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A NOVEL METHOD FOR THE CONTROL OF POD DISEASES OF COCOA

T.N. Sreenivasan

Cocoa Research Unit, University of the West Indies,
St. Augustine Trinidad, West Indies.

ABSTRACT

Pod diseases of cocoa are widespread in cocoa-growing countries and are responsible for substantial losses in income. Black pod, Moniliophthora pod rot, Witches' broom and Watery pod rot are the major diseases of cocoa pods. The conventional methods of fungicide application by spraying an aqueous suspension using diverse equipment so far yielded only limited control. The drawback of these methods seem to be the inability of the system to release adequate quantities of the chemical during the prolonged rainy spells which are frequent in the tropics. The need for the development of an alternative method for the control of pod diseases was recognized. A new method is being developed at the Cocoa Research Unit, Trinidad. Copper fungicides were placed in a collar-like device and attached to the top of the main trunk or branches of cocoa trees. The water flow from rains passes through the collar permitting a slow release of the fungicide during rainy periods. This guarantees the availability of fungicide in sufficient concentration to prevent pod infection during the prolonged rainy spells. Preliminary studies on Black Pod disease have shown very significant reduction in pod losses when collars with 10g or 5g a.i. were used.

OBJECTIVES

- To develop an effective fungicide application method against cocoa black pod and other pod diseases
- To reduce costs of application
- To harness nature as an accomplice
- To reduce environmental damage

Drawbacks of the Current Method (Spraying)

"Even after some 25 years of spraying experiments control obtained from spraying is often inconsistent or unsatisfactory. Black pod can be controlled by spraying. First one must get a good even deposit of fungicide over the pods - more easily said than done because of the pod's shape, its waxy surface and its position with the trunk partly shielding it from spray. The problem seemed unsurmountable to Dade (1931), the first real authority on black pod, who concluded that to be effective, spraying must be so frequent that it is uneconomic" (Gorenz, 1974).

"Even if a fungicide film were to expand uniformly with the increasing surface area of the pod, and without developing cracks growth alone would reduce the deposit to marginal or ineffective levels in about a month. The effects of weathering will be superimposed upon this attenuation by growth (Hislop and Park, 1962).

"The end result of applied research should be more effective control of black pod at a lower cost. The time is ripe for some sophisticated team approaches to the problem of black pod control especially in high rainfall - high incidence regions, if any breakthrough is to be achieved (Gorenz, 1974).

The Host: The Cocoa Tree

- Pods are formed on trunks and branches
- Surface area of target is small in relation to the area sprayed
- At maximum rate of growth the target area doubles in 10 days
- A five fold increase in surface area occurs during the first two months of pod growth

The Disease: Black pod

- Destroys pods
- Pathogen survives on the tree and in soil
- Free water (rain) is essential for sporulation, dispersal and infection
- Therefore, no water (rain) = no black pod

Reasons for Unsatisfactory Control

- Failure to maintain an effective concentration of chemical on pod surface throughout the cropping season
- Continuous and heavy rains wash away the chemical and help the pathogen to multiply and disperse its inoculum and initiate the infection process - all at the same time
- Current spraying technology is not ideal for fungicide application for the control of pod diseases

Requirements for an Efficient Control Method

- | | |
|---|---|
| The method should provide adequate fungicide deposit on:- | |
| Trunks and branches | - to prevent canker and sporulation of the pathogen |
| Pods | - to prevent pod loss |
| Tree base soil | - to prevent infection and survival of the pathogen |
| During rainfall | - to prevent spread of inocula |
| From pod set to harvest | - to reduce application frequency |

CRU'S Collar Method of Fungicide Application

Incorporation of fungicides (various Cu preparations) in a collar-like device attached to the top of main trunk and branches (Fig.1).

Mode of Action

Rainfall > run off water on trunk/branches > downstream flow by gravity > flow through collar > carry fungicide/s > coats trunk and pod surface with fungicide > settles around tree base soil. The heavier the rainfall > the larger the quantity of fungicide released > perfect control.

RESULTS

Preliminary study (Tim Pettit, CRU) showed highly significant results. Collar with 10g. and 5g. a.i. (various copper fungicides) effectively controlled black pod incidence throughout the crop season.

Advantages

- Single application
- Independent of weather conditions
- Longlasting (effective for the entire cropping season)
- Labour saving and economic
- Availability of chemicals, when and where required
- No separate soil applications required

Other possible uses

- To control witches broom disease of cocoa
- To control Moniliophthora pod rot
- To control Watery pod rot
- To control several other tree diseases where stem or collar is affected

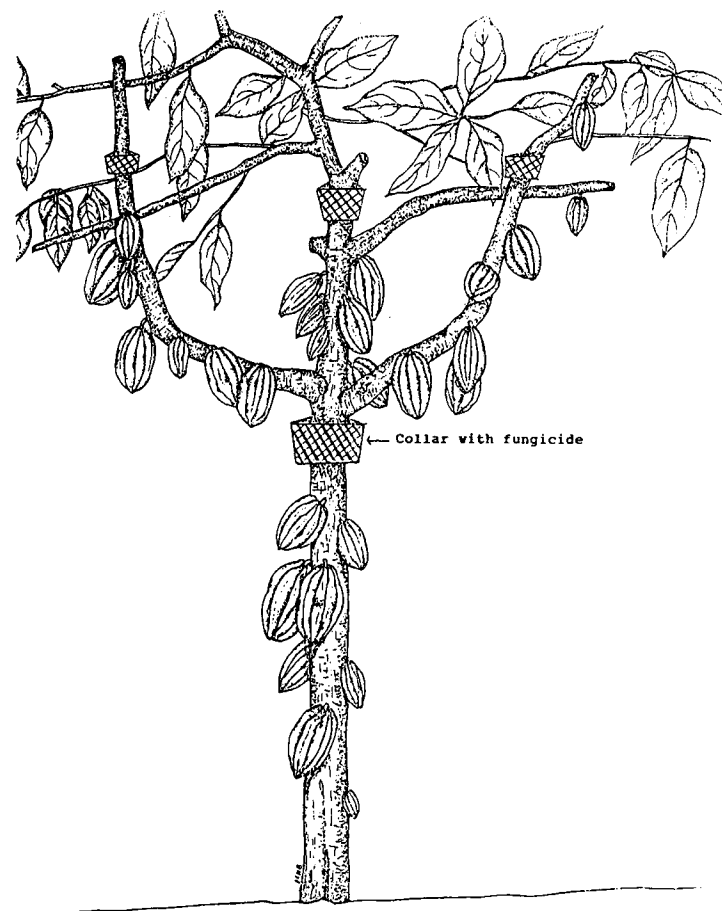


Fig. 1. Diagram showing collar on cocoa tree.

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