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PLANT RESOURCES OF JALDAPARA RHINO SANCTUARY

L. K. Banerjee

BOTANICAL SURVEY OF INDIA

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भारतीय वनस्पति सर्वेक्षण
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FOREWORD

Researches in biodiversity rich areas are attracting world-wide attention, for studies on vegetation, floral composition and ecological characteristics are of prime importance for conservation, sustainable use and management of biodiversity and ecosystems.

The Botanical Survey of India, with the prime objective of assessing the plant wealth in the country, has been exploring different plant diversity rich ecosystems in India. In the process, the Survey has also undertaken botanical studies in important National Parks, Wildlife Sanctuaries, Tiger Reserves, etc. with the twin objectives of bringing out floristic details and their importance to wildlife.

Jaldapara Wildlife Sanctuary famous for the Great Indian one-horned rhino is, so to say, one of the remnants of its vast distribution range which inhabited the swamps of the Indo-gangetic-Brahmaputra-Plains, not long ago. Kaziranga-Manas Wildlife Sanctuaries being the other refugia in Assam, have also been studied earlier for their floral wealth and life-style of rhinos by Dr. P. K. Hajra, a Scientist of the Botanical Survey of India, and also botanised the Dudhwa National Park in Uttar Pradesh and recommended it as a suitable alternate site for translocation of rhinos from Kaziranga, which is now a home for the animal.

Besides being famous for the rhinos, the Jaldapara Wildlife Sanctuary is also rich in plant diversity. The present work is an attempt to give details on the floral riches, the life of the one-horned rhino populations and their dependance on plants for food and shelter in the sanctuary.

I hope this publication will be of use to foresters, conservationists and tourists in knowing the plants of this sanctuary and their importance for the survival of the endangered rhino.

Botanical Survey of India
P-8 Brabourne Road
Calcutta-700 001
July 20, 1993.

Director

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Photo showing Rhino in the savannah-grassland in Forest Block, No. 3, Jaldapara Sanctuary.

Occasionally Tiger is found in the sanctuary for attacking Rhino calves. Bengdaki swamps in the Jaldapara Sanctuary.

Riparian forests along the Torsa river, Jaldapara Sanctuary.

Survey and Collection of plant materials on Elephant back through the wet alluvial savannah and riparian formation in the Sanctuary.

Grassland formation in Moiradanga areas on older river bed.

Formation of *Acacia catechu* and *Dalbergia sissoo* as a pioneer tree species among grasses along the river bank.

Survey work in wet alluvial savannah grassland where rhino rambles most of the time.

INTRODUCTION

The Jaldapara wildlife Sanctuary, Jalpaiguri district, North Bengal with its amazing variety of wild flora and fauna is the second largest natural habitat of one-horned Rhinoceros in India after the Kaziranga in Assam. During the early thirties of the present century a necessity was felt to protect the grasslands of Chilapata and Malangi forest blocks of the North Bengal forests as these areas were in danger due to extension proposal of tea cultivation in these blocks. In the early thirties, the then Conservator of West Bengal forest was greatly interested in the valuable forest resources and the important fauna, specially the Rhinoceros inhabiting this tract. At that time value of a rhino horn was said to be half its weight in gold. During that period, there was a large scale organised poaching activities in the Kaziranga forest for rhino horns and it was felt that the areas of the North Bengal forest bound to be next target for poachers unless serious protection measures could be taken up imposing some Act of forest regulation.

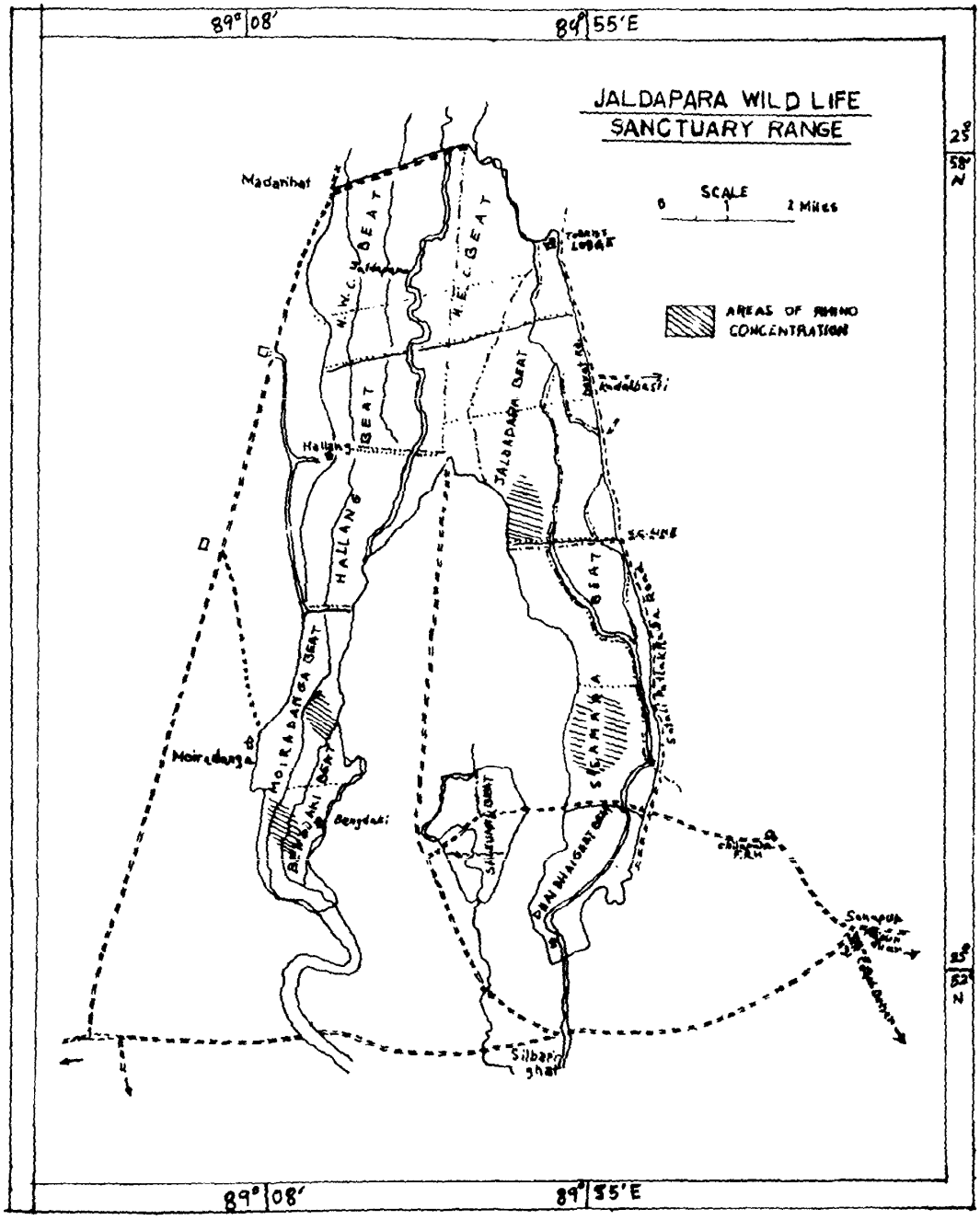
In the year 1932 the Bengal Rhinoceros preservation Act came into force and in 1940 these rhino habitat of North Bengal was declared as Game Sanctuary under the Govt. of West Bengal. In 1954 a new forest range was created with the headquarters at Jaldapara with the idea to entrust a separate set up to look after the welfare and maintenance of the fauna and flora carefully under the management of Coochbehar Forest Division. In the year 1959 the forestry operations of the sanctuary have been completely suspended as it was felt that the sanctuary is delightfully rich in various other forms of wild fauna and flora and the name of the 'Jaldapara Game Sanctuary' was officially altered to 'Jaldapara Wildlife Sanctuary'. Later in 1972 this Sanctuary was re-declared as such under the Wildlife (Protection) Act 1972 and in 1976 it received a legal status of a Rhino Reserve. Following this, the management of this sanctuary has been shifted from Coochbehar Forest Division to the Jalpaiguri Forest Division for better official management. The Indian Rhinoceros population distributed from the Brahmaputra valley in Assam, Jaldapara and Gorumara Sanctuary in North Bengal and Chitawan range in Nepal is an isolated remnant of a former distribution range of the Great Indian Rhinoceros extending right across the Indo-Gangetic plain and Himalayan foot hills. There is evidence that all three species of the Asian Rhinoceros (Great Indian, Sumatran and Javan) were at one time found in this part of India. The

enormous pressure from the increased human population over the last 160 years has been largely responsible for eliminating all but small pockets of rhinos from this former extensive range. There appears to be no census data on the Jaldapara rhino population immediately prior to the 1968-72. Some 28 rhinos were lost by poaching during the period 1968-72 and a census in 1972 showed 45 animals as present. It seems that there must have been about 70 Rhinos in the sanctuary prior to 1968. During 1973-80 there had been a serious problem in the natural death of rhinos in the sanctuary and a census report during the period showed a sharp decline in Rhino population with a reduced number of 22 out of 45.

This depletion of rhino population brought a serious necessity to study the food and feeding habit of rhinos, general status of the ecosystem, detail study of the vegetation, fodder resources for the wild animals and wild plant resources for forest utilization of the sanctuary. In view of the above, the present author undertook intensive field work from the Ecology Unit, Botanical Survey of India from the year 1984 onwards to find out general composition of vegetation, knowledge on flora, availability of food plants in different types of the vegetation, food and feeding habits of the herbivores in different seasons and biomass analysis of dominant food grasses from some selected grasslands of the sanctuary where rhinos ramble frequently in comparison to other places. The wild plant resources for forest utilization and present and future forest management have also been pointed out briefly. An alphabetical list of plants occurring in the Sanctuary and their uses for various purposes, is provided at the end *(see Appendix)*.

AREA AND TOPOGRAPHY

Jaldapara Sanctuary is situated on the bank of the Torsa river, 36m above the mean sea level in between 89^0 08′ - 89^0 55′E and 25^0. 58′ 26^0. 52′ N with an area of 115.55 sq. km astride the Torsa and Malangi rivers about 12 km south of the Bhutan border in the Northern part of West Bengal. It is bounded on the North by Hasimara and Nilpara-Madarihat Road, on the South by Bhutan border and Silahabari, on the East by Chilapata forest and on the West by Falakata Kharibaries. Trouser shaped or 'V' shaped up side down tract of the sanctuary is more or less flat with gentle slope from north to south and is strewn with a number of streams, meandering rivulets and natural wallows and pools (Fig. 1 :– Map). The Western arm of the sanctuary is drained by the Torsa and the Eastern arm by the river Malangi. Besides the critical Salkumar areas, there are some cultivated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N.E.C. BEAT
HALLANG BEAT
JALDAPARA BEAT
SOUTH BEAT
MOIRABARGA BEAT
SHIKARIKATA BEAT
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Banerhat
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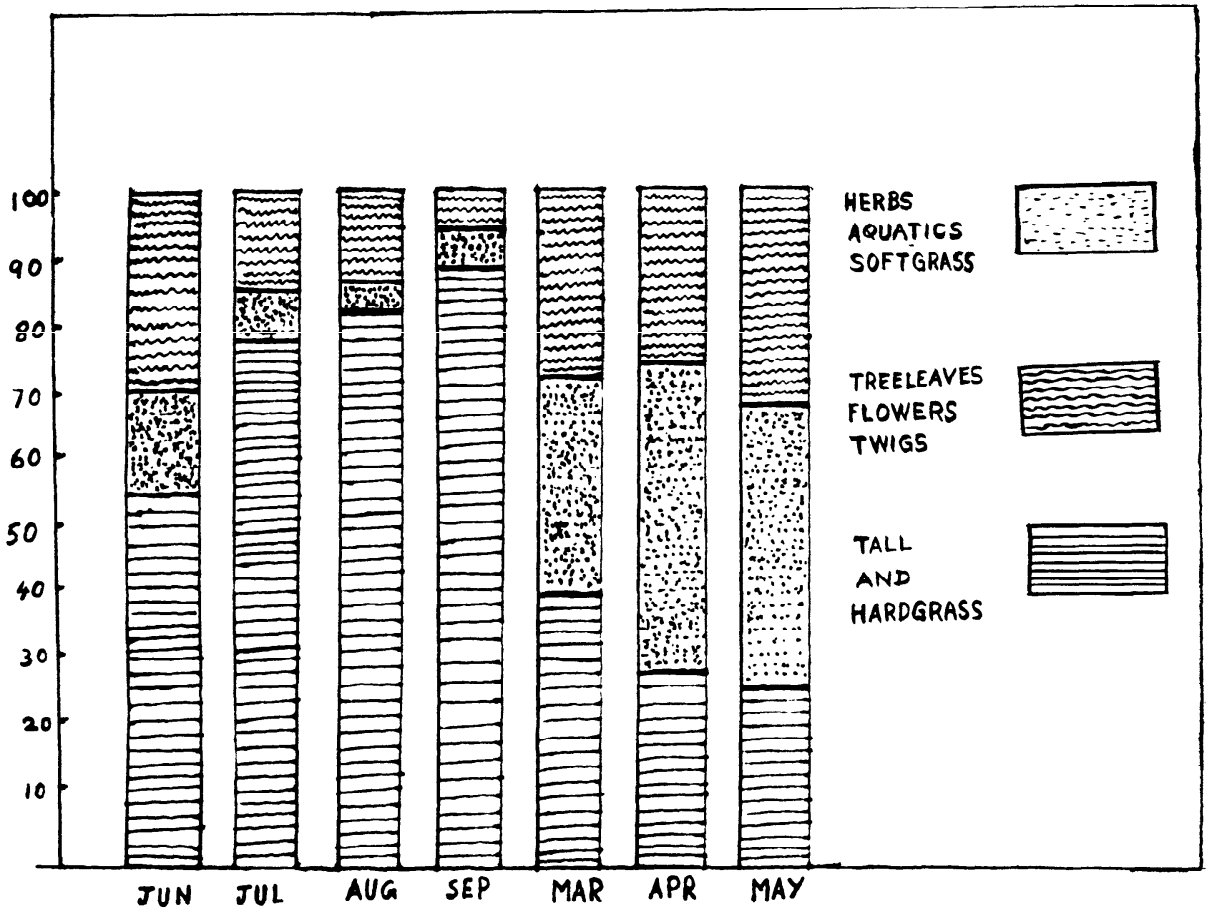
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TREELEAVES
FLOWERS
TWIGS
TALL
AND
HARDGRASS

lands in between the two arms of the sanctuary which are vulnerable to trespass and encroachment. The areas distributed in 12 forest blocks though created primarily to preserve the famous Rhinoceros inhabited in the savannah grasslands are now rich in various forms of wildlife and many commercial and economically important plant resources.

ENVIRONMENT

The sanctuary in the foot hills enjoys a subtropical climate, cold in winter, hot and extremely humid in summer. The main seasons noted in the sanctuary are : Cold season November to February; Hot season April to June and Rainy season July to September. A quasi- autumn during October separates the rainy months and the winter months when days become bright and pleasant. A quasi spring during March separates the winter and summer when a number of trees put forth colourful blossoms. The winter can be unpleasantly cold though snowfall hardly occurs at Jaldapara.

TEMPERATURE

In the sanctuary the temperature normally ranges from 10^0 C in January to 31. 7^0C in June. The maximum winter temperature rarely exceeds 21^0 C whereas the minimum summer temperature normally remains below 23^0 C. Recorded highest and lowest mean temperatures at Jaldapara Sanctuary for a year from January to December noted in 1984 are given in the Table :

Table showing maximum and minimum temperature in ^{0} C

MONTHS	JN.	FB.	MR.	AP.	MY.	JN.	JL.	AG.	SP.	OT.	NV.	DC.
Maximum	21	21.5	27	29	31	31.7	31.3	30	29	28.4	23	22
Minimum	10	13.4	16.5	20	21.8	22	22.3	22.2	21	18	16	11.2

RAINFALL

South West Monsoon is the main source of rainfall. Maximum rainfall occurs from mid June to September. July and August are the wettest months. March receives maximum of winter rain. December is the driest month with minimum rainfall. Pre-monsoon showers or thunder showers often accompanied by hail, occur in the months of

April and May. Monthly rainfall recorded in the sanctuary varies from 0 to 6500 mm; details are given in Table below :

Table showing rainfall in mm.

MONTHS	JN.	FB.	MR.	AP.	MY.	JN.	JL.	AG.	SP.	OT.	NV.	DC.
1984	70	200	310	510	310	4500	6500	6000	5100	940	120	0

HUMIDITY

Since the sanctuary is located in the foot hills of the outer Himalaya, it remains adequately humid throughout the year. Maximum relative humidity varies between 80 95%, seldom below 75% with a maximum in June to September and a minimum in December to February.

FROST, DEW AND FOG

From November to February the nights are very cold with much frost and dew and in low lying areas a dense fog lingers often till after 9 A.M. From March to the onset of monsoon, fog and frost are absent, but dew is deposited until April.

WIND AND THUNDER STORMS

From September and October the wind blows pleasantly over the foot hills beginning about 8 A.M. During hot months from April to June, hot wind blows up the foot hills from 11 A.M. to 9 P.M. and the air becomes dry with dust which is frequently interrupted by the thunderstorms.

SOIL

The soil of the sanctuary consists mainly of : Recent deposits, Submontane-tarai soil and Foothill swampy soils.

The recent deposits are manifest in the form of coarse gravel, cobbles and rock boulders mixed with ferruginous sand and silica which line the banks of Torsa and Malangi rivers in particular. River gravels and alluvium along the bed of Torsa and Malangi and other lower terraces of several forest blocks are common. The submontane tarai soil

is usually composed of unassorted materials of brown earth, rich in minerals and nutrients. Variegated slates, quartzites and dolomites are also common along the beds of low hills. Large and rounded quartzite pebbles set in ferruginous sand forming alternate coarse and fine bands in sandy loamy and clay soils are found mostly in higher terraces of the forest blocks.

Foothill swampy soil is made up of alluvium with deposit of sand and sandy clay along the course of the rivers and fine sand consolidating into clay in the rest of the swamps. There is ample ground water supply at a moderate depth and upper soil may be very porous and dry during summer and almost devoid of humus.

WATER SUPPLY OF THE SANCTUARY

The sanctuary is well watered by two perennial rivers, the Torsa and Malangi. During the monsoon the low lying riverine tracts are flooded and permanent swamps are found in the western part of the sanctuary. Some artificial wallows have been constructed in the central part of the sanctuary. Though some parts towards the northern regions get dry in the summer but on the whole water is not a problem in the sanctuary.

VEGETATION

Vegetation of the sanctuary can be divided into 4 major formations :

a. Tropical wet semi evergreen formation

b. Tropical moist deciduous formation

c. Riparian fringing formation and

d. Alluvial grassland and Savannah woodland formation

Of these types the alluvial grassland and savannah woodland formation which occupy almost half the area of the sanctuary and densely covered with 4-6 m tall grasses in association with a few deciduous trees is the most important for rhino habitat. This type can be divided again into 4 subtypes according to the varied ecological conditions of the sanctuary. In the sanctuary under growth of herbs and shrubs vary almost nil to a dense cover. Climbers are locally common. Bamboos are absent but cane brakes are frequently found in moist areas. Epiphytes and ferns are quite conspicuous.

a. Tropical wet semi evergreen formation : This type of formation usually occurs along elevated foothills of Hollong, north eastern part and eastern surroundings of the sanctuary. Upper storey is mainly dominated by *Michelia champaca* L., *Tetrameles nudiflora* R. Br., *Cinnamomum glaucescens*(Nees) Hand. Mazz., *C. bejolghota* Sw., *Celtis trimorensis* Span., *Stereospermum personatum* Chatt., *Bauhinia purpurea* L., *Actinodaphne obovata* Bl., *Beilschmiedia sikkimensis* Hook. f., *B. roxburghiana* Nees, *Polyalthia simiarum* Hook.f. & Thoms., and others. Middle storey is mainly dominated by *Sapium baccatum* Roxb., *Dillenia indica* L., *Elaeocarpus lucidus* Roxb., *E. rugosus* Roxb., *Alstonia scholaris* R. Br., *Persea gamblei* (King ex Hook.f.) Kost. *P. glaucescens* Long., *Knema erratica* (Hook.f. & Thoms.) Sincl., *Litsea glutinosa* (Lour) Rob., *Gmelina arborea* Roxb., *Premna bengalensis* Clarke, and others. The lower storey is dominated mainly by *Mallotus philippensis* Muell.-Arg., *Syzygium cumini* Skeels., *Callicarpa arborea* Roxb., *Aphanamixis polystachya* (Wall.) Park., *Litsea monopetala* (Roxb.) Pers., *Styrax serrulatum* Roxb., *Garcinia kydia* Roxb., *Ficus microcarpa* L.f., and others.

The following lianas, climbers and shrubs are usually common in this formation : *Clematis gouriana* DC., *Naravelia zeylanica* (L.) DC., *Cissus adnata* Roxb., *Acacia pennata* Willd., *Dalbergia stipulacea* Roxb., *Chonemorpha fragrans* (Moon) Alston, *Uncaria sessilifructus* Roxb., *Tinospora cordifolia* (Willd.) Hook.f. & Thoms., *Olax scandens* Roxb., *Calamus latifolius* Roxb., C. *tenuis* Roxb., *Ixora undulata* Roxb., *Alpinia nigra* (Gaertn.) Burtt, *Clerodendrum viscosum* Vent., *Melastoma malabathricum* L., *Canthium glabrum* Bl., *Leea sambuciana* Willd., *Securinega virosa* Baillon., *Fagerlindia fasciculata* (Roxb.) Tiruveng., and others.

b. Tropical moist deciduous formation : This type of formation occurs along hillslopes of Torsa valley in the northwest part of Jaldapara block, southwest part of Mairadanga and upper part of Bardabri where soils are usually porous and drained. Upper canopy of this type is mainly covered by *Shorea robusta* Gaertn. f. which attains 15 to 20 m height. Lower canopy is formed by a number of semi-evergreen and deciduous species intimately mixed to a closed forest of good height. Climbers and shrubs are fairly common and herbaceous undergrowth is luxuriant during the monsoon. Main components of *Shorea robusta* association are : *Schima wallichii* Korthals., *Dillenia pentagyna* Roxb., *Bauhinia purpurea L., Kydia calycina* Roxb., *Terminalia bellirica* Roxb., *Hymenodictyon excelsum* Wall., *Careya arborea* Roxb., *Oroxylum indicum* (L.) Vent., *Lannea coromandelica* (Houtt.) Merr., *Toona ciliata* Roem., *Sterculia urens* Roxb., *Bridelia retusa* Alst., *Garuga pinnata* Roxb., and others. The common medium sized trees in the lower canopy are : *Semecarpus anacardium* L.f.,

Dysoxylum binectariferum Bedd., *Mallotus philippensis* Muel.-Arg., *Syzygium formosum* Masam., *Litsea glutinosa* Rob., *Beilschmiedia roxburghiana* Nees, *Persea glaucescens* (Nees) Long., *Haldina cordifolia* (Roxb.) Ridsd. and others. The smaller tree species, climbers and shrubs associated in this formation are : *Crateva religiosa* Forst f., *Ixora arborea* Roxb. ex Sm., *Emblica officinalis* Gaertn., *Holarrhena pubescens* (Buch.-Ham.) Wall. ex G. Don, *Wrightia arborea* Mabber., Meliosma simplicifolia (Roxb.) Walp., *Murraya paniculata* Jack., *Wendlandia heynei* Sant. & Merch., *Abrus precatorius* L., *Asparagus racemosa* Willd., *Argyreia roxburghii* Choisy, *Acacia pennata* Willd., *Bauhinia vahlii* Wt. & Arn., *Rhynchostylis retusa Bl., Ichnocarpus frutescens* R.Br., *Cissus adnata* Roxb., *Cayratia pedata* (Lamk.) Juss. ex Gagnep., *Dalbergia volubilis* Roxb., *Dioscorea bulbifera* L., *Indigofera pulchella* Roxb., *Helicteres isora* L., *Ziziphus oenoplea* (L.)Mill., *Grewia disperma* Rottb., *Leea asiatica* (L.) Ridsd., *Morinda angustifolia* Roxb. and many others.

c. Riparian fringing formation : Narrow fringes along the banks of streams, water courses and rivers are typically covered with fresh water swamp species which are able to withstand temporary flooding. The common associates are : *Terminalia arjuna* Wt. & Arn., *Salix tetrasperma* Roxb., *Anthocephalus chinensis* (Lamk.) A. Rich. ex Walp., *Trema orientalis* (L.) Bl., *Streblus asper* Lour., *Ficus semicordata* Buch.-Ham. ex Smith, *F. saemocarpa* Miquel., *F. microcarpa* L.f., *Duabanga grandiflora* (Roxb. ex DC.) Walp., *Albizia procera* (Roxb.) Benth., *Macaranga denticulata* Muell.-Arg., *Bischofia javanica* Bl., *Dillenia indica* L. and others. The climbers frequently met with are : *Smilax perfoliata* Lour., *Tetrastigma lanceolarium* (Roxb.) Planch., *Milletia extensa* (Benth) Baker, *Mucuna pruriens* (L.) DC., *Ipomoea nil* (L.) Roth., *I. quamoclit* L., *Ampelocissus sikkimensis* (Laws.) Planch., *Dioscorea puber* Bl., *D. pentaphylla* L., *Cissus adnata* Roxb. and others.

d. Alluvial grassland and Savannah woodland formation : Savannah formation within the sanctuary is the most important habitat for Rhinoceros population. According to Champion and Seth (1968) there are three distinct types of savannah formations throughout the North Bengal region such as : 1. Moist 'Sal' Savannah, 2. Wet alluvial Savannah grassland without any tree species association, and 3. Low alluvial Savannah grassland with woody tree species association.

1. Moist 'Sal' Savannah : This is characterised by the presence of *Shorea robusta* Gaertn.f., *Lagerstroemia parviflora* Roxb., *Careya arborea* Roxb., *Emblica officinalis* Gaertn., *Dillenia pentagyna* Roxb., *Terminalia alata* Heyne ex Roth, *T. chebula* Retz., *Dalbergia latifolia* Roxb., in association with predominant grasses such as *Saccharum spontaneum* L., *Heteropogon contortus* P. Beauv. ex R. & S., *Arundo donax* L., *Apluda mutica* L., *Imperata cylindrica* Raeuschel., *Cymbopogon martinii* Watson, *Themeda arundinacea* Ridley and others. This type commonly occurs

outside the sanctuary proper, mostly along Bordabri and Salkumar blocks and in similar regions where undergrowth in the 'Sal' forests is subjected to heavy fires.

2. Wet alluvial Savannah grassland without tree species association: This type is common along the banks of cutoff meanders of the main river flow and on similar low alluvial patches inside the sanctuary where low lands are highly flooded during the monsoon but completely dry out during the hot seasons. This condition is not suitable for the growth of tree species unless the lands are raised considerably due to siltation. These pure grassland formations along the banks of the rivers Torsa and Malangi in Sisamara, Dhaidhai Ghat, Chilapata, Jaldapara, Bengdaki and some places of the Hollong range are the main habitats of Rhinoceros and are mainly dominated by *Saccharum narenga* (Nees ex Steud.) Hack., *S. spontaneum* L., *S. bengalense* Retz., *S. longisetosum* (Anderss. ex Bth.)Narayansw. ex Bor, *Arundo donax* L., *Phragmites karka* (Retz.) Trin. ex Steud., *Imperata cylindrica* Raeuschel., *Themeda arundinacea* (Roxb.) Ridley, *Digitaria ciliaris* (Retz.) Koel., *Arundinella bengalensis* (Spreng.) Druce, *Setaria palmifolia* (Koen.) Stapf, *Cymbopogon gidarba* (Ham.) Haines, *Thysanolaena maxima* (Roxb.) O.Ktze., and many others.

3. Low alluvial Savannah grasslands with woody tree species association : This is a typical representative of the sanctuary in the stable alluvial flats along the banks of the Torsa river in Hollong, Jaldapara, Bengdaki and Moiradanga forest blocks. These flats are also flooded during the rainy season but dry out during the rest of the year. Soils are mainly composed of sandy alluvium but clay and thin layer of loam are also found in the depressions which make the habitats suitable for growth of some woody deciduous species in association with densely covered tall grasses. *Bombax ceiba* L., *Acacia catechu* Willd., *Dalbergia sissoo* Roxb., *Emblica officinalis* Gaertn., *Albizia procera* (Roxb.) Benth., and some times *Lagerstroemia parviflora* Roxb., are the most common woody species found along tall grass. Most common grasses, 4-5 m tall in this type are : *Saccharum longisetosus* var. *hookeri* (Hack.) Bor, *Saccharum narenga* (Nees ex Steud.) Hack., *Dichanthium annulatum* (Forsk.) Stapf, *Themeda arundinacea* (Roxb.) Ridley, *T. villosa* (Poir.) A. Camus, *Setaria pumila* R. & S., *Phragmites karka* (Retz.) Trin. ex Steud., *Centotheca lappacea* (L.) Desv., *Arundo donax* L., *Rotboellia cochinchinensis* Clayton, *Setaria intermedia* R. &. S., *Isachne globosa* (Thunb.) O.Ktze., *Polytoca digitata* (L.f.) Druce, *Arundinella decempedalis* (O.Ktze.) Jan. and others.

Grassland on new gravels and sand-beds : There are often changes in the course of the rivers following floods and a new deposition of gravels and sands take place over the standing vegetation along the river banks. This condition causes destruction of older serals and brings

about a complete edaphic changes where some pioneer tree species and grasses colonise the new deposits. Here the soil is very porous and dry during summer and is almost devoid of humus. Grasses are mainly dominated by *Saccharum spontaneum* L., *Bothriochloa pertusa* (L.) A. Camus, *Perotis indica* (L.) Kuntze, *Apluda mutica* L., *Vetiveria zizanioides* (L.) Nash, *Chrysopogon aciculatus* (Retz.) Trin., *Pennisetum glaucum* (L.) R. Br., *Setaria intermedia* R. &. S., *S. palmifolia* (Koen.) Stapf, and others in association with almost pure formation of *Dalbergia sissoo* Roxb., *Acacia catechu* (L.f.) Willd., and a purple flowered herb, *Exacum tetragonum* Roxb. This type is found in Garodhat, Patlakhawa and some part of Chilapata, Madarihat and Nilpara areas of the sanctuary.

Within the grasslands of the sanctuary there are some wetlands, water pools and large water bodies which are commonly associated with the following hydrophytes :

Typha angustifolia L., *Eleocharis palustris* R. Br., *E. retroflexa* Urb. *Ludwigia octovalvis* (Jacq.) Raven, *Alternanthera sessilis* (L.) DC., *Polygonum barbatum* L., *Commelina benghalensis* L., *Schoenoplectus articulatus* (L.) Palla, *Panicum paludosum* Roxb., *Echinochloa colona* (L.) Link, *Leersia hexandra* Sw., *Vallisneria natans* (Lour.) Hara, *Hydrilla verticillata* (L.f.) Royle, *Potamogeton pectinatus* L., *Aponogeton undulatus* Roxb., *Caldesia parnassifolia* (L.) Parl., *Sagittaria trifolia* L., *Butomopsis latifolia* (D.Don) Kunth, *Najas minor* All., *Monochoria vaginalis* Presl., *Floscopa scandens* Lour., *Coix lacryma-jobi* L. and others.

FAUNA OF THE SANCTUARY

The sanctuary is well known for the Great Indian one-horned Rhinoceros (*Rhinoceros unicornis*) and gour population. Apart from the rhino and gour, other animals are also found in considerable numbers. According to the report of Indian Board of Wild Life, 1980 (Memorandum to wildlife status Evaluation Committee's report at Jaldapara on 28.10.1980) the sanctuary represents the following wildlife figures :

Rhinos	22 (including calves)	Indian Elephants	11
Gours	36	Wild Pigs	188
Sloth Bears	10	Tigers	11
Leopards	5	Sambars	58
Barking Deers	147	Hog Deers	631
Hares	250	Civet Cats	10

DISTRIBUTION OF FOOD RESOURCES AND WILD ANIMALS IN THE DIFFERENT VEGETATION TYPES OF THE SANCTUARY

Distribution of wild animals is ultimately governed by the availability of food resources in the different vegetation types. Comparison of major vegetation types and presence of wild animals will be instructive for determining various food resources for the wild animals in different vegetation types of the sanctuary :

The wet semi-evergreen formation : It has a complete canopy of considerable height and a fully shaded forest floor covered with leaf litters. Grasses and other herbs are usually very little and the top storey may be formed by some deciduous species. Grazing or browsing of angulates is very rare except in some degraded places where the canopy is open. Food resources available in this type are mainly underground corms and tubers of *Costus speciosus* (Koen.) Smith, *Curcuma amada* Roxb., *Globba racemosa* Smith, *Hedychium gracile* Roxb., *Zingiber roseum* (Roxb.) Rosc., *Molineria capitulata* (Lour.) Herb., *Dioscorea bulbifera* L., *D. pentaphylla* L., *Asparagus racemosa* Willd., *Chlorophytum tuberosum* (Roxb.) Baker, *Arisaema speciosum* Mart., *A. tortuosum* (Wall.) Schott, *Colocasia esculenta* (L.) Schott, *Ariopsis peltata* Nimmo, *Lasia spinosa* (L.) Thw. and others.

The foliage of small trees and shrubs at low canopy level of *Litsea monopetala* (Roxb.) Pers., *Macaranga denticulata* (Bl.) Muell.-Arg., *Fagerlindia fasciculata* Tiruveng., *Leea asiatica* (L.) Ridsdale, *Ehretia acuminata* R. Br., *Mallotus philippensis* (Lamk.) Muell.-Arg. and fleshy fruits of *Syzygium jambos* (L.) Alston, *S. cumini* (L.) Skeels, *S. operculatum* (Roxb.) Niedezn., *Litsea glutinosa* Rob., *Sapium baccatum* Roxb., *Cinnamomum glaucescens* Hand.-Mazz., *Persea gamblei* (Hook.f.) Kosterm., *Elaeocarpus lucidus* Roxb., *Ficus bengalensis* L. and many others.

Since this type is rich in foliage trees and fleshy fruits, a good number of arboreal monkeys and squirrels are common. Due to absence of grasses, large herbivores are usually uncommon except some wild pigs which are capable of digging up underground corms and tubers.

Moist deciduous formation : The deciduous tree species of medium to good height form an open canopy in this formation. Considerable quantity of grasses, shrubs and herbs are common during the monsoon. Sometimes growth of canes and other palatable grasses in this type make the habitat more suitable for wild animals than the wet semi-evergreen type. Populations of monkeys and squirrels are less due to

lack of leaves and fleshy fruits but elephants, gours, deers and sometimes rhinos are frequent in this open deciduous formation.

Alluvial grassland Savannahs : The riverine grasslands and low alluvial Savannah woodlands which occupy almost half the plant cover of the sanctuary offer best grazing grounds for larger herbivores like rhinoceros, sambars and chitals. The leaves, flowers and fruits of *Acacia catechu* (L.f.) Willd; *Bombax ceiba* L., *Dalbergia sissoo* Roxb., *Oroxylum indicum* (L.)Vent., *Emblica officinalis* Gaertn., within the grassland savannah are also good fodder for larger herbivores. At some places these grasslands are found to be replaced by the pure community of *Alpinia nigra* Burtt, which serve as a good grazing ground for elephants.

Riparian fringing forests : Some tree species form a characteristic narrow fringe along the water courses, mainly dominated by *Ficus semicordata* Buch.-Ham., *F. racemosa* L., *Bischofia javanica* Bl., *Duabanga grandiflora* (Roxb. ex DC.) Walp., *Bridelia retusa* Spreng., *Dillenia pentagyna* Roxb., *Anthocephalus cadamba* (Roxb.) Miq., *Macaranga denticulata* Muell.-Arg., in association with grasses, *Saccharum spontaneum* L., *S. narenga* Hack., *Themeda arundinacea* (Roxb.) Ridley, and others. Leaves, fruits and twigs of this formation are palatable food for sloth bears, sambars, elephants and monkeys. Due to the presence of water, rhinos also visit frequently these areas during dry season.

Degraded riparian fringes are much favoured ecologically to a secondary grassland formation and such habitat can support larger number of herbivores and smaller mammals like hares in the sanctuary. In general, the distribution of plant species which form food resources for wild animals in the different types of vegetation within the sanctuary can be presented in the following table :

Vegetation Types	*Food Resources in the Sanctuary for Wild Animals*							
	Herbs	Shrubs	Grasses	Fleshy fruits	Seeds	Tubers	Leaves	Wood
Wet Semi-evergreen	R	R	O	A	R	A	A	A
Moist deciduous	A	A	C	C	C	O	A	A
Savannah grassland	R	R	A	O	O	O	R	O
Riparian fringes	A	A	C	C	O	C	A	C

A = abundant, R = rare, C = common and O = absent.

Distribution of Wild Animals in different vegetation types in the Jaldapara Sanctuary

	VEGETATION TYPES			
Name of Animals	Wet Semi evergreen	Moist deciduous	Savannah grassland	Riparian Fringes
Rhinoceros	O	R	C	R
Gour	O	R	R	R
Elephant	R	R	O	C
Sloth Bear	R	O	O	C
Sambar	R	C	R	R
Hog Deer	R	C	C	R
Wild Pig	C	R	O	R
Barking Deer	R	C	C	R
Tiger	R	R	R	O
Chital	R	C	R	O
Civet Cat	R	R	O	O
Monkey	C	R	O	R
Hare	O	C	R	R
Squirrel	C	C	O	R

C = common, R = frequent or rare, O = absent.

HABITAT AND FOOD OF RHINOCEROS IN THE JALDAPARA SANCTUARY

Rhinoceros prefer fresh water swamps with dense cover of tall grasses. The animals feed on coarse and soft grasses, leaves and flowers of some deciduous species and some aquatic weeds. Presence of tall grasses and some woody deciduous species in the habitat provide good cover for maintaining constant body temperature and also hiding cover for security of the animals. It has been found that rhinos ramble commonly in search of food along the forest blocks of Torsa I and II, Jaldapara III, Chilapata III (Sissumara) and North West C.C. Line (Fig. 1 : Map) where the vegetation consists of low alluvial savannah grasslands, flooded during the monsoon and densely covered with 4-6 m tall grasses and frequently associated with some deciduous trees. The common grasses and tree species in these areas are :

Saccharum narenga Hack., *S. bengalense* Retz., *S. spontaneum* L., *S. longisetosum* (Anderss. ex Benth.) Narayansw. ex Bor, *S. longisetosum* var. *hookeri* (Hack.) Bor, *S. arundinaceum* Retz., *Cymbopogon flexuosus* (Nees) Wats., *C. gidarba* (Ham.) Haines, *C. jwarancusa* (Tones) Schult.,

Imperata cylindrica (L.) Raeuschel., *Themeda arundinacea* (Roxb.) Ridley, *T. caudata* (Nees) A. Camus, *Arundo donax* L., *Arundinella bengalensis* (Spreng.) Druce, *Aristida setacea* Retz., *Pennisetum glauca* (L.) R. Br., *Rottboellia cochinchinensis* (Lour.) Clayton, *Thysanolaena maxima* (Roxb.) O. Ktze., *Phragmites karka* (Retz.) Trin. ex Steud., *Heteropogon contortus* (L.) P. Beauv. ex R. & S., *Setaria palmifolia* (Koen.) Stapf, *Apluda mutica* L., *Oplismenus compositus* (L.) P. Beauv., *Vetiveria zizanioides* (L.) Nash, and others. Among the woody species *Bombax ceiba* L., *Dalbergia sissoo* Roxb., *Albizia procera* (Roxb.) Benth., *Emblica officinalis* Gaertn., *Acacia catechu* (L.f.) Willd., *Lagerstroemia parviflora* Roxb. are common. Some degraded patches of these are found seriously infested by a noxious weed *Mikania cordata* (Burm.f.) Robinson, which forms a carpet over the vast stretches of grassland smothering out regeneration of palatable grasses.

DETERMINATION OF FEEDING HABIT OF RHINOCEROS IN THE JALDAPARA SANCTUARY

Feeding habit of Rhinoceros in the Jaldapara sanctuary has been ascertained by the analysis of faecal samples. The method was widely used for finding out food preference in ungulates by several workers (Stewart, 1967; Storr, 1961; Brahmachary *et al.*, 1970). On some occasions direct observation was also carried out in the field on elephant back to find out the feeding habit during dry season. It has been found that Rhinoceros chiefly subsist upon tall grasses and some herbs and when they are scarce, rhinos are compelled to feed upon young leaves, fruits, flowers, some aquatic weeds and some soft small grasses and sedges or the supplementary cultivated crops as found in the nearby villages.

METHODS

Forage plants can be identified easily as cuticles of almost every plant species has unique characteristic for identification. Reference slides were prepared after boiling the fresh leaf fragments in aqueous solution of chloral hydrate for 7-10 minutes in a water bath until it became transparent. The transparent leaf fragments were washed and mounted on slides for microscopic study. 5 fresh faecal samples per month were collected during June, July, August and September (wet season) and March, April and May (during dry season) from the rhino dung heaped at Hollong, Moiradanga, Khejurbari, Chilapata and N.W.C.C. Line. The portion of faecal matters were collected randomly

during different times of the day at an interval of 7-10 days. The collected materials were preserved in formaldehyde-acetic acid and after boiling with chloral hydrate solution, the cuticular fragments were taken out for preparation of slides. Each slide was identified under 10 × 100 magnification compared with similar section collected from fresh sample. For tabulating the quantitative data counting of the plant materials were done very carefully.

It was also attempted to observe grasses and other species nibbled by rhino at 4 forest blocks. Though it was very difficult to approach the rhino and observe exactly what it was eating, however, it was possible following the regular tracks of rhino on elephant back and reaching immediately to the spot where the animal had extensively grazed. A systematic survey was made in 4 forest blocks walking along 100 m line at random for determining frequency and density of plant species and percentage cover of seemingly dominant food grasses. The biomass of the most preferred grass species from selected habitats where rhinos ramble most frequently was estimated by using harvest method and the harvest grasses were oven dried at 105^0C and the dry weight of the sample was measured. The biomass of the same species growing in other parts of the sanctuary was also studied for comparison.

RESULT

The food analysis of rhino revealed that grasses in the ground contribute a major portion (75.6%) of its diet in comparison to other herbs, foliage, fruits and flowers of various tree species. In total 16 species of grasses were encountered in the faecal pellet. Among these *Saccharum narenga* Hack., *S. arundinaceum* Retz. and *S. longisetosum* var. *hookeri* (Hack.) Bor, were found most favoured food comprising 16.5%, 17.3% and 18.2% respectively of the total grass consumed. Other 13 grasses namely, *Saccharum spontaneum* L., *S. longisetosum* (Anderss. ex Benth.) Narayansw. ex Bor., *S. bengalense*, Retz., *Thysanolaena maxima* (Roxb.) O.Ktze., *Imperata cylindrica* Raeuschel., *Phragmites karka* (Retz.) Trinex Steud., *Cymbopogon gidarba* (Ham.) Haines, *C. jwarancusa* Schult., *Arundo donax* L., *Arundinella bengalensis* Druce, *Heteropogon contortus* R. & S., *Setaria palmifolia* Stapf, *Themeda caudata* A. Camus and *Apluda mutica* L. in total comprise only 23.6% of the total grass consumed. Among the herbs, foliage and flowers, consumed fragments of the leaves of *Dalbergia sissoo* Roxb. and *Acacia catechu* (L.f.) Willd. were found most common in the faeces (6.3% and 5.2% respectively). The flowers of *Bombax ceiba* L. and *Oroxylum*

indicum (L.) Vent. comprise of 3.2%. Herbs and unidentified species were found to comprise 6.2% and 3.2% respectively.

SEASONAL CHANGES IN FOOD HABIT

The observation on seasonal changes in food habit were made with the help of data collected from different sources. Fragments of the plant species which could be identified in the faecal matters with certainty have been taken into account. The grazing of some plant species which have been observed directly in the field during the dry season are also included. Some plant species which were mentioned by the forest people as occasional rhino food have also been taken into account in this data. Rhinos ramble in search of food and mostly graze on grassy vegetation; yet the diet composition, differs between the wet season (June to September) and dry season (March to May). Fig. 2 represents percentage contribution of different food items of the total recognizable foods in wet and dry seasons. Due to scarcity of grasses in dry season, considerable portion of herbs, aquatic weeds, sedges, and small soft grasses become common food during March to May. During the months of April and May, rhinos feed on young foliage of *Acacia catechu* (L.f.) Willd., *Dalbergia sissoo* Roxb., *Macaranga denticulata* Muell.-Arg., *Trema orientalis* (L.) Bl, *Syzygium cumini* (L.) Skeels., *Ficus hispida* L.f., *F. semicordata* Buch.-Ham., *Litsea monopetala* Pers. along with flowers of *Bombax ceiba* L., *Oroxylum indicum* (L.) Vent. and others which are found to be most common associates in the savannah-woodland vegetation. With the onset of rains followed by the lush growth of tall and hard grasses in the lowlying savannah grasslands, a change in the food preference of rhinos could be seen in between June to September. The same food preference may continue up to January with little changes. The contribution of food plants consisting of grasses, sedges, herbs, foliage, twigs and flowers of tree species in the diet during dry and wet seasons could be classified into 3 categories from the nature of different grazing counts as follows :

Food Plants of Rhinoceros in the Jaldapara Sanctuary

Sample	Observation on Actual Feeding	Microscopic Examination of Dung	Reported by Local Forest People
Tall & hard grass category :			
Saccharum narenga Hack.	+	+	
S. arundinaceum Retz.	+	+	

Sample	Observation on Actual Feeding	Microscopic Examination of Dung	Reported by Local Forest People
S. spontaneum L.		+	
S. bengalense Retz.	+	+	
S. longisetosum var. *hookeri* (Hack.) Bor	+	+	
Thysanolaena maxima (Roxb.) O. Ktze.		+	
Imperata cylindrica (L.) Raeuschel.	+	+	
Phragmites karka (Retz.) Trin. ex Steud.	+	+	
Heteropogon contortus R. & S.	+	+	
Cymbopogon gidarba (Ham.) Haines		+	
C. jwarancusa Schult.		+	
Themeda arundinacea (Roxb.) Ridley	+	+	
T. caudata A. Camus	+	+	
Setaria palmifolia Stapf	+	+	
Vetiveria zizanioides (L.) Nash		+	
Arundinella bengalensis Druce		+	
Arundo donax L.		+	
Rottboellia cochinchinensis (Lour.) Clayton		+	
Chrysopogon aciculatus Trin.		+	
Tree leaves, flowers and twigs category :			
Dalbergia sissoo Roxb.	+		+
Acacia catechu (L.f.) Willd.	+		+
Macaranga denticulata Muell.-Arg.			+
Bombax ceiba L. (flowers)	+		
Oroxylon indicum (L.)Vent. (flowers)	+		
Trema orientalis (L.)Bl.			+
Ficus hispida L.f.	+		
F. semicordata Buch.-Ham.	+		
Litsea monopetala Pers.			+
Herbs, aquatics, small grasses and sedges category :			
Alysicarpus bupleurifolius (L.)DC.	+		
Alternanthera sessilis R.Br.ex DC.	+		
Costus speciosus Sm.	+		
Crotalaria alata Buch.-Ham.			+
Desmodium gangeticum (L.) DC.	+		

Sample	Observation on Actual Feeding	Microscopic Examination of Dung	Reported by Local Forest People
Flemingia strobilifera (L.) R.Br.			+
Hydrocotyle javanica Thunb.			+
Hedychium gracile Roxb.	+		
Melilotus indica (L.) All.			+
Oxalis corniculata L.	+		+
Polygonum plebeium R. Br.			+
Vallisneria natans (Lour.) Hara	+		+
Agrostis myriantha Hook. f.		+	
Oplismenus compositus P. Beauv.		+	
Paspalum conjugatum Berg.		+	
Brachiaria reptans Gard. & Hubb.	+	+	
Digitaria ciliaris Koel.			+
Kyllinga brevifolia Rottb.			+
Kyllinga memoralis Hutch. & Dal.			+
Fimbristylis complanata Link	+		+
Bulbostylis densa Hand.-Mazz.			+

PREFERENCE OF GRASSLANDS BY RHINOS IN THE SANCTUARY

Survey of the grasslands in the sanctuary reveals that rhinos ramble in maximum numbers in most of the seasons within 4 forest blocks of the sanctuary located at Jaldapara III, Torsa I and II Chilapata III or Sissumara.

The question consequently arises as to why do the rhinos congregate for maximum time in these 4 forest blocks ? The answer may be related to several ecological factors of the habitat but the most important factor could be the rhinos' preferred food plants and their quality and quantity available in these forest blocks. In order to determine such aspects, the percentage cover of seemingly preferred dominant food grasses and their productive biomass per h a. per year and comparison of the biomass of the same dominant grass species growing in other parts of the sanctuary have been calculated to find out why the Rhinos concentrate maximum time within the 4 forest blocks of the sanctuary.

Three types of dominant grass communities have been identified within the four forest blocks : In Jaldapara III where total area is 791.56 ha., the grassland is dominated by *Saccharum narenga* Hack. in common association of *Saccharum longisetosum* Bor, *Themeda*

arundinacea (Roxb.) Ridley, *Arundinella bengalensis* (Spreng.) Druce, *Imperata cylindrica* (L.) Raeuschel., *Phragmites karka* (Retz.) Trin. ex Steud., *Heteropogon contortus* (L.) P. Beauv. and others.

In the Chilapata or Sissumara block where the total area is 556.01 ha. the grassland is dominated by *Saccharum longisetosum* var. *hookeri* (Hack.) Bor in association with *Saccharum narenga* Hack., *S. spontaneum* L., *S. arundinaceum* Retz., *S. bengalense* Retz., *Apluda mutica* L., *Thysanolaena maxima* (Roxb.) O. Ktze., *Vetiveria zizanioides* (L.) Nash and others.

Dominant species was determined by the maximum percentage cover of the species within the total number of quadrats by random sampling method. Productivity of each dominant species was estimated by harvesting of clip-quadrat of the size 1 × 1 m and clipping of the vegetation was done by hand sickle, close to the ground. Fresh weight of the vegetation in each quadrat was estimated in the field with the help of a balance and the same dry weight was calculated by oven-dry processes in the laboratory.

Thirty quadrats were harvested in each forest block. Percentage composition of dominant grass and average productivity of dominant grass in terms of biomass were estimated ton per ha. as follows : In Jaldapara III block, *Saccharum narenga* Hack. was dominated over other grasses covering about 72%. This community produces average production of dry matter 19.50 tons/ha/year.

In Torsa I & II blocks *Saccharum arundinaceum* Retz. dominated other grasses covering about 65%. The community produces an average weight of dry matter of 21.15 tons/ha./year. In the Chilapata block *Saccharum longisetosum* var. *hookeri* (Hack.) Bor dominated over the other grasses covering about 75%. This community produces an average weight of dry matter of 22.05 tons/ha./year.

Similar estimation of dry matter (biomass) of the three dominant grasses occurring in different places of the sanctuary was made by harvesting in a 1 × 1 m quadrat. It was found that average dry matter productivity of *Saccharum narenga* Hack. in Hollong was 12.50 tons/ha./year, and in Bengdaki 13.75 tons/ha./year respectively. In case of *Saccharum longisetosum* var. *hookeri* (Hack.) Bor, average dry matter weight in N.W.C.C. Line was 14.20 tons/ha./year, and in Bordabri it was 14.00 tons/ha/year. For *Saccharum arundinaceum* Retz., the average dry matter weight in Dhaidhai ghat was 15.08 tons/ha./year, and in Jaldapara II, 14.80 tons/ha./year.

The above investigations indicate that the grasslands in Chilapata, Torsa I & II and in Jaldapara III forest blocks of the sanctuary are quite productive as compared to the other areas of the sanctuary.

These four blocks need very careful management for maintaining proper food chain of the rhino population in the Sanctuary. On the other hand effort should be made for planting these four grass species in other parts of the sanctuary to develop and provide ensured forage grasses for the survival of rhino population in the Sanctuary.

Table showing Percentage Cover & Biomass Production of Dominant Grasses in 4 Forest Blocks in the Jaldapara Sanctuary.

Forest Blocks	Dominant Grass Species	% Cover	Biomass Ton/Ha	Year
Jaldapara III	*Saccharum narenga*	72%	19.50 t/h	1984-86
Torsa I & II	*Saccharum arundinaceum*	65%	21.15 t/h	1984-86
Chilapata	*Saccharum longisetosum* var. *hookeri*	75%	22.05 t/h	1984-86
Other blocks :				
Hollong	*Saccharum narenga*	35%	12.50	1986
Bengdaki	*Saccharum narenga*	38%	13.75	
Dahidhai ghat	*Saccharum arundinaceum*	40%	15.08	
Jaldapara II	*Saccharum arundinaceum*	31%	14.80	
Bordabri	*Saccharum longisetosum* var. *hookeri*	41%	14.00	
N.W.C.C. Line	*Saccharum longisetosum* var. *hookeri*	34%	14.20	

The above table indicates average % cover of three dominant grasses in different blocks and their average biomass productivity during the wet season in Jaldapara Sanctuary.

ENUMERATION AND ECOLOGICAL NOTES ON VASCULAR PLANT RESOURCES OF THE JALDAPARA SANCTUARY

The urgent need for detail botanical accounts of the sanctuary, in general, is mainly due to the alarming rate at which several plants are vanishing from many regions on the earth. Rapid industrialisation, relentless pressure of an ever increasing population, unplanned developmental activities and over exploitation of raw plant materials are some of the major causes for disappearance of many plants. Therefore, it becomes imperative to make intensive plant explorations for preparing at least an inventory of all the plants of the sanctuary before some disturbing factor affects the valuable plants of the natural ecosystem.

Over-exploitation of the forest produce for industrial uses, such as paper-making, pulp-extraction for rayon manufacture, timber for furniture and house building etc. have become injurious factors to the natural vegetation in several regions in India. Aquisition of forest areas for rehabilitation, cultivation of more food crops, construction of dams for hydroelectric projects for more electric power and open cut-mining activities have further threatened the vegetation of forest ecosystem in many parts of the country. The question is how to check this over exploitation of our valuable plant resources. It is obvious that miss-utilization or over-utilization of a forest asset is bound to happen if one is not fully aware of it. Intensive plant exploration and documentation of the plant resources will be prerequisite for ensuring their protection and to avoid over-exploitation.

Therefore, it is inevitable, in order to have a sound ecological development of a forest ecosystem, first to identify its plant resources available in the reserves and then to plan their management and optimum utilization.

Previous botanical work on the forests of Jaldapara Sanctuary revealed that when compared with the intensive botanical activities elsewhere in the North Bengal forests since the time of Prain (1903), Gamble (1910), Cowan and Cowan (1929) and others, the forest of the Jaldapara Sanctuary has escaped due botanical recognition except some sporadic references to the Cooch-Behar or Jailpaiguri forest division. Mukherjee (1965) and Chaudhari (1969) have published some interesting data on the vegetation and ecology of Jailpaiguri district and North Bengal regions respectively but the Jaldapara Sanctuary has totally been ignored.

Prain (1903) remarks: "The Duars which are merely an eastward extension across the Tista of the sub-mountain forest belt, have been however, partialy explored by Gamble and fully examined by Haines to whose exertions our knowledge of the region is chiefly due. Much, however, yet remains to be done both in the Duars and in Cooch-Behar." It was therefore, thought that intensive plant explorations, enumeration of taxa and plant resources along with vegetation of the sanctuary would be of great value for providing a detailed botanical account of the sanctuary. The sequence of families in the enumeration is followed broadly as given in Bentham and Hooker's system of classification of vascular plants. However, certain modifications as given in recent works have also been followed. Brief ecological notes, flowering and fruiting time and distribution of taxa within the sanctuary have been provided based on field data. Some sterile and unnumbered specimens are not included in the list. All the specimens collected from the sanctuary are in the Herbarium of Ecology Unit, Botanical Survey of India, Howrah (CAL).

ENUMERATION OF SPECIES

RANUNCULACEAE

Clematis gouriana Roxb. ex DC. Woody climbers; frequent in moist evergreen forests; fl. & fr.: Sept. Nov. Hollong, Salkumar. Medicinal.

Naravelia zeylanica (L.) DC. Climbers in semi evergreen forests; fl. & fr.: Oct. Jan. Hollong, Jaldapara. Medicinal & fibre.

DILLENIACEAE

Dillenia indica L. Trees; common along river banks and moist mixed forests; fl. & fr.: June Sept. Bordabri, Torsa, Salkumar. Edible & softwood.

Dillenia pentagyna Roxb. Trees; common along low hilly regions and riversides; fl. & fr. : March June. Salkumar, Bordabri, Hollong. Edible & softwood.

MAGNOLIACEAE

Magnolia pterocarpa Roxb. Trees; frequent in moist forests and hill slopes; fl. & fr. : Apr. July. Hollong, Salkumar. Timber & plywood.

Michelia champaca L. Trees; common in moist and dry mixed forests; fl. & fr. : Feb. May. Champbari, Hollong, Jaldapara, Salkumar, Kunjanagar. Timber & plywood.

ANNONACEAE

Annona reticulata L. Trees; common along river banks and moist forests; fl. & fr. : June Aug. Bordabri, Salkumar, Torsa. Edible & medicinal.

Miliusa longiflora (Hook. f. & Thoms.) Sincl. Trees; frequent in moist semi evergreen forests; fl. & fr. : March June. Hollong, Salkumar. Fodder, dye & plywood.

Miliusa tomentosum (Roxb.) Sincl. Trees; frequent in wet semi evergreen forests; fl. & fr. : Apr. Aug. Hollong, Jaldapara, Salkumar. Fodder, dye & plywood.

Polyalthia simiarum Hook. f. & Thoms. Trees; frequent in moist semi evergreen forests; fl. & fr. : May July. Hollong, Jaldapara. Pencil, toy, timber & plywood.

Uvaria hamiltonii Hook. f. & Thoms. Climbers; frequent in wet forests and low hill slopes; fl. & fr.: May Aug. Hollong, Salkumar. Medicinal.

MENISPERMACEAE

Cissampelos pareira L. var. **hirsuta** (Buch. Ham. ex DC.) Forman, Climbers; common in moist forests and forest edges; fl. & fr. : March May. Hollong, Jaldapara, Salkumar. Medicinal.

Tinospora cordifolia (Willd.) Hook. f. & Thoms. Woody climbers; common in moist and dry forests and forest borders; fl. & fr. : Feb. June. Hollong, Jaldapara, Bordabri. Fodder & medicinal.

BRASSICACEAE

Rorippa indica (L.) Hiern, Erect herbs; frequent in damp places; fl. & fr.: Apr. Sept. Chilapata.

Rorippa nasturtium-aquaticum (L.) Sching. & Thell. Small herbs; frequent along streams and swamps; fl. & fr.: June Sept. Kunjanagar. Medicinal.

CAPPARACEAE

Capparis sepiaria L. Climbers; frequent along roadsides and forest borders; fl. & fr.: Oct. Jan. Jaldapara. Medicinal.

Cleome gynandra L. Annual herbs; common along roadsides and forest edges; fl. & fr.: June Sept. Hollong, Jaldapara. Medicinal.

Crateva religiosa Forst. f. Trees; frequent in dry mixed forests;. fl. & fr. March July. Bordabri, Salkumar. Pencil, toy, cart wheel & medicinal.

FLACOURTIACEAE

Casearia elliptica Willd. Small trees; frequent in dry mixed forests; fl. & fr.: May Oct. Bordabri, Hollong. Timber & plywood.

Flacourtia jangomas (Lour.) Raeusch. Small trees; frequent in moist deciduous forests; fl. & fr. : March Oct. Salkumar. Cottage industry & edible.

Hydnocarpus kurzii (King) Warb. Trees; rare in Chilapata forest near C. C. Line; fl. & fr.: not seen. Medicinal & aromatic oil.

POLYGALACEAE

Polygala longifolia Poir. Slender herbs; frequent in grasslands; fl. & fr. : May Sept. Jaldapara. Medicinal.

Polygala persicariaefolia DC. Annuals; frequent in grasslands; fl. & fr. : July Sept. Jaldapara. Medicinal & fodder.

CARYOPHYLLACEAE

Drymaria cordata (L.) Willd. ex Roem. & Schult. Annuals; frequent along stream side and wastelands; fl. & fr. : May July. Jaldapara. Medicinal.

Polycarpon prostratum (Forsk.) Aschers. & Schweinf. Herbs; common in moist places and riversides; fl. & fr. : March–April. Torsa. Medicinal.

PORTULACACEAE

Portulaca oleracea L. Succulent annuals; frequent in waste places and roadsides; fl. & fr. : March May. Jaldapara. Edible & medicinal.

Portulaca pilosa L. ssp. **grandiflora** (Hook.) Geesink, Succulent annuals; frequent in sandy riverbeds; fl. & fr. : May June. Chilapata.

HYPERICACEAE

Hypericum hookerianum Wight & Arn. Bushy shrubs; frequent along river sides and moist rocky slopes along with grasses; fl. & fr. : June Sept. Hollong, Bengdaki. Medicinal & dye.

CLUSIACEAE

Garcinia kydia Roxb. Trees; frequent in high hill forests in moist places; fl. & fr. : Feb May. C.C.Line, Bordabri. Medicinal, gum & edible.

Garcinia pedunculata G. Don, Trees; rare in high hill forests; fl. & fr.: Oct. Feb. C.C.Line. Medicinal, dye and gum.

Mesua ferrea L. Trees; rare in high hill forests; fl. & fr. : Feb. May. C.C.Line; one tree is planted in Madarihat. Aromatic oil, toy, cart wheel and timber.

THEACEAE

Schima wallichii (DC.) Korthals, Trees; frequent in high hill forests along 'Sal' association; fl. & fr. : May July. Bordabri. Medicinal & timber.

Camellia sinensis (L.) O. Ktze. Bushy shrubs; commonly cultivated outside the sanctuary; fl. & fr. : not seen. Tea.

SAURAUIACEAE

Saurauia roxburghii Wall. Large shrubs or small trees; common along river banks and moist places in mixed forests,; fl. & fr. : May Oct. Hollong, Jaldapara, Bordabri. Medicinal & toy.

DIPTEROCARPACEAE

Shorea robusta Gaertn. f. Trees; common in high hill forests; fl. & fr. : Apr. June. Bordabri, Chilapata, Jaldapara, C.C.Line. Timber, fat, gum & tannin.

MALVACEAE

Abelmoschus moschatus Medic. Herbs; frequent in open forests and shaded places; fl. & fr. : July Oct. Bordabri, Kunjanagar. Medicinal & fibre.

Abutilon indicum (L.) Sw. Herbs; common along roadsides and open places in disturbed soils; fl. & fr. : Aug. Oct. Jaldapara. Fibre.

Kydia calycina Roxb. Trees; common in dry mixed forests in association with 'Sal'; fl. & fr. : Sept. Feb. Bordabri. Fodder, plywood & timber.

Sida acuta Burm. f. Herbs; frequent in grasslands and open forests; fl. & fr. : Sept. Dec. Hollong, Bordabri. Medicinal.

Sida cordata (Burm. f.) Borss. Trailing herbs; common in hill slopes, grassy forest floors and roadsides; fl. & fr. : Apr. Oct. Hollong, Salkumar, Bordabri. Medicinal & fibre.

Sida rhombifolia L. Herbs; common in open forests and grasslands; fl. & fr. : Feb. Apr. Hollong, Jaldapara. Medicinal & fibre.

Thespesia lampas (Cav.) Dalz. & Gibson, Shrubs; frequent in moist forests and waste places; fl. & fr. : Oct. Dec. Salkumar, Hollong. Medicinal and fibre.

Urena lobata L. Undershrubs; common in degraded forests and roadsides; fl. & fr. : Aug. Sept. Hollong, Jaldapara, C.C.Line. Fibre.

Urena sinuata L. Stellate pubescent herbs; common in degraded areas in moist and dry mixed forests; fl. & fr. : July Oct. Hollong. Medicinal and fibre.

BOMBACACEAE

Bombax ceiba L. Trees; common in wet and dry mixed forests and savannah woodlands; fl. & fr. : Feb. June. Hollong, Jaldapara, Salkumar, Bordabri, Moiradanga, Chilapata, Madarihat. Fodder, fibre, softwood, cottage industry, paper pulp & plywood.

STERCULIACEAE

Abroma augusta (L.) L.f. Shrubs; frequent in moist forests; fl. & fr.: July Sept. Kunjanagar. Medicinal and fibre.

Guazuma ulmifolia Lamk. Trees; frequent along riversides and open lands; fl. & fr. : Oct. Jan. Salkumar, Bordabri. Medicinal, fodder & plywood.

Helicteres isora L. Shrubs; rare in dry mixed forests; fl. & fr. : Sept.- Jan. Bordabri. Medicine & fibre.

Melochia corchorifolia L. Shrubby weeds; common in wasteplaces; fl. & fr.: Sept. Jan. Jaldapara. Fibre.

Pterospermum lancifolium DC. Small trees; frequent in open forests; fl. & fr. : March Sept. Hollong, Salkumar. Medicinal, Pencil, toy and softwood.

Sterculia urens Roxb. Trees; frequent in dry mixed forests; fl. & fr.: Oct. March. Hollong, Bordabri. Gum, fibre & edible.

Waltheria indica (L.) L. Weeds; common in waste places and roadsides; fl. & fr. : Aug. Dec. Jaldapara. Medicinal.

TILIACEAE

Grewia disperma Rottb. Shrubs; frequent in moist forests; fl. & fr. : July Dec. Salkumar. Pencil, toy, cart wheel & edible.

Grewia microcos L. Trees; frequent in wet and dry mixed forests; fl. & fr. : June Dec. C.C.Line, Jaldapara. Medicinal & fibre.

Grewia subinaequalis DC. Shrubs; common in dry mixed forests; fl. & fr. : Apr. Sept. Hollong, Salkumar. Edible.

Grewia tiliifolia Vahl, Trees; frequent in mixed forests; fl. & fr. : March Aug. Hollong, C.C.Line, Jaldapara. Pencil, toy, cart wheel & edible.

Triumfetta rhomboidea Jacq. Herbs; common in grasslands, roadsides, and shaded places; fl. & fr. : Aug. Dec. Hollong, Bordabri. Medicinal & fibre.

ELAEOCARPACEAE

Elaeocarpus ganitrus Roxb. Tall trees; rare along riverbanks in moist forests; fl. & fr. : July Oct. C.C.Line, Chilapata. Medicinal, plywood & special care for conservation. "Rudrakha".

Elaeocarpus floribundus Bl. Trees; rare in moist forests on hill slopes; fl. & fr. : June Sept. Salkumar, Kunjanagar. Edible, plywood and oil.

Elaeocarpus lucidus Roxb. Tall trees with many stilt roots from 2 m height of the stem; rare in moist forests along river banks; fl. & fr. : Apr. Sept. Hollong. Plywood, timber & special care for conservation.

Elaeocarpus rugosus Roxb. Trees with buttresses; frequent in moist semi evergreen forests; fl. & fr. : March Oct. Hollong. Aromatic oil, fat, soap & timber.

Elaeocarpus tectorius (Lour.) Poir. Trees; rare in swamp forests; fl. & fr. : May Oct. Hollong. Oil & timber.

GERANIACEAE

Geranium nepalensis Sweet, Herbs; frequent in moist grasslands and forest edges; fl. & fr. : June Sept. Jaldapara, Hollong. Medicinal.

OXALIDACEAE

Biophytum reinwardtii (Zucc.) Klotzsch, Herbs; frequent in open grasslands and moist places; fl. & fr. : July Oct. Jaldapara. Medicinal.

Oxalis corniculata L. Herbs; common in ditches and fresh water swamps; fl. & fr. : July Oct. Jaldapara. Medicinal & edible.

BALSAMINACEAE

Impatiens bracteata Wall. Herbs; frequent in wet mixed forests and forestedges; fl. & fr. : June Sept. Hollong, Bordabri. Medicinal.

Impatiens chinensis L. Herbs; frequent in open grasslands and forestedges; fl. & fr. : May Aug. Salkumar, Jaldapara. Medicinal.

RUTACEAE

Aegle marmelos Corr. Trees; frequent in dry mixed forests and roadsides; fl. & fr. : Dec. Apr. Hollong, Bordabri, Salkumar. Medicinal, fodder & edible.

Glycosmis arborea (Roxb.) DC. Shrubs or small trees; frequent in wet and dry mixed forests; fl. & fr. : Jan. June. Salkumar, Hollong, Jaldapara. Medicinal, aromatic oil, fat & soap.

Micromelum integerrimum (Roxb.) Wt. & Arn. ex Roem. Small trees; frequent towards village fringes; fl. & fr. : Oct. March. Jaldapara village. Medicinal.

Murraya paniculata (L.) Jack, Small trees; frequent in moist forests; fl. & fr. : March Aug. Salkumar, Kunjanagar. Medicinal & edible.

BURSERACEAE

Bursera serrata Wall. Tall trees; rare along moist forests and along streams; fl. & fr. : June Oct. C.C.Line. Medicinal, aromatic oil & soap.

Garuga pinnata Roxb. Trees; frequent in dry mixed forests; fl. & fr.: Feb.- June. Salkumar, Bordabri. Dye, gum, tannin, softwood & plywood.

Canarium bengalense Roxb. Trees with buttresses; rare in moist forests; fl. & fr.: June-Oct. C.C.Line. Gum & oil.

MELIACEAE

Aglaia hiernii Visw. & Ramach. Small trees; frequent in moist areas; fl. & fr. : Apr. Aug. Kunjanagar, Salkumar.

Aphanamixis polystachya (Wall.) Parker, Small trees; common along streams and moist places; fl. & fr. : Feb. June. Salkumar, Jaldapara. Softwood & plywood.

Azadirachta indica A. Juss. Trees; frequent along roadside and forest edges; fl. & fr. : May Dec. Hollong, Jaldapara, Bordabri. Medicinal, aromatic oil, fat, soap, plywood, timber & edible.

Chukrassia tabularis A. Juss. Trees; frequent in wet and dry mixed forests; fl. & fr. : Apr. Oct. Madarihat.

Cipadessa baccifera (Roth) Miq. Small trees; frequent in dry mixed forests; fl. & fr. : Apr. Sept. Bordabri. Plywood & timber.

Dysoxylum binectariferum (Roxb.) Bedd. Trees with garlic smell in stems; common in moist forests near streams; fl. & fr. : Feb. May. Salkumar, Chilapata, Hollong. Pencil, toy & cart wheel.

Melia azedarach L. Small trees; frequent along forest edges; fl. & fr.: June- Sept. Madarihat, Bordabri. Medicinal.

Toona ciliata Roem. Trees; frequent along forest edges and road sides; fl. & fr. : March Aug. Salkumar, Bengdaki. Dye, gum, tannin & timber.

Trichilia connaroides (Wt. & Arn.) Bentv. Small trees; frequent in moist forests and river sides; fl. & fr. : Apr. June. Salkumar.

OLACACEAE

Olax nana Wall. Perennial herbs with yellowish roots and reddish globose fruits; frequent in moist places on rocks and open grasslands; fl. & fr. : June Sept. Hollong. Medicinal.

Olax scandens Roxb. Climbers; frequent in dry mixed forests; fl. & fr. : Apr. Aug. Bordabri, Salkumar. Medicinal.

AQUIFOLIACEAE

Ilex umbellulata (Wall.) Lees. Trees; frequent along wooded savannah grasslands and along river sides; fl. & fr. : Feb. July. Jaldapara, Kunjanagar, Bordabri. Medicinal.

CELASTRACEAE

Celastrus paniculatus Willd. Climbing shrubs; frequent in dry mixed forests; fl. & fr. : Apr. July. Hollong, Salkumar. Medicinal.

Euonymus echinatus Wall. Climbing undershrubs; rare on rocky grass lands; fl. & fr. : May Aug. C.C.Line. Medicinal.

RHAMNACEAE

Gouania tiliaefolia Lamk. Scandent shrubs; frequent in moist forest in shaded places; fl. & fr. : June Sept. Hollong, Salkumar. Medicinal.

Rhamnus nepalensis Wall. Bushy shrubs; frequent in mixed forests; fl. & fr. : Oct. Feb. Moiradanga, Kunjanagar. Medicinal.

Ziziphus mauritiana Lamk. Trees; frequent along forest edges and dry mixed forests; fl. & fr. : Oct. Feb. Moiradanga, Bengdaki. Edible, charcoal & medicinal.

Ziziphus oenoplia (L.) Mill. Straggling shrubs; frequent in dry mixed forests and forest edges; fl. & fr. : Oct. Feb. Bordabri, Salkumar. Medical & edible.

VITACEAE

Ampelocissus latifolius (Roxb.) Planch. Extensive climbers; frequent in wet mixed forests; fl. & fr. : May Sept. Hollong. Medicinal, fodder & green manure.

Ampelocissus sikkimensis (Laws.) Planch. Climbers; frequent in moist forests; fl. & fr. : Apr. Aug. Hollong, Bordabri. Edible.

Cayratia pedata (Lour.) Juss. ex Gagnep. Lianas; frequent in moist forests; fl. & fr.: Apr. Aug. Hollong, Chilapata. Medicinal.

Cissus adnata Roxb. Climbers; common along forest edges; fl. & fr.: June Sept. Hollong, Jaldapara, Chilapata, C.C. Line. Medicinal.

Cissus javana DC. Slender climbers; frequent in mixed forests; fl. & fr. : July Aug. Jaldapara, Salkumar, Bordabri. Medicinal.

Tetrastigma lanceolarium (Roxb.) Planch. Climbers; frequent in wet evergreen forests; fl. & fr. : March June. Hollong, Jaldapara. Medicinal & edible.

Tetrastigma serrulatum (Roxb.) Planch. Wiry climbers; frequent in moist forests and river banks; fl. & fr. : Feb. June. Jaldapara. Medicinal.

Tetrastigma thomsonianum Planch. Slender climbers; frequent in moist shaded places in wet forests; fl. & fr. : Feb. June. Kunjanagar. Medicinal.

LEEACEAE

Leea asiatica (L.) Ridsdale, Shrubs ; commonly infesting the grasslands and degraded forest parts; fl. & fr. : June Aug. Torsa, Chilapata. Medicinal, fodder & edible.

Leea indica (Burm.f.) Merr. Shrubs; commonly infesting the grasslands and degraded forest parts; fl. & fr. : May Aug. Bengdaki, Chilapata, Hollong. Medicinal.

Leea macrophylla Roxb. ex Horn. Herbs with extensive spreading habit; common along savannah grasslands, and degraded forest parts; fl. & fr. : May-Aug. Chilapata, Kunjanagar, Malangi, Torsa. Medicinal.

SABIACEAE

Meliosma simplicifolia (Roxb.) Walp. Small trees; common in moist forests; fl. & fr. : Apr. June. Hollong, Jaldapara, Kunjanagar. Pencil, toy & cart wheel.

ANACARDIACEAE

Lannea coromandelica (Houtt.) Merr. Deciduous trees; frequent in dry mixed forests; fl. & fr. : Feb. May. Bordabri, Hollong, Salkumar. Dye, gum, tannin & softwood.

Mangifera indica L. Trees; frequent in moist forests; fl. & fr. : Jan. July. Salkumar. Edible & timber.

Rhus javanica L. Trees; frequent along forest edges and village sides; fl. & fr. : June Oct. Madarihat. Medicinal, aromatic oil, fat & soap.

Semecarpus anacardium L.f. Trees; frequent in 'Sal' forests; fl. & fr.: June-Sept. Bordabri. Medicinal, dye & plywood.

Spondias pinnata (L.f.) Kurz, Trees; frequent in open forests and road sides; fl. & fr. : May Sept. Salkumar, Jaldapara. Softwood & edible.

PAPILIONACEAE

Abrus fruticulosus Wt. & Arn. Climbing shurbs; frequent in shaded areas in moist forests; fl. & fr. : Aug. Oct. Hollong, Chilapata. Medicinal.

Abrus precatorius L. Climbers; frequent in dry mixed forests; fl. & fr. : June Sept. Bordabri, Salkumar. Medicinal.

Aeschynomene aspera L. Shrubs; frequent in swamps and ditches; fl. & fr. : Apr. Sept. Jaldapara. Fodder, cottage industry & paper pulp.

Alysicarpus glumaceus (Vahl) DC. Undershrubs; frequent in open grasslands and forest edges; fl. & fr. : July Nov. Jaldapara. Fodder.

Atylosia scarabaeoides (L.) Benth. Perennial trailing herbs; frequent in dry mixed forests and forest edges; fl. & fr. : Aug. Dec. Hollong, Bordabri. Green manure.

Crotalaria alata D. Don, Undershrubs; common in savannah grasslands; fl. & fr. : Aug. Dec. Chilapata. Fibre.

Crotalaria albida Heyne ex Roth, Erect herbs; frequent in forest edges; fl. & fr. : July Sept. Jaldapara. Medicinal & fibre.

Crotalaria juncea L. Herbs; occasional in grasslands; fl. & fr. : Sept.-Dec. Jaldapara. Medicinal & fibre.

Crotalaria pallida Ait. Herbs; frequent along forest edges; fl. & fr. : June Aug. Salkumar, Bengdaki. Medicinal.

Crotalaria sessiliflora L. Herbs or undershrubs; frequent in grasslands; fl. & fr. : Aug. Nov. Chilapata, Kunjanagar. Fibre.

Dalbergia lanceolaria L. f. Trees; frequent in dry mixed forests; fl. & fr. : Apr. Dec. Bordabri, Salkumar. Timber & plywood.

Dalbergia latifolia Roxb. Trees; frequent in semievergreen forests; fl. & fr. : Apr. Dec. Bordabri, Kunjanagar. Plywood & timber.

Dalbergia sissoo Roxb. Trees; common in savannah woodlands and river banks; fl. & fr. : Apr. Dec. Hollong, Madarihat, Jaldapara. Timber.

Dalbergia stipulacea Roxb. Climbing shrubs; frequent in moist forests; fl. & fr. : Apr. Dec. Salkumar. Fibre.

Dalbergia volubilis Roxb. Large woody climbers; occasional in moist forests and river banks; fl. & fr. : May Dec. C.C.Line, Bengdaki. Fibre.

Desmodium caudatum (Thunb.) DC. Shrubs with hooked hairs in pods; common in dry mixed forests and 'Sal' forests; fl. & fr. : Sept. March. Bordabri, Hollong, Salkumar. Medicinal.

Desmodium gangeticum (L.) DC. Herbs; common in dry mixed forests; fl. & fr. : Nov. March. Bordabri, Salkumar. Fibre & medicinal.

Desmodium gyroides (Link) DC. Shrubs with showy flowers; common in moist forests and grasslands; fl. & fr. : Sept. Jan. C.C.Line, Bordabri, Hollong. Medicinal & fibre.

Desmodium heterocarpon (L.) DC. Pubescent undershrubs; common in wet and dry mixed forests and grasslands; fl. & fr. : Oct. March. Hollong, Jaldapara, Bengdaki, Daidaighat, C.C.Line. Medicinal & fibre.

Desmodium laxiflorum (L.) DC. Undershrubs; common on hilly slopes and grasslands; fl. & fr. : Dec. Apr. Jaldapara, Hollong, Salkumar, Bordabri. Medicinal & fibre.

Desmodium motorium (Houtt.) Merr. Undershrubs, the telegraph plant with motile leaflets; occasional in forest edges; fl. & fr. : Aug. Dec. Hollong, C.C.Line. Medicinal.

Desmodium triangulare (Retz.) Merr. Shrubs; frequent in semi-evergreen forests; fl. & fr. : Aug. Nov. Hollong. Fibre.

Desmodium triflorum (L.) DC. Prostrate herbs; common in open fields; fl. & fr. : Dec. Feb. Hollong, Bordabri. Medicinal & fodder.

Derris robusta (DC.) Benth. Trees; frequently planted in tea gardens; fl. & fr. : Apr. Nov. Madarihat. Shade trees.

Dunbaria rotundifolia (Lour.) Merr. Slender, twining herbs; frequent in savannah grasslands; fl. & fr. : Aug. Dec. Jaldapara. Medicinal & fodder.

Dysolobium tetragonum Prain, Woody twiners; frequent along savannah grasslands with golden brown winged pods; fl. & fr. : Aug. Dec. Jaldapara, Chilapata. Medicinal & fodder.

Flemingia macrophylla (Willd.) Ktze.ex Merr. Shrubs; common in open forests in association with 'Sal'; fl. & fr. : March Aug. Salkumar, Bordabri. Medicinal, fodder & edible.

Flemingia strobilifera (L.) R. Br. Erect shrubs; frequent in 'Sal' forests; fl. & fr. : March Aug. Bordabri. Medicinal & green manure.

Indigofera linifolia Retz. Annuals; common in sandy places and roadsides; fl. & fr. : June Sept. Jaldapara, Hollong. Fodder & green manure.

Medicago lupulina L. Trailing weeds; common in open grasslands; fl. & fr. : Feb. Apr. Jaldapara. Fodder & edible.

Medicago polymorpha L. Diffused herbs; frequent in open fields; fl. & fr. : Feb. Apr. Hollong, Bengdaki. Fodder.

Melilotus alba Lamk. Herbs; common as grassland weeds; fl. & fr. : Feb. Apr. Hollong, Jaldapara. Fodder & green manure

Millettia extensa Benth. ex Baker, Straggling shrubs; frequent in dry mixed forests and forest edges; fl. & fr. : May Aug. Bordabri, Salkumar. Fodder & fibre.

Psoralea corylifolia L. Pubescent annuals; common along forest edges and degraded parts; fl. & fr. : Aug. Dec. Jaldapara, Kunjanagar. Medicinal.

Pueraria lobata (Willd.) Ohwi, Climbers; frequent along forest edges; fl. & fr. : Aug. Dec. Jaldapara. Medicinal, fodder & green manure.

Pueraria phaseoloides (Roxb.) Benth. Twining shrubs; frequent along forest borders; fl. & fr. : Aug. Dec. Bengdaki. Medicinal.

Sesbania sesban (L.) Merr. Herbs; frequent in swamps; fl. & fr. : Oct. Dec. Jaldapara, Chilapata. Green manure & edible.

Smithia grandis Benth. Herbs, much branched; common in savannah grasslands; fl. & fr. : June Nov. Jaldapara, Hollong. Medicinal.

Tephrosia candida (Roxb.) DC. Shrubs; frequent in forest edges and degraded forest parts; fl. & fr. : Aug. Nov. Torsa, Jaldapara. Green manure.

Tephrosia purpurea (L.) Pers. Herbs; common along roadsides and forest edges; fl. & fr. : July Sept. Hollong, Madarihat. Medicinal & green manure.

Uraria neglecta Prain, Herbs; common in grasslands and forest edges; fl. & fr. : Sept. Feb. Jaldapara, Hollong. Medicinal.

Uraria rufescens (DC.) Schindl. Undershrubs; common in 'Sal' forests; fl. & fr. : Sept. Dec. Bordabri, Salkumar. Medicinal.

Vigna clarkei Prain, Slender, rigid climbers or twiners; frequent in savannah grasslands; fl. & fr. : Aug. Dec. Jaldapara. Medicinal.

CAESALPINIACEAE

Bauhinia purpurea L. Trees; frequent in 'Sal' forests; fl. & fr. : Apr. Dec. Bordabri, Salkumar. Green manure, dye, gum, tannin & timber.

Bauhinia racemosa Lamk. Small trees, frequent in 'Sal' forests; fl. & fr. : March Feb. Bordabri. Green manure, gum, toy.

Bauhinia vahlii Wt. & Arn. Large climbers; common in wet and dry mixed forests; fl. & fr. : Apr. Sept. Hollong, Bordabri, C.C.Line, Salkumar. Dye, gum, tannin, fibre & edible.

Bauhinia variegata L. Trees; frequent in dry mixed forests; fl. & fr.: Apr. Sept. Bordabri, Hollong. Fodder, green manure, dye, gum, tannin & timber.

Caesalpinia cucullata Roxb. Large climbers on lofty trees; frequent in moist forests; fl. & fr. : Jan. Dec. Hollong. Medicinal.

Caesalpinia tortuosa Roxb. Climbers; mostly in mixed forests; fl. & fr. : Apr. Sept. Bordabri, Salkumar. Medicinal.

Cassia absus L. Herbs; frequent in degraded grasslands; fl. & fr. : Nov. March. Hollong. Medicinal & fodder.

Cassia fistula L. Trees; frequent in dry mixed forests; fl. & fr. : March Dec. Bordabri, Hollong, Salkumar. Medicinal, pencil, toy, cart wheel & timber.

Cassia sophera L. Herbs; occasional in degraded forest parts and roadsides; fl. & fr. : March July. Jaldapara. Medicinal, green manure & edible.

MIMOSACEAE

Acacia catechu (L.f.) Willd. Trees; common in wet and dry mixed forests and savannah woodlands; fl. & fr. : May Sept. Hollong, Jaldapara, Bordabri, Salkumar, Bengdaki. Medicinal, dye; gum & tannin.

Albizia chinensis (Osbeck) Merr. Trees; frequent along river banks and moist forests; fl. & fr. : May Dec. Chilapata, Jaldapara. Fodder, green manure, pencil, toy & cart wheel.

Albizia lebbeck (L.) Benth. Large trees; occasional in mixed forests; fl. & fr. : Apr. Nov. Hollong, Jaldapara. Fodder, green manure, pencil, toy, cart wheel & softwood.

Albizia lucidior (Steud.) Nielson, Medium trees; common along the river banks on sandy alluvium; fl. & fr. : June Dec. Chilapata, Torsa, Malangi. Fodder, green manure, softwood.

Albizia procera (Roxb.) Benth. Large trees; occasional in mixed forests and roadsides; fl. & fr. : June Jan. Jaldapara, Bordabri, Chilapata. Fodder, green manure, pencil, toy & cart wheel & timber.

Mimosa pudica L. Prickly undershrubs; frequent in forest edges and waste places; fl. & fr. : June Dec. Hollong, Jaldapara. Medicinal & green manure.

ROSACEAE

Photinia hookeri (Dcne.) Merr. Small trees; rare in moist hilly regions; fl. & fr. : Apr. Nov. Salkumar. Medicinal & toys.

Potentilla supina L. Prostrate herbs; frequent on hilly slopes on rocks; fl. & fr. : Feb. May. Bordabri, Chilapata. Medicinal.

DROSERACEAE

Drosera peltata Smith, Insectivorous herbs; frequent in sandy places amidst grasslands and moist rocky slopes; fl. & fr. : May Oct. Chilapata, C.C.Line. Medicinal & special care.

COMBRETACEAE

Combretum acuminatum Roxb. Lianas; frequent in moist and dry forests; fl. & fr. : Feb. Dec. Hollong, Bordabri. Medicinal & fibre.

Combretum latifolium Bl. Lianas; occasional in dry mixed forests; fl. & fr. Oct. March. Bordabri. Cottage industry.

Terminalia alata Heyne ex Roth, Large trees; occasional in dry mixed forests; fl. & fr. : May Dec. Hollong, Salkumar, Bordabri. Medicinal, fodder, cottage industry, paper pulp & timber.

Terminalia arjuna Wt. & Arn. Large trees; common along river-banks and moist forests, fl. & fr. : Apr. Dec. Hollong, Jaldapara, Kunjanagar. Medicinal, cottage industry, paper pulp, plywood & timber.

Terminalia bellirica (Gaertn.) Roxb. Large trees; frequent in dry mixed forests; fl. & fr. : Feb. Sept. Bordabri, Salkumar, Hollong. Medicinal, timber & edible.

Terminalia chebula Retz. Large trees; frequent in 'Sal' forests and dry mixed forests; fl. & fr. : March Aug. Hollong, Salkumar, Bengdaki, Jaldapara, Bordabri. Medicinal, plywood, timber & edible.

MYRTACEAE

Syzygium cumini (L.) Skeels, Trees; common in mixed forests and road sides; fl. & fr. : Apr. Sept. Jaldapara, Hollong. Medicinal, fodder, plywood & edible.

Syzygium formosum (Wall.) Masamune, Trees; occasional in moist forests and riverbanks; fl. & fr. : March Aug. Salkumar. Medicinal, fodder & edible.

Syzygium jambos (L.) Alston, Trees; frequent in moist forests and river-banks; fl. & fr. : May Sept. Hollong, Jaldapara. Medicinal, fodder, plywood & edible.

Syzygium operculatum (Roxb.) Niedenzu, Trees; frequent in moist forests; fl. & fr. : May Sept. Kunjanagar, Hollong. Medicinal & edible.

BARRINGTONIACEAE

Careya arborea Roxb. Trees; frequent in dry mixed forests; fl. & fr.: March Aug. Bordabri. Medicinal, pencil, toy, cart wheels, softwood, cottage industry, paper pulp & plywood.

MELASTOMATACEAE

Melastoma malabathricum L. Small shrubs; common in forest edges and river banks; fl. & fr. : Jan. May. Hollong, Jaldapara, Kunjanagar. Medicinal, dye, gum & tannin.

Melastoma napalense Lodd. Shrubs; frequent in mixed forests and forest clearings; fl. & fr. : Feb. June. Salkumar.

Osbeckia nepalensis Hook. Shrubs; occasional in moist forests and grasslands; fl. & fr. : June Oct. Hollong, Salkumar. Medicinal.

Osbeckia rostrata D. Don, Slender undershrubs; frequent in moist forests and forest edges; fl. & fr. : July Sept. Hollong, Salkumar. Medicinal.

LYTHRACEAE

Ammannia auriculata Willd. Annuals; common in swamps; fl. & fr. : Jan. Apr. Jaldapara. Medicinal.

Duabanga grandiflora (Roxb. ex DC.) Walp. Trees with drooping branches; common along the river banks; fl. & fr. : Apr. Sept. Hollong, Bordabri. Pencil, toy, cart wheel & softwood.

Lagerstroemia parviflora Roxb. Trees; frequent in dry mixed forests; fl. & fr. : Apr. Dec. Salkumar, Bordabri. Pencil, toy, cart wheel, plywood & timber.

Rotala rotundifolia (D. Don) Kochne, Herbs; common in open swamps; fl. & fr. : June Sept. Hollong, Jaldapara. Medicinal.

Woodfordia fruticosa (L.) Kurz, Straggling shrubs; frequent in dry mixed forests; fl. & fr. : Dec. Apr. Hollong, Bordabri. Medicinal.

ONAGRACEAE

Ludwigia octovalvis (Jacq.) Raven, Paludose herbs; common in swamps and ditches; fl. & fr. : Aug. Feb. Hollong, Jaldapara. Medicinal.

Ludwigia perennis L. Herbs; common in moist places and swamps; fl. & fr.: Nov. Apr. Hollong, Jaldapara. Medicinal & fooder.

CUCURBITACEAE

Gynostemma pentaphyllum (Thunb.) Makino, Slender scandent shrubs; frequent in moist forests and grasslands; fl. & fr. : June Nov. Jaldapara, Kunjanagar. Medicinal & special care.

Momordica dioica Willd. Climbers; common in waste lands and forest edges near villages; fl. & fr. : March Dec. Salkumar, Jaldapara. Medicinal & edible.

Mukia maderaspatana (L.) M. J. Roem. Scabrid herbs; frequent in waste lands and forest edges; fl. & fr. : May Nov. Salkumar. Medicinal.

Trichosanthes cordata Roxb. Climbers; frequent near villages and forest edges; fl. & fr. : March July, Hollong. Medicinal.

DATISCACEAE

Tetrameles nudiflora R. Br. Lofty trees; occasional in mixed forests; fl. & fr. : Apr. Dec. Salkumar. Medicinal, softwood, paper pulp & plywood.

AIZOACEAE

Glinus lotoides L. Annuals; frequent along sandy riverbeds; fl. & fr.: Feb. May. Torsa. Medicinal & edible.

Glinus oppositifolius (L.) A. DC. Annuals; occasional in moist areas; fl. & fr. March May. Jaldapara. Medicinal & edible.

Mollugo pentaphylla L. Diffuse annuals; common in moist places and river banks; fl. & fr. : July Sept. Jaldapara, Hollong. Medicinal & edible.

APIACEAE

Centella asiatica (L.) Urban, Herbs; frequent in forest edges and waste places; fl. & fr. : Apr. Nov. Hollong, Bordabri, Salkumar. Medicinal. & edible.

Hydrocotyle javanica Thunb. Herbs; common in moist places and forest edges; fl. & fr. : May Oct. Hollong, Jaldapara, Chilapata. Medicinal, fodder & edible.

Oenanthe javanica (Bl.) DC. Perennial herbs; frequent in moist forests and shaded places; fl. & fr. : Apr. Sept. Hollong, Kunjanagar. Edible. & medicinal.

Sanicula tenuifolium Wall. ex Clarke, Herbs; frequent in moist forests; fl. & fr. : Nov. March. Hollong, Chilapata. Medicinal.

Trachyspermum ammi (L.) Sprague ex Turrill, Herbs; frequent along river-banks and moist places; fl. & fr. : June Sept. Hollong, Chilapata, Jaldapara. Medicinal & edible.

CAPRIFOLIACEAE

Sambucus hookeri Rehder, Shrubs; occasional in evergreen forests; fl. & fr. : March Sept. Hollong, Salkumar. Medicinal.

RUBIACEAE

Anthocephalus chinensis (Lamk.) A. Rich. ex Walp. Trees; frequent along river banks; fl. & fr. : Apr. Sept. Hollong, Jaldapara. Medicinal, pencil, toy, cart wheel, softwood, plywood & timber.

Borreria articularis (L.f.) F. N. Williams, Hispid herbs; frequent along forest edges and roadsides; fl. & fr. : July Dec. Bordabri. Medicinal.

Canthium dicoccum (Gaertn.) T. & B. Small trees; occasional in moist forests; fl. & fr. : Apr. Oct. Salkumar, Jaldapara. Medicinal.

Canthium glabrum Bl. Small trees; frequent in mixed forests; fl. & fr. : Apr. Sept. Hollong, Salkumar. Medicinal.

Catunaregam spinosa (Thunb.) Tirvengadum. Straggling shrubs; frequent in mixed forests; fl. & fr. : June Nov. Hollong, Bordabri. Medicinal & fodder.

Coffea bengalensis Roxb. Undershrubs; common in mixed forests; fl. & fr. : Feb. Oct. Hollong, Jaldapara, Bordabri, Salkumar. Medicinal, aromatic oil, & soap.

Gardenia latifolia Ait. Trees; frequent in mixed forests along river banks; fl. & fr. : Apr. Dec. Hollong, Bordabri, Salkumar. Pencil, toy & cart wheel.

Hedyotis auricularia L. Herbs; frequent in grasslands and forest edges; fl. & fr. : May Sept. Jaldapara, Bengdaki. Medicinal.

Hedyotis scandens D. Don, Climbers; occasional in mixed forests; fl. & fr. : June Dec. Hollong. Medicinal.

Haldina cordifolia (Roxb.) Ridsdale, Trees; frequent in dry mixed forests; fl. & fr. : Apr. Sept. Bordabri, C.C.Line. Medicinal, cottage industry, paper pulp, plywood & timber.

Hymenodictyon excelsum (Roxb.) Wall. Large deciduous trees; frequent in dry mixed forests and river banks; fl. & fr. : July Feb. Madarihat, Jaldapara, Chilapata. Softwood, cottage industry & paper pulp.

Ixora arborea Roxb. ex Smith, Small trees, frequent in semi evergreen forests; fl. & fr. : Nov. July. Hollong, Salkumar. Medicinal & toy.

Ixora undulata Roxb. Shrubs; occasional in mixed forests; fl. & fr. : Apr. Sept. Bordabri, Hollong. Medicinal.

Meyna spinosa Roxb. ex Link, Bushy trees; frequent in dry mixed forests and village sides; fl. & fr. : Apr. Oct. Hollong, Bordabri. Medicinal & fodder.

Morinda angustifolia Roxb. Shrubs; common in moist deciduous forests; fl. & fr.: Apr. Oct. Bordabri, Chilapata. Dye, gum & tannin.

Morinda umbellata L. Subscandent shrubs; frequent in mixed forests; fl. & fr. : June Oct. Bordabri, Salkumar, Hollong. Medicinal & dye.

Mussaenda roxburghii Hook.f. Shrubs; frequent in moist forests and forest edges; fl. & fr. : Apr. Sept. Hollong, Bordabri. Ornamental.

Paederia foetida L. Slender twiners; frequent in forest edges and bushes; fl. & fr. : Apr. Dec. Hollong. Bordabri. Medicinal.

Psychotria adenophylla Wall. Shrubs; frequent in moist forests and in 'Sal' forests; fl. & fr. : May- Nov. Bordabri. Medicinal.

Tamilnadia uliginosa (Retz.) Tirvengadum & Sastre, Rigid shrubs or small trees; frequent in dry mixed forests; fl. & fr. : May Nov. Hollong. Medicinal & fodder.

Uncaria sessilifructus Roxb. Large woody climbers; frequent in moist forests; fl. & fr. : Oct. Feb. Hollong, Salkumar. Medicinal.

Wendlandia heynei (R. & S.) Santapau & Merchant, Small trees; frequent in mixed forests; fl. & fr. : Sept. Apr. Hollong, Bordabri. Medicinal & fodder.

ASTERACEAE

Ageratum conyzoides L. Annuals; frequent in forest edges and degraded grasslands; fl. & fr. : Feb. Apr. C.C. Line, Hollong, Jaldapara. Medicinal & fodder.

Artemisia caruifolia Ham. Aromatic undershrubs; rare in moist grasslands; fl. & fr. : July Oct. C.C. Line. Medicinal & aromatic oil.

Blumea alata (D. Don) DC. Herbs; common in open grasslands, and forest clearings; fl. & fr. : Feb. Apr. Hollong, Jaldapara. Medicinal, aromatic oil, fat & soap.

Blumea balsamifera (L.) DC. Undershrubs; frequent in grasslands and roadsides; fl. & fr. : Dec. Apr. C. C. Line, Bengdaki. Aromatic oil, fat & soap.

Blumea lacera (Burm. f.) DC. Viscid herbs; common along roadsides and waste places; fl. & fr. : Sept. Feb. Hollong, Jaldapara. Medicinal.

Blumea laciniata (Roxb.) DC. Herbs; frequent in open grasslands and forest clearings; fl. & fr. : Feb. Apr. Jaldapara, Salkumar. Medicinal.

Chromolaena odorata (L.) King & Robinson, Shrubs; common in thickets and bushes; fl. & fr. : Nov. Feb. Hollong, Jaldapara. Medicinal.

Conyza canadensis (L.) Cronq. Herbs; frequent in open grasslands; fl. & fr. : Apr. Aug. Jaldapara, Kunjanagar. Medicinal.

Emilia sonchifolia (L.) DC. Herbs; frequent in open grasslands; fl. & fr. : Oct. Feb. Jaldapara, C.C.Line. Medicinal.

Erigeron bonariensis L. Herbs; frequent in open grasslands; fl. & fr.: June Dec. Jaldapara, Hollong, Chilapata. Medicinal.

Gnaphalium luteo-album L. Woody herbs; frequent in waste lands and forest edges; fl. & fr. : Apr. Aug. Jaldapara, Chilapata. Medicinal.

Mikania scandens Willd. Herbs; twining and infesting the forests and grasslands, an extensive exotic weed; fl. & fr. : Apr. Sept. All over the sanctuary. Medicinal.

Senecio nudicaulis Buch.- Ham. Herbs; frequent in mixed forests; fl. & fr. : Apr. June. Bordabri, Chilapata. Medicinal.

Tridax procumbens L. Herbs; common in roadsides and forest-edges; fl. & fr. : Jan. Dec. Hollong, Jaldapara. Medicinal.

Vernonia cinerea (L.) Less. Herbs; common along roadsides and open grasslands; fl. & fr. : Apr. Aug. Hollong, Salkumar. Medicinal.

Vernonia silhetensis (DC.) Kerr. Herbs or undershrubs; frequent along forest clearings and open grasslands; fl. & fr. : June Oct. Jaldapara, Hollong. Medicinal.

Wedelia wallichii Less. Herbs; frequent in forest undergrowth; fl. & fr. : Aug. Oct. Hollong, Jaldapara. Medicinal.

CAMPANULACEAE

Lobelia alsinoides Lamk. Small herbs; frequent in sandy alluvium of river banks; fl. & fr. : Jan. Dec. Jaldapara. Medicinal.

MYRSINACEAE

Ardisia solanacea (Poir.) Roxb. Shrubs; frequent in mixed forests; fl. & fr.: May Sept. Hollong, Salkumar. Medicinal.

Embelia ribes Burm. f. Scandent shrubs; frequent in wet mixed forests; fl. & fr. : Feb. Apr. Hollong, Chilapata. Medicinal.

Embelia tsjeriam cottam (R. & S.) DC. Small trees; occasional in dry mixed forests; fl. & fr. : Jan.- Dec. Hollong. Medicinal.

Maesa indica (Roxb.) Wall. Shrubs; occasional in mixed forests; fl. & fr. : Dec. Aug. Salkumar, Chilapata. Medicinal.

EBENACEAE

Diospyros malabarica (Desr.) Kostel, Trees; occasional in wet mixed forests and river banks; fl. & fr. : May Dec. Salkumar, Kunjanagar. Gum, tannin & timber.

Diospyros melanoxylon Roxb. Trees; frequent in 'Sal' forests and mixed forests; fl. & fr. : Apr. Dec. Bordabri, Kunjanagar, C.C.Line. Edible, tannin & timber.

Diospyros montana Roxb. Small trees; rare in mixed forests; fl. & fr.: Apr. Dec. Salkumar. Dyes, gum, tannin.

SYMPLOCACEAE

Symplocos cochinchinensis ssp. **laurina** (Retz.) Nooteboom, Shrubs or small trees; frequent in moist forests; fl. & fr. : Oct. June. Hollong. Medicinal, dye, gum, tannin & softwood.

STYRACACEAE

Styrax serrulatum Roxb. Trees; rare in moist forests; fl. & fr. : Apr. Nov. Salkumar. Aromatic oil, fat, soap & special care for conservation.

OLEACEAE

Jasminum sambac (L.) Ait. Suberect or climbing shrubs; wild along forest edges and dry mixed forests; fl. & fr. : Apr. Oct. Salkumar, Hollong. Aromatic oil, fat & soap.

Myxopyrum smilacifolium (Wall.) Bl. Scandent shrubs; frequent in moist forests and shaded places; fl. & fr. : Apr. Dec. Hollong, Chilapata. Medicinal.

Olea dioica Roxb. Trees; rare in semi evergreen forests; fl. & fr. : Apr. Sept. C.C.Line. Pencil, toy, cart wheel & special care for conservation.

APOCYNACEAE

Alstonia scholaris (L.) R. Br. Trees; common in wet semi evergreen formation; fl. & fr. : Sept. Feb. Hollong. Pencils, toys, cart wheel, softwood, cottage industry & paper pulp.

Carissa paucinervia A. DC. Spiny shrubs; in open deciduous forests; fl. & fr. : Aug. Oct. Bordabri, Salkumar. Edible & fodder.

Chonemorpha fragrans (Moon) Alston, A lofty climber frequent in wet semi evergreen forests; fl. & fr. : June Feb. Hollong. Medicinal & special care for conservation.

Holarrhena pubescens (Buch.-Ham.) Wall. ex G. Don, Trees; frequent in primary and secondary forests; fl. & fr. : Apr. Jan. Salkumar, Hollong. Medicinal, green manure, pencil, toy & cart wheel.

Ichnocarpus frutescens (L.) R. Br. Woody climbers; in wet and dry mixed forests; fl. & fr. : May Nov. Hollong, Bordabri and Salkumar. Medicinal, dye, gum & tannin.

Melodinus monogynus Roxb. Large climbers ; rare in wet mixed forests; fl. & fr. : Apr. Jan. Hollong, Bengdaki. Fibre.

Rauvolfia serpentina (L.) Benth. ex Kurz, Herbs; rare in moist shaded places; fl. & fr. : May Oct. Salkumar. Medicinal & special care for conservation.

Tabernaemontana divaricata (L.) R. Br. Bushy shrubs; frequent in moist forests; fl. & fr. : March Dec. Hollong, Bengdaki. Medicinal.

Wrightia arborea (Dennst.) Mabberley, Trees; common in dry mixed forests; fl. & fr. : Feb. June. Hollong, C.C. Line. Medicinal, softwood, cottage industry & paper pulp.

ASCLEPIADACEAE

Calotropis gigantea (Willd.) Ait. Shrubs; frequent in waste places; fl. & fr.: March Oct. Jaldapara, Chilapata. Medicinal.

Ceropegia macrantha Wight, Climbers ; rare in moist grasslands and open places; fl. & fr. : July Sept. Salkumar. Medicinal.

Cryptolepis sinensis (Lour.) Merr. Slender climbers; frequent in primary forests; fl. & fr. : June Sept. Dahidai ghat. Medicinal.

Dregea lanceolata (Cooke) Sant. & Wagh, Clmbers; in mixed forests; fl. & fr. : May Sept. Hollong. Medicinal.

Gymnema acuminatum Wall. Twining shrubs; frequent in mixed forests; fl. & fr. : Aug. Oct. Jaldapara forest. Medicinal.

Hoya lanceolata Wall. Epiphytic climbers in open forests; fl. & fr. : May Nov. Sissoomara. Medicinal and special care.

Sarcostemma secamone (L.) Bennet, Climbers; frequent in wet mixed forests; fl. & fr. : May Dec. Bordabri. Medicinal.

Tylophora indica (Burm.f.) Merr. Slender climbers; often in roadside areas; fl. & fr. : June Oct. Hollong, C.C. Line. Medicinal & fibre.

LOGANIACEAE

Buddleja asiatica Lour. Shrubs; rare in thickets; fl. & fr. : Jan. Dec. Jaldapara 3. Medicinal, aromatic oil, fat & soap.

GENTIANACEAE

Canscora diffusa (Vahl) R. Br. ex Roem. & Schult. Herbs; frequent in grasslands and shaded places; fl. & fr. : Oct. Dec. Hollong. Medicinal.

Exacum teres Wall. Purple flowered herbs in grasslands of high hill forests; fl. & fr. : Aug. Dec. Bengdaki. Medicinal.

Exacum tetragonum Roxb. Blue flowered herbs; common in newly deposited sands along the river banks; fl. & fr. : June Sept. Jaldapara, Chilapata. Medicinal.

Nymphoides indicum (L.) O. Ktze. Aquatic herbs; common in water pools and swamps; fl. & fr. : May Sept. Jaldapara. Medicinal.

BORAGINACEAE

Cordia dichotoma Forst. f. Trees in wet mixed forests; fl. & fr. : Aug. Oct. Hollong, Jaldapara. Plywood & timber.

Cynoglossum glochidiatum DC. Herbs, frequent in open grassland; fl. & fr. : July Sept. Moiradanga. Aromatic oil & medicinal.

Ehretia acuminata R. Br. Trees; frequent in dry mixed forests; fl. & fr. : June Oct. Hollong, C.C.Line. Fodder, toy & edible.

Heliotropium indicum L. Herbs in moist places; fl. & fr. : Apr. Aug. Jaldapara roadside. Medicinal.

CONVOLVULACEAE

Argyreia hookeri Clarke, Climbers; frequent in wet evergreen forests; fl. & fr. : July Oct. Hollong. Medicinal.

Argyreia roxburghii Choisy, Large spreading climbers in grasslands; fl. & fr. : June Dec. Torsa, Malingi. Medicinal.

Evolvulus alsinoides L. Herbs along roadsides and grasslands; fl. & fr. : Aug. Oct. Madarihat. Medicinal & fodder.

Ipomoea tuba (Schlecht.) G.Don, Twiners in open forests and thickets; fl. & fr. : July Oct. Torsa, Chilapata. Medicinal & fodder.

Merremia vitifolia (Burm.f.) Hall.f. Twiners; frequent in forest edges and roadside thickets; fl. & fr. : Jan. Dec. Salkumar. Medicinal.

Porana racemosa Roxb. Twiners; frequent in secondary forests and forest edges; fl. & fr. : July Dec. Bordabri. Medicinal and ornamental.

SOLANACEAE

Datura metel L. Shrubs; frequent along roadsides and degraded forests; fl. & fr. : May Sept. Madarihat. Medicinal.

Solanum ferox L. Prickly shrubs; frequent in dry hilly regions; fl. & fr. : June. Feb. Salkumar. Medicinal.

Solanum nigrum L. Herbs in open places and roadsides; fl. & fr. : May Nov. Torsa. Fodder & medicinal.

Solanum torvum Sw. Shrubs in mixed forests and shaded places; fl. & fr.: June Sept. Jaldapara. Medicinal & fodder.

OROBANCHACEAE

Aeginetia acaulis (Roxb.) Walp. Parasite on roots; rare in shaded forest; fl. & fr. : July Oct. Hollong. Medicinal.

LENTIBULARIACEAE

Utricularia bifida L. Herbs; in marshy places; fl. & fr. : June Oct. Salkumar. Medicinal & special care for conservation.

Utricularia caerulea L. Herbs; frequent in marshy places amidst grasses; fl. & fr. : July Sept. Bengdaki. Medicinal & special care for conservation.

Utricularia scandens Benj. Terrestrial herbs ; frequent in moist grasslands; fl. & fr. : June Oct. Jaldapara. Medicinal & special care for conservation.

Utricularia stellaris L. f. Herbs; in swamps; fl. & fr. : June Oct. Cherokhoa. Medicinal, special care for conservation.

BIGNONIACEAE

Oroxylum indicum (L.) Vent. Trees; common in wet and dry mixed forests; fl. & fr. : June Dec. Hollong, Jaldapara, Salkumar. Medicinal, fibre, fodder, edible.

Stereospermum chelonoides (L.f.) DC. Trees in wet mixed forests; fl. & fr.: Apr. Oct. Hollong, Salkumar. Medicinal & timber.

PEDALIACEAE

Martynia annua L. Herbs; rare along waste places and roadsides; fl. & fr.: Feb. May. Moiradanga. Medicinal.

Sesamum orientale L. Annual herbs; frequent along roadsides as escape from cultivation; fl. & fr. : Jan. May. Jaldapara. Oil.

THUNBERGIACEAE

Thunbergia coccinea Wall. ex DC. Climbers; planted for ornamental red flowers; fl. & fr. : Aug. Dec. Hollong. Ornamental.

Thunbergia fragrans Roxb. Climbers in wet mixed forests; fl. & fr. : Aug. Dec. Hollong. Medicinal.

Thunbergia grandiflora (Rottl.) Roxb. Large climbers; frequent in mixed forests; fl. & fr. : Apr. Oct. Hollong. Medicinal.

SCROPHULARIACEAE

Bacopa monnieri (L.) Pennell, Herbs in marshy lands; fl. & fr. : Aug. Oct. Hollong. Medicinal & edible.

Centranthera cochinchinensis (Lour.) Merr. Herbs; frequent in open grasslands; fl. & fr. : July Sept. Torsa. Medicinal.

Limnophila chinensis (Osb.) Merr. Herbs in open marshes; fl. & fr.: Aug. Sept. Jaldapara. Medicinal & aromatic oils.

Limnophila rugosa (Roth) Merr. Herbs in moist places; fl. & fr. : Aug.- Sept. Jaldapara. Medicinal & aromatic oil.

Lindernia crustacea (L.) F.v. Muell. Herbs in marshy lands; fl. & fr.: June Sept. Torsa. Medicinal.

Lindernia elata (Benth.) Wettst. Slender herbs; frequent in marshy grasslands; fl. & fr. : June Sept. Malangi. Medicinal.

Lindenbergia muraria (Roxb.) Bruhl. Herbs ; common in moist places; fl. & fr. : July Sept. Khajur bari. Medicinal.

Mazus pumilus (Burm. f.) van Steenis, Herbs in dry hilly places; fl. & fr. : May Oct. Bengdaki. Medicinal.

Scoparia dulcis L. Herbs ; along roadsides and forest edges; fl. & fr. : Apr. Sept. Hollong. Medicinal.

Scrophularia elatior Benth. Undershrubs; frequent in grasslands; fl. & fr. : July Dec. Jaldapara. Medicinal.

Sopubia trifida D. Don, Herbs; frequent in grasslands; fl. & fr. : May Nov. Chilapata. Medicinal.

Striga lutea Lour. Herbs; frequent in grasslands and roadsides; fl. & fr. : Feb. May. Moiradanga. Medicinal.

Torenia diffusa D. Don, Herbs; frequent along streams among grasses; fl. & fr. : May Oct. Daidaighat. Medicinal.

ACANTHACEAE

Aechmanthera gossypina (Nees) Nees, Shrubs; rare in dry mixed forests; fl. & fr. : July Dec. C.C.Line. Medicinal.

Andrographis paniculata (Burm. f.) Nees, Herbs; frequent in forest edges and roadsides; fl. & fr. : Aug. Dec. Hollong. Medicinal.

Asystasia neesiana Nees, Herbs in shaded places; fl. & fr. : Oct. Dec. Chilapata. Medicinal.

Goldfussia discolor Nees, Shrubs; frequent in dry mixed forests; fl. & fr. : June Sept. Salkumar. Medicinal.

Hygrophila salicifolia (Vahl) Nees, Herbs; frequent in wet mixed forests; fl. & fr. : May Sept. Bengdaki. Medicinal & fodder.

Justicia adhatoda L. Shrubs along roadside and waste lands; fl. & fr.: March June. Jaldapara. Medicinal.

Justicia procumbens L. Slender herbs; forest edges and roadsides; fl. & fr. : Apr. July. Hollong. Medicinal.

Justicia vasculosa (Nees) T. And. Herbs in wet mixed forests; fl. & fr. : Oct. Dec. Jaldapara. Medicinal & fodder.

Lepidagathis incurva D. Don, Herbs; frequent in dry mixed forests and bushes; fl. & fr. : Nov. Feb. Bordabri. Medicinal.

Pseuderanthemum indicum (Nees) A.M. & J.M. Cowan, Undershrubs; in wet mixed forests; fl. & fr. : Dec. Feb. Salkumar. Medicinal

Pseuderanthemum palatiferum (Wall.) Radlk. ex Lindan, Undershrubs; rare in wet mixed forests; fl. & fr. : Nov. Jan. Hollong. Fodder & medicinal.

Pteracanthus calycinus (Nees) Bremek. Shrubs in wet mixed forests; fl. & fr. : July Oct. Salkumar. Fodder & medicinal.

Rungia parviflora (L.) Nees, Herbs; mostly along roadsides and waste lands; fl. & fr. : Jan. Dec. Jaldapara. Medicinal & fodder.

Sympagis brunoniana (Nees) Bremek. Shrubs; frequent in forest edges; fl. & fr. : Aug. Oct. Khajur Bari. Fodder & medicinal.

Sympagis divaricatus (Nees) Bremek. Shrubs in dry mixed forests; fl. & fr. : June Oct. Bordabri. Medicinal & fodder.

VERBENACEAE

Callicarpa arborea Roxb. Trees; frequent in wet mixed forests; fl. & fr. : May Oct. Hollong, Jaldapara. Medicinal & timber.

Callicarpa vestita Roxb. Shrubs; frequent in wet mixed forests; fl. & fr.: Apr. Sept. Hollong, Chilapata. Medicinal.

Clerodendrum indicum (L.) O. Kuntze, Shrubs; frequent in open places; fl. & fr. : Jan. March. Daidaighat. Medicinal.

Clerodendrum serratum (L.) Spreng. Shrubs; common in shaded places and forest edges; fl. & fr. : Jan. March. Bordabri. Medicinal.

Clerodendrum viscosum Vent. Shrubs; common in forest clearings and roadsides; fl. & fr. : Feb. May. Hollong, Jaldapara. Medicinal.

Gmelina arborea Roxb. Trees; frequent in dry mixed forests; fl. & fr. : March May. Hollong, Jaldapara. Medicinal, fodder, plywood & timber.

Lantana camara L. var. **aculeata** (L.) Molden. Spiny shrubs; common along roadsides and waste places; fl. & fr. : Jan. Dec. Hollong, Jaldapara, Salkumar. Medicinal.

Premna barbata Schauer, Large shrubs; frequent in moist places; fl. & fr. : Apr. July. Salkumar, Moiradanga, Hollong. Medicinal & fodder.

Premna bengalensis Clarke, Trees; common in wet and dry mixed forests and forest edges; fl. & fr. : Apr. Oct. Hollong, C.C.Line. Medicinal, pencil, toy & cart wheel.

Pygmaeopremna herbacea (Roxb.) Molden. Stemless undershrubs; rare in moist forests; fl. & fr. : May Sept. Salkumar. Medicinal & special care for conservation.

Vitex negundo L. Shrubs; frequent along roadsides and river banks; fl. & fr. : Apr. Sept. Torsa. Medicinal.

Vitex vestita Schauer, Shrubs; frequent in primary forests; fl. & fr. : Apr. Sept. Bengdaki. Medicinal.

LAMIACEAE

Anisomeles indica (L.) O. Ktze. Herbs along roadsides and degraded forest floors; fl. & fr. : Sept. Dec. Jaldapara. Medicinal.

Hyptis suaveolens (L.) Poit. Herbs or undershrubs; frequent along forest edges and roadsides; fl. & fr. : Aug. Oct. Bengdaki. Medicinal and aromatic oil.

Leonurus japonicus Houtt. Herbs in wastelands and degraded forest areas; fl. & fr. : Apr. June. Salkumar. Aromatic oil.

Leucas indica (L.) R. Br. ex Vatke, Herbs along roadsides and cultivated fields; fl. & fr. : May Aug. Madarihat. Medicinal.

Leucas plukenetii (Roth) Spreng. Herbs; frequent in grasslands and roadsides; fl. & fr. : June Nov. Hollong. Medicinal.

Orthosiphon incurvus Benth. Undershrubs; frequent in shaded places and forest edges; fl. & fr. : June Sept. Salkumar. Medicinal.

Plectranthus japonicus (Burm. f.) Koidz. Herbs in forest edges and grasslands; fl. & fr. : Aug. Oct. Bordabri. Medicinal.

Plectranthus ternifolius D. Don, Bushy shrubs in moist grasslands; fl. & fr. : Aug. Dec. Chilapata. Medicinal, aromatic oil, fat & soap.

Pogostemon andersonii (Prain) Panig. Herbs along roadsides and forest edges; fl. & fr. : June Oct. Malangi. Aromatic oil.

Teucrium quadrifarium Buch.-Ham. Herbs ; frequent in wet mixed forest; fl. & fr. : June Sept. Hollong. Aromatic oil.

Teucrium visidum Bl. Herbs; in primary forests; fl. & fr. : July Dec. Jaldapara. Medicinal & aromatic oil.

PLANTAGINACEAE

Plantago erosa Wall. Herbs; along roadside and waste places; fl & fr. : Apr. Sept. Jaldapara. Medicinal.

NYCTAGINACEAE

Boerhaavia diffusa L. Herbs; frequent in grasslands and roadsides; fl. & fr.: Apr. June. Hollong. Medicinal & edible.

AMARANTHACEAE

Achyranthes aspera L. Undershrubs; frequent along forest edges and roadsides near villages; fl. & fr. : May Oct. Jaldapara. Medicinal.

Aerva lanata (L.) Juss. Herbs; along roadsides and waste places; fl. & fr. : July Oct. Salkumar. Medicinal & fodder.

Alternanthera sessilis (L.) R. Br. ex DC. Herbs; in shallow ditches, roadsides and open fields; fl. & fr. : July Sept. Chilapata. Medicinal & fodder.

Amaranthus gracilis Desf. Herbs; common in degraded grasslands and cultivated fields; fl. & fr. : Jan. Dec. Hollong, Salkumar. Medicinal & fodder.

Celosia argentea L. Annual herbs; common in dry mixed forests, roadsides and wastelands; fl. & fr. : June Dec. Jaldapara. Medicinal & fodder.

Deeringia amaranthoides (Lamk.) Merr. Scandent shrubs; frequent along forest edges and wastelands; fl. & fr. : June Dec. Hollong. Edible.

Gomphrena globosa L. Herbs; ornamental in gardens; fl. & fr. : Apr. Aug. Bordabri. Medicinal & fodder.

Pupalia lappacea (L.) Juss. Subscandent shrubs; common in wet mixed forests and forest edges; fl. & fr. : June Dec. Bengdaki, Torsa. Medicinal.

CHENOPODIACEAE

Chenopodium ambrosioides L. Herbs; frequent in grasslands and waste places; fl. & fr. : Jan. March. Jaldapara. Medicinal & edible.

POLYGONACEAE

Polygonum barbatum L. Stout annual herbs in wet places; fl. & fr. : June - Sept. Daidaighat. Medicinal & fodder.

Polygonum hydropiper L. Annuals in moist places; fl. & fr. : June Sept. Hollong. Medicinal.

Polygonum nepalense Meissn. Creeping annuals; frequent in grasslands and cultivated fields; fl. & fr. : July Sept. Bengdaki. Medicinal & fodder.

Polygonum plebeium R. Br. Prostrate herbs; common along roadsides, open grasslands and degraded areas; fl. & fr.: March June. Jaldapara. Medicinal & fodder.

Polygonum viscosum D. Don, Ascending annuals, in ditches and ponds; fl. & fr. : Aug. Oct. Torsa. Medicinal.

ARISTOLOCHIACEAE

Aristolochia tagala Cham. & Schlecht, Perennial twiners; frequent in wet mixed forests; fl. & fr. : Apr. Aug. Hollong. Medicinal & special care for conservation.

PIPERACEAE

Pepromia pellucida (L.) H. B. K. Much branched herbs; frequent in shaded places and often in waste places; fl. & fr. : July Sept. Salkumar. Medicinal.

Piper longum L. Herbs, trailing on ground; common in forest edges and open forest floors; fl. & fr. : June Oct. Jaldapara, Hollong. Medicinal, aromatic oil & edible.

Piper peepuloides Roxb. Slender herbs; frequent in forest bushes; fl. & fr. : May Oct. Jaldapara, Hollong. Medicinal & edible.

MYRISTICACEAE

Knema erratica (Hook. f. & Thoms.) Sinclair, Lofty trees, rare in wet semi-evergreen forests, mostly along river banks, fl. & fr. : Oct. Feb. Hollong. Medicinal, aromatic, plywood & timber.

LAURACEAE

Actinodaphne obovata (Nees) Bl. Trees; frequent in moist evergreen forests; fl. & fr. : March June. Hollong, Bengdaki, Jaldapara. Medicinal, aromatic & timber.

Beilschmiedia roxburghiana Nees, Trees; common in wet and dry mixed forests; fl. & fr. : March Aug. Hollong, Chilapata, Bengdaki. Plywood, timber & medicinal.

Beilschmiedia sikkimensis Hook. f., Trees; frequent in moist forests; fl. & fr. : March Aug. Hollong, Salkumar. Medicinal, softwood, plywood & timber.

Cinnamomum bejolghota (Buch.-Ham.) Sw. Trees in moist evergreen forests; fl. & fr. : Feb. May. Salkumar. Aromatic oil, medicinal, plywood & timber.

Cinnamomum glaucescens (Nees) Hand. Mazz. Trees; frequent in 'Sal' forests; fl. & fr. : Feb. May. Hollong, Bordabri. Aromatic oil, plywood & timber.

Cryptocarya amygdalina Nees, Trees, frequent in wet forests; fl. & fr. : March Sept. Bordabri, Torsa. Softwood.

Litsea glutinosa (Lour.) C. B. Rob. Trees; frequent in wet mixed forests and river sides; fl. & fr. : May June. Salkumar, Torsa, Hollong. Cottage industry, plywood & timber.

Litsea monopetala (Roxb.) Pers., Small trees or shrubs; common in moist evergreen forests; fl. & fr. : March June. Hollong, Jaldapara, Chilapata. Fodder, softwood, cottage industry, paper pulp & plywood.

Litsea salicifolia (Nees) Hook. f. Trees; frequent along riversides and hill slopes; fl. & fr. : Feb. Apr. C. C. Line, Hollong. Cottage industries.

Persea gamblei (Hook. f.) Kosterman, Trees; common in foot hill of moist evergreen forests; fl. & fr. : March Aug. Hollong, Bordabri. Medicinal and timber.

Persea glaucescens (Nees) Long. Trees; frequent in semi-evergreen forests; fl. & fr. : March June. Hollong, Jaldapara. Aromatic & timber.

LORANTHACEAE

Dendrophthoe falcata (L.f.) Etting. Robust shrubs; frequent in wet and dry mixed forests; fl. & fr.: Jan. May. Jaldapara, C.C.Line. Medicinal.

Loranthus pulverulentus Wall. Shrubs; frequent in wet mixed forests; fl. & fr.: Oct. May. Torsa, Malangi. Medicinal.

Viscum monoicum Roxb. ex DC. Shrubs; frequent in wet mixed forests; fl. & fr.: Nov. Feb. Salkumar, Jaldapara. Medicinal.

EUPHORBIACEAE

Antidesma acidum Retz. Shrubs; frequent in wet and dry mixed forests and forest edges; fl. & fr.: Apr. July. Hollong. Medicinal & edible.

Antidesma acuminatum Wall. Shrubs; in wet mixed forests; fl. & fr.: May Aug. Jaldapara. Hollong, Salkumar. Edible.

Baccaurea ramiflora Lour. Trees; rare in moist evergreen forests; fl. & fr.: Mar. July. Hollong. Edible & softwood.

Breynia retusa (Dennst.) Alst. Shrubs; frequent in moist forests; fl. & fr.: Mar. July. Chilapata. Medicinal & green manure.

Bridelia pubescens Kurz, Trees in dry and wet mixed forests; fl. & fr.: Apr. Aug. Salkumar, Jaldapara. Toy & timber.

Bridelia scandens (Roxb.) Willd. Scandent shrubs; frequent in dry mixed forest; fl. & fr.: Aug. Nov. Hollong, Jaldapara. Fodder, pencil, toy, cartwheel, cottage industry, paper pulp & plywood.

Croton roxburghii Balak. Trees; rare in dry mixed forests; fl. & fr.: Feb. May. Bordabri. Medicinal & aromatic oil.

Drypetes assamica (Hook. f.) Pax & Hoffm. Trees; frequent along riverside and moist places; fl. & fr. : Nov. March. C.C.Line, Bordabri. Plywood & timber.

Euphorbia hirta L. Herbs; common along roadsides and forest edges; fl. & fr. : Jan. Dec. Hollong. Medicinal.

Euphorbia indica Lamk. Herbs; frequent along roadsides; fl. & fr. : Jan. Mar. Jaldapara. Medicinal.

Euphorbia neriifolia L. Shrubs; frequent in forest edges; fl. & fr. : Feb. May. Bengdaki. Medicinal.

Glochidion lanceolarium (Roxb.) Voigt, Shrubs; frequent in degraded forest plot; fl. & fr.: July Sept. Torsa. Medicinal & toy.

Jatropha curcas L. Small trees; frequent along roadside and waste lands near village; fl. & fr. : Jan. Mar. Sisoomara. Medicinal & oil.

Macaranga denticulata (Bl.) Muell.-Arg. Trees; frequent along river banks, moist forest and grasslands; fl. & fr. : Feb. Apr. Hollong. Fodder, dye, gum, tannin, cottage industry & paper pulp.

Mallotus albus (Roxb.) Muell.-Arg. Shrubs in mixed forests; fl. & fr.: Feb. Sept. Hollong, Bengdaki. Dye, gum & medicinal.

Mallotus roxburghianus Muell.-Arg. Trees; common in dry mixed forests; fl. & fr. : Jan. Apr. Hollong, Salkumar. Dye, toy & timber.

Mallotus philippensis (Lamk.) Muell.-Arg. Trees; common in dry mixed forests; fl. & fr. : March Sept. Hollong, Bordabri. Aromatic oil, fat, soap, dye, gum, tannin, pencil, toy, cartwheel & plywood.

Manihot esculenta Crantz, Shrubs; frequently cultivated for edible tubers in wastelands and villages; fl. & fr. : May Sept. Jaldapara. Medicinal & edible.

Phyllanthus debilis Willd. Undershrubs, along roadsides and waste lands; fl. & fr. : June Aug. Salkumar, Bordabri. Medicinal & fodder.

Phyllanthus emblica L. Trees; common in savannah woodlands and dry mixed forests; fl. & fr. : Apr. Sept. Jaldapara, Madarihat. Medicinal, Fodder, oil, cottage industry & edible.

Phyllanthus parvifolius Buch.-Ham. Shrubs; frequent in forest edges; fl. & fr. : July Sept. Bengdaki. Fodder & medicinal.

Phyllanthus reticulatus Poir. Small trees; common in wet forests and forest edges; fl. & fr. : Jan Apr. Daidaighat, Chilapata. Medicinal & fodder.

Sapium baccatum Roxb. Trees; frequent in wet mixed forests; fl. & fr. : Apr. Aug. Hollong. Medicinal & softwood.

Sapium eugenifolium Hook. f. Trees; frequent in mixed forest; fl. & fr.: May Sept. Salkumar, Hollong. Fodder & softwood.

Sauropus androgynus (L.) Merr. Shrubs; in open forests; fl. & fr. : July Sept. Moiradanga. Medicinal.

Securinega virosa (Roxb.) Baill., Shrubs; frequent in forest edges and wet mixed forests; fl. & fr. : Apr. Oct. Salkumar. Dye, gum & tannin.

Suregada multiflora (Juss.) Baill. Trees; frequent along roadsides and forest edges; fl. & fr. : June. Aug. Kunjanagar. Edible & softwood.

Trewia nudiflora L. Trees, common along riversides; fl. & fr. : June Oct. Madarihat, Jaldapara. softwood & plywood.

ULMACEAE

Celtis trimorensis Span. Trees; 20 25 m tall; frequent in wet and dry mixed forests; fl. & fr.: Jan. May. Salkumar. Plywood & timber.

Trema orientalis (L.) Bl. Trees; frequent in forest edges and village side. fl. & fr. : Feb. Aug. Jaldapara, Kunjanagar. Medicinal, fodder, pencil, toy & cartwheel.

MORACEAE

Artocarpus chama Buch.-Ham. Trees; common in moist evergreen forests; fl. & fr. : March Sept. Hollong, Salkumar, Jaldapara. Plywood & timber.

Ficus hirta Vahl, Shrubs; frequent in moist forests; fl. & fr.: Feb. Aug. Chilapata. Medicinal, fodder & fibre.

Ficus hispida L. f. Small trees; common along roadside and waste lands; fl. & fr. : Feb. Aug. Jaldapara, Salkumar. Fodder, edible & softwood.

Ficus racemosa L. Trees in wet and dry mixed forests; fl. & fr. : March Aug. Salkumar, Jaldapara. Fodder & softwood.

Ficus religiosa L. Trees; common along roadsides; fl. & fr. : Mar. Aug. Hollong, Jaldapara. Medicinal, fodder & softwood.

Ficus retusa L. Wide-spreading trees. frequent in swamp forest; fl. & fr. : March Sept. C.C.Linc. Medicinal, fooder & softwood.

Ficus saemocarpa Miquel. Trees; frequent along riverbanks; fl. & fr.: Mar. Sept. Malangi. Fodder & softwood.

Ficus semicordata Buch.-Ham. ex J.E.Sm. Trees; common along riversides and moist places; fl. & fr. : Feb. Sept. Hollong, Jaldapara. Torsa. Medicinal, fodder & softwood.

Morus australis Poir. Shrubs or small trees, often cultivated; planted in Hollong lodge; fl. & fr. : Feb. Sept. Hollong. Fodder, pencil, toy, cartwheel & edible.

Streblus asper Lour. Trees; frequent in mixed forest; fl. & fr. : June Oct. Chilapata. Medicinal, fodder, dye, gum, tannin, pencil, toy, cartwheel, cottage industry & paper pulp.

URTICACEAE

Elatostema cuneatum Wt. Herbs in moist places; fl. & fr. : March July. Kunjanagar. Medicinal.

Pilea glaberrima (Bl.) Bl. Herbs; frequent in moist places near streams, fl. & fr. : Apr. Aug. Malangi. Medicinal.

Poilkilospermum suaveolens (Bl.) Merr. Large climbers; frequent in mixed forests; fl. & fr. : Jan. Aug. Jaldapara, Chilapata. Medicinal.

Pouzolzia hirta (Bl.) Hassk. Herbs; frequent in grasslands; fl. & fr. : June Sept. Jaldapara. Medicinal.

Pouzolzia zeylanica (L.) Benn. & Brown, Herbs in mixed forests; fl. & fr. : May Aug. Salkumar. Medicinal.

FAGACEAE

Castanopsis indica (Roxb.) DC. Trees; frequent in wet forests and forest edges; fl. & fr. : Feb. Aug. Salkumar. Plywood & timber.

Castanopsis kurzii (Hance) Biswas, Trees; frequent in mixed forests; fl. & fr. : May Sept. Hollong, Salkumar. Medicinal & timber.

SALICACEAE

Salix tetrasperma Roxb. Trees; common along the river side; fl. & fr. : March. Aug. Hollong, Torsa. Pencil, toy, cartwheel, softwood & timber.

HYDROCHARITACEAE

Blyxa octandra (Roxb.) Planch. ex Thw. Aquatic herbs in shallow ditches; fl. & fr. : Jan. May. Chilapata, Hollong. Fodder & green manure.

Hydrilla verticillata (L. f.) Royle, Aquatic herbs; in wallow pools and swamps; fl. & fr. : Jan. Mar. Jaldapara. Medicinal & fodder.

Hydrocharis dubia (Bl.) Backer, Aquatic herbs in shallow pools and swamps; fl. & fr. : Feb. June. Torsa. Fodder & green manure.

Vallisneria natans (Lour.) Hara, Aquatic herbs; common in shallow water and river beds; fl. & fr. : Feb. May. Hollong. Medicinal, fodder & green manure.

ORCHIDACEAE

Aerides multiflorum Roxb. Showy, epiphytic herbs with stout stems, frequent in open forest and forest borders; fl. & fr. : May Sept. Hollong. Special care for conservation.

Bulbophyllum striatum (Griff.) Reichb. f. Pseudobulbous, epiphytic herbs; frequent in shaded forest; fl. & fr. : Sept. Jan. Salkumar. Special care for conservation.

Bulbophyllum triste Reichb.f. Epiphytic herbs; in shaded forests; fl. & fr.: May Aug. Salkumar. Special care for conservation.

Calanthe angusta Lindl. Terrestrial herbs; frequent in grasslands with white flowers; fl. & fr. : Aug. Dec. Moiradanga. Special care for conservation.

Calanthe puberula Lindl. Herbs; frequent in grasslands on humus; fl. & fr. : Aug. Oct. Jaldapara. Special care for conservation.

Dendrobium lituiflorum Lindl. Pendulous, epiphytic herbs in moist evergreen forests; fl. & fr. : May Oct. Bordabri. Special care for conservation.

Dendrobium sulcatum Lindl. Stem erect, epiphytic herbs; in moist forests; fl. & fr. : June Nov. Bengdaki. Special care for conservation.

Eulophia bicallosa (D. Don) Hunt & Summerh. Rhizomatous, saprophytic herbs; frequent in moist forests on humus; fl. & fr. : June Dec. Hollong. Special care for conservation.

Eulophia bracteosa Lindl. Terrestrial herbs; frequent on humus in moist forests; fl. & fr. : July Dec. Daidaighat. Special care for conservation.

Geodorum densiflorum (Lamk.) Schltr. Herbs; in wet mixed forest; fl. & fr. : May Sept. Hollong. Special care for conservation.

Habenaria foliosa A. Rich. Leafy tuberous herbs; frequent in open grasslands; fl. & fr. : July Feb. Jaldapara. Special care for conservation.

Habenaria marginata Colebr. Tuberous herbs; frequent in open forest floor; fl. & fr. : June Nov. Bordabri. Special care for conservation.

Nervilia falcata (King & Pantl.) Schltr. Small terrestrial herbs; often found in grasslands and moist forest floors; fl. & fr. : June Sept. Kunjanagar. Special care for conservation.

Oberonia ensiformis (Sm.) Lindl. Epiphytic herbs in wet mixed forests; fl. & fr. : Sept. Jan. Torsa. Special care for conservation.

Oberonia rufilabris Lindl. Short stemmed epiphytic herbs; frequent in moist forests; fl. & fr. : Oct. Feb. Hollong. Special care for conservation.

Peristylus lacertiferus (Lindl.) Sm. Herbs; rare in grasslands and shaded places; fl. & fr. : Aug. Feb. Chilapata. Special care for conservation.

Phaius longipes (Hook.f.) Holtt. Slender, terrestrial herbs in wet mixed forests; fl. & fr. : Nov. Feb. Hollong. Special care for conservation.

Spiranthes sinensis (Pers.) Ames, Terrestrial herbs; frequent in savannah grasslands; fl. & fr. : May. Oct. Jaldapara. Special care for conservation.

Vanda teres Lindl. Stem terete, much branched epiphytic herbs; raro in open forests and forest edges; fl. & fr. : June Dec. Hollong. Special care for conservation.

Zeuxine nervosa (Wall. ex Lindl.) Trim. Terrestrial herbs; rare in grasslands and moist places; fl. & fr. : Apr. June. Salkumar. Special care for conservation.

ZINGIBERACEAE

Alpinia malaccensis (Burm. f.) Rosc. Herbs; frequent along river sides and in moist places; fl. & fr. : March Sept. Jaldapara. Fodder & paper pulp.

Alpinia nigra (Gaertn.) Burtt, Undershrubs; common in degraded part of grasslands, and shaded places; fl. & fr. : May Aug. Bengdaki, Torsa, Jaldapara. Fodder, aromatic oil, cottage industry & paper pulp.

Amomum aromaticum Roxb. Aromatic herbs; frequent in shaded places in moist forests; fl. & fr. : Dec. Jan. Torsa. Medicinal, fodder & edible.

Costus speciosus (Koenig ex Retz.) Smith, Herbs; frequent in savannah grasslands and shaded places in mixed forests; fl. & fr. : June Sept. Jaldapara, Torsa, Chilapata. Medicinal & special care for conservation.

Curcuma angustifolia Roxb. Herbs with yellow rhizome; frequent in moist forests; fl. & fr. : May Oct. Hollong. Dye & medicinal.

Globba marantina L. Herbs; in moist evergreen forests; fl. & fr. : June Oct. Jaldapara. Medicinal & fodder.

Globba racemosa J.E. Smith, Herbs; frequent in wet evergreen forests; fl. & fr. : May Sept. C.C.Line. Medicinal.

Hedychium elwesii Baker, Herbs, very variable; frequent along streams and moist forests; fl. & fr. : May Aug. Hollong, Jaldapara, Salkumar. Medicinal.

Hedychium gracile Roxb. Herbs; frequent in moist forests; fl. & fr. : May Aug. Jaldapara, C.C.Line. Fodder.

Hornstedtia linguiformis (Schult.) K. Schum. Herbs with long creeping rhizomes; frequent in shaded places of mixed forests; fl. & fr.: March Aug. Salkumar. Medicinal & fodder.

Zingiber rubens Roxb. Herbs; frequent in moist forests; fl. & fr. : July Oct. Malangi. Medicinal & edible.

MARANTACEAE

Phrynium pubinerve Bl. Herbs; frequent in shaded places of wet forest; fl. & fr. : May Sept. Salkumar. Medicinal & fodder.

MUSACEAE

Musa balbisiana Colla, Herbs; frequent in forest edges; fl. & fr. : Feb. Oct. Wild at Salkumar. Edible & special care for conservation.

HYPOXIDACEAE

Curculigo orchioides Gaertn. Herbs with tubers; frequent in shaded forests, grasslands and waste places; fl. & fr. : March Aug. Jaldapara, Salkumar, C.C.Line. Medicinal.

AMARYLLIDACEAE

Crinum amoenum Roxb. ex Ker-Gawl. Bulbous herbs in grasslands; fl. & fr. : Apr. June. Jaldapara. Fodder.

Pancratium verecundum Ait. Herbs with white bulbs; frequent in grasslands and moist places; fl. & fr. : May June. Jaldapara. Medicinal & fodder.

DIOSCOREACEAE

Dioscorea bulbifera L. Climbers with angled stem; frequent in shaded places in mixed forests; fl. & fr. : June Dec. Hollong. Medicinal, edible & special care for conservation.

Dioscorea pentaphylla L. More or less prickly climbers; frequent in wet mixed forests; fl. & fr. : July Oct. Salkumar, Jaldapara. Special care for conservation, medicinal & edible.

Dioscorea prazeri Prain & Burkill, Slender, much branched climbers; rare in moist evergreen forests; fl. & fr. : June Sept. Hollong, Bordabri. Edible, medicinal & special care for conservation.

Dioscorea puber Bl. Climbers in dry mixed forests; fl. & fr. : Apr. Oct. Salkumar. Medicinal, edible & special care for conservation.

LILIACEAE

Asparagus racemosus Willd. Climbing herbs with tuberous rootstock; common in open forests and scrubs; fl. & fr. : July Oct. Bordabri, Kunjanagar, Torsa. Medicinal & aromatic oil.

Chlorophytum tuberosum (Roxb.) Baker, Herbs in moist forests; fl. & fr. : Sept. Feb. Bengdaki. Medicinal & fodder.

Gloriosa superba L. Climbing herbs; rare along riversides and forest edges; fl. & fr. : July Oct. Salkumar. Medicinal & special care for conservation.

Ophiopogon parviflorus (Hook.f.) Hara, Herbs, with short rootstock; frequent in shaded places in moist forests; fl. & fr. : Sept. Feb. Jaldapara, Salkumar. Medicinal & fodder.

SMILACACEAE

Smilax aspera L. Subscandent shrubs; frequent in wet mixed forests; fl. & fr. : Sept. Feb. Salkumar. Medicinal & green manure.

Smilax perfoliata Lour. Scandent, prickly shrubs; frequent in moist forests and forest edges; fl. & fr. : Sept. Feb. Hollong. Medicinal.

PONTEDERIACEAE

Monochoria hastata (L.) Solms, Rhizomatous creeping herbs; frequent in pools and canals; fl. & fr. : March June. Malangi. Fodder.

XYRIDACEAE

Xyris indica L. Tufted herbs; common along stream sides and swamps; fl. & fr. : June Oct. Torsa. Medicinal.

COMMELINACEAE

Commelina appendiculata Clarke, Procumbent herbs; frequent in open grasslands in swamps; fl. & fr. : Apr. Aug. Chilapata. Medicinal & fodder.

Commelina benghalensis L. Creeping herbs; frequent in waste places and swampy lands; fl. & fr. : Apr. Aug. Jaldapara. Medicinal & fodder.

Floscopa scandens Lour. Creeping herbs; common in moist places; fl. & fr. : June Sept. Jaldapara. Medicinal & fodder.

Murdannia blumei (Hassk.) Brenan, Spreading herbs; along stream sides, swamps and paddy fields; fl. & fr. : May Oct. Torsa. Medicinal.

Murdannia nudiflora (L.) Brenan, Slender herbs in marshy lands; fl. & fr. : June Oct. Moiradanga. Fodder.

ARECACEAE

Calamus erectus Roxb. Erect, tufted shrubs; common in shaded places in moist forests; fl. & fr. : Jan. May. Jaldapara. Cottage industry, paper pulp & special care for conservation.

Calamus latifolius Roxb. Scandent shrubs; common in 'Sal' forests in shaded places; fl. & fr. : March Sept. Bordabri. Cottage industry & special care for conservation.

Caryota urens L. Palm; wild in moist forests; fl. & fr. : not seen. Salkumar. Fibre & edible.

Phoenix acaulis Roxb. ex Buch.-Ham. Short stemmed palm; frequent in 'Sal' forests; fl. & fr. : Apr. Oct. Bordabri. Medicinal & cottage industry.

PANDANACEAE

Pandanus odoratissimus L. f. Shrubs with tapering leaves; frequent along riversides and forest edges; fl. & fr. : March Oct. Jaldapara. Cottage industry & aromatic oil.

ARACEAE

Amorphophallus bulbifer (Roxb.) Bl. Herbs in moist places; fl. & fr.: May Nov. Chilapata. Medicinal, fodder & edible.

Arisaema petiolulatum Hook. f. Herbs; common in shaded moist forests; fl. & fr. : Jan. Apr. Hollong. Fodder.

Colocasia esculenta (L.) Schott, Herbs in moist places; often cultivated; fl. & fr. : June Sept. Jaldapara. Medicinal & edible.

Lasia spinosa (L.) Thw. Prickly herbs; common in swamps, ditches, and riversides; fl. & fr. : Jan. Nov. Salkumar, Daidaighat. Medicinal & edible.

Rhaphidophora glauca (Wall.) Schott, Thick stemmed, climbing on lofty trees; frequent in moist forests; fl. & fr. : July Sept. Hollong. Medicinal & fodder.

Scindapsus officinalis Schott, Large climbers; frequent in moist forests and forest edges; fl. & fr. : March Oct. Hollong. Medicinal.

ALISMATACEAE

Caldesia parnassifolia (L.) Parl. Herbs in pools and ditches; fl. & fr.: Apr Sept. Jaldapara. Green manure & edible.

Sagittaria trifolia L. Herbs; frequent in swampy ditches and shallow pools; fl. & fr. : May Oct. Malangi. Medicinal & green manure.

BUTOMACEAE

Butomopsis latifolia (D. Don) Kunth, Erect herbs; frequent in paddy fields and ditches; fl. & fr. : March Aug. Salkumar. Medicinal, fodder & green manure.

POTAMOGETONACEAE

Potamogeton nodosus Poir. Floating herbs in pools and shallow rivers; fl. & fr. : Feb. Apr. Chirokhwa, Hollong. Fodder & green manure.

CYPERACEAE

Bulbostylis densa (Wall.) Hand.-Mazz. Herbs; common in wastelands and moist places; fl. & fr. : June - Oct. Jaldapara. Fodder.

Carex baccans Nees, Tufted herbs; frequent in wet forests; fl. & fr. : Sept. Dec. Jaldapara. Fodder, cottage industry & paper pulp.

Carex spiculata Boott, Herbs; frequent along riversides and marshy lands; fl. & fr. : July Sept. Jaldapara. Cottage industry & paper pulp.

Cyperus distans L.f. Tufted herbs; common in riversides and moist waste lands; fl. & fr. : Jan. March. Hollong, Jaldapara. Fodder.

Cyperus elatus L. Herbs; frequent in moist places and grasslands; fl. & fr. : May Aug. Malangi. Fodder.

Cyperus halpan L. Tufted herbs; frequent along ditches and riversides; fl. & fr. : Apr. July, Jaldapara. Fodder.

Cyperus kyllingia Endl. Herbs; common along riversides and grasslands; fl. & fr. : July Sept. Salkumar. Fodder.

Cyperus laxus Lamk. Herbs; frequent in marshy places; fl. & fr. : May Aug. Jaldapara. Fodder.

Cyperus platystylis R. Br. Herbs; frequently floating in swamps and pools; fl. & fr. : March July. Jaldapara. Fodder.

Eleocharis acutangula (Roxb.) Schult. Herbs; common along swamps and ditches; fl. & fr.: June Oct. Jaldapara. Fodder, cottage industry & paper pulp.

Fimbristylis acuminata Vahl, Herbs; common in swampy places; fl. & fr. : Apr. June. Chilapata. Fodder.

Fimbristylis complanata (Retz.) Link, Perennial herbs; common in marshy grasslands; fl. & fr. June Aug. Torsa, Bengdaki. Cottage industry & fodder.

Fimbristylis dichotoma (L.) Vahl, Herbs; in open grasslands; fl. & fr.: March June. Jaldapara. Fodder.

Hypolytrum nemorum (Vahl) Spreng. Herbs; common in moist grasslands and swampy places; fl. & fr. : June – Aug. Jaldapara, Hollong, Chilapata. Fodder.

Mariscus sumatrensis (Retz.) Raynal, Perennial herbs; frequent in open marshy grasslands; fl. & fr. : March Oct. Moiradanga. Cottage industry & fodder.

Pycreus unioides (R. Br.) Urb. Herbs in sandy riverbeds; fl. & fr.: March May. Torsa, Daidaighat. Fodder.

Rhynchospora rubra (Lour.) Makino, Tufted herbs; frequent in grasslands and forest edges; fl. & fr.: June Oct. Kunjanagar. Fodder.

Schoenoplectus articulatus (L.) Palla, Herbs; common in paddy fields and along the edges of ditches and swamps; fl. & fr. : July Aug. Torsa, Malangi, Jaldapara. Fodder.

Schoenoplectus juncoides (Roxb.) Palla, Herbs; common in marshy places and riversides; fl. & fr.: Apr. June. Malangi. Fodder & cottage industry.

Schoenoplectus mucronatus (L.) Palla, Herbs with creeping rhizomes; frequent in swamps and ditches; fl. & fr.: Apr. July. Jaldapara, Torsa. Fodder.

Scleria biflora Roxb. Annuals; frequent in ditches and grasslands; fl & fr. : July – Sept. Madarihat. Fodder

POACEAE

Apluda mutica L. Decumbent grass; common in open grasslands; fl. & fr.: Aug. Oct. Chilapata, Moiradanga. Fodder.

Apocopis paleacea (Trin.) Hochr. Small, slender grass; frequent in open grasslands and savannahs; fl. & fr.: Aug. Sept. Chilapata, Malangi. Fodder.

Arundinella bengalensis (Spreng.) Druce, Stout grass; common in open grasslands and savannahs; fl. & fr.: July Dec. Jaldapara, Torsa, C.C.Line, Chilapata. Fodder & cottage industry.

Arundinella decempedalis (O.Ktze.) Jan. Stout grass; common in savannahs and open grasslands; fl. & fr.: June Oct. Moiradanga, Torsa, Jaldapara, Bengdaki. Fodder & aromatic oil.

Arundinella nepalensis Trin. Stout grass; common in grasslands and savannahs; fl. & fr. : July Sept. C.C.Line, Daidaighat, Chilapata. Fodder & paper pulp.

Arundo donax L. Tall, reed like grass with fistular stem; common along riversides, ditches and swamps; fl. & fr. : Oct. Jan. Hollong, Chilapata, Torsa, Malangi, Bengdaki. Fodder, dyes & green manure.

Brachiaria reptans (L.) Gard. & C.E.Hubb. Culms often rooting at basal nodes; frequent along roadsides and forest edges; fl. & fr.: June Sept. Jaldapara, Hollong. Fodder.

Brachiaria subquadripara (Trin.) Hitchc. Slender, creeping grass; common along fireline and edges of savannahs; fl. & fr. : July Sept. Jaldapara, Chilapata. Fodder.

Centotheca lappacea (L.) Desv. Erect grass; common in swamps and open grasslands; fl. & fr. : June Oct. Hollong, Jaldapara. Fodder.

Chrysopogon aciculatus (Retz.) Trin. Culms 20 60 cm.; common along roadsides, wastelands and forest margins; fl. & fr.: Aug. Oct. Hollong. Fodder.

Coix lacryma jobi L. Culms stout, branching and rooting at nodes; common in wet lands and swamps; fl. & fr. : Aug. Sept. Malangi, C. C. Line, Torsa. Fodder, cottage industry & paper pulp.

Cymbopogon gidarba (Buch.-Ham. ex Hook. f.) Haines, Slender grass with glabrous nodes; common in open grasslands and savannahs; fl. & fr.: Sept. Dec. Jaldapara, Hollong, Torsa, C. C. Line. Fodder.

Digitaria ciliaris (Retz.) Koel. Decumbent grass, frequent in wastelands and roadsides; fl. & fr. : July Sept. Hollong. Fodder.

Digitaria ternata (A. Rich.) Stapf ex Dyer, Erect or decumbent grass; common in grasslands, in moist shaded places; fl. & fr. : July Sept. Jaldapara. Fodder.

Eleusine indica (L.) Gaertn. Tufted culms; common along roadsides and wasteplaces; fl. & fr.: July Oct. Hollong, Salkumar. Fodder.

Eragrostis gangetica (Roxb.) Steud. Culms branched; common in swamps and wet grasslands; fl. & fr.: June Sept. Jaldapara. Fodder.

Eragrostis unioloides (Retz.) Nees ex Steud. Culms solitary; common in open marshy places and swamps; fl. & fr. : June Sept. Jaldapara. Fodder.

Eulalia fastigiata (Nees ex Steud.) Haines, Coarse, tufted grass; common in open grasslands, savannahs and forest borders; fl. & fr. : Aug. Dec. Torsa, Jaldapara, Hollong. Fodder & oil.

Eulalia leschenaultiana (Decne.) Ohwi, Slender tufted grass; common in open grasslands and savannahs; fl. & fr.: July Oct. Bordabri, C. C. Line, Hollong, Bengdaki. Fodder & aromatic oil.

Eulalia trispicata (Schult.) Henr. Tufted grass; common in open grasslands, and forest edges; fl. & fr.: Aug. Sept. Moiradanga, Hollong. Fodder & oil.

Heteropogon contortus (L.) P. Beauv. ex R. & S. Tufted grass; common in dry mixed forest and open grasslands; fl. & fr.: Sept. Jan. Salkumar, Bordabri, Hollong. Fodder.

Imperata cylindrica (L.) Raeuschel. Solid culms with creeping rootstock; common in open grasslands and dry mixed forests; fl. & fr. : May Sept. Hollong, Jaldapara, Chilapata, Bengdaki, Torsa. Fodder, cottage industry & paper pulp.

Isachne albens Trin. Erect grass; common along roadsides and grasslands; fl. & fr.: July Aug. Chilapata, Kunjanagar. Fodder.

Isachne globosa (Thunb.) O. Ktze. Common grasses along forest edges and grasslands; fl. & fr.: July Sept. Bordabri, Bengdaki. Fodder.

Ischaemum indicum (Houtt.) Merr. Small grass; common in open grasslands and roadsides; fl. & fr.: July Sept. Hollong, C. C. Line. Fodder.

Leersia hexandra Sw. Densely tufted grass; common in swamps and wet grasslands; fl. & fr.: Aug. Dec. Jaldapara, Chilapata. Fodder.

Mnesithea clarkei (Hack.) Koning & Sosef, Erect grass; common in open grasslands and in savannahs; fl. & fr.: Aug. Oct. Moiradanga, Bordabri. Fodder.

Ophiuros megaphyllus Stapf ex Haines, Erect grass, 1.5-2 m; common in open grasslands, swamps and forest edges; fl. & fr.: June Dec.

Hollong, Chilapata, Bordabri, Moiradanga. Fodder, cottage industry & paper pulp.

Oplismenus burmannii (Retz.) P. Beauv. Ascending grass; frequent along forest edges in shaded places; fl. & fr.: July Aug. Jaldapara. Fodder.

Oplismenus compositus (L.) P. Beauv. Ascending and decumbent grass; common in open grasslands and forest edges; fl. & fr.; June Oct. Jaldapara, Daidaighat, Bordabri, Chilapata. Fodder.

Panicum incomptum Trin. Branched culms, often rooting at nodes; common in open grasslands in moist places; fl. & fr.: June Aug. C. C. Line, Moiradanga. Fodder.

Panicum repens L. Procumbent grass; common in moist grasslands; fl & fr. : Aug. Sept. Salkumar, Chilapata, Daidaighat. Fodder.

Paspalum conjugatum Berg. Stoloniferous grass; frequent in swamps and moist grasslands; fl. & fr.: Aug. Oct. Jaldapara, Hollong. Fodder.

Paspalum vaginatum Swartz, Tufted grass; common along swamps and riversides; fl. & fr.: June Aug. Kunjanagar, Daidaighat. Fodder.

Pennisetum glaucum (L.) R.Br. Tufted grass; common in grasslands and forest edges; fl. & fr.: July Sept. Hollong, Torsa. Fodder.

Phacelurus zea (Clarke) Clayton, Tall grass; frequent in savannahs and open grasslands; fl. & fr.: Aug. Oct. Jaldapara. Moiradanga. Cottage industry & fodder.

Phragmites karka (Retz.) Trin. ex. Steud. Tall grass up to 9 m. with jointed hollow stems; common along swamps, streams and wetlands; fl. & fr.: Sept. Jan. Hollong, Jaldapara, Chilapata, Torsa, Kunjanagar. Fodder, fibre, cottage industry & paper pulp.

Pogonatherum paniceum (Lamk.) Hack. Glabrous, tufted grass; frequent on hill slopes in shaded places; fl. & fr.: June Aug. Bordabri. Fodder.

Polytoca digitata (L. f.) Druce, Culms up to 2 m; common in open grass lands and savannahs; fl. & fr.: July Sept. Jaldapara, Bengdaki. Fodder & paper pulp.

Saccharum arundinaceum Retz. Tall, tufted grass up to 8 m; common in wet savannah grasslands, riversides and forest edges; fl. & fr.: Oct. Jan. Jaldapara, Hollong, Bordabri, Torsa, Chilapata, Bengdaki. Fodder, paper pulp & cottage industry.

Saccharum bengalense Retz. Tall grass up to 7 m; common along the savannahs, riversides and forest edges; fl. & fr.: Sept. Dec. Jaldapara, Hollong, Torsa, Malangi, C.C.Line, Kunjanagar, Chilapata. Fodder, fibre, cottage industry & paper pulp.

Saccharum longisetosum (Anderss. ex Benth.) Narayansw. ex Bor, Stout culms 2.5-3 m tall, with golden brown spikelets; common in savannahs, open grasslands and river banks; fl. & fr.: Aug. Oct. Jaldapara, Hollong, Bengdaki, Bordabri, C.C.Line, Chilapata. Fodder & cottage industry.

Saccharum longisetosum var. **hookeri** (Hack.) Bor, Stout grass with golden brown spikelets and villous glumes; common in savannahs, open grasslands, swamps and riversides; fl. & fr.; Aug. Oct, Torsa, C.C.Line, Chilapata, Moiradanga, Jaldapara, Kunjanagar. Fodder.

Saccharum narenga (Nees ex Steud.) Hack. Culms 3-4 m., silky below panicle, rootstock stout, horizontal; common in savannahs, open grasslands, forest edges and riversides; fl. & fr.: July Sept. Hollong, Jaldapara, Torsa, Chilapata, Moiradanga, C.C.Line and most of the other places of the sanctuary. Fodder, cottage industry and paper pulp.

Saccharum spontaneum L. Coarse grass with solid stem up to 6 m; common along river beds, swamps and savannah grasslands; fl. & fr.: Sept. Dec. Torsa, Malangi, Chilapata, Kunjanagar, Jaldapara. Fodder, cottage industry & paper pulp.

Setaria intermedia R.&S. Flaccid grass; common in open grasslands and riversides; fl. & fr. July Sept. Jaldapara, Moiradanga, Bengdaki, Chilapata. Fodder.

Setaria palmifolia (Koen.) Stapf, Tufted culms; common in open grass lands in shaded places; fl. & fr.: Aug. Oct. Jaldapara. Moiradanga. Fodder.

Themeda arundinacea (Roxb.) Ridl. Tall grass; frequent in moist forests, grasslands and hill slopes; fl. & fr.: Aug. Dec. Salkumar, Bordabri, Hollong. Fodder, cottage industry & paper pulp.

Themeda villosa (Poir.) A. Camus, Tufted grass, 2.5-3 m tall; common in open forests and grasslands; fl. & fr. : Aug. Oct. Hollong. Jaldapara, Bengdaki, C.C.Line. Fodder & paper pulp.

Thysanolaena maxima (Roxb.) O.Ktze. Culms 2-3 m; common in savannah woodlands and grasslands; fl. & fr.: Nov. March. Jaldapara, Hollong, Torsa, C.C.Line. Fodder, cottage industry & paper pulp.

Vetiveria zizanioides (L.) Nash, Coarse perennial grass with stout rhizomes; common along riverbeds and grasslands; fl. & fr.: Aug. Oct.

Chilapata, Bordabri, Jaldapara, Bengdaki, Hollong, Torsa. Fodder, aromatic oil, cottage industry & paper pulp.

MANAGEMENT

The principal object of management of the wild life sanctuary is mainly preservation and improvement of indigenous flora and fauna. The entire scheme of management in Jaldapara Sanctuary is oriented towards providing the protection of forest resources and creating most favourable living conditions for wild animals, specially the extremely valuable Indian Rhinos which are worth 5 lakhs each in the overseas market and its horn is currently fetching Rs. 62,000/- per kg. The secondary aim of management is to give maximum facilities to the visitors, intending to watch and enjoy the wild life in their original habitat and the researchers to study the wild flora and fauna in a natural condition. With these in view some special objectives of the management programme of the sanctuary may be mentioned as follows:

1. Tree felling should be prohibited, except felling of 'Simul' trees which attain 180 cm b.h.g. as such trees hinder the growth of grasses required for Rhino food.

2. Controlled burning: To improve regeneration of fodder grasses controlled burning should be practised every year at the beginning of dry season. Burning of grasses should not be started at a time in all the forest blocks but on a rotational basis and the entire burning must be completed by the end of December.

3. Fire lines : All fire lines should be cleared up by the middle of November each year for using observation lines and providing a suitable edge effect to the animals too.

4. Water resources : Before the summer, natural wallow pools should be improved and chemical test of the river water should be performed each year for determining any deliberate poisoning of the water.

5. A few tall watch towers should be erected at different points and some more wireless sets should be installed for protection of the sanctuary.

6. Hunting. shooting, fishing, trapping, grazing and cutting of thatch should be prohibited.

7. Regular census should be done according to the existing practice.

8. The total area of the sanctuary should be extended to about double. The present area of 115 sq. km. and all the lands between the two legs of the sanctuary where about 10,000 people live must be acquired for wild life habitat.

9. Special care should be taken to eradicate severe infestation of the weed, *Mikania scandens* which forms a carpet on vast stretches of forest floor and on savannah grasslands smothering out regeneration of rhino's food grasses. Physical removal of weeds, replanting the infested area with supplementary fodder grasses and controlled burning should be done each year for improving the wild life habitat.

10. Special care should be taken with constant checking on the entry of unauthorised persons and commercially motivated, externally financed, high powered organised gangs in the sanctuary for preventing Rhino poaching.

THREAT TO FOREST RESOURCES

Human persecution to forest resources in any sanctuary is more or less unavoidable due to unstable economic condition and multifaceted problems of the people living near by. This situation has become more acute in case of Jaldapara wildlife sanctuary in North Bengal. The forest resources in this sanctuary are virtually unguarded because large area in the sanctuary is inhabited by 10,000 people and is presently vulnerable to trespass and encroachment. The area consists of some 5000 ha of river valley extending from Salkumar to the Jaldapara Range Office along the central part of the sanctuary. The addition of this large area to the sanctuary contiguous with the eastern and western legs will greatly strengthen proper protection of rhino population and other animals and certainly improve the quality of the forest resources of the sanctuary. There were plans under Sixth Plan to remove all people from this area and convert it to sanctuary for reducing vulnerability arising from human interference.

The forest produce has now attracted organised gangs and fostered illicit trade. The problem has worsened with the soaring prices of timber during the past ten years. The price of the most common timber 'Sal' is almost five times than what it was ten years ago. It is learnt that many people illegally collect firewood, poles and timber from the forests. The valuable forest resources are thus being depleted and

seriously threatened inspite of the efforts made by the Forest Department to protect the assets. During the past eight years much forest produce has been recovered from the North Bengal forest circles Jalpaiguri, Buxa, Baikunthapur and Cooch Behar. There have been assaults on forest personnel, specially in Salkumar areas, where there is a rise in theft of forest produce. Recently, five forest personnel had been seriously assaulted when they caught a group involved in the theft of forest produce.

The Forest Department feels that unless the existing police organization at different levels in North Bengal is geared to meet all the exigencies of the situation, it would be almost impossible to stop organized vandalism. The role of police in protecting the forest produce was taken into consideration at the time of preparation of the Indian Forest Act 1972. They had been given all the powers of forest officers in the matter of detection and prevention of such offences.

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APPENDIX

USES OF PLANT RESOURCES OF THE JALDAPARA SANCTUARY WITH CODE NUMBERS* INDICATED AGAINST EACH SPECIES

Name of species	Uses	Page
A		
Abelmoschus moschatus (L.) Medicus	1,7	24
Abroma augusta (L.) L.f.	1,7	25
Abrus fruticulosus Wt. & Arn.	1	30
Abrus precatorius L.	1	7,30
Abutilon indicum (L.) Sweet	1,7	24
Acacia catechu (L.f.) Willd.	2,5	8,9,11,13,15,16,34
Acacia pennata Willd.	1	6,7
Achyranthes aspera L.	1	49
Actinodaphne obovata (Nees) Bl.	1,4,11	51
Aechmanthera gossypina (Nees) Nees	1	47
Aegle marmelos Corr.	1,2,12	27
Aeginetia acaulis (Roxb.) Walp.	1,13	45
Aerides multiflorum Roxb.	13	56
Aerva lanata (L.) Juss.	1,2	49
Aeschynomene aspera L.	2,9	30
Ageratum conyzoides L.	1,2	40
Aglaia hiemii Visw. & Ramach.	1	27
Agrostis myriantha Hook. f.	2	17
Albizia chinensis (Osbeck) Merr.	2,3,6	34
Albizia lebbeck Benth.	2,3,6,8	34
Albizia lucidior (Steud.) Nielson	2,3,6,8	34
Albizia procera Benth.	2,3,6,8,11	7,8,13,34
Alpinia malaccensis Rosc.	2,9	58
Alpinia nigra (Gaertn.) Burtt	2,4,9	6,11,58
Alstonia scholaris (L.) R.Br.	6,8,9	6,42
Altemanthera sessilis (L.) R.Br.ex DC.	1	9,16,50

* 1 = Medicine, 2 = Fodder, 3 = Green manure, 4 = Aromatic oil, fat & soap, 5 = Dye, Gum & Tannin, 6 = Pencil, Toy & Cart wheel, 7 = Fibre, 8 = Softwood, 9 = Cottage industry & paperpulp, 10 = Plywood, 11 = Timber, 12 = Edible and 13 = Special care for conservation.

Name of species	Uses	Page
Alysicarpus bupleurifolius (L.) DC.	2	16
Alysicarpus glumaceus (Vahl) DC.	2,3	30
Amaranthus gracilis Desf.	1	50
Ammannia auriculata Willd.	1	36
Amomum aromaticum Roxb.	1,2,12	58
Amorphophallus bulbifer (Roxb.) Bl.	1,2,12	61
Ampelocissus latifolius (Roxb.) Planch.	1,2,3	29
Ampelocissus sikkimensis Lawson) Planch.	1,2,3	7,29
Andrographis paniculata Nees	1	47
Anisomeles indica (L.) O.Kuntze	1	48
Annona reticulata L.,	1,12	21
Anthocephalus chinensis Rich. ex Walp.	1,6,8,10,11	7,38
Antidesma acidum Retz.	5,12	52
Antidesma acuminatum Wall.	1,12	52
Aphanamixis polystachya (Wall.) Park.	8,10	6,27
Apluda mutica L.	2	8,9,13,14,18,63
Apocopis paleacea Hochr.	2	64
Aponogeton undulatus Roxb.	2	9
Ardisia solanacea Roxb.	1	41
Argyreia hookeri Clarke	1	44
Argyreia roxburghii Choisy	1	7,44
Ariopsis peltata Nimmo	1,2	10
Arisaema petiolulatum Hook. f.	1,2	61
Arisaema tortuosum (Wall.) Mart. ex Schott	1,2	10
Aristida setacea Retz.	2	13
Aristolochia tagala Cham. & Schl.	1,13	51
Artemisia canifolia Ham.	1,4	40
Artocarpus chama Buch.-Ham.	10,11	54
Arundinella bengalensis (Spreng.) Druce	2	8,13,14,16,17,64
Arundinella decempedalis Jan.	2,4	9,64

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* 1 = Medicine, 2 = Fodder, 3 = Green manure, 4 = Aromatic oil, fat & soap, 5 = Dye, Gum & Tannin, 6 = Pencil, Toy & Cart wheel, 7 = Fibre, 8 = Softwood, 9 = Cottage industry & paperpulp, 10 = Plywood, 11 = Timber, 12 = Edible and 13 = Special care for conservation.

Name of species	Uses	Page
Arundinella nepalensis Trin.	2	64
Arundo donax L.	2,5	8,13,14,16,64
Asparagus racemosa Willd.	1,4	7,10,59
Asystasia neesiana Nees.	1	47
Atylosia scarabaeoides Benth.	3	30
Azadirachta indica A. Juss.	1,4,10,11,12	27
B		
Baccaurea ramiflora Lour.	8,12	52
Bacopa monnieri (L.) Pennell	1,12	46
Bauhinia purpurea L.	3,5,6	6,33
Bauhinia racemosa Lamk.	3,5,6	33
Bauhinia vahlii Wt. & Arn.	5,7,12	7,33
Bauhinia variegata L.	2,3,5,11	33
Beilschmiedia roxburghiana Nees	8,10,11	6,7,51
Beilschmiedia sikkimensis Hook.f.	1,8,10,11	6,51
Biophytum reinwardtii (Zucc.) Klotzsch	1	26
Bischofia javanica Bl.	8,9,10,11	7,11
Blumea alata (D.Don)DC.	1,4	40
Blumea balsamifera DC.	1,4	40
Blumea lacera (Burm.f.)DC.	1	40
Blumea laciniata (Roxb.) DC.	1	40
Blyxa octandra (Roxb.) Planch.ex Thw.	2,3	56
Boerhaavia diffusa L.	1,12	49
Bombax ceiba L.	2,7,8,9,10	8,11,13,14,15,16,25
Borreria articularis (L.f.)Williams	1	38
Borthriochloa pertusa (L.) Camus	2	9
Brachiaria reptans (L.) Gard.et Hubb.	2	17,64
Brachiaria subquadripara (Trin.) Hitchc.	2	64
Breynia retusa (Dennst.) Alston	1,3	52
Bridelia pubescens Kurz	6,11	53
Bridelia scandens (Roxb.) Willd.	2,6,9,10	53
Buddleja asiatica Lour.	1,4	43

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* 1 = Medicine, 2 = Fodder, 3 = Green manure, 4 = Aromatic oil, fat & soap, 5 = Dye, Gum & Tannin, 6 = Pencil, Toy & Cart wheel, 7 = Fibre, 8 = Softwood, 9 = Cottage industry & paperpulp, 10 = Plywood, 11 = Timber, 12 = Edible and 13 = Special care for conservation.

Name of species	Uses	Page
Bulbophyllum striatum (Griff.) Reichb.f.	13	56
Bulbophyllum triste Reichb.f.	13	56
Bulbostylis densa (Wall.) Hand.-Mazz.	2	17,62
Bursera serrata Wall.	1,4	27
Butomopsis latifolia (D.Don.) Kunth	1,2,3	9,62
C		
Caesalpinia cucullata Roxb.	1	33
Caesalpinia tortuosa Roxb.	1	33
Calamus erectus Roxb.	9,13	61
Calamus latifolius Roxb.	9,13	6,61
Calamus tenuis Roxb.	9,13	6
Calanthe angusta Lindl.	13	56
Calanthe puberula Lindl.	13	56
Caldesia parnassifolia (L.) Parl.	1,2	9,62
Callicarpa arborea Roxb.	1,11	6,48
Callicarpa vestita Roxb.	1	48
Calotropis gigantea (Willd.) Ait.	1,7	43
Camellia sinensis (L.) O.Ktze.	1,5	24
Canarium bengalense Roxb.	4	27
Canscora diffusa R.Br.ex Roem. & Schult.	1	43
Canthium dicoccum (Gaertn.) T.&B.	1	38
Canthium glabrum Bl.	1	6,38
Capparis sepiaria L.	1	22
Carex baccans Nees	1,2,4	62
Carex spiculata Boott.	1,2,9	62
Careya arborea Roxb.	1,6,8,9,10	6,7,36
Carissa paucinervia A.DC.	2,12	42
Caryota urens L.	7,12	61
Casearia elliptica Willd.	10,11	22
Cassis absus L.	1,2	34
Cassia fistula L.	1,6,11	34
Cassia sophera L.	1,3,12	34

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Name of species	Uses	Page
Castanopsis indica (Roxb.)DC.	10,11	55
Castanopsis kurzii (Hance)Biswas	10,11	56
Catunaregam spinosa (Thunb.) Tirveng.	1,2	38
Cayratia pedata (Lamk.) Juss.ex Gagnep.	1	7,29
Celastrus paniculatus Willd.	1	28
Celosia argentea L.	1	50
Celtis trimorensis Span.	10,11	6,54
Centella asiatica (L.)Urban	1,12	37
Centotheca lappacea (L.) Desv.	1,2	8,64
Centranthera cochinchinensis (Lour.)Merr.	1	46
Ceropegia macrantha Wight	1	43
Chenopodium ambrosioides L.	1,12	50
Chlorophytum tuberosum (Roxb.)Baker	1,2	10,60
Chonemorpha fragrans (Moon.) Alston	1.13	6,42
Chromolaena odorata (L.) King & Rob.	1	40
Chrysopogon aciculatus (Retz.) Trin.	2	9,16,64
Chukrasia tabularis A. Juss.	1,11	27
Cinnamomum bejolghota (Buch.-Ham.) Sweet	2,4,10,11	6,51
Cinnamomum glaucescens (Nees) Hand.-Mazz.	1,4,10	6,10,51
Cipadessa baccifera (Roth)Miq.	10,11	27
Cissampelos pareira L. var. *hirsuta* Form.	1	22
Cissus adnata Roxb.	1	6,7,29
Cissus javana DC.	1	29
Clematis gouriana Roxb.ex DC.	1	6,21
Cleome gynandra L.	1	22
Clerodendrum indicum (L.) Kuntze	1	48
Clerodendrum serratum (L.) Spreng.	1	48

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Name of species	Uses	Page
Clerodendrum viscosum Vent.	1	6,48
Coffea bengalensis Roxb.	1,4	38
Coix lacryma-jobi L.	2,9	9,64
Colocasia esculenta (L.) Schott	1,12	10,61
Combretum acuminatum Roxb.	1,7	35
Combretum latifolium Bl.	7	35
Commelina appendiculata Clarke	1,2	60
Commelina benghalensis L.	1,2	9,60
Conyza canadensis (L.) Cronq.	1	40
Cordia dichotoma Forst. f.	10,11	44
Costus speciosus (Koen.) Sm.	1,13	10,16,58
Crateva religiosa Forst. f.	1,6	7,22
Crinum amoenum Ker-Gawl.	2	59
Crotalaria alata Buch.-Ham.	1,7	16,30
Crotalaria albida Heyne ex Roth	1,7	31
Crotalaria juncea L.	1,7	31
Crotalaria pallida Ait.	1,7	31
Crotalaria sessiliflora L.	1	31
Croton roxburghii Balak.	1,4	53
Cryptocarya amygdalina Nees	8	52
Cryptolepis sinensis (Lour.) Merr.	1	43
Curculigo orchioides Gaertn.	1	59
Curcuma amada Roxb.	1,2,5	10
Curcuma angustifolia Roxb.	1,5	58
Cymbopogon flexuosus Wats.	2,4	12
Cymbopogon gidarba Haines	2,4	8,12,14,16,64
Cymbopogon jwrancusa Schult.	2,4	12,14,16
Cymbopogon martinii Watson	2	8
Cynoglossum glochidiatum DC.	1,4	44
Cyperus distans L.f.	2	62
Cyperus elatus L.	2	62
Cyperus halpan L.	2	62
Cyperus laxus Lamk.	2	62
Cyperus platystylis R.Br.	2	62

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Name of species	Uses	Page
D		
Dalbergia lanceolaria L.f.	10,11	31
Dalbergia latifolia Roxb.	10,11	7,31
Dalbergia sissoo Roxb.	11	8,9,11,13,14,15,16,31
Dalbergia stipulacea Roxb.	7	6,31
Dalbergia volubilis Roxb.	7	7,31
Datura metel L.	1	44
Deeringia amaranthoides (Lamk.) Merr.	1,12	50
Dendrobium lituiflorum Lindl.	13	56
Dendrobium sulcatum Lindl.	13	57
Dendropthoe falcata (L.f.) Etting.	1	52
Derris robusta Benth.	11	32
Desmodium caudatum (Thunb.) DC.	1	31
Desmodium gangeticum (L.) DC.	1,7	16,31
Desmodium gyroides (Link) DC.	1,7	31
Desmodium heterocarpon (L.) DC.	1,7	31
Desmodium laxiflorum (L.) DC.	1	31
Desmodium motorium (Houtt.) Merr.	1	32
Desmodium triangulare (Retz.) Merr.	7	32
Desmodium triflorum (L.) DC.	1	32
Dichanthium annulatum (Forsk.) Stapf	2	8
Digitaria ciliaris (Retz.)Koel.	2	8,17,64
Digitaria ternata (Rich.)Stapf ex Dyer	2	64
Dillenia indica L.	8,12	6,7,21
Dillenia pentagyna Roxb.	8,12	6,7,11,21
Dioscorea bulbifera L.	1,12,13	10,59
Dioscorea pentaphylla L.	1,12,13	7,10,59
Dioscorea prazeri Prain & Burkill	1,12,13	59
Dioscorea puber Bl.	1,12,13	7,59
Diospyros malabarica Kostel	5,11,12	41
Diospyros melanoxylon Roxb.	5,11,12	41

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Name of species	Uses	Page
Diospyros montana Roxb.	5,11	41
Dregea lanceolata (Cooke.) Sant. &Wagh.	1	43
Drosera peltata Smith	1,13	35
Drymaria cordata (L.) Willd.ex Roem & Schult.	1	23
Drypetes assamica Pax. & Hoffm.	10,11	53
Duabanga grandiflora (Roxb.ex DC.) Walp.	6,8	7,11,36
Dunbaria rotundifolia (Lour.) Merr.	1	32
Dysolobium tetragonum Prain	1	32
Dysoxylum binectariferum (Roxb.)Bedd.	6	7,28
E		
Echinochloa colona (L.) Link	1	9
Ehretia acuminata R.Br.	2,6,12	10,44
Elaeocarpus floribundus Bl.	1,4,12	26
Elaeocarpus ganitrus Roxb.	1,4,10,13	26
Elaeocarpus lucidus Roxb.	10,11,13	6,10,26
Elaeocarpus rugosus Roxb.	4,1	6,26
Elaeocarpus tectorius (Lour.)Poir.	4,11	26
Elatostema cuneatum Wt.	1	55
Eleocharis acutangula (Roxb.) Schult.	2,9	63
Eleocharis palustris R.Br.	1,2	9
Eleocharis retroflexa (Poir.)Urban	1,2,9	9
Eleusine indica (L.) Gaertn.	2	65
Emblica officinalis Gaertn.	1,2,4,6	7,8,11,13
Embelia ribes Burm.f.	1	41
Embelia tsjeriam-cottam DC.	1	41
Emilia sonchifolia (L.) DC.	1	40
Eragrostis gangetica (Roxb.) Steud.	2	65
Eragrostis unioloides Steud.	2	65
Erigeron bonariensis L.	1	40
Eulalia fastigiata (Steud.) Haines	2	65

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Name of species	Uses	Page
Eulalia leschenaultiana Ohwi	2,4	65
Eulalia trispicata (Schult.) Henr.	2	65
Eulophia bicallosa Hunt & Summerh.	13	57
Eulophia bracteosa Lindl.	13	57
Euonymus echinatus Wall.	1	28
Euphorbia indica Lamk.	1	53
Euphorbia hirta L.	1	53
Euphorbia neriifolia L.	1	53
Evolvulus alsinoides L.	1	44
Exacum teres Wall.	1	43
Exacum tetragonum Roxb.	1	9,44
F		
Fagerlindia fasciculata (Roxb.) Tiruveng.	2	6,10
Ficus bengalensis L.	1,2,3	10
Ficus hirta Vahl	1,2,7	54
Ficus hispida L.f.	2,8	15,16,55
Ficus microcarpa L.f.	2	6,7
Ficus recemosa L.	2,8	11,55
Ficus religiosa L.	1,2,8	55
Ficus retusa L.	2,8	55
Ficus saemocarpa Miquel.	2,8	7,55
Ficus semicordata Buch.-Ham.	1,2,8	7,11,15,16,55
Fimbristylis acuminata Vahl	2	63
Fimbristylis complanata (Retz.)Link	2,9	17,63
Fimbristylis dichotoma (L.) Vahl	2	63
Flacourtia jangomas (L.) Raeusch.	9,12	22
Flemingia macrophylla (Willd.) Merr.	1,2,12	32
Flemingia strobilifera (L.) R.Br.	1,3	17,32
Floscopa scandens Lour.	1,12	9,60
G		
Garcinia kydia Roxb.	1,5,12	6,23
Garcinia pedunculata G.Don.	1,5	23

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Name of species	Uses	Page
Gardenia latifolia Ait.	5,6	38
Garuga pinnata Roxb.	5,8,10	7,27
Geodorum densiflorum (Lamk.) Schltr.	13	57
Geranium nepalensis Sweet	1	26
Glinus lotoides (O. Ktze.) L.	1,12	37
Glinus oppositifolius (L.) DC.	1,12	37
Globba marantina L.	1	58
Globba racemosa J.E Smith	1	10,58
Glochidion lanceolarium (Roxb.)Voigt	1,6	53
Gloriosa superba L.	1,13	60
Glycosmis arborea (Roxb.) DC.	1,4	27
Gmelina arborea Roxb.	1,2,10,11	6,48
Gnaphalium luteo-album L.	1	40
Goldfussia discolor Nees	1	47
Gomphrena globosa L.	1,2	50
Gouania tiliaefolia Lamk.	1	28
Grewia disperma Rottb.	6,12	7,25
Grewia microcos L.	1,7	25
Grewia subinaequalis DC.	1,7,12	25
Grewia tiliifolia Vahl	6,12	25
Guazuma ulmifolia Lamk.	1,2,10	25
Gymnema acuminatum Wall.	1	43
Gynostemma pentaphyllum (Thunb.) Makino	13	37
H		
Habenaria foliosa A.Rich.	13	57
Habenaria marginata Colebr.	13	57
Haldina cordifolia (Roxb.)Rids.	1,9,10,11	7,39
Hedychium elwesii Baker	1	58
Hedychium gracile Roxb.	1	10,17,58
Hedyotis auricularia L.	1	38
Hedyotis scandens D.Don.	1	38
Helicteres isora L.	1,7	7,25

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Name of species	Uses	Page
Heliotropium indicum L.	1	44
Heteropogon contortus (L.) P.Beauv.ex R.&S.	2	8,13,14,16,18,65
Holarrhena pubescens Wall.ex G.Don	1,3,6	7,42
Hornstedtia linguiformis (Schult.)Schum.	1,2	58
Hoya lanceolata Wall.	1,13	43
Hydnocarpus kurzii (King) Warb.	1,4	22
Hydrilla verticillata (L.f.)Royle	1,2	9,56
Hydrocharis dubia (Bl.)Backer	2,3	56
Hydrocotyle javanica Thunb.	1,2,12	17,37
Hygrophila salicifolia Nees	1	47
Hymenodictyon excelsum (Roxb.)Wall.	8,9	6,39
Hypericum hookerianum Wt.& Arn.	1,5	23
Hypolytrum nemorum (Vahl)Spreng.	2	63
Hyptis suaveolens (L.) Poit.	1,4	49
I		
Ichnocarpus frutescens R.Br.	1,5	7,42
Ilex umbellulata (Wall.)Lees.	1	28
Impatiens bracteata Wall.	1	26
Impatiens chinensis L.	1	26
Imperata cylindrica (L.) Raeuschel.	2,9	8,13,14,16,18,65
Indigofera linifolia Retz.	2,3	32
Indigofera pulchella Roxb.	1,2	7
Ipomoea tuba G.Don	1	44
Isachne albens Trin.	2	65
Isachne globosa (Thunb.) Kuntze	2	8,65
Ischaemum indicum (Houtt.)Merr.	2	65
Ixora arborea Roxb.ex J.E.Smith	1,6	7,39
Ixora undulata Roxb.	1	6,39
J		
Jasminum sambac (L.) Ait.	1	42
Jatropha curcas L.	1,4	53

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Name of species	Uses	Page
Justicia adhatoda L.	1	47
Justicia procumbens L.	1	47
Justicia vasculosa (Nees) T. And.	1	47
K		
Knema erratica (Hook.f. & Thoms.) Sincl.	1,11,13	6,51
Kydia calycina Roxb.	2,10,11	6,24
Kyllinga brevifolia Rottb.	2	17
Kyllinga nemoralis (J.R.& G.Forst.) Hutch. & Dal.	2	17
L		
Lantana camara L. var. *aculeata* (L.) Mold.	1	48
Lagerstroemia parviflora Roxb.	6,10,11	7,8,13,36
Lannea coromandelica (Houtt.) Merr.	5,8	6,30
Lasia spinosa (L.) Thw.	1,12	10,61
Leea asiatica (L.)Ridsd.	1,2,12	7,10,29
Leea indica (Burm.f.) Merr.	1,12	29
Leea macrophylla Roxb.ex Horn.	1	29
Leea sambuciana Willd.	1	6
Leersia hexandra Sw.	2	9,65
Leonurus japonicus Houtt.	4	49
Lepidagathis incurva D.Don	1	47
Leucus indica (L.)R. Br. ex Vatke	1	49
Leucus plukenetii (Roth)Spreng.	1	49
Limnophila chinensis (Osb.) Merr.	1,4	46
Limnophila rugosa (Roth) Merr.	1	46
Lindenbergia muraria (Roxb.) Bruhl.	1	46
Lindernia crustacea (L.) F.v. Muell.	1	46
Lindernia elata (Benth.) Wettst.	1	46
Litsea glutinosa (Lour.)Rob.	1,2,9,10	6,7,10,52
Litsea monopetala (Roxb.)Pers.	2,8,9,10	6,10,15,16,52
Litsea salicifolia (Nees) Hook.f.	1,9	52

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Lobelia alsinoides Lamk.	1	41
Loranthus pulverulentus Wall.	1	52
Ludwigia octovalvis (Jacq.) Raven	1	9,36
Ludwigia perennis L.	1	37
M		
Macaranga denticulata (Bl.) Muell.-Arg.	2,5,9	7,10,11,15,16,53
Maesa indica (Roxb.) Wall	1	41
Magnolia pterocarpa Roxb.	8,10,11	21
Mallotus albus (Roxb.) Muell.–Arg.	4,10	53
Mallotus philippensis (Lamk.) Muell.-Arg.	4,5,6,10	6,7,10,53
Mallotus roxburghianus Muell. - Arg.	6,4,11	53
Mangifera indica L.	11,12	30
Manihot esculenta Crantz	1,12	53
Mariscus sumatrensis (Retz.) Raynal	2,9	63
Martynia annua L.	1	45
Mazus pumilus (Burm.f) van Steenis	1	46
Medicago lupulina L.	2,12	32
Medicago polymorpha L.	2,12	32
Melastoma malabathricum L.	1,5	6,36
Melastoma nepalensis Lodd.	1,5	36
Melia azedarach L.	1	28
Melilotus alba Lamk.	2,3	32
Meliosma simplicifolia (Roxb.) Walp.	16	7,30
Melochia corchorifolia L	7	25
Melodinus monogynus Roxb.	7	42
Merremia vitifolia Hall.f.	1	44
Mesua ferrea L.	4,6	23
Meyna spinosa Roxb. ex Link.	1,2	39
Michelia champaca L.	10,11	6,21
Micromelum integerrimum (Roxb.) Wt. & Arn. ex Roem.	1	27
Mikania scandens Willd.	1	40,69

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Name of species	Uses	Page
Miliusa longiflora (Hook. f. & Thoms.) Sincl.	5,10	21
Miliusa tomentosa (Roxb.)Sincl.	2,5,10	21
Milletia extensa (Benth.)Baker	2,7	7,32
Mimosa pudica L.	1,2	34
Mnesithea clarkei (Hack.) Koning & Sosef	2	65
Molineria capitulata (Lour.) Herb.	1,2	10
Mollugo pentaphylla L.	1,12	37
Momordica dioica Willd.	1,12	37
Monochoria hastata (L.)Solms	1,2,3	60
Monochoria vaginalis Presl.	1,2,3	9
Morinda angustifolia Roxb.	5	7,3,9
Morinda umbellata L.	1,5	39
Morus australis Poiret	2,6,12	55
Mucuna pruriens (L.) DC.	1	7
Mukia maderaspatana (L.)Roem.	1	37
Murdannia blumei (Hassk.)Brenan	1,12	60
Murdannia nudiflora (L.) Brenan	1,2	60
Murraya paniculata (L.) Jack.	1,12	7,27
Musa balbisiana Colla	1,2,12,13.	59
Mussaenda roxburghii Hook. f.	1	39
Myxopyrum smilacifolium (Wall.)Bl.	1	42
N		
Najas minor All.	2,3	9
Naravelia zeylanica (L.) DC.	1,7	6,21
Nervilia falcata (King & Pantl.)Schlech.	13	57
Nymphoides indicum (L.) Ktze.	1	44
O		
Oberonia ensiformis (Sm.)Lindl.	13	57
Oberonia rufilabris Lindl.	13	57
Oenanthe javanica (Bl.) DC.	1,12	38
Olax nana Wall.	1	28
Olax scandens Roxb.	1	6,28

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Name of species	Uses	Page
Olea dioica Roxb.	6,13	42
Ophiopogon parviflorus (Hook.f.)Hara	1	60
Ophiuros megaphyllus Stapf ex Haines	2,9	65
Oplismenus burmannii (Retz.) P.Beauv.	2	66
Oplismenus compositus (L.) P.Beauv.	2	13,17,66
Oroxylum indicum (L.) Vent.	1,2,7,12	6,11,14,15,16,45
Orthosiphon incurvus Benth.	1	49
Osbeckia nepalensis Hook. f.	1	36
Osbeckia rostrata D.Don.	1	36
Oxalis corniculata L.	1,12	17,26
P		
Paederia foetida L.	1	39
Pancratium verecundum Ait.	1,2	59
Pandanus odoratissimus L.f.	4	61
Panicum incomptum Trin.	2	66
Panicum paludosum Roxb.	2	9
Panicum repens L.	2	66
Paspalum conjugatum Berg.	2	17,66
Paspalum vaginatum Swartz	2	66
Pennisetum glaucum (L.) R.Br.	2	9,13,66
Pepromia pellucida (L.) H.B.K.	1	51
Peristylus lacertiferus (Lindl.) Sm.	13	57
Perotis indica (L.) Kuntze	2	9
Persea gamblei (Hook.f.) Kost.	1,11	6,10,52
Persea glaucescens (Nees) Long.	1,4,11	6,7,52
Phacelurus zea (Cl.)Clayton	2	66
Phaius longipes (Hook.f.)Holtt.	13	57
Phoenix acualis Roxb. ex Buch.-Ham.	1,9	61
Photinia hookeri (Dene.) Merr.	1,6	34
Phragmites karka (Retz.)Trin.ex Steud.	2,9	8,13,14,16,18,66
Phrynium pubinerve Bl.	1,2	59
Phyllanthus debilis Willd.	1,2	54
Phyllanthus emblica L.	1,2,4,8,12	54

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Name of species	Uses	Page
Phyllanthus parvifolius Buch.-Ham.	1,2	54
Phyllanthus reticulatus Poir.	1,2	54
Pilea glaberrima (Bl.) Bl.	1	55
Piper longum L.	1,4,12	51
Piper peepuloides Roxb.	1,12	51
Plantago erosa Wall.	1	49
Plectranthus japonicus (Burm.f.)Koidz.	1,4	49
Plectranthus ternifolius D.Don	1,4	49
Pogostemon andersonii (Prain)Panig.	4	49
Pogonatherum paniceum (Lamk.) Hack.	2	66
Poilkilospermum suaveolens (Bl.)Merr.	1	55
Polyalthia simiarum Hook.f.&Thoms.	6,10,11	6,21
Polycarpon prostratum (Forsk.) Asch.&Schweinf.	1	23
Polygala longifolia Poir.	1	22
Polygala persicariaefolia DC.	1	23
Polygonum barbatum L.	1,2	9,50
Polygonum hydropiper L.	1,2	50
Polygonum nepalense Meissn.	1,2	50
Polygonum plebeium R.Br.	1,2	17,50
Polygonum viscosum D.Don	1,2	50
Polytoca digitata (L.f.) Druce	2	9,66
Porana racemosa Roxb.	1	44
Portulaca oleracea L.	1,12	23
Portulaca pilosa ssp. *grandiflora* Gessink	1,12	23
Potamogeton nodosus Poiret	1,2,3	62
Potamogeton pectinatus L.	1,2,3	9
Potentilla supina L.	1,2,3	34
Pouzolzia hirta (Bl.) Hassk	1	55
Pouzolzia zeylanica (L.) Bennett & Brown	1	55
Premna barbata Schauer	1,2	48

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Name of species	Uses	Page
Premna bengalensis Clarke,	1,6	6,48
Pseuderanthemum palatiferum (Wall.) Lind.	1	47
Psoralea corylifolia L.	1	32
Psychotria adenophylla Wall.	1	39
Pteracanthus calycinus (Nees) Bremek.	1	47
Pterospermum lancifolium DC.	1,6,8	25
Pueraria lobata (Willd.) Ohwi	1,2,3	33
Pueraria phaseoloides (Roxb.) Benth.	1	33
Pupalia lappacea (L.) Juss.	1	50
Pycreus uniloides Urb.	2	63
Pygmaeopremna herbacea (Roxb.)Moldenke	1,13	48
R		
Rauvolfia serpentina (L.) Benth.ex Kurz	1,13	42
Rhamnus nepalensis Wall.	1	28
Rhaphidophora glauca (Wall.)Schott	1	61
Rhus javanica L.	1,4	30
Rhynchospora rubra (Lour.) Makino	2	63
Rhynchostylis retusa Bl.	13	7
Rorippa indica (L.) Hiern.	1	22
Rorippa nasturtium-aquaticum (L.) Sching & Thell.	1	22
Rotala rotundifolia (Roxb.) Koehne	1	36
Rungia parviflora (L.) Nees	1,2	47
S		
Saccharum arundinaceum Retz.	29	12,14,15,18,19,66
Saccharum bengalense Retz.	2,7,9	8,14,16,18,67
Saccharum longisetosum (Anderss.ex Bth.) Narayansw. ex Bor	2,9	8,12,14,16,67
Saccharum longisetosum var. *hookeri* Bor	2,9	18,19,67

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Name of species	Uses	Page
Saccharum narenga Hack.	2,9	8,11,12,14,15,17,18, 19,67
Saccharum spontaneum L.	2,9	8,9,11,12,14,16,18,67
Sagittaria trifolia L.	1,3	9,61
Salix tetrasperma Roxb.	6,8,11	7,56
Sambucus hookeri Rehder	1	38
Sanicula tenuifolium Wall.ex Clarke,	1	38
Sapium baccatum Roxb.	1,8	6,10,54
Sapium eugenifolium Hook.f.	2,8	54
Sarcostemma secamone (L.) Bennet	1	43
Saurauia roxburghii Wall.	1,6	24
Sauropus androgynus (L.) Merr.	1	54
Schima wallichi (DC.) Korthals	1,11	6,23
Schoenoplectus articulatus (L.) Palla	2	9,63
Schoenoplectus juncoides (Roxb.) Palla	2,9	63
Schoenoplectus mucronatus (L.) Palla	2	63
Scindapsus officinalis Schott	1	61
Scleria biflora Roxb.	2	63
Scoparia dulcis L.	1	46
Scrophularia elatior Benth.	1	46
Securinega virosa (Roxb.)Baillon,	5	6,54
Semecarpus anacardium L.f.	1,5,10	7,30
Senecio nudicaulis Buch.-Ham.	1	40
Sesamum orientale L.	1,4	45
Sesbania sesban (L.)Merr.	3,12	33
Setaria intermedia R.& S.	2	8,9,67
Setaria palmifolia (Koen.) Stapf	2	8, 9,13,14,16,67
Setaria pumila (Poir.) R.& S.	2	8
Shorea robusta Gaertn.f.	4,5,11	6,24
Sida acuta Burm.f.	1	24
Sida cordata (Burm.f.) Borssum	1,7	24
Sida rhombifolia L.	1	24
Smilax aspera L.	1,3	60
Smilax perfoliata Lour.	1	7,60

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Name of species	Uses	Page
Smithia grandis Benth.	1	33
Solanum ferox L.	1	44
Solanum nigrum L.	1	45
Solanum torvum Swartz	1	45
Sopubia trifida D.Don	1	46
Spiranthes sinensis (Pers.) Ames	13	57
Spondias pinnata (L.f.) Kurze.	8,12	30
Sterculia urens Roxb.	5,8	6,25
Stereospermum chelonoides (L.f.) DC.	1,11	45
Stereospermum personatum Chatt.	1,11	6
Streblus asper Lour.	1,2,5,6,9	7,55
Striga lutea Lour.	1	46
Styrax serrulatum Roxb.	4,13	6,42
Suregada multiflora Baill.	1,8	54
Sympagis brunoniana (Nees) Bremek.	1	47
Sympagis divaricatus (Nees)Bremek.	1	47
Symplocos cochinchinensis ssp. *laurina* (Retz.) Noot.	1,5,8	41
Syzygium cumini (L.) Skeels	1,2,10,12	6,10,15,35
Syzygium formosum (Wall.) Masamune	1,2,12	7,35
Syzygium jambos (L.) Alston,	1,2,10,12	10,35
Syzygium operculatum (Roxb.) Niedenzn.	1,12	10,35
T		
Tabernaemontana divaricata (L.)R.Br.	1	43
Tamilnadia uliginosa Tirv. & Sast.	1,2	39
Tephrosia candida DC.	3	33
Tephrosia purpurea (L.) Pers.	1,3	33
Terminalia alata Heyne ex Roth	1,2,9,11	7,35
Terminalia arjuna (Bedd.) Wt. & Arn.	1,9,10,11	7,35
Terminalia bellirica (Gaertn.) Roxb.	1,11,12	6,35
Terminalia chebula Retz.	1,10,11,12	7,35
Tetrameles nudiflora R.Br.	1,8,9,10	6,37

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Name of species	Uses	Page
Tetrastigma lanceolarium (Roxb.) Planch.	1,12	7,29
Tetrastigma serrulatum (Roxb.) Planch.	1	29
Tetrastigma thomsonianum Planch.	1	29
Teucrium quadrifarium Buch.-Ham.	1,4	49
Teucrium visidum Bl.	14	49
Themeda arundinacea (Roxb.) Ridl.	2,9	8,11,13,16,17,67
Themeda caudata (Nees) Camus	2,9	13,14,16
Themeda villosa (Poir.) A. Camus	2,9	8,67
Thespesia lampas (Cav.) Dalz.&Gibs.	1,7	24
Thunbergia coccinea Wall.ex D.Don.	1	45
Thunbergia fragrans Roxb.	1	46
Thunbergia grandiflora Roxb.	1	46
Thysanolaena maxima (Roxb.) Ktze.	2,9	8,13,14,16,18,67
Tinospora cordifolia (Willd.) Hook.f.&Thoms.	1,2	6,22
Toona ciliata M.J.Roem.	5,11	6,28
Torenia diffusa D.Don.	1	46
Trachyspermum ammi (L.) Sprague ex Turrill	1,12	38
Trema orientalis (L.)Bl.	1,2,6	7,15,16,54
Trewia nudiflora L.	8,10	54
Trichosanthes cordata Roxb.	1	37
Trichilia connaroides (W.& A.)Bentv.	1	28
Tridax procumbens L.	1	40
Triumfetta rhomboidea Jacq.	1,7	26
Tylophora indica (Burm.f.)Merr.	1,7	43
Typha angustifolia L.	2,9	9
U		
Uncaria sessilifructus Roxb.	1	6,39
Uraria neglecta Prain,	1	33
Uraria rufescens (DC.)Schindl.	1	33
Urena lobata L.	1,7	24
Urena sinuata L.	1,7	24
Utricularia bifida L.	1,13	45

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Utricularia caerulea L.	1,13	45
Utricularia scandens Benj.	1,13	45
Utricularia stellaris L.f.	1,13	45
Uvaria hamiltoni Hook.f. & Thoms.	1	21
V		
Vallisneria natans (Lour.) Hara	1,2,3	9,17,56
Vanda teres Lindl.	13	57
Vernonia cinerea (L.) Less.	1	40
Vernonia silhetensis (DC.) Kerr.	1	41
Vetiveria zizanioides (L.) Nash	2,4,9	9,13,16,18,67
Vigna clarkei Prain	1	33
Viscum monoicum Roxb. ex DC.	1	52
Vitex negundo L.	1	48
Vitex vestita Schauer	1	48
W		
Waltheria indica (L.)L.	1	25
Wedelia wallichii Less.	1	41
Wendlandia heynei (R.& S.) Sant. & Merch.	1,2	7,39
Woodfordia fruticosa (L.) Kurz.	1	36
Wrightia arborea (Dennst.)Mabberly	1,8,9	7,43
X		
Xyris indica L.	1	60
Z		
Zeuxine nervosa Trim.	13	58
Zingiber rubens Roxb.	1,12	58
Zingiber roseum (Roxb.) Rosc.	1,2,12	10
Ziziphus mauritiana Lamk.	1,12	28
Ziziphus oenoplia (L.) Mill.	1,12	7,29

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