Chapter ~ VI

Summary

6. SUMMARY

An investigation was undertaken in the terai region in Cooch Behar district of West Bengal , India for selecting mulberry varieties in this area suitable for bivoltine silkworm rearing through systematic evaluation of nutritional efficiencies , rearing performance and quality of cocoon of different bivoltine breeds and hybrids of *Bombyx mori* L . (Lepidoptera : Bombicidac) Furthermore, with the help of fertilizer enrichment an attempt was made to improve the quality of leaves of the mulberry variety having the highest leaf yield potential in this zone. This was attempted with a view to increase both quality and quantity of cocoon production from the potentially high yielding bivoltine breeds and their hybrids using these higher nutrient value . In order to boost up qualitatively superior bivoltine silk production in the terai region, mulberry varieties were used and the performance of bivoltine breeds was assessed. The ultimate objective was to make the sericulture enterprise more remunerative through optimizing leaf : cocoon ratio.

A preliminary screening of eight well recognised mulberry varieties was done . The varieties were C 776 , S779 , C763 , TR4 , TR8 , TR10, Kosen and S1 , collected from Central Sericulture Research and Training Institute , Berhampore , West Bengal under the Ministry of Textiles, Govt. of India. The screening was performed with the leaves of these varieties on the bivoltine larvae of *Bombyx mori* , the P5 x KPGB . The selection of relatively superior mulberry varieties was based on the bivoltine breeds P5 and KPGB and their two reciprocal hybrids . Subsequently the quantitatively the best leaf yielding S1 variety of mulberry was cultivated for nutrient enrichment using different levels of fertilizers and its suitability was assessed using the same two silkworm breeds and two hybrids. The experiment on combination of leaves was undertaken only on the hybrid (P5 x KPGB) silkworm . All the breeds of silkworm were collected from the Regional Sericulture Research Station , Central Silk Board , Kalimpong , West Bengal. The rearing was undertaken following the recommendation of Ullal and Narasimhanna (1987) in three different seasons , Spring (February - March) , Autumn (October - November) and Summer (May - June) . Consumption and utilization of food by the fifth instar larvae were estimated using the gravimetric

method of Waldbauer (1968) on dry weight basis . Biochemical assessment of mulberry leaves was undertaken using Lowry method (1951) for total protein , Anthrone method (Plummer , 1979) for total carbohydrate and the procedure of Paul et al . (1992) for the determination of leaf moisture.

1. From the preliminary screening of eight mulberry varieties it was found that the leaf yield of S1 variety (60.30 q/ha) was significantly the best followed by TR10 (39.94 q/ha) but the quality of leaves with respect to protein (17.33 %) and carbohydrate (10.57%) content was low in S1 , whereas the Kosen variety was significantly the superior most with respect to quality of leaves(18.09% and 10.76 % protein and carbohydrate respectively) followed by TR10 (17.81 % protein and 10.78 % carbohydrate) but the leaf yield was very poor in Kosen (27.76 q/ha) . The leaves of different varieties fed to the larvae of BV-worms showed significant variation on key parameters of rearing performance. The highest cocoon wt. was obtained from TR10 (1.82g) , the highest shell wt.(0.40g) from TR10 and Kosen while the highest SR% was obtained from Kosen (22.22%) which was followed by TR10 (21.98%) and then by S1 (21.79%).

Among the eight mulberry varieties initially screened S1 , TR10 and Kosen appeared as better varieties for the agro-climatic region under study with respect to yield and quality of leaves as well as cocoon qualities obtained therefrom.

2. Subsequent investigation revealed that the higher values for mature larval weight and single cocoon weight were obtained during the favourable seasons (spring and autumn) from P5 x KPGB (49.27g and 2.21g respectively in spring and 50.37g and 2.20g respectively in autumn) and P5 (51.03g and 2.09g respectively in spring and 50.10g and 2.21g respectively in autumn) breeds when the leaves of Kosen were fed to the larvae . The hybrids produced higher shell weights during the favourable seasons (0.44g and 0.43g in spring and autumn respectively from P5 x KPGB) when reared on Kosen variety . Higher values of silk ratio was obtained from the pure breeds during spring and from hybrids during autumn when reared on TR10 (20.84 from KPGB during spring and 20.40 from KPGB x P5 during autumn) and S1 (21.05 from KPGB during spring and 20.44 KPGB x P5 during autumn) and during summer the value was higher

especially in case of KPGB x P5 and on leaves of any variety , particularly on Kosen (20.52) . Absolute silk content was higher during spring when P5 x KPGB was reared on Kosen (4206.33g) ,ERR wt . Was also higher in the hybrids during favourable seasons when the reared on Kosen, (21.32 kg.) .The higher ERR no. was obtained during favourable season when the leaves of S1 variety (9900.00) were used for the hybrids . Fecundity was higher in KPGB x P5 and on Kosen during summer (637.33). On the whole, almost all the rearing parameters were satisfactory during favourable seasons , in case of the hybrids and on Kosen .

The different indices of nutritional efficiencies revealed that during summer irrespective of the mulberry varieties , higher values were obtained for consumption index , growth rate , approximate digestibility and efficiency of conversion of ingested and digested foods . Whereas , lower nutritional efficiencies were recorded during spring and autumn. In spite of lower consumption index and approximate digestability, there were higher conversion efficiencies in the larvae fed on Kosen whereas due to higher C.I. and digestibility in case of S1 leaves ,the values of conversion efficiencies were the highest. Hybrid larvae recorded higher rates of growth and digestibility as well as conversion efficiencies though consumption index was low as compared to those of the pure breeds.

For obtaining the best cocoon quality and quantity in the terai the bivoltine hybrid silkworm, especially KPGB x P5 and the variety Kosen appeared the best breed and varaiety respectively .

The Kosen variety was the best of three screened varieties so far as its leaf quality , nutritional efficiencies , most of the rearing parameters and cocoon yield of worm were concerned but leaf yield was very poor even less than half that of S1 and two third that of TR10.

3. With a view to exploit high yield potential of S1 variety in this region its qualitative improvement was explored through higher inputs of fertilizer such as 0:0:0 kg NPK/ha (Fo) , 40 :20:20 kg NPK/ha (F1) , 80:40:40 kg NPK/ha(F2) , 120 :60:60 kg NPK/ha(F3) and 160:80:80 kg NPK/ha (F4) .

All the yield attributing characters as well as yield were always significantly the best at the highest (F4) level of . fertilizer. The resultant protein and carbohydrate contents were 23.61% and 16.27% respectively .Subsequently the larvae of different breeds and hybrids were reared on these improved leaves (F4) in different seasons . The highest larval weight (51.23g), cocoon weight (2.15g) , shell weight (0.46g) , SR%(21.21%) , absolute silk content (4521.00g), ERR in wt.(21.32kg.) , ERR no (9900.00) , cocoon quality (filament length 805.03 mt.) and fecundity (696.67) were obtained from the larvae of both the hybrids during favourable seasons particularly during spring . Again the higher consumption index (2.48)was recorded in the larvae fed with the leaves of low nutrient contents and least (0.97) from the leaves of higher nutrient contents . As a result , the leaf requirements by the larvae were low when the leaves with higher nutrient contents were used . Moreover , the digestibility and efficiency of conversion of food increased with the improvement of nutrient levels in food. Increased fertilizer levels not only increased the quantitative yield of mulberry leaves , by about 50% , but also improved the quality of leaves .

4. With a view to exploiting nutrient rich leaves of Kosen and TR10 and better leaf yield of S1 , larvae were reared on combinations of mulberry varieties , using the leaves of one variety in early larval stages (up to the third) and another variety in the late stages (fourth & fifth) of larvae.

From the rearing performance and nutritional efficiency of larvae it was recorded that the leaves of higher nutrient content resulted in better nutritional efficiency and rearing performance. However , better nutrient -rich leaves of Kosen or TR10 varieties when used in early stage and the leaves of S1 variety at the late stage provided encouraging result for exploitation by the farmers in the agro-climate of terai.