

Study of the Impact of Spring Season on Rearing, Breeding and Economic Parameters of *Bombyx mori* L.

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Abstract: *The impact of spring season on rearing, breeding and economic traits of Bombyx mori L. was observed for each parameter of each breed under study. On the basis of average EI of all parameters, it became evident that seven breed showed good suitability during spring season because their average EI remained more than 50. Among all breeds evaluated, SK6 (60.06), SK1 (59.81), SK31 (57.30), SK28 (52.92) and NB4D2 (52.60) acquired 1st, 2nd, 3rd, 4th and 5th rank respectively, on the basis of average EI. Thus it became evident that spring season remain suitable for all SK breeds and NB4D2 breed with respect of proper rearing and breeding as well as for good productivity. Spring season was observed as best suitable season for rearing of SK1 breed because this breed acquired 1st rank on the basis of the average results of all parameters studied during present research work. The results also indicated that spring season remain not suitable for CSR breeds of Bombyx mori L. because these breeds acquired 9th, 10th, 11th and 12th rank on the basis of average EI.*

Keywords: Spring season, Rearing, Breeding, Economic parameters, Bombyx mori L.

1. Introduction

In different parts of India, Sericulturists are conducting a number of researches on selection of silkworm strains suitable for rapidly changing climatic conditions and having high level of cocoon productivity. Thiagrajan *et al.* (1993) observed differential effects of seasonal variation on 26 strains of *Bombyx mori* and selected some strains suitable for Indian seasonal changes. Rearing of bivoltine mulberry silkworm in India is facing several problems. Researches were conducted in different parts of India for enumeration of suitable silkworm for increased production of raw silk. The tropical bivoltine breeds of this silkworm are not fully exploited commercially due to non - availability of research data regarding suitable breeds for all seasons and suitable rearing practices. Genetic diversity, viability and productivity of a silkworm breed remain complexly related and being influenced by intrinsic and extrinsic factors. Thus selection of suitable and stable bivoltine breed of *Bombyx mori* is necessary to fulfill the objective of the production of quality silk in high quantity.

2. Materials and Method

Twelve bivoltine breeds of mulberry silkworm were reared separately during spring season in indoor conditions. All necessary protocols were adopted during this research work. Different rearing, breeding and economic parameters were observed for each breed. Data were recorded and analysed accordingly.

3. Results and Discussion

The data observed for rearing and breeding performance such as fecundity (average number), hatching performance (%), larval duration (d: h), larval weight (gm) and pupa weight (gm) for 12 breeds of *Bombyx mori* L. during spring season are presented in Table - 1. The maximum fecundity (631) was observed for SK 31 breed followed by SK 28 (619), SH 6 (612) and CSR 19 (610). Minimum fecundity was observed as 513 for CSR 4 breed. Maximum hatching was observed for SH 6 (95.50%) followed by SK 6 (95.30%) and DUN 6 (95.00%). Minimum hatching percentage as 91.50% was observed for CSR 2 breed during spring season. Maximum larval duration was observed for SK 28 breed (27 days 2 hrs) followed by SK 31 (27 days 1 hr), DUN 6 (27 days 1 hr), and 27 days for CSR 2, CSR 4, SK 6 and DUN 22 breeds. Minimum larval duration was observed for CSR 19 as 25 days followed by CSR 19 as 25 days 1 hr during spring season.

The data observed for single larva weight (mean) indicates maximum value as 5.20 gm for SK 1 breed followed by SK 6 breed as 5.0 gm. Minimum larval weight was observed for DUN 22 as 4.01 gm during spring season. Maximum weight of pupa was observed for SK 1 breed as 1.62 gm followed by SK 6 (1.59 gm) and NB4D2 (1.50 gm). Minimum weight of pupa was observed for CSR 19 breed as 1.33 gm. Pupa weight was observed as less than mean weight of all breeds (1.44 gm) for CSR 2, CSR 4, CSR 18, CSR 19, SK 28 and DUN 6 breeds.

Table 1: Rearing and breeding performance of 12 breeds of *Bombyx mori* L. during Spring season

Sl. No.	Mulberry Silkworm Breeds	Fecundity (Average Number)	Hatching Percentage	Larval Duration (d: h)	Larval Weight (gm)	Pupa Weight (gm)
1	CSR 2	517	91.50	27: 0	4.51	1.38
2	CSR 4	513	92.60	27: 0	4.30	1.39
3	CSR 18	575	93.50	25: 1	4.75	1.35
4	CSR 19	610	94.30	25: 0	4.10	1.33
5	SK 1	515	94.20	26: 1	5.20	1.62
6	SK 6	530	95.30	27: 0	5.00	1.59
7	SK 28	619	93.50	27: 2	4.82	1.59
8	SK 31	631	94.00	27: 1	4.91	1.49
9	SH 6	612	95.50	26: 0	4.21	1.44
10	DUN 6	592	95.00	27: 1	4.11	1.41
11	DUN 22	583	94.50	27: 0	4.01	1.40
12	NB4D2	579	93.50	26: 2	4.57	1.44
	Mean	573	93.95	26: 9	4.57	1.44
	SD	44.16	0.97	0.80	0.44	0.10

Table 2: Values of Evaluation Index (EI) for rearing and breeding performance of 12 breeds of *Bombyx mori* L. during Spring season

Sl. No.	Mulberry Silkworm Breeds	Fecundity	Hatching	Larval Duration	Larval Weight	Pupa Weight
1	CSR 2	37.31	24.74	57.88	48.64	44.00
2	CSR 4	36.41	36.08	57.88	43.86	45.00
3	CSR 18	50.45	45.36	33.38	54.09	41.00
4	CSR 19	58.38	53.60	32.88	39.32	39.00
5	SK 1	36.87	52.58	45.88	64.32	68.00
6	SK 6	40.26	63.92	57.88	59.77	65.00
7	SK 28	60.42	45.36	58.88	55.68	49.00
8	SK 31	63.13	50.52	58.38	57.73	55.00
9	SH 6	58.83	65.98	45.38	41.82	50.00
10	DUN 6	54.30	60.82	58.38	39.55	47.00
11	DUN 22	52.26	55.67	57.88	37.27	46.00
12	NB4D2	51.36	45.36	46.38	57.50	56.00

The evaluation index calculated for different parameters related to rearing and breeding performances of 12 breeds of *Bombyx mori* L. is presented in Table - 2. The EI was observed as above 50 with regard to fecundity for CSR 18, CSR 19, SK 28, SK 31, SH 6, DUN 6 and DUN 22 breeds. Maximum value of EI with regard to fecundity was observed as 63.13 for SK 31 breed of *Bombyx mori* L. The EI with regard to hatching was observed more than 50 for CSR 19, SK 1, SK6, SK 31, SH 6, DUN 6 and DUN 22 breed.

Maximum value of EI with regard to hatching was observed as 65.98 for SH 6 breed. The data related to EI for larval duration indicates that SK 28 breed shows maximum as 58.88. Minimum EI was observed as 32.88 for CSR 19 breed with regard to larval duration. The EI above 50 for larval duration was observed for CSR 18, SK 1, SK 6, SK 28, SK 31 and NB4 D2 breeds. The EI with regard to pupa weight was observed 50 and above 50 for SK 1, SK 6, SK 31, SH 6 and NB4 D2 breeds.

Table 3: Performance of Economic traits of 12 breeds of *Bombyx mori* L. during Spring season

Sl. No.	Mulberry Silkworm Breeds	Cocoon Weight (gm)	Shell Weight (gm)	Shell Ratio (%)	Silk Filament Length (mtr.)
1	CSR 2	1.70	0.33	19.41	895.10
2	CSR 4	1.80	0.34	18.89	911.43
3	CSR 18	1.73	0.33	19.07	925.21
4	CSR 19	1.68	0.31	18.45	918.16
5	SK 1	2.10	0.44	20.95	1194.10
6	SK 6	2.02	0.42	20.79	1162.22
7	SK 28	1.83	0.37	20.22	1058.32
8	SK 31	1.90	0.39	20.53	1146.31
9	SH 6	1.83	0.37	20.22	1096.22
10	DUN 6	1.80	0.36	20.00	1020.00
11	DUN 22	1.74	0.35	20.11	1011.86
12	NB4D2	1.90	0.38	20.00	1120.81
	Mean	1.84	0.37	19.89	1038.35
	SD	0.13	0.04	0.57	106.85

Table 4: Values of Evaluation Index (EI) for Economic traits of 12 breeds of *Bombyx mori* L. during Spring season

Sl. No.	Mulberry Silkworm Breeds	Cocoon Weight	Shell Weight	Shell Ratio	Silk Filament Length	Average EI of all parameters observed during Spring season	Rank
1	CSR 2	39.23	40.00	41.58	36.59	44.11	IX
2	CSR 4	46.92	42.50	32.46	38.13	42.14	XI
3	CSR 18	41.54	40.00	35.61	39.41	43.32	X
4	CSR 19	37.69	35.000	24.74	38.75	39.93	XII
5	SK 1	70.00	67.50	68.60	64.58	59.81	II
6	SK 6	63.85	62.50	65.79	61.59	60.06	I
7	SK 28	49.23	50.00	55.79	51.92	52.92	IV
8	SK 31	54.62	55.00	61.23	60.10	57.30	III
9	SH 6	49.23	50.00	55.79	55.42	52.49	VI
10	DUN 6	46.92	47.50	51.93	48.28	50.51	VII
11	DUN 22	42.31	45.00	53.86	47.52	48.64	VIII
12	NB4D2	54.62	52.50	51.93	57.72	52.60	V

The data related to performance of economic traits of 12 breeds of *Bombyx mori* L. during spring season was presented in Table - 3. Maximum single cocoon weight was observed as 2.10 gm for SK1 breed followed by SK 6 (2.02 gm), SK 31 (1.90gm) and NB4D2 (1.90 gm). Minimum cocoon weight was observed as 1.68 gm for CSR 19 breed during Spring season. The maximum shell weight was observed as 0.44 gm for SK 1 breed followed by SK 6 (0.42 gm) and SK 31 (0.369 gm). Minimum shell weight as 0.31 gm was observed for CSR 19 breed. Maximum shell ratio was observed as 20.95% for SK 1 breed followed by SK 6 (20.79%), SK 31 (20.53%), SK 28 (20.22%) and SH 6 (20.22%). Maximum silk filament length was observed for SK 1 (1194.10 mtr) followed by SK 6 (1162.22 mtr) SK 31 (1146.31 mtr) and NB4D2 (1120.81 mtr). Minimum filament length was observed for CSR 2 breeds as 895.10 mtr.

The data calculated for Evaluation Index for economic traits of 12 breeds of *Bombyx mori* L. during Spring season is presented in Table - 4. EI value more than 50 with regard to cocoon weight was observed for SK 1 (70.00), SK 6 (63.85), SK 31 (54.62) and NB4D2 (54.62). Maximum value of EI with regard to cocoon weight was observed as 70 for SK 1 breed. The EI with regard to shell weight was observed as 50 or more than 50 for SK 1 (67.50), SK 6 (62.50), SK 28 (50), SK 31 (55), SH 6 (50) and NB4D2 (52.50). Maximum value of EI with regard to shell weight was observed as 67.50 for SK 1 breed. Value of EI as more than 50 was observed with regard to shell ratio for SK 1 (68.60), SK 6 (65.79), SK 28 (55.79), SK 31 (61.23), SH 6 (55.79), DUN6 (51.93), DUN 22 (53.86) and NB4D 2 (51.93). Maximum EI value for shell ratio was observed as 68.60 for SK 1 breed among all the 12 breeds of *Bombyx mori* L. under study. EI value with regard to silk filament length was observed more than 50 for SK 1 (64.58), SK 6 (61.59), SK 28 (51.92), SK 31 (60.10), SH 6 (55.42) and NB4D2 (57.72). Maximum value of EI with regard to silk filament length during Spring season was observed as 64.58 for SK1 breed among all 12 breeds of *Bombyx mori* L.

The results of this research study is also in conformity of results obtained by Neelaboina *et al.* (2018), Nisar *et al.* (2005, 2008 and 2013), and Suresh Kumar *et al.* (2005).

4. Conclusion

The biological and developmental activities of specific silkworm breed also remain restricted in accordance with the prevailing ecological conditions of specific season apart from their genetic makeup. Due to this reason, different economic traits of mulberry silkworm breeds showed variation during spring season.

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