

IMPACT OF *Apanteles creatonoti* (HYMENOPTERA : BRACONIDAE) ON THE POPULATION OF *Spilosoma obliqua*

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ABSTRACT

Apanteles creatonoti Viereck (Braconidae) is an important larval parasitoid of *Spilosoma obliqua* (Wlk). The pest mortality due to this parasitoid was 38 per cent in the fields of Maharashtra. In the laboratory ($25 \pm 1^{\circ}\text{C}$ temp., 55-60 per cent R.H., 12 h photoperiod) the parasitism reached upto 45.60 per cent. The parasitoid attacks five-day-old host larvae mostly. The optimum host density for maximum parasitism was 50. The progeny production ranged from 57 to 96 (average 84.1) with an average sex ratio ($\sigma^{\circ}:\text{♀}$) 1:1.679. The innate capacity for increase was found to be 0.181 per female per day on the five-day-old hosts and population multiplied to 50.25 times in a mean generation time of 21.64 days.

KEY WORDS : *Apanteles creatonoti*, Impact, *Spilosoma obliqua*

Spilosoma obliqua (Wlk.) is a serious polyphagous pest of agricultural crops in India and is parasitised by the braconid, *Apanteles creatonoti* Viereck. The biology and reproductive potential with respect to host age have been studied by Sathe *et al* (1987,88) by using *Thiacidas postica* (Wlk) host larvae. It is reported as a potential parasitoid of *S. obliqua* from the fields of Maharashtra (Sathe, 1987). The present study was aimed to find out the impact of this parasitoid on *S. obliqua* population. The data will serve as a basis for biological control of this pest.

MATERIALS AND METHODS

The survey of parasitoids of *S. obliqua* was conducted during 1990 to 1993 by collecting its larvae, 7 days intervals from the fields of sunflower in Maharashtra, India. Cocoons of the parasitoid were also collected and reared for emergence of adults. The laboratory maintained cultures of both host and parasitoids were used for all experiments

at, $25 \pm 1^{\circ}\text{C}$ 55-60% R.H. and 12 h photoperiod. Reproductive potential in relation to host age was determined by exposing 50 *S. obliqua* larvae of age, ranging from 1 to 10-day-old to a single mated female at 24 h interval in a glass cage (25 x 25 x 30 cm). To determine the optimum host density for maximum parasitisation, 5-day-old *S. obliqua* larvae were exposed to the mated females with host densities 10, 30, 50 and 100 in a similar glass cage. The fecundity was studied by exposing five-day-old host larvae to the mated females at 24 h interval till death. All parasitised larvae were separately reared in plastic containers and observed for adult emergence. Life tables were prepared with the help of fecundity and later the intrinsic rate of natural increase of population of parasitoids were calculated using Birch's (1948) formula as elaborated by Howe (1953) and Watson (1964). During the study, the hosts and parasitoids were fed with sunflower leaves and 50 per cent honey respectively.

Table 1. Parasitoids of *Spilosoma obliqua*

Parasitoid	State attacked	Family	Order
<i>Apanteles obliquae</i>	L		
<i>Glyptapanteles malshri</i>	L		
<i>Apanteles creatonoti</i>	L		
<i>Parenion bhairavi</i>	L		
<i>Bracon kripatrikii</i>	L	Braconidae	Hymenoptera
<i>Aquthis indica</i>	L		
<i>Foletesor originis</i>	L		
<i>Balcemena</i> sp.	L		
<i>Aquthis</i> sp.	L		
<i>Hydrobracon</i> sp.	L		

Table 2. Adult longevity of *A. creatonoti* with different food

Food Provided	Sex		Average longevity (days)	Range
	♂	♀		
100% honey	♂	♂	7.7	5 - 10
	♀	♀	9.3	7 - 13
50% honey	♂	♂	5.9	4 - 7
	♀	♀	7.3	5 - 9
50% Glucose D	♂	♂	4.1	3 - 5
	♀	♀	5.2	3 - 6
Water	♂	♂	1.6	1 - 2
	♀	♀	2.4	1 - 3
Control	♂	♂	1.3	1 - 2
	♀	♀	1.5	1 - 2

Mating took place within 6 h of emergence and lasted for 40 sec. Oviposition was completed with 3 sec, more than one eggs were laid in a single host. Maximum progeny production was obtained with 5-day-old hosts. However, 3 to 6-day old were also readily accepted for parasitism (Table 3). One-day-old and 10-day-old hosts were unparasitised.

With a host density 50, maximum parasitoid emergence was recorded (Table 4). The average duration of immature stages was 18 days. Longevity of ovipositing females ranged from 7 to 13 days (average 9.3) (Table 5). The number of progeny production averaged 84.1 (range 57 to 96) individuals with a sex ratio ($\frac{\text{♂}}{\text{♀}}$) 1:1.679 (Table 5). Maximum mean progeny production per day, mx was 13.1 on the third day (Table 6). The innate capacity for increase was 0.181 per female per day

Table 3. Host age selection by *A. creatonoti*

Host age in days	Total No. of hosts tried	Total no. of parasitoids emerged			% Parasitism
		Male	Female	Total	
1	250	0	0	0	0.00
2	250	6	11	17	6.80
3	250	28	50	78	31.20
4	250	44	59	103	41.20
5	250	42	72	114	45.60
6	250	37	71	108	43.20
7	250	23	48	71	28.40
8	250	17	26	43	17.20
9	250	0	3	3	1.20
10	250	0	0	0	0.00

RESULTS AND DISCUSSION

In the fields, 38 per cent of *S. obliqua* was parasitised by *A. creatonoti*. About a dozen parasitoids were recorded on *S. obliqua* (Table 1). Life cycle of this parasitoid was completed within 18 days on *S. obliqua*: egg stage 3 days, larval stage 8 days and pupal stage 7 days. Adult survived for 13 days at an average period of 9.3 days (Table 2).

and population multiplied 50.23 times in a mean generation time of 21.64 days (Table 7).

A. creatonoti can be easily reared in the laboratory with the success of 45.6 per cent progeny production. It is good complementary parasitoid for *S. obliqua* and has desirable characters *Viz.*, rearable under laboratory condition, less developmental time, mate easily in the

Table 4. Parasitism by *A. creatonoti* in relation to host density

Host density	Hosts tried	Total no. of parasitoids emerged			% Parasitism
		Male	Female	Total	
10	50	03	08	16	32.00
20	100	17	21	38	38.00
30	150	24	37	61	40.56
50	250	39	74	113	45.20
100	500	81	24	?	?

Table 5. Longevity, oviposition, progeny production and sex ratio in *A. cretonoti*

Female Number	Longevity (days)	Oviposition (days)	Progeny production			Sex ratio
			Male	Female	Total	
A	10	8	42	46	88	1:1.095
B	7	3	27	30	57	1:1.111
C	9	8	22	78	90	1:1.354
D	7	5	18	41	59	1:2.277
E	8	6	41	43	84	1:1.048
F	8	7	46	48	94	1:1.043
G	11	8	38	55	93	1:1.447
H	13	8	42	54	96	1:1.285
I	8	7	28	63	91	1:1.250
J	12	8	33	56	89	1:1.696
Mean	9.3	7.0	33.7	51.4	84.1	1:1.679

Table 6. Daily production of females of *A. cretonoti*

Female Number	Number of females produced per day													Total individuals produced	Total No. females produced
	1	2	3	4	5	6	7	8	9	10	11	12	13		
A	0	3	12	10	8	5	3	3	2	0	-	-	-	88	46
B	2	7	13	05	3	0	0	-	-	-	-	-	-	57	30
C	5	12	14	12	11	10	9	5	0	-	-	-	-	90	78
D	5	11	13	08	04	00	0	-	-	-	-	-	-	59	41
E	4	10	14	09	04	02	0	0	-	-	-	-	-	84	42
F	5	12	14	08	05	02	02	0	-	-	-	-	-	94	48
G	4	11	13	09	08	05	03	02	0	0	-	-	-	93	55
H	5	11	12	10	08	04	03	01	0	0	0	0	0	96	54
I	06	11	13	11	11	07	04	0	-	-	-	-	-	91	63
J	03	10	13	11	07	07	05	02	0	0	0	0	-	89	56
Mean	3.9	9.8	13.1	9.3	6.9	4.2	2.9	1.3	0.2	0	0	-	-	84.1	-

laboratory, attack early instars of the pest and kill the pest in early stages, high fecundity with sex ratio favouring female per day.

Table 7. Life table of *A. cretonoti*

Pivotal age in (days)	Proportional life at age x l_x	No. of female progeny/female m_x	$l_x m_x$	$l_x m_x x$
18 days immature period				
19	1.0	3.9	3.9	74.10
20	1.0	9.8	9.8	196.00
21	1.0	13.1	13.1	275.10
22	1.0	9.3	9.3	204.60
23	1.0	6.9	6.9	158.70
24	1.0	4.2	4.2	100.80
25	0.80	2.9	2.32	58.00
26	0.50	1.3	0.65	16.90
27	0.40	0.2	0.08	2.16
			50.25	1086.36

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PY.5 (ARAVINDAR) : A FINE SHORT DURATION RICE VARIETY

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ABSTRACT

A new variety of paddy, PY.5 (Aravindar) has been released by the Government of Pondicherry from the Krishi Vigyan Kendra, Pondicherry for general cultivation. It was found to be a high yielder with good milling and cooking qualities. It recorded a mean grain yield of 6.3 t/ha with an increase of 12.5 and 43.4 per cent over IR.50 and TKM.9 respectively. It is semidwarf (90-95 cm) with long slender grain and matures in 100 to 105 days. It is moderately resistant to brown plant hopper and rice tungro virus with better storage potential.

KEY WORDS : PY.5, Rice, Short Duration, High Yield

Rice is grown in an area of 25,000 ha in the Union Territory of Pondicherry. Fine grained rice varieties are generally preferred by the consumers of this region. The short duration rice varieties cultivated at present generally yield well but lack other desirable qualities such as resistance to insect pests and diseases and good grain characteristics. With this objective, breeding work was concentrated in the Pondicherry Krishi Vigyan Kendra, which resulted in the evolution of a short duration rice PY.5 (P.2409) which possesses moderate resistance to the brown plant hopper (BPH) *Nilaparvata lugens* (Stal.) and rice tungro virus (RTV) and long slender grain in addition to high yield potential.

MATERIALS AND METHODS

P.2409 was evolved by hybridisation and pedigree selection from the cross Swarnadhan/NLR

Table 1. Performance of P.2409 rice culture at Krishi Vigyan Kendra, Pondicherry

Year	Grain yield (kg/ha)		
	P.2409	IR.50	TKM.9
1989	6170	2490	3040
1990	6570	6005	5080
1991	6178	5858	3955
1991	4667	4796	4870
1992	6510	3330	3750
1992	6267	6017	NA
Mean	6060	4769	4139
% on IR.50	127.6	100.0	87.2

9674. The single plant was selected during 1988 and the homozygous line during 1989. It was forwarded to preliminary yield trial (PYT), in 1990, comparative yield trial (CYT) in 1991-92 and to adaptive research trials (ART) and on-farm trials (OFT) in 1992 and 1993 at 35 locations in Pondicherry and Karaikal regions. The culture was tested as IET 13431 in initial yield trial - early during *rabi* 1992, under the All India Co-ordinated Rice Improvement Programme (AICRIP).

RESULTS AND DISCUSSION

In the station trials, P.2409 recorded consistently higher grain yield over the standard varieties IR.50 and TKM.9 registering a mean increase of 27.6 and 46.4 per cent respectively (Table 1). In the OFT, P.2409 recorded higher yield in all the locations tested with an average yield of 6604 kg/ha as compared to 6511 kg of IR.50 and 4693 kg of TKM.9. The increase in yield over IR.50 and TKM.9 was 1.4 and 40.7 per cent respectively (Table 2). The overall performance of this culture under different yield trials has clearly indicated its superiority over IR.50 and TKM.9 in

Table 2. Performance of P.2409 in on-farm trials in farmers' holdings

Year	No. of Trials	Grain yield (kg/ha)		
		P.2409	IR.50	TKM.9
1992-93	35	6604	6511	4693
	% on IR.50	101.4	100.0	72.1