



Research Article

Biology and feeding efficacy of the anthocorid, *Blaptostethus pallescens* Poppius on *Oligonychus coffeae* in tea

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ABSTRACT: The anthocorid predator, *Blaptostethus pallescens* Poppius was studied for the first time on red spider mite (RSM), *Oligonychus coffeae* Nietzer. Laboratory studies indicated that *B. pallescens* can be successfully reared on RSM. Incubation period was 4.4 ± 0.34 days. The total developmental period of five nymphal instars to adults was 17.1 ± 0.34 days. *Blaptostethus pallescens* nymphs consumed RSM in the range of 3.83 ± 0.18 to 17.37 ± 0.95 /day. Female *B. Pallescens* consumed more mites than male. The study clearly showed *B. pallescens* is a promising candidate in tea plantations for the control of red spider mite.

KEY WORDS: *Blaptostethus pallescens*, biology, predator, red spider mite, tea

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INTRODUCTION

Oligonychus coffeae Nietzer (Acari: Tetranychidae) the red spider mite (RSM), is a major pest of tea. Nymphs and adults of RSM lacerate cells, producing minute characteristic reddish brown marks on the upper surface of the mature leaves, which turn red in severe case of infestation, resulting in crop loss. There are several control measures adapted to check the RSM population. The control measures include spraying of acaricides and bioproducts. These measures may introduce problems like insecticide resistance, residue, health hazards and environmental pollution. Hence non-chemical and eco-friendly methods of pest control are in trend.

Anthocorids are known to be potential predators on several pests on different crop ecosystem (Muraleedharan and Ananthakrishnan, 1978; Ballal *et al.*, 2009; Gupta *et al.*, 2011). Anthocorids such as *Anthocoris pilosus* (Jakovlev), *Cardiastethus poweri* White, *Cardiastethus consors* White, *Orius albidipennis* Reuter, *Orius vicinus* (Ribault), *Orius majusculus* (Reuter), *Orius minutus* (Linnaeus), *Orius niger* (Wolff), *Orius tricolor* (White) and *Orius thripoborus* (Hesse) were observed to be potential predators of mites in different countries (CABI, 2006). *Blaptostethus pallescens* Poppius (Hemiptera: Anthocoridae) has been

found to be potential predator of pests of maize and mites of grain warehouses in Egypt (Tawfik *et al.*, 1974; Tawfik and El-Hussain, 1971). *Blaptostethus kumbi* Rajasekhara collected from sugarcane fields in Mysore (Rajasekhara, 1973); *B. pallescens* from Tamil Nadu and Bombay (Muraleedharan, 1977) and Bangalore (Jalali and Singh, 2002). *B. pallescens* has also been recorded from Madagascar (Muraleedharan, 1977) and from grain warehouses in Egypt, where mites were common (Tawfik and El-Husseini, 1971). Laboratory studies indicated that *B. pallescens* could feed on 190 and 116 two spotted spider mites, *Tetranychus urticae* Koch (Acari: Tetranychidae) nymphs during its nymphal and adult stages (Ballal *et al.*, 2009).

Blaptostethus pallescens can be intensively cultured, without encountering problems of cannibalism and excessive handling; thus making it amenable to commercial production (Ballal, *et al.* 2003). Hence attempts were made to culture this predator in the laboratory and to study its biology and feeding potential. Through the present study, an attempt was made to evaluate the efficacy of *B. Pallescens* as a predator of *Oligonychus coffeae* in the laboratory.

MATERIALS AND METHODS

Red spider mites were collected from the tea fields of

UPASI Experimental Farm, Anamallais (Coimbatore District, Tamil Nadu, India) (10°22'N latitude, 76°58'E longitude and 1065 m a.s.l) and reared in laboratory. RSM adults were transferred onto fresh tealeaves placed over moist cotton wool kept in plastic trays (42 × 30 × 6.5 cm) (Vasanthakumar and Babu, 2013).

Nymphs and adults of *B. Pallescens* were obtained from mass production laboratory at the National Bureau of Agriculturally Important Insect Resources (NBAIR, Bangalore, India). Pearl pet plastic containers of 500 ml capacity were used to culture the anthocorids. The containers were provided with tea shoots in a water fitted vial. RSM was placed on the leaves using a soft brush. Pollen was sprinkled on cotton. A swab of cotton soaked in water was stuck to the wall of the container. One container could hold 10 adults and replicated 20 times. The eggs were laid in tea shoots, inserted into the tissue with only operculum of the eggs visible. After 24hrs, the shoots with eggs were removed and placed in small, round, ventilated plastic containers (dia 6.5 cm and ht 2.5 cm) when the nymphs hatched, they were shifted to pearl pet jars provided with RSM on tea leaves. Feeding was provided on alternate days till adults emerged. The freshly emerged adults were shifted to pearl pet jars with tea shoots and seeds for oviposition.

In order to study the feeding potential of nymphs five sets of ventilated container, described above, were arranged with newly hatched nymph in each container. 10 number of red spider mite adults were placed on a piece of tea leaf and kept inside the container. After every 24h period, the number of live RSM was recorded and another set of RSM was provided. The RSM number was increased for different instars i.e., 10, 15, 20, 25 and 30 for I, II,III, IV and V instars. The experiment was replicated five times.

The feeding potential of adult male and female was also studied. The method was same as that followed for nymphs. The adults were provided with 50 numbers of RSM adults per day till mortality.

RESULT AND DISCUSSION

Blaptostethus pallescens was reared successfully on RSM. The biological parameters are presented in Table1.

The newly hatched nymphs developed normally with five nymphal instars and became adults in 17.1 ± 0.34 days. Fifth instar showed longest development period (7.5 ± 0.16).Total developmental period varied from 20-24 days i.e., an average of 21.5 ± 0.5 days.



Fig. 1. *Blaptostethus pallescens* feeding on *Oligonychus coffeae*.

Mean longevity of adult male and female was 39.6 ± 4.82 and 43.7 ± 4.19 days respectively (Table 2). Ballal *et al.*, 2003 reported that when *B. pallescens* were reared on UV- irradiated eggs of *Corcyra cephalonica*, adult male and female longevity was 42.4 and 58.2 days respectively. Similar investigation was made by Tawfik and El Hussieni (1971) was male and female longevity was 17.7 and 24.4 days respectively when fed with lepidopteran larvae. The female: male ratio was 1.2:1. This was similar to the studies conducted by Ballal *et al.* (2003) and Tawfik and El Hussieni (1971).

Number of RSM consumed per *B. Pallescens* ranged between 3.83 ± 0.18 to 17.37 ± 0.95 during their nymphal period. Ballal *et al.* (2003) observed that feeding potential of *B. pallescens* nymph on *Corcyra* eggs ranged between 83 to 130. It was reported that *B. Pallescens* can feed upto 40 two-spotted spider mites (*Tetranychus urticae*) per day (Ballal *et al.*, 2009). The result indicated that the feeding potential increased with the age. The adult male consumed an average

Table 1. Incubation and stadial periods of *Blaptostethus pallescens*

Species	Incubation Period (d) (Mean ± SE)	Stadial period (d) (Mean ± SE)					Total nymphal period (d)	Total developmental period (d)
		I	II	III	IV	V		
<i>B. pallescens</i>	4.4 ± 0.34	3.2 ± 0.13	1.8 ± 0.13	2.2 ± 0.13	2.4 ± 0.16	7.5 ± 0.16	17.1 ± 0.35	21.5 ± 0.5

of 28.01±1.33 adult RSM per day while adult female fed more than the adult male i.e., 33.57±0.72 (Table 3). *Blaptostethus pallescens* adult female had higher feeding potential than male when fed with eggs of *Corcyra cephalonica* (Ballal *et al.*, 2003). In a study conducted by Bukero *et al.*, 2014 on feeding performance of *Menochilus sexmaculatus* (Fabricius) on *Aphis gossypii* (Glov.), *Bemisia tabaci* (Ginn.) and *Amrasca biguttula biguttula* (Distant), the adult female devoured highest number of nymphs of *A. gossypii* followed by *B. tabaci* and *A. biguttula* during its life span as compare to male.

Table 2. Longevity and fecundity of *Blaptostethus pallescens*

Species	Longevity (d) (Mean ± SE)		Progeny production (nymphs/fe- male)
	Male	Female	
<i>B. pallescens</i>	39.6± 4.82	43.7± 4.19	136±22.6

Table 3. Average number of RSM consumed/predator

Predatory Stage	RSM consumed/predator/day (Mean ± SE)
1st instar	3.83 ± 0.18
2nd instar	11.00 ± 1.25
3rd instar	11.58 ± 0.83
4th instar	15.08 ± 1.27
5th instar	17.37 ± 0.95
Adult male	28.01 ± 1.33
Adult female	33.57 ± 0.72

CONCLUSION

The study showed that the anthocorid, *Blaptostethus pallescens* is an efficient predator of red spider mite. This predator can be utilized as an important biological control agent for the management of RSM in tea plantations. However, detailed field studies are required for measuring the performance of *B. Pallescens* against red spider mite and achieving this goal.

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