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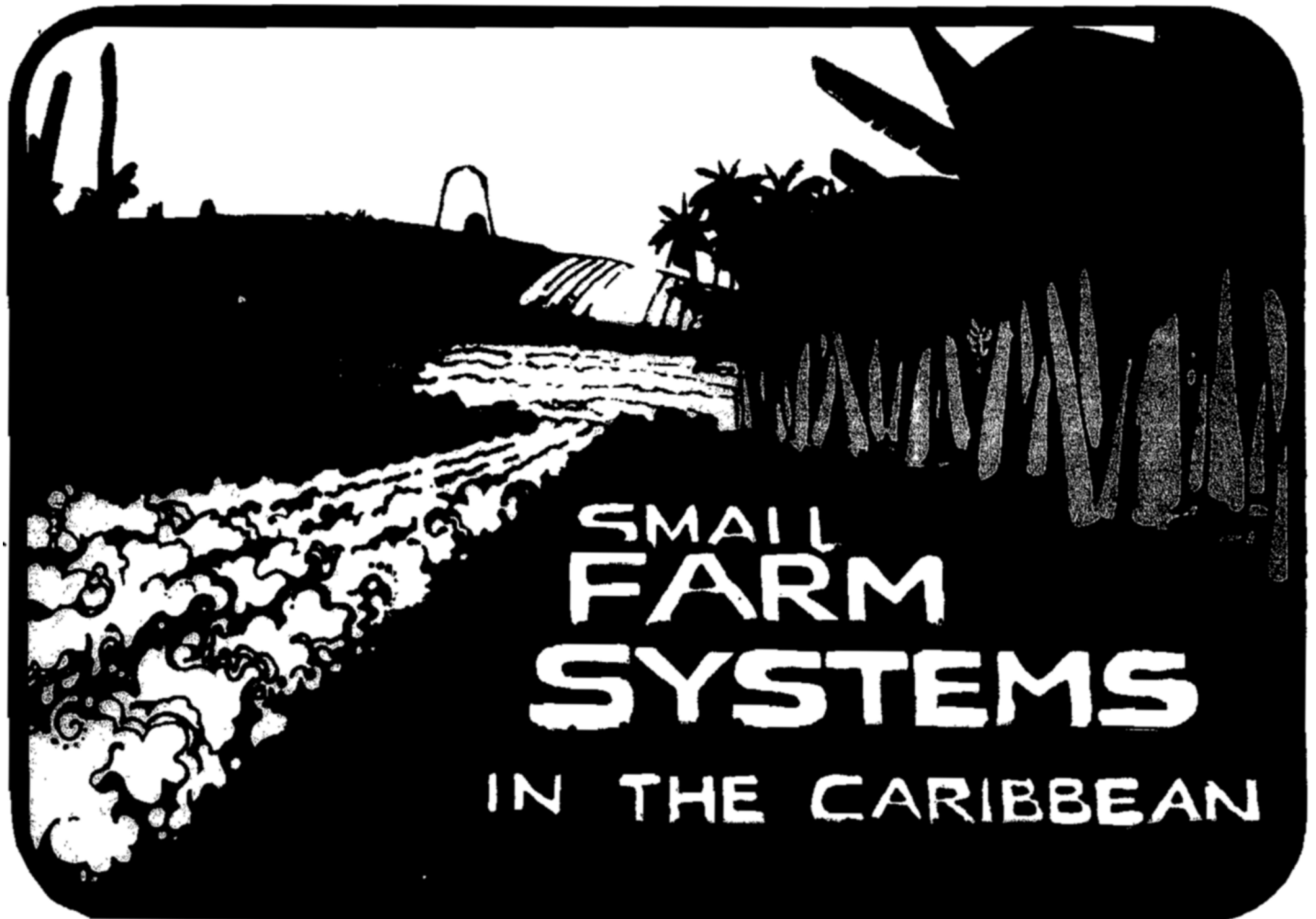
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Preliminary Investigations for Biological Control of *Brassolis sophorae* in Guyana

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The coconut *Cocos nucifera* is an economically significant crop in Guyana. *Brassolis sophorae* inflicts serious damage and causes yield loss. Native natural enemies do not provide adequate control. Biological control by importation of exotic natural enemies from other parts of South America has com-

menced recently and *Spilochalcis* sp. nr. *erythrina* has been introduced. Attempts are under way to procure other known parasites.

Keywords: Biological control, *Cocos nucifera*, *Brassolis sophorae*, Guyana, *Spilochalcis* sp. nr. *erythrina*.

The coconut, *Cocos nucifera*, constitutes an important source of edible fats and ranks third in importance to sugar cane and rice in the agro-economy of the Cooperative Republic of Guyana. The coconut butterfly *Brassolis sophorae* is a serious pest of coconut.

B. sophorae occurs in Trinidad and throughout tropical South America (Fruhstorfer, 1924; Kaye, 1921). Damage to coconut palm is inflicted by the larvae, popularly known as the coconut caterpillar, which strip the foliage leaving only the mid-ribs. Such trees lose an entire crop of nuts and usually the trees will only produce another crop a year or a year and a half after such an attack has subsided. Continuous and repeated attacks can result in mortality of the palm. Rai (1973) reported 20% loss of palms in one estate as a result of continuous infestation over two years.

Manthirana (1980) assessed the current uneconomic situation of the coconut industry and suggested measures to improve it, including attempts for biological control of *B. sophorae*. An investigation sponsored by the Food and Agricultural Organization of the United Nations was undertaken in 1982 to:

1. Evaluate the naturally occurring parasites and predators;
2. Introduce, breed and release exotic parasites; and
3. Evaluate control after release of parasites.

The following is a preliminary report of the investigations so far made.

Biology

The biology of *B. sophorae* has been investigated by Cleare and Squire (1934) and van Dinther (1960). Eggs are laid in groups arranged in a single layer on the leaf bases, the fibrous material in the crown and the spathe covering the inflorescence and the trunk. The hatching larvae live gregariously and pass through seven instars. Larger larvae construct nests by webbing together several leaflets. They hide during the day in these nests or other protected places, e.g., the narrow spaces between the bases of the leaf stalks and the fibrous material at the base of the crown, coming out at night in a procession to feed on leaves. On completion of larval development, they pupate in protected situations, viz., leaf bases under coconut husks on the ground. The egg, larval and pupal stages, respectively, last for 20-25, 76-91 and 11-15 days under ambient conditions in the Guyanas. The total egg to adult development period spans 110-129 days.

In addition to coconut, they feed on several other palm species including the oil palm, royal palm and cabbage palm.

Natural Enemies

Cleare and Squire (*op. cit.*) have reported egg parasites *Telenomus nigrocoxalis* Ashm. and *Anastatus reduvii* How., a larval parasite *Chaetolyga pyrhopryga* Wied. and pupal parasites *Brachymeria annulata* F., *B. incerta* Cress. and *Spilochalcis morleyi* Ashm. from Guyana. *C. pyrhopryga* was considered unimportant as it only parasitized 1% of the larvae.

During the present investigations, field work was undertaken in affected areas along East Coast Demerara, West Bank Demerara and Berbice County. Collections of eggs, larvae and pupae were made in several large coconut estates, viz., Drill, Letter "T", Robinson and Park estates, as well as in small holdings at Black Bush Polder, Lesbeholden, Cotryverton, Adventure, Village #63 along Corentyne Coast and along Canal #2 along the West Bank of River Demerara. The parasites reared included *Telenomus* sp. (Scelionidae) and *Anastatus* sp. (Eupelmidae) from eggs; *Brachymeria* sp. nr. *annulata* F., *Spilochalcis* sp. nr. *burmeisteri* Kirby (Chalcididae), *Paraphrissopoda chrysostoma* Wied. and *Sarcodexia innota* Walk. (Sarcophagidae) from pupae.

No larval parasite was encountered. The specific status of egg parasites could not be ascertained, but presumably these are the same reported by Cleare and Squire (*op. cit.*). The two Chalcid pupal parasites also determined at the Commonwealth Institute of Entomology are perhaps the same reported by the aforementioned authors. The status of the two Sarcophagids is not known. Larvae of most species of this family are scavengers and only a few are parasites of other insects.

The two egg parasites were obtained from collections of eggs along East Coast Demerara; only a few batches of eggs were collected in the Berbice county and none yielded parasites. The incidence of *Anastatus* sp. was negligible; only a few eggs in three egg-masses out of 89 collected at Drill and Letter "T" estates, yielded this Eupelmid. Only ten of the egg-masses yielded *Telenomus* sp. and only three of these had all the eggs parasitized.

Of the two Chalcids, *Brachymeria* was less abundant than *Spilochalcis*. Both were obtained mostly from pupae under heaps of husks, with very few pupae in the base of the crown yielding parasites.

It is quite evident that the native parasites of *B. sophorae* do not exert adequate control and there is a need to import exotic parasites which, if established, may regulate the pest populations

at a lower level. Mariconi and Zamith (1954), van Dintner (1960), Guagliumi (1972) and Herting and Simmonds (1975) recorded several other parasites of *B. sophorae* known from South America. These are given in Table 1.

TABLE 1. Distribution of parasites of *Brassolis sophorae* in South America other than Guyana.

Parasite	Stage attacked	Distribution
SCELIONIDAE		
<i>Telenomus</i> sp.*	Egg	Brazil, Surinam, Trinidad
EULOPHIDAE		
<i>Tetrastichus</i> sp.	Egg	Brazil
CHALCIDIDAE		
<i>Brachymeria ovata</i> Say	Pupa	Brazil
<i>B. annulata</i> Fabr.*	Pupa	Brazil, French Guyana
<i>Spilochalcis morleyi</i> Ashmead*	Pupa	Brazil, Paraguay
<i>S. nigrifrons</i> Cameron	Pupa	Brazil
TACHINIDAE		
<i>Belvosia bicincta</i> R.D.	Larva	Brazil
<i>Heminasipoda</i> sp.	Larva	Brazil
<i>Winthemia erythrina</i> Macq.	Larva	Brazil
<i>W. pinguis</i> Fabr.	Larva	Argentina, Brazil, Bolivia, Peru, Surinam
<i>Xanthozona melanopyga</i>		Brazil, Surinam

*Also reported from Guyana

In order to initiate a program of biological control by introduction of exotic parasites, exploration in Brazil, French Guyana and Surinam was planned to obtain stocks of these parasites, evaluate them and introduce promising species into Guyana. Selected species are to be bred at the facilities of the Entomology Division of the Central Agricultural Station, Guyana and released against *B. sophorae*. The program proposed two survey trips, one each to be made in the dry and the wet seasons in order to determine seasonal activity of parasites.

Surveys for Exotic Parasites

The first survey trip to Surinam and French Guyana was conducted during the wet season in July-August 1983. In French Guyana, *B. sophorae* was not encountered due to seasonal scarcity, whereas in Surinam, 24 nests containing 3,250 larvae were obtained at Jenny, Coroni West, Victoria, Jerrykaba and around Paramaribo. These yielded no parasites. As pupae were not obtained in the field, several lab-formed pupae were placed in coconut esrates. A few of these were attacked by the Sarcophagid, *Blaesexipha (Kellymia) plinthopyga* Wied.

The first survey in Brazil was made during May 8-25, 1984, in the midst of the wet season. It was restricted to the states of Sergipe, Pernambuco and Rio Grande do Norte. Activity by *Brassolis* in the states of Sergipe and Rio Grande do Norte was not detected. A few pupae were found at Feira Nova in the state of Pernambuco and these yielded *Spilochalcis* sp. nr. *erythrina*. A

nucleus culture of the Chalcid was taken to Guyana and a laboratory colony established at the insectaries of Central Agricultural Station. It was handed over to the local staff for maintenance and release under the terms of the project.

The second survey mission to Brazil is planned in November-December 1984 during the dry season.

DISCUSSION AND CONCLUSION

Recovery surveys in Brazil will be made after adequate numbers have been released. Attempts are under way to obtain other known parasites from Brazil. In case parasites from north-eastern South America fail to establish, explorations should be extended to other areas, i.e., Bolivia, Paraguay and Peru, which have not yet been explored for natural enemies. These surveys may reveal hitherto unknown parasites that may augment the native parasites in Guyana.

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