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On

RECENT TRENDS IN AQUATIC AND TERRESTRIAL BIOLOGY

22nd April -2022

Organized by
P.G and Research Department of Zoology

CERTIFICATE

This is to certify that Prof. / Dr. / Mr. / Ms. / C. CHRISTA QUEENSLY, ASST. PROF. IN ZOOLOGY, MUSLIM ARTS COLLEGE - THIRUVITHANCODE. has participated / delivered an invited Lecture / presented a paper entitled Studies on the Growth and Economic Parameters of Silkworm B. Mori L. Fed with Riboflavin treated leaves. in the National Seminar on Recent Trends in Aquatic and Terrestrial Biology held on 22nd April 2022, organized by the P.G and Research Department of Zoology, Muslim Arts College, Thiruvithancode, Kanyakumari – 629174, Tamil Nadu, India.

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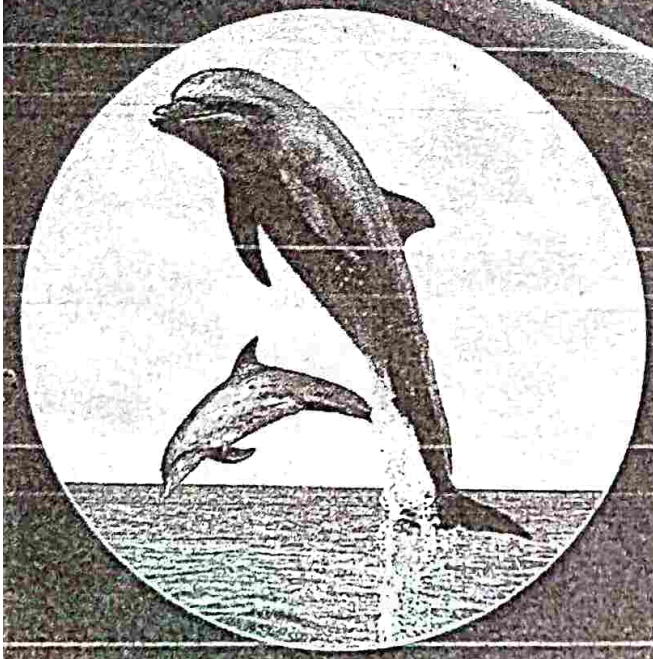

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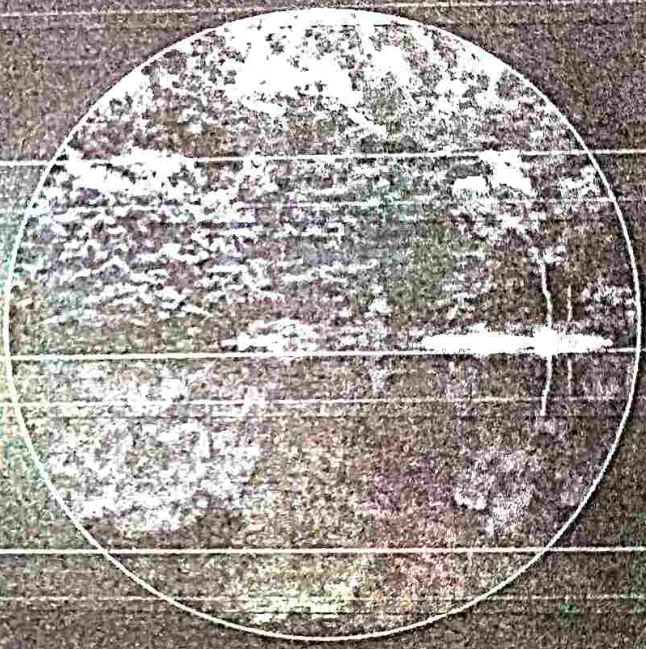

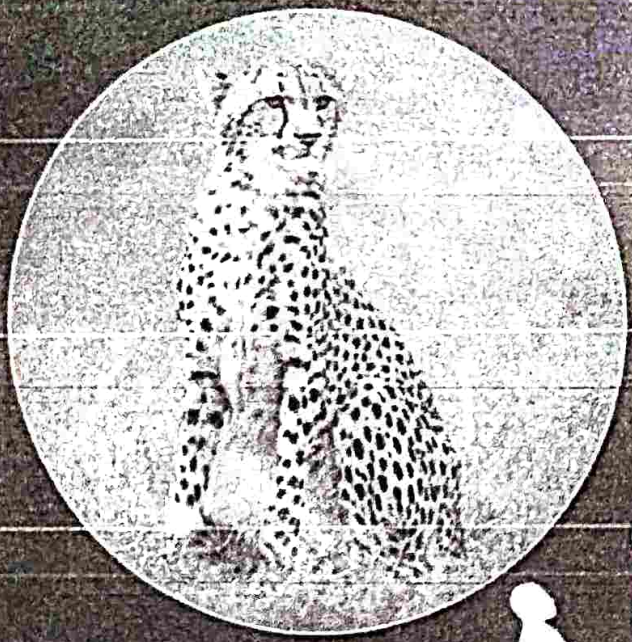

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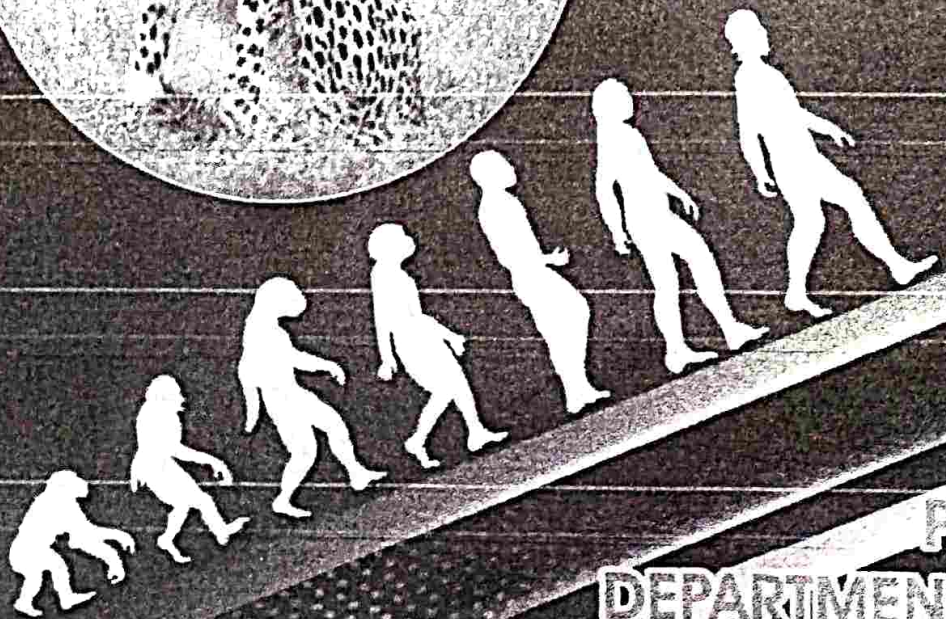

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STUDIES ON THE GROWTH AND ECONOMIC PARAMETERS OF SILKWORM *BOMBYX MORI* L. FED WITH RIBOFLAVIN TREATED MULBERRY LEAVES

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Abstract

Silkworm *Bombyx mori* is an important economic insect and also a tool to convert leaf protein into silk protein. This study was carried out to determine the growth and economic parameters of silkworm *Bombyx mori* (V^{th} instar larvae) fed by mulberry (*Morus alba*) leaves. The growth and Economic parameters like larval length, larval width, larval weight, percentage of mortality, cocooning percentage, cocoon weight, pupal weight, shell weight, and shell ratio. The Riboflavin were treated to throughout the V^{th} instar larval period. In the present study, it has been observed that the growth and economic parameters of *B. mori* enhanced by 1.0 % of Riboflavin treated group (T2) than control and other treated groups are 0.5% and 1.5%. This study has been indicated that the Riboflavin exhibits the presence of more growth stimulant activity and can be used to increase the silk yield in commercial silkworm rearing with reference to sericulture.

Keywords: *Bombyx mori*, *Morus alba*, Riboflavin, Feed Efficacy, Silkworm

Introduction

The silkworm, *Bombyx mori*, is a monophagous lepidopteron insect which has been domesticated for more than five thousand years. Mulberry leaves suitable as food for silkworms must contain several chemical constituents such as water (80%), proteins (27%) and carbohydrates (11%), other extracts, mineral matters, vitamins etc. and at the same time, they must have the favourable physical features such as suitable tenderness, thickness and tightness, in order to be eaten by silkworms easily (Koul, 1989). Mulberry leaf is the sole food and source of nutrition for the silkworm, Bombyx mori due to the presence of morin (Tribhuwan and Mathur, 1989). Legay, (1958) has stated that silk production is dependent on the larval nutrition and nutritive value of mulberry leaves plays a very effective role in producing good quality cocoons.

Materials and Methods

Silkworm Rearing: The first day of V instar of popular Indian silkworm *Bombyx mori* race were collected from Silkworm Culture Centre. The larvae were reared simultaneously both in control and experimental groups separately on mulberry leaves dipped in Riboflavin (0.5%), (1.0%), and (1.5%) solution in the laboratory.

Economic Traits

The economic parameters like cocoon parameters (cocooning percentage, pupal weight, cocoon weight, shell weight and shell ratio) were measured by using appropriate and formulas and digital balance, the other economic traits like shell ratio, larval length, larval width, larval weight and percentage of mortality were calculated by following appropriate and formulas scales. The economic traits were analyzed the control and Riboflavin treated groups.

Cocooning Percentage (CP) was calculated by following formula (Evans, 1939)

$$CP = \frac{\text{Number of cocoons formed}}{\text{Total number of larvae kept for rearing}} \times 100$$

Shell weight (SW) and Shell Ratio (SR)

Average shell weight of 6 cocoons, selected randomly from control and B-complex vitamins treated groups (Pupae were removed from cocoons and only shell was weighed). Shell Ratio (SR) was calculated by following formula (Evans, 1939)

$$SR = \frac{\text{Weight of cocoon shell}}{\text{Weight of whole cocoon}} \times 100$$

Results

Growth parameters like larval length, larval width, and larval weight data of control and different concentrations of Riboflavin treated mulberry leaves fed *B. mori* were presented in Table 1. Table 1 shows that the larval length of control and Riboflavin treated mulberry leaves fed V^{th} instar

larvae control (7.36±0.20) and (7.54±0.30, 8.09±0.29 and 7.42±0.26) in 0.5, 1.0 and 1.5 % respectively. In these four concentrations, the 1.0% concentration Riboflavin treated larvae larval length was significantly increased than the other three groups. The larval width of control and Riboflavin treated mulberry leaves fed Vth instar larvae were (0.71±0.07) in control and , (0.82±0.18, 0.90±0.09 and 0.07±0.08), at 0.5%,1.0% and 1.5% concentration respectively. In these four concentrations, the 1.0% concentration Riboflavin treated larvae, the larval width was significantly increased than the other three groups

The larval weight of control (3.62±0.19), and (4.02±0.33, 4.82±0.29 and 3.6±0.25) at 0.5%, 1.0%, 1.5% concentration respectively. The percentage of mortality in control concentration was (90%), and the highest mortality was recorded in 1.5% concentration of experimental group larvae.

Economic parameters like Cocooning Percentage (CP), cocoon weight, pupal weight, Shell Weight (SW), and Shell Ratio (SR), data of control mulberry leaves and different concentrations of Riboflavin, treated mulberry leaves fed *B. mori* larvae produced cocoon were presented in Table 2. Overall economic parameters the maximum values were obtained in 1.0% concentration of riboflavin treated group larvae than compared to control group larvae.

Table. 1. Growth parameter of Vth instar larvae of *Bombyx mori* fed with control and riboflavin treated mulberry leaves.

Concentration %	Larval length (cm)	Larval width (cm)	Larval weight (gm)	Percentage of mortality
Control	7.36±0.20	0.71±0.07	3.62±0.19	90
0.5%	7.54±0.30 (2.39)	0.82±0.18 (13.41)	4.02±0.33 (9.95)	93 (3.22)
1.0%	8.09±0.29 (9.02)	0.90±0.09 (21.11)	4.82±0.29 (24.90)	97 (7.21)
1.5%	7.42±0.26 (0.81)	0.07±0.08 (-914.28)	3.6±0.25 (-0.55)	91 (1.10)

Table. 2. Economic parameter of Vth instar larvae of *Bombyx mori* fed with control and riboflavin treated mulberry leaves.

Concentration	Cocooning percentage (%)	Cocoon weight (gm)	Pupal weight (gm)	Shell weight (gm)	Shell ratio (%)
Control	86.09±0.42	1.47±0.02	2.94±0.52	0.86±0.08	20.92±0.23
0.5%	87.86±0.64 (2.01)	1.92±0.16 (23.43)	3.23±0.26 (8.98)	0.98±0.09 (12.24)	21.09±0.49 (0.81)
1.0%	89.23±0.93 (38.15)	1.98±0.18 (25.76)	3.92±0.23 (25)	1.23±0.24 (30.08)	22.14±1.42 (5.51)
1.5%	86.92±0.93 (0.95)	1.52±0.10 (3.29)	3.02±0.12 (2.65)	0.94±0.29 (8.51)	21.42±0.72 (2.33)

Discussion

In the present study, growth and economic parameters are significantly increased in some groups. Many researchers showed that the larval characters improve by different concentrations of supplementary compounds such as ascorbic acid, folic acid, thiamin (Sarker *et al.*, 1993; Nirwani and Kaliwal, 1996, Etebari *et al.*, 2004). According to Soo-Hoo and Frankel, (1966) the diminishing consumption rate of less preferred food was partially compensated by increased assimilation efficiency. Ashfaq *et al.* (2001) have mentioned that silkworm fed with M. nigra showed high food consumption, coefficient of nutrition utilization, larval size, larval weight and cocoon weight that may provide important factors for increasing silk tenacity and elongation. According to Mathavan and Krishnan, (1976) assimilation efficiency did not vary significantly as a function of reduced food consumption. The growth and development of silkworm is under the continuous influence of factors operating within and outside of the body (Murugan *et al.*, 1998).

Conclusion

In the present study to be concluded that growth and economic parameters of *Bombyx mori*. L was comparatively more when the silkworm fed with 1.0 % of riboflavin treated mulberry leave than the control and other treated groups such as 0.5% and 1.5%.

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