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Effect of biopesticides on *Rhynocoris marginatus* (Fabricius) (Heteroptera: Reduvidae)

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ABSTRACT: **The effect of biopesticides (Nivaar, Mealisac, Osaqua, Citropyne and Azadirachtin) and synthetic pesticide (cypermethrin) on egg hatchability, nymphal mortality and biological control potential of *Rhynocoris marginatus* on the cotton pest, *Aphis gossypii* was studied under laboratory condition. The biopesticides at specified concentrations did not affect the biological control potential of *R. marginatus*, however, its ovicidal property was evident.**

KEY WORDS: *Aphis gossypii*, biological control potential, biopesticides, *Rhynocoris marginatus*

Rhynocoris marginatus (Hetereptera: Reduviidae) is a generalist predator found in agroecosystem and scrub jungle (Sahayaraj, 1994) and it was reported to be a predator on more than 20 insect pests (Sahayaraj, 1998). Due to complications arising from the use of chemical synthetic pesticides, botanicals, particularly neem products are suitable for integrated pest management (IPM). Generally biopesticides are considered safe to natural enemies of target pests. However, recent studies (Jhansilakshmi *et al.*, 1998) have shown that biopesticides are toxic to some natural enemies. It is therefore necessary to understand the effect of biopesticides on mortality and predatory potential of *R. marginatus* on an important cotton pest *Aphis gossypii* Glover (Heteroptera: Aphididae). Cotton is one of the principal cash crops in India, but the yield is generally reduced by various insect pests including *A. gossypii*. The study was undertaken to determine the effect of biopesticides and insecticides on egg hatchability, nymphal mortality and feeding potential of *R. marginatus* on cotton pest *Aphis gossypii*. The results of this study may lead to subsequent planning for release of this predator into the cotton ecosystem to manage *A. gossypii*.

MATERIALS AND METHODS

One-day old eggs and first instar nymphs of *R. marginatus* were used in this study. Both, the predator and the pest were collected from cotton ecosystem at Tirunelveli District, Tamil Nadu, India. The predator was maintained on cotton leaves infested with *Aphis gossypii* under laboratory conditions (28 ± 2°C, 70–80% relative humidity) in 250ml plastic containers. Five biopesticides and also a synthetic pesticide were used in this study as follows. Two neem products such as Nivaar (Shri Disha Biotech, Pvt. Ltd, Hydrabad) and Azadirachtin (SPIC Bioproducts, Chennai), three-multi-herbal based products, namely, Mealisac, Osaqua and Citropyne (Osalin Research Laboratories, Bangalore) and a synthetic pesticide cypermethrin (Tropical Agrosystem Ltd., Chennai–3.0%) were used.

One-day old eggs of *R. marginatus* were dipped in 1ml of 0.5 percent biopesticide suspension and placed in a Petri-dish and allowed to dry for 10min. Ten eggs were used for each treatment with a biopesticide and each treatment was replicated five times. Control was treated with water alone. After the treatments, the eggs were incubated in small plastic vials (30ml capacity) at room temperature. Observations were made daily to record the number of nymphs hatched in each biopesticide treatment separately. From this observation per cent hatching was calculated. Filter paper strips (2x2cm) were immersed in the biopesticide suspension allowed to dry and introduced into plastic containers. Leaves heavily infested with *A. gossypii* (25 no.) were cut into pieces and introduced into the plastic containers. Later, first instar *R. marginatus* nymphs were allowed to feed on *A. gossypii*. Filter paper strips immersed in water were used as a control. Nymphal mortality and number of *A. gossypii* consumed by a single predatory nymph was observed for about 96 hours. Predatory efficiency was asserted in terms of number of prey consumed. Five replications were maintained for each biopesticide separately. Data were analyzed by one-way analysis of variance using Systat 7.0. Where appropriate, percentages were transformed and means were separated by Duncans Multiple Range test (DMRT).

RESULTS AND DISCUSSION

Results of egg hatchability, nymphal mortality and predatory potential of *R. marginatus* are presented in Table 1. Hundred per cent egg and nymphal mortality was observed when they were subjected to a synthetic pesticide cypermethrin. The results revealed that all the biopesticides caused significant effect on per cent egg hatchability. Among the biopesticides tested, Mealisac was found to be the most toxic to the eggs of *R. marginatus* (76% mortality) followed by Nivaar (64%), Osaqua and Azadirachtin (60%), and Citropyne (58%). Sahayaraj and Paulraj (1999) reported that plant extracts, *viz*, *Azadirachta indica* A.Juss, *Vitex negundo* Linn., *Pongamia glabra* Vent *and Calotrophis gigantea* Linn. had ovicidal properties and hence the hatching percentage of *R. marginatus* decreased from lower to higher concentrations.

Table 1. Impact of biopesticides on the mortality, egg hatchability and predatory potential of *R. marginatus*

Biopesticide used	Egg hatchability (%)	Nymphal mortality (%)	Predatory potential (%)
Control	90^{a}	0.000	99.6^{a}
Osaqua	40^{b}	0.016^{a}	95.4^{a}
Mealisac	24^{c}	0.032^{b}	97.4^{a}
Citropyne	42^{bd}	0.075^{c}	99.3^{a}
Nivaar	46^{bde}	0.075^{dc}	98.8^{a}
Azadirachtin	40^{bdef}	0.10^{a}	98.1^{a}
Cypermethrin	00	100^{f}	

Within the same column, data followed by the same letter do not differ significantly at 5% level.

Though the tested biopesticides had ovicidal property, they caused minimal nymphal mortality (Table 1) and did not affect the predatory potential of first instar *R. marginatus*. Biopesticides were reported to be safer to the mirid predator, *Cyrtorhinus lividipennis* Reuter (Jhansilakshmi *et al.*, 1998) and Sontakke (1993) found that neem oil and synthetic insecticide combination was toxic to the mirid bug *C. lividipennis* in the fields. A non-oil formulation of azadirachtin caused mortality of nymphs and had several delayed effects on adults of predatory bug, *Podisum maculiventris* (Say) (Vinuela *et al.*, 2000)

The predatory potential of both biopesticide treated and control *R. marginatus* did not differ significantly (Table 1). In contrast Sahayaraj (2001) reported that the predatory potential of *R. marginatus* was reduced while predating on *S. litura* larvae fed on leaves treated with Vijayneem and Nimbicide in comparison to control. This study reveals that *R. marginatus* release can be integrated with use of biopesticides for the management of *Aphis gossypii* population in cotton ecosystem.

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