30. Endemic Plants of Andaman and Nicobar Islands

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Introduction

Since the time of Darwin and Wallace, oceanic islands have been recognized to be of great significance in studies of organismic diversity, biogeography and evolution. Isolated from the main lands by vast expanses of water and with relatively little or no human interference, they provide ideal sites for the study of evolution, speciation and adaptive radiation. Such island groups display enormous variety of biota and more importantly, with a sizeable endemic component. However, most of these islands have been subject to overexploitation of natural resources and ill planned developmental activities leading to widespread destruction of natural habitats and loss of biodiversity, which is not yet fully understood and catalogued.

Andaman & Nicobar (A&N) Islands, situated between 6° 45' to 13° 41' N latitudes and 92° 12' to 93° 57' E longitudes (Fig - 1), form the largest archipelago in the Bay of Bengal, consisting of 306 islands and 206 rocks and rocky outcrops. Often described as 'Islands of the marigold sun', they were known as 'Kalapani' because of their having been an area of penal settlement during British rule. These groups of islands are projections of a long narrow submarine range of mountains, with only the peaks being visible above the sea. Geologically these islands are quite young in age, probably formed in upper Mesozoic (*ca* 100 million years ago). This mountain range has a narrow deep oceanic furrow on the western boundary that abuts on the main continental plate on the west. The total geographical area of these islands is 8,249 km^2**,** coast line of 1,962 kms. The northern group of islands, the Andaman group, is 6,408 km^2 and the Nicobar group is 1,841 km^2. This large archipelago is separated from mainland India by almost 1000 kms; the nearest landmass in the north is Myanmar, roughly 280 km north of Landfall Island, the northern-most island is the Andaman Group. The closest landmass to the Great Nicobar Island is Sumatra, 145 km south.

The Great Andaman group of islands comprises North, Middle and South Andaman Islands, with Baratang Island situated between Middle and South Andaman Island. Andaman group is 352 km in length, its extreme width, however is nowhere more than 52 kms. Ritchie's Archipelago, a group of islands, is located east of Middle Andaman while Labyrinth group of islands lies southwest of South Andaman (Plate 30). The Little Andaman is located 55 km south of South Andaman, across the Duncan passage. The land area of 6408 km^2 of the Andaman Group constitutes almost 90% (5629 km^2), as reserve or protected forest of which 36% is Tribal Reserve. The elevation in the Andamans ranges from 0-732m, the Saddle Peak in North Andaman being the highest.

The Nicobar group is spread over an area of 1,841 km^2 of which, 1,542 km^2 area falls under recorded forests. The Nicobars are separated from the Andamans by the 10^0 Channel, a wide gap of 160 km with heavy tidal flows, making sea transport by small boasts difficult. The Nicobars consists of 24 islands in three distinct clusters of which 12 are inhabited having 170 villages and hamlets. The Northern Group consists of Car Nicobar, Batti Malv and the Central or the Nancowry Group. The latter includes Car Nicobar, Tillanchong, Chowra, Teressa, Bompoka, Trinkat, Kamrota, Katchal and Nancowry islands. The southern group consists of the two large islands Little and Great Nicobar, together with Pigeon, Megapode, Kondul, Pilo Milo, Menchal, Treis, Trak and Meroe Islands. The entire Nicobar is a Tribal Reserve and has four sanctuaries. An area of 885 km^2 in Great Nicobar Island is designated as the Great Nicobar Biosphere Reserve and two other areas within it as national parks (Jayaraj & Andrews, 2005). The climate is humid tropical. The average annual rainfall varies from 1,400 mm to 3,000 mm and average annual temperature varies from 24 °C to 28 °C.

The A&N islands are the homeland of six tribal communities, *viz*., Great Andamanese, Onge (numbering only 97), Jarwa, Sentinels (numbering 100 – 150). Shompen and Nicobarese. However, there is a distant racial difference between the Andaman tribes and their counter parts in the Nicobars. The former four are Negrito, while the latter are Mongoloid. The Nicobarese are well integrated and assimilated to the Indian mainstream and the Shompen, who are still shy and avoid any interaction with the outsiders but they are not particularly hostile. The Onge, Jarwas and Great Andamanese have accepted outside intervention and are being rehabilitated by the A&N Administration. However, the Sentinels are still hostile.

Vegetation

The A&N has a rich wealth of vegetation. While describing the vegetation of these islands Parkinson (1923) wrote "from the water's edge to tops of the highest hills, the islands are nearly every where densely wooded". According to Balakrishnan & Ellis (1996) and Rao (1999), the climatic climax of the islands is typically the Tropical Lowland Rain Forest, which is in a state of equilibrium, seemingly undisturbed, influenced by warm and wet conditions. These forests are floristically the richest, highly complex, most exuberantly developed, though somewhat influenced by altitude and intensity of monsoons. The higher reaches are also affected by high wind velocity, causing dessication, exhibiting stunted, scrub-like vegetation, called Hill-top vegetation as seen on Saddle Peak in North Andamans, and mount Thuiller in Great Nicobar. Kurz (1876) while working on the Nicobar group of islands has grouped the vegetation of this area into following categories: (i) Mangrove forests; (ii) Beach forests; (iii) Tropical Forests, (iv) Grass-heaths of Car Nicobar and Kamrota islands; (v) Marine vegetation with some sea grasses such as *Halophia ovalis* and *Enhalus acoroides.*

Champion & Seth (1968) treated the forests of A&N Islands under 11 types, *viz.* (i) Giant evergreen forest, (ii) Andaman tropical evergreen forest, (iii) Southern hill-top tropical evergreen forest, (iv) Cane brakes, (v) Wet bamboo brakes, (vi) Andaman semi evergreen forest, (vii) Andaman moist deciduous forest, (viii) Andaman secondary moist deciduous forest, (ix) Littoral forest, (x) Tidal swamp forest, and (xi) Submontane hill valley swamp forest.

According to Balakrishnan & Ellis (1996) the configuration and composition of some of the above major types of forests can be summarized as follows: The giant evergreen forests are typically climatic climax, where optimum conditions are prevalent. Characteristically the top canopy, though irregular, is almost covered. The soil is deep alluvial and able to retain the water content of the abundant rainfall of about 300 cm for long periods. Several species of *Dipterocarpus viz.*, *D. alatus*, *D. gracilis*, *D. incanus*, *D. turbinatus* var. *andamanica* and *Hopea odorata* are found here. The second storey comprises *Baccaurea sapida*, *Sideroxylon longipetiolatus*, *Endospermum malaccense*, *Artocarpus gomezianus*, *Myristica glaucesens* and *Buchanania platyneura.*

The Andaman tropical evergreen forests are less luxuriant, the top storey being irregular and the canopy not complete. They occur at the top of hills with elements of moist deciduous type on the slopes. Many species of *Dipterocarpus* occur here among which *D. kerrii* is prominent, intermixed with *Artocarpus chaplasha*, *Panchonia andamanica*, *Hopea odorata*, *Sideroxylon longipetiolatum*, associated with *Garcinia andamanica*, *Myristica andamanica*, *M. glaucescens* and *Baccaurea sapida*. The climbers include *Gnetum scandens*, *Ancistrocladus tectorius*, the climbing bamboo *Dinochloa scandens* var. *andamanica*, *Artabotrys speciosus*, *Calamus longisetus*, *C. palustris*, *C. pseudorivalis*, *etc.* the last three making cane-brakes at disturbed places having exposed canopy.

The Andaman Semi-evergreen forests occur on immature, alluvial soil, distributed in the main valleys of the Andamans forming some of the densest forests. The top layer mainly includes *Dipterocarpus alatus*, *D. pilosus*, *Petrocymbium tinctorium*, *Sterculia campanulata*, *Terminalia bialata*, *Calophyllum soulattri*, *Atrocarpus lakoocha*, *A. chaplasha* and *Pterocarpus dalbergioides* intermixed with *Dillenia pentagyna*, *Pometia pinnata*, *Litsea panamonja*, *Xanthophyllum*

andamanicum, *Mangnolia andamanica*, *Garcinia andamanica*, *Caryota mitis* and *Parishia insignis.* Climbers include *Dinochloa scandens* var. *andamanica*, *Combretum latifolium*, *Thunbergia fragrans* and *Calamus* spp. Because of many good timber yielding plants, these forests are economically the most important.

The Andaman moist deciduous forests are with leaf-shedding plants reaching a height of about 45 m, attaining large girth and often predominantly buttressed. The second storey includes some evergreen species. Shrubby climbers are common, including canes. These are commonly met with in the Andaman Islands, rarely so in the Nicobars. The hard coarse grained sandstone forms the underlying rock with shale and conglomerate. The soil is rather shallow and sandy loamy. The characteristic species include: *Pterocarpus dalbergioides*, *Lagerstroemia hypoleuca*, *Chukrasia tabularis*, *Sterculia alata*, *Pterocymbium tinctorium*, *Terminalia bilata*, *T. procera*, *etc.* The second storey comprises *Adenanthera pavonina*, *Dillenia pentagyna*, *Lannea coromandelica*, *Diospyros marmorata*, *etc.*, followed by similar trees like *Murraya paniculata*, *Pterospermum alatum*, *Ixora grandifolia*, *Atlantia monophylla*, *Antiaris toxicaria*, *Artocarpus chaplasha*, *Canarium euphyllum*, *Spondias mangifera*, *Garuga pinnata*, *Gyrocarpus americanus*, *Zanthoxylum budrunga*, *etc.*

The Andaman secondary moist deciduous forests comprise elements intermixed with preceeding forest, and they are essentially composed of two canopies, the upper one comprising *Bombax ceiba*, *Pterocymbium tinctorium*, *Terminalia bialata*, *Tetrameles nudiflora*, *Parishia insignis*, *etc.* and the lower canopy comprising *Pterocarpus dalbergioides*, *Lagerstroemia hypoleuca*, *Albizia lebbeck*, *Adenanthera pavonina*, *Planchonia andamanica*, *Diploknema butyracea*, *etc.* This type is more regenerated secondary forests, where semi-evergreen type existed previously.

The Southern hill-top tropical evergreen forests are to be found in some of the high hill tops of these islands, *i.e.*, Saddle Peak of North Andamans and Mount Thuiller of Great Nicobar Island. These hills are subject to high velocity wind with heavy rainfall of over 450 cm per year associated with high humidity during the monsoon season. The trees of these forests are stunted and surrounded by wet evergreen forests at lower hill slopes. The common trees include *Dipterocarpus costatus*, *Phyllanthus andamanica*, *Memecylon collinum*, *M. caeruleum*, *Psychotria balakrishnaii*, *Grewia indandamanica*, *Canarium manii*, *Mesua ferrea*, *Hopea andamanica*, *Cratoxylum formosum*, *Euphorbia epiphylloides*, *Chionanthus sumatranus*, *Crytocarya ferrarsi*, *Phoenix andamanica* and the climbing bamboo *Dinochloa scandens* var. *andamanica* and *Schizostachyum andamanicum* making impenetrable thickets with entangled and matted stems. The ground layer has grasses such as *Oryza indandamanica*, *Imperata cylindrica*, *Heteropogon contortus*, *Chrysopogon aciculatus*, associated with several species of mosses, *Sonerila* sp., *Utricularia exoleta* and *Rostellularia procumbens.* The rocks and boulders here are usually covered by dense moss, especially during monsoon season bearing amidst them the rare North east Indian orchids *Porpax meirax* and *Ascocentrum ampullaceum.*

Parkinson (1923), while dealing with only Andaman Islands, expounds the main forest types under: (i) Mangrove forests, (ii) Littoral forests, (iii) Evergreen forests, (iv) Deciduous and semideciduous forests, and (v) Forests of the parched and shallow-soiled slopes of high hills as at Saddle Peak, the Cladius Range and Mt. Farrington in the Middle Andaman and Mt. Ford on Rutland Island. Thothathri (1960) treats the Andaman forests under seven types including vegetation of the cleared lands and open areas and marine vegetation. Saldanha (1989) demarcates six forest types in the Andamans: (i) Giant Andaman Evergreen, (ii) Andaman Tropical Evergreen, (iii) Andaman Moist Deciduous forests, (iv) Andaman Hill-top Evergreen, (v) Littoral forests and (vi) Mangrove forests. He also calls Bamboo and Cane brakes as local variations.

While dealing with the natural vegetation of the entire A&N Islands, Balakirshnan (1977, 1989) broadly classified the vegetation into 2 major groups consisting of eight types, giving importance not only to forests but also to the other types occurring in various ecological zones. According to him the vegetation of these islands can be broadly classified as tropical evergreen with minor variations from north to south depending upon rainfall, type of soil and degree of salinity

in the soil. Based on the proximity to the sea and salinity of the soil, the vegetation can be placed into two major groups, *i.e.* Littoral and Inland types, each further subdivided as follows:

A. Littoral: (i) Submerged vegetation, (ii) Mangrove vegetation (iii) Strand vegetation, (iv) Tidal or swamp forests.

B. Inland: (i) Evergreen forests, (ii) Deciduous forests, (iii) Grasslands, (iv) Aquatic vegetation.

Floristically, A&N Islands shows close affinities with Indo – Chinese and Indo – Malayan region. Presence of over 2,000 indigenous and 500 non – indigenous angiosperm species within a land mass of 8,290 km^2 is a significant feature of the islands, making them a cynosure not only for plant taxonomists but also for conservationists. Among the non-endemic angiosperms, about 40% are found in mainland India. As regards Pteridophyes, 120 species are known under 36 families. Nearly 365 species are considered as 'threatened' while 40 species have been listed under Red Data Book of Indian Plants. More than 600 species of exotic plants have been introduced to these islands, many of them being aggressive and invasive in nature, which pose serious threat to the native flora and fauna.

Of about 2000 native angiosperms, 14% are endemic to these islands. At the generic level endemism is rather less with only three genera *viz.*, *Sphyranthera* (Euphorbiaceae) with 2 species. *Pubistylis* (Rubiaceae) with one species and *Nicobariodendron* (Celastraceae) with one species. Recently Garbyal *et al.* (2008), Naithani (2008) and Naithani *et al.* (2008) have mentioned some rare, endemic lesser known trees from the Islands. An updated list of endemic vascular plants from these islands is given in Table 1 (Plate 30).

Table 1: Endemic Plants of Andaman & Nicobar Islands: Distribution among major islands and habitat types.

P = Present; A = Absent. Habitats: GAE = Giant Andaman Evergreen; ATE = Andaman Tropical Evergreen; AMD = Andaman Moist Deciduous forests; AHTE = Andaman Hill Top Evergreen; LF = Littoral Forests; MF = Mangrove Forests.

Name of species	Family	Habitat	Great Nicobar	Car Nicobar	Andaman
Cyathea albosetacea	Cyatheaceae	AMD	P	A	A
Cyathea nicobarica	Cyatheaceae	AMD	P	A	A
Alstonia kurzii	Apocyniaceae	LF	A	A	P
Artabotrys nicobaricus	Annonaceae	AMD	P	A	A
Chilocarpus denudatus var. *nicobaricus*	Apocynaceae	ATE	P	A	A
Chisocheton nicobaricus	Meliaceae	ATE	P	A	A
Cleistanthus balakrishanani	Euphorbiaceae	ATE	P	A	A
Claoxylon rostratum	Euphorbiaceae	ATE	A	A	P
Clematis smilacifolia var. *andamanica*	Ranunculaceae	AMD	A	A	P
Codiocarpus andamanica	Icacinaceae	ATE	A	A	P
Connarus nicobaricus	Connaraceae	ATE	P	A	A
Coptophyllum nicobaricum	Rubiaceae	ATE	P	A	A
Cyclea pendulina	Menispermaceae	ATE	A	A	P
Cyrtandroemia nicobarica	Scrophulariaceae	ATE	P	A	A
Cyrtandra burttii	Gesneriaceae	ATE	P	A	A
Cyrtandra occidentalis	Gesneriaceae	LF	P	A	A
Cyathostemma micranthum	Annonaceae	LF	A	A	P
Dillenia andamanica	Dilleniaceae	AMD	P	A	P
Diospyros marmorata	Ebenaceae	AMD			P
Drypetes bhattacharyae	Euphorbiaceae	LF	A	A	P
Dysoxylum alliaceum	Meliaceae	AMD	A	A	P

Elatostema novorea	Urticaceae	AMD	A	P	A
Embelia microcalyx	Myrsinaceae	LF	A	P	A
Friesodielsia forniculata	Annonaceae	ATE	P	A	A
Friesodielsia khoshooi	Annonaceae	LF	P	A	A
Garcinia andamanica	Garciniaceae	ATE			P
Genianthus horei	Asclepiadaceae	AHTE	P	A	A
Glochidion calocarpum	Euphorbiaceae	LF	A	A	P
G. mauritiana var. *andamanensis*	Rutaceae	AMD	A	A	P
Grewia colophylla	Teliaceae	AMD	A	A	P
Hedyotis paradoxa	Rubiaceae	ATE	A	A	P
Ixora brunnescens	Rubiaceae	LF	A	A	P
Ixora cunifolia var. *macrocarpa*	Rubiaceae	LF	A	P	A
Ixora grandifolia var. *kurziana*	Rubiaceae	AMD	A	P	A
Ixora tenuifolia	Rubiaceae	AMD	A	P	A
Jasminum multiflorum var. *nicobaricum*	Oleaceae	AMD	P	A	A
Knema andamanica	Myrsinaceae	GAE	A	A	P
Lagestroemia hypoleuca	Lythraceae	AMD	P		P
Leea grandifolia	Vitaceae	LF	A	P	A
Litsea kurzii	Lauraceae	LF	A	P	A
Macaranga nicobarica	Euphorbiaceae	LF	A	P	A
Mallotus oblongifolius var. *rubriflorus*	Euphorbiaceae	LF	A	A	P
Maesa andamanica	Myrsinaceae	AMD	A	A	P
Mangifera andamanica	Anacardiaceae	AHTE			P
Mangifera nicobarica	Anacardiaceae	ATE	P		
Magnolia andamanica	Magnoliaceae		A	A	P
Memecylon andamanicum	Memecylaceae	ATE	P	A	A
Mesua manii	Clusiaceae	ATE			P
Nicobariodendron sleumeri	Celastraceae	ATE	P	A	A
Nothophoebe nicobaricus	Lauraceae	ATE	P	A	A
Ophiorrhiza infundibularis	Rubiaceae	ATE	P	A	A
Ophiorrhiza nicobarica	Rubiaceae	ATE	P	A	A
Oropheo katschallica	Annonaceae	ATE	A	A	A
Otanthera nicobarensis	Melastomataceae	ATE	P	A	A
Paramignya andamanica	Rutaceae	ATE	A	A	P
Pellionia procridifolia	Urticaceae	LE	A	P	A
Phyllanthus andamanicus	Euphorbiaceae	AHTE			P
Phyllanthus sanjappae	Euphorbiaceae	AHTE			A
Polyalthea crassa	Annonaceae		A	A	P
Polyalthea parkinsonii	Annonaceae	LF	A	A	P
Pseuduvaria prainii	Annonaceae	AHTE	A	A	P
Psychotria andamanica	Rubiaceae	AHTE	A	A	P
Psychotria platyneura	Rubiaceae	AHTE	A	A	P
Semecarpus kurzii	Anacardiaceae	AMD	A	A	P
Sphyranthera airyshawii	Euphorbiaceae	AHTE			P
Sphyranthera lutescen	Euphorbiaceae	ATE	A	A	P
Sterculia rubiginosa	Sterculiaceae	ATE	P	A	P
Strobilanthes glandulosus	Acanthaceae	AHEE	A	A	P
Tabernaemontana crispa	Apocynaceae	LF	A	A	P
Tarenna weberaefolia	Rubiaceae	ATE	A	A	P
Terminalia procera	Combretaceae	ATE	A	A	P
Tetrastigma andamanica	Vitaceae	LF	A	A	P
Uvaria nicobarica	Annonaceae	ATE	P	A	A
Trigonostemon villosus var. *nicobaricus*	Euphorbiaceae	AHTE	P	A	A
Vitex diversifolia	Verbenaceae	LF			A
Vitex wimberleyi	Verbenaceae	AMD			A
Aerides emericii	Orchidaceae	ATE	P	A	A
Anoectochilus nicobaricus	Orchidaceae	ATE	P	A	A
Aglaonema nicobaricum	Araceae	ATE	P	A	A

Bentinckia nicobarica	Araceae	LF	P	A	A
Calamus andamanicus	Arecaceae	ATE	p	A	P
Calamus baratangensis	Arecaceae	ATE	A	A	P
Calamus basui	Arecaceae	ATE	A	A	P
Calamus dilaceratus	Arecaceae	ATE	P	A	A
Calamus pseudo –rivalis	Arecaceae	ATE	P	A	A
Calamus semierectus	Arecaceae	ATE	A	P	A
Calamus uniforms var. *pantong*	Arecaceae	ATE	P	A	A
Daemonorops aurus	Arecaceae	ATE	A	A	p
Daemonorops rarispinosa	Arecaceae	ATE	A	A	P
Daemonoropos wrightmyoenisis	Arecaceae	ATE	A	A	P
Dioscorea vexans	Dioscoreaceae	ATE	P	A	A
Dinochloa scandens var. *andamanica*	Bambusoideae	ATE	P	P	P
Dracaena brachyphylla	Agavaceae	ATE	A	A	P
Dendrobium shompenii	Orchidaceae	ATE	P	A	A
Eria bractescens var. *kurzii*	Orchidaceae	ATE	A	A	P
* *Freycinetia insignis*	Pandanaceae		P	A	A
Homalomena griffithii var.*ovata*	Araceae	ATE	P	A	A
Hornstedtia fenzlii	Zingiberaceae	ATE	P	A	A
Korthelsia rogersii	Arecaceae	ATE	A	A	P
Pandanus leram var. *andamanensium*	Pandanaceae	LF	P	A	A
Phalaenopsis speciosa	Orchidaceae	ATE	A	A	P
Phrynium paniculatum	Marantaceae	ATE	P	A	A
Pinanga manii	Arecaceae	AMD	P	A	A
Pomatocalpa andamanicum	Orchidaceae	ATE	A	A	P
Rhopaloblaste augustata	Arecaceae	ATE	P	A	A
Trichoglottis quadricornuta	Orchidaceae	LF	A	P	A
Vanilla andamanica	Orchidaceae	ATE	A	A	P

* Only woody climber in family Pandanaceae, also found in Malay Peninsula, Java.

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Fig - 1 : Location of Andaman & Nicobar Islands

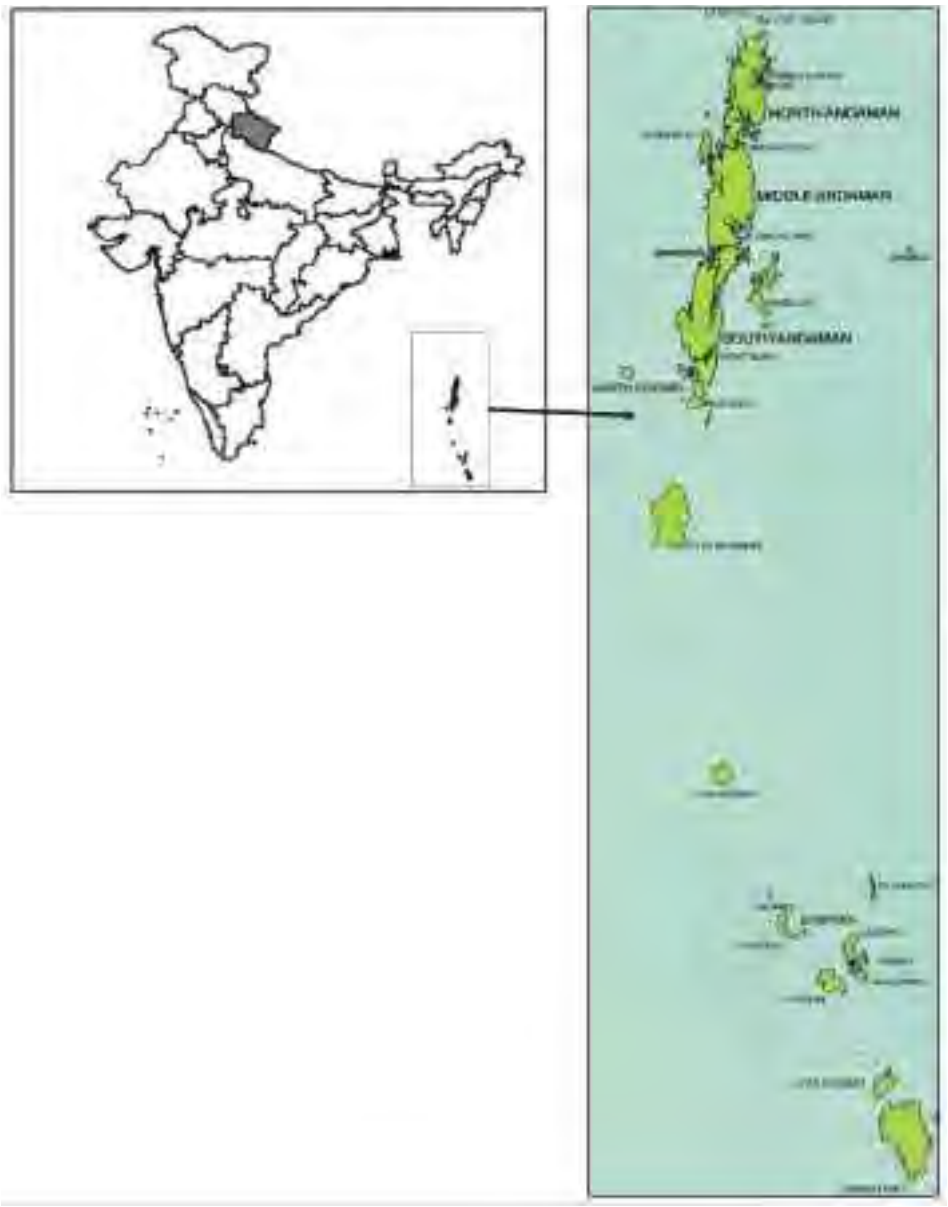

Plate 30
Endemic Plants of Andaman & Nicobar Islands

1. *Vanilla andamanica*
2. *Calamus dilaceratus*
3. *Cyrtandroemia nicobarica*
4. *Cyathea albosetacea*
5. *Dillenia andamanica*
6. *Dinochloa andamanica*
7. *Freycinetia insignis*
8. *Hornstedtia fenzlii*
9. *Bentinckia nicobarica*
10. *Freycinetia insignis*
11. *Pinanga manii*
12. *Calamus semierectus*