

VASCULAR STREAK DIEBACK OF COCOA IN INDIA

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Cocoa (*Theobroma Cacao* L.) is subject to attack of many diseases; some causing direct loss of crop as in the case of pod diseases while others causing general debility in the plants. Most diseases can be controlled by one means or the other. This may involve field sanitation and manipulation of agro-techniques besides chemical applications. Some diseases are more difficult to control. In such cases it may become necessary to cut and remove the affected plants or plant parts. But even so, it is difficult to eradicate the disease. The vascular streak dieback of Cocoa falls under this group.

History and Distribution

The term dieback has been generally and widely used to denote the condition of progressive desiccation of the branches from the tip inwards due either to physiological or pathological causes. Thus, dieback of one kind or the other has been in existence in almost every cocoa growing country in the world. In the early 1960's a very severe outbreak of dieback occurred on cocoa in the New Britain Island and several areas in Papua and New Guinea. Although, the disease was recognised as clearly distinct from the physiological dieback, it has not been possible to establish the cause precisely until about 1971 when a previously unknown fungus *Oncobasidium theobromae* Talbot and Keane was discovered as constantly associated with the disease. To distinguish it from other minor form of dieback the disease was given the name Vascular streak dieback deriving out of the characteristics streaking of the Vascular tissues in infected stems. By about this time, the disease had also made its appearance in the western parts of peninsular Malaysia. Since then the disease has assumed serious proportions in Papua and New Guinea and parts of Malaysia. The incidence of the disease has however been confined to the high rainfall areas of the Far East; the peninsular Malaysia on the west to New Britain Island in the east. In Papua and New Guinea particularly this is the most destructive disease in cocoa and has even proved to be a limiting factor in the crop development.

India has been mercifully free of many serious cocoa diseases. Commercial cultivation of the crop having initiated in the country about two de-

cadec ago, the only major disease that has been affecting the crop is the ubiquitous black pod, which can be controlled by spraying.

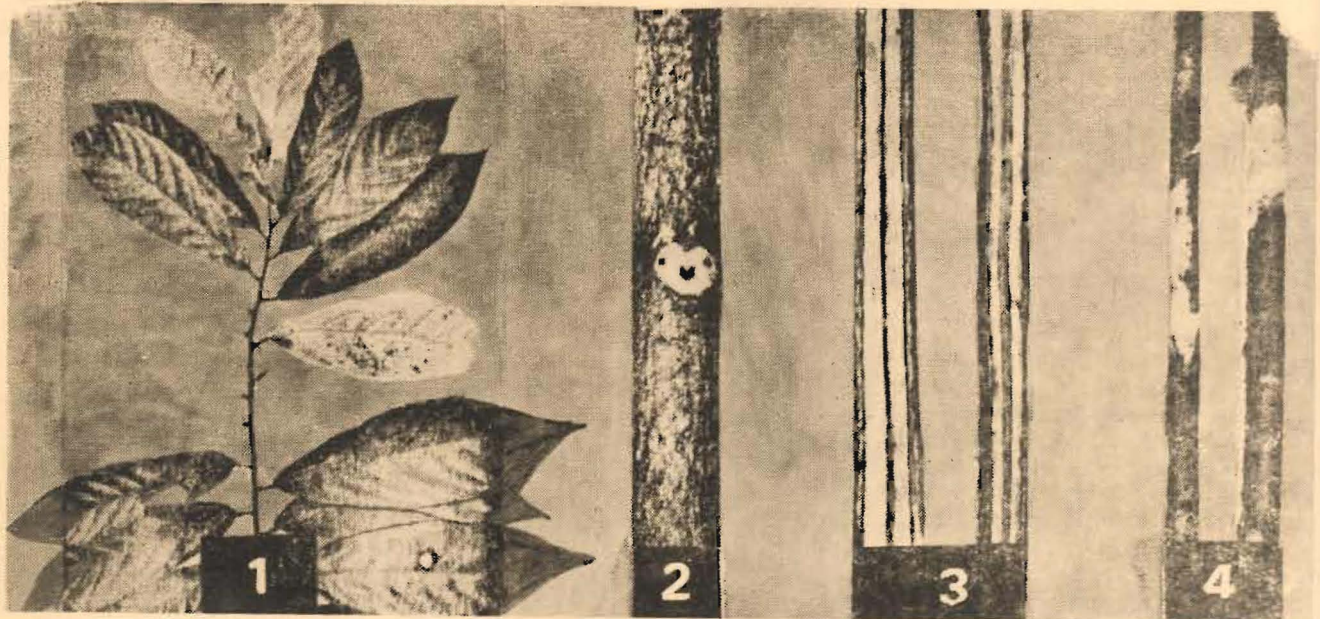
Recently, a case of dieback was noticed in grown up Cocoa plants of over 5 years in parts of Kottayam District in Kerala which is the principal cocoa growing state in India. The disease was identified as Vascular streak dieback caused by the fungus, *Oncobasidium theobromae*. The disease having been reported as highly destructive and lacking effective control measures, the notice of its incidence in India should be of great concern to the Cocoa interests in the country. To enable the growers particularly to keep a vigil on the disease spread and to take appropriate remedial measures, the symptoms of the disease and control measures in brief are described below.

Symptoms

The first indication of the disease is a characteristic yellowing of one or two leaves on the second or third flush behind the growing tip. Small sharply defined green spots may be seen scattered over giving the leaves a spotted appearance. The diseased leaves fall prematurely within a few days of turning yellow. Further leaves progressively develop similar symptoms up and down the stem and fall. This gives rise to a distinctive situation where the youngest and the oldest leaves remain intact while all the middle ones have fallen (Fig. 1). This is in fact a distinguishing feature of the disease.

Portion of the bark from where the leaves have fallen becomes rough due to swelling of the lenticels. As the leaves fall, the axillary buds sprout prolifically; but the lateral shoots so developed soon die after a small growth. The unhardened terminal leaves in the young flush produced from diseased shoots may show interveinal necrosis reminiscent of calcium deficiency. The affected shoot is eventually killed and if unchecked the disease will extend back along the main branch resulting in progressive death of the tree. In seedlings the infection occurs in the main stem and in most cases the disease becomes fatal.

The dry surface layer of a leaf scar resulting from the fall of a diseased leaf when sliced off, three black spots which represents the discoloured Vascular bundles may be clearly seen (Fig. 2). The bark on the



diseased regions when peeled, the cambium layers turn brown more rapidly than normal. The diseased stem when split longitudinally, a brown streaking of the wood may be seen (Fig. 3). This streaking is associated with the presence of the fungus in the xylem vessels and may extend well beyond the area of yellowed leaves. Streaking of the wood prior to the death of plant is a very good diagnostic character. In wet weather the fruiting bodies of the fungus appear as a white crust on the infected stems arising from the scars of freshly fallen leaves (Fig. 4).

Epidemiology.

The disease is spread through spores of the fungus released only at night following rain sufficient to wet the fertile layer. The spores are ejected into the air and dispersed by wind. Those that land on the surface of young unhardened leaves germinate and penetrate through the epidermis and mesophylls into the veins. From there the fungus grows down into the stem. An incubation period of 3 to 5 months occur before the first symptoms are visible.

Sporulation and infection are very important in determining the disease spread. Wetting of the surface by rain water is essential for sporulation and for this reason, spores are produced and infection occurs only in wet weather. Lack of winds in the night limits spore dispersal. High humidity which causes condensation on the spores to increase their weight will again be a possible limiting factor for the disease spread.

Control.

The great rapidity with which new flushes are produced during the rainy season when disease infec-

tion takes place, practically defeat all attempts to use protective fungicides against the disease. Use of systemic fungicides though may sound promising, none of the currently available systemics have been found effective in trials carried out in other countries.

Pruning of the diseased branches can be useful in delaying disease build up. This will remove sources of fresh infection besides preventing further growth of the fungus on already infected trees. Pruning must be done about 30 to 40 cm below the end of visible streaking in the wood. This is necessary because the fungus may be present beyond the visible limit of discolouration. For this purpose it is necessary to first split the branches to reveal the extent of streaking. As the fungus is unable to live or sporulate in dead or dying tissues, it is not necessary to remove or burn the infected prunings from the garden. Regular pruning of chupons on the trunk will deny the fungus access through these unhardened leaves. There are also indications that by judicious within canopy pruning which improves aeration and reduces the period during which foliage remain wet the disease can be reduced by taking advantage of the dependence of the pathogen on moisture availability for development and spread.

REFERENCES

- KEANE, P.J. AND TURNER, P.D. (1971) : Vascular streak dieback of cocoa in West Malaysia, . *Cocoa & Coconuts in Malaysia*, 50—57.
- CHRIS PRIOR (1980): Vascular streak dieback, *Cocoa growers Bulletin* 29, 21-26.
- WOOD G.A.R. (1973): *Cocoa*, 3rd edition, Longman, 149-150.