IJFANS INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 11,Iss 11 , 2022

Studies on effect of fortification of seriboost on mulberry and silkworm, *Bombyx mori* L.

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Abstract

The present study was undertaken to know the effect of micronutrient, seriboost on mulberry and cocoon characters of silkworm, *Bombyx mori* L. The mulberry leaves were sprayed with seriboost in different concentrations (2%,5% and 10%) and feeding them to the silkworms. Among these three concentrations tested, it was observed that the 5% registered higher yield parameters in mulberry and cocoon characters in *B.mori* followed by 10% , 2% and control batches.

Key words: *Bombyx mori*, seriboost, mulberry growth, cocoon parameters.

Introduction

Mulberry (*Morus alba* L.) is a fast growing and high biomass producing woody plant. Mulberry leaf is a sole source of food for silkworm. Production of good cocoon crops necessitates production of superior quality mulberry leaves (Vijaya *et al*.,2009). Nearly 70 percent of the silk produced by silkworm is directly derived from proteins of mulberry leaves. Hence, silkworm should be fed with good quality mulberry leaves in abundant quantity for the successful cocoon production (Islam 2023).

The leaf yield and quality of mulberry depends on the soil types and availability of plant nutrients. Application of manures and fertilizers is one of the important inputs for increasing mulberry leaf yield (Adeduntan 2003). Foliar application of nutrients is widely employed to improve the yield, and quality of leaves, will boost up mulberry productivity (Bongale 2001). Zinc fortified mulberry leaves increases the quality parameters of cocoon (Wani *et al*.,2018 and Nithya *et al*., 2018). Micronutrients in combination significantly influenced the cocoon characteristics (Devi and Yellamma 2013 and Geetha *et al*.,2016). In view of these , the present study was undertaken to know the effect of micronutrient seriboost on mulberry yield and cocoon parameters.

Materials and Methods

The experiment was conducted at department of Zoology, Muslim Arts College, Thiruvithancode. MR_2 mulberry variety was used in the study, cultivated under irrigated conditions in Randomized Block Design (RBD) with four treatments, including control, each comprising five replications.

Preparation and spraying of micronutrient

Seriboost is a multinutrient (zinc, iron, manganese and boron) formulation used as foliar spray containing all necessary nutrients in a balanced proportion, procured from Central Silk Board, Mysore. Three concentrations (2%,5% and 10%) were prepared by using distilled water. Foliar spray to mulberry plants was done twice during the morning hours of the day. One spray 20 days after pruning and another spray after an interval of 10 days.

Silkworm rearing and experimental design

Silkworm larvae at third instars (PM× CSR_2) were purchased from Sericulture Centre, Konam, Nagercoil. About 100 larvae/ replication (four batches) were maintained as follows

Batch 1-Control

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 11,Iss 11 , 2022

Batch II-2% seriboost

Batch III -5% seriboost

Batch IV- 10% seriboost

The larvae fed four times daily with healthy leaves until cocoon spinning. Cocoons were collected on the 6th day of mounting and assessed for commercial parameters.

Observations recorded

Mulberry growth and cocoon parameters

For each parameter five plants per treatment per replication were taken and average calculated. Height of the plant (cm), number of shoots/plant, number of leaves per plant and weight of leaves (mg) were measured and recorded.Matured larval weight, cocoon weight and shell weight were measured and recorded. Shell ratio was calculated by using the following formula

$$\text{Shell ratio} = \frac{\text{Cocoon weight}}{\text{Shell weight}} \times 100$$

Results

Mulberry growth parameters such as longest branch length, number of shoots per plant, number and weight of leaves are presented in Tables 1 and 2. The longest plant (79.35±1.46 cm) was recorded in 5% seriboost treated mulberry (Fig.1). Maximum nuber of shoots (18.48±1.78) also observed in the same treated plants than control (12.29±1.12) and other treatments (Fig.2) Maximum number (192.00±12.16) and weight (3.10±0.12g) of leaves were recorded at 5% seriboost treated groups (Figs.3 and 4).

Table 3 shows the influence of seriboost on larval weight and cocoon parameters. Larval weight (16.56 percent) was increased when larvae fed with foliar spray seriboost (5% Seriboost), when compared to control (328±10.02mg) (Fig.5). Cocoon weight in control was 1150.14mg, which increased to 1200.14mg by foliar application of seriboost at 5%. Shell weight (200.16±2.32mg) and shell ratio(16.66%) increased maximum in 5% seriboost treated groups than the corresponding controls (180.20mg and 15.65% respectively) (Fig.6).

Discussion

Mulberry has the capacity to absorb nutrients much more effectively and quicker through leaf, owing to comparatively larger area when supplied through foliar spray. Seriboost foliar spray to mulberry leaves has helped in improving the nutrient contents of mulberry inturn to provide the required nutrients for better growth of the silkworm leading to improve qualitative and quantitative cocoon production. In the present study, all growth parameters of mulberry such as length and number of shoots increased when seriboost was applied to the mulberry plant. This work was in agreement with Ahmed *et al.* (2018) who studied the effect of urea fertilization on growth characters of mulberry. They reported that foliar spray sustain high mulberry productivity without addition of any extra fertilizer elements over the existing recommendation. In the study, three concentrations of seriboost (2%,5% and 10%) were used. Out of these three concentrations, 5% concentration increased the height of the plant and number of shoots. According to Rani *et al.* (2016) combined spray of micronutrients such as, calcium and magnesium (0.4% ca + 0.2% mg) had significant influence on the yield parameters of mulberry than other treatments and control. Singhvi *et al*.(2007) studied the effect of foliar application of agrobloom (0.3%) on leaf production in mulberry. Leaf weight considered as a more precise index for yield assessment, as leaf to cocoon ratio is calculated by weight (Dandin and Kumar 1989) In the present study, leaf length and weight were increased in 5% seriboost application. The present study report was in accordance with Singhvi *et al*.(2001) who have reported that 15.17% leaf yield was increased by the foliar application of salicylic acid in mulberry.

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Foliar spray micronutrient showed better results for larval weight and cocoon characters. When *B.mori* larvae fed with mulberry leaves treated with different concentrations of foliar spray seriboost increased the larval weight and cocoon productivity in *B.mori* . Maximum increase was recorded with 5% seriboost followed by 10% , 2% and control. Maximum larval weight (380.14±4.86 mg) was observed at 5% seriboost treated group as per Murugesh *et al* .(2020).They studied the effect of fortifying the mulberry leaves with minerals such as, zinc sulphate, magnesium sulphate and potassium chloride at different concentrations (10,25,50,100 and 200ppm) and feeding them to the silkworm, *B.mori* on the cocoon yield. Among the five concentrations tested, they observed that the zinc sulphate at 100 ppm, magnesium sulphate at 200 ppm and potassium chloride 100 at ppm registered significantly higher mature larval weight, cocoon weight, shell weight and shell ratio than the other treatments and control.The present study was also in agreement with Singhvi *et al.* (2001), and (2007). They studied the influence of foliar application of seriboost and agroboom respectively on mulberry yield , quality and cocoon productivity .

Conclusion

It is clearly concluded that foliar application of seriboost at 5 % concentration on mulberry was an effective treatment for growth and productivity of mulberry and it is also able to enhance the cocoon productivity.

Table-1

Effect of foliar spray seriboost on growth of mulberry

Parameters / Treatments (%)	Height of the plant (cm)	Number of shoots/plant
Control	62.00±1.67	12.30 ±1.12
2.00	76.50 ±1.32 (23.38)	15.27± 1.20 (24.15)
5.00	79.35± 1.46 (27.98)	18.48± 1.78 (50.24)
10.00	77.30 ±1.46 (24.67)	16.00± 1.08 (30.08)

Note: Percent change over control values in parentheses

Fig-1 Effect of seriboost on height of the plant (cm)

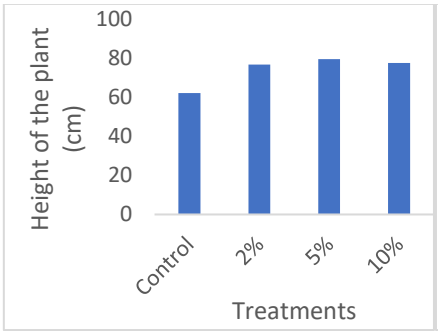
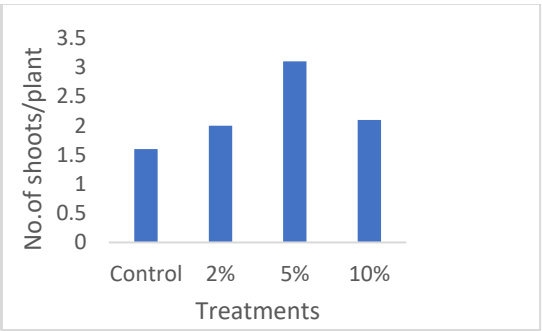


Fig-2 Effect of seriboost on no.of shoots/plant



ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 11,Iss 11 , 2022

Table-2

Effect of foliar spray seriboost on yield of mulberry

Parameters / Treatments (%)	Number of leaves	Weight of leaves (g)
Control	150.40 ±10.46	1.60 ±0.04
2.00	180.00± 17.42 (20.00)	2.00± 0.86 (25.00)
5.00	192.00± 12.16 (28.00)	3.10± 0.12 (93.75)
10.00	182.06± 15.4 (21.28)	2.10± 0.49 (31.25)

Note: Percent change over control values in parentheses

Fig-3 Effect of seriboost on no.of leaves / plant

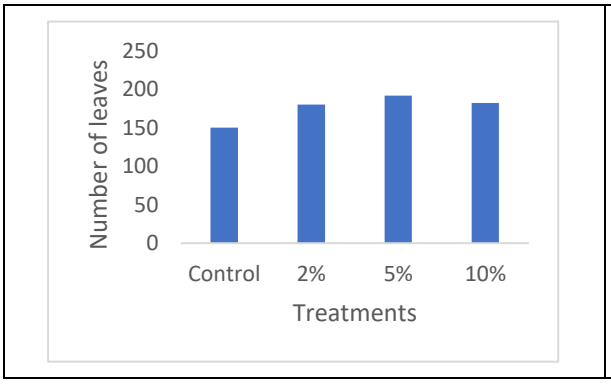


Fig-4 Effect of seriboost on weight of leaves (g)

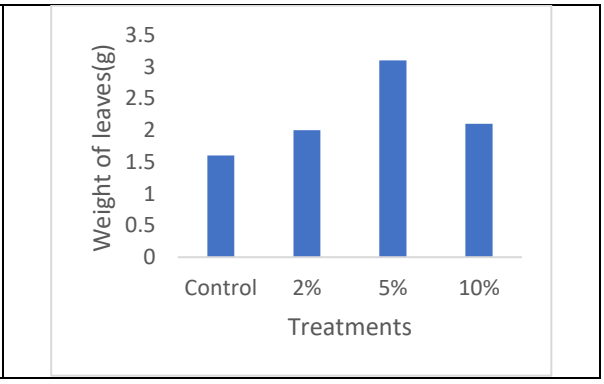


Table-3

Effect of foliar spray seriboost on larval weight and cocoon parameters of *B.mori*

Parameters / Treatments(%)	Larval weight (mg)	Cocoon weight (mg)	Shell weight (mg)	Shell ratio (%)
Control	328.15 ±10.02	1150.14± 18.46	180.20± 1.52	15.65± 0.42
2.00	370.21± 9.47 (13.49)	1180.29 ±24.91 (2.62)	190.16± 1.76 (5.56)	16.10 ±0.018 (2.88)
2.5	380.14± 4.86 (16.56)	1200.18± 86.14 (4.35)	200.16± 2.32 (11.11)	16.66± 0.21 (6.45)
3.00	375.26± 8.16 (15.03)	1190.46± 28.32 (3.47)	195.52± 4.16 (8.33)	16.38± 0.34 (4.66)

Note:Percent change over control values in parentheses

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 11,Iss 11 , 2022

Fig-5 Effect of seriboost on *B.mori* larval weight (mg)

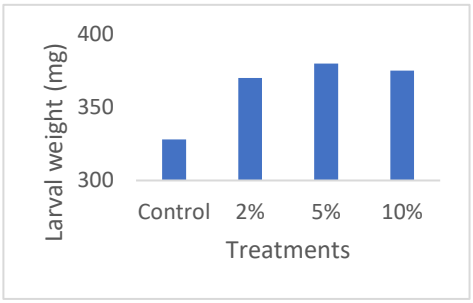
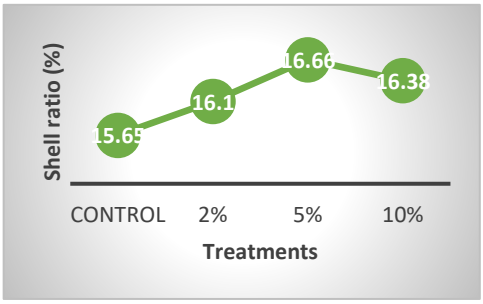


Fig-6 Effect of seriboost on shell ratio of *B.mori*



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