South Pacific Stusy Vol. 18, No. 2, 1998

Effects of Optimum Dosages of Nitrogen, Potassium, Calcium and Copper on Silkworm, *Bombyx mori* L. Development and Silk Yield

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Abstract

The role of mineral nutrients supplemented by mulberry leaves, after feeding to the silkworm larvae *Bombyx mori* was determined following completely randomized design with 6 treatments having three repeats. The differences were found to be significant among treatments. The treatment T5 i.e., 0.2 % N + 0.3 % K + 0.1% Ca + 0.05% Cu gave maximum food consumption (55.82 g/10 larvae) and coefficient of utilization (65.71%) on cumulative basis, maximum larval body weight (62.42 g/10 larvae), body length (7.667 cm/larva) and cocoon yield with (1.487 g/cocoon) and without pupa (0.2967 g/cocoon)

Key words: Pakistan, mineral nutrients, silkworm, silk yield

Introduction

Sericulture is one of the major labour intensive cottage industry, capable of significant contribution towards easing the problems of unemployment and improving the socio-economic status of the rural masses. There are about 5,500 silk looms in Pakistan and almost 62,000 people engaged in silkworm rearing, 3,000 in silk trade and reeling and more than 10,000 in weaving silk cotton (AHMAD and MUZAFFAR, 1987:6). Silkworm nutritionists have always been searching for better food by supplementing the mulberry leaves with different nutrients. Various minerals viz., 0.2% N (HAQ and SALEEM, 1985:4 & MAHMOOD, 1989:76), 0.3% K + 0.2% N (JAVAID, 1991:77), 0.1 Ca (MAQBOOL, 1991:79), 0.2% N + 0.1% Ca + 0.1% K (ISHTIAQ and AKHTAR, 1992:3), 0.2% N + 0.1% P + 0.1% K (AHMAD, 1993:76), 0.5% Ca + 0.1% N (HUSSAIN, 1993:75) reported to have good influence on silkworm survival and yield. Keeping the attempts of earlier workers in view, the present project was planned to determine the effect of optimum dosages of important nutrients in different combinations on the development of silkworm and on the silk yield.

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Materials and Methods

The eggs of silkworm, *Bombyx mori* L. were purchased from Forest Department, Faisalabad (Pakistan) in the month of February, 1995, placed in an incubator run at 24-27°C and 70-80% R.H. for hatching. Six treatments viz., mulberry leaves dipped in distilled water as a control (T0), in 0.2% N + 0.3% K and 0.1% Ca (T1), in 0.2% N + 0.3% K and 0.05% Cu (T2), in 0.3% K + 0.1% Ca and 0.05% Cu (T3), in 0.2% N + 0.1% Ca and 0.05% Cu (T4), in 0.2% N + 0.3% K, 0.1% Ca and in 0.05% Cu (T5) were designed in three repeats under CRD. The newly hatched 1st and 2nd instar larvae were fed on chopped mulberry leaves while full grown fresh leaves dipped in combinations of different minerals were offered to the later instars. Data on food consumption, coefficient of utilization, larval weight along with larval length and cocoon weight with and without pupa were recorded. The data were analysed statistically with IBM Compatible Computer using Mstat Package.

Results and Discussion

The results (Table 1) on cumulative food consumption indicates that maximum preference of the silkworm larvae to mulberry leaves was observed in T5, where most optimum combination of minerals was used, (i.e., 0.2% N + 0.3% K, 0.1% Ca and 0.05% Cu). Whereas, minimum food consumption was observed in T0, where mulberry leaves were dipped in distilled water. A number of research workers such as MAHMOOD (1989:76) and ISHTIAQ and AKHTAR (1982:3), have reported better food consumption from diet containing optimum mineral nutrients.

The food converted into body matter during the entire larval life confirms that the individuals, which were fed the mulberry leaves impregnated with a combination of optimum dozes of mineral nutrients (T5) were not only consumed to the maximum but were also converted maximum of it into body matter. The conclusions drawn by JAVAID (1991:77), ISHTIAQ and AKHTAR (1992:3) and HUSSAIN (1993:75) for better coefficient of utilization after feeding the silkworm larvae on artificial diet or mineral supplemented mulberry leaves are in confirmation to the present findings.

Body weight and body length are two important parameters of the life of silkworm and are ultimately dependent upon better food quality, rate of consumption and coefficient of utilization. During the present investigation, it has been observed that in case of maximum food consumption and coefficient of utilization (T5) the performance of the silkworm larvae in terms of body weight and length was also found maximum and it was only due to better food. The body weight during 5th instar thus recorded to be 62.47 g/10 larvae whereas, body length during 5th instar was 7.667 cm/larvae. These findings are in conformity with those of MAHMOOD (1989:76) who also recorded better body weight as well as

length after feeding mineral supplemented mulberry leaves.

The net outcome of the present studies is reflected in the form of better cocoon yield which again confirmed the outcome of previous workers like MAQBOOL (1991:79) and JAVAID (1991:77) who got the similar results after feeding the mulberry leaves impregnated with various minerals individually.

Keeping all the results presented here in view, it can be safely said that the individuals fed in T5 resulted not only in better food consumption, coefficient of utilization, and larval development but also produced heavier cocoons.

Table 1. Effect of minerals on the silkworm, *Bombyx mor*i L. development and cocoon yield

Treatments	Consumption g／10 larvae	Coefficient of utilization (%)	5th instar larval body weight／10 larvae (g)	Body length cm／larva	Fresh green cocoon weight with pupa (g)	Cocoon weight without pupa (g)
T0	40.19 b	49.72 c	49.65 b	6.81 b	1.265 e	0.1747 c
T1	53.89 a	61.84 b	61.35 a	7.59 a	1.377 d	0.2333 b
T2	54.33 a	64.37 ab	61.22 a	7.61 a	1.442 b	0.2933 a
T3	55.39 a	63.00 ab	62.41 a	7.57 a	1.380 d	0.2300 b
T4	55.60 a	63.25 ab	62.44 a	7.62 a	1.407 c	0.2300 b
T5	55.82 a	65.71 a	62.47 a	7.67 a	1.487 a	0.2967 a

Means sharing similar letters are not significantly different by DMR Test at P = 0.05.
Where;
T0 = mulberry leaves dipped in distilled water as check,
T1 = mulberry leaves dipped in 0.2% N + 0.3% K and 0.1% Ca,
T2 = mulberry leaves dipped in 0.2% N + 0.3% K and 0.05% Cu,
T3 = mulberry leaves dipped in 0.3% K + 0.1% Ca and 0.05% Cu,
T4 = mulberry leaves dipped in 0.2% N + 0.1% Ca and 0.05% Cu,
T5 = mulberry leaves dipped in 0.2% N + 0.3% K, 0.1% Ca and 0.05% Cu.

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(Accepted 8 December 1997)