Chemical studies on the leaf and Root (Wilt) diseases of coconuts in Travancore-Cochin *

I. Some observations of the incidence of the diseases

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DURING a rapid reconnaissance soil survey of Travancore and Cochin for a study of coconut soils with special reference to Leaf and Root (Wilt) diseases of coconut, certain observations were made regarding the occurrence and spread of these diseases. These observations are summarised in this paper.

ERRATIC SPREAD

Survey of the Leaf and Root diseases conducted earlier had shown that the diseases were in existence more than 85 years ago at Eratupettah in Meenachil taluk. Later on they were reported from Kaviyoor and Kalloppara in Thiruvalla taluk and a little later from Kayangulam. These places are more than 30 miles distant from one another and coconut areas intervening were free from disease. Thus the diseases broke out in Travancore from more than one independent focus of infection. This fact was further confirmed in the present enquiry. Diseased tracts separated by a few miles of healthy areas were found almost throughout Travancore and Cochin. Pockets of infection were noticed in isolated places in Nallanad, Colamachel, Keezhcherry Vamanapuram, Thiruthymon, Elakamon, Ailam, Koduvazhanur, Elamba, Pazhayakunnumel etc. in south Travancore which is a comparatively healthy area free from disease. Places like Ponkunnam, in the eastern midland region is typical of this condition. During a tour from Moovattupuzha to Kottayam high incidence of disease was noticed round about Kuravilangad. In Shertallai extensive areas of good yielding gardens were found but towards the interior of Ponnamveli, near

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Shertallai town high diseased pockets were observed. These are only a few of the numerous instances of diseased area situated in the midst of healthy areas or *vice versa*. A very peculiar nature of the disease is that even in the same garden healthy trees are with their leaves almost touching those of the diseased ones. The truth of these statements can be noted even by the casual visitor travelling from Karunagappally to Ernakulam along the Trivandrum-Ernakulam trunk road. He could very easily locate diseased areas separated by healthy ones by distances which sometimes extend to a few miles and healthy and diseased trees existing side by side in the same garden.

ACTION OF WIND

There is a wide-spread belief that the Leaf and Root diseases are spread by wind. The popular name is *'Kattu Veezhcha'* meaning wind spread. Coconut growers reported that after the initial infection, the spread of the disease is in the direction of the wind. This belief is strengthened by the observation that the disease is first noticed in low lying areas on banks of the rivers and places adjacent to the paddy fields. If there are sharp bends or corners of coconut gardens jutting into the field, the disease first appears there. These situations are subject to full wind action.

ACTION OF WATER

It is generally believed that the diseases made themselves significant after the great floods of 1882 when the land was under water and remained waterlogged for a considerable period. During the survey additional evidence in support of this was obtained. Palms growing on banks of rivers which remain flocded for some days every year during the monsoons or in situations which are waterlogged or has the water-table quite near the surface were severely infected.

TO ILLUSTRATE

The Palace Ward, Alleppey, land surrounding the Lakshmipuram palace garden, Changanacherry and certain localities in Kumbalangi which are waterlogged areas and in some portions of the banks of Kallada, Meenachil and Thodupuzha rivers subject to flooding serious outbreak of the diseases was observed.

One very striking case of infection probably connected with the water movements was observed near Kandampuzha ferry — a ferry of the Kallada river, about 18 miles to the north east of Quilon. About two miles to the south of the ferry very serious disease infection was observed in

a locality — called "Mudirapparambu". The affected gardens were on the western bank of the river, while extensive areas of the eastern bank and on the northern and southern sides of the infected areas were disease - free. The question then naturally arises as to how this isolated place came to be infected. At present there appears to be no clear answer. It was, however, observed that at the point where severe infection was noticed the river had a sharp turn in its course and the flow of river water was such that flood waters from hills on the east could hit the western bank at the point of infection rather than at places on the eastern bank.

Contrary to the above are some of the localities in the Kuttanad area. This area known as the 'Granary of Kerala' contains extensive paddy fields which are submerged for the greater part of the year. Here and there in this vast expanse of water can be seen some homesteads raised from reclaimed clayey soil. These homesteads are like small islands each containing a few coconut trees and surrounded by water on all sides. The water level is very high, water standing sometimes a few inches below the land surface. The palms in some of these islands are very healthy and free from diseases. Floods are also very common in these localities. The water, however, is in a stage of a continuous movement. The problem of stagnant *versus* moving water in relation to the diseases, thus comes into prominence. Very attractive gardens were found on the banks of the Pothottapuzha, Muringapuzha and Ithipuzha — tributaries of the Vembanad lake and at Vaikam, Kumarakom and other places on the banks of the lake itself. Healthy coconut gardens with very high water-table but subject to the ebb and flow and with water in a state of movement were found in other situations also. But isolated pockets of infection were seen even in such situations.

UPLAND REGIONS

Travelling in Travancore-Cochin from the sea coast in the west to the hill ranges in the east, one comes across the coastal sandy tract, the clayey reclaimed areas of the backwaters, the midland or the upland regions lying between the backwaters and the hill slopes with sandy loam soil, laterite soil of the hill slopes with a fairly high percentage of gravel and sand, loamy soils of the hill slopes of laterite *cum* gneiss origin and the alluvial soils of the river beds. Coconuts are cultivated in all these situations. The Leaf and the Root

(Wilt) diseases were also found in all these typical classes of soils. With regard to the upland and midland regions and the hill slopes it was particularly interesting to know that while some of the hill slopes contained very healthy palms, the palms on adjoining slopes were diseased. In Kanjirapally area, for instance at a height of 800—1000 ft. above the sea level, some of the hill slopes were found healthy while others were diseased. Similar observations were made in the Regional Research Station, Thodupuzha. Drought, unsuitable soil conditions, parasitic organisms or virus infection may be prime causes of the diseases, but it is difficult to explain why one of the slopes gets the disease while the other does not. It is, therefore, ventured to suggest that the mineralogical composition of the rocks of the hills may be different, that the products of weathering of the rocks may contain some toxic material which may cause disease incidence in the slopes and valleys and further these materials carried by rain water to the rivers may get deposited at different points along the course of rivers thus creating foci of the infection quite independent of each other.

The work of Menon and co-workers of the Central Coconut Research Station, Kayangulam has definitely established that the leaf disease is caused by parasitic fungal organisms like *Helminthosporium halodes, Gloeosporium* sp., *Gliocladium roseum* and *Fusaria*. These workers have also isolated fungi like *Rhizoctonia solani, R. bataticola* and *Botryodiplodia theobromae* from roots of palms affected by the Root (Wilt) disease. Virus investigations started recently have given indications that the disease may be of virus origin. Chemical studies have revealed differences in the chemical make up of soil of healthy and diseased tracts. However, in view of the observations recorded above, it is suggested that the possibility of water in some way not yet explained, being the cause or the carrier of a parasitic or a toxic factor, may not be overlooked.