Tree flora and plant associations of Silent Valley, Kerala*

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Forests of Silent Valley are having a complex natural eco-system. Many varied ecological niches of the forests provide ideal living conditions for all kind of species especially of tropical rain forest, having strong tendency to change in species composition in time and space and high diversity of dominance. The trees are thickly populated with their peculiar morphological features.

Based on the observations on the plant collections of Silent Valley made by the author (1986), by BSI, Southern Circle and Forest Genetics and Plant Breeding Institute, Coimbatore, Reports by Nayar (1980), by Nair (1981) and Flora by Mani Lal (1988) it has been assessed that common trees are *Palaquium ellipticum, Mesua nagassarium, Poeciloneuron indicum, Cullenia exarillata, Machilus macrantha, Calophyllum elatum* etc. Noteworthy is the occurence of *Poeciloneuron indicum* and almost the absence of any *Dipterocarpus* sp. On the basis of fossil records it can be said that the whole peninsular India was covered with such forests during the Miocene-Pliocene times.

There are about 101 tree species out of the 966 species of angiosperms found in the area. The maximum frequency of the prominent species of mature trees is about 70 of *Palaquium ellipticum*. At the height of about 900-1,200 meters there is *Cullenia - Palaquium* Association, at 1,000-1,400 meters *Palaquium- Mesua* Association, at 1,400-1,600 meters *Mesua-Calophyllum* Association and above to this there is a transition zone and then above 1,900 meters there is a Shola Forest.

Key-words—Tree flora, Plant Associations, Silent Valley.

INTRODUCTION

THE Silent Valley is known with its significant name due to the apparent silence that reigns in the forests there. It is because of the absence of the singing insects known as *Cicadas* which have resounding noise and could be heard in other nearby forests. It is about 45 Km North of Mannar Ghat, the nearest town, in the district of Palghat, Kerala. The vegetation of the valley is relatively not exposed to any external influences and is more dense along the water courses. According to Meher-Homji (1980) there are very few places in the Western Ghats where the forests are preserved in the magnitude and grandeur of Silent Valley forests. The area of catchment of rivers are almost undisturbed from the human activities. No settlement of tribals are found within the forests. It is very much inhabited by poisonous snakes and wild animals.

The valley is very important from the botanical point of view because the flora and vegetation of this area is diversified and complex. Since, it is naturally protected area, it provides a shelter for rare, endangered and interesting plant species. It may be treated as an example of wet evergreen forests with its associated Sholas and other vegetational forms.

The flora of this area is particularly important because the forests are having a complex eco-system. Many varied ecological niches of the forests provide an ideal living condition for all kind of plant species. The plant species of a tropical rain forest, having a strong tendency to change in species composition in time and space and high diversity of dominance are most suited to this area. The trees are thickly populated with their peculiar morphological features.

Tropical rain forests cover about 7% of the earth surface and are estimated to enhabit more than half of all the species of living organisms. The total number of species are estimated somewhere between 1.5 to 2.5 million in tropical rain forests (Wilson, 1988). Silent

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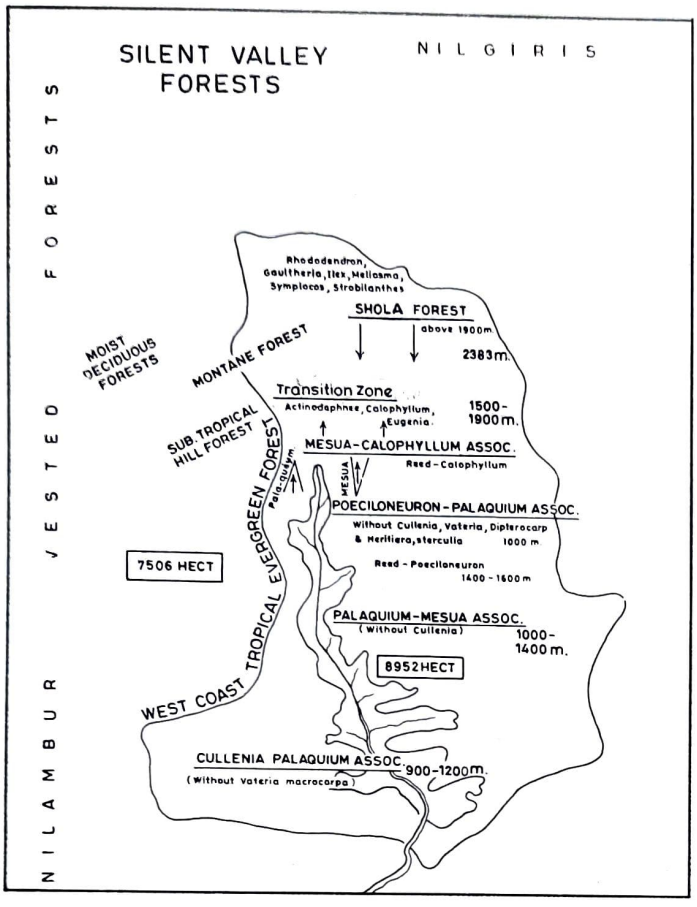

Map 1:

Valley covering a small area of about 8,952 hectares has as many as 966 species of angiosperms belonging to 559 genera of 134 families (Manilal, 1988).

GENERAL FEATURES OF THE AREA

It is almost a rectangular plateau with a gradual slope without any steep gradient. It is protected on all sides by high hills of Western Ghat ranges. There are highest peaks on the northern boundary in which Sispara (2.206 m) and Anginda (2383 m) are prominent. The river Kunthipuzha, a tributary of Bharatpuzha flows gently through the valley and join with the river Bhawani near Mukali. The forests of Nilambur Division and a part of Nilgiris lie on the northern boundary and Palghat division in the south. Attapadi forests are contiguous to Silent Valley on the eastern boundary, while on the western boundary are the forests of Nilambur Division.

Tropical climate of the area is benefited by both south-west and north-east monsoons. The average precipitation of the area is about 3,180 mm and is due to mainly south-west monsoon.

MATERIAL AND METHOD

The present observations are based on a collection of 300 plants of angiosperms from Silent Valley area. Collections of plants of this area made by the Botanical Survey of India, Southern Circle and Forest Genetics and Plant Breeding Institute, Coimbatore, were also considered in this study. Reports of the survey of this area by Nayar (1980), Nair (1981) and Flora by Manilal (1988) have also been consulted to assess the Tree Flora.

FLORISTIC COMPOSITION

Trees are predominant in the Silent Valley forests which are of different sizes. There are three tree layers in addition to shrubs and herbs (Fig. 1). At some places only 2 layered trees are found. The canopy is formed by the tallest trees. The height of these trees sometimes reaches over 300 ft (90 m). Generally they are about 200 feets (60m). Under the canopy, many smaller trees grow with a range of other kind of plants. Even the undergrowth is composed of mainly woody plants of tree forms. They are extremely numerous in species and varied in forms. The trunks of the trees are as a rule straight and slender and do not branch till near the top. The base is very commonly provided with the plank buttresses, flange like outgrowths which are highly characteristic features. The bark of these trees is thin and smooth, and rarely have deep fissures or conspicuous lenticels. Vast majority of the mature trees as well as of the shrubs and saplings have large, leathery, dark green leaves with entire or nearly entire margins. The similarity and colouring of the majority of the leaves are mainly responsible for the monotonous appearance of the forests, especially during the period when young foliages are produced. Large and striking coloured flowers are uncommon. Most of the trees and shrubs have inconspicuous often greenish white or light coloured flowers.

The valley may be divided into four regions - upland, riparian, slopes and plains. The plains are having a big patches of grasses with *Phoenix* and other fire resistant plant species.

Manilal (1988) has reported 22 tree taxa from upland region, 13 from riparian and 49 from the slopes in addition to many common taxa. Present author found *Phyllanthus*, *Dalbergia*, *Wendlandia*, *Careya*, *Zizyphus*, *Eucalyptus* and *Phoenix* species grown in the grassy plains. Shola forests are sheltered in the north- eastern region of Walakkad with grassy down. The tree species which are most common in the forests are *Palaquium ellipticum* and *Cullenia excelsa*. The abundance of each species vary greatly in different localities. *Calophyllum*

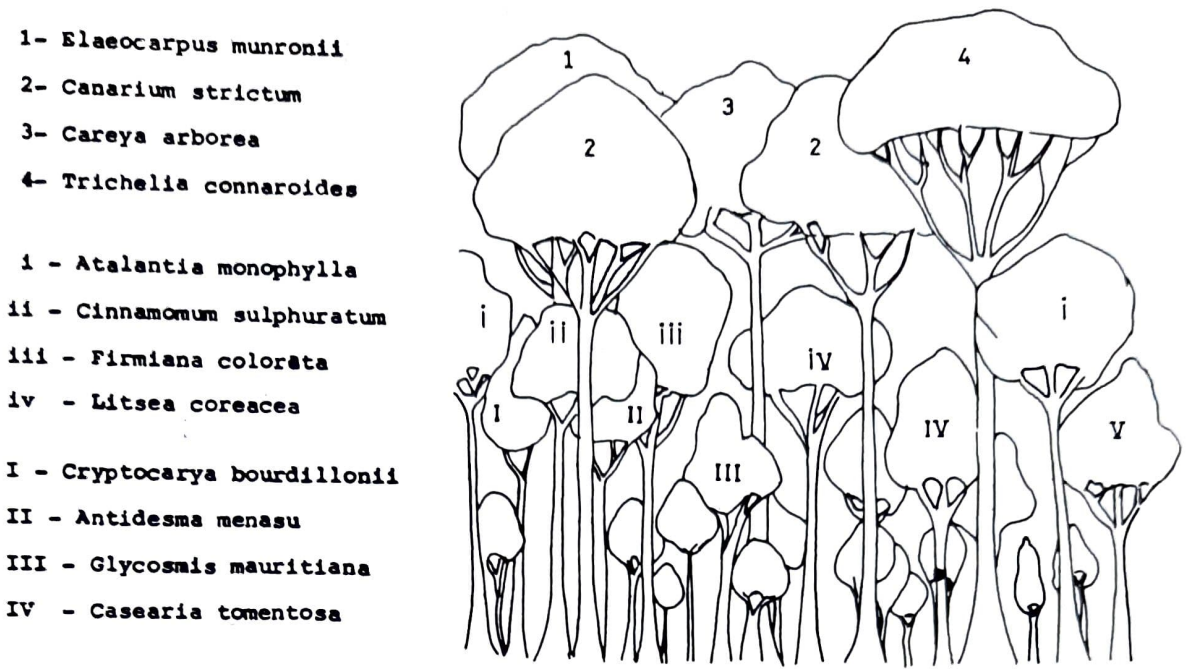

Fig. 1:

elatum, Cullenia exarillata, Machilus macrantha, Mesua nagassarium, Poeciloneuron indicum, Actinodaphne, Rhododendron, Gaultheria, Ilex, Meliosma, Eugenia and *Symplocos* are some of the common tree species. Other evergreen forest species are such as *Artocarpus heterophyllus, Canarium strictum, Cinnamomum zeylanicum, Dysoxylum malabaricum, Elaeocarpus munroii, E. tuberculatus, Gomphandra polymorpha, Gordonia obtusa, Holigharna arnottiana, Hydnocarpus alpina, H. laurifolia, Litsea wightiana, Mangifera indica* and *Xanthophyllum flavescens*. Noteworthy is the dominance of *Poeciloneuron indicum*. Absence of any *Dipterocarpus* and *Gluta* species is very significant. Tree ferns belonging to the genus *Alsophila* (*Cyathea sensu lato*) are also present.

The formation of association of different tree species is different according to the height of the area (Map-1). *Cullenia-Palaquium* Association is found from 900 to 1,200 m height. The forests of Veliaparathode are the best example of this Association. On little upwards from 1,000 to 1,400 m *Palaquium* forms Association with *Mesua* and *Cullenia* is reduced in their presence. Little more above *Poeciloneuron-Palaquium* Association is found without the presence of *Cullenia, Vateria, Dipterocarpus, Heritiera* and *Sterculia*. *Reed- Poeciloneuron* Association is marked at the elevation of 1,400-1,600 m. *Mesua* increases more and more in number forming the Association of *Mesua - Calophyllum* having *Reed-Calophyllum* Association at few places. Above 1,500 to 1,900 m a transition zone is found in which *Actinodaphne, Calophyllum* and *Eugenia* are common. Above this elevation shola forests start which are in stretches in the sheltered places. These forests have *Rhododendron, Gualtheria, Ilex, Meliosma, Symplocos* and *Strobilanthes* species in addition to the common shola forest plant species.

The first storey in the shola forests comprises: *Ternstroemia japonica, Syzygium cumunii, Michelia nilagirica, Gordonia obtusa, Sideroxylon tomentosum, Elaeocarpus, Photinia* and *Cinnamomum* species. *Rhododendron nilagiricum* and *Euonymus* species are common at outskirts.

DISCUSSION

India has its flora of a great diversity. This can largely be attributed to the vast geographical area stretching over many latitudes. The marked difference in elevations and the varied climate ranging from the tropical to the arctic condition and from aridity to high humidity have made it more complex. The flora of Silent Valley has tropical Montane rain climate protected from all sides from the extremes of weather, therefore, the forests are much luxuriant. Another reason for its thriving is that it has been made National Rainforest Biosphere and has been conserved. Proposed Hydroelectric project on river Kunthipuzha has been abondoned. Therefore, the flora has become more rich though it was already harbouring many new and rare species of plants.

The density and frequency of seedlings, saplings, young trees and mature trees of 12 dominant species as quoted by Manilal (1988) are very high in Silent Valley as compared to other forests. The process of natural regeneration in tropical rain forests is no doubt exceed-

ingly complex. The seeds of the rain forests trees usually show a high percentage of germination. They may germinate just after falling from the trees or may have some resting period for germination. For both the germinations, floor of the forest should not have water. For successful germination and establishment of the seedlings dried condition of the floor is needed. In Western Ghats, seed falling on the floor just before or during the monsoon do not germinate or if they germinate, make a little progress until the wettest period is over (Aiyar, 1932). In *Mesua ferrea* the seeds fall before the monsoon in May and June, but commonly do not germinate until September, the beginning of the dry season. *Palaquium ellipticum* seeds fall down during the monsoons and germinate immediately, but the seedlings wait for the wet conditions to be finished. Just getting dry weather they start growing vigorously. The germination is abundant no doubt but the seedlings suffer a heavy loss in such cases.

The flora of Silent Valley is the relic of the past as the Indian subcontinent during the Miocene-Pliocene times (about 21 my B. P.) was covered with evergreen forests. Khan (1993) while tracing a vegetational history of the Silent Valley has shown that the forests were not so thick in Silent Valley during the earlier time. Slowly and gradually it developed the thickets of the forests and the frequency and density of various tree species increased in time and space (Fig. 1).

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