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OBSERVATIONS ON THE VEGETATION OF TELLICHERRY DIVISION OF CANNANORE DISTRICT, KERALA

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INTRODUCTION

Cannanore (11° 40′ to 12° 48′ N and 74° 52′ to 76° 07′ E) is the northern-most district of Kerala State, situated between North Wynaad and Tellicherry taluks of this district form the Tellicherry division. This area is bounded in the north by Taliparamba taluk of Cannanore District and Karnataka State and in the east by Karnataka State and Calicut District and in the west by the Arabian Sea. The total area of the division is about 2460 square kilometres.

This region has some mountain ranges, including the well-known Brahamagiri (*ca* 1600 m). The forests are dense towards the north-east and south-east of this region.

The rock bed is mainly of gneiss. The soil of the main ridge is a ferruginous red sandy loam generally up to 4.5 m deep. On the plateau, the soil is rich clayey loam, generally up to 2.5 m deep with the red gravelly or yellowish clayey sub-soil layer of considerable depth. Laterite is present along the coastal areas of this region. Under tall trees and in shady places there is humus. Near streams, the soil is sandy. In poorer forests the soil tends to be gravelly.

The temperature at the foot of the ghats is between 21° C-39° C, while on the plateau, it is between 13° C-32° C. March, April and May are the hottest months and the average temperature during these months is 25.0° C to 33.0° C. In the months of December and January, the average temperature is 16.0° C to 22.0° C.

The average annual rainfall is 3437 mm. The South-West Monsoon brings the greater part of the total rainfall in July and August. The rainfall gradually increases from the coastal region to the Ghats. The annual rainfall at Manantoddy in the south-east corner (2834 mm) is the lowest in this region, while at Irikkur near the Western Ghats the rainfall (3978 mm) is the highest. The North-East Monsoon is active in October and November.

A strong wind starts about the beginning of November and ends by April. Forest fires spread during this period.

PREVIOUS EXPLORATIONS

Botanically this area has remained under-explored. Barber, Beddome, Cherian Jacob, Gopal Rao, Lawson, Rangachari and a few others seem to have made random collections in this region. Gamble and Fischer (1915-'36) report a few plants from this area in their "*Flora of the Presidency of Madras*". Recently, during the period 1965-67, Ellis, explored the Chandanathode area intensively.

PRESENT WORK

The present paper is the result of a preliminary study. Four exploration trips have been conducted in this region to cover different seasons during 1977-78 and a total number of 1250 field numbers representing about 825 species, have been collected.

VEGETATION

The area is very rich in vegetation. Physiographically, this area (Tellicherry Division is divisible into coastal, midland and mountainous regions and for each the account on the vegetation is separately given.

Coastal Region :

The coastal region consists of Strand and Estuarine vegetation. Some of the plants of Strand Vegetation are *Calophyllum inophyllum* L., *Eclipta alba* (L.) Hassk., *Elaeocharis spiralis* (Rottb.) R. & S., *Hygrophila auriculata* (Schum.) Heine, *H. quadrivalvis* Nees, *Ixora coccinea* L., *Launaea pinnatifida* Cass., *Morinda citrifolia* L., *Ipomoea aquatica* Forsk., *I. pescaprae* Sweet, *Pedalium murex* L., *Phyla nodiflora* (L.) Greene, *Polycarpaea corymbosa* (L.) Lamk., *Portulaca oleracea* L., *Premna serratifolia* L., *Martynia annua* L., *Sida cordifolia* L., and *Sphaeranthus indicus* L.

The mangrove vegetation is found at the estuaries and backwaters. The important constituents of this type are : *Acanthus ilicifolius* L., *Avicennia officinalis* L., *Cerbera odollam* Gaertn., *Clerodendrum inerme* (L.) Gaertn., *Cyperus javanicus* Houtt., *Derris trifoliata* Lour., *Excoecaria agallocha* L., *Rhizophora mucronata* Lamk., *Scaevola taccada* (Gaertn.) Roxb., *Sphenoclea zeylanica* Gaertn. and *Xyris indica* L. *Acrostychium aureum* L., is abundant along the margins of the backwaters.

Midland Region :

This region covers the major part of the district with numerous hills and dales, presenting an undulating surface, gradually ascending and finally merging into the slopes of the Western Ghats.

Typical flora of this area is that of a moist deciduous forest consisting of a mixture of evergreen and deciduous trees. Climbers and epiphytes are few. Undergrowth consists of a variety of annuals and perennials. The plain and moist western parts are very rich in fresh water and marshy plants. Some of the common and conspicuous aquatics are : *Dysophylla tomentosa* Dalz., *Eichhornia crassipes* (Mart.) Solms, *Hydrilla verticillata* (L. f.) Royle, *Hygrophila auriculata* (Schum.) Heine, *Monochoria vaginalis* (Burm. f.) Presl, *Nelumbo nucifera* Gaertn., *Nymphaea pubescens* Willd., *N. nouchali* Burm. f., *Nymphoides indica* (L.) Kuntze, *N. cristata* (Roxb.) Kuntze and *Rotala rotundifolia* (D. Don) Koehne.

Mountainous Region :

This is a continuation of the Mid-land region, gradually ascending to the main ridge of the Western Ghats. Three main type of forests, *viz.*, I. Tropical moist deciduous forest, II. Tropical semi-evergreen forest and III. Tropical wet-evergreen forests are found in this region. *Sholas* and grasslands occur in certain places, at higher altitudes.

Tropical Moist Deciduous Forest : This type of vegetation is found at the foot of the ghats up to 300 m and also in the Wynaad plateau at about 700-800 m. It is a mixture of deciduous and some evergreen species. Due to the occurrence of frequent forest fires and constant exploitation by man, many areas of this type of forest are now under secondary succession. The most extensive community found in these forests is *Tectona grandis, Anogeissus latifolia, Terminalia crenulata.*

The main constituents of this type of forest are as follows, according to the stratification.

Upper Storey : *Adina cordifolia* (Roxb.) Hook. f. ex Brandis, *Albizia odoratissima* (L. f.) Benth., *A. procera* Benth., *Anogeissus latifolia* (DC.) Wall. ex Bedd., *Dalbergia latifolia* Roxb., *Ficus glomerata* Roxb., *Grewia tiliifolia* Vahl, *Lagerstroemia microcarpa* Wight, *L. par-*

viflora Roxb., *Mangifera indica* L., *Mitragyna parvifolia* (Roxb.) Kunth, *Pongamia pinnata* (L.) Pierre, *Tectona grandis* L. f., *Terminalia crenulata* Roth, *T. arjuna* Wight & Arn., *T. bellirica* (Gaertn.) Roxb. and *T. paniculata* Roth, constitute the upper storey.

Second storey : The under storey is composed of species like *Acacia leucophlaea* (Roxb.) Willd., *Bambusa arundinacea* (Retz.) Roxb., *Bridelia retusa* Spr., *Butea monosperma* (Lamk.) Taub., *Callicarpa tomentosa* (L.) Murray, *Cassia fistula* L., *Dendrocalamus strictus* (Roxb.) Nees, *Emblica officinalis* Gaertn., *Gardenia turgida* Roxb., *Helicteres isora* L., *Ixora arborea* Roxb. ex Sm., *Mallotus philippensis* (Lamk.) Muell.-Arg., *Santalum album* L., *Trema orientalis* (L.) Bl., *Wrightia tinctoria* R. Br., and *Ziziphus xylopyrus* Willd.

Ground Vegetation : *Asclepias curassavica* L., *Cassia hispida* L., *C. occidentalis* L., *C. tora* L., *Cipadessa baccifera* (Roth) Miq., *Desmodium pulchellum* (L.) Benth., *Eupatorium odoratum* L., *Flacourtia indica* (Burm. f.) Merr., *Glycosmis mauritiana* (Lamk.) Tanaka, *Lantana camara* L., *Polygonum chinense* L., *Stachytarpheta indica* (L.) Vahl, *Xeromphis spinosa* (Thunb.) Keay etc., constitute the undergrowth.

The common climbers found in these forests are : *Asparagus racemosus* Willd., *Butea parviflora* Roxb., *Cardiospermum halicacabum* L., *Cocculus hirsutus* (L.) Diels, *Dioscorea bulbifera* L., *D. hamiltonii* Hook. f., *D. pentaphylla* L., *D. wallichii* Hook., *Gloriosa superba* L., *Hemidesmus indicus* (L.) R. Br., *Merremia vitifolia* (Burm. f.) Hall. f., *Mucuna hirsuta* Wight & Arn., *Smilax zeylanica* L., *Ziziphus oenoplia* Mill. and *Z. rugosa* Lamk.

Tropical Semi-Evergreen Forest : This type of forests are mostly found on hill slopes from 450 to 850 m and also in the plains with an annual rainfall from 2000-2500 mm. The forests occur in parts of Kannoth, Hilldale and Tirunalli. In Kannoth range, along with semi-evergreen elements, *Ochroma pyramidale* Urban is cultivated on a large scale by the forest department for its soft and very light wood.

Top Storey : The dominant species are : *Artocarpus hirsutus* Lamk., *Cullenia exarillata* A. Robyns, *Dimocarpus longan* Lour., *Elaeocarpus tuberculatus* Roxb., *Hopea parviflora* Bedd., *Lagerstroemia microcarpa* Wight, *Mangifera indica* L., *Nephelium stipulaceum* Bedd., *Sterculia guttata* Roxb., *Terminalia paniculata* Roth and *Vateria indica* L. The occurrence of characteristic and conspicuous species of the moist deciduous forests namely *Lagerstroemia microcarpa* Wight and *Terminalia paniculata* Roth, in these semi-evergreen forests is of special significance. The evergreen elements like *Hopea wightiana* Wall. and *Vateria indica* L., occurring especially nearby streams in the lower elevations (150 m) is also of special significance.

Lower Canopy : The lower canopy is composed of species like *Aporusa lindleyana* (Wight) Baill., *Bambusa arundinacea* (Retz.) Roxb., *Bischofia javanica* Bl., *Cinnamomum zeylanicum* Bl., *Elaeocarpus serratus* L., *Elaeagnus conferta* Roxb., *Ervatamia heyneana* (Wall.) Cooke, *Euodia lunuakenda* (Gaertn.) Merr., *Hydnocarpus laurifolius* (Dennst.) Slum., *Mallotus philippensis* (Lamk.) Muell.-Arg., *Ochlandra* spp., *Pithecellobium monadelphum* (Roxb.) Kosterm., *Saraca asoca* (Roxb.) De Willde and *Xanthophyllum flavescens* Roxb.

Under Growth : *Antidesma menasu* Tul., *Barleria* spp., *Ixora coccinea* L., *Leea indica* (Burm. f.) Merr., *Melastoma malabathricum* L., *Psychotria dalzellii* Hook. f., *Nilgirianthus ciliatus* (Nees) Brem., etc., constitute the undergrowth. In places where the canopy is open *Eupatorium odoratum* L. and *Lantana camara* L., are seen. *Cycas circinalis* L., is also found in this region.

The common climbers include *Abrus pulchellus* Wall. ex Thw., *Aristolochia indica* L., *A. tagala* Cham., *Calycopteris floribunda*

(Roxb.) Poit., *Combretum latifolium* Bl., *Entada pursaetha* DC., *Gnetum ula* Brongn., *Gymnema sylvestre* (Retz.) Schult., *Ichnocarpus frutescens* (L.) R. Br., *Pothos scandens* L., *Uvaria narum* (Dunal) Bl. and *Ziziphus rugosa* Lamk.

Tropical Wet Evergreen Forests : The tropical evergreens occur at elevations above 300 m but descends even up to 150 m in Kottiyoor valley due to protection from human interference. The tropical rain forest formations are characterized by a luxuriant growth of evergreen trees of different sizes and shapes, in several tiers or storeys. These forests are characterized by a high proportion of *Mesua ferrea* L., *Palaquium ellipticum* L. and *Cullenia exarillata* A. Robyns. The type is termed *Mesua—Palaquium—Cullenia* type. The absence of *Dipterocarpus indicus* L., *Kingiodendron pinnatum* (DC.) Harms and *Hopea* spp., is noteworthy ; these species are met with in lower elevations adjoining Kannoth block, where *Mesua* is absent. The distribution of the species are governed mainly by altitude and edaphic factors. Such forests are found in Chandanathode, Kottiyoor, Panoth and Tirunalli.

Tropical evergreen forests of this area are divided, on the basis of height of the plants occurring, into : (a) Top Storey or the emergent layer (30 to 40 m), (b) Second Storey or ecodominant layer (15 to 25 m.) (c) Under Storey or Sub-Canopy layer (3 to 10 m) and (d) Undergrowth or ground layer.

Top Storey : The common species constituting the top canopy are : *Aglaia roxburghii* Miq., *Artocarpus hirsutus* Lamk., *Bischofia javanica* Bl., *Canarium strictum* Roxb., *Cullenia exarillata* A. Robyns, *Dimocarpus longan* Lour., *Dysoxylum malabaricum* Bedd., *Elaeocarpus tuberculatus* Roxb., *Garcinia indica* Choisy, *Gordonia obtusa* Wall. ex Wight & Arn., *Knema attenuata* (Roxb.) Ham., *Mangifera indica* L., *Myristica dactyloides* Gaertn., *Palaquium ellipticum* Engl. and *Vateria indica* L.

Second Storey : The chief species of the lower canopy are : *Aporusa lindleyana* (Wight) Baill., *Baccaurea courtallensis Muell.*-Arg., *Cinnamomum zeylanicum* Bl., *Elaeocarpus serratus* L., *Diospyros ebenum* Koenig, *Hydnocarpus laurifolius* (Dennst.) Sleumer, *Lophopetalum wightianum* Arn., *Macaranga peltata* (Roxb.) Muell.-Arg., *Nephelium stipulaceum* Bedd. and *Toona ciliata* Roem. Bamboos appear mainly as *Ochlandra* brakes along the larger streams but occasionally spread over the slopes.

Under Storey : The third storey consists of species like *Apama siliquosa* Lamk., *Elaeagnus latifolia* L., *Ervatamia heyneana* (Wall.) Cooke, *Humboldtia brunonis* Wall., *Leea indica* (Burm. f.) Merr., *Memecylon angustifolium* Wight, *M. edule* Roxb., *Olea dioica* Roxb., *Pavetta indica* L., *Psychotria thwaitesii* Hook. f. and *Xanthophyllum flavescens* Roxb.

The following ferns are also found *Arachniodes aristata* (Forst. f.) Tindle, *Athyrium hohenackerianum* (Kuntze) Moore, *Angiopteris evecta* (Forst.) Hoffm., *Asplenium formosum* Willd., *Alsophila glabra* Hook., *Dicranopteris linearis* (Burm. f) Underwood, *Drynaria quercifolia* (L.) J. Sim., *Pleopeltis nuda* Hook., *Lygodium microphyllum* (Cav.) R. Br., *Phymatodes nigrescens* (Bl.) J. Sm. A shrubby climbing fern *Stenochlaena palustris* (Burm.) Bedd., is seen growing on trees near the swampy places.

Undergrowth : The ground flora is very rich, consisting of shade loving plants such as *Begonia malabarica* Lamk., *Colebrookea oppositifolia* Smith, *Globba bulbifera* Roxb., *Mackenziea caudata* (T. And.) Ramam., *Pandanus thwaitesii* Mart., *Pogostemon benghalensis* (Burm. f.) Kuntze, *P. parviflora* Benth., *Wendlandia tinctoria* Kuntze and *Zingiber roseum* (Roxb.) Rosc.

Herbs which have been collected in these forests include *Ageratum conyzoides* L., *Coleus malabaricus* Benth., *Crotalaria retusa* L., *Flemingia grahamiana* W. & A., *Jerdonia indica* Wight, *Ophiorrhiza pectinata* Arn., *O. hirsuta* Wight, *Pellonia heyneana* Wedd., *Spilanthes acmella* Murr., *Tephrosia tinctoria* Pers. and *Urena lobata* L.

The climbers in these forests include *Aristolochia tagala* Cham., *Bauhinia phoenicea* Heyne, *Dumasia villosa* DC., *Embelia ribes* Burm. f., *Gnetum ula* Brongn., *Gymnema sylvestre* (Retz.) Schum., *Mucuna hirsuta* Wight & Arn., *Naravelia zeylanica* (L.) DC., *Pothos scandens* L., *Smilax zeylanica* L., *Thunbergia mysorensis* T. And. and *Toddalia asiatica* Lamk. var. *floribunda* Gamble.

Sholas and Grasslands : *Sholas* are restricted to the valleys and depressions where the moisture content is higher. The distribution of the species is governed mainly by altitude and ecological limitations. The *shola* type of forests are seen at Chandanathode at lower elevations (825 m) and also in the higher altitude (1200 m) and in Brahmagiri, it exists up to 1500 m. The *sholas* in higher elevations are characterized by the presence of *Mesua ferrea* L., with an abundance of *Cullenia exarillata* A. Robyns. The sholas at the lower elevations are conspicuous by the absence of *Mesua ferrea* L. Some of the common elements recorded in these areas are : *Ardisia solanacea* Roxb., *Allophylus rheedii* (Wight) Radlk., *Elaeagnus kologa* Sch., *Elaeocarpus serratus* L., *E. tuberculatus* Roxb., *Euodia lunuakenda* (Gaertn.) Merr., *Eurya nitida* Korth., *Glochidion velutinum* Wight, *Memecylon edule* Roxb., *Microtropis stocksii* Gamble, *Nothopegia colebrookiana* Bl., *Schefflera wallichiana* (W. & A.) Harms, *S. venulosa* Harms, *Symplocos beddomei* C. B. Cl., *S. laurifolia* Retz. ex D. Don, and *Ternstroemia japonica* L. and some of the grasses abundantly found are *Eulalia trispicata* (Schult.) Henr. and *Heteropogon contortus* (L.) P. Beauv. ex Roem. et Schult. The bracken fern *Pteridium aquilinum* (L.) Kuhn., occurs in all the higher elevations.

The common orchids generally met with in the above type of forests are : *Bulbophyllum tremulum* Wight, *Calanthe masuca* Lindl., *Dendrobium nanum* Hook. f., *D. heyneanum* Lindl., *Habenaria longicorniculata* Grah., *Liparis longipes* Lindl., *Malaxis versicolor* (Lindl.) Abey., *Peristylus goodyeroides* (D. Don) Lindl., *Pholidota pallida* Lindl. and *Zeuxine longilabris* (Lindl.) Benth. ex Hook. f.

Some rare and interesting plants were collected from this region. These are : *Desmos lawii* (Hook. f. & Thoms.) Saff., *Dillenia bracteata* Wight, *Diospyros pruriens* Dalz., *Epipogium roseum* (D. Don) Lindl., *Eriocaulon dianae* Fyson var. *longibracteata* Fyson, *Goniothalamus wynaadensis* Bedd., *Isonandra stocksii* C. B. Cl., *Leucas eriostoma* Hook. f., *Nilgirianthus lupulinus* (Nees) Brem., *Paramignya armata* Oliv., *Podochilus falcatus* Lindl., *Syzygium montanum* Gamble, *Symplocos beddomei* C. B. Cl., *Turraea villosa* Benn., *Vernonia dalzelliana* Drumm. & Hutch. and *Vigna pilosa* Baker.

Some plants collected from this region are new records to South India. These are *Ammannia auriculata* Willd., *Eryngium foetidum* L., and *Paspalum canarae* (Steud.) Veldk. var. *fimbriatum* (Bor) Veldk.

New plants reported from this area include *Sida beddomei* K. C. Jacob and *Nothopegia beddomei* Gamble var. *wynaadica* Ellis & Chandras.

CONCLUSION

The whole area is under biotic disturbance. Most of the coastal regions are at present occupied by coconut plantations and paddy fields. The midland and mountainous regions are also under similar interferences and as a result, the natural vegetation is gra-

dually getting degraded and relegated to some patches in many places.

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