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Classification
Tropical Crops
Plant and Animal Quarantine

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Plant Pest Control

The main aim of this Information Circular is to indicate the present state of research in the South Pacific on the coconut parasite Brontispa longissima Gestro.

In 1965, Manciot reported that dieldrin spraying applied every four weeks was effective (R. Manciot - Lutte chimique contre le Brontispa du cocotier, Oléagineux 20 - 1965).

Cochereau, Entomologist of ORSTOM (Office de la Recherche Scientifique et Technique Outre-mer), Nouméa, began experimenting at the I.R.H.O. Station on Santo island (New Hebrides) on the effect of Azodrin and Bidrin systemic insecticides injected into the trunks of coconut trees. The injected dose and the distribution of the product in the plant are tested.

It should be noted that Azodrin has already been successfully used against the stick-insect, Graeffa crouani Le Guillou (Phasmidae) in Western Samoa.

However, research workers are especially interested in biological solutions. As a result Cochereau, in June 1970, began to breed and made releases of the parasite Tetrastichus brontispae Ferr. (Hymenoptera - Eulophidae) in coconut plantations heavily infested with Brontispa on the I.R.H.O. Station of Santo (New Hebrides). The parasite is settling down and is spreading.

Millaud, who introduced this parasite in Tahiti in 1962, obtained excellent results.

The fight against the Brontispa goes on in the British Solomon Islands Protectorate under the direction of J.H. Stapley, Entomologist. Moreover, the South Pacific Commission has allocated A$ 1000 for this research-work. A copy of Mr Stapley's report, dated 27 February 1970, unabridged, is attached.

Other information is included following Mr Stapley's report which will be of special interest to the officers of agricultural services responsible for the protection of cultivated plants.

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THE INTRODUCTION AND ESTABLISHMENT OF THE BRONTISPA PARASITE IN THE SOLOMON ISLANDS

BY

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ENTOMOLOGIST

Introduction

Tetrastichus brontispae Fer. is a tiny wasp-like insect and parasitises the pupal stage of the coconut leaf beetle Brontispa longissima Gestro. A consignment of the parasite was brought into the Solomon Islands by the writer in July 1968 from Tahiti where it had been collected from Mons. R. Millaud, Chef de Section, L'economie Rurale.

Tetrastichus had been introduced into Tahiti by Mons. Millaud in 1962 for the first time and later introductions were made in 1963. Checks made from time to time showed that the maximum degree of parasitism to be 38.45%.

Release & Spread of Parasite

A release of the parasite was made in Yandina in the Russell Islands on July 15th in 5 acres of young coconuts of the variety FMS. This variety of coconuts is particularly susceptible to Brontispa and in this area the infestation was 100%. Further consignment of Tetrastichus were received from Tahiti and further releases made in the same area of coconuts. The last release was made on October 10th, 1968, bringing the estimated total of parasites released in this area to about 10,000 individuals. The object of such a large concentration of parasite was to secure a saturation of the area which was heavily infested by Brontispa.

The method of release is to place tubes containing the emerging parasites in the fork of a palm frond horizontally so that the parasites can escape but cannot be swamped by rain. The first check was made on December 27th when parasitised pupae were found on coconuts in the release area. The degree of parasitism was 23% which was quite satisfactory and showed that the parasite was alive and breeding naturally.

A second check was made on February 20th, 1969, also in the area of release and on this occasion the degree of parasitism had risen to 78% of the pupae found. Furthermore, parasites were found for the first time outside the release area and the degree of parasitism estimated to be about 50% in this area. A further and more extensive check was made on April 28th. On this occasion, the parasite had spread into all neighboring coconut plantations mostly containing small palms. The degree of parasitism was variable but in some plantations reached 100% of the pupae found. The original release area was now virtually free from the ravages of Brontispa which had been so clearly evident at the time of the original release. It was estimated that the parasite had now spread over an area of at least 50 acres from the original 5 acres.

Subsequent checks were made from time to time and the parasite was found in many new areas of coconuts. Spraying against Brontispa, normally carried out every 2 months had been stopped in areas neighboring the original area of release from the beginning and further areas were left unsprayed as the parasite spread.

By February 1970, a total of 500 acres of young coconuts were left unsprayed in the interest of parasite activity. At this time, a much more extensive survey was undertaken and the parasite found easily. As a result of the

survey, the parasite was found to have spread from one coast to the other, a distance of about 1½ miles and the total area covered to be about 1,000 acres. This area is not of course solid coconuts and many areas are solely bush but the parasite appeared to have spread successfully around such obstacles. Another area, which was still being sprayed, was also examined as it was separated from the original area of release and spread by an isthums leading to a small peninsular. The parasite was also found in this area despite the sprays which had been applied as a routine. The parasite had also been found westwards about 2 miles from the original area. The total area covered by the parasite was now estimated to be in the region of 2,000 acres of land.

Breeding

Obviously, to make an effective contribution to the control of Brontispa over the whole area of young coconuts in the Russell Islands it would be necessary to distribute that parasite artificially and perhaps to breed it, as a means of carrying out this intention. To this end, a special breeding cabinet was constructed containing a strip light, to activate the parasites, and heaters to secure an even temperature. The procedure is as follows: Pupae of Brontispa must be supplied to the Tetrastichus but the pupae must be not more than 48 hours old. To obtain such pupae, it is necessary to collect Brontispa larvae and hold them in jars in the laboratory on coconut leaves. The larvae are found in the tightly rolled spike in the centre of the palm, (either young or old). In due course, they will enter the pupal stage. Sorting through the larvae every day ensures that the pupae found are no more than 24 hours old, ideal for parasitism. Pupae collected in the field are invariable too old and simply change: into beetles, as the pupal stage lasts only 5 days.

Pupae of the correct age are placed in tubes about 6 per tube together with about 10 Tetrastichus in each tube with the pupae. The tubes are then illuminated with a strip light of 10-15 watts at a temperature of 85 deg. Fah. After 24 hours the tubes are removed to another chamber also at 85 deg. Humidity must be kept up by placing in the tubes slips of filter paper which are kept moist by a little water 2-3 times a day. After 5 days, these pupae which have succumbed to the parasites, turn dark in colour as their contents are gradually consumed. The parasites bite their way out of the pupal case about 17 days later. For the last 8 days of this period, it is desirable that the tubes should be placed in another chamber kept at a lower temperature of about 78 deg. and the slips of paper moistened. If the pupal case becomes too hard, the parasites are trapped within.

The breeding of parasites is by no means straightforward and requires constant attention to detail. The cabinet must be inspected frequently to check on the temperature and the slips of paper moistened regularly. This procedure must be maintained over week-ends. If the ambient temperature is high and liable to go higher with the operation of the strip light, it is necessary to house the cabinet in an airconditioned room running at about 78 deg. High temperatures seem to weaken the parasite and it survives for a shorter time when exposed to temperatures over 85 deg.

When the parasites emerge from the pupal cases, they live normally for about 48 hours, sometimes longer. All attempts to feed them have ended in disaster as the smallest trace of moisture in the tubes traps the tiny insects.

By maintaining a constant temperature in the chambers, no moisture film develops inside the tubes but the inclusion of drops of sweetened water or honey in the tubes invariably leads to the insects becoming trapped in moisture films or drops.

The summarised procedure is as follows:-

1. Six pupae about 24 hours old per tube with 10 Tetrastichus.

2. Tubes kept for 24 hours within ten inches of a 10-15 watt strip light at a temperature not exceeding 85 deg. Fah.

3. Rearing tubes placed in chambers temperature 85 deg. for 9 days. Slips of paper moistened twice a day.

4. After 9 days, tubes removed to another chamber with variable temperature from 78 deg. - 85 deg. from night to day. Moistening the slips of paper maintained.

5. Tetrastichus emerging about 17th day after egg laying.

Results

An attempt at breeding was made in the latter part of 1969, after the arrival of the breeding cabinet.

Difficulty was found in maintaining a constant supply of Brontispa

larvae from plantations on Guadalcanal so that pupae too old were often used in error. During this period, a total of 773 pupae were put up with Tetrastichus parasites. Of these 25% became parasitised and these pupae yielded an average of 13 parasites per pupa. This level of reproduction is not enough. At least 50% parasitism is desirable which would increase the number of parasites produced. The number of parasite emerging was about double the numbers utilised for breeding, whereas the desirable number would be x 5 or x 10. With more skill from experience, it should be possible to obtain such numbers. Actually the degree of parasitism obtained in breeding is similar to that first achieved in Tahiti.

Future Proposals

It is desirable to set up new centres of parasite infestations. This can be accomplished by -

1. Collection of parasitised pupae from Brontispa infested coconuts and their transfer to new coconut plantations already infested with Brontispa.

2. Rearing of new parasites in the laboratory according to the procedure outlined above and then release.

Acknowledgement

Levers Pacific Plantations Pty. Ltd., provided the site for the release of the parasites. Their help and interest is gratefully acknowledged.

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COCHEREAU (ORSTOM, Noumea) visited Santo (New Hebrides) in June 1970 to look for and send to Africa the pest Pleurotropis parvulus Fer. (Hymenoptera, Eulophidae) introduced into the New Hebrides in 1938 to combat Promocotheca opacicollis-Cestro (Coleoptera, Hispinae). This pest will be introduced into the Ivory Coast to control a destructor akin to the oil palm pest Coelaenomenodera elaeidis Maul.

A NEW FRUITFLY IN FRENCH POLYNESIA

Following a request for determination of a new fruitfly, at the time unknown in French Polynesia and discovered by using traps near mango trees, the Entomology Division of the Tropical Agricultural College of the University of Hawaii has identified, in the specimens sent:

(Dacus) Strumeta tryoni Froggatt.

TRUST TERRITORY OF THE PACIFIC ISLANDS

A notification published by the High Commissioner of the Territory on 4th February 1969 amends the Plant and Animal Quarantine Laws of 17 June 1959.

The notification authorizes importation of bananas from Central and South America, providing such bananas are imported from the United States and that they have been legally imported into the United States in accordance with U.S. Department of Agriculture plant quarantine regulations.

FAO Plant Protection Bulletin
Vol. 17 - 3 - June 1969.

GIANT SNAIL CONTROL (ACHATINA FULICA)

(according to Cochereau - ORSTOM, Noumea)

Preventive action

Prevent the introduction of this major destructor into the islands. To achieve this, it is necessary, in the first instance, to warn populations on the seriousness of the damage this mollusc can cause to crops and gardens and to ensure strict quarantine action.

This snail can be introduced into the islands as:

- juveniles and adults

- eggs

a) Juveniles and adults

- warn the populations against the danger of introducing this snail for breeding (for food) or for zoological attraction.

- check on all green plants leaving an infested island.

b) Eggs

- avoid exporting vegetable mould in any form (leaf mould, compost, flower pots etc.) because the snail lays its eggs in mould found in damp and shady places and reproduces very rapidly.

Curative action

The following control measures are recommended:

- the systematic harvesting and destruction of all snails and eggs found (school pupils can be given a reward for their catch). The snail has nocturnal habits, it lives in damp and shady places; it is fond of Crinum Hibiscus, paw paw trees, banana trees, sugar cane, etc.

- spraying of the top soil (mould, damp places, rotting wood) with a residual insecticide (aldrin, dieldrin)

- poisoned bait, sawdust and metaldehyde (common commercial products) scattered usually in granulated form.

If these measures do not exterminate the snail a biological control programme should be considered, possibly by introducing predator snails such as those of the following families Rhytididae (Rhytida), Spiraxidae (Euglandina) and more especially Streptaxidae (Gonaxis)

Comment: In most cases, Achatina was introduced by man into territories where, because of its high reproduction rate, and its exceptional appetite, it quickly became a major destructor. A person, unaware of the danger, can

bring a few snails into an island as a zoological attraction or to breed the snails and eat them. Before the second World War there was in fact a considerable trade of this mollusc with Japan.

ISSUED IN THIS SERIES

		Classification
1.	Annual Conference of O.I.E. held in Paris 13-18 May, 1968, Report of SPC Observer. September 1968.	Livestock Production and Health
2.	South Pacific Commission Publications' Series. October 1968.	Publication
3.	Free Diving Without Breathing Apparatus - Its Accidents. March 1969.	Public Health
4.	"A" Level: Australia's Notification on Bovine Pleuropneumonia Regulations. March 1969.	Plant and Animal Quarantine
5.	Study Tour to Noumea, Brisbane, Territory of Papua and New Guinea and British Solomon Islands Protectorate. March 1969.	Tropical Crops
6.	"A" Level: Agricultural Education - Bulletin No. 1. April 1969.	Agricultural Education
7.	Introduction and Spread of Culicoides and Other Insect Species by Aircraft. May 1969.	Public Health
8.	Diarrhoeal Diseases in Adults. May 1969.	Public Health

9.	"A" Level: Agricultural Education - Bulletin No. 2. May 1969.	Agricultural Education and Extension
10.	"A" Level: Agricultural Education - Bulletin No. 3. November 1969.	Agricultural Education and Extension
11.	Agricultural Extension Workshop - Western Samoa. November 1969.	Agricultural Education and Extension
12.	Asian-Pacific Weed Science Society. December 1969.	Tropical Crops
13.	The Status and Potential of the Chilli Industry in the Solomon Islands. December 1969.	Tropical Crops
14.	Manpower Planning in the South Pacific. March 1970.	All
15.	Fibreglass Water Tanks. April 1970.	Public Health Engineering
16.	U.N. World Youth Assembly. May 1970.	Social Welfare and Youth
17.	News and Views from the Journals. June 1970.	Public Health
18.	Acute Rheumatism and Chronic Rheumatic Carditis in Fiji. June 1970.	Public Health
19.	Public Health Problems of Gonnorrhea and Syphilis. June 1970.	Public Health
20.	Clinical Aspects and Diagnosis of Leprosy. June 1970.	Public Health
21.	News and Views from the Journals 2: On Insects and their Control. June 1970.	Public Health Environmental Health and Vector Control

22.	Breadfruit Diseases in the South Pacific. June 1970.	Tropical Crops
23.	Second World Consultation on Forest Tree Breeding. June 1970.	Forestry
24.	Agricultural Research in the South Pacific. July 1970.	Tropical Crops Livestock Production and Health
25.	Crown-of-Thorns Starfish. July 1970.	Fisheries
26.	Counter-Attack - Crown-of-Thorns Starfish. September 1970.	Fisheries
27.	A Simple Field Test for Determination of Salinity of Water Supplies. December 1970.	Public Health
28.	Asian Coconut Community. January 1971.	Tropical Crops
29.	O.I.E./F.A.O. Regional Conference on Epizootics in Asia, the Far East and Oceania. January 1971.	Livestock Production and Health
30.	Plant Pest Control. January 1971.	Tropical Crops Plant and Animal Quarantine