

Diseases of the Coconut Palm*

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IV. — BUD ROT

The fourth disease of coconuts to be considered in this series is bud rot. The disease is common to most coconut growing areas of the world and is caused by the fungus *Phytophthora palmivora* Butl. Butler in 1906 (2) reported the disease in Madras, South East India, affecting three species of palms: palmyra palm (*Borassus flabellifer* L.), coconut palm (*Cocos nucifera* L.), and betel-nut palm (*Areca Catechu* L.). He named the fungus *Pythium palmivorum* and later, after comparative studies with a culture obtained from coconuts by Ashby in Jamaica, renamed it *Phytophthora palmivora* (3). The fungus has since been studied by many workers in several hosts (4, 5, 7, 8, 9).

The symptoms of the disease are quite characteristic and readily distinguished from those of other diseases of the coconut palm. The disease manifests itself in the early stages by a withering or dying of the youngest leaves, which turn greyish-brown and finally break down at the base. The rot may spread to the next youngest leaves, which will turn yellowish-brown. The rot spreads inward, killing the young tissues in the bud. The older leaves remain normal for several months, so the tree appears as if it has lost its top fronds. Well developed fruits may mature in a normal fashion. Figure 61, picturing a diseased tree occurring in Jamaica, illustrates the effects of bud rot on the young fronds of the

coconut palm. The youngest fronds have collapsed, and those next in age have turned yellowish-brown. The older fronds appear normal in color, and some nuts are still present on the tree, which is more or less typical of middle or advanced stages of the disease.

As the disease progresses, the young nuts are shed and the leaves in order of age turn yellowish-brown and drop off or collapse at their bases and hang downward around the trunk. The entire crown eventually dies and the fronds may fall off completely leaving a bare dead trunk. Figure 62 illustrates these late symptoms of the disease. At this stage (or earlier) the fronds may be pulled out easily and the tissues emit a very offensive odor. The rotted bud or heart tissues may contain several species of insects, fungi, and bacteria, which are secondary to the primary infection caused by *P. palmivora*.

The bud is not always killed and recovery may occur (1), but the new leaves are small, giving an appearance termed "little leaf" or "bitten leaf." According to Briton-Jones (1), bitten leaf is an expression of recovery. Several organisms have been obtained from palms exhibiting symptoms of bitten leaf but all thus far isolated are of only secondary importance (1, 6). The type and severity of the bitten leaf symptoms depends upon the extent to which the bud was damaged (1). This recovery aspect and symptom variability, according to Briton-Jones (1), has led to considerable confusion in the literature.

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61. Coconut palm in Jamaica, exhibiting symptoms of bud rot resulting from infection by the fungus *Phytophthora palmivora*. Note the presence of fruit and collapse of youngest heart fronds.

Figure 63 illustrates a coconut palm in Trinidad exhibiting symptoms of bitten leaf resulting as a recovery stage from the bud rot disease caused by *P. palmivora*. A recovered palm may again become infected with *P. palmivora* and again exhibit symptoms of recovering (1). Recovered palms eventually appear normal if fertilization and moisture are adequate. The rate and extent of recovery depends upon these environmental factors, but usually it would be best to remove the palm and replant (1).

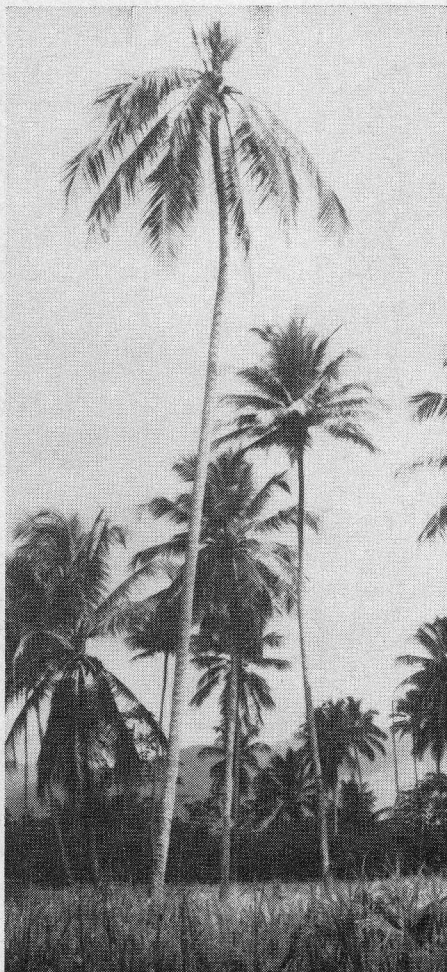
Conditions favorable for spread of the disease occur during periods of rainfall accompanied by high winds or hur-

ricanes because the fungal spores germinate best with high humidity and they are usually disseminated by the wind (8). The exact mode of entrance into the tree is not known, but palms subjected to periods of high winds or hurricanes have many small wounds that could serve as infection courts (6, 8). The fungus may remain dormant during dry weather for long periods because it forms thick-walled spores, termed chlamydospores, that are quite resistant to adverse conditions. Seal (8) found viable chlamydospores on plants nine months after the plants had been killed by the organism.



62. Coconut palm in Miami, Florida, exhibiting final symptoms of the bud rot disease caused by *Phytophthora palmivora*.

Control of this disease may be obtained through exclusion of infected plants, eradication of plants found to be infected, and by protection of exposed plants with effective fungicides. At one time the State of Florida had local quarantines on all properties within a quarter-mile zone of the property on which coconut palms were found infected with bud rot (8). In the British West Indies (1) the recommended control was to spray with Bordeaux mixture coupled with the cutting down and burning of infected palms. The protective application of Bordeaux mix-



63. Coconut palm in Trinidad exhibiting symptoms of bitten leaf attributed to a recovery stage of the bud rot disease.

ture has given inconclusive results, but the eradication program has proved helpful. Seal (8) reported adequate control of the disease by the immediate removal and burning of infected plants, supplemented with spraying of healthy plants in the vicinity with a 5-5-50 (plus sticker) Bordeaux mixture.

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The 'Tambulilid' Dwarf Coconut

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The widespread devastation of coconuts in the Bicol region (Albay, Camarines Norte, Camarines Sur, Sorsogon) of the Philippine Islands due to the mysterious disease called *cadang-cadang* has stirred interest among coconut farmers to plant a dwarf variety of coconut known as 'Tambulilid'. This variety is believed to be resistant to the destructive *cadang-cadang* disease. A number of coconut growers have planted this variety in place of the varieties attacked by the disease.

The dwarf coconut fruits early. Palms about 15 feet high bear many fruits that nearly touch the ground. When planted in good soil, the young palms start to flower in their third to fourth year.

They produce ripe fruits in about ten months time from the appearance of the inflorescence. A fully grown leaf measures up to ten feet long. Nuts are quite large with a sizeable amount of fiber; the shell and white kernel are fairly thick. Trunks measure 18 inches or more in circumference. The meat or endosperm is said to be richer in oil and sweeter than that of the ordinary coconut which makes it very popular.

According to information given by a grower, the original tree from which present plantations originated comes from San Miguel Islands in Tabacco, Albay Province on the island of Luzon. It is now about thirty years old.

From observations and evidence of