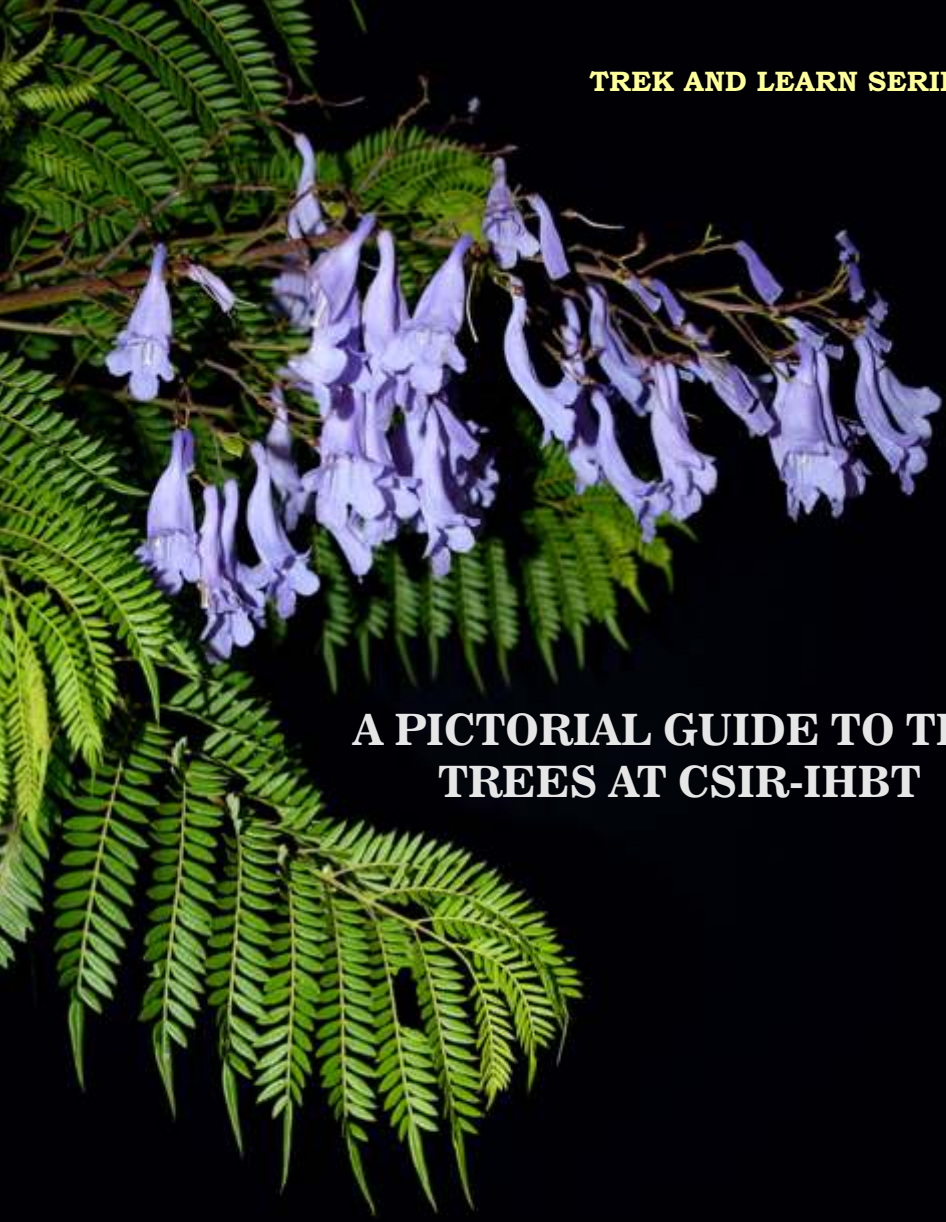
TREK AND LEARN SERIES



A PICTORIAL GUIDE TO THE TREES AT CSIR-IHBT

VIKAS KUMAR • OM PARKASH • BHAVYA BHARGAVA • SANJAY KR. UNIYAL

CSIR- INSTITUTE OF HIMALAYAN BIORESOURCE TECHNOLOGY
PALAMPUR-176061, HIMACHAL PRADESH
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Front :- *Jacaranda mimosifolia*
Back :- CSIR-IHBT Campus

DISCLAIMER

Information on medicinal uses provided in this publication is based on literature and is just for general awareness. It is not for prescribing remedies for any ailment. Please do not use it at home for treatment of any disease as it may have adverse effect on the body. It is recommended to seek advise from health care practitioners/professionals before using any plant.

FOREWORD

Loss of tree cover and rampant extraction of natural resources have adversely affected ecosystem health and sustainability. To combat this, the Green India Mission has been launched by the Government of India. The mission focuses on increasing the tree cover in the country and also on awareness creation.

Recognizing this, the CSIR-Institute of Himalayan Bioresource Technology is not only raising tree plantations but has also initiated publications under the "Trek and Learn Series". The series caters to highlighting the importance of common plant species occurring in our vicinity and garnering support for their conservation.

The present book entitled "***A Pictorial Guide to the Trees at CSIR-IHBT"*** is an addition to the publications under the "Trek and Learn series". The book presents information on 70 tree species that belong to 34 families. Amongst others, the important trees described in the book include *Cedrus deodara* (the state tree of Himachal Pradesh), *Cordia dichotoma* (Lasora), *Ginkgo biloba* (the living fossil), *Phyllanthus emblica* (Amla), *Prunus cerasoides* (Padam), *Putranjiva roxburghii* (Putranjeev), *Terminalia arjuna* (Arjun), *T. bellirica* (Baheda), and *T. chebula* (Harad).

The high quality photographs immensely add to the quality of book while the distribution maps provide locations of species distribution. Undoubtedly, the book would be of great help not only to the students and researchers but also to the common man.

This is an excellent effort towards awareness creation and science popularization. I congratulate the authors for the punctilious work done by them.

Date : 2nd July, 2020

Sanjay Kumar
Director
CSIR-IHBT Palampur

PREFACE

"वृक्षो रक्षति रक्षितः" *highlights the protective role of trees but for that we need to protect them too.*

Trees form an important component of the ecosystem that sustains life. While this is a common knowledge, we seem to have become oblivious of the same and are now realizing it the hard way. It is, therefore, no surprise that the best strategy to combating environmental disasters is increasing the green cover. Coming up of *urban forests*, green patches in built up areas, is a testimony to this.

It is also well known that we appreciate the beauty of what we know and what catches our eye. Thus, awareness creation through pictorial representation becomes important. This forms the basis of the book "***A Pictorial Guide to the Trees at CSIR-IHBT"*** and we are happy to note that you are reading it.

The book carries taxonomic characterization, vernacular names, flowering and fruiting season, and associated information on each of the 70 tree species present in the Institute. Uses of individual species are presented under the "notes" section. The highlight of the book is field photographs that depict the characteristics of the species. Further, the provided distribution map helps in locating species inside the campus.

Compilation of such a comprehensive pictorial guide would not have been possible without the help and support rendered by fellow colleagues. We express our sincere thanks to Dr. Sanjay Kumar, Director, CSIR-IHBT for encouragement and facilities. Thanks are due to Dr. Amit Kumar for helping us with the base map. Staff and faculty members of the Environmental Technology Division are thanked for their support in multiple ways. Ms. Alpy Sharma, Mr. Rohit Kumar and Mr. Puneet Kumar helped us with photographs and typesetting. We are grateful to Drs. Durgesh Verma, Virendra K. Madhukar, Dinesh S. Rawat and Sentu K. Dey for providing the images of *Santum album, Tabebuia rosea*, *Quercus oblongata*, *Alstonia scholaris,* respectively and to Mr(s). Deep S. Das, P. Murugan (BSI, Kolkata) for providing image of *Neolamarckia cadamba and Phyllanthus emblica*, respectively and to Mr. Prashant (efloraindia group) for providing images (fruits) of *Terminalia chebula*.

The National Mission on Himalayan Studies, G.B. Pant National Institute of Himalayan Environment, Ministry of Environment, Forest and Climate Change, is acknowledged for the financial assistance rendered through the project "Threatened life support tree species of the Himalayan region" that helped in publication of the book.

We sincerely hope that in these unprecedented times of COVID-19 when we are looking for solutions in nature, this book will surely help appreciating the bounty of nature and meet its intended purpose of science popularization.

Happy strolling, off course with the book in your hand!!

-The Authors-

ABBREVIATIONS USED

ca	About
diam.	Diameter
Eng.	English
Fl.	Flowering
Fr.	Fruiting
Hin.	Hindi
Loc.	Location
m	Meter
Qtrs.	Quarters
Sans.	Sanskrit
Vern.	Vernacular Name

CONTENTS

INTRODUCTION

Defining simple things, at times, becomes quite difficult. Generally, woody plants that have a distinct bole and a canopy are referred to as trees. Needless to say they support branches and bear leaves, flowers and fruits. The well-defined root system helps them in holding their ground. Importantly, Trees are pivotal to life on earth. Their loss is leading to habitat degradation and associated impacts. It has severely limited ecosystem functioning and therefore has necessitated greening programmes. This is reflected in the Green India Mission of the Government of India. While plantation programmes have been prioritized, the importance of maintaining green patches alongside concrete establishments has been emphasized. It is important to document the diversity of these patches for the overall conservation and management of resources. Also, these need to be popularized so that the masses are attracted towards the same and motivated to conserve them. It is with this background that the present book has been drafted. It focusses on the tree species at CSIR- Institute of Himalayan Bioresource Technology.

The Institute: Established in the year 1983 as *CSIR Complex* and rechristened as the *Institute of Himalayan Bioresource Technology* in the year 1997, the Institute is nestled in the lush green valley of Palampur with an overarching Dhauladhar mountain. CSIR-IHBT strives to develop technologies to boost bioeconomy through sustainable utilization of Himalayan bioresources that accrue benefits to the society, industry and environment. The campus of the Institute supports laboratories, residences, farms and fields. A substantial portion of it is still pristine and provides a breeding ground for biodiversity.

Tree species richness: The campus of CSIR-IHBT houses 70 tree species that are distributed in 34 families. Amongst the 34 families Cupressaceae, Euphorbiaceae, Moraceae, Myrtaceae, Rosaceae (each with 5 taxa) are the dominant ones. With regards to the genera, *Ficus* is the most species rich being represented by 4 species. Many of these tree species such as *Cedrus deodara*, *Juglans regia*, *Santalum album*, *Prunus cerasoides*, *Quercus oblongata, Taxus wallichiana* etc. have multiple utility and are of great conservation significance. The list of tree species occurring in the campus is provided in the table 1. In the subsequent pages, details of individual species per page has been provided.

Table 1: Statistics of the tree flora in the CSIR-IHBT

Sl. No.	Species	Family	Group
1.	*Agathis robusta*	Araucariaceae	Gymnosperm
2.	*Araucaria araucana*	Araucariaceae	Gymnosperm
3.	*Cedrus deodara*	Pinaceae	Gymnosperm
4.	*Cryptomeria japonica*	Cupressaceae	Gymnosperm
5.	*Cupressus funebris*	Cupressaceae	Gymnosperm
6.	*Cupressus sempervirens*	Cupressaceae	Gymnosperm
7.	*Ginkgo biloba*	Ginkgoaceae	Gymnosperm
8.	*Pinus roxburghii*	Pinaceae	Gymnosperm
9.	*Platycladus orientalis*	Cupressaceae	Gymnosperm
10.	*Podocarpus neriifolius*	Podocarpaceae	Gymnosperm
11.	*Taxodium distichum*	Cupressaceae	Gymnosperm
12.	*Taxus wallichiana*	Taxaceae	Gymnosperm
13.	*Albizia chinensis*	Fabaceae	Angiosperm
14.	*Alnus nepalensis*	Betulaceae	Angiosperm
15.	*Alstonia scholaris*	Apocynaceae	Angiosperm
16.	*Bauhinia variegata*	Caesalpiniaceae	Angiosperm
17.	*Callistemon citrinus*	Myrtaceae	Angiosperm
18.	*Celtis australis*	Ulmaceae	Angiosperm
19.	*Cinnamomum camphora*	Lauraceae	Angiosperm
20.	*Cordia dichotoma*	Boraginaceae	Angiosperm
21.	*Crataegus songarica*	Rosaceae	Angiosperm
22.	*Ehretia acuminata*	Boraginaceae	Angiosperm
23.	*Elaeocarpus sphaericus*	Elaeocarpaceae	Angiosperm
24.	*Eucalyptus citriodora*	Myrtaceae	Angiosperm
25.	*Eucalyptus youmanii*	Myrtaceae	Angiosperm
26.	*Ficus auriculata*	Moraceae	Angiosperm
27.	*Ficus palmata*	Moraceae	Angiosperm
28.	*Ficus religiosa*	Moraceae	Angiosperm
29.	*Ficus semicordata*	Moraceae	Angiosperm
30.	*Grevillea robusta*	Proteaceae	Angiosperm
31.	*Jacaranda mimosifolia*	Bignoniaceae	Angiosperm
32.	*Juglans regia*	Juglandaceae	Angiosperm
33.	*Lagerstroemia indica*	Lythraceae	Angiosperm
34.	*Litsea monopetala*	Lauraceae	Angiosperm
35.	*Lyonia ovalifolia*	Ericaceae	Angiosperm
36.	*Magnolia champaca*	Magnoliaceae	Angiosperm
37.	*Magnolia grandiflora*	Magnoliaceae	Angiosperm
38.	*Mallotus philippensis*	Euphorbiaceae	Angiosperm
39.	*Malus domestica*	Rosaceae	Angiosperm
40.	*Mangifera indica*	Anacardiaceae	Angiosperm

41.	*Melaleuca bracteata*	Myrtaceae	Angiosperm
42.	*Melia azedarach*	Meliaceae	Angiosperm
43.	*Morus alba*	Moraceae	Angiosperm
44.	*Murraya koenigii*	Rutaceae	Angiosperm
45.	*Neolamarckia cadamba*	Rubiaceae	Angiosperm
46.	*Persea odoratissima*	Lauraceae	Angiosperm
47.	*Phoenix sylvestris*	Arecaceae	Angiosperm
48.	*Phyllanthus emblica*	Euphorbiaceae	Angiosperm
49.	*Platanus orientalis*	Platanaceae	Angiosperm
50.	*Populus deltoides*	Salicaceae	Angiosperm
51.	*Prunus cerasoides*	Rosaceae	Angiosperm
52.	*Prunus persica*	Rosaceae	Angiosperm
53.	*Pterospermum acerifolium*	Sterculiaceae	Angiosperm
54.	*Putranjiva roxburghii*	Euphorbiaceae	Angiosperm
55.	*Pyrus pashia*	Rosaceae	Angiosperm
56.	*Quercus oblongata*	Fagaceae	Angiosperm
57.	*Salix alba*	Salicaceae	Angiosperm
58.	*Salix babylonica*	Salicaceae	Angiosperm
59.	*Santalum album*	Santalaceae	Angiosperm
60.	*Sapium sebiferum*	Euphorbiaceae	Angiosperm
61.	*Saraca asoca*	Caesalpiniaceae	Angiosperm
62.	*Syzygium cumini*	Myrtaceae	Angiosperm
63.	*Tabebuia rosea*	Bignoniaceae	Angiosperm
64.	*Tecoma stans*	Bignoniaceae	Angiosperm
65.	*Terminalia arjuna*	Combretaceae	Angiosperm
66.	*Terminalia bellirica*	Combretaceae	Angiosperm
67.	*Terminalia chebula*	Combretaceae	Angiosperm
68.	*Toona ciliata*	Meliaceae	Angiosperm
69.	*Vernicia fordii*	Euphorbiaceae	Angiosperm
70.	*Zanthoxylum armatum*	Rutaceae	Angiosperm

AGATHIS ROBUSTA (ARAUCARIACEAE)

Agathis robusta (C.Moore ex F.Muell.) F.M.Bailey, Syn. Queensl. Fl. 498 (1883).

Large straight, monoecious, evergreen tree up to 30 m tall. Bark thick, brown, scaly. Leaves leathery ovate or elliptical, opposite or subopposite, 5–12 cm long, 2–4 cm wide glossy dark green above, paler beneath, with parallel veins, margin thickened; petiolate. Male strobili, cylindrical, 5–10 cm long. Female cones sub-globose or ovoid. Seed flattened with a wing on one side

Vern.: Kauri Pine (Hin.); Queensland Kauri Pine, Smooth-barked Kauri (Eng.).

Fl. & Fr.: March-April.

Loc.: Near Tea Processing Unit.

Notes: Wood is used in making furniture, plywood, cabinet work, indoor fittings, boat building. Planted as an avenue tree.

Agathis robusta: a. Habit; b. Bark; c. Leaves; d. Location map.

ARAUCARIA ARAUCANA (ARAUCARIACEAE)

Araucaria araucana (Molina) K.Koch, Dendrologie 2(2): 206 (1873).

Evergreen tree, 30–40 m tall. Leaves thick, stiff, scale-like, triangular, broad at the base. Male cones solitary or in groups, erect, yellowish-brown, with 20 whorled scales; microsporophylls acute, recurved. Female cone globular, dark brown, maturing in 2–3 years, falling off at maturity, scales with a long triangular recurved point. Seeds bright brown to orangish, triangular, with a long narrow nut.

Vern.: Monkey Puzzle Tree (Eng.).

Fl.: June-July; *Fr.*: September-October.

Loc.: Director's Residence, Residential Avenue, Guest House, Institutional Avenue, near Library.

Notes: Seeds are consumed. Resin is used mainly for joinery and carpentry.

Araucaria araucana: a. Habit; b. Bark; c. Leaves; d. Location map.

CEDRUS DEODARA (PINACEAE)

Cedrus deodara (Roxb. ex D.Don) G.Don in Loudon, Hort. Brit. 2: 388 (1830).

Evergreen tree, up to 70 m tall. Bark fissured; branches spreading and pendulous branchlets. Leaves 2–5 cm long, linear, needle shaped at the end of branchlets. Male cones numerous, cylindrical, erect, 5–12 cm long. Female cones 7–12 cm long, erect, solitary, at the end of branchlets with numerous, thin, crustaceous bract scales.Young cones bluish-purple. Seeds triangular, wings longer than seeds.

Vern.: Deodar, Devdar, Diyar (Hin.); Deodar Cedar, Himalayan Cedar (Eng.).

Loc.: Institutional Avenue, Biodiversity Field, near Chandpur Lab.

Fl. & Fr.: September-December.

Notes: Highly prized timber. Wood is also used in fever, urinary infection, chest complaints; oil is used for skin ailments and ulcers.

Cedrus deodara: a. Habit; b. Bark; c. Leaves; d. Location map.

CRYPTOMERIA JAPONICA (CUPRESSACEAE)

Cryptomeria japonica D. Don, Trans. Linn. Soc. London 18(2): 167 (1839).

Tree, up to 40 m tall. Bark reddish brown, fibrous, peeling off in strips. Leaves awl-shaped, 1–2 cm, arranged spirally, subulate to linear, rigid. Monoecious. Pollen cones borne in racemes of 6–35, ovoid or ovoid-ellipsoid, each cone subtended by a leaf shorter than cone. Seed cones borne in groups of 1–6, globose or subglobose, cone scales 20–30, apex usually recurved.

Vern: Japanese Cedar, Sugi, Japanese Red Cedar (Eng.).

Fl. & Fr.: February-October.

Loc.: Biodiversity Field.

Notes: The leaves are very aromatic and are used as incense sticks. The wood is strongly rot resistant and is used for buildings, bridges, ships, lamp posts, furniture, utensils etc.

Cryptomeria japonica: a. Habit; b & c. Female cone; d. Location map.

CUPRESSUS FUNEBRIS (CUPRESSACEAE)

Cupressus funebris Endl., Syn. Conif. 58. (1847).
Tree, up to 30 m tall. Leaves densely appressed, scale-like, 2-kinds, ca 1.5 mm, apex pointed, bright or grey-green; facial pairs with a linear abaxial gland; lateral pairs folded face-to-face, overlapping basal part of facial pairs, ridged abaxially. Male cones ellipsoid or ovoid, 2. microsporophylls 10–14. Seeds 3-5 on each scale, globose, dark brown when ripe.
Vern.: Chinese Weeping Cypress (Eng.).
Fl. & Fr.: March -June.
Loc.: Guest House, near N.K. Jain Block, New Residential Colony.
Notes: The leaf is antiperiodic and used in the treatment of bleeding piles, excessive menstrual flow. Decoction of fruiting branches is used in the treatment of cold. Wood is used for cabinetwork, furniture, fine art articles, general construction, agricultural implements etc.

Cupressus funebris: a. Habit; b & c. Female cone; d. Location map.

CUPRESSUS SEMPERVIRENS (CUPRESSACEAE)

Cupressus sempervirens L., Sp. Pl. 2: 1002 (1753).
Evergreen tree, up to 25 m tall. Bark greyish brown, fissured; branches ascending or horizontally spreading; branchlets ultimate ones 4-angled. Leaves in 4 ranks, densely appressed, dark green, not glaucous, ridged abaxially, without a conspicuous abaxial gland, apex obtuse or subacute. Pollen cones 4–8 mm. Seed cones yellowish grey when ripe, subglobose or ellipsoid; cone scales 8-14, each fertile scale with 8–20 seeds.
Vern: Mediterranean Cypress, Italian Cypress, Persian Cypress, Pencil Pine (Eng.).
Fl. & Fr.: May-August.
Loc.: Near Pilot Plant, near N.K. Jain Block, Guest House.
Notes: The cones and young branches are anthelmintic, antipyretic, antirheumatic, balsamic and vasoconstrictor. Wood is fragrant, very hard, durable and is used for building uses, cabinet making and wardrobes.

Cupressus sempervirens: a. Habit; b & c. Female cone; d. Location map.

GINKGO BILOBA (GINKGOACEAE)

Ginkgo biloba L. Mant. Pl. 2 313, 1771; Thunb. Fl. Jap 358 (1784).

Deciduous tree, up 15 m tall. Bark greyish, furrowed on old tree. Leaves fan shaped, glossy green, leaf blade divided by a deep incision which cuts into two lobes. Male and female strobili on different tree. Male cones appear in catkin while ovules borne on a long, dichotomously branched peduncle. Seeds long pedunculate, pendulous, drupe-like.

Vern.: Maidenhair Tree (Eng.).

Fl. & Fr.: February-October.

Loc.: Near Scholars' Hostel, Pilot Plant, Institutional Avenue, Chandpur Farm.

Notes: It is used in China and Japan for making chess boards and chess men. The roasted seeds are eaten at feast and diminish the effect of drinking wine.

Ginkgo biloba: a. Habit; b & c. Leaves; d. Location map.

PINUS ROXBURGHII (PINACEAE)

Pinus roxburghii Sarg., Silva N. Amer. 11: 9 (1897).
Evergreen tree, up to 40 m tall. Bark reddish brown, corky exfoliating into scales when mature, rough, deeply fissured. Leaves needle-like dark or light-green, 3 in each bundle, on dwarf-shoots surrounded by persistent bud-scales. Male cones ovoid or cylindrical, yellow in colour, in dense terminal clusters, 1.5–2 cm long. Female cones solitary or 2–5 together; bract scales woody, with pyramidal, pointed or recurved beak.
Vern.: Chir, Cheel, Kulain (Hin.); Longleaf Indian Pine (Eng.).
Fl. & Fr.: March-June.
Loc.: Botanical Garden, near Tea processing unit, Store & Purchase, Scholars' hostel, Chandpur avenue.
Notes: Wood is used for construction and furniture; resin used for treating boils, gonorrhoea and inflammation.

Pinus roxburghii: a. Habit; b. Male cone; c. Fruits; d. Location map.

PLATYCLADUS ORIENTALIS (CUPRESSACEAE)

Platycladus orientalis (L.) Franco, Portugaliae Acta Biol., Sér. B, Sist. 33 (1949).

Small tree, 9–20 m tall. Bark reddish brown to light greyish brown, thin, flaking in long strips. Leaves persistent, scale-like, oppsoite. Male cones yellowish green, ovoid, 2–3 mm. Seed cones when immature bluish green, subglobose. Ripe cones reddish brown, subovoid, proximal 2 fertile cone scales 2-seeded, distal 2 fertile scales 1-seeded. Seeds greyish brown or purplish brown, ovoid or sub-ellipsoid.

Vern.: Morpankhi (Hin.); Oriental Thuja, Oriental Arborvitae (Eng.).

Fl.& Fr.: March-October.

Loc.: Near N.K. Jain Block, Guest House, P.S. Ahuja Block.

Notes: It is widely used as ornamental in garden. Decoction or the juice of the leaves is used to relieve all kinds of bleeding, gastric ulcers, gonorrhoea and colds.

Platycladus orientalis: a. Habit; b & c. Fruits; d. Location map.

PODOCARPUS NERIIFOLIUS (PODOCARPACEAE)

Podocarpus neriifolius D. Don, Descr. Pinus [Lambert] 2: 21 (1824).

Large, evergreen tree, up to 25 m tall with whorled branches. Bark greyish brown, thin, fibrous, peeling off in longitudinal flakes. Leaves sessile leathery, midvein prominent on surfaces, base cuneate, apex long. Male cones solitary or in clusters of 2 - 3, normally sessile, 2.5-5 cm, with several spirally arranged, basal bracts. Female cone solitary, axillary, single flowered. Receptacle orange-red when ripe, obconical-ellipsoid, base with 2 subulate bracts.

Vern.: Brown Pine, Oleander Podocarp (Eng.).

Fl.& Fr.: May- November.

Loc.: Near A.K. Gupta Block, P.S. Ahuja Block, Chandpur Lab.

Notes: Decoction of the leaves used in treatment of rheumatism and arthritis. The juice from the leaves is prepared as a remedy against maggot infested sores. Wood is used for general carpentry, boat making, furniture, musical instruments, carvings etc.

Podocarpus neriifolius: a. Habit; b & c. Leaves; d. Location map.

TAXODIUM DISTICHUM (CUPRESSACEAE)

Taxodium distichum (L.) Rich., Ann. Mus. Natl. Hist. Nat. 16: 298 (1810).

Deciduous tree, up to 40 m tall. Bark reddish-brown with long shallow cracks. Leaves spirally arranged, linear, pointed ca 1 cm long, light green. Male and female strobili appear on same tree. Male strobili stalked consisting of 6–8 stamens and surrounded at base by scales. Female strobili scattered, solitary or several together, consisting of numerous overlapping pointed bracts. Cones globose or obovoid, resinous, purplish.

Vern.: Bald Cypress, Swamp Cypress, White Cypress, Red Cypress (Eng.).

Fl.& Fr.: March- October.

Loc.: Near A.K. Gupta Block and near Director's Residence.

Notes: It is planted in parks and along the water course. It is also valued for its resistance to decay and termites. Wood is used in building construction, as fence posts, planking in boats, doors, blinds, flooring, shingles, caskets, interior trim and cabinetry.

Taxodium distichum: a. Habit; b & c. Fruits; d. Location map.

TAXUS WALLICHIANA (TAXACEAE)

Taxus wallichiana Zucc. in Abh., Math.- Phys. Cl. Kongl. Bayer. AKad. Wiss. 3: 803, t. 5 (1843).

Evergreen tree, up to 30 m high. Bark brownish to greyish brown. Leaves arranged spirally or in two opposite rows, 1-veined, dark green, linear, glossy-green above, pale beneath. Male cones solitary, axillary, globose, yellow; sporophylls 6–10, peltate. Female cones minute with single erect ovule, surrounded by a disc. Fruits succulent, ovoid, bright red, aril cup- shaped.

Vern.: Thuner, Brahmi (Hin.); Himalayan Yew (Eng.).

Fl. & Fr.: April-November.

Loc.: Botanical Field.

Notes: All parts are poisonous except aril. The plant yields "taxol" that is used for treating ovarian and breast cancer.

Taxus wallichiana: a. Habit; b Leaves; c. Inflorescence (male); d. Location map.

ALBIZIA CHINENSIS (FABACEAE)

Albizia chinensis (Osbeck.) Merr., Amer. J. Bot. 3: 575 (1916).

Deciduous tree, up to 30 m tall. Leaves compound, bi-pinnate, 16–20 cm long, pinnae 8–18 pairs; leaflets 20–40 pairs, linear-oblong, 5–10 × 2–4 mm, apex acute. Stipules cordate, ca 2.5 cm long, caducous. Inflorescence globose head, arranged in axillary or terminal panicle, pubescent. Flowers yellowish-grey. Calyx 4–5 mm long, pubescent. Corolla greenish-yellow, 2-3 times longer than calyx. Fruits pod, 10-18 cm long, linear, flat.

Vern.: Kala Siris, Siran (Hin.); Chinese Albizia (Eng.).

Fl.: March-May; *Fr.*: November-April.

Loc.: Near Gate no. 1, Tea Processing Unit, N.K. Jain Block, V.S. Rama Das Block, Chandpur Farm.

Notes: Wood is used for making packing cases. The plant is considered as one of the best shade trees in tea gardens.

Albizia chinensis: a. Habit; b & c. Inflorescence; d. Fruits; e. Location map.

ALNUS NEPALENSIS (BETULACEAE)

Alnus nepalensis D.Don, Prodr. Fl. Nepal. 58. (1825).
Deciduous tree, up to 35 m tall. Bark silvery grey. Leaves broadly ovate-elliptic, 8–18 × 6.5–8 cm, apex acuminate, margin sinuate-dentate, base rounded, falcate, minutely brown-glandular beneath; petioles 0.8–1.5 cm long. Male flowers borne in terminal catkins which are 5–18 cm long, green. Female flowers borne in ovoid cone, 1.2– 2 cm long. Fruits woody, cone-like.
Vern.: Utis, Ootis (Hin.); Himalayan Alder, Indian Alder, Nepalese Alder (Eng.).
Fl.: March-May; *Fr.*: November-April.
Loc.: Botanical Garden.
Notes: It is an excellent soil binder tree that is native to southeast Asia. It has root nodules that fix nitrogen. Leaves used as fodder. Tannin is obtained from bark.

Alnus nepalensis: a. Habit; b. Male Inflorescence; c. Female cone; d. Location map.

ALSTONIA SCHOLARIS (APOCYNACEAE)

Alstonia scholaris (L.) R.Br., Asclepiadeae 65 (1810).
Evergreen tree up to 20 m tall. Trunk lactiferous with rough, grey bark, branches whorled. Leaves simple, whorled, 4–7 in number, elliptic-lanceolate, elliptic-oblong, oblanceolate to obovate, 7–28 × 2–8 cm, apex obtuse to rounded, sometimes acute or retuse, margin entire, base cuneate to attenuate, shiny green above, pale green to white beneath. Flowers greenish white, aromatic. Calyx with 5 lobes; lobes ovate-lanceolate, hairy. Corolla with 5 lobes; lobes obovate, hairy. Stamens inserted. Pistils with 2 separate ovaries, hairy. Fruits follicles, up to 60 cm long, pendulous in cluster.
Vern.: Satvan, Chitvan (Hin.); Saptaparna (Sans.); Devil Tree (Eng.).
Fl.: April-May; *Fr.*: June-August.
Loc.: Botanical Garden, near A.K. Gupta Block, Type V Qtrs.
Notes: Infusion of bark is given for treating fever, chronic diarrhoea, dyspepsia, etc.

Alstonia scholaris: a. Habit; b. Leaves; c. Inflorescence; d. Location map.

BAUHINIA VARIEGATA (CAESALPINIACEAE)

Bauhinia variegata L., Sp. Pl. 1: 375 (1753).
Deciduous tree, up to 20 m tall. Bark thick, smooth, brownish-grey. Leaves broadly ovate to suborbicular, 5–18 cm across, apex deeply 1/5 to 3 clefts nearly up to middle, apex obtuse, base rounded-cordate; petioles 2–4 cm long. Inflorescence terminal or axillary raceme, 6–10-flowered. Flowers 4-5 cm long, white, purple, variegated. Calyx tubular, 2.5–3 cm long, entire, 5-toothed. Petals elliptic-obovate, 4–5 × 2.5–3 cm, claws ca 1.5 cm long, white, posterior one purple. Fertile stamens 5. Ovary glabrescent; stigma oblique, flat. Fruits pod, linear, 15–20 cm long, flat.
Vern.: Guira, Kuiral, Kachnar (Hin.); Variegated Bauhinia (Eng.).
Fl.: February-April; *Fr.*: May-August.
Loc.: Near Floriculture Extension, Pilot Plant Avenue.
Notes: Leaves are used as fodder. Fresh flowers eaten as vegetable, dried flowers used in cough and cold.

Bauhinia variegata: a. Habit; b. Inflorescence; c. Flower; d. Location map.

CALLISTEMON CITRINUS (MYRTACEAE)

Callistemon citrinus Skeels, Bull. Bur. Pl. Industr. U.S.D.A. 282, 49 (1913).

An evergreen, small, aromatic tree/large shrub up to 10 m tall. Bark rough with longitudinal fissures. Leaves thick coriaceous, alternate, linear-lanceolate, 4–8 × 0.5–1 cm, apex pointed, margin entire, base cuneate. Flowers dark red, densely arranged in terminal spikes. Calyx tube campanulate, ca 3 × 2.5 mm, woolly, white. Petals obovate. Stamens numerous, exserted, bright red. Fruit capsule woolly, cup-shaped.

Vern.: Lal Botal Brush, Laila Majnu (Hin.); Scarlet Bottle Brush, Lemon Bottle Brush, Red Bottle Brush (Eng.).

Fl.: April-July; *Fr.*: July-October.

Loc.: Throughout campus along road sides.

Notes: Native of E. Australia, widely planted as an avenue tree. Used in the treatment of diarrhoea, dysentery and rheumatism. It is also used as an insecticide.

Callistemon citrinus: a. Habit; b. Inflorescence; c. Fruits; d. Location map.

CELTIS AUSTRALIS (ULMACEAE)

Celtis australis L., Sp. Pl. 2: 1043 (1753).

Polygamous, deciduous tree, up to 25 m tall. Bark smooth, pale-grey or brownish. Leaves ovate-elliptic, 4–10 × 2–5.5 cm, apex acuminate, margin serrate, base rounded; petioles 7–15 mm long. Flowers greenish white, 4–5-merous; male flowers at base, female borne in axil of leaves. Perianth segment ovate, fringed, woolly. Stamens 4–5. Fruits drupe, ellipsoid, ca 5 mm long, purple-black.

Vern.: Nettle Wood, Mediterranean Hackberry, European Nettle Tree, Lote Tree, Honeyberry (Eng.).

Fl.: March-April; *Fr.*: September-October.

Loc.: Botanical Garden, near Guest House, Floriculture, Chandpur Avenue.

Notes: It is native to southern Europe, North Africa and Asia Minor. It is used as ornamental plants. Fruits are edible. Decoction of leaves and fruits is used in treating amenorrhoea.

Celtis australis: a. Habit; b & c. Inflorescence; d. Fruits; e. Location map.

CINNAMOMUM CAMPHORA (LAURACEAE)

Cinnamomum camphora (L.) J.Presl, Prir. Rostlin 2: 47 (-56, t. 8) (1825).

Evergreen tree, up to 25 m tall. Bark, rough, thick, brown, irregular longitudinally fissured. Leaves alternate, ovate-elliptic, 6–13 × 2.5–5 cm, apex acuminate, margin entire, undulate, base cuneate, camphor fragrance. Inflorescence axillary, panicle. Flowers ca 3 mm across, creamy, greenish-white. Perianth tube obconical, ca 1 mm, pubescent inside; lobes elliptic, ca 2 mm. Fertile stamens 9. Fruits ovoid or subglobose to ovoid, 6–8 mm in diam., purple-black.

Vern.: Kapoor (Hin.); Camphor tree (Eng.).

Fl.: April-May; *Fr.*: August-November.

Loc.: Gate no.1, Botanical Garden, Biodiversity Field, New Residential Colony, Chandpur Farm etc.

Notes: Camphor is obtained from wood chips. Volatile oil used as stimulant, antispasmodic and antiseptic. Widely planted as ornamental.

Cinnamomum camphora: a. Habit; b & c. Inflorescence; d. Location map.

CORDIA DICHOTOMA (BORAGINACEAE)

Cordia dichotoma G.Forst., Fl. Ins. Austr. 18, n. 110 (1786).

Deciduous tree, up to 15 m tall. Bark with vertical deep fissures, dark grey to brown. Leaves simple, alternate to subopposite, obovate-oblong or suborbicular, 7–13 × 3.5–10 cm, apex acute, margin sinuate-dentate, base cordate-rounded, slightly pubescent beneath. Flowers white, 0.5–1 cm across, in terminal or axillary cyme. Calyx campanulate, acrescent in fruits. Corolla tube lobed; lobes oblong, recurved. Fruits drupe, ovoid, 1.5–2 cm long with short apiculate, green becomes yellow-orange when ripe.

Vern.: Lasora (Hin.); Indian Cherry (Eng.).

Fl.: March-April; *Fr.*: May-July.

Loc.: Botanical Garden.

Notes: Plant is used in snake-bite. Fruits are used as astringent, anthelmintic, diuretic, expectorant and also in treatment of urinary infection, diseases of lungs and spleen. Fruit pulp used as gum.

Cordia dichotoma: a. Habit; b. Flowers; c. Fruits; d. Location map.

CRATAEGUS SONGARICA (ROSACEAE)

Crataegus songarica K. Koch, n Verh. Ver. Bef. Gartenb. 1(2): 287 (1853).

Small, armed tree, or large shrub, 4–5 m tall. Leaves simple, alternate, broadly ovate to rhomboidal, 3.5–6 × 2.5–5.2 cm, apex acute-acuminate, margin serrate and with 2–3 pairs of deep, oblong lobes, base cuneate. Inflorescence corymb. Flowers creamy white, ca 1.5 cm across. Calyx lobes 5; lobes ovate, 2–3 mm long. Petals broadly oblanceolate, 8 mm long, apex orbicular. Ovary pubescent apically, 2–3-loculed. Fruits pome, globose, rarely ellipsoid, 1.2–1.6 cm in diam, reddish-black.

Vern.: Ban-Sangli, Pandakh (Hin.); Indian Hawthorn (Eng.).

Fl.: April-May; *Fr.*: May-July.

Loc.: Chandpur Farm.

Notes: Planted as ornamental. Fruits are edible and considered as heart tonic.

Crataegus songarica: a. Habit; b. Leaves; c. Flowers; d. Fruits; e. Location map.

EHRETIA ACUMINATA (BORAGINACEAE)

Ehretia acuminata R.Br., Prodr. Fl. Nov. Holland. 497 (1810).

Deciduous tree, up to 15 m tall. Bark brown-grey with longitudinal cracks. Leaves elliptic-oblong, 5–15 × 2–5.5 cm, acuminate, margin serrated, base cuneate, glabrescent; petioles 1–2 cm long. Inflorescence terminal, paniculate, pubescent. Flowers many, ca 5 mm across, white, sweet fragrant. Calyx 5-lobed; lobes ovate, greenish white. Corolla about twice long as calyx, 5-lobed; lobes oblong, reflexed, white. Stamens 5, exserted. Fruits drupe, globose, ca 5 mm diam, orange.

Vern.: Pudila, Nara (Hin.); Kodowood (Eng.).

Fl.: March-April; *Fr.*: June-August.

Loc.: Scholars' Hostel, near Scientist Apartments, Guest House Avenue, N.J. Jain Block, Pilot Plant.

Notes: It is used as ornamental tree and also for timber.

Ehretia acuminata: a. Habit; b. Inflorescence; c. Flowers; d. Location map.

ELAEOCARPUS SPHAERICUS (ELAEOCARPACEAE)

Elaeocarpus sphaericus (Gaertn.) Ettingsh., Denkschr. Kaiserl. Akad. Wiss., Wien. Math.-Naturwiss. Kl. 47(Abth. 1): 140 (1883).

Evergreen tree, up to 20 m tall. Trunk with large spreading crown of leaves, bark coarsely textured. Leaves simple, alternate, elliptic, oblong-elliptic to oblong-obovate, 10–17 × 3–5 cm, apex acute to acuminate, margin indistinctly crenate-serrate to subentire, base cuneate, glabrescent, glands on lateral veins beneath. Flowers numerous, white. Sepals lanceolate, softly hairy. Petals oblong to obtriangular, fringed up to middle, margin and base pubescent. Fruits globose, up to 2 cm across, blue when mature.

Vern.: Rudraksh, Rudraki (Hin.); Utrasum Bead Tree, Woodenbager (Eng.).

Fl.: April-May; *Fr.*: June-August.

Loc.: Botanical Garden, A.K. Gupta Block, Type IV Qtrs.

Notes: It is considered as sacred tree. Fruits are edible and used as pickles. Seeds are used as beads in necklace.

Elaeocarpus sphaericus: a. Habit; b. Inflorescence; c. Fruit; d. Location map.

EUCALYPTUS CITRIODORA (MYRTACEAE)

Eucalyptus citriodora Hook, J. Exped. Trop. Australia [Mitchell] 235 (1848).

Evergreen tree, up to 30 m tall. Bark smooth, whitish-grey, peeling off in longitudinal strips. Leaves lanceolate, falcate, 14–22 × 3–4.5 cm, apex pointed, margin entire, base cuneate, oblique, surface gland dotted. Inflorescence terminal or axillary, 3-flowered umbels. Flowers appear white due to the stamens. Hypanthium ca 5 × 4 mm; operculum hemispheric, pointed. Stamens many in 2 whorls. Fruits capsule, ovoid-urceolate 10–15 × 8–10 mm long, brown with red dots.

Vern.: Safeda (Hin.); Lemon Scented Eucalyptus, (Eng.).

Fl. & Fr.: March-December.

Loc.: N.K. Jain Block, Botanical Garden, Biodiversity Field.

Notes: Essential oil is used in aroma therapy and also as insect repellant. Wood is used in construction. It is reported to be used as an antiseptic and fumigant.

Eucalyptus citriodora: a. Habit; b & c. Inflorescence; d. Location map.

EUCALYPTUS YOUMANII (MYRTACEAE)

Eucalyptus youmanii Blakely & McKie, Proc. Linn. Soc. New South Wales 55: 590 (1930).

Evergreen tree, up to 20 m tall. Bark rough, stringy, grey. Leaves ovate-lanceolate, 0.5–10 × 1.5–4 cm, apex acuminate, base cuneate, oblique, pale-green; petioles 0.7–1.8 cm long. Flowers terminal or axillary, 7-flowered umbels. Mature bud ovate or spindle-shaped, 0.6–1 cm long; operculum conical. Fruits capsule, 4–8 mm long, woody, semispherical, valves protruding.

Vern.: Youman's Stringybark, Large-fruited Stringybark (Eng.).

Fl. & Fr.: February-April.

Loc.: Botanical Garden, near Scholars' Hostel, near Guest House.

Notes: It is native to eastern Australia. Used as timber. Leaves are the source of rutin, a bioflavonoid, used in medicine and food industry.

Eucalyptus youmanii a. Habit; b. Bark; c. Inflorescence; d. Location map.

FICUS AURICULATA (MORACEAE)

Ficus auriculata Lour., Fl. Cochinch. 2: 666 (1790).
Deciduous tree, 5–10 m tall. Bark smooth, greyish. Leaves simple, alternate, broadly ovate-cordate, 12–35 × 10–25 cm, apex obtuse-mucronate, margins irregularly toothed, base cordate, glabrous or puberulent on veins above, softly pubescent beneath; petioles 7–10 cm. Figs borne on main trunk and leafless branchlets, sub-globose to pear-shaped, 2-3.5 cm diam., with 4-6 conspicuous longitudinal ridges, glabrescent, green becoming red when mature.
Vern.: Fagoora, Timla, Tirmal (Hin.); Roxburgh Fig, Elephant Ear Fig (Eng.).
Fl. & Fr.: March-June.
Loc.: Near Library, Biodiversity Field, New Resident Colony
Notes: Fruits are edible. Leaves are used as fodder. Unripe fruits are cooked in curries.

Ficus auriculata: a. Habit; b. Branch with fig and leaves; c. Figs; d. Location map.

FICUS PALMATA (MORACEAE)

Ficus palmata Forssk., Fl. Aegypt.-Arab. 179 (1775).
Deciduous tree, up to 12 m tall. Bark smooth, brownish-grey. Leaves simple, alternate, broadly ovate-suborbicular, 5–15 × 4–11 cm, apex acute, margin dentate-serrate, base cuneate-cordate, undivided or sometimes palmately lobed, scabrous above, tomentose beneath; petioles 1.2–2.8 cm long, pubescent. Figs usually solitary, occasionally paired, subglobose or pyriform, 0.8–2.5 cm long, pubescent, green turning purple-blue when mature.
Vern.: Phegra, Daghla, Anjir, Fagad (Hin.); Punjab Fig, Wild Fig (Eng.).
Fl. & Fr.: March-June.
Loc.: Scientist Apartments, Botanical Garden, near Floriculture Field, Chandpur Farm.
Notes: Fruits are edible. Fruits are used in constipation and disease of lungs and bladder. It is used as anti-inflammatory, humectant and purgative.

Ficus palmata: a. Habit; b. Leaves; c. Figs; d. Location map.

FICUS RELIGIOSA (MORACEAE)

Ficus religiosa L., Sp. Pl. 2: 1059 (1753).

Deciduous tree, up to 30 m tall. Bark yellowish to greyish brown, peels off when ages. Leaves simple, alternate, broadly ovate, suborbicular, triangular ovate or rhombic, 10–20 × 5–12 cm, long caudate-acuminate or abruptly acuminate, margin entire, undulate, truncate, rarely cordate or cuneate, waxy, shiny above, glabrous, with cystolith beneath; petioles up to 12 cm long. Figs borne in pairs at leaf axils, globose, up to 1.5 cm across, sessile, reddish to dark purple when mature.

Vern.: Peepal, Pipal (Hin.); Sacred Fig (Eng.).

Fl.: April-May; *Fr.*: May-September.

Loc.: Near N.K. Jain Block, New Residential Colony.

Notes: Bark is used as astringent. Leaves, young shoots and fruits are purgative.

Ficus religiosa: a. Habit; b. Leaves; c. Figs. d. Location map.

FICUS SEMICORDATA (MORACEAE)

Ficus semicordata Buch.-Ham. ex Sm., Cycl. (Rees) 14: Ficus n. 71 (1810).

Semi evergreen tree, up to 12 m tall. Bark dark grey, smooth. Leaves simple, alternate, elliptic, ovate-lanceolate to oblong-lanceolate, 12–31 × 4–12 cm, apex acuminate, margin entire or serrulate, base deeply obliquely cordate at one side and auriculate on another side, both surfaces hirsute, more so on lower surface, minute pappilae above; petioles up to 3 cm long. Figs in pairs or in clusters, borne on leafless branchlets near ground, globose to subglobose, up to 1.5 cm across, reddish purple when ripe.

Vern.: Khaina, Jharphali (Hin.); Drooping Fig (Eng.).

Fl.: May-June; *Fr.*: June-October.

Loc.: Botanical Garden.

Notes: Fruits are edible. Immature fruits are used in treating constipation and its paste is applied to relieve headache. Leaves used as fodder.

Ficus semicordata: a. Habit; b & c. Leaves; d. Location map.

GREVILLEA ROBUSTA (PROTEACEAE)

Grevillea robusta A. Cunn. ex R.Br., Suppl. Prodr. Fl. Nov. Holl. 24 (1830).

Evergreen straight tree, up to 25 m tall. Bark dark brown, rough, fissured longitudinally. Leaves alternate, pinnately compound; pinnae 12–24 cm long, dark green above, silky white beneath. Flowers bright yellow-orange, arranged in 10 cm long racemes. Perianth glabrous, tube ca 1.5 cm long, recurved, slightly down one side; limb ovoid with 4 revolute segments. Stamens 4, short. Ovary glabrous; style 1.5–2.5 cm long. Fruits 2-seeded follicles 1.5–2 cm long, black.

Vern.: Silver Oak, Silk Oak (Eng.).

Fl.: March-May; *Fr.*: June-August.

Loc.: Director Residence, near Floriculture Field, Scholars' Hostel, Chandpur Avenue.

Notes: Planted for landscaping. It is also used for timber. Flowers are a source of nectar. Wood is used for cabinet work.

Grevillea robusta: a. Habit; b & c. Inflorescence; d. Fruits; e. Location map.

JACARANDA MIMOSIFOLIA (BIGNONIACEAE)

Jacaranda mimosifolia D.Don, Bot. Reg. 8: t. 631 (1822). Deciduous tree, 6–12 m tall. Bark rough with shallow ridges, grey-white to brown. Leaves paripinnate compound, opposite; pinnae up to 20 pairs; leaflets elliptic to lanceolate, 0.5–2.5 × 0.2–0.5 cm, apex cuspidate, margin entire. Inflorescence paniculate. Flowers mauve or light blue. Calyx 2–3 mm long; lobes triangular, pubescent. Corolla funnel-shaped; lobes 2, pubescent. Fertile stamens ca 10. Fruits capsules orbicular, hard, green.

Vern.: Neeli Gulmohur (Hin.); Jacaranda, Blue Jacaranda, Black Poui, Fern Tree (Eng.).

Fl.: April-June; *Fr.*: July-October.

Loc.: Near Guest House, Chandpur Farm, Floriculture Field, Scholars' Hostel.

Notes: Planted for landscaping. Timber used in carpentry. Roots and barks are used in treating syphilis. Leaves are used in healing wounds.

Jacaranda mimosifolia: a. Habit; b. Inflorescence; c. Flower; d. Fruits; e. Location map.

JUGLANS REGIA (JUGLANDACEAE)

Juglans regia L., Sp. Pl. 2: 997 (1753).

Deciduous tree, 6–32 m tall. Bark grey, fissured longitudinally. Leaves alternate, imparipinnate; leaflets 7–13, oblong-lanceolate, 5–16 × 2.5–7 cm, apex acuminate, margin entire, undulate, base oblique. Flowers unisexual on different branches. Male flowers small, arranged in catkin of 7–15 cm long; stamens 10–40. Female flowers 1–3. Fruits drupe, globose to ovoid, 4–5 × 3–4 cm, enclosing large 2-valved, rugose nut, greenish with white dots.

Vern.: Akhror, Akhrot (Hin.), Common Walnut, Persian Walnut, English Walnut (Eng.).

FI.: March-April; *Fr.*: August-October.

Loc.: Scientists Apartments.

Notes: Wood used in making furniture. Fruit kernels are edible. Bark used for oral health care. Leaves are anthelmintic, anti-inflammatory, astringent etc.

Juglans regia: a. Habit; b. Fruit; c. Fruiting twigs; d. Location map.

LAGERSTROEMIA INDICA (LYTHRACEAE)

Lagerstroemia indica L., Syst. Nat., ed. 10. 2: 1076 (1759).

Small, deciduous tree or shrub, up to 6 m tall. Bark greyish brown, glabrous, branches angular, glabrescent. Leaves simple, alternate or opposite, ovate to obovate-oblong, 3–8 × 1.5–4 cm, apex obtuse or subacute, margin entire, base cuneate or rounded, glabrescent, subsessile. Flowers pink, sometimes purple, mauve or white, 4–6-merous. Calyx campanulate; lobes triangular. Petals long clawed, wrinkled. Fruits capsule, globose, up to 1 cm across.

Vern.: Sawani, Farash (Hin.); Common Crape Myrtle Tree (Eng.).

Fl.: March-July; *Fr.*: June-November.

Loc.: Institutional Avenue.

Notes: Roots are astringent and diuretic. Bark is used as febrifuge and stimulant. Decoction of flowers is used in treating cold.

Lagerstroemia indica: a. Habit; b & c. Inflorescence; d. Location map.

LITSEA MONOPETALA (LAURACEAE)

Litsea monopetala (Roxb.) Pers., Syn. Pl. [Persoon] 2(1): 4 (1806).

Semi deciduous or evergreen tree, up to 12 m tall. Bark dark grey, rough. Leaves broadly elliptic, 9–23 × 5–10 cm, apex obtuse or shortly apiculate, margin entire, base rounded, glabrous above, rusty tomentose beneath; petioles 1–2.5 cm long. Flowers dense in axillary umbel, ca 5 mm across, cream to pale-greenish. Perianth 5–6-parted, concave, creamy-white. Stamens 9–13, exserted, filaments hairy. Fruits ovoid, 5–8 mm long, black.

Vern.: Meda, Gwa, Jangli-rai-am, Singraf, Katmarra (Hin.).

Fl.: March-July; *Fr.*: July-November.

Loc.: Chandpur Farm, Floriculture Field.

Notes: It is used in silk-worm farming. It is also used for timber. Leaves are used topically for arthritis.

Litsea monopetala: a. Habit; b & c. Inflorescence; d. Location map.

LYONIA OVALIFOLIA (ERICACEAE)

Lyonia ovalifolia (Wall.) Drude, Nat. Pflanzenfam. [Engler & Prantl] 4 (1, lief. 37): 44 (1889).

Deciduous tree, up to 12 m high. Bark rough, peeling off in narrow strips, reddish-brown. Leaves alternate or subopposite, ovate, 10–15 × 5–7.5 cm, acuminate, margin entire, base rounded-cordate; petioles 0.5–1.5 cm long. Flowers many, 0.6–1.2 cm long, flask-shaped, arranged on 5–8 cm long racemes. Sepals small, triangular, 1.5–2.5 mm long, connate at the base. Corolla tubular, 0.8–1.2 cm long, white sometimes tinged with pink at apex, pubescent. Fruits capsule, globose, 4–6 mm in diam., glabrous, 5-valved.

Vern.: Anyar, Aiyaar (Hin.); Oval-Leaf Lyonia (Eng.).

Fl.: April-June; *Fr.*: July-November.

Loc.: Botanical Garden.

Notes: Leaves and buds are toxic. They have insecticidal properties.

Lyonia ovalifolia: a. Plant twig; b Flowers; c & d. Fruits; e. Location map.

MAGNOLIA CHAMPACA (MAGNOLIACEAE)

Magnolia champaca (L.) Baill. ex Pierre, Fl. Forest. Cochinch. t. 3. 1880.

Evergreen tree, up to 25 m tall. Bark thick, rusty dark grey. Leaves ovate-lanceolate to elliptic-lanceolate, 9–12 × 4–5 cm, apex acute-acuminate, base cuneate, pilose on lower midrib; lateral nerves 10–15 pairs; petioles up to 1 cm, yellow hairy. Flowers terminal, yellow fragrant, 7–10 cm across. Perianth 9, outer row obovoid, ca 4.5 × 1.5 cm, inner row weakly narrow. Stamens many, anthers ca 3 cm long. Gynoecium ca 7 mm long, carpel sessile. Fruit receptacles oblong, 7–10 cm long.

Vern.: Champa (Hin.); Yellow Jade Tree, Joy Perfume Tree (Eng.).

Fl.: March-May; *Fr.*: May-July.

Loc.: Gate no. 1., Botanical Garden, Biodiversity Field.

Notes: Wood used in cabinet and building works; also planted near temples as a sacred tree.

Magnolia champaca: a. Habit; b & c. Flower; d. Location map.

MAGNOLIA GRANDIFLORA (MAGNOLIACEAE)

Magnolia grandiflora L., Syst. Nat., ed. 10. 2: 1082 (1759).

Evergreen tree, 12–25 m tall. Bark thick, rusty dark grey. Leaves elliptic-oblong to obovate, acute-acuminate, base cuneate, 12–25 × 6–9 cm, tomentose beneath; petioles up to 1 cm, yellow hairy. Flowers terminal, solitary, creamy-white, fragrant, 15–25 cm across. Perianth 9–15, outer row broader, obovoid, 6–9 × 3.5–5 cm. Stamens many, ca 2 cm long, yellow. Fruit cone like in appearance, 7–10 cm long, covered with green scales.

Vern.: Him-Champa (Hin.); Southern Magnolia (Eng.).

Fl.: April-June; *Fr.*: July-October.

Loc.: Gate no. 1, near N.K. Jain Block, Botanical Garden, Director's Residence.

Notes: Planted as ornamental tree.

Magnolia grandiflora: a. Habit; b. Flower bud c. Flower; d. Location map.

MALLOTUS PHILIPPENSIS (EUPHORBIACEAE)

Mallotus philippensis (Lam.) Müll.Arg. in Linnaea 34: 196 (1865).

Dioecious, evergreen tree, up to 12 m tall. Bark thin, dark grey. Leaves rusty, coriaceous, ovate, 10–20 × 4–9 cm, apex acute-acuminate, margin entire, pubescent beneath, red gland dotted; petioles 2–8 cm long. Flowers yellow, unisexual. Male flowers clustered in terminal branched panicle. Stamens 20–30. Female flowers solitary; style 3, recurved, papillose. Fruits capsule, 3-lobed, 0.8–1.2 cm diam., with red glands.

Vern.: Kamala, Sinduri, Rohani, (Hin.); Monkey Face Tree (Eng.).

Fl.: October-December; *Fr.*: March-May.

Loc.: Botanical Garden.

Notes: Red dye obtained from fruits widely used for colouring silk and wool. Bark is used in typhoid and meningitis.

Mallotus philippensis: a. Habit; b & c. Fruits; d. Location map.

MALUS DOMESTICA (ROSACEAE)

Malus domestica (Suckow) Borkh., Theor. Prakt. Handb. Forstbot. 2: 1272 (1803).

Deciduous tree, up to 10 m tall. Bark greyish to purple-brown. Leaves alternate, elliptic-ovate, 4–12 × 2–5 cm, apex acute, margin serrate, base rounded, pubescent beneath; petioles 2–3 cm long. Inflorescence 4–6-flowered cyme. Flowers ca 5 cm across, white, flushed with pink. Calyx tube ca 5 mm long with triangular lobes, pubescent. Petals elliptic, 1–2 × 0.8–1.2 cm. Fruits pome, subglobose, 4–10 × 3–7 cm, green becoming yellowish-red when mature.

Vern.: Seb, Sev (Hin.); Apple (Eng.).

Fl.: March-April; *Fr.*: July-August.

Loc.: Chandpur Farm.

Notes: Planted as ornamental. Fruits are edible and considered as heart tonic.

Malus domestica: a. Habit; b. Leaves; c. Fruit; d. Location map.

MANGIFERA INDICA (ANACARDIACEAE)

Mangifera indica L., Sp. PI. 1: 200 (1753).
Evergreen tree, 10–35 m tall. Bark brown rough, with longitudinal cracks. Leaves alternate, oblong-lanceolate, 15–30 × 3.5–6.5 cm, acute-acuminate, margin entire, undulate; petioles 1.5–6 cm long. Inflorescence panicle, terminal, rarely axillary, pubescent. Flowers sweet fragrant; pedicel 1.5–3 mm long. Calyx 5-lobed; lobes ovate-lanceolate, tomentose. Petals 5, elliptic, tips reflexed, pale yellow with yellow, red-orange longitudinal stripes at base. Stamens 4-5, one fertile, rest sterile. Fruits drupes, ovoid-oblong to subreniform, weakly compressed laterally, fleshy with sweet juice.
Vern.: Aam (Hin.); Mango (Eng.).
Fl.: March-April; *Fr.*: July-August.
Loc.: Director's Residence, Type IV and V Qtrs.
Notes: Immature fruits are used for making chutney, mango powder, pickle etc. Seeds are used in treatment of diabetes. It is regarded as a sacred tree and used in religious ceremonies.

Mangifera indica: a. Habit; b Fruits; c. Fruits (close-up view); d. Location map.

MELALEUCA BRACTEATA (MYRTACEAE)

Melaleuca bracteata F.Muell., Fragm. (Mueller) 1(1): 15 (1858).

Evergreen tree or shrub, up to 15 m tall. Bark dark grey, rough; branches slender, pendulous. Leaves simple, spirally arranged, lanceolate to linear-lanceolate, 8–28 × 1–5 mm, apex acute-acuminate, margin entire, base cuneate, hairy above with oil glands, aromatic. Flowers numerous in clusters forming cylindrical spikes, white to creamy white. Petals caducous. Stamens numerous, exserted, white. Fruits capsule, ovoid or subglobose, ca 3 mm across.

Vern.: Golden Bottle Brush, Black Tea Tree (Eng.).

Fl.: February-April; *Fr.*: May-July.

Loc.: Near Tea Processing Unit, near Type V Qtrs.

Notes: It is used as ornamental tree. The essential oil from leaves and twigs is antiseptic.

Melaleuca bracteata: a. Habit; b & c. Inflorescence; d. Location map.

MELIA AZEDARACH (MELIACEAE)

Melia azedarach L., Sp. Pl. 1: 384 (1753).

Deciduous tree, up to 15 m tall. Leaves usually 2-pinnate, 40–90 cm long; leaflets 3–7 on each pinna, opposite or subopposite, ovate or elliptic, 3–5 × 1.2–2.5 cm, apex acuminate, margin serrate, base rounded, oblique. Inflorescence axillary, paniculate. Flowers lilac, sweet-scented. Calyx 5-lobed, ovate, ca 2 mm long, pubescent. Petals 5, oblanceolate, ca 8 × 1.8 mm, spreading, white or purplish. Staminal tube 0.5–1 cm long, 20–30-toothed, purple. Fruits drupe ovoid-ellipsoid, ca 1.2 cm diam., yellow.

Vern.: Bakain (Hin.); Persian Lilac, Chinaberry Tree (Eng.).

Fl.: March-May; *Fr.*: June-August.

Loc.: Chandpur Farm, Gate no. 1, Biodiversity Field.

Notes: Flowers and leaves applied as poultice to relieve headache. Seed used in treatment of rheumatism. Bark and leaves given in leprosy and scrofula.

Melia azedarach: a & b. Habit; c. Flowers; d. Location map.

MORUS ALBA (MORACEAE)

Morus alba L., Sp. Pl. 2: 986 (1753).
Monoecious, deciduous tree or large shrub, up to 10 m tall. Bark brown, rough; branchlets hairy. Leaves simple, alternate, ovate to broadly ovate, usually lobed, 4–9 × 1.5–6 cm, apex acute, margin dentate, base cordate, glabrous above, hairy beneath; petioles up to 3 cm long, hairy. Flowers on spikes, greenish. Male spikes almost twice as long as females. Female flowers dense; perianth 4, outer keeled, inner concaved. Fruits berry, clustered together, ovoid to oblong, white when ripe or reddish purple.
Vern.: Toot, Shahtoot (Hin.); White Mulberry (Eng.).
Fl.: February-March; *Fr.* April-May.
Loc.: Near Tea Processing Unit, near New Residential Colony.
Notes: It is used in silkworm farming. Fruits are edible. The roots, leaves and fruits are used in treating dizziness, insomnia and premature aging.

Morus alba: a. Habit; b & c. Fruits; d. Location map.

MURRAYA KOENIGII (RUTACEAE)

Murraya koenigii (L.) Sprengel, Syst. Veg. 2: 315. 1825.
Small tree, up to 6 m tall. Bark green or grey. Leaves pinnately compound, 20–50 cm long; petioles puberulent; leaflets subopposite-alternate, ovate-lanceolate, apex acute, margin minutely crenate, base cuneate. Inflorescence terminal, corymbs or paniculate ca 7 cm long. Flowers many, dense, greenish-white, fragrant. Calyx 5, ca 1 mm long, fused at base. Corolla ca 5, linear, obtuse, ca 5 mm long. Stamens 10, exserted. Fruits berries, subglobose, ca 9 × 10 mm, purple-black.
Vern: Kadi patta, Meethi Neem (Hin.); Curry Leaf Tree (Eng.).
Fl.: March-April; *Fr.*: May-June.
Loc.: Scientist Apartments, Botanical Garden.
Notes: Leaves used as a culinary ingredient and also consumed raw for treating dysentery. Vegetative parts are used as tonic, stomachic and carminative.


b


a


c


d

Murraya koenigii: a. Habit; b & c. Inflorescence; d. Location map.

NEOLAMARCKIA CADAMBA (RUBIACEAE)

Neolamarckia cadamba (Roxb.) Bosser, Bull. Mus. Natl. Hist. Nat., B, Adansonia Sér. 4, 6(3): 247 (1985).

Deciduous tree, up to 40 m tall. Bark grey with longitudinal fissures. Leaves simple, ovate to elliptic-oblong, 13–35 × 8–16 cm, apex bluntly acuminate, margin entire, base rounded; petioles 2–3 cm long. Flowers in heads of 3–5 cm diam., fragrant. Calyx ca 3 mm long. Corolla tube 0.8-1 cm long, pubescent, orange. Fruits minute, capsule compact together to form infructescence having 3–4 cm in diam.

Vern.: Kadamb, Cadam (Hin.); Burflower-tree, Wild Cinchona (Eng.).

Fl.: March-May; *Fr.*: July-September.

Loc.: Near Pilot Plant.

Notes: Wood used in construction. Bark and leaves used in fever and skin ailments. Decoction of leaves used in mouth ulcer. Flowers offered to Deities.

Neolamarckia cadamba: a. Habit; b. Bark; c. Fruit; d. Location map.

PERSEA ODORATISSIMA (LAURACEAE)

Persea odoratissima (Nees) Kosterm., J. Sci. Res. (Jakarta) 1: 116 (1952).

Evergreen tree, up to 15 m high. Bark brownish-grey. Leaves oblong-lanceolate, 5–16 × 2–4.5 cm, apex weakly acuminate, margin entire, base cuneate; petioles 1–2.5 cm long. Inflorescence panicle. Flowers pale-yellow, 5–8 mm across. Perianth segments lobes oblong, ca 5 mm long. Fruits ellipsoid, 1.2–1.8 cm long, supported by perianth, green, turning purplish-black when ripe.

Vern.: Fragrant Bay Tree (Eng.).

Fl.: February-March; *Fr.*: May-June.

Loc.: Botanical Garden.

Notes: Used in silkworm rearing. Leaves used as fodder. Red dye obtained from the bark. Wood used in making furniture and in construction work. Wood also used as sticking agent in incense.

Persea odoratissima: a. Habit; b. Fruits; c. Fruits (close-up view); d. Location map.

PHOENIX SYLVESTRIS (ARECACEAE)

Phoenix sylvestris (L.) Roxb., Fl. Ind. (Roxburgh) 3: 787 (1832).
Dioecious, evergreen tree, up to 15 m tall. Trunk greyish brown, covered with persistent leaf bases. Leaves pinnately compound, irregularly arranged, pinnae induplicate, stiff, 30–40 × 1–1.5 cm, apex acicular; leaf base modified into acanthophylls. Male flowers up to 40 cm long panicles, white, aromatic. Female flowers in large bunches; spathes up to 40 cm long. Fruits drupe, oblong, up to 3 cm long, fleshy, palatable, brownish red when ripe.
Vern.: Khajoor (Hin.); Wild Date Palm (Eng.).
Fl.: May-June; *Fr.*: September-October.
Loc.: Botanical Garden.
Notes: Fruits are edible. Juice from the tree is used as a cooling beverage.

Phoenix sylvestris: a. Habit; b. Spathe; c. Inflorescence; d. Location map.

PHYLLANTHUS EMBLICA (EUPHORBIACEAE)

Phyllanthus emblica L., Sp. Pl. 2: 982 (1753).
Monoecious, deciduous tree, up to 12 m tall. Trunk smooth with grey, scaly bark. Leaves simple, alternate, subsessile, linear-oblong, 5–15 × 1–4 mm, apex subacute or obtuse, margin entire, base rounded, glabrous, subsessile. Male and female flowers borne in same branch at leaf axils. Male flowers numerous, in clusters, short pedicelled, yellow; perianth with 6 lobes; stamens 3, filaments connate into short column. Female flowers few, sessile, borne above male flowers; perianth with 6 lobes; ovaries 3-chambered. Fruits capsule, globose, fleshy up to 2.5 cm across, greenish yellow.
Vern.: Anwala, Amla, Aola (Hin.); Ambliki (Sans.); Emblic Myrobalan (Eng.).
Fl.: February-April; *Fr.*: September-November.
Loc.: Botanical Garden.
Notes: Fruits edible. It is a strong anti-oxidant and used as anti-inflammatory, antiulcer, etc.

Phyllanthus emblica: a. Habit; b. Leaves; c. Fruits; d. Location map.

PLATANUS ORIENTALIS (PLATANACEAE)

Platanus orientalis L., Sp. Pl. 2: 999 (1753).

Deciduous tree, up to 25 m tall. Bark rough, flaking, greyish-brown. Leaves simple, alternate, palmate, 3–7-lobed, margin toothed, tomentose; petioles 3–8 cm long, tomentose. Flowers 4-merous, unisexual, crowded in ball-like heads, green. Male flowers: sepals short; stamens longer than petals. Female flowers with long styles. Infructescence 2–5, globose, 2–3 cm across, green, turning brown on maturity.

Vern.: Chinar (Hin.); Old World Sycamore, Oriental Plane, Plane Tree (Eng.).

Fl.: March-May; *Fr.*: May-October.

Loc.: Near Tea Processing Unit, Chandpur Farm.

Notes: It is the state tree of Jammu & Kashmir. Bark boiled in vinegar and is given in diarrhea, dysentery, hernia and toothache.

Platanus orientalis: a. Habit; b. Leaves; c. Fruits; d. Location map.

POPULUS DELTOIDES (SALICACEAE)

Populus deltoides W.Bartram ex Marshall, Arbust. Amer. 106 (1785).

Dioecious, deciduous tree, up to 55 m tall. Bark grey, crown large, spreading. Leaves simple, broadly triangular to ovate-cordate, 4–10 × 3.5–9 cm, apex acute to acuminate, margin coarsely crenate-serrate, base truncate to cordate or broadly cuneate, glandular, ciliate, glabrous above, nerves hairy beneath; petioles 5-12 cm long. Catkins loosely 15–40-flowered, arises from axil of leaves, appearing before the new leaves. Fruits capsule, ovoid 8-11 mm long, 4-valved, shortly stalked to subsessile.

Vern.: Popular (Hin.); Cottonwood Poplar (Eng.).

Fl.: March-April.; *Fr.*: May-June.

Loc.: Near N.K. Jain Block, Chandpur Avenue, New Residential Colony.

Notes: Wood is used in making match sticks and furniture.

Populus deltoides: a. Habit; b. Leaves; C. Fruits; d. Location map.

PRUNUS CERASOIDES (ROSACEAE)

Prunus cerasoides D. Don, Prodr. Fl. Nepal. 239 (1825). Deciduous tree, 5–15 m tall. Bark reddish-brown, peeling off in thin circular strips. Leaves elliptic to ovate-lanceolate, 3–12 × 2.5–5 cm, apex acuminate, margin simple or serrated, gland-tipped, base rounded-cuneate, glossy above, glabrous; petioles 1.2–2 cm long. Flowers 1–3, borne in umbellate fascicle, 1.5–2.5 cm across, pinkish-white. Calyx campanulate, ca 1 cm long; lobes ovate, acute. Petals obovate, 1.5–1.8 cm long. Fruits drupe, ovoid, up to 1.5 cm across, red or yellow.

Vern.: Panyyan, Phaja, Padam (Hin.); Himalayan Wild Cherry (Eng.).

Fl.: October-December; *Fr.*: February-March.

Loc.: Botanical Garden, Biodiversity Field, Chandpur Avenue.

Notes: Stem is anti-pyretic. Bark is applied on body swellings. Fruits are edible. Kernel used in treating stones in urinary bladder.

Prunus cerasoides: a. Habit; b. Flowers; c. Fruits; d. Location map.

PRUNUS PERSICA (ROSACEAE]

Prunus persica (L.) Batsch, Beytr. Entw. Gewächsreich 30 (1801).

Deciduous tree, up to 10 m tall. Bark grey, silvery gloss, cracked. Leaves simple, alternate, lanceolate, oblong-lanceolate, 7–15 × 2–4 cm, apex acuminate, margin serrate, base rounded to broadly cuneate; petioles, 8–12 mm long, with or without 1–4 nectaries. Flowers solitary, 1.5–3.5 cm across, pinkish-white. Calyx campanulate, 5–6 mm long; lobes ovate to oblong, obtuse, subglabrous. Petals oblong-elliptic to obovate, 1–2 × ca 1 cm. Stamens many, anthers purplish red. Fruits drupe, globose, ovoid, broadly ellipsoid, 5–7 cm across, rusty pubescent, fleshy, sweet, greenish white to orange with red tinge; seeds 1 or rarely 2.

Vern.: Aaru (Hin.); Peach (Eng.).

Fl.: March-April *Fr.*: April-July.

Loc.: Botanical Garden, near Store & Purchase, Floriculture Field.

Notes: Fruits edible. It is used in treatment of gastritis, whooping cough and bronchitis.

Prunus persica: a. Habit; b. Flowers; c. Fruit; d. Location map.

PTEROSPERMUM ACERIFOLIUM (STERCULIACEAE)

Pterospermum acerifolium (L.) Willd., Sp. Pl., ed. 4 [Willdenow] 3(1): 729 (1800).

Deciduous tree, up to 30 m tall. Bark grey or greyish brown, rough, cracked. Leaves simple, alternate, variable in shape and size, almost broadly ovate to suborbicular, irregularly lobed or not, up to 40 cm across, truncate, usually abruptly acuminate, margin irregularly coarsely toothed, cordate or peltate. Flowers solitary or 2–3-flowered, axillary, white, aromatic. Calyx lobes 5; lobes linear, villous, white, turning rusty yellow. Petals 5, linear to narrowly obovate. Fruits capsules up to 15 cm long, woody, 5-angled, rusty brown tomentose, warted.

Vern.: Kanak Champa (Hin.); Maple-leaved Bayur, Bayur (Eng.)

Fl.: March-June; *Fr.*: September-December.

Loc.: Chandpur Avenue, New Residential Colony.

Notes: Flowers are used as general tonic.

Pterospermum acerifolium: a. Habit; b. Flowers; c. Fruits; d. Location map.

PUTRANJIVA ROXBURGHII (EUPHORBIACEAE)

Putranjiva roxburghii (Wall.) Hurusawa in J. Fac. Sci. Univ. Tokyo Bot. 6: 337 (1954).

Usually dioecious, evergreen tree, up to 15 m tall. Bark with horizontal lenticels, dark grey; branches pendulous. Leaves simple, alternate, elliptic-oblong to narrowly ovate, 4–10 × 2–5 cm, apex acute or acuminate, margin indistinctly serrulate, base cuneate, waxy, shiny, dark green above, glabrous. Male flowers numerous, in cluster, axillary, short-pedicelled, greenish yellow. Female flowers few, axillary, long-pedicelled, greenish-yellow. Perianth 3–5-lobed; stamens 3, almost connate at base; ovary 3-chambered, hairy. Fruits drupes, globose or ovoid, up to 2 cm across, white-tomentose.

Vern.: Pitmar, Putranjeev, Jiyapeeta (Hin.); Indian Amulet Tree (Eng.)

Fl.: March-May: *Fr.*: February-March.

Loc.: Near Store & Purchase, Botanical Garden.

Notes: Powdered leaves are given with milk to improve fertility in humans.

Putranjiva roxburghii: a. Flowering twig; b & c. Inflorescence; d. Location map.

PYRUS PASHIA (ROSACEAE)

Pyrus pashia Buch.-Ham. ex D.Don, Prodr. Fl. Nep. 236 (1825).

Deciduous tree, 5–15 m tall. Bark grey, coarse; branches armed. Leaves simple, ovate, narrowly ovate or ovate-lanceolate, 4.5–10 × 2–5 cm, apex acuminate, margin crenate or obtusely serrate, base rounded; petioles 1.5–3.5 cm long, glabrescent. Flowers white, tinged-brownish, 0.8–5 cm across cm across; pedicels 1.2–4.5 cm long, pubescent to glabrescent. Calyx tube campanulate, 3–6 mm long; lobes ovate to triangular, acute to acuminate, margin entire, woolly. Petals obovate to obovate-orbicular, 8–15 × 4–9 mm, apex rounded, white. Fruits pome, globose to subglobose, 1.5–2 cm in diam., fleshy, yellowish-brown, with white dots.

Vern.: Kainth, Chotia, Kainth, Shegal, Mahal Mol (Hin.); Wild Himalayan Pear (Eng.).

Fl.: February-March; *Fr.*: May-December.

Loc.: Chandpur Avenue, Floriculture Field.

Notes: Leaves are used as fodder. Fruits are edible and juice is used in diarrhoea. Wood is also used in making walking sticks.

Pyrus pashia: a. Habit (fl.); b. Habit; c. Inflorescence; d. Location map.

QUERCUS OBLONGATA (FAGACEAE)

Quercus oblongata D. Don, Prodr. Fl. Nepal. 57 (1825). Monoecious, evergreen to semi-evergreen tree, up to 40 m tall. Bark grey to dark grey, cracked. Leaves simple, alternate in cluster, elliptic-lanceolate to oblong-lanceolate, 7–25 × 2–14 cm, apex acute to subacuminate, margin coarsely serrate, base cuneate, glabrous above, finely grey tomentose beneath. Male catkins, up to 10 cm long, pubescent, pale white. Female flowers solitary or in cluster; cupules covering lower half of acorn. Fruits acorn, ovoid-ellipsoid, up to 1.5 cm across, hairy when young, shiny brown when matures.

Vern.: Banjh, Ban (Hin.); Vari, Ring (Him.); White Oak (Eng.).

Fl.: March-June; *Fr.*: September-December.

Loc.: Chandpur Farm, Botanical Garden, Biodiversity Field.

Notes: Seeds are diuretic and astringent. Also used in treating gonorrhea, indigestion, etc.

Quercus oblongata: a. Habit; b. Bark; c. Leaves; d. Location map.

SALIX ALBA (SALICACEAE)

Salix alba L., Sp. Pl. 2: 1021 (1753).

Dioecious, deciduous tree, up to 30 m tall. Bark grey, deeply cracked when matures. Leaves simple, alternate, lanceolate, oblanceolate or obovate-lanceolate, 5–15 × 1–3.5 cm, apex acuminate, margin serrulate, base cuneate, usually glabrous above, tomentose beneath. Male catkins 3–5 cm long, glandular; stamens 2, free, anther yellow. Female catkins 3–4.5 cm long, glandular; ovary ovoid–conical, up to 5 mm across. Fruits capsule, 7–10 mm long, dry.

Vern.: Bod, Bains (Hin.); White Willow (Eng.).

Fl.: April-May; *Fr.*: May.

Loc.: Botanical Garden, Store & Purchase.

Notes: Leaves and bark are used for treating fever, dyspepsia, joint pain, rheumatism, arthritis, gout, immune diseases and headache.

Salix alba: a. Habit; b. Inflorescence; c. Fruits; d. Location map.

SALIX BABYLONICA (SALICACEAE)

Salix babylonica L., Sp. PI. 1017. (1753).
Dioecious, evergreen to semi-deciduous tree, up to 15 m tall. Trunk stout, branches pendulous, weeping with broad rounded crown, glabrous. Leaves simple, alternate, spirally arranged, lanceolate to linear-lanceolate, 4–14 × 1–2 cm, apex acuminate, margin serrate-serrulate, base cuneate, glabrous, deep green above, greyish-glaucous beneath; mid-vein pale white; petioles up to 1 cm long. Male and female flowers are borne in catkins. Male catkins terete, curved up to 3 cm long, appearing golden-yellow. Female catkins pendulous, up to 2.5 cm long. Fruits capsule, sessile.
Vern.: Majnu (Hin.); Weeping Willow, Babylon Weeping Willow (Eng.).
Fl.: February-April; *Fr.* May-July.
Loc.: Near Scientist Apartments, Guest House, Director's Residence.
Notes: It is used as an ornamental plant.

Salix babylonica: a. Habit; b. Bark; c. Inflorescence; d. Location map.

SANTALUM ALBUM (SANTALACEAE)

Santalum album L., Sp. Pl. 1: 349 (1753).

Small, evergreen tree, up to 5 m tall. Bark rough, cracked, reddish or dark brown. Leaves ovate or elliptic-lanceolate, 3–8 × 3–5 cm, apex acute, margin entire, base rounded; petioles ca 2 cm long. Flowers purple-brown, axillary or terminal paniculate cymes. Perianth 5, basally connate into a campanulate tube of 2 mm long; lobes short, ovate. Fruits drupe, globose, ca 1 cm across, red, purple, turning black when ripe.

Vern.: Chandan (Hin.); Indian Sandalwood Tree, White Sandal Tree (Eng.).

Fl.: March-April; *Fr.*: November-December.

Loc.: Near Gate no. 1.

Notes: Source of aromatic oil. Traditionally, it is used in skin disease, diarrhoea, gonorrhea, piles, vomiting, jaundice and as blood purifier.

Santalum album: a & b. Flowering twig; c. Flowers; d. Location map.

SAPIUM SEBIFERUM (EUPHORBIACEAE)

Sapium sebiferum (L.) Dum. Cours., Bot. Cult. 3: 651 (1802).

Small, deciduous tree, 5–10 m tall. Bark rough with longitudinal cracks, greyish. Leaves orbicular-ovate or sub-rhombic, 3.5–8 cm long, apex acuminate, margin entire; petioles 1.2–3.5 cm long. Raceme terminal, spike-like, 5–10 cm long. Male flowers in clusters of 10–15 flowers, ca 0.25 cm across. Perianth unequally 4-lobed, cupular, yellow; anthers large. Female flower solitary, longer than male flowers. Perianth 3-lobed, ovate; ovary narrowed into a stout style. Capsules ca 9 × 11 mm, trilobed, apiculate, shallowly 6-ridged.

Vern.: Pahadi Shisham (Hin.); Chinese Tallow-Tree (Eng.).

Fl.: May-July; *Fr.*: June-October.

Loc.: Near Guest House, Store & Purchase, Chandpur Avenue.

Notes: The wax around seeds is frequently used for making candles in China.

Sapium sebiferum: a. Habit; b. Inflorescence; c. Fruit (dehisced); d. Location map.

SARACA ASOCA (CAESALPINIACEAE)

Saraca asoca (Roxb.) DeWilde in Blumea 15: 393 (1968). Evergreen tree, up to 15 m tall. Bark smooth, grey-brown. Leaves paripinnate compound, alternate, oblong to oblong-lanceolate, leaflets 4–20 pairs, 12–25 × 5–8 cm, apex acute to obtuse, margin entire to undulate, base cuneate to cuneate-rounded. Flowers yellowish orange to crimson borne in corymbs, aromatic. Calyx petaloid, funnel-shaped with long tube; lobes 4, obovate. Stamens exserted, lower half white, upper half crimson. Fruits pods, up to 12 cm long.

Vern.: Ashok, Sita Ashok (Hin.); Ashok Tree (Eng.).

Fl.: April-May; *Fr.*: November-December.

Loc.: Botanical Garden, New Residential Colony.

Notes: Bark is used in treatment of menorrhagia, leucorrhoea, irregular menstrual cycle, uterine disorders, back pain etc. Flowers are used as cardiac and brain tonic.

Saraca asoca: a. Habit; b. Flowering twig; c. Inflorescence; d. Location map.

SYZYGIUM CUMINI (MYRTACEAE)

Syzygium cumini (L.) Skeels, Bull. Bur. Pl. Industr. U.S.D.A. 25: 248 (1912).

Deciduous tree, up to 25 m tall. Bark smooth, greyish brown. Leaves lanceolate, elliptic to ovate-oblong, 7–13 × 3–6 cm, apex acuminate, margin entire, base subcuneate, paler beneath, aromatic; petioles 1.5–2 cm long. Flowers sessile, 0.5–1 cm across, greenish-white, borne in axil of older leaves. Calyx campanulate, contracted into a stalk like base; limb 4-lobed. Petals 4, orbicular. Fruits oblong or ovoid-oblong, ca 1 × 0.5 cm, dark-purple, becoming black when ripe.

Vern.: Jamun (Hin.); Java Plum, Black Plum (Eng.).

Fl.: March-May; *Fr.*: June-July.

Loc.: Chandpur Lab, Botanical Garden.

Notes: Fruits are sweet and edible. Bark is used in treatment of sore throat, bronchitis, asthma, thirst, biliousness, dysentery and ulcers. Seed and bark powders are given in diabetes.

Syzygium cumini: a. Habit; b & c. Flowering twig; d. Location map.

TABEBUIA ROSEA (BIGNONIACEAE)

Tabebuia rosea (Bertol.) DC., Prodr. 9: 215 (1845).
Tree, 12–30 m tall. Bark vertically fissured, dark grey. Leaves palmately 5-foliolate; petioles 5–32 cm long; leaflets 7–15 × 3–6 cm, elliptic to oblong-ovate, while terminal leaflets larger, apex acute to acuminate, margin entire, base cuneate to rounded. Inflorescence sub-umbellate to panicle of 5–15 flowers. Flowers 7–12 cm long, rosy pink, flowering when leafless. Calyx campanulate, bilabiate, 1.6–1.8 cm long, pubescent. Corolla 6–10 cm long, rosy-pink. Stamens didynamous. Fruits capsule, linear cylindric, 20–40 × 1.0–1.5 cm, tomentose.
Vern.: Basant Rani (Hin.); Salvador Pink Trumpet Tree (Eng.).
Fl. & Fr.: December–March.
Location: Near Floriculture Field.
Notes: Bark used as diuretic, antipyretic; fruits diuretic, peel as hypnotonic. Planted as an avenue tree.

Tabebuia rosea: a. Habit; b. Leaves; c. Flowering; d. Location map.

TECOMA STANS (BIGNONIACEAE)

Tecoma stans (L.) Kunth, Nov. Gen. Sp. [H.B.K.] 3(10): 144 (ed. qto.) (1819).

Small tree or large shrub, 4–8 m tall. Leaves compound, opposite with 3–7 pinnae; leaflets ovate-elliptic or lanceolate, acuminate, margin serrate, slightly pilose on veins beneath. Flowers campanulate, 4–5 cm long, terminal corymbose panicle, bright yellow. Calyx tube ca 5 mm long, lobed; lobes triangular, acuminate, pubescent on margin. Corolla campanulate, fragrant; tube ca 4 cm long, lobes suborbicular. Stamens 1.5–2 cm long. Fruits capsule, 14–18 cm long, flat, tapering at both end.

Vern.: Piliya (Hin.); Yellow Trumpet, Yellow-Elder, Yellow Bells (Eng.).

Fl. & Fr.: Almost throughout the year.

Loc.: Botanical Garden.

Notes: Leaves are used for treating diabetes and urinary disorder. Roots are used as diuretic and vermifuge.

Tecoma stans: a. Habit; b. Inflorescence; c. Flowers; d. Location map.

TERMINALIA ARJUNA (COMBRETACEAE)

Terminalia arjuna (Roxb. ex DC.) Wight & Arn., Prodr. Fl. Ind. Orient. 1: 314 (477) (1834).

Deciduous tree, up to 30 m tall. Bark whitish grey to pinkish grey, thin, smooth. Leaves simple, sub-opposite, oblong, oblong-elliptic to elliptic, 10–20 × 4–8 cm, acute or sub-obtuse, margin entire, obliquely rounded to shallowly cordate, glabrous, 1–2 glands beneath. Flowers numerous in panicled-spike, sessile, white. Calyx lobes triangular-ovate. Stamens 10, exserted. Fruits drupe, ovoid to obovoid-oblong, up to 5 cm across, fibrous-woody.

Vern.: Arjun (Hin.); Arjun Tree (Eng.).

Fl.: March-May; *Fr.*: November-December.

Loc.: Botanical Garden.

Notes: Bark is used as cardio tonic, astringent, aphrodisiac, wound healing and expectorant etc. Bark ashes also prescribed for snakebite and scorpion sting.


a


b


c


d

Terminalia arjuna: a. Habit; b. Inflorescence; c. Fruits; d. Location map.

TERMINALIA BELLIRICA (COMBREATACEAE)

Terminalia bellirica (Gaertn.) Roxb., Pl. Coromandel 2(4): 54. t. 198 (1805).

Deciduous tree, up to 30 m tall. Bark grey or light brown, thick, shallowly cracked. Leaves simple, alternate, ovate to elliptic-ovate, 9–28 × 3–14 cm, apex subacute to acuminate or emarginate, margin entire or undulate, base unequally cuneate, glabrescent; petioles up to 4 cm long. Flowers in spikes, sessile, solitary, extra-axillary, greenish yellow. Calyx lobes triangular-ovate, velutinous inside. Petals absent. Stamens exserted. Fruits drupe, ovoid, obovoid or flask-shaped, up to 4 cm long, greyish brown, velutinous.

Vern.: Baheda, Bhaira (Hin.); Beleric Myrobalan (Eng.).

Fl.: April-June; *Fr.* June-July.

Loc.: Botanical Garden.

Notes: Fruits are one of the ingredients in 'Triphala', an Ayurvedic medicine and also in preparation of ink. Wood used as fuel and also in construction.

Terminalia bellirica: a. Habit; b. Flowering twig; c. Inflorescence; d. Location map.

TERMINALIA CHEBULA (COMBRETACEAE)

Terminalia chebula Retz., Observ. Bot. (Retzius) 5: 31 (1788).

Deciduous tree, up to 30 m tall. Bark dark brown, copious, scaly. Leaves simple, sub-opposite, oblong-ovate, ovate or elliptic-ovate, 7–25 × 2–10 cm, apex acute, margin entire, base obliquely sub-cuneate to rounded, glabrescent, green above, pale green beneath; petioles glandular at apex. Flowers numerous in panicled-spike, sessile, aromatic, creamy white. Calyx lobes triangular-ovate, rusty tomentose inside. Stamens 10, in 2 whorls, exserted. Fruits drupe, obovoid, up to 3.5 cm across, glabrous, pale green.

Vern.: Harara, Harad, Harra (Hin.); Haritaki (Sans.); Black or Chebulic Myrobalan (Eng.).

Fl.: April-June; *Fr.*: January-March.

Loc.: Botanical Garden.

Notes: Fruit is antiseptic, astringent, cardiotonic, diuretic, and febrifuge in action. It is one of the ingredients in 'Triphala', an Ayurvedic formulation.

Terminalia chebula: a. Habit; b. Bark; c. Fruits; d. Location map.

TOONA CILIATA (MELIACEAE)

Toona ciliata M.Roem., Fam. Nat. Syn. Monogr. 1: 139 (1846).

Deciduous tree, 20–30 m tall. Bark thin, rough, dark grey to reddish brown. Leaves usually paripinnate, 40–70 cm long; leaflets (3–)6–10 pairs, ovate-lanceolate, 11–12 × 3.5–4 cm, apex acuminate, base obliquely rounded. Inflorescence panicle, 40–45 cm long, sparsely pubescent. Flowers unisexual, greenish or creamy yellow. Sepals 5, ovate, ca 0.8 mm, pubescent. Petals 5, ovate-oblong, 3.5–5 × 2–2.5 mm, free. Stamens 5. Ovary 5-locular, weakly imbedded in disk. Capsule ovate-oblong, 1.5–3 cm long.

Vern.: Tun, Toona (Hin.); Red Cedar (Eng.).

Fl.: November-March; *Fr.*: June-August.

Loc.: Near Gate no. 1, Botanical Garden, Chandpur Avenue.

Notes: Wood used in making furniture. Bark powder is used as astringent, antiperiodic and febrifuge.

Toona ciliata: a. Habit; b. Inflorescence; c. Fruits; d. Location map.

VERNICIA FORDII (EUPHORBIACEAE)

Vernicia fordii (Hemsl.) Airy Shaw, Kew Bull. 20(3): 394 (1967).

Deciduous tree, up to 20 m tall. Bark smooth, thin with latex. Leaves simple, alternate, cordate, 5–25 × 4–20 cm, apex acuminate, margin entire; petioles 5–18 cm long, green flushed with red. Flowers unisexual, borne together, 2.5–3.5 cm across, usually appears before new leaves, pink-white. Calyx hairy outside. Petals obovate, 2-3 cm long, pink-white, veined with dark pink at base. Fruits drupe, subglobose, 4–6 × 3–5 cm, green, becoming brown when ripe.

Vern.: Tung Tree, Chinese Wood-oil Tree (Eng.).

Fl.: March-April; *Fr.*: June-September.

Loc.: Botanical Garden, New Residential Colony.

Notes: Tree is poisonous. Tung oil obtained from seeds are widely used in making varnishes, paints and artificial leather etc.

Vernicia fordii: a. Habit; b. Leaves; c. Fruit; d. Location map.

ZANTHOXYLUM ARMATUM (RUTACEAE)

Zanthoxylum armatum DC., Prodr. [A. P. de Candolle] 1: 727, sphalm. (1824).

Small tree or large shrub, up to 6 m tall. Bark grey-brownish, rough. Leaves imparipinnate, 8–15 cm long; petiolte and rachis winged, compressed prickles; leaflets 3–5 pairs, opposite, elliptic-lanceolate, 2–10 × 1–2.5 cm, apex acute-acuminate, margin entire or crenate-serrate, base rounded or cuneate. Flowers small, 1–2-sexual or polygamous borne in panicle. Perianth uni to biseriate, ca 1 mm long, ovate-lanceolate, acute-acuminate, yellow. Stamens 6–8. Fruit follicles, ovoid, 5–6 mm, glandular warty, reddish.

Vern.: Timroo (Hin.); Winged Prickly Ash (Eng.).

Fl.: March-April; *Fr.:* August-September.

Loc.: Near N.K. Jain Block, Botanical Garden.

Notes: Bark used as insect repellant and as a fish poison. Leaves and fruits are used for making chutney. Fruits and seeds have carminative, stomachic, anthelmintic properties.

Zanthoxylum armatum: a. Armed stem; b & c. Fruits; d. Location map.

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INDEX

परिकल्पना: जैवार्थिकी के उन्नयन हेतु प्रौद्योगिकीय उद्भवता एवं विकास में हिमालयी जैवसंपदा के संपोषणीय उपयोग द्वारा विश्व स्तर पर अग्रणी होना

VISION: To be a global leader on technologies for boosting bioeconomy through sustainable utilization of Himalayan bioresources