GAU Res. J. 1993. 19 (1) : 47-51

Seasonal Development of *Goniozus (= Parasierola) Nephantidis* Muesebeck and its Effectiveness Against *Opisina arenosella* Walker

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ABSTRACT

The studies on the development of *Goniozus nephantidis* Muesebeck on the larvae of *Corcyra cephalonica* (Stainton) in different months of the year, and its effectiveness against *Opisina arenosella* Walker, were done under Mahuva (Gujarat State) conditions during 1983-86. The egg to larval (4.00 days), pupal (6.37 days) and oviposition (2.70 days) periods were shorter in the months of June - July, March and January - February, respectively, while they were longer in Aprill (5.83 days), May - June (10.00 days) and April (12.00 days). The females survived longer (20.40 days) in November - December and males in April (7.40 days). November - December had provided the suitable conditions (28.78^{0}C and 41.15% RH) for obtaining the higher yield of cocoons (74.76%) by good fecundity (21.00 eggs/female) of the parasitoid.

The field releases made for three years (1983-86) resulted the overall recovery to be 30.97 per cent parasitism of *O. arenosella*. November and February were found the most sutitable months for obtaining the higher recovery.

(Received on 28th Janu., 1992)

INTRODUCTION

The Oecophorid pest of coconut. *Opisina arenosella* Walker was found associated with total 23 natural enemies under Mahuva conditions of Gujarat State. Among the larval parasitoids, the bethylid, *Goniozus (= Parasierola) nephantidis* Muesebeck is the most important one. The life-history and habits of this parasitoid have been reported earlier (Rao et al: 1948; Kurian and Antony,1961; Remadevi *et al* 1978 (its biology and natural incidence under Mahuva conditions have been stutied) Kapadia and Mittal:1986): Releasing of this parasitoid for the control of the pest was suggested(Selvasekaran and Chandrasekaran, 1984). Since no studies on its development in different seasons and effectiveness has previously been done in Gujarat; attempts were, therefore, made to know the seasonal development of the parasitoid and to evaluate its effectiveness against the pest.

MATERIALS AND METHODS

The development of *G. nephantidis* was studied under the laboratory conditions in different months of the years (1983-84), using the laboratory host, *Corcyra cephalonica* (Stainton). For this purpose, the culture used was from its mass rearing in the laboratory. Different developmental stages of the parasitoid were studied as per method described by Kapadia

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and Mittal (1986). The mass rearing of the parasitoid was also done by adopting this method in which the mated parasitoid females were released individually into the glass tube (9 x 2.5 cm in diameter) bearing a single healthy *Corcyra* larva. Honey was provided as small droplets on a plastic piece as food for them. After a day, the parasitized larva was removed and replaced by another healthy host larva. These larvae were kept on paper for obtaining the parasitoid cocoons. The emerged adults were collected in glass tubes (10 x 3 cm in diameter) for their field releases.

Five day old female parasitoids were released in the selected coconut orchard of 200 palms, infested with the suitable stage of the pest. The number of parasitoid females released was in proportion of 20 per cent of population of full grown *Opisina* larvae. The field releases were made during three years (1983-86). The observations on the level of parasitism in the released and non-released coconut orchards were recorded after 15 days of the release. The control orchard was selected about 2 km away from the released orchard. Twenty five infested coconut palms were selected at random from the experimental orchard for determining the parasitism.

RESULTS AND DISCUSSION

The results obtained on the development of parasitoid in different months of the year and field recovery by the parasitoid are presented in Table 1 and 2.

1. Seasonal development

The data indicated that egg to larval period was less (4.00 days) in the months of June - July than in other months (5.15-5.83 days). The pupal period varied from 6.56 to 10.00 days. It was comparatively shorter (6.56 days) in months of January - February as compared to May-June (10.00 days). The oviposition period prolonged in the month of April (12.00 days), followed by November - December (9.50 days), and shortened in January - February (2.70 days). The fecundity was higher (30.10) in April, followed by November - December (21.00). The longevity of females and males was longer in November - December (20.40 days) and April (7.40 days), respectively. The percentage becoming cocoons from total eggs laid was higher (74.76%) in November - December, followed by March (72.72%), while the lowest percentage cocoons (30.56%) was obtained in April, followed by February (42.56%). No report regards the seasonal development of this parasitoid is available from the published literature. However, Rao *et al.* (1948) reported that the parasitoid was less active during the periods of monsoon.

2. Effectiveness

The field releases of the parasitoid were made in four selected coconut orchards in each year. The data summarized in Table 2 revealed that during the releasing year of 1983-94, the percentage parasitism over the control varied from 18.52 to 52.20 per cent parasitism. The maximum recovery (52.20%) was obtained in February. The released parasitoid caused an average 29.94 per cent parasitism over the control in the said year. The parasitism in the released orchards of 1984-85 was recorded in the range of 21.25 to 30.00 per cent over the control. The higher recovery (30.00%) was obtained in the February release, followed by January (28.27%). Whereas, the average recovery was 26.44 per cent in this releasing year. In releasing year of 1985-86, the levels of parasitism in the experimental orchards were recorded more in the range of 15.00 to 88.50

TABLE 1

Developmental stages, fecundity and percentage becoming cocoons of *Goniozus nephantidis* on *C. cephalonica* during the different months of the year, 1983-84.

Sr. No.	Particular		Average period (days)/month						
			April	May-June	June-July	November December	January-February	February	March
1.	Egg to larval period		5.83	5.30	4.00	5.15	5.31	5.40	5.61
2.	Pupal period		9.03	10.00	6.65	9.76	6.56	8.70	6.37
3.	Pre-oviposition period		4.10	4.00	5.83	6.40	6.20	10.00	5.33
4.	Oviposition period		12.00	4.13	5.50	9.50	2.70	5.33	4.67
5.	Post-oviposition period		3.70	3.00	2.00	3.40	4.90	2.67	4.16
6.	Fecundity		30.10	13.26	11.67	21.00	5.00	12.20	9.16
7.	Egg laying day		5.30	1.93	2.50	3.80	1.33	2.75	2.33
8.	Longevity	Female	19.00	9.45	8.61	20.40	14.20	18.60	9.80
		Male	7.40	4.05	2.86	4.70	3.60	4.25	4.00
9.	% becoming cocoons from eggs laid		30.56	67.27	70.29	74.76	62.22	42.62	72.72
	Average temp. (°C) :		25.71	32.41	31.86	28.78	26.44	26.80	34.02
	Average relative humidity (%) :		57.90	74.48	85.52	41.15	39.76	39.01	35.90

TABLE 2

Field releases and effectiveness of *Goniozus nephantidis* against *O. arenosella* during different years (1983-86).

Year of study	*Experimental orchard No.*	*No. of parasitoid adults released**	*Month of releasing*	*Parasitism (%) after 15 days of release*		*Parasitism (%) over the control*
				Experimental orchard	*Control orchard*	
1983-84	1	285	January	18.52 (27)	0.00 (25)	18.52
	2	225	February	58.34 (72)	6.14 (65)	52.20
	3	250	February	43.60 (78)	18.75 (48)	24.85
	4	912	April	35.71 (28)	11.54 (26)	24.17
	4	1672	_	39.04 (205)	9.11 (164)	29.94
1984-85	1	167	September	40.00 (40)	18.75 (56)	21.25
	2	180	November	28.57 (42)	2.33 (58)	26.24
	3	1175	January	28.27 (49)	0.00 (43)	28.27
	4	1000	February	30.00 (40)	0.00 (30)	30.00
	4	2522	_	31.71 (171)	5.27 (187)	26.44
1985-86	1	2200	February	88.50 (32)	0.00 (40)	88.50
	2	400	April	15.00 (20)	0.00 (20)	15.00
	3	280	November	28.57 (70)	0.00 (200)	28.57
	4	580	December	20.00 (300)	6.00 (300)	14.00
	4	3460	_	38.02 (422)	1.50 (560)	36.52
Overall	12	7454	_	36.27	5.29	30.97

* Proportion of females to male was 4 : 1.
Figures in parentheses indicate number of *opisina* larvae observed.

per cent as compared to the non-released orchard. The February release had gave the maximum recovery (88.50%). The average parasitism in this releasing year was 36.52 per cent.

The results of three years indicated that the overall recovery was 30.97 per cent. November and February were found the most suitable months for getting the higher recovery.

Dharmaraju (1963) recorded upto 19 per cent parasitism by this parasitoid. Manjunath (1985) reported that this parasitoid caused 28 per cent parasitism

The present studies suggest that the mass releases programme of *G. nephantidis* should be considered well in advance of November and February for the good suppression of the pest.

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