

Biology of *Dicladispa armigera* (Oliv.) (Coleoptera: Chrysomelidae) in Kangra valley of Himachal Pradesh

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ABSTRACT

The incubation period, total larval period, pupal period and adult longevity of male and female of *Dicladispa armigera* (Oliv.) through different generations varied from 3.29 ± 0.20 to 5.01 ± 0.08 , 10.51 ± 0.08 to 12.69 ± 0.08 , 6.00 ± 0.25 to 8.64 ± 0.08 , 25.25 ± 0.30 to 34.50 ± 0.36 and 34.25 ± 0.30 to 40.17 ± 0.24 days, respectively. Whereas, pre-mating, pre-oviposition, oviposition and post-oviposition periods based on different generations varied between 1.8 ± 0.33 to 3.01 ± 0.33 , 2.28 ± 0.26 to 3.62 ± 0.12 , 14.20 ± 0.1 to 17.42 ± 0.31 and 15.58 ± 0.3 to 16.92 ± 0.23 days, respectively.

Key words: Biology, rice hispa, longevity, instars

Dicladispa armigera (Oliv.) is a major pest of rice in many Asian and oriental regions of the world (Butani and Jotwani, 1976; Zafar *et al.* 1986). In India it has been reported as a serious pest from many rice-growing states including Himachal Pradesh (Aggarwal, 1955). It is one of the limiting factors in cultivation of rice in Kangra Valley of Himachal Pradesh where rice is preferred over maize during wet season. Its epidemic had been reported from Palampur, Nagrota and Baijnath blocks of Kangra district in 1978 by Thakur *et al.* (1979). Since biology of an insect is affected by the prevailing environmental conditions, a detailed study on the biology of *D. armigera* was carried out at Rice and Wheat Research Centre, CSK HPKV, Palampur.

MATERIALS AND METHODS

Primary culture of *D. armigera* in the laboratory was initiated from the field collected adults and maintained on potted rice plants (Variety: Kasturi) each covered with a cage.

Biology of *D. armigera* was studied on potted rice plants from July to December during 2002 and 2003. The experiment was replicated twelve times. A pair of freshly emerged *D. armigera* adults were released on each caged potted plant for oviposition and subsequent studies on the biology that included oviposition period, post-oviposition period, incubation period, larval period,

pupule period and adult longevity.

RESULTS AND DISCUSSION

Biology of the pest did not differ significantly amongst generations across the years of study. Premating, Pre-oviposition oviposition and post-oviposition periods varied from 2.38 ± 0.29 to 3.01 ± 0.33 , 2.99 ± 0.10 to 3.62 ± 0.12 , 14.20 ± 0.10 to 16.83 ± 0.11 and 15.60 ± 0.10 to 16.01 ± 0.12 days, respectively whereas during second year, the respective periods ranged from 1.80 ± 0.20 to 2.60 ± 0.24 , 2.58 ± 0.26 to 3.25 ± 0.22 , 14.33 ± 0.26 to 17.42 ± 0.31 and 15.58 ± 0.30 to 16.92 ± 0.23 days (Table 1). Sen and Chakravorty (1970) have reported similar pre-mating period. Vadalia *et al.* (1989) have reported 3.50 ± 0.50 , 13.69 ± 3.90 and 22.20 ± 10.40 days as pre-oviposition, oviposition and post-oviposition periods, respectively. The mean incubation period during different generations varied from 4.02 ± 0.09 to 5.01 ± 0.08 and 3.92 ± 0.20 to 4.42 ± 0.15 days in the first and second year, respectively. Sen and Chakravorty (1970), Butani and Jotwani (1976), Vadalia *et al.* (1989) have all reported incubation periods ranging from 3-7 days. *D. armigera* passed through four instars with total larval duration ranging from 10.98 ± 0.06 to 12.69 ± 0.08 and 10.51 ± 0.08 to 12.58 ± 0.11 days in different generations in the first and second year, respectively. The total larval duration through all the generations averaged 11.50 ± 0.08

Table1. Biology of *Dicladispa armigera* (Oliv.) on paddy under laboratory conditions.

Parameters		*Duration of various parameters during different generations (Mean \pm S.E/)**			
		First(July- Aug.)	Second (Aug.- Sept.)	Third (Sept.- Oct.)	Fourth (Oct.- Dec.)
Pre-mating period	1 st Year	2.38 \pm 0.29	3.01 \pm 0.33	2.76 \pm 0.28	2.60 \pm 0.20
	2 nd Year	2.00 \pm 0.01	1.80 \pm 0.33	2.60 \pm 0.24	2.40 \pm 0.24
Pre-oviposition period	1 st Year	3.12 \pm 0.12	2.99 \pm 0.10	3.62 \pm 0.12	3.02 \pm 0.13
	2 nd Year	3.17 \pm 0.21	2.58 \pm 0.26	3.17 \pm 0.21	3.25 \pm 0.22
Oviposition period	1 st Year	16.83 \pm 0.11	16.32 \pm 0.11	15.67 \pm 0.12	14.20 \pm 0.10
	2 nd Year	16.33 \pm 0.30	14.33 \pm 0.26	17.17 \pm 0.21	17.42 \pm 0.31
Post-oviposition period	1 st Year	16.01 \pm 0.12	15.60 \pm 0.10	15.96 \pm 0.10	16.00 \pm 0.11
	2 nd Year	16.92 \pm 0.23	16.00 \pm 0.21	15.58 \pm 0.30	15.83 \pm 0.20
Incubation period	1 st Year	4.02 \pm 0.09	4.43 \pm 0.02	4.92 \pm 0.06	5.01 \pm 0.08
	2 nd Year	4.25 \pm 0.21	3.92 \pm 0.20	4.08 \pm 0.23	4.42 \pm 0.15
Larval period	1 st Year	10.98 \pm 0.06	11.26 \pm 0.08	11.63 \pm 0.08	12.69 \pm 0.08
	2 nd Year	12.24 \pm 0.08	10.51 \pm 0.08	10.67 \pm 0.08	12.58 \pm 0.11
Pupal period	1 st Year	7.76 \pm 0.11	7.27 \pm 0.08	6.86 \pm 0.08	8.64 \pm 0.08
	2 nd Year	7.25 \pm 0.22	6.00 \pm 0.25	6.92 \pm 0.20	8.08 \pm 0.20
Longevity (Male)	1 st Year	28.18 \pm 0.21	25.80 \pm 0.20	28.41 \pm 0.21	30.68 \pm 0.29
	2 nd Year	27.75 \pm 0.33	25.25 \pm 0.30	27.83 \pm 0.30	34.50 \pm 0.36
Longevity (Female)	1 st Year	37.45 \pm 0.22	34.74 \pm 0.25	37.85 \pm 0.20	39.12 \pm 0.20
	2 nd Year	37.00 \pm 0.33	34.25 \pm 0.30	37.42 \pm 0.36	40.17 \pm 0.24

* Duration in days ** Mean of 12 replications

days (Table 2). *Vadalia et al.* (1989) have found 8.63 days as average larval period. Minimum variation was observed in pre-mating, pre-oviposition oviposition and post-oviposition periods amongst the generations in both the years (Table 1). Duration of third instar was least affected by the ambient temperature. During larval stage *D. armigera* spent maximum time in first instar and least time in second instar. The average pupal period between different generations ranged from 6.86 \pm 0.08 to 8.64 \pm 0.08 and 6.00 \pm 0.25 to 8.08 \pm 0.20 days in the first and second years of study, respectively. *Vadalia et*

al. (1989) have reported 7.66 \pm 1.13 days as average pupal period. These figures are concurrent to our observations.

The females survived longer than males in all the generations. The average male longevity ranged from 25.80 \pm 0.20 to 30.68 \pm 0.29 and 25.25 \pm 0.30 to 34.50 \pm 0.36 days in first and second years, respectively. On the other hand, females survived for 34.74 \pm 0.25 to 39.12 \pm 0.20 and 34.25 \pm 0.25 to 40.17 \pm 0.24 days through different generations in the respective years. *Prakasa Rao et al.* (1971) had reported that the adults

Table2. Duration of different larval instars of *Dicladispa armigera* (Oliv.) on paddy under laboratory conditions.

Generation		Duration (Mean \pm S.E.)**				
		I	II	III	IV	Total Larval period
First(July- Aug.)	1 st Year	2.07 \pm 0.10	2.14 \pm 0.20	3.13 \pm 0.20	3.64 \pm 0.15	10.98 \pm 0.06
	2 nd Year	2.80 \pm 0.10	2.55 \pm 0.14	3.74 \pm 0.11	3.15 \pm 0.10	12.24 \pm 0.08
Second (Aug.- Sept.)	1 st Year	2.60 \pm 0.22	2.80 \pm 0.32	2.79 \pm 0.27	3.07 \pm 0.20	11.26 \pm 0.08
	2 nd Year	2.01 \pm 0.01	2.20 \pm 0.11	3.10 \pm 0.08	3.20 \pm 0.11	10.51 \pm 0.08
Third (Sept.-Oct.)	1 st Year	2.15 \pm 0.06	2.94 \pm 0.06	3.29 \pm 0.30	3.25 \pm 0.32	11.63 \pm 0.08
	2 nd Year	2.20 \pm 0.11	2.12 \pm 0.11	3.21 \pm 0.11	3.13 \pm 0.11	10.67 \pm 0.08
Fourth (Oct.-Dec.)	1 st Year	2.12 \pm 0.02	3.06 \pm 0.07	3.40 \pm 0.20	4.11 \pm 0.17	12.69 \pm 0.08
	2 nd Year	2.00 \pm 0.15	3.32 \pm 0.12	3.24 \pm 0.11	4.02 \pm 0.01	12.58 \pm 0.11
Mean	1 st Year	2.23 \pm 0.19	2.73 \pm 0.60	3.15 \pm 0.20	3.51 \pm 0.51	11.64 \pm 0.32
	2 nd Year	2.25 \pm 0.05	2.47 \pm 0.10	3.32 \pm 0.09	3.37 \pm 0.07	11.50 \pm 0.08

Table 3. Weather data corresponding to different generations during 1st and 2nd years of study.

Year	Weather parameter	Generations				
		Mean± S. E.	First	Second	Third	Fourth
1 st	Temp. °C	Max.	30.00 ± 0.44	30.60 ± 0.41	29.40 ± 0.44	28.30± 0.39
		Min.	21.70 ± 0.43	22.20 ± 0.40	18.10 ± 0.41	14.60± 0.40
	RH (%)		74.8 ± 0.23	69.2 ± 0.31	63.7 ± 0.33	66.00± 0.32
2 nd	Temp. °C	Max.	29.9±0.70	27.4±0.46	27.2±0.60	24.0±0.80
		Min.	21.3±0.42	20.4±0.34	14.5±0.60	9.7±0.62
	RH (%)		69.2±0.73	69.1±0.42	67.7±0.27	66.6±0.32

of *D. armigera* lived up to 78 days at Cuttack (Orissa) which was almost double the longevity noted at Kangra Valley. But Vadalia *et al.* (1989) had reported average longevity of males and females as 34.90+8.00 and 41.50+10.00 days respectively, which corroborates the present findings.

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