

Distribution of Conifers

(Dr. Pooja Dixit, Botany Department, J.N.M.P.G. College, Lko.)

(For M.Sc. II semester)

Coniferales are a large group comprising number of plants distributed in temperate regions and high altitudes of tropics. Conifers almost cover the globe, from within the Arctic Circle to the limits of tree growth in the Southern Hemisphere. At those extremes, they often form pure stands of one or a few species. The immense boreal forests (or taiga) of northern Eurasia and North America are dominated by just a dozen species of conifers, with even fewer adjunct kinds of hardwoods. The richest north temperate conifer forests are those of mid-latitude mountain systems, where conifers also dominate in numbers. At lower latitudes and moderate elevations, are found warm temperate woodlands and forests of pine (*Pinus*), oak (*Quercus*, a hardwood), and juniper (*Juniperus*), which vary in composition and density across Eurasia and North America.

Most tropical conifers are confined to cooler mountain areas where they form solid stands or grow with tropical hardwoods, while a few species inhabit lower elevations. The dammars (*Agathis*), for instance, dominate lowland tropical rain forests in Malaysia, Indonesia, and the Philippines, where they support an important forest industry. Conifers are widespread in southern temperate regions as well, generally with less dominance than in the north. Their greatest diversity is found in the humid portions of the three southern continents, but the largest areas are occupied by semiarid open woodlands of cypress pine (*Callitris*) in Australia and sederboom (*Widdringtonia*) in southern Africa.

Conifer species are unevenly distributed. The Eurasian continent is richest in conifers, but every region has its own endemic genera and species. The most widely distributed genera are junipers (*Juniperus*) and pines (*Pinus*), both of which cover the northern continents and extend well into the tropics. Spruces (*Picea*) and firs (*Abies*) are only slightly more restricted. Yellowwood (*Podocarpus*) is the most widely distributed genus on the southern continents, followed by *Retrophyllum*.

At the other extreme, the most narrowly restricted endemic genera are *Austrotaxus*, *Neocallitropsis*, and *Parasitaxus* of New Caledonia, an island with the richest conifer flora in the world for its size (14 genera and 44 species). Other highly local genera include *Athrotaxis*, cheshunt pine (*Diselma*), and creeping pine (*Microcachrys*) in Tasmania, Patagonian cypress (*Fitzroya*) and Prince Albert yew (*Saxegothaea*) in Chile and Argentina, *giant Sequoia* (*Sequoiadendron*) in California, and dawn redwood (*Metasequoia*) and white-berry yew (*Pseudotaxus*) in China. Most conifer genera fall between those extremes, with scattered distributions on one or more continents.

Coniferous flora of India

The wild Conifers of India are chiefly distributed in the Himalayas and connecting ranges of Himachal Pradesh, Kashmir, Assam and Burma. In the Himalayas, particularly the Conifers are the flourishing group, covering extensive areas in a more or less pure forest formation. The living conifers comprises 52 genera and 566 species under 7 families.

During the tertiary, India had very few Conifers. Our concept of the modern coniferous flora of this country is based on relatively recent immigrants. The transition of the tertiary was accompanied by overhauling of the existing flora. The end of the cretaceous was marked by great physical disturbance. This was succeeded by an era of slow but continuing upheavals in India and elsewhere. The younger rocks of the Sivalik system which was laid down in Pliocene, has yielded no trace whatsoever of fossil conifers. The first evidence of the group comes from the overlying Pleistocene beds where the characteristic winged pollen grains of Abietieae (Pinaceae) have been found. It seems that the advent of coniferous flora of the Himalayas was an event of the geologically recent past. The coniferous invasion of India must be placed at a date towards the end of the Pliocene or even later. This was postponed until the elevation of the Himalayas contributed a suitable climate for the development of the invaders from higher latitudes and made our northern as well as western frontiers habitable by them. The success of the invasion emerges from the fact that *Cedrus*, *Juniperus*, *Picea*, *Taxus* and other modern genera are plants of cold or cold temperate climates and that they rapidly established themselves in the different altitudes of Himalayas.

The distribution of wild conifers in the Indian empire mostly confined to the western and the eastern Himalayas including the hill of Northern Burma. The number of species is not very large but the Himalayan conifers are well represented both in the western and eastern ranges.

The modern coniferous flora is a mixture of two elements, one element originating from the North and West is represented by *Abies*, *Cedrus*, *Picea* and *Pinus*, all of which dominate the western Himalayas. The other element is derived from the East and South east and is typified by *Cephalotaxus*, *Libocedrus* and *Podocarpus* these genera are mainly inhabitants of the eastern Himalayas. The intermediate zone with Nepal in the center has both elements. The two species of *Pinus* seen in Assam and Burma may be regarded as “the vanguard of a north western column” which extends southwards. A South Indian conifer, *Podocarpus* with sps. *Podocarpus latifolia* and *P. wallichianus* ranges from Assam to Malaya Peninsula through Burma. It is the only known tertiary conifer from peninsular India.

The following three regions are recognized for present day distribution of Indian conifers:

North-West Himalayas-Conifers grow in range of 1066-3,048 m. *Abies pindrow*, *A. spectabilis*, *Cedrus deodara*, *Juniperus macropoda*, *J. recurva*, *J. squamata* (western Himalaya), *Picea smithiana* (Afghanistan to Kumaon), *Pinus gerardiana* (Punjab to Afghanistan) have been reported from this region.

Central Himalayas- In this region *Cupressus funebris*, *Podocarpus neriifolius* are found in hills up to 914 m. Some species are found at 1020-4866m., most of them extend above 9133m like *Cupressus torulosa*, *Juniperus recurva*, *Pinus excelsa*, *P. roxburghii*, *Taxus baccata* etc.

Eastern Himalayas-In this region *Cephalotaxus griffithii*, *C. mannii*, *Podocarpus latifolia* and *Thuja orientalis* grow between 610-1980 m. *Cryptomeria japonica* (Darjeeling), *Cupressus torulosa* and *Pinus khasiya* confined to Naga hills. *P. spinulosa* from 1980-4572 m.

The following account gives a brief survey of the various members of the conifers:

1. *Cupressus torulosa*:

It is the only *Cupressus* in India and is confined to outer ranges of North-Western Himalayas and extending up to Central Nepal. Its occurrence is distinctly noticed from 5,000 to 13,000 ft. It also occurs in the Western Himalayas and ascends from 5,000 to 15,000 ft. being abundant from 10,000 to 15,000 ft.

2. *Juniperus* (4 Species):

(a) *J. communis*—spreads mostly over to the North-Western Himalayan ranges from Afghanistan to Kumaon, from 5,000-14,000 ft. in altitude

(b) *J. pseudosabina*, *J. reccuva* and *J. macropoda*—purely natives of the Western Himalayas occurring in higher altitudes, 7,500-15,000 ft.

3. *Cephalotaxus* (2 Species):

(a) *C. griffithii* predominates over the Mishmi Hills and Upper Assam between Burma, etc. It ascends from 3,000-8,000 ft.

(b) *C. mannii* is only confined to Khasia Hills and Assam from 3,000-6,000 ft.

4. *Taxus Baccata*:

It occurs in Bhutan, Assam and Upper Burma. In Himalayas it extends both over the Eastern and Western from 5,000 to 12,000 ft.

5. *Podocarpus* (4 Species):

(a) *P. latifolia* may be considered to be originally growing in lower hill forests of South India, Assam and Burma.

(b) *P. neriifolius* grows in Annamalies, has a wide range of distribution ascending up to 5,000 ft. It also grows abundantly in the lower hill forests of Central Himalayas, Eastern Himalayas, Bangladesh, Assam, Andaman Islands, South Burma, etc.

(c) *P. cupressina* spreads over the hills of Burma.

6. *Pinus* (6 Species):

(a) *P. wallichiana*—evidently a North-West Himalayan species, ranging from an elevation of 5,000 to 10,000 ft.

(b) *P. roxburghii* is mainly confined to the lower hill ranges, descending to the valleys of Western and Eastern Himalayas, where it extends up to Bhutan. It is abundant in the wild state of growth from 1,000 to 3,000 ft. and ascends up to 6,000 ft. It has adapted itself to grow in the plains.

(c) *P. insularis*—native of Eastern Himalayas, spreading over Khasia, Jaintia and Naga Hills. It ascends from an elevation of 2,000 to 5,000 ft. It is also found in 7,000 ft. and above.

(d) *P. gerardiana*—chiefly a species of the North-West Himalayas, extending from Punjab to Afghanistan and Baluchistan, ranging from an altitude of 5,000 to 10,000 ft.

(e) *P. merkusii* occurs between 500 ft. to 2,000 ft., rarely 3,500 ft. in Burma.

(f) *P. armandi*—occur in North-East Frontier of Assam.

7. *Cedrus libani* Var *deodara*:

Cedrus libani var *deodara* evidently a native of North-Western Himalayan ranges and occurs extensively from 8,000 to 10,000 ft.

8. *Picea smithiana*:

Picea smithiana, the morinda spruce or west Himalayan spruce occurs in Western and Eastern Himalayas, Afghanistan, Chitral, Kumaun, Shimla, Nepal and Sikkim from 6,000 to 10,000 ft.

9. *Tsuga brunoniana*:

Tsuga brunoniana occurs in North-Western Himalayas, Nepal, Bhutan, Sikkim and Eastern Himalayas on an elevation of 6,000 to 10,000 ft.

10. *Larix griffithii*:

Larix griffithii is confined to Eastern Himalayas growing abundantly from Nepal to Bhutan between an elevation of 8,000 to 10,000 ft. attaining a slightly higher attitude in Sikkim and Tibet.

11. *Abies webbiana*:

Abies webbiana is indigenous both to Eastern and Western Himalayas, ranging from 7,000 to 12,000 ft. and sometimes up to 14,000 ft. altitude.