Abstract

The objective of this breeding study, was to amalgamate desirable traits available with a group of potential bivoltine genetic resources possessing attributes on fitness, productivity, fibre quality and shorter larval duration through appropriate selection of breeding resource materials, adopting specific breeding and selection strategies and by undertaking systematic hybrid evaluation so as to develop and identify superior bivoltine hybrid combinations possessing the desired targeted traits on productivity (shell percentage >22) along with relatively shorter larval duration (around 22 days).

Thirty one bivoltine silkworm genetic resources available at Satellite Silkworm Breeding Station, Coonoor when subjected for evaluation studies employing multiple trait index and index scoring method, had resulted in identification twelve potential parental resources. Amalgamation of desired traits on fitness, productivity, fibre quality and shorter larval duration was attempted in selective fashion and by adopting productivity index suggested by Gamo, (1976) along with keeping a minimum of 30% female population in selected batches.

Ten new SLD breeds developed after breeding process, when subjected for hybrid evaluation, heterosis studies, estimation of silk productivity (Gamo, 1976), measurement of cocoon uniformity, assessment of reproductive potential had resulted in the development of six new breeds, SLD1, SLD2, SLD4, SLD6, SLD8 and SLD9; Of which, SLD4 and SLD8, are marginally superior to CSR2 and CSR4 in productivity merits and relatively shorter larval duration (20 hours (SLD4), one day twenty hours (SLD8) less); One new single hybrid, SLD4 x SLD8 with shorter larval duration (18 hours less) and marginally superior productivity traits than the control, CSR2 x CSR4; Six new foundation crosses, SLD1 x SLD2, SLD2 x SLD4, SLD3 x SLD4, SLD5 x SLD9, SLD8 x SLD9 and SLD9 x SLD10; Of which SLD2 x SLD4 and SLD8 x SLD9, are marginally superior to CSR2 x CSR27 and CSR6 x CSR26, in productivity merits and with shorter larval duration (20 to 24 hours less) and One new double hybrid (SLD2 x SLD4) x (SLD8 x SLD9) with marginally superior productivity traits and shorter larval duration (one day 18 hours less) than the control, (CSR2 x CSR27) x (CSR6 x CSR26).
Breeding as an important tool has been exploited by many breeders in the improvement of livestock for their economic gains. Apart from livestock, among insects, the silkworm *Bombyx mori* L. has been subjected to different kinds of breeding techniques to attain maximum silk productivity. Silkworm breeding is essentially conducted to bring together all desirable genes in appropriate combinations to improve the genetic potentiality for maximizing the cocoon yield and productivity per unit area and population. Silkworm breeding aims to achieve superior performances in respect of egg yield, cocoon raw silk yield, cocoon stability and production followed by expansion to new areas besides others. Silkworm breeders continue to strive for an inherent gain in resistance by incorporating resistant genes into the genetic backgrounds of high yielding temperate bivoltines.

Breeding programmes aimed at breed improvement have generally relied on the use of established breeds or elite lines. The goal of breeding is to bring together the desirable constellations of genes in appropriate combinations in order to improve the genetic performance for maximizing the yield and productivity per unit of population. Conventional breeding methods employed by the breeders have enabled to achieve the desired objective in several plant and animal species. The selection of superior parental combinations to a large extent determines the degree of success of the breeding programme. The success depends on the initial selection of parents, their effective utilization in desirable combinations, choice of mating systems to obtain genetic variability to step up selection. Proper evaluation of suitable parents is therefore crucial for breeders.

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 (Krishanswami, 1978) and fluctuation of temperature during different stages of larval development was found to be more favourable for growth and development of larvae than constant temperature (Anonymous, 1975). There are 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).

Sub-tropical climate prevailing in the Nilgiris hill area brings boon, together with bane. Though the semi-temperate / sub-tropical conditions prevailing in the western ghats of Nilgiris been an ideal, to realize the full potential of bivoltine silkworm breeds and hybrids, the prolonged larval duration observed with sericulturists of the area acts as a deter to this avocation. The prolonged larval duration exposes more duration to the vagaries of hill climate and often leads to poor yield from crops succumbing to pathogens. It became imperative to take up silkworm improvement studies with an objective of developing breeds with relatively shorter larval duration with out compromising on productivity traits.

To develop such breeds with shorter larval duration while balancing the productivity aspects, calls for judicious amalgamation of these desired traits. Since there is a negative co-relation between larval duration and productivity, appropriate breeding strategy and selection pressure are required to address this issue. This breeding study is about one such attempt made on amalgamating desired traits at targeted level of productivity (Shell percentage >22) along with relatively shorter larval duration (around 22 days) in bivoltine silkworm at Satellite Silkworm Breeding Station, Coonoor.