



E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2020; 9(4): 756-759
Received: 19-04-2020
Accepted: 22-05-2020

Deepa KB

Department of Sericulture, UAS
GKVK, Bengaluru, Karnataka,
India

Fathima sadatulla

Department of Sericulture, UAS
GKVK, Bengaluru, Karnataka,
India

Divyashree HJ

Department of Sericulture, UAS
GKVK, Bengaluru, Karnataka,
India

Vishaka GV

Department of Sericulture, UAS
GKVK, Bengaluru, Karnataka,
India

Nithya BN

Department of Sericulture, UAS
GKVK, Bengaluru, Karnataka,
India

Nithin kumar DM

Department of Sericulture, UAS
GKVK, Bengaluru, Karnataka,
India

Corresponding Author:**Deepa KB**

Department of Sericulture, UAS
GKVK, Bengaluru, Karnataka,
India

Effect of Amino acid formulation as foliar spray on biochemical constituents of V-1 mulberry variety

Deepa KB, Fathima sadatulla, Divyashree HJ, Vishaka GV, Nithya BN and Nithin kumar DM

Abstract

A study on "Effect of Amino acid formulation as foliar spray on biochemical constituents of V-1 mulberry variety was conducted by utilizing the established V-1 mulberry garden at department of Sericulture, UAS, G.K.V.K., Bengaluru during 2016-17. Spraying of 3.5 % amino⁺ spray on 25th and 35th day after pruning recorded maximum biochemical parameters of V-1 mulberry such as leaf moisture, carbohydrates and protein content (74.7, 25.76 and 23.48 per cent respectively) chlorophyll (33.23), nitrogen (3.76 %), phosphorous (0.46 %), potassium (1.53 %), calcium (1.69 %), magnesium (0.57 %), sulphur (0.49 %) and zinc (22.75 ppm) contents recorded significantly high in 3.5 % amino⁺ spray on 25th and 35th day after pruning. The details are discussed.

Keywords: Foliar spray, Amino acid formulation, bio chemical constituents

Introduction

The mulberry leaf quality plays a vital role in healthy growth of silkworm and the economic traits such as larval, cocoon and grainage parameters which are influenced largely by the nutritional status of the leaves fed to silkworm (Krishnaswami *et al.*, 1971) [4]. Hence, nutrition of silkworm, *Bombyx mori* L. is of primary importance as the cocoon production is directly influenced by the nutritive status of mulberry leaves. Since sericulture involves both crop and animal husbandry, the crop management on scientific lines should be an approach to provide an environment to silkworm to express the inherent capacities to produce what it can. Foliar feeding is a way of supplementing the nutrients quickly and specifically and also for stimulation of plant metabolism. Foliar fertilization has been used as a means of supplying supplemental doses of major and minor nutrients, plant hormones, stimulants and other beneficial substances. The plant nutrients which are absorbed through roots can also be absorbed with equal efficacy through foliage (Del, 1971) [2] and often several times more efficiently than from soil treatments (Sastry and Appajirao, 1958) [8].

Materials and methods

The field experiment was conducted at the Department of Sericulture, G.K.V.K., UAS, Bengaluru during 2016-17. The experiment was laid out in Randomized Complete Block Design with 10 treatments and three replications. The experiment consisted of foliar application of amino acids (amino⁺) in different concentration at different intervals. The treatment were as follow.

T1 -Absolute control (No POP)

T2- POP + Water spray

T3 -POP + 2.0 % amino + at 25th DAP and 35th DAP

T4- POP+ 2.5 % amino + at 25th DAP and 35th DAP

T5 -POP+ 3.0 % amino + at 25th DAP and 35th DAP

T6- POP+ 3.5 % amino + at 25th DAP and 35th DAP

T7 -POP + 2.0 % amino + at 25th DAP and 35th DAP

T8 -POP + 2.5 % amino + at 25th DAP and 35th DAP

T9- POP+ 3.0 % amino + at 25th DAP and 35th DAP

T10- POP + 3.5 % amino + at 25th DAP and 35th DAP

*DAP- Days after pruning

* POP- package of practice recommended dose of NPK at the rate of 350:140:140 kg/ ha/ year and FYM at the rate of 20 MT/ha/year was applied.

Amino acid formulation Amino+ used as a foliar spray applied at different concentration at different intervals. Amino+ is a liquid organic plant growth promoter containing 16 free bio available and biodegradable amino acids, it is compatible with all commonly used agro chemicals. Amino+ is neither toxic nor harmful and non-phototoxic. It is suitable for all agro-climatic zones. It contains total dissolved solids 30-33 %, hydrolysed protein 9-11 %, hydrolyzed carbohydrates 6-7 %, amino nitrogen 3.5-4 %. Amino acids which increase the endogenous plant hormones or inhibit some endogenous hormones e.g., auxins, cytokinins etc., inhibit the negative hormone like abscisic acid, ethylene etc.

Results and Discussion

Mulberry has the capacity to absorb nutrients much more effectively and quicker through leaf, owing to comparatively larger leaf area when supplied through foliar spray. Amino acid foliar spray to mulberry leaves has helped in improving the nutrient content of mulberry, in turn to provide the required nutrients for better growth of the silkworm leading to improved qualitative and quantitative cocoon production. This work is the first of its kind because there is no available literature pertaining to the use of amino acid foliar spray. This being the case, mulberry raised with foliar spray of different concentrations of amino+ showed marked variation with respect to quality parameters of leaf viz., moisture content, chlorophyll, carbohydrate, protein, N, P, K, Ca, Mg, S and Zn current topic is discussed in the light of related findings under the following headings.

Moisture content of leaf

Leaf moisture percentage of V-1 mulberry differed significantly among the treatments (Table 1). The mulberry plot treated with 3.5 % amino+ spray on 25th and 35th day after pruning (T6) recorded maximum leaf moisture content of 74.74 % per cent whereas lowest moisture content of 68.77 per cent was registered in T1. The increased in leaf moisture content might due to foliar spray of amino+ which steadily supplied moisture directly to the leaf thereby increasing the moisture content in leaf. The present findings are in conformity with Bose *et al.* (1995) [1] who observed highest moisture content (74.44 %) of mulberry leaf when molybdenum given as foliar spray at 2.5 kg/ha /yr.

Chlorophyll content

The mulberry plants sprayed with amino+ foliar spray significantly increased the chlorophyll content in leaves of V-1 mulberry (Table 1). Maximum chlorophyll content of 33.2 was recorded in T6 (3.5 % amino+ spray on 25th and 35th days after pruning). Minimum chlorophyll content of 28.01 was recorded in T1 (absolute control). The increased chlorophyll content might be due to supply of amino acids (Total dissolved solids 30-33 %, hydrolysed protein 9-11 %, hydrolysed carbohydrates 6-7 %, amino nitrogen 3.5-4 %). Amino acids to the plants through foliar spray of amino+. These observations show similarity with the findings of Rajat Mohan *et al.* (2003) [6] who opined that spraying of CCC from 5-10 ppm on S-146 mulberry 40 days before rearing has improved the leaf moisture, chlorophyll a and b and total chlorophyll in leaf. Where, nitrogen has helped in harvesting of solar energy through chlorophyll synthesis, as it is an essential constituent of chlorophyll. 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 (Sujathamma and Dandin, 2000) [9]. Sudhakar *et al.* (2011) [10] reported that foliar application of 7 per cent Vermiwash on V-1 mulberry twice during every crop (30 and 40 days after pruning) along with the soil application of 50 per cent recommended N and P + 20 kg Seriazao and 25 kg Seriphos biofertilizer + 10t FYM + 5t Vermicompost/ha/year has significantly increased the levels of total chlorophyll reflecting its impact on the increased qualitative parameters of leaf.

Carbohydrate and protein

Significant improvement was noticed in carbohydrate and protein content of V-1 mulberry among the treatments (Table 1). The highest carbohydrate and protein content of 25.76 and 23.48 per cent was recorded in treatment which received 3.5 % amino+ spray on 25th and 35th day after pruning (T6). Similarly, the lowest carbohydrate, proteins (20.37 % and 18.81 %) were observed in T1. Increase in carbohydrate and protein content in V-1 mulberry can be attributed to nutrient composition of amino+. Similarly, the present results are in close conformity with the findings of Prasanna Kumar *et al.* (2001) [5] observed that 'Green leaf' foliar spray at 5 ml/lit on M-5 and V-1 mulberry after pruning has enhanced the protein content (18.83 % in M-5 and 20.00 % in V-1) as compared to control (14.06 %). Foliar application of Daman Panshibao at 0.5 ml/10 lit on M-5 mulberry improved crude protein (18.54 %) as compared to unsprayed leaves (Jyothi *et al.*, 2000) [3].

Table 1: Quality parameters of V-1 mulberry leaf as influenced by the foliar application of amino acid formulation on 60th day after pruning

Treatments	Moisture (%)	Protein (%)	Carbohydrates (%)	Chlorophyll SPAD meter value
T ₁ -(No RDF) absolute Control	68.77	18.81	20.37	28.01
T ₂ -RDF+ Water spray	71.27	18.94	21.65	29.23
T ₃ -RDF+2.0% amino+ at 25 th DAP and 35 th DAP	74.48	22.06	22.50	31.51
T ₄ -RDF+2.5% amino+ at 25 th DAP and 35 th DAP	74.64	22.06	23.20	32.23
T ₅ -RDF+3.0% amino+ at 25 th DAP and 35 th DAP	74.71	23.05	23.93	32.93
T ₆ -RDF+3.5% amino+ at 25 th DAP and 35 th DAP	74.74	23.48	25.76	33.23
T ₇ -RDF+2.0% amino+ at 30 th DAP and 40 th DAP	73.16	20.75	22.43	31.45
T ₈ -RDF+2.5% amino+ at 30 th DAP and 40 th DAP	74.48	21.75	23.16	32.24
T ₉ -RDF+3.0% amino+ at 30 th DAP and 40 th DAP	74.54	22.18	23.27	32.31
T ₁₀ -RDF+3.5% amino+ at 30 th DAP and 40 th DAP	74.68	22.17	23.31	32.50
F- Test	*	*	*	*
S.Em±	0.15	0.52	0.60	0.35
CD@5%	0.46	1.54	1.77	1.03

DAP- Days after pruning * -Significant

POP= NPK @ 350:140:140 kg/ ha/ year + FYM@20 MT/ha/year

N, P, K, Ca, Mg, S and Zn contents of V-1mulberry

Macro nutrient content in V-1mulberry leaves was significantly influenced by application of amino+ foliar spray. The maximum available nitrogen, phosphorous and potassium content of 3.76, 0.46 and 1.53 per cent respectively was recorded in T6 with 3.5 % amino+ spray on 25th and 35th day after pruning (Table 2). Secondary nutrients viz., calcium, magnesium, sulphur and micro nutrient zinc content of V-1mulberry leaves were significantly influenced by the application of foliar spray of amino+(Table3).Significantly higher calcium content (1.69 %), magnesium (0.57 %), sulphur (0.49 %) and zinc (22.75 ppm) was recorded in mulberry grown with 3.5 % amino+ spray on 25th and 35th day after pruning (T6). Increased N, P, K, Ca, Mg, S and Zn

content of mulberry leaf may be due to increased foliar application of amino+ and its nutrient composition. Foliar application of Daman Panshibao at 0.5 ml/10 lit on M-5 mulberry improved High mineral content viz., nitrogen (2.94 %), phosphorus (0.45 %), and potassium (2.62 %) over untreated mulberry plot (0.330 %) (Jyothi *et al.*, 2000) [3]. Similarly Venkataramana *et al.* (2009) [11] who reported that foliar application of 200 ppm of vermiwash enhanced the absorption of nutrients and increased N, P, K content in the mulberry. Foliar spray of 'Seriboost' @ 2.5 ml/lit once, twice and thrice on 16, 23 and 30 days after pruning on M-5 mulberry significantly increased the level of nitrogen, phosphorus, potassium, calcium, magnesium and sulphur content in leaves (Rajegowda *et al.*, 1999) [7].

Table 2: Nitrogen, phosphorous and potassium contents of V-1 mulberry leaf as influenced by the foliar application of amino acid formulation on 60th day after pruning

Treatments	Nitrogen (%)	Phosphorous (%)	Potassium (%)
T ₁ -(No RDF) absolute Control	3.01	0.29	1.30
T ₂ -RDF+ Water spray	3.03	0.32	1.34
T ₃ -RDF+2.0% amino ⁺ at 25 th DAP and 35 th DAP	3.53	0.35	1.39
T ₄ -RDF+2.5% amino ⁺ at 25 th DAP and 35 th DAP	3.53	0.41	1.44
T ₅ -RDF+3.0% amino ⁺ at 25 th DAP and 35 th DAP	3.69	0.44	1.50
T ₆ -RDF+3.5% amino ⁺ at 25 th DAP and 35 th DAP	3.76	0.46	1.53
T ₇ -RDF+2.0% amino ⁺ at 30 th DAP and 40 th DAP	3.32	0.36	1.36
T ₈ -RDF+2.5% amino ⁺ at 30 th DAP and 40 th DAP	3.48	0.39	1.43
T ₉ -RDF+3.0% amino ⁺ at 30 th DAP and 40 th DAP	3.55	0.42	1.45
T ₁₀ -RDF+3.5% amino ⁺ at 30 th DAP and 40 th DAP	3.54	0.43	1.49
F-Test	*	*	*
S. Em±	0.09	0.01	0.01
CD@5%	0.25	0.02	0.03

DAP- Days after pruning

* -Significant POP= NPK @ 350:140:140 kg/ ha/ year + FYM@20 MT/ha/year

Table 3: Secondary nutrient content and Zinc content in V-1Mulberry leaf as influenced by the foliar application of amino acid formulation on 60thday after pruning DAP- Days after pruning

Treatments	Calcium (%)	Magnesium (%)	Sulphur (%)	Zinc (ppm)
T ₁ -(No RDF) absolute Control	1.49	0.49	0.36	13.30
T ₂ -RDF+ Water spray	1.51	0.50	0.38	14.00
T ₃ -RDF+2.0% amino ⁺ at 25 th DAP and 35 th DAP	1.58	0.52	0.40	16.00
T ₄ -RDF+2.5% amino ⁺ at 25 th DAP and 35 th DAP	1.62	0.54	0.43	20.00
T ₅ -RDF+3.0% amino ⁺ at 25 th DAP and 35 th DAP	1.66	0.55	0.47	21.60
T ₆ -RDF+3.5% amino ⁺ at 25 th DAP and 35 th DAP	1.69	0.57	0.49	22.75
T ₇ -RDF+2.0% amino ⁺ at 30 th DAP and 40 th DAP	1.51	0.51	0.39	17.75
T ₈ -RDF+2.5% amino ⁺ at 30 th DAP and 40 th DAP	1.54	0.52	0.41	19.15
T ₉ -RDF+3.0% amino ⁺ at 30 th DAP and 40 th DAP	1.62	0.53	0.44	20.7
T ₁₀ -RDF+3.5% amino ⁺ at 30 th DAP and 40 th DAP	1.63	0.54	0.45	21.2
F-Test	*	*	*	*
S.Em±	0.02	0.013	0.005	1.510
CD@5%	0.04	0.039	0.015	4.487

POP= NPK @ 350:140:140 kg/ ha/ year + FYM@20 MT/ha/year

References

- Bose PC, Ratnasen, Dutta RK. Effect of foliar application of micronutrients to mulberry on the rearing performance of silkworm, *Bombyx mori* L. J. Seri. 1995; 3(1):15.
- Del R. A review of foliar fertilization of crops in India. Fertil. News. 1971; 16(12):77-78.
- Jyothi BL, Govindan R, Shanthakumar K. Performance of silkworm, *Bombyx mori* on mulberry raised by foliar application of Daman penshibao. Paper presented In: Nation Conf. Seric. Res. Dev, CSR&TI, Mysore, 2000, 67.
- Krishnaswami S, Kumararaj S, Vijayaraghavan K, Kasiviswanathan K. Silkworm feeding trials for evaluating the quality of mulberry leaves as influenced by variety, spacing and nitrogen fertilizers. Indian J Seric. 1971; 10:79-89.
- Prasanna kumar GS, Lokesh G, Ananthanarayana SR. Field performance of silkworm hybrids raised on mulberry with foliar application. Proc. Nation. Sem. Mulb. Seri. Res. India. Karnataka State Seric. Res. Dev. Inst. Bangalore, 2001, 448-454.
- Rajat Mohan, Juyal AC, Ramakant, Singh PK, Singh BD. Response of foliar spray of CCC on growth and quality of mulberry. Proc. Nation.Conf. Trop. Seri. Global Comp., Mysore, 2003, 48.

7. Rajegowda, Raju M. Effect of micronutrients foliar spray on mulberry growth, silk production and cost benefit. *J Ecobiol.* 2011; 28(1):49-53.
8. Sastry VVK, Appaji Rao B. Foliar application of nutrients. *Andhra Agric. J.* 1958; 5(2):294-301.
9. Sujathamma P, Dandin SB. Leaf quality evaluation of mulberry (*Morus spp.*) through chemical analysis. *Indian J Seric.* 2000; 39:117-121.
10. Sudhakar P, Anantha Raman KV, Shantala R, Subrahmanyam MR, navendrakumar, Jaishankar. Integrated nutrient management through the use of organic manures, foliar spray of vermiwash and panchagavya and their impact on mulberry plant growth yield and cocoon production. Paper presented In: Nation. Conf. Seric. Innov. Before and Beyond, CSR&TI, Mysore, 2011, 55.
11. Venkataramana P, Narasimhamurth YB, Krishna Rao JV, Kamble CK. Efficacy of foliar sprays of vermiwash and cowdung wash on biochemical and yield attributes and yield of mulberry (*Morus alba L.*). *Karnataka J Agril. Sci.* 2009; 22(4):921-923.