

NOTE ON BACTERIAL ASSOCIATION WITH ROOTS OF ARECANUT PALM INFECTED WITH THE YELLOW-LEAF DISEASE

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The yellow-leaf, a serious disease of the arecanut palm (*Areca catechu* L.), is prevalent in Kerala, coastal Maharashtra, and parts of Mysore and Tamil Nadu.

The chief symptom is the yellowing of the leaves, distinct from the physiological yellowing by the abrupt demarcation of the yellow and normal green areas in the affected leaves. All or some of the leaves in a palm may be affected. When the disease has advanced, the leaves become smaller, stiff, pointed and bunchy, and finally fall off, leaving the bare pointed trunk, which ultimately dies. The lateral roots do not develop properly, and the tips of the young roots become dark and gradually rot away. The nuts become black, fall off, and are unfit for consumption.

The only comprehensive published account, including the symptoms described above, is by Menon (1963) from Kerala. She attributed the disease to a virus, named it the Arecanut Yellow Virus (AYV), and transmitted it by mechanical inoculation of the sap from the diseased leaves to certain broad-leaved plants and also to coconut. Conversely, the virus from the coconut leaf could also be transmitted mechanically to the arecanut palm. She has not made it clear whether the diseased coconut leaves used were from the palms affected by the root-wilt. The virus could also be transmitted through infected soil and by the insect *Carvalhoia arecae* Miller & China. In a more recent paper, the same author (Nayar, nee Menon, 1968) reported the histopathological changes in the tissues of the infected host.

While the above reports conclusively claim the disease to be of viral origin, this has not been substantiated by subsequent workers in Kerala and Mysore State (Central Arecanut Research Station, 1969a; College of Agriculture, Hebbal, 1969).

A critical examination of Menon's findings would only suggest that the leaves of the diseased palm as also the soil of the infected gardens carry a virus that is capable of inducing certain symptoms on the arecanut palms and some other hosts, including the coconut. To conclusively demonstrate the viral nature of the yellow-leaf disease, it would be necessary to reproduce typical symptoms by an inoculation of the healthy arecanut palms with bacteria-free saps of the diseased leaf.

No attempt has so far been made to examine the cause of the disease from the bacterial angle. Hence the roots of the arecanut palm affected by the yellow-leaf disease were examined for bacterial association.

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When longitudinal slices (1 cm × 0.5 cm) of the root tissues of the diseased palms were mounted in water and examined under the microscope, bacterial streaming was noticed at several discrete sites on the vertical edges, occasionally on both sides at corresponding points of the vascular vessels, suggesting an invasion of the cortical as well as the vascular tissues of the roots. Of the 30 root pieces representing 5 diseased palms received from Kerala, 21 were positive for bacterial streaming. On the other hand, a similar number of roots examined from the healthy palms from Vittal in Mysore showed no bacterial streaming.

A large number of bacterial colonies were obtained when dilution of the macerate of the tissues from the surface-sterilized pieces of the infected roots were streaked on potato-sucrose agar and incubated for 48 hr at 30°–35°C. The bacteria represented 2 distinct forms, one of which was tentatively identified as a *Pseudomonas*.

When a causal agent of the diseased plant is suspected to be a bacterium, microscopic examination of the slices of the invaded organs for bacterial streaming (ooze) is important. If the streaming occurs from discrete points of the cut edges of the sliced tissues, it normally suggests a diseased condition of bacterial origin.

While the identification of the correct pathogen is still open and can be settled only after critical pathogenicity experiments, it is important to mention the work of Orian (1941, 1953) from Mauritius. He observed natural infection of 3 species of palms—the royal palm (*Roystonea regia* (H. B. & K.) O. F. Cooke), arecanut palm (*Areca catechu* L.) and the native white-palm (*Dictyosperma alba* Wendl. & Drude)—with *Xanthomonas vasculorum* and could also successfully demonstrate the susceptibility of young coconut seedlings by spindle inoculation with the bacterium. After extensive observations, he believed that *X. vasculorum* could originally be a pathogen of the palms rather than of sugarcane.

The observations reported in this note warrant a detailed examination of this disease from the bacterial angle. A demonstration of the neutrality of the bacteria associated with the roots of diseased palms would be essential before the disease is ascribed to a virus or to other causes.

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