OBSERVATIONS ON A BORER OF COCONUT PETIOLES IN THE BRITISH SOLOMON ISLANDS PROTECTORATE

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ABSTRACT.

Larvae of an unidentified xyloryctid restricted to the islands of Choiseul and Santa Isabel damage coconuts by tunnelling into the petioles of the fronds. Coconut palms over four years of age are attacked. On young palms the eggs tend to be laid on the youngest fronds and occasionally there is no oviposition for up to two months. Biological control appears to be of little significance. Modification of secondary growth of coconut plantings is seen as a promising line of research on control which is made all the more imperative by possible future unintentional introduction of the pest to neighbouring islands.

INTRODUCTION.

Damage to coconut petioles by boring larvae on the island of Santa Isabel was first brought to the notice of the Agricultural Department in 1960. An insect pest survey begun in 1962 subsequently showed that damage also occurred on Choiseul and that the insect responsible for the damage was absent from neighbouring islands of the Solomons and the Territory of Papua and New Guinea. The damage is caused by larvae of a xyloryctid (Lepidoptera) ; adult specimens collected have not enabled the Commonwealth Institute of Entomology to place the moth in a genus.

DAMAGE.

Coconut palms under four years of age are generally not attacked. An obvious symptom of a heavy attack by petiole-boring larvae is premature senescence of leaflets of middle-aged fronds. The petioles of such fronds have numerous black necrotic spots and occasional holes particularly in the basal leafletless areas. Severely attacked petioles are tunnelled extensively by late instar larvae (*Plate* I). Recent tunnels are filled with moist brownish-black frass. The walls of the tunnels are blackened. Badly attacked fronds sometimes snap in wind.

Before premature senescence occurs, attack can be recognized by the presence of black necrotic spots on petioles and gum exudations around some of these spots. These symptoms appear on the undersides of the leafletless portions of petioles (*Plate* II).

Severe damage appears to delay fruiting of young coconut palms. Yields of older palms are probably reduced by heavy attacks of petiole-boring larvae.

In 1964, heavy attacks occurred almost all along the west coast of Choiseul. On the east coast, attacks were not as heavy and were more scattered. In the same year about 5,000 palms of all ages around Santa Isabel were checked. Of these 15 per cent. were damaged by petiole-boring larvae.

ECOLOGY.

The adult moths which are brown and about $1\frac{1}{2}$ in. long were never observed on coconut palms. The egg, oval and flattened dorso-ventrally, is about 3/16 x 2/16 in. in size. Before hatching, eggs are olive-green, empty eggs are pale brown. Eggs are laid singly or in rows in which the preceding egg is slightly overlapped by the following; up to five eggs have been recorded in a row. On five-year-old coconut palms, eggs tend to be deposited on the youngest fronds as *Table* 1 shows.

Most eggs are laid on undersides of basal leafletless areas of petioles. The maximum number of eggs recorded on a petiole was 19 on a second youngest petiole of a seven-year-old palm at Rasa, Santa Isabel.

Each larva increases in length from about $\frac{1}{4}$ in. to about $2\frac{1}{2}$ in. The last larval instar is about $\frac{1}{2}$ in. in diameter.

Monthly dissections for two years of second youngest petioles show that early larval instars are commonly found in the younger petioles and that late instars are predominant in the older petioles. These observations which are presented in *Table* 2 support data obtained in egg

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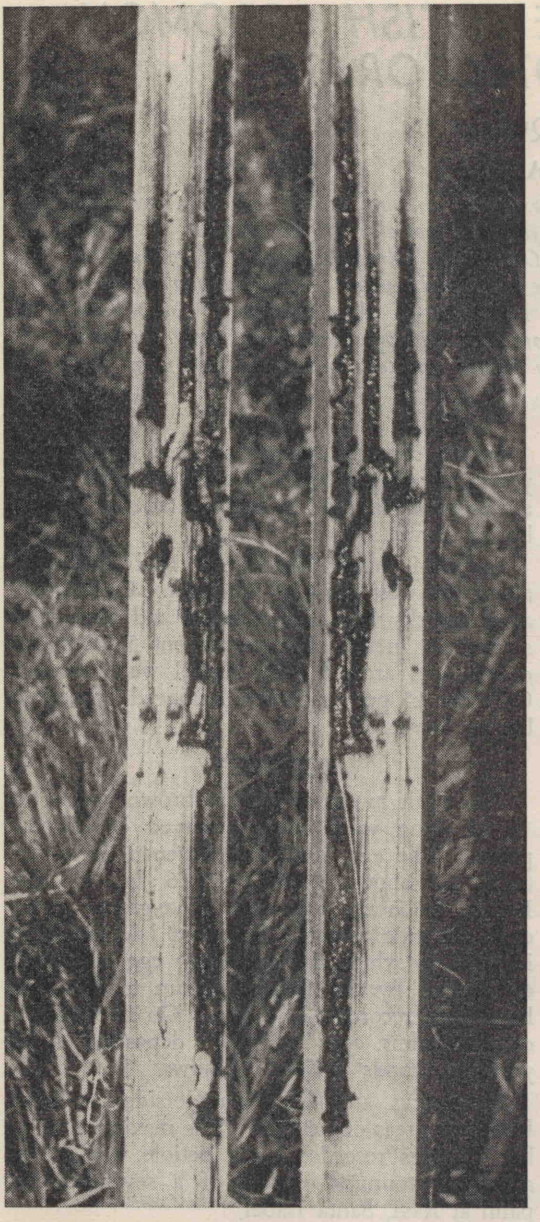

Plate I.—A petiole split in half to show extensive tunnelling by the coconut petiole borer (three late instar larvae are obvious).

site studies showing that most eggs are laid on the youngest petioles.

The mean head capsule width of larvae from ninth youngest petioles is significantly greater at the five per cent. level than the mean head capsule width of the larvae from the second youngest petioles.

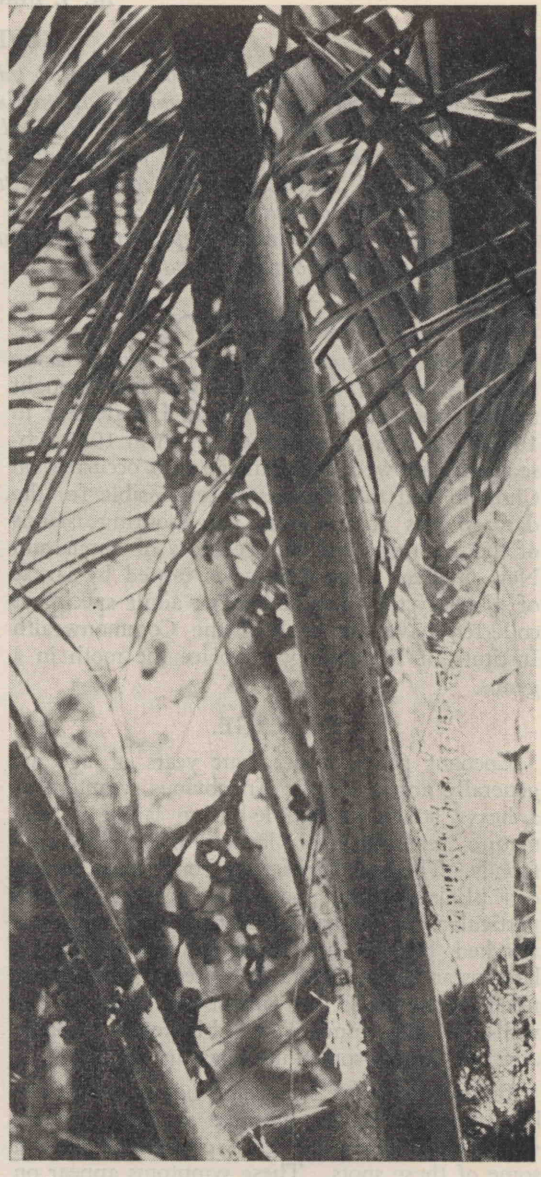

Plate II.—Coconut petiole borer attack symptoms on the underside of the basal leafletless area of a petiole.

Table 1.—Egg sites on young palms.*

		Petiole Age.†									
		1	2	3	4	5	6	7	8	9	10
Eggs	No.	1	5	9	4	1	2	0	0	0	0
	per cent.	4.5	23	41	18	4.5	9	0	0	0	0

* Data obtained from sixty-seven five-year old palms at Tolana, Santa Isabel on 3.1.1964. Palms had an average of sixteen petioles.

† Petiole age=1 is used to describe the youngest petioles, petiole age=2 are second youngest petioles, etc.

Table 2.—Larval instar distribution on young palms.

	Larval head capsule width.*			
		Mean.‡	Standard deviation.‡	Number measured.
Petiole age †	2	0.07	0.03	255
	9	0.12	0.06	167

* Data obtained from seven-year-old palms at Rasa, Santa Isabel 1963-1964.

† As in *Table* 1.

‡ Measurements are in inches.

The maximum number of larvae recorded in a petiole was eight in a second youngest petiole of a seven-year-old palm at Rasa, Santa Isabel.

The last larval instar almost tunnels out of the petiole before pupating; a thin petiole tissue 'window' is left at the end of the tunnel in which pupation takes place. This 'window' is broken by the pupa just prior to emergence of the moth. Pupae were noted in ninth youngest petioles and not in second youngest petioles (Rasa, Santa Isabel 1963-1964).

Monthly observations at Rasa on Santa Isabel in 1963, had suggested that eggs were not laid in every month. Convincing evidence of this was obtained later, as shown in *Table* 3.

Although 75 per cent. of the palms at Tolana showed signs of damage (January, 1964), the percentage of palms bearing newly laid eggs never exceeded thirteen during the course of observation.

Dipterous pupae were found in larval tunnels on three occasions, twice on Santa Isabel and once on Choiseul. If this fly is a parasite, it would not appear to be of any significance in biological control.

In February and in July, 1963, a nymph of *Salomona* sp. (Orthoptera : tettigonoidea) was found inside a late instar tunnel. If this grasshopper is a predator, its value in biological control is doubtful.

Older petioles which have been ripped open exposing larval tunnels were occasionally noted; the identity of this predator is unknown.

Dead larvae and pupae were frequently found in tunnels. Detailed examinations of dead larvae by the Division of Invertebrate Pathology of the University of California have not revealed fungus, nematode or protozoan infection nor any indication of bacteriosis.

DISCUSSION.

Further study of the coconut petiole borer is required before any control measures can be given. In particular, other host plants must be investigated and their influence established on attack by the coconut borer in the thick secondary growth of coconut plantings.

The biological control fauna should be thoroughly investigated to indicate methods of increasing its influence in reducing damage.

Finally the effect of coconut palm condition on the borer and its damage should be considered and modified appropriately by managing the secondary growth of plantings, i.e., by providing secondary growth that does not include

Table 3.—Monthly variation in numbers of eggs laid on young palms.*

		Date.															
		1964.												1965.			
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A
Total eggs on seventy-five palms.	Observed on youngest three petioles	0	3	0	0	6	16	24	33	26	....	6	19	0	0	4	
	Estimated on all petioles	0	4	0	0	9	23	35	48	38	....	9	28	0	0	6	

* Data obtained from five-year-old palms at Tolana, Santa Isabel.
Estimated using data presented in *Table* 1.

hosts of the coconut petiole borer, that encourages the biological control fauna, and that improves nutrition of coconut palms whilst at the same time increasing the resistance of coconut palms to the coconut petiole borer.

Brown (1958) noted the restricted distribution within the Solomons of another coconut pest *Amblypelta cocophaga* (Hemiptera : coreidae) ; the premature nutfall bug occurs on the New Georgia group, Guadalcanal and Malaita. Now with the record of another pest in the Solomons with restricted distribution, the introduction of inter-island quarantine should be considered.

The dangers of transporting coconut frond material from one island to another should be publicised using all mass media. Legislation and enforcement of legislation is probably impracticable, so further research should be done to ensure the availability of control methods following the accidental introduction of the coconut petiole borer to other islands.

Inter-territory quarantine should prevent the coconut petiole borer being introduced to the Territory of Papua and New Guinea, Bougainville neighbours Choiseul.

REFERENCES.

BROWN, E. S. (1958). Revision of the genus *Amblypelta* Stal (Hemiptera : coreidae), *Bull. ent. Res.*, 49 : 509-541.

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