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REARING PERFORMANCE OF BIVOLTINE HYBRIDS OF THE SILKWORM, *Bombyx mori* L IN POONCH DISTRICT OF JAMMU AND KASHMIR STATE DURING SPRING REARING SEASON

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ABSTRACT

In India, the bulk of silk produced is from multivoltine which are of inferior quality. It is a fact that more than 96% of the silk produced comes from multivoltine x multivoltine or multivoltine x bivoltine hybrids. Quality silk can be produced only from bivoltine. Therefore, it is highly pertinent to have more bivoltine silkworm breeds known for quality silk. However, the climatic conditions of Poonch District of Jammu and Kashmir State are not conducive to rear bivoltine hybrids throughout the year. Hence, there is an urgent need to develop bivoltine hybrids which can yield stable crops under adverse climatic conditions. Keeping this in view, an attempt has been made to evaluate the bivoltine hybrids.

KEYWORDS: *Bombyx Mori L, Bivoltine Hybrids, Poonch District*

Article History

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INTRODUCTION

The success of sericulture industry depends upon several factors of which the impact of the environmental factors such as biotic and abiotic factors is of vital importance. Among the abiotic factors, temperature plays a major role on growth and productivity of silkworm, as it is a poikilothermic (cold-blooded) insect (Benchamin and Jolly, 1986). It is also known that the late age silkworms prefer relatively lower temperature than young age and fluctuation of temperature during different stages of larval development was found to be more favorable for growth and development of larvae than constant temperature. There is ample literature stating that good quality cocoons are produced within a temperature range of 22-27°C and above these levels makes the cocoon quality poorer (Krishnaswami *et al.,* 1973). However, polyvoltine races reared in tropical countries are known to tolerate slightly higher temperature (Hesieh *et al.,* 1995), which is also true with cross-breeds that have been evolved especially for tropical climate.

The effect of temperature higher than 30°C on silkworm larvae was reported earlier by Takeuchi *et al.,* (1964) and Ohi and Yamashita (1977). Huang *et al.,* (1979) and He and Oshiki (1984) used a survival rate of silkworm as the main characteristic for evaluating thermo-tolerance. Kato *et al.,* (1989) conducted a series of experiments and concluded that the resistance to high temperature is a heritable character and it may be possible to breed silkworm races tolerant to high temperature. Falconer (1990) in his review of the environmental effect of insect concluded that the performance of an insect is best improved by selection in the environment in which it is subsequently exploited. Shirota(1992) and Tazima and Ohnuma (1995) while attempting to synthesize high-temperature resistant silkworm races confirmed the genetical nature of thermo-tolerance by selection based on pupation rate of silkworms reared under high-temperature conditions in the fifth instar.

The hot climatic conditions of tropics prevailing particularly in summer are contributing to the poor performance of the bivoltine breeds and the most important aspect is that many quantitative characters such as viability and cocoon traits decline sharply when the temperature is higher than 28°C (Shibukawa (1965). Therefore, it is very much essential to develop bivoltine breeds/hybrids which can withstand the high-temperature stress conditions. Keeping these in view, compatible bivoltine hybrids for rearing throughout the year were developed by utilizing Japanese thermo-tolerant hybrids as breeding resource material (Datta *et al*., 1997; Datta *et al.,* 2000, Datta *et al.,* 2001a, Datta *et al.,* 2001b; Suresh Kumar *et al.,* 2002) and suggested that any study involving cocoon traits is a trendsetter to provide basis to formulate appropriate selection policies for required environments. While studying the performance of robust and productive hybrids under two temperature conditions Suresh Kumar *et al.,* (1999) and Datta *et al.,* 2001a) indicated that the deleterious effect of high temperature was more pronounced in productive hybrids than the robust hybrids. Studies on the effect of high temperature of F1 hybrids between polyvoltine and bivoltine (Suresh Kumar *et al.,* 2001 a) indicated that there was maternal effect regarding temperature tolerance as evident from the better performance of those hybrids where the female parent used was more tolerant to high temperature than the male parent.

One of the main aims of the breeders is to recommend silkworm breeds/hybrids to farmers that are stable under different environmental conditions and minimize the risk of falling below a certain yield level. Silkworm breeds that are reared over a series of environment exhibiting less variation are considered stable. The climatic conditions prevailing in the tropics are most unpredictable and the problems of tropical sericulture are the occurrence of aggravated silkworm diseases, unsuitable mulberry leaf for bivoltine silkworms and lack of sustainable silkworm breeds for effective selection of desirable characters. In order to introduce bivoltine races in a tropical country like India, it is necessary to have stability in cocoon crop under high-temperature environment. The pre-requisite of summer hybrid is healthiness and adaptability to adverse conditions of high temperature, low food quality, relatively higher economic traits, with potential for increased cocoon production. Considering the poor performance of productive bivoltine hybrids during the summer season, an emphasis was given to evolve bivoltine silkworm breeds suitable to tropical conditions for achieving the primary objective of establishing bivoltine sericulture with quality raw silk among sericulturists. Keeping this in view, an attempt was made to study the effect of high temperature and high humidity conditions on the performance of bivoltine hybrids.

MATERIALS AND METHODS

Different hybrid combinations were prepared by utilizing the bivoltine breeds available of silkworm *Bombyx mori L.* The single hybrids were reared in Govt. Degreecollege Poonch, Poonch District of Jammu and Kashmir state during spring rearing season in the years 2012 to 2017and the data generated for different metric traits were analyzed statistically by adopting the mean value of the traits.

RESULTS AND DISCUSSIONS

The performance of bivoltine hybrids during the spring season is presented in Table 1. The fecundity ranged from 522 to 610 with the lowest of 522 recorded for CSR18 x CSR19 and the highest of 610 recorded for CSR2 x CSR4. The yield/10000 larvae by weight ranged from 14.367 to 15.743 kg with the lowest of 14.367 kg recorded for CSR46 x CSR47 and the highest of 15.743 kg recorded for CSR2 x CSR4. The cocoon weight ranged from 1.757 to 1.889 g with the lowest of 1.757 g recorded for CSR18 x CSR19 and the highest of 1.889 g recorded for CSR2 x CSR4. The cocoon shell weight ranged from 0.383 to 0.452g with the lowest of 0.383 recorded for CSR18 x CSR19 and the highest of 0.452g recorded for CSR2 x CSR4. The cocoon shell percentage ranged from 21.7 to 23.9 % with the lowest of 21.7 % recorded for CSR18 x CSR19 and the highest at 23.9 % recorded for CSR2 x CSR4.

CONCLUSIONS

From the present study, it may be concluded that on the basis of the highest value of cumulative one hybrid namely CSR2 X CSR4 is suitable for Poonch District of Jammu and Kashmir State during spring rearing season.

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APPENDICES

Table 1: Performance of Bivotine Hybrids

Sl. No.	Hybrid Crosses	Fecundity (No.)	Yield/10000 Larvae (wt)	Cocoon Weight (g)	Cocoon Shell Weight (g)	Cocoon Shell %
1	CSR2 x NB4D2	577	15.587	1.852	0.427	23.0
2	CSR2 x CSR4	610	15.743	1.889	0.452	23.9
3	CSR50 x CSR51	576	15.058	1.863	0.432	23.1
4	CSR18 x CSR19	522	14.368	1.757	0.383	21.7
5	CSR46 x CSR47	578	14.367	1.779	0.413	23.2