Fungus to Fight Black Beetle

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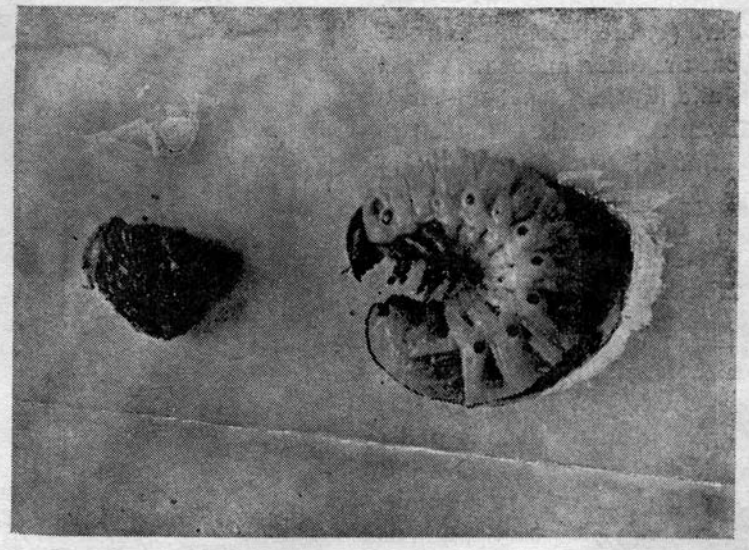
Introduction

Among the fortytwo known species of *Oryctes*, the rhinoceros beetle, *Oryctes rhinoceros* L. has proved to be a major pest of coconut. It is met at all the coconut growing regions. Though the immature stages of the pest are harmless, the adult destroys the unopened leaves and spathes by boring into the crown of the palm and thereby reduces yield considerably. The seriousness of the damage caused by this pest varies from region to region.

The different methods adopted for its control are mechanical, chemical and biological. The chemical and mechanical methods of control are quite effective in checking the pest population. Treatment of the palms and the breeding places of the pest with insecticides like BHC/Aldrin helps to reduce pest infestation. However, the treatment should be a continuous process. Otherwise the pest population will again increase and attack on palms will be resumed. Once the treatment is discontinued toxicity of the insecticide diminishes due to the decomposition of the material under field conditions. Mechanical control by hooking out the beetle from the crowns of palms, though useful, has its own limitations. It is costly and can be done only with the help of a skilled worker.

Biological control, by means of other insects, fungi, bacteria



Infected mummifield larva Healthy larva

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etc. is of more recent origin. And it appears to have high potentialities. The success lies in the fact that once the parasite or pathogen is established it continues to be effective by virtue of its further spread by contact, through air, water, etc. The use of micro-organisms in the control of insect pests is one of the most important aspects in the various methods of control.

The fungus enemy

The Black beetle is subject to a number of diseases. Of these, one disease due to a fungus, *Metarrhizium anisopliae*, commonly known as "Green muscardine", causes maximum destruction to the pest. This fungus has a wide distribution and causes disease in various other injurious insects such as frog hoppers, white grubs, etc.

History of the Pathogen

This pathogen was first discovered by Metchnikoff in 1879 in Russia and was named *Entomophthora anisopliae* having collected it from the larvae of certain coleopteran pest (cockchafer) of wheat. Later, Sorokin named it *Metarrhizium anisopliae*. Since 1879 it has been observed in nearly all corners of the world attacking a great variety of insects belonging to widely different families. It was first discovered on *O. rhinoceros* by Friederichs (1913) in Samoa. In India the first record was by the Madras Agricultural Department in 1939.

Symptoms of disease

Initial symptoms of the disease appear in grubs as restless, sluggish movement followed by starvation. The affected grubs generally move to the surface of the feeding material. Death occurs within two to four days after the first appearance of these symptoms. After death the normal greyish white colour of the larva changes into opaque, dull creamy white. Then the integument gets hardened and mummified. Two or three days after death a white growth (Mycelium of the fungus) appears on the entire body surface which is followed by the development of green spores. With the development of spores the entire surface of the grub except the head capsule turns greenish. Later, the body of the larva shrinks more and more and the integument becomes hard and brittle (see figure on pagc 10).

The fat body and appendages of the infected pupa get deformed and the integument darkens before death. The fungal outgrowth is not so profuse here as in the larva.

The diseased adult is unable to balance itself on its legs and it shows abnormal behaviour. The abdomen becomes rigid and the legs stiffen after death. The fungal growth appears on all the joints of the specimen and base of antennae except the hard chitinous portions of the beetle, such as wings, head, etc.

All stages of the beetle except the eggs are susceptible to the fungus. Whether the infection takes place by the penetration of the integument or by oral intake is still not known. However, it is clear that the fungus is able to penetrate the integument of the insects.

Control

The practical utility of the parasitic fungi like *M. anisopliae* in controlling the insect pest was attempted by several workers. Partial control of *O. rhinoceros* in limited areas by the use of *M. anisopliae* was achieved in Samoa, Ceylon and India by introducing the pathogen in the breeding places of the beetle like coconut logs, cowdung pits, decaying organic debris, etc.

In the experiments conducted at the Central Coconut Research Station, Kayangulam, nearly 80 per cent mortality was obtained on the tenth day after inoculation when the pathogen was mixed in the breeding material. The spore dust for the treatment was prepared by growing the pathogen in sterilized potato slices, for a period of 20 days. It was collected and mixed thoroughly with dried cowdung. Sufficient water was added to the cowdung to keep up the moisture level. Rhinoceros grubs were then introduced into the treated cowdung.

The mortality of the grubs began to appear from the third day onwards after such introduction. Nearly hundred per cent of the grubs were dead on thirteenth to fifteenth day. The rate of mortality of the grubs was comparatively more between the seventh and eleventh day after inoculation.

Considerations

The nature and extent of disease incidence or spread of infection on pest depends not only upon the virulence and quantity of the pathogen but is also correlated with the environmental conditions and predisposing factors such as relative humidity, temperature, rainfall, etc.

High humidity and low temperature may be favourable for the spread of the disease. So the disease is more prevalent during the South West monsoon season when the humidity is high and the temperature low. A good number

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Pests -- known and unknown

BY

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"Why! Here is a good specimen of root-wilt, and here of leaf-rot. Take a photograph of these." I said to my photographer. We were going through Kandallur Village, Alleppey District, Kerala State.

"Here it looks that every tree is affected by one disease or other and we can get a clump of trees showing various stages of several diseases," said the photographer.

"It looks like a pathological museum of coconut trees. Let me see who is the architect of this," I said.

I followed a foot-path which led to a small house. By this time a number of children had gathered around us and were pointing out to a man standing near the house oblivious to all the things happening around.

A child from the group called out "Uncle, this lady has brought camera with her to take photographs of your coconut trees."

He moved forward mechanically with a blank look on his face.

"Is this your Garden?" I asked.

"Yes. It is my garden which is an ancestral property. This house is our family house."

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