Short Scientific Report *Journal of Plantation Crops, 2013, 41(3): 444-446*

Evaluation of egg larval predator anthocorid bug *Cardiastethus exiguus* against *Opinsina arenosella* in Tamil Nadu

(Manuscript Received: 19-03-13, Revised: 14-10-13, Accepted: 04-11-13)

Keywords: Anthocorid bug, biological suppression, *Cardiastethus exiguus*, coconut, *Opisina arenosella*

The leaf eating black headed caterpillar *Opisina arenosella* is a serious pest of coconut palm causing significant yield loss in all the coconut growing tracts of India. Though chemical measures of management has been recommended to contain this pest, the difficulty in applying the insecticides in the target area that are 30-40 feet high is a prime reason for farmers to avoid this technology (Anonymous, 1999). During the disease outbreaks, the pest is best managed by biological suppression using parasitoids like *Goniozus nephantidis* and *Bracon brevicornis* (Sathiamma *et al*., 1996). Though the bio-agents are mass multiplied and released in farmers field, varying degree of success has been reported in terms of the efficacy of the bio-agents. This prompts the need to search for bio-agents with enhanced prey potential. *Cardiastethus exiguus* is an egg-larval predator of *O. arenosella*. The intrinsic behaviour and life cycle of the anthocorid bug *C. exiguus* on *O. arenosella* was reported by Nasser and Abdurahiman (1996). Mass culturing of this predator has been standardized (Ballal *et al*., 2002). Limited scale field efficacy of this predator on coconut leaf eating black headed caterpillar *O. arenosella* has been taken up at Kerala. (Nasser and Abdurahiman, 1998; Lyla *et al*., 2006). The efficacy of the predator in Tamil Nadu is not attempted till date. Hence, the present investigations were carried out to evaluate the egg larval predator anthocorid bug, *C. exiguus* against *O. arenosella* in Tamil Nadu.

Field experiments on the evaluation of predator *C. exiguss* on *O. arenosella* were carried out at Ekatampalayam village of Chennimalai Taluk of Erode district for two seasons in 2009 and 2010. Three treatments were imposed *viz*., release of 50 bugs (T1), and 75 bugs (T2) in the crown region and no predator or control (T3) with seven replications comprising ten infested trees per replication at 15 days interval for six times consecutively. The releases of predator doses were fixed based on the previous reports (Nasser and Abdurahiman, 1998; Lyla *et al*., 2006). Pre-release observations on the population of the different stages of pest in each sample palm from 41-60 per cent leaflets of sample leaves were recorded. Post release observations on the reduction of the pest population were recorded by drawing leaflet samples from each sample palm at fifteen days interval of time. The data on the population of pest were converted into corresponding square root transformed values for statistical interpretation (ANOVA) (Snedecor and Cochran, 1967). The Duncans multiple range test (DMRT) was applied for comparing treatment means.

Efficacy of *C. exiguus* against *O. arenosella* during 2009

The results on the efficacy of *C. exiguus* against *O. arenosella* during the season 2009 revealed that there was gradual decline in the level of population of *O. arenosella* after second and third releases of anthocorid bugs *C. exiguus* during the initial stage of pest build up. However, significant reduction in the pest population was achieved only after six successive releases of predators as against the control. There was marginal level of differences

between the treatments T1 (50 bugs tree^{-1}) and T2 (75 bugs tree^{-1}) in reducing the population of *O. arenosella* upto two releases of predators. Interestingly both T1 and T2 are on par in reducing the population of *O. arenosella* after three to six releases (Table1).

predators as against in control (Table 2) There was no significant difference between two different rates of releases in reducing the population of *O. arenosella.* Pooled analysis was carried out for both seasons (2009 & 2010) and revealed the similar results (Table 3). This result was found in agreement

Table 1. Efficacy of *C. exiguus* against *O. arenosella* (2009) at Ekatampalayam

Treatments	Pre-release population of pest*	Post release Population of pest (mean no. tree^{-1})*					
	(Mean no. tree^{-1})	1st BCR	2nd BCR	3rd BCR	4th BCR	5th BCR	6th BCR
T1 - *C. exiguus* release @ 50 per tree	5.80 (2.41)[a]	4.6 (2.14)[b]	2.7 (1.64)[b]	1.35 (1.16)[b]	0.65 (0.80)[b]	0.30 (0.54)[b]	0.2 (0.46)[b]
T2 - *C. exiguus* release @ 75 per tree	5.40 (2.32)[b]	3.2 (1.79)[c]	1.8 (1.34)[c]	1.10 (1.04)[b]	0.43 (0.64)[b]	0.25 (0.50)[b]	0.1 (0.31)[b]
T3 - Control	6.30 (2.51)[a]	6.70 (2.59)[a]	5.30 (2.30)[a]	4.90 (2.21)[a]	5.50 (2.34)[a]	5.00 (2.23)[a]	4.2 (2.04)[a]

*Mean of seven replications; BCR: Bio-control agents release

Figures in parentheses are in square root transformed values; In a column, means followed by the same letter are not significantly different by DMRT.

Efficacy of *C. exiguus* against *O. arenosella* during 2010

Another field experiment carried out during the season 2010 showed that there was steady decrease in the level of population of *O. arenosella* after second and third releases of anthocorid bugs. Significant reduction in the population of pest was observed only after six consecutive releases of

with findings by earlier workers (Nasser and Abdurahiman, 1998; Lyla *et al*., 2006). Since *C. exiguus* is a polyphagous general anthocorid predatory bug, it was found that it predates not only the leaf eating black headed caterpillar, *O. arenosella* but also immature stages of larval ecto parasitoids *viz*., braconids and bethylids in the field experimental plot. Hence, it should be released

Table 2. Efficacy of *C. exiguus* against *O. arenosella* (2010) at Ekatampalayam - East garden

Treatments	Pre-release population of pest*	Post release Population of pest (mean no. tree^{-1})*					
	(Mean no. tree^{-1})	1st BCR	2nd BCR	3rd BCR	4th BCR	5th BCR	6th BCR
T1 - C. *exiguus* release @ 50 per tree	12.50 (3.53)[a]	7.25 (2.69)[b]	4.10 (2.02)[b]	2.45 (1.56)[b]	1.15 (1.07)[b]	0.65 (0.80)[b]	0.40 (0.63)[b]
T2 - C. *exiguus* release @ 75 per tree	11.90 (3.44)[a]	6.10 (2.46)[c]	3.50 (1.87)[c]	2.10 (1.45)[b]	0.90 (0.94)[b]	0.45 (0.67)[b]	0.28 (0.53)[b]
T3 - Control	13.00 (3.61)[a]	13.20 (3.63)[a]	13.50 (3.67)[a]	12.80 (3.57)[a]	12.00 (3.46)[a]	12.30 (3.51)[a]	11.50 (3.39)[a]

*Mean of seven replications, BCR : Bio control agents release

Figures in parentheses are in square root transformed values

In a column, means followed by the same letter are not significantly different by DMRT

Table 3. Efficacy of *C. exiguus* against *O. arenosella pooled* analysis for two seasons

Treatments	Pre-release population of pest*	Post release Population of pest (mean no. tree^{-1})*					
	(Mean no. tree^{-1})	1st BCR	2nd BCR	3rd BCR	4th BCR	5th BCR	6th BCR
T1 - *C. exiguus* release @ 50 per tree	9.15 (3.02)^{a}	5.93 (2.42)^{b}	3.4 (1.83)^{b}	1.9 (1.36)^{b}	0.9 (0.94)^{b}	0.48 (0.67)^{b}	0.30 (0.54)^{b}
T2 - C.exiguus release @ 75 per tree	10.21 (3.19)^{a}	4.65 (2.12)^{c}	2.65 (1.61)^{c}	1.6 (1.25)^{b}	0.66 (0.79)^{b}	0.35 (0.59)^{b}	0.19 (0.42)^{b}
T3 - Control	9.65 (3.11)^{a}	9.95 (3.06)^{a}	9.4 (2.99)^{a}	8.85 (2.89)^{a}	8.75 (2.9)^{a}	8.65 (2.87)^{a}	7.85 (2.72)^{a}

*Mean of seven replications; BCR: Bio-control agents release

Figures in parentheses are in square root transformed values; In a column, means followed by the same letter are not significantly different by DMRT

alone. It should not be combined with the release of other two larval parasitoids (Mohammad *et al*., 1982).

It is evident from the above investigations that the anthocorid bug *C. exiguus* is an efficient egg larval predator of *O. arenosella* and could effectively suppress the coconut black headed caterpillar population, when it is released alone @ 50 nos. tree^{-1} at 15 days interval for six times consecutively. However, care has to be taken that the releases should be coincided with the egg laying stage of the pests.

Acknowledgement

The authors profusely thank the Director, National Institute of Agriculturally Important Insects, Bangalore for the supply of bio-agents to conduct the study in Tamil Nadu.

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