

Diseases of Coconut in Papua and New Guinea.

DOROTHY E. SHAW.

Principal Plant Pathologist, D.A.S.F., Port Moresby.

COCONUTS in Papua and New Guinea are free from serious diseases caused by organisms; the few diseases which do occur being of only minor importance. One of the factors which has contributed to this position is the prohibition against unrestricted importation and the rigorous quarantine measures in operation.

Coconuts in the Territory are affected by soil deficiency diseases with various leaf patterns, tapering of the stem, reduced yield and other symptoms, but these have been published previously, or are still under investigation by the chemistry section of the Department.

Diseases caused by organisms, or in which organisms play a part, are discussed below:

WHITE THREAD BLIGHT.

This disease is caused by the fungus *Corticium penicillatum* Petch, and the known Territory distribution is New Guinea mainland, New Hanover, New Ireland, New Britain, Bougainville and Papua.



Plate I.—White thread blight. Large white area on leaflets caused by *Corticium penicillatum*.

The disease usually occurs on the older leaves and can be distinguished from the ground by the presence on the upper surface of the leaves of large dead patches, mainly circular in outline, comprising all or part of several to many leaflets,

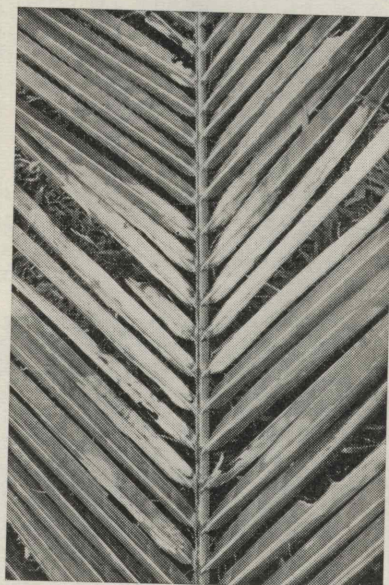


Plate II.—White thread blight. White appearance of upper surface of leaflets caused by *Corticium penicillatum*.

sometimes several feet in diameter, and usually pale tan at first but later becoming bleached to pale buff. (Plates I and II.)

On the under surface of the leaves, white fungal threads in strands run along the midrib and these and finer threads spread lengthwise over the under surface forming a white film. The advance threads spreading towards the tip of the leaflets resemble fans of white cotton. (Plate III.) The fungus kills the leaf tissue, forming the conspicuous bleached spot visible on the upper surface; the tissue below the advancing edge of the fungus is usually green. The spores of the fungus, if present, occur on the white mass of threads.

The disease is usually found on the older leaves, and therefore does little damage. For some time after the disease was described 40

years ago, it was recommended that affected leaves be removed and burnt, but now such measures are rarely necessary.

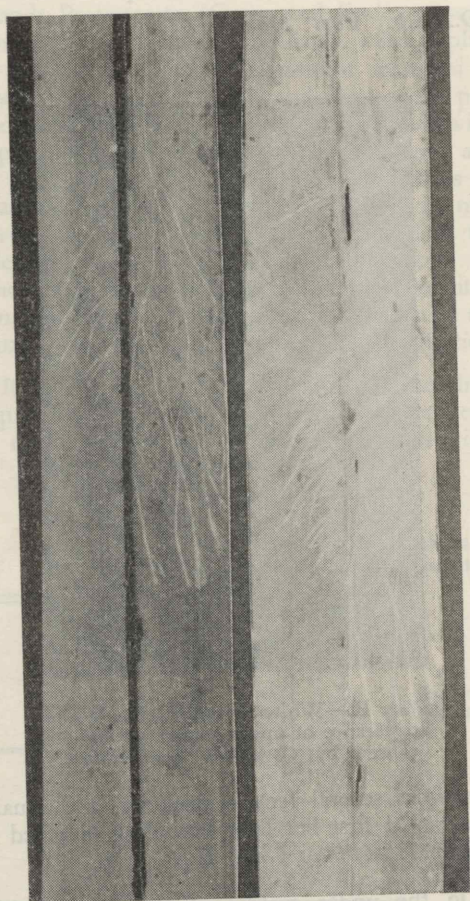


Plate III.—White thread blight. Fungal threads of *Corticium penicillatum* on under surface (same leaflet, 2 exposures).

LEAF SPOTS.

Various leaf spots occur on coconut leaves in the Territory, but they are usually found only on older leaves, and are of little importance. Occasionally they do occur on young leaves of palms in the field, and can be controlled if good conditions are provided, such as soil balanced in nutrients, and without competition from weeds and grasses. Occasionally the spots build up on young palms in nurseries, and in this case can be controlled by fungicides.

The main fungi associated with leaf spots are described below :—

Pestalotiopsis palmarum (Cooke) Steyaert (often given as *Pestalotia palmarum* Cooke).

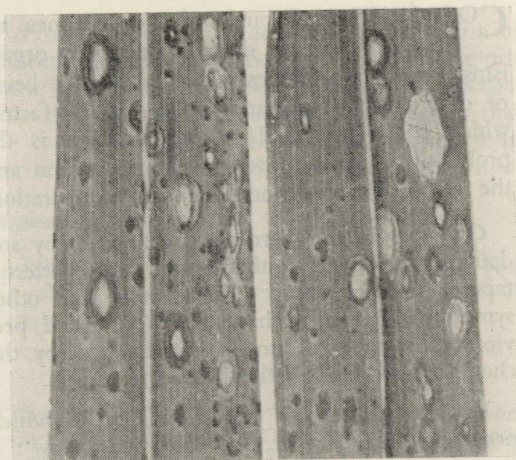


Plate IV.—Leaf spots. Young and old spots, mainly caused by *Pestalotiopsis palmarum*.

This fungus is the one most commonly found on leaf spots of coconut in the Territory. The spots are oval in shape, reaching $\frac{1}{2}$ in. x $\frac{1}{4}$ in. in size, tan coloured when young, later nearly white or pale grey on the upper surface, with a distinct edge, and small black bodies about the size of a small pin's head scattered over the surface; these are the fruiting bodies which contain masses of spores. Young and old spots are shown in Plate IV. Inoculation tests reported by several workers gave negative results, and the workers concluded that weakening of the plant is necessary for infection.

Pestalotiopsis theae (Saw.) Steyaert.

This fungus has been found on large leaf spots, as shown in Plate V, and has also been isolated from the edge of the lesions. The spots are light brown in colour, with a definite edge, often with a concentric pattern, and with the fruiting bodies bearing the spores scattered over the centre. The lesions can reach 4 in. and more in length, and often take up the whole width of the leaf, although occasionally a lesion is stopped by the midrib. Only a few collections of this

disease have been found to date in the Territory. No pathogenicity tests have as yet been reported with this species on coconut.

Pestalotiopsis spp.

Other species of *Pestalotiopsis*, viz. *P. japonica* (Syd.) Steyaert, *P. papposa* Steyaert and *P. stictica* (Berk. and Curt.) Steyaert have also been recorded on leaf spots on coconut in the Territory but at present no pathogenicity tests with these organisms have been reported on coconut, and it is not known whether they are primary or secondary invaders.

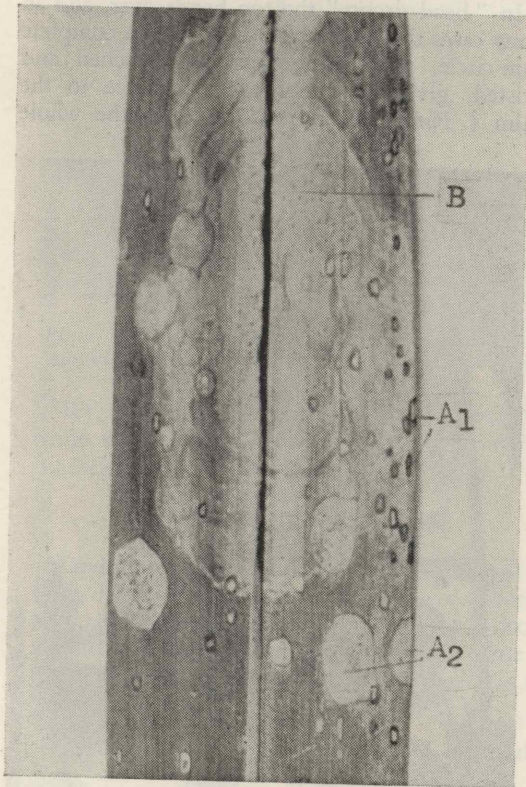


Plate V.—Leaf spots. A1 and A2, young and old spots caused by *P. palmarum*; B, large leaf spot caused by *P. theae*.

Melanconium palmarum Cooke.

This fungus has been found occurring on large leaf spots very closely resembling those described above for *P. theae*, but on one collection

only to date. Again, it is not known under what conditions this fungus occurs on leaf spots, and its relation to the spot.

Epicoccum cocos Stevens.

This fungus has also been found on leaf spots in the Territory. The spots on which it occurs are oval in outline, usually dark tan in colour, and often smaller than the spots with *P. palmarum*. The spores occur in black masses the size of a pin's head, scattered over the surface of the spot. Stevens, who first described the fungus, stated that "infection often occurs through wounds caused by insects, though often also such injuries are not evident." No pathogenicity tests have been reported to the author's knowledge.

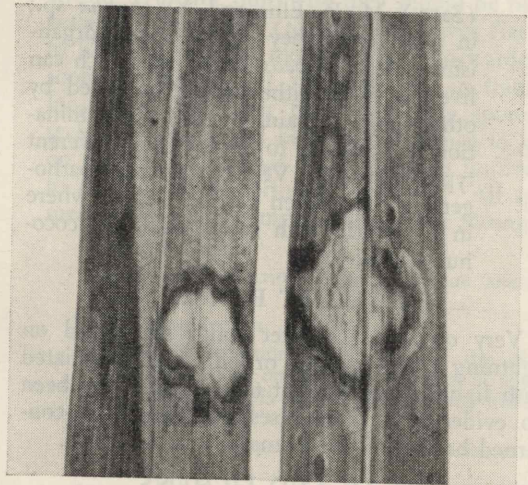


Plate VI.—Leaf spots, caused by *Helminthosporium incurvatum*.

Helminthosporium incurvatum Bernard.

Very occasionally this fungus is found on spots on coconut leaves in this Territory. The spots are less regular in outline than those of *P. palmarum*, but they have a distinct border. (Plate VI.) The spores are not borne in masses as are the spores of the fungi mentioned above, but are borne on stalks which rise from the leaf surface. The spores cannot be seen with the naked eye unless conditions for sporulation have been extremely good, in which case the spores and their stalks may appear as a fine black dust on the surface of the lesion.

In considering the leaf spots of coconut in this Territory, the following should be emphasized :—

1. It is often difficult to distinguish the different types of spots, and the only sure means of identifying the fungi at present is by microscopical examination.
2. Often more than one type of spot occurs on the same leaf, as shown in *Plate V*.
3. As well as those listed above, other species of fungi are found on healthy and diseased coconut leaves.* In some cases they are sooty moulds living on insect honey dew on the leaf surface, or black moulds on the leaf surface, such as *Clasterosporium cocoicola* M. B. Ellis and D. Shaw, *Sporidesmium macrurum* (Sacc.) M. B. Ellis and *Xylohypha* sp.; in other cases they are secondary organisms such as *Gloeosporium* sp. which can live on tissue either dying or killed by other fungi. Again, microscopic examination is necessary to identify the different types of spores. Very few tests for pathogenicity have been carried out anywhere in the world with fungi found on coconut leaves.

BRACKET FUNGI.

Very occasional bracket fungi are found on lightning struck palms, or on palms associated with lightning strike, but to date there has been no evidence in these cases that the fungi concerned have been the primary cause of death.

ALGAE AND LICHENS.

Species of these organisms occur on leaves and trunks, particularly on palms immediately adjacent to the coast. As damage either does not occur or is quite negligible, they are not discussed here in detail.

UNCONFIRMED DISEASES.

Since the present pathological service commenced in 1955, there have been no confirmed records of the following :—

1. Bud rot of coconut caused by *Phytophthora palmivora*; (Dwyer, 1953)

* The fungi and other conditions recorded on coconuts in Papua and New Guinea, as well as the relevant literature, have been recorded by Shaw (1963).

2. Bacterial leaf blight; (Dwyer, 1937)
3. Stem bleeding disease. (Dwyer, 1937)

Information and specimens of any condition thought to resemble the three mentioned above would be welcome.

PALMS WITH ABNORMAL HABITS.

Occasionally palms are found with abnormal growth habits, such as "corkscrew", often called "head droop" or "strangle disease", the "head droop" condition being a stage of the corkscrewing.

In "head droop" the top bends over, and in many cases the whole stem may form a complete semi-circle, while the leaves are bunched and twisted, giving a one-sided appearance to the palm (*Plate VII*). In some cases the whole

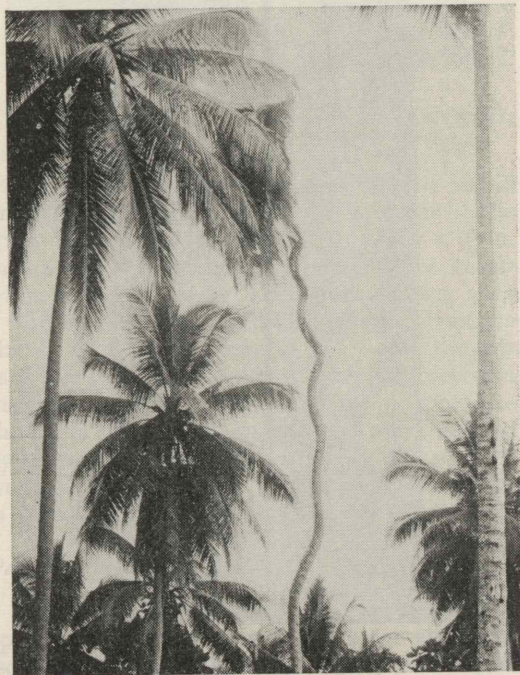


Plate VII.—"Head droop", a stage of "corkscrewing", showing one sided appearance of cabbage.

stem may form a distinct loop, or in others become "S" shaped. Occasionally the stem continues to "corkscrew" for many feet (*Plate*

SPECIMENS.

Specimens of fungi collected in the Territory are lodged in the Fungal and Pathology Herbarium at the Department of Agriculture, Stock and Fisheries at Port Moresby. Portion of most of the collections are also sent to various institutions overseas, for additional lodging and study.

Collections are welcomed from all areas of the Territory, at all times. If specimens are received continually in this way, there is a constant check on both the distribution and degree of severity of the various diseases, as well as on the appearance in the Territory of hitherto unrecorded diseases.

Specimens of coconut leaves should be sent wrapped in plastic if they can reach Headquarters within 24 hours, otherwise they should be placed between newspaper, (to keep the leaves flat and to help dry out the moisture) and forwarded as soon as possible. If specimens are in transit a long time, i.e., over three days, the spores of secondary fungi and bacteria commence to grow on the surface, so that it is sometimes impossible to distinguish the primary organism. All specimens should be accompanied by a note stating :—

Collector's name.

Locality of collection (e.g., Plantation and District.)

Date of collection.

Degree of infection (e.g., whether the disease occurs on only one or several leaves of a palm, or whether it is widely spread over hundreds of palms.)

Colour of the palms (e.g., older leaves very yellow, etc.)

Any additional notes such as type of ground cover (legumes or kunai), or interplanted cacao, or cattle grazing, are most helpful and often necessary for a complete understanding of the disease.

REFERENCES.

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- DWYER, R. E. P., 1953. Diseases of coconuts (*Cocos nucifera*) in Papua and New Guinea. *Papua and New Guinea agric. Gaz.* 8(1) : 24-40.
- SHAW, DOROTHY E., 1963. Plant pathogens and other micro-organisms in Papua and New Guinea. *Dept. Agric., Stock and Fisheries Res. Bull.* No. 1, 82pp.



Plate VIII.—Palm with "corkscrew" trunk, resuming normal growth and symmetrical cabbage.

VIII), and there is usually failure to bear nuts while the condition persists. The cause of the condition is unknown.

LIGHTNING STRIKE.

Death of palms struck by lightning, and the slow death of surrounding palms over a period of up to 18 months after the strike, still occurs in parts of the Territory. The precise cause of the slow death of the surrounding palms has not been elucidated.

Notification of any lightning strike, together with the exact time of the strike, will be welcomed. The site will be visited by the Pathologist or Agricultural Officers, who will plan the position of the struck palms and the surrounding ones, and keep a check on the position and time of death of any surrounding palms, over a period of months.