

Soil Conditions and Disease Incidence in Coconut

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Introduction

UNFAVOURABLE soil conditions play an important role in the incidence of diseases in plants. Generally, plants growing in soils unsuitable for their normal development will lose their vigour and consequently their capacity for disease resistance with the result that they become susceptible to infection by pathogenic organisms. So far as coconut is concerned adverse soil conditions act as predisposing factors in the incidence of certain diseases such as

root (wilt) disease, stem bleeding, nut fall, root rot etc. In the following discussion soil environment associated with the incidence of coconut diseases are dealt with.

Root (wilt) disease

This is the most important disease of coconuts in the Travancore-Cochin area of Kerala State affecting about a lakh of acres and causing an annual loss of about 10 million rupees. The disease has been prevalent in the State for nearly

80 years and is believed to have made its appearance after the great floods of 1882. The disease is systemic and highly infectious.

The important symptoms of the disease are a slow and general wilting of the leaves and ribbing and drying of leaflets accompanied or preceded by shedding of immature nuts and buttons. A general chlorosis of leaves and deterioration of the root system are other salient features of the disease. The yield and quality of nuts are adversely affected.

Although no particular deficiency of any macro or micronutrients was found to be the direct cause of the disease the fertility status of the soils in the diseased tract was found to be low. The present trend of investigations indicate that the primary cause is possibly a sap transmissible virus. However, there is general agreement among the research workers on the wilt diseases of coconut that availability of nutrient, physical conditions of soil and allied water relationship are factors of very great significance. Prolonged water-logging and lack of moisture in the soil are equally harmful for the coconut palm. Both these conditions will hinder the proper development of the root system thereby obstructing the necessary nutrient absorption. Proper soil management and cultural practices are of utmost importance to check the spread of the disease. In low-lying places where there is the danger of water logging, suitable drains should be opened to enable proper drainage. In sandy and sandy loam soils where there is severe drought in the summer months coconut gardens should be irrigated at regular intervals. Heavy

soils without open texture for free drainage must be properly conditioned for coconut growth by giving an adequate supply of river sand to ensure proper aeration and drainage. Thus palms grown under ideal soil conditions will thrive well and have better chances to resist the incidence of disease.

Stem bleeding

This disease was first reported in India in 1922. The main symptoms of the disease are the exudation of a dark reddish brown fluid from the cracks on the bark, usually found at the lower portion of the trunk and rotting of the

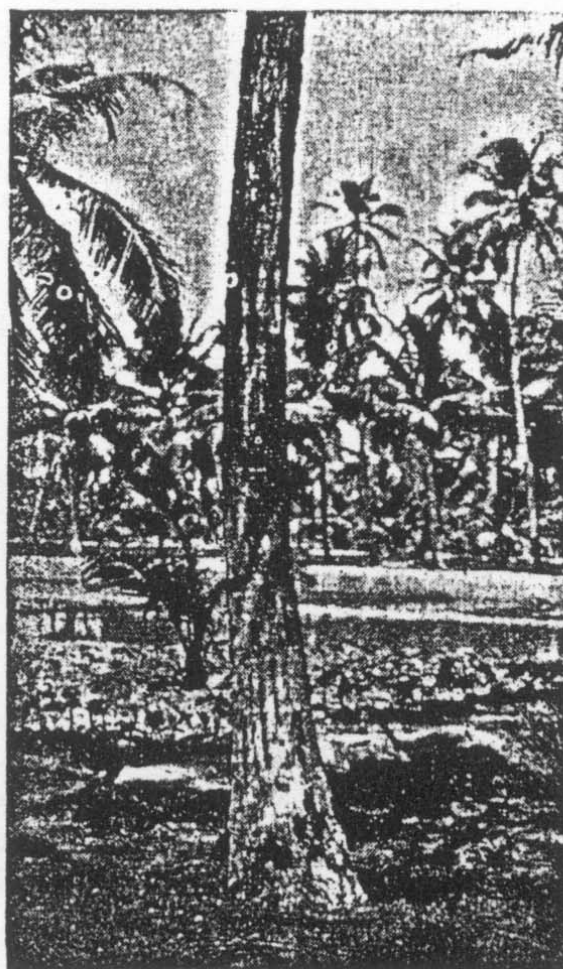


Fig. 1

A palm affected by stem bleeding

internal tissue which later develops into a general decay.

A fungus, *Ceratostomella paradoxa* is often found to be associated with the infected tissue. But it has been noticed that the palms are often predisposed to infection due to adverse soil conditions. Any drastic or sudden measure which would tend to change the moisture holding capacity of the soil will enhance disease incidence. Palms growing under unfavourable conditions will produce a large number of growth cracks on the surface of the stem. Since *C. paradoxa* is a wound parasite, the presence of such growth cracks will pave way to fungal infection. Hence general improvement of cultural conditions is of utmost importance to lessen the number of growth cracks and thereby to check the spread of the disease. According to Britton Jones, a system of drainage, regular cultivation and proper manuring would give excellent result.

Sometimes bleeding may be caused by *Anabe roga*, a fungal disease, or due to adverse subsoil conditions like too high acidity or alkalinity of subsoil water. In such cases necessary correctives have to be added to the soil to reduce excess acidity/alkalinity.

Root rot

The rotting of roots in coconut may be due to various reasons. In many cases of root decay unfavourable soil conditions act as predisposing factors leading to fungal infection. Thus fungi such as *Ganoderma ucidum* (causal organism of *Anabe roga*), *Fomes* spp., *Rhizoctonia* sp. and *Pythium* sp. have been reported to be associated with root decay in different places. Mainte-

nance of the normal nutrient status of the soil and adoption of proper sanitary plant protection measures such as application of lime and sulphur at the base of and digging isolation trenches around the diseased palms are to be resorted to for controlling the spread of root rot.

Nut fall

Button shedding or immature nut fall may be due to fungal infection or physiological factors resulting from adverse soil conditions such as excessive moisture, inadequate moisture or deficiency of any major nutrients in the soil. These conditions lead to destruction of root system and consequently obstruct absorption of water and nutrients. Thus water relationship leading to physiological drought is an important predisposing factor so far as nut fall is concerned. Regular manuring to make good the losses sustained by the soil due to constant exhaustion of nutrients and proper cultural practices can give good results.

Tapering disease

Tapering or pencil point disease has been found to occur in all the coconut growing areas. The characteristic symptoms of the disease are the yellowing of the tips of the leaves, a reduction in their size, a gradual decrease in the girth of the trunk and a dwindling in size of the crown. Gradual diminution in the size of crown and diameter of the stem leads to complete cessation of the production of spathes. The palm subsequently dies. Extensive root decay has been noticed in the affected palms. Tapering stem has been observed in the water logged low-lying

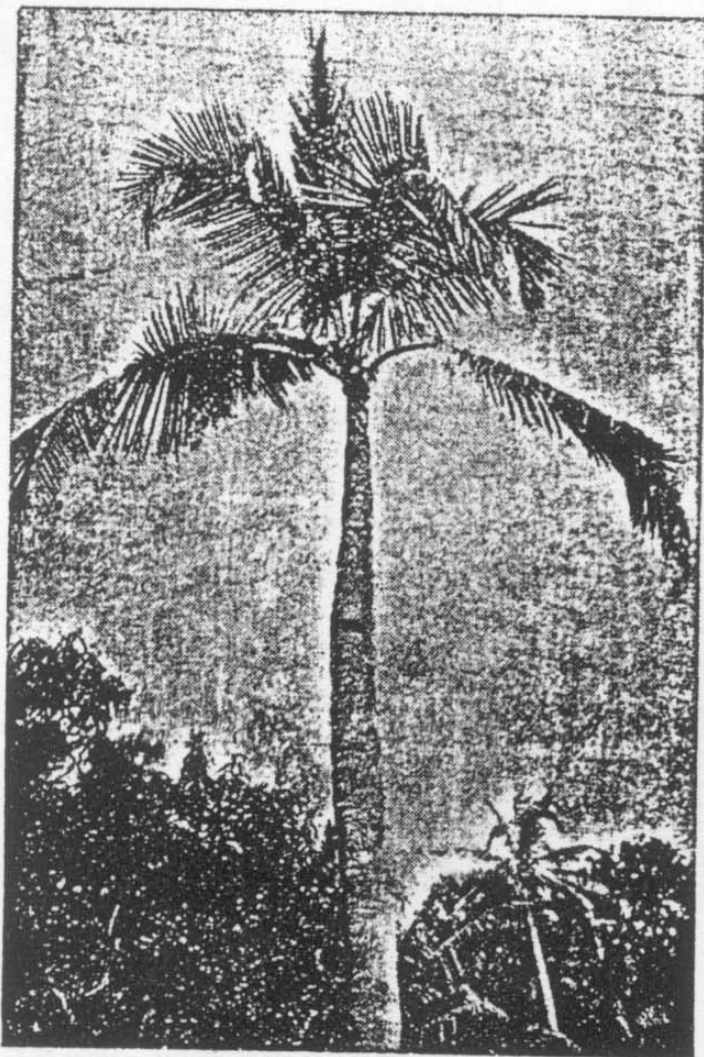


Fig 2

Tapering stem of a coconut palm

areas of the sandy coastal regions of Travancore-Cochin in Kerala State. The

soil in the affected areas has been found to be deficient in nutrients. According to Briton Jones, application of a complete fertilizer mixture will help recovery of the palms. Soil amelioration should be carried out before the tendency to tapering takes a definite hold.

Conclusion

Whether the cause of a particular disease is parasitic or nutritional, the conditions may be directly or indirectly related to different soil factors. Condition of the host plays an important role even in the case of pathogenic infection since palms grown in unhealthy environments do not develop good disease resisting capacity. Adequate supply of nutrients and proper soil management to enable the maximum development of a healthy root system are therefore indispensable to keep the palms in healthy condition. Hence coconut growers should devote particular attention to maintain their gardens in the most ideal way so that the palms are free from diseases and give the maximum yield.