



Impact of olfactory conditioned parasitoid *Goniozus nephantidis* in suppression of *Opisina arenosella* under field conditions in east coast of Andhra Pradesh

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The coconut palm with incessant and plentiful provision of food, supports a wide range of caterpillar pests viz., *Opisina arenosella* Wlk., *Contheyla rotunda* H., *Latoia lepida* (Cram.), *Macroleptra nararia* M., *Gangara thyrsis* M., *Phalacra* sp, a variety of bag worms etc., which defoliates the palm leading to yield losses. *O. arenosella* (Becker, 1981), the leaf eating caterpillar or the black headed caterpillar is a major pest of the coconut palm (Nirula, 1956). Outbreak of this pest assumes severe proportions on the coastal and backwater tracts. This pest has been observed regularly and is persistent in Godavari district of Andhra Pradesh since 1947 (Dharmaraju, 1952). Infestation by this pest in severe cases makes the whole plantation present a burnt appearance due to the drying of leaves/leaflets with only the upper epidermis intact or in cases of old infestation leaves remain with midrib of the leaflet only. When palms are severely damaged, the attacked leaves droop, bunches buckle and the immature nuts shed heavily (Muthiah, 2007).

The recorded list of natural enemies against this caterpillar comprised of 40 parasitoids and 20 insect predators (Cock and Parera, 1987; Pillai and Nair, 1993a & 1993b). Among the parasitoids, the larval parasitoid *Goniozus nephantidis* (Musebeck) (Hymenoptera: Bethyridae) is a promising gregarious ectoparasitoid. Venkatesan *et al.* (2003) reported significant effective suppression of *O. arenosella* pest population with four releases of *G. nephantidis* at 10 parasitoids per palm at fortnightly interval during the larval and pupal stage. At present

G. nephantidis is mass multiplied on *Corcyra cephalonica* (Ramadevi *et al.*, 1981) and these parasitoids were then released in the field against *O. arenosella* larvae with which they had no previous experience (Subaharan *et al.*, 2005).

Earlier studies conducted by Subaharan *et al.* (2005) in laboratory and field revealed that olfactory condition of *G. nephantidis* parasitoids *i.e.*, exposure to odour of larval frass and damaged leaves enhances the parasitisation potency of parasitoids. The present studies were carried to evaluate the parasitisation potentiality of conditioned and unconditioned parasitoids, under east coast field conditions of Andhra Pradesh.

A field trial was carried out in the Matlapalem village of East Godavari district in 2011 and in Undrajvaram village in West Godavari district in 2012. Initial population of *O. arenosella* was recorded in the treatment and control palms by taking samples of 10 leaflets per palm from 10 palms each and expressed as average population per leaflet. Similarly, post-release observations on parasitised and unparasitised pest population per leaflet and per cent parasitisation were recorded at monthly intervals up to three months after release of parasitoids in treatment and control palms. An untreated control was also maintained for comparison. Observations were taken once in a month. For olfactory conditioning, the parasitoids were exposed to odour of larval frass and larval damaged leaves in a test tube of 15 cm long and 3 cm diameter as suggested by Subaharan *et al.* (2005). The dose for the release of conditioned and

Table 1. Parasitisation efficiency of conditioned and unconditioned parasitoid *G. nephantidis* against coconut black headed caterpillar, *O. arenosella*

Treatment	Average of ten palms (<i>O. arenosella</i> larval population per ten leaflets)															
	Pre - release				Post-release											
					One month after release				Two months after release				Three months after release			
	2011	2012	2011	2012	2011	2012	2011	2012	2011	2012	2011	2012	2011	2012		
Larval pop.	p.p.*	Larval pop.	p.p.*	Larval pop.	p.p.*	Larval pop.	p.p.*	Larval pop.	p.p.*	Larval pop.	p.p.*	Larval pop.	p.p.*	Larval pop.	p.p.*	
T1 - Conditioned	17.82 (4.33)	0.0	18.00 (4.35)	0.0	3.88 (2.20)	78.2 (2.27)	4.16 (1.42)	76.9	1.04	94.2	3.02 (2.00)	83.2	0.00 (1.00)	100.0 (1.00)	0.00 (1.00)	100.0
T2 - Unconditioned	18.58 (4.42)	0.0	18.10 (4.36)	0.0	9.64 (3.25)	48.1 (2.77)	6.71 (2.81)	62.9	7.02 (2.81)	62.2	5.10 (2.46)	71.8	3.02 (2.00)	83.8 (1.99)	2.99 (1.99)	83.5
T3 - Control	18.75 (4.44)	0.0	19.12 (4.48)	0.0	18.25 (4.38)	2.7 (4.46)	18.92	1.1	18.06 (4.36)	3.7	18.73 (4.44)	2.0	25.7 (5.17)	+37.3 (5.32)	27.36 (5.32)	+43.1
SEM	0.041		0.049		0.049	0.018			0.045		0.018		0.034		0.015	
CD (5%)			NS		0.14	0.05			0.13		0.05		0.10		0.04	

Values in parenthesis are square root transformed values; p.p.* = per cent parasitisation

unconditioned parasitoids were fixed at 20 parasitoids per palm. Four releases were made at 10 days interval during the experimental period. Each treatment was replicated on 10 palms. Three replications were maintained. The method and time of release of parasitoid was as per the technique suggested by Venkatesan *et al.* (2003).

The observations revealed that during both the years of study higher initial parasitisation by *G. nephantidis* was observed in T₁ treatment (conditioned parasitoid treatment) *i.e.*, 78.2 and 76.9 in 2011 and 2012 respectively, whereas in T₂ treatment (unconditioned parasitoid treatment) the initial parasitisation of *O. arenosella* by *G. nephantidis* was comparatively lower *i.e.*, 48.1 and 62.9 in 2011 and 2012 respectively. During both the years an increase of pest population in untreated control was observed even though initial natural parasitisation on a lower scale was recorded. After 3rd month release, a 100 per cent parasitisation was achieved in both 2011 and 2012 years in conditioned parasitoid treatment whereas, in the unconditioned parasitoid treatment parasitisation to a level of 83.8 and 83.5 was observed (Table 1). This is in line with the findings of Subaharan *et al.* (2005) where, the laboratory conditioned parasitoids for three days when offered a choice for parasitism preferred *O. arenosella* (64%) as against its surrogate host *C. cephalonica* (36%) on which they were reared. The present study hence inferred that conditioning

of parasitoids to the frass of its natural host, *O. arenosella* when they are continuously reared on laboratory host. *C. cephalonica* increased the host searching and parasitisation efficiency in the field.

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