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Effect of Major Nutrients (NPK) and Lime on Growth, Yield and Quality of Mango cv Latsundari Grown in Acid Lateritc Soil of Bhubaneswar, Orissa

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Abstract

An investigation was carried out with application of N 0, P(P_2O_5) 0, K(K_2O) 0; N 500, P250, K 500; N 1000, P 500, K 1000; and N 1500, P 750, K 1500 g/plant with (12,400 g) or without lime to 15 year old mango cv Latsundari at Bhubaneswar. Higher levels of nutrients increased yield, yield attributing characters and fruit quality. These characters were increased/improved with addition of lime. But maximum benefit was obtained at N-1000, P-500, K-1000 g/plant along with lime which was better than higher dose of nutrients with lime for negative intersection of lime with that level of nutrients.
Key words : Nutrients, Lime, Yield, Mango, Latsundari.

Mango (*Mangifera indica* L.) is the most important fruit crop of Orissa covering a area of 140 thousand hecrtares with a production of 432 thousand metric tones. Cultivar Latsundari is a widely accepted variety in the state and out side due to its appealing color and good quality. But the yield and quality of this variety is adversely affected due to poor nutrient management. Most of the mango orchards are established on the resource poor, low fertile acidic lateritic soils of Orissa. Fertilizer and soil management are seldom done in mango orchards. Chadha (1) emphasized on application of nutrients and management of acid soil in mango growing areas. The mango crop responds well to nutrients in acid soils (2). The major nutrients nitrogen, phosphorus and potassium play an important role in boosting the crop yield and quality of mango. But the effect of major nutrients in presence of lime on yield and quality of mango in acid lateritic soil is lacking. Hence this study was taken up.

Methods

To know the effect of major nutrients and lime on mango Latsundari, an experiment was carried out at the progeny orchard, Ekamra Kanan, Directorate of Horticulture, Government of Orissa, Bhubaneswar, Orissa. Four graded dose combinations of N, P and K i.e. N 500, P 250, K 500 (F_1); N 1000, P 500, K 1000 (F_2); N 1500, P 750, K 1500 (F_3) with lime (L_1) at 12,400 g/ plant or without lime (L_0) to mango cv Latsundari of 15 year old were supplied. The nutrients were applied in the form of urea, SSP and MOP in the first week of October. The experiment was laid out in a randomized block design with three replications. The initial soil characteristics of feeding zone (30—45 cm depth) was

Table 1. Effect of fertilizers and lime on yield attributing characters of mango cv Latsundari.

Treatments	No. of panicles/ m^2	Length of panicle	No. of rachis	Gender ratio	No. of pea drop
L_0F_0	36.3	21.8	15.5	2.95 : 1	1255.3
L_0F_1	44.3	25.2	20.2	2.72 : 1	1014.6
L_0F_2	51.0	30.3	24.6	2.68 : 1	930.0
L_0F_3	52.3	30.8	24.8	2.45 : 1	920.6
L_1F_0	41.7	24.7	23.6	2.73 : 1	1016.0
L_1F_1	69.7	32.2	28.0	2.56 : 1	956.0
L_1F_2	81.7	39.2	30.1	2.30 : 1	625.6
L_1F_3	78.0	38.5	29.4	2.40 : 1	641.6

Table 2. Yield and fruit characteristics of mango crop as influenced by fertilizer and lime.

Treatments	Yield (q/ha)	Mass (g/fruit)	Density (g/cc)	Pulp : stone+peel	Nutrient content of pulp N%	P%	K%
L_0F_0	28.6	87.86	1.27	1.43 : 1	0.11	0.098	0.32
L_0F_1	38.4	107.79	1.31	1.52 : 1	0.14	0.118	0.41
L_0F_2	47.4	133.06	1.34	1.67 : 1	0.17	0.129	0.52
L_0F_3	46.0	139.65	1.33	1.78 : 1	0.18	0.130	0.56
L_1F_0	42.8	105.62	1.29	1.59 : 1	0.16	0.106	0.43
L_1F_1	52.9	172.20	1.30	1.74 : 1	0.18	0.139	0.55
L_1F_2	68.4	260.30	1.43	2.61 : 1	0.20	0.145	0.65
L_1F_3	65.7	249.49	1.42	2.49 : 1	0.19	0.139	0.62

acidic, clay, loam, OC 2.6 g/kg, available N, P and K were 113.6, 8.0 and 112 kg/ha and of low in status. The soil was lateritic in origin. The yield and its attributing characters were recorded. Some chemical and biochemical parameters were estimated following standard procedures (3).

Results and Discussion

Yield Attributing Characters and Sex Ratio

Table 1 shows that application of higher doses of fertilizers increased the growth and improved yield attributing characters. These characters further increased with addition of lime. The plant nutrients at of N 1000 g, P 500 g and K 1000 g with lime 12,400 g per plant resulted in maximum no. of panicles/m^2, length of panicle (cm) and no. of rachis to the tune of 81.7, 39.2 and 30.1 respectively. The male and perfect flower ratio was minimum (2.30 : 1) and the fruit drop at pea stage was minimum (625.0). These results corroborate the findings of Banik et al. (4) in mango cv Fazli in West Bengal.

Table 3. Effect of fertilizer and lime on fruit quality parameters of mango cv Latsundari.

Treatments	TSS (°B)	Total sugar (%)	Reducing sugar (%)	Non reducing sugar (%)	Acidity (%)
T_1	11.33	10.12	3.6	6.3	0.245
T_2	13.00	12.10	4.2	7.7	0.212
T_3	14.00	12.95	4.4	8.1	0.202
T_4	14.67	13.50	4.6	8.7	0.196
T_5	12.66	11.50	3.9	7.5	0.202
T_6	15.00	13.95	4.7	8.8	0.192
T_7	16.67	15.55	5.3	9.5	0.170
T_8	16.33	15.15	5.1	9.2	0.178

Yield and Fruit Characteristics

Table 2 shows that yield of mango fruit increased with increasing fertilizer dose and maximum fruit yield to a tune of 68.4 q/ha was obtained in L_1F_2 treatment and followed the same trend as yield attributing characters. Maximum mass per fruit of 260.3 g and density of 1.43 g/cc were recorded this treatment. The pulp and stone + peel ratio was also found to be maximum of 2.61 : 1 compared to control (1.43 : 1) indicating that the economic part (pulp) was increased due to application of fertilizer and lime over no fertilizer and lime. The percentage of nutrient content of the pulp was maximum to a value of 0.2, 0.145 and 0.56 N, P and K respectively under this treatment (L_1F_2). Similar findings were reported by Singh and Khan (5).

Quality Parameters of Mango Fruit

Table 3 shows that the quality parameters of mango pulp like TSS (°B), TS (%), reducing sugar (%), non-reducing sugar (%) and acidity (%) were improved with addition of fertilizers and lime. Maximum quantity of TSS (16.67), total sugar (15.55%), reducing sugar (5.3%), non-reducing sugar (9.5%) and minimum quantity of acidity (0.170%) were recorded in L_1F_2 treatment confirming that application of N 1000 g, P 500 g, K 1000 g and lime 12.400 g per plant was superior to other doses. It implies that the maximum level of nutrients have some negative interaction with lime. Hence farmers should apply this dose of nutrients with lime (L_1F_2) to achieve higher yield of good quality fruit of mango cv Latsundari. Similar findings were reported by earlier workers (1, 6).

References

1. Chadha K. L. 1985. Mango industry of India. 2nd Int.

Symp. mango, Bangalore, India.
2. Parida G. N., D. P. Ray, R. C. Swain, B. Routray and J. Patra. 1988. Placement of fertilizers for better production of mango crop. Hort. in Orissa, Mango spl. No. 1, pp. 45—47.
3. Tandon H. L. S., editor. 1993. Method of analysis of soils, plants, waters and fertilizers. Fertilizer Devel. and Consul. Organ., New Delhi, India.
4. Banik B. C., S. K. Sen and T. K. Bose. 1997. Effect of different levels of nitrogen, phosphorus and potassium on growth yield and quantity of mango cv Fazli. Environ. Ecol. 15 : 269—271.
5. Singh K. and A. Khan. 1993. Effect of fertilizers in yield and quality of mango fruit. Prog. Hort. 22 : 44—50.
6. Samra J. S., R. S. Thakur and K. L. Chada. 1978. Evaluation of existing critical limits of leaf nutrient standards in mango. Sci. Hort. 8 : 349—355.