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EFFECT OF INTEGRATED NUTRIENT MANAGEMENT ON YIELD, QUALITY AND ECONOMICS OF GUAVA

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ABSTRACT

The experiment was conducted during 2009-10 at the Fruit Research Station, Kuthulia Farm, College of Agriculture, Rewa (M.P.) to evaluate the effect of integrated nutrient management on yield, quality and economics of guava. Application of 50 % RDF (250:100;250 g NPK)+25 kg FYM+ 5 kg vermicompost/tree (T8) and 100% RDF (500:200:500 g NPK) +Zn, B, Mn foliar spray +organic mulching 10 cm thick /tree (T_4) were found significantly superior than other INM treatments with respect to yield attributes, yield and economics from guava cv. Allahabad Safeda. Under these treatments, fruit yield ranged from 89.07 to 90.0 qha-1 and economics from Rs.53204 to Rs.53439 ha^{-1}. Only total soluble solids were found in the higher range (12.23 to 12.430Brix) in T1 and T3 treatments. Other fruit qualities as well as fruit size were not influenced significantly due to INM treatments.

Key Words: Allahabad Safeda, Integrated nutrient Management, yield, Quality.

INTRODUCTION

Guava (*Psidium guajava* L.) is one of the most promising fruit crops of India and is considered to be one of the exquisite nutritionally valuable and remunerative crops (Singh *et al.* 2000). In Rewa region, guava is grown on an area of 277 ha with a production of 2019 tonnes and productivity of 7.29 t ha-1, which is very low as compared to national average. The stagnation and decline in the productivity of guava in Rewa region is due to decline in the soil organic matter, over mining of nutrients reserve, loss of nutrients and non availability of cost effective fertilizers. The application of fertilizers even in balanced form may not sustain the soil fertility and productivity in guava orchards. However research evidences are encourageous about the integrated use of inorganic fertilizers, biofertilizers and organic manures including crop residues, vermicompost which may improve the soil productivity and crop yield (Singh *et al.*2011).The nutritional and economical gain due to integrated nutrient management on guava has not been studied in Rewa region, hence the present work was taken up.

MATERIALS AND METHODS

The experiment was conducted during 2009-10 at the Fruit Research Station, Kuthulia farm, College of Agriculture, Rewa (M.P.) under All India Coordinated Research Project on Subtropical Fruits. The experiment was conducted on silty loam soil which was neutral in reaction pH (7.2), high in available nitrogen (341.2 kg ha^{-1}) and phosphorus (26.8 kg ha^{-1}) and medium in available potash. The annual rainfall varied from 900 to1150 mm which was received mainly from July to September. The eleven treatments consisted of T_1 (500 g: 200 g : 500 g NPK /tree as control), T_2 (T_1 + Zn (0.5%) + B (0.2%) + Mn (1%) as foliar spray twice (August and October), T_3 (T_1 + organic mulching @ 10 cm thick) , T_4 (T_2 + organic mulching @10 cm thick) , T5(50 % NPK+ 25 kg FYM + 250 g Trichoderma), T6(50 % NPK + 50 kg FYM + 250 g Azospirillium) , T_7 (50 % NPK + 50 kg FYM + 250 g Azotobactor), T_8 (50 % NPK + 25 kg FYM + 5 kg vermicompost), T_9 (50 % NPK+ 25 kg FYM + 250 g Pseudomonas florescence), T_{10} (50 % NPK+ 25 kg FYM + 250 g Trichoderma + 250 g Pseudomonas) and T_{11} (50 % NPK+ 25 kg FYM + 250 g Aspergillus niger) were arranged in randomized block design and replicated thrice. All the treatments were applied in first week of July. The guava variety Allahabad Safeda was taken as the test variety. The orchard was planted during the year 2005. The planting spacing was 6m x 6m and two plants per treatment were taken. The quality parameters of fruits were determined as per methods of A.O.A.C. (1997).

RESULTS AND DISCUSSION

Fruit size and Yield attributes

The data (Table 1) reveal that there were no significant changes in the length and width of fruits, its pulp thickness and seed cavity diameter due to different INM treatments. This is an indication of the

fact that the genetically governed size of fruits did not change due to nutritional modifications. The number of fruits per tree differed significantly, it was maximum (194.30 fruits / tree) under T_8 (50 % NPK+ 25 kg FYM + 5 kg vermicompost), followed by T_6 (191.00), T5 (188.66) and T_9 (187.16). The fruit weight and fruit yield per plant were maximum in T_8 (32.40) followed byT_3 (30.24). The beneficial effect of 50 % NPK through fertilizers integrated with FYM and Vermicompost on guava were also reported by Ram and Pathak (2007), Naik and Babu (2007), Dutta *et al.* (2009), Patel *et al.* (2009) and Shukla *et al.* (2009).

Table 1: Yield attributes, fruit yield and economics of guava under different INM treatments

Treatments	Length of the fruit (cm)	Width of the fruit (cm)	Pulp thickness (cm)	Seed cavity diameter (cm)	Number of fruits /tree	Fruit yield/tree (kg)	Fruit Yield (q ha^{-1})	Net income (Rs/ha)	B:C ratio
T_1	6.73	7.40	1.33	4.16	176.5	28.85	80.16	49431	2.60
T_2	6.53	7.40	1.30	4.26	183.2	30.25	84.03	51317	2.56
T_3	6.67	7.63	1.30	4.53	182.7	30.24	83.99	50403	2.50
T_4	6.53	7.40	1.23	4.33	186.0	32.06	89.07	53439	2.49
T_5	6.60	7.36	1.40	4.56	188.7	31.43	87.32	40708	1.87
T_6	6.40	7.33	1.33	4.30	191.0	31.18	86.62	44962	2.07
T_7	6.96	7.73	1.36	4.66	171.0	28.52	79.21	39311	1.98
T_8	6.20	7.16	1.26	4.40	194.3	32.40	90.00	53204	2.44
T_9	6.46	6.83	1.40	4.16	187.2	30.98	86.07	32638	1.61
T_{10}	6.43	7.2	1.13	4.40	185.5	30.93	85.93	18620	1.27
T_{11}	6.53	7.5	1.20	4.85	168.5	27.72	76.99	24011	1.45
SEm±	0.21	0.21	0.11	0.21	4.02	0.77	2.01	-	-
CD (P=0.05)	NS	NS	NS	NS	11.36	2.17	5.69	-	-

Yield and Econmics

The treatment T_8 (50 % NPK+ 25 kg FYM + 5 kg vermicompost per tree) gave maximum yield 90 (q ha^{-1}), followed by treatment T_4 (89.07q ha^{-1}) and T_5 (87.32 q ha^{-1}). These treatments gave 12.2, 11.1 and 8.9 percent higher yield as compared to control in which 100 % NPK was given through fertilizers. It may be due to increase in number of fruits/tree by 5.3 to 10.0 % and fruit yield/plant 8.9 to 11.1 percent as compared to T_1 in which 100 % NPK given through fertilizers. Integrated use of NPK along with FYM, vermicompost and mulching in T_8, T_4, and T_5 gave higher yield by 8-12 percent as compared to T_1. Dutta *et al.* (2000) reported higher yield of guava due integrated use of FYM, vermicompost and 50% NPK through fertilizers. The treatment T_4 gave maximum net profit of Rs. 53438 ha^{-1}, followed by 50 % NPK+ 25 kg FYM + 5kg vermicompost (Rs.53204 ha^{-1}) with benefit cost ratio of 2.49 and 2.44, respectively which were higher than all the treaments tried. This was due to higher yield and yield attributes in these treatments. The similar findings were also reported by Shukla *et al.* (2009).

Table 2: Fruit quality parameters of guava under different INM treatments

Treatments	T.S.S.0 Brix	Acidity (%)	Pulp seed ratio	Number of seed per fruit	100 seed weight (g)	Storage life of fruit at room temperature (days)
T_1	12.23	0.50	71.71	301	1.15	4.0
T_2	12.03	0.53	73.66	319	1.05	5.6
T_3	12.43	0.56	73.77	341	1.26	4.3
T_4	11.70	0.57	74.40	330	1.27	5.0
T_5	11.83	0.53	73.84	330	1.16	4.6
T_6	11.66	0.48	74.36	327	1.21	4.0
T_7	11.5	0.47	75.85	347	1.22	4.3
T_8	11.9	0.57	73.12	315	1.27	5.0
T_9	11.56	0.48	72.82	304	1.17	5.3
T_{10}	11.9	0.54	73.29	308	1.12	6.3
T_{11}	11.73	0.51	75.91	387	1.33	60
SEm±	0.14	0.015	2.88	9.53	0.04	0.63
CD (P=0.05)	0.394	NS	NS	26.95	0.12	NS

Fruit Quality

Among the fruit quality parameters, the total soluble solids, number of seeds per fruit and 100-seed weight were influenced significantly due to INM treatments. Out of these, T_4 and T_8 treatments increased the TSS of guava fruits significantly which may be attributed to increased absorption of nutrients by the plants as a result of improved physico-chemical and biological activities in the soil. These results are in close agreement with those of Athani *et al.* (2007) and Shukla *et al.* (2009). The number of seeds (387 per fruit) and 100-seed weight (1.33g) were found significantly higher under T_{11} treatment having 50%NPK+ 25kg FYM 250 g Aspergillus niger.This might be attributed to the combined role of these inputs upon the better partitioning of metabolites from source to the sink. The fruit quality with respect to acidity, pulp: seed ratio and storage life of fruits did not change up to significant extent due to INM treatments. However, significant changes may occur after one year or so which needs further observations on the same trees.

The findings allude that amongst the INM treatments, T8 or T4 may be applied to secure maximum profit from guava cv. Allahabad Safeda. Fruit qualities viz. acidity, pulp: seed ratio and storage life of fruit were not influenced due to INM treatments.

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