Techniques for Mass Rearing of Parasitoids of *Opisina Arenosella* Wlk., The Leaf Eating Caterpillar of Coconut Palm

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Opisina arenosella is one of the major pests of coco nut palm. The pest outbreak often assumes severe proportions on the coastal, backwater and certain interior tracts. It occurs in Andhra Pradesh, Gujarat, Karnataka, Kerala, Maharashtra, Orissa, Tamil Nadu and West Bengal. The caterpillars live on the lower surface of the leaves in galleries and feed on the chlorophyll containing parenchymatous tissues.

Biological method of pest suppression was recognised since 1948, by release of indigenous larva and pupal parasitoids. Forty species of parasitoids and 20 species of predators were recorded as natural enemies of this pest. The parasitoids which can easily be reared under laboratory conditions are being mass multiplied and released as and when *Opisina* infestation is noted. Recently techniques were developed at the Biological Control Laboratory of CPCRI, Regional Station, Kayangulam for the mass rearing of the effective larval, pre-pupal and pupal parasitoids, which could be effectively utilised for the suppression of the pest in the field. Some of the important parasitoids are as follows.

Name & Family		Host stag
Apanteles taragamae	(Braconidae)	Larva
Bracon hebetor	(,,)	,,
Goniozus nephantidis	(Bethylidae)	,,
Elasmus nephantidis	(Elasmidae)	Pre-pupa
Brachymeria nosatoi	(Chalcididae)	Pupa
B. nephantidis	(,,)	,,
B. atteviae	(,,)	,,
B. lasus	(,,)	,,
Antrocephalus hakonensis	(,,)	,,
Xanthopimpla punctata	(Ichneumonidae)	,,
X. nana nana	(,,)	,,
Goryphus nursei	(,,)	Larva-pupa

Among these, the larval parasitoid *G.nephantidis*, pre-pupal parasitoid *E.nephantidis* and pupal parasitoid *B. nosatoi* are the dominant ones. Species of *Xanthopimpla* (pupal) are very much prevalent in certain plantations in Kerala, Karnataka and Tamil Nadu. These parasitoids can easily be mass cultured in the laboratory and released on a large scale in infested coconut plantations. By the release of these lab-reared parasitoids at fixed norms and regular intervals 80-90 per cent suppression of the pest is possible.

An account on the mass rearing techniques of the dominant parasitoids is given below:

Goniozus nephantidis

One or two medium to late instar caterpillars of *O.arenosella* are to be introduced into clean dry glass vials (7.5 x 2.5 cm) and one to three day old mated females of *G. nephantidis* 1-2 numbers are released into the vials. The parasitoid lays its eggs on the host's body; the emerging larvae feed on the host and pupae.

The adult parasitoid emerges from the brood in 10-14 days. The host larva is to be parasitised individually in small glass vials and many such parasitised larvae are to be transferred to bigger glass bottles or conical flasks for emergence of adult parasitoids. The brood is female biased. *G.nephantidis* can also be reared on larvae of *Corcyra cephalonica.*

The same method can be used for rearing *Bracon hebetor.* Glass chimney sandwich method is widely used for mass rearing. Both *Opisina* and *Corcyra larvae* are used as hosts. Egg to adult period is completed in 1 - 10 days. The adult parasitoids emerging in culture tubes are mostly males.

Elasmus nephantidis

One or two fully grown late last instar caterpillars (pre-pupae) of *O.arenosella* are to be intro-

duced into clean dry glass vials (7.5x2.5cm). 1-2 day old *E.nephantidis* mated females, 2-3 numbers, are to be released into the vials, when the host caterpillars commence spinning silken cocoons. The parasitoid readily parasitises the host larva. After egg laying the parasitoid can be transferred to other glass vials containing appropriate stage of the host caterpillar. The egg to adult stage of the parasitoid is completed in 11 days. The newly hatched parasitoid larvae can be found all over the body of the host and the developing larvae quickly feed from the different points. All the larvae stop feeding more or less simultaneously. Freshly formed pupae are creamy, which changes to light brown and then brown. Emergence of adults from a brood is completed within 1-3 hours. Sex ratio of parasitoid is normally female-biased.

As *E.nephantidis* is highly host-specific and stage-specific adequate supply of *O.arenosella* caterpillars has to be ensured before taking up laboratory multiplication of this parasitoid. For mass culturing of this parasitoid, specimen jars of size 17.5x6.8cm containing pre-pupal caterpillars of *O.arenosella* remaining inside the silken galleries can also be used.

Brachymeria nosatoi

Thirty to fifty adults of *B.nosatoi* comprising both sexes are to be sorted out and released into a cylindrical glass jar of size 17.5x6.8cm, the mouth of which is covered with muslin cloth. Honey is to be provided as small droplets on a piece of wax-coated paper or butter paper, as food for the parasitoid. The jar containing the parasitoids is to be kept in dim sunlight for 10-15 minutes daily for about 3-4 days after which only the host pupae are to be offered for parasitisation. Exposure to sunlight stimulates mating.

Pupae are removed with cocoons and silken galleries in tact or leafbits containing pupae within cocoons and silken galleries and placed on a piece of card board 12cm long and 6cm wide. The card board piece containing several pupae is to be inserted into the horizontally placed glass jar containing the mated parasites for parasitisation.

The parasitoid readily oviposit in the pupae standing on the galleries and partially disorganising the pupal tissues with their ovipositors by repeated thrust. These pupae without cocoons and silken galleries are to be placed on the card board and covered with silken galleries as the parasitoid will not parasitise naked pupae. Depending on the activity of female parasitoid, the host pupae can be exposed for a period of 4-6 hours for parasitisation. To avoid superparasitism, the host pupae are to be removed from the rearing cages 4-5 hour after oviposition by the parisitoids. The card board piece containing parisitised pupae is to be transferred to a similar glass jar or the parisitised pupae alone to a conical flask and kept for the emergence of the parasitoids. Normally the emergence of parisitoid commences 12 days after oviposition and continues upto 20 days in the laboratory temperature and relative humidity ranging between 23-30°C and 45-80°C, respectively.

For rearing *B.nephantidis, B.atteviae* and *B.lasus* naked pupae or pupae within cocoons and silken galleries can be exposed on a piece of card board. All of them readily oviposit in the naked pupae. *B.lasus* generally prefers large host pupae. Small host pupae produce a larger proportion of male progeny. *Anadevidia peponis* pupae are suitable for rearing *B.lasus* successfully. Pupae of *Herculia nigrivitta* infesting dried coconut leaves can also be used for rearing *B.nephantidis* and *B.atteviae*. However *B.nosatoi* can be reared only on *O.arenosella* pupae remaining inside the cocoons and silken galleries.

Xanthopimpla punctata

Glass chimney method is suitable for rearing *X.punctata* in the laboratory. Host pupae are to be offered 4-5 days after mating of the parasitoid. Pupae of *A.peponis* can also be used as host. The pupae are to be rolled in snakegourd leaves and provided for parasitisation. If *O.arenosella* pupae are used, the same remaining inside the cocoons and silken galleries cut along with coconut leafbits in tact, are to be placed between the nylon mesh and the muslin cloth coverings of the glass jar containing mated parasitoids. Naked pupae of either hosts are not parasitised. The adult parasitoid also feeds on the haemolymph that exudes through the oviposition punctures made by the parasitoid itself. Depending on the activity of the parasitoid the exposure time for parasitisation can be 1-3 hours. Parasitised pupae are to be transferred to separate glass jars or conical flasks and kept for emergence of adult parasitoids. Moistened cotton rolls are to be provided in tile jars or flasks to maintain adequate relative humidity, particularly during summer season. Egg to adult stages are completed in 10-12 days at 22-30°C temperature and 45-80 per cent relative humidity. Normally, the male parasitoids emerge one day earlier than the females.

X.nana nana can also be reared in the laboratory using the above technique. This species completes its life cycle in 17-19 days. Both the males and females of *X.nana nana* emerge more or less simultaneously.