

Report of the Crop Protection Division - 1979

1. *Promecotheca cumingi*

Some areas in Galle, Ambalangoda and Katunayake were affected with this pest during 1978 (Mahindapala, 1978). Monthly population counts were taken at these three localities from early 1978. By January 1979, areas in and around Katunayake were free of the pest. As reported in the annual report of 1978, an outbreak of this pest occurred in Galle area during the latter part of 1978. The reasons for the outbreak were rather obscure, but an apparent 'one-stage condition' was observed in these areas.

As the population of the parasite, *Dimmockia javanica*, was not building up resulting in a resurgence of the pest, a parasite breeding station was established in February 1979 at the premises of the Tea Research Institute sub-station at Kottawa, Talgampola. A field-collected nucleus culture of *Dimmockia javanica* was initially used to build up the parasite culture. During a routine survey in Galle area in March, the larval/pupal parasite *Pediobius parvulus* was found parasitizing *Promecotheca* in two localities, and these were brought to the laboratory to initiate breeding. Both parasites were bred in large numbers and released in the field.

The parasite, *Pediobius parvulus*, established very quickly in the field. It is relevant to mention here that out of the two introduced parasites, *Dimmockia javanica* has been solely responsible for controlling *Promecotheca* during the major outbreak of 1971. Although at that time a considerable number of the parasite, *Pediobius parvulus*, had been bred and released, it failed to establish. Recoveries of this parasite had been made only twice during the major outbreak period.

The usefulness of *Pediobius* with its long adult life to control the pest which was in an apparent 'one-stage condition' was commented on in the annual report of 1978. As thought then, the parasite executed an excellent control in the Galle area after large numbers were liberated. By July, the pest population decreased considerably and the palms were on a definite path of recovery.

In addition to releasing laboratory bred parasites, a system of re-distribution of parasites by collecting parasitized mines from areas of high parasitization and re-locating them in areas of low parasitization was also undertaken.

In January 1979, a total area of approximately 5000 acres was severely affected. The spread of the pest was effectively arrested by the end of May 1979, by which time the total area under severe infestation had increased to approximately 6000 acres (Fig. 1).

The area under infestation in Galle was divided into eight localities and populations of the pest and the parasite were monitored monthly. During periods of heavy infestations, population counts were taken at even shorter intervals. The results of these studies (Perera, P.A.C.R., personal communication) are given in Figure 2 where changes of parasite activity are given for eight localities. Figure 2 I gives the average figures for the Galle area.

In 1978, the pest was first detected in China Gardens, Galle and the parasites were first released there. The parasite establishment was quick, and by September, about 80% parasitization was evident (Fig. 2 C).

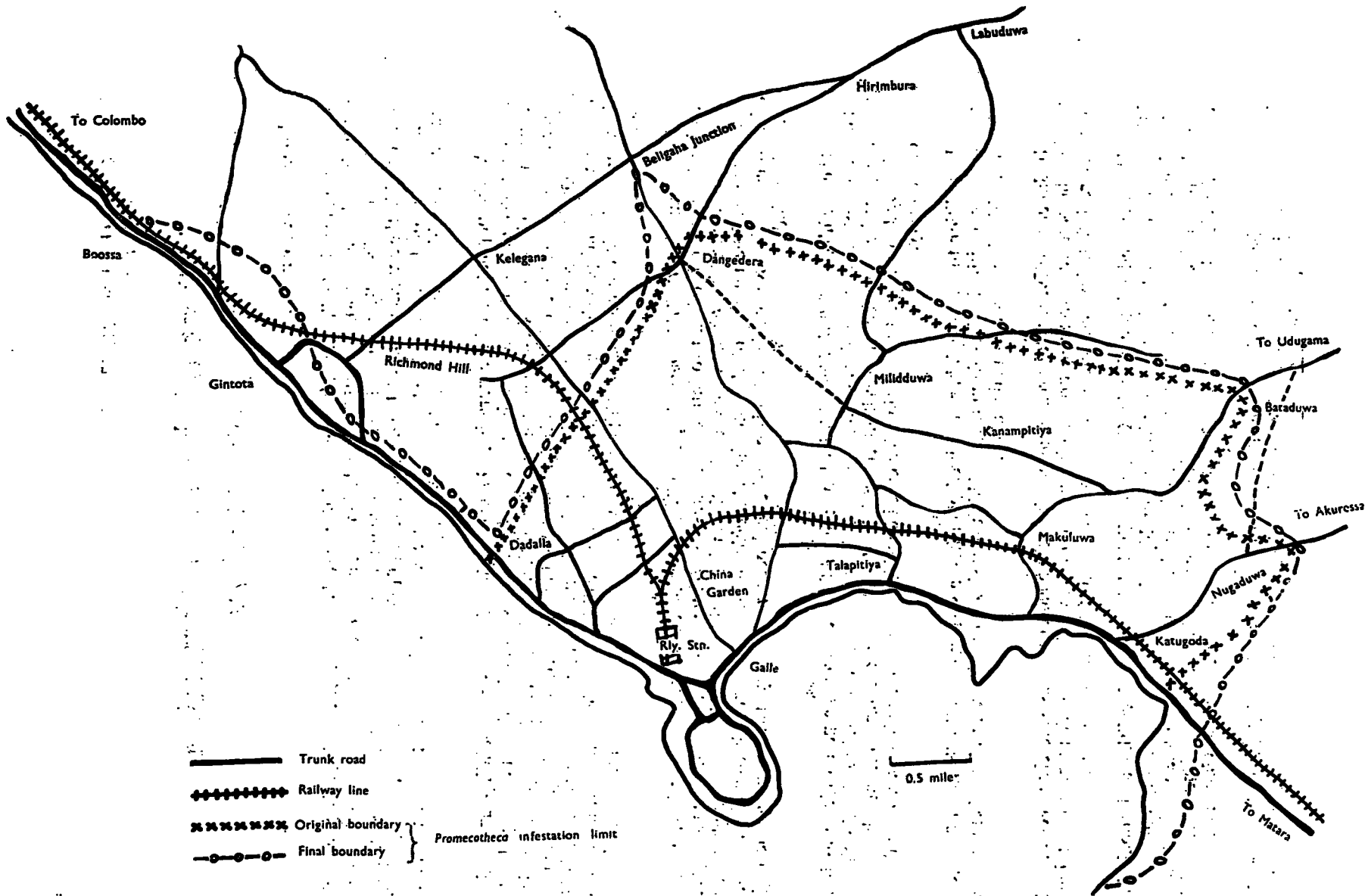


Fig. 1. Spread of *Promecotheca cumingi* in the Galle area.

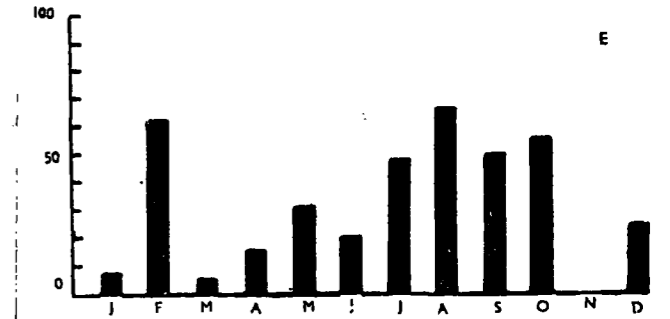
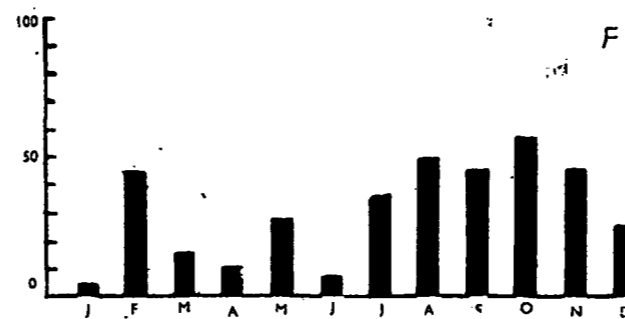
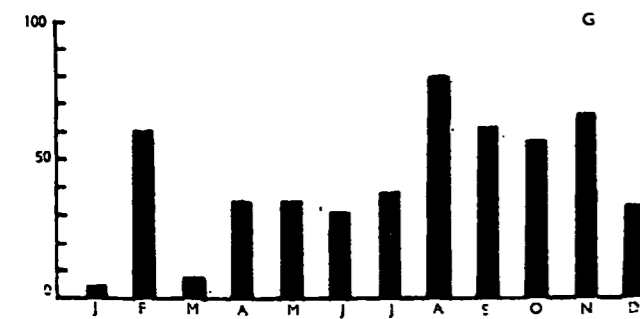
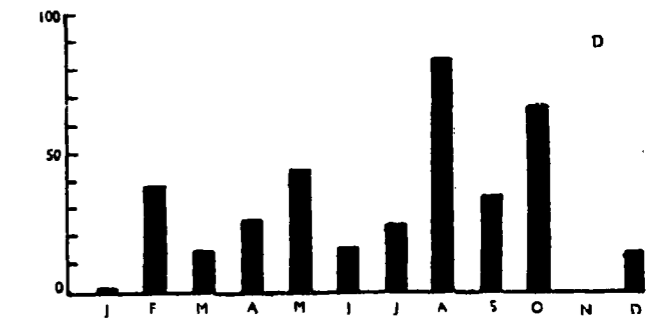
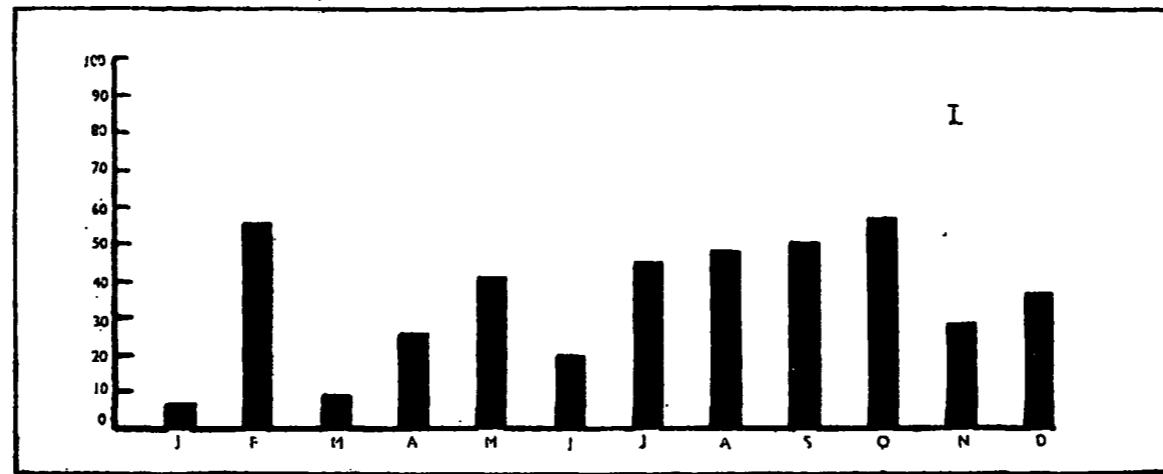
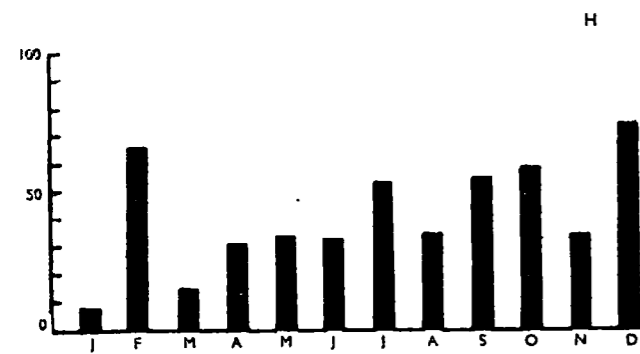
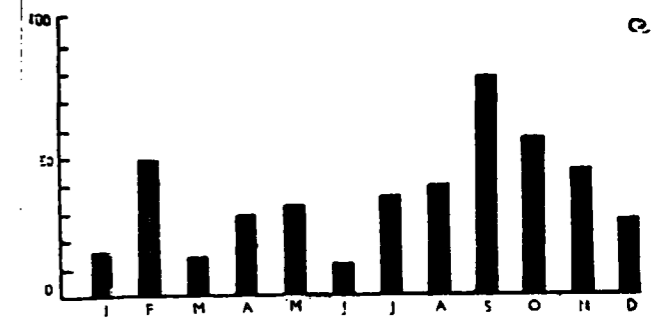
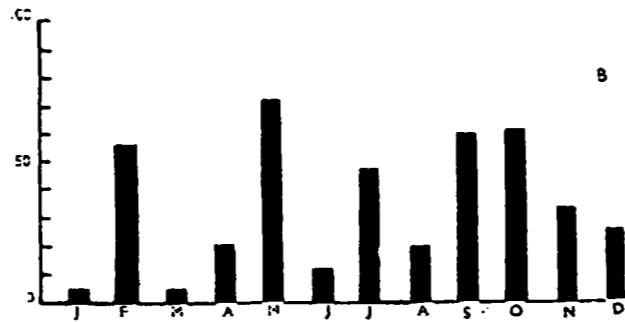
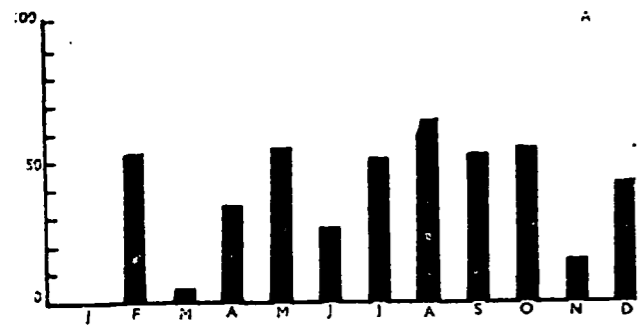


Fig. 2-*Promecotheca cumingi* in the Galle area.percent parasitism in some sampling sites.

A—Dadalla

B—Dangedera

C—China Gardens

D—Bataduwa

E—Makuluwa

F—Thalapitiya

G—Milidduwa

H—Katugoda

I — Overall percent parasitism, Galle area

Bimonthly pattern of population fluctuation of the parasite was the feature in 1978 and during the early part of 1979. It was thought that the 'one-stage condition' was the contributory factor for this phenomenon. However, with the liberation and re-location of parasites, this trend ceased, and from June onwards, a gradual buildup of the parasite was evident (Fig.2 D). At Bataduwa and Makuluwa (Fig. 2 D and 2 E), parasites have not been recorded in November, as there was no pest.

During surveys in 1979, several minor pockets of infestation were observed north of Galle (Gintota, Boossa) and parasites were released in these areas too.

The pest activity was slightly evident at Ambalangoda too. The parasites were released and re-located in these areas and it was possible to completely control the pest in these localities by July, 1979.

By December, 1979, the coconut palms in the affected areas of Galle had almost completely recovered. The Institute will continue its activities with a programme of surveillance in these areas.

The honourable Minister of Coconut Industries together with the Secretary of the Ministry, accompanied by the District Minister Galle and Member of the National State Assembly, Galle, visited the affected area during early 1979 to obtain first hand information of the pest outbreak.

2. The Coconut Caterpillar (*Nephantis serinopa*)

Pest position in 1979

This pest remained a problem in Vitarandeniya area in the Southern Province. During the latter part of 1978 and the early part of 1979, this pest spread quickly around the initial outbreak area. The area under infestation was estimated to be around 1000 acres, and some plantations in the following villages were affected:

Bedigama and Rote, Vitarandeniya
 Tenagama and Dematawela, Vitarandeniya
 Beligalla, Mahaheella and Pallaththara, Beliatta
 Puwakdandawa and Sitinamaluwa, Beliatta
 Marakolliya, Tangalla.

During 1978, the pest control strategy had been the judicious use of insecticides and parasites (*Eriborus trochanteratus*, *Perisierola nephantidis* and *Trichospilus pupivora*). The same techniques were employed during the year under review in the Southern Province. Spraying of insecticide was resorted to only in instances where pest populations were very high and parasite populations remained very low or were absent. This is first verified by a series of pest/parasite population studies. Consequent to such studies insecticidal spraying was carried out on about 60 acres of land in the Vitarandeniya area. Appropriate parasites in large numbers were released after spraying.

The observations taken from these trials indicated the necessity to carry out the control programme according to a strict time schedule. When insecticidal spraying was carried out in a severely affected estate, the pest numbers were immediately reduced, and it is then necessary to start parasite liberations at once when the pest is at a more manageable level. If the parasites are not released immediately, the pest multiplies extremely quickly as was seen in an estate at Vitarandeniya, presumably due to the killing of naturally-occurring parasites by the insecticides. Any delay in releasing parasites or carrying out a second spray would offset the benefits of the first spray. By the end of the year, the pest in a much active state was observed in about 50 acres.

This pest also caused damage to coconut plantations at Ambalangoda, Ja-ela and Chilaw. Severe infestations at Ja-ela were treated with insecticides, and with subsequent release of parasites, particularly *Trichospilus pupivora*, the pest was brought under control towards the end of the year. The infestation on the coastal strip at Chilaw was also brought under control by releasing large numbers of parasites. The control achieved at Ambalangoda was much less satisfactory due to the poor cooperation of the general public. The affected palms on the coastal strip at Ambalangoda are far too tall to attempt spraying with insecticides and the owners are not interested in carrying out the control programme. Large numbers of parasites were supplied to the Regional Office of the Coconut Cultivation Board which kindly agreed to release them in infested localities.

During the year under review the officers of the division toured the Eastern Province twice. At the time of the cyclone in November 1978, the pest was present at a few localities north of Batticaloa and at Kallar and Akkaraipattu. The coconut plantations in most of these areas were completely devastated by the cyclone resulting in a relative disappearance of the pest. During the survey carried out in early 1979 the pest was found surviving in small numbers in palmyra palms, *Borassus flabellifera*, which were relatively unharmed by the cyclone. It appears that these palms provided the refuge for the pest and a survey was carried out in several localities in the eastern province where the pest was present previously to ascertain whether the pest survived in palmyra palms.

These surveys reveal that out of nine localities in which the coconut caterpillar was present before the cyclone, only two localities show the presence of the caterpillar after the cyclone. The pest was present as an incipient mild attack. In both these localities caterpillar infested palmyra trees were observed growing alongside the coconut and the infestation on palmyra was found to be heavier than on coconut. These investigations are being continued.

During the second survey carried out in late 1979, the pest was observed in small numbers at Akkaraipattu and Saukady. The pest position in the Eastern Province was monitored regularly by an employee stationed at Mylambavely and, where necessary, parasites were despatched from the headquarters to be released in affected areas.

Biological control programme

The Parasite Breeding Station at Mylambavely, which was extensively damaged by the cyclone, did not function during the year. The restoration work commenced towards the latter part of the year. As the pest was observed in negligible numbers, parasites were not needed.

The Insectary at the headquarters functioned smoothly and the following parasites were bred:

Perisierola nephantidis
Eriborus trochanteratus
Trichospilus pupivora
Spoggosia bezziana

The parasite *Trichospilus pupivora* was found to be very active in the Southern Province and at Ja-ela and steps were taken to increase the output of this parasite which was bred on pupae of *Prodenia litura* reared on castor leaves.

The number of parasites released in different provinces are given in Table 1.

Table 1. *Release of parasites of the Coconut Caterpillar (1979)*

		North Western Province	Western Province	Southern Province	Eastern Province	Total
<i>Perisicrola</i>	...	8,000	9,630	52,620	—	70,250
<i>Eriborus</i>	...	1,085	9,815	1,900	—	12,800
<i>Spoggosia</i>		1,800	925	—	—	2,725
<i>Trichospilus</i>		24,600	406,450	586,250	9,000	1,026,300
Total		35,485	426,820	640,770	9,000	1,112,075

Several field experiments on the biology, ecology and population dynamics of this pest were carried out in the Southern Province (Vitarandeniya) and at Ja-ela. The results of these experiments will be published separately.

3. The Coconut Scale — *Aspidiotus destructor*

During the year under review, five reports of this pest were received; three from North Western Province, one from the North Central Province and one from the Southern Province. In all these localities, the pest was controlled by naturally-occurring predators, *Chilocorus nigrinus* and *Pullus xerampelinus* and the parasite *Aphytis chrysomphali*.

Several field studies on the behavioural response of the indigenous parasite *Aphytis chrysomphali* were carried out during the year and the results will be reported separately.

4. The Red Weevil — *Rhynchophorus ferrugineus*

Several reports of this pest were received and these were referred to the Coconut Development Officers for inspection.

Attempts were under way to build a modified electronic detector of the Red Weevil with the help of an electronics expert of the Food and Agricultural Organization, resident in Sri Lanka.

5. The Black Beetle — *Oryctes rhinoceros*

A few reports of this pest on young plantations were received. The growers were advised on plant sanitation aspects.

A consignment of Ethyl Chrysanthemumate was procured to carry out trials on attractants. An olfactometer was made with eight compartments which were connected with a central compartment with 3.5 cm diameter duct. Different attractants were placed in the compartments and 20 adult beetles were released in the central compartment. The experiment was carried out separately with unmated males as well as virgin females in the central compartment. Beetles of the opposite sex (unmated males and virgin females) were placed as the attractant. After 24 hr the population of beetles in each compartment was noted. The results of several trials are presented in Table 2.

Table 2. Response of black beetle to different attractants

Attractant	% beetles attracted	
	Unmated males	Virgin females
1. Pure sand	5	5
2. Sand and cowdung mixture	0	15
3. Ethyl chrysanthemumate	10	0
4. Split petioles	10	25
5. Cowdung	20	15
6. Unmated males (four)	—	30
7. Virgin females (four)	50	—
8. Blank	0	10

The results indicate that black beetles are positively attracted to virgin females. Further work on this and the use of Ethyl Chrysanthemumate in the field is being carried out.

Towards the end of the year, a field trial to test the efficacy of three commonly available organochlorine compounds as repellants was initiated at Wennappuwa. The insecticides tested are B.H.C. dust, Aldrin dust and Aldrin (E.C.).

6. Biological control of *C. romolaena odorata*

The defoliator insect, *Ammalo insulata*, was found to be established in many areas where the weed, *Chromolaena odorata* (= *Eupatorium odoratum*), was present.

During the early part of the year several field trials were carried out to study the life cycle, in particular the pupal stage, of the pest. Some factors responsible for the heavy pupal mortality observed in the field were elucidated and these will be reported later.

During the latter part of the year, a field study was undertaken at Malwana to study the population fluctuation of the defoliator insect. Periodic population counts were taken for this purpose.

No recoveries of the flower-attacking weevil, *Apion brunneonigrum*, first released in 1976, were made.

7. Diseases

- (i) **Bud Rot**—Only a few reports of the occurrence of this disease were received. However, an outbreak of the disease at Nalawalana (near Makandura - NWP) was controlled by spraying neighbouring healthy palms with a copperbased fungicide as a prophylactic measure. Although, initially, the pathogen appeared to spread, the treatment controlled the spread.
- (ii) **Stem Bleeding and Leaf Blight** — Several reports of the occurrence of this disease were received during the year under review. These were referred to the Coconut Development Officers for inspection and advice.

8. Plant Pathology research

- (i) The work carried out on Leaf Blight disease in collaboration with the Department of Biological Sciences of the Sri Jayawardenepura University during the academic year 1977/78 indicated that the fungus, *Pestalozzia palmarum*, was unable to infect healthy Coconut leaves (Mahindapala, 1978). Further work on inoculation of coconut leaves with this fungus was carried out at the Institute and the results were negative, indicating the nonparasitic nature of *P. palmarum*.
- (ii) Studies were carried out on the phylloplane mycoflora of coconut. In these studies the fungal flora of coconut leaves of varying ages was quantitatively assessed using standard techniques (see Bainbridge and Dickinson, 1972) with appropriate modifications.

The following fungi were isolated.

- Abisidia* sp
Acremonium terricola Gams
Alternaria alternata (Fr.) Keissler
 * *Aspergillus ustus* (Bain) Thom & Church
Asteromella cocoes Batis a & Bezerva
Botryodiplodia theobromae
Cercospora ? *canescens* Ellis & Mart
Cladosporium oxysporum Berk. & Curt
 ** *Curvularia lunata* Walker
Fusarium equisiti (Corda) Sacc.
Helminthosporium sp
 ** *Mucor* sp
Nigrospora oryzae Berk. & Br.
 * *Penicillium citrinum* Thom
 * *Penicillium* sp.
 * *Pestalozzia palmarum* Cooke
Phomopsis cocoina (Cooke) Punith.
Pseudocercospora sp
 * *Syncephalastrum racemosum* Cohn

The fungi marked (*) were consistently recorded from all leaves of the coconut palm irrespective of the age while those marked (**) were isolated from a majority of leaves.

These leaves were apparently healthy and did not show any Leaf Blight symptoms, yet *P. palmarum* was found on these. These observations indicate the surface-inhabiting, saprophytic nature of *P. palmarum*. A paper based on these results was read at the annual sessions of the Sri Lanka Association for the Advancement of Science and will be submitted for publication.

- (iii) A field experiment was started at Weligama to test the effectiveness of fertilizer on controlling the Leaf Blight Disease. Nitrogen, Phosphorus and Potassium fertilizers were used at different levels and the severity of blight was assessed regularly. The results of this experiment will be reported elsewhere.

- (iv) Several laboratory studies were carried out on the biology of *Pestalozzia palmarum* and *Drechslera incurvata*.
- (v) Some studies on soil mycoflora were initiated towards the end of the year to study the mycofloral activity in soils of differing nutrient richness.
- (vi) The culture collection of the division together with several entomogenous fungi was maintained by regular transfer.
- (vii) The results of the electron microscopy of tissues from Leaf Scorch Decline palms were still unavailable.

The yield records of a block of palms containing Leaf Scorch affected palms were maintained to study the progress of the condition.

9. Staff

- (i) M. S. Alagiah, V. Sithambarapillai, M. T. Aloysius and Velupillai, Grade II labourers of the Parasite Breeding Station, Mylambavelly, were transferred to the Coconut Cultivation Board with the closure of the Insectary. Mr. M. S. Velu, T. A., reverted to the headquarters.
- (ii) Messrs. P. A. C. R. Perera and A. M. Chandrasena were appointed Research Assistant and Technical Assistant respectively.
- (iii) Messrs. S. V. Sinnathamby and A. M. Chandrasena returned to the island after a course of training in biological control at the CSIRO, Canberra Australia. Mr. P. A. C. R. Perera participated in a course on the use of radio isotopes and radiation in entomology held in July/August by the IAEA/FAO at the University of Florida, U.S.A.
- (iv) Dr. R. Mahindapala, Crop Protection Officer, spent three months in the Philippines as an Advisor to the Educational Projects Implementing Task Force of the Ministry of Education and Cultural Affairs of the Government of the Philippines. He was also appointed a visiting lecturer in the Department of Botany, University of Kelaniya and in the Department of Biological Sciences, Sri Jayawardenepura University.

The Crop Protection Officer also served as a member of the Drafting Committee on Pesticides of the Bureau of Ceylon Standards. He was also elected as a member of the Faculty of Science of Sri Jayawardenepura University.

10. Lectures, Seminars, Publications etc.

- (i) Dr. R. Mahindapala gave a course of lectures on epidemiology of plant diseases to B. Sc. (Special) Students of the Visayas State College of Agriculture, Leyte, the Philippines.

The following seminars were also given by him:

- (a) On "The Coconut Research Institute of Sri Lanka and its activities" to the Faculty of the Visayas State College of Agriculture, Leyte, the Philippines.
- (b) On "Coconut Research in the Philippines" to the staff of the Coconut Research Institute of Sri Lanka.

Mr. S. V. Sinnathamby conducted a seminar in November at the Sri Jayawardanepura University on 'Biology and control of the coconut Scale, *Aspidiotus destructor* in Sri Lanka'.

(ii) Paper read

Mahindapala, R., (1978). Studies on leaf blight diseases of coconut. 35th annual session, Sri Lanka Association for the Advancement of Science 15-19 December 1979.

(iii) Papers published

Mahindapala, R. and Chandrasena, A. M., (1975). Yield and drupe characteristics of coconut palms affected with Leaf Scorch Decline. *Ceylon Cocon. Q.*, 26, 73—76.

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Sinnathamby, S. V., (1977). Developments in the control of coconut scale, *Aspidiotus destructor* Sign. in Sri Lanka. *Ceylon Cocon. Q.*, 28, 81—88.

Sinnathamby, S. V., (1977). Studies on the biology of *Pullus xerampelinus* Muls. (Coleoptera : Coccinellidae), a predator of *Aspidiotus destructor* Sign. (Homoptera : Coccidae) with a note on its parasite. *Ceylon Cocon. Q.*, 28, 94—100.

Fernando, P. and Mahindapala, R., (1977). Leaf Blight disease of coconut. 1. Studies on *Pestalotia palmarum*. *Ceylon Cocon. Q.*, 28, 73—80.

11. References

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