COCOA CANKER AND SUDDEN DEATH

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WHAT IS COCOA CANKER?

Cocoa canker is a disease which attacks the bark of stems and main branches of cocoa trees in Papua New Guinea and most other cocoa growing countries. Sometimes the infections are small and hard to find and they stay in the outer bark where they do very little damage. However, they often spread slowly inwards and kill the bark all the way down to the wood. These infections are much more serious and if they ring-bark the tree it often dies. Sometimes the tree slowly becomes weaker and takes a long time to die. However, a very bad form of canker known as Sudden Death has become common in Papua New Guinea in the past few years. In this form the whole tree, or one or more large branches, dies very rapidly.

SYMPTOMS OF CANKER

Small cankers are hard to find unless you cut the bark but large and active ones are more easy to see because they form a rusty-red liquid which runs out through cracks in the bark. This liquid dries on the bark to form small, black, rubbery lumps during dry weather and can also blacken the bark surface. The bark over old cankers may be very thick and rough. When you cut the surface bark away from a canker you can see the infected area which is normally a reddish-purple colour, with a distinct line separating the diseased from the healthy bark. When cankers are young and growing rapidly they are brownish in colour and the edges are not distinct. Small cankers infect only the outer layers of bark and can be cut out without damaging the wood but as they spread they penetrate deeper into the bark until they kill the cambium. This is the layer next to the wood which produces the outer bark layers. If it is killed the tree cannot replace the bark except by making new bark at the edge of the infected area. Cankers can occur on any part of the tree but are most common at the foot of the trunk and at the base of the main branches.

Trees with severe canker may die slowly or very rapidly. In the first case, the tree loses its leaves gradually, the shoot tips die back and it may produce a heavy crop of flowers. Death may take many months. In the case of very rapid death (Sudden Death) the whole tree or affected branch suddenly wilts and all the leaves die and turn brown. The leaves continue to hang on the tree for

some weeks after they have died, which makes Sudden Death a very easy disease to see. The leaves of trees with Sudden Death may go yellow before they go brown but whether or not this occurs the tree usually dies in less than a week.

An actively growing canker. Notice the drops of liquid (arrowed) exuding from cracks in the bark.

Canker at the base of a large tree. Notice how the bark is stained black.

WHAT CAUSES CANKER?

Canker is caused by a fungus called *Phytophthora palmivora* which is the same fungus as causes Black Pod disease. The fungus can infect all parts of the tree and causes pod rot (black pod), canker, chupon wilt, tip blight and seedling blight.

HOW DO INFECTIONS START?

The fungus produces tiny spores (seeds) which are spread around the tree by rain splashes and by insects. These spores can survive a long time in the soil and ants which carry soil are important in moving them around the trees. The fungus needs rain to produce the spores and therefore canker (and black pod) are always worse in wet weather.

Canker (arrowed) around a channel in the bark made by a longicorn larva.

The same canker after the bark has been scraped to reveal the infection. The cankered areas are separated from the healthy bark by a sharp line (arrowed).

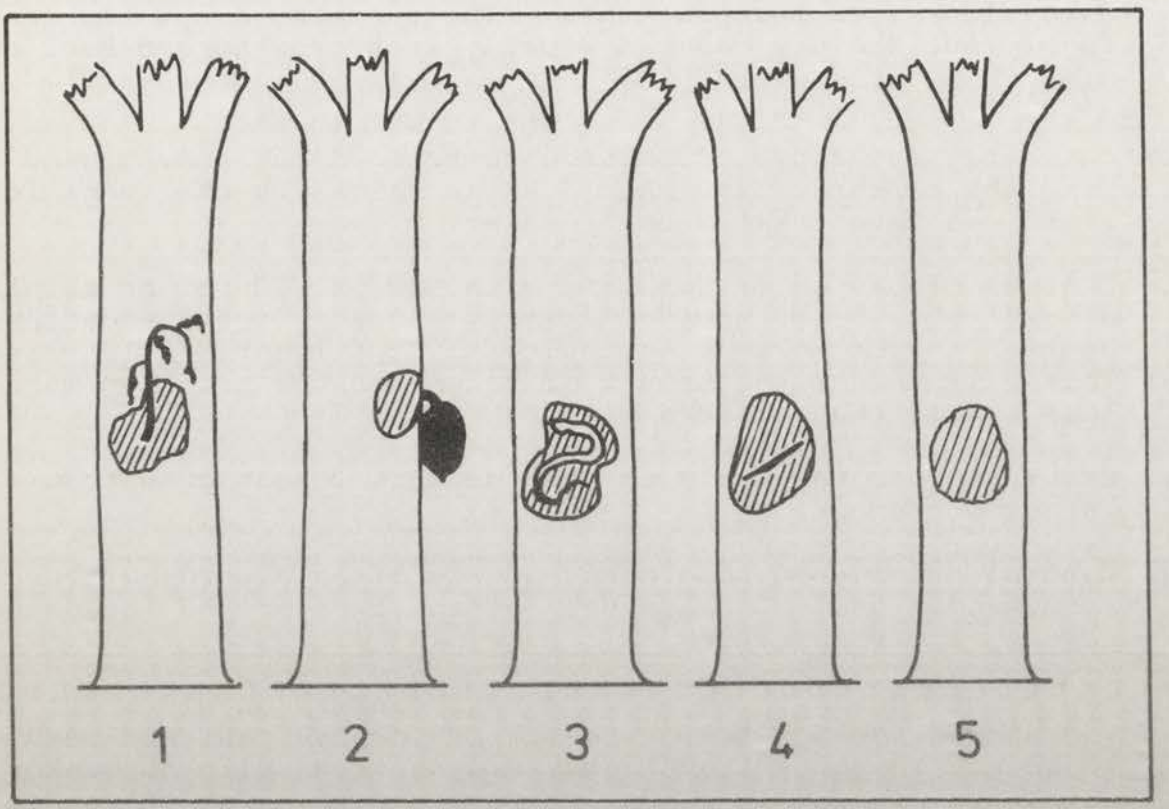
HOW TO DISTINGUISH SUDDEN DEATH FROM ROOT ROT

When a cocoa tree's roots are killed by the root-rotting fungi *Rigidoporus lignosus* and *Phellinus noxius* it may also die suddenly and it is hard to tell the difference between death from root rot and Sudden Death caused by canker. However, there are three important differences:

Canker (Sudden Death)	*Root rot*
1. The bark at the base of the tree may or may not be discoloured when scraped. If it is it will be a deep red colour and the discolouration will be patchy.	1. The bark at the base of the tree will be dead and brown when scraped, usually all the way around the tree and extending up the trunk for only a few centimetres.
2. The roots are not rotten.	2. At least some of the main roots are rotten and may have soil sticking to them. You may also be able to see a crust of fungus on the main roots and at the base of the trunk just above ground level.
3. The trunk wood is not discoloured at the base, except perhaps where it has been attacked by scolytid beetles.	3. The wood of the trunk is brown at the base. The brown colour spreads only a short way up the trunk, often more so at the centre. You can see this most easily by splitting the trunk down the middle.

There are five main ways in which the fungus can enter the bark and start a canker.

HOW CANKERS START



1. A chupon becomes infected and the fungus spreads from it into the bark.

2. The fungus grows back from an infected pod through the pod stalk and starts a canker in the bark.

3. The damage done by an insect (*Pantorhytes*, longicorns or termites) provides an entry point for the fungus.

4. The fungus enters through a knife cut.

5. Sometimes the fungus appears to get in through undamaged bark.

CANKERS AND SCOLYTID BEETLES

Trees with canker are often attacked by small brown beetles about 2-4 mm long called scolytids, ambrosia beetles, shothole borers or booze bugs. They tunnel into the cankered areas and produce a lot of dry sawdust which is pushed out of the holes and piles up at the base of the tree. You quite often see trees which look healthy but which have a lot of these beetles in the trunk and people sometimes think that the beetles actually kill the tree. In fact, the beetles always attack the cankered bark at a time when the canker has already weakened the tree and their arrival is a sign that the tree will be dead within a few months.

WHAT TO DO ABOUT CANKER

1. You should find out how big the canker is by scraping away the surface bark. You should cut small ones out completely. Do not attempt to cut out larger ones, but paint them with 2% copper oxychloride (Cuprox), 2% copper oxide (Nordox) or 2% difolatan after scraping them. The scraping helps the cankers to dry out and dry cankers usually stop growing and heal over.

Note

You can carry the fungus from tree to tree on the knives used for scraping the cankers. You should clean knives in the fungicide mix after you have treated each canker.

2. Control black pod by spraying with Nordox, Cuprox or difolatan according to Department of Primary Industry recommendations available from Lowands Agricultural Experiment Station, Keravat. This will reduce the amount of fungus on the tree and make it less likely that cankers will start.

3. Prune chupons regularly so that cankers cannot grow from infected chupons.

4. Control *Pantorhytes*, longicorns and termites according to D.P.I. recommendations. Cankers very often start around the damage done by these insects.

5. You cannot do anything about severe cankers on old trees and you should replace these trees. If you use your own seed, try to select the pods from high yielding trees with no canker but which are growing in places where there is a lot of canker on other trees. Seed from these trees is more likely to have some resistance to canker. The decision on whether to replant single trees or whether to replace the whole block will depend on the age of the trees and their general condition. Advice on replanting and rehabilitation can be obtained from Lowlands Agricultural Experiment Station, Keravat, East New Britain.