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Common Timber Yielding Plants of District Bilaspur of Himachal Pradesh, India

Research Article

Mahender K*

Department of Botany, Govt P.G. College Ghumarwin, India

***Corresponding author:** Mahender K, Associate Professor, Department of Botany, Govt P.G. College Ghumarwin, District Bilaspur, PIN 174021 (H.P.), India; Email: mahender2629@gmail.com

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Abstract

This paper deals with the 13 timber yielding plant species viz. *Anogeissus latifolia*, *Cedrus deodara*, *Dalbergia latifolia*, *Dalbergia sissoo, Eucalyptus teriticornis, Pinus patula, Pinus roxburghii, Pinus wallichiana, Santalum album, Shorea robusta, Tectona grandis, Terminalia alata* and *Toona ciliata* of district Bilaspur of Himachal Pradesh. Out of them 04 species are SOFT WOOD (Gymnosperms) while 09 species are HARD WOOD (Angiosperms). Personal survey of the district was carried out in order to ascertain the common timber yielding plants. Plants were collected from different parts of the district and were identified using standard procedures. Important vegetative and floral characterstics of plants were noted as well as their photographs were also taken in the field. Herbarium mounts of plants were prepared for records and identification. For the identification and description of plants the terminologies followed are in accordance with the International Plant Names Index and The Plant List (2013). The Natural System of Classification of Spermatophytes, given by Bentham and Hooker (1862- 1883) and Hooker (1872-1897) along with latest amendments have been followed in this paper.

Keywords: Timber Plants; Secondary Xylem; Wood; Gymnosperms; Angiosperms; Bilaspur (HP)

Introduction

Since the time immemorial wood has been used by the man for house building and subsequently for furniture making. Therefore, plants are invaluable to mankind in the form of wood, which is the secondary xylem of woody plants. Based upon the type of plants, wood is of two types: SOFT WOOD and HARD WOOD. Soft Wood is obtained from Gymnosperms while Hard Wood from Angiosperms. Both types of Wood have their own significance. Wood is not only used for domestic purposes but for commercial purposes also.

Bilaspur is the second smallest and one of the twelve districts of Himachal Pradesh. Bilaspur is surrounded by Hamirpur and Mandi districts on the North, Mandi, and Solan on the East, Solan district and Punjab State on South while Una and Hamirpur districts on the West side. This is situated between 310 12/ 30// and 310 35/ 45// North latitude and 760 23/ 45// and 760 55/ 40// East longitude in the outer hills of the Himalayas. The river Satluj flows through the district Bilaspur for about 90 KM. This river enters the district Bilaspur at KARAHI KA GHARAAT near the village Kasol, near Kol dam and leaving it at the village NEILA near the Bhakhra dam. Its area is 1167 Sq Km. The altitude of Bilaspur varies from 290 metres to 1980 metres, consequently great variations in its flora.

The objective of this paper is to identify the common timber yielding plants of the district Bilaspur of Himachal Pradesh along with their sytematics, common names, vernacular names, citations, morphological features, flowering and fruiting seasons, places of collection, habitat, as well as their distribution in the World, India, and Himachal Pradesh along with the economic and ethnobotanical uses. Coloured photographs of plants are also taken in the field.This paper aims to make readers and researchers more aware about the importance as well as motivate them for the conservation of plants for the future generations.

Materials and Methods

Extensive field survey of different places at different times of the

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district Bilaspur has been carried out during 2009 to 2014. Standard Procedures are followed for the collection, preservation, and identification of plants. Important vegetative and floral characteristics of plants have been noted as well as their photographs are also taken in the field. Herbarium mounts of these plants are prepared for record and identification. While describing and identifying the plants, we strictly adhered to the terminologies used by Haris and Haris (1994), Jain and Rao (1977), Polunin and Stainton (1984), Stainton (1988) and Womersley (1981). The nomenclature of plants is in accordance with the International Code of Nomenclature (ICN), International Plant Names Index (IPNI), The Plant List (2013) and Bannet (1987). The Natural System of Classification of Spermatophytes, given by Bentham and Hooker (1862-1883) and Hooker (1872-1897) along with latest amendments have been followed in this paper.

Observations

In order to enumerate the timber yielding plants, extesive survey of the district Bilaspur has been carried out during different seasons. A total of 13 species belonging to 10 genera and 08 families are reported. 04 plant species are gymnosperms belonging to single family while 09 plant species are angiosperms belonging to 07 different families. The family Pinaceae (gymnosperm) comprises 02 genera and 04 species. The angiospermic families like Combretaceae and Papilionaceae includes 02 species each but rest of the five families- Dipterocarpaceae, Meliaceae, Myrtaceae, Santalaceae and Verbenaceae has one species each.

Dalbergia latifolia has been introduced by Sh. H.M. Bhatia, Retired IFS officer (PCCF) of Rajasthan cadre to the village Chamog. *Pinus patula* has been reported from the nursery garden of ACC Limited at Barmana. *Dalbergia sissoo*, *Toona ciliata* and *Eucalyptus teriticornis* are reported to be growing very well throughout the district. *Anogeissus latifolia* is abundant in Swarghat Forest Range and Kotdhar region of Kalol Forest Range while it is less abundant in Sadar Forest Range. *Santalun album*is growing very well in the Changer sector and in the campus of Govt. P.G. College Bilaspur. *Terminalia alata* is abundant in Jhandutta Forest Range. *Tectona grandis* has been found to be growing in dense patches at Jhandutta, Ghumarwin, Chabyon (near Kol Dam) while it is sporadic in other parts of Bilaspur. *Cedrus deodara* and *Pinus wallichiana* are restricted to Bahadurpur region while *Pinus roxgurghii* is very common species of this district.

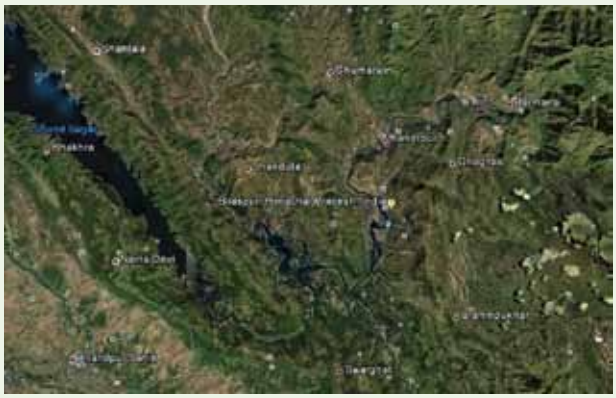

Figure 2: District Bilaspur of Himachal Pradesh.

Results and Discussions

Thirteen different species of timber yielding plants viz. *Anogeissus latifolia, Cedrus deodara, Dalbergia latifolia, Dalbergia sissoo, Eucalyptus teriticornis, Pinus patula, Pinus roxburghii, Pinus wallichiana, Santalum album, Shorea robusta, Tectona grandis, Terminalia alata* and *Toona ciliata* are collected and identified from the district Bilaspur of Himachal Pradesh. These timber yielding plant species are described alphabetically as under:

1) *Anogeissus latifolia* (Roxb. ex DC.) Wall ex Bedd. Fl. Sylv. S. India 1: 15 1869; FBI. 2: 450. 1878; Kanjilal, For. Fl. Chakrata, Dehradun & Saharanpur. 254. 1901; Brandis, Ind. Trees. 315. 1906; PP. 36. 1916; FF. 240. 1918; FHP. 1: 282. 1984; FSIR. 299. 2004. Conocarpus latifolia Roxb. ex DC. Prodr. 3: 17. 1828; Roxb. Fl. Ind. (ed. Carey) 2: 442. 1832. **Family Combretaceae**. AXLE-WOOD. Vern.: Button Tree, Bakla, Bakli, Bankli, Challya, Dhaoyo, Dhao, Dhau, Dhaura, Dhauri, Dhauta, Dhava, Dhawa, Dohu. Figure 3.

It is a large deciduous tree. Bark smooth, greenish-white. Leaves are alternate or inconstantly opposite, 5-10 cm long, elliptic, entire, sub-coriaceous, acute or obtuse, glabrous; secondary nerves 8-14 pairs, tertiary nerves prominent beneath; petioles 0.5-1 cm long. Flower- heads are 5-10 mm across, axillary; peduncles 0.5-1 cm long. Calyx is campanulate, tube 0.4-0.5 mm long, laterally 2-winged, long

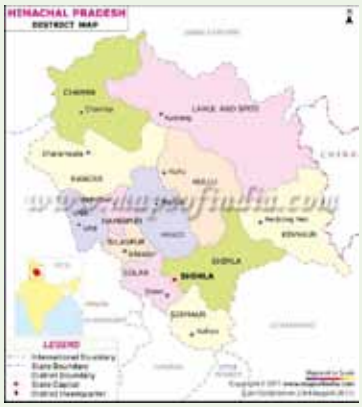

Figure 1: Himachal Pradesh.

Figure 3: *Anogeissus latifolia* (Roxb. ex DC.) Wall ex Bedd. AXLE-WOOD. Vern.: Button Tree, Bakla, Bakli, Bankli, Challya, Dhaoyo, Dhao, Dhau, Dhaura, Dhauri, Dhauta, Dhava, Dhawa, Dohu.

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and narrowed above the ovary, teeth minute, triangular, persistent. Petals are absent. Stamens 10, in 2 series, exserted.

Ovary is 1-celled. Ovules are 2, pendulous. Fruits a dry drupe, 4-5 mm long, beak 2.5-3 mm long, 2-winged, yellowish-green; in dense ± 1cm across heads. Flowering and Fruiting: May- June.

Specimens examined: Swarghat, 25July, 2011, Mahender. 190,191.

Habitat: Common. **Distribution:** Himalayas to Sri Lanka; India Himachal Pradesh: Bilaspur, Sirmaur (Saketi, Kala Amb, Nahan, Renuka), Kangra (DD, RRL). Altitude: 400-1100 meters.

Economic and Ethnobotanical Uses: Wood is used for axles, shafts, poles, batons, agricultural implements, and tool handles; also suitable for furniture, construction purposes [1]. Tree yields a gum which is used in pharmaceutical preparations, for sizing paper and calico printing. Tasar silkworm is fed on its leaves. Root is useful in vitiated conditions of 'kapha', 'vata' and abdominal disorders. Bark improves both taste and appetite; removes 'kapha' and 'vata', useful in anaemias, urinary discharges, wounds, ulcers, inflammations, diabetes, haemorrhages, dysentery, piles; applied in skin diseases and erysepelas. Leaves juice is given in purulent discharges from the ear. Fruit is cooling, astringent to bowels; increases 'vata'; cures 'kapha' and biliousness [2,3].

2) *Cedrus deodara* (Roxb. ex D. Don) G. Don in Loud. Hort. Brit. Ed. 388. 1830; Troup, Silvi. Ind. Trees III: 1096. f.445-448. 1921; Raizada & Sahni, Living Ind. Gymno. Ind. For. Rec. (n.s.) Botany 5 (2): 129. f.9. t.VIII. f.4. 1960; FBH. 2. 1977; Polunin & Stainton, Fls. Himal. 386. f.510.1984; Naithani, Fl. Chamoli 2: 762. 1985; Stainton, Fls. Himal. Supplement 59. t.112. f.499.1988; Sahni, Gymno. India & Adj. Countr. 86. t.13. f.1. 1990; FLS. 580. 1994; FK. 707. 1999;Gaur, Fl. Garhwal. 51. 1999; FGHNP. 269. 2000; FSIR. 698. 2004; FC. 830. 2006. *Pinus deodara* Roxb. (Hort. Beng. 69. 1814, nom.nud.) ex D. Don in Lamb. Descr. Genus *Pinus* 2: 8. 1824; Roxb, Fl. Indica. ed. 2.3. 651. 1832. *Cedrus libani* Barell var. *deodara* (Roxb. ex D. Don) Hook.f. in Himal. J. 1: 257. 1854; FBI. 5: 653. 1888; FS. 486. f.159. 1902, 1921; PP. 40. 1916. *Cedrus deodara* Loud. Stewart. PP. 220. 1869; Kanjilal, For. Fl. Chakrata, Dehradun & Sharanpur. 549. 1901; Brandis, Ind. Trees. 691. 1906; FF. 544. 1918. **Family Pinaceae.** THE DEODAR, TRUE CEDARS, HIMALAYAN CEDAR. Vern.: Dada, Dedwar, Deodar, Dewdár, Deyar, Diar, Geyar, Kairval, Kalain, Kalon, Kelai, Keli, Kelmang, Kelo, Kelu, Keolikelmang, Keori, Kilan, Kilankaper Figure 4.

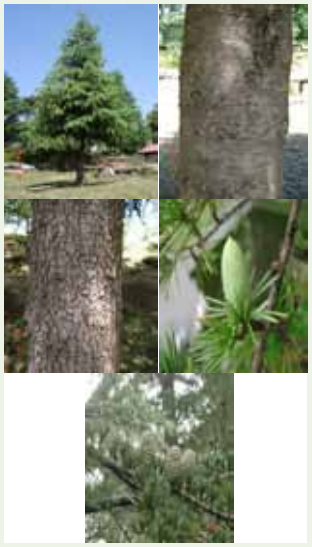

Figure 4: ***Cedrus deodara*** (Roxb. Ex D. Don) G. Don. syn. *Cedrus deodara* (Roxb.) Loud., *libani* Barell var. *Cedrus deodara* (Roxb. ex D. Don.) Hook. f. THE DEODAR, TRUE CEDARS, HIMALAYAN CEDAR. **Vern.:** Dada, Dedwar, Deodar, Dewdár, Deyar, *Diar,* Geyar, Kairval, Kalain, Kalon, Kelai, Keli, Kelmang, *Kelo,* Kelu, Keolikelmang, Keori, Kilan, Kilankaper.

A long-living, very large, evergreen tree up to 80-90 m in height and 12-15 m in girth, young trees cone-like in appearance, but old ones usually with rounded and flattened tops. Bark green or gray, thin and smooth on young trees, but 0.5-3 cm thick, dark grayish brown, dark brown, sometimes reddish or black, divided into irregular oblong scales or plates with vertical as well as diagonal cracks, quite rough, deeply furrowed in old stems. Blaze is 3.8-5 cm, pinkish brown. Branches are irregular, horizontal, slightly ascending, descending or spreading, never in whorls, leading shoots and tips of branches usually drooping. Young or New shoots with pale green leaves appear in March or early April and are covered with grayish down. Shoots (Branchelets) dimorphic. Long shoots or shoots of unlimited growth long, slender, bearing scaly leaves, spirally arranged foliar leaves and dwarf shoots. Dwarf shoots or shoots of limited growth are short, thick, bearing tufts of leaves (15-20) in pseudo whorls. Every year it elongates slightly and a new whorl of leaves is added, successive years of growth being marked by a ring of recurved bud scales; sometimes bears flowers or occasionally develop into long shoots. Winter buds small, ovoid, with brown scales, which persist on the shots even after the appearance of young leaves. Leaves dark green, 2.5-5 cm long, acicular, stiff or rigid, sharply pointed, triquetrous (3-sided), glaucous or silvery, amphistomatic with two rows of marginal resin canals on the inner surface, persistent, lasting 1-6 years. Leaf shedding occurs in May or sometimes in October-November at the time of cone ripening. Strobili (cones or flowers) solitary, erect, terminal borne on short shoots, appearing in July-August, maturing during late September, unisexual and dioecious, sometimes monoecious, in latter case, they are borne on separate branches. Male cones solitary, terminal on dwarf shoots, oblong, ovoid or cylindrical, 2.5-4.5 cm long and 1-1.5 cm in diameter, pale green when young, yellowish-green with purplishtinge when mature, each consisting of numerous microsporophylls (stamens) arranged spirally on a broad central axis, each stamen with two abaxially placed, oblong microsporangia or pollen sacs, the connective of which is produced into a flattened ovate, obtuse, upturned, beak-like appendage with an irregularly crenulate margin. Depending upon the altitude, locality and season male cones appear during March-June and shed their pollens from September to October. Before shedding, they elongate rapidly to 5-7.5 cm in length and turn yellow. Pollen grains are winged, golden. Pollination occurs in October. Young Female strobili or cones appear in August, erect, solitary, terminal on dwarf shoots, arising progressively every year towards the terminal end on the upper side of horizontal branches, scaly leaves of unequal sizes enclosing the young cones, each consisting of a broad central axil on which are present spirally arranged bract scales, in the axis of which are present fan-shaped ovuliferous scales bearing two inverted ovules on the

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adaxial surface. Many of the ovuliferous scales present at the base and apex are sterile. At the time of pollination, the cones are difficult to find as they are inconspicuous and partly hidden by rosettes of leaves. They are narrowed to a claw-like process at the base, bract scales often enlarging after flowering time and larger than the ovuliferous scales. They are pale glaucous green, oblong or ovoid, 1.2-2 cm long and 0.6 cm in diam. They are however, in an open state to receive pollen grains, as the scales stand perpendicular to the axis and the ovules are exposed. After pollination, the sporophylls grow slightly and cone becomes compact and finally closes. Growth ceases until the following spring, i.e. March of next year. By early part of May next, they become barrel shaped and increase to 8-12 cm in length and 5-8 cm in diam, with fan shaped, 3-3.5 cm broad ovuliferous scales. By the end of June or during July, they become full sized and are pale bluish green. During August they turn chocolate-brown, ripen from September to November and finally turn woody and brown in colour. Thus, the time taken from the first appearance of the female strobili to the ripening of cones is about 12½ - 13½ months. Ripe (Mature) Female cones large, 10-15 cm by 7.5-10 cm, erect, barrel-shaped, ovoid, ellipsoidal or cylindrical, brown, resinous, on short stout stalks, bracts minute or absent, ovuliferous scales woody, closely overlapping, fan shaped with a basal stalk-like claw, breaking up on the tree and shedding the winged seeds along with cone scales, the central axis persisting for a long time on the tree. Seeds pale brown, triangular, two to each ovuliferous scale, winged, each with a broad membranous apical wing, 0.8-1.6 cm long (with wings 2.5-3.8 cm long), wings with round corners, larger than the seeds, being 1.7-2.5 cm. Germination epigeous. Cotyledons 9-11. Seed shedding up to December in certain localities. At the time of shedding, the cone breaks up on the tree, the scales and seeds falling to the ground and persistent woody axis remaining for years on the branches.

Specimens examined: Bahadurpur, 17 April 2010, Mahender. 67, 68.

Habitat: Evergreen pyramidal shaped trees, typically gregarious, often found in pure stands, common in temperate slopes, also found in association with *Picea smithiana* and *Pinus wallichiana*, and infrequently with oaks, maple, cherries, chestnuts and other broad-leaved species, often planted in hill stations in Europe, America and other parts of the world. **Distribution:** Afghanistan, Asia Minor, Atlas Mountains (Africa, Algeria), Cyprus, Mediterranean mountains, Nepal (Kurnauli valley), Pakistan (Chitral, Dir, Dungagale, Hazara, Kagan valley, Thundi, Trans Indus), Syrian mountains, W. Himalayas. India: Jammu & Kashmir, Uttarakhand (Almora, Chakrata, Jaunsar, Kumaon, Mussoorie, Nainital, Ranikhet, Tehri-Garhwal). Himachal Pradesh: Chamba (Dalhousie, Kala Top, Khajjiyar, Pangi, Tisa), Kangra (Bara-Bangal, Chhota-Bangal, Dhauladhar near McCleodganj to Dharamkot, Palampur, Tathwani), Kinnaur (Jangi, Kalpa, Nichar, Rundung, Ralli), Kullu (Bahu, Banjar, Chowai, Jaloripass, Khanag, Kullu, Manali, Manikaran, Nagar, Pulga, Seraj), Lahaul&Spiti (Kali, Miyar nala, Lahaul), Mandi (Junee, Karsog, Mandi, Nachan, Suket), Shimla (Baghi, Bushahr, Boileauganj, Chachpur, Charabra, Chopal, Chota Shimla, Fagu, Glen, Jakhoo Hills, Jubbal, Khadrala, Kharapathar, Kotgarh, Kufri, Mahasu, Nankheri, Naldhera, Potter's Hill, Rohru, Summer Hill, Tara Devi), Solan (Kasauli, Solan), Sirmaur (Churdhar, Haipurdhar, Haban, Nauradhar, Rajgarh). Altitude: 1200-3300 m.

Economic and Ethnobotanic Uses: Its wood is the strongest, most valuable and the best among coniferous woods. It is an important constructional timber and is extensively employed for construction, beams, floorboards, posts, cooperage, door and window frames, furniture, packing cases, spars and shingles and railway sleepers. It is also used for bridge construction, wagon building, brush backs, carriages and several other purposes. It is suitable for pattern making, poles for carrying high tension lines, battery separators, and second grade pencils][1,4,5]. Due to the presence of oil, seasoned heartwood is durable and is rarely attacked by white ants and fungi [6]. Needles contain ascorbic acid and yield an essential oil [7,8,9]. (Simson and Rau, 1922; Kirtikar and Basu, 1935; Raizada and Sahni, 1960; Ambasta, 1986; Gaur, 1999; Joshi, 2000; Pullaiah, 2002; Seth, 2003, 2006; Sharma, 2003; and Singh and Kumar, 2000).

3) *Dalbergia latifolia* Roxb. Kanjilal, For. Fl. Chakrata, Dehradun & Saharanpur. 200. 1901; Brandis, Ind. Trees. 233. 1906; Parker, FF. 167.1956. **Family Papilionaceae.** BLACK WOOD, BLACK ROSEWOOD, BOMBAY BLACKWOOD, BOMBAY ROSEWOOD, EAST INDIAN ROSEWOOD, JAVENESE PALISSANDER, MALABAR ROSEWOOD, ROSE WOOD OF SOUTHERN INDIA, ROSETTA ROSEWOOD. Vern.: Kalashisham, Lalshisham, Shisham, Walayati-shisham Figure 5.

It is a large deciduous tree with thick boughs and spreading crown. Bark grey, smooth or less furrowed. Leaves with longer rachises; leaflets 3-7, 1-7.5 cm long, broadly elliptic, orbicular or elliptic-obovate, obtuse, sometimes emarginate. Flowers whitish, 0.5 cm long, on pedicels nearly as long as calyx tube; in short, axillary and much branched panicles. Stamens are 9. Ovary is glabrous, style slender, nearly as long as the ovary. Fruits (Pods) broad, oblong-lanceolate, 1-4 seeded. Flowering and Fruiting: May-August.

Specimens examined: Chamog, 4 June 2010, Mahender. 74.

Habitat: Scattered in the dry deciduous forests throughout the Indian Penninsula. **Distribution:** Native of India; Indonesia, grown in Kenya, Malaysia, Myanmar, Nepal, Nigeria, Philippines, Sri Lanka,

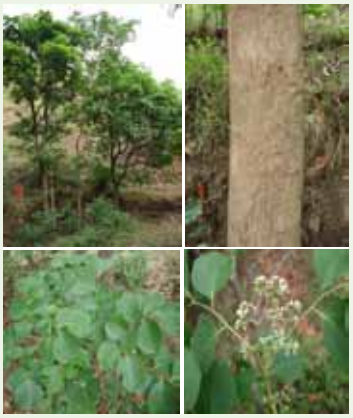

Figure 5: ***Dalbergia latifolia*** Roxb. BLACK WOOD, BLACK ROSEWOOD, BOMBAY BLACKWOOD, BOMBAY ROSEWOOD, EAST INDIAN ROSEWOOD, JAVENESE PALISSANDER, MALABAR ROSEWOOD, ROSE WOOD OF SOUTHERN INDIA, ROSETTA ROSEWOOD. **Vern.:** Kalashisham, Lalshisham, Shisham, Walayati-shisham.

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Vietnam. India: Sub-Himalayan tract, Gangetic plains, Bengal, Bundelkhand, Bihar, Madhya Pradesh, C. W. & S. India, Rajasthan, Sikkim. Altitude: Up to 600 m.

Economic and Ethnobotanical Uses: Wood is more valued as timber. It is ranked among the finest woods for cabinets and furniture. It is a valuable decorative wood suitable for carving and ornamental plyboards and veneers. It is also used to make furniture, panelling, interior, and exterior joinery. It is especially useful for pattern making, calico-printing blocks, gun- carriages, wagons, pulleys, mathematical instruments (scales), musical instruments (keys of violin), picture frames, shoe lasts, hairbrush backs, decorative items and screws. It is also used for ammunition boxes, naves, boat knees, agricultural implements, combs, boat building, shuttles, etc. It is too expensive for general construction work, but when available used for posts, rafters, floorboards, door and window frames [10,11]Bark is used in tannin industry. Leaves are used as fodder. It is often planted in gardens. It is a good shade tree for avenues. It checks spread of particulate pollutants from the environment [9,12,13].

4) *Dalbergia sissoo* Roxb. ex DC. (Hort. Beng. 53. 1814, nom. nud.); et Prodr. 2: 416. 1825; Fl. Ind. (ed. Carey) 3: 223. 1832; FBI. 2: 231. 1876; Kanjilal, For. Fl. Chakrata, Dehradun & Saharanpur. 199. 1901; FS. 146. 1902, 1921; Brandis, Ind. Trees. 233. 1906; PP. 24. 1916; FF.166. 1918; Kanjilal et al., Fl. Assam 2: 100. 1938; Deb. in Bull. Bot. Surv. India. 3: 266. 1961; Ali in Fl. W. Pak. 100: 56. 1977; FBH. 76. 1977; Raizada & Saxena, Fl. Mussoorie. 1:166. 1978; Bhandari, Fl. Ind. Desert. 104. 1978. 1990; Sharma & Kachroo, Fl. Jammu. 1: 152. 1981. FHP. 1:198. 1984; Mathew, Fl. Tamil. Carnat. 4: t.152.1988; Singh et al., Fl. Manipur. 1:281. 2000; FSIR. 246. 2004; FC. 266. 2006. **Family Papilionaceae**. INDIAN REDWOOD, SISSOO, SOUTH INDIAN REDWOOD. Vern.: Nelkar, Shewa, Shia, Shin, Shishai, Shisham, Sisam, Sissai, Sissu, Sisu, Tahli, *Talli, Siunti*. Figure 6.

This is a large deciduous tree, up to 30 m high. Young branches densely pubescent. Wood is very hard, brown; heartwood dark brown or blackish. Bark rough, furrows mainly longitudinal. Leaves imparipinnate; 8-20 cm long with 1-3 cm long petioles, pubescent; rachis zigzag; leaflets 3-5, alternate, obliquely ovate, 3.9-9 x 3-7 cm, acuminate or caudate- acuminate, glabrous, tomentose when young, pale green, entire, abruptly pointed, terminal one stalked, petiolules 4-5 mm long; laterals subsessile. Stipules 5 mm long, lanceolate, caducous. Flowers are small, ca 7-10 mm long, yellowish-white, sub-sessile, in axillary or terminal panicles, hairy. Bracts are ca 2 mm, linear-subulate, hairy and caducous. Calyx bell-shaped; 5- 6 mm long; teeth 5, short, ciliate, 2 uppers united except at tip, laterals obtuse, lowest the longest. Corolla 7.5-8 mm long, pale yellow, petals 5, much longer than the calyx, glabrous, standard long clawed, ovate; wings 7 mm long, oblong; keel nearly straight, obtuse, nearly as long as wings. Stamens 9, all united (monadelphous), tube split along the upper side. Ovary is hairy, 7-8 mm long; style short; stigma capitate. Fruits (Pods) 3.8-8.5 x 0.7-1.3 cm, long stalked, flat or strap-shaped, linear-oblong, glabrous, cuneate at base, tip rounded, 1-4 seeded. Seeds are 7-9 x 4.5-7 mm, reniform, brown to brownish black, compressed, glabrous. Flowering and Fruiting: March-February next.

Specimens examined: Bhager, 15 April 2012, Mahender. 390,391.

Figure 6: ***Dalbergia sissoo*** Roxb. ex DC. INDIAN REDWOOD, SISSOO, SOUTH INDIAN REDWOOD. **Vern.:** Nelkar, Shewa, Shia, Shin, Shishai, Shisham, Sisam, Sissai, Sissu, Sisu, Tahli, *Talli, Siunti.*

Habitat: Scattered in forests and widely planted along the roadside.

Distribution: Widely spread in tropical regions, Baluchistan, W. Himalaya, Terai of Nepal, India and Pakistan. India: Throughout India, Sikkim and Assam. It is extensively planted throughout India. Himachal Pradesh: Chamba (DD, Chamba), Hamirpur, Kangra (Dharamshala, Jwalamukhi, Kangra, Nurpur-Nagni), Kinnaur (BSD, DD Jeori), Shimla (BSD, DD, Rampur), Sirmaur (Nahan, Renuka), Solan, Una. Altitude: 600-1500 m.

Economic and Ethnobotanical Uses: A very valuable timber tree. Wood is very hard, durable and good for furniture, musical instruments and house construction. It is esteemed also for railway sleepers, plywood, etc. Pulp is used in paper industry. Leaves are used as fodder [13,14,15]. The juice of the leaves is good for diseases of eye. Decoction of the leaves is useful in gonorrhoea. The roots are astringent and useful in diarrhoea and dysentery [2,16]. (Kirtikar and Basu, 1935; Bennet et al., 1991; Singh et al., 2006; Singh and Kumar, 2000; Pullaiah, 2002; and Seth and Jaswal, 2004.).

5) *Eucalyptus tereticornis* Sm. GMT. 354; Brand. 327. T.N.; Brandis, Ind. Trees. 327. 1906; FF. 250. 1918. **Family Myrtaceae.** HORNE CAP, POPLAR BOX. Vern.: Safeda, Sapheda Figure 7.

It is a compact, straight-growing tall handsome tree. Bark grey or white, exfoliating in long flakes, rough at branchlets. Wood is hard, reddish brown, close grained with damp or slightly oily feel when dry. Leaves are falcate, ovate or roundish, rarely, lanceolate, 10-20 cm long, very lustrous and intensely green on both surfaces; petioles terete 1.3-2.4 cm long; secondary nerve and intra-marginal vein slender, distinct. Flowers are 7-11, in umbels, small, white, on very short pedicels; peduncles up to 2.5 cm long; hypanthium hemispherical,

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Figure 7: ***Eucalyptus tereticornis*** Sm. syn. *Eucalyptus umbellata* Domin. HORNE CAP, POPLAR BOX. **Vern.:** *Safeda*, Sapheda.

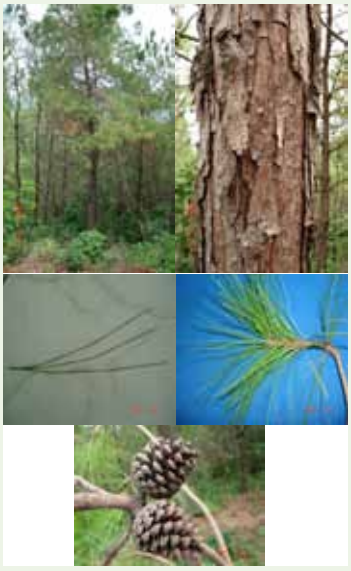

Figure 8: ***Pinus patula*** Schiede ex Schltdl. & Cham., Linnaea **6:** 354. 1831. PATULA PINE, PINO PATULA, SPREADING-LEAVED PINE, MEXICAN WEEPING PINE. **Vern.:** Cheel.

2-3 mm long and 4-5 mm wide. Calyx 0.64 cm in diameter at mouth; tube not produced beyond ovary; operculum much longer than calyx. Capsules globose, 5-7 x 4-8 mm in diameter, 4-valved, valves closed. Flowering and Fruiting: March-June.

Specimens examined: Chamaog, 3 March 2012, Mahender. 411,412.

Economic and Ethnobotanical Uses: Wood is employed for engineering construction, sleepers, ship-building and flooring. Its wood is also used as timber, for agricultural implements and tool handles. It is also a source of essential oil [1,12,17]. (Vidyarthi, 1997; Ambasta, 1986; and Nayar et al. 1989).

6) *Pinus patula* Schiede ex Schltdl. & Cham., Linnaea 6: 354. 1831. **Family Pinaceae.** PATULA PINE, PINO PATULA, SPREADING-LEAVED PINE, MEXICAN WEEPING PINE. Vern.: Cheel. Figure 8.

This is a large evergreen tree, up to 40 m tall and 1 m in dia. below breast height. Stem usually with a single, straight, slender trunk; in closed canopy stands. First-order branches are long, slender, spreading or slightly ascending; higher order branches are slender, drooping, the ultimate branches pendent. The shoots are rough and scaly when the leaf fascicles have fallen, yellow or red-brown, foliage shoots with prominent, decurrent pulvini. Cataphylls subulate, recurved at apex, scarious, with erose-cliate margins, brown, early deciduous. Vegetative buds oblong-cylindrical; the terminal bud 15-20 mm long; and the lateral buds are shorter, brown, not resinous. The scales are spreading, subulate, with ciliate margins. Fascicle sheaths initially 20- 30 mm long with 6-8 imbricate, chartaceous, white-yellow or orange-brown scales, pensistent but shortening to 12-15 mm in mature fascicles, slowly weathering to grey-brown. Bark is thin, scaly, red- brown on young trees; becoming thick, dark grey-brown, rough and scaly with large elongated plates and deep longitudinal fissures on mature plants. Leaves in fascicles of 3, sometimes 4-5, in drooping tufts, in two rows on either side of the upturned shoot, persisting for 2-3 years, thin, lax, drooping-pendent, serrulate at the margins, acute, pale-dark green; triangular in outline; stomata on all sides. MALE CONES crowded near the proximal end of new shoots, spreading, subtended by scarious bracts, ovoid-oblong to cylindrical, 15-20 x 5-6 mm, pink yellow, finally yellow-brown. FEMALE CONES subterminal or lateral in position, in whorls of 2 to many, rarely solitary, persistent or decisduous, peduncles up to 20 mm long. Young Cones are ovoid, on recurved peduncels with persistent calaphylls, purple turning light brown, maturing in two seasons. Mature Cones narrowly ovoid when closed slightly curved, asymmetrical at base, 5-12x3-6 cm when open. Megasporophylls 100-150, serotinous or parting sometime after maturing, tenacious or deciduous with the peduncle, woody, oblong, usually curved when spreading, the proximal megasporophylls connate, purple, brown to dark brown, with adaxial light brown marks left by the seed wings. Apophysis is flat to slightly raised, transversely keeled, gibbous on proximal sporophylls, rhomboid, upper margin acute or obtuse-rounded, abaxial surface striate or smooth, lustrous or yellow brown. Umbo is dorsal, flat or raised, sunken into the apophysis, 3-7 mm wide, grey, with a minute, deciduous prickle. Seeds obliquely ovoid, flattened, 4-6x2-4 mm, dark grey. Seed wings articulate, held to the seed by two oblique claws which partly cover the seed on one side, obliquely ovate-oblong, 12-18x5-8 mm, light brown with dark stripes.

Specimens examined: Barmana, 23 May 2009, Mahender. 130.

Distribution: Native of Mexico. It is planted at high altitudes in Ecuador, Bolivia, Colombia, Kenya, Tanzania, Angola, Zimbabwe, Papua New Guinea and Hawaii. At lower altitudes it is cultivated in S. Brazil, S. Africa, India and Argentina. It has been introduced in New South Wales, Australia and in New Zealand. This plant is cultivated in United Kingdom as an ornamental tree. India: Himachal Pradesh.

Economic and Ethnobotanical Uses: Wood is used for making

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board and furniture. It is also used for pulp and paper production. Gum and resin are obtained from the stem [Google Search]. (Forest, F. et al. 2018. Gymnosperms on the EDGE. Scientific Reports 8: 6053; Google Search).

7) *Pinus roxburghii* Sarg., in Silva N. Amer. 2: 9.1897; Raizada & Sahni in Ind. For. Rec. n.s. 5 (2): 115. t.V. f.1. 1960; Stewart in Nasir & Ali, Annot. Cat. Vasc. Pl. W. Pak. & Kashmir 25. 1972; FBH. 2. 1977; Polunin & Stainton, Fls. Himal. 388. f.511. 1984; Naithani, Fl. Chamoli 2: 763. 1985; Stainton, Fls. Himal. Suppl. 60. t.113. 1988; Sahni, Gymno. India & Adj. Countr. 66. t.10. f.1. 1990; FK. 708. 1999; Gaur, Fl. Garhwal. 51. 1999; FGHNP. 270. 2000; FSIR. 699. 2004; FC. 833. 2006. *Pinus longifolia* Roxb., Fl. Ind. 3: 651.1832; Stewart, PP. 226. 1869; Hook. f., FBI 5: 752. 1888; Kanjilal, For. Fl. Chakrat, Dehradun & Saharanpur. 548. 1901; FS. 485. f.158, 1902, 1921; Brandis, Ind. Trees. 690. 1906; PP. 39. 1916; FF. 538. 1918; Troup, Silvi. Ind. trees III: 1036. f. 413, 414. 1921. **Family Pinaceae.** CHIR PINE, LONG-LEAVED PINE, LONG-LEAVED INDIAN PINE, THREE-LEAVED PINE, HIMALAYAN LONG NEEDLE PINE. Vern.: Anander, Chil, Chir, Dhupasarala, Drabchir, Gula, Nakhtar, Nashtar, Ransuru, Salla, Saral, Thansa. Figure 9.

This is a large tree up to 55 m in height and 4 m in girth, mostly evergreen, but occasionally partially deciduous in dry localities. Trunk is tall, straight, but sometimes stunted and gnarled. Crown of the plant up to middle age is elongated and more or less pyramidal, afterwards becoming spreading, rounded or umbrella-shaped with a massive branch system. Bark non-resinous, deeply and irregularly fissured, up to 6 cm thick; of young trees dark grey, exfoliating in rough, longitudinally elongated plates; of older trees darker, reddish or reddish brown, turning light grey on exposure and shedding in large plates, up to 61 cm in length and 23 cm in breadth. Branches up to middle age whorled, with verticals, not well defined, spreading in mature trees. Shoots are of two kinds, i.e. dimorphic. Long shoots or shoots of unlimited growth grey or pale brown when young, covered with scale leaves, which persist for several years; bear foliar spurs and buds. Dwarf shoots or shoots of limited growth, bear three leaves and enclosed by usual two prophylls and 8-15 spirally arranged, imbricate, chartaceous, acuminate, fimbricate cataphylls (scales), which are at first white or green, later turning brown or grey. Both prophylls and cataphylls constitute 1.3-2.5 cm long, persistent basal sheath around the leaves. Dwarf shoots appear in March-April, but unfold in the following April, soon after the shedding of pollen. Winter buds small, ovoid, non-resinous, light-reddish brown, protected by closely pressed brown scales with fibrillar margins, formed in October or November, but growth ceases till December or early January. Leaves in fascicles of three1, borne on dwarf shoots, light to deep green, non-glaucous, needle-like, slender, 15-40 cm long, margins minutely, but closely serrulate (i.e. finely toothed), apex narrowing into a long fine point, obscurely triquetrous, with one side rounded and two sides flat, having several faint lines of stomata on all the three surfaces and marginal resin canals; needles persist for 1½-3 years, new ones appearing in January. Leaf shedding occurs in May and June. Strobili (Flowers or cones) unisexual and monoecious, bisexual cones have been reported by Rao (1932). Male strobili appear in January at low elevations, in groups, arranged spirally on the shoots of current year in 5/8 phyllotaxy; the whole inflorescence being 2.5-10.2 cm long by 3.8-5.1 cm in diameter, each male cone occupying the place of a dwarf shoot, borne in the axil of a prominent brown scale or a scale leaf (which falls as soon as the cone matures) and covered over by protruding, four prominent and numerous small, light-brown, acuminate scales with fimbricate margins. These bracts persist as they are held between the tightly packed other cones. Each cone consists of a central axis on which are born 90-140 spirally arranged microsporophylls with their tips becoming scaly and bending upwards, and each bearing two abaxial microsporangia. Cones are yellowish green and globular, when young, 1.3-1.8 cm long when ripening, and become cylindrical, ovoid, elongated, subtended by protruding, light brown, acuminate scales with fimbriate margins and light-reddish brown after the pollen is shed. Just prior to shedding, the central axis elongates considerably, especially at the base and reaches a length of 3-4 cm. Pollen shedding during February-April, depending upon the altitude, locality and season. Pollen is shed in large quantities, ensuring fertilization by the agency of wind. Female strobili appearing in early February at low elevations are borne either singly or in pairs in one or two whorls of three each on the apices of young shoots. Young cones before pollination are pale- green or slightly purplish at first, erect, ovoid and covered by involucral bracts (in 5/8 phyllotaxy), which persist for a year. In the cone are bract scales and ovuliferous scales. Prior to pollination the bract scales are longer than the ovuliferous scales and are more or less at right angles to cone axis, but the ovuliferous scales soon outgrow the bracts. Within one month of pollination, cones are green, 1.5-2 cm long. By the end of October, they are fairly soft (easily cut by a knife), turn greyish or light brown outside, remaining green inside and are 1.8-2.6 cm long by 1.5-2 cm in diameter. A reddish light-brown bud then appears at the tip of cone bearing shoot, which pushes the cone horizontally from its erect position. They

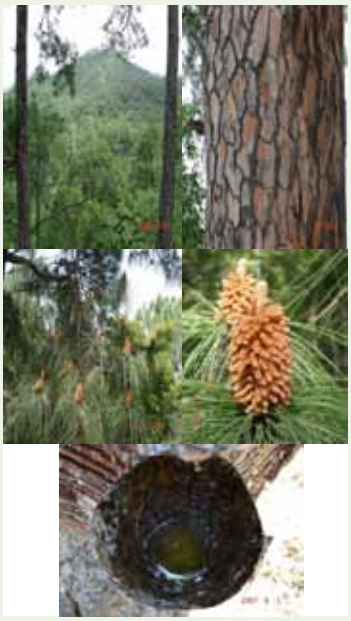

Figure 9: *Pinus roxburghii* Sarg. syn. *Pinus longifolia* Roxb. CHIR PINE, LONG-LEAVED PINE, LONG-LEAVED INDIAN PINE, THREE-LEAVED PINE, HIMALAYAN LONG NEEDLE PINE. **Vern.:** Anander, Chil, Chir, Dhupasarala, Drabchir, Gula, Nakhtar, Nashtar, Ransuru, Salla, Saral, Thansa.

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are concealed within the fully grown new leaves and remain in this horizontal position throughout winter.

Primordial needles solitary, 1.5 cm (in young seedlings) to 6.5 cm long, acicular, glaucous green, sharply serrulate.

Due to rapid growth and swelling (thickening of cell walls) of ovuliferous scales, cones become closed, the closing being also favoured by plenty of resin secretion, which also protects the young ovules from drying and can be seen in the form of large shining drops on the scales. Cones once again become green and active. By March, one year-old cones are green, soft, 2.5-4.6 cm by 2.5-3.8 cm having inconspicuously recurved scales with brown tips (remains of winter stage). In mid-April they are 7.5-10.5 cm long, soft; green with recurved scales and general shape now resembling mature cones. By June or July the cones have reached full size, but are still green. In the beginning of winter cones are fully grown, hard and brown. They remain in this condition throughout winter. At higher elevation the cones may be 6 weeks late in development in comparison to the development of cones at low elevations. Mature female cones (24 months after pollination in the spring of third season) light-brown, long, ovoid, 11.5-21 cm long, 6.4-14 cm in diameter on short stout stalks, solitary or 2-5 together horizontally, pendulous or erect on branches, each consisting of a central axis and 95-115 spirally arranged pairs of bracts and ovuliferous scales, the former is a membranous structure at the base of ovuliferous scales, which are very thick, hard and woody, pyramidal or rhomboidal having two winged seeds at the base on the abaxial side and a prominent exposed part (umbo) with a pyramidal, pointed curved or reflexed beak. In the months of March-May of third year, cones begin to open only in dry weather, closing up again during rains. Open cones may be as big as 24 cm by 18 cm. Although the opening is rapid, seeds require good shaking by breeze and take 2-3 weeks (or up to July in cool localities) to escape completely. Thus the time taken from first appearance of female cones to their ripening and opening is nearly 26-27 months. Empty dry cones remain on the tree for a long time, sometimes for a year or so. Seeds 0.7-1.6 cm long by 0.5-0.6 cm wide, winged, with a long, thin membranous wing, 0.7-1 cm wide, seeds with wing measure 2.5-4.5 cm in length. Germination: Epigeous. Cotyledons 10-14. Flowering and Fruiting: 3-Year life cycle; January-February (Male cones), February-April (pollen shedding), February-April (1st year female cones, pollination), March (2nd year green, fertilized cones), March-July (3rd year brown, mature, woody female cones ready for seed shedding). The dry cones remain long on the tree.

Specimens examined: Chanjhiar, 27 August 2011, Mahender.131,132.

Habitat: Himalayan chir pine requires a monsoon rainfall and therefore, it is not seen in the inner valleys, where the monsoon does not penetrate. Its seeds falling in the hot weather germinate as soon as the monsoon breaks. It is a gregarious species, and forms pure forests of considerable extent, although at lower and upper limits it occurs mixed with other species. It is the most important pine, which is roughly estimated to extend over about 8730 KM in the tropical, subtropical and temperate Himalayas. In H.P. and Uttarakhand twisted fibered trees also occur. **Distribution:** Afghanistan, Bhutan, Nepal, Pakistan (Dungagali, Hazara, Kahuta hills, Khanpur, Kurihar drainage, Muree, Pakhli plain, Rawalpindi, Siren valley, Thandian ranges), West and East Himalayas. India: Jammu & Kashmir (Jammu, Poonch), NEFA along the Kameng Frontier division, Siwalik hills flanking the Himalayas, Uttarakhand (Almora, Bawar, Bhagirathi, Bhilganga, Chakrata, Dehradun, Jamuna, Jaunsar, Kaliganga rivers, Kumaon Himalayas, Nainital, Ranikhet, Saharanpur, Tehri-Garhwal, Tons valley). Himachal Pradesh: Bilaspur (Sarium peak, Swarghat), Chamba (Bathri, Chamba, Dalhousie, Kathlog), Hamirpur (Hamirpur), Kangra (Dehragopipur, Dharamshala, Kangra, Nurpur, Palampur, Shiwalik), Kinnaur (Sungra), Kullu (Bahu, Banjar, both banks of Parbati river up to Manikaran, Hurla, lower Beas valleys, Kandugad, Kullu, Sainj, Seraj, Tirthan valley), Lahaul&Spiti, Mandi (Nachan, Suket), Shimla (Chadwick fall, Chirgaon, Chopal, Jubbal, Kotgarh, Kotkhai, Nogli, Pabber ranges, Pandrabeesh, Rampur Bushahr, Rohru, Shimla, Tara Devi, Taranda), Sirmaur (Haban, Kheradhar, Nahan, Rajgarh, Sangrah), Solan (Kasauli, Kunihar, Solan), Una. Altitude: 450- 2450 m, thriving best at 610-1525 m.

Economic and Ethnobotanic Uses: Wood is used for joinery work, shingles, packing cases, constructional work, light furniture, house fitments, pattern making, cores for lamin boards, drawing boards and plane tables [1,3,4,18,19] Treated wood is used for railway sleepers [4]. It produces resin of commercial importance. Rosin is used in the preparation of soap, sizing of paper and cloth; also used in manufacture of linoleum, sealing-wax, oil cloth, lubricating compounds and inks 8,19]. The turpentine oil is used in pharmaceutical preparations, perfumery industry, synthetic pine oils, disinfectants, insecticides and denaturants; used as a solvent for paints and varnishes [10,8,20,19]. The chir pine needles yield oil, which is reported to have antibacterial activity against a number of organisms. Bark is used for tanning [8,18,20,21].

8) *Pinus wallichiana* A.B. Jackson in Kew Bull. 1838: 85. 1838; Raizada & Sahni in Ind. For. Rec. n.s. 5(2): 111. t.V. f.2. 1960; Gupta, Fl. Nainital. 439. 1968; Hara et al., Enum. Flow. Pls. Nepal 1: 26. 1978; Polunin & Stainton, Fls. Himal. 387. f.511. 1984; Naithani, Fl. Chamoli. 2: 763. 1985; Stainton, Fls. Himal. Suppl. 60. t.110. 1988; Sahni, Gymn. India & Adj. Count. 58.t.10. f.2. 1990; FLS. 582. 1994; Gaur, Fl. Garhwal. 52. 1999; FK. 708. 1999; FGHNP. 271. 2000; FSIR. 699. 2004; FC. 834. 2006; *Pinus excelsa* Wallich ex D. Don in Lambert, Descr. Gen. *Pinus* 2: 5. t.3. 1824 (non Lam., 1778); Wallich list 6059. 1828; Stewart, PP. 225. 1869; FBI 5: 651. 1888; Kanjilal, For. Fl. Chakrata, Dehradun & Saharanpur. 547. 1901; FS. 484. f.157. 1902, 1921; Brandis, Ind. Trees. 689. 1906; PP. 39. 1916; FF. 540. 1918. *Pinus griffithii* Mc Clelland in W. Griff. Notul. Pl. Asiat. 4: 17. 1854; Kitamura in Kihara, Fauna & Fl. Nepal Himal. 81. t.9-12. 1955; FBH. 3. 1977. **Family Pinaceae.** BHUTAN PINE, BLUE PINE, HIMALAYAN BLUE PINE, INDIAN BLUE PINE. Vern.: Andal, Biar, Chil, Chir, Chiti, Darchil, Kachir, Kaiar, Kail, Keiiri, Lem, Lhim, Lhimtser, Lim, Palsam, Partal, Sam, Shim, Somshing, Tser, Yari, Yero Figure 10.

It is a tall, evergreen and graceful or elegant tree up to 50 m in height and 3 m in girth and considered as one of 'the most beautiful" pines in the world. Branches are whorled, spreading, usually ascending in young trees and horizontal or drooping with upturned ends in old trees, uninodal or multinodal. Bark 1.3-2.8 cm, thin, smooth, resinous,

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greenish-white, greenish-grey or slate-coloured in young trees; grey or greyish-brown, corky, rough, scaly, superficially or shallowly fissured and divided into small, oblong, plates on the old trees. Winter buds small, cylindric-conic, 0.6-1.3 cm long, with numerous, lanceolate, fibrillar margined scales, either free or matted with resin. Shoots are dimorphic, i.e. of two types. Long shoots or shoots of unlimited growth, appearing in March or early April (depending upon locality), without down, glaucous, green or light-brown, darkening in colour with age. Dwarf shoots or shoots of limited growth or foliar spurs, borne on long shoots in the axils of scaly leaves, persistent, less than a millimeter in length, bearing five needles and enclosed by two prophylls and 8-10 spirally arranged (in 2/5 phyllotaxy) cataphylls, outermost being the smallest and innermost the largest, both prophylls and cataphylls deciduous, 1.3-2.3 cm long, forming a basal sheath around needles, which is with slightly fibrillar margins and a prominent midrib. Leaves borne in fascicles of five, rarely 4, 6 or even 7 in abnormal fascicles, persistent, lasting 3-4 years, erect and pointed upwards in young trees, but spreading or drooping and slightly bent in older trees; slender (thin and delicate), triquetrous, convex surface green, bluish or greyish-green, and glaucous on inner surface, giving the foliage its characteristic bluish tinge (colour), 10-21 cm long, shorter in stunted and diseased trees, margins minutely toothed, apex sharp pointed, ridged (ridges are epidermal projections between which the stomata are arranged in longitudinal rows), white stomatic lines on flat surfaces, resin canals marginal. Leaf shedding occurs in May-July, sometimes during October--December. New shoots appear in March-April and attain full size by August-September.

Strobili (Flowers, catkins or cones) are unisexual and monoecious. Male strobili in catkins, appearing in October-November, in 15-35 spirally arranged clusters, 1.3-5.1 cm long, at the base of current years young long shoots, each cone taking the place of a dwarf shoot and arising in the axil of a green, scaly leaf and enclosed by involucres of 8-12, equally prominent greenish-white, imbricate scales, which adhere to the catkins when it falls; cones when young are usually green, sometimes dark reddish-purple, ovoid or oblong, 0.7-1 cm long; when ripe yellow, light-brown or dark-brown and often pink towards the apex, elongated and 1-2 cm long, fall soon after ripening. Each cone consists of 85-115 spirally arranged microsporophylls (stamens) on a central axis, each stamen 0.1-0.15 cm long with its tip bent and extended upwards, and bears two microsporagia (pollen sacs) on its abaxial side. Pollination in April- June, depending upon the locality, season and altitude (the lower the altitude, earlier the cones shed their pollens). Female strobili terminal or sub-terminal, solitary or 2-3 together, sometimes more forming a whorl around the terminal bud, appear in February, when they replace the terminal or sub-terminal bud(s) of current years young long shoots, pale green, erect and protected by an involucre of bracts, pale or glaucous green turning to deep-pink or reddish purple and finally to greenish-brown at the time of pollination. In April cone axis elongates, cones protrude out of the involucre and measure 1.5-2 cm long and 0.8-1 cm in diameter with scales open to receive pollen. After pollination (end of April and beginning of June), the cones close and by August become 2.5-5.1 cm long by 1-1.3 cm in diameter, with 2.5-3.8 cm long peduncle or stalk, which elongates considerably after pollination, and cones become pendulous and bluish-green, with each scale being tipped with a small rudimentary brown umbo. Ripe (Mature) Female cones pendulous on 3.3-7.5 cm long stalks, cylindrical, 15-33 cm long and 3.0-6.5 cm in diameter before expansion, light-brown, very resinous and each consisting of 80- 90 spirally arranged pairs of bracts and ovuliferous scales (megasporophylls) on a central axis, the latter arising in the axils of the former, the bract scales being small and membranous, but the ovuliferous scales being fleshy, about 3.8-6.5 cm long and 2.0-3.8 cm broad, wedge shaped, rhomboidal or spathulate, exposed portion longitudinally grooved with a thickened apex, the basal ones sometimes reflexed and each bearing two winged seeds on its abaxial side. Ovuliferous scales become woody and hard during later stages, but they are not as hard as in Pinus roxburghii. Ripening, opening and shedding of seeds occur during September- November of the second year. The time taken from the first appearance of the female flower to the ripening of the cone is approximately 18 months, and to the shedding of seeds is about 22 months. Seeds bluish or dark-brown, compressed, acute at both ends, ovoid, 0.5-1 cm by 0.3-0.5 cm, winged, 0.7-1 cm wide with wings, membranous, obliquely truncate, about 3 times the length of seeds; the size of the seeds with wings being 1.5-4 cm in length. Germination of seed is epigeous. Cotyledons 8-12. Flowering and Fruiting: 3-Year life cycle; October-November (Male cones), February (1st year female cones), April-June (pollen shedding, pollination), September-November of the second year (fertilization) while ripening, opening and shedding of seeds during third year; cones remain on the branches long after the seeds have fallen.

Specimens examined: Bahadurpur, 17 April, 2009, Mahender. 133.

Habitat: Common on alpine slopes both in pure and mixed forests; also found in association with *Picea smithiana and Abies pindrow*. At higher elevations it is stunted and assumes a shrubby prostrate form (due to bending with snow). It can grow in areas where the annual rainfall is as less as 25 cm as in Suliman range or in areas where the annual rainfall is 510 cm as in Apa Tanang in E. Himalayas. Its altitudinal range (1200-3700 m) is also greater than any other Himalayan conifer. **Distribution:** Native of temperate Himalayas occurs throughout the greater Himalaya (West, Central and East) extending from Kafiristan (Baluchistan, Afghanistan) in the West to Arunachal Pradesh (India) in the east through the hills of Pakistan, Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Nepal, Sikkim, Bhutan and SE. Tibet. Its latitudinal and longitudinal ranges are 250N-360N (latitude) and 680E-1000E (longitude). In West Himalayas, it is abundant between 1830-2555 m, and extends westwards from Garhwal through Jaunsar, Chakrata, Mussoorie, Shimla, Bushahr, Kullu, Chamba, Kashmir (in India); Murree hills, Waziristan, Hazara (in Pakistan); and Kafiristan (in Afghanistan). In Central Himalayas it occurs at an altitude as high as 3600 m along the regions of Namchebazar and Thengopoche (in Nepal). In East Himalayas it extends eastwards from Chumbi valley across Sikkim border through lower Rangeet valley above the river Tista and then through Bhutan, where it is in abundance to small scattered patches on the north and east of Brahmputra in the NEFA at 1500-1830 m at Kameng division, Khalaktang area, Rupa valley, Dirang-Dzong valley (500 m), Subansri division, and Apatanang valley. Himachal Pradesh: Chamba {726-2400 m; Chamba (726 m), Dalhousie (2036 m), Kala Top (2400 m), Khajjiyar (2000 m), Lakkarmandi, Tisa

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(1870 m)}. Kangra [Multhan, ChottaBhanghal, Upper area of Boh]. Kinnaur [2200-2800 m; Kalpa (2800 m), Kinnaur, Nichar (2200 m), Kalpa (2800 m)]. Kullu [1500-2700 m; in all the valleys of GHNP; Bahu (1500 m), Banjar (2000 m), Chowai (2050 m), Gulaba forest, Jaloripass (2700 m), Kandugad (1700 m), Khanag (2692 m), Manali (2300 m), Manikaran (1737 m), Nagar (1768 m), Nohnoo (2600-2650 m), Pulga, Sojha (2692 m)]. Lahaul&Spiti [Lahaul; Pattan valley, near Kardangmonastry, Trilokinath]. Mandi [760-2000 m; Junee (2000 m), Karsog (2050 m), Mandi (760 m), Nachan, Suket]. Shimla [1500-3250 m; Bahali, Bashahr (1830-2440 m), Boileauganj (2050 m), Chadwick fall (1600 m), Chirgaon (1700 m), Chopal (2000-3200 m), Chotta Shimla (2150 m), Glen (1830 m), Hattoo peak (3250 m), Indian Institute of Advanced Studies (2100 m), Jubbal (2000 m), Kamnadevi (2175 m), Kotgarh, Naldehra (2149 m), Nankheri (3000 m), Narkanda (2700 m), Potter's Hill (2050 m), Roghi (2800 m), Rohru (1500-1535 m), Sarahan (3300 m), Shillaroo (2600 m), Summer Hill (2010 m), Tara Devi (1851-2050 m), Theog)]. Sirmaur [2250-3300 m; Haban, Kheradhar, Rajgarh (2250 m). Solan [1350-1928 m; Kasauli (1928 m), Solan (1350 m)]. Altitude: 1200-3800 m or more.

Economic and Ethnobotanical Uses: Its timber is fairly good. The sapwood is white and the heartwood is light brown. Kail wood is considered best next to deodar for internal fittings and planking of residential houses, furniture, packing cases, match boxes, drawing boards, fermentation vats, lorry bodies, shingles and railway sleepers; also used for other construction purposes, cheap pencils, battery separators, violins, joinery work, pattern making, cores for lamin boards, drawing boards and plane tables. Treated wood is used for railway sleepers. It yields excellent charcoal [1,18,19]. Oleoresin (sometimes referred to as Gum) yields turpentine oil and rosin. The oleoresin is used for varnish and paints. Rosin is used in soap making, sizing of paper and cloth, also used in manufacture of sealing-wax, oil cloth, lubricating compounds and inks [18,19]. Bark contains a fair amount of colouring matter [19]. Cones are employed for lighting fires and are collected by local people for medicinal purposes. The needles (leaves) form admirable litter and in certain localities they are mixed with mortar and plaster in building. The needles are added to give consistency to mud used in plastering, also used as animal beds [1,18,22].

9) *Santalum album* L. Kanjilal, For. Fl. Chakrata, Dehradun & Saharanpur. 438. 1901; Brandis, Ind. Trees. 553. 1906; Kirtikar & Basu, Ind. Med. Plants. 3: 2186. 1935; Bennet et al., Venerated Plants. 163. 1992. **Family Santalaceae.** SANDAL TREE, SANDAL WOOD, WHITE SANDAL WOOD, YELLOW SANDAL WOOD. Vern.: Chandal, Chandan, Chandoi, Safedchandan, Sandal Figure 11.

This is a small, evergreen, glabrous tree, usually up to 10 m high with slender drooping branchlets. It is a partial root parasite. Leaves are glabrous, opposite, thin, usually 3-6 x 1.5-3 cm, ovate or elliptic-lanceolate; petiole 1.3 cm long. Flowers are brownish-purple, ± 4 mm across, in terminal and axillary paniculate cymes. Perianth is companulate, limb of 4 valvate triangular segments. Stamens 4, exserted, alternating with 4 rounded obtuse scales, which may be regarded either as petals or as lobes of the disc. Fruits (Drupes) are globose, ± 1.3 cm in diameter, purple-black; endocarp hard. Flowering and Fruiting: September-April next.

Specimens examined: Koshrian, 18 July, 2011, Mahender.

Habitat: Wild, in forests in S. India; cultivated elsewhere. **Distribution:** India: S. India, Tamil Nadu, Karnataka, Cultivated in Rajasthan, Uttar Pradesh, Uttarakhand, Madhya Pradesh, Orissa, Himachal Pradesh. Altitude: Up to 1200 m.

Economic and Ethnobotanical Uses: The tree is a source of Sandal Wood and Sandal Wood Oil, the lattter extracted from the heartwood. Sandal wood is one of the finest woods for carving and also employed for making curios of exquisite beauty [1,10,11]. Sandal wood oil is widely used in soap, cosmetics, perfumery and forms the

Figure 10: ***Pinus wallichiana*** A.B. JACKS. syn. *Pinus excelsa* Wall., *Pinus griffithii* McClelland. BHUTAN PINE, BLUE PINE, HIMALAYAN BLUE PINE, INDIAN BLUE PINE. **Vern.:** Andal, Biar, Chil, Chir, Chiti, Darchil, Kachir, Kaiar, Kail, Keiiri, Lem, Lhim, Lhimtser, Lim, Palsam, Partal, Sam, Shim, Somshing, Tser, Yari, Yero.

Figure 11: ***Santalum album*** L. SANDAL TREE, SANDAL WOOD, WHITE SANDAL WOOD, YELLOW SANDAL WOOD. **Vern.:** Chandal, Chandan, Chandoi, Safedchandan, Sandal.

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base for attars (ottos) produced in India; also employed as a base for co-distillation of some of the other essential oils of delicate fragrance [24,2,16]. Sawdust is used in agarbattis as incense; for scenting clothes and cup boards. Bark is useful in malaria [12,18].

10) *Shorea robusta* Gaertn. Suppl. Carp. 48. 1805; Stewart. PP. 28. 1869; Kanjilal, For. Fl. Chakrata, Dehradun & Saharanpur. 71. 1901; Brandis, Ind. Trees. 69. 1906; PP. 8. 1916; FF. 32. 1918; Faizada& Saxena, Fl. Mussoorie. 1: 64.1978; Polunin & Stainton, Fls. Himalaya. 60. 1984. *Shorea robusta* Roxb. ex Gaertn.f. FSIR. 165. 2004. **Family Dipterocarpaceae**. COMMON SAL, INDIAN DAMMER, SAL TREE. Vern.: Sakher, Sakhu, Sakhua, Sakoh, Sal, Sala, Salwa, Seral, Shal Figure 12.

It is a large sub-deciduous tree. Bark of young trees blackish-brown, smooth or with a few longitudinal cracks; of old trees very thick dark-grey, rough with irregular furrows. Leaves are broad, ovate-oblong, 10-20 x 5-13 cm, rounded-cordate, undulate or entire, acuminate, glabrous, shining when fully mature; lateral nerves 12-15 pairs, conspicuous beneath; petiole terete, 1-2 cm long; stipules 7-8 mm long, pubescent, caducous. Flowers are yellow, about 1 cm long and 1.5-2 cm across; in terminal and axillary racemes forming 15-20 cm long panicle; rachis and branches grey- tomentose. Calyx tube is 3-4 mm long, adnate to the torus, segments ovate, obtuse, grey tomentose, accrescent in fruit. Petals are yellow, about 1 cm long, narrow-oblong, silky-tomentose outside, orange inside. Stamens are up to 50, about 1 mm long, lobes hairy, connective with subulate, bearded appendages. Ovary is 3-celled; style subulate. Fruit ± 1 cm, ovoid, acute, fleshy, indehiscent, white-pubescent; wings of fruiting calyx 5, 5-8 cm long, oblong or spathulate, obtuse, brown when dry, unequal, with 10-15 longitudinal nerves joined by numerous transverse nerves. Flowering and Fruiting: March-July.

Specimens examined: Naswal, 21 April, 2012, Mahender. 485.

Distribution: Tropical Asia, Malaya, Sub-Himalayan belt from Himachal Pradesh to Bhutan; the Southern or Central India belt extends form the Coromandel coast west to the Panchmari sandstone hills and south to the Godavari river. India: Himachal Pradesh, Uttarakhand, Assam, Central and South India. Himachal Pradesh: Sirmaur (Paonta Sahib, Nahan). Altitude: up to 1500 m.

Figure 12: ***Shorea robusta*** Gaertn. COMMON SAL, INDIAN DAMMER, SAL TREE. **Vern.:** Sakher, Sakhu, Sakhua, Sakoh, Sal, Sala, Salwa, Seral, Shal.

Economic and Ethnobotanical Uses: Sal Wood is one of the best sleeper woods in India, sued for beams, scantlings, rafters, floors, piles, mine work, bridges, ship building, dug- out boats, carriage and wagon building, fellows, hubs and spokes of wheels, agricultural implements, tool handles, liquid storage vats, bear and oil casks [25-28]. Bark and leaves are used for tanning. Bark is used for the production of boards and isolation of cellulose. Leaves are used for making bidis, sometime used as fodder; good host for lac insects, used for making platters and cup. Flowers are good source of honey[29-31]. Tree yields an oleoresin called Sal Dammar or Bengal Dammar (Laldhuna, ral, dhup, guggal), used as an incense, in paints and varnishes and for caulking boats, employed for hardening softer waxes for use in shoe polishes, carbon papers and ribbons. Sal resin yields an essential oil called Chua Oil, used as a fixative, also used for flavouring chewing and smoking tobacco[32-35]. (Watt, 1889-1893; KirtikarBasu, 1935; Singh et al., 1983; Ambasta, 1986; Nayar et al. 1989; Warrier et al., 1994;Pullaiah, 2002; Agarwal, 2003)

11) *Tectona grandis* L.f., Roxb. Cor. Pl. t.6; Bedd. Fl. Sylv. t.250; Stewart, PP. 166. 1869; Brandis FF. t.44. 354. 1874; Kanjilal, For. Fl. Chakrata, Dehradun & Saharanpur. 394. 1901; Brandis, Ind. Trees. 505. 1906; PP. 5. 1916; FF. 405. 1918. **Family Verbenaceae**. INDIAN OAK, SHIP TREE, TEAK. Vern.: Sagon, Sagun, Sagwan, Sakhu, Segun. Figure 13.

It is a large deciduous tree, fluted near the base; heartwood golden yellow when freshly cut, turning brown, oily to touch. Bark is light-brown or grey, thin, fibrous, peeling off in long thin strips. Branchlets are quadrangular and channeled, with large quadrangular pith. Leaves are simple, opposite, elliptic or obovate, upper side rough, underside clothed with dense stellate, grey or tawny tomentum, blade 30-60 cm long, narrowed into petiole 2.5-3.8 cm, of seedlings and coppice shoots the leaves often 60-90 cm long, smaller and bract like in the inflorescence; lateral nerves 8-12 pairs. Flowers are white, regular, bracteolate, sweet- scented, in erect, 30- 90 cm long panicles, which are dichotomously or trichotomously branched cyme. Bracts are small, narrow. Calyx is campanulate, shortly 5-6 lobed, stellate-pubescent, globose in bud; salver-shaped and 3-4 cm across in open flowers; enlarged in fruit. Corolla tube is short, limb spreading, equally 5-6 lobed, slightly pubescent. Stamens are 6, exserted. Ovary is 4-celled, hairy, style shortly 2-4 fid. Fruits (Nuts) are hard, bony, enclosed in a thick spongy covering consisting of a dense felt of branched hairs; endocarp very hard, 4-celled. Seeds are 1-3, rarely 4, a central cavity having the appearance of a 5th cell. The inflated calyx, which encloses the fruit like a bladder is generally ovoid, 2.5-3.8 cm in diameter, reticulate and more or less corrugated. Flowering and Fruiting: July-January next.

Specimens examined: Bilaspur, 18 July, 2011, Mahender. 309,310.

Distribution: Indigenous to both Penninsulas of India; Java, Indian Archipelago India: Jhansi in North to Mahanadi in Central India; cultivated in Bengal, Assam, Dehradun and now in Himachal Pradesh.

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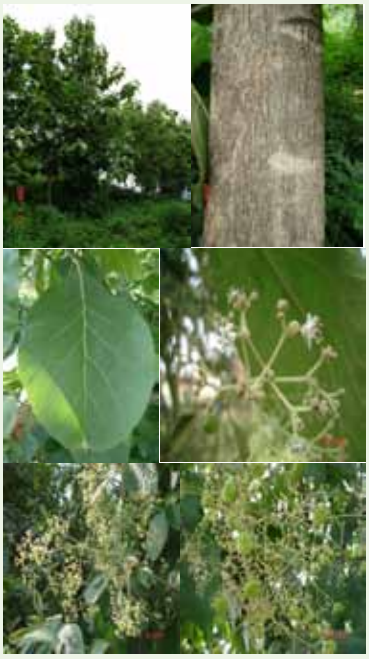

Figure 13: ***Tectona grandis*** L.f. INDIAN OAK, SHIP TREE, TEAK. **Vern.:** Sagon, Sagun, Sagwan, Sakhu, Segun.

Economic and Ethnobotanical Uses: Wood is very durable, resistant to fungi; used for poles, beams, trusses, columns, roofs, doors, window frames, flooring, planking, panelling, staircases and other constructional work. It is one of the best timbers for furniture and cabinet- making, wagons and railway carriages. Due to its better shape-retention ability, teak is popular in marine constructions and is a class by itself for boat- and ship-building, particularly for decking [10,1,12]. On account of its resistance to chemicals, teak wood articles are used in chemical industries and for making laboratory bench top; suitable for casks and vats for shipping corrosive liquids and for storing vegetable oils, fruit syrups, chutneys, etc. Teak is employed for sound-boards of musical instruments, keys, etc. and for different grades of plywood. Wood waste in the form of wood-shavings and sawdust is used for chip-boards, fiberboards, and plastic boards. Leaves contain about 6% tannin and a dye; also used plates and for packing, thatching. Root-bark is used for colouring matting [1,2,19]. (Watt, 1889- 1893; Kirtikar and Basu, 1935; Singh et al., 1983; Ambasta, 1986; and Agarwal, 2003).

12) *Terminalia alata* Heyne ex Roth. FHP. 1: 282.1984. *Terminalia tomentosa* (DC). Wt. & Arn. Kanjilal, For. Fl. Chakrata, Dehradun & Saharanpur. 253. 1901; Brandis, Ind. Trees. 310. 1906; PP. 36. 1916; FF. 240. 1918. *Terminalia elliptica* Willd. FSIR. 302. 2004. *Pentaptera tomentosa* Roxb. Stewart. 88.1869. **Family Combretaceae.** BLACK MURDAH. Vern.: Ain, Aisan, Alson, Anjan, Asaina, Asan, Asna, Assain, Asun, Kauha, Sadri, Sain, Saj, Sein Figure 14.

This is a large deciduous tree, up to 33 m, trunk tall; young parts rusty-pubescent. Bark is dark-grey or black, much furrowed longitudinally, exfoliating in think rectangular pieces. Leaves are 12-25x6-10 cm, alternate or sub-opposite, upper alternate, oblong-

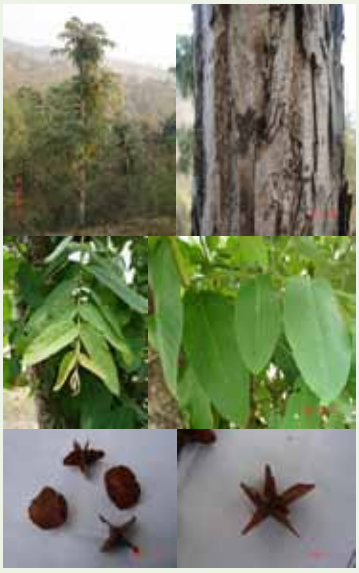

Figure 14: ***Terminalia alata*** Heyne Ex Roth. syn. *Terminalia tomentora* (DC). Wt. & Arn.; *Terminalia crenulata* Roth.; *Terminalia elliptica* Willd.; *Pentaptera tomentosa* Roxb. ex. DC. BLACK MURDAH. **Vern.:** Ain, Aisan, *Alson,* Anjan, Asaina, Asan, Asna, Assain, Asun, Kauha, Sadri, Sain, Saj, Sein.

elliptic or obovate, hard, coriaceous, glabrescent above, tomentose beneath, base unequal-sided, tip acute or rounded; lateral nerves 10-20 pairs; petiole 7-10 mm long with 1-2 glands on the sides. Flowers are bisexual, dull-yellow, sessile, apetalous, in erect, terminal, paniculate spikes and lower on axillary branches. Calyx lobes are ovate, broad-acute, glabrous or hairy; free part of the tube salver-shaped. Fruits (Drupes) are 3-6.5 cm long, with 5 broad transversely-striated coriaceous wings having a crenulate edge. Flowering and Fruiting: August-March next.

Specimens examined: Sargal (Berthin), 2 June, 2009, Mahender. 155,156.

Distribution: Sub-Himalayan tracts and Deccan Peninsula, Burma, Nepal, Sri Lanka. India: Himachal Pradesh, Uttarakhand. Himachal Pradesh: Sirmaur (Reuka), Mandi (DD), Una (BSD). Altitude: 400-1100 m.

Economic and Ethnobotanical Uses: Wood is used for beams, joints, rafters, door and window frames, boarding, construction of carts, toys, furniture, oil mills, rice pounders, engine brake blocks, electric casing, tool-handles, agricultural implements and plywood manufacture. Wood yields pulp which is used for manufacture of printing and wrapping paper. Wood is resistant to fire and is used in fire-proof buildings; also yields good quality charcoal [1,10,11]. Bark is used for tanning and dyeing. Leaves are used as fodder and for feeding tasarsilkworms [36-41]. Gum from the tree is used as an adhesive and also used as incense and in cosmetics [41-49]. (Watt, 1889-1893; Kirtikar and Basu, 1935; Ambasta, 1986; Nayar et al.,1989; Joshi, 2000; and Agarwal, 2003).

13) *Toona ciliata* M. Roemer, Fam. Nat. Syn. Monogr. Hesperid 1: 139. 1846; Santapau in Bull. Bot. Surv. India 3: 13. 1962; FBH. 55. 1977; Raizada & Saxena, Fl. Mussoorie. 1:101. 1978; Sharma &

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Kachroo, Fl. Jammu. 1:122. 1981; FHP. 1:144. 1984; FK. 190. 1999; FGHNP. 88. 2000; FSIR. 196. 2004; FC. 220. 2006; *Cedrela toona* Roxb. ex Rottboell & Willd. in Ges. Naturf. Freunde New Schriften 2: 198. 1803; Stewart, PP. 34. 1869; FBI. 1:568. 1875; Kanjilal, For. Fl. Chakrata, Dehradun & Saharanpur. 109. 1901; FS. 83. 1902, 1921; Brandis, Ind. Trees. 145. 1906; PP. 43. 1916; FF. 73. 1918; P. Abdulla in Nasir and Ali. Fl. W. Pak. 17: 2. f.1 (A-D). 1972. *Toona hexandra* (Wallich ex Roxb.) M. Roemer, Monogr. Hesperid 1: 139. 1846 ssp. *hexandra* var. *gamblei* (CDC) Almeida & Almeida in J. Bomb. Nat. Hist. Soc. 91: 473. 1994. Gaur, Fl. Garhwal. 376. 1999. **Family Meliaceae.** AUSTRALIAN TOON, AUSTRALIAN RED CEDAR, BURMA CEDAR, BURMA TOON, CEDRELA TREE, HAPPY TREE, INDIAN MAHOGANY, INDIAN TOON, MOULMEIN, CEDAR, RED CEDAR, SANDAL NEEM, SINGAPORE CEDAR, TOON. Vern.: Bisru, Chitisirin, Darab, Der, Deri, Drab, Dravi, Guldar, Khanam, Khushing, Lim, Lud, Mahalimbu, Mahanim, Tun, Tuna, Tunkajhar, Tuni, Tunni Figure 15.

Tree is up to 30 m high deciduous tree. Stem with red coloured, scented wood. Bark is smooth up to middle age, afterwards rough, exfoliating in irregular scales, dark grey, thin. Leaves are paripinnate, 30-60 cm long; petioles 5-10 cm long; leaflets 8-30, 5-15 cm long, opposite or sub-opposite or alternate, ovate-lanceolate or lanceolate, 6-15 x 2.5-6 cm, base oblique, margins entire or faintly sinuate, tip acuminate, glabrous, rachis pubescent, petiolules 1-2 mm long. Flowers are 4-6 cm long, sweet scented, creamish, in 20-30 cm long, large drooping panicles, shorter than the leaves; peduncles 5-6 cm long, papillose towards base, pedicels 1.5-2 mm long, not reflexed in the fruits, pubescent or puberulous. Calyx 5 lobed, lobes 1-1.5 mm long, sepals are ciliate, obtuse, ovate. Petals are 5, creamy-yellow, ovate- oblong, ciliate, 3-6 mm long, sub-acute, obovate. Stamens are 5 inserted on the 5 fleshy, orange-coloured lobes of the disc; filaments 0.3-0.5 cm long, free hairy, anther lobes ca 1 mm long, oblong, dorsifixed. Ovary is hairy; style 1-1.5 mm long, flattened; stigma peltate or 5- lobed. Fruits (Capsules) are dark-brown, oblong or oblanceolate, ca 1.3-2.4 cm long, 5 valved. Seeds are 1.3 cm long, reddish-brown, numerous, winged at both ends, oblong. Flowering and Fruiting: March-July.

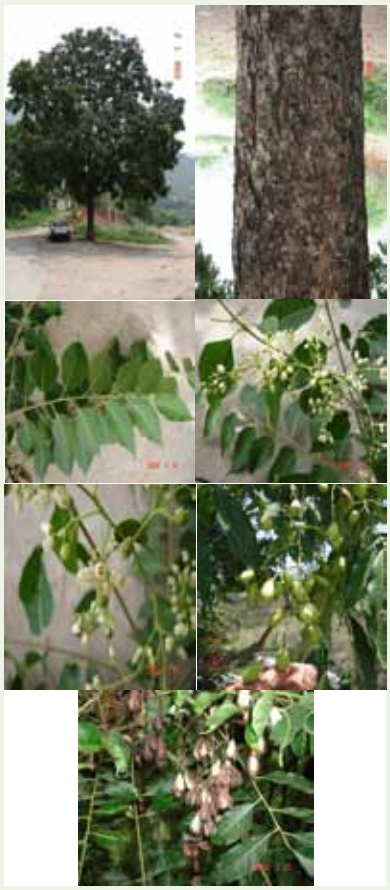

Figure 15: ***Toona ciliata*** M. Roemer syn. *Cedrella toona* Roxb. AUSTRALIAN TOON, AUSTRALIAN RED CEDAR, BURMA CEDAR, BURMA TOON, CEDRELA TREE, HAPPY TREE, INDIAN MAHOGANY, INDIAN TOON, MOULMEIN, CEDAR, RED CEDAR, SANDAL NEEM, SINGAPORE CEDAR, TOON. **Vern.:** Bisru, Chitisirin, Darab, Der, Deri, Drab, Dravi, Guldar, Khanam, Khushing, Lim, Lud, Mahalimbu, Mahanim, Tun, Tuna, Tunkajhar, Tuni, *Tunni*.

Specimens examined: Bilaspur, 18 July, 2011, Mahender. 313,314.

Habitat: Forests, road sides and waste places.

Distribution: Extends between Pakistan and Australia, occurring widely in almost all the countries in between such as India, Bangladesh, Nepal, Bhutan, China, Burma, Thailand, Java, Malaya, Laos, Kampuchea, Vietnam, the Philippines, Malaysia, Indonesia and New Guinea. India: Throughout India, in the forests of the sub-Himalayan tract and valleys of the outer Himalaya up to an altitude of 1500 m and in most of the plains of India. Himachal Pradesh: Chamba (DD, Khjjiar, Nainikhud, Chamba), Hamirpur, Kangra (RRL, Throughout Kangra, Dharamshala, Maranda, Paprola, Palampur, Baijnath, Kangra, Andreta, Jaisinghpur, Nurpur, Ranital), Kinnaur (BSD, Jeori). Kullu (Sainj, Ropa in Tirthan valley), Mandi (Nachan, Suket), Shimla (Satluj valley), Sirmaur (Nahan, Kheradhar, Sarahan), Solan (Sabathu, Kunihar). Altitude: 500-1500 m.

Economic and Ethnobotanical Uses: The wood of the Toon is red, even-grained, soft, easily worked and not eaten by white ants. Wood is used as a high value timber for furniture, ceilings, floors, doors, windows, plywood manufacture, and other articles, priced for construction purposes. Wood yields an essential oil. It is an important tree of social forestry. It is used as a fodder tree [50-55]. Bark is used for tanning. Flowers are a useful source of bee-forage and apiculture. Flowers yields a sulphur dye called Gunari [56].

References

1. Ambasta SP (1986) The useful plants of India. Publication and Information Directorate. CSIR, New Delhi. 918.
2. Kirtikar KR, Basu BD (1935) Indian Medicinal Plants. Vols. I – IV (Text) + V-VIII (Plates). Reprinted by Bishen Singh, Mahendra Pal Singh, Dehradun, India. 2793
3. Warrier PK, Nambiar VPK, Ramankutty C (1994) Indian medicinal plants: A compendium of 500 species. Orient Blackswan 3: 132-135
4. Seth MK (2003) Trees and their economic importance. THE BOTANICAL REVIEW (NEW YORK) 69: 321-376.
5. Seth MK (2006) Gymnosperms of India. In: Plant Taxonomy-An Overview (Eds. I.B. Prasher and A.S. Ahluwalia), Botany Department, Panjab University, Chandigarh-160 014 (India) 73-78.

Citation: Mahender K. Common Timber Yielding Plants of District Bilaspur of Himachal Pradesh, India. J Plant Sci Res. 2021;8(2): 209

6. Simson JL, Rau MG (1922) The constituents of some Indian essential oils. Superintendent Government.
7. Collett H (1902) Flora Simlensis, A handbook of flowering plants of Simla & the neighbourhood. Thacker, Spink and Co., London, 2nd edition by Thacker, Spink and Co., Calcutta and Simla, 652 pp. (Reprinted many times by Bishen Singh, Mahendra Pal Singh, Dehradun, India).
8. Kanjilal U (1901) Forest flora of Chakrata, Dehradun and Saharanpur Forest divisions, U.P. (revised and enlarged by B.L. Gupta in 1969). Forest Research Institute, Dehradun and Manager of Publications, New Delhi 593.
9. Parthiban KT (2016) Tree Insurance - An Innovative Intervention in Industrial Agroforestry. 2016. Indian Forester 142: 445-450.
10. Parker RN (1918) A forest flora for the Punjab with Hazara and Delhi, Lahore (Reprinted many times by Bishen Singh Mahendra Pal Singh, Dehradun).
11. Chowdhery HJ, Wadhwa BM (1984) Flora of Himachal Pradesh. 3 Volumes. Flora of India Series 2. Botanical Survey of India, Howrah, Calcutta. 860
12. Champion HG, Seth SK (1968) A Regional Survey of the Forest Types of India. Govt. of India Publication. Delhi, 404.
13. Nayar MP, Ramamurthy K, Agrawal VS (1989) Economic plants of India. Vol. I. Botanical Survey of India, Kolkatta. 159.
14. Singh PB, Aswal BS, Gaur RD (1983) New records of plants from Himachal Pradesh, India In: Higher plants of Indian subcontinent (Eds. B.K. Gupta). Bishan Singh Mahendra Pal Singh, Dehradun 341-347.
15. Singh H. Sharma M (2006) Flora of Chamba district (Himachal Pradesh). Bishen Singh Mahendra Pal Singh, Dehradun, India, 881.
16. Singh KK, Kumar K (2000) Ethnobotanical Wisdom of Gaddi Tribe in Western Himalaya. Bishen Singh Mahendera Pal Singh, Dehradun, India. 139.
17. Pullaiah T (2002) Medicinal plants in India. Regency Publications, New Delhi. 2: 580
18. Vidyarthi OP (1997) Wild and cultivated plants of Jammu, Kashmir & Ladakh. Directorate of Social Forestry Project, Jammu & Kashmir Government. 336.
19. Sharma R (2003) Medicinal plants of India. An Encyclopedia. Daya Publishing House, New Delhi. 302
20. Watt G (1889) A dictionary of economic products of India. Vols. I-VI. Vol. I: Abaca to Buxus, 559 pp.; Vol. II: Cabbage to Cypequs, 689 pp.; Vol. III: Dacrydium to Gordonia, 534 pp.; Vol. IV: Gossypium to Linociera, 643 pp.; Vol. V: Linum to Oyster, 676 Vol. VI: Part 1: Pachyrhizus to Rye, 594 Part 2: Sabadila to Silica, 687pp.; Part 3: Silk to Tea, 479 pp.; Part 4: Tectona to Zygophiluos, 375. Cosmo Publications, Delhi.
21. Singh S (2018) Timber yielding plants of district Haridwar and adjacent Siwalik hills. Annals of Plant Sciences 7: 1978-1982.
22. Singh KJ, Thakur AK (2014) Medicinal Plants of the Shimla hills, Himachal Pradesh: A Survey. International Journal of Herbal Medicine 2: 118-127.
23. Singh SK, Rawat GS 2000. Flora of Great Himalayan National Park, Himachal Pradesh. Bishen Singh Mahendra Pal Singh, Dehradun, India, 304
24. Joshi SG (2000) Medicinal plants in India. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi. 491.
25. Kaur H, Sharma M (2003) Flora of Sirmaur district (Himachal Pradesh). Bishen Singh Mahendra Pal Singh, Dehra Dun, India. 770.
26. Chase MW, Reveal JL (2009) A Phylogenetic Classification of the Land Plants to Accompany APG III. Botanical Journal of the Linnean Society 161: 122-127.
27. Parthiban KT, Seenivasan R (2017) Forestry Technologies – A Complete Value Chain Approach. Scientific Publishers. Jodhpur. 629
28. Mamgain MD (1975) Himachal Pradesh District Gazetteer–Bilaspur. Government of Himachal Pradesh, Shimla, 541.
29. Masilamani P, Selvam S, Albert A, Govindaraj M (2017) Effect of different methods of lifting and stumping of teak (Tectona grandis linn. F) Seedlings on stump quality and its economic analysis. Indian Journal of Forestry.
30. Nair NC (1977) Flora of Bushahr Himalaya. International Bio-Science Publishers, Hisar, Madras. 360.
31. Dhaliwal DS, Sharma M (1999) Flora of Kullu district (Himachal Pradesh). Bishen Singh Mahendra Pal Singh Dehradun, India. 744.
32. Nayar MP, Ramamurthy K, Agrawal VS (1994) Economic plants of India. Vol. II. Botanical Survey of India, Kolkatta. 258.
33. Chauhan NS (1999) Medicinal and aromatic plants of Himachal Pradesh. Indus Publishing Company, New Delhi, India. 632
34. Polunin O, Stainton A (1984) Flowers of the Himalaya. Oxford University Press, Delhi. 580.
35. Gaur RD (1999) Flora of district Garhwal-Northwest Himalaya (with ethnobotanical notes). Trans Media, Srinagar (Garhwal), India. 811.
36. Raizada MB, Sahni KC (1960) Living Indian Gymnosperms. Part I (Cycadales, Ginkgoales and Coniferales). Ind. For. Rec. N.S., Bot. 5**:** 73-150.
37. Raizada MB, Saxena, HO (1978) Flora of Mussoorie. Vol.1. Bishen Singh Mahendra Pal Singh, Dehradun. 645.
38. Agarwal VS (2003) Directory of Indian Economic Plants. Bishen Singh Mahendra Pal Singh, Dehradun, India. 565.
39. Sahni KC (1990) Gymnosperms of India and adjacent countries. Bishen Singh Mahendra Pal Singh, Dehradun, India. 169.
40. Bamber CJ (1916) Plants of the Punjab. Superintendent, Government Printing, Lahore, Punjab, 652
41. Bentham G, Hooker JD 1862-1883. Genera Plantarum: ad exemplaria imprimis in Herberiis Kewensibus servata definita 1-3.
42. Dhyani SK (2014) National Agroforestry Policy 2014 and the need for area estimation under agroforestry. Curr Sci 107: 9-10.
43. Seth MK, Jaswal S (2004) An Enumeration of Plant Resources of Shimla (Himachal Pradesh) in the N.W. Himalayas. International Book Distributors & Publishers, Dehradun. 206.
44. Brandis D (1906) Indian Trees. An account of trees, shrubs, woody climbers, bamboos and palms indigenous or commonly cultivated in the British Indian Empire. Constable and Company Ltd., London. 767 pp. (Reprinted many times by International Book Distributions, Dehradun, India). Brickell, C. (Editor-in-Chief) 1960, 1996. The Royal Horticultural Society A-Z Encyclopedia of Garden Plants. Dorling Kinder sky. London, New York, Stuttgart, Moscow, 1080.
45. Forest Survey of India at Ministry of Environment and Forests (2013) “India State of Forest Report 2013,” Dehradun, 26
46. Gamble JS (1881) A manual of Indian timbers. An account of the structure, growth, distribution and qualities of Indian woods. Sampson, Low, Marston and Co. Ltd., London. 868 (Reprinted many times by International Book Distributors, Dehradun, India).
47. ICN (International Code of Nomenclature) for Algae, Fungi and Plants or MELBOURNE CODE, 2012.
48. The Plant List. A working list of All Plants.
49. Dhyani SK (2014) National Agroforestry Policy 2014 and the need for area estimation under agroforestry. Curr Sci 107: 9-10.
50. Jain SK, Rao RR (1977) Handbook of field and herbarium methods. Today and Tomorrow’s Printers and Publishers, New Delhi, India. 158.
51. Stainton A (1988) Flowers of the Himalaya – A supplement. Oxford University Press, Delhi, India 86.
52. Stewart JL (1869) Punjab Plants comprising botanical and vernacular names and uses of most of the trees, shrubs and herbs of economic value, growing with in the province. Public Works Department, Government Press, Lahore,

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Reprinted in 1977 by Periodical Experts Book Agency, Delhi and International Book Distributors, Dehradun, India. 106.

53. Harris JG, Harris MW (1994) Plant identification terminology-an illustrated glossary. Spring Lake Publishing, Spring Lake, Utah, USA 188.

54. International Plant Name Index (IPNI).

55. Hooker JD (1872) The flora of British India. 7 Vols. Vol. I: Ranunculaceae to Polygaleae, 740 pp.; Vol. II: Sabiaceae to Cornaceae, 792 pp.; Vol. III: Caprifoliaceae to Apocynaceae, 712. to Amarantaceae, 780pp.; Vol. V: Chenopodiaceae to Orchideae, 910pp.; Vol. VI: Orchideae to Cyperaceae, 792pp.; Vol. VII: Cyperaceae to Gramineae and General Index, 842pp. L. Reeve and Co., London.

56. Womersley JS (1981) Plant collecting and herbarium development - a manual. FAO Plant Production and Protection Paper 33, FAO, Rome, Italy. 137.

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