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Studies on age specific & female fertility life tables of *Helicoverpa armigera* under controlled condition

Chandan Maity, Palash Mondal and Laltu Mondal

Abstract
Tomato, *Lycopersicon esculentum* is one of the most popular and widely grown vegetable in the world. In India, tomato is cultivated extensively in different parts of the country and considered one of the most remunerative vegetables. Among pest complex of tomato *Helicoverpa armigera* is an important pest which causes considerable losses in quantity of tomato fruits. Therefore to minimize the loss an experiment was conducted to study the biology of two generations of *H. armigera* in the laboratory of Department of Plant Protection, Palli Siksha Bhavana, Visva Bharati at 26±1 ºC and 80±5% RH. As these information will be helpful to formulate pest management strategies. The experimental findings on life tables of first and second generation indicated that age specific survival (lx) of insect was gradually decreased with the advancement of time. Expectancy of life also revealed similar trend in both generation. Results regarding the female fertility validates that immature stage including the pre reproductive period of *H. armigera* was 40.5 days in first and second generations. Thereafter, insects continued to lay eggs for 6 days and 7 days in first and second generation respectively. Natality rate (mx) i.e. the number of female off-spring produced/ female at age x in first and second generation were not similar during the whole length of reproductive period. The net reproductive rate (R_0) of first generation of *H. armigera* was estimated 133.83 females/ female while mean length of generation (T) was 43.7 days. Whereas in second generation which was estimated 126.22 females/ female while mean length of generation (T) was 43.9 days. Where, the approximate rate of increase (r_{approx}) was slightly lesser than the actual rate of natural increase ($r_{accurate}$) in both generation, which indicated the population trends towards overlapping generation. The finite rate of increase (λ) was 1.118 females/ female/day, potential fecundity (Pf) was 277.7 females/ female and monthly rate of increase (MRI) was 28.39 females/ female while time required for population to double (DT) was 6.18 days in first generation. While in second generation almost similar trends were observed, the finite rate of increase (λ) was 1.116 females/ female/day, potential fecundity (Pf) was 336.5 females/ female and monthly rate of increase (MRI) was 26.91 females/ female while doubling time (DT) was 6.28 days. The experimental findings revealed that that larval period of first generation of *H. armigera* was 22 days while pupal period and the adult longevity were 11 and 10 days, respectively. The above biological parameters indicated that the insect could complete a generation within almost one and half month. The results also revealed that per cent adult formation (47%) affected the growth index (1.42) and suitability index (0.05) of the insect. The reproductive period of the female insect was continued up to 6 days. Similarly, in second generation larval period of insect continued up to 23 days while pupal period lasted for 12 days and the adults lived up to 8 days. The per cent adult formation was 58%. The growth and suitability indices were 1.65 and 0.05, respectively. The reproductive period of the female insect continued up to 7 days.

Keywords: tomato, *Helicoverpa armigera*, age, female fecundity, life table

Introduction
Tomato, *Lycopersicon esculentum* is one of the most popular and widely grown vegetable in the world. In India, it occupies an area of 8, 82,000 hectares with an annual production of 18,735,000 MT [1]. Tomato production has intensified over the years, however, yields continued to be low due to several production constraints such as insect, pests, and disease and other environmental factors [2, 3]. The borer is considered as one of the major pests of tomato, inflicting devastating crop losses in India [4]. Among pest complex of tomato, *Helicoverpa armigera* is an important pest which causes considerable losses in quantity of tomato fruits [5]. Infestation of *H. armigera* accounted tomato fruit yield loss to the tune of 72.19 and 77.76 %, respectively during first and second year of bio-efficacy experiment [6]. Generally the farmers of India control this pest by the application of chemical insecticides. But, the application of

chemical insecticides has got many limitation and undesirable side effects [7]. The best insect pest management in terms of economics & maintenance of pest population below threshold level can be achieved only when the knowledge on pest biology, fluctuation of pest population in relation to weather factors, vital statistics throughout the life cycle of pest, key mortality factors of pest in the nature as well as efficacy of different bio pesticides along with new generation ecofriendly pesticides is known clearly. The use of life table by entomologists is a fairly recent approach in studying the population dynamics of insects and the usefulness of life tables in this area is gaining more importance in pest management programme. However, the value of life tables in actuarial work long has been recognized. Life tables depict the vital statistics of insect life and could be used as bioclimatic indices of population growth rates responding to selected conditions [8]. Hence, keeping the above view in mind the research programme was undertaken with the objective to construct life tables of *H. armigera* in the laboratory.

Materials and Methods

Rearing for oviposition and maintenance of nucleus culture

Tomato var. *Patharkuchi* (local variety) was cultivated in farmer's field in Binuria village near Sriniketan of Birbhum district of red lateritic zone of West Bengal. The infested fruits with borer larvae were collected from the field and reared in the laboratory of Department of Plant Protection, Palli Siksha Bhavana, Visva-Bharati. Field collected larvae kept in plastic containers (2.5 cm diam.x10 cm long) till adult emergence. The fruits (food) were changed whenever required to avoid decomposition. The larvae were gently taken out with the help of a fine camel brush during the food change and placed them to the fresh foods. Before pupation each container partly filled with sterilized soil within which the advanced instar larva undergoes pupation. The adults obtained from the culture were used for further study. The male and female moths paired for egg laying in glass mating jars (15 cm diam.x30 cm long) lined with black papers on inner walls with muslin cloths on the tops. Cotton swabs soaked in 5% honey solution were provided as food for the adults within the mating jars. The black papers containing the fertilized eggs were cut in pieces and kept in plastic containers (2.5 cm diam.x10 cm long) for hatching. Freshly hatched neonate larvae (0-12 h old) were reared separately on fresh unripe sliced tomatoes kept in the containers (2.5 cm diam.x10 cm long) for the maintenance of nucleus culture. Mean oviposition period and average number of eggs laid by the female insect was calculated after their mortality.

Age-specific survivorship and female-fertility

The adult moths were collected from nucleus culture and kept in rearing jars (15 cm diam.x30 cm long) for oviposition in the laboratory at 26±1ºC and 80±5% RH. Initially, 100 eggs in groups of ten were kept in ten vials (2.5 cm diam.x10 cm long) till hatching. Embryonic death of insect if any, assumed to be homogeneous during the incubation period. After hatching first instar larvae were kept separately in plastic vials (2.5 cm diam.x10 cm long). The food (unriped tomato slice) was changed daily to avoid any type of contamination till pupation. The observations for survival of the insect were recorded every day at regular interval till the mortality of all adults. Mortality during pupal stage also assumed as homogeneous. After adult emergence, same age groups of five male and female moths were collected from survivorship experiment and provided cotton swab soaked in 5% sugar solution as supplementary food. They were paired separately and numbers of egg laid by each female during the entire oviposition period were kept in separate petri dishes (4 cm diam.) to observe hatching. However, observations on survival of the moths were continued till mortality of the last adult. As the sex ratio is 1:1, the numbers of eggs laid by each female was divided by two to get the number of female birth (mx). In this way, all the fertile eggs were recorded and average rate of egg laying female^{-1} day^{-1} was calculated. This was continued for entire oviposition period of the females. The experiment validated in second generation also. The data obtained in the study was used for construction of age specific survivorship and female fertility life tables as proposed by Howe (1953) [9]; Choudhary and Bhattacharya (1986) [10].

Growth and development

Hundred newly hatched (0-12 h old) larvae of the lepidopteron borer were taken from nucleus culture and reared individually on sliced unriped tomato and kept in labelled plastic container (6″ diam. and 10″ long) having screw cap fitted with fine wire mess to facilitate aeration in the laboratory at 26 ± 1ºC and 80±5% RH. Food was given *ad libitum*. Before pupation each container filled up with sterilized soil at the base. Date of pupation and adult emergence were noted down. Observations continued till the mortality of all emerged adults. Similar methodologies adopted for second generation for validation of the experiment. Growth index (G.I.) and suitability index (S.I.) calculated using the formulae proposed by Pant (1956) [11] and Howe (1971) [12], respectively.

Results and Discussion

Age specific survivorship

The age specific survival (lx) of *H. armigera* in first generation decreased at a regular interval after the initiation of experiment. This pattern was noticed up to 33rd day. Among all the larval instar most vulnerable instars was first to third instar. During that phase number of dying individual (dx) were 22. While no insect mortality was recorded from 34th to 41st day, which was pupal to pre oviposition period. Confirmation of pupal mortality within the pupal case is difficult. Hence, similar to embryonic mortality, pupal mortality was also assumed homogenous throughout the pupal period. Thereafter, a sharp decline in the survival of insect was noticed till the end of the experiment i.e. mortality of the last adult insect (Table 1 & Fig. 1).

The life expectancy of *H. armigera* of first generation population shows a gradual decrease with the advancement of age. The expectancy of life found to be quite high (31.28 to 25.93 days) at early stages and it was recorded from the day of initiation to 17th day. At middle age, the expectancy ranged almost between 25 to 12 days and finally declined to 0.5 days on cessation (Table1 & Fig. 1).

The age specific life Table was also continued for second generation population of *H. armigera*. The survivorship pattern observed similar to first generation population (Table 2. and Fig. 2). The age specific survival (lx) of *H. armigera* was quite high at early period of life and it was more than 60.0 up to 18th day. However, a gradual decrease of population was recorded up to 34th day, after which, for a period of 8 days no mortality was noticed. There was a sharp

decline in survival of the insect from 44th day to end of the study due to mortality of the adult insect. The life expectancy of *H. armigera* of second generation population gradually decreased with an advancement of age. The expectancy of life was quite high (27.72 to 24.68 days) at early ages i.e. up to 17th day. At middle age, the expectancy fell within 24 to 14 days and finally to 0.5 days on cessation. Similar result was publicized by Pramanik *et al.* (2012) [13], they recorded that age specific survival (lx) of *L. orbonalis* was gradually decreased with the advancement of time. Expectancy of life also revealed similar trend.

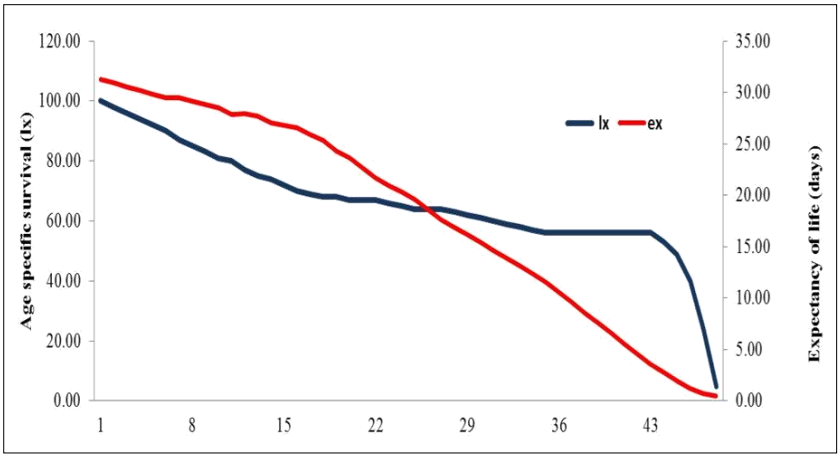

Fig 1: Age specific survivorship of H. armigera on tomato (1st generation)

Table 1: Age specific survivorship of *H. armigera* on tomato (1st generation)

x	lx	dx	100qx	Lx	Tx	ex
0	100.00	2.00	20.00	99.00	3128.00	31.28
1	98.00	2.00	20.41	97.00	3029.00	30.91
2	96.00	2.00	20.83	95.00	2932.00	30.54
3	94.00	2.00	21.28	93.00	2837.00	30.18
4	92.00	2.00	21.74	91.00	2744.00	29.83
5	90.00	3.00	33.33	88.50	2653.00	29.48
6	87.00	2.00	22.99	86.00	2564.50	29.48
7	85.00	2.00	23.53	84.00	2478.50	29.16
8	83.00	2.00	24.10	82.00	2394.50	28.85
9	81.00	1.00	12.35	80.50	2312.50	28.55
10	80.00	3.00	37.50	78.50	2232.00	27.90
11	77.00	2.00	25.97	76.00	2153.50	27.97
12	75.00	1.00	13.33	74.50	2077.50	27.70
13	74.00	2.00	27.03	73.00	2003.00	27.07
14	72.00	2.00	27.78	71.00	1930.00	26.81
15	70.00	1.00	14.29	69.50	1859.00	26.56
16	69.00	1.00	14.49	68.50	1789.50	25.93
17	68.00	.00	0.00	68.00	1721.00	25.31
18	68.00	.00	14.71	67.50	1653.00	24.31
19	67.00	.00	.00	67.00	1585.50	23.66
20	67.00	.00	.00	67.00	1518.50	22.66
21	67.00	1.00	14.93	66.50	1451.50	21.66
22	66.00	1.00	15.15	65.50	1385.00	20.98
23	65.00	1.00	15.38	64.50	1319.50	20.30
24	64.00	.00	.00	64.00	1255.00	19.61
25	64.00	.00	.00	64.00	1191.00	18.61
26	64.00	1.00	15.63	63.50	1127.00	17.61
27	63.00	1.00	15.87	62.50	1063.50	16.88
28	62.00	1.00	16.13	61.50	1001.00	16.15
29	61.00	1.00	16.39	60.50	939.50	15.40
30	60.00	1.00	16.67	59.50	879.00	14.65
31	59.00	1.00	16.95	58.50	819.50	13.89
32	58.00	1.00	17.24	57.50	761.00	13.12
33	57.00	1.00	17.54	56.50	703.50	12.34
34	56.00	.00	.00	56.00	647.00	11.55
35	56.00	.00	.00	56.00	591.00	10.55
36	56.00	.00	.00	56.00	535.00	9.55
37	56.00	.00	.00	56.00	479.00	8.55
30	56.00	.00	.00	56.00	423.00	7.55
39	56.00	.00	.00	56.00	367.00	6.55

40	56.00	.00	.00	56.00	311.00	5.55
41	56.00	.00	.00	56.00	255.00	4.55
42	56.00	3.00	53.57	54.50	199.00	3.55
43	53.00	4.00	75.47	51.00	144.50	2.73
44	49.00	9.00	183.67	44.50	93.50	1.91
45	40.00	16.00	400.00	32.00	49.00	1.23
46	24.00	19.00	791.67	14.50	17.00	.71
47	5.00	5.00	1000.00	2.50	2.50	.50

X:Age of the insect in days; lx: No. surviving at the beginning of each age interval x; dx: No. dying within age interval x to x+1; 100qx: Mortality rate at the age interval x to x+1; Lx: Avg. Number survives at the age interval x to x + 1; ex: Expectation of life at the beginning of each age interval x; Tx : Lx + Lx+1+.....+ Lx+n

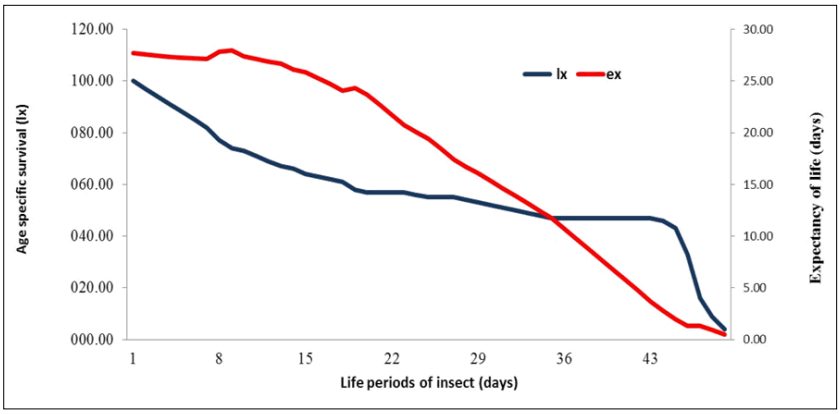

Fig 2: Age specific survivorship and expectancy of life of H. armigera (2nd generation)

Table 2: Age specific survivorship of *H. armigera* on tomato (2nd generation)

x	lx	dx	100qx	Lx	Tx	ex
0	100.00	3.00	30.00	98.50	2772.00	27.72
1	97.00	3.00	30.93	95.50	2673.50	27.56
2	94.00	3.00	31.91	92.50	2578.00	27.43
3	91.00	3.00	32.97	89.50	2485.50	27.31
4	88.00	3.00	34.09	86.50	2396.00	27.23
5	85.00	3.00	35.29	83.50	2309.50	27.17
6	82.00	5.00	60.98	79.50	2226.00	27.15
7	77.00	3.00	38.96	75.50	2146.50	27.80
8	74.00	1.00	13.51	73.50	2071.00	27.99
9	73.00	2.00	27.40	72.00	1997.50	27.36
10	71.00	2.00	28.17	70.00	1925.50	27.12
11	69.00	2.00	28.99	68.00	1855.50	26.89
12	67.00	1.00	14.93	66.50	1787.50	26.68
13	66.00	2.00	30.30	65.00	1721.00	26.08
14	64.00	1.00	15.63	63.50	1656.00	25.88
15	63.00	1.00	15.87	62.50	1592.50	25.28
16	62.00	1.00	16.13	61.50	1530.00	24.68
17	61.00	3.00	49.18	59.50	1468.50	24.07
18	58.00	1.00	17.24	57.50	1409.00	24.29
19	57.00	.00	.00	57.00	1351.50	23.71
20	57.00	.00	.00	57.00	1294.50	22.71
21	57.00	.00	.00	57.00	1237.50	21.71
22	57.00	1.00	17.54	56.50	1180.50	20.71
23	56.00	1.00	17.86	55.50	1124.00	20.07
24	55.00	.00	.00	55.00	1068.50	19.43
25	55.00	.00	.00	55.00	1013.50	18.43
26	55.00	1.00	18.18	54.50	958.50	17.43
27	54.00	1.00	18.52	53.50	904.00	16.74
28	53.00	1.00	18.87	52.50	850.50	16.05
29	52.00	1.00	19.23	51.50	798.00	15.35
30	51.00	1.00	19.61	50.50	746.50	14.64
31	50.00	1.00	20.00	49.50	696.00	13.92
32	49.00	1.00	20.41	48.50	646.50	13.19
33	48.00	1.00	20.83	47.50	598.00	12.46
34	47.00	.00	.00	47.00	550.50	11.71
35	47.00	.00	.00	47.00	503.50	10.71
36	47.00	.00	.00	47.00	456.50	9.71

37	47.00	.00	.00	47.00	409.50	8.71
30	47.00	.00	.00	47.00	362.50	7.71
39	47.00	.00	.00	47.00	315.50	6.71
40	47.00	.00	.00	47.00	268.50	5.71
41	47.00	.00	.00	47.00	221.50	4.71
42	47.00	1.00	21.28	46.50	174.50	3.71
43	46.00	3.00	65.22	44.50	128.00	2.78
44	43.00	10.00	232.56	38.00	83.50	1.94
45	33.00	17.00	515.15	24.50	45.50	1.30
46	16.00	7.00	437.50	12.50	21.00	1.31
47	9.00	5.00	555.56	6.50	8.50	.94
48	4.00	4.00	1000	2.00	2.00	.50

X:Age of the insect in days; lx: No. surviving at the beginning of each age interval x; dx: No. dying within age interval x to x+1; 100qx: Mortality rate at the age interval x to x+1; Lx: Avg. Number survives at the age interval x to x + 1; ex: Expectation of life at the beginning of each age interval x; Tx : Lx + Lx+1+.....+ Lx+n

Female fertility

Results regarding the female fertility of first generation population of *H armigera* have been presented in the Table 3. Which validates that immature stage including the pre reproductive period of *H. armigera* was 40.5 days. Thereafter, the insect continued to lay eggs for 6 days. At the beginning of the egg laying, the survival fraction of female (lx) or proportional survival of female at the age x was 0.56 and thereafter it gradually decreased due to death of the females. Natality rate (mx) i.e. the number of female off-spring produced/ female at the age x was not similar during the whole length of reproductive period. Similar results were revealed by Shah et al. (2007) [14].

The net reproductive rate (R_0) of first generation of *H. armigera* was estimated 133.83 females/ female while mean length of generation (T) was 43.7 days. Where, the approximate rate of increase (r_{approx}) was slightly lesser than the actual rate of natural increase ($r_{accurate}$) indicated the population trends towards overlapping generation [15]. The finite rate of increase (λ) was 1.118 females/ female/day, potential fecundity (Pf) was 277.7 females/ female and monthly rate of increase (MRI) was 28.39 females/ female while time required for population to double (DT) was 6.18 days.

Similar trend also noticed in second generation. Table 4. Revealed that immature stage including the pre reproductive period of *H. armigera* was 40.5 days. Thereafter, the insect continued to lay eggs for 7 days. At the beginning of the egg laying, the survival fraction of female (lx) or proportional survival of female at the age x was 0.47 and it started decreasing with the advancement of age of female adults. Natality rate (mx.) at the age x was also not similar during the whole length of reproductive period. Pramanik *et al.* (2012) [16], also found the similar trend of results, where natality rate showed no similarity during whole reproductive period which was continued up to 2.7 days with a fecundity of 35.4 eggs/female while net reproductive rate was estimated 7.93 females/ female. Besides, finite rate of increase, potential fecundity and monthly rate of increase were 1.07 females/ female/ day, 79.0 females/ female and 7.61 females/ female, respectively.

Almost similar results recorded in net reproductive rate (R0) of *H. armigera* in second generation, which was estimated 126.22 females/ female while mean length of generation (T) was 43.9 days. The finite rate of increase (λ) was 1.116 females/ female/day, potential fecundity (Pf) was 336.5 females/ female and monthly rate of increase (MRI) was 26.91 females/ female while doubling time (DT) was 6.28 days. Jha *et al*. (2012) [17] also substantiated that the intrinsic rate of increase (r), finite rate (λ) and mean generation time (T) of *H. armigera* were 0.0853/day, 1.0890/day and 46.6/day, respectively on *Z. Mays*.

Table 3: Age specific female-fertility life table and growth & development of *H. armigera* on tomato (1st generation)

x	lx	mx	lx.mx	x.lx.mx	$e^{-rx.lx.mx}$ (r=0.1121)	% contribution*
0.5 to 40.5 days immature stages and pre-reproductive period						
41.50	0.56	24.40	13.66	567.05	0.1301314	13.02617
42.50	0.56	49.60	27.77	1180.48	0.2364670	23.67037
43.50	0.53	60.10	31.85	1385.60	0.2424084	24.26510
44.50	0.49	70.70	34.64	1541.61	0.2356727	23.59086
45.50	0.40	52.50	21.00	955.50	0.1277055	12.78333
46.50	0.24	20.40	4.89	227.66	0.0266151	2.664174
Σ x. lx.mx					5857.91	
Net reproductive rate (R_0) = Σ lx.mx					133.83 females/ female	
Mean length of generation (T) =Σ x.lx.mx/ Σ lx.mx					43.7 days	
Approximate rate of increase (r_{approx}) = $\log_e R_o/T$					0.1118 females/ female /day	
Actual rate of natural increase ($r_{accurate}$)					0.1121 females/ female /day	
Finite rate of increase (λ)= $e^{r(accurate)}$					1.118 females/ female /day	
Potential fecundity (Pf) = ∑mx					277.7 females/ female	
Doubling time (DT) = $\log_e 2 / \log_e \lambda$					6.18 days	
Monthly rate of increase (MRI) = λ^{30}					28.39 females/ female	
Growth & Development						
Larval period (Days)					22.0	
Pupal period (Days)					11.0	
Adult period (Days)					10.0	
% Adult formation					47.0	

Growth index	1.42
Suitability index	0.05
Reproductive period (Days)	6.0

x: Pivotal age in days; lx: Survival fraction of females; mx: Natality rate; *: % contribution of each group towards 'r'

Table 4: Age specific female-fertility life table and growth & development of *H. armigera* on tomato (2nd generation)

x	Lx	mx	lx.mx	x.lx.mx	$e^{-rx.lx.mx}$ (r=0.1121)	% contribution*
0.5 to 40.5 days immature stages and pre-reproductive period						
41.50	0.47	22.60	10.62	440.81	0.1091710	10.92797
42.50	0.47	43.00	20.21	858.92	0.1860207	18.62060
43.50	0.46	70.90	32.61	1418.70	0.2688394	26.91073
44.50	0.43	79.40	34.14	1519.31	0.2520414	25.22925
45.50	0.33	64.10	21.15	962.46	0.1398456	13.99849
46.50	0.16	34.30	5.48	255.19	0.0324926	3.252501
47.50	0.90	22.20	1.99	94.90	0.0105940	1.060456
Σ x. lx.mx					5550.32	
Net reproductive rate (R_0) = Σ lx.mx					126.22 females/female	
Mean length of generation (T) =Σ x.lx.mx/ Σ lx.mx					43.9 days	
Approximate rate of increase (r_{approx}) = $\log_e R_o/T$					0.1100 females/ female/day	
Actual rate of natural increase ($r_{accurate}$)					0.1166 females/ female/day	
Finite rate of increase (λ)= $e^{r(accurate)}$					1.116 females/ female/day	
Potential fecundity (Pf) = ∑mx					336.5 females/female	
Doubling time (DT) = $\log_e 2 / \log_e \lambda$					6.28 days	
Monthly rate of increase (MRI) = λ^{30}					26.91 females/ female	
Growth & Development						
Larval period (Days)					23.0	
Pupal period (Days)					12.0	
Adult period (Days)					8.0	
% Adult formation					58	
Growth index					1.65	
Suitability index					0.05	
Reproductive period (Days)					7.0	

x: Pivotal age in days; lx: Survival fraction of females; mx: Natality rate; *: % contribution of each group towards 'r'

Growth and development

The studies on growth and development of *H. armigera* were carried out on two consecutive generations in the laboratory and details of the biological parameters of this insect have been presented in the Table 3 and 4. Table 3 depicted that larval period of first generation of *H. armigera* was 22 days while pupal period and the adult longevity were 11 and 10 days, respectively. The above biological parameters indicated that the insect could complete a generation within almost one and half month. The results also revealed that per cent adult formation (47%) affected the growth index (1.42) and suitability index (0.05) of the insect. The reproductive period of the female insect was continued up to 6 days. Similarly, in second generation larval period of insect continued up to 23 days while pupal period lasted for 12 days and the adults lived up to 8 days. The per cent adult formation was 58%. The growth and suitability indices were 1.65 and 0.05, respectively. The reproductive period of the female insect continued up to 7 days (Table 4). In a laboratory experiment Shivanna *et al.* (2012) [17] observed that total developmental periods of *H. armigera* was 47.40±0.80 and 50.13±1.23 days, in male and female, respectively. The incubation ranged between 3 to 5 days, whereas, total larval period varied from 22 to 26 days with an average pupal period ranged from 9 to 11 days. The fecundity/female ranged from 249.15-429.51 eggs and hatchability ranged between 74.60-89.0% in different generations. The longevity of male and female moths was 2.49-5.64 and 8.70-11.31 days, respectively [18].

Conclusion

Before employ sustainable management practice of any insect pest it is necessary to know its various crucial statistics of life such as larval period, pupal period, per cent adult emergence, survival pattern, potential fecundity, natality rate, intrinsic rate of increase etc. Studies on age specific & female fertility life tables of *H. armigera* have immense important to find out critical information particularly for the insect like *H. armigera* which has status of national pest. Beside this, age specific life table of the insect also gave an idea about the share of different age groups in population build-up of a particular generation. This experiment also depicts the vulnerable stage of the test organism.

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