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Short Scientific Reports

Xanthopimpla nana nana Schulz. (Hymenoptera: Ichneumonidae), A new Pupal Parasitoid of *Opisina arenosella* Wlk. on Coconut*

Opisina arenosella Wlk. (= *Nephantis serinopa* Meyrick), the leaf eating caterpillar pest of coconut, is subject to natural parasitism by a variety of indigenous larval and pupal parasitoids. Out of these, the pupal parasitoid *Xanthopimpla punctata* F. (Hymenoptera: Ichneumonidae) plays only an insignificant role in the natural suppression of the pest, in the west coast of India. During the survey of the backwater areas near Quilon, Kerala conducted in October, 1980 for the indigenous natural enemy complex of the pest, yet another species of ichneumonid *Xanthopimpla nana nana* Schulz. emerged in large numbers from the field collected pupae. This parasitoid is a new record on *O. arenosella*. It occurs in Kerala and other parts of India, Java and Sri Lanka (V. K. Gupta: personal communication). Morphologically *X. punctata* and *X. nana nana* differed in several respects. In *X. nana nana* all abdominal segments except the second bear clear punctations, whereas in *X. punctata* there are only four pairs of punctations. In *X. nana nana* the trochanter, femur and tibia of the hindlegs and the femur and the tibia of the mid- and forelegs bear clear black patches (Figs. 1 and 2). Such patches are not

FIG. 1. *XANTHOPIMPLA NANA NANA* FEMALE

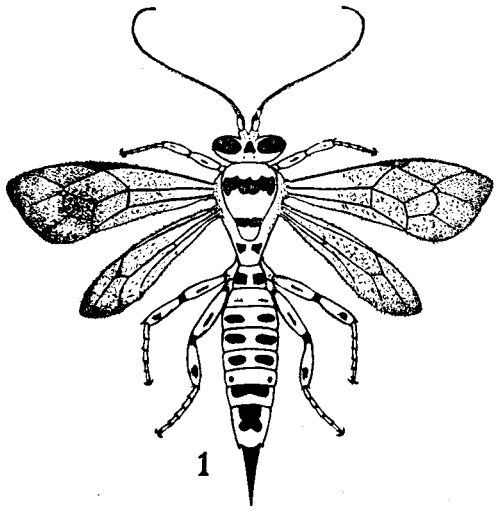
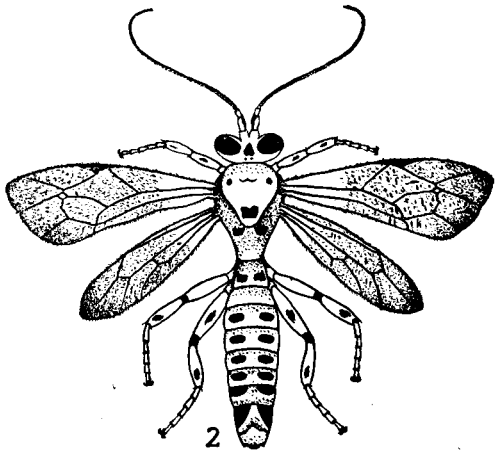


FIG. 2. *XANTHOPIMPLA NANA NANA* MALE



* *Contribution No. 569 of CPCRI Regional Station, Kayangulam.*

present in *X. punctata*. The ovipositor sheath of *X. nana nana* is 1–3 mm long and darker in colour than that of *X. punctata* which is 2–4 mm long.

According to Joy and Joseph (1977, 1978) and Pillai and Nair (1981) the chalcidid *Brachymeria nosatoi* Habu was the dominant species of pupal parasitoid of *O. arenosella* in southern Kerala. *B. nosatoi* maintained its high intensity of population even at high temperatures and low relative humidity of the summer season, which is also the peak period of pest abundance (Pillai and Nair, 1981). However, in certain localised tracts, where *X. nana nana* was present, it was found to excel even *B. nosatoi* in the intensity of natural parasitism.

The data on the intensity of natural parasitism collected during October–December 1980 and January 1981 are furnished in Table I.

It is evident from the data that *X. nana nana* is an important pupal parasitoid, which is exerting considerable check on *O. arenosella* population. The sex ratio of parasitoids emerged from the pupae collected from field showed preponderance of males (3 males: 1 female).

Females mate on the day of emergence or on the subsequent day, with the earlier emerged males. The females are polyandrous and mate many times during their long life span. On mounting the female, the male places his prothoracic legs just below the bases of the wings and holds the wings and abdomen of the female firmly with his meso-and metathoracic legs. Without

Table I. *Intensity of natural parasitism of* X. nana nana *and other species of pupal parasitoids of* O. arenosella

Period of collection of sample pupae	No. of pupae under observation	Total parasitism %	Percentage parasitism by					
			X. nana nana	*B. nosatoi*	*B. nephantidis*	*Antrocephus hakonensis* (Ashmead)	*T. pupivora*	*Eurytoma albotibialis* Ashmead (Hyperparasite)
October–December 1980	80	57.50	27.50	18.75	8.75	—	1.25	1.25
		(46)	(22)	(15)	(7)		(1)	(1)
January 1981	54	72.20	9.26	44.44	11.11	1.84	5.55	—
		(39)	(5)	(24)	(6)	(1)	(3)	

Figures in parantheses indicate the actual number of parasitised pupae.

exhibiting any specific courtship behaviour, the male parasitoid bends his abdomen, seeks out the genital pore of the female and mates. During the process of mating the male slightly vibrates his antennae which are anteriorly oriented, fans his wings in high speed for one second, then stops for two seconds and repeats the whole process during the entire period of mating, which normally lasts 1.5 – 2.5 minutes.

X. nana nana was reared in the laboratory inside glass chimneys. One to four day old *O. arenosella* pupae, were provided for egg laying after 4–5 days of mating. Pupae of *Anadevidia (= Plusia) peponis* F. were also used as hosts in the laboratory. The pupae rolled in snake gourd leaves were provided for parasitisation. *O. arenosella* pupae remaining inside silken galleries, were placed between the nylon mesh and muslin cloth coverings of the glass jar. No oviposition was, however, noticed in naked pupae of either hosts. Disorganisation of host tissues took place due to the repeated thrusts with the ovipositor and its rotatory movement. The adult parasitoid was observed to feed on the haemolymph of the host that exuded from the oviposition punctures made by the parasitoid itself. The parasitised pupae were transferred to separate glass jars or conical flasks and kept for emergence of adult parasitoids. Moistened cotton rolls were provided in the jars/flasks to maintain adequate relative humidity. Nearly 60 to 70 per cent successful parasitisation of the host pupae could be obtained by adopting this method. Four generations of the parasitoid were reared in the laboratory continuouly on *O. arenosella* and *A. peponis* pupae.

X. nana nana completed its life cycle in 17–19 days at 22–30°C and 45–80% R. H. in the insectary. Both the males and females of *X. nana nana* emerged more or less simultaneously. In the case of *X. punctata* reared simultaneously, the egg to adult stages were completed in 10–12 days and normally the males emerged one day earlier than the females. Longevity of adults of *X. nana nana* fed with concentrated honey was 30–55 days.

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The Influence of Rainfall on the Yield of Cardamom (*Elettaria Cardamom* Maton) in Coorg District

Most of the cardamom growing areas are rainfed and the information on the influence of distribution and intensity of rainfall on the crop yield is lacking. To study this aspect, 13 cardamom estates were selected, wherein data on yield and rainfall are available for more than a decade. In all these estates recommended doses of manures and fertilisers, proper plant protection measures and cultural practices were undertaken regularly.

Several attempts have been made to utilise the correlation and regression methods to study the effect of climatic parameters on crop yield in cereals (Fisher, 1924; Stacy et al., 1957; Dayal Ram, 1965; Runge, 1968).

Annual rainfall, number of rainy days and yield/ha. were collected from two estates in Mercara taluq; four estates in Somwarpet taluq and seven estates in Virajpet taluq for a period of ten years. Multiple regression analysis utilising: (1) total rainfall during the year, (2) the number of rainy days and (3) the coefficient of variation in the monthly rainfall at each of the locations, as auxillary variants, was attempted to study the relationship between rainfall attributes and cardamom yields.

The range and mean of annual rainfall, the number of rainy days and yields are presented in Table I. The following regression equation was obtained, when the effects of total rainfall (X_1), number of rainy days (X_2)and coefficient of variation for the rainfall received in different months (X_3)on the yield of cardamom was studied.

$$Y = 59.689 + 0.00095\ X_1 - 0.173\ X_2 \quad (0.017) \quad (0.524)$$
$$+ 0.764\ X_3\ (R^2 = 0.03) \quad (0.439)$$

The contribution of the variation in the monthly rainfall (X_3) to the variation in the yield of cardamom is higher than that of total rainfall (X_1) and the number of rainy days (X_2). In other words, the analysis suggests that yield of cardamom is influenced more by the distribution of monthly rainfall rather than the total rainfall and the number of rainy days. Showers during April could not give any clue for predicting yield nor the