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Impact of Spacing's and Fertilizer's on the production of M5 Mulberry Variety

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Abstract

A field experiment was conducted on a newly established mulberry garden at Pakani, Sholapur, (M.S) India. The experiment was conducted during 2010 – 2011. The experiment consisting of M5 mulberry variety, the plot is designed split split plot having four types of spacing namely 6' × 6', 2' × 3', 3'× 3', 6' × 3' × 2' and different fertilizer doses. The present investigation is shows the impact of M5 (3'×3') spacing type and T3 (NPK) fertilizer treatment on leaves weight as well as height of plant which shows positive results.

Keywords: Mulberry Variety, Spacing, Fertilizers, Productivity.

Introduction

Mulberry (*Morus alba* L.) is a deep rooted fast growing foliage crop of commercial importance, which produces leaves continuously throughout the year for rearing silkworm (*Bombyx mori* L.). The mulberry leaf yield and quality depends on the soil type, plant variety, availability of plant nutrients and agro-ecological conditions, which reflects on the quality of silk production. Mulberry leaf productivity is highly dependent on plant nutrients like NPK and is known to respond well to the addition of organic manures (Jaiswal *et al.*, 2005). Long-term field experiments on nutrient management in different cropping system indicated decline in factor productivity with soil organic matter as well as available N, P and K status of the soil. Besides, the physicobiochemical properties of the soil damaged significantly. Presently, Indian soils are 70 % deficient in N, 50% in P, 13% in K, 4.7% in Zn, 4.8% in Cu, 11.5 % in Fe and 4.0 % in Mn (Pal., 2007).

The chemical fertilizers are becoming costlier day by day due to escalating costs and scarce availability of commodities. The highly intensive mulberry cropping system causes depletion of nutrients in soil and excess usage of inorganic fertilizers and pesticides caused deleterious effect on soil health. In this context, supply of major nutrients to mulberry through organic manures and biofertilizers is highly imperative. Organic manures are bulky in nature which supplement the crop with small amounts of major nutrients like NPK and other minor nutrients required by the crop and encourages the proliferation of soil microflora (Lakshmi *et al.*, 1977). Introduction of crop benefiting microbial inoculants in to soil play a significant role in the mobilization of various nutrients needed by the crop. The economy of sericulture depends not only on high yield but also on the quality of mulberry leaves (Das *et al.*, 1983; Rangaswamy et al; 1976). Maximization of mulberry leaf yield per unit area will lead to increased cocoon production per hectare at reduced cost. So production of mulberry leaves on scientific lines is essential for organizing sericulture on sound economic lines (Rangaswamy *et al;* 1976).

Maximization of leaf yield is the most important steps for enhancing the cocoon production & its economics. Improvement in yield and quality of mulberry can be accomplished through the application of fertilizers. Literature available from different countries suggests that mulberry plant responds well to nitrogen applications especially with respect to the leaf yield and the quality of foliage which can be improved by suppling phosphatic and potassic fertilizers along with

nitrogen (Basavanna *et al.*, 1974 Kasiviswanathan *et al* 1979; Bongale, 1994). The present investigation was thus aimed at the development of a package of cultivation for elite mulberry cultivers.

Materials and Methods:

The experiment was conducted in a newly established mulberry garden at Pakani, Sholapur, (M.S) India, during 2010 - 2011. The soil of the experimental plot was black cotton having high water holding capacity. The plantation was irrigated with 4 to 5 cm depth water once in 10 days. The experiment was conducted during late rainy and starting of winter season. The plot is divided into 5 different spacing types viz., 6'+6', 2'+3', 3'+3', 6'+3'+2' both for M5 variety (4 plots) and 1 for control (no fertilizers).

Fertilizers: - fertilizers are supplied to the experimental plot viz;

1) 6' + 6' spacing foliar spray plots are named as M1 and its control MC1
2) 2'+3'- nitrogen (urea) plots are named as M2 and its control MC2
3) 3'+3'- mixed fertilizers plots are named as M3 and its control MC3
4) 6'+3'+2'- FYM + vermicompost plots are named as M4 and its control MC4

The super height is used as a foliar spray(5 to 10 ml / liter), nitrogen is used in the form of Urea (46 % N), mixed fertilizers (360 : 180 :180) like nitrogen in the form of urea (46 % N), Phosphorus is used as single super phosphate (SSP) (16 % P_2O_5) and potassium as Muriate of potash (MOP) (60 % K_2O), FYM (20 MT / ha / year) and Vermicompost is supplied for next plot, there is no fertilizer is supplied to control plot, only water is provided to that plot. Irrigation is supplied after 15 days. The results are calculated by leaf weight, shoot height process. Fertilizer treatments were imposed after pruning and completing of intercultural operations. Water is supplied every after 12 days because black soil having high water holding capacity. After 70 days of pruning plant height, weight of leaves (6^{th} no., 10^{th} no. 5 leaves of plant of each plot was weighted) (Table no. 1-3).

Results

Main effect of Spacing: The present study was carried out in three seasons namely rainy, winter and summer. The impact of spacing during rainy season on weight of 6^{th} number leaf, 10^{th} number of leaf and average five leaves is significantly higher in M3 (0.684 ± 0.19), M3 (5.682 ± 0.040) and M2 (18.04 ± 0.069) respectively. The impact of spacing during winter season on weight of 6^{th} number leaf, 10^{th} number of leaf and average five leaves is significantly higher in M1(0.86 ± 0.04), M3(5.864 ± 0.07) and M3 (18.202 ± 0.025) respectively. The impact of spacing during summer season on weight of 6th number leaf, 10^{th} number of leaf and average five leaves is significantly higher in M1 (0.78 ± 0.036), M3 (5.132 ± 0.027) and M3 (16.64 ± 0.06) respectively. From observation it is clearly indicate that M3 (3'×3') spacing type shows highly significant leaves weight as compared other type of spacing.

In the present study also impact of spacing on height of mulberry plant higher during rainy, winter and summer season are M4 (286.08 cm), M3 (183.8 cm) and M3 (153.2 cm) respectively. From observation it clearly indicates that M3 type shows better impact as compare other types.

Main effect of fertilizer: There was significant difference in the leaf yield, growth and quality of leaves among different fertilizer doses. The present study of fertilizers during rainy season on weight of 6^{th} number leaf, 10^{th} number of leaf and average five leaves is significantly higher in T3 (0.684 ± 0.19), T3 (5.682 ± 0.040) and T2 (18.04 ± 0.069) respectively. The impact of fertilizers during winter season on weight of 6^{th} number leaf, 10^{th} number of leaf and average five leaves is significantly higher in T1(0.86 ± 0.04), T3(5.864 ± 0.07) and T3 (18.202 ± 0.025) respectively. The impact of fertilizers during summer season on weight of 6^{th} number leaf, 10^{th} number of leaf and average five leaves is significantly higher in

T1(0.78 ± 0.036), T3(5.132 ± 0.027) and T3 (16.64 ± 0.06) respectively. From observation it is clearly indicate that T3 (NPK) fertilizers shows highly significant leaves weight as compared other treatment of fertilizers.

In the present study also impact of spacing on height of mulberry plant higher during rainy, winter and summer season are T4 (286.08 cm), T3 (183.8 cm) and T3 (153.2 cm) respectively. From observation it clearly indicates that T3 (NPK) fertilizer treatment shows better impact as compare other treatments.

The present investigation shows impact of both spacing and fertilizers on mulberry M5 variety during 2010-11 of three season period, from this it is clearly indicate that the impact of M3 (3'×3') spacing type and T3 (NPK) fertilizer treatment on mulberry leaves weight as well as height of mulberry plant which shows positive results.

Discussion

Different elite mulberry varieties have been reported to exhibit a significant difference in leaf yield (Kashiviswanathan *et al.,* 1979; Saratchandra *et al.,* 1992). Ghosh *et al.,* (1997) shows the variety S 36 is exhibited higher values of NPK contents in both the spacing against other test varieties. Thus, variety S36 has been found superior both in terms of higher leaf yield and quality. Similar results were also obtained earlier by (Prabhuraj *et al.,* 2005) who observed that combination of FYM, sericulture wastes compost, green manure and biofertilizers with NPK recorded significantly higher population of inoculated phosphate solubilizing microorganism and nitrogen fixing bacteria. In the present study besides higher leaf yield variety M5 also exhibited values of treatment of fertilizer NPK (T3) in both spacings against test fertilizer treatment.

Though the wider spacing of 90 × 90 cm showed significantly higher in NPK content in leaves than 60 × 60 cm spacing, the leaf yield was found significantly higher in closer spacing. This suggest that though there was a significant improvement in nutritional quality due to the adoption of the wider spacing, the total leaf yield per hector could not be improve the leaf yield, due to which reduction of plant per unit area. This can be supported by the observation of Choudhury *et al.,* (1991) who also observed that the increase in spacing from 60 × 60 cm and 90 × 90 cm and further to 120 × 90 cm reduced the leaf yield markedly under assured irrigated condition. The effect of plant density on leaf yield and quality was reported earlier by many authors like Kashiviswanathan *et al.,* (1979), Dahiphale *et al.,* (1992), Das *et al* ., (1993) and Tikader *et al.,* (1993).

The different fertilizer dose had significant effect on growth, yield and NPK in leaves of mulberry. The fertilizer treatment F1 (300: 180: 120 Kg NPK/ ha/yr) resulted in maximum growth, yield and quality which may be due to the application of higher dose of fertilizer. The present investigation also revealed that different fertilizer doses had significant effect on growth, yield and NPK in leaves of mulberry.

Table No.1: Effect of Spacing's and Fertilizers on 6^{th} and 10^{th} number leaf, Average weight of 5 leaves and Height of mulberry (branch) plant (M5 Variety), during Rainy season 2010.

Spacing	MC1	M1	MC2	M2	MC3	M3	MC4	M4
Fertilizers	TC1	T1	TC2	T2	TC3	T3	TC4	T4
6^{th} no. leaf weight	0.234 ± 0.018	0.618 ± 0.019	0.13 ± 0.029	0.536 ± 0.033	0.16 ± 0.022	0.684 ± 0.083	0.19 ± 0.028	0.59 ± 0.045
10^{th} no. leaf weight	3.626 ± 0.039	4.312 ± 0.045	1.78 ± 0.068	4.23 ± 0.029	2.16 ± 0.044	5.682 ± 0.040	2.74 ± 0.044	4.524 ± 0.053
Average Five leaves Weight	11.32 ± 0.245	16.69 ± 0.038	9.13 ± 0.033	17.362 ± 0.069	13.29 ± 0.044	18.042 ± 0.091	12.17 ± 0.316	18.022 ± 0.122
Height of Branch	94.12 ± 3.916	230 ± 0.048	32.16 ± 0.048	248.3 ± 4.807	49.4 ± 0.053	286.08 ± 9.581	56.28 ± 0.069	258.60 ± 2.525

Table No.2: Effect of Spacing's and Fertilizers on 6th and 10th number leaf, Average weight of 5 leaves and Height of mulberry (branch) plant (M5 Variety) during winter season 2010.

Spacing	MC1	M1	MC2	M2	MC3	M3	MC4	M4
Fertilizers	TC1	T1	TC2	T2	TC3	T3	TC4	T4
6th no. leaf weight	0.4 ± 0.024	0.782 ± 0.035	0.21 ± 0.015	0.334 ± 0.018	0.3 ± 0.041	0.722 ± 0.027	0.32 ± 0.062	0.62 ± 0.014
10th no. leaf weight	1.56 ± 0.023	4.784 ± 0.047	1.06 ± 0.063	4.36 ± 0.071	1.23 ± 0.031	5.132 ± 0.027	1.33 ± 0.026	4.734 ± 0.050
Average Five leaves Weight	7.85 ± 0.062	16.49 ± 0.04	4.38 ± 0.047	15.32 ± 0.057	5.63 ± 0.033	16.044 ± 0.068	6.08 ± 0.085	15.322 ± 0.030
Height of Branch	83 ± 2.345	112.4 ± 2.073	27.3 ± 03.157	116.2 ± 3.492	36.8 ± 2.949	153.2 ± 3.701	40.18 ± 3.044	130.2 ± 3.420

Table No.3 Effect of Spacing's and Fertilizers on 6th and 10th number leaf, Average weight of 5 leaves and Height of mulberry (branch) plant (M5 Variety) during summer season 2011.

Spacing	MC1	M1	MC2	M2	MC3	M3	MC4	M4
Fertilizers	TC1	T1	TC2	T2	TC3	T3	TC4	T4
6th no. leaf weight	0.48 ± 0.022	0.86 ± 0.04	0.21 ± 0.025	0.73 ± 0.018	0.26 ± 0.021	0.762 ± 0.034	0.29 ± 0.029	0.69 ± 0.030
10th no. leaf weight	2.034 ± 0.035	3.562 ± 0.038	1.07 ± 0.043	4.52 ± 0.067	1.96 ± 0.036	5.864 ± 0.036	1.99 ± 0.032	4.806 ± 0.068
Average Five leaves weight	10.808 ± 0.093	16.306 ± 0.023	6.96 ± 0.069	17.344 ± 0.023	9.16 ± 0.022	18.202 ± 0.025	9.38 ± 0.041	17.682 ± 0.039
Height of Branch	59 ± 7.211	163.6 ± 1.140	27.26 ± 4.595	167.6 ± 4.037	38 ± 2.449	183.8 ± 3.033	43.26 ± 3.392	149.6 ± 2.302

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