



## Generation Effect of *Goniozus nephantidis* Muesbeck Reared on Rice Moth and Coconut Black Headed Caterpillar

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The experiment was carried out at Department of Agricultural Entomology, College of Agriculture, Dapoli (M.S.) during 2007-08 to determine the generation effect of a larval parasitoid, *Goniozus nephantidis* Muesbeck. To determine the generation effect, larval parasitoid was reared up to seven generations on different larval host combinations. This experiment was carried out to determine effect of continuous laboratory rearing of *G. nephantidis* on factitious host, *C. cephalonica*. It was found that there was no major difference in fecundity, total number of larvae parasitized and life cycle of *G. nephantidis* when reared from one to six generations on *C. cephalonica* and then on *O. arenosella*. The little difference was observed after seventh generation on fecundity and potentiality. This indicated that the *G. nephantidis* could be mass produced on factitious host, *C. cephalonica* successfully up to six generations.

**(Key word:** Generation effect, *Opisina arenosella*, *Goniozus nephantidis*)

The coconut palm, *Cocos nucifera* L. having eulogistic epithets such as 'Kalpavriksha', tree of life, tree of abundance etc. is considered to have a high utility value, since its every part and product is put to some useful purpose. It is attacked by a number of insect pests at all stages of its growth. As many as 759 pests have been recorded on coconut (Copeland, 1931; Nirula, 1955 and Lever, 1969). Out of these, the black headed caterpillar, *Opisina arenosella* Walker (Lepidoptera: Xylorictidae) is one of the most serious pest. The peak infestation occurs during February to May in Konkan region of Maharashtra (Desai *et al.*, 2003).

In spite of the availability of effective chemicals, it is rather difficult and uneconomical to use these for the control of leaf feeding pests of coconut especially on tall palms. Applying pesticides through conventional methods such as spraying and dusting on tall palms is almost impracticable. Therefore, there is need of integrating chemical and cultural methods with the use of natural enemies.

Parasitoids, predators and pathogens play an effective role in the biological control of *O. arenosella* in the field. Pillai and Nair (1993) reported 40 species of parasitoids and 20 species of predators on coconut black headed caterpillar. Among the hymenopteran parasitoids recorded from India, the larval ectoparasitoid, *Goniozus nephantidis* Muesbeck (Hymenoptera: Bethyilidae) is the most promising and can be utilized in biological control programme of coconut black headed caterpillar. The parasite is very specific to coconut black headed

caterpillar larvae in nature and attacks the later instar caterpillars for oviposition and feed on the body fluid of early instar caterpillars. This parasitoid has several advantages like short life cycle, high female: male ratio and can be easily multiplied on the factitious host *Corcyra cephalonica* Stainton in the laboratory.

The larval ectoparasite, *G. nephantidis* is having high searching ability, easy to multiply in the laboratory and high potentiality of parasitization of host. A single parasite can parasitize as many as 14 larvae of the natural host, this indicated the high level of parasitization by the parasite in the field. A single parasite can give the progeny of about 32. It also indicated that the inoculative release of parasites as per recommendation would take care of the pest in the field (Kurade, 2007).

The considerable work on the biology and potentiality of this parasitoid has been done in India. The larval parasitoid is efficiently mass produced on laboratory host *C. cephalonica* and then released in the field for suppressing population of *O. arenosella*. Continuous rearing of the parasitoid on factitious host may lead to poor acceptance of the natural host. The literature on such type of generation effect is not available. Therefore, it was necessary to find out generation effect of the parasite reared on *C. cephalonica*, to observe up to how many generations it can accept the natural host? With a view to elucidate the information on generation effect, the present study was undertaken.

## MATERIALS AND METHODS

To study the generation effect of *G. nephantidis* reared on *C. cephalonica*, the laboratory culture maintained on *O. arenosella* was used for conducting the experiment. The following combinations of laboratory and natural hosts were employed in the study.

### 1. One generation on *C. cephalonica* and then on *O. arenosella*

In this combination, one generation of *G. nephantidis* was reared on laboratory host *C. cephalonica* and the next generation of the parasitoid was reared on natural host *O. arenosella*.

### 2. Two generations on *C. cephalonica* and then on *O. arenosella*

Here, the larval parasitoid, *G. nephantidis* was reared on *C. cephalonica* for two successive generations and the next generation of the parasitoid was reared on natural host *O. arenosella*.

### 3. Three generations on *C. cephalonica* and then on *O. arenosella*

In this combination, *G. nephantidis* was reared on *C. cephalonica* for three consecutive generations and resulting generation of parasitoid from *C. cephalonica*, was released on *O. arenosella*.

### 4. Four generations on *C. cephalonica* and then on *O. arenosella*

The larval parasitoid, *G. nephantidis* was reared on *C. cephalonica* for four consecutive times and generation of parasitoid emerged after fourth generation on *C. cephalonica* was then reared on *O. arenosella*.

### 5. Five generations on *C. cephalonica* and then on *O. arenosella*

In this combination, first *G. nephantidis* was reared successively for five generations on *C. cephalonica* and the next generation of the parasitoid was reared on the natural host, *O. arenosella*.

### 6. Six generations on *C. cephalonica* and then on *O. arenosella*

Here, *G. nephantidis* was reared on its factitious host *C. cephalonica* for six successive generations and then the larval parasitoid was reared on natural host *O. arenosella* to see the generation effect.

### 7. Seven generations on *C. cephalonica* and then on *O. arenosella*

In this combination, *G. nephantidis* was reared on *C. cephalonica* for seven consecutive generations and the next generation of the parasitoid was reared on the natural host, *O. arenosella*.

For each combination, ten mated females of *Goniozus* were kept in a plastic vial, provided that these females were multiplied on *C. cephalonica* for known number of generations (one to seven). Then, one fifth instar larva of *O. arenosella* was released in each vial. The vials were kept under observations to see egg laying. After egg laying, the larva of *O. arenosella* having eggs on its body was removed from the vial taking care that *Goniozus* female could not escape from the vial. Then, another fifth instar larva of *O. arenosella* was released in the same vial. This procedure was repeated till female stopped egg laying.

The observations on number of larvae parasitized, fecundity and hatching percentage were recorded. The observations on larval period, pupal period were also recorded to study the life history of progeny.

## RESULTS AND DISCUSSION

Data on average number of larvae parasitized, average number of eggs laid, mean hatching percentage, mean larval period and mean pupal period for one to seven generations are given in Table 1.

During all the generations, the total number of larvae of *O. arenosella* parasitized were more or less same and ranged between 5.5 to 6.3. Similarly, the

**Table 1.** Generation effect of *G. nephantidis* reared on *C. cephalonica* against *O. arenosella*

Sr. No.	No. of generations	Average no. of larvae parasitized	Average no. of eggs laid	Hatching percentage(%)	Larval period (hrs)	Pupal period (days)
1.	One generation	6	34.5	95	103.9	6.3
2.	Two generations	5.7	34.8	94	100.2	6.3
3.	Three generations	6.3	36.8	96	100.6	6.5
4.	Four generations	5.8	36.2	97	102.1	6.3
5.	Five generations	6.3	36.9	96	100.6	6.6
6.	Six generations	5.8	35.8	95	100.8	6.5
7.	Seven generations	5.5	30.2	98	100.7	6.3

fecundity of a *Goniozus* female ranged from 30.2 to 36.9. It was lowest (30.2) when parasitoid continuously reared on laboratory host, *C. cephalonica* consecutively for seven generations. There was no any difference observed in hatching percentage and it was ranged from 94 to 98 per cent. Similarly, there was no any deviation due to generation effect observed on larval period as well as pupal period. The larval period ranged from 100.2 to 103.9 hours and pupal period from 6.1 to 6.6 days (Fig. 1).

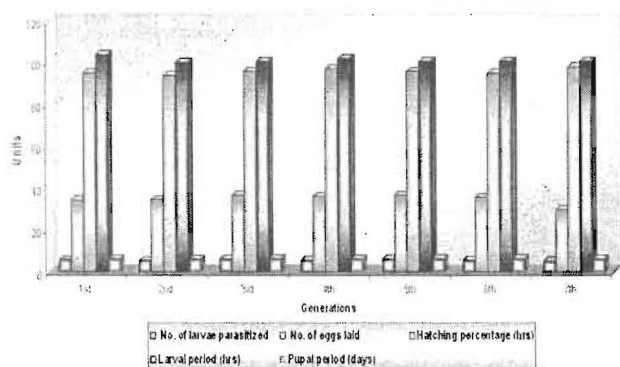


Fig. 1. Generation effect of *G. nephantidis* reared on *C. cephalonica* against *O. arenosella*

Overall results showed that there was no much generation effect observed in *G. nephantidis* when continuously reared on *C. cephalonica* up to six generations. The slight difference in total number of eggs laid (fecundity) was observed when *G. nephantidis* was reared on *C. cephalonica* for seven generations. This indicated that the *G. nephantidis* can be mass produced on factitious host *C. cephalonica* successfully up to six generations. However, the generation effect after seventh generation needs to be studied in future.

Ramamohana Rao et al., (1986) reared *G. nephantidis* on *C. cephalonica* up to three generations and reported that there is no any difference in number of larvae parasitized and fecundity. Paul et al., (1979) concluded that, *P. nephantidis* was not observed to develop host adaptability after continuous rearing on *C. cephalonica* and readily parasitized the larva of *O. arenosella*. Also, Nandihalli and Prasad (1986)

reported that both hosts i.e. *C. cephalonica* and *O. arenosella* were equally suitable for mass rearing of *G. nephantidis*.

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