

# GANODERMA ROOT AND BOLE ROT OF COCONUT

A severe outbreak of *Ganoderma* rot and bole rot of coconut, was recorded recently in the southern part of Sri Lanka in one of the coconut estates at Ambalantota.

A survey of disease incidence was carried out in the estate, 62 hectares in extent. It was found that nearly 350 palms have been infected by the fungus *Ganoderma boninense* Pat. causing lethal root and bole rot of coconut palms. This disease was first reported in Sri Lanka by Pieris in 1973 in the Southern part of the country. Palms which are more than 20 years old, and those that are weakened due to age, environmental stress, water logging or prolonged neglect are prone victims of the disease. Infected senile palms may act as inoculum thus spreading the disease to the underplantation. The infection of a palm by *Ganoderma* starts with the invasion of the fungus through the root system. This results in the progressive destruction of roots and the basal tissues of the trunk. Due to the destruction of roots, the disease is characterized by wilting, drying and drooping of the leaves up to the outermost whorls of the crown. Subsequently the other leaves wither and droop in quick succession, leaving the unopened spindle leaf. At the final stage all fronds fall leaving a tapering and crownless stem (Fig. 1). With the progress of the disease, the nut production gradually declines and affected palms produce small nuts. There is also considerable immature nut fall. During the advanced stage of the disease nuts shrivel and get distorted.

As the roots decay, the palm produces new roots from higher regions up the trunk. The infection tends to spread from the exterior to the centre of the stem. Due to the fungal invasion, a considerable area of the bole decays, at times resulting the formation of large cavities (Fig.2) or hard tissues turning into pulpy masses. Trunks of such palms most frequently fracture at the base and they fall (Fig.3). Exudation of a viscous reddish brown liquid from the basal portion of the stem is visible in affected palms. Initially these bleeding patches appear on several places as vertical streaks, and gradually the streaks spread

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Fig. 1 Crownless palm

upwards on the stem extending to about two meters, from ground level. Initial rotting and discolouration can be seen upto the height of bleeding.



Fig. 2 Formation of a Cavity in a diseased palm

Fig. 3 Base of a fallen palm.

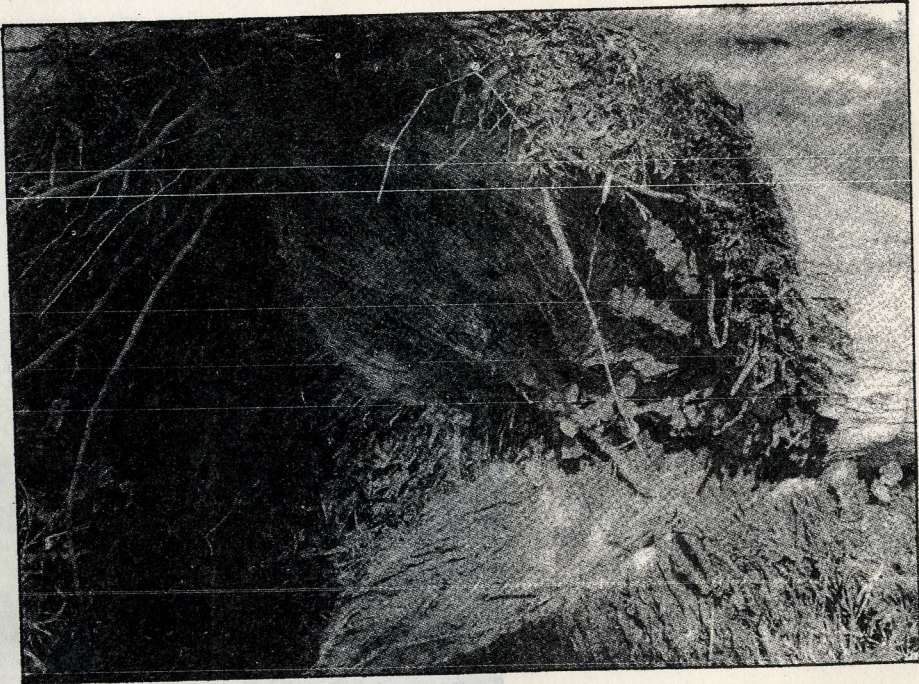
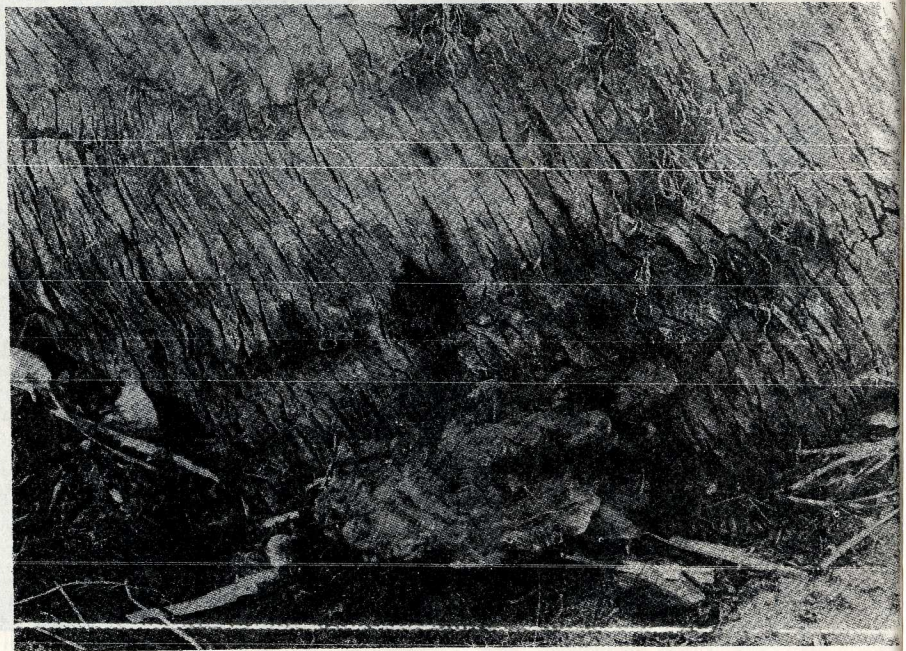




Fig. 4 Sporophore of *G. boninense*

Fig. 5 Compound bracket like structure



At the later stages of the disease or just prior to the death of the palm, sporophores of *Ganoderma* appear at the base of the stem or from the exposed roots in some palms. Initial formation of the sporophore appears as a small white button-like structure at the base of the affected palm (Fig. 4). This develops gradually into a bracket type fruit body. As the sporophore develops its upper surface turns into a rich brown colour with a shiny appearance. In the early stages of the development a characteristic distinct white margin running around the sporophore is seen. The under surface is off white and consists of a large number of tiny spores.

Frequently few sporophores are formed close together, which fuse and form a compound structure (Fig.5). When the palm falls or is cut down, the remaining stump gets colonized by the fungus and produces sporophores on them.

This disease spreads through root contact or by air borne spores, and is prevalent in sandy soil. Water deficit during dry months and water logging during rainy months predispose the palms to infection by the pathogen.

#### **Management of the disease**

Integrated management approach is more appropriate to control this disease as the pathogen is soil borne. The following measures can be adopted for the affected areas.

1. Phytosanitation: Removal of palms in the advanced stage of the disease, along with the bole and root system.
2. Provide adequate soil moisture through drip irrigation if possible or adopt moisture conservation methods.
3. Provide good drainage in water logging areas.
4. Isolation of diseased palms from neighbouring healthy palms by digging trenches 1 m deep and 30 cm wide, 4m away from the diseased palm.
5. Apply normal recommended dose of fertilizer along with organic manure.
6. Treat the planting holes with 1% Bordeaux mixture.

7. Apply a systemic fungicide through root feeding or trunk injection to the palms in advanced stage of the disease.

*Trichoderma spp* which are soil fungi have been found to be antagonistic to *Ganoderma*, to cause lysis in the mycelium of the pathogen. In India 5kg of Neem cake is applied annually to the affected palms in order to enhance the growth of the antagonistic soil micro flora. Also banana rhizome extracts have been proven to be effective in inhibiting the growth of the pathogen. Therefore cultivation of crops like banana as intercrops is a promising feature in an integrated disease management programme.