: 240. 1940; Haridasan &

Rao, For. Fl. Meghalaya 2: 820. 1987. *F. indica* Linn., Sp. Pl. 1060. 1753. "Brat, Bor gach".

Evergreen tree; branches spreading; aerial roots forming prop roots. Leaves alternate, *ca* 10.0-18.5 x 6-12 cm, elliptic to ovate, obtuse, rounded at base, coriaceous. Receptacles globose, *ca* 1.5 cm in diam., axillary, sessile, paired, red when ripe; basal bracts 3. Tepals 3, lanceolate.

Fls. & Frts.: April - November.

Occurrence: Common, along roadside of the area.

Distribution: Throughout India; Bangladesh.

Specimen examined: Haduk; *Bora* 15437 (NEHU).

3. *Ficus benjamina* Linn., Mant. 129. 1767; King in Hook. f., Fl. Brit. Ind. 5: 508. 1888; Kanjilal *et al.*, Fl. Assam 4: 143. 1990; Deb, Fl. Tripura 1: 212. 1981; Haridasan & Rao, For. Fl. Meghalaya 2: 821. 1987. *F. nitida* Thunb., Diss. Fic. 10. 1786. "Jari gach".

Tree; branches spreading, drooping. Leaves *ca* 3-12 x 1.5-6.0 cm, ovate-elliptic, acuminate, narrowed at base, entire; stipules *ca* 1 cm long, lanceolate. Receptacle *ca* 1 cm in diam., globose or ovoid, paired, red when ripe. Male flowers shortly pedicellate; stamen 1. Female flowers sessile.

Fls. & Frts.: October - April

Occurrence: Occasionally, along roadside of the area.

Distribution: Throughout India; China, Malaysia, North Australia.

Specimen examined: Haduk; *Bora* 15486 (NEHU).

4. *Ficus drupacea* Thunb. var. *pubescens* (Roth.) Corner in Gard. Bull. Straits Settlem. 17: 381. 1960; Deb, Fl. Tripura 1: 213. 1981; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 285. 1996. *F. mysorensis* Hyne ex Roth., Nor. Sp. 390. 1821; King in Hook. f., Fl. Brit. Ind. 5: 500. 1888; Kanjilal *et al.*, Fl. Assam 4: 240. 1940. "Dhopabor".

Laege tree, young parts tomentose. Leaves *ca* 9.5-25.5 x 4.5-13.2 cm, broadly elliptic or ovate-elliptic, bluntly acuminate, subcordate at base, entire. Receptacles globose, *ca* 2.5-3.0 cm in diam., orange red when mature.

Fls. & Frts.: October - April.

Occurrence: Occasionally, in the hilly forest.

Distribution: North East India, Western Ghats; Bangladesh, Myanmar, Sri Lanka.

Speciemen examined: Dhekiabari; *Bora* 15551 (NEHU).

5. *Ficus geniculata* Kurz. in J. As. Soc. Beng. 13. 2: 105. 1873; King in Hook. f., Fl. Brit. Ind. 5: 576. 1888; Kanjilal *et al.*, Fl. Assam 4: 248. 1940. "Tenga barat".

Large tree. Leaves ovate-oblong, acuminate, glabrous, coriaceous; stipules ovate-lanceolate. Receptacles subglobose, shortly pedunculate, axillary, solitary or paired:

Fls. & Frts.: September - March.

Occurrence: Common, in the hilly forest.

Distribution: Assam, Sikkim; Bangladesh, Bhutan.

Specimen examined: Burha Mayong; *Bora* 15484 (NEHU).

6. ***Ficus heterophylla*** Linn. f., Suppl. 442. 1782; King in Hook. f., Fl. Brit. Ind. 5: 518. 1988; Kanjilal *et al.*, Fl. Assam 4: 251. 1940; Haridasan & Rao, For. Fl. Meghalaya 2: 826. 1987. **"Lota dimaru".** **Fig. 50**

Straggling, creeping or climbing hispid shrub. Leaves alternate, polymorphic, *ca* 3-12 x 1.5-3.4 cm, ovate to elliptic-lanceolate, sometimes lobed, acuminate, rounded at base, subentire or dentate, scabrid, petiolate; stipules linear-lanceolate. Receptacles globose to pyriform, solitary axillary, stalked. Gall flowers pedicellate.

Fls. & Frts.: April - December.

Occurrence: Common, climbing, creeping on shady forest floors, along water bodies etc.

Distribution: Throughout the hotter parts of India; **Malaysia**.

Specimen examined: Thengbhanga; *Bora* 14820 (NEHU).

7. ***Ficus hispida*** Linn., f., Suppl. Pl. 442. 1782; King in Hook. f, Fl. Brit. Ind. 5: 522. 1888; Kanjilal *et al.*, Fl Assam 4: 255. 1940; Deb, Fl. Tripura 1: 215. 1983; Haridasan & Rao, For. Fl. Meghalaya 2: 826. 1987 *F. oppositifolia* Roxb., Pl. Coroman. 2: 14. t. 124. 1799. **"Khahata dimoru".**

Hispid shrub. Leaves opposite, *ca* 8-25 x 4-10 cm, broadly ovate-oblong or subovate, crenulate, acuminate, rounded or truncate at base, scabrous above, hispid beneath. minutely dentate, coriaceous. Receptacles *ca* 1.0-2.5 cm in diam., depressed globose, hispid, clustered on trunk and leafless hanging branches. Male perianth 3 lobed; stamen 1.

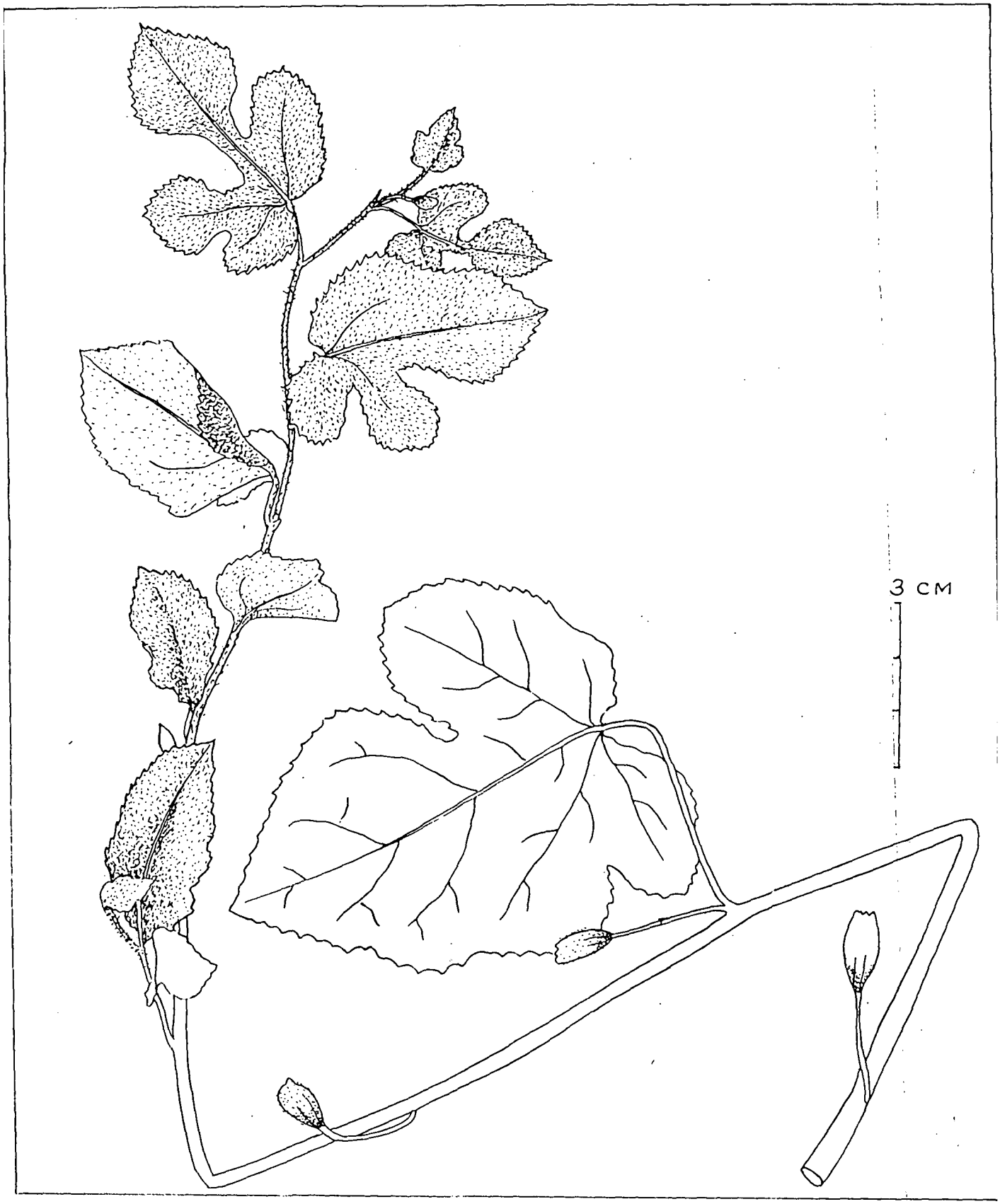


Fig. 50: ***Ficus heterophylla*** Linn. f. (Moraceae)

Fls. & Frts.: Most part of the year.

Occurrence: Common, throughout the sanctuary.

Distribution: Throughout India; **Australia, China, Malaysia, Sri Lanka.**

Specimen examined: Burha Mayong; *Bora* 15071 (NEHU).

8. ***Ficus nervosa*** Heyne ex Roth., Nov. Pl. Sp. 338. 1817; King in Hook. f., Fl. Brit. Ind. 5: 512. 1888; Kanjilal *et al.*, Fl. Assam 4: 245. 1940. Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 287. 1996.

Tree, buttresed at base. Leaves *ca* 4.5-16.5 x 2.8-7.8 cm, ovate-elliptic or ovate-lanceolate, abruptly acuminate, rounded at base, nerves prominent, much raised beneath. Receptacles axillary, globose, *ca* 0.6-0.8 cm in diam., 1-3 together, brownish when mature.

Fls. & Frts.: October - April.

Occurrence: Occasionally, in hilly forest of the area.

Distribution: North East India, Western Ghats; **Bhutan, China, Malaya, Myanmar, Sri Lanka.**

Specimen examined: Dhekiabari; *Bora* 15550 (NEHU).

9. ***Ficus racemosa*** Linn., Sp. Pl. 1060. 1753; Corner in Gard, Bull. Singapore 21: 34. 1965. *F. glomerata* Roxb., Pl. Coromen. 2: 13. t. 123. 1999; King in Hook. f., Fl. Brit. Ind. 5: 535. 1988. **"Mau dimaru".**

Decidous tree; branches pale or reddish brown. Leaves alternate, *ca* 8-18 x 3-6 cm, ovate-oblong or elliptic-lanceolate, glabrous, acute, rounded or acute at base, entire stipulate. Receptacles *ca* 2-3 cm in diam., subglobose or

pyriform, stalked, clustered on trunk or leafless branches. Male flowers in 2-3 ring; stamens 2.

Fls. & Frts.: February - September.

Occurrence: Common, along water bodies in the plain forest and throughout the hilly forest of the sanctuary.

Distribution: Throughtout India; Australia, Bangladesh, China, South East Asia.

Specimen examined: Kamarpur; *Bora* 15208 (NEHU).

10. *Ficus religiosa* Linn., Sp. Pl. 1059. 1753; King in Hook. f., Fl. Brit. Ind. 5: 513. 1888; Kanjilal *et al.*, Fl. Assam 4: 246. 1940; Haridasan and Rao, For. Fl. Meghalaya 2: 831. 1987. *F. peepul* Griff., Nat. Pl. Asiat. 4: 393. 1854. "Anhat gach".

Deciduous tree; branches spreading. Leaves alternate, *ca* 8-17 x 6-9 cm, broadly ovate, coriaceous, undulate, apex acuminate to a long tail, cordate to rounded at base, 3 nerved from base; petioles *ca* 4-9 cm long. Receptacles *ca* 1 cm in diam., subglobose, axillary, sessile, paired, dark purple when ripe; basal bracts 3, broad. Male tepals 2, ovate; stamens 1. Tepals 3-4 in female and gall flowers.

Fls. & Frts.: April - September.

Occurrence: Common, along roadside, forest margins and sometimes growing as epiphyte.

Distribution: Throughout India; Bangladesh, China, North Thailand, Vietnum.

Specimen examined: Haduk; *Bora* 15287 (NEHU).

11. *Ficus semicordata* Buha.-Hum., ex. Sm. in Rees. Encyl. 14: no. 71. 1810; Chauhan *et al.* in Namdapha (edt Hajra) 289. 1996. *F. cunia* Buch.-Ham. ex. Roxb., Fl. Ind. 3: 561. 1832; King in Hook. f., Fl. Brit. Ind., 5: 523. 1888; Kanjilal *et al.*, Fl. Assam 4: 253. 1940.

Medium sized tree; bark greyish-brown. Leaves alternate, *ca* 10-25 x 5-9 cm, oblong or elliptic-lanceolate, acute or acuminate at apex, unequal or cordate at base, entire or serrate, scabrous, petiolate. Receptacles *ca* 1.5 cm in diam., globose or pyriform, paired or clustered on leafless drooping branches from main trunk, hispid; basal bracts 3. Male and gall flowers shortly pedicellate. Stamen 1.

Fls. & Frts.: August - November.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: North East India, Sikkim, Uttar Pradesh, Kashmir; China, Malaysia, Myanmar, Nepal.

Specimen examined: Burha Mayong; *Bora* 15165 (NEHU).

4. *Morus* Linn.

Linn., Sp. Pl. 986. 1753 & Gen. Pl. ed. 5: 424. 1754.

60 species distributed in tropical and temperate regions, 5 species in India; one species in the study area.

Morus macroura Miq., Pl. Jungh 42. 1851; Haridasan & Rao, For. Fl. Meghalaya 2: 836. 1987. *M. laevigata* Wall. ex Brandis, Forest. Fl. N.W. Ind. 409. 1874; Hook. f., Fl. Brit. Ind. 5: 492. 1888; Kanjilal *et al.*, Fl. Assam 4: 274. 1940.

Large tree. Leaves broadly ovate or ovate-orbicular, acuminate, subcordate at base, dentate, pubescent, sometimes 3 lobed. Flowers monoecious, densed in axillary drooping catking. Male catking villous; perianth 4 partite; stamens 4. Tepals pubescent. Style papillose. Fruiting spikes yellow, cylindric. Fruits achene.

Fls. & Frts.: February - June.

Occurrence: Common, in the hilly forest of the sanctuary.

Distribution: Most part of India; Bangladesh, Myanmar.

Specimen examined: Burha Mayong; *Bora* 15360 (NEHU).

5. *Poikilospermum*

Zipp. ex. Miq. Ann., Mus. Bot. Lungd. Bat. 1: 203. 1863-64.

About 20 species distributed in Indo-Malayan regions; 2 species in India; one species in the study area.

Poikilospermum suaveolens (Bl.) Merr. in Contrib. Ann., Arb., 8: 47. 1934: Haridasan & Rao, For. Fl. Meghalaya 2: 837. 1987. *Cephalus suaveolens* Bl., Bijdr. 483. 1826; Hook. f., Fl. Brit. Ind. 5: 545. 1888; Kanjilal *et al.*, Fl. Assam 4: 272. 1940.

Large scandent shrub; latex milky. Leaves *ca* 12-30 x 8-16 cm, broadly obovate-elliptic, oblanceolate, acute or obtuse, nearly rounded at base; stipules intrapetiolar. Flowers dioecious in axillary, cymose, globose heads. Male perianth 4 lobed, obovate; stamens 4. Fruits enclosed by the perianth.

Fls. & Frts.: January - June.

Occurrence: Occasionally, in the hilly forest of the sanctuary, usually branches embracing the rocks.

Distribution: Assam, Meghalaya, Tripura, Tropical forest of Eastern Himalaya; Malaya Islands.

Specimen examined: Hiloikhunda; *Bora* 15367 (NEHU).

6. *Streblus* Lour.

Lour., Fl. Cochinch 2: 614. 1790.

About 25 species distributed in Madagscar and Indo-Malysia regions; 4 species in India; one species in the study area.

Streblus asper Lour., Fl. Cochinch 2: 615. 1790; Hook. f., Fl. Brit. 5: 489. 1888; Kanjilal *et al.*, Fl Assam 4: 276. 1940; Haridasan & Rao, For. Fl. Meghalaya 2: 838. 1987. "Shoura".

Small to medium sized evergreen tree. Leaves *ca* 2.0-6.5 x 1.5-3.0 cm, elliptic-obovate or rhomboid, acute, cuneate at base, rough, serrate, shortly petiolate; stipules linear-lanceolate. Flowers unisexual. Male flowers pale yellow, in globose heads; stamens 4. Female flowers solitary. Tepals 4, enlarged in fruits. Drupes *ca* 0.6 cm in diam., 1 seeded, covered by the enlarged perianth.

Fls. & Frts.: February - July.

Occurrence: Common, throughout the sanctuary.

Distribution: Throughout India; Bangladesh, China, Malaysia, Thailand, Vietnum.

Specimen examined: Haduk; *Bora* 14713 (NEHU).

Uses: Twigs used for tooth brushing.

101. URTICACEAE

A. L. de Juss., Gen. Pl. 400. 1789.

Herbs, shrubs or trees, often with stinging hairs. Leaves usually stipulate. Flowers unisexual, minute, usually cymose, sometimes modified heads. Perianth biseriate; tepals 4-5. Stamens 4-5, opposite to tapels. Staminodes scale like or absent in female flowers. Ovary 1-celled; ovule solitary. Fruits utricle or drupe usually enclosed by the persistent perianth.

The family comprises about 52 genera and 1050 species, distributed in tropical and temperate regions; 21 genera and about 114 species in India; 8 genera and 12 species in the study area.

Key to the genera

1a. Plants with stinging hairs .... 3. ***Dendrocnide***

1b. Plants without stinging hairs:

2a. Herbs or undershrubs:

3a. Stamens 2; pistillode woolly

..... 5. ***Neodistemon***

3b. Stamens 4-5; pistillode rudimentary:

4a. Leaves sessile; female perianth not tubular; stigma penicillate

.... 4. ***Elatostema***

4b. Leaves petiolate; female perianth tubular; stigma not penicillate .... 7. *Pouzolzia*

2b. Shrubs or small trees:

5a. Flowers clustered in long spikes .... 1. *Boehmeria*

5b. Flowers clustered in cymes or panicles:

6a. Leaves white, pubescent beneath:

7a. Female perianth campanulate; ovary oblique .... 8. *Sarcochlamys*

7b. Female perianth ovoid; ovary straight .... 2. *Debregeasia*

6b. Leaves green, glabrous beneath .... 6. *Oreocnide*

1. *Boehmeria* Jacq.

Jacq., Strip. Am. Hist. 216. 1763.

Shrub or small trees, more or less pubescent. Leaves 3 nerved; stipules lateral. Flowers in axillary, sessile clusters, often arranged in cymes. Male perianth 3-5 partite; stamens as many as tepals. Female perianth 2-4 toothed, tubular; stigma penicillate. Fruits achene enclosed within persistent perianth.

About 150 species distributed in tropical and subtropical regions; about 15 species in India; 3 species in the study area.

Key to the species

1a. Flowers in axillary clusters .... 1. ***B. glomerulifera***

1b. Flowers in clusters in spikes:

2a. Leaves narrow lanceolate .... 2. ***B. macrophylla***

2b. Leaves ovate-elliptic .... 3. ***B. scabrella***

1. *Boehmeria glomerulifera* Miq. in Zoll., Syst. Verz. 104. 1854; Haridasan & Rao, For. Fl. Meghalaya 2: 840. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 290. 1996. *B. malabarica* Wedd. in Nouv. Arch. Mus. Hist. Nat. Paris 8: 355. 1855-56; Hook. f., Fl. Brit. Ind. 5: 575. 1888; Kanjilal *et al.*, Fl. Assam 4: 286. 1940.

Shrub; branches spreading. Leaves alternate, *ca* 0.5 -15.0 x 2.5-6.5 cm, ovate or ovate-lanceolate, acuminate, rounded or subcordate at base, serrate, pubescent beneath. Flowers greenish white, in axillary small clusters, sessile. Achenes ovoid.

Fls. & Frts.: January - March.

Occurrence: Common, in shady hilly forest of the sanctuary.

Distribution: North East India; Bangladesh, Malaysia, Myanmar, Nepal, Sri Lanka.

Specimen examined: Rangamati; *Bora* 15103 (NEHU).

2. *Boehmeria macrophylla* Hornem., Hort. Reg. Bot. Hafn. 2: 890. 1815, *non* D. Don, 1825; Friis & Marais in Kew Bull. 37: 163. 1982; Haridasan & Rao,

For. Fl. Meghalaya 2: 841. 1987; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 291. 1996. *B. platyphylla* D. Don, Prodr. Fl. Nep. 60. 1825; Hook. f., Fl. Brit. Ind. 5: 578. 1888; Kanjilal *et al.*, Fl. Assam 4: 288. 1940.

Shrub; branches spreading, pubescent. Leaves opposite, *ca* 8-25 x 2.5-5.5 cm, narrow lanceolate, acuminate, creneate or rounded at base, scabrous above, strigose on nerves beneath, dentate. Flowers greenish yellow, monoecious, in clusters in long spikes. Perianth 4 lobed in male and 2-4 toothed in female flowers. Stamens 4. Achenes brownish.

Fls. & Frts.: October - January.

Occurrence: Common, in shady hilly forest of the sanctuary.

Distribution: Throughtout India; China, Malaysia, Myanmar, Nepal, Sri Lanka.

Specimen examined: Hiloikhunda; *Bora* 15097 (NEHU).

3. *Boehmeria scabrella* Gaud., Voy. Uranie. 499. 1830; Srivastava in Mudgal *et al.*, Fl. M.P. 2: 585. 1997. *B platyphylla* var. *scabrella* (Gaud) Wedd. in Nouv. Arch Mus. Hist. Nat. Paris 9: 665. 1856; Hook. f., Fl. Brit. Ind. 5: 578. 1888. **Fig. 47**

Erect pubescent shrub. Leavs opposite, *ca* 5-13 x 2.5-7.0 cm, ovate-elliptic, acuminate, rounded or subcordate at base, serrate, pubescent, long petiolate, 3 nerved; stipules lanceolate. Flowers greenish white, in clusters in spikes. Achenes ovoid-elliptic, small, hairy at apex.

Fls. & Frts.: July - December.

Occurrence: Common, in shady hilly forest in the sanctuary as

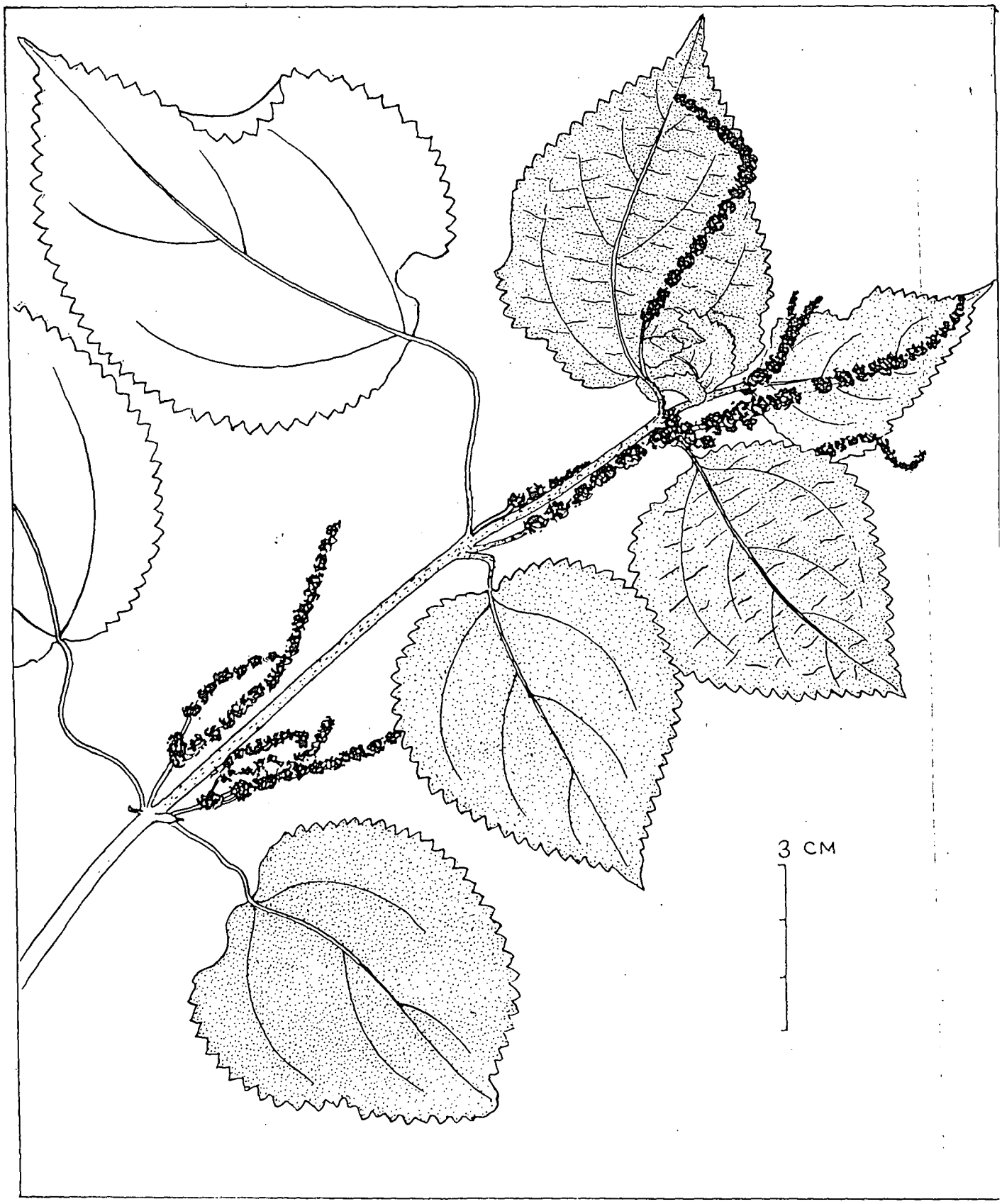


Fig. 47: ***Boehmeria scabrella*** Gaud. (Urticaceae)

undergrowth.

Distribution: Tropical & subtropical Himalaya; Africa, China, Japan.

Specimen examined: Rangamati; *Bora* 14742 (NEHU).

2. *Debregeasia* Gaud.

Gaub., Bot. Voy. Bon. t. 90. 1844.

About 17 species distributed in tropics and subtropics; 5 species in India; one species in the study area.

Debregeasia dentata Hook. f., Fl. Brit. Ind. 5: 541. 1888; Kanjilal *et al.*, Fl. Assam 4: 296. 1940.

Shrub; branches pubescent. Leaves elliptic-ovate, acute or acuminate, dentate, 3 nerved at base, sparsely hairy above, tomentose beneath, stipulate. Flowers clustered in panicles. Perianth 4 partite. Stames 4. Achenes aggregate.

Fls. & Frts.: October - January.

Occurrence: Common, along roadside of the area.

Distribution: Assam; Bangladesh.

Specimen examined: Haduk, Jugdal; *Bora* 14757 (NEHU).

Notes: Confined to Indo-Bangladesh region.

3. *Dendrocnide* Miq.

Miq., Pl. Jungh. 29. 1851.

About 100 species distributed mostly in tropics and subtropics; 5

species in India; one species in the study area.

Dendrocnide sinuata (Bl.) Chew in Gard. Bull. 21. 206. 1965; Haridasan & Rao, For. Fl. Meghalaya 2: 843. 1987. *Laportea crenulata* Wedd. Mon. Urtic. 133. 1856; Hook. f., Fl. Brit. Ind. 5: 550. 1888; Kanjilal *et al.*, Fl. Assam, 4: 281. 1940. "Surat".

Shrub, stinging hairy. Leaves alternate, *ca* 10-25 x 5.0-12.5 cm, broadly elliptic-ovate, acuminate, rounded or cordate at base, crenate-serrate. Flowers white, dioecious in short dichotomous cymes. Tepals 4, basally connate. Stamens 4. Achenes *ca* 0.5 cm in diam., globose, tipped by style.

Fls. & Frts.: August - January.

Occurrence : Common, in shady places of the sanctuary.

Distribution: Assam, Meghalaya, Sikkim, South India, Tripura, Tropical Himalaya; Malaya Islands, Sri Lanka.

Specimen examined: Burha Mayong; *Bora* 15470 (NEHU).

4. *Elatostema* Forst.

G. R. & G. Forst., Char. Gen. Pl. 105. 1776, *non. cons.*

About 200 species distributed in tropical regions; 31 species in India; one species in the study area.

Elatostema sessile Forst., Char. Gen. 106. 1776; Hook. f., Fl. Brit. Ind. 5: 563. 1888; Kanjilal *et al.*, Fl. Assam 4: 284. 1940; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 292. 1996.

Lithophytic herb. Leaves *ca* 6.5-12.5 x 2.0-4.5 cm, elliptic-lanceolate, acuminate, oblong at base, serrate, sessile. Flowers greenish brown, in axillary clusters, bracteate. Perianth 4 partite. Stamens 4; inflexed in bud. Female perianth persistent. Achenes ellipsoid, ribbed.

Fls. & Frts.: February - August.

Occurrence: Occasionally, in shady places, along the streams in the hilly forest of the sanctuary.

Distribution: Throughout India; Africa, Bhutan, China, Malaysia, Myanmar, Nepal.

Specimen examined: Rangamati; *Bora* 15095 (NEHU).

5. *Neodistemon* Babu et Henry

Babu et Henry in Taxon 19(4): 651. 1970.

Monotypic genus, confined to Indo-Malaysia.

Neodistemon indicum (Wedd.) Babu & Henry in Taxon 19: 651. 1970; Srivastava in Mudgal *et al.*, Fl. M.P. 2: 590. 1997. *Distemon indicum* Wedd. in Nouv. Arch. Mus. Hist. Nat. Paris 9: 551. t. 20 A. 1857; Hook. f., Fl. Brit. Ind. 5: 588. 1888. **Fig. 48**

Erect pubescent herb. Leaves alternate, *ca* 3.0-7.5 x 2.0-4.5 cm ovate, acuminate, cuneate at base, dentate. Flowers greenish white, minute, in clusters in axillary or terminal pseudospikes; bracts ovate, acuminate. Male flowers apically hooked hairy; stamens 2. Female flowers strigose. Achenes ovoid within crustaceous perianth.

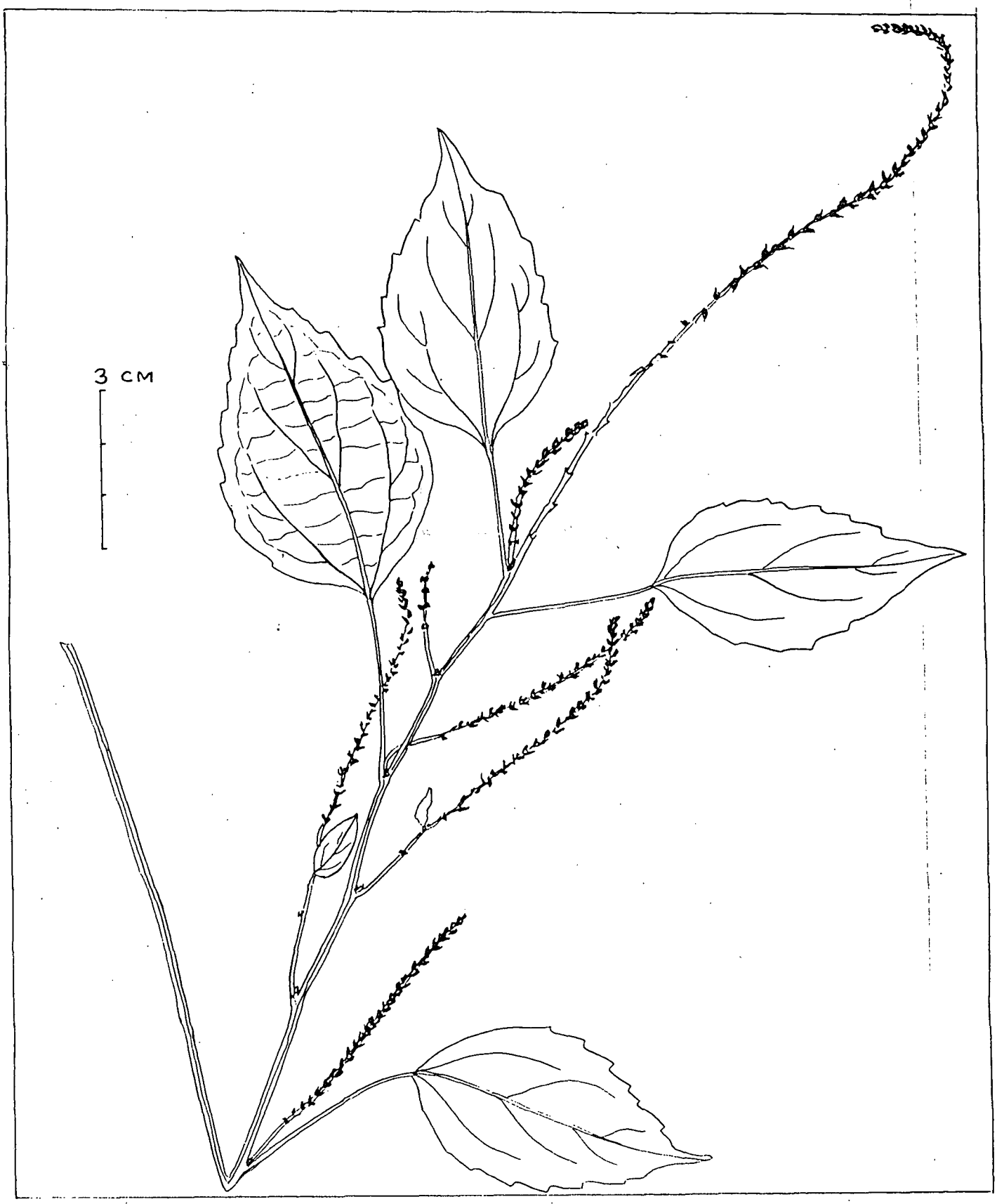


Fig. 48: ***Neodistemon indicum*** (Wedd.) Babu & Henry (Urticaceae)

Fls. & Frts.: July - November.

Occurrence: Rare, occurs in shady hilly slopes.

Distribution: Arunachal Pradesh, Assam, Meghalaya, South India; China, Japan, Tropical Africa.

Specimen examined: Guvali; *Bora* 15334 (NEHU).

6. *Oreocnide* Miq.

Miq., Pl. Jungh 1: 39. 1851.

About 20 species distributed in South East Asia; 2 species in India; one in the study area.

Oreocnide integrifolia Miq., Pl. Jungh. 1: 39. 1851; Kanjilal *et al.*, Fl. Assam 4: 293. 1940; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 293. 1996. *Villebrunea integrifolia* Gaud., Voy. Bonite Voy. t. 91. 1866; Hook. f., Fl. Brit. Ind. 5: 589. 1888.

Small tree; young parts pubescent. Leaves alternate, *ca* 8-18 x 3.5-8.0 cm, oblong-lanceolate or elliptic-oblong, penninerved, acuminate, acute at base, pubescent beneath. Flowers creamy, in globose clusters in cymes. Male perianth 4 fid; stamens 4. Female perianth tubular. Achenes clustered in head, white when ripe.

Fls. & Frts.: December - August.

Occurrence: Rare, occurs in the hilly forest of the sanctuary.

Distribution: North East India; Bhutan, China, Myanmar, Nepal.

Specimen examined: Burha Mayong; *Bora* 15094 (NEHU).

7. *Pouzolzia* Gaud.

Gaud. in Bot. Voy. 503. 1826.

Herbs or undershrubs. Leaves 3 nerved; upper most passing into bracts, stipulate, Flowers in axillary unisexual or androgynous sessile clusters. Male flowers shortly pedicellate; perianth 4-5 partite; stamens 4-5. Female flowers subsessile, perianth 2-4 toothed; stigma filiform. Achenes within the marcescent perianth.

About 50 species distributed in tropical regions; 12 species in India; 4 species in the study area.

Key to the species

1a. Male perianth 4 lobed; leaves *ca* 2-4 cm long

.... 4. ***P. zeylanica***

1b. Male perianth 5 lobed; leaves longer than above:

2a. Flowers in terminal bracteate spikes

.... 3. ***P. pentandra***

2b. Flowers in axillary clusters:

3a. Leaf base rounded or cordate;
male flowers hairy above

.... 2. ***P. hirta***

3b. Leaf base usually rounded;
male flowers nearly glabrous

.... 1. ***P. bennettiana***

1. *Pouzolzia bennettiana* Wight. Icon. 6. t. 1978. 1853; Hook. f., Fl.

Brit. Ind. 5: 585. 1888; Kanjilal *et al.*, Fl. Assam, 4: 291. 1940; Chauhan *et al.* in Fl. Namdapha (edt. Hajra) 294. 1996.

Tall herb; young parts, branches pinkish pubescent. Leaves *ca* 3-10 x 0.5-2.0 cm, ovate-lanceolate, acuminate, subsessile. Flowers greenish white, minute, in axillary clusters.

Fls. & Frts.: September - March.

Occurrence: Common, in grassland of the sanctuary.

Distribution: Arunachal Pradesh, Assam, Meghalaya, South India; Sri Lanka.

Specimen examined: Haduk; *Bora* 14764 (NEHU).

2. *Pouzolzia hirta* (Bl.) Hassk. Cat. Hort. Borger. 80. 1844; Hook. f., Fl. Brit. Ind. 5: 586. 1888; Kanjilal *et al.*, Fl. Assam 4: 291. 1940. *Urtica hirta* Bl., Brijdr. 495. 1825. *Gonostegia hirta* Miq. Ann. Mus. Bot. Lud. Bat. 4: 303. 1869. **Fig. 49**

Suberect slender herb. Leaves opposite, *ca* 3-7 x 0.8-1.5 cm, ovate-lanceolate, entire, subsessile; stipules shortly acuminate. Flowers white, in axillary clusters. Male perianth 5 partite; stamens 3. Female perianth tubular, 4 toothed.

Fls. & Frts.: June - September.

Occurrence: Common, in grassalnd of the area.

Distribution: Assam, Meghalaya, Tropical Himalaya; Australia, China, Malysia.

Specimen examined: Haduk, Jugdal; *Bora* 14828 (NEHU).

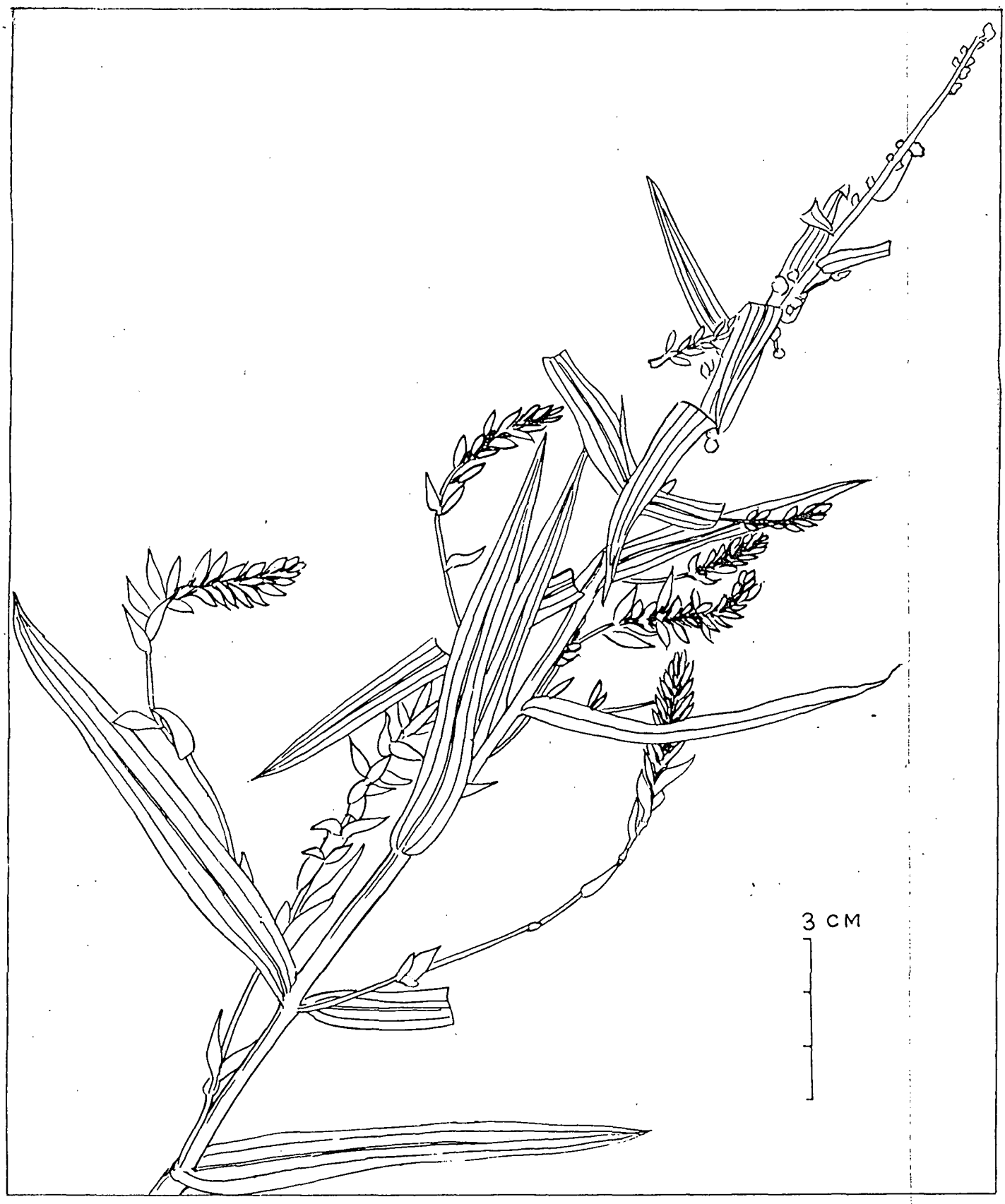


Fig. 49: ***Pouzolzia hirta*** (Bl.) Hassk. (Urticaceae)

3. *Pouzolzia pentandra* (Roxb.) Benn. Pl. Jav. Rar. 64. t. 14. 1838; Hook. f., Fl. Brit. Ind. 5: 583. 1888. *Urtica pentandra* Roxb., Fl. Ind. 3: 583. 1832. *Gonostegia pentandra* Miq., Ann. Mus. Bot. Lugd. Bot. 4: 302. 1869.

Erect tall herb. Leaves opposite, *ca* 2.0-8.5 x 0.5-1.0 cm, oblong-lanceolate, acute or acuminate, shortly petiolate; upper ones smaller, linear oblong, alternate. Flowers white, clustered in terminal bracteate spikes. Male perianth 5 partite; stamens 5. Female perianth broad, laterally winged in fruits. Achenes ovoid.

Fls. & Frts.: June - October.

Occurrence: Common, in grassland and moist shady places of the sanctury.

Distribution: Assam, Meghalaya, Orissa, Tropical Himalaya, West Bengal; Afghanistan, China.

Specimen examined: Haduk; *Bora* 14763 (NEHU).

4. *Pouzolzia zeylanica* (Linn.) Benn., Pl. Jav. Rar. 67. 1838; Deb, Fl. Tripura 1: 231. 1981. *Parietaria zeylanica* Linn., Sp. Pl. 1052. 1753. *Pouzolzia indica* Gaud., Bot. Freyc. Voy. 503. 1826; Hook. f., Fl. Ind. 5: 582. 1888; Kanjilal *et al.*, Fl. Assam 4: 291. 1940.

Erect or prostrate, pubescent herb. Leaves opposite, *ca* 2-4 x 1.0-1.8 cm, ovate-lanceolate, acute, cuneate or rounded at base, entire, pubescent. Flowers white, in axillary clusters. Perianth 4 partite; tepals ovate lanceolate, hairy outside, persistent in female flowers. Stamens 4. Style feathery. Achenes broadly ovoid, shining, 2 winged.

Fls. & Frts.: June - January.

Occurrence: Common, in grassland and moist places of the sanctuary.

Distribution: Throughout India; China, Malaysia.

Specimen examined: Haduk; *Bora* 15457 (NEHU).

8. *Sarcochlamys* Gaud.

Gaud., Voy. Bot. t. 89. 1826.

Monotypic genus, distributed in Assam, Meghalaya, Tripura and neighbouring countries.

Sarcochlamys pulcherrima Gaud., Bot. Voy. Bonite t. 89. 1846; Hook. f., Fl. Brit. Ind. 5: 588. 1888; Kanjilal *et al.*, Fl. Assam 4: 292. 1940; Haridasan & Rao, For. Fl. Meghalaya 2: 848. 1987.

Shrub; bark dark brown. Leaves *ca* 7.5 - 18.5 x 1.0-2.8 cm, lanceolate, acuminate, narrowed down to the base, white beneath. Flowers creamy, clustered in spikes. Perianth 5 paritite, sepaloid in male and 4 lobed, campanulate in female. Stigma sessile. Achenes oblique within perianth.

Fls. & Frts.: June - December.

Occurrence: Occasionally, in the hilly forest of the sanctuary.

Distribution: Assam, Meghalaya, Tripura; Bangladesh, China, Myanmar.

Specimen examined: Sanaka; *Bora* 15096 (NEHU).

Notes: Confined to North East India.

INDEX TO THE NAME OF FAMILIES IN THIS VOLUME

ACANTHACEAE	36,427
ALANGIACEAE	32,289
AMARANTHACEAE	38,478
ANACARDIACEAE	28,162
ANNONACEAE	25,48
APIACEAE	32, 281
APOCYNACEAE	33,355
ARALIACEAE	31,286
ARISTOLOCHIACEAE	37,499
ASCLEPIADACEAE	33,365
ASTERACEAE	33,319
BALSAMINACEAE	27,118
BASELLACEAE	38,490
BEGONIACEAE	31,274
BIGNONIACEAE	36,424
BOMBACACEAE	26,93
BORAGINACEAE	34,375
BRASSICACEAE	27,64
BURSERACEAE	29,130
BYTTNERIACEAE	27,102
CACTACEAE	31,277
CAESALPINIACEAE	30,211
CANNABACEAE	38,558
CAPPARACEAE	27,66
CARYOPHYLLACEAE	27,76
CAPRIFOLIACEAE	33,291
CELASTRACEAE	29,139
CHENOPODIACEAE	38,488
CHLORANTHACEAE	37,506
CLUSIACEAE	26,82
COMBRETACEAE	32,239
CONVOLVULACEAE	35,384
CRASSULACEAE	30,238
CUCURBITACEAE	31,264
CUSCUTACEAE	33,398
DATISCACEAE	31,276
DILLENIACEAE	25,45
EBENACEAE	34,352
ELAEANACEAE	38,514
ELAEOCARPACEAE	26,109
EUPHORBIACEAE	37,520
FLACOURTIACEAE	25,71
HYDROPHYLLACEAE	35,374
HYPERICACEAE	26,81
ICACINACEAE	29,138
LAMIACEAE	35,465
LAURACEAE	38,508
LECYTHIDACEAE	32,249
LEEACEAE	29,153
LENTIBULARIACEAE	35,423
LINACEAE	28,111

NEHU LIBRARY
Acc : 103597
Acc : 13-8-07
Date
Class
Sub.
Enter by
Transaction by

LOBELIACEAE	33,342
LORANTHACEAE	37,515
LYTHRACEAE	30,252
MALPIGHIACEAE	28,112
MALVACEAE	26,85
MELIACEAE	29,132
MENISPERMACEAE	26,52
MENYANTHACEAE	373
MIMOSACEAE	30,222
MOLLUGINACEAE	30,279
MORACEAE	37,559
MORINGACEAE	27,167
MYRSINACEAE	24,346
MYRTACEAE	32,245
NYCTAGINACEAE	38,477
NYMPHAEACEAE	25,60
OLEACEAE	34,353
ONAGRACEAE	32,258
OXALIDACEAE	28,115
PAPAVERACEAE	25,63
PAPILIONACEAE	30,168
PASSIFLORACEAE	36,262
PIPERACEAE	37,501
PLANTAGINACEAE	35,475
PLUMBAGINACEAE	34,344
POLYGALACEAE	27,75
POLYGONACEAE	37,491
PORTULACACEAE	27,78
PUNICACEAE	32,257
RANUNCULACEAE	25,42
RHAMNACEAE	28,140
ROSACEAE	31,234
RUBIACEAE	33,293
RUTACEAE	27,119
SABIACEAE	29,160
SAPINDACEAE	29,156
SAPOTACEAE	34,350
SAURURACEAE	37,505
SCROPHULARIACEAE	36,411
SIMAROUBACEAE	28,129
SOLANACEAE	35,399
SPHENOCLEACEAE	33,343
STERCULIACEAE	26,95
TAMARICACEAE	25,79
TRAPACEAE	31,261
TILIACEAE	26,103
ULMACEAE	38,556
URTICACEAE	37,574
VERBENACEAE	36,445
VITACEAE	29,145