To study the age specific life table of mulberry silk worm (*Bombyx mori* Linneaus race Nistari) on two cultivar of mulberry plants

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Abstract

Life table studies, viz. age specific and survival of *B. mori* on the two different hosts i.e, S-1635 and S-146 species of mulberry plant (*Morus alba*) under natural condition indicate that the insect preferred both the hosts species but S-146 were favored and suitable food for the development of *B. mori*. Linn.

Keywords : Hosts plants, life table, *Bombyx mori*, survival.

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The silk production and silk industry was originated first in China, where the art and source of silk production was kept as secret for more than 2000 years. The silk production in other countries of the world became possible when the art and technology of silk production were smuggled by monks. The growth rate of the silkworm larvae, *Bombyx mori* L. was accelerated with shortened larval life, increased silkworm output and eggs laying potential of the moth tropical application of ovine prolactin. Significant of prolactin is increasing growth and fecundity of the silkworm was envisaged (Bhaskar *et al.*, 1983). Recently, much research has been done on the diet supplementation of mulberry leaves fed to silkworms. These supplementations include vitamins such as ascorbic acid, thiamin, niacin, folic acid and multi-vitamins (Etebari 2002; Nirwani and Kaliwal, 1996 & 1998; Saha and Khan, 1996; Etebari *et al.*, 2004).

Materials and Methods

The studies on various aspects of mulberry sericulture were conducted under laboratory condition in the Sericulture Research, Demonstration and Training Unit lab, Department of Entomology, College of Agriculture, S.V.P. University of Agriculture & Technology, Modipuram, Meerut (U.P.) during 2009.

Age Specific life table

Observation on number of alive and dead insect out of hundred were recorded daily, The following assumption were used in the construction of age specific life table.

x = Age of the Insect in days.

I_x = Number surviving insects at the beginning of each interval x out of 100.

d_x = Number dying during the age interval x out of 100.

$100q_x$ = Mortality rate at the age interval x .

e_x = Expectation of life or mean life remaining for individuals of age x .

Life expectation was calculated using the equations

$$e_x = T_x / I_x$$

To obtain e_x , two other parameters L_x and T_x were also computed as given below :

L_x = The number of individual alive between age x and $x+1$ and calculated by the equation.

$$L_x = I_x + I_{x+1} / 2$$

T_x = The total number of individual of x age units beyond the age x , and obtained by the equation.

$$T_x = I_x + (I_x + 1) + (I_x + 2) + \dots + I_w$$

Where, I_w = the last age interval.

Results and discussion

Mulberry plant species S-1635: It was apparent from table-1 that the insect required 40 days to complete its generation on S-1635 species of mulberry plant. The table clearly revealed no drop in the survivorship (I_x) for the first two days followed by a pause of four days. It again started falling on 2nd day till 24th day. A long pause where no survivorship reduction was reported and recorded between 24th to 32rd. Thereafter, survivorship again dropped gradually till 40th day and afterwards a sharp decline in the survivorship (I_x) was recorded till the culmination of the generation.

Table 1: Age specific life table of *Bombyx mori* Linneaus race Nistari on S-1635

X	lx	dx	100qx	Lx	Tx	ex
0	100	0	0.00	100.00	2809.50	28.09
1	100	0	0.00	100.00	2709.50	27.09
2	100	4	4.00	98.00	2609.50	26.09
3	96	1	1.04	95.50	2511.50	26.16
4	95	6	6.31	92.00	2416.00	25.43
5	89	1	1.12	88.50	2324.00	26.11
6	88	0	0.00	88.00	2235.50	25.40
7	88	2	2.27	87.00	2147.50	24.40
8	86	0	0.00	86.00	2060.50	23.84
9	86	3	3.48	84.50	1974.50	22.95
10	83	0	0.00	83.00	1890.00	22.77
11	83	2	2.40	82.00	1807.00	21.77
12	81	2	2.46	80.00	1725.00	21.29
13	79	3	3.79	77.50	1645.00	20.82
14	76	0	0.00	76.00	1567.50	20.62
15	76	2	2.63	75.00	1491.50	19.62
16	74	1	1.35	73.50	1416.50	19.14
17	73	4	5.47	71.00	1343.00	18.39
18	69	0	0.00	69.00	1272.00	18.44
19	69	2	2.89	68.00	1203.00	17.44
20	67	2	2.98	66.00	1135.00	16.94
21	65	1	1.53	64.50	1069.00	16.44
22	64	0	0.00	64.00	1004.50	15.69
23	64	0	0.00	64.00	940.50	14.69
24	64	1	1.56	63.50	876.50	13.69
25	63	0	0.00	63.00	813.00	12.90
26	63	0	0.00	63.00	750.00	11.90
27	63	0	0.00	63.00	687.00	10.91
28	63	0	0.00	63.00	624.00	9.91
29	63	0	0.00	63.00	561.00	8.91
30	63	0	0.00	63.00	498.00	7.91
31	63	0	0.00	63.00	435.00	6.91
32	63	0	0.00	63.00	372.00	5.91
33	63	0	0.00	63.00	309.00	4.91
34	63	0	0.00	63.00	246.00	3.91
35	63	9	14.28	58.50	183.00	2.91
36	54	15	20.37	48.50	124.50	2.31
37	39	17	32.55	36.00	76.00	1.94
38	22	8	36.36	25.00	40.00	1.82
39	14	13	61.90	14.50	15.00	1.08
40	1	1	100	0.50	0.05	0.05

Table 2: Age specific life table of *Bombyx mori* Linneaus race Nistari on S-146

X	lx	dx	100qx	Lx	Tx	ex
0	100	0	0.00	100.00	2708.50	27.08
1	100	0	0.00	100.00	2608.50	26.08
2	100	3	3.00	98.50	2508.50	25.08
3	97	2	2.06	96.00	2410.00	24.84
4	95	5	5.26	92.50	2314.00	24.35
5	90	0	0.00	90.00	2221.50	24.68
6	90	3	3.34	88.50	2131.50	23.68
7	87	0	0.00	87.00	2043.00	23.48
8	87	0	0.00	87.00	1956.00	22.48
9	87	0	0.00	87.00	1869.00	21.48
10	87	4	4.59	85.00	1782.00	20.48
11	83	0	0.00	83.00	1697.00	20.44
12	83	0	0.00	83.00	1614.00	19.44
13	83	0	0.00	83.00	1531.00	18.44
14	83	2	2.40	82.00	1448.00	17.44
15	81	6	7.40	78.00	1366.00	16.86
16	75	0	0.00	75.00	1288.00	17.17
17	75	0	0.00	75.00	1213.00	16.17
18	75	3	4.00	73.50	1138.00	15.17
19	72	0	0.00	72.00	1064.50	14.78
20	72	0	0.00	72.00	992.50	13.78
21	72	4	5.56	70.00	920.50	12.78
22	68	2	3.04	67.00	850.50	12.50
23	66	0	0.00	66.00	783.50	11.87
24	66	0	0.00	66.00	717.50	10.87
25	66	0	0.00	66.00	651.50	9.87
26	66	0	0.00	66.00	585.50	8.87
27	66	0	0.00	66.00	519.50	7.87
28	66	0	0.00	66.00	453.50	6.87
29	66	0	0.00	66.00	387.50	5.87
30	66	0	0.00	66.00	321.50	4.87
31	66	0	0.00	66.00	255.50	3.87
32	66	6	9.09	63.00	189.50	2.87
33	60	8	13.34	56.00	126.50	2.10
34	52	25	48.07	39.50	70.50	1.35
35	27	11	40.74	21.50	31.00	1.14
36	16	15	87.50	9.00	9.50	0.59
37	1	1	100.00	0.50	0.50	0.50

The highest mortality of 15 and 17 was observed on 36th and 37th day, respectively, while 9 and 13 deaths were encountered on 35th and 39th day followed by and 8 death on 38th day. A lower mortality of 6, 4 and 3 was seen on 4th, 2nd, 17th and 9th, 13th day. Death ranging from 1 to 2 was observed on 3, 5, 7, 11, 12, 15, 16, 19, 20, 21, 24 and 40th day. No mortality was exhibited on the remaining days.

However, between 25th to 35th days the mortality of insect did not occur at all. As far as life expectancy (ex) was concerned it reduced marginally upto 4th days and thereafter it gradually increases till 24th days on account of more number of deaths on

preceding days. Then onwards, with the advancement of development *B. mori* there was gradual reduction in ex till it finally reached 0.5 on 40th day.

Mulberry plant species: S-146

The Table-2 indicates that on mulberry species S-146 *B. mori* took 37 days to complete its life cycle. In this case the survivorship declined from the second day and continued decreasing with a number of pause till 22st day. Thereafter lx remained stable from 23rd to 31th day. The lx once again start declined from 32nd to 37th day. A sharp declined in lx was observed on 34th and 36th day. The generation was terminated by a reduction of one on 37th day.

The highest morality ratio observed on 34th and 36th day. The generation terminated by the reduction of 1 on 37th day. A high mortality of 25 and 15 was observed on 34th and 36th day, respectively, while 8 and 11 deaths were encountered on 33rd and 35th day followed by 6 deaths on 15th and 32nd day. A lower mortality of 5, 4 and 3 was seen on 2, 4, 6, 10, 18th and 21st day. Death ranging from 1 to 2 was observed on 3, 14, 22 and 37th day. No mortality was exhibited on the remaining days. The life expectancy period exhibited the similar pattern like of S-1635.

Conclusions

Both the mulberry plant cultivars grown in same condition but race Nistari reared on S-146. Cultivar of mulberry plants was significantly superior in comparison to the S-1635, because it will take minimum time to complete its generation and maximum survivorship of mulberry silk worm race Nistari.

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