

Population Growth of *Heliothis armigera* Hbn. on Sunflower

Life table is a concise summary of certain vital statistics of insect population. It is a useful technique in the study of population dynamics, provides a format for recording and accounting for all population changes in the life cycle of a species. The objective of the present study was to collect information for the construction of the life tables under laboratory condition, when the larvae of *Heliothis armigera*, a polyphagous and destructive pest causing heavy losses to many important crops were reared on sunflower heads. Life tables for this pest has been studied by other workers on lucerne (Billapate *et al.*, 1977) lima bean (Bilapate *et al.*, 1978) and pea pods (Bilapate and Pawar, 1978).

A laboratory culture of *H. armigera* was used for this study. Known number of adult pairs were released for egg-laying in cages (30 × 30 cm). Eggs laid on white muslin cloth were collected by wet camel hair brush and 100 eggs were kept for hatching. Immediately after hatching, the larvae were transferred on piece of sunflower heads (*Helianthus annuus* L.) kept in plastic containers (5 × 5 cm). The feeding material was renewed daily in the morning till all the larvae pupated. The adults emerged on a particular day were paired and released in separate cages for egg-laying. The fecundity of the females on subsequent days was noted daily till all the females died. The number of eggs laid per female was divided by two (sex ratio 1 : 1) to get the number of female births (mx). Observations from hatching of eggs till the emergence of adults were recorded

daily which provided the values for the life table (lx). Life tables were constructed according to the method of Birch (1948) and Atwal and Bains (1974). This study was conducted under laboratory conditions at $26 \pm 2^\circ\text{C}$ temperature. Stable age-distribution (percent distribution of various stages) was also worked out by observing the population schedule of birth rate and death rate (mx and lx) when grown in limited space.

The results (Table 1) indicated that the preoviposition period lasted for 3 days. The first female mortality within the cohort occurred on ninth day after the emergence of adults and mortality increased thereafter. The adults attained a greater mean progeny production per day of 99.50 on 44th day of pivotal age and the reproduction ceased by eighth day after oviposition. The population would be able to multiply 306.56 times at the end of each generation.

The mean time for completing a generation (T) was 43.22 days. The innate capacity for increase (rm) was 0.1325 with a finiterate of increase 1.141 per female per day. The population would be able to multiply 2.528 times every week (Table II).

On reaching stable age-distribution, the population of *H. armigera* in its various stages viz., eggs, larvae, pupae and adults contributed to the time 49.457, of 47.680, 2.464 and 0.398 per cent, respectively.

The net reproductive rate on sun flower was more (306.56) than on lucerne (185.69) and lima bean (206.47) (Bilapate *et al.*, 1977 and 1978) indicating that the sunflower is a better host than lucerne and lima bean.

N. DHANDAPANI
M. BALASUBRAMANIAN

Department of Agri. Entomology
Tamil Nadu Agricultural University
Coimbatore-3.

REFERENCES

- ATWAL, A. S. and BAINS, S. S. 1974. *Applied Animal Ecology*. Kalyani Publishers, Ludhiana, pp. 245.
- BILAPATE, G. G., PAWAR, V. M. 1978. Life tables for the gram pod borer, *Heliothis armigera* Hubner (Lepidoptera : Noctuidae) on pea. *proc. Indian Acad. Sci.*, 87 B: 119-121
- BILAPATE, G. G., PAWAR, V. M. and GAIKWAD B. B. 1978. The rate of increase in numbers of *Heliothis armigera* on green lima bean. *J Maharashtra Agric. Univ.* 3: 38-39.
- BILAPATE, G. G., PAWAR, V. M., and RAODEO, A. K. 1977. Growth of population of *Heliothis armigera* Hbn. on lucerne *Indian J. agric. Sci.* 47: 540-542.
- BIRCH, L. C. 1948. The intrinsic rate of natural increase in an insect population. *J. anim. Ecol.* 17: 15-26.

May 1981]

RESEARCH NOTES

TABLE I Life table (for females)-age specific fecundity for *H. armigera* on sunflower

x	$\frac{l}{x}$	$\frac{m}{x}$	$\frac{l}{x} \frac{m}{x}$	$\frac{x \cdot l}{x} \frac{m}{x}$
0-37	0.80	Immature stages		
38	0.80	*	0.80	30.40
39	0.80	*	0.80	31.20
40	0.80	*	0.80	32.00
41	0.80	14.95	11.96	490.36
42	0.80	48.73	38.98	1637.16
43	0.80	78.60	62.88	2703.84
44	0.80	99.50	79.60	3502.40
45	0.80	60.78	48.63	2187.90
46	0.74	50.45	37.33	1717.18
47	0.72	26.17	18.84	885.48
48	0.53	11.23	5.95	285.60
49	0.35	0.00	0.00	0.00
$=R_0$ $=\sum \frac{l}{x} \frac{m}{x}$ $=306.56$ $\sum x \cdot \frac{l}{x} \frac{m}{x}$ $=13503.52$				

* Pre-oviposition period.

TABLE II Generation time, innate capacity for increase in numbers and finite rate of increase in numbers and finite rate of increase in numbers in *Heliothis armigera* Hbn. on sunflower.

Particulars	
Mean length of the generation $T_c = \frac{\sum x_l x_{mx}}{R_o}$	
$= \frac{13503.52}{306.56}$	$= 44.048$ days
Innate capacity for increase in numbers $rc = \frac{\log_e R_o}{T_c}$	$= \frac{5.7265}{44.048} = 0.130$
Now arbitrary rm (rc) are 0.12 & 0.14	
$\sum e^{-rm} x_l x_{mx}$	$= 1096.6$
$\frac{1}{\sum e^{-rm} x_l x_{mx}}$	$= 0.1325$
Finite rate of increase in numbers (λ) antilog $e. rm$	$= 1.141$
$T = \frac{5.7265}{0.1326}$	$= 43.22$ days
Weekly multiplication of population (erm)	$= 2.528$