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Short communication

EFFECT OF INTEGRATED NUTRIENT MANAGEMENT IN GUAVA ON SOIL PROPERTIES

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Guava (*Psidium guajava* L.) is the most important fruit known as poor men's apple due to its cheaper rates, nutrition (Vitamin-C and essential minerals) and availability almost throughout the year. Nutrient management in guava orchards is major factor for vegetative growth and quality fruit production as well as to maintain the soil properties. Application of inorganic fertilizer to meet the major soil nutrients for longer period may result in soil and environmental hazards. Considering the deterioration of soil health, integrated use of organic, inorganic and bio-fertilizers is needed. Such information is not available properly on guava therefore, the present study was undertaken to generate the sufficient information regarding some properties of guava soils.

The experiment was conducted at Experimental station, Narendra Dev University of Agriculture and technology Kumarganj, Faizabad (U.P.) during season 2008-09. The investigation was laid out in randomized block design having sixteen treatments of different organic, inorganic and biodynamic fertilizers which were replicated thrice. The details of treatment were as T_1 : 20 kg FYM + N 400 g urea 300 g single super phosphate and 250 g muriate of potash per plant + 80 g $ZnSO_4$, T_2: 20 kg FYm + NPK + 70 g $CuSO_4$, T_3: 20 kg FYM + NPK + 50 g $FeSO_4$, T_4: 20 kg FYM + 50% NPK + $ZnSO_4$ + Cu SO_4 + Fe SO_4, T_5: 10 kg decomposed bio pressmud + NPK + Zn SO_4, T_6:10 kg decomposed bio pressmud + NPK + $CuSO_4$, T_7: 10 kg decomposed bio pressmud + NPK + Fe SO_4 , T_8: 10 kg decomposed bio-pressmud + 50% NPK + $ZnSO_4$ + $CuSO_4$ + $FeSO_4$, T_9: 40 kg FYM + Bioveta basal application (50 g/plant), T_{10}: 40kg FYM + Bioveta foliar application (2ml/L), T_{11}: 20kg decomposed bio pressmud + Bioveta basal application (50 g/plant), T_{12}: 20kg decomposed bio pressmud + Bioveta foliar application (2ml/L), T_{13}: 20kg FYM + NPK, T_{14}: 10kg decomposed bio pressmud + NPK, T_{15}: 40 kg FYM (alone) and T_{16}: 20kg decomposed bio pressmud alone. Ten years old orchard of guava cv L.-49 (Sardar) having 8x8 m plant to plant distance and 3x3 m basin size was used as experimental field. The calculated amounts of nutrients were applied into two split dose as per treatment.

Table 1: Effect of treatments on physical properties of soil in guava orchard

Treatments	pH	EC (dSm^{-1})	ESP	O C ($g\ kg^{-1}$)	Moisture (%)
T_1	8.6	3.60	31.48	3.50	18.0
T_2	8.6	3.63	31.44	5.54	18.0
T_3	8.6	3.60	31.40	3.52	18.0
T_4	8.1	3.54	31.40	3.50	18.2
T_5	8.5	3.56	29.36	3.48	18.1
T_6	8.5	3.56	29.34	3.47	18.3
T_7	8.5	3.55	29.30	3.48	18.0
T_8	8.5	3.58	29.33	3.46	18.4
T_9	8.4	3.58	30.30	4.33	18.8
T_{10}	8.4	3.60	30.29	4.32	16.0
T_{11}	8.4	3.64	29.32	4.32	18.9
T_{12}	8.4	3.63	29.32	4.60	18.9
T_{13}	8.4	3.60	29.30	4.60	19.0
T_{14}	8.4	3.50	30.33	4.28	18.2
T_{15}	8.3	3.50	29.35	4.66	19.0
T_{16}	8.4	3.50	29.30	4.69	19.2
SEm±	0032	0.011	0.068	0.014	0.312
CD (P=0.05)	0.094	NS	0196	0.042	0.889
Initial	9.2	3.70	40.0	3.05	17.8

The physico-chemical properties of soil were analyzed by standard methods (Jackson, 1973). The bacteria and fungi population were analyzed with isolation of composite soil samples by dilution plate technique using culture media. The pH and ESP decreased significantly due to different treatment combinations (Table 1). However, the decrement in EC was found non significant. The minimum values of pH (8.1), EC (3.5 dSm^{-1}), ESP (29.3), were recorded under T_4, T_{14} and T_{10}, respectively. However, maximum values of these properties were recorded under T_1 treatment. The findings are in accordance to earlier observations made by Pereira and Mitra (1999) and Ingle et al (2001). The organic Carbon and moisture content were increased with increasing levels of farmyard manure and pressmud over initial values of these two parameters. The application of FYM and pressmud were statistically at par with respect to organic carbon and moisture content.

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Table 2: Effect of various treatments on chemicals and biological properties of soils of guava orchards

Treatments	Available Nitrogen (kg ha^{-1})	Available phosphorus (kg ha^{-1})	Available Potassium (kg ha^{-1})	Fungal population $000g^{-1}$	Bacterial population mg^{-1} of soil
T_1	142.0	20.0	184.0	175.0	3.5
T_2	141.0	19.8	183.0	163.0	3.0
T_3	141.0	20.0	184.0	172.0	3.2
T_4	145.0	20.8	185.0	178.8	3.8
T_5	144.0	20.7	185.0	180.0	4.5
T_6	144.0	20.5	184.0	182.2	4.5
T_7	143.0	20.8	184.0	185.0	4.0
T_8	144.0	20.0	185.0	183.0	4.5
T_9	149.0	20.0	182.0	180.0	5.0
T_{10}	150.0	19.5	182.0	165.0	5.7
T_{11}	148.0	19.6	183.0	175.0	5.0
T_{12}	144.0	19.2	181.0	160.0	3.8
T_{13}	149.0	19.0	181.0	150.0	3.0
T_{14}	148.0	19.8	182.0	140.0	3.0
T_{15}	148.0	19.7	183.0	170.0	3.7
T_{16}	148.0	19.5	181.0	160.0	3.8
CD (P=0.05)	1.17	1.08	1.47	8.38	1.77
Initial	125.0	18.0	165.0	145.0	2.8

The data (Table 2) clearly indicated the amounts that of available nutrients in guava basins soils increased significantly over their values with various treatments. The highest concentration of available N (150 ha^{-1}) P (20.8 kg ha^{-1}) and K (185 kg ha^{-1}) were recorded in T_{10} and T_4 treatments respectively. While as, the lowest content of available N, P and K, were noted under T_2, T_{13} and T_{16} treatments respectively. Application of FYM proved superior to other organic manures in respect of available N, P and K contents in guava orchard soils. The microbial population (Fungal as well as bacterial) were found significantly maximum (1,95,000 g^{-1} and 6.50 mg^{-1} of soil of fungal and bacterial respectively) under treatment combination of T_5 (10 kg decomposed bio pressmud + NPK + $ZnSO_4$) followed by T_4 and T_8 treatments. The minimum fungal and bacterial population were counted on the soil of T_{16} (20 kg decomposed bio pressmud alone) treatment. The increment in available N, P, K as well as microbial population might be due to the balanced dose of almost all essential nutrients combined with organic matter and micronutrients which also provide a good medium for microbial growth and development. The results are enclosing agreement with findings of Vedamani *et al.* (2006) in acid lime and Vishwanath *et al.* (2008) under orchard of aonla.

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