

## LIVING GYMNOSPERMS IN WEST BENGAL STATE OF INDIA

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### ABSTRACT

The paper throws light on the living gymnosperms in West Bengal state of India. Darjeeling district of the state falls under the Eastern Himalayan region which is one of the global megadiversity centres. Sixty-one species under 24 genera belonging to 12 families are recorded from the state. These are enlisted with their localities of occurrence. The distribution of indigenous taxa is provided.

The state of West Bengal lies between 21<sup>0</sup>45'-27<sup>0</sup>16'N latitude and 85<sup>0</sup>55' - 89<sup>0</sup>-56'E longitude, covering a geographical area of about 88752sq. km. It is bounded on north by Sikkim and Bhutan, on the east by Assam and Bangladesh, on the south by Bay of Bengal, on the west by Bihar and Orissa and on the north-west by Nepal. Excepting the spurs of western hilly tract of the bordering states of Bihar and Orissa, the major landmass of West Bengal can be divided into two natural geographical divisions viz. the Northern Himalayan and the Plains Division.

In general the vegetation of the state of West Bengal can broadly be categorised into five *vegetational* zones, viz, Subtropical to temperate forests of northern Himalayan region in Darjeeling, Northern tropical dry deciduous Peninsular sal forests, Tropical seasonal swamp forests, Dry deciduous scrub; & Littoral and Swamp forest.

The coal basin of Raniganj area in western region which is an outcome of upper series of Gondwana system shows prevalence of Cycads & Conifers. The conifers make a dominating vegetation in the upper limits of Darjeeling district. *Cryptomeria japonica* has been extensively planted from 1200-2400m in Darjeeling Division, since its introduction from Japan in 1891, but it is flourishing more at lower height. It does not thrive well above 1600m. *Juniperus recurva* and *Taxus wallichiana* are found above 1800m. The temperate conifers mainly restricted to Singalila range include *Abies pindrow*, *Larix griffithii*, *Tsuga dumosa* and *Pinus roxburghii*; the latter is found only in dry inner valleys.

The temperate forest zone of Darjeeling shows a characteristic distribution of scrub forest communities generally on the sites of abandoned shifting cultivation and specially in the areas which are excessively overgrazed or where trees have been ruthlessly lopped. Such secondary forests are mainly composed of dwarf conifers, mostly represented by the introduced trees of *Pinus wallichiana* alongwith other angiosperms associates.

The conifer - Rhododendron forest is predominant in the highest limit (2700-38000m) of the district mainly in Darjeeling and to lesser extent in Kalimpong Division. Among the conifers, *Taxus wallichiana* is scatteredly distributed at higher elevations of the Tonglu Range. But further upwards towards 'Phaloot, *Taxus* is replaced to large extent by *Tsuga dumosa* between 2400m to

2800m and thence higher up merge with *Abies spectabilis*. At 'Ramam' (2750m) in Darjeeling district, the upper storey of the forests is made up of *Tsuga dumosa* with occasional presence of *Abies densa*. Near Sandakhphu (3500m) *Abies densa* is the sole representative of the coniferous members which forms the first story in the forest.

A small area in Kalimpong Division is occupied by the kind of forest visible in Darjeeling above 2700m where patches of conifers flourish with the main species being *Tsuga dumosa*. *Larix griffithiana* and *Taxus wallichiana*. There is a very old tree of *Ginkgo biloba* at Kalimpong.

In addition to those indigenous taxa a large number of other Gymnosperms are grown in world famous Indian Botanic Garden, Howrah and Llyod Botanic Garden, Darjeeling. Several *Cycades*, *Thuja*, *Araucaria* etc are grown at large scale in Nurseries in Howrah district and at Kalimpong.

A perusal of the literature has revealed the occurrence of sixty one species under 24 genera and 12 families of Gymnosperms in West Bengal State. These are enlisted in Table-I. The species marked with astrik are rare in cultivation.

**Table-I: Living Gymnosperms in West Bengal**

Species	Family	Locality
* <i>Abies delavayi</i> (Van Tiegh) Franch.	Pinaceae	Llyod Botanic Garden, Darjeeling.
* <i>Abies densa</i> Griff	Pinaceae	Llyod Botanic Garden, Darjeeling.
* <i>Abies nordmanniana</i> (Stev.) Spach	Pinaceae	Llyod Botanic Garden, Darjeeling. (cf. Chakraverty <i>et al</i> 2003)
* <i>Abies spectabilis</i> (D. Don) G. Don ( <i>Abies webbiana</i> Lindl.)	Pinaceae	Llyod Botanic Garden, Darjeeling.
<i>Agathis brownii</i> (Lam.) L.H. Bailey	Araucariaceae	Assembly House Garden, Kolkata. (cf. Chakraverty <i>et al</i> 2003)
<i>Agathis dammara</i> (Lamb.) L. C. Rich. ( <i>Agathis loranthifolia</i> Salibs.)	Araucariaceae	Indian Botanic Garden, Howrah.
<i>Agathis robusta</i> F.M. Bailey	Araucariaceae	Indian Botanic Garden, Howrah. Llyod Botanic Garden, Darjeeling.

		Assembly House Garden, Kolkata.
<b>Araucaria bidwilli</b> Hook.	Araucariaceae	Indian Botanic Garden, Howrah.
		Llyod Botanic Garden, Darjeeling.
<b>Araucaria cookii</b> R.Br. ex D.Don ( <i>Araucaria</i> <i>angustifolia</i> (Bertol.) O. <i>Kuntze.</i> ) ( <i>Araucaria</i> <i>columnaris</i> Hook.)	Araucariaceae	Llyod Botanic Garden, Darjeeling.  Indian Botanic Garden, Howrah.
<b>*Araucaria</b> <b>cunninghamii</b> D.Don	Araucariaceae	Indian Botanic Garden, Howrah.
<b>Araucaria heterophylla</b> (Salisb.) Franco ( <i>Araucaria excelsa</i> R.Br.)	Araucariaceae	Indian Botanic Garden, Howrah.
<b>Araucaria rulei</b> F. Muell.	Araucariaceae	Indian Botanic Garden, Howrah.
<b>Callitris rhomboidea</b> R.Br.  ( <i>Callitris cupressiformis</i> Vent.) ( <i>Cupressus</i> <i>australis</i> Pers.)	Cupressaceae	Llyod Botanic Garden, Darjeeling.  BSI, Garden at Yercaud (T.N.)
<b>Callitris robusta</b> R.Br. ( <i>Callitris columellaris</i> F.v. Muell.  <i>Callitris glauca</i> R.Br.)	Cupressaceae	Llyod Botanic Garden, Darjeeling.
<b>*Cedrus deodara</b> (Roxb.) Loud.  ( <i>Cedrus libani</i> Loud.)	Pinaceae	Llyod Botanic Garden, Darjeeling (Planted)
<b>Cephalotaxus mannii</b> Hook. f.	Cephalotaxaceae	Darjeeling.
<b>Cryptomeria japonica</b> (L.f.) D. Don	Taxodiaceae	Darjeeling (Planted)

<b>*Cunninghamia lanceolata</b> Hook.f. ( <i>Cunninghamia. sinensis</i> R.Br.)	Taxodiaceae	Llyod Botanic Garden, Darjeeling (Planted)
<b>Cupressus arizonica</b> Greene	Cupressaceae	Indian Botanic Garden, Howrah.
<b>*Cupressus cashmeriana</b> Royle	Cupressaceae	Llyod Botanic Garden, Darjeeling.
<b>Cupressus funebris</b> Endl.	Cupressaceae	Indian Botanic Garden, Howrah.
<b>Cupressus goveniana</b> Gord.	Cupressaceae	Llyod Botanic Garden, Darjeeling.
<b>Cupressus macrocarpa</b> Hartw. ( <i>Cupressus horizontalis</i> Mill.)	Cupressaceae	Llyod Botanic Garden, Darjeeling.
<b>Cupressus sempervirens</b> L.	Cupressaceae	Indian Botanic Garden, Howrah.
<b>Cupressus torulosa</b> D.Don	Cupressaceae	Indian Botanic Garden, Howrah, Llyod Botanic Garden, Darjeeling.
<b>*Cycas beddomei</b> Dyer	Cycadaceae	Indian Botanic Garden, Howrah.
<b>Cycas circinalis</b> L.	Cycadaceae	Indian Botanic Garden, Howrah.
<b>*Cycas pectinata</b> Griff.	Cycadaceae	Indian Botanic Garden, Howrah.
<b>Cycas revoluta</b> Thunb.	Cycadaceae	Indian Botanic Garden, Howrah.
<b>Cycas rumphii</b> Miq.	Cycadaceae	Indian Botanic Garden, Howrah.
<b>*Encephalartos villosus</b> Lehm.	Zamiaceae	Indian Botanic Garden, Howrah.
<b>Ephedra foliata</b> Boiss & Kotschy ex Boiss.	Ephedraceae	Indian Botanic Garden, Howrah.
<b>*Ginkgo biloba</b> L.	Ginkgoaceae	Darjeeling, Kalimpong (Planted).  Indian Botanic Garden,

		Howrah.
<b>*Gnetum ula</b> Brongn.	Gnetaceae	Indian Botanic Garden, Howrah.
<b>Juniperus chinensis</b> L.	Cupressaceae	Indian Botanic Garden, Howrah.
<b>Juniperus communis</b> L.	Cupressaceae	Darjeeling.
<b>Juniperus pseudosabina</b> Fischer & Meyer ( <i>Juniperus wallichiana</i> Hook. f. ex Paxt.)	Cupressaceae	Llyod Botanic Garden, Darjeeling.
<b>Juniperus recurva</b> Buch.-Ham. ex D.Don	Cupressaceae	Indian Botanic Garden, Howrah.  Llyod Botanic Garden, Darjeeling.
<b>Picea smithiana</b> (Wall.) Boiss.	Pinaceae	Llyod Botanic Garden, Darjeeling.
<b>Pinus kesiya</b> Royle ex Parl.  ( <i>Pinus insularis</i> Endl.)	Pinaceae	Llyod Botanic Garden, Darjeeling.
<b>Pinus patula</b> Schiede & Deppe	Pinaceae	Darjeeling (Planted)
<b>Pinus roxburghii</b> Sar. ( <i>Pinus longifolia</i> Roxb.)	Pinaceae	Indian Botanic Garden, Howrah.  Llyod Botanic Garden, Darjeeling.
<b>Pinus wallichiana</b> A.B. Jacks.	Pinaceae	Darjeeling.
<b>Podocarpus gracilior</b> Pilger	Podocarpaceae	Indian Botanic Garden, Howrah.
<b>Podocarpus macrophylla</b> D.Don	Podocarpaceae	Llyod Botanic Garden, Darjeeling.
<b>*Podocarpus nerifolia</b> D.Don	Podocarpaceae	Indian Botanic Garden, Howrah.  Llyod Botanic Garden, Darjeeling.

<b>Podocarpus taxifolia</b> H.B. & K.	Podocarpaceae	Llyod Botanic Garden, Darjeeling.
<b>Pseudotsuga sp. (?)</b>	Pinaceae	Darjeeling (Planted).
<b>Taxodium distichum</b> Rich.	Taxodiaceae	Indian Botanic Garden, Howrah.  Llyod Botanic Garden, Darjeeling.
<b>Taxodium mucronatum</b> Tenore	Taxodiaceae	Indian Botanic Garden, Howrah.
<b>Taxus wallichiana</b> Zucc.  <i>(Taxus baccata ssp. wallichiana)</i>  <i>Taxus baccata auct. pl.</i>	Taxaceae	Darjeeling.
<b>Thuja occidentalis L.</b> <i>(Thuja compacta) Stand. ex Gord.)</i>	Cupressaceae	Indian Botanic Garden, Howrah.  Llyod Botanic Garden, Darjeeling.
<b>Thuja orientalis L.</b> <i>(Thuja filiformis Lodd. ex Lendl.  (Biota orientalis (L.) Endl.)</i>	Cupressaceae	Llyod Botanic Garden, Darjeeling.  Indian Botanic Garden, Howrah.
<b>Thuja plicata</b> Donn <i>(Thuja gigantea Nutt.)</i>	Cupressaceae	Llyod Botanic Garden, Darjeeling.
<b>Tsuga dumosa</b> (D.Don) Eichler	Pinaceae	Darjeeling.  Llyod Botanic Garden Darjeeling.
<b>*Zamia angustifolia</b> Jacq.	Zamiaceae	Indian Botanic Garden, Howrah.
<b>*Zamia floridana</b> DC.	Zamiaceae	Indian Botanic Garden, Howrah.
<b>Zamia furfuracea</b> Ait.	Zamiaceae	Indian Botanic Garden, Howrah.
<b>Zamia latifolia</b> Lodd.	Zamiaceae	Indian Botanic Garden,

		Hawrah.
<b>Zamia pallida</b> Salisb.	Zamiaceae	Indian Botanic Garden, Hawrah.
<b>Zamia pumila</b> L.	Zamiaceae	Indian Botanic Garden, Hawrah.

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