

Recent History of Biological Control in the Freely Associated States of Micronesia

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Abstract—There have been many introductions of parasites and predators to the Federated States of Micronesia (FSM) but, in the majority of cases, their impact on the populations of the pests for which they were introduced has not been assessed.

In recent years, the release of biocontrol agents has reduced pest abundance of (i) the coconut scale on Kapingmarangi, Pohnpei, FSM, and Majuro, Republic of the Marshall Islands; (ii) spiraling whitefly on Nukuoro Island and the main island of Pohnpei; (iii) orange spiny whitefly on Pohnpei, Kosrae, Chuuk and Yap, FSM; (iv) green stinkbug, (v) bean leafminer, (vi) Siam weed, and (vii) fluted scale on Pohnpei, FSM.

Introduction

The introduction of predators, parasites and microorganisms as biological control agents to control pestiferous arthropods has been widely used on small islands and some introductions are credited with reducing pest populations. Since the 1940's, several introductions of beneficial organisms have been made to the Marshall Islands, the Federated States of Micronesia and the Republic of Palau. Notably, *Rodolia pumila* (Weise) and other species of coccinellids have been distributed for control of the fluted scale, *Icerya aegyptiaca* (Douglas), and the coconut scale, *Aspidiotus destructor* Signoret. Other introductions have included predators, parasites and a virus for control of the rhinoceros beetle, *Oryctes rhinoceros* (Linnaeus), predators and parasites for control of several whiteflies, predatory snails for control of the giant African snail, several insects for control of *Lantana* and *Clidemia* and several agents for the control of arthropods of medical importance (Dumbleton 1957, Schreiner 1989). Since the early introductions of beneficial organisms are discussed in those two papers, this report will focus on introductions in the late 80's and early 90's.

Recent Introductions

(i) *Encarsia haitiensis* (Dozier) (Aphelinidae)

The spiraling whitefly, *Aleurodicus dispersus* Russell, became a serious insect pest in many crops after it was accidentally introduced to Pohnpei, F.S.M. early

in 1986. The hymenopterous parasite, *E. haitiensis* was obtained from Guam in 1987 and soon became firmly established, reducing the spiraling whitefly population in 6 months (Esguerra 1989a). On Nukuoro Atoll, an outer, low-lying island south of Pohnpei, the spiraling whitefly was observed to infest banana, papaya, coconut and plumeria in 1988. *E. haitiensis* from the main island of Pohnpei was introduced that year and the whitefly is no longer a problem pest there.

The whitefly has also spread to Majuro where a very low population has been observed on coconut and plumeria, although *E. haitiensis* has not yet been introduced.

On a visit to Palau on January 23, 1991, the spiraling whitefly was observed on coconut and plumeria, but *E. haitiensis*, was already present.

(ii) *Encarsia smithi* (Silvestri) (Aphelinidae)

The orange spiny whitefly, *Aleurocanthus spiniferus* Quaintance, was identified as a serious insect pest of citrus on Pohnpei, Chuuk and Yap States. On Pohnpei in 1987, the undersurface of leaves of the majority of citrus trees was heavily infested with the whitefly, which produced such copious honeydew that the upper leaf surfaces lying below were covered with black sooty mold growing on the honeydew deposited on them.

In 1988, shipments of *E. smithi* adults were received from Guam. The adults were released on citrus trees at two sites in Kolonia, Pohnpei. Surveys conducted before releasing the parasitoids demonstrated the absence of natural enemies. Post release surveys conducted in 1988 showed that *E. smithi* was established and, in 1989, that high parasitization of the orange spiny whitefly nymphs was being produced by *E. smithi*. Now, orange spiny whitefly is no longer a problem pest of citrus on Pohnpei (Esguerra 1989b, Muniappan et al. 1991) or on Kosrae (Nafus 1987). *E. smithi* has also become established in Chuuk and Yap States and is responsible for the reduction of orange spiny whitefly populations.

(iii) *Chilocorus nigrinus* (Fabr.)

Pseudoscymnus anomalus Chapin (Coccinellidae)

The presence of severe coconut scale (*Aspidiotus destructor*) infestations on coconut, breadfruit, papaya and plumeria on Kapingamarangi Atoll (445 nautical miles south west of Pohnpei) was reported in June 1987. The majority of coconut and breadfruit trees had stopped bearing fruit as a result of the severe defoliation caused by the scale.

Two coccinellid predators were collected from Pohnpei and released on four occasions on coconuts on Kapingamarangi. After a year, observations revealed that most of the trees had started to recover from the scale infestation and high populations of the predatory beetles were present on most of the affected trees (Esguerra 1989c).

On Majuro, Republic of the Marshall Islands, the coconut scale also became a problem in 1988 on coconut, breadfruit, banana, papaya and plumeria. The two coccinellid beetles were released at Laura (on the northern side of the island). A visit in 1989 showed that they were also present at Rita (on the southern side

of the island). The majority of trees have recovered as a result of the establishment of the beetles.

(iv) *Trissolcus basalis* (Wollaston) (Scelionidae)

The green stinkbug, *Nezara viridula* (Linnaeus), has long been a serious pest of okra, cucumber and bean plantings on Pohnpei, feeding mainly on fruits and flowers.

On November 16, 1989, a shipment of *N. viridula* eggs parasitized by *T. basalis* was received from Hawaii State Department of Agriculture. Newly emerged *T. basalis* adults were released on vegetable plantings where there were high numbers of the stinkbug. Within six months this egg parasitoid had become established throughout the island and the green stinkbug is no longer a pest problem.

(v) *Chrysocharis oscinidis* Ashmead (Eulophidae)

Ganaspidium utilis (Cynipidae)

The bean leafminer, *Liriomyza trifolii* (Burgess), is a common pest of legumes on Pohnpei. Yardlong beans are particularly susceptible to attack which dwarfs young seedlings and may even kill them. Beans that survive severe infestation produce only very few, small pods.

On October 27, 1990, two parasitoids, *G. utilis* and *C. oscinidis*, were imported from the University of Hawaii. On November 3 and 5, 1990, adult parasitoids were released on leafminer-infested yardlong beans at Kolonia and at the Pohnpei Agriculture and Trade School, Madolenimw. Although no quantitative assessment of the impact of these two parasites on bean leafminer has been done, recent visual observations showed that leafminer damage was very low compared with the infestation observed a year earlier.

(vi) *Ophiomyia lantanae* (Froggatt) (Agromyzidae)

Lantana occurs along roadsides and open lands on Pohnpei and several biological control agents have been released for its control (Schreiner 1989). An additional biocontrol agent, the lantana seedfly, was received from the University of Guam and 45 adults released at Uh on April 10, 1991 and more than 200 adults at Madolenimw on April 17, 1991. It is not yet known whether the fly has become established.

(vii) *Rodolia pumila* (Weise) (Coccinellidae)

An outbreak of the fluted scale, *Icerya aegyptiaca*, on breadfruit and papaya on Mokil Island was reported in 1989. The predatory coccinellid beetle, *R. pumila*, from the main island of Pohnpei was released on two occasions in 1989 and, although its impact has not been evaluated, islanders have reported that the scale is no longer a big problem.

(viii) *Pareuchaetes pseudoinsulata* Rego Barro (Arctiidae)

Siam weed, *Chromolaena odorata* (Asteraceae), has become an important pest on Pohnpei, Kosrae and Yap. It is abundant along roadsides, on vacant lands and even in cultivated lands.

In February 1989, larvae of the moth *P. pseudoinsulata* were brought from Guam to Pohnpei. Some were released on *Chromolaena* at Kitti and others reared in the laboratory to provide a source for future releases.

After almost two years of continuous releases, *P. pseudoinsulata* finally became established in one area at Palikir and has significantly reduced the weed population there. Releases are now being made at Kitti. On May 26, 1991, 500 adults of *P. pseudoinsulata* were released on Kosrae and on June 28, 1991, 500 adults on Yap, but it is not known whether these have led to establishment (Esguerra et al. 1991).

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