International Journal of Environment and Climate Change

Volume 13, Issue 8, Page 1615-1623, 2023; Article no.IJECC.101053
ISSN: 2581-8627
(Past name: British Journal of Environment & Climate Change, Past ISSN: 2231–4784)

Effect of Integrated Nutrient Management on Physical Characteristics of Guava (*Psidium guajava*) cv. Allahabad Safeda under Meadow Orcharding

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/IJECC/2023/v13i82111

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/101053

Original Research Article

Received: 01/04/2023
Accepted: 01/06/2023
Published: 14/06/2023

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ABSTRACT

The present study was carried out in the years 2022, at Central Research Farm, Department of Horticulture, Sam Higginbottom Institute of Agriculture & Sciences, Prayagraj (U.P.). Twenty treatments made up the experiment with : (T_0) Control, (T_1) 100% NPK (650:325:375g plant-1), (T_2) 100% NPK (650:325:375g plant-1)+FYM 13.2kg plant-1+VC 9.9kg plant-1+PM 3.3 kg plant-1, (T_3) 60% NPK (390:195:225g plant-1)+ FYM 16 kg plant-1, (T_4) 60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1, (T_5) 60% NPK (390:195:225g plant-1)+ PM 4 kg plant-1, (T_6) 40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+VC 9 kg plant-1, (T_7) 40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+PM 4 kg plant-1, (T_8) 40% NPK (260:130:150g plant-1)+ PM 3 kg plant-1+VC 9 kg plant-1, (T_9) 25% NPK (162.5:81.25:93.75)+FYM 10 kg plant-1+PM 2.5kg plant-1+VC 7.5 kg plant-1, (T_{10}) Aztobacter 250g plant-1, (T_{11}) Aztobacter 250g plant-1 +100% NPK (650:325:375g plant-1), (T_{12}) Aztobacter 250g plant-1+100% NPK (650:325:375g plant-1)+FYM 13.2kg plant-1+VC 9.9kg plant-1+PM 3.3 kg plant-1, (T_{13}) Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ FYM 16 kg plant-1, (T_{14}) Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1, (T_{15}) Aztobacter 250g plant-1+60% NPK (390:195:225g plant-1)+ PM 4 kg plant-1, (T_{16}) Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+VC 9 kg plant-1, (T_{17}) Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+PM 4 kg plant-1, (T_{18}) Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ PM 3 kg plant-1+VC 9 kg plant-1, (T_{19}) Aztobacter 250g plant-1+25% NPK (162.5:81.25:93.75)+FYM 10 kg plant-1+PM 2.5kg plant-1+VC 7.5 kg plant-1. These treatments were evaluated in Randomized Blocked Design with three replications. The results showed that a combination of different nutrients had a significant impact on the guava plant's growth and yield parameters, including minimum days required for flowering (24.16), from flower to fruit set (19.31), from fruit set to maturity (99.15), and fruits per plant (246.14), fruit weight (g) (144.74), fruit setting (%) (96.01), pulp weight (g) (136.03), total soluble solid (^{0}Brix) (9.52), Ascorbic acid (mg / 100 g) (206.88), minimum acidity (0.41)were all found to be best under the treatment (T_{14}) Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1, whereas acidity (0.80%) was at its highest in T_0 Control.

Keywords: INM; biofertilizer; micronutrients; guava; yield.

1. INTRODUCTION

Guava (*Psidium guajava* L.), belongs to the Myrtaceae family, It is a fruit that originated in Mexico or Central America and is now found across tropical America and the Caribbean. It was first introduced to India in the 17th century. It is known as the apple of the tropics and is a crucial tropical fruit crop that is produced throughout tropical and subtropical regions. It is referred to as poor man's fruit. Guavas are a highly common and well-liked fruit because of their affordable pricing, nutritional content, and pleasant taste. Although the fruit (berry) has a great source of pectin (0.5–1.8%) and ascorbic acid, it is poor in calories. Due to its hardy nature and prolific bearing even on marginal lands, the guava is a significant fruit crop throughout the country's tropical and subtropical areas [1-5]. Modern fruit farming techniques like the Meadow Orchard use tiny or dwarf trees with modified canopies. This system can support 5000 plants per hectare, which are planted at 2.0 m × 1.0 m spacing and are regularly topped, especially during the initial stages. Guava topping and hedging are useful for limiting tree growth and increasing fruit supply.. The organic manure plays a vital role as it supplies all the essential nutrients in a balanced form maintaining the soil health physically as well as chemically [6-8]. The Experiment revealed that the vermicompost was superior over other organic sources and closely followed by poultry manure and leaf litter in improving vegetative growth, flowering, fruiting, yield and fruit attributes and fruit quality along with improvement in soil fertility and leaf nutrient status of the guava plant [9].

The chemical fertilizers have played a very significant role in providing nutrients for intensive crop production, which has brought about manifold increase in production of fruit crops [10-15]. Though the chemical farming helped the farmers to accomplish new strides in Horticulture, but their indiscriminate and unscrupulous use in horticulture/agriculture has led to Deterioration of soil health. The increased use of fertilizers in an unbalanced manner, will be led to diminishing

soil productivity and multiple nutrient deficiencies [16-19]. The gravity of Environmental degradation caused by the faulty cultivation practices had led to a focus on an Ecologically sound, viable and sustainable farming system. One such alternative horticulture system, which will help to overcome the problem of soil degradation and declining soil fertility and crop yield, is integrated nutrient management (INM) [20,21,22].

The integration of organic manures and inorganic fertilizers was more effective in increasing the growth and yield of guava trees than the inorganic fertilizers alone [23,24]. It is also helpful to reduce the inorganic fertilizer requirement, to restore the organic matter in soil and to increase nutrient use efficiency, to maintain quality in terms of physical, chemical and biological properties of soil, to maintain the nutrient balance between the supplied nutrient and nutrient removed by plant and to improve soil health and productivity on a sustainable basis.

2. MATERIALS AND METHODS

A field experiment was conducted in 2022 at Central Research Farm, Department of Horticulture, Sam Higginbottom Institute of Agriculture & Sciences, Prayagraj (U.P.). The experiment was conducted in a randomized complete block design. The experiment consists of twenty treatments. The treatment were control (T_0) Control, (T_1) 100% NPK (650:325:375g plant-1), (T_2) 100% NPK (650:325:375g plant-1)+FYM 13.2kg plant-1+VC 9.9kg plant-1+PM 3.3 kg plant-1, (T_3) 60% NPK (390:195:225g plant-1)+ FYM 16 kg plant-1, (T_4) 60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1, (T_5) 60% NPK (390:195:225g plant-1)+ PM 4 kg plant-1, (T_6) 40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+VC 9 kg plant-1, (T_7) 40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+PM 4 kg plant-1, (T_8) 40% NPK (260:130:150g plant-1)+ PM 3 kg plant-1+VC 9 kg plant-1, (T_9) 25% NPK (162.5:81.25:93.75)+FYM 10 kg plant-1+PM 2.5kg plant-1+VC 7.5 kg plant-1, (T_{10}) Aztobacter 250g plant-1, (T_{11}) Aztobacter 250g plant-1 +100% NPK (650:325:375g plant-1), (T_{12}) Aztobacter 250g plant-1+100% NPK (650:325:375g plant-1)+FYM 13.2kg plant-1+VC 9.9kg plant-1+PM 3.3 kg plant-1, (T_{13}) Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ FYM 16 kg plant-1, (T_{14}) Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1, (T_{15}) Aztobacter 250g plant-1+60% NPK (390:195:225g plant-1)+ PM 4 kg plant-1, (T_{16}) Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+VC 9 kg plant-1, (T_{17}) Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+PM 4 kg plant-1, (T_{18}) Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ PM 3 kg plant-1+VC 9 kg plant-1, (T_{19}) Aztobacter 250g plant-1+25% NPK (162.5:81.25:93.75)+FYM 10 kg plant-1+PM 2.5kg plant-1+VC 7.5 kg plant-1. Five to Six years old guava trees of uniform vigor and size were selected for investigation. The whole tree was used as a single experimental unit. All the treatments were arranged in randomized block design and each treatment was replicated thrice. Thus, a total of 60 plants were selected for each set of experiment. The whole of the organic manure was applied as a basal dose at the onset of monsoon. Then required doses of fertilizers were applied in August and then bio-fertilizers were applied one week after each application of inorganic fertilizer. For the 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. Micronutrients were applied before flowering of guava plants. The various fruit parameters fruit length and diameter were noted using the vernier caliper, the volume of fruit was recorded by water displacement method and the weight of fruit was recorded using an electronic weighing balance. Yield per hectare was calculated on the basis number of trees per hectare and yield per plant. For the determination of chemical parameters of fruit viz., acidity, total soluble solids (TSS), sugars, ascorbic acid, pH and pectin content, four healthy fruits were selected randomly from each tree at full maturity stage. A hand refractometer was used for the determination of T.S.S. in 0Brix. Acidity was estimated by simple acid–alkali titration method as described in A.O.A.C. (1970). Sugars in fruit juice were estimated by the method suggested by Nelson (1944). The assay method of ascorbic acid was followed given by Ranganna (1977).The estimation of pectin was according to the methods of Kertesz (1951).

3. RESULTS

The growth parameter characters of the tree were significantly influenced by different treatments (Table 1). Days required for flowering, Days required from flower to fruit set, Days required from fruit set to maturity, Number of

Table 1. Effect of integrated nutrient management on Yield Attributes of Guava (*Psidium guajava*) cv. Allahabad Safeda under meadow orcharding

Treatment notation	Treatment combinations/concentrations	Days required for flowering	Days required from flower to fruit	Days required from fruit set to maturity	Number of fruit per plant	Fruit weight (g)	Pulp weight (g)	Fruit setting (%)
T_0	Control	50.30	43.31	140.29	197.43	81.47	75.21	78.05
T_1	100% NPK (650:325:375g plant-1)	32.17	27.41	133.32	211.00	116.96	109.70	87.73
T_2	100% NPK (650:325:375g plant-1)+FYM 13.2kg plant-1+VC 9.9kg plant-1+PM 3.3 kg plant-1	40.40	35.97	129.97	268.17	106.18	98.30	90.23
T_3	60% NPK (390:195:225g plant-1)+ FYM 16 kg plant-1	43.34	35.86	125.48	260.10	104.55	96.80	92.22
T_4	60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1	47.55	40.00	132.86	239.41	126.81	119.54	91.71
T_5	60% NPK (390:195:225g plant-1)+ PM 4 kg plant-1	38.29	33.24	124.11	244.44	114.52	107.13	90.03
T_6	40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+VC 9 kg plant-1	41.54	35.41	136.23	231.17	122.59	115.08	87.70
T_7	40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+PM 4 kg plant-1	40.41	33.85	130.52	245.92	107.03	99.49	87.92
T_8	40% NPK (260:130:150g plant-1)+ PM 3 kg plant-1+VC 9 kg plant-1	35.33	26.78	122.26	269.04	127.52	120.44	92.14
T_9	25% NPK (162.5:81.25:93.75)+FYM 10 kg plant-1+PM 2.5kg plant-1+VC 7.5 kg plant-1	42.01	34.96	129.81	277.56	130.48	123.00	93.39
T_{10}	Aztobacter 250g plant-1	48.01	42.19	134.48	267.03	114.52	107.42	91.96
T11	Aztobacter 250g plant-1 +100% NPK (650:325:375g plant-1)	36.23	28.63	137.26	254.95	121.18	113.84	90.90
T12	Aztobacter 250g plant-1+100% NPK (650:325:375g plant-1)+FYM 13.2kg plant-1+VC 9.9kg plant-1+PM 3.3 kg plant-1	37.64	29.90	122.29	291.59	110.85	103.36	90.82
T13	Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ FYM 16 kg plant-1	28.19	24.31	117.86	307.84	137.00	128.78	93.95
T14	Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1	24.16	19.31	99.15	330.61	144.74	136.03	96.01

Treatment notation	Treatment combinations/concentrations	Days required for flowering	Days required from flower to fruit	Days required from fruit set to maturity	Number of fruit per plant	Fruit weight (g)	Pulp weight (g)	Fruit setting (%)
T15	Aztobacter 250g plant-1+60% NPK (390:195:225g plant-1)+ PM 4 kg plant-1	26.91	21.27	110.67	323.05	142.53	133.93	94.70
T16	Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+VC 9 kg plant-1	33.01	27.79	128.15	293.47	112.52	104.53	91.65
T17	Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+PM 4 kg plant-1	47.00	37.44	133.85	295.78	107.89	99.81	91.43
T18	Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ PM 3 kg plant-1+VC 9 kg plant-1	44.67	35.55	133.89	270.55	122.85	114.95	93.35
T19	Aztobacter 250g plant-1+25% NPK (162.5:81.25:93.75)+FYM 10 kg plant-1+PM 2.5kg plant-1+VC 7.5 kg plant-1	39.23	31.55	134.23	282.11	120.90	113.49	93.73
	F-Test	S	S	S	S	S	S	S
	C.D. at 0.5%	5.322	3.293	5.059	12.660	8.120	8.140	0.596
	S.Ed. (±)	2.629	1.627	2.499	6.254	4.011	4.021	0.294

Table 2. Effect of integrated nutrient management on chemical characters of guava (*Psidium guajava*) cv. Allahabad Safeda under meadow orcharding

Treatment notation	Treatment combinations/concentrations	Total soluble solid (^{0}Brix)	Ascorbic acid (mg / 100 g)	Total sugars	Acidity
T_0	Control	7.18	128.71	6.09	0.80
T_1	100% NPK (650:325:375g plant-1)	8.34	132.25	6.71	0.64
T_2	100% NPK (650:325:375g plant-1)+FYM 13.2kg plant-1+VC 9.9kg plant-1+PM 3.3 kg plant-1	7.56	135.52	6.39	0.61
T_3	60% NPK (390:195:225g plant-1)+ FYM 16 kg plant-1	7.57	131.15	6.73	0.69
T_4	60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1	8.20	132.11	7.14	0.57
T_5	60% NPK (390:195:225g plant-1)+ PM 4 kg plant-1	8.46	130.66	7.17	0.64
T_6	40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+VC 9 kg plant-1	7.98	148.66	6.93	0.57
T_7	40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+PM 4 kg plant-1	8.05	135.88	6.64	0.65

Treatment notation	Treatment combinations/concentrations	Total soluble solid (^{0}Brix)	Ascorbic acid (mg / 100 g)	Total sugars	Acidity
T_8	40% NPK (260:130:150g plant-1)+ PM 3 kg plant-1+VC 9 kg plant-1	8.29	138.15	7.21	0.56
T_9	25% NPK (162.5:81.25:93.75)+FYM 10 kg plant-1+PM 2.5kg plant-1+VC 7.5 kg plant-1	8.52	140.15	6.49	0.60
T_{10}	Aztobacter 250g plant-1	8.36	144.36	7.08	0.71
T11	Aztobacter 250g plant-1 +100% NPK (650:325:375g plant-1)	8.15	145.25	7.20	0.74
T12	Aztobacter 250g plant-1+100% NPK (650:325:375g plant-1)+FYM 13.2kg plant-1+VC 9.9kg plant-1+PM 3.3 kg plant-1	8.19	148.54	7.31	0.77
T13	Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ FYM 16 kg plant-1	9.07	153.15	7.66	0.46
T14	Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1	9.52	154.55	7.85	0.41
T15	Aztobacter 250g plant-1+60% NPK (390:195:225g plant-1)+ PM 4 kg plant-1	9.17	153.25	7.74	0.43
T16	Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+VC 9 kg plant-1	7.76	148.25	7.18	0.73
T17	Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+PM 4 kg plant-1	8.16	150.15	7.19	0.71
T18	Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ PM 3 kg plant-1+VC 9 kg plant-1	8.18	151.55	7.17	0.67
T19	Aztobacter 250g plant-1+25% NPK (162.5:81.25:93.75)+FYM 10 kg plant-1+PM 2.5kg plant-1+VC 7.5 kg plant-1	8.34	152.44	7.25	0.72
	F-Test	S	S	S	S
	C.D. at 0.5%	0.429	6.864	0.256	0.138
	S.Ed. (±)	0.212	3.390	0.126	0.068

flowers per plant, Number of fruit per plant, Fruit weight (g), and Fruit yield per tree (kg). The maximum increase in Plant height. It was also found that Treatment T_{15} was found to be at par with treatment T_{14}.

The salient features of the result obtained are summarized below:-

Treatment T_{14} Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken minimum days required for flowering (24.16). Whereas the maximum days required for flowering (50.30) was found in control.

Treatment T_{14} Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken minimum days required from flower to fruit set (19.31). Whereas the maximum days required from the flower to fruit set (43.1) was found in control.

Treatment T_{14} Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken minimum days required from fruit set to maturity (99.15). Whereas the maximum days required from fruit set to maturity (140.29) was found in control.

Treatment T_{14} Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken a maximum number of fruit per plant (246.14). Whereas the minimum number of flower per plant (107.07) was found in the control.

Treatment T_{14} Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken maximum fruit weight (g) (144.74). Whereas the minimum fruit weight (g) (81.47) was found in the control.

Treatment T_{14} Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken maximum fruit yield per tree (kg) (35.58). Whereas the minimum fruit yield per tree (kg) (8.72) was found in the control.

Treatment T_{14} Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken maximum polar and radial diameter (cm) (6.20 and 6.43). Whereas the minimum polar and radial diameter (cm) (4.05 and 4.23) was found in the control.

Treatment T_{14} Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken maximum number of seeds per fruit (278.12). Whereas the minimum number of seeds per fruit (217.92) was found in the control.

Treatment T_{14} Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken maximum pulp weight (g) (136.03). Whereas the minimum pulp weight (g) (75.21) was found in the control.

Treatment T_{14} Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken maximum seed weight (g) (7.71). Whereas the minimum seed weight (g) (6.26) was found in the control.

Treatment T_{14} Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken maximum fruit setting (%) (96.01). Whereas the minimum fruit setting (%) (78.05) was found in the control.

Treatment T_{14} Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken maximum total soluble solid (^{0}Brix) (9.52). Whereas the minimum total soluble solid (^{0}Brix) (7.18) was found in the control.

Treatment T_{14} Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken maximum Ascorbic acid (mg / 100 g) (206.88). Whereas the minimum Ascorbic acid (mg / 100 g) (153.63) was found in the control.

Treatment T_{14} Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken maximum total sugars (7.85). Whereas the minimum total sugars (6.09) was found in the control.

Treatment T_{14} Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken minimum acidity (0.41). Whereas the maximum acidity (0.80) was found in the control.

4. CONCLUSION

The present investigation concluded that among the different treatment combinations the treatment T_{14} Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was superior with respect to fruit growth, yield and quality parameters and also best in net return (Rs. 1622.82 /tree) with Benefit Cost Ratio (4.86)respective

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Adsule RN, Kadam SS. Hand book of fruit science and Technology production composition, storage and processing (Eds.D.K. Salinkhe and S.S. Kadam), marcel dekker Inc., New York. 1995:419-433.
2. Agnihotri A, Tiwari R, Singh OP. Effect of crop regulators on growth, yield and quality of guava. Annals of Plant and Soil Research. 2013;15(1):54-57.
3. Athani SI, Praburaj HS, Ustad AI, Swamy GSK, Patil PB, Kotikal YK. Effect of organic and inorganic fertilizers on growth, leaf, major nutrient and chlorophyll content and yield of guava cv. Sardar. Acta Horticulturae (ISHS) 2007a;735:381-385.
4. Barne, Varsha G, Bharad SG, Dod VN, Baviskar MN. Effect of integrated nutrient management on yield and quality of Guava, Asian J. Hort. 2011;6(2):546-548.
5. Bashir MA, Mushtaq Ahmad, Salik MR, Awan MZ. Manures and fertilizers effect on yield and fruit quality of guava. Journal of Agricultural Research (Lahore, Pakistan). 2009;47(3):247-251.
6. Kumrawat D, Kanpure RN, Singh OP, Bhandari J, Kachouli B. Effect of integrated nutrient management on quality and yield parameters of guava (*Psidium guajava* L.) cv. l-49. Journal of Pharmacognosy and Phytochemistry. 2018;7(5):1668-1670.
7. Lal G, Sen NL. Flowering and fruiting of guava (*Psidium guajava* L.) cv. Allahabad Safeda under meadow orcharding as influenced by application of nitrogen, zinc and manganes. J. Eco. Physiol. 2002;5:3-4.
8. Monga PK, Kumar H, Vij VK and Aulakh PS. Effect of NPK on yield and fruit quality of sweet orange cv. Jobba. Indian Journal of Horticulture. 2002;59(4):378-381.
9. Naik MH, Babu RSH. Feasibility of organic farming in guava (*Psidium guajava* L.).International Society for Horticultural Science (ISHS), Belgium. 2007;735:365-372.
10. Dhomane PA, Kadam AS, Lakade SK, Gharage VR. Effect of different sources of nitrogen on growth and yield of guava (*Psidium guajava* L.) cv. SARDAR. Asian J. Hort. 2011;6(1):92-95.
11. Dwivedi Vandana, Agnihotri Santosh. Effect of integrated nutrient management on growth, yield and economics of guava (*Psidium guajava* L.) cv. Allahabad Safeda under meadow orcharding. Int. J. Curr. Microbiol. App. Sci. 2018;7(06):3449-3453.
12. Jaiprakash, Prasad VM, Bahadur V, Dinesh. Studies on impact of organic and inorganic fertilizers on growth, yield and quality of guava (*Psidium guajava*) Allahabad Safeda under sub tropical climatic conditions. Biological Forum – An International Journal. 2021;13(3a):285-288.
13. Jaiprakash, Singh NP, Sankaran M. Influence of nitrogen, zinc and boron on leaf nutrient composition and yield of guava cv. L-49 (*Psidium guajava* L.). Environ. & Eco. 2006;24S(Special 4):1158-1160.
14. Jamwal Sudhir, Mishra Saket, Singh Sandeep. Effect of integrated nutrient management on physical characteristics of guava under Meadow Orcharding Cv. Allahabad Safeda under meadow orcharding. Journal of Pharmacognosy and Phytochemistry. 2018;SP1:2076-2079.
15. Kumar Y, Rattanpal HS. Effect of pruning in guava planted at different spacings under Punjab conditions. Indian Journal of Horticulture. 2010;67:115-119.
16. Nanthakumar S, Veeraraghavathatham D. Effect of integrated Nutrient management on yield and quality attributes of brinjal (*Solanum melongena* L.) cv. Palur-1. South Indian Horticulture, 2001; 49(special):195-198.
17. Ram RA, Pathak RK. Integration of organic farming practices for sustainable production of guava. A case study. Acta Horticulturae (ISHS). 2007b;735:357-363.
18. Rubee Lata Dwivedi DH, Ram RB, Meena ML. Response of organic substrates on growth, yield and physiochemical characteristics of guava cv. red fleshed. Indian Journal of Ecology. 2011;38(1):81-84.
19. Sandhyarani M, A Bhagwan, A. Kiran Kumar and M. Sreedhar (2022). Studies on effect of Biofertilizers and Biostimulant on Post Harvest Quality Parameters and Shelf Life of Guava (*Psidium guajava* L.) cv. Allahabad Safeda under meadow orcharding under Meadow Planting System. Biological Forum – An International Journal, 14(2): 1166-1169.

20. Shukla AK, Sarolia DK, Kumari B, Kaushik RA, Mahawere LN and Bairwa HL. 2009. Evaluation of substrate dynamics for integrated nutrient management under high density planting of guava cv. Sardar. Indian Journal of Horticulture 66(4): 461-463.
21. Tyagi SK, Kulmi GS, Khire AR. Effect of Integrated Nutrient Management on Growth, Yield and Economics of Guava (*Psidium guajava* L.). J Krishi Vigyan 2021, 2021;10(1):69-72
22. Virendra Singh, Dashora, LK, Rathore, RS, Meena CL. Flowering and yield of guava (*Psidium guajava* L.) cv. 'sardar' as influenced by various organic and inorganic sources. Current Agriculture. 2007;31(1/2):67-71.
23. Uma Shankar, Pathak RA, Pathak RK, Ojha CM. Effects of NPK on the yield and fruit quality of guava cv. Sardar. Prog. Hort. 2002;34(1):49-55.
24. Virendra Singh, Dashora LK, Karatha KM, Ahalawat TR, Barad AV. Growth, flowering, fruiting and yield of guava (*Psidium guajava* L.) Cv. 'Sardar' grown under high-density-planting system as influenced by various organic and inorganic sources. The Asian Journal of Horticulture. 2008;3(2):382-385.

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