

FOREST FLORA OF NICHLAUL—IV. TREES

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ABSTRACT

This paper enlists the trees found in Nichlaul forest, Gorakhpur Division (U.P.). Geographical limits, topography, edaphic and climatic factors of the area, its vegetational composition, injurious factors, phenological behaviour of the common plants and an artificial key to the families as well as to the species are given. In all, 109 tree species belonging to 91 genera and 44 families are included, giving field observations, local names, habit, habitat, dominance and sociability. Flowering and fruiting seasons as well as collection numbers of plants are indicated.

INTRODUCTION

There have been a few noteworthy contributions on the flora of Gorakhpur during recent years (Sen, 1959, 1960; Dixit *et al.* 1968; Sahai and Sinha 1968; Gupta, 1969). However, these are concerned with the herbaceous angiosperms of the area. Panigrahi and Saran (1967) reported 102 woody species during their floristic studies on the entire Gorakhpur Forest Division. Sharma *et al.* (1969) confined their studies to pteridophytes only during their exploration of the forests of Gorakhpur Division.

During the course of intensive study (1966-69) the authors collected 203 woody species from the Nichlaul forest of Gorakhpur Division. The present paper, IV in the series* of Forest Flora of Nichlaul, deals only with the trees of this forest. In all, 109 species belonging to 91 genera and 44 families have been reported chiefly on the basis of field observations. Information on local names, habit, habitat, dominance and sociability have been given. Flowering and fruiting seasons as well as collection numbers of

plants, have been indicated. An artificial key to the species has been prepared based mainly on the vegetative characters under two groups A. and B.—A. dealing with plants having compound leaves and B. having simple leaves. The collected specimens have been deposited in the Herbarium, Botany Department, University of Gorakhpur, Gorakhpur.

GEOGRAPHICAL LIMITS

The forests of Gorakhpur Division are situated in Maharajganj, Pharenda and Sadar Tehsils of Gorakhpur district. They lie between lat. $26^{\circ}42'$ and $27^{\circ}25'N$ and long. $83^{\circ}13'$ and $83^{\circ}52'E$.

Nichlaul forest which contains very rich vegetation and remains unexplored so far, has been selected for the present investigation. The forest under study lies 91 km north-west of Gorakhpur in Maharajganj Tehsil and is adjoining the foot-hills of Nepal-Himalaya. The total area is about 5,231.78 ha. The average altitude of the area is about 99.77 m.

TOPOGRAPHY

The land surface is apparently a level tract sloping gently from north-west to south-east. A remarkable feature of its landscape is the total absence of any hill or hillock. The forest is mainly intersected by

* Forest Flora of Nichlaul-I. Herbaceous plants. *Indian For.* 1972 (In press).
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Forest Flora of Nichlaul-III. Phytosociological studies. *Bull. bot. Surv. India* 13 : 180-186. 1971.

the river Little Gandak which drains the entire area. Due to recent construction of Gandak canal, the drainage of the forest has been badly impeded resulting in the submergence of the area for about four months every year. Besides, there are many tals, nullahs and low lying areas which remain inundated during and for some months, after the rains.

SOIL

The soil is composed of Gangetic alluvium. Since much of the ground is liable to inundation, the particles deposited are very fine. In most places the soil is of heavy texture, although the banks of the river have soil of a coarser nature as the heavier silt gets deposited there. The subsoil, mostly of land clay, is poorly aerated with little thickness of loam at the surface. Beneath this, at depths varying from a few to six meters or more, there is usually a deposit of pure sand (Tiwari, 1965).

CLIMATE

The average rainfall is about 1200 mm. The monsoon rains commence during June (2nd-3rd week) and come to an end in September but may persist till October. From October to May, there is usually a prolonged dry weather with only scanty winter rains. The hot weather commences in March and lasts till the rains set in. The minimum temperature goes down to 6°C in the month of January and maximum rises upto 43°C in the month of June.

VEGETATION

The forest abounds in trees, shrubs and woody climbers. The herbaceous flora is poor during rainy season due to the inundation of forest ground. The vegetation of the area is almost of moist deciduous type. However, some of the trees are evergreen and semi-evergreen. Most of the trees shed their leaves at the beginning of the cold season while others during the hot summer months. The forest is thickest during rainy season.

Following Champion and Seth (1968), the forest under study may be categorised as under:

- (A) Eastern heavy alluvium sal.
- (B) West Gangetic moist deciduous forest.
- (C) Seasonal swamp forest.
- (D) Low alluvial savanna woodland.

(A) *Eastern heavy alluvium sal*: This occupies about one-third of the entire forest. The principal species is *Shorea robusta* Gaertn. f. which grows gregariously. The sal trees in this area somewhat vary in height, stocking and quality. The undergrowth is generally poor except along the edges of the depressions and in grasslands.

The forest can easily be distinguished in three stories. The top storey is composed of *Adina cordifolia* (Roxb.) Benth. & Hook. f. ex Brandis, *Bombax ceiba* Linn., *Bridelia retusa* Spreng., *Dalbergia sissoo* Roxb., *Dillenia pentagyna* Roxb., *Diospyros excelsa* Buch.-Ham., *Lagerstroemia parviflora* Roxb., *Lannea coromandelica* (Houtt.) Merr., *Terminalia alata* Heyne ex Roth and *T. chebula* Retz. Climbing over the top of the trees, are the gigantic climbers like *Acacia rugata* (Lam.) Merr., *Butea parviflora* Roxb., *Capparis zeylanica* Linn., *Combretum roxburghii* Spreng., *Erycibe paniculata* Roxb., *Zizyphus rugosa* Lamk. etc.

The middle storey is constituted by *Aegle marmelos* (Linn.) Corr., *Anthocephalus chinensis* A. Rich. ex Walp., *Butea monosperma* (Lam.) Taub., *Careya arborea* Roxb., *Cassia fistula* Linn., *Croton roxburghii* Bal., *Dalbergia lanceolaria* Linn. f., *Dillenia pentagyna* Roxb., *Ehretia laevis* Roxb., *Embelia tsjeriam-cottam* A. DC., *Holarrhena antidysenterica* A. DC., *Kydia calycina* Roxb., *Mallotus philippensis* (Lam.) Muell.-Arg., *Miliusa tomentosa* (Roxb.) J. Sinclair, *Schleichera oleosa* Oken, *Semecarpus anacardium* Linn. f., *Spondias pinnata* Kurz, *Xeromphis spinosa* (Thunb.) Keay. The common climbing plants on these trees are: *Capparis zeylanica* Linn., *Cissampelos pariera* Linn., *Dalbergia volu-*

bilis Roxb., *Dioscorea bulbifera* Linn., *Hemidesmus indicus* R. Br., *Porana paniculata* Roxb., *Stephania japonica* (Thunb.) Miers, *Zizyphus oenophia* (Linn.) Mill.

The third storey consists of shrubby undergrowth of *Ardisia solanacea* Roxb., *Baliospermum montanum* (Willd.) Muell.-Arg., *Carissa opaca* Stapf, *Clerodendrum indicum* (Linn.) O. Kuntze, *C. viscosum* Vent., *Glycosmis mauritiana* (Lam.) Tanaka, *Grewia rothii* DC., *Leea edgeworthii* Santapau, *Murraya koenigii* (Linn.) Spreng., *Pogostemon benghalense* (Burm.) O. Kuntze, *Solanum erianthum* D. Don and *Zizyphus nummularia* (Burm. f.) Wt. & Arn. The undergrowth is very dense along the grassy depressions and is composed of *Ardisia solanacea* Roxb., *Carissa opaca* Stapf, *Ficus heterophylla* Linn. f., *Glycosmis mauritiana* (Lam.) Tanaka, *Phragmites maxima* (Forsk.) Blatt. and *Solanum erianthum* D. Don. Elsewhere it is generally light and consists of *Clerodendrum indicum* (Linn.) O. Kuntze, *C. viscosum* Vent., *Grewia rothii* DC., *Murraya koenigii* (Linn.) Spreng. etc.

Northern portion of the sal forest is interrupted by grassland dotted with trees and shrubs like *Adina cordifolia* (Roxb.) Benth. & Hook. f. ex Brandis, *Aphanamixis polystachya* (Wall.) Parker, *Bombax ceiba* Linn., *Carissa opaca* Stapf, *Casearia elliptica* Willd., *Holarrhena antidysenterica* A. DC., *Mallotus philippensis* (Lam.) Muell.-Arg., *Mimosa himalayana* Gamble, etc. The chief climbers found over trees and shrubs of this open grassy area are *Acacia rugata* (Lam.) Merr., *Combretum roxburghii* Spreng., *Dalbergia volubilis* Roxb., *Zizyphus oenophia* (Linn.) Mill.

At places where soil is loamy and well drained, patches of teak plants are seen amongst the sal. The ground vegetation in such areas is poor. The chief associated shrubs are *Carissa opaca* Stapf, *Clerodendrum viscosum* Vent., *Pogostemon bengha-*

lense (Burm.) O. Kuntze and *Streblus asper* Lour.

(B) *West Gangetic moist deciduous forest*: This occupies the North-west portion of the Nichlaul forest. It contains luxuriant teak crops. The chief associates are: *Albizzia lebbbeck* (Linn.) Benth., *Alangium salvifolium* (Linn. f.) Wang., *Careya arborea* Roxb., *Casearia elliptica* Willd., *Cassia fistula* Linn., *Citrus medica* Linn., *Ficus racemosa* Linn., *F. religiosa* Linn., *F. semicordata* Buch.-Ham., *Mallotus philippensis* (Lam.) Muell.-Arg., *Miliusa tomentosa* (Roxb.) J. Sinclair, *Streblus asper* Lour. The rim of teak forest is occupied by *Ailanthus excelsa* Roxb.

The teak forest is completely deciduous during April-June excepting some evergreen trees and shrubs e.g. *Alangium salvifolium* (Linn. f.) Wang., *Citrus medica* Linn., *Ficus religiosa* Linn., *Mallotus philippensis* (Lam.) Muell.-Arg., *Miliusa tomentosa* (Roxb.) J. Sinclair and *Streblus asper* Lour.

The undergrowth of teak is quite poor. The prominent shrubs scattered in the area are *Carissa opaca* Stapf, *Clerodendrum viscosum* Vent., *Pogostemon benghalense* (Burm.) O. Kuntze, *Streblus asper* Lour. Besides, much of the ground is occupied by teak saplings. Climbers are totally absent.

(C) *Seasonal swamp forest*: The swamp forest occurs in low-lying areas which remain undated during and for some months after the rains. This is chiefly located along the river, Little Gandak. The soil of this area usually consists of fine clay and is very rich in humus. Some of the characteristic species found in this area are: *Adina cordifolia* (Roxb.) Benth. & Hook. f. ex Brandis, *Alangium salvifolium* (Linn. f.) Wang., *Alstonia scholaris* (Linn.) R. Br., *Aphanamixis polystachya* (Wall.) Parker, *Ardisia solanacea* Roxb., *Bischofia javanica* Blume, *Calamus tenuis* Roxb., *Celtis tetrandra* Roxb., *Cordia dichotoma* Forst. f., *Drypetes roxburghii* (Wall.) Hurusawa, *Ficus benjamina* Linn. var. *comosa* King, *F. heterophylla* Linn. f.,

Glochidion multiloculare Voigt, *Grewia disperma* Rottl. ex Spreng., *Kirganelia reticulata* (Poir.) Baill., *Litsea glutinosa* (Lour.) C. B. Robins., *Pongamia pinnata* (Linn.) Pierre, *Salix tetrasperma* Roxb., *Syzygium cumini* Skeels, *Vitex negundo* Linn., *Woodfordia fruticosa* (Linn.) Kurz, etc.

The most conspicuous climbers are *Ampelocissus latifolia* (Roxb.) Planch., *Argyreia sericea* Dalz., *Bridelia stipularis* Blume, *Cissus adnata* Roxb., *Clematis gouriana* Roxb. ex DC., *Ichnocarpus frutescens* R. Br., *Ipomoea muricata* (Linn.) Jacq., *Mallotus repandus* Muell.-Arg., *Rivea hypocrateriformis* Choisy, *Stephania japonica* (Thunb.) Miers, *Tiliacora acuminata* (Lam.) Miers, *Tinospora cordifolia* (Willd.) Miers, etc.

(D) *Low alluvial savanna woodland*: This type occurs on the higher and more stable alluvial terraces. Such a forest is characterised by an assemblage of large number of species. Prominent trees forming the upper storey in this area are: *Albizia procera* (Roxb.) Benth., *Bombax ceiba* Linn., *Dalbergia sissoo* Roxb., *Ficus racemosa* Linn., *Lannea coromandelica* (Houtt.) Merr., *Tectona grandis* Linn. f., *Wendlandia heynei* (R. & S.) Steud.

The middle storey consists of *Acacia catechu* Willd., *Ailanthus excelsa* Roxb., *Aphanamixis polystachya* (Wall.) Parker, *Calli-carpa arborea* Roxb., *Embllica officinalis* Gaertn., *Flacourtia indica* Merr., *Garuga pinnata* Roxb., *Gmelina arborea* Roxb., *Terminalia bellirica* (Gaertn.) Roxb., *Trewia polycarpa* Benth., *Xeromphis spinosa* (Thunb.) Keay.

Most common shrubs and climbers are: *Alangium salvifolium* (Linn. f.) Wang., *Ampelocissus latifolia* (Roxb.) Planch., *Ardisia solanacea* Roxb., *Calamus tenuis* Roxb., *Cissus adnata* Roxb., *Colebrookia oppositifolia* Smith, *Murraya koenigii* (Linn.) Spreng., *Polyalthia suberosa* (Roxb.) Thw., *Pogostemon benghalense* (Burm.) O. Kuntze, *Solanum torvum* Swartz, *Tiliacora acuminata*

(Lam.) Miers, *Ventilago maderaspatana* Gaertn.

The common grasses found in this area are: *Apluda mutica* Linn., *Phragmites maxima* (Forsk.) Blatt. & McC., *Saccharum spontaneum* Linn. Some of the interesting dwarf species found in this localities are: *Careya herbacea* Roxb., *Combretum nanum* Buch.-Ham. ex Don, *Grewia sapida* Roxb.

FACTORS INJURIOUS TO THE VEGETATION

I. Climatic :

(a) *Drought*: Damage to the vegetation by drought is insignificant in the area of present investigation. Only sporadic drying of trees may be observed in dry years. However, considerable damage by drought has been reported in 1907 and 1908 when the district had annual rainfalls as low as 714 mm and 933 mm (Tiwari, 1965).

(b) *Frost*: Frosts are not a normal feature in Gorakhpur forests, because the temperature remains almost uniform throughout the year and in winter season it seldom falls below 0°C. However, fairly severe frost occurred in the year 1905, 1925 and 1933 to 1937 which badly affected the young crops of sal (Tiwari, 1965).

(c) *Storms*: Intense heat for a few days during summer is generally followed by wind-storms and occasional light showers. The intensity is seldom so high as to uproot the sal stands but breakage of twigs and branches by wind is common, particularly in the young teak plants. The worst damage from this source is the destruction of sal flowers and fruits which are of vital importance for regeneration.

(d) *Floods*: The river, Little Gandak, often comes down in flood and plays havoc in the area. The river often changes its course washing away large tracts of forest bearing alluvial soil.

During the year 1961, due to sudden spill of water of the Great Gandak, practically the entire northern forests were submerged,

the depth of water being upto 5 m at places (Tiwari, 1965).

II. Fire :

On the whole, damage by fire is slight. In sal areas, severe fires are not common, but on a hot windy summer day considerable damage may be done by fire to the young crops resulting in a great setback in growth and even the older crops may suffer. In the non-sal areas, fires are more frequent and may occasionally cause considerable damage to the young plants, otherwise they are not of much importance.

III. Biotic :

(a) *Plant climbers*: The forest is infested with a large number of climbers which cause great damage to valuable timber trees. Some of the most common climbers that affect the young trees and shrubs are: *Acacia rugata* (Lam.) Merr., *Butea parviflora* Roxb., *Capparis zeylanica* Linn., *Combretum roxburghii* Spreng., *Erycibe paniculata* Roxb., *Milletia auriculata* Baker, *Tiliacora acuminata* (Lam.) Miers, *Ventilago maderaspatana* Gaertn.

(b) *Fungi*: The root fungus—*Polyporus shoreæ* is a serious pest and kills many sal trees, usually in groups in the moist areas near 'tals' and depressions etc.

(c) *Wild animals*: Pigs, 'nilgai' and wild cattle do some damage by browsing of young shoots. Monkeys and baboons also cause great damage by destroying the flowers and fruits of the plants, particularly *Alangium salvifolium* (Linn. f.) Wang., *Shorea robusta* Gaertn., *Terminalia bellirica* (Gaertn.) Roxb. etc. and receptacles of *Ficus racemosa* Linn.

(d) *Domestic animals*: The forests are particularly liable to damage from illicit grazing as they are surrounded by a dense population which maintain large herds of cattle, for which there is, at certain seasons of the year, little sustenance outside the forests.

The injury is greatest to the young plants along the borders as the cattle are attracted by their succulent leaves.

(e) *Man*: Continuous collection of twigs and branches of trees and shrubs by villagers for fodder and fuel causes great damage to the plants.

PHENOLOGICAL BEHAVIOUR OF COMMON PLANTS

The periodic behaviour of plants in relation to the various phases of their life cycle is termed as phenology. Thus, the germination, vegetative growth, flowering and fruiting of plants in relation to time period are some aspects of phenology. Information regarding the phenological behaviour is useful in determining the proper time for seed collection and in proper evaluation of silvicultural problems.

The phenological aspects of the tropical vegetation was first studied by Schimper (1903). Blatter (1906-1907) presented an interesting correlation of the flowering time with the climate in different parts of the country. Richard (1932) summarised most of the available information on the subject. The phenological behaviour of a few species of New Forest, Dehra Dun has been studied by Krishnaswamy and Mathuda (1954). Koelmeyer (1959) investigated the periodicity of leaf change and flowering in the principal plant communities of Sri Lanka. Gupta (1960, 1967) has made certain phenological observations on the flora of Naini Tal and Mussoorie hills.

In the present investigation a correlation of the flowering of some selected species with foliage condition has been studied.

Flowering commences with the leaf fall:

Butea monosperma (Lam.) Taub.

Madhuca longifolia (Koenig) Mac Bride var. *latifolia* (Roxb.) Chev.

Ougeinia oojeinensis (Roxb.) Hochreut.

Flowering commences when the tree is completely nude; the new foliage appears only after the flowering has been completed:

Alangium salvifolium (Linn. f.) Wang.

Bombax ceiba Linn.

Erythrina indica Lam.

Garuga pinnata Roxb.

Lannea coromandelica Merrill

Spondias pinnata Kurz

Flowering commences after leaf fall with new foliage:

Adina cordifolia (Roxb.) Benth. & Hook. f. ex Brandis.

Albizzia lebbbeck (Linn.) Benth.

A. procera (Roxb.) Benth.

Careya arborea Roxb.

Cassia fistula Linn.

Dalbergia lanceolaria Linn. f.

Emblia officinalis Gaertn.

Gmelina arborea Roxb.

Holarrhena antidysenterica Wall. ex DC.

Lagerstroemia parviflora Roxb.

Milusa tomentosa J. Sinclair

Mitragyna parvifolia Korth.

Oroxylum indicum Vent.

Schleichera oleosa (Lour.) Oken.

Terminalia alata F. Heyne ex Roth.

Flowering commences while the mature leaves are present on the plant. Majority of the plants fall under this category. Some of the common species are:

Bridelia retusa Spreng.

Eleodendron roxburghii Wt. & Arn.

Ficus benjamina Linn. var. *comosa* King

Litsea glutinosa (Lour.) C. B. Robins

L. monopetala (Roxb.) Pers.

Mallotus philippensis (Lam.) Muell.-Arg.

Mangifera indica Linn.

Semecarpus anacardium Linn.

Wendlandia heynei Santapau & Merchant

Xylosma longifolium Clos.

AN ARTIFICIAL KEY TO THE FAMILIES

Leaves usually reticulately veined. Perianth tetra- or pentamerous. Embryo with two cotyledons ...

Leaves usually parallel veined. Perianth trimerous. Embryo with one cotyledon ...

Class I. Dicotyledons

Class II. Monocotyledons

CLASS I. DICOTYLEDONS

1. Leaves simple :

2. Perianth biseriate, i.e. calyx and corolla both distinct :

3. Flowers polypetalous :

4. Torus small or elongated :

5. Stamens indefinite. Leaves large :

6. Gynoecium apocarpous :

7. Leaves upto 90 cm long, dentate. Sepals and petals 5-merous, each in a single series ; sepals persistent ...

1. *Dilleniaceae*

7. Leaves upto 20 cm long, entire. Sepals and petals 3-merous ; petals in two series ; sepals not persistent ...

2. *Annonaceae*

6. Gynoecium syncarpous :

8. Sepals imbricate in bud. Armed trees ...

3. *Flacourtiaceae*

8. Sepals valvate in bud :

9. Calyx irregular, adnate to the ovary, lobes enlarged in fruits ...

5. *Dipterocarpaceae*

9. Calyx regular, free, lobes not enlarged in fruits :

10. Stamens monadelphous :

11. Leaves lobed. Anthers monotheous. Fruit enclosed in calyx ...

6. *Malvaceae*

11. Leaves not lobed. Anthers ditheous. Fruit not enclosed in calyx ; composed of 5-spirally twisted carpels ...

8. *Sterculiaceae*

10. Stamens free. Fruit drupaceous

5. Stamens definite upto 10. Leaves minute, scale like ...

9. *Tiliaceae*

4. *Tamaricaceae*

4. Torus thickened or expanded into fleshy disc :

12. Calyx imbricate :

13. Plants with schizogenous resin-passages in the bark ...

17. *Anacardiaceae*

13. Plants without resin-passages in the bark ...

14. *Celastraceae*

12. Calyx valvate :

Stipules transformed into prickles ...

15. *Rhamnaceae*

4. Disc thin or absent. Ovary usually included in calyx tube :

14. Calyx inferior, free :

15. Leaves stipulate. Carpels more or less united ...

26. *Samydaceae*

15. Leaves exstipulate. Carpels united ...

25. *Lythraceae*

- | | | | | | |
|---|-----|-----|-----|-----|----------------------------|
| 14. Calyx superior, adnate to the ovary : | | | | | |
| 16. Leaves exstipulate, aromatic ... | ... | ... | ... | ... | 23. <i>Myrtaceae</i> |
| 16. Leaves not aromatic : | | | | | |
| 17. Fruit angled or winged : | | | | | |
| 18. Ovary 1-celled ... | ... | ... | ... | ... | 22. <i>Combretaceae</i> |
| 18. Ovary 2-celled ... | ... | ... | ... | ... | 24. <i>Lecythidaceae</i> |
| 17. Fruit neither angled nor winged ... | ... | ... | ... | ... | 27. <i>Alangiaceae</i> |
| 3. Flowers gamopetalous : | | | | | |
| 19. Leaves alternate : | | | | | |
| 20. Plant with milky latex ... | ... | ... | ... | ... | 30. <i>Sapotaceae</i> |
| 20. Plant without milky latex : | | | | | |
| 21. Stamens inserted on the receptacles ... | ... | ... | ... | ... | 31. <i>Ebenaceae</i> |
| 21. Stamens inserted on the corolla : | | | | | |
| 22. Ovary 1-celled ... | ... | ... | ... | ... | 29. <i>Myrsinaceae</i> |
| 22. Ovary 2- or 4-celled ... | ... | ... | ... | ... | 34. <i>Boraginaceae</i> |
| 19. Leaves opposite or verticillate : | | | | | |
| 23. Leaves stipulate ; ovary inferior ... | ... | ... | ... | ... | 28. <i>Rubiaceae</i> |
| 23. Leaves exstipulate ; ovary superior : | | | | | |
| 24. Plants with milky juice : | | | | | |
| 25. Filaments united into a tube ; anthers adnate to stigma ... | ... | ... | ... | ... | 33. <i>Asclepiadaceae</i> |
| 25. Filaments and anthers both free ... | ... | ... | ... | ... | 32. <i>Apocynaceae</i> |
| 24. Plants without milky juice : Ovary entire ; style terminal ... | ... | ... | ... | ... | 36. <i>Verbenaceae</i> |
| 2. Perianth uniseriate : | | | | | |
| 3. Flowers apetalous : | | | | | |
| 26. Leaves stipulate. Flowers unisexual or polygamous : | | | | | |
| 27. Plants with milky-juice : | | | | | |
| 28. Ovary 1-celled ... | ... | ... | ... | ... | 41. <i>Moraceae</i> |
| 28. Ovary 3-celled ... | ... | ... | ... | ... | 38. <i>Euphorbiaceae</i> |
| 27. Plants without milky-latex : | | | | | |
| 29. Bark smooth with numerous lenticels. Fruit a samara, nut or drupe ... | ... | ... | ... | ... | 40. <i>Ulmaceae</i> |
| 29. Bark rough, longitudinally furrowed. Fruit a many seeded capsule ... | ... | ... | ... | ... | 42. <i>Salicaceae</i> |
| 26. Leaves exstipulate. Flowers bisexual (unisexual in <i>Litsea</i>) : | | | | | |
| Leaves gland-dotted. Ovary superior ... | ... | ... | ... | ... | 37. <i>Lauraceae</i> |
| 1. Leaves compound : | | | | | |
| 2. Flowers polypetalous : | | | | | |
| 3. Fruit a legume : | | | | | |
| 4. Corolla papilionaceous ; aestivation descending imbricate ... | ... | ... | ... | ... | 19. <i>Papilionaceae</i> |
| 4. Corolla not papilionaceous : | | | | | |
| 5. Aestivation of corolla ascending imbricate ... | ... | ... | ... | ... | 20. <i>Caesalpiniaceae</i> |
| 5. Aestivation of corolla valvate. Flowers in cylindric spike ... | ... | ... | ... | ... | 21. <i>Mimosaceae</i> |
| 3. Fruit not a legume : | | | | | |
| 6. Anthers monothecous : | | | | | |
| 7. Plant with whorled branches. Bark covered with thick-based squat spines. Leaves digitate. Fruit 5-valved capsule ... | ... | ... | ... | ... | 7. <i>Bombacaceae</i> |
| 7. Plant without whorled branches. Bark rough. Leaves 3-pinnate. Fruit follicle, longitudinally 9-ribbed ... | ... | ... | ... | ... | 18. <i>Moringaceae</i> |
| 6. Anthers ditheous : | | | | | |
| 8. Calyx imbricate : | | | | | |
| 9. Torus elongated in fruit below the ovary : | | | | | |
| 10. Leaves gland-dotted. Carpels united. Fruit berry ... | ... | ... | ... | ... | 10. <i>Rutaceae</i> |
| 10. Leaves not gland-dotted. Carpels distinct. Fruit samaroid ... | ... | ... | ... | ... | 11. <i>Simaroubaceae</i> |
| 9. Torus not elongated below the ovary : | | | | | |
| 11. Leaves dotted. Fruit berry ... | ... | ... | ... | ... | 12. <i>Burseraceae</i> |
| 11. Leaves not dotted. Fruit drupe ... | ... | ... | ... | ... | 17. <i>Anacardiaceae</i> |
| 8. Calyx valvate : | | | | | |
| 12. Stamens monadelphous ... | ... | ... | ... | ... | 13. <i>Meliaceae</i> |
| 12. Stamens free, distinct ... | ... | ... | ... | ... | 16. <i>Sapindaceae</i> |
| 2. Flowers gamopetalous : | | | | | |
| Fruit elongated. Seed winged ... | ... | ... | ... | ... | 35. <i>Bignoniaceae</i> |
| 2. Flowers apetalous : | | | | | |
| Leaves pinnately 3-foliolate. Flowers unisexual ... | ... | ... | ... | ... | 39. <i>Bischofiaceae</i> |

CLASS II. MONOCOTYLEDONS

- | | | | | | |
|---|-----|-----|-----|-----|----------------------|
| 1. Flowers glumaceous, arranged in spikelets ... | ... | ... | ... | ... | 44. <i>Gramineae</i> |
| 1. Flowers not glumaceous, arranged on a spadix ... | ... | ... | ... | ... | 43. <i>Palmaceae</i> |

AN ARTIFICIAL KEY TO THE SPECIES

A. COMPOUND LEAVES

1. Leaves compound, alternate :
 2. Leaves palmately compound :
 3. Leaves 3-foliolate ; margin crenate :
 4. Trees armed. Leaves gland-dotted. Blaze yellow. Seed numerous, embedded in mucilaginous pulp ... 13. *Aegle marmelos*
 4. Trees unarmed. Leaves not gland-dotted. Blaze pink with crimson juice. Seed 3-4, not embedded in mucilaginous pulp ... 92. *Bischofia javanica*
 3. Leaves 5-7-foliolate ; margin entire :
 - Bark covered with conical prickles. Leaflets lanceolate. Flowers scarlet. Anthers monothecous. Capsule 5-valved. Seed comose... 9. *Bombax ceiba*
 2. Leaves pinnately compound :
 5. Leaves imparipinnate :
 6. Leaflets 3, stipellate :
 7. Trees armed :
 - Bark greenish-grey, exfoliating in papery flakes. Blaze yellow. Flowers scarlet ... 32. *Erythrina indica*
 7. Trees unarmed :
 8. Blaze uniformly red, exuding red juice. Flowers orange-red. Pods not articulated. Seed 1 ... 29. *Butea monosperma*
 8. Blaze white, streaked blood-red. Flowers white or pale-pink. Pods articulated. Seed 2-5 ... 33. *Ougeinia oojeinensis*
 6. Leaflets more than 3, exstipellate :
 9. Leaflets opposite or sub-opposite :
 10. Margin crenate-serrate :
 11. Leaflets crenate. Seed winged ... 15. *Garuga pinnata*
 11. Leaflets serrate. Seed not winged ... 17. *Azadirachta indica*
 10. Margin entire :
 12. Lateral nerves intramarginal :
 - Blaze pink, aromatic. Drupe 4 cm long, ovoid, yellow when ripe ... 27. *Spondias pinnata*
 12. Lateral nerves not intramarginal :
 13. Blaze yellowish-green :
 - Leaflets 5-9, ovate or elliptic. Flowers white tinged with pink. Seed 1 ... 34. *Pongamia pinnata*
 13. Blaze deep red :
 14. Leaflets 7-9, ovate-oblong ; lateral nerves 5-9 pairs. Drupe 1.5 cm long, reniform, red when ripe. Seed 1 ... 24. *Lannea coromandelica*
 14. Leaflets 9-17, oblong-lanceolate ; lateral nerves 9-16 pairs. Capsule 3 cm long, globular, yellow when ripe. Seed 3, arillate, aril scarlet ... 16. *Aphanamixis polystachya*
 9. Leaflets not opposite or sub-opposite :
 15. Leaflets 3-5. Bark rough, longitudinally furrowed ; blaze light-brown. Flowers pale-white. Pods pale-brown ... 31. *Dalbergia sissoo*
 15. Leaflets 11-17. Bark smooth, not longitudinally furrowed ; blaze greenish-grey. Flowers purple, pods purple-brown ... 30. *Dalbergia lanceolaria*
 5. Leaves paripinnate :
 16. Leaves unipinnate :
 17. Margin of leaflets dentate or minutely spinulose :
 18. Stem unbranched, covered with persistent petiole-bases. Petioles spinous. Margin of leaflets spinulose. Fruit drupe, orange-yellow ... 108. *Phoenix sylvestris*
 18. Stem branched, not covered with the persistent petiole-bases. Petiole not spinous. Margin of leaflets dentate. Fruit samaroid, straw-coloured ... 14. *Ailanthus excelsa*
 17. Margin of leaflets entire :
 19. Leaflets 4-8. Young foliage bright red ... 23. *Schleichera oleosa*
 19. Leaflets more than 4-8. Young foliage not bright-red :
 20. Leaflets 1-2.5 × 0.5-1 cm, linear-oblong :
 - Flowers yellow striped with red. Pods with crustaceous brittle epicarp ... 38. *Tamarindus indica*
 20. Leaflets more than 1-2.5 × 0.5-1 cm, elliptic-oblong or ovate-lanceolate :
 21. Bark smooth with horizontal wrinkles ; blaze yellow. Leaflet elliptic-oblong. Flowers bright yellow. Fruit indehiscent, cylindrical. Seed not winged ... 36. *Cassia fistula*

15. Flowers small. Fruits 1-2-seeded drupe. Seed large :
 16. Leaves over 2.5 cm in breadth. Blaze reddish-brown. Fruit 1-2 cm long, obovate ... 47. *Syzygium cumini*
 16. Leaves 2.5 cm or less in breadth. Blaze yellow. Fruit 12 × 6 mm, oblong-ovoid ... 48. *Syzygium salicifolium*
14. Leaves not aromatic when bruised :
 17. Seed winged :
 18. Lateral nerves 5-7 pairs. Flowers white ... 51. *Lagerstroemia parviflora*
 18. Lateral nerves 10-12 pairs. Flowers purple ... 52. *Lagerstroemia speciosa*
 17. Seed not winged :
 19. Flowers dioecious ; petals absent ... 91. *Trewia polycarpa*
 19. Flowers monoecious ; petals present :
 20. Leaves 30-70 cm long. Young leaves when bruised yield red dye : Calyx accrescent in fruit ... 78. *Tectona grandis*
 20. Leaves below 25 cm long. Young leaves when bruised not yield red dye :
 21. Petiole 5-12 cm long :
 Leaf base cordate. Flowers brownish-yellow ... 76. *Gmelina arborea*
 21. Petiole below 3.5 cm long :
 22. Leaves ovate-lanceolate, glabrous above, stellate-tomentose beneath. Flowers pale-purple ... 75. *Callicarpa arborea*
 22. Leaves, ovate, glabrous above, pubescent along the nerves beneath. Flowers greenish-white ... 77. *Premna latifolia* var. *mucronata*
2. Margin serrate-dentate or crenate :
 23. Plants with milky latex. Young branchlets fistular. Blaze cream-colour. Leaves pale-green scabrous above, hispid beneath. Flowers in enclosed receptacles... 99. *Ficus hispida*
 23. Plants without milky latex. Young branchlets solid. Blaze blood-red. Leaves dark green, glabrous on both surfaces. Flowers white, not enclosed in receptacles ... 19. *Eleodendron roxburghii*
1. Leaves simple, not opposite :
 24. Leaves verticillate :
 Plant with milky latex. Leaves 3-7 at the nodes ; petiole 1.5 cm long with a projection at the base. Fruits follicular. Seed comose on either side ... 67. *Alstonia scholaris*
 24. Leaves alternate :
 25. Margin entire :
 26. Latex present :
 27. Flowers crowded in globose heads either on or inside fleshy receptacles :
 28. Flowers on the inner walls of the closed receptacles : ...
 29. Receptacles axillary, in pairs, sessile :
 30. Petiole articulated to the blade :
 31. Blaze yellow. Ripe receptacles white ... 104. *Ficus virens*
 31. Blaze not yellow. Ripe receptacles not white :
 32. Blaze reddish with milky latex. Lateral nerves 6-9 pairs. Ripe receptacles dark purple ... 101. *Ficus religiosa*
 32. Blaze orange with red latex. Lateral nerves 3-6 pairs. Ripe receptacles black ... 102. *Ficus rumphii*
 30. Petiole not articulated to the blade :
 33. Blaze yellow with orange streaks. Leaves 12-18 cm long ; lateral nerves 4-6 pairs. Ripe receptacles red ... 97. *Ficus benghalensis*
 33. Blaze pink without orange streaks. Leaves 6-12 cm long ; lateral nerves numerous. Ripe receptacles orange-yellow ... 98. *Ficus benjamina* var. *comosa*
 29. Receptacles usually on leafless branches :
 Blaze pinkish with white latex turning to yellow. Petiole 1.5-4.5 cm long. Receptacles pinkish ... 100. *Ficus racemosa*
 28. Flowers on the outer wall of lobulate receptacles :
 Bark reddish-brown, rough ; blaze red. Fruit smooth ; orange-red when ripe ... 96. *Artocarpus lakoocha*
 27. Flowers not crowded on or inside large fleshy receptacles :
 34. Bark dark-green with vertical cracks ; blaze red. Leaves oblong-elliptic ; petiole 4-5 cm long. Flowers white ... 65. *Madhuca longifolia* var. *latifolia*
 34. Bark ash-coloured without vertical cracks ; blaze white. Leaves linear ; petiole 1.5 cm long. Flowers bright yellow ... 69. *Thevetia peruviana*

26. Latex absent :
35. Leaves with characteristic smell when bruised :
36. Fruit samaroid :
Leaves elliptic, lateral nerves 5-8 pairs, arcuate. Flowers in fascicles on leafless branches 94. *Holoptelea integrifolia*
36. Fruit not samaroid :
37. Flowers white :
Leaves obovate, lateral nerves 6-8 pairs. Flowers sessile in terminal or axillary dichotomously branched cyme. Drupes 2-lobed, deep red when ripe 72. *Ehretia laevis*
37. Flowers greenish-yellow :
38. Flowers monoecious :
39. Flowers leaf-opposed. Stamens indefinite. Carpels free :
40. Bark dark-brown. Petals 6, biseriate. Inner petal saccate at the base 2. *Milusa tomentosa*
40. Bark not as above. Petals 6, biseriate. Inner petal not saccate at the base 3. *Milusa velutina*
39. Flowers not leaf-opposed. Stamens definite. Carpels fused :
41. Bark greenish, smooth, blaze white. Lateral nerves 6-12 pairs ; petiole upto 1.8 cm long. Perfect stamens 9 79. *Beilschmiedia roxburghiana*
41. Bark dark grey or black ; blaze yellow with acrid juice. Lateral nerves 18-22 pairs ; petiole 1.5 cm, pulvinate. Perfect stamen 1 25. *Mangifera indica*
38. Flowers dioecious :
42. Leaves oblong or lanceolate ; petiole 2-3.5 cm long. Perianth rudimentary 80. *Litsea glutinosa*
42. Leaves broadly oblong-ovate or obovate ; petiole less than 2 cm long. Perianth segments 6 81. *Litsea monoptera*
35. Leaves without characteristic smell when bruised :
43. Leaves parallel veined. Flowers glumaceous, arranged in spikelets :
Culm with the lower branches thorny ; culm-sheaths with large fringed auricles 109. *Bambusa arundinacea*
43. Leaves not parallel-veined. Flowers not glumaceous, not arranged in spikelets :
44. Leaves minute, scale like :
Flowers purple-pink, in compact cylindrical, loosely paniced spikes, 5-9 cm long 6. *Tamarix dioica*
44. Leaves large not scale like :
45. Leaves deeply 2-lobed, cordate :
46. Petiole black. Basal nerves 7-9. Leaves acidic in taste. Flowers dull-white. Calyx 5-cleft 37. *Ptilostigma malabaricum*
46. Petiole green. Basal nerves 9-11. Leaves not acidic in taste. Flowers deep purple. Calyx 2-cleft 35. *Bauhinia purpurea*
45. Leaves not deeply 2-lobed, not cordate :
47. Receptacles of fruit enlarged and fleshy :
Bark dark brown, exfoliating in irregular scales ; blaze red, exuding resin which blackens on exposure. Lateral nerves 15-22 pairs, purple beneath 26. *Semecarpus anacardium*
47. Receptacles of fruit neither enlarged nor fleshy :
48. Flowers monochlamydous (petals absent) :
49. Fruit dehiscent :
50. Leaves gland-dotted beneath ; petiole 3-10 cm long. Capsule 12 × 12 mm, 3-lobed, covered with crimson powder 88. *Mallotus philippensis*
50. Leaves not gland-dotted beneath ; petiole upto 1.8 cm long. Capsule 2 cm in diam., orbicular, 6-8 lobed, not covered with crimson powder 87. *Glochidion lanceolarium*
49. Fruit indehiscent :
51. Flowers dioecious :
52. Leaves obovate. Flowers in axillary fascicle. Drupe white 90. *Securinega virosa*
52. Leaves ovate or elliptic. Flowers in axillary or paniced spike. Drupe black 82. *Antidesma ghesaembilla*

51. Flowers monoecious :
53. Leaves 2-3.5 × 1.5-2 cm, obovate, dark green. Drupe purple or blue when ripe ... 89. *Melanthesa rhamnoides*
53. Leaves 10-16 × 2.8-3.5 mm, linear-oblong, pale-green. Berry pale yellow when ripe ... 86. *Emblica officinalis*
48. Flowers diplochlamydous (petal present) :
54. Armed tree :
- Bark rough, black with rectangular peelings ; blaze crimson, exuding blood-red sap. Lateral nerves 17-21 pairs, prominent ... 83. *Bridelia retusa*
54. Unarmed trees :
55. Leaves lobed, 5-7 nerved at the base ... 8. *Kydia calycina*
55. Leaves not as above :
56. Calyx persistent :
57. Calyx-segments enlarged in 5, unequal spatulate wings ... 7. *Shorea robusta*
57. Calyx segments not as above :
58. Bark black, exfoliating in regular rectangular plates ; blaze pink. Fruits globose, yellow when ripe. Seed enclosed in yellow pulp ... 66. *Diospyros exculpta*
58. Bark not as above ; blaze cream-coloured. Fruits ellipsoidal, black when ripe. Seed enclosed in red pulp ... 54. *Alangium salvifolium*
56. Calyx not persistent :
59. Bark dark grey or black, deeply furrowed ; blaze reddish-brown. Petiole with 2 glands :
60. Petiole 3-8 mm long with 2-glands at the junction of mid-rib and petiole. Fruit 5-winged ... 43. *Terminalia alata*
60. Petiole 1.5-2.5 cm long with 2-glands at the base of lamina. Fruit not winged ... 45. *Terminalia chebula*
59. Bark bluish-grey ; blaze yellow. Petiole without 2 glands : Fruit drupaceous ... 44. *Terminalia bellirica*
25. Margin serrate-dentate or serrulate :
61. Armed trees :
62. Leaves palmi-nerved. Stamens definite. Seed 1 :
63. Leaves velvety-tomentose beneath :
64. Cymes axillary, sessile. Petals 5. Drupes exceeding 1 cm in diam., orange-red ... 20. *Zizyphus mauritiana*
64. Cymes axillary and terminal, pedunculate. Petals 0. Drupes about 1 cm in diam., white ... 21. *Zizyphus rugosa*
63. Leaves not velvety-tomentose beneath :
- Drupe about 2.5 cm in diam., woody, deep green... 22. *Zizyphus xylopyrus*
62. Leaves penninerved. Stamens indefinite. Seed 8-14 :
- Drupe red or black. Lateral nerves 3-5 pairs, purplish-beneath (when young) ... 4. *Flacourtia indica*
61. Unarmed trees :
65. Leaves palmi-nerved :
66. Basal nerves 3 :
67. Leaves glandular on serrate margins ... 11. *Grewia disperma*
67. Leaves eglandular on serrate margins :
68. Blaze yellow. Leaves smooth. Drupe orange-red ... 93. *Celtis tetrandra*
68. Blaze red. Leaves scabrous. Drupe black... 95. *Trema orientalis*
66. Basal nerves 5-7 ... 12. *Grewia elastica*
65. Leaves penni-nerved :
69. Plants with milky latex :
70. Flowers on the inner wall of the closed receptacles : Leaves unequal-slided, rough. Receptacles on leafless branches ... 103. *Ficus semicordata*
70. Flowers not as above :
71. Leaves ovate-lanceolate, cordate, glabrous, lobed, smooth on both surfaces. Fruit a syncarium, formed from the whole inflorescence ... 105. *Morus alba*

71. Leaves rhomboid or ovovate, not cordate, not lobed, rough on both surfaces. Fruit not a syncarium, formed from one flower only. ... 106. *Streblus asper*
69. Plants without milky latex :
72. Fruits with persistent calyx :
73. Leaves 30-95 cm long : Flowers cauliflorous. Calyx fleshy. Blaze red, lateral nerves 35 pairs ... 1. *Dillenia pentagyna*
73. Leaves below 30 cm long :
74. Fruits angular :
75. Flowers scarlet in pendulous raceme. Fruit 4-angular. Seed one in yellow pulp ... 49. *Barringtonia acutangula*
75. Flowers greenish-yellow in axillary fascicles. Fruit 6-angular. Seed many in red pulp ... 53. *Casearia elliptica*
74. Fruits not angular :
76. Blaze pale-yellow :
Lateral nerves 4-5 pairs. Flowers white. Stamens 4-8. Drupe 1-seeded ... 71. *Cordia dichotoma*
76. Blaze deep-red :
Lateral nerves 10-15 pairs. Flowers white and pink. Stamens more than 8. Drupe many-seeded ... 50. *Careya arborea*
72. Fruit without persistent calyx :
77. Fruits composed of 5, spirally twisted carpels :
Flowers scarlet ... 10. *Helicteres isora*
77. Fruits not as above :
78. Armed tree :
Blaze orange. Petiole 8-9 mm long. Drupe red or black ... 5. *Xylosma longifolium*
78. Unarmed trees :
79. Bark with vertical furrows :
Leaves dark green above and whitish beneath ... 107. *Salix tetrasperma*
79. Bark without vertical furrows :
80. Blaze cream-coloured :
Leaves dark green on both surfaces ... 85. *Drypetes roxburghii*
80. Blaze pink-coloured :
81. Lateral nerves 6-8 pairs. On maturity leaves turn to bright yellow. Fruit indehiscent, glabrous, red. Seed 1 ... 64. *Embelia tsjeriam-cottam*
81. Lateral nerves 9-14 pairs. On maturity leaves turn to coppery red. Fruit dehiscent, 3-lobed. Seed 3 ... 84. *Croton roxburghii*

ENUMERATION OF THE SPECIES

1. DILLENIACEAE

1. *Dillenia pentagyna* Roxb.

A large deciduous tree. Flowers yellow, cauliflorous. Fruits orange-yellow, fleshy. Common in Sal forests. The flower buds and young fruits are sweet scented. *Flowers*: March-April ; *Fruits*: May-June ; S.K.S. 718. *Loc. name*: Aggai.

2. ANNONACEAE

2. *Milusa tomentosa* (Roxb.) Sinclair (*Sacopetalum tomentosum* Hook. f. & Thoms.)

A large deciduous tree. Flowers greenish-yellow, leaf-opposed. Petals 6, in 2-series ; the outer minute, linear ; the inner 3, obtuse, saccate at the base. Abundantly found scat-

tered throughout the forests, especially in moist localities. The leaves are aromatic and olive-green, turning to orange-yellow before falling. *Flowers and Fruits*: April-July ; S.K.S. 520.

Loc. name: Kajrauta.

3. FLACOURTIACEAE

4. *Flacourtia indica* (Burm. f.) Merr. (*F. ramontchii* L'Herit)

A small, armed, deciduous tree. Flowers greenish-yellow. Stamens indefinite. Drupes 8 mm long, dark-red or black. Seed 8-14. Frequently found in open forests and grasslands. The plant is seen having large horizontal thorns (6 cm long) on the main trunk and purple petioles and midrib when young.

Flowers: March-April; *Fruits*: May-June; S.K.S. 599,603.

Loc. name: Kanker.

5. *Xylosma longifolium* Clos.

An evergreen tree, thorny when young. Flowers yellow. Fruit 5 mm long, globose, red or black. Seed 2. Abundantly found along Doma road sides. *Flowers*: November-January; *Fruits*: March-April; S.K.S. 530.

Loc. name: Chamarkolha.

4. TAMARICACEAE

6. *Tamarix dioica* Roxb.

A small tree with long spreading and drooping branches. Flowers purple-pink. Capsule 5 mm long, 3-valved. Very common on sandy soils along the river, Little Gandak. *Flowers*: May-July; *Fruits*: August-October; S.K.S. 120.

Loc. name: Jhau.

5. DIPTEROCARPACEAE

7. *Shorea robusta* Gaertn. f.

A large, semi-deciduous tree. Flowers yellowish. Calyx segments enlarged into 5, unequal, spatulate wings. It is abundantly cultivated in North-West portion of the forest. *Flowers*: March-April; *Fruits*: May-June; S.K.S. 19.

Loc. name: Sakhu.

6. MALVACEAE

8. *Kydia calycina* Roxb.

A small deciduous tree. Flowers white or pink. Very common in mixed forest. The flowers are sweet scented. *Flowers*: September-November; *Fruits*: Cold season; S.K.S. 508.

Loc. name: Pathi.

7. BOMBACACEAE

9. *Bombax ceiba* Linn. (*B. malabaricum* DC.)

A tall deciduous tree. Flowers bright red. Capsule upto 15.6 cm long, 5-angled. Seeds many, enveloped in copious floss.

This is the common silk cotton tree frequently found in mixed and Sal forests. The

bole is straight, cylindrical, butteressed at the base and covered with large conical prickles. The branches are in whorls of 5-7, spreading horizontally. *Flowers*: February-March; *Fruits*: April-May; S.K.S. 502.

Loc. name: Semal.

8. STERCULIACEAE

10. *Helicteres isora* Linn.

A shrub or small tree. Flowers scarlet. Fruits: 4-5 cm long, cylindrical, composed of 5 spirally twisted carpels. Not common. Occasionally found in Sal forest. *Flowers*: August-September; *Fruits*: October-January, rarely upto June; S.K.S. 540.

Loc. name: Marrorphal.

9. TILIACEAE

11. *Grewia disperma* Rottl. ex Spreng. (*G. laevigata* auct. plur. non Vahl)

A small tree. Flowers pale-white. Drupes 8 mm in diam., 1-4 lobed, black. Commonly found in moist localities, especially along river banks. *Flowers*: August-October; *Fruits*: October-February; S.K.S. 535.

12. *G. elastica* Royle

A large tree. Flowers yellow. Drupes 8 mm in diam., globose, dark purple when ripe. Very common throughout the forest especially along river bank. *Flowers*: April-June; *Fruits*: August-November; S.K.S. 668.

Loc. name: Dhaman.

10. RUTACEAE

13. *Aegle marmelos* (Linn.) Correa

A deciduous tree with sharp straight axillary spines. Flowers greenish-white. Fruits 8-20 cm in diam., globose or pyriform. Common in Sal forests. The fruits are of smaller size and contain more mucilage than the cultivated ones. *Flowers*: March-May; *Fruits*: March-June; S.K.S. 220.

Loc. name: Bel.

11. SIMAROUBACEAE

14. *Ailanthus excelsa* Roxb.

A large, deciduous tree. Flowers small, greenish-yellow. Fruit 3-5, 6 × 1.3 cm, samaroid, lanceolate. It is a fast growing elegant tree commonly found in mixed forest. The

branches arise in whorls of 6-9. The fruit remains attached for a long time. *Flowers*: February-April; *Fruits*: April-June; S.K.S. 885.

Loc. name: Ailansat.

12. BURSERACEAE

15. *Garuga pinnata* Roxb.

A large deciduous tree. *Flowers* yellow. *Drupe* yellow, fleshy, pyriform. *Seeds* winged. Very common in mixed forest. *Flowers*: March-May; *Fruits*: May-July, followed by new foliage; S.K.S. 209.

Loc. name: Kikar.

13. MELIACEAE

16. *Aphanamixis polystachya* (Wall.) Parker. [*Amoora rohituksa* (Roxb.) Wt. & Arn.]

A small evergreen tree. *Flowers* white. *Fruits* 3 cm long, 3-celled, globular, yellow when ripe. *Seeds* arillate, aril scarlet. Abundantly found along the river and Doma road-sides. The dehiscent capsules, with scarlet arillate seeds are abundantly seen along road-sides during monsoon. *Flowers*: August-November; *Fruits*: December-July; S.K.S. 549.

Loc. name: Athara.

17. *Azadirachta indica* A. Juss. (*Melia azadirachta* Linn.)

A deciduous tree. *Flowers* white. *Drupe* 1.5 cm long, greenish-yellow when ripe. Rare, a few plants are seen along Doma road-sides. *Flowers*: March-May; *Fruits*: May-July; S.K.S. 71.

Loc. name: Neem.

18. *Toona ciliata* Roem. (*Cedrela toona* Roxb. ex Rottl. & Willd.)

A large deciduous tree. *Flowers* cream colour. *Fruit* 2 cm long, capsular, dark-brown. *Seeds* reddish-brown, with membranous wings on either end. Abundantly found in mixed forest. The dehiscent capsules persist for a long period on the tree. *Flowers*: March-April; *Fruits*: June-July; S.K.S. 85,112.

Loc. name: Toon.

14. CELASTRACEAE

19. *Eleodendron roxburghii* Wt. & Arn. [*E. glaucum* auct. (non Pers.)]

A medium-sized tree, forming dense crown. *Flowers* white, in axillary dichotomously branched cymes. *Fruit* 1.5 cm long, yellowish-green, tipped with persistent style. Rarely found inside the forest. *Flowers*: April-June; *Fruits*: January-June; S.K.S. 414.

Loc. name: Mutmur.

15. RHAMNACEAE

20. *Zizyphus mauritiana* Lam. (*Z. jujuba* Lam. non Mill.)

A medium-sized, deciduous tree; young parts pubescent. *Flowers* greenish-yellow. *Drupe* 1.5 cm in diam., globose, yellow or red. Abundantly found in grasslands. *Flowers*: September-November; *Fruits*: November-March; S.K.S. 331.

Loc. name: Ber.

21. *Z. rugosa* Lam.

A medium-sized, evergreen tree. *Flowers* greenish. *Drupe* 1 cm in diam., globose or pyriform, white when ripe. Abundantly found in grasslands. *Flowers*: March-May; *Fruits*: April-July; S.K.S. 449.

22. *Z. xylopyrus* (Retz.) Willd.

A small tree. *Flowers* greenish-yellow. *Drupe* 1-2.5 cm in diam., woody, deep green when ripe. Common in mixed forest. *Flowers*: April-June; *Fruits*: October-December; S.K.S. 223.

Loc. name: Chittaina.

16. SAPINDACEAE

23. *Schleichera oleosa* (Lour.) Oken (*S. trijuga* Willd.)

A large handsome tree. *Flowers* yellowish-green. *Fruit* 1 × 1.8 cm globose, apiculate, dry. Frequently found in Sal and mixed forests. It presents a most singular appearance with bright-red young foliage during April-May. *Flowers*: March-April; *Fruits*: October-November; S.K.S. 74.

Loc. name: Kusum.

17. ANACARDIACEAE

24. *Lannea coromandelica* (Houtt.) Merr.
(*Odina wodier* Roxb.)

A deciduous tree. Flowers greenish-yellow. Drupes 1.4 cm long, reniform, red when ripe. Very common throughout the forest. The flowers appear when the plant is leafless. The leaves are green, turning to yellow before falling. *Flowers*: March-April; *Fruits*: April-June; S.K.S. 128, 662.

Loc. name: Jigna.

25. *Mangifera indica* Linn.

A large, evergreen tree. Flowers yellowish-green. Drupes 2-15 cm long, ovoid, yellowish or reddish. Common in Sal forest along road sides. The tree is largely attacked by the semi-parasite *Dendrophthoe falcata* (Linn. f.) Etting. *Flowers*: January-March; *Fruits*: March-July; S.K.S. 778.

Loc. name: Aam.

26. *Semecarpus anacardium* Linn. f.

A small, medium-sized tree. Flowers greenish-white. Drupe 3 cm long, compressed, shining, black when ripe, seated on an orange-coloured fleshy receptacle. Fairly common, scattered throughout as a constituent of the under-storey of sal forest. *Flowers*: June-August; *Fruits*: August-October; S.K.S. 780.

Loc. name: Bhilva.

27. *Spondias pinnata* (Linn. f.) Kurz (*S. mangifera* Willd.)

A small, deciduous tree. Flowers greenish-white. Drupes 4 cm long, ovoid or oblong, yellow when ripe. Rare; found in Sal forest. Flowers appear when the plant is leafless. The leaves are dark green, turning bright-yellow before falling. *Flowers*: March-April; *Fruits*: May-August; S.K.S. 35.

Loc. name: Amra.

18. MORINGACEAE

28. *Moringa oleifera* Lam. (*M. pterygosperma* Gaertn.)

A small or large deciduous tree. Flowers white. Capsule 20-45 cm long, linear, pendulous, 9-ribbed longitudinally. Seeds 3-gonous,

winged. Rarely found in the forest. *Flowers*: January-March; *Fruits*: April-June; S.K.S. 39.

Loc. name: Sahzan.

19. PAPILIONACEAE

29. *Butea monosperma* (Lam.) Taub. (*B. frondosa* Koenig ex Roxb.)

A medium-sized, deciduous tree. Flowers orange-red, fascicled into dense racemes, on leafless branches. Pod 10-16 × 4-6 cm, pendulous, silky tomentose, 1-seeded. Seeds oval, dark brown. Very common in Sal forest. *Flowers*: March-April; *Fruits*: May-July; S.K.S. 217.

Loc. name: Palas.

30. *Dalbergia lanceolaria* Linn. f.

A small deciduous tree. Flowers purple. Pod 3-6 × 2 cm, purple-brown, 1-3 seeded. Seed reniform. A common constituent of Sal forest. The flowers are showy and appear when the tree is leafless. *Flowers*: April-June; *Fruits*: September-October; S.K.S. 146.

31. *D. sissoo* Roxb.

A large tree. Flowers pale-white. Pod 4-7 × 0.6-1 cm, strap-shaped, pale-brown. Seeds 2-3. Very common throughout the area particularly in Sal forest. *Flowers*: February-April; *Fruits*: November-February; S.K.S. 190.

Loc. name: Shisham.

32. *Erythrina indica* Lam.

A medium-sized, armed tree. Flowers bright scarlet. Very common throughout the sal and mixed forests. It gives a touch of colour to the forest when in full bloom. *Flowers*: March-April; S.K.S. 113.

33. *Ougeinia oojeinensis* (Roxb.) Hochr.

A medium-sized, deciduous tree. Flowers light-pink. Pods 4-8 × 0.8 cm, jointed. Rare, only few plants seen in sal forests. *Flowers*: February-May; *Fruits*: May-June; S.K.S. 21.

Loc. name: Panan.

34. *Pongamia pinnata* (Linn.) Pierre

A middle-sized evergreen tree. Flowers

white tinged with pink. Pod 6-10 × 2-3 cm thick woody, 1-seeded. *Flowers*: March-June; *Fruits*: throughout the year; S.K.S. 212.

Loc. name: Dithori.

20. CAESALPINIACEAE

35. *Bauhinia purpurea* Linn.

A small tree. Flowers deep purple. Calyx 2-cleft. Pod linear, pointed at both the ends. Rare, only a few plants seen planted near the rest houses. The trees are beautiful when in flowers. *Flowers*: September-December; *Fruits*: December-March; S.K.S. 581.

Loc. name: Kachnar.

36. *Cassia fistula* Linn.

A medium-sized tree with drooping branches. Flowers bright yellow. Pods 32-49 × 2-2.2 cm, cylindrical, dark-brown when ripe. Seeds embedded in yellow pulp, parallel with septa. Common in Sal forest. Beautiful bright yellow flowers appear when the tree is leafless. *Flowers*: March-July; *Fruits*: Winter season; S.K.S. 216.

Loc. name: Amaltas.

37. *Piliostigma malabaricum* (Roxb.) Benth. (*Bauhinia malabarica* Roxb.)

A deciduous tree. Flowers dull-white. Calyx 5-cleft, tomentose. Pod flexible beaked. Seed ovoid-globose, polished dark-brown. Common throughout the forest. The leaves are acidic in taste—a character of specific importance. *Flowers*: September-November; *Fruits*: December-March; S.K.S. 461.

Loc. name: Sahoul.

38. *Tamarindus indica* Linn.

A deciduous tree with dense crown. Flowers yellow striped with red. Stamens 3. Pods 8-15 × 1.5-2 cm, indehiscent, with crustaceous brittle epicarp and thick pulpy mesocarp. Seeds dark brown, smooth, shining. Rarely found scattered in Sal forest. The yield of fruits is very poor. *Flowers*: July-November; *Fruits*: December-March; S.K.S. 200.

Loc. name: Imili.

21. MIMOSACEAE

39. *Acacia catechu* (Linn. f.) Willd.

A moderate-sized deciduous tree. Flowers white, fading to pale-brown. Pods 5-7.5 cm long, strap-shaped, dark-brown, dehiscent. Abundantly found throughout the forests. *Flowers*: August-October; *Fruits*: November-February; S.K.S. 314.

Loc. name: Khaira.

40. *Albizzia lebbbeck* (Linn.) Benth.

A large deciduous tree. Flowers greenish-white. Pods 12-22 × 3-4 cm, glabrous, straw-coloured. Seeds 4-12, brown. Common in Sal forest. The pods remain persistent for a long period. *Flowers*: April-May; *Fruits*: November-March; S.K.S. 131.

Loc. name: Siris.

41. *A. procera* (Roxb.) Benth.

A large graceful tree. Flowers yellowish green. Pods 10-15 × 2 cm, reddish-brown. Seeds 6-12, pale-brown. Very common throughout the forests, especially along Doma road-sides. *Flowers*: May-July; *Fruits*: Cold season; S.K.S. 80.

Loc. name: Safed-siris.

42. *Pithecolobium dulce* (Roxb.) Benth. (*Inga dulcis* Willd.)

A thorny shrub or tree. Flowers white in axillary heads. Pods spirally twisted, reddish when ripe. Seeds black, shining, covered with white spongy edible aril. Uncommon. A few trees are seen along the road sides. *Flowers*: January-February; *Fruits*: April-May; S.K.S. 178.

Loc. name: Jangli-jalebi.

22. COMBRETACEAE

43. *Terminalia alata* Heyne ex Roth (*T. tomentosa* Wt. & Arn.)

A large deciduous tree. Flowers dull-yellow, sessile in terminal tomentose panicles. Fruits 5 × 4 cm, 5-winged, wings coriaceous with crenulate edge, dark brown. Very common in Sal forest, especially along road-sides. *Flowers*: July-August; *Fruits*: November-March; S.K.S. 186.

Loc. name: Asna.

44. *Terminalia bellirica* (Gaertn.) Roxb.

A large deciduous tree. Flowers greenish-yellow in slender axillary and extra-axillary interrupted drooping spikes. Fruits 3×2 cm, ovoid, tomentose, brown, not winged. Abundantly found throughout the forest, also in grasslands. Large umbragenous crown and buttressed base are characteristic. *Flowers*: April-June; *Fruits*: December-February; S.K.S. 661.

Loc. name: Bahera.

45. *T. chebula* Retz.

A medium-sized, deciduous tree. Flowers dull-white, in terminal or axillary paniced spikes. Fruits $2.5-4 \times 1.5$ cm, obovoid or ellipsoid, drupaceous, 5-ribbed when dry. Common in Sal forest. The flowers appear with new foliage. *Flowers*: April-March; *Fruits*: December-February; S.K.S. 213.

Loc. name: Harra.

23. MYRTACEAE

46. *Psidium guajava* Linn.

A medium-sized tree. Flowers white. Fruit many seeded berry. Frequent in swamp forest. The fruits are of inferior quality and are generally eaten by birds, monkeys and children. *Flowers*: April-June; *Fruits*: July-August and November-January; S.K.S. 853.

Loc. name: Amrood.

47. *Syzygium cumini* (Linn.) Skeels (*Eugenia jambolana* Lam.)

A medium-sized or large evergreen tree. Flowers greenish-white, small, subsessile in trichotomous panicles. Fruit 1-2 cm long, obovate, black with dark-purple juice. Seed one. It is abundantly found in swamp forest, chiefly mixed with *Barringtonia acutangula* (Linn.) Gaertn., *Ficus racemosa* Linn., *Salix tetrasperma* Roxb., *Xylosma longifolium* Clos. *Flowers*: May-June; *Fruits*: June-July; S.K.S. 871.

Loc. name: Jamun.

48. *S. salicifolium* Grah.

A small tree. Flowers greenish-white, small, sessile or sub-sessile in small heads at

the ends of branches or cymes. Fruit 12×6 mm, oblong-obovoid. Seed one. Gregarious and abundant along the bank of rivers and tals. *Flowers*: March-June; *Fruits*: July-August; S.K.S. 929.

Loc. name: Kathjamunia.

24. LECYTHIDACEAE

49. *Barringtonia acutangula* (Linn.) Gaertn.

A small glabrous tree. Flowers scarlet, pendulous, many-flowered racemes, 15-32 cm long. Fruits 2-4 cm long, quadrangular, crowned by the persistent calyx-lobes. Abundant in swamp forest, generally in association with *Bischofia javanica* Bl., *Ficus semicordata* Buch-Ham. ex J. E. Sm., *Syzygium cumini* (Linn.) Skeels, *Trewia polycarpa* Benth., etc. The trunk gives a rugged appearance with crowded leaves at the end of the branches. The flowers are small but as they grow in pendulous raceme, they render beauty to the plant. *Flowers*: April-July; *Fruits*: September-October; S.K.S. 425.

Loc. name: Paniha, Ijar.

50. *Careya arborea* Roxb.

A moderate-sized deciduous tree. Flowers white and pink in clusters of 4-6, at the ends of the branches. Fruits 6-8 cm long, globular, crowned with persistent calyx-limb and style. Seeds numerous, immersed in pulp. Very common in Sal and teak forests, especially along road-sides. The flowers are bad smelling and appear when the tree is leafless. Leaves turn red or purple before falling. *Flowers*: March-April; *Fruits*: July; S.K.S. 934.

Loc. name: Kumbhi.

25. LYTHRAGEAE

51. *Lagerstroemia parviflora* Roxb.

A large deciduous tree. Flowers white. Capsule $1.5-2.5 \times 1-2$ cm, ovoid or ellipsoid. Seeds 1-1.8 cm long, winged. Very common in Sal forest. In juvenile plants, the leaves are very large resembling that of *Holarrhena*

antidysenterica Wall. *Flowers*: May-July ; *Fruits*: Cold season ; S.K.S. 253, 446.

Loc. name: Ashidh.

52. *Lagerstroemia speciosa* (Linn.) Pers. (*L. flosreginae* Retz.)

A medium-sized tree. Flowers purple. Capsule 1.8-2.8 × 1.2 cm, seated on woody, thickened, ribbed calyx. Seeds 1-1.4 cm long, winged. Rare. Only a few plants seen along the river and roads. The tree looks beautiful when in flowers. *Flowers*: June-October ; *Fruits*: September-March ; S.K.S. 254.

26. SAMYDACEAE

53. *Casearia elliptica* Willd. (*C. tomentosa* Roxb.)

A small deciduous tree. Flowers greenish-yellow. Capsule 1-2.5 × 0.7-1.5 cm, yellow when ripe. Seeds embedded in red pulp. Very common in teak forest, also on outskirts of Sal forest. *Flowers*: March-May ; *Fruits*: April-May ; S.K.S. 602.

Loc. name: Beri.

27. ALANGIACEAE

54. *Alangium salviolium* (Linn. f.) Wang.

A small deciduous tree. Flowers white. Fruits 2.5 × 1.4 cm, crowned with persistent calyx-limb, black when ripe. Very common along the river. Flowers and buds largely eaten by baboon. *Flowers*: March-May ; *Fruits*: June-August ; S.K.S. 83, 300.

Loc. name: Akola.

28. RUBIACEAE

55. *Adina cordifolia* (Roxb.) Benth. & Hook. f. ex Brandis.

A tall deciduous tree. Flowers yellow, in globose peduncled heads. Capsules numerous in each head. Seeds oblong, winged. Fairly abundant throughout the forest. The leaves are dark green, curved downward on either-side and bear several dark brown spots before falling. *Flowers*: June-August ; *Fruits*: Cold season ; S.K.S. 247.

Loc. name: Haldu.

56. *Anthocephalus chinensis* (Lam.) A. Rich. ex Walp.

A large tree. Flowers orange, in solitary globular heads. Fruits 5 cm across, yellow. Common along river banks. The branches are in whorls. *Flowers*: June-July ; *Fruits*: August-September ; S.K.S. 900.

Loc. name: Kadamb.

57. *Hymenodictyon excelsum* (Roxb.) Wall.

A medium-sized deciduous tree. Flowers greenish-white, in large terminal panicles of spikes. Capsule 2-valved, ellipsoid, reddish-brown, dehiscent. Seeds lenticular, winged around the margin. Common throughout the forest. *Flowers*: May-July ; *Fruits*: Cold season ; S.K.S. 727.

Loc. name: Bhurkur.

58. *Hyptianthera stricta* (Roxb.) Wt. & Arn.

A small evergreen tree. Flowers white, in axillary fascicles. Berries 5-7 mm, crowned by the persistent calyx. Fairly common in damp and shady places, especially along river-banks. *Flowers*: April-May ; *Fruits*: February-March ; S.K.S. 450.

59. *Ixora arborea* Roxb. ex Sm. (*I. parviflora* Vahl, non Lam.)

A small evergreen tree. Flowers white. Fruits 5-7 mm, shining, black. Very common all over the Sal forest in damp and dry situations. The plant looks very elegant with masses of white terminal flowers. A large number of bees are seen around the sweet scented flowers. *Flowers*: March-May ; *Fruits*: April-June ; S.K.S. 915.

60. *Mitragyna parvifolia* (Roxb.) Korth.

A large deciduous tree. Flowers light yellow in globose heads. Fruits in head consisting of small, ribbed, 2-valved capsules. Seeds numerous, winged. Common along river banks and in open forest. *Flowers*: May-July ; *Fruits*: Cold season ; S.K.S. 218, 800.

Loc. name: Tikui.

61. *Wendlandia heynei* (R. & S.) Santapau & Merchant [*W. exserta* (Roxb.) DC.]

A small deciduous tree. Flowers dull-white in large conical terminal panicles of cymes. Capsule 2 mm long, white-tomentose. Seeds minute, black. Fairly abundant in mixed

forest, especially along Doma-road sides. The leaves turn purple before falling. *Flowers*: March-April; *Fruits*: April-July; S.K.S. 917.

62. *Xeromphis spinosa* (Thunb.) Keay [*Randia dumetorum* (Retz.) Poir]

A small tree with strong, straight, decussate spines, 2.5-4 cm long. Flowers greenish-white, 1-3 at the end of short lateral branchlets. Fruits 4.5 × 2.5 cm, glabrous, yellow when ripe. Seeds numerous, imbedded in a gelatinous pulp. Abundant throughout the forest. The flowers are white in the beginning turning to yellow with age. *Flowers*: April-June; *Fruits*: November-April; S.K.S. 150, 537.

Loc. name: Mainphal.

63. *X. uliginosa* (Retz.) Maheshwari [*Randia uliginosa* DC.]

A rigid small tree with thick woody 4-angled branches. Flowers white, solitary, 3.5 cm in diam., fragrant. Fruits 5-6 cm in diam., ellipsoid, smooth yellowish crowned by the persistent calyx-lobes. Common in open forest. The leaves are crowned at the ends of the branches. The main trunk is covered with strong and sharp spines. Flowers are showy and fragrant. *Flowers*: May-June; *Fruits*: September-December; S.K.S. 921.

Loc. name: Pindar.

29. MYRSINACEAE

64. *Embelia tsjeriam-cottam* A. DC.

A small tree with lenticellate branches. Flowers greenish-yellow, small, in axillary or terminal simple or fascicled racemes. Fruit globose, red. Abundant in Sal forest, chiefly along road-sides, forming an understorey. *Flowers*: April-July; *Fruits*: November-February; S.K.S. 647.

Loc. name: Baibrang.

30. SAPOTACEAE

65. *Madhuca longifolia* (Koenig) Mac Bride var. *latifolia* (Roxb.) Chev.

A large deciduous tree. Flowers cream-coloured, clustered at the ends of the branches. Fruits 2.5-5 cm long berries, 1-4 seeded.

Seeds dark brown, shining. Commonly found in Sal forest. *Flowers*: March-May; *Fruits*: June-August; S.K.S. 121.

Loc. name: Mahua.

31. EBENACEAE

66. *Diospyros exculpta* Büch.-Ham. (*D. tomentosa* Roxb.)

A small deciduous tree. Flowers dull-white, dioecious. Male flowers in cymes. Calyx funnel-shaped. Corolla-lobes twisted, villous. Female flowers solitary, larger. Common in Sal forest. *Flowers*: April-June; S.K.S. 219.

Loc. name: Tendu.

32. APOCYNACEAE

67. *Alstonia scholaris* (Linn.) R. Br.

A tall evergreen tree. Flowers greenish-white, in compact umbellate cymes. Fruits 25-40 cm long terete paired follicles, hanging in clusters. Seeds many, flattened, hairy on either side. Only a few plants seen on the river banks and Doma-road sides. *Flowers*: November-January; *Fruits*: March-June; S.K.S. 537.

68. *Holarrhena antidysenterica* (Roth) A. DC.

A small deciduous tree. Flowers white. Fruits of 2, divaricate follicles. Abundantly found in Sal forest. *Flowers*: May-July; *Fruits*: Cold season; S.K.S. 221.

Loc. name: Kurchi.

69. *Thevetia peruviana* (Pers.) L. Schum.

A small evergreen tree. Flowers yellow. Fruits drupaceous, broader than long, bluntly 4-angled. Cultivated near the temple but few plants are seen as escapes in Sal forest. *Flowers* and *Fruits*: Throughout the year; S.K.S. 87.

33. ASCLEPIADACEAE

70. *Calotropis gigantea* (Linn.) R. Br.

A small tree. Flowers light purple. Corolla-lobes spreading. Follicles 7-10 × 3 cm, recurved, fleshy. Seeds numerous, black, flat with a bright silky-white coma. Abundant in grasslands and along the river embankments. *Flowers*: December-August; *Fruits*: February-June; S.K.S. 208.

34. BORAGINACEAE

71. *Cordia dichotoma* Forst. f.

A small deciduous tree. Flowers white. Drupes upto 2.5 cm long, ovoid, apiculate, yellow, subtended by the enlarged and hardened calyx. Abundant throughout the area, chiefly along river banks. The leaves when bruised have a characteristic smell. *Flowers*: March-May ; *Fruits*: July-September ; S.K.S. 678.

Loc. name: Lasora.

72. *Ehretia laevis* Roxb.

A small deciduous tree with spreading crown. Flowers white. Drupes 5 mm, globose, 2-lobed, deep red, with 1-4 seeded pyrenes. Frequent in Sal forest. The bruised leaves and blazed bark have a peculiar offensive smell resembling that of *Holoptelca integrifolia* (Roxb.) Planch. *Flowers*: January-March ; *Fruits*: February-April ; S.K.S. 809.

Loc. name: Datranga.

35. BIGNONIACEAE

73. *Haplophragma adenophyllum* (Wall.) P. Dop.

A large tree with dense crown. Flowers yellowish-brown. Capsule 30-50 × 3 cm, cylindrical, ribbed, rusty-tomentose. Seeds winged. A rare tree, only a few plants seen in Sal forest. *Flowers*: September-November ; *Fruits*: October-February ; S.K.S. 269.

74. *Oroxylum indicum* (Linn.) Vent.

A small deciduous tree. Flowers large, dark purple, fleshy, malodorous. Capsule 40-60 × 6-8 cm, flat, oblong, narrowed on either ends. Seeds 4 × 6 cm, numerous, silvery white. Frequently found in Sal forest. *Flowers*: July-October ; *Fruits*: October-June ; S.K.S. 809.

36. VERBENACEAE

75. *Callicarpa arborea* Roxb.

A small tree. Flowers pale-purple, in dichotomous corymbose cymes. Drupes 2 mm long, purple, seated on the small spreading calyx. Very common in swamp forest. *Flowers*: April-June ; *Fruits*: August-November ; S.K.S. 657.

76. *Gmelina arborea* Roxb.

A medium-sized deciduous tree. Flowers brownish-yellow, in panicles. Drupe 2 cm long, yellow when ripe. Common throughout the forest chiefly in grasslands. *Flowers*: March-May ; *Fruits*: May-June ; S.K.S. 639.

Loc. name: Kambhar.

77. *Prema latifolia* Roxb. var. *mucronata* (Roxb.) C. B. Clarke

A small or medium-sized deciduous tree. Flowers greenish-white. Drupes dark purple. Frequent on the margins of Sal forest. The leaves before shedding turn black and emit an unpleasant smell when bruised. *Flowers* and *Fruits*: April-August ; S.K.S. 675.

78. *Tectona grandis* Linn. f.

A large deciduous tree ; branchlets 4-angular, stellately tomentose. Flowers white. Abundant. The main constituents of teak are *Careya arborea* Roxb., *Flacourtia indica* (Burm. f.) Merrill, *Streblus asper* Lour. etc. *Flowers*: July-August ; *Fruits*: October-December ; S.K.S. 369.

Loc. name: Sagon ; Teak.

37. LAURACEAE

79. *Beilschmiedia roxburghiana* Nees

A medium-sized evergreen tree. Flowers yellowish-green. Fruits 4.5 cm long, oblong-obovoid, dark purple when ripe. Commonly found in moist situations forming the middle storey of Sal forest. *Flowers*: April-May ; *Fruits*: Rainy season ; S.K.S. 710.

80. *Litsea glutinosa* (Lour.) C. B. Robinson (*L. chinensis* Lam.)

A medium-sized evergreen tree. Flowers yellowish-green. Fruits globose, black, supported by thickened, club-shaped perianth tube. Abundant in swampy places. Leaves turn black at maturity. *Flowers*: April-July ; *Fruits*: Winter season ; S.K.S. 573, 664.

Loc. name: Medh.

81. *L. monopetala* (Roxb.) Pers. (*L. polyantha* Juss.)

A small tree. Flowers greenish-yellow. Fruits ovoid, black, seated on the small subcupular perianth. Common in swamp forest.

Leaves aromatic when bruised. *Flowers*: March-June; *Fruits*: June-September; S.K.S. 597.

38. EUPHORBIACEAE

82. *Antidesma ghesaembilla* Gaertn.

A small deciduous tree. Flowers greenish-yellow, dioecious, in densely pubescent, terminal or axillary paniced spikes. Drupe 4 × 3 mm, red finally black when ripe. Frequent in grasslands. *Flowers*: April-June; *Fruits*: Cold season; S.K.S. 222.

Loc. name: Banmasuria.

83. *Bridelia retusa* Linn.

A medium-sized deciduous tree with strong, horizontal, conical spines 4 cm long when young. Flowers greenish-yellow, in axillary clusters which in turn are arranged in spikes. Fruits 6-10 mm in diam., globose, purplish-black with persistent calyx. Abundant in Sal forest. The main trunk is largely attacked by white ants. *Flowers*: August-October; *Fruits*: Cold season; S.K.S. 291, 409.

Loc. name: Khaja.

84. *Croton roxburghii* Bal.

A small deciduous tree. Flowers yellowish-green, on long terminal racemes. Capsules 1-1.2 cm, 3-grooved, covered with scales. Seeds ellipsoid, smooth, brown. Abundantly found scattered all over the Sal forest. The leaves turn coppery red before falling. *Flowers*: February-March; *Fruits*: April-May; S.K.S. 701.

Loc. name: Lapkan.

85. *Drypetes roxburghii* (Wall.) Hurusawa (*Putranjiva roxburghii* Wall.)

A medium-sized evergreen tree with pendent branches. Flowers yellow, dioecious. Fruit 1 cm long, ellipsoid, white-tomentose, pointed at both ends. Fairly common in swamp forest. *Flowers*: March-May; *Fruits*: November-March; S.K.S. 65.

Loc. name: Nizzia, Putra-jiva.

86. *Embblica officinalis* Gaertn. (*Phyllanthus emblica* Linn.)

A moderate-sized deciduous tree. Flowers greenish-white or yellow, in axillary fascicles.

Fruits 1-3 cm in diam., greenish-yellow, fleshy with 6-vertical faint furrows. Seeds 6, trigonous. Not common; occasional specimens found scattered throughout the area. *Flowers*: February-May; *Fruits*: Cold season; S.K.S. 734.

Loc. name: Aonla.

87. *Glochidion lanceolarium* Voigt. non. Dalz.

A small or medium-sized evergreen tree. Flowers pale-green, in axillary clusters. Capsule 2 cm in diam., orbicular, 6-8 lobed. Fairly common in Sal forest, chiefly in moist localities. *Flowers*: December-February; *Fruits*: Summer season; S.K.S. 729.

88. *Mallotus philippensis* (Lam.) Muell.-Arg.

A small tree. Flowers yellowish-brown, in spikes. Capsule 6-12 mm, 3 lobed, covered with a crimson powder. Seeds smooth, black. Abundant in Sal forest forming middle storey, along with *Alangium salvifolium* (Linn. f.) Wang., *Streblus asper* Lour., etc. *Flowers*: September-November; *Fruits*: March-May; S.K.S. 46.

Loc. name: Roina.

89. *Melanthesa rhamnoides* (Retz.) Bl. (*Breynia rhamnoides* Muell.-Arg.)

A small tree. Flowers greenish-yellow on filiform pedicels. Fruits 6 mm, smooth, dull-red or purple. Fairly abundant in mixed forest. The leaves are dark green above and pale beneath, turning black when dry. *Flowers and Fruits*: April-October; S.K.S. 69.

90. *Securinega virosa* (Roxb. ex Willd.) Pax & Hoffm. (*Fluggea microcarpa* Blume).

A small glabrous tree. Flowers greenish, small, in axillary fascicles. Fruits globose, white with a fleshy pericarp. Not very common; occasional plants seen in open forest. *Flowers and Fruits*: April-August; S.K.S. 974.

91. *Trewia polycarpa* Benth. (*T. nudiflora* Linn.)

A middle-sized deciduous tree. Flowers pale-green, dioecious. Male flowers in pendulous racemes. Female flowers solitary or

2-3 together. Fruits upto 3.5 cm in diam., drupaceous, green. Very common in swamp forest. The plant is often confused with *Gmelina arborea* Linn. *Flowers*: February-April; *Fruits*: Cold season; S.K.S. 245.

Loc. name: Bahlol.

39. BISCHOFIACEAE

92. *Bischofia javanica* Bl.

A large semi-deciduous tree. Flowers greenish, dioecious, in axillary paniced racemes. Fruits 6 mm, globose, berries, brown or black when ripe. Seeds 3-4, smooth. Very common in swamp forest. Leaves turn red before falling. *Flowers*: April-May; *Fruits*: Cold season; S.K.S. 908.

Loc. name: Mircha, Sahul.

40. ULMACEAE

93. *Celtis tetrandra* Roxb.

A medium-sized deciduous tree with drooping branches. Flowers yellowish-green, in axillary cymes. Drupe 7 mm long, ellipsoid, orange-red when ripe. Very common in mixed forest as a constituent of middle storey. Flowering starts with new leaves. *Flowers*: February-March; *Fruits*: October-November; S.K.S. 961.

94. *Holoptelea integrifolia* (Roxb.) Planch.

A large deciduous tree, buttressed at the base. Flowers greenish, in numerous fascicles on the leafless branches. Fruits 2.5 × 2 cm, samaroid, oval or orbicular; wing reticulately veined. Sporadically found in Sal forest. *Flowers*: February-March; *Fruits*: March-June; S.K.S. 969.

95. *Trema orientalis* (Linn.) Blume

A small tree with spreading branches. Flowers greenish, in axillary pubescent cymes. Drupes 3 mm, ovoid, black when ripe with persistent calyx. Frequently found along the river. *Flowers* and *Fruits*: Almost throughout the year; S.K.S. 184, 505.

41. MORACEAE

96. *Artocarpus lakoocha* Roxb.

A large deciduous tree. Flowers yellow, in axillary, sub-sessile heads. Male receptacles

2.5 cm long, spongy, caducous. Female receptacles 5-8 cm, lobulate, orange-red when ripe. Rare. Leaves turn bright red before falling. *Flowers*: March-April; *Fruits*: Rainy season; S.K.S. 911.

Loc. name: Barhal.

97. *Ficus benghalensis* Linn.

A large evergreen tree with numerous aerial roots from the branches. Receptacles upto 1.6 cm in diam., sessile, red when ripe. Fairly common throughout the area. *Receptacles*: March-July; S.K.S. 780.

Loc. name: Bargad.

98. *F. benjamina* Linn. var. *comosa* King

A large handsome, umbragenous tree with drooping branches and aerial roots. Receptacles 2.5 × 1.5 cm, solitary or paired, subsessile, orange-yellow when ripe. Very rare; only one tree seen in swamp forest. *Receptacles*: March-June; S.K.S. 628.

99. *F. hispida* Linn. f.

A moderate-sized tree with hollow branches. Receptacles 1-2.8 cm long, turbinate, in pairs from leaf axils (young branches) or in fascicles on leafless branches, greenish-yellow when ripe. Frequently found scattered throughout the area; chiefly in moist situations. *Receptacles*: Throughout the year; S.K.S. 166, 294, 365.

Loc. name: Kathgularia.

100. *F. racemosa* Linn. (*F. glomerata* Roxb.)

A large deciduous tree, buttressed at the base. Receptacles 3.2 × 3.5 cm, top-shaped, red or pink when ripe, clustered on leafless branches usually on main trunk. *Receptacles*: April-July; S.K.S. 580.

Loc. name: Gular.

101. *F. religiosa* Linn.

A large deciduous tree. Receptacles 10 × 8 mm, sessile, paired, dark-purple when ripe. Frequent throughout the area. *Receptacles*: April-May and August-November; S.K.S. 102.

102. *F. rumphii* Blume

A large deciduous tree. Receptacles 15 ×

14 mm, sessile, in axillary pairs, whitish with dark spots when ripe. Frequent in swamp forest, chiefly along the river, associated with *Barringtonia acutangula* Gaertn. and *Ficus racemosa* Linn. *Receptacles*: April-June; S.K.S. 466.

Loc. name: Gajahar.

103. *Ficus semicordata* Buch.-Ham. ex J. E. Smith (*F. cunea* Buch.-Ham. ex Roxb.)

A medium-sized or large tree with spreading branches. *Receptacles* 2 cm across, pyriform, verrucose, in pairs or fascicled on the base of trunk or on leafless paniced racemes, reddish-brown when ripe. Frequent in swamp forest. *Receptacles*: Throughout the year; S.K.S. 107.

104. *F. virens* Ait (*F. infectoria* Roxb. non Willd.)

A large deciduous tree with few aerial roots. *Receptacles* 6-10 × 6-8 mm, sessile, in axillary pairs, tubercled, white when ripe. Common throughout the area. *Receptacles*: August-October; S.K.S. 127.

105. *Morus alba* Linn.

A small deciduous tree. Flowers monoecious, on short ovoid spikes. Female spikes, purplish-black when ripe. Rare; only a few plants seen along Doma-road side. *Flowers*: February-March; *Fruits*: April-June; S.K.S. 919.

106. *Streblus asper* Lour.

A rigid, small, often gnarled, evergreen tree. Flowers yellowish-green, dioecious. *Fruits* 5 mm, globose, baccate, enclosed by the accrescent calyx, yellow when ripe. Abundant in grassland and in moist places. *Flowers*: February-April; *Fruits*: May-July; S.K.S. 951.

Loc. name: Singhore.

42. SALICACEAE

107. *Salix tetrasperma* Roxb.

A moderate-sized tree. Leaves 4-12 × 1-2.5 cm, oblong lanceolate, serrulate, green above, white beneath. Common along the river banks near 'Ledi bridge'. The plants are characterised by drooping, silky white

branchlets. The chief undergrowths are *Barringtonia acutangula* Gaertn., *Calamus tenuis* Roxb. and *Ficus heterophylla* Linn. f. S.K.S. 907.

43. PALMACEAE

108. *Phoenix sylvestris* (Linn.) Roxb.

A tall palm upto 15 m high with hemispherical crown. Trunk rough, covered with persistent petiole bases. Male flowers white. *Fruits* oblong-ellipsoid, orange-yellow. Very common in grasslands. *Flowers*: January-March; *Fruits*: April-June; S.K.S. 190.

44. GRAMINEAE

109. *Bambusa arundinacea* Retz.

A tall thorny bamboo. Culms 20-35 m high, 10-18 cm in diam., with almost leafless horizontal armed branches. Spikelets usually 5 in a cluster, 8-25 mm long, lanceolate. *Caryopsis* 5-8 × 2 mm, oblong. Gregarious in teak forest and grasslands. *Flowers* and *Fruits*: April-June; S.K.S. 494.

Loc. name: Bans.

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