

Coconut seedling basal stem break (069)

Common Name

Coconut seedling basal stem break (Solomon Islands), lethal bole rot (the name given to the disease caused by *Marasmiellus cocophilus* in Kenya and Tanzania).

Scientific Name

Marasmiellus cocophilus

Distribution

It is only recorded from Kenya, Tanzania, and Solomon Islands.

Hosts

Coconut, *Cynodon dactylon* (Bermuda grass), *Echinochloa colona* (junglerice), *Eleusine indica* (goose grass), found in the nursery of Levers Pacific Plantations Ltd., Russell Islands, Solomon Islands.

Symptoms & Life Cycle

Premature death of the oldest two or three leaves is the first symptom; later, white fungal threads and toadstools appear at the base of the petioles, on top of the seednut (Photo 1). As the fungus progresses, successively younger leaves are infected, brown rots and cracking occurs in the leaf bases, and isolated rots, 1-1.5 cm deep, with shallow, reddish-brown margins, extend into the bole. Root decay is not extensive, although new roots that penetrate the decayed leaf junction of the petioles and the seednut, are killed.

Similar symptoms occur in seedlings planted in the field. Rots also occur in the swollen leaf bases, roots decay, mycelium and toadstools are present, and because the roots are destroyed, leaves are small (Photo 2).

In East Africa, root infections of seedlings leads to rapid infection of the stem and death. On older palms, leaves wilt, and remain as a 'skirt' around the trunk, the spear leaf dies and a foul-smelling soft rot develops. A dry, reddish-brown rot with a yellow margin is typically present at the base of the bole. Cavities within these areas of rot are lined with mycelium in young palms, 2-4 years old, but this is rare in 4-6-year-old palms, and they are absent in mature palms. Toadstools commonly occur on exposed roots, leaf bases of seedlings and on the soil surface around holes where diseased palms were present 2-years' before.

Little is known about the method of infection and spread of the fungus in Solomon Islands. On one occasion, toadstools were detected on seednuts taken from the outbreak area to another destination within the country, suggesting the fungus is seedborne. By contrast, in East Africa, spread is said to occur through soil, root contact between palms, infected coconut debris, and probably by airborne spores. Infection also occurs via wounds.

Impact

Only one outbreak has been recorded in Solomon Islands, but the consequences were considerable. The fungus was first observed in August 1978 when a few 8-9-month-old Malayan Dwarf x Rennell coconut seedlings in the Yandina nursery snapped at the junction of stem and nut. In March the following year, about 7,000 seedlings were affected.

Some 6000 seedlings that appeared healthy were transplanted to the field, and many developed symptoms similar to those in the nursery: the leaves were small and they unfurled before they had emerged fully in contrast to healthy leaves. However, few of the transplanted palms died. Most began to recover 5-6 months after planting when new uninfected roots were produced and new leaves developed which were progressively more normal in appearance.

In East Africa, death of palms up to 8 years old was reported in the late 1960s, with seedlings being highly susceptible on transfer to the field. Here losses of over 90 per cent occurred in some areas.

Detection & inspection

In the nursery, look for outer leaves of seedlings that are dying early, swollen leaf bases, with cracks, rots, fungal threads and small white toadstools, leading to a stem break between leaves and roots. In the field, look for seedlings with stunted leaves.



Photo 1. Toadstools of *Marasmiellus cocophilus* growing from the junction of petiole and coconut husk.



Photo 2. Little-leaf symptom on a seedling planted out in the field, associated with infection by *Marasmiellus cocophilus* in the nursery.

Management

BIOSECURITY

After the outbreak in Yandina, and because the fungus was reported to cause a lethal disease, the movement of seednuts from the Russell Islands was prohibited. In 1986, the situation was reassessed, and the quarantine removed. The reasons for this were as follows:

- Basal stem rot had not occurred in Solomon Islands since 1979 (although toadstools could still be found on grasses in the nursery).
- The condition had not been reproduced consistently experimentally.
- Palms planted in the field from the 1979 Yandina nursery appeared normal.
- In East Africa, diseases similar to coconut lethal yellowing (caused by a phytoplasma) have been found where *Marasmiellus cocophilus* was reported previously.

However, the presence of *Marasmiellus cocophilus* and other marasmioid fungi (see **Fact Sheets nos. 70&484**), as well as fungi of other kinds, in coconuts, either before or after nutfall, is of concern. Because of this it is recommended that the *FAO/IBPGR Technical Guidelines for the Safe Movement of Coconut Germplasm* should be followed when movements of coconuts are made between countries: (<http://www.bioversityinternational.org/e-library/publications/detail/coconut/>).

CULTURAL CONTROL

Although the disease in Solomon Islands was quite different from that in East Africa, and the one in East Africa may have been confused with other diseases, nevertheless, hygiene is important in coconut nurseries for the production of healthy seedlings. Do the following:

- Remove weeds in the nursery (grasses in particular) and trim roots that extend beyond the polythene bags to prevent infection as they grow into the soil.
- Provide at least 1 m between seedlings, either those growing in polythene bags or growing from nuts placed on the soil. There should be free movement of air. If seedlings are closely spaced, the chances of diseases increases.
- Note, the complete removal of the husk is effective in preventing *Marasmiellus cocophagus* from colonising seedlings, but some varieties (e.g., the Malayan Dwarf x Rennell hybrid) do not tolerate this treatment and rot when planted.

CHEMICAL CONTROL

Seed treatment should always be considered as a precautionary measure whenever seednuts are being moved between countries, or between areas within countries if coconut diseases are not well distributed. Seednuts should be taken directly from the palm, partially dehusked by trimming at the top and three sides and dipped in an appropriate fungicide for 15 minutes. The addition of a wetting agent is considered beneficial. The fungicide Calixin (tridemorph) was used in Solomon Islands.

When using a pesticide, always wear protective clothing and follow the instructions on the product label, such as dosage, timing of application, and pre-harvest interval. Recommendations will vary with the crop and system of cultivation. Expert advice on the most appropriate pesticides to use should always be sought from local agricultural authorities.

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Information from Bock KR *et al.* (1970) Lethal bole rot disease of coconuts in East Africa. *Annals of Applied Biology* 66: 453-464; and Jackson GVH & Firman ID (1982) Seedborne marasmioid fungi of coconuts. *Plant Pathology* 31: 187-188; and Kohler F *et al.* (1997) Diseases of cultivated crops in Pacific Island countries. South Pacific Commission. Pine Printers Pty Limited, Canberra, Australia; and from Frison EA, *et al.* (eds.). 1993. *FAO/IBPGR Technical Guidelines for the Safe Movement of Coconut Germplasm*. Food and Agriculture Organization of the United Nations, Rome/International Board for Plant Genetic Resources, Rome. (https://www.bioversityinternational.org/fileadmin/user_upload/Coconut_361.pdf); Dr DN Pegler, Kew Botanic Gardens, UK, is thanked for identifying specimens of *Marasmiellus cocophilus* from coconuts of Solomon Islands.

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