



Impact of leaves of different mulberry genotypes on nutritional efficiency of conversion parameters of silkworm, *Bombyx mori* L.

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ABSTRACT

The silkworm, *Bombyx mori*, is a domesticated insect widely used to produce silk worldwide for human consumption. *B. mori* is a monophagous insect that feeds on nutritious mulberry leaves to produce silk. The efficiency of conversion of leaves to larval biomass by silkworm larva largely depends upon the type of silkworm breed/hybrid and the quality of mulberry leaves fed to them. The silkworms having good efficiency of conversion of leaves perform better in larval growth and silk gland development, which finally leads to enhanced silk production. In the current research work, the highest efficiency of conversion of ingesta to larva (28.608%) and efficiency of conversion of digesta to larva (51.527%) were found in Goshorami fed silkworm batch which differed significantly from other varieties.

KEYWORDS: Nutritional efficiency, *B. mori*, Mulberry genotypes, Kokuso-21

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INTRODUCTION

The *Bombyx mori* is an important insect of the order Lepidoptera which undergoes complete metamorphosis consisting of egg, larva, pupa and moth stages. Among these stages, the larva is the leaf consuming stage and needs a continuous supply of nutritious mulberry leaves for proper growth and development up to the spinning of cocoons. The mulberry varieties differ significantly with regard to different nutrients present in leaves (Islam, 2023). Therefore, the proper selection of nutritious mulberry varieties acquires significance for the successful rearing of silkworms (Islam *et al.*, 2022a; Islam *et al.*, 2023). Dietary efficiency studies in silkworm with respect to the utilization of food and its impact on silkworm growth, ingestion and digestion of food have been carried out by many workers (Ueda & Suzuki, 1967; Horie & Watanabe, 1983; Islam *et al.*, 2022b). Sigematsu and Takeshita (1967) found an increase in the mulberry leaf ingestion during late age silkworm rearing with a decrease in rearing temperature. Muniraju *et al.* (1999) carried out study on the effect of temperature on leaf-silk conversion and reported that temperature of 26 °C throughout the rearing period resulted

in higher silk conversion and better survival rate in the bivoltine silkworm. Sumioka *et al.* (1982a, b) concluded that silkworm strains must be developed based on food utilization efficiency at different feeding amounts under favourable conditions during silkworm rearing. The amount of food consumed by the silkworm larva varies in different instars and mainly depends upon the nutritional quality of mulberry leaves (Ito, 1972; Islam *et al.*, 2020a, b). Increase in ingesta, digesta and excreta per larva with advancement in age of silkworm of temperate breeds were studied by different researchers (Fakuda *et al.*, 1963; Jeksheva & Genova, 1991). Slansky and Scriber (1985) reported that the food consumption by insects leads to healthy growth and development and also enhances biomass accumulation and reproductive performance. Around 97% of the leaf consumption occurs in late age instars of *B. mori* (Hiratsuka, 1920; Waldbauer, 1968; Horie *et al.*, 1976). It was reported that qualitative and quantitative traits of cocoons were improved after silkworms were reared on enhanced nutritional leaves (Legay, 1958; Gangwar, 2010). The work on genetic control of leaf conversion efficiency of the silkworms were also carried out by different researchers (Paoloni-Giacobino *et al.*, 2003; Ogunbanwo &

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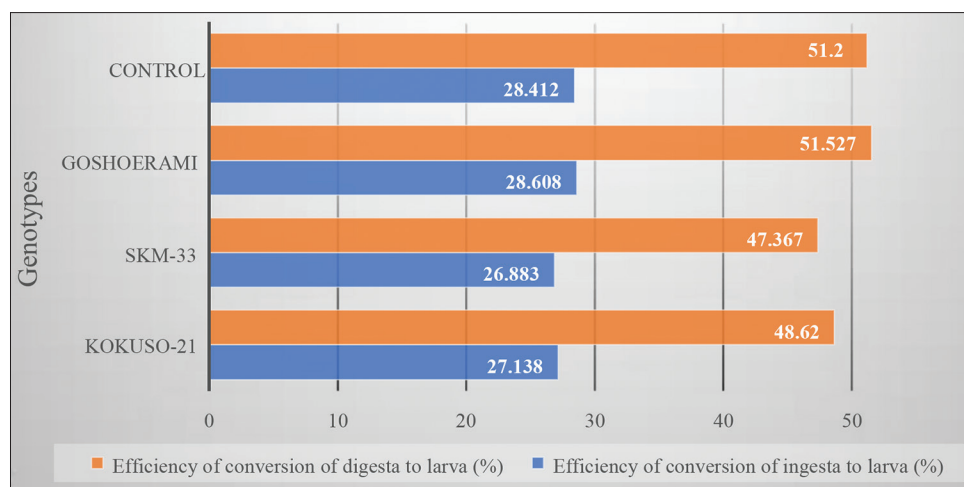


Figure 1: Effect of different mulberry genotypes on efficiency of conversion of ingesta and digesta to larva

Okanlawon, 2009). Now considering the role played by the nutrition the present study was undertaken to study the impact of different mulberry genotypes on the nutritional efficiency parameters of *B. mori*.

MATERIALS AND METHODS

The study was performed at COTS, Mirgund, SKUAST Kashmir, India. The silkworm race (PAM-117) after incubation was brushed and reared on leaves of three different mulberry genotypes viz., Kokuso-21, SKM-33 and Goshierami up to spinning of the cocoon. In this experiment, four replications per treatment of 100 larvae were kept throughout the rearing period and one control was also maintained for comparison.

RESULTS AND DISCUSSION

The efficiency of conversion of ingesta and digesta to larva which indicates the efficiency of conversion of ingested and digested food into biomass/body matter differed significantly after the silkworms were fed on different mulberry genotypes. The efficiency of conversion of ingesta to larva showed a significant difference after silkworms were fed on different mulberry genotypes, the highest efficiency of conversion of ingesta to larva (28.608%) was recorded in silkworm batch fed with Goshierami mulberry leaves which was at par with control (28.412%) and the lowest efficiency of conversion of ingesta to larva (26.883%) was recorded in SKM-33 fed silkworm batch (Table 1 & Figure 1). The efficiency of conversion of digesta to larva also showed a significant difference where Goshierami fed silkworm batch recorded highest efficiency of conversion of digesta to larva (51.527%) which was at par with control (51.200%) and SKM-33 fed silkworm batch showed lowest efficiency of conversion of digesta to larva (47.367%) (Table 1 & Figure 1). The nutritional efficiency of larva significantly impacts the pupa, adult and finally in the production of silk in silkworm (Takano & Aral, 1978). The current results are in conformity with Dar and Singh (1998) and Trivedi and Nair (1999), who stated that higher efficiency of conversion of ingesta and digesta to larva results in better growth and development of silkworms. The

Table 1: Effect of different mulberry genotypes on nutritional efficiency of conversion parameters

Genotypes	Efficiency of conversion of ingesta to larva (%)	Efficiency of conversion of digesta to larva (%)
Kokuso-21	27.138 ^b	48.620 ^b
SKM-33	26.883 ^c	47.367 ^c
Goshierami	28.608 ^a	51.527 ^a
Control	28.412 ^a	51.200 ^a
CD ($p \leq 0.05$)	0.205	0.463

results are in agreement with the findings of Sarkar *et al.* (1998) who reported significantly highest ECI and ECD to larva after silkworms were fed on bush leaves as compared to tree leaves. Our results are in line with Dar *et al.* (1988) who after feeding three mulberry varieties found best results in Ichinose variety with regard to efficiency of conversion of ingested and digested food into larva. The similar results were also reported by Paul *et al.* (1992), Sarkar and Fujita (1994) and Ahamed *et al.* (1998).

CONCLUSION

According to many researchers, quality of mulberry leaves play an important role in the robust growth of silkworm larvae. The larvae which are fed on nutritious mulberry leaves have better nutritional efficiency of conversion into larval biomass, resulting in enhanced silk production. In the current study, Goshierami fed larvae were found to record highest efficiency of conversion of ingesta and digesta to larva, which is an important parameter for the screening of silkworm breeds. Thus, the above mentioned variety can be used for rearing purpose to maximize the profitability of silkworm farmers.

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