



## Life table and intrinsic rate of increase of *Earias vittella* Fabriciu on bhendi and cotton

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**Abstract:** Investigations were made on life table of *Earias vittella* on bhendi and cotton. The survival (IX) from egg to adult emergence was 0.39 on bhendi and 0.33 on cotton. The adults attained the greatest mean progeny production per day (mx) of 44.0 on 30th day on bhendi and of 44.2 on 31st day on cotton. The net reproductive rate (Ro) was 57.23 on bhendi and 49.06 on cotton. The innate capacity for increase (rm) was 0.1387 on bhendi and 0.1292 on cotton while the finite rate of increase (l) was 1.15 females/day on bhendi and 1.14 females/day on cotton. The mean generation time (TC) was 29.49 days on bhendi and 30.48 days on cotton. The doubling time (DT) of the population was 5.00 days on bhendi and 5.36 days on cotton. The population would multiply 2.64 times on bhendi and 2.47 times on cotton.

**Key words:** Bhendi, Cotton, *Earias vittella*, Life table, Reproductive rate.

### Introduction

The shoot and fruit borer, *Earias vittella* Fabricius is an important pest attacking cotton and bhendi and causes heavy yield losses. Life table is a concise summary of certain vital statistics of insect population. The construction of life table of this pest is vital to the description and understanding of the population dynamics.

### Materials and Methods

Life table studies were made pertaining to *E. vittella* on bhendi and cotton as host

plants under laboratory condition. Five pairs of adults were released for egg laying in separate cages at the rate of one pair per cage. Eggs laid on bhendi fruits by the female which were kept inside the cage, were collected using wet camel hair brush and 100 eggs were observed for hatching. Immediately after hatching, the larvae were transferred to respective feeding material kept in plastic containers. The feed was renewed daily in the morning till all the larvae pupated. The adults that emerged on a particular day were paired and caged in

Table 1. Survival and age-specific fecundity of spotted bollworm, *E. vittella* on bhendi

Pivotal age (days) x	Survival of females at age l x	Age schedule for female births at age m x	l x . m x	x . l x . m x
0-24	0.39	Immature stages	-	-
25	0.39	x	0.39	9.75
26	0.38	x	0.38	9.88
27	0.38	12.20	4.64	125.17
28	0.38	23.00	8.74	244.72
29	0.38	34.80	13.22	383.50
30	0.38	27.40	10.41	322.77
32	0.31	8.80	2.73	87.30
33	0.18	0.00	0.00	0.00
			R0 57.23	Σ.x.lx.mx 1684.69

Table 2. Survival and age-specific fecundity of spotted bollworm, *E. vittella* on cotton

Pivotal age (days) $x$	Survival of females at age $l_x$	Age schedule for female births at age $m_x$	$l_x \cdot m_x$	$x \cdot l_x \cdot m_x$
0-25	0.33	Immature stages	-	
26	0.33	x	0.33	8.58
27	0.33	x	0.33	8.91
28	0.31	14.20	4.40	123.26
29	0.31	26.40	8.18	237.34
30	0.31	32.80	10.17	305.04
31	0.31	44.20	13.70	424.76
32	0.31	30.00	9.30	297.60
34	0.16	0.0	0.00	0.00
			R0 49.06	$\sum x.l_x.m_x$ 1492.81

Table 3. Generation time, innate capacity for increase and finite rate of increase in number of *E. vittella* on bhendi and cotton

Parameter	Value on	
	Bhendi	Cotton
Mean length of generation TC (days) $\frac{\sum x.l_x.m_x}{R_0}$	29.49	30.48
Innate capacity for increase in numbers (calculated) $rc = \frac{\log_e R_0}{TC}$	0.138710	0.129239
Innate capacity for increase (arbitrary) (females/day)	0.14	0.13
Mean generation time (days) $T = \frac{\log_e R_0}{rm}$	29.08	30.02
Finite rate of increase $\lambda = \text{antilog } e^{rm}/\text{female/day}$	1.15	1.14
Doubling time (DT) (days) $= \frac{\log 2}{\log \lambda}$	5.00	5.36
Weekly multiplication of the population = $(e^{rm})^7$	2.64	2.47

separate cages for egg laying. The fecundity of females on subsequent days was recorded till all of them died.

To determine the females born (mx) out of eggs laid per female, the sex ratios of male: female (1:1) for bhendi and cotton were utilized. Observations on hatching of eggs till the emergence of adults were recorded daily. The life table was constructed according to the method of Birch (1948) elaborated by Home (1953) and Atwal and Bains (1974). The innate capacity for increase (rm), net reproductive rate (Ro) and mean generation time (TC) were the basic population parameters used to assess the population growth in the laboratory. The value of rm was calculated by using the formula  $Ee^{-7-rmx} \cdot rm = 1096.6$ .

### Results and Discussion

Survival and age specific fecundity of *E. vittella* on bhendi and cotton indicated that females started laying eggs after 26<sup>th</sup> day on bhendi and 27<sup>th</sup> day on cotton of pivotal age which lasted upto 33<sup>rd</sup> on bhendi and 34<sup>th</sup> day on cotton.

The net reproductive rate (Ro) representing the ratio of total female births, was 57.23 on bhendi and 49.06 on cotton (Tables 1 and 2). However, Ambegaonkar and Bilapate (1982) reported that reproductive rates of *E.vittella* was 114.50 and 93.96 on bhendi fruits and cotton bolls respectively.

The mean length of generation (TC) of 29.49 and 30.48 days, innate capacity for increase (rm) of 0.1387 and 0.1292; first rate of increase of 1.15 and 1.14 females/day, doubling time (DT) of 5.00 and 5.36 days with population multiplication ( $e^{rm}$ ) of 2.64 and 2.47 times were observed on bhendi and cotton respectively.

The present investigations revealed that bhendi is better suitable host than cotton. Evidently, the *E. vittella* can cause considerable damage in less time on bhendi than on cotton. The implications of these results should be considered in the development of future management programmes for *E. vittella*.

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