

OBSERVATIONS ON *XANTHOPIMPLA PUNCTATA PUNCTATA*  
F. (HYMENOPTERA:ICHNEMONIDAE), A PUPAL PARASITOID OF  
*OPISINA ARENOSELLA* WLK.\*

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ABSTRACT

*Xanthopimpla punctata* F. the solitary, polyphagous, pupal parasitoid has been so far considered as an insignificant species in the biological suppression of the coconut leaf eating caterpillar, *Opisina arenosella* Wlk. (Lepidoptera:Cryptophasidae). Recent observations carried out in Tamil Nadu and Kerala revealed that *X. punctata* breeds in *O. arenosella* during July to December with a peak period of activity during September - October. Without uniformly dispersing in all the *Opisina* - infested coconut gardens, the adult parasitoids congregated in some localised tracts close to the sea, back waters or other water ways or in irrigated coconut plantations and effected a high degree of parasitism, suppressing even the dominant species of pupal parasitoids like *Brachymeria nosatoi* Habu. Other ichneumonid parasitoids such as *Zanthopimpla* sp. and *X. nana nana* Schulz. were not found to build up their populations in the territory occupied by *X. punctata*. Host feeding is present prior to oviposition, which is continued in every one to three days, through out the long life span of the female parasitoid. A method for rearing this parasitoid in the laboratory, its mating behaviour life history, intensity of natural parasitism etc. are also discussed.

INTRODUCTION

*Opisina arenosella* Wlk. (= *Nephantis serinopa* Meyr.) (Lepidoptera:Cryptophasidae), the leaf eating caterpillar, is an economically important pest of coconut palms in India and Sri Lanka. The months migrate to distant places and establish there causing severe damage to coconut plantations. More than fifty species of parasitoids and predators are now known to be associated with this pest, among which the pupal parasitoids are more important (Pillai and Nair, 1981). *Xanthopimpla punctata* F.,

*Xanthopimpla* sp. and *X. nana nana* Schulz. (Pillai and Nair, 1983) are the recorded ichneumonid pupal parasitoids of *O. arenosella* in Kerala State.

*X. punctata* F. (Hymenoptera: Ichneumonidae) occurs in China, Formosa, India, Nigeria etc. parasitising host insects infesting Jasmine, tea, cotton, paddy, snake gourd, soybean etc. Its hosts include the European corn borer, *Ostrinia nubilalis* Hb. the *Lasiocampid* *Metanastris punctata* Wlk. the leaf roller *Sylepta derogata* F., the *Lymantrids* *Olene mendosa* Hb. and

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*Notolophus posticus* Wlk. and *Nausinoe geometralis* Guen., *Anadevidea peponis* (F.) etc. Significant level of parasitism by *X. punctata* has not been reported so far. Soman (1927) observed two to three per cent parasitism on *N. posticus* on tea in Formosa. Pillai and Nair (1981) recorded only 1.36% incidence of it on *O. arenosella* in Kerala. In this paper, we furnish the results of our observations carried out at Salem (Tamil Nadu) and Ayiramthengu, Quilon district, Kerala State. A method for rearing *X. punctata* in the laboratory and details of its mating habits and life history are also furnished to enable the parasite breeding laboratories to take up multiplication of this parasitoid also for biological suppression of *O. arenosella*.

#### MATERIALS AND METHODS

The method used by Pillai and Nair (1983) for rearing *X. nana nana* was used for laboratory multiplication of *X. punctata*. Mating habits of the parasitoid were studied under a stereoscopic microscope and in laboratory cages. The virgin female was transferred to a clean glass vial, 7.5cm × 2.5cm, containing three to four-day-old males. Biology of the parasitoid was studied at a temperature range of 22-30°C and 45-80% RH in the insectary.

To study the intensity of natural parasitism, pupal cases from which the moths and parasitoids emerged and the live pupae were collected from Salem during September, 1981 and brought to the laboratory at the Central Plantation Crops Research Institute, Regional Station, Kayangulam. The live pupae were transferred to glass bottles, 18cm × 9cm, for recording the emergence of

moths and parasitoids, from which the intensity of natural parasitism was computed. Empty pupal cases were examined and the extent of pupal parasitism by different parasitoids recorded as per the method adopted by Pillai and Nair (1982), in which the nature, size and position of the emergence holes are taken into consideration. At the time of emerging *X. punctata* makes a characteristic operculum like opening at the cephalic end of the host pupa, which is retained intact in the pupal case.

Intensity of parasitism by *X. punctata* at Ayiramthengu was recorded during 1983 and 1984 by observing the live pupae collected from the field and reared in the laboratory.

#### RESULTS AND DISCUSSION

##### *Laboratory rearing of X. punctata:*

Five to six mated females and two to three male parasitoids were released in a glass bottle. Undiluted honey was provided as minute droplets on a piece of wax-coated paper. The mouth of the jar was closed with a piece of mosquito net fastened with rubber bands. Over the net a piece of snake gourd leaf was kept on which several pupae of *O. arenosella* or *A. peponis* were placed. The pupae were held tight to the bottle with a piece of muslin cloth and rubber bands. The glass bottle was kept horizontally.

The female parasitoid thrust her ovipositor into the host pupa, contracted her abdomen, disorganised the pupal contents with the clockwise and anticlockwise rotatory movements of the ovipositor and fanned her wings in slow

or high speed during oviposition. When *A. peoponis* pupae were used for rearing the parasitoid, the female parasitoids fed on the host's haemolymph after puncturing, in every one to three days, during their long life span. They were removed every day and fresh pupae offered for parasitisation. Upto six host pupae were parasitised by a female parasitoid a day. The parasitised pupae were transferred to a similar glass bottle, covered with a muslin cloth and kept undisturbed for emergence of the parasitoids.

#### *Mating habits:*

The females mated immediately on emergence with the earlier emerged males. An unmated female may mate any time during its long life span. The females are polyandrous. On recognition of the female, the male waves his antennae and touches her with them. Vibrating the wings he mounts on the female, assumes a parallel position and holds her wings with the first pair of legs. The abdomen of the female is held firmly with the meso and metathoracic legs of the male in three ways.

1. Holds the ventral side of the female's abdomen firmly with the claws.
2. Locks the abdomen of the female between the legs with the firm claw to claw hold of all the four legs.
3. Locks the female between the meso-and metathoracic legs of one side and the metathoracic leg of the other side with claw to claw hold.

The male alternately vibrates the wings in high speed, four to fifteen times, during

mating, each lasting 3 to 20 seconds. The time lag between wing fannings is one to eleven seconds. Mating lasts for 35-61 seconds. The male terminates mating. The female may mate four times in 30 minutes with different males.

#### *Life history*

First host feeding: Fifth day of emergence; Preoviposition period: Six to seven days; Egg period: one day; Larval period: 4 to 10 days; Pupal period: 5 to 10 days; Egg to adult stages: 10 to 20 days; Longevity of females: one to five months.

Female progeny produced in *O. arenosellain* the field during 1983 and 1984 was 44.36% and 46.12% respectively.

#### *Intensity of incidence of X. punctata at Salem:*

Infestation by *O. arenosella* was very severe at Salem during 1981. By September, the pest had completed three to four generations and excepting the unopened spear leaves all the remaining leaves were heavily infested in majority of coconut palms and palmyra palms growing in the hedges of coconut gardens. Several hundred of adults of *X. punctata* were observed hovering in the coconut gardens and a large number of female parasitoids were noticed in the act of oviposition in the pupae of *O. arenosella*. However, it could not suppress the outbreak of the pest.

One hundred and sixteen emerged pupal cases were collected from the infested field and examined. The results of examination of empty pupal cases are summarised below.

No. of emerged pupal cases of <i>O. arenosella</i> examined	: 116	the hyperparasitoid ( <i>Eurytoma albotibialis</i> ) emerged	: 2
No. of pupal cases from which months emerged	: 79	Percentage parasitism by the hyperparasitoid	: 1.72
No. of pupal cases from which parasitoids emerged	: 37	Other parasitoids such as <i>Trichospilus pupivora</i> Ferr., <i>B. nosatoi</i> , <i>Xanthopimpla</i> sp. and <i>X. nana nana</i> were totally absent at Salem area.	
Percentage of total parasitism	: 31.9		
No. of pupal cases from which <i>X. punctata</i> emerged	: 31		
Percentage parasitism by <i>X. punctata</i>	: 26.72	The intensity of incidence of <i>X. punctata</i> recorded from the rearings of live pupae (351 nos.) collected from Salem area is furnished in Table-I. Of the total parasitism, the contribution of <i>X. punctata</i> was to the extent of 53.77%.	
No. of pupal cases from which <i>Brachymeria</i> spp. emerged	: 4		
Percentage parasitism by <i>Brachymeria</i> spp.	: 3.45		
No. of pupal cases from which			

Table I. Intensity of parasitism by *X. punctata* F. and other parasitoids in *O. arenosella* Wlk. at Salem and at Ayiramthengu.

Locality of sample pupae year of observation	No. of pupae from which months and parasitoids emerged	No. of parasitoids emerged	Percentage parasitism	<i>X. punctata</i>	<i>B. nosatoi</i>	<i>B. nephantidis</i>	<i>B. lasus</i>	<i>B. himeatevae</i>	<i>B. phalus-hakonen-sis</i>	Hyper-parasitoid <i>Eurytoma albotibialis</i>
<b>SALEM</b>										
1981	351	173	49.27	26.5 (93)	Absent	10.82 (38)	Absent	7.12 (25)	0.57 (2)	4.27 (15)
<b>AYIRAMTHENGU</b>										
1983	355	204	57.46	37.46 (133) Male:74 Female: 59 44.36%	10.70 (38)	8.17 (29)	0.56 (2)	Absent	Absent	0.56 (2)
1984	562	363	64.59	43.59 (245) Male:132 Female: 113 46.12%	10.32 (58)	8.90 (50)	0.71 (4)	0.35 (2)	ABSENT	0.71 (4)

\*Figures in parantheses indicate the actual number of parasitised pupae

*Intensity of parasitism by X. punctata at Ayiramthengu:*

Ayiramthengu is an area close to the sea where congregation of *X. punctata* was observed during September 1983 and 1984. The data on the extent of parasitism are summarised in Table I. This data reveal the remarkable degree of activity of *X. punctata*. Of the total parasitism, the contribution by *X. punctata* ranged from 65.2% to 67.5% during 1983-84. Another important result emerged from this study was that *B. nosatoi*, which is the most dominant species of pupal parasitoid of the pest in southern Kerala was unable to compete with *X. punctata*. The other two allied species of ichneumonid pupal parasitoid viz. *Xanthopimpla* sp. and *X. nana nana* also totally absent in the territory occupied by *X. punctata*.

A few other breeding sites of *X. punctata* were also located at Kayankulam Kayal Farm and nearby areas of Alleppey district during 1983 and 1984.

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