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Biological Control of the Palau Coconut Beetle, *Brontispa palauensis* (Esaki and Chujo), on Guam[1]

There are three species of coconut beetles, i.e., *Brontispa mariana* Spaeth, *Brontispa palauensis* (Esaki and Chujo), and *Brontispa chalybeipennis* (Zacher), known to occur in the Micronesian region. Their geographical distribution within Micronesia is very distinct. *B. mariana* in Saipan, Tinian, Rota, Yap, and Truk Islands; *B. palauensis* in Palau Islands (except Ngaiangl and Angaur); and *B. chalybeipennis* in Ponape, Kosrae, and Marshall Islands have been recorded (Gressitt, 1955). The primary host of these beetles is coconut palm, *Cocos nucifera* L. However, *B. palauensis* and *B. chalybeipennis* have been observed to feed on young *Pandanus* sp. and *Exorrhiza ponapensis*, respectively, in addition to coconut.

The Palau coconut beetle, *Brontispa palauensis*, is another one of the accidentally introduced pests to Guam. This beetle is a native of Palau Islands in the Western Carolines. It was first recorded by Chujo (1937) from Palau. Detailed morphological description of this insect has been reported by Hagen and Doutt (1950) and Gressitt (1955).

B. palauensis has been first noted on Guam in 1973 in Maite and Afame Heights. Inquiries in Maite revealed that there used to be a group of people from palau who lived in that area a few years prior to this observation. The infestation in Afame Heights, about a mile from Maite, took place probably by transferring infested coconut fronds from Maite to the solid waste dump in Afame Heights. Subsequently, the beetle has spread all over the island in about two years time. The spread of the beetle within a localized area was aided by the wind. However, its distribution to various parts of the island has been aided by the accidental transfer of infested coconut fronds from one area to the other for social events. The biology, habits, and attempts at biological control of *B. mariana* in Saipan have been reported by Lange (1950). The biology and habits of *B. palauensis* are similar to *B. mariana*. The adult beetle lays eggs in the folded tender leaves of the coconut palm. Grubs feed on the leaflets by scraping on the green tissue. Pupation takes place inside the folded leaflet or in-between leaflets that are tightly packed in the tender terminal leaf. Adults feed on the leaflets similar to their grubs.

Biological Control: The center of geographical distribution of the genus *Brontispa* is Austro-Malayan region (Lange, 1950). A number of indigenous parasites of *Brontispa* are known to occur in this region; however, only the larval and pupal parasite, *Tetrastichus brontispae* (Ferriere), has been widely used for biological control of *Brontispa* spp. in the Pacific region.

T. brontispae was introduced into South sulawesi (Celebes) from West java in 1932 and 1933 for the control of *Brontispa longissima celebensis* (Gestro). In 1933, the parasite was well established and a maximum of 90% parasitism was recorded. Attempts to establish this parasite against *B. longissima javana* Weise in East Java between 1932 and 1937, and Central Java in 1954, were unsuccessful (Rao et al., 1971). *T. brontispae* was introduced into Solomon Islands from Java in 1936 without significant results. Hence, it was reintroduced from Tahiti in 1968 and was successfully established (Stapley, 1971). *T. brontispae* and an egg parasite, *Haeckeliania brontispae* Ferriere, were introduced in 1948 to Saipan and Rota from Malaya and Java for the control of *B. mariana*. Of

[1] Contribution No. 10, Guam AES.

this, only *T. brontispae* established and *H. brontispae* did not (Lange, 1950). In 1963, *T. brontispae* was introduced and established into French Polynesia for the control of *B. longissima* (Millaud, 1966). In 1973, *T. brontispae* was introduced into American Samoa from New Hebrides for *B. longissima* control (Cochereau, 1973).

Since the observation of infestation of Palau coconut beetle, *B. palauensis*, on Guam in late 1973, efforts were made to introduce *T. brontispae* for biological control. In mid 1974, shipments of *T. brontispae* were received from Saipan, New Hebrides, New Caledonia, and British Solomon Islands. Initially, parasite releases were made in Maite and Sinajana. In early 1975, the field recovery of this parasite was made and further field releases were continued until 1977. Initial observations in Sinajana and Maite showed remarkable recovery of the *B. palauensis* infested trees after the establishment of *T. brontispae*.

Table 1. Percentage of Parasitism by *T. brontispae* on *B. palauensis* during erarly 1980

VILLAGE	% OF PARASITISM
Agana Heights, Maina	32
Agat, Santa Rita	34
Asan	76
Barrigada, Harmon	22
Dededo	12
Mangilao	16
Mongmong, Toto	2
Sinajana	72
Tamuning, Tumon	18
Yigo	26
Yona	48

During early 1980, an islandwide survey was done to estimate the parasitism by *T. brontispae* and the results are presented in Table 1. To determine parasitism, 50 last instar larvae and pupae were field collected from each village and incubated in the laboratory for the emergence of the parasites. The percentage of parasitism varied from as low as 2% in certain areas to a maximum of 76% in some other areas.

In addition to *T. brontispae*, an earwig, *Chelisoches morio* F., which lives on coconut palms was also found to feed on the larvae of *B. palauensis*.

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Predator Deterrent Effect of *Leucaena leucocephala* on the Coccinellid, *Cryptolaemus montrouzieri*[1]

Leucaena leucocephala (Lam.) DeWit, a native of Latin America, grows luxuriently on limestone plateaus of Guam and other Mariana Islands. It probably was introduced into Guam around 1860 by the Spaniards. In 1945, the United States Navy spread the seeds throughout Guam to revegetate the island in order to remedy the damages done to the vegetation during World War II (Fosberg, 1959). The possible uses of *L. leucocephala* as a forage crop and in biomass production have been reviewed by the National Academy of Sciences (1977) and Jones (1979).

In early 1977, the spherical mealybug,

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