

Poster 33: *Acerophagus papayae* Noyes and Schauff (Hymenoptera: Encyrtidae) as a Biocontrol Agent of *Paracoccus marginatus* Williams and Granara de Willink (Hemiptera: Pseudococcidae) in Barbados

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Paracoccus marginatus Williams and Granara de Willink (Hemiptera: Pseudococcidae) is a polyphagous insect that attacks different crops and ornamental plants (Williams and Granara, 1992; Walker *et al.*, 2011). Although *P. marginatus* has been recorded in Central and South America, Mexico, Florida and the Caribbean islands, only in Florida and the Caribbean the pest is considered of economic importance (Pantoja *et al.*, 2002). Host plants of economic importance include: papaya, citrus, tomato, bean, potato, cotton, mango, among others.

The parasitoid *Acerophagus papayae* Noyes and Schauff (Hemiptera: Pseudococcidae) has been reported as an efficient biocontrol agent of *P. marginatus* (Noyes and Schauff, 2003; Nisha and Kennedy, 2016). The parasitoid specie was already present at the field and it was observed attacking the *P. marginatus* colonies. The biology of the parasitoid and *P. marginatus* was studied and it was evaluated the influence of three host plants: Papaya, *Carica papae* L. (Caricaceae), Bean, *Phaseolus vulgaris* L. (Fabaceae) and Sea Island Cotton, *Gossypium barbadense* L. (Malvaceae) on the development of the pest and parasitoid. For *A. papayae* it was evaluated the preferred nymphal stage and the percentage of parasitism on nymphs reared in different hosts.

The experiment was carried out in the facilities of Ministry of Agriculture and Rural Development of Barbados. The biology of *P. marginatus* was carried out in greenhouse and laboratory conditions (temperature of 26 ± 2 °C; RH 70 ± 10 % and photophase 14 h). The biology of *A. papayae* was studied only in laboratory condition. Ten plants of each host were infested, using 70 nymphs/plant. The observations were done daily until the insects reached adult stage. The parameters evaluated were: a) Immature phase: longevity of female and male and viability, b) Mature phase: female and male longevity, viability and

number of eggs by female, sex proportion, c) Egg phase: period of emergence of the nymphs and eggs viability.

In order to evaluate the host preference by *A. papayae*, it was carried out the study of the biology of the parasitoid. Seventy nymphs of 1st, 2nd and 3rd instars were separated, placing them in plants of each host, having 10 replications. Each plant was placed in a cage (50 x 50 x 50 cm). Ten couples of the parasitoids were released in each cage and removed after 24 hours. To determine the number of nymphs parasitized by each female, 30 nymphs were maintained in leaves and offered to a parasitoid couple for 24 hours. The observation of the material was done daily. To determinate other biological parameters, 70 nymphs from the 3rd instar were separated and exposed to 10 parasitoids for 24 hours. The biological parameters evaluated were: a) Adult phase: male and female longevity with and without parasitic activity, parasitism and superparasitism frequency and sexual proportion. b) Lifespan: duration.

The statistical analysis was conducted with ANOVA, t-test of Student (LSD), 5% probability with 10 replications.

When evaluating the different hosts, there was a statistically significant difference showing Papaya as the most favorable host for the development of *P. marginatus* (Table P33.1). Our results agree with those of Williams and Granara-de-Willink (1992), Meyerdirk and Kauffman (2001), Nisha and Kennedy (2016), who reported papaya as the primary host, while bean and cotton were registered as secondary hosts. In the experiment, a statistically significant difference was observed in the number of eggs per female when *P. marginatus* was maintained in greenhouse conditions. The highest number of eggs was registered in papaya with a mean of 436.3 eggs (Table P33.2). The same results were observed at laboratory conditions, having a mean of 334.6 eggs per female when using Papaya as a host. The less favorable host was the Sea Island Cotton in both, green house and laboratory condition. Since the duration of the immature stage and viability were affected, the effect on reproduction was probably a consequence of this.

Table P33.1. Preference (%) of *Acerophagus papayae* by nymphs of different instars of *Paracoccus marginatus* in papaya under laboratory conditions, Barbados, 2003.

Nymphal Instar	Mean ± SE
1 st	04.4 ± 0.63 d
2 nd	17.7 ± 1.108 b
3 rd	80.4 ± 2.83 a
C.V. (%)	21.33
DMS a 5%	5.86

* Means followed by the same letter do not differ from each other by Student's T test (LSD), at 5% probability level.

Table P33.2. Number of eggs (mean \pm SE) per female *Paracoccus marginatus* maintained in three hosts in greenhouse and under laboratory conditions, Barbados, 2003.

	Number of eggs/ female (Mean \pm SE)		
	Papaya	Bean	Cotton
Green House	436.3 \pm 20.79 a	278.1 \pm 24.92 a	105.2 \pm 08.11 a
Laboratory	334.6 \pm 23.52 b	208.0 \pm 16.28 b	68.70 \pm 05.87 b
C.V. (%)	24.1		
DMS a 5%	51.8		

* Means followed by the same letter do not differ from each other by Student's T test (LSD), at 5% probability level.

The 3rd nymphal instar was observed to be the preferred instar by *A. papayae*, showing 80.4 % of parasitism in nymphs reared in Papaya. The less favorable one was the first instar having 4.4 % of parasitism (Table P33.2). This information will be an important factor when mass producing *A. papayae* to be used in biological control programmes.

The results showed that the percentage of parasitism was also affected when using different hosts. The most favorable one was papaya showing 86.1 % of parasitism, when compare with Sea Island Cotton, which was the less favorable host having 49.1 % of parasitism (Table P33.3). The results show the potential of the use of papaya as a host when rearing *A. papayae* for its use in biological control programmes.

Table P33.3. % of parasitism (mean \pm SE) in 24 h of *Acerophagus papayae* on *Paracoccus marginatus* nymphs kept in different hosts under laboratory conditions, Barbados, 2003.

Host Plants	Parasitism (%) Mean \pm SE
Papaya	86.1 \pm 1.70 a
Bean	68.9 \pm 2.16 b
Cotton	49.1 \pm 2.31 c
C.V. (%)	10.81
DMS a 5%	6.91

* Means followed by the same letter do not differ from each other, by Student's T test (LSD), at 5% probability level.

It was verified the potential of *Acerophagus papayae* as an efficient biocontrol agent to be used in biological control programmes of *Paracoccus marginatus* in the Caribbean.

References

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