Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; SP1: 2076-2079

Sudhir Jamwal
Department of Horticulture Sam Higginbottom University of Agriculture Technology and Sciences, Allahabad, U.P, India

Saket Mishra
Department of Horticulture Sam Higginbottom University of Agriculture Technology and Sciences, Allahabad, U.P, India

Sandeep Singh
Department of Horticulture Sam Higginbottom University of Agriculture Technology and Sciences, Allahabad, U.P, India

Correspondence
Sudhir Jamwal
Department of Horticulture Sam Higginbottom University of Agriculture Technology and Sciences, Allahabad, U.P, India

Effect of integrated nutrient management on physical characteristics of Guava under Meadow Orcharding CV. Allahabad Safeda

Sudhir Jamwal, Saket Mishra and Sandeep Singh

Abstract
An experiment was carried out during 2016 in the central field of Department of Horticulture Sam Higginbottom University of Agriculture Technology and sciences, Allahabad (U.P) on three years old guava plants under Meadow orcharding cv. Allahabad safeda. The results revealed that the application of Azatobacter + (100% Nitrogen through urea) $T_{11,}$ significantly influence the physical parameters of guava, Maximum increase in tree height (21.99%), canopy spread N-S direction (23.57%), and E-W (23.50%) were obtained with treatment T_{11}. whereas maximum number of fruits/tree (21), Maximum average fruit weight (190.10gm), Maximum fruit length (7.10cm), Maximum fruit diameter (7.15 cm), Maximum fruit volume (192.13), Maximum fruit yield/tree (3.99Kg),Fruit yield/ha (199.58 q) has been obtained with treatment T_{14} Azotobacter + (75% Nitrogen through urea + 25 % Vermicompost)

Keywords: Guava, Allahabad safeda, integrated nutrient management, Physical parameters

Introduction
Guava (*Psidium guajava*) belongs to the family Myrtacea, and native to tropical America is one of the most common and valuable fruit crop grown in tropical and subtropical regions of the country, due to its hardy nature the trees even grown in the marginal lands as its cultivation requires little care and inputs. Globally India, Brazil, Mexico, South Africa, Jamaica, Kenya, Cuba, United States of America, Egypt, Thailand, Columbia and Pakistan are the major producer of guava fruits. In India guava is the fifth important fruit crop after mango, citrus, banana and apple, major guava producing states are Madhya Pradesh, Uttar Pradesh, Maharashtra, Bihar, Andhra Pradesh, Rajasthan, Gujarat, Karnataka and Tamil Nadu, covering a total area of 268 thousand hectares with total production of 3668 thousand tonnes and productivity of 13.07 t/ha, (National Horticulture board database 2014). Due to the hazardous effect of chemical fertilizers the need of the hour is to adopt an integrated approach to supply all the essential nutrients to the plants without harming the soil and environment, now a day's Integrated Nutrient Management (INM) gaining significance in the field of fruit production as INM maintains the soil health, minimize environmental pollution and cut down on the use of chemical fertilizers and provide most of the nutrients to the plants at low cost, ultimately benefiting most of the farmers who are small and marginal and cannot afford to buy expensive chemical fertilizers. Integrated nutrient management involves the combine use of various plant nutrient supply system, the use of organic manure along with bio-fertilizers and inorganic fertilizers as a cheap source of available nutrient to plants and has resulted in beneficial effects on growth, yield and quality of various fruit crops under normal spacing (Ram and Rajput, 2000).

The high density or meadow orcharding facilitates enhance production and quality of fruits. The Meadow Orchard is a modem method of fruit cultivation by adopting modified canopy system. Better light distribution within tree canopy increases the number of well illuminated leaves. It also promotes rate of photosynthesis that leads to high yield per unit area. This system of guava planting is going to revolutionize the guava industry by enhancing productivity coupled with reduction in production costs. The meadow orchard system of guava accommodates 5000 plants ha^{-1}, planted at 2.0 x 1.0 m spacing. Keeping in view the above mentioned points the present investigation was conducted to find out the best combination of integrated nutrient management for sustainable production.

Materials and Methods
The experiment has been carried out at the Central Research Farm, Department of Horticulture, Sam Higginbottom University of Agriculture, Technology & Science, Allahabad

(U.P.) -211007, during the year 2016 in winter season crop i.e Ambe Bahar. The soil of the experimental area is sandy loam in texture with soil reaction in almost neutral range (pH 7.2), organic carbon is 0.51%, nitrogen is available but phosphorus and potash are in medium to higher range. Average annual rainfall is 1100 mm precipitating mostly in between middle of July to end of September, January is the coldest month when mercury may drop down to an average minimum of 5^0 C on the other hand May to June are the hottest months recording average high temperature above 46^0 C. Uniform, healthy and disease free, 03 year old Guava plants (Allahabad Safeda) under meadow orcharding (2m x 1m) has been selected for the present investigations during 2016. The Experiment consisted of 20 treatment combinations applied to individual plant in three replications in Complete Randomized Design (CRD) which are as follows:

T_0 = Control
T_1 = 100% of Nitrogen/tree through Urea
T_2 = 100% N/tree through organic manure (33.3% FYM + 33.3% Vermicompost + 33.3% Poultry manure)
T_3 = 75% N/tree through urea + 25% N/tree through FYM
T_4 = 75% N/tree through urea + 25% N/tree through Vermicompost
T_5 = 75% N/tree through urea + 25% N/tree through poultry manure
T_6 = 50% N/tree through urea + 25% FYM +25 % Vermicompost
T_7 = *50*% N/tree through urea + 25% FYM +25% poultry manure.
T_8 = 50% N/tree through urea + 25% poultry manure + 25 % Vermicompost
T_9 = 25% N/tree through urea+25% FYM +25% poultry manure+25 % Vermicompost
T_{10} = 100% Nitrogen/tree through biofertilizer (Azotobactor)
T_{11}=Azotobactor + T_1 (100% of Nitrogen/tree through Urea)
T_{12}= *Azotobactor* + T_2 (100% N/tree through organic manure)
T_{13} = *Azotobactor* + T_3 (75% N/tree through urea + 25% N/tree FYM)
T_{14} = *Azotobactor* +T_4 (75% N/tree through urea + 25% N/tree through Vermicompost)
T_{15} = *Azotobactor* + T_5 (75% N/tree through urea + 25% N/tree through poultry manure)
T_{16} = *Azotobacto*r+ T_6 (50% N/tree through urea + 25% FYM +25 % Vermicompost)
T_{17} = *Azotobactor* + T_7 (50% N/tree through urea + 25% FYM +25% poultry manure)
T_{18} = *Azotobacto*r + T_8 (50% N through urea+25% poultry manure + 25% Vermicompost),
T_{19} = *Azotobacto*r+ T_9 (25% N/tree through urea+25% FYM +25% poultry manure+25 % Vermicompost.

The height of the plant was measured with the help of a measuring device during the time of application of the treatment and after the harvesting of the fruits, whereas percent increase in height has been measured by the following formula.

$$\text{Per cent increase in plant height} = \frac{\text{Plant height (AFH) - Plant height (BFA)}}{\text{Plant height (BFA)}} \times 100$$

Note: **AFH** = After fruit harvest,
BFA = Before fertilizer application.

The plant spread was measured with the help of a measuring device from (N-S and E-W) during the time of application of the treatment and after the harvesting of the fruits, whereas percent increase in plant spread has been measured by the following formula.

$$\text{Percent increase in plant spread} = \frac{\text{Plant spread (AFH) – Plant spread (BFA)}}{\text{Plant spread (BFA)}} \times 100$$

Note: **AFH** = After fruit harvest,
BFA = Before fertilizer application

Whereas Fruit length and diameter were measured using the vernier caliper, Volume of the fruit was obtained by water displacement method, Weight and yield/plant was recorded using electronic weight balance, Yield/ha has been obtained by multiplying yield/tree with 5000, since plants are planted at the spacing of (2x1).

Results and Discussion

It has been observed that there was very little improvement in all the physical parameters in guava when the nutrients were applied with only organic fertilizers or inorganic fertilizers or bio fertilizers respectively, but growth parameters and yield parameters significantly increased when the combined application of organic, inorganic and bio fertilizers were applied. Table-1 on growth characteristics of guava i.e plant height, canopy (N-S and E-W) has shown significant increase in percentage when data recorded after harvesting of the fruits to the data that has been recorded at the time of application of the treatments where maximum increase in plant height (21.99%), canopy (23.57%) N-S, canopy (23.50%) E-W has obtained with T_{11}=Azotobactor + T_1 (100% of Nitrogen/tree through Urea) it clearly shows that nitrogen significantly influenced the vegetative growth in the plants.

Table 1: Effect of Integrated Nutrient Management on Plant height, Plant spread (N-S) and (E-W) of Guava (*Psidium guajava* L.) cv. Allahabad Safeda under Meadow orcharding

Treatment	Plant height (m)		% Increase	Plant spread (N - S) (m)		% Increase	Plant spread (E- W) (m)		% Increase
	Before treatment	After harvesting		Before treatment	After harvesting		Before treatment	After harvesting	
T_0	1.37	1.51	10.49	1.20	1.33	10.83	1.17	1.31	11.93
T_1	1.60	1.92	19.75	1.25	1.55	24.00	1.20	1.48	23.40
T_2	1.39	1.55	11.78	1.22	1.38	13.42	1.21	1.37	13.22
T_3	1.50	1.78	18.93	1.30	1.57	21.08	1.29	1.55	20.21
T_4	1.52	1.80	18.68	1.31	1.58	20.61	1.30	1.57	20.72
T_5	1.50	1.79	19.33	1.30	1.58	21.85	1.30	1.57	20.82
T_6	1.44	1.67	15.70	1.24	1.49	20.16	1.25	1.48	18.35
T_7	1.44	1.69	17.63	1.26	1.51	19.84	1.25	1.49	19.20
T_8	1.48	1.72	16.22	1.28	1.53	19.84	1.28	1.52	18.70
T_9	1.41	1.61	14.18	1.23	1.43	16.26	1.22	1.42	16.39
T_{10}	1.38	1.54	11.62	1.20	1.36	13.33	1.20	1.36	13.33
T_{11}	1.61	1.96	21.99	1.34	1.66	23.57	1.28	1.58	23.50
T_{12}	1.40	1.58	12.59	1.22	1.40	14.44	1.21	1.40	15.70
T_{13}	1.55	1.74	12.50	1.33	1.63	22.86	1.32	1.59	20.51
T_{14}	1.60	1.89	18.13	1.35	1.65	22.52	1.33	1.61	21.00
T_{15}	1.55	1.85	19.35	1.34	1.64	22.08	1.33	1.61	21.05
T_{16}	1.54	1.78	15.58	1.32	1.56	18.48	1.32	1.58	19.75
T_{17}	1.53	1.78	16.34	1.32	1.57	19.24	1.31	1.57	19.90
T_{18}	1.54	1.79	15.98	1.32	1.57	18.94	1.32	1.58	19.75
T_{19}	1.42	1.62	13.82	1.25	1.47	17.60	1.23	1.45	17.89
F- test	**S**	**S**		**S**	**S**		**S**	**S**	
S. Ed. (±)	**0.02**	**0.01**		**0.014**	**0.013**		**0.014**	**0.013**	
C. D. (P = 0.05)	**0.04**	**0.03**		**0.028**	**0.026**		**0.028**	**0.026**	

whereas Table 2 shows that maximum average fruit weight (190.10 g), fruit length (7.10 cm), fruit diameter (7.15 cm), number of fruits/tree (21.0), fruit yield/tree (3.99 kg), fruit yield/ha (199.58 qts) has been obtained with T_{14} = *Azotobactor* +T_4 (75% N/tree through urea + 25% N/tree through Vermicompost), same results were also given by Sharma *et al.* (2013).

Table 2: Effect of Integrated Nutrient Management on growth and fruit yield characteristics of Guava (*Psidium guavajava L*) cv, Allahabad Safeda under Meadow orcharding

Treatments	No. of fruits/tree	Av. Fruit weight (gm)	Fruit length (cm)	Fruit diameter (cm)	Yield/tree (Kg)	Yield/ha (q)	Fruit Volume (cc)
T_0	10.33	112.75	5.10	5.12	1.17	58.26	114.55
T_1	14.33	132.00	6.03	5.86	1.89	94.60	133.15
T_2	13.00	122.15	5.50	5.52	1.59	79.39	122.10
T_3	18.67	170.25	6.27	6.10	3.18	158.91	171.45
T_4	19.33	182.65	6.33	6.14	3.53	176.57	178.20
T_5	19.00	175.33	6.28	6.11	3.33	166.57	173.58
T_6	16.67	159.00	6.17	6.01	2.65	132.49	160.90
T_7	16.00	152.05	6.14	5.91	2.43	121.64	159.10
T_8	16.67	155.20	6.18	6.04	2.59	129.32	160.17
T_9	15.00	140.00	5.97	5.57	2.10	104.97	138.47
T_{10}	12.00	119.50	5.24	5.46	1.43	71.71	141.40
T_{11}	14.67	136.50	6.10	5.90	2.00	100.09	136.05
T_{12}	13.67	128.35	5.95	5.55	1.75	87.71	130.35
T_{13}	20.00	182.90	6.79	6.90	3.66	182.88	181.63
T_{14}	21.00	190.10	7.10	7.15	3.99	199.58	192.13
T_{15}	20.67	185.50	7.01	7.04	3.83	191.69	185.82
T_{16}	18.00	170.00	6.29	6.30	3.06	153.00	167.92
T_{17}	17.00	165.12	6.27	6.30	2.81	140.35	165.12
T_{18}	17.00	168.55	6.28	6.26	2.87	143.27	168.00
T_{19}	15.33	145.35	6.01	6.05	2.23	111.43	146.76
F- test	**S**	**S**	**S**	**S**	**S**	**S**	**S**
S. Ed. (±)	**0.61**	**0.49**	**0.16**	**0.05**	**0.09**	**4.70**	**1.18**
C. D. (P = 0.05)	**1.24**	**1.00**	**0.33**	**0.10**	**0.19**	**9.49**	**2.38**

It has been observed that Nitrogen and vermicompost improves microbial distribution and plays the important role in photosynthesis and accumulation of the food material, vermicompost also improves the moisture retention capacity in the soil. It may also act in activating the enzymes due to which the size of the fruits has considerably increased. It has been concluded that the application of organic manure with chemical fertilizer along with biofertilizer significantly influenced the physical characteristics that's why maximum number of fruits per plant, maximum average weight of per fruit, maximum fruit length, maximum fruit diameter, maximum yield per tree and maximum yield per hector has

been obtained with T_{14} = *Azotobactor* +T_4 (75% N/tree through urea + 25% N/tree through Vermicompost. The present findings are in accordance with the results reported by Domane *et al.* (2013), Sharma *et al.* (2013), Yadev *et al.* (2013) and Kumar *et al.* (2017).

In conclusion our results revealed that physical characteristics in guava has significantly influenced by the application of nitrogen in the form of 25gm Azotobacter + 25% vermicompost + 75% urea and it is concluded with the suggestion to adopt this treatment for sustainable production.

References

1. Dhomane PA, Kadam AS. Influence of different sources of nitrogen on yield and benefit cost ratio of guava (Psidium guajava L.) cv. Sardar, Scholarly *Journal of Agricultural Science* 2013; 3(7):261-263.
2. Kumar KR, Jaganath S, Guruprasad TR, Mohamad Tayeeb. Effect of organic, inorganic and biofertilizer sources on different spacing for vegetative growth and fruit yield of guava cv. Lalit. *International Journal of Agricultural Sciences and Research (IJASR).* 2017; 7(2):2250-0057.
3. National Horticulture Board Data Base, 2014.
4. Ram RA, Rajput MS. Role of biofertilizers and manures in production of guava (*Psidium guajava* L.) cv. Allahabad Safeda. Haryana Journal of Horticultural Sciences 2000; 29(3-4):193-194.
5. Sharma Akash, Wali VK, Bakshi P, Jasrotia A. Effect of organic and inorganic fertilizers on quality and shelf life of guava (*Psidium guajava* L.) cv. Sardar, *The Bioscan*, 2013; 8(4):1247-1250, 201.
6. Shukla AK, Sarolia DK, Kumari B, Kaushik RA, Mahawer LN, Bairwa HL. Evaluation of substrate dynamics for integrated nutrient management under high density planting of guava cv. Sardar. Indian J Hort. 2009; 66(4):461-464
7. Varsha G, Barne SG, Bharad VN, Dod, Baviskar MN. Effect of integrated nutrient management on yield and quality of Guava. Asian Journal of Horticulture, 2011; 6(2):546-548.
8. Yadav RI, Singh RK, Jat AL, Choudhary HR. Effect of nutrient management through organic sources on productivity and profitability of guava (*Psidium guajava* L.) under Vindhyan region. Environment and Ecology, 2013; 31(2A):735-737.