EFFECT OF FOLIAR SPRAY SERIBOOST ON MULBERRY LEAF YIELD AND COCOON PARAMETERS OF SILKWORM, BOMBYX MORI L.

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Abstract

The study was undertaken to improve the growth and biochemical contents of mulberry and cocoon productivity through foliar application of seriboost at 2,2.5 and 3% concentration on mulberry MR_2 variety. Results revealed that among all experimental concentrations 2.5% was performed well in respect of growth and biochemical contents of leaves and cocoon parameters. Highest shoot length, number of shoots, leaf weight, number of leaves, protein, carbohydrate, chlorophyll and moisture content in leaves and cocoon parameters in B.mori were recorded maximum at 2.5% seriboost followed by 3%, 2% and control batches.

Key words: Seriboost, mulberry growth, pigments, biochemical, cocoon parameters.

Introduction

Mulberry (Morus sp.) is a deep rooted high biomass producing foliage crop cultivated as a sole food for silkworm, Bombyx mori L. The silk produced by the silkworm are directly derived from protein of mulberry leaves. Feeding of quality mulberry leaf is one of the important pre-requisite for producing of quality cocoons (Juyal et al., 2003 and Vijaya et al.,2009) and hence cultivation of mulberry with proper nutrient management is important. The soil application of fertilizers is a common practice in various crops including mulberry, but such application has certain disadvantages including their high cost and less nutrient uptake in rainfed conditions. Hence, an alternative approach is necessary for the purpose of enhancing mulberry production without causing the substantial damage to the ecosystem.

Foliar application in right time (Narahari et al., 1997) is an admirable way of supplying instant nutrient to the plants for quick boost and is very effective in improving the leaf quality ,which is an important for the optimum growth and development of silkworm. B.mori (Bose et al.,1994 and Singhal et al., 1999) . Foliar application of micronutrients improved mulberry leaf yield (Lokanath and Shivashankar 1986) ultimately cocoon yield (Vishwanath and Krishnamurthy 1982). Several workers have reported the improved nutritive parameters like protein, sugar, chlorophyll contents through foliar application of nutrients (Das et al.,2003., Dhiraj and Kumar 2011., Rani et al.,2016 and Wani et al.,2017). Considering the importance of foliar application, a study was conducted to know the effect of seriboost through foliar application on quality leaf production as well as silkworm cocoon production.

Materials and Methods

A study was conducted at PG and Research Centre, Muslim Arts College, Thiruvithancode . The V_1 mulberry was chosen as the test crop. The variety was planted at 60 cmx60cm spacing in a Randomized Block Design with four treatments each comprising five replications under irrigated condition.

Preparation of spray formulations

Seriboost was purchased from Central Sericultural Research and Training Institute, Mysore. It is a liquid plant growth promotor containing zinc, iron, manganese and boron. The formulations (2%,2.5% and 3%) were prepared by using distilled water.

Spraying of formulations

Foliar spray of liquid formulations was done twice. One 20 days after pruning and another after an interval of 10 days. The formulations were sprayed during the morning hours of the day.

Silkworm rearing

Silkworm larvae at third instars ($PMxCSR_2$) were purchased from Sericulture Centre, Konam, Nagercoil About 100 larvae/replication (four batches) were maintained as follows .

Batch 1-Control

Batch II- 2% Seriboost

Batch III-2.5% Seriboost

Batch IV- 3% Seriboost

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

Observations recorded

Mulberry growth parameters

For each parameter five plants per treatment per replication were taken and average calculated. Height of the plant (cm), number of shoots/ plant, internodal distance (cm), number of leaves per plant and weight of leaves (mg) were measured and recorded.

Mulberry leaf samples were collected, shade dried and ground into powder for chemo-assay. The leaves obtained from different treatments were used for estimation of biochemical constituents following standard procedures.

Protein content (mg/g) of the leaf was estimated following the procedure of Lowry et al. (1951). Total carbohydrate (mg/g) content of the leaf was estimated following the method of Dubios et al. (1956).

Leaf moisture (%) Moisture content of the leaf was estimated through gravimetric method by taking the difference between fresh and dry weight**.**

chlorophyll (mg/g). Chlorophyll ‘a’, ‘b’ and total chlorophyll were computed using the standard formulae

Observations were also recorded on mean matured larval weight, Cocoon weight and Shell weight. Ten cocoon were randomly selected after 6 days of spinning for each treatment, replication- wise and weighed on sensitive balance. After weighing the cocoons, they were cut open to remove the pupae and exuvae and the shells were weighed and recorded. Shell ratio (%) was also calculated and recorded.

Results

Plant growth parameters

Results pertaining to growth namely, height (longest branch length), number of shoots per plant, internodal distance(cm), number and weight of leaves are presented in Tables 1 and 2. The longest plant (78.46±1.32cm) was recorded in 2.5% seriboost treated mulberry. Maximum number of shoots (16.84±1.80) also observed in 2.5% treated plants than control (12.29±1.12) and other treatments. Minimum intermodal distance (5.25±0.06cm) at 2.5% was observed.

Biochemical contents of mulberry

Significantly increased protein(0.628±0.009mg/g) and carbohydrate (0.648±0.007mg/g) was noted in 2.5 ml concentration of seriboost treated leaves when compared to respective controls (0.406and 0.461mg/g) (Table3). Foliar treatment exerted significance influence on chlorophyll content. The highest clorophyll 'a' (49.40 percent) chlorophyll 'b' (64.63percent) and total chlorophyll (55.40 percent), was recorded at 2.5% seriboost, when compared to respective controls (Table 4). Results indicated that leaf moisture did not show significant variation. Highest moisture content (74.16%) was observed in 2.5% seriboost treated plant (Table3). Table 5 shows the influence of seriboost on larval weight and cocoon parameters. Larval weight (16.56 percent) was increased when larvae were treated with foliar spray seriboost (2.5%) when compared to control (328±10.02 mg). Cocoon weight in control was 1150.14 mg, which increased to 1190.81 mg by foliar application of seriboost at 2.5%. Same trend was noticed in the case of shell weight and shell ratio.

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 and leaf yield increased when foliar spray seriboost was applied to the mulberry plant. This work was in agreement with Kar et al. (2017) who studied the effect of foliar supplementation of nutrient – composite on growth characters of mulberry. They reported that nutrient- composite sustain high mulberry productivity of the variety C- 2038 over the years without addition of any extra fertilizer elements to the soil over the existing recommendation. In the present study, three concentrations of seriboost (2%,2.5% and 3%) were used. Out of these three concentrations, 2.5% 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.

Present investigation revealed that 2.5% seriboost foliar treatment recorded maximum leaf moisture content (74.16%). The increased in leaf moisture content might be due to seriboost which steadily supplied moisture directly to the leaf. This finding is in correlation with Bose et al. (1995) who observed highest moisture content (74.44%) of mulberry leaf when molybdenum given as foliar spray at 2.5kg/ha/yr. As per Shivanshankar (2015), the moisture content in V_1 mulberry leaf is influenced by foliar spray of Paras. The colored pigment chlorophyll also increased when mulberry was treated with foliar spray seriboost. The increased amount of chlorophyll content in leaves indicates the photosynthetic efficiency , thus it can be used as one of the criteria for quantifying photosynthetic rate in mulberry. These observations show similarity with the findings of Mohan et al. (2003) who opined that spraying ccc from 5-10ppm in mulberry improved chlorophyll in leaf. Sudhakar et al. (2011) reported that foliar application of 7% vermiwash on V_1 mulberry along with soil application of NPK and biofertilizer significantly increased the level of total clorophyll.

Increase in carbohydrate and protein content in mulberry can be attributed to nutrient composition of seriboost. The present results are in close conformity with the findings of Prasanna kumar et al. (2001) who observed the ' green leaf' foliar spray at 5ml/lit on M_5 and V_1 mulberry enhanced the biochemical contents. Foliar spray of urea (Qaiyyum et al., 1991), potassium chloride (Das et

al.,2003), spirulina , soyabean and vermiwash (Kumar and Kumar. ,2014) and amino acid formulations (Deepa et al., 2020) recorded maximum biochemical parameters such as protein, carbohydrate, total sugar and starch.

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 2.5% seriboost followed by 3% , 2% and control. Maximum larval weight (380 mg) was observed at 2.5% seriboost treated group as per Vijaya et al .(2009).The present study was in agreement with Singhvi et al. (2001), and (2007) . They studied the influence of foliar application of seriboost and agrobloom respectively on mulberry yield , quality and cocoon productivity . Thus quality mulberry leaf is a single factor which contribute about 38.2% for the succes of silkworm crop production (Miyashiter 1986).

Conclusion

It is clearly concluded that foliar application of seriboost at 2.5 % concentration on mulberry was an effective treatment for growth and productivity of mulberry and it is also able to enhance biochemical constituent of mulberry without causing substanied loss to ecosystem, which inturn enhanced the cocoon productivity.

Table-1

Influence of foliar spray seriboost on growth of mulberry

Parameters / Treatments(%)	Height of the plant (cm)	Number of shoots / plant (cm)	Internodal distance (cm)
Control	62.95±1.67	12.29 ±1.12	7.30± 1.84
2.00	76.40 ±1.32 (21.37)	14.27± 1.20 (16.11)	6.29± 1.16 (-13.84)
2.5	78.46± 1.68 (24.64)	16.84± 1.80 (37.02)	5.25 ±0.06 (-39.05)
3.00	77.34 ±1.46 (22.86)	15.00± 1.08 (22.05)	6.26 ±1.18 (-14.25)

Note: Percent change over control values in parentheses

Table-2

Influence of foliar spray seriboost on yield of mulberry

Parameters / Treatments (%)	Number of leaves (gm)	Weight of leaves (cm)
Control	150.40 ±10.46	1.60 ±0.04
2.00	180.00± 17.42 (20.00)	2.00± 0.86 (25.00)
2.5	187.00± 18.16 (24.67)	2.15± 0.16 (34.38)
3.00	185.06± 15.4 (23.33)	2.12± 0.49 (32.50)

Note: Percent change over control values in parentheses

Table-3

Influence of foliar spray seriboost on biochemical content of mulberry

Parameters / Treatments (%)	Protein content (mg/g)	Carbohydrate content (mg/g)	Leaf moisture (%)
Control	0.406± 0.001	0.461± 0.003	69.50 ±1.86
2.00	0.516± 0.002 (27.09)	0.572± 0.009 (24.08)	72.18± 1.16 (3.86)
2.5	0.628± 0.007 (64.68)	0.648± 0.007 (40.56)	74.16± 1.36 (6.71)
3.00	0.521± 0.005 (28.33)	0.532± 0.005 (15.40)	2.91± 1.43 (4.91)

Note: Percent change over control values in parentheses

Table-4

Influence of foliar spray seriboost on chlorophyll content of mulberry

Parameters / Treatments (%)	Chlorophyll 'a' (mg/g)	Chlorophyll 'b' (mg/g)	Total Chlorophyll (mg/g)
Control	2.53± 0.04	1.64± 0.03	4.17± 0.06
2.00	3.00± 0.07 (18.58)	2.16± 0.02 (31.71)	5.16± 0.04 (23.74)
2.5	3.78± 0.09 (49.40)	2.70± 0.08 (64.63)	6.48± 0.09 (55.40)
3.00	3.58± 0.02 (41.50)	2.20± 0.06 (34.15)	5.78± 0.08 (38.61)

Note: Percent change over control values in parentheses

Table-5

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

Parameters / Treatments(%)	Cocoon weight (mg)	Shell weight (mg)	Shell ratio (%)	Larval weight (mg)
Control	1150.14± 18.46	180.20± 1.52	15.65± 0.42	328.15 ±10.02
2.00	1160.29 ±24.91 (0.87)	190.16± 1.76 (5.56)	16.37 ±0.018 (4.60)	370.21± 9.47 (13.49)
2.5	1190.81± 86.14 (3.48)	200.16± 2.32 (11.11)	16.81± 0.21 (7.41)	380.14± 4.86 (16.56)
3.00	1180.46± 28.32 (2.61)	195.52± 4.16 (8.33)	16.52± 0.34 (55.59)	375.26± 8.16 (15.03)

Note:Percent change over control in parentheses

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