



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(11): 1214-1216
© 2022 TPI

www.thepharmajournal.com

Received: 09-07-2022

Accepted: 11-09-2022

Harish Gowda

Department of Sericulture,
University of Agricultural
Sciences, GKVK, Bangalore,
Karnataka, India

Ramakrishna Naika

Professor and Head, Department
of Crop Protection and
Sericulture, College of
Sericulture, Chintamani,
Karnataka, India

Manjunath Gowda

Professor and Head, Department
of Sericulture, University of
Agricultural Sciences, GKVK,
Bangalore, Karnataka, India

Naveen DV

Assistant Professor,
Department of Soil Science and
Agricultural Chemistry, College
of Sericulture, Chintamani,
Karnataka, India

Bharathi VP

Associate Professor, Department
of Sericulture, College of
Sericulture, Chintamani,
Karnataka, India

Corresponding Author:

Harish Gowda

Department of Sericulture,
University of Agricultural
Sciences, GKVK, Bangalore,
Karnataka, India

Growth and yield parameters of tree mulberry as influenced by different levels of major nutrients

Harish Gowda, Ramakrishna Naika, Manjunath Gowda, Naveen DV and Bharathi VP

Abstract

A study on assessment of growth and yield parameters of tree mulberry applied with different levels of major nutrients was conducted in the established V-1 tree mulberry garden at College of Sericulture, Chintamani during 2020-21. The recommended dose of fertilizer was applied through soil application and as water-soluble fertilizers (WSF) at four levels (25, 50, 75 and 100 percent of RDF+ FYM). The results revealed that the longest shoot height (cm), number of branches and total number of leaves per tree were higher in the treatment with 100 % RDF through soil application and all these parameters were on par with the treatment of 75 percent RDF through WSF + FYM. Similar trends were observed for leaf yield/tree, leaf yield/ha/crop and leaf to shoot ratio.

Keywords: Tree mulberry, levels of major nutrients, growth parameters and yield

Introduction

Mulberry is a hardy, perennial, deep-rooted foliage-bearing plant that produces a lot of biomass and grows throughout the year in the tropics. In recent years, unpredictable rainfall due to failing monsoons, recurrent droughts, and declining ground water resources have resulted in insufficient water supply for irrigation, limiting mulberry production potential. In majority areas the farmers alter their mulberry cultivation practices to combat the water scarcity and make better use of available water. Tree mulberry refers to mulberry plants that are permitted to grow tall, with a crown height of 5 to 6 feet from the ground level and a stem girth of 4 to 5 inches or more. Typically, the plantation is raised as a block plantation with varying spacing between plant and row distances of 6' x 6', 8' x 8' and 10' x 10'. The plants are typically pruned once a year during the monsoon season (July-August) at a height of 5-6' from the ground level, with a maximum of 8-10 shoots at the crown (Dandin and Sengupta, 1988) [2].

Nutritious mulberry leaves enhance silkworm growth, development, health, food consumption and conversion, hence enhancing commercial features and, as a result, silk production. The quality of mulberry leaves is critical to the overall performance of sericulture industry (Choudhury *et al.*, 1991) [1]. Application of the needed fertiliser to mulberry trees in the required amount is critical for silkworm growth and cocoon production.

Mulberry is one of the major commercial crops in Chikkaballapur and Kolar districts in eastern dry zone of Karnataka where scarcity of water is at its peak. At present, farmers are shifting towards cultivation of tree mulberry. Fertilizer application is through soil under irrigated conditions and few farmers fertilize through drip irrigation with ventury. The information on recommended dose of fertilizer to tree mulberry gardens is scanty and hence the experiment was carried out to optimize the fertilizer dose for mulberry under tree type garden.

Material and Methods

The experiment was conducted in the established V-1 tree mulberry garden geographically located in eastern dry zone (Zone-5) of Karnataka. The mulberry was cultivated under irrigated conditions with 8ft X 8ft spacing. Experiment was laid in a completely randomized block design with 8 treatments and 3 replications each viz., T₁: Control, T₂: 100 % Recommended dose of fertilizers through soil application + FYM, T₃: 25% Recommended dose of fertilizers through soil application + FYM, T₄: 50% Recommended dose of fertilizers through soil application + FYM, T₅: 50% Recommended dose of fertilizers through soil application+ FYM,

T₆: 25 % NPK through water soluble fertilizers + FYM (Fertigation), T₇: 50 % NPK through water soluble fertilizers + FYM (Fertigation), T₈: 75 % NPK through water soluble fertilizers + FYM (Fertigation). Package of practices was followed as per the recommended standards. The growth and yield parameters of V-1 tree mulberry were recorded treatment-wise in each replication by harvesting fresh leaves from five randomly selected trees under each treatment at 60 DAP and the mean yield was calculated as per the standards suggested and analysed statistically.

Results and Discussion

Application of 100 per cent recommended dose of fertilizers + FYM (T₂) to tree mulberry garden recorded longest shoot length (48.33, 78.90 and 100.93 cm), number of shoots/tree (30.23, 41.83 and 43), number of leaves/tree (280.10, 485.63 and 738.13 No.), leaf area (89.20, 121.27 and 136.80 cm²), respectively on 15th, 30th and 45th days after application of fertilizers. The leaf yield (7460.80 kg/ha/crop) and leaf to shoot ratio (1.63) were also highest in the same treatment. However, all these parameters were on par with the treatment which received 75 per cent RDF through water soluble fertilizers + FYM (T₈) where it recorded longest shoot length (46.03, 65.97, 100.83 cm), number of shoots/tree (28.67, 37.83, 40.17 No), number of leaves/tree (268.37, 482.87, 730.77 No.), leaf area (74.63, 113.50, 128.27 cm²), respectively on 15th, 30th and 45th days after application with different levels of fertilizers. The leaf yield (4100 g/tree), leaf

yield (7117.60 kg/ha/crop) and leaf to shoot ratio (1.57) were also on par with the treatment which received 75 per cent RDF through water soluble fertilizers + FYM (T₂). However, the lowest growth and yield parameters of V-1 tree mulberry were recorded in control plot (T₁) (Table 1 & 2).

Increase in plant height and number of shoots may be attributed due to addition of major nutrients like nitrogen, phosphorous and potassium at different levels through soil and fertigation. The difference in number of shoots per tree and the increased number of internodes might have contributed to higher number of leaves and the increased leaf yield might be due to higher tree height, more number of shoots per tree and number of leaves per tree recorded in the same treatment. Sreerama (2006) [7] reported that application of 400:180:25 kg/ha/yr NPK recorded significantly more shoots per plant (11.68) and leaves per plant (226.26) in mulberry. Further, Mahesh *et al.* (2020) [4] reported that 125 per cent RDF recorded higher shoot height (142.2 cm) and number of leaves per plant (22.9) in mulberry followed by application of 100 per cent RDF and 75 per cent RDF.

When nitrogen was supplied in optimum quantity the plants put forth vigorous vegetative growth, the leaves enlarge in the size, become deep dark green, indicating the increase in chlorophyll content and ultimately, the nitrogen helps to increase the yield. The leaves become succulent, improving their feed value to the silkworms. Nitrogen fertilizer application was found to enhance leaf and shoot yield of mulberry considerably (Kasiviswanathan, 1970) [3].

Table 1: Effect of different levels of NPK fertilizers on growth parameters in tree mulberry

Treatments	Longest shoot length (cm)			No of shoots/tree			Number of leaves/tree		
	15 DAF	30 DAF	45 DAF	15 DAF	30 DAF	45 DAF	15 DAF	30 DAF	45 DAF
T ₁ : Control	22.60 ^e	53.07 ^c	82.65 ^c	20.30 ^d	30.83 ^c	32.00 ^d	187.17 ^d	348.57 ^c	469.23 ^c
T ₂ : 100% RDF + FYM	48.33 ^a	78.90 ^a	100.93 ^a	30.23 ^a	41.83 ^a	43.00 ^a	280.10 ^a	485.63 ^a	738.13 ^a
T ₃ : 25 % RDF + FYM	29.80 ^d	54.73 ^c	81.63 ^c	24.50 ^c	32.92 ^c	34.92 ^{cd}	207.70 ^{cd}	353.27 ^c	540.30 ^c
T ₄ : 50 % RDF + FYM	34.40 ^c	62.50 ^{bc}	89.75 ^{bc}	25.07 ^{bc}	34.17 ^c	35.83 ^{bc}	243.60 ^{bc}	355.77 ^c	641.43 ^{bc}
T ₅ : 75 % RDF + FYM	44.83 ^{ab}	65.40 ^{bc}	99.08 ^{ab}	27.00 ^b	37.23 ^{bc}	39.00 ^b	248.00 ^b	433.87 ^b	668.90 ^b
T ₆ : 25 % RDF through WSF + FYM	33.03 ^{cd}	60.87 ^c	91.67 ^{bc}	23.13 ^c	36.67 ^{bc}	38.00 ^{bc}	218.37 ^c	405.43 ^{bc}	625.93 ^{bc}
T ₇ : 50 % RDF through WSF + FYM	43.87 ^{bc}	62.83 ^{bc}	92.38 ^{bc}	24.73 ^{bc}	37.17 ^{bc}	38.67 ^c	225.53 ^{bc}	429.07 ^{bc}	663.77 ^{bc}
T ₈ : 75 % RDF through WSF + FYM	46.03 ^{ab}	65.97 ^b	100.83 ^{ab}	28.67 ^{ab}	37.83 ^b	40.17 ^{ab}	268.37 ^{ab}	482.87 ^{ab}	730.77 ^{ab}
F-Test	*	*	*	*	*	*	*	*	*
SE(m)±	1.28	2.96	2.63	0.81	1.17	1.05	7.49	13.92	20.87
C.D @ 5%	3.89	8.98	7.98	2.46	3.55	3.17	22.73	42.23	63.31
C.V %	5.56	5.59	5.55	5.65	5.53	5.51	5.66	5.56	5.72

Note: *Significant at 5%, DAF – days after fertilizer application, WSF – water soluble fertilizers, RDF - recommended dose of fertilizers

Table 2: Effect of different levels of NPK fertilizers on leaf yield parameters in tree mulberry

Treatments	Leaf area (cm ²)			Leaf yield/Tree (g)	Leaf yield (kg/ ha/crop)	Leaf to shoot ratio
	15 DAF	30 DAF	45 DAF	45 DAF	45 DAF	
T ₁ : Control	43.60 ^d	61.17 ^e	78.00 ^d	2710.00 ^e	4704.57 ^d	1.23 ^c
T ₂ : 100% RDF + FYM	89.20 ^a	121.27 ^a	136.80 ^a	4340.00 ^a	7464.80 ^a	1.63 ^a
T ₃ : 25 % RDF + FYM	58.20 ^c	83.33 ^{cd}	93.77 ^c	3120.00 ^d	5416.30 ^c	1.23 ^c
T ₄ : 50 % RDF + FYM	58.63 ^c	85.27 ^{cd}	97.80 ^c	3447.00 ^c	5983.90 ^b	1.40 ^b
T ₅ : 75 % RDF + FYM	70.00 ^{bc}	110.10 ^b	124.23 ^b	4040.00 ^{bc}	7013.40 ^a	1.53 ^{ab}
T ₆ : 25 % RDF through WSF + FYM	62.23 ^c	80.50 ^d	99.43 ^c	3342.00 ^c	5798.23 ^b	1.33 ^{bc}
T ₇ : 50 % RDF through WSF + FYM	63.90 ^c	90.73 ^c	102.07 ^c	3655.03 ^c	6336.40 ^b	1.37 ^{bc}
T ₈ : 75 % RDF through WSF + FYM	74.63 ^b	113.50 ^{ab}	128.27 ^{ab}	4100.00 ^{ab}	7117.60 ^a	1.57 ^{ab}
F-Test	*	*	*	*	*	*
SE(m)±	2.114	2.978	3.422	115.019	199.418	0.050
C.D @ 5%	6.41	9.03	10.38	348.88	604.87	0.15
C.V %	5.51	5.53	5.50	5.54	5.54	5.15

Note: *Significant at 5%, DAF – days after fertilizer application, WSF – water soluble fertilizers, RDF - recommended dose of fertilizers

Application of NPK fertilizers significantly increased all the yield characters over the control (no NPK) among the fertilizer treatments, application of 400 kg N, 200 kg P and 125 kg K/ha/yr showed significantly highest values for all yield characters. (Paul and Qaiyyum, 2009) [6]. Significant increase in growth and yield parameters in mulberry might be due to adequate water-soluble fertilizers with increased nutrient use efficiency and reduced loss by leaching as well as volatilization (Naveen *et al.*, 2019) [5]. Similarly, the maximum leaf yield (506.4 g per plant) was observed with application of 125 per cent recommended dose of fertilizers which was significantly superior compared to other treatments. The lowest leaf yield of 364.6 g/plant was registered with application of 100 per cent RDF (control).

Conclusion

The treatments consisted of different levels of major nutrients in varied combinations with FYM (20 t/ha/year). The longest shoot length (48.33, 78.90 and 100.93 cm), number of shoots per tree (30.23, 41.83 and 43.00), number of leaves per tree (280.10, 485.63 and 738.13), and leaf area (89.20, 121.27 and 136.80 cm²) were recorded in tree mulberry raised with 100 per cent RDF + FYM on 15th, 30th and 45th day respectively after being applied with different levels of major nutrients. The next pre-eminent treatment was 75 per cent NPK through WSF + FYM (46.03, 65.97 and 100.83 cm), (28.67, 37.83 and 40.17), (268.37, 482.87 and 730.77) and (74.63, 113.50 and 128.27 cm²), respectively.

Maximum leaf yield per tree (4340 g/tree) and leaf to shoot ratio (1.63) was noticed in mulberry raised with 100 per cent RDF + FYM followed by 75 per cent RDF through water-soluble fertilizers + FYM (4100 g/tree), (1.57) and 75 per cent RDF fertilizers + FYM (4040 g/plant), (1.53) on 45th day after application of different levels of fertilizers. However, all the parameters were also found better at 75 per cent NPK through water-soluble fertilizers + FYM and also we can get better B:C ratio. Therefore, 75 per cent NPK through water-soluble fertilizers was found to be optimum dose for V-1 tree mulberry.

References

1. Choudhury PC, Shuka P, Chosh B, Sengupta K. Effect of spacing, crown height and method of pruning on mulberry leaf yield, quality and cocoon yield. *Indian J Seric.* 1991;30(1):46-53.
2. Dandin SB, Sengupta K. Mulberry cultivation as high bush and small tree in hilly regions. Central Silk Board, Bangalore, 1998, 16.
3. Kasiviswanathan K, Iyengar MNS. Effect of plant density, methods of leaf harvest and nitrogen fertilization on the leaf yield of irrigated mulberry in Mysore State. *Indian J Seric.* 1970;9:43-48.
4. Mahesh R, Hirompremit Meitei, Debashish, Chakravarty, Sivaprasad V. Effect of fertilizer dose and split application of fertilizer on growth, yield and nutrient use efficiency in mulberry. *Innovative Farming.* 2020;5(2):92-97.
5. Naveen DV, Venkatachlapathi V, Vinoda KS, Bharathi VP, Ramakrishna Naika, Venkataravana P. Effect of graded levels of water-soluble fertilizers on growth, yield of mulberry and cocoon quality. *Innovative Farming.* 2019;4(4):185-188.
6. Paul NK, Qaiyyum A. Effect of different levels of NPK

fertilizers and irrigation on yield and nutritive quality of mulberry leaf. *Bangladesh J Agri. Res.* 2009;34(4):435-442.

7. Sreerama N. Effect of different levels of N, K and Zn application with recommended dose for irrigated mulberry and silkworm, *Bombyx mori* L. M.Sc (Seri.) Thesis, University of Agricultural Sciences, Bangalore, 2006, 153.