

FLORISTIC STUDIES IN TRIVANDRUM DISTRICT, KERALA

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INTRODUCTION

Trivandrum, the southernmost district in Kerala lies between $8^{\circ} 17' 50''$ and $8^{\circ} 53' 42''$ N and $76^{\circ} 40' 24''$ and $70^{\circ} 17' 00''$ E. It is bounded in the north by Quilon District, in the east and south, by Thirunelveli and Kanyakumari Districts of Tamil Nadu, and in the west by Arabian Sea.

This district can be divided on a physiographic basis into three zones—coastal, mid-land and mountainous. Except the hills at Veli and Varkala the coastal zone comprises more or less flat waste-lands. The other two zones are distinctly hilly. The main systems of hills are the southernmost part of the Western Ghats. The main ghat stretches along the eastern border with elevations varying between 1000 and 1869 m above the sea level.

The higher slopes of the main ghats and the spurs are very steep and rocky and in many places inaccessible. Such places are usually barren. The lower slopes of the ghats are generally covered with dense forests. The highest point in the tract is 'Agastyarkudam' with an elevation of 1869 m. Other important peaks are Aduppukkal mottai and Chemungi.

There are three rivers in this district—Neyyar, Karamana and Vamanapuram, the first taking its source on Agastyarkudam and the others on Chemungi.

Rocks are of plutonic origin constituting charnokites and norities, granulites etc. The whole rocky system is described as "gneissic" on account of its structure. Laterite and porous rocks are also met with.

Soil is almost wholly loam, of varying depth in different places. The soil in coastal tract consists mainly of pure crystalline sand and is usually deficient in potash. The river banks and bottom are rich in alluvial deposits. On the top of hills and on elevated grounds which are subjected to heavy run off, there is a large proportion of laterite gravel and broken pieces of other rocks in different stages of disintegration.

Climate of this area is moderately humid. The variation in temperature is little. The maximum mean daily temperature in the plains during the hottest month (March) is about 32.4° C. Mean daily minimum temperature in the coldest month (January) is 22.2° C. On hills these may be 35° C and 16° C respectively, varying somewhat with altitude.

South-west Monsoon commences from June, continuing up to September. After a pause North-East Monsoon sets in. The average annual rainfall is 3178 mm (during 1952-1961).

PREVIOUS WORK

No comprehensive account on the flora of this district is available, though pioneers like Bourdillon, Barber, Beddome, Wight, Lawson, Narayanaswamy, Rama Rao, Vencoba Rao, Cherian Jacob and others had contributed much to the floristics and study of forestry of erstwhile Travancore State.

Abraham (1962) has given a general account of the vegetation. Bourdillon has presented "A Report on the Forest Trees of Travancore" Later in 1908, he published his

monumental work. "The Forest Trees of Travancore"

Lawson (1893) has recorded his visits to Ponnudi, Merchiston and Trivandrum. In 1914 Rama Rao, the then Conservator of Forests of Travancore has compiled "a preliminary list" of 3535 plants with the help of curator Ven-coba Rao who was a devoted plant collector of this area.

Botanically, the coast of Trivandrum has received rather scant attention. Thomas (1962) has explored the Veli Hills in Trivandrum with special reference to ecological factors and published an account dealing with 249 species. Rao and Sastri (1972, 1974 a, 1974 b) have given an account of coastal floristics and ecology of Veli. However, a clear picture of the floristics of the whole coast of Trivandrum is lacking.

Contributions of Cook and Gut (1971), and Gaudet (1974) are concerned with the problem of *Salvinia molesta* Mitchell. Nair and Ghosh (1974, 1976, 1977 a, 1977 b) have contributed to the knowledge on the ferns of the area. Joseph and Chandrasekharan (1973, 1974, 1978) Nayar (1966, 1969), Maheshwari (1964), Raizada and Chatterji (1963), Ravi (1970) and Vasudevan Nair (1966) are some of the recent contributors to the flora of this district.

A perusal of Madras Herbarium points to the meagre collections from Trivandrum, compared to the other districts in the Peninsula.

PRESENT STUDY

This paper is the result of a preliminary study on the flora of Trivandrum District. Four seasonal exploration trips were undertaken to different areas of this district during 1977-78 and a total of 700 species of plants have been collected.

VEGETATION

Coastal Region : The coastal region consists of strand and estuarine vegetations. Strand

vegetation is of two types : sand and rock. 'Rock strand' is met with in Varkala and Kovalam.

'Strand Sand' : Coconut plantations are seen bordering on the coast. Towards the east, on fine coarse sand are seen sand binders like *Indigofera spicata* Forsk., *Ipomoea pes-caprae* Sweet, *Pedatum murex* L., *Polycarpaea corymbosa* (L.) Lamk., *Portulaca oleracea* L., *Rothia indica* (L.) Druce, etc. The common shrubs in the mixed bushy zone are *Calotropis gigantea* (L.) R. Br., *Dodonaea viscosa* Jacq., *Erythroxylum monogynum* Roxb., *Gmelina asiatica* L., *Hugonia mystax* L., etc. The inner woodland zone consists of trees like *Hopea wightiana* Wall. ex W. & A., *Morinda tomentosa* Heyne ex Roth, *Wrightia tinctoria* R. Br., etc. *Cassytha filiformis* L., is a common parasite.

Estuarine Vegetation : Pro-estuaries like Tidal mangrove, Prohaline and Euhaline are met with in the coastal zone.

(i). Tidal Mangrove : Tidal mangroves are seen at Veli, Anchuthengu and Nadayara. Along the margin of the lakes are seen abundant growth of *Acanthus ilicifolius* L., and *Acrostichum aureum* L., forming extensive belts. Common climbers among these are *Cissus vitiginea* L., *Derris trifoliata* Lour., *Flagellaria indica* L., *Gloriosa superba* L., *Parsonia laevigata* (Moon) Alston, etc. The trees are *Avicennia officinalis* L., *Barringtonia racemosa* Roxb., *Bruguiera gymnorhiza* (L.) Lamk. and *Sonneratia caseolaris* (L.) Engl.

(ii). Prohaline : In prohaline type, are found dense growth of salt tolerant fresh water forms like *Ceratopteris siliquosa* (L.) Copel., *Corchorus aestuans* L., *Crinum asiaticum* L., *Hygrophila quadrivalvis* Nees, *Salvinia molesta* Mitchell, *Sphenoclea zeylanica* Gaertn., *Striga asiatica* (L.) O. Kuntze, etc.

(iii). Euhaline : Highly salt tolerants, like *Acanthus ilicifolius* L., *Acrostichum aureum* L., *Pandanus fascicularis* Lamk., etc. occur in this type.

Stagnant pools and canals are common in the coastal and midland regions which harbour a rich aquatic vegetation. The common aquatic vascular plants are *Eichhornia crassipes* (Mart.) Solms, *Pistia stratiotes* L., *Blyxa octandra* (Roxb.) Thw., *Hydrilla verticillata* (L. f.) Royle, *Monochoria vaginalis* (Burm. f.) Presl ex Kunth, *Nelumbo nucifera* Gaertn., *Nymphaea nouchali* Burm. f., *Nymphoides indica* (L.) Kuntze, etc.

Owing to the rapid industrialisation and urbanization the natural vegetation of the coast of Trivandrum is very much disturbed. The vegetation of Veli is being continuously affected by the pollutants released from Travancore Titanium Products, Vikram Sarabhai Space Centre, etc. The actual 'Veli Hills' reported by former collectors like C. A. Barber and others has now been cleared for the construction of Vikram Sarabhai Space Centre. The pollution problem at the industrial sector in Veli affecting even common plants of Veli, need urgent attention.

Midland region : Most of this zone is under cultivation of coconut, Arecanut, Paddy and Tapioca. Tropical trees like *Anacardium occidentale* L., *Artocarpus hirsutus* Lamk., *A. heterophyllum* Lamk., etc. are also cultivated. Some of the common weeds in the cultivated fields are *Achyranthus aspera* L., *Ageratum conyzoides* L., *Emilia sonchifolia* (L.) DC., *Synedrella nodiflora* (L.) Gaertn. etc.

Mountainous region : Six major types of forests are met with in this region.

(i). **West Coast Tropical Evergreen Forests :** These forests are characterized by the great luxuriance of vegetation of several types consisting of tall trees with several shrubs and herbs forming the undergrowth. Some patches of this type can be seen at places like Suryakanthi, Kallar Valley, Valleys of Agastyarkudam etc.

The trees of first storey are *Ailanthus triphysa* (Dennst.) Alston, *Artocarpus hirsutus*

Lamk., *Cullenia exarillata* A. Robyns, *Dipterocarpus indicus* Bedd., *Dysoxylum malabaricum* Bedd. ex Hiern, *Elaeocarpus tuberculatus* Roxb., *Hopea parviflora* Bedd., *Lophopetalum wightianum* Arn., *Mesua ferrea* L., *Palaquium ellipticum* Engl., *Persea macrantha* (Nees) Kosterm., *Toona ciliata* Roem., *Vateria indica* L., *Vitex altissima* L. f., etc.

The second storey consists of trees like *Actinodaphne bourdillonii* Gamble, *Aporosa acuminata* Thw., *Canarium strictum* Roxb., *Cinnamomum malabathrum* (Lamk.) Batke., *Ficus arnottiana* (Miq.) Miq., *Dimocarpus longan* Lour., *Gordonia obtusa* Wall. ex W. & A., *Xanthophyllum flavescens* Roxb., etc.

The third storey is formed of shrubs, like *Breynia retusa* (Dennst.) Alston, *Canthium parviflorum* Lamk., *Casearia esculenta* Roxb., *Ixora* spp., *Psychotria curviflora* Wall., etc. The ground layer consists of *Elatostema lineolatum* Wight, *Eleusine indica* (L.) Gaertn., *Ophiorrhiza brunonis* W. & A., *Pogostemon heyneanus* Benth., *Phyllanthus gardnerianus* (Wight) Baill. etc. Species of *Pandanus* L. f., are very common. Epiphytes like *Cymbidium aloifolium* Sw., *Oberonia verticillata* Wight, *O. wightiana* Lindl., *Peperomia portulacoides* (Lamk.) A. Dieter, and parasites like *Helicanthes elastica* (Desr.) Dans., *Taxillus tomentosus* (Roth) van Tiegh., etc., are common. The common ferns include *Adiantum caudatum* L., *Blechnum orientale* L., *Cheilanthes farinosa* Kaulf., *Dicranopteris linearis* (Burm. f.) Underwood var. *linearis*, *Leucostegia immersa* (Wall.) Presl, *Nephrolepis cordifolia* (L.) Presl, *Macrothelypteris torresiana* (Gaud.) Ching, *Tectaria coadunata* (J. Sm.) C. Chr. etc. Climbers like *Butea parviflora* Roxb., *Dioscorea oppositifolia* L., *D. wallichii* Hook. f., *Millettia rubiginosa* Wight & Arn., *Pothos scandens* L. etc., are also common.

(ii). **Southern Hilltop Tropical Evergreen Forests :** This type is confined to high ridges like Churuttumoola and Ponmudi. The composition is more or less similar to the West

Coast Tropical Evergreen Forests. High velocity winds, poor conditions of soil, etc., account for the low stature of trees in this type.

The upper storey consists of *Cullenia exarillata* A. Robyns, *Ficus arnottiana* (Miq.) Miq., *Dimocarpus longan* Lour., *Persea macrantha* (Nees) Kosterm., *Semicarpus travancorica* Bedd., etc. The lower storey includes *Melastoma malabathricum* L., *Psychotria flavida* Talbot, *Syzygium caryophyllatum* (L.) Alston, *Spilanthes paniculata* Wall. ex DC., *Crotalaria retusa* L., *Plectranthus wightii* Benth., *Strobilanthes asperimus* Nees, *Pogostemon mollis* Benth. etc.

(iii). *Westcoast Semi-Evergreen forests* : This type is common adjoining evergreens and sides of rivers. A mixture of species of both evergreen and deciduous plants are found.

The first storey is characterized by the following plants : *Adenia cordifolia* (Roxb.) Hook. f. ex Brandis, *Artocarpus hirsutus* Lamk., *Alstonia scholaris* R. Br., *Bridelia retusa* Spr., *Carallia brachiata* (Lour.) Merr., *Grewia tiliæfolia* Vahl, *Lagerstroemia lanceolata* Dalz. & Gibs., *Terminalia paniculata* Roth etc.

The lower storey consists of *Aporosa lindleyana* (Wight) Baill., *Cinnamomum malabathrum* (Lamk.) Batke., *Clerodendrum viscosum* Vent., *Mallotus philippensis* Muell.-Arg., *Xanthophyllum flavescens* Roxb., *Butea parviflora* Roxb. etc.

(iv). *Southern Secondary Moist Mixed Deciduous Forests* : This type occurs in lower elevations. The composition is mixed and irregular with scattered trees of *Bridelia retusa* Spr., *Grewia tiliæfolia* Vahl, *Gordonia obtusa* Wall. ex W. & A., *Gardenia turgida* Roxb., *Lagerstroemia lanceolata* Wall., *Mastixia arborea* (Wight) Bedd. ssp., *meziana* (Wargenin) Mathew, *Tectona grandis* L. f., *Terminalia paniculata* Roth etc. *Emblica officinalis* Gaertn., with a dense undergrowth of grasses is also common.

(v). *Wet Bamboo Brakes* : A large portion of the slopes of hills and the valleys are covered

with two species of *Ochlandra rheedii* Gamble and *O. travancorica* Gamble. A new species *O. ebracteata* Raizada et R. N. Chatterji is also reported from Kottur R. F.

(vi). *Myristica swamp forests* : Partially cleared *Myristica* Swamps are seen at Kottur R. F. which is characterized by the looped knee-roots on the ground. These Swamps are usually found in valleys often subjected to inundation. The common elements in the swamps are *Myristica dactyloides* J. Gaertn., *M. malabarica* Lamk., *Gymnacranthera farquhariana* (Hook. f. & Thoms.) Warb., *Knema attenuata* Warb., *Hydnocarpus alpina* Wight and *Lophopetalum wightianum* Arn. Most of the swamps are now converted into paddy fields.

Some of the new taxa published from this district by various authors include *Eria muscicola* (Lindl.) Lindl. var. *brevilinguis* Joseph et Chandr. (collected from western slopes of Agastyarkudam), *Garcinia echinocarpa* Thw. var. *monticola* Maheshwari (collected from Chemungi), *Ochlandra ebracteata* Raizada & R. N. Chatterji and *Sonerila sadasivani* Nayar.

Other interesting plants collected from this district are : *Ampelocissus arnottiana* Wight & Arn.—A rare member of Vitaceae from Pulimath. *Buchanania lanceolata* Wight and *Cabomba aquatica* Abul. *Eulophia cullenii* Fischer all new representations in MH., and *Chilochista pusilla* (Willd.) Schlecht., a rare orchid from Ponmudi. Still others are, *Clidemia hirta* D. Don—from Kowdiyar, Trivandrum, a new alien to India ; *Crotalaria incana* L., a South American species, reported from Museum Compound, Trivandrum. *Gluta travancorica* Bedd. Collected on the way to Agastyarkudam from Boneccord. *Morinda reticulata* Gamble—the first collection after the type collection from, Boneccord. *Phaius luridus* Thw.—A new record for India, from Agastyarkudam. *Premna glaberrima* Wight—A species from Ponmudi declared as endangered, and *Struchium sparganophorum* (L.) O. Kuntze—Collected from Pulimath.

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