www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(2): 2133-2136
© 2023 TPI
www.thepharmajournal.com
Received: 08-12-2022
Accepted: 18-01-2023

Abhishek Jaiswal
Department of Horticulture, Naini Agricultural Institute, SHUATS, Prayagraj, Uttar Pradesh, India

VM Prasad
Department of Horticulture, Naini Agricultural Institute, SHUATS, Prayagraj, Uttar Pradesh, India

Vijay Bhadur
Department of Horticulture, Naini Agricultural Institute, SHUATS, Prayagraj, Uttar Pradesh, India

Narendra Kumar
Department of Horticulture, Naini Agricultural Institute, SHUATS, Prayagraj, Uttar Pradesh, India

Corresponding Author:
Abhishek Jaiswal
Department of Horticulture, Naini Agricultural Institute, SHUATS, Prayagraj, Uttar Pradesh, India

Effect of organic manure and inorganic fertilizer on growth, yield and quality of guava (*Psidium guajava* L.)

Abhishek Jaiswal, VM Prasad, Vijay Bhadur and Narendra Kumar

Abstract
Guava (*Psidium guajava* L.) is the most widely farmed Myrtaceae species. It ranks third (260 mg/100 g) in vitamin C concentration behind Barbedose cherry (1500 mg/100 g) and Anola (700 mg/100 g). Guava is one of India's most popular fruits. It is the fourth most important crop in terms of area and yield, following mango, bananas, and citrus. There is a need for a method of nutrient management that has no negative impact on yield and quality and is both cost-effective and environmentally friendly.So, to find out Effect of Organic Manure and In-Organic Fertilizer on growth yield and Quality of Guava (*Psidium guajava* L.) fruit in meadow orchard; a field experiment was conducted at the Horticulture Research Farm, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj (U.P.) during the year 2021. The experiment comprised of 7 treatments of different levels of inorganic fertilizers and organic manures including FYM and vermicompost replicated thrice in a Randomized Block Design. The main objective of the experiment was to evaluate the influence of organic manure and in-organic fertilizer on growth, yield and quality attributes of guava. From the present investigation Treatment T_5(75% RDF+25% Vermicompost) was found best with growth attributes i.e., Plant Height (7.12, 7.17, 7.20 & 7.26) m, plant spread E-W (7.21, 7.23, 7.27 & 7.33) m, Plant Spread N-S (7.11, 7.12, 7.16 & 7.22) m, number of branches per plant (6.17, 6.63, 7.48 & 8.72), Canopy Height (2.78, 2.8, 2.82 & 2.87) m and Stem girth (11.94, 11.99, 12.05 & 12.15) cm at 30, 60, 90 & 120 DAFA (Days after fertiliser application); yield attributes i.e., Average fruit weight (215.48) g, Fruit yield per plot (50.66) Kg and Total yield (20.27) t/ha and quality attributes i.e., TSS(10.17)(°Brix) and Acidity(0.4)%. These practices may be passed on to the farmers for obtaining higher returns in this agro-climatic zone.

Keywords: FYM, guava, growth, inorganic, organic, quality, vermicompost and yield

Introduction
Subtropical and tropical regions all around the world cultivate guava (*Psidium guajava* L.) for its delicious fruit. The Myrtaceae family, of which guava is a member, includes 140 genera and over 3,000 species. In India, guava, often called the "tropical apple," ranks fourth in popularity, after the more common mango, banana, and citrus. There are more than 60 nations where guava is cultivated, and each year a global harvest of approximately 40 million tonnes is harvested (Irshad *et al*., 2020) [8]. India, China, and Kenya are the top three guava-producing countries, with Brazil and Venezuela also developing a name for themselves (Gill, 2010) [7]. A number of Indian states cultivate it, including Uttar Pradesh, Bihar, Madhya Pradesh, Maharashtra, Andhra Pradesh, Tamil Nadu, West Bengal, Punjab, Assam, Orissa, Gujarat, Karnataka, and Kerala. There are over 255,000 ha dedicated to guava cultivation in India, yielding 404,800 metric tonnes, and generating a productivity of 15.87 metric tonnes per hectare (NHB, 2015-16) [9]. Flowering and fruiting occur at different times of year for guava. This is because there are three unique blossoming seasons: Ambebahar (February–March), Mrigbahar (June–July), and Hastabahar (October–November), each of which has its own fruiting season (July–August, October–December, and February–April) (Shukla *et al*., 2009) [12].

In addition to guava nectar, other tasty guava-based items include jelly, jam, canned fruit products, fruit butter, toffee, cheese, and guava fruit spreads. Guava's ascent to fame can be attributed to its rich flavour, high nutritional value, and high pectin content. I it's also a rich resource for vitamin C and pectin (Agnihotri *et al*. 1962) [1]. That's why, it is in high demand as a table fruit, as a raw material for processing businesses, and as a foreign exchange earner (Purseglove, 1974) [10].

Among several other factors, probably nutrition is a key factor affecting the productivity of fruit trees. As guava tree removes large amount of nutrients from soil, balance fertilization seems to be an important factor governing the productivity of guava trees. Large scale use of chemical fertilizers causes problem of ground water and environmental pollution through leaching, volatilization and denitrification in addition to wastage of nutrients through costly fertilizers. The occurrence of multi-nutrient deficiencies and overall decline in productive capacity of soil has been widely reported due to non-judicious fertilizer use (Chhonkar, 2008) [6]. Application of the organic manures such as F.Y.M, vermicompost and inorganic fertilizers such as N, P & K doses have been observed in increasing the number of leaves, the number of branches, plant height and also enhancing good yield and quality of fruits which, resulting in enhanced shoot growth, & fruit setting of fruit in ambient temperature.

Hence, to maintain the quantity of the guava produced but also not decrease the nutritional quality and soil fertility the following experiment "Effect of Organic Manure and In-Organic Fertilizer on growth, yield and Quality of Guava (*Psidium guajava* L.)" was investigated under Prayagraj agro-climatic conditions.

Materials and Methods

This study was conducted on a 10-year-old Guava plant during the Hasthbahar of 2021 at the Horticulture Research Farm, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology, and Sciences (SHUATS), Prayagraj (U.P.). The experimental field is located on the left side of the Allahabad-Rewa Road, close to the Yamuna River, about 8 kilometres from Allahabad city.

A randomised block design was used for the study, with three replications for each of the seven treatment groups. The specifics of each treatment and their possible combinations are listed in Table 1. Additionally, to inorganic fertilisers, vermicompost and FYM were used. The guava trees selected for the experimentation were subjected to preparation of basin around the canopy of tree. For application of manure and fertilizers the top soil around the tree (equal to the leaf canopy of the tree) was dug up to 15 cm and the manures and fertilizers were uniformly mixed into the soil, which was then leveled. Half dose of urea and full dose of diammonium phosphate and muriate of potash were applied on first week of September and remaining half dose of nitrogen was applied in two equal splits one month after first dose. The whole of the organic manure (farm yard manure)/ vermicompost was incorporated along the basin.Growth attributes like Plant Height (m), Plant Spread E-W(m), Plant Spread N-S (m), number of branches per plant, Canopy Height (m) and Stem girth (cm) at 30, 60, 90 & 120 DAFA (Days after fertiliser application); yield attributes like Average fruit weight (g), Fruit yield per plot (Kg) and Total yield (t/ha) and quality attributes like TSS (°Brix) and Acidity (%) were all successfully measured to determine the best treatment combination for guava cultivation.

Table 1: Treatment Details & Treatment combinations

S. No.	Treatment symbols	Treatment combination(Kg/ha)
1.	T_0	[Control, 100% RDF] 1103.5 g Urea+652.17 g DAP+500 g MOP.
2.	T_1	[75% RDF+25% FYM] 808.61 g Urea+ 489.13 g DAP+ 375 g MOP+12.5 kg FYM
3.	T_2	[25% RDF+ 75% FYM] 273.15 g of Urea+163.04 g DAP+ 125 g of MOP+ 37.5 kg FYM.
4.	T_3	[50% RDF+ 50% FYM] 550.67 g Urea+326.01 g DAP+ 250 g MOP+ 25 kg FYM
5.	T_4	[25% RDF+ 75% Vermicompost] 273.15 g of Urea + 163.04g DAP + 125g of MOP+ 3.75 kg Vermicompost
6.	T_5	[75% RDF+25% Vermicompost] 808.61 g Urea+ 489.13 g DAP+ 375 g MOP+1.25 kg Vermicompost
7.	T_6	[50% RDF+ 50% Vermicompost] 550.67 g Urea+326.01 g DAP+ 250 g MOP+ 2.5 kg Vermicompost

Results and Discussion

Growth attributes

Table 2 and Fig. 1 display the results of a study that measured the impact of organic manure and inorganic fertiliser applications on the growth attributes of guava. Since the F Cal value was higher than the F Tab value, the data suggests that there were significant changes in growth parameters. Treatment T_5(75% RDF+25% Vermicompost) was found to be the best, with the maximum plant height of 7.26 m,Plant spread (m) (E-W) and (N-S) of 7.33 m and 7.22 m, number of primary branches per plant i.e., 8.72, Canopy height of 2.87 m & Stem girth of 12.15 cmwhereas treatment T_2(25% RDF+ 75% FYM) had the lowest plant height of 4.68 m,Plant spread (m) (E-W) and (N-S) of 4.76 m and 4.65 m, number of primary branches per plant i.e., 5.5, Canopy height of 1.15 m & Stem girth of 9.12 cm. These outcomes may have been influenced by an increase in the N_2-fixing bacteria and actinomycetes in the soil due to the use of vermicompost. Increased microbial activity in the soil may have increased the amount of phosphorus and nitrogen available to plants. Vermicomposting, an aerobic biological process, is effective in transforming carbon-rich organic materials into humus (Chanda *et al.*, 2011). The soil's microbial activity is influenced by vermicompost, which also raises oxygen levels, keeps temperatures stable, makes the soil more porous and water-permeable, and enhances the plant's nutrient content (Arora *et al.*, 2011) [4].

Yield attributes

The effect of varying levels of organic manures and inorganic fertilizers on yield attributes of guava is shown in Table 3 and Fig 2.Because the F Cal value was greater than the F Tab value, the influence of organic manures and inorganic fertilizers on yield attributes of guava was found to be significant. Treatment T_5 (75% RDF+25% Vermicompost) was determined to be the best, with the highest Average fruit weight (g) of 215.48 g, Fruit yield per plant (Kg)of 50.66 Kg and Total yield (t/ha)20.27 t/ha where-as T_2 (25% RDF+ 75% FYM) had the lowest Average fruit weight (g) of 196.16 g, Fruit yield per plant (Kg) of 28.19 Kg and Total yield (t/ha) 11.28 t/ha. The slow and steady release of nutrients from the organic carbon in vermicompost may be responsible for this effect, allowing the plant to take full advantage of them. When added to the soil, vermicompost adds nutrients that aren't found in chemical fertilisers. Vermicompost's multifarious effects may have impacted plant development

and harvest success. In addition to providing plant nutrients, vermicompost enhances the soil's physiochemical and biological qualities (Meena, 2003) [3]. Anon (2000) [2] discovered the same thing about sapotas.

Quality attributes

Table 4 and Fig. 3 display the results of the study that measured the impact of organic manure and inorganic fertiliser applications on the quality attributes of guava. Since the F Cal value was higher than the F Tab value, the data suggests that there were significant changes in quality parameters. Treatment T_5(75% RDF+25% Vermicompost) was found to be the best, with the maximum T.S.S (°Brix) of 10.17°Brix andlowest Acidity (%) of 0.4% whereas treatment T_2(25% RDF+ 75% FYM) had the lowest T.S.S (°Brix) of 8.86 °Brix andhighest Acidity (%) of 0.52%. Improvements in soil physical qualities, water holding capacity, bulk density, and chemical properties like nutrient status and soil pH might have been linked to vermicompost's effect on fruit quality, as documented by Chattopadhyay (1994) [5]. Further, it is likely that the increased vegetative growth under organic treatments was the contributing factor for the increased yields and fruit quality due to the increased quantities of photosynthates that were translocated to fruits, thereby increasing the contents of various fruit quality parameters. The results of the experiments confirm the findings of Ram *et al*., 2007 [11] in Guava.

Table 2: Effect of organic manure and in-organic fertilizer on growth attributes of guava (*Psidium guajava L.*)

S. No.	Treatment	Plant Height (m)	Plant Spread (m)		Number of branches per plant	Canopy Height (m)	Stem girth (cm)
			E-W	N-S			
1	T_0	5.67	5.74	5.64	6.37	1.76	10.27
2	T_1	7.12	7.19	7.09	8.67	2.8	12.05
3	T_2	4.68	4.76	4.65	5.5	1.15	9.12
4	T_3	6.12	6.19	6.09	7.06	2.09	10.85
5	T_4	5.2	5.28	5.17	6.09	1.45	9.66
6	T_5	7.26	7.33	7.22	8.72	2.87	12.15
7	T_6	6.61	6.7	6.58	7.76	2.4	11.37
F-Test		S	S	S	S	S	S
S.Ed=		0.07	0.08	0.08	0.14	0.04	0.06
CD(5%)=		0.15	0.16	0.17	0.3	0.09	0.14

Table 3: Effect of organic manure and in-organic fertilizer on yield attributes of guava (*Psidium guajava* L.)

S. No.	Treatment	Average fruit weight (g)	Fruit yield per plant (Kg)	Total yield (t/ha)
1.	T_0	203.46	35.67	14.27
2.	T_1	214.05	49.5	19.8
3.	T_2	196.16	28.19	11.28
4.	T_3	207.11	39.73	15.89
5.	T_4	199.81	31.37	12.55
6.	T_5	215.48	50.66	20.27
7.	T_6	213.68	44.91	17.96
F-Test		S	S	S
S.Ed=		0.69	0.78	0.31
CD(5%)=		1.5	1.7	0.68

Table 4: Effect of organic manure and in-organic fertilizer on quality attributes of guava (*Psidium guajava* L.)

S. No.	Treatment	T.S.S (°Brix)	Acidity (%)
1.	T_0	9.38	0.48
2.	T_1	10.12	0.41
3.	T_2	8.86	0.52
4.	T_3	9.66	0.46
5.	T_4	9.12	0.5
6.	T_5	10.17	0.4
7.	T_6	9.94	0.44
F-Test		S	S
S.Ed=		0.05	0.01
CD(5%)=		0.11	0.012

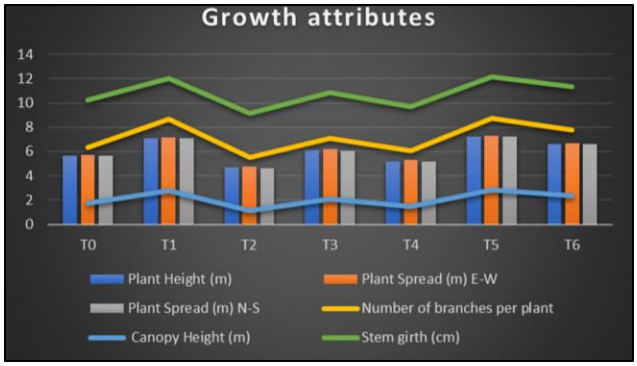

Fig 1: Effect of Organic Manure and In-Organic Fertilizer on growth attributes of Guava (*Psidium guajava* L.)

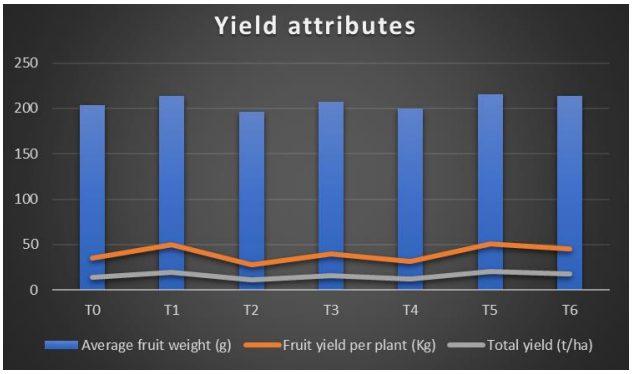

Fig 2: Effect of Organic Manure and In-Organic Fertilizer on yield attributes of Guava (*Psidium guajava L.*)

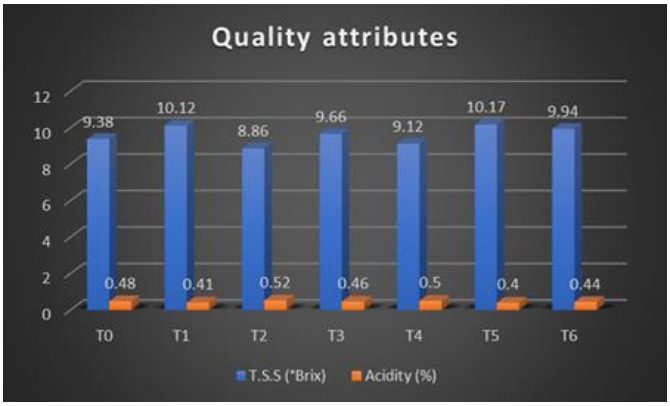

Fig 2: Effect of organic manure and in-organic fertilizer on quality attributes of guava (*Psidium guajava* L.)

Conclusion

From the present investigation it may be concluded that effect of Treatment T_5 (75% RDF+25% Vermicompost) was found to be best. It was found best in terms of growth attributes i.e., plant height (m), plant spread (E-W &N-S) (m), number of branches per plant, Canopy Height (m) and Stem girth (cm) at 120 DAFA (Days after fertiliser application); yield attributes i.e., Average fruit weight (g), Fruit yield per plot (Kg) and Total yield (t/ha) and quality attributes i.e., TSS (°Brix) and Acidity %

Since this is based on a single evaluation trail season, more trials are required to confirm the results.

Acknowledgement

Those in the Department of Horticulture at Sam Higginbottom University of Agriculture, Technology & Sciences in Prayagraj (Uttar Pradesh), India, deserve the author's undying gratitude for all their assistance (both teaching and non-teaching staff).

References

1. Agnihotri BN, Kapoor KL, God KR. Guava. In: A Textbook on Pomology, Chattopadhyay TK(Ed), Kalyani Pub, New Delhi. 1962;3:277.
2. Anonymous. Studies on feasibility of organic farming in sapota cv. Kalipatti. Report presented at 35th meeting of horticulture and agroforestry sub-committee of agricultural, 2000.
3. Meena KC. Vermiculture in relation to organic farming. Intensive Agriculture. 2003;XXXXI(3-4):27-29. council of G. A. U. to be held at Navsari on April 26-27th, pp. 477-479.
4. Arora VK, Singh CB, Sidhu AS, Thind SS. Irrigation, tillage and mulching effects on Soybean yield and water productivity in relation to soil texture. Agric. Water Management, 2011.
5. Chattopadhyay TK. Nutrition of fruit plants and orchard manuring practice. In: A Text book of Pomology. Kalyani publisher, 1994, p. 153
6. Chhonkar PK. Organic farming and its relevance in India. Organic agriculture. Indian Society of Soil Science, Jodhpur, 2008, p. 5-33.
7. Gill PPS, Bal JS. Effect of pre-harvest applications of nutrient and growth regulators on quality of Sardar guava. Haryana Journal of Horticultural Sciences. 2010;39(3/4):193-194.
8. Irshad Z, Hanif MA, Ayub MA, Jilani MI, Tavallali V. Guava. In Medicinal Plants of South Asia (pp. 341-354). Elsevier, 2020.
9. NHB,2015-16 https://nhb.org.in/en/financing_post/circulars-2015-16
10. Purseglove JW. Tropical Crops Dicotyledons. Longman, London, 1974, pp. 208-10.
11. Ram RA, Bhriguvanshi SR, Garg N, Pathak RK. Studies on organic production of guava (*Psidium guajava* L.) cv. Allahabad Safeda. Acta Horticulture. 2007;735:373-379.
12. 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 Journal of Horticulture. 2009;66(4):461-464.