DIVERSITY IN THE WOODY FLORA OF SAL (*SHOREA ROBUSTA*) FORESTS OF BANGLADESH[1]

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ABSTRACT

The tropical moist deciduous forests of Bangladesh locally known as sal forests predominantly contain sal (*Shorea robusta* Gaertn. f.). It covers about 110 thousand hectares of land and has a wide but interrupted distribution. There is scant record on the flora and vegetation of sal forests from Bangladesh. About 65 percent of sal forest is highly degraded. The present work is a first attempt to document the woody flora of sal forests of Bangladesh. In this paper a general description of these forests containing landscape, soils, climate, forest types, vegetation, floristics and diversity has been given. The woody taxa enumerated including three monocotyledonous families (Gramineae, Liliaceae and Palmae) number about 260 species under 160 genera comprising of 56 families. Out of these 260 taxa trees, shrubs and woody climbers are represented by about 133, 77 and 50 species respectively. Leguminosae ranks top of the list. Euphorbiaceae and Rubiaceae occupy the next positions. About 17 families are represented by single woody taxa only. Floristic composition varies from area to area. The conservation needs have been emphasized.

সারসংক্ষেপ

বাংলাদেশের ক্রান্তীয় আর্দ্র পত্রমোচী বন স্থানীয়ভাবে শালবন নামে পরিচিত, যার প্রধান বৃক্ষ হচ্ছে শাল (*Shorea robusta* Gaertn. f.)। এই শালবন প্রায় ১১০ হাজার হেক্টর এলাকা জুড়ে বিক্ষিপ্তভাবে বিস্তৃত। বাংলাদেশের শালবনের ফ্লোরা এবং ভেজিটেশন সম্পর্কিত তথ্য খুবই স্বল্প। প্রায় শতকরা ৬৫ ভাগ শালবন এখন বিলুপ্তির পর্যায়ে। বর্তমান প্রবন্ধটি বাংলাদেশের শালবনের কাষ্ঠল ফ্লোরা রেকর্ডের একটি প্রাথমিক পদক্ষেপ। প্রবন্ধটিতে শালবনের ভূ-প্রকৃতি, মৃত্তিকা, জলবায়ু, বনের প্রকৃতি, ভেজিটেশন, উদ্ভিদরাজি ও বৈচিত্র সম্পর্কে আলোকপাত করা হয়েছে। তিনটি একবীজপত্রী গোত্র (Gramineae, Liliaceae, Palmae) সহ রেকর্ডকৃত কাষ্ঠল প্রজাতির সংখ্যা ২৬০টি। উহারা ১৬০টি জেনাস ও ৫৬টি গোত্রভুক্ত। রেকর্ডকৃত ২৬০টি প্রজাতির মধ্যে বৃক্ষ, গুল্ম ও কাষ্ঠল আরোহীর সংখ্যা যথাক্রমে ১৩৩, ৭৭ ও ৫০টি। Leguminosae গোত্রভুক্ত প্রজাতির সংখ্যা সর্বাধিক। Euphorbiaceae ও Rubiaceae এর স্থান পরবর্তী পর্যায়ে। প্রায় ১৭টি গোত্রের কাষ্ঠল প্রজাতির সংখ্যা মাত্র একটি। স্থানভেদে উদ্ভিদরাজির গঠনে (floristic composition) পার্থক্য বিরাজমান। প্রবন্ধটিতে শালবনের সংরক্ষণের বিষয়েও আলোকপাত করা হয়েছে।

Key words : Biodiversity, checklist, flora, sal forest, *Shorea robusta*, vegetation.

INTRODUCTION

Shorea robusta Gaertn. f. is locally known as sal in Bangladesh. It is distributed in India, Nepal and Bangladesh (FAO 1985). Among the dipterocarps it has the widest distribution. In India it occupies two main regions separated by the Gangetic plain, namely the sub-Himalayan region (north of the Gangetic plain) and south of the Ganga. In Bangladesh it has a fairly wide but interrupted distribution extending from Panchagar in the north, Sherpur in the east and Comilla in the south. The total area is about 110 thousand hectares, out of which 86% is in the central region and 14% is in

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northern region (Ghani *et al.* 1990). About 65% of sal forest is highly degraded. Throughout its natural range sal occupies several forest types from tropical moist deciduous to tropical dry deciduous forests (Troup 1921, Champion *et al.* 1965, FAO 1985). Troup (1921) described the forest types and major floristic composition of sal forests of India and Nepal. Among its range it differs widely in floristic composition (Troup 1921). So the biodiversity of *sal* forest is very wide and interesting both from ecological and conservation point of views. But nothing was mentioned about *sal* forests of Bangladesh by Troup (1921; FAO 1985). There is no detailed list of plants of the *sal* forests of the country. Prain (1903) emphasized on the exploration of the Madhupur forests which occupy the major sal forests of the country. List of important forest species are available in the Working Plans of Mymensingh Division (Choudhury 1960) and Northern Forest Division (Sattar 1976). Cowan and Cowan (1929) prepared a list of plants from northern Bengal which included the plants of Darjeeling and Jalpaiguri districts. Ismail and Mia (1973) gave a brief account of the ecology of sal forests of Bangladesh. In the distribution notes of species cited by Hooker (1872-1897), Prain (1903) and Brandis (1906) information is available on the occurrence of some species from these forest areas. About 65 percent of the *sal* forest is highly degraded or has been encroached. Thus the forest vegetation is degenerating at an alarming rate before it has been documented.

The present work aims to prepare a checklist of trees, shrubs and woody climbers of *sal* forests of Bangladesh. The checklist has been prepared based on herbarium materials preserved at the Bangladesh Forest Research Institute Herbarium, Chittagong; the Bangladesh National Herbarium, Dhaka (DACB); and the Herbarium of the Botany Department, Dhaka University. Field trips were made in certain forest areas for further collection and study the forest vegetation. Records on distribution from literatures (Hooker 1872-1897, Prain 1903 and Brandis 1906) have also been included.

Woody taxa of dicots; bamboos, rattans and some Liliaceous taxa of monocots have been listed.

LOCATION AND DISTRIBUTION OF SAL FORESTS

Sal forests are scattered in the comparatively drier central and northern areas of the country, mostly occurring in Dhaka and Rajshahi Divisions. The major forest lies in the districts of Gazipur, Mymensingh and Tangail. It has two distinct belts, the larger one falls between the Brahmaputra and the Jumuna with a length of about 80 km and width of about 7-20 km running north to south. This belt is also known as Madhupur Garh. The smaller belt of the deciduous forest of Sherpur distrct lies along the foot hills of the Garo Hill of India with a width of 1.5-10 km and a length of about 60 km running east to west. In addition to the above, there are some smaller patches of forest areas in Comilla, Rangpur, Dinajpur, Thakurgaon districts.

Forests of Comilla district are located in Salbonbihara, Moinamoti and Rajeshpur. Salbonbihara is situated about 10 km west of Comilla in the hilly areas at Lalmai hill. Rajeshpur is situated in the eastern border of Comilla district adjacent to Tripura State of India. Forests of Dinajpur-Thakurgaon districts are situated at Singra, Nawabgonj, Dharmapur and Madhypara. In Rangpur few patches still occur in Mithapukur. Under Naogaon district few patches of natural *sal* occur in Paikbhanda, Dhamouirhat and Patnitolla along the western border of the country.

LANDSCAPE

Madhupur Garh, the large tract of *sal* forest forms a slightly elevated tract of not exceeding 15 m in height over the surrounding plains. The ridges locally known as *chalas* are flat terrace lands and are not continuous. Numerous depressions with gentle slope intercepting the ridges known as *biads* are almost all cultivated for growing paddy.

Chalas contain the forest trees. The configuration of the forests along the foot hills of the Garo hill is somewhat different from Madhupur Garh. This forest consists of irregular masses of broken hills in the form of projections from Garo Hills often having no connection with mainhill. These hills are of varying heights with a maximum of about 150 m from the surrounding land. The forests of Salbonbihara in Comilla are in the hilly area of Lalmai hills which are small hills slightly elevated than the surrounding lands. The forest lands of Rajeshpur, Comilla and other sal forests of Dinajpur-Thakurgaon, Rangpur and Naogaon consist slightly raised flat terraces, separated by depressions.

SOILS

The *sal* forests occupy the upland terrace soils. The following brief description of soils of *sal* forests has been given after Richards and Hassan (1988). Three major soil typs are observed in *sal* areas : deep red brown terrace soils; shallow red brown terrace soils and brown mottled terrace soils. About half of the forest land is covered by deep red brown terrace soils. The soils are moderately to strongly acidic in reaction. Iron-manganese concentration occurs at variable depths depending on seasonal fluctuations of ground water table and is also regulated by high seasonal rainfall. Major physical problems of soils are low organic matter content, low fertility and low moisture holding capacity.

CLIMATE

The general climatic feature of most *sal* growing areas of Bangladesh is moderate. The annual temperature ranges from 10-34^{0}C and annual rainfall ranges from 1500-2100 mm. Following Thornthwaite's principles of differentiating the climatic regions, most of the sal growing areas are included in the humid region, some are very near to prehumid near Comilla and rest in the subhumid regions at Naogaon and northern districts (Ismail and Mia 1973). Humidity varies from 60-86 percent. Duration of sunshine ranges from 5-9 hours. Average maximum wind speed is 16 km/hr.

PHYTOGEOGRAPHY, FOREST TYPES AND VEGETATION

Phytogeographically the *sal* growing areas of Bangladesh fall within Indian regions (Thaktajan 1986). Champion *et al.* (1965) classified the *sal* forests of Bangladesh under tropical moist deciduous type. Most of the *sal* forests are of this type except a few patches along foot hills of Garo hills which are semi evergreen type.

Shorea robusta (sal) is the dominant species of these forests and usually forms 75% to 25% of the upper canopy but may be absent locally over fairly large patches (Ismail and Mia 1973). Its associates are other deciduous species; but the associates vary in different localitities. *Adina cordifolia, Albizia procera, Bombax ceiba, Butea monosperma, Lagerstroemia parviflora, Dillenia pentagyna, Garuga pinnata, Hymenodictyon orixensis, Semecarpus anacardium, Miliusa velutina, Schleichera oleosa, Terminalia bellirica* are common associates with *sal* in Madhupur, Singra (Dinajpur) and Rajendrapur areas. There is a fairly defined lower stratum of deciduous trees, such as *Careya arborea, Bauhinia* spp., *Holarrhena pubescence.* Climbers are large and heavy. Chief amongst them are *Entada rheedii, Spatholobus roxburghii,* species of *Smilax, Dioscorea* and other members of Vitaceae. *Mucuna pruirens, Ichnocarpus frutescens* and *Asparagus* are not uncommon. The undergrowth is rich in *Curcuma* sp., *Eupatorium odoratum, Clerodendrum viscosum, Glycosmis arborea, Flacourtia* sp. *Glochidion* spp., *Randia* spp., *Leea* spp., *Desmodium* spp., *Imperata cylindrica* and other grasses. Shrubby *Syzygium nervosum, Glochidion* spp. and *Flacourtia* spp. are found along the edge of the forests. Among the mistletoes *Macrosolen cochinchinensis* is common

on *Shorea robusta*. Among the palms only rattan, *Calamus viminalis* var. *fasciculatus* is found along the dry outskirts of Madhupur and Rajendrapur areas. Except the semi-evergreen vegetation of Gazni there does not occur any natural bamboo in *sal* forests. Remnants of the bamboo groves of *Melocanna baccifera* and *Oxytenanthera nigrociliata* occur in second or third storey of semi evergreen forests of Runctia and Gazni.

Vegetation of Runctia area is little different from those of Madhupur and other areas. Other than *sal*, more common species of the upper canopy in this area are *Adina cordifolia, Protium serratum, Schima wallichii, Oroxylum indicum, Stereospermum personatum, Dalbergia sericea, Garuga pinnata*. The vegetation of the forests on the foothills of Garo Hill is of mixed type. Here *sal* in the upper canopy is mixed with *Artocarpus chama, Aphanamixis polystachya* and other evergreen species.

Associates are less both in number and composition in the forests of Comilla, Damoirhat, Paikbandha, Patnitolla and Madhya Para where *sal* occupy more than 90% of the upper canopy. *Psidium araca* a neotropical species occur in naturalized condition in Salbonbihara of Comilla.

No gymnospermous taxa was recorded from the *sal* forests of Bangladesh.

DIVERSITY AND CONSERVATION

The woody taxa enumerated including three monocotyledonous families number about 260 species under 160 genera comprising of 56 families (Table 1). Leguminosae ranks top of the list having 59 species. Euphorbiaceae and Rubiaceae occupy the next positions having 29 and 17 species respectively. Moraceae and Verbenaceae comprise of about 10-12 species. About 17 families are represented by single woody taxa only. Number of species under about 23 families vary from two to six. Out of these 260 taxa trees, shrubs and woody climbers are represented by about 133, 77 and 50 species respectively. Many members of Tiliaceae, Moraceae, Flacourtiaceae, Myrsinaceae vary from tall shrub to samll tree based on habitat and biotic interferences. About 20 families are represented by climbers or woody climbers, of which Leguminosae ranks top by 15 species. Only bamboo, rattan and woody Liliaceae have been treated under monocots. One taxa under Palmae, two taxa under Bambusoideae, and two taxa under Liliaceae are represented by five species under three genera. *Macrosolen cochinchinensis* is a common mistletoe species on *Shorea robusta*.

Table 1. Enumeration of woody taxa of sal forests of Bangladesh and their diversity

	Families	Number of Genera	Number of Species	Number of Trees	Number of Shrubs	Number of Climbers
1.	Acanthaceae	1	1	-	-	1
2.	Anacardiaceae	3	3	3	-	-
3.	Annonaceae	3	4	3	1	-
4.	Apocynaceae	6	7	3	3	1
5.	Aristolochiaceae	1	1	-	-	1
6.	Asclepiadaceae	5	6	-	2	4
7.	Bignoniaceae	2	2	2	-	-
8.	Bombacaceae	1	1	1	-	-
9.	Boraginaceae	1	2	2	-	-
10.	Burseraceae	2	2	2	-	-

Table 1. contd.

	Families	Number of Genera	Number of Species	Number of Trees	Number of Shrubs	Number of Climbers
11.	Capparaceae	1	1	-	1	-
12.	Convolvulaceae	1	1	-	-	1
13.	Combretaceae	2	4	2	-	2
14.	Datiscaceae	1	1	1	-	-
15.	Dipterocarpaceae	2	2	2	-	-
16.	Dilleniaceae	2	2	1	-	1
17.	Ebenaceae	1	2	2	-	-
18.	Elaeocarpaceae	1	2	2	-	-
19.	Euphorbiaceae	13	29	23	3	3
20.	Fagaceae	1	1	1	-	-
21.	Flacourtiaceae	3	3	1	2	-
22.	Gramineae	2	2	2	-	-
23.	Juglandaceae	1	1	1	-	-
24.	Lauraceae	3	5	5	-	-
25.	Lecythidaceae	2	2	2	-	-
26.	Leeaceae	1	6	-	6	-
27.	Leguminosae	24	59	19	25	15
28.	Liliaceae	2	2	-	-	2
29.	Loranthaceae	3	5	-	5	-
30.	Lythraceae	1	2	2	-	1
31.	Malpighiaceae	1	1	-	-	1
32.	Malvaceae	3	3	-	3	-
33.	Melastomataceae	1	1	-	1	-
34.	Meliaceae	4	4	4	-	-
35.	Menispermaceae	1	1	-	-	1
36.	Moraceae	3	11	11	-	-
37.	Myrsinaceae	3	5	-	5	-
38.	Myrtaceae	2	4	2	2	-
39.	Ochnaceae	1	2	1	1	-
40.	Olacaceae	1	1	-	-	1
41.	Oleaceae	1	3	-	-	3
42.	Palmae	1	1	-	-	1
43.	Ranunculaceae	1	1	-	-	1
44.	Rhamnaceae	3	5	1	2	2

Table 1. contd.

	Families	Number of Genera	Number of Species	Number of Trees	Number of Shrubs	Number of Climbers
45.	Rubiaceae	12	17	11	4	2
46.	Rutaceae	6	6	3	3	-
47.	Sapindaceae	2	2	1	-	-
48.	Sapotaceae	1	1	1	-	-
49.	Solanaceae	1	2	-	2	-
50.	Sterculiaceae	3	3	2	-	1
51.	Theaceae	1	1	1	-	-
52.	Tiliaceae	2	4	4	-	-
53.	Ulmaceae	1	1	1	-	-
54.	Urticaceae	3	3	-	3	-
55.	Verbenaceae	6	10	7	3	-
56.	Vitaceae	4	6	-	-	6

Semecarpus anacardium, Zanthoxylum rhetsa are mostly distributed in *sal* forests. Habitats of most of these species are becoming localized. *Psidium araca* is confined at Salbanbihara in Comilla. Only one tree of *Dehaasia kurzii* was found in Madhupur National Park. Futher exploration are needed to determine the status of these plants and to draw conservation plans. Floristic composition of different *sal* forests indicates that there is some variations in the flora. So, *in-situ* conservation sites need to be selected based on biodiversity, genetic diversity and phytosociological studies.

FLORISTICS

A list of the woody taxa including the undershrub is given below. The families, and genera, and species under each family have been arranged alphabetically.

LIST OF TAXA

ACANTHACEAE
Thunbergia grandiflora Roxb.

ANACARDIACEAE
Lannea coromandelica (Houtt.) Merr.
Semecarpus anacardium Linn. f.
Spondias pinnata (Linn. f.) Kurz

ANNONACEAE
Polyalthia longifolia (Sonn.) Thw.
P. suberosa (Roxb.) Thw.
Miliusa velutina Hook. f.
Uvaria ferruginea Buch. - Ham.

APOCYNACEAE
Alstonia scholaris (Linn.) R. Br.
Ervatamia divaricata (Linn.) Alston
Holarrhena pubescence (Buch. - Ham.) Wall.
Ichnocarpus frutescens (Linn.)R. Br.
Rauvolfia canescens Linn.
R. serpentina (Linn.) Benth. ex Kurz
Wrightia arborea (Dennst.) Mabb.

ARISTOLOCHIACEAE
Aristolochia indica Linn.

ASCLEPIADACEAE
Calotropis acia Buch. - Ham.
C. gigantea (Linn.) R. Br.
Cryptolepis buchanani Roem et. Schutt.
Hemidesmus indicus Br.
Oxystelma esculentum Br.
Wattakaka volubilis (Linn. f.) Stapf.

BIGNONIACEAE
Oroxylum indicum (Linn.) Vent
Stereospermum personatum (Hassk.) Chatterjee

BOMBACACEAE
Bombax ceiba Linn.

BORAGINACEAE
Cordia dichotoma Forst. f.
C. grandis Roxb.

BURSERACEAE
Garuga pinnata Roxb.
Protium serratum (Wall. ex Colebr.) Engl.

CAPPARACEAE
Capparis zeylanica Linn.

CONVOLVULACEAE
Argyreia argentea (Roxb.) Coisy.

COMBRETACEAE
Combretum decandrum Roxb.
C. punctatum Bl.
Terminalia bellirica (Gaertn.) Roxb.
T. chebula (Gaertn.) Retz.

DATISCACEAE
* *Tetrameles nudiflora* R. Br.

DILLENIACEAE
Dillenia pentagyna Roxb.
Delima sarmentosa Linn.

DIPTEROCARPACEAE
* *Dipterocarpus turbinatus* Gaertn.
Shorea robusta Roxb. ex.Gaertn. f.

EBENACEAE
**Diospyros melanoxylon* Roxb.
D. montana Roxb. var. *cordifolia* (Roxb.) Hern.

ELAEOCARPACEAE
Elaeocarpus floribundus Bl.
E. rugosus Roxb.

EUPHORBIACEAE
Antidesma acidum Retz.
A. bunius (Linn.) Spreng.
A. ghaesembilla Gaertn.
Aporusa dioica (Roxb.) Muell. - Arg.
A. wallichii Hook. f.
Baccaurea ramiflora Lour.
Bridelia pubescence Kurz.
B. squamosa (Muell. - Arg.) Graham
B. stipularis (Linn.) Bl.
B. tomentosa Bl.
Cnesmone javanica Bl.
Croton caudatus Gaisel
C. joufra Roxb
C. roxburghii Balakrishnan
C. tiglium Linn.

Glochidion lanceolarium (Roxb.) Voigt
G. multiloculare (Willd.) Muell. - Arg.
G. velutinum Wt.
Jatropha curcas Linn..
J. gossypifolia Linn.
Mallotus philippensis (Lam.) Muell. - Arg.
M. repandus (Willd.) Muell-Arg.
M. roxburghianus Muell. - Arg.
Phyllanthus emblica Linn.
P. reticulatus Poir
Sapium sebiferum Roxb.
Suregada multiflora (Juss.) Baill.
Trewia nudiflora Linn.

FAGACEAE
Quercus serrata Thunb.

FLACOURTIACEAE
Casearia tomentosa Roxb.
Flacourtia indica (Burm. f.) Merr.
Homalium bhamonense Cubit et. Smith

GRAMINEAE
Melocanna baccifera (Roxb.) Kurz
Oxytenanthera nigrociliata Munro

JUGLANDACEAE
Engelhardtia spicata Lesch. ex Bl.

LAURACEAE
Dehaasia kurzii King
Litsea glutinosa (Lour.) Robinson
L. monopetala (Roxb.) Pers.
L. salicifolia (Nees) Hook. f.
Persea gamblei (Hook. f.) Kostermens

LECYTHIDACEAE
Barringtonia acutangula (Linn.) Gaertn.
Careya arborea Roxb.

LEEACEAE
Leea aequata Linn.
L. alata Edgew
L. asiatica (Linn.) Ridsdale
L. indica (Burm. f.) Merr.
L. macrophylla Roxb.
L. robusta Roxb.

LEGUMINOSAE

(Caesalpinoideae)
Bauhinia acuminata Linn.
B. malabarica Roxb.
B. purpurea Linn.
B. racemosa Lam.
B. variegata Linn.
Caesalpinia bonduc (Linn.) Roxb.
C. digyna Rottler.
Cassia fistula Linn.
**C. siamea* Lamk.
Mezonevron cucullatum (Roxb.) Arnott.
Tamarindus indica Linn.

(Mimosoideae)
**Acacia auriculiformis* A. Cunn. ex. Benth.
**A. mangium* Willd.
A. pennata (L.) Willd.
A. rugata (Lam.) Voigt.
Albizia chinensis (Osbeck.) Merr.
A. lebbeck (Linn.) Benth.
A. lucidior (Steudel) Hara
A. myriophylla (Roxb.) Benth.
A. odoratissima (Linn. f.) Benth.
A. procera (Roxb.) Benth.
Entada rheedii Sprengel
Mimosa himalayana Gamble

(Papilionoideae)
Abrus precatorius Linn.
Butea monosperma (Lamk.) Kuntze
Canavalia gladiata (Jacq.) DC
Crotalaria alata D. Don.
C. calycina Schrank.
Dalbergia lanceolaria Linn. f.
D. rimosa Roxb.
D. sericea G. Don.
**D. sissoo* DC.
D. volubilis Roxb.
Derris cuneifolia Benth.
D. robusta Benth.
Desmodium concinnum DC
D. gangeticum (Linn.) DC
D. heterocarpon (Linn.) DC
D. laxiflorum DC
D. motorium (Houtt.) Merr.
D. pulchellum (Linn.) Baker
D. triangulare (Retz.) Merr.
D. triquetrum (Linn.) DC
Erythrina orientalis (Linn.) Murr.
Flemingia congesta Roxb. ex. Aiton.
F. involucrata Benth.
F. strobilifera (Linn.) Aiton
Indigofera hirsuta Linn.
Millettia extensa (Benth.) Baker
M. pachycarpa Benth.
Mucuna pruriens (Linn.) DC
Pueraria phaseoloides (Roxb.) Benth.
Spatholobus parviflorus (Roxb.) O. Kuntz.
Uraria crinita Desv.
U. lagopodioides (Linn.) Desv.

LILIACEAE
Asparagus racemosus Willd.
Smilax zeylanica Linn.

LORANTHACEAE
Dendrophthoe falcata (Linn. f.) Etting
Macrosolen cochinchinensis (Lour.) Van Tiegh.
Scurrula gracilifolia (Roxb. ex. Schult.) Dans.
S. parasitica Linn.
S. pulverulenta (Wall. ex. Roxb.) G. Don.

LYTHRACEAE
Lagerstroemia parviflora Roxb.
L. speciosa (Linn.) Pers

MALPIGHIACEAE
Hiptage benghalensis (Linn.) Kurz

MALVACEAE
Abutilon indicum (Linn.) Sweet.
Hibiscus vitifolius Linn.
Thespesia lampas (Cava) Dalz. et. Gibs.

MELASTOMATACEAE
Melastoma malabathricum Linn.

MELIACEAE
Aphanamixis polystachya (Wall.) Parker
Azadirachta indica A. Juss
* *Melia azedarch* Linn.
Toona ciliata Roem.

MENISPERMACEAE
Tinospora cordifolia (Willd.)
Hook. f. et. Thom.

MORACEAE
Artocarpus chama Hamilton
**A. heterophyllus* Lamk.
A. lacucha Buch. - Ham.
Ficus benghalensis Linn.
F. hirta var. *roxbughii* (Miq.) King
F. hispida Linn. f.
F. infectoria Roxb.
F. religiosa Linn.
F. rumphii Bl.
F. semicrodata Ham. ex. Smith
Streblus asper Lour.

MYRSINACEAE
Ardisia colorata Roxb.
A. icara Buch. - Ham.
A. solanacea (Poir.) Roxb.
Embelia robusta Roxb.
Maesa ramentacea A. DC.

MYRTACEAE
Psidium araca
Syzygium cumini (Linn.) Skeel
S. fruticosum (Roxb.) DC
S. nervosum DC

OCHNACEAE
Ochna pumila Buch. - Ham.
O. squarrosa Linn.

OLACACEAE
Olax scandens Roxb.

OLEACEAE
Jasminum laurifolium Roxb.
J. sambac (Linn.) Ait.
J. scandens Vah.

PALMAE
Calamus viminalis Willd. var.
fasciculatus (Roxb.) Becc. ex. Hook. f.

RANANCULACEAE
Naravelia zeylanica (Linn.) DC.

RHAMNACEAE
Gouania tiliaefolia Lamk.
Ventilago madraspatana Gaertn.
Ziziphus mauritiana Lamk.
Z. oenoplia (Linn.) Mill.
Z. rugosa Lamk.

RUBIACEAE
Adina cordifolia (Roxb.) Hook. f. ex. Brandis
Anthocephalus chinensis (Lamk.) Rich. ex. Walp.
Canthium angustifolium Roxb.
C. parviflorum Lamk.
Hedyotis scandens Roxb.
Hymendictyon orixensis (Roxb.) Mabberly
Ixora arborea (Roxb.) Sm.
I. specetabilis Wall.
Mitragyna parvifolia (Roxb.) Korth.
M. speciosa Korth.
Morinda angustifolia Roxb.
Mussaenda corymbosa Roxb.
Pevetta indica Linn.
Randia dumentorum Lamk.
R. longiflora Lamk.
R. uliginosa DC.
Wendlandia tinctoria DC

RUTACEAE
Aegle marmelos (Linn.) Correa
Clausena heptaphylla Wt. et Arnott.
Glycosmis arborea (Roxb.) DC.
Micromelum minutum (Forst. f.) Wt. et Arnott.
Murraya koenigii (Linn.) Spreng.
Zanthoxylum rhetsa (Roxb.) DC.

SAPINDACEAE
Erioglossum rubiginosum (Roxb.) Bl.
Schleichera oleosa (Lour.) Oken

SAPOTACEAE
Madhuca latifolia (Roxb.) Macbr.

SOLANACAE
Solanum indicum Linn.
S. ferox Linn.

STERCULIACEAE
Byttneria pilosa Roxb.
Firmiana colorata (Roxb.) R. Br.
Sterculia villosa Smith.

THEACEAE
Schima wallichii (DC) Korth

TILIACEAE
Grewia asiatica Linn.
G. excelsa Vahl.
G. laevigata Vahl.
G. pilosa Lam.
G. tiliaefolia Vahl.
Microcos paniculata Linn.
Triumfetta rhomboidea Jacq.

ULMACEAE
Trema orientalis (Linn.) Bl.

URTICACEAE
Boehmeria scabrella Gaud.
Laportea crenulata (Roxb.) Gaud.
Sarcochlamys pulcherrima Gaud.

VERBENACEAE
Callicarpa arborea Roxb.
C. macrophylla Vahl.
Clerodendrum serratum (Linn.) Moon.
C. siphonanthus R. Br.
C. viscosum Vent.
Gmelina arborea Linn.
Premna latofolia Roxb. var *mucronata* Clarke
**Tectona grandis* Linn.
Vitex glabrata R. Br.
V. peduncularis Wall.

VITACEAE
Ampelocissus barbata (Wall.) Planch.
A. latifolia (Roxb.) Planch.
Cayrantia elongata (Roxb.) Suesseng.
C. japonica (Thunb.) Gagnep.
Cissus adnata Roxb.
Tetrastigma bracteolatum (Wall.) Planch.

* Planted species

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