

Biological Control of the Philippine Lady Beetle, *Epilachna philippinensis* (Coleoptera: Coccinellidae), on solanaceous plants by the parasitoid, *Pediobius foveolatus* (Hymenoptera: Eulophidae), on Saipan

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Abstract—The Philippine lady beetle became a serious pest of solanaceous crops on Saipan after its accidental introduction in 1948. In 1985, *Pediobius foveolatus* adults were reared from *Epilachna varivestis* pupae which had been parasitised as larvae in USA. These parasitoids were released into two heavily-infested mixed plantings of eggplant and tomato. In a 1989 survey, *P. foveolatus* was reared from 80% of *E. philippinensis* larvae collected. Prior to release of the parasitoid, *E. philippinensis* was typically controlled using biweekly insecticide applications, but chemical control is now required only occasionally. Rapid success of this program may be due to an abundance of solanaceous weeds (eg. *Physalis* spp., *Solanum nigrum*) providing an untreated refuge for parasitoid production.

Introduction

The land area of Saipan is 123 sq km and its average monthly rainfall is around 30 cm, with a dry season from December to June and a rainy season from July to November. Its average temperature is about 26°C.

In the Northern Mariana Islands, *Epilachna philippinensis* Dieke, locally known as the Philippine lady beetle, is a serious pest of solanaceous plants, particularly tomatoes and eggplants and, in addition, it feeds on several weeds including *Physalis* spp. and *Solanum nigrum*. In the Pacific, there are at least three species of *Epilachna*, two of which attack Solanaceae and one Cucurbitaceae. There is no record of when this pest reached the Commonwealth of the Northern Mariana Islands but, according to Peterson (1985), it was accidentally introduced around 1948 into Guam, an island about 44 miles south of the Northern Marianas.

Tomatoes and eggplants are grown on more than 50 acres of land in the Northern Marianas but, in spite of an increasing demand, farmers have not been able to produce as much as they could because of serious infestation by this pest. Damage is caused by the grazing of one surface of the leaf, leaving the other epidemis intact. Serious damage may cause the death of seedlings.

In 1978 the larval parasitoid, *Pediobius foveolatus* (Crawford), was introduced into Guam from Maryland (Nechols 1984) and surveys indicated that it became established. Although insecticides such as Sevin and Diazinon were used regularly on Saipan the beetle population remained high, probably because of the numbers feeding on widely distributed wild host plants. In this situation, biological control is clearly an attractive approach.

Methods

In June 1985 a shipment of *P. foveolatus* in 580 *Epilachna varivestis* Mulsant pupae was received in Saipan from the Beneficial Insects Research Laboratory, Delaware, USA and the emerging parasitoids given access to *E. philippinensis* larvae. A total of 10,300 *P. foveolatus* was received, but 5,680 died largely due to damage during handling. The surviving 4620 natural enemies were released into two heavily-infested mixed plantings of eggplant and tomato which had alternative host weeds present.

Results and Discussion

In a 1989 island-wide survey, *P. foveolatus* was reared from about 80% of *E. philippinensis* larvae collected. Prior to release of the parasitoid, *E. philippinensis* was typically controlled using bi-weekly insecticide applications, but chemical control is now required only occasionally. It is assumed that success of this program may have been due to the abundance of solanaceous weeds, which provide an untreated refuge for parasitoid production. Also the rate of success of biological control measures is evidently higher in the tropics, and island ecosystems are particularly suited for biological control since the introduced biological control agents rarely encounter predators or competitors.

References

- Nechols, J. R. 1984. Five year summary of cooperative regional research project W-84, 1979-1983. Guam Agri. Exp. Sta., 4pp.
- Peterson, G. D. 1955. Biological control of *Epilachna philippinensis* in Guam (Scientific Note). J. Econ. Entomol. 48: 758-759.