



REARING PERFORMANCE OF CONVENTIONAL BIVOLTINE SILKWORM BREEDS OF MULBERRY SILKWORM, *BOMBYX MORI* L. AT P₂ LEVEL IN DEHRADUN CLIMATIC CONDITION

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ABSTRACT

Uttarakhand is popularly known as bowl of bivoltine silk because of its high quality bivoltine cocoons of international grade. Due to its heritage importance the silk is cultivated since long back especially in Doon valley. The climate of valley for producing silk is very congenial. The weather condition during spring and autumn seasons favors the rearing of bivoltine silkworm breeds because their excellent performance. Dehradun lies in the Doon Valley, on the watershed of the Ganga and Yamuna rivers. Land availability, climate and socio-economic conditions of the region favor bivoltine sericulture. Rearing with conventional combinations like NB4D2 x SH6 and its reciprocals are observed to show promising results recording an average yield of above 45 kg per 100 dfls at farmers' level. Therefore, considering the potential, popularity and consistency in performance of these component breeds over the years, it was decided to continue maintenance and multiplication of NB4D2 and SH6 at P₂, Basic Seed Farm, Sheeshambara, Dehradun for downstream multiplication and further exploitation at farmer level. As such rearing performance of NB4D2 and SH6 was reviewed during spring and autumn crops of the year 2020-21, 2021-22 and 2022 - 23.

Observations were recorded on various qualitative and quantitative traits viz. fecundity, hatching percentage, larval duration, ERR (by no.), cocoon yield per 100 dfls (by no. and by wt.), single cocoon weight, single shell weight and shell ratio. Results obtained indicate that the both aforementioned races are performing well over the norms in terms of fecundity, ERR, cocoon yield per 100 dfls as well as other characters under review. In NB4D2 fecundity ranged from 520 - 530, 511 - 518.5; ERR from 7914 - 9113, 6317 - 9041 and cocoon yield per 100 dfls from 40383 - 44703, 28241 - 42374 in spring and autumn seasons respectively, while SH6 the same ranged from 503 - 520, 506.5 - 522.5; 6406 - 9950, 6418 - 9160 and 36997 - 46059, 30336 - 44302 respectively for successive three years.

KEY WORDS: *Silkworm, Bombyx mori L., rearing, maintenance, multiplication.*

INTRODUCTION

Maintenance of silkworm breed without losing their qualitative and quantitative characters is of paramount importance in sericulture. The prevailing congenial weather condition during spring and autumn seasons favor the rearing of bivoltine silkworm breeds in Doon Valley. P₂, Basic Seed Farm (BSF), National Silkworm Seed Organization, Central Silk Board, Sheeshambara, Dehradun (Uttarakhand) is situated geographical position at north latitude 30°20'12'' and east longitude 77°53'31'' with an average annual rainfall 1485 mm (last five-year data) has been playing vital role in maintenance and multiplication of various conventional breeds. However, of these NB4D2 and SH6 have completed several generations and have acclimatized and commercialized to a maximum extent due to their superiority with respect to qualitative and quantitative parameters like fecundity, hatching, ERR, cocoon yield and other economical character. Further, good performance of these breeds is well reflected in hybrid combination viz. NB4D2 x SH6 and its reciprocal recording an average yield above 45 kg / 100 dfls at farmers' level. It is to be mentioned that nearly 80 % requirement of commercial seed is met through cross breeds of NB4D2 and SH6. As such, the potentiality, popularity and consistency in performance and inclination of farmers towards these breeds it was decided to continue maintenance and multiplication of NB4D2 and SH6 at P₂, BSF, Sheeshambara for downstream and ultimate exploitations at farmers' level. In this endeavor, rearing performance of NB4D2 and SH6 was evaluated with reference to the norms fixed for successive three years (2021 - 23) to support their down stream multiplication and further exploitation through hybrid combination, for sustainable development of bivoltine silk in North Western part of the country.

MATERIAL AND METHODS

The material for the present study comprised of two conventional breeds of *Bombyx mori* L. viz. NB4D2 and SH6. Mass rearing of 5 dfls. of these breeds was carried out at P₂, Basic Seed Farm, Sheeshambara during spring and autumn seasons respectively for successive three years from 2021 - 23. Required activities like disinfection, incubation, brushing, chawki and late age rearing were



carried out following standard rearing practices (Krishnaswamy, 1979; Dandin and Giridhar, 2010; Rahmathulla, 2012; Sisodia and Gaherwal, 2017).

Larvae were fed four times in a day with mulberry leaves of improved varieties viz. S146, S1635, V1, K2, Mandalay. Quantum of feed was provided as per recommendation made by Datta *et al.* (1996). Further required abiotic condition like maintenance of temperature, relative humidity, light and aeration were maintained following recommended rearing practices. Microscopic larval examination was conducted in each stage as per protocol. Recommended doses of bed disinfectant were applied during different instars of larval development (Benchamin and Nagaraj, 1987). Cocoon harvest was carried out on 7th and 6th day respectively for spring and autumn crops, following random selection of cocoons and subsequently assessment for quantitative characters.

Observations were recorded on various qualitative and quantitative traits viz. fecundity, hatching, larval period, ERR / 10,000 larvae brushed, cocoon yield / 100 dfls (by no. and by wt.), single cocoon weight, single shell weight and silk ratio.

RESULTS AND DISCUSSION

Standard P2 level norms in respect of characters viz. fecundity, hatching percent, larval period, ERR, cocoon yield / 100 dfls, single cocoon weight, single shell weight, shell ration percent and observations made on rearing performance for the year 2021 - 23 in respect of NB4D2 and SH6 are depicted in Table-1. It is evident from the observations that in NB4D2, fecundity was noticed to be above the norms ranging from 520 - 530 and 511 - 518.5 respectively in both spring and autumn seasons. While in the same in SH6 ranged from 503 - 520 and 506.5 - 522.5 indicating its superiority over the norms for this breed. Further, in NB4D2, hatching percentage ranged from 91.5 - 94 percent and 87 - 92.5 percent in both the seasons. Similarly, in SH6 the same was observed to be ranging from 91 - 92.75 and 91 - 92.5 percent indicating consistent uniformity in hatching behavior, attributed to proper hibernation and incubation of eggs. While, other characters viz. ERR / 10000 larvae brushed, cocoon yield / 100 dfls (no.) and cocoon yield / 100 dfls (wt.) in NB4D2 were found ranging from 7914 - 9113, 6317 - 9041, 40383 - 44703, 28241 - 42374 and 65.100 - 67.266, 37.320 - 66.865 during spring and autumn seasons respectively. Similarly, in SH6 the same ranged from 6406 - 9950, 6418 - 9160, 36997 - 46059, 30336 - 44302, 44.700 - 63.675 and 39.535 - 67.496 indicating their superiority over the norms specified for each breed. Furthermore, quantitative characters viz. single cocoon weight, single shell weight and silk ration percent in respect of NB4D2 were observed ranging from 1.425 - 1.758, 1.505 - 1.945, 0.283 - 0.368, 0.287 - 0.360 and 18.045 - 21.855, 18.925 - 20.169 respectively continuous for three years under observation. Similar observations were obtained in respect of SH6.

Table-1. Rearing performance of conventional races at P2 level during 2020 - 21, 2021 - 22 and 2022 - 23

Rearing parameter	Norm / year	Races			
		Spring		Autumn	
		NB4D2	SH6	NB4D2	SH6
Fecundity (No.)	Fixed norm	500-525	520-550	500-525	520-550
	2020-21	520	505	511	515
	2021-22	530	503	518.5	506.5
	2022-23	521.5	520	518	522.5
	Average	523.8	509.3	515.8	514.6
Hatching %	Fixed norm	≥90	≥90	≥90	≥90
	2020-21	93	91.5	87	92
	2021-22	91.5	91	92.5	91
	2022-23	94	92.7	90.5	92.5
	Average	92.83	91.75	90	91.83
Larval Duration Day/hour	Fixed norm	26-27	26-27	26-27	26-27
	2020-21	27	28	26.5	26
	2021-22	29	29.5	26	27
	2022-23	27.5	27.5	27	27
	Average	27.8	28.3	26.5	26.6
ERR/10000 Larvae brushed	Fixed norm	8000	7500	8000	7500
	2020-21	8735	6406	6317	6418
	2021-22	7914	8087	8411	7728
	2022-23	9113	9950	9041	9160
	Average	8587	8147	7923	7768
Cocoon yield / 100 dfls (no.)	Fixed norm	34200	36000	34200	33700
	2020-21	44445	38813	28241	30336
	2021-22	40383	36997	40443	35710
	2022-23	44703	46059	42373	44302
	Average	41353	37468	37814	35541



	Average	43177	40623	37019	36782
Cocoon yield/100 dfls (wt.)	Fixed norm	57.000	60.000	55.000	53.000
	2020-21	67.266	54.633	37.320	39.535
	2021-22	65.100	44.700	58.910	53.850
	2022-23	65.365	63.675	66.865	67.496
	Average	65.910	54.336	54.365	53.627
Single cocoon wt. (g.)	Fixed norm	1.750	1.700	1.700	1.600
	2020-21	1.758	1.610	1.505	1.503
	2021-22	1.684	1.497	1.792	1.853
	2022-23	1.425	1.491	1.945	1.747
	Average	1.622	1.533	1.747	1.701
Single shell wt. (g.)	Fixed norm	0.340	0.320	0.330	0.300
	2020-21	0.317	0.293	0.287	0.278
	2021-22	0.368	0.314	0.360	0.343
	2022-23	0.283	0.405	0.336	0.317
	Average	0.322	0.337	0.328	0.312
Shell ratio %	Fixed norm	19-20.50	19-20.50	19-20	18.50-19.50
	2020-21	18.04	18.16	19.51	18.53
	2021-22	21.85	21.15	20.16	18.48
	2022-23	18.25	17.67	18.92	18.11
	Average	19.38	18.99	19.53	18.37
Pupation %	Fixed norm	90	90	85	85
	2020-21	92	91	81	82
	2021-22	91	84	84	82
	2022-23	90	94	89	86
	Average	91	89.67	84.66	83.33

In the light of above findings, it is clear that conventional breeds, NB4D2 and SH6 are performing equally well at par the norm, in respect of both qualitative and quantitative traits under observations. Marked consistency in performance during the period under study indicate the necessity for their maintenance at P2 level for subsequent downstream multiplication.

The present finding get support from the observations of earlier authors who reported that traditional breeds like NB4D2 and SH6 have shown good performance and downstream. In addition, these breeds have completed several generations and are well acclimatized to the zoo-geographic climatic conditions of Northern India. Further, Siddique *et al.* (2003) have reported that silkworm rearing with ruling combinations, NB4D2 x SH6 and its reciprocal are being conducted at large scale since long in the region. As such, good performance of these breeds may be attributed to the fact that hybrid combinations of these breeds are still in vogue gaining popularity at farmers level in Doon valley.

CONCLUSION

Based on the above account it may be concluded that both NB4D2 and SH6 breeds deserve their maintenance at P2, Basic Seed Farm, Sheeshambara, Dehradun to support their further exploitation through hybrid combination for sustainable development of bivoltine silk.

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