CHAPTER-I

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Silk production involves the cultivation of mulberry and silkworm rearing which are essentially akin to agriculture, particularly mulberry cultivation which is land and water based and also influenced by soil, climate and other edaphic factors. Whereas silkworm rearing is almost exclusively dependant on the mulberry leaf production and its quality. Silkworm rearing is also profoundly influenced by the climate and hence there is a demand for region and season specific silkworm races. (Thangvalu, 1999)

It is well known that there are different climatic zones within the sub-continent viz., tropical, sub-tropical and temperate. Therefore, it is very essential to evolve suitable silkworm races adaptable to specific climatic zones and different seasons; so that silkworm rearing will be more successful and silkworm crop loss will be reduced.

Climate influences the living organisms profoundly (Uvarov, 1931) and silkworm *Bombyx mori* L. is no exception. Realising the profound influence of climate on agricultural crops the Planning Commission (Khanna, 1989) identified 15 resource development regions (Agro-climatic zones) in the country (Devaiah *et al.*, 1999). Out of the 15 regions identified 14 are in the mainland and the remaining one is present in the islands of Bay of Bengal and the Arabian sea.

The twenty one agro climatic ecological zones (Ghosh, 1991) have been developed by the Planning commission and ICAR and most of the characters as well as few salient features of the five major sericulture states are summarised for the benefit of silkworm breeders as well as other extension specialists.

Though more than 60 multivoltine and 50 bivoltine races are evolved and available, only a few races are popular in the field (Pure Mysore, Nistari, Tamil Nadu white among the multivoltines and NB4D2, NB18, KA, SF19, YS-3, SH 6 among the bivoltines) which indicates that most of the evolved races are not evaluated properly

region wise and season wise. In recent past yield performance of few bivoltine races (CSR2, CSR4,CSR5) and their hybrids which were evolved at Mysore were found to be satisfactory particularly during October-February seasons in the southern plateau region of Karnataka and Kashmir region. Begum *et al.*, (2003) opined that due to varied climatic conditions in India different breeds evolved are reared in different seasons, which give better results.

During the last ten years, mulberry cultivation and silkworm rearing have been introduced under varied agro-climatic conditions in different parts of India. Silkworm rearing is also taken up by marginal and small farmers under rain-fed conditions as well as under semi irrigated and rain-fed areas, in the plains, coastal regions, plateau and hilly areas.

The sustainable development of sericulture in different agro-climatic ecological zones depends heavily on silkworm breeds with specific characters and adaptable to specific zones. In each zone, the cropping pattern are different, even in sericultural practices. For instance, in major part of Jammu and Kashmir there is only one crop of silkworm during spring season, though a second crop is practiced in a very limited scale in Jammu region. Whereas there are four to five well defined crops in West Bengal. On the other hand, in the southern states (Karnataka, Andhra Pradesh and Tamil Nadu), all through the year silkworm rearing is taken up and there is a continuous and overlapping silkworm crop. The practice is slightly different in West Bengal and most of the Northern states where silkworm rearing is restricted to certain seasons only.

In West Bengal the silkworm crops are taken up as per specific crop seasons such as Falgun (February-March), Chaitra (March-April), Jaishta (May-June), Bhaduri (August-September), Aswija (September-October) and Agrahayani (November-December).

Most of the farmers of West Bengal take up three or more crops in a year depending upon mulberry sprouting and leaf availability in their zone. In Jammu and

Kashmir silkworm rearing is similar to temperate sericulture (one crop in Kashmir and two crops in Jammu division). Generally in North Eastern states, particularly in Assam, the farmers take up rearing in small population (05 to 20 disease free layings) for their own convenient time. As a result of these wide ranging silkworm rearing patterns the prevalence of silkworm diseases, pathogens and parasites pose a great threat particularly in South India where the disease causing pathogens load in the microenvironment of the silkworm rearing which is relatively high throughout the year. This indicates that silkworm breeds need to be different for each of these regions according to need. For Jammu and Kashmir, Doon valley of Uttar Pradesh, Punjab, Haryna and Himachal Pradesh bivoltine breeds of superior quality of silk yielding traits are essential and breeds also should have high survival value with inherent potential to survive in low management systems like floor rearing on any base such as mat, cot, varandah, etc. In West Bengal and Eastern region (Assam, Manipur, Nagaland, Mizoram and Tripura) mulberry leaf availability is maximum during summer-rainy season (July to September) when the temperature and relative humidity are essential. In hot and dry zones of South India, where rain fed mulberry is popular, silkworm breeds with short larval duration and high survival rate are required. For irrigated mulberry gardens where congenial climatic conditions are provided moderately high yielding bivoltine hybrids and cross breeds are required during the favourable and unfavourable seasons respectively.

The Regional Approach of Silkworm Breeding: Silkworm breeding should be carried out in different regions for specific agro-climatic conditions as selection in race improvement will be more ideal and advantageous through location/region specific breeding/screening programmes. Falconer (1952, 1960 and 1990) has observed that performance is best improved by selection under the condition in which the performance is specifically measured. It is likely that a silkworm race selected for rain-fed mulberry conditions would certainly express better performance under irrigated mulberry.

The newly evolved multivoltine and bivoltine silkworm races and the potential hybrid should be tested for their field adaptability with reference to region and season specificity. Recently, All India Co-ordinated Experiments for evaluation of silkworm races have been introduced on the model of co-ordinated field trials conducted for crop improved by ICAR and Agricultural universities but the system developed for evaluation of silkworm races/hybrids needs standardisation and improvement. So that field evaluation are conducted properly and suitable hybrids may be fixed for regional and seasonal needs based on evaluation index. This type of exercise will bring some immediate relief so that some of the very old and out dated races and their hybrids will be replaced by qualitatively and quantitatively superior hybrids of the new races which will further increase the silk yield per unit area which at present is very low in India (75.0 kg of raw silk per hectare in India compared to100.0 to 120.0 kg of raw silk per hectare in China and Japan. Mano *et al.,* (1997) studied the evaluation index of some of the popular and recently fixed bivoltine hybrids of the new races which indicates that at least nine combinations out of forty three combinations tested have scored > 50 points for six of the nine important traits tested. This study also indicates that some of the Indian hybrids recorded high index value for shell weight, shell ratio and filament length. Ramesh Babu *et al.,* (2001) evaluated the genetic resources for identification of potential parents utilizing these indices.

In the recent past hybrid vigour in silkworm has received a considerable attention because of marked effect of the yield components. In multivoltine x bivoltine or bivoltine x bivoltine is well documented that F1 hybrids are superior to their parents in many qualitative and quantitative characters (Toyama, 1906).The first generation (F1) hybrids are recommended to raise commercial crops. Bivoltine cocoons are comparatively good and produced of international quality yarn of 2A and above grade.

Considering the climatic condition of NE Region it has become a need of the time to identify bivoltine commercial hybrid with high qualitative and quantitative characters for rearing under favourable conditions. North East is a constellation of

seven states and situated within 90-97°E longitude and 22-29°N latitude. The climate can be classified into subtropical and sub-temperate. The temperature ranges from 8°C to 38°C in plains while in hilly regions like Arunachal Pradesh it varies 0-35°C. Relative humidity ranges from 38% to 98% and annual precipitation ranges from 1000 mm to 11500 mm.

Silkworm Hybrids of silkworm is essential for increasing productivity (Choudhury, 1992). Promising hybrids are utilized for obtainment of good quantitative traits. We also need season specific and region specific hybrids suitable to varied climatic condition of India. Hybrids are prepared having desirable characters but they should be acclimatized in the varied climatic conditions before commercial exploitation. Multivoltine hybrids like N x D3C and MBD1V x MBDV were developed and popularized during the 70's.and N x G, N x YB were developed and popularized during the 80's.

Presently, farmers of north east zone are using hybrids like SH6 x KA, P5 x KPG-B and NB18 x P5.However, existing breeds and hybrids are unable to satisfy the needs of Seri farmers. Normally hybrids (having high shell weight of multi x bivoltine and bivoltine hybrids) are imported from Karnataka but due to variable climatic conditions most of them do not survive or show poor performance. Therefore, their possibility of crop failure cannot be denied. So, a promising batch of ten numbers of new hybrids were evaluated under the Assam climatic condition in main commercial seasons (Spring and Autumn) for commercial exploitation with a aim for higher productivity.

The present investigation aims to find outthe following aspects:

- To assess the performance of a few combination of newly evolved productive bivoltine x bivoltine hybrids were considered for two consecutive seasons for autumn commercial seasons and spring commercial seasons.

- To assess the performance of a few combination of newly evolved productive multi x bivoltine hybrids were considered for two consecutive spring commercial seasons.

  And

- Identification of the suitable hybrids/combinations with better productivity under the agro climatic conditions of Assam with desirable qualitative and quantitative traits for commercial exploitation.