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Impact of Mulberry Varieties and Various Alternate Hosts on the Development of *Bombyx mori* L. and Silk Yield

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Abstract

This paper reports on silkworm (*Bombyx mori* L.) larvae feeding on mulberry varieties and alternate hosts. In the present experimentation, it was concluded that mulberry variety *Morus nigra* leaves consumed by silkworm larvae, affected not only the silk yield significantly but also increased food consumption, coefficient of utilization, larval size, larval weight, cocoon weight and egg production as compared to those of other mulberry varieties and alternate hosts which were used in the experiment.

Keywords: Sericulture, Alternate hosts

Introduction

In Pakistan silkworm rearing activity is mainly concentrated around irrigated forest plantations of Changa Manga, Chichawatni, Multan, Kamalia etc. (ANONYMOUS, 1990). It has not been much expanded on commercial basis and is confined only to the cited locations. Reason behind that we are still using traditional way of silkworm rearing development of this industry can only be done if better mulberry varieties and silk seed are used along with improved diets and technology for silkworm rearing (KHAN, 1993).

Silkworm larvae have also been successfully reared on peepal (*Ficus rilegiasa*) leaves and produced better quality/quantity of silk, but their rearing on peepal leaves at large scale is not possible because the un-availability of leaves on required time.

Efforts made to increase the quality and quantity of silk, is now on its way but due to limited supply of mulberry leaves, silkworm nutritionists have always been searching for better food either through alternate host plants or different varieties of mulberry plants (GOPAL 1910; NAKI, 1920; BOUINHOL, 1951; TRAGER, 1953). SALEEM and HAQ (1984) have stated that not only the increased cocoon production of *Bombyx mori* L. is affected by different varieties of mulberry, but also of varying quantities of single food plant. NASREEN *et al*. (1999), reported an improvement in the silk quantity as well as quality on alternate host plants.

Keeping all above in view, Such a comprehensive study was planned to find out the performance of silkworm larvae on various mulberry varieties and alternate hosts with

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ultimate objective of improving the quality/quantity of natural silk.

Materials and Methods

The eggs of silkworm *Bombyx mori* L. were purchased from the Forest Department, Faisalabad and placed in an incubator run at an ambient temperature (25-27oC) and relative humidity 70-75% RH in Sericulture Laboratory Department of Agri-Entomology University of Agriculture, Faisalabad during 1998. Soon after hatching, an experiment was laid out following Completely Randomized Design. There were ten treatments and each treatment was replicated thrice. From the newly hatched stock, fifty larvae were separated and placed in each replication. The rearing was carried out in cardboard trays (12 x 9 inches size) separately in the following treatments.

T0 = *Morus alba* (Mulberry leaves)
T1 = *Morus indica* (Mulberry leaves)
T2 = *Morus nigra* (Mulberry leaves)
T3 = *Morus chinensis* (Mulberry leaves)
T4 = *Morus laevigata* (Mulberry leaves)
T5 = *Eugena jumbulana* (Jaman leaves)
T6 = *Citrus reticulata* (Kinnow leaves)
T7 = *Citrus limonia* (Mitha leaves)
T8 = *Cynodon dactylon* (Khabal leaves)
T9 = *Populas cuphratica* (Popular leaves)

First two instars of silkworm larvae were offered chopped tender leaves of respective plant, while later three instars were fed on full grown leaves according to their treatments. However, the larvae could not survive to join the 2nd instar in T5, T6, T7, T8 and T9 due to starvation. What so ever, they fed during 1st instar, was mainly a sort of forced feeding. Therefore, after 1st instar, experiment was continued only for the test treatments viz; T0, T1, T2, T3 and T4, embodying various mulberry varieties. Food consumption (F.C.) and coefficient of utilization (C.U.) was calculated according to EVANS (1939), as:

F.C. = Dry wt.of leaves offered - Dry wt.of residual leaves

$$\text{C.U.} = \frac{\text{Dry wt. of F.C. - Dry wt.of faeces}}{\text{Dry wt.of food consumed}} \times 100$$

Data regarding all the parameters under study were recorded and analyzed through Duncans Multiple range test (STREEL and TORRIE, 1980).

Results and Discussion

Food Consumption

Data presented in table 1 indicate significant differences during entire larval life of

silkworm of *Bombyx mor*i L. The best food consumption (47.39 g/10 larvae) was recorded in treatment T2 where (Table 1), *Morus nigra* leaves were offered and this value was statistically independent when compared with rest test treatments. Maximum coefficient of utilization (64-56%) was recorded in treatment T2 where, *M. nigra* leaves were fed to silkworm larvae. While the lowest (49.68%) Coefficient of utilization was observed in treatment T0, where, *M. alba* leaves were offered. Our achievements also are in confirmity with the work of ALI and YOUNUS (1970) having coefficient of utilization 75%. Similar results were also obtained by El. SHAARAWY *et al*. (1977).

Table 1. Food consumption, coefficient of utilization and various yield parameters as affected by different treatments in *Bombyx mori* L.

	T0	T1	T2	T3	T4
Food consumption (g/10 larvae)	37.85e	38.97d	47.96a	41.96c	43.45b
Coefficient of tilization (%)	49.68e	52.00d	64.56a	59.52c	60.82b
Body weight (g/10 larvae) in fifth instar	41.66c	44.53bc	48.57a	45.01bc	46.72b
Body length (cm/larvae) in fifth instar	6.21d	6.31d	7.01a	6.59c	6.95b
Fresh green cocoon wt. with pupae (g/cocoon)	1.07c	1.10c	1.29a	1.18b	1.20b
Fresh green cocoon wt. with out pupae (g/shell)	0.27d	0.27d	0.31a	0.28c	0.29b
Egg production (nos.) per female of silkworm adult	304.67c	329.33c	177.33a	411.33b	429.67b

Means sharing similar letters are not significantly different by DMR test at P=0.05.

Weight gain after consuming the required amount of leaves was maximum (48.57g/10 larvae) in treatment T2 and was minimum (41.66 g/10 larvae) in treatment T0, where, *M. nigra* and *M. alba* leaves were fed, respectively.

Larval length was maximum in T2, while minium in T0. Our findings also confirme the work done by the El-SHAARAWY *et al*. (1977) as they found that fourth and fifth instar larvae were heavier than those of control, when fed on artificial diet. Our findings are in close contact with that of AKHTAR and ASGHAR (1972) who worked out an increased larval length when feeding was done on mulberry varieties. El-SHAARAWY *et al*. (1977) have also observed that larval length was influenced by the food given to larvae.

Silkworm larvae fed better on *M. nigra* leaves and spun heavier cocoon than all the test treatments. The maximum cocoon weight with and without pupa was 1.29 g/cocoon and 0.31 g/shell witnessed in T2, respectively. Our findings are close to that of SAMOKHVALOVA (1972) who found that quality of food had a profound effect on silk yield. SALEEM and HAQ (1984) confirmed our work by reporting good silk yield by feeding

different mulberry varieties to silkworm larvae. NASREEN *et al*. (1999) observed that cocoon production of *B. mori* raised on different hosts is positively correlated to their food consumed.

Egg production per female of silkworm adult in a close contest to that of SAMOKHVALOVA (1976), who revealed increased number of eggs in a batch, as compared with a diet consisting of one species of plant leaves only.

Keeping all the results recorded during the present experimentation in view it is concluded that mulberry variety *M. nigra* had a positive effect not only on the life processes of silkworm larvae but the silk yield too.

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