Chapter - I

Introduction

1. INTRODUCTION

In order to reduce rural poverty and to create more employment opportunities through increasing agricultural production and rural industrialisation the sericulture can be considered as an appropriate option for self reliance. From the dawn of human civilisation one of the three basic needs of human being was cloth or fabrics. Among the types of fabrics discovered so far silk has been occupying the position of queen by virtue of its remarkable strides, the elegance, sheen and appeal of the thread spun by the silkworm. Silk is a way of life in India over thousands of years , it has become an inseparable part of Indian culture and tradition . Raw silk is non-perishable and highly valued. About 57% of the gross value of Indian silk fabrics produced is received by the cocoon producers, 16% by the reelers and twisters , 11% by the weavers and 16% by the traders (Datta, 1996).

Sericulture has been practised in tropical , subtropical and temperate countries . Over 60 countries at present are engaged in sericulture and the world silk production in 1993 was over one lakh tonnes of which India's share was 13,913 tonnes , ranking second (after China) among the silk producers and accounting for 13% of the global production . Silkworm egg production has also increased significantly from 113 million dfls (disease free layings) in 1965 to 310 million dfls in 1994 (Datta , 1996) . In perspective of trade balance deficit during the eighties a new dimension was added to the strategy . Despite marginal decrease in the quantum of export of natural silk goods the export earning registered an increase to a considerable extent because of higher prices fetched by Indian silk goods in the foreign market.

The world silk demand has been increasing and only Indian and China have the promise to increase their silk production to meet the growing world silk demands . Though both the countries have sufficient manpower and congenial socio-economic and agro-climatic conditions for development of sericulture , India has certain natural advantages over China for boosting up its silk production . China already has 50 lakh acres of mulberry cultivation as compared to 6 lakh acres in India . Therefore , the scope for further expansion of mulberry acreage is better in India than in China.

Sericulture being a highly labour intensive industry in the country, it aims not only at increased silk production but also to generate more employment opportunities . The demand for silk within the country is also increasing with the improvement of economic conditions of some people But the increased silk production cannot sustain on the domestic demand alone. India can advantageously exploit situation in the world silk market and organise large scale export and earn valuable foreign exchange . The Government of India too , has taken the sericulture industry as an anti-poverty programme all over the country.

Of late , West Bengal ranks fourth of the 18 silk producing states in India. Industrially backward and agriculturally less productive , subsistence ridden northern tracts of West Bengal , particularly the terai region (entire Cooch Behar and Jalpaiguri district , parts of Darjeeling and Uttar Dinajpur) can be considered as a new productive zone for sericulture and has special relevance to the socio-economic and agro-ecological background.

However , about 90% of the present silk production in our country is from multivoltine races which yield qualitatively very poor silk . The international qualitative classification of silk ranges from 4A to H grade . While the silk produced in Japan , South Korea , Brazil and a few other countries fall under superior grades, the greater bulk of Indian silk produced by multivoltine silk worm fall under H grades. If India is to compete in the international market successfully , it is necessary to improve the quality of domestic silk yarn. By improving the technology of silk reeling and processing the quality of multi bivoltine silk being produced at present can be improved only marginally . But production of superior quality international grade of raw silk is possible only from the rearing of bivoltine silkworm.

Bivoltine silkworm races are primarily suited for temperate climate conditions . In India , bivoltine races are reared in the temperate areas of Jammu and Kashmir and under subtropical conditions in parts of Uttar Pradesh , Himachal Pradesh , Punjab, hilly tracts of West Bengal etc. Such rearing is restricted to only the favourable season. Production of crop round the year is not possible. But with a concerted research the evolution of new bivoltine breeds and rearing

technologies befitting tropical climate, the scope for continuous rearing of bivoltine silkworms is being contemplated in non-conventional areas.

Subba Rao *et al.* (1987) suggest that bivoltine rearing could be conducted in the district of Jalpaiguri , a district in the east Himalayan terai belt of West Bengal almost throughout the year except during May- June due to scarcity of suitable mulberry leaves. Prevailing longer duration of winter season has increased the scope of bivoltine silkworm rearing in this zone . Moreover , per capita income of the rural population in this region is far below the state average. Expansion of sericulture industry is therefore , appropriate for a labour surplus economy on other districts of terai zone of West Bengal . Till now a little information is available on the feasibility of rearing BV-race in this zone. This vacuum calls for an extensive investigation towards formulation of an optimum dietary schedule for best adapted bivoltine breeds having high rearing performance, befitting the prevailing ecological conditions for maximum economic return through the production of best quality as well as quantity of silk.

Mulberry belongs to genus *Morus* and family Moraceae. The number of species belonging to the genus is more than twenty. It is a deep rooted perennial plant. Unlike other agriculture crops , mulberry can thrive in varied soil and climatic conditions . Mulberry can be cultivated successfully in the plains of the Ganges stretching to the hills of the Himalayas . In can tolerate moisture stressed condition , in drought prone areas , as well as in hill areas with high rainfall . The general explanation for this wide adaptability is mainly attributed to its heterozygous nature due to cross pollination from time immemorial. Nutritive value of mulberry leaves varies among the varieties and according to agro-climatic conditions of an area . The nutritional levels of different cultivars of mulberry influence the larval growth of silkworm which ultimately is expressed as economic traits such as yield , cocoon and shell weights and silk percentage. Cultivars having higher yield as well as better nutritional potential are always desirable. Because , the yield and quality of leaves are dependent on the agro-climatic conditions of a locality . In order to minimise this gap , cultivars are to be trialed for a particular area and the best one is to be selected and recommended for the farmers . The quality of the cultivars may be maintained or improved by using fertilizers and cultural practices . The research in this direction has been

carried out in a limited extent in the terai belt and there is enough scope for terai region of West Bengal to be explored for this purpose.

Moreover , the studies on quantitative nutritional aspect in any insect is of fundamental importance for understanding the insect plant relationship (Walbauer, 1968 ; Babu *et al* , 1979). It is not only helpful to identify the better host species supplying better nutrition for polyphagous insect species (Senapati , 1989), but also helps for the monophagous insect species to select best host variety particularly those having wide genetic diversity (Yadava *et al* , 1978).

Various physiological activities of an organism are expressed in different aspects of growth which results from the balance between matter assimilation and dissimilation by complicated mechanisms (Ueda and Suzuki , 1967). Food ingestion , consumption and utilization patterns and their relationships with host plant are ultimately reflected in rearing performance of silkworm . Food utilization efficiencies under different level of feeding , various kinds of nutrient requirement by different silkworm breeds and hybrids have added a new dimension in the selection of variety for higher productivity and quality of cocoon to a greater extent (Magadum *et al* , 1992; Anantha Raman *et al*, 1992) .

The present investigation is , therefore undertaken at Bidhan Chandra Krishi Viswavidyalaya , North Bengal Campus , Pundibari , Cooch Behar to select varieties suitable for bivoltine silkworm rearing in terai region through systematic evaluation of nutritional efficiencies , rearing performance and quality of cocoon of different bivoltine breeds and hybrids of *Bombyx* mori L on superior mulberry varieties , initially screened out from several varieties on the basis of yield and quality of leaves, further, attempts were also made to improve quality of leaves of the highest leaf high yield potential mulberry variety for increasing more yield and quality cocoon of yield potential bivoltine breeds and hybrids by feeding leaves having higher nutrient value through manipulation of fertility status of mulberry crop for minimising quality-yield gap of leaf with an ultimate objective to make the sericulture enterprise more remunerative through optimising leaf : cocoon ratio . Such comprehensive studies will lead to enrichment of package for raising bivoltine silkworm in terai region of West Bengal , a newly explored

area for bivoltine silk worm rearing. A following aspects were considered in the present investigation:

1.Preliminary screening of mulberry varieties.

2.Selection of a suitable superior variety from the initial screening of eight varieties.

3.Enrichment of nutritional quality of leaves by fertilizer supplementation to the mulberry field and its impact on silkworm.

4.Impact of different combinations of two mulberry varieties as food on the larval performance , nutritional efficiencies and cocoon qualities.