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PESTS OF COCOA - *PANTORHYTES*

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INTRODUCTION

Pantorhytes weevils are the most serious insect pests of cocoa in Papua New Guinea. The larvae cause damage by boring into the tree trunk and main branches to feed on the wood. This damage can kill cocoa trees, or seriously reduce yields.

Pantorhytes larval channels are also a major entry point for the bark canker fungus, *Phytophthora palmivora* which also kills trees, especially those over 10 years old (see Plant Pathology Note No. 20 in this issue of HARVEST).

DESCRIPTION

There are over 60 species of *Pantorhytes* but only about 6 are serious pests of cocoa. They are found in different parts of Papua New Guinea:

P. szentivanyi (Northern Province)

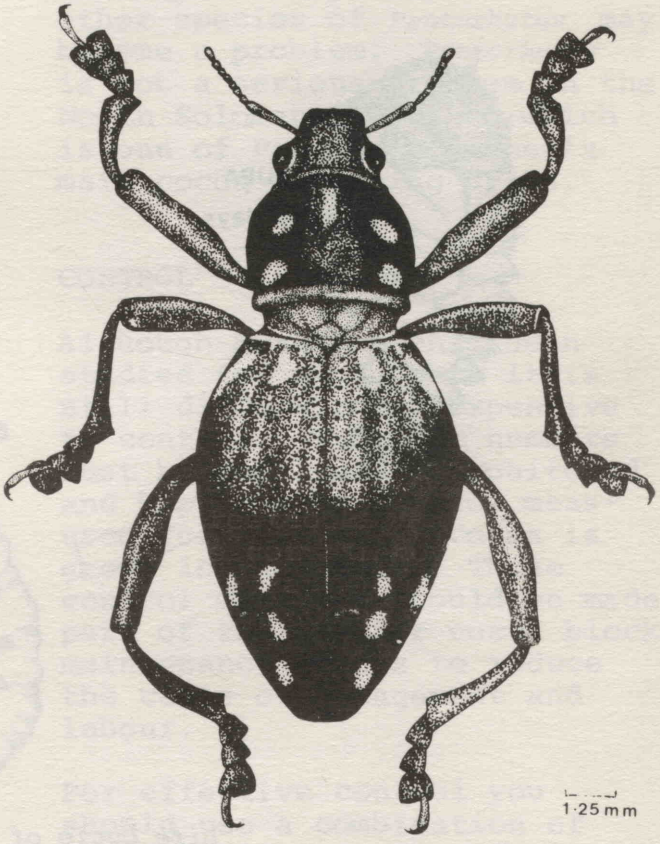
P. plutus (New Britain and New Ireland Provinces)

P. batesi (Morobe Province)

P. proximus (Central Province)

P. stanleyanus (Milne Bay and Central Provinces)

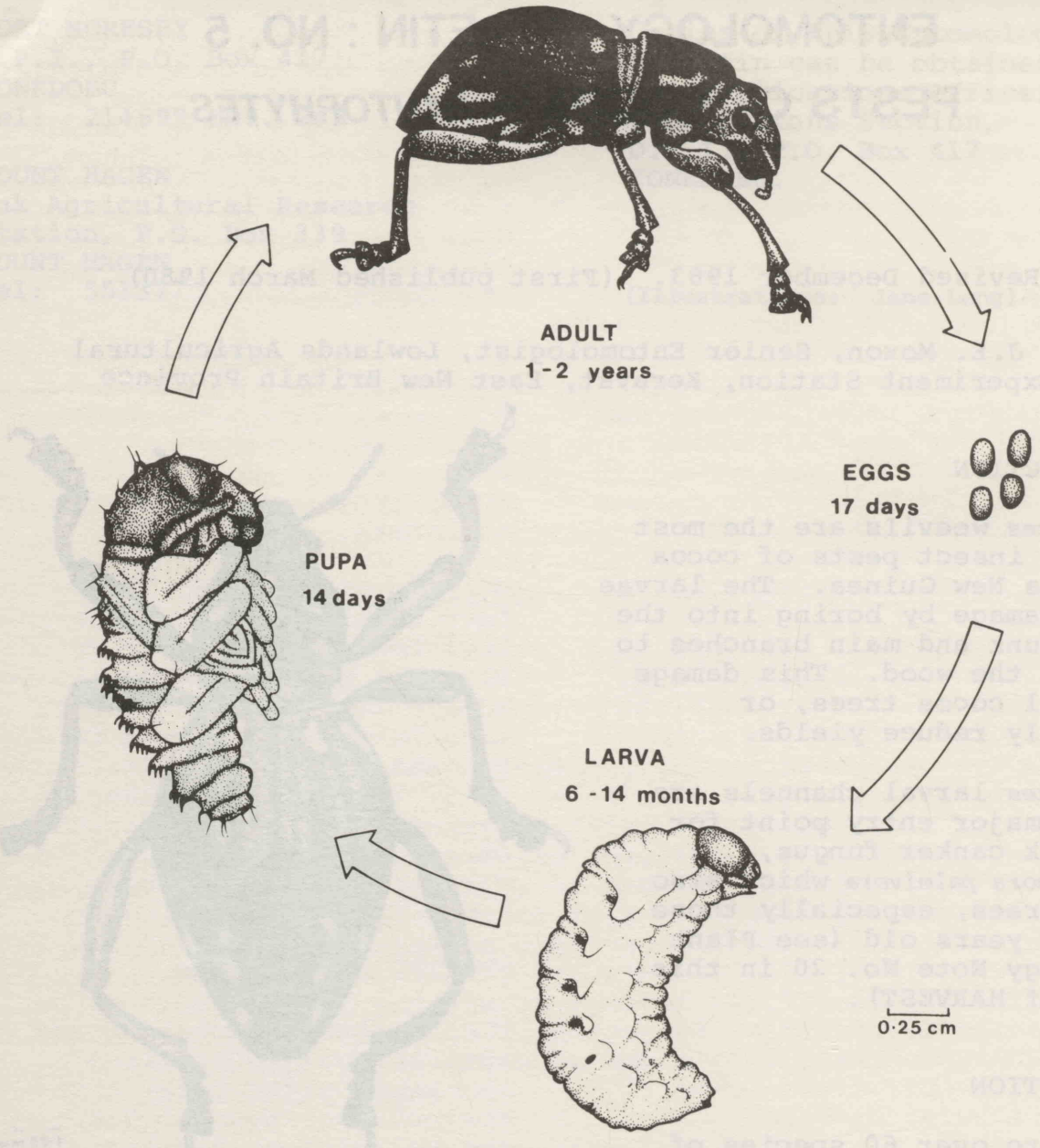
P. pseudocarbonarius (Sepik and Madang Provinces)



Pantorhytes *adult, about 5 times natural size*

Adults of the different species are similar in size and shape, but they can be distinguished from each other by the markings, often brightly coloured, on their bodies.

Males and females look alike. They have strong bodies about 1.5 cm long, strong legs and no wings. They move from one area to another by walking or by being carried. This can happen when planting material is moved in trucks.



Life cycle of Pantorhytes

BIOLOGY

The eggs are white, ovoid, and about 2 mm long. They are laid singly in crevices on the trunk and main branches of the tree and often around the jorquette region (the part of the tree where the branches join the trunk).

The larva hatches from the egg and immediately chews into the wood of the trunk or one of the main branches. It is cream coloured, has no legs and grows to about 1.5 cm long. As it feeds the larva makes a vertical channel under the bark. The larva feeds for many months and moults (changes its skin and grows) 9 times.

Larval damage causes the tree to produce gum which is pushed out of the larval channel onto the bark. If this gum is brown then there is an active larva in the channel. If however, the gum is clear the larva has probably matured and left the channel.

When the larva has matured, it

moves to a position just under the bark where it pupates (enters the resting stage). The pupa is similar in size to the mature larva.

The soft bodied adult emerges from the tree and feeds for several weeks, before it becomes strong. It then mates and the females begin to lay eggs.

The adults usually feed on young cocoa shoots and sometimes on pod husks. However, damage resulting from adult feeding is not usually a problem.

ECONOMIC IMPORTANCE

Small numbers of *Pantorhytes* will reduce cocoa production while large numbers may kill most of the trees in a cocoa block.

Pantorhytes *larva and channel inside a cocoa tree.*

Pantorhytes damage cocoa trees when the larvae bore into the trunk and main branches to feed. The tree canopy (the number and area of leaves produced by the tree) suffers, pod production falls and branches may be ringbarked and break off. Very often a large number of the attacked trees die.

As new areas of land are developed and planted to cocoa other species of *Pantorhytes* may become a problem. *Pantorhytes* is not a serious problem in the North Solomons Province which is one of Papua New Guinea's main cocoa producing areas.

CONTROL

Although *Pantorhytes* has been studied for many years it is still difficult and expensive to control. The pest numbers must be continuously monitored and kept low by control measures for as long as cocoa is grown in the block. These control measures should be made part of the regular cocoa block maintenance rounds to reduce the costs of management and labour.

For effective control you should use a combination of the following recommendations:

1. Hand picking adults

Hand collection and killing adult weevils will reduce severe *Pantorhytes* infestations to low levels in mature cocoa. Rounds must be done every week until adult numbers have been reduced to very low levels, say one adult *Pantorhytes* per 10 trees.

Hand picking will require approximately 20 man hours per hectare per round. This makes it an expensive control method. The method is particularly suitable, and cheaper, for young

trees (less than about 3 years old) where adults can be seen more easily. It is also suitable on smallholder blocks where the work can be done by family members.

On large trees, *Pantorhytes* weevils are more easily seen during the middle of the day when they come down from the canopy to avoid the hot sun. Hand picking is best combined with the 'channel paints' method described below.

2. Larval treatment (channel paints)

Larvae living inside the trees can be killed by applying an insecticide onto the bark above them. The position of the larvae is shown by the 'gum and brown frass' described earlier. Scrape away the 'frass', but do not cut the tree. Use a 2.5 cm wide paint brush to paint an insecticide mixture onto the bark over the larval tunnel.

All trees should be inspected and the places where frass is found treated every 2 weeks. If the treatment is stopped the *Pantorhytes* will soon build up again. This is because adults live for several years and continue to lay eggs and re-infest the trees. For this reason, larval treatment is best combined with hand picking where the adult weevils are killed.

'Channel painting' will require approximately 15 man hours per hectare per round. The insecticide recommended is 1.5% dichlorvos (Nuvan or Vapona) with 1% Ridomil included as a canker preventative. The insecticide is prepared by mixing together:

30 ml 'Nuvan 50'
250 ml white oil
10 g Ridomil 25 wp
700 ml water

Mix up only enough for immediate use on that day because the mixture quickly loses its strength. Wear rubber gloves. Take care not to spill the insecticide on your body. Wash yourself well with soap and water after using the chemical, or after spills.

IMPORTANT NOTE:

Do not cut out larvae from the tree with a knife. This seriously damages the tree. Longicorn larvae are also a serious pest of cocoa and their damage looks very similar to that of *Pantorhytes*. Treat them with 'channel paints' in the same way.

3. Crazy ants

These ants attack *Pantorhytes* adults and eat their eggs. Dense populations of crazy ants will completely remove and prevent re-entry of *Pantorhytes* in cocoa. There is evidence that crazy ants control other pests of cocoa. They also remove other kinds of 'tent' building ants that spread black pod disease. Crazy ants should be introduced into cocoa blocks following the method in Entomology Bulletin No. 4 in this issue of HARVEST.

4. Coconut shade

Pantorhytes are often not a serious problem on cocoa when coconuts are used as the shade tree. In areas where *Pantorhytes* are known to be a serious problem, thought should be given to redevelopment beneath hybrid coconuts. The coconuts must be planted 3 years before cocoa so that the coconuts are not overgrown.

The loss of the money that could be earned from cocoa in these 3 years will make the scheme unattractive to many growers. But the recommendation is suitable

for long term farming. It is also good for smallholders and in other situations where the grower does not have the knowledge or money to practice complicated management.

5. Chemical control of adults

Chemical control of the adult weevils is difficult and expensive. It is only worthwhile on complete stands of high yielding cocoa.

The recommended insecticide is permethrin (trade name Ambush). The insecticide is prepared by mixing:

100 ml Ambush 10 ec 5 ml washing up liquid 10 litres water

OR

20 ml Ambush 50 ec 5 ml washing up liquid 10 litres water

This mixture is applied to put 100 g of permethrin active ingredient per hectare. This 10 litres of mixture should treat about 60 trees.

The insecticide is sprayed into the cocoa canopy, trunk and branches using a mistblower every 6 weeks for 1½ years. Then spraying is continued at 3-monthly intervals.

Sprays are more effective and less expensive on young trees where *Pantorhytes* are covered with the insecticide more easily.

6. Plant barriers

Pantorhytes weevils will walk into newly planted cocoa from nearby bush, or from infested cocoa blocks. To help prevent this, a 15 metre wide strip should be cleared and planted to the cover crop *Pueraria*.

Crazy ants live very well under *Pueraria* and if they are introduced into the barrier strip they will also help keep out the *Pantorhytes*. Extra food for the crazy ants can be provided by planting *Gliricidia* in the strip. This helps to establish the crazy ants.

Care must be taken to prevent the *Pueraria* from growing over the young cocoa. If *Pueraria* is unavailable, allow grass to grow in the barrier strip. This will do a similar job.

Plant barriers are useful when only part of the cocoa block is next to *Pantorhytes* infested areas. If a barrier has to be planted around most of a block, a lot of money will be lost. This is because a lot of cocoa could have been planted in the barrier, and the pest controlled by less costly methods. Smallholders may not even have enough land for barriers.

Wide rivers and crops such as oil palm or cattle pastures will also help prevent *Pantorhytes* walking in.

7. Alternate host plants

There are plants growing in the bush and on cultivated land that *Pantorhytes* can live on. These are called alternate host plants.

It is known that *Pantorhytes* can live on: *Pipturus argenteus, Trema cannabina, Cananga odorata, Casuarina oligodon* (yar), *Schuurmansia henningsii, Hibiscus, Macaranga, Melochia odorata, Trichospermum psyclocladum, Ochroma lagopus* (balsa), *Ficus* spp. There are probably many more alternate host plants not yet known so when clearing land for new cocoa blocks remove all kinds of tree except those suitable for shade: coconuts, *Gliricidia* and *Leucaena*.

CONTROL PROCEDURES

Infested cocoa blocks

An integrated control programme combining the following methods should be used:

First map the extent and severity of *Pantorhytes* in the block.

Then do:

EITHER

- Hand picking of adults
- Painting larval channels
- Introduction of crazy ants

OR

- Spray adult weevils (plantations only).

If the *Pantorhytes* are restricted to a small area in the block make a concentrated effort to eliminate them using a combination of the above methods.

New cocoa plantings and redevelopment of old cocoa

It is much easier and cheaper to stop *Pantorhytes* entering newly planted cocoa blocks than to control them once they have entered it. The following procedure should therefore be followed when developing new cocoa blocks:

1. Clearfell all trees except recommended shade trees.

2. Plant hybrid coconuts as shade. Otherwise, *Gliricidia* is second best.

3. Introduce crazy ants first along the boundary of the blocks (on plantations immediately - on smallholdings after 1 year) following the recommended method.

4. Establish a *Pueraria* or grass barrier strip only if the adjacent boundary of old cocoa or bush is limited to a short distance.

FURTHER INFORMATION

For further information and advice about controlling *Pantorhytes*, contact your nearest D.P.I. entomologist or didiman. Entomologists are based at:

RABAUL
Lowlands Agricultural Experiment Station, P.O. Keravat, E.N.B.P.
Tel: 926251 or 926252

LAE
Bubia Agricultural Research Centre, P.O. Box 73
LAE
Tel: 424933

KIMBE
Dami Oil Palm Research Station
DAMI
P.O. Box 165, KIMBE, W.N.B.P.
Tel: 935204

PORT MORESBY
D.P.I., P.O. Box 417
KONEDOBU
Tel: 214699 Ext. 255

MOUNT HAGEN
Kuk Agricultural Research Station, P.O. Box 339
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Tel: 551377

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A new type of Ridomil will soon replace Ridomil 25 wp. Please contact L.A.E.S., Keravat for the latest information.