

Biological Control of Papaya Mealybug, *Paracoccus marginatus* (Williams and Granara De Willink) (Pseudococcidae: Hemiptera) on Papaya

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ABSTRACT

Biological control of papaya mealybug by releasing parasitoid A. papayae at 100 numbers per hectare proved superior to unreleased field in causing reduction in mealybug population besides recording higher level of parasitoid activity. The mean initial mealybug population was 48.4 in parasitoid released field and 46.65 in unreleased field. The population of mealybugs at 15 and 30 Days After Release (DAR) was found to be 28.95 and 16.45 in parasitoid released field respectively. The pre-release mean population of parasitoid was 1.69 in released and 1.45 in unreleased field. At 30 DAR the population of parasitoid count was found to be 5.10 in released and 2.25 in unreleased field.

Key words: Papaya mealybug, *Paracoccus marginatus*, *Acerophagus papayae*

INTRODUCTION

Papaya mealybug is a polyphagous pest which cause damage to a large number of economically important field crops, tropical and sub tropical fruits and the ornamental plants⁴. The natural enemies of papaya mealybug include the commercially available mealybug destroyer ladybird beetle *Cryptolaemus montrouzieri* Mulsant, lace wings and hover flies; all are generalist predators and have potential impact on papaya mealybug population. In addition to predators, several parasitoids may attack papaya mealybug. Four species of encyrtid endoparasitic wasps specific to mealybug were collected in Mexico by

USDA and ARS researchers and Mexican cooperators as potential biological control agents. These were *Acerophagus papayae* (Noyes and Schauf), *Anagyrus loecki* (Noyes and Menezes), *Anagyrus californicus* Compere and *Pseudleptomastix mexicana* (Noyes and Schauf)^{3,12}. However *A. papayae* emerged as the dominant species in controlling the papaya mealybug. An amount of Rs.122 crores have been saved by rural farmers for not advocating pesticide application for the past six months in papaya, mulberry and cassava due to release of parasitoids. An amount of Rs. 435 crores have been saved from loss due to the papaya mealybug in the above three crops¹.

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As limited information is available on biological control of papaya mealybug in Southern Zone of Andhra Pradesh the study was planned to study control papaya mealybug through biological control.

MATERIALS AND METHODS

Biological control through *Acerophagus papayae* Noyes and Schauff

The invasive encytrid parasitoid *Acerophagus papayae* culture was brought from NBAII, Bangalore and released in the farmer’s field for the suppression of PMB. For this field experiment, an unreleased field 2.5 km away from the released field was maintained. The experimental field and unreleased field were identical for variety and all other agronomical practices. In the experimental field, 100 numbers of *A. papayae* were released per hectare during early morning period on papaya plants. Observations on PMB and *A. papayae* were recorded at pre-release and fortnight intervals. PMB population was recorded in 4 cm² on 4 leaves/ sample and the mean of 5 samples of papaya field. The *A. papayae* population was recorded 4 leaves / sample and the mean was worked out. The observations were recorded for 30 days both in released and

unreleased fields¹⁰. Data recorded from RBD design was statistically analyzed using Microsoft excel.

RESULTS AND DISCUSSION

Biological control through *Acerophagus papayae* Noyes and Schauff

The treatment of releasing parasitoid *A. papayae* at 100 numbers per hectare proved superior to unreleased field in causing reduction in mealybug population. The mean initial mealybug population was 48.4 in parasitoid released field and 46.65 in unreleased field. The population of mealybug counted at 15, 30 days after release (DAR) was found to be 28.95 and 16.45 respectively in parasitoid released field. In parasitoid unreleased field, the population of mealybugs counted at 15, 30 days after release (DAR) was found to be very high i.e., 59.5 and 75.3 respectively. The pre-release mean population of parasitoid was 1.69 in released and 1.45 in unreleased field. At 30 DAR the population of parasitoid count was found to be 5.10 in released and 2.25 in unreleased field (Table. 1) (Fig .1). There was a substantial reduction in the mealybug population and increase in the parasitoid activity gradually.

Table 1: Evaluation of *Acerophagus papayae* efficacy against papaya mealybug

Treatment	Mean number of mealybug and parasitoids on leaves (4cm ²)*					
	Pre release		15DAR		30DAR	
	PMB	AP	PMB	AP	PMB	AP
Released	48.4 (6.96)	1.69 (1.30)	28.95 (5.38)	2.95 (1.72)	16.45 (4.06)	5.10 (2.26)
Unreleased	46.65 (6.83)	1.45 (1.20)	59.5 (7.71)	1.95 (1.39)	75.3 (8.68)	2.25 (1.50)
SED	0.16	0.17	0.21	0.34	0.20	0.63
CD (P=0.05)	0.31	N.S	0.43	0.69	0.42	0.31

Figures in the parentheses are square root transformed values

PMB –Papaya Mealy Bug, AP - *Acerophagus papayae*

DAR –Days After Release, *Mean number of 5 samples, 4 replications

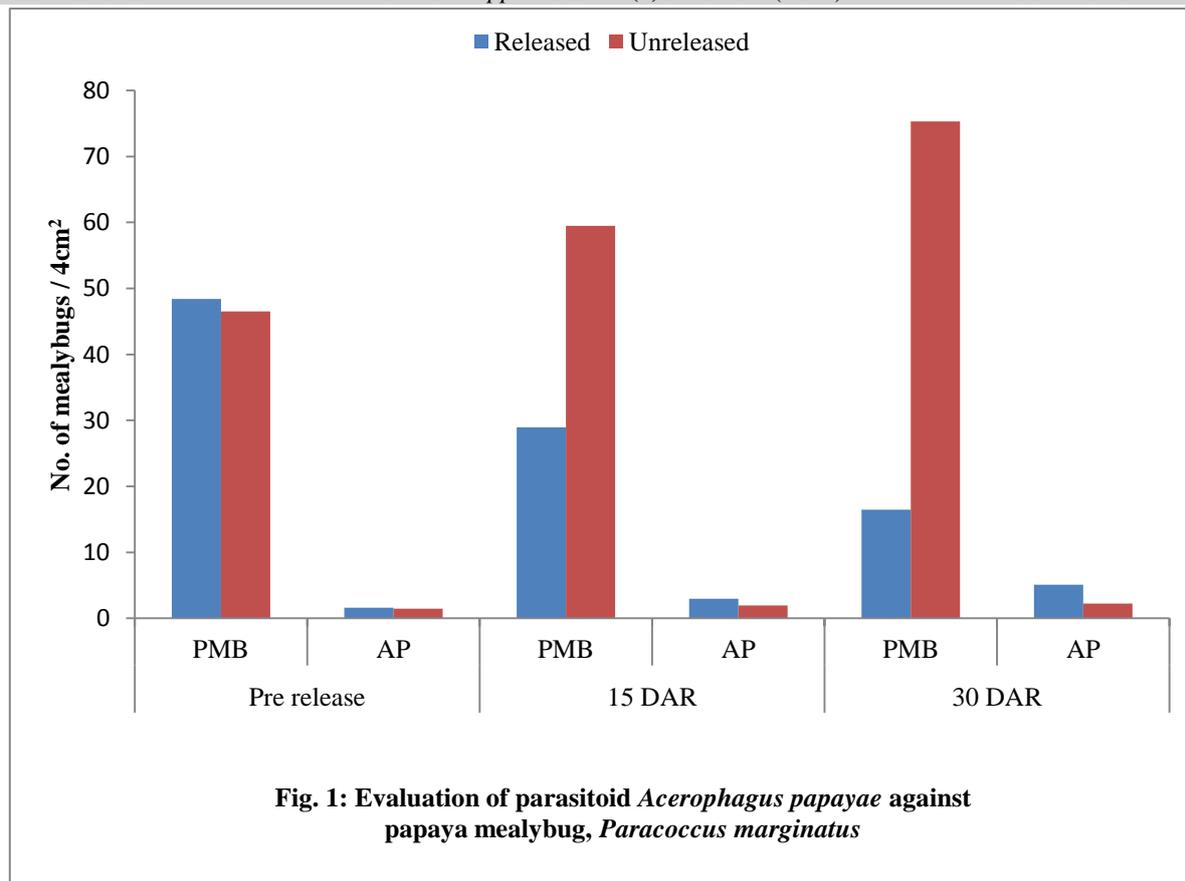


Fig. 1: Evaluation of parasitoid *Acerophagus papayae* against papaya mealybug, *Paracoccus marginatus*

The use of exotic natural enemies to suppress pest population has long been an integral part of biological control, which has continually proved very valuable in eliminating pest problems¹¹. The present results indicated that *A. papayae* was very effective in reducing mealybug population in parasitoids released field when compared to unreleased field. The present results are in close agreement with the findings of Sakthivel⁹ who reported that the population of papaya mealybug was found to decrease considerably with an increase in per cent parasitisation. Muniappan *et al*⁵, reported that four months after introduction of the parasitoids there was significant reduction in *P. marginatus*. Shylesha *et al*¹⁰, Krishnamoorthy *et al*², and Qadri⁸ reported that the parasitoid *A. papayae* was observed in few numbers at 20 days after release and the spread of the parasitoid was very good by 40 and 60th day of release. After a span of three months, there was a reduction of 80-90% in pest population. Pokharkar *et al*⁷, and Nakat *et al*⁶, reported that there was 85-92% reduction

in mealybug population within three months after releasing the parasitoid *A. papayae*.

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