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Mini Review

Evaluation of Mulberry Varieties for Rearing Performance and Economic Traits of Silkworm Races

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Abstract

Mulberry silkworm is a monophagous, which feeds only on the mulberry leaves. The agro-climatic conditions of about 38 districts in mid hills 750m-1500m (for bivoltine sericulture) and about 20 districts in the Terai belt 100m-750m (for Bivoltine and cross breed sericulture in specific seasons) and also the socio-economic settings are ideally suitable for the development of sericulture industry in Nepal. Sericulture is considered as a re-emerging industry for poverty alleviation in SAARC region including Nepal. Sericulture act as a magnet for smallholder farmer as the investment is nominal and risk is minimal. The various parameter of silkworm such as net feed consumption, feces weight of 5th instar larva, efficiency of cocoon production (ECP), efficiency of conversion of ingested food (ECI), efficiency of conversion of digested food(ECD), body weight of larva, highest dry weight of cocoon etc are directly influenced by the varieties of mulberry used as feed. research conducted for evaluation of different mulberry varieties (S-36 , khopasi-1 , Chinese hybrid ,kanva-2 , & Mysore local) used for rearing of silkworm (Bivoltine $J_{12}\times C_{12}$) in Chitwan, Nepal (Y. dhakal) revealed that kanva-2 variety of mulberry was superior having highest body weight of larva , highest dry weight of cocoon, ECI(15%) , ECD(17.59%) , ECP(8.57%) but the net feed consumption (27.4g/larva) , amount of feces weight of 5th instar (3.68g/larva) and amount of left over feed (5.05kg/200 larva) was found to be highest in khopasi-1. The same result was found from different mulberry varieties (kanva-2, khopasi-1, Ichinose & Husan) used for rearing silkworm (J_{12}, C_{12},$J_{12}\times C_{12}$) showing the kanva-2 variety of mulberry and $J_{12}\times C_{12}$ genotype of silkworm were found to be superior.

Keywords: Silkworm; Sericulture; Mulberry; Cocoon

Introduction

Nearly 95% of commercial silk comes from *Bombyx mori* L., which is known as mulberry silkworm (Ganga, 1997) . Sericulture act as a magnet for smallholder farmer as the investment is nominal and risk is minimal as in case of Nepal. High profit is the ultimate motivation for the farmer that can be achieved by producing as many good quality cocoons as possible which requires good mulberry garden (Benchamin, 1990) . The nutritive value of mulberry leaf is one the important factors, which contributes maximum for good crop yield. It is well known that the quality and quantity of silk are function of quality of and quantity of mulberry leaves (Prasad, 1989) . The nutrition of silkworm *B. mori* L. has been primarily important because of cocoon production is influenced by the nutritive value of food stuffs i.e. quality of mulberry leaves. Silk moths lay their eggs on the mulberry leaves, and the worms hatch after fourteen days. The worms of silkworm feed on the leaves continuously, and they molt as they grow. After molting four times, the larvae enclose themselves in a cocoon of raw silk produced by their salivary glands. Silk is basically a protein consisting of the amino acid glycine (60%), alanine (20%), and serine (20%). Inside the cocoon, a silkworm transforms into a pupa that emerges as a moth in about three weeks. The moths reproduce and die within five days, but in this time the female manages to Lay from 200 to 500 eggs to continue the life cycle.

In the history of sericulture development in Nepal, the initiation was taken by the then Rana prime minister Chandra Shamsher in 1911 A.D. Nepal is devoid of native

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races of silkworms and is non-traditional to sericulture with a number of unsuccessful attempts in the course of its introduction (Palikhe, 1995) . Sericulture has been prioritized by Agriculture prospective Plan (APP) for mid hill region in order to meet the goal of poverty reduction, and women empowerments because it is a competitive income generating enterprise. Interaction of mulberry varieties and silkworm races play a vital role in quality and yield of cocoons. Due to the lack of researches on interaction of mulberry varieties and silkworm races, farmers are unable to exploit the yield potential by rearing proper silkworm race and feeding the most suitable mulberry varieties. Since amount of protein in different mulberry varieties ranges from 13.86% to 25.20%, there is need of selection of mulberry varieties for mulberry varieties for improvement of yield and quality of cocoon (Gupta, 1998). The review determine the optimum combination of silkworm races and mulberry varieties to enhance sericulture business by increasing yield of cocoons and improving cocoon quality under farmer's conditions in context of Nepal.

Egg Hatchability

Silkworm races differed in hatchability, Among different races $J_{12}\times C_{12}$ had the highest hatchability (98.5%) followed by C12×J12 (97.6%), J12 (93.4%) and C12 (82.7%), respectively (Gautam, 2006) .

Larval Weight

The larval weight at fifth instar at fifth day was highest for $J_{12}\times C_{12}$ silkworm race fed on kanva-2 mulberry variety gained the highest body weight (46.13g/10larva (Gautam, 2006) but found to be (38.5g/10larva (Y. dhakal)), while the lowest body weight was observed in the silkworm race J12 (29.26g/10larva) fed on Husan mulberry variety (Gautam, 2006) but found to be S-36(30.5g/10larva (Y. dhakal).

The various parameter of silkworm on Kanva-2 mulberry such as efficiency of cocoon production (ECP=8.57%), efficiency of conversion of ingested food (EC=15%I), efficiency of conversion of digested food (ECD17.59%) ,body weight of larva(4.87g/larva) ,dry weight of cocoon(2.76g) which is the most superior among the checked varieties (Y. dhakal). Whereas the various parameters such as net feed consumption(27.4g/larva), faeces weight of 5th instar larva(3.68g/larva) and the amount of leftover fed (5.05kg/200larva) was found to be of Khopasi-1 variety of mulberry.

The productivity of silkworm in term of cocoon crop depends on several factors that operate within and outside the body of silkworms' Growth of the silkworm depend on the nutritional status of the mulberry leaves and the nutritional requirement of the silkworm varies according to their growth stage (Bose, 1991). The quality of leaf is connected with larval duration, larval mortality, mounting, shell and cocoon weight (Takeuchi, 1961).It is well known that the quality and quantity of silk are function of quality and quantity of mulberry leaves (Prasad, 1989). This being so, this appears to be scope for identification of optimal silkworm genotype × mulberry variety combinations that can boost silk production. The result, obtained from this review, is irrespective of the leaf yield of selective mulberry variety has opened the door for further research on leaf yield that support to rear silkworm profitably.

Conclusion

The success of sericulture depends on the various factors including successful implementation of technological and managerial tools along with high yielding best suited mulberry varieties and silkworm races. High yielding silkworm races fed on nutrient rich mulberry varieties yield desirable gains. Hence, interaction of mulberry varieties and silkworm races plays a vital role in quality and quantity of cocoon. The $J_{12}\times C_{12}$ race of silkworm when reared on kanva-2 variety of mulberry results in high productivity in term of quality and quantity of cocoon.

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