International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2018; 6(5): 2577-2579

Received: 24-07-2018
Accepted: 25-08-2018

Pratibha Jatav
Ph.D. Scholar, Department of Horticulture, College of Agriculture, RVSKVV, Gwalior, Madhya Pradesh, India

AK Barholia
Professor, Department of Horticulture, College of Agriculture, RVSKVV, Gwalior, Madhya Pradesh, India.

Arjun Kashyap
Ph.D. Scholar, Department of Horticulture, College of Agriculture, RVSKVV, Gwalior, Madhya Pradesh, India

Correspondence
Pratibha Jatav
Ph.D. Scholar, Department of Horticulture, College of Agriculture, RVSKVV, Gwalior, Madhya Pradesh, India

Impact of organic, inorganic and bio-fertilizer on vegetative growth, reproductive growth and fruit yield of guava (CV. G-27)

Pratibha Jatav, AK Barholia and Arjun Kashyap

Abstract
In order to estimate the impact of organic, inorganic and bio-fertilizer, a field trial was conducted at Pomology Orchard, College of Agriculture, Gwalior (M.P.). The experiment was laid out in Randomized Block Design (RBD) with three replication and twenty three treatments consisting of soil application of nitrogen, phosphorus, potash, vermi-compost, Neem-cake, FYM, Azotobacter, Phosphate solubilizing bacteria (PSB), Potash rich and no fertilizer, manures and bio fertilizer as a control in well established guava orchard. The two years pooled data (2016-17 & 2017-2018)revealed that the application of T_{23} = 75% NPK (375:225:300g)+ Neem cake 8 kg + Azotobacter 30ml +Potash rich 30ml +PSB 30ml per tree significantly influence the vegetative, reproductive and yield parameters of guava. Maximum increase in Tertiary shoot length (28.9 cm), maximum Shoot diameter (5.32 mm), maximum number of leaves per shoot (31.2), maximum no. of flower per Shoot (11.3), maximum fruit setting (86.0%), minimum fruit drop (14.0%), maximum fruit retention (71.9%), maximum no. of fruit per tree (313.7), maximum Fruit weight (241.6g), maximum fruit Yield (76.2kg/ tree), maximum fruit yield (211.6 q/ ha) were obtained with treatment 75% NPK (375:225:300g)+ Neem cake 8 kg + Azotobacter 30ml +Potash rich 30ml+PSB 30ml per tree (T_{23}).

Keywords: Organic manure, inorganic fertilizer, bio-fertilizer, growth, yield, guava

Introduction
Guava (*Psidium guajava* L.), is one of the most popular fruits grown in tropical, sub-tropical and some parts of arid regions of India. Guava belongs to the family Myrtaceae. Basically guava is a hardy crop but it gives good response to manuring and fertilization. Like any other plants, guava also requires different nutrient elements for proper growth and yield. Use of inorganic fertilizers,organic manures along with biofertilizers are chief sources of plant nutrients have resulted in beneficial effects on growth, yield and quality of various fruit crops (Ram and Rajput, 2000) [5]. In general, the fruit tree supplemented with mixed quantity of the inorganic fertilizers and inorganic manures at full bearing stage to harvest sustainable production with optimum quality fruits. The total area under guava cultivation and production in India is about 2.51 lakh hectares and 4083,000 MT, respectively. The productivity of guava in India is 16.2 MT/ha. The total area and production of guava in Madhya Pradesh is around 24370 hectares and 9.12 Lakh MT, respectively. Madhya Pradesh ranks first in productivity with 37.4 MT/ha. Guava shares 4.5 percent of area and 3.3 percent of production among fruit crops in India (Anonynous, 2015) [1].

Materials and Methods
The investigation was carried out at the Pomology orchard, College of Agriculture, Gwalior (M.P.) on 22 year old guava tree of cv. Gwalior 27.Gwalior cultivar situated at 26^0 13' N latitude and 78^0 14' E longitudes at an altitude of 211.5 m above mean sea level in Gird belt. It has a subtropical climate with hot and dry summer where maximum temperature exceeds 45^0 C in May June. The winters are cold and minimum temperature reaches as low as 2^0 C in December and January. The experiment comprised of three replications with 23 treatments viz., T_1 = Control, T_2 = 100% NPK (500:300:400g) per tree, T_3 = 100% NPK + FYM 30kg per tree, T_4 = 100% NPK + Vermi-compost 15 kg /tree, T_5 = 100% NPK + Neem cake 8 kg per tree, T_6 = 75% NPK (375:225:300g) + FYM 30kg per tree, T_7 = 75% NPK + Vermi-compost 15 kg per tree, T_8 = 75% NPK + Neem cake 8 kg per tree, T_9 = 75% NPK +FYM 30kg + Azotobacter 30ml per tree, T_{10} = 75% NPK+FYM 30kg + Potash rich 30ml per tree, T_{11} =

75% NPK +FYM 30kg + Azotobacter 30ml+PSB 30ml per tree, T_{12} = 75% NPK +FYM 30kg + Potash rich 30ml+PSB 30ml per tree, T_{13} = 75% NPK +FYM30kg+Azotobacter30ml +Potash rich 30ml+PSB 30ml per tree, T_{14} = 75% NPK+Vermi compost 15kg + Azotobacter 30ml per tree, T_{15} = 75% NPK + Vermi compost 15kg + Potash rich 30ml per tree, T_{16} = 75% NPK+ Vermi compost 15kg + Azotobacter 30ml+PSB 30ml per tree, T_{17} = 75% NPK + Vermi compost 15kg + Potash rich 30ml+PSB 30ml per tree, T_{18} = 75% NPK + Vermi compost 15kg + Azotobacter 30ml +Potash rich 30ml+PSB 30ml per tree, T_{19} =75% NPK + Neem cake 8 kg + Azotobacter 30ml per tree, T_{20} =75% NPK + Neem cake 8 kg + Potash rich 30ml per tree, T_{21} = 75% NPK + Neem cake 8 kg + Azotobacter 30ml+PSB 30ml per tree, T_{22} = 75% NPK + Neem cake 8 kg + Potash rich 30ml+PSB 30ml per tree, T_{23} = 75% NPK + Neem cake 8 kg + Azotobacter 30ml +Potash rich 30ml+PSB 30ml per tree. The whole quantity of the organic manure and bio fertilizer (Azotobater, PSB and Potash rich) was applied as a basal dose on the onset of monsoon. Then required doses of fertilizers were applied in two split doses in the month of July and August. For application of manure and fertilizers the top soil around the tree (equal to the leaf canopy of the tree) was dug up to 30 cm and the fertilizers were uniformly mixed into the soil, which was then leveled. Irrigation was supplied immediately after fertilizer application

Results and Discussions

It is evident from the data (Table 1 and 2) that vegetative as well as reproductive growth and yield were significantly influenced by the application of different combinations of organic, inorganic and biofertilizers

Table 1: Effect of Organic Fertilizer, Inorganic Fertilizer and Bio-fertilizer, on Vegetative and Reproductive growth of guava

Treatment	Tertiary shoot length (cm)	Shoot diameter (mm)	No. of leaves per shoot	No. of flower per shoot	Fruit setting (%)	Fruit drop (%)	Fruit retention (%)
T_1	9.9	3.10	15.5	5.17	53.9	46.1	47.8
T2	15.1	3.54	17.2	6.50	59.1	40.9	52.8
T3	15.8	3.76	17.5	6.67	59.9	40.1	54.0
T4	17.1	3.99	17.8	6.83	61.0	39.0	54.8
T5	17.5	4.22	18.2	7.00	62.8	37.2	56.0
T6	12.9	3.12	15.7	5.67	55.8	44.2	49.1
T7	13.7	3.19	16.7	5.67	57.2	42.8	50.0
T8	14.3	3.27	16.8	6.00	58.1	41.9	50.8
T9	18.0	4.38	18.8	7.33	63.8	36.2	56.7
T10	19.4	4.63	21.5	8.17	68.5	31.5	60.3
T11	20.7	4.82	23.3	8.33	72.4	27.6	64.3
T12	21.4	4.95	24.0	8.67	74.3	25.7	65.1
T13	26.5	5.23	28.3	10.0	80.8	19.2	70.3
T14	18.2	4.48	20.0	7.50	65.2	34.8	58.0
T15	19.9	4.70	22.3	8.00	69.3	30.7	61.4
T16	22.0	5.03	24.8	9.00	75.6	24.4	66.4
T17	22.7	5.10	25.3	9.33	77.3	22.7	67.2
T18	27.8	5.27	30.5	10.3	82.6	17.4	71.2
T19	18.6	4.58	20.7	7.67	66.9	33.1	58.7
T20	20.1	4.77	23.7	8.17	71.1	28.9	62.4
T21	24.1	5.15	26.3	9.50	79.3	20.7	68.2
T22	25.2	5.19	27.3	9.67	79.7	20.3	69.2
T23	28.9	5.32	31.2	11.3	86.0	14.0	71.9
SE(m)	0.458	0.088	0.426	0.275	0.776	0.670	0.299
CD (at 5%)	1.28	0.25	1.19	0.77	2.18	1.88	0.84

Table 2: Effect Organic Fertilizer, Inorganic Fertilizer and Bio-fertilizer, Yield parameters of guava

Treatment	No. of fruit per tree	Fruit weight (g)	Fruit Yield (kg/ tree)	Fruit yield (q/ ha)
T_1	165.3	190.0	31.5	87.4
T2	201.8	206.8	41.8	116.1
T3	213.7	207.8	44.6	123.8
T4	225.0	210.5	47.7	132.4
T5	230.8	212.9	49.4	137.4
T6	172.8	196.9	34.1	94.6
T7	183.5	199.6	36.5	101.5
T8	192.0	201.8	38.8	107.8
T9	241.8	213.5	51.9	144.3
T10	255.8	216.6	55.7	154.8
T11	271.3	224.8	61.3	170.1
T12	280.3	225.5	63.6	176.6
T13	304.5	236.2	72.3	200.9
T14	247.0	215.0	53.4	148.2
T15	259.5	219.0	57.2	158.9
T16	285.0	227.5	65.2	181.0
T17	290.7	229.2	67.0	186.1
T18	307.7	239.1	74.0	205.5
T19	252.0	216.1	54.8	152.2

T20	263.7	221.6	58.8	163.4
T21	294.0	230.7	68.2	189.4
T22	297.3	231.5	69.2	192.2
T23	313.7	241.6	76.2	211.6
SE(m)	3.961	2.741	1.068	2.961
CD (at 5%)	11.14	7.71	3.00	8.33

Vegetative growth

Data given in Table 1 revealed that the maximum increase in tertiary shoot length (28.9 cm), maximum shoot diameter (5.32 mm), maximum number of leaves per shoot (31.2) was recorded in the trees treated with 75% NPK (375:225:300g)+ Neem cake 8 kg + Azotobacter 30ml +Potash rich 30ml+PSB 30ml per tree(T_{23}). The positive influence of bio-fertilizers in combination with chemical fertilizers on growth performance in respect of tertiary shoot length, shoot diameter and number of leaves per shoot might be due to the fact that application of NPK and neem cake along with *Azotobacter*, PSB and Potash rich. the useful effect of nitrogen is certainly the results of an increase in growth attributes. As nitrogen is the major constituent of fertilizers applied and as it is constituent of the protein which is essential for formation of protoplasm thus affecting the cell division and cell elongation and encourages above ground vegetative growth abd imparts deep green colour to the leaves. Inoculation with *Azotobacter* a biological nitrogen fixer improved the nitrogen use efficiency of the plant. In addition to this phosphorus plays an important role in energy transformation and it is essential for cell division and fat and albumin formation. Potassium plays an important role in photosynthesis and translocation of sugar. Findings are in conformity with those of Ram *et al.* (2005) [8], Shukla *et al.* (2009) [6] in guava

Reproductive growth

It is evident from the data shown in Table 1 that maximum no. of flowers per shoot(11.3), maximum fruit setting (86.0%), minimum fruit drop (14.0%), maximum fruit retention (71.9%) was recorded with the application of 75% NPK (375:225:300g)+ Neem cake 8 kg + Azotobacter 30ml +Potash rich 30ml+PSB 30ml per tree (T_{23}). It may be due to the supply of the nutrients to the tree as per the requirement of the crop which had induced more flowering and fruit set. This was supported by the findings of Chaudhury *et al*. (1975) [2].

Yield

It is obvious from the data given in Table 2, that maximum no. of fruit per tree (313.7), maximum fruit weight (241.6g), maximum fruit yield (76.2kg/ tree), maximum fruit yield (211.6 q/ ha) were recorded in the trees treated with 75% NPK (375:225:300g)+ Neem cake 8 kg + Azotobacter 30ml +Potash rich 30ml+PSB 30ml per tree(T_{23}) Neem cake is rich in plant nutrients and it improved the general appearance of fruit, leafage, growth, blossoming and strenthening the roots. When mixing with any nitrogen fertilizers it slow the conversion of nitrogenous compounds imto a nitrogen gas, thus making nitrogen available to the plant for a longer duration. It is a totally organic plant food which increases productivity and soil fertility. Similar result were observed by Ram *et al*. (1998) [4], Ram and Rajput (2000) [5] in guava and by Vedamani *et al*. (2006) [7] and Musmade *et al*. (2009) [3] in acid lime.

References

1. Anonymous. Horticulture statistics division, DAC & FW, 2015, 17p, 185p.
2. Chaudhury DN, Shyamal NR, Maurya KR. Influence of inorganic and organic manures alone and in combination on growth, yield and chemical qualities of guava (*Psidium guajava* L.). Indian Food Packer. 1975; 29:24-26.
3. Musmade AM, Jagtap DD, Pujari CV, Hiray SA. Integrated nutrient management in acid lime. Limbu Samachar. 2009; 15:36-40.
4. Ram RA, Rajput MS, Bhriguvanshi SR. Effect of organic and biofertilizers on growth, yield and fruit quality of guava cv. Allahabad Safeda. Internat. J Mendel, 1998; 15(1-2):17-18.
5. Ram RA, Rajput MS. Role of biofertilisers and manures in production of guava (*Psidium guajava* L.) cv. Allahabad Safeda. Haryana J Hortic. Sci. 2000; 29(3):193-194.
6. Shukla AK, Sarolia DK, Bhavana Kumari, Kaushik RA, Mahawer LN, Bairaw HL. Evaluation of substrate dynamics for integrated nutrients management under high density planting of guava cv. 'Sardar'. Indian J Hort., 2009; 66(4):461-464.
7. Vedmani GM, Ramavatharam N, Haribabu K. Effect of graded levels of nitrogen through organic and inorganicsources on yield and quality of acid lime (*Citrus aurantifolia* S.). The Orissa J of Hort. 2006; 34(1):49-51
8. Ram RA, Bhriguvanshi SR, Garg N, Pathak RK. Studies on organic production of guava (*Psidium guajava* L.) cv. 'Allahabad Safeda'. 1st international guava symposium, Dec. 5-8, CISH, Lucknow (U.P.) INDIA, 2005, 69-70.