Plant Archives Vol. 24, No. 2, 2024 pp. 54-62 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org
DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2024.v24.no.2.007

RESPONSE OF ORGANIC SOURCE OF NUTRIENTS ON GROWTH OF GUAVA (*PSIDIUM GUAJAVA* L.)

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(Date of Receiving-07-01-2024; Date of Acceptance-19-04-2024)

ABSTRACT

An investigation was done to study "Response of organic fertilizers on growth of guava (*Psidium guajava* L.)" was conducted at horticulture farm, Aroma College, Haridwar during summer season of 2022-23 to evaluate the performance of different organic source of nutrients on growth of Thai guava cv. VNR bihi. Therefore, the biofertilizers were applied as per various treatments under the tree canopy. This experiment was designed in Randomized Block Design with three replicates. The highest plant height (172.67cm^2), Plant spread (241.71 cm^2), Stem girth (167.33mm), Leaf area (62.47cm^2) to were found in T_{12} (FYM + Poultry manure + *Azotobacter* + PSB) from March to December every month followed by T_{11} (FYM + Poultry manure + PSB). While and the lowest of all these were found in control T_{14} (145.57 cm^2, 184.41 cm^2, 143.11 mm, 51.69 cm^2) was recorded.

Key words : Guava (Thai guava cv. VNR bihi), Farmyard Manure, Poultry manure, Phosphate Solubilizing Bacteria.

Introduction

One of the most significant fruits in India's tropical and subtropical regions is the guava (*Psidium guajava* L.), a member of the Myrtaceae family. Native to Tropical America, guavas are. The smooth bark of the guava tree is distinctive. Their fruits are globose berries, and they have greenish-brown to brown colour, scaly, angular young stems, lots of stamens, actinomorphic white flowers and an inferior ovary. There are many seeds imbedded in the flesh, which might be white, yellow, pink, or red. Only 20 of the approximately 150 species in the genus "*Psidium*" produced edible fruits. Guava is grown up to 1500 meters above sea level. It grows effectively in a broad variety of soil conditions, from thick clay to very light sandy soil. Guavas are known as the "*apple of the tropics*" because of their high vitamin C content (75–260 mg/100 g pulp) and plenty of minerals. One of the most significant components of its seed is the dietary fiber (Anonymous, 2009). Vitamin C strengthens immunity and shields us from common diseases and germs. Thiamine (0.03-0.07 mg/100 g pulp) and riboflavin (0.02-0.04 mg/100 g pulp) are both present in guavas in reasonable amounts. Guava 9 pulp also has carbohydrates, pectin (0.5–1.8%) and sugars, along with minerals like phosphorus (22.5–40.0 mg/100 g pulp), calcium (10.0–30.0 mg/100 g pulp) and iron (20–25 mg/100 g pulp). Moreover, it includes a class of powerful antioxidants known as carotenoids, which are unsaturated fatty acid derivatives, polyphenols and omega-3 and omega-6 fatty acids. Since guavas are eaten raw together with their skin and pulp, growing them organically is a possibility. Indian farmers are primarily organic, however since the green revolution a few years ago, the usage of artificial fertilizers and The use of insecticides has significantly increased. Both the environment and human health suffered as a result of this. Organic farming, which makes use of organic resources such animal feces, agricultural leftovers, farmyard manure and oil cakes, is gradually regaining popularity. Organic farming does not make use of synthetic agrochemicals. Organic manures have a lower concentration of plant nutrients than fertilizers, but they do contribute to improved soil permeability, good soil aggregation, the supply of various macro micro. In this experiment, the emphasis was made to study the response of organic fertilizers on different parameters of Thai guava variety VNR bihi. VNR bihi is a research-led innovative guava variety. This variety is developed by VNR nursery a private research organization in the horticulture sector. VNR bihi is India's biggest guava. It is unique in all aspects like big size attractive fruit, average fruit size vary from 300 g to 1.2 kg per fruit, appealing fruit colour, less seed area, very thick pericarp and an early fruiting variety. This variety is suitable for long-distance transport because it has a longer shelf life of 15 days, while in refrigerated condition can be stored up to 30 days. It has a good balance of acid and sugar and staggered harvesting as fruit can be stored on tree for 10-12 days.

Materials and Methods

The experiment was conducted during summer season of 2022-23 at experimental site of Horticulture Farm, Distt Haridwar and Uttarakhand. 1. FYM (100% replacement of nitrogen through FYM) 2. Vermicompost (100% replacement of nitrogen through Vermicompost) 3. FYM + Poultry manure (80% replacement of nitrogen through FYM + 20% replacement of nitrogen through poultry manure) 4. FYM + Azotobacter (150 ml/plant) 5. FYM + PSB (150 ml/plant) 6. FYM + Azotobacter + PSB (75 ml + 75 ml/plant) 7. Vermicompost + Azotobacter (150 ml/plant) 8. Vermicompost + PSB (150 ml/plant) 9. Vermicompost + Azotobacter + PSB (75 ml + 75 ml/plant) 10. FYM + Poultry manure + Azotobacter (80% replacement of nitrogen through FYM +20% replacement of nitrogen through poultry manure) 11. FYM + Poultry manure + PSB (80% replacement of nitrogen through FYM + 20% replacement of nitrogen through poultry manure) 12. FYM + Poultry manure + Azotobacter + PSB (80% replacement of nitrogen through FYM + 20% replacement of nitrogen through poultry manure) 13. 50% FYM + Jeevamrit (4 litre per plant in 21 days interval) 14. Control (no application. Full dose of organic manures and biofertilizers were incorporated in first week of March. Jeevamrit is applied in the field at 21 days interval. During March, after applying water through drip irrigation, the biofertilizers were applied as per various treatments under the tree canopy. The chemical composition of different organic manures used for the experiment is given in Table below:

Organic manure	Nitrogen %	Phosphorus %	Potassium %
Farmyard Manure	0.5	0.5	0.5
Vermicompost	1.8	0.7	1.5
Poultry Manure	2.8	2	2.2

Results and Discussion

Effect of organic treatments on growth parameters

Plant height (cm) : A perusal of data on plant height (cm) of guava affected with different organic treatments from March to December at monthly interval is given in Table 1. The experimental data indicated that there was no significant influence of organic treatments in March and April. In May, the maximum plant height (137 cm) was observed in FYM +poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria, which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (135.57 cm), FYM + poultry manure + *Azotobacter* (134.57 cm), FYM + poultry manure (134.77 cm) and vermicompost + *Azotobacter* + Phosphate Solubilizing Bacteria (133.20 cm). Minimum plant height (126.30 cm) was recorded in control. In June, FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria had resulted in maximum plant height (143 cm), which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (141.40 cm), FYM + poultry manure + *Azotobacter* (140.28 cm), FYM + poultry manure (140.45 cm) and vermicompost + *Azotobacter* + Phosphate Solubilizing Bacteria (138.79 cm), while minimum plant height (130.65 cm) was observed in control. In July, maximum height (149.67 cm) was obtained in FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (147.91 cm), FYM + poultry manure + *Azotobacter* (146.74 cm), FYM + poultry manure (146.88 cm) and vermicompost + *Azotobacter* + Phosphate Solubilizing Bacteria (145.21 cm) and minimum plant height (135.98 cm) was recorded in control. In August, the maximum plant height of 157.66 cm was observed in FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (155.71 cm), FYM + poultry manure + *Azotobacter* (154.34 cm), FYM + poultry manure (154.38 cm) and vermicompost + *Azotobacter* + Phosphate Solubilizing Bacteria (152.72 cm). Minimum plant height (142.35 cm) was recorded in control. In September, highest plant height (161.67 cm) was recorded with the application of FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (159.61 cm), FYM + poultry manure + *Azotobacter* (158.04 cm), FYM + poultry manure (157.99 cm) and vermicompost + *Azotobacter* + Phosphate Solubilizing Bacteria (156.31cm) and minimum plant height (144.21 cm) was reported in control.

In October, the data showed maximum plant height (166.67 cm) by the application of FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria, which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (164.41 cm), FYM + poultry manure + *Azotobacter* (162.74 cm), FYM + poultry manure (162.49 cm) and vermicompost + *Azotobacter* + Phosphate Solubilizing Bacteria (160.71 cm), whereas, minimum plant height (146.75 cm) was reported in control.

In November, maximum plant height (168.67 cm) was noted with the application of FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (166.40 cm), FYM + poultry manure + *Azotobacter* (164.63 cm), FYM + poultry manure (164.28 cm) and vermicompost + *Azotobacter* + Phosphate Solubilizing Bacteria (162.42 cm), while, minimum plant height (147.52 cm) was reported in control. In December month, plant height was found maximum (172.67 cm) from plant receiving FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (170.24 cm), FYM + poultry manure + *Azotobacter* (168.42 cm), FYM + poultry manure (168.03 cm), vermicompost + *Azotobacter* + Phosphate Solubilizing Bacteria (166.11 cm) and minimum plant height (149.57 cm) was reported in control.

Plant spread (cm) : The data presented in Table 2 showed plant spread (cm) of guava influenced with different organic treatments from March to December at monthly interval. The experimental data indicated that there was no significant influence of organic treatments in March and April. In May, the maximum plant spread (157.13 cm) was observed in FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria, which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (154.69 cm) and FYM + poultry manure + *Azotobacter* (152.06 cm) and minimum plant spread (133.58 cm) was recorded in control. In June, FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria resulted in maximum plant spread (167.55 cm) which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (165.12 cm) and FYM + poultry manure + *Azotobacter* (161.73 cm), while, the minimum plant spread (139.14 cm) was observed in control. In July, maximum plant spread (186.77 cm) was obtained in FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (183.47 cm) and FYM + poultry manure + *Azotobacter* (179.83 cm) and minimum plant spread (152.05 cm) was obtained in control. In August, the maximum plant spread (205.21 cm) was recorded with FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (201.87 cm) and FYM+ poultry manure. In October, the data showed maximum plant spread (226.22 cm) by the application of FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria, which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (222.62 cm*)*, whereas, minimum plant spread (176.23 cm) was reported in control.

In November, maximum plant spread (233.22 cm) was noted with the application of FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria, which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (229.17 cm), while, minimum plant spread (180.18 cm) was reported in control.

In December month, plant spread was found maximum (241.71 cm) from plant receiving FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria, which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (237.32 cm), while, minimum plant spread (184.41 cm) was reported in control.

Stem girth (mm) : The data presented in Table 3 reveals the stem girth (mm) of guava influenced with different organic treatments from March to December at monthly interval. The experimental data indicated that there was no significant influence of organic treatments in March. In April, the maximum stem girth of 131.33 mm was obtained in FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (130.83 mm), FYM + poultry manure + *Azotobacter* (130.02 mm), FYM + poultry manure (129.58 mm) and vermicompost + *Azotobacter* + Phosphate Solubilizing Bacteria (128.88 mm) and minimum stem girth (122.39 mm) was reported in control. In May, the maximum stem girth of 136.84 mm was observed in FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria, which was at par with

Table 1 : Effect of organic source of nutrients on plant height (cm) in guava *cv*. VNR bihi.

Treatments	March	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
T_1 (FYM)	119.00	122.79	127.71	132.42	138.02	144.67	147.17	150.78	151.73	154.03
T_2 (Vermicompost)	121.33	125.29	130.96	135.76	141.46	148.21	151.01	154.76	155.76	158.16
T_3 (FYM + Poultry manure)	123.67	128.38	134.77	140.45	146.88	154.38	157.99	162.49	164.28	168.03
T_4 (FYM + *Azotobacter*)	120.00	123.85	129.26	134.12	139.94	146.77	149.83	153.67	154.79	157.28
T_5 (FYM + PSB)	120.33	124.33	129.89	134.96	141.15	148.29	151.44	155.51	156.79	159.36
T_6 (FYM + *Azotobacter* + PSB)	121.00	125.19	131.19	136.45	142.75	149.96	153.17	157.35	158.77	162.01
T_7 (Vermicompost + *Azotobacter*)	122.33	126.59	132.00	137.31	143.63	150.90	154.22	158.42	159.91	163.22
T_8 (Vermicompost + PSB)	121.67	126.00	132.19	137.68	144.09	151.47	154.96	159.28	160.94	164.48
T_9 (Vermicompost + *Azotobacter* + PSB)	122.33	126.98	133.20	138.79	145.21	152.72	156.31	160.71	162.42	166.11
T_{10} (FYM + Poultry manure + *Azotobacter*)	123.33	128.13	134.57	140.28	146.74	154.34	158.04	162.74	164.63	168.42
T_{11} (FYM + Poultry manure+PSB)	124.00	128.90	135.57	141.40	147.91	155.71	159.61	164.41	166.40	170.24
T_{12} (FYM + Poultry manure + *Azotobacter* + PSB)	125.00	130.00	137.00	143.00	149.67	157.66	161.67	166.67	168.67	172.67
T_{13} (50% FYM + Jeevamrit)	119.50	122.81	127.81	132.22	137.63	144.04	146.14	149.70	150.56	152.75
T_{14} (Control)	118.33	121.42	126.30	130.65	135.98	142.35	144.21	146.75	147.52	149.57
C.D. at 5%	NS	NS	4.66	5.31	5.57	6.11	6.70	7.30	7.70	8.10

Table 2 : Effect of organic source of nutrients on plant spread (cm) in guava *cv*. VNR bihi.

Treatments	March	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
T_1 (FYM)	119.42	126.42	138.42	145.57	159.57	173.64	182.54	187.15	192.08	197.63
T_2 (Vermicompost)	120.36	128.03	141.03	148.26	162.34	176.84	185.84	190.75	195.76	201.66
T_3 (FYM + Poultry manure)	123.18	133.88	150.25	158.68	176.43	194.23	206.23	213.22	219.94	227.15
T_4 (FYM + *Azotobacter*)	120.20	127.92	141.19	149.02	164.27	179.02	188.09	193.09	198.47	204.64
T_5 (FYM + PSB)	120.01	129.64	143.01	151.38	166.55	181.24	190.42	196.22	201.37	207.62
T_6 (FYM + *Azotobacter* + PSB)	119.51	129.44	142.86	151.32	166.89	182.04	191.54	197.49	203.10	209.50
T_7 (Vermicompost + *Azotobacter*)	121.71	131.84	146.15	155.22	172.19	189.28	199.44	205.89	211.79	218.44
T_8 (Vermicompost + PSB)	122.00	132.24	146.67	155.85	173.02	190.22	200.62	207.28	213.65	220.48
T_9 (Vermicompost + *Azotobacter* + PSB)	122.67	133.20	148.36	157.83	175.00	192.24	203.50	210.23	216.91	224.01
T_{10} (FYM + Poultry manure + *Azotobacter*)	123.50	135.54	152.06	161.73	179.83	197.84	210.34	217.74	224.60	232.40
T_{11} (FYM + Poultry manure+PSB)	123.73	137.92	154.69	165.12	183.47	201.87	214.77	222.62	229.17	237.32
T_{12} (FYM + Poultry manure + *Azotobacter* + PSB)	123.90	140.22	157.13	167.55	186.77	205.21	218.27	226.22	233.22	241.71
T_{13} (50% FYM + Jeevamrit)	119.32	125.97	136.53	142.53	155.86	169.11	177.67	181.66	185.66	191.00
T_{14} (Control)	119.00	124.02	133.58	139.14	152.05	164.47	172.43	176.23	180.18	184.41
C.D. at 5%	NS	NS	5.21	6.61	7.86	8.03	7.45	7.41	7.61	9.06

Table 3 : Effect of organic source of nutrients on stem girth (mm) in guava *cv*. VNR bihi.

Treatments	March	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
T_1 (FYM)	121.33	125.21	129.06	134.06	138.94	141.35	144.44	146.32	148.54	149.54
T_2 (Vermicompost)	121.85	125.81	129.77	134.94	139.90	142.50	145.70	147.66	149.96	151.05
T_3 (FYM + Poultry manure)	124.03	129.58	134.65	141.08	146.75	150.36	154.39	157.05	160.69	162.44
T_4 (FYM + *Azotobacter*)	122.33	126.40	130.45	135.83	140.87	143.66	147.00	149.06	151.47	152.66
T_5 (FYM + PSB)	122.67	126.93	131.06	136.49	141.65	144.53	147.98	150.12	152.64	153.92
T_6 (FYM + *Azotobacter* + PSB)	123.00	127.58	131.79	137.35	142.58	145.54	149.09	151.36	154.04	155.36
T_7 (Vermicompost + *Azotobacter*)	123.00	127.96	132.51	138.33	143.72	146.76	150.47	152.86	155.90	157.39
T_8 (Vermicompost + PSB)	123.21	128.30	133.12	139.11	144.59	147.78	151.64	154.05	157.23	158.75
T_9 (Vermicompost + *Azotobacter* + PSB)	123.67	128.88	133.84	139.92	145.44	148.75	152.73	155.26	158.57	160.23
T_{10} (FYM + Poultry manure + *Azotobacter*)	124.33	130.02	135.16	141.77	147.56	151.32	155.47	158.18	161.94	163.75
T_{11} (FYM + Poultry manure+PSB)	125.00	130.83	136.04	142.83	148.69	152.52	156.91	159.69	163.50	165.46
T_{12} (FYM + Poultry manure + *Azotobacter* + PSB)	125.34	131.33	136.84	143.84	149.83	153.84	158.33	161.33	165.34	167.33
T_{13} (50% FYM + Jeevamrit)	120.00	123.56	127.11	131.70	136.45	138.65	141.56	143.12	145.12	146.02
T_{14} (Control)	119.73	122.39	125.68	129.88	134.49	136.49	139.00	140.41	142.23	143.11
C.D. at 5%	NS	2.90	3.70	3.72	4.67	4.88	5.19	5.44	5.68	5.83

FYM + poultry manure + Phosphate Solubilizing Bacteria (136.04 mm), FYM + poultry manure + *Azotobacter* (135.16 mm), FYM + poultry manure (134.65 mm), vermicompost + *Azotobacter* + Phosphate Solubilizing Bacteria (133.84 mm) and minimum stem girth (125.68 mm) was reported in control. In June, FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria resulted in maximum stem girth of 143.84 mm, which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (142.83 mm), FYM + poultry manure + *Azotobacter* (141.77 mm), FYM + poultry manure (141.08 mm), while, minimum stem girth was observed in control (129.88 mm). In July, maximum stem girth (149.83 mm) was obtained in FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (148.69 mm), FYM + poultry manure + *Azotobacter* (147.56 mm), FYM + poultry manure (146.75 mm) and vermicompost + *Azotobacter* + Phosphate Solubilizing Bacteria (145.44 mm) and minimum stem girth (134.49 mm) was reported in control. In August, the maximum stem girth (153.84 mm) was recorded with FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (152.52 mm), FYM + poultry manure + *Azotobacter* (151.32 mm) and FYM + poultry manure (150.36 mm), while, minimum stem girth (136.49 mm) was observed in control. In September, highest stem girth (158.33 mm) was recorded with the application of FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria, which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (156.91 mm), FYM + poultry manure + *Azotobacter* (155.47 mm) and FYM + poultry manure (154.39 mm). Lowest stem girth (139 mm) was reported in control. In October, the data showed maximum stem girth (161.33 mm) by the application of FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria, which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (159.69 mm), FYM + poultry manure + *Azotobacter* (158.18 mm) and FYM + poultry manure (157.05 mm), whereas, minimum stem girth (140.41 mm) was reported in control. In November, maximum stem girth (165.34 mm) was noted with the application of FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria, which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (163.50 mm), FYM + poultry manure + *Azotobacter* (161.94 mm), FYM + poultry manure (160.69 mm), while, minimum stem girth (142.23 mm) was reported in control.

In December month, stem girth was found maximum

Table 4 : Effect of organic source of nutrients on leaf area (cm^2) in guava *cv*. VNR bihi.

Treatments	March	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
T_1 (FYM)	42.97	44.45	46.01	47.09	48.20	49.44	50.67	51.98	52.69	53.35
T_2 (Vermicompost)	43.08	44.61	46.22	47.41	48.60	49.91	51.53	52.58	53.34	54.03
T_3 (FYM + Poultry manure)	44.52	46.52	48.61	50.37	52.02	53.83	55.54	57.49	58.60	59.53
T_4 (FYM + *Azotobacter*)	43.21	44.87	46.55	47.86	49.07	50.48	51.83	53.31	54.10	54.81
T_5 (FYM + PSB)	43.42	45.10	46.89	48.61	49.56	51.04	52.46	54.04	54.89	55.63
T_6 (FYM + *Azotobacter* + PSB)	43.56	45.32	47.20	48.68	50.03	51.54	53.02	54.64	55.53	56.32
T_7 (Vermicompost + *Azotobacter*)	43.96	45.79	47.80	49.36	50.77	52.35	53.86	55.56	56.53	57.34
T_8 (Vermicompost + PSB)	44.01	45.85	47.94	49.55	51.03	52.72	54.31	56.09	57.11	57.94
T_9 (Vermicompost + *Azotobacter* + PSB)	44.13	46.03	48.16	49.84	51.43	53.19	54.84	56.70	57.78	58.64
T_{10} (FYM + Poultry manure + *Azotobacter*)	44.89	46.92	49.18	50.99	52.61	54.57	56.36	58.37	59.52	61.14
T_{11} (FYM + Poultry manure+PSB)	45.06	47.17	49.56	51.45	53.26	55.19	57.33	59.05	60.26	61.29
T_{12} (FYM + Poultry manure + *Azotobacter* + PSB)	45.57	47.75	50.30	52.25	54.13	56.13	57.99	60.10	61.38	62.47
T_{13} (50% FYM + Jeevamrit)	42.49	43.92	45.43	46.44	47.53	48.74	49.96	51.21	51.90	52.51
T_{14} (Control)	42.08	43.40	44.88	45.87	46.92	47.77	49.29	50.50	51.11	51.69
C.D. at 5%	NS	NS	NS	NS	2.01	2.83	3.12	2.96	2.80	2.91

(167.33 mm) from plant receiving FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria, which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (165.46 mm), FYM + poultry manure + *Azotobacter* (163.75 mm), FYM + poultry manure (162.44 mm), and minimum stem girth (143.11 mm) was reported in control.

Leaf area (cm^2) : The data presented in Table 4 indicates leaf area (cm^2) of guava influenced with different organic treatments from March to December at monthly interval. The experimental data indicated that there was no significant influence of organic treatments in March, April, May and June. In July, maximum leaf area (54.13 cm^2) was obtained in FYM + poultry manure+ *Azotobacter* + Phosphate Solubilizing Bacteria, which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (53.26 cm^2), FYM + poultry manure + *Azotobacter* (52.61 cm^2) and minimum leaf area (46.92 cm^2) was recorded in control. In August, the highest leaf area (56.13 cm^2) was recorded with the application of FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria, which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (55.19 cm^2), FYM + poultry manure + *Azotobacter* (54.57 cm^2) and FYM + poultry manure (53.83 cm^2) and the lowest leaf area (47.77 cm^2) was reported in control. In September, the data showed maximum leaf area (57.99 cm^2) by the application of FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria, which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (57.33 cm^2), FYM + poultry manure + *Azotobacter* (56.36 cm^2) and FYM + poultry manure (55.54 cm^2), whereas, minimum leaf area (49.29 cm^2) was reported in control.

In October, the highest leaf area (60.10 cm^2) was recorded with the application of FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria, which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (59.05 cm^2), FYM + poultry manure + *Azotobacter* (58.37 cm^2) and FYM + poultry manure (57.49 cm^2) and the lowest leaf area (50.50 cm^2) was reported in control. In November, maximum leaf area (61.38 cm^2) was noted with the application of FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria, which was at par with FYM + poultry manure + Phosphate Solubilizing Bacteria (60.26 cm^2), FYM + poultry manure + *Azotobacter* (59.52 cm^2) and FYM + poultry manure (58.60 cm^2), while, minimum leaf area (51.11 cm^2) was reported in control. In December month, leaf area was found maximum (62.47 cm^2) from plant receiving FYM + poultry manure + *Azotobacter* + Phosphate Solubilizing Bacteria, which was at par with

FYM + poultry manure + Phosphate Solubilizing Bacteria (61.29 cm^2), FYM + poultry manure + *Azotobacter* (61.14 cm^2), however, minimum leaf area (51.69 cm^2) was reported in control.

Conclusion

The present investigation entitled, "Response of organic fertilizers on growth of guava (*Psidium guajava* L.)" was undertaken to evaluate the best organic source of nutrient in terms of growth, yield and quality of Thai guava variety - VNR bihi. The maximum plant height was observed with the application of FYM + poultry manure + Azotobacter + Phosphate Solubilizing Bacteria every month from March to December. While, the minimum was observed in control. The plant spread was recorded maximum with FYM + poultry manure + Azotobacter + Phosphate Solubilizing Bacteria. In case of stem girth, from March to December combined application of FYM + poultry manure + Azotobacter + Phosphate Solubilizing Bacteria resulted in maximum stem girth, while it was minimum with control. Different organic manures and biofertilizers exerted a marked influence on leaf area. From March to December every month maximum leaf area was recorded under treatment FYM + poultry manure + Azotobacter + Phosphate Solubilizing Bacteria and minimum in control. As above, from the experiment carried out, bring the conclusion that organic source of nutrients had a substantial impact on two years old Thai guava cv. VNR bihi in terms of growth, parameters of guava. It is concluded that combination of 80% replacement of nitrogen through FYM + 20% replacement of nitrogen through poultry manure + Azotobacter + Phosphate Solubilizing Bacteria may be recommended to improve the growth parameters of guava. Winter season fruits are more superior to rainy season fruits.

References

A.O.A.C. (1990). *Official Methods of Analysis*. 15th Edition. Association of Official Analytical Chemist, Washington, D.C.

Amanullah, Mohamed M., Sekar S. and Muthukrishnan P. (2010). Prospects and potential of poultry manure. *Asian J. Plant Sci.*, **9**, 172-182.

Anonymous (2009). *Pakistan Economic Survey 2008-2009*. Government of Pakistan, Ministry of Food.

Anonymous (2018a). *Horticultural Statistic at a Glance*. Department of Agriculture, Cooperation and Farmer Welfare, Ministry of Agriculture and Farmer Welfare, Government of India.

Costa Araujo da, R., Bruckner C.H., Martinez H.E.P., Salomão L.C.C, Alvarez V.H., Pereira de Souza A., Pereira W.E. and Hizumi S. (2006). Quality of yellow passion fruit (*Passiflora edulis* Sims f. flavicarpa Deg.) as affected by potassium nutrition. *Fruits*, **61(2)**, 109-115.

Dadashpour, A. and Jouki M. (2012). Impact of integrated organic nutrient handling on fruit yields and quality of strawberry *cv*. Kurdistan in Iran. *J. Ornamental Horticult. Plants*, **2(4)**, 251- 256.

Devadas, V.S. and Kuriakose K.P. (2002). Evaluation of different organic manures on yield and quality of pineapple var. Mauritius. In : *IV International Pineapple Symposium*, **666**, 185-189.

Devi, H.L., Mitra S.K. and Poi S.C. (2012). Effect of different organic and biofertilizer sources on guava (*Psidium guajava* L.) 'Sardar'. In : *III International Symposium on Guava and other Myrtaceae*, **959**, 201-208.

Dhillon, W.S. (2013). *Fruit production in India*. Narendra Publishing House, Delhi, pp: 263-278.

Dwivedi, D.H., Lata R., Ram R.B. and Babu M. (2010). Effect of bio- fertilizer and organic manures on yield and quality of 'Red Fleshed' guava. In : *XXVIII International Horticultural Congress on Science and Horticulture for People (IHC2010*), *International Symposiumon*, **933**, 239- 244.

Dwivedi, V. (2013). Effect of integrated nutrient management on yield, quality and economics of guava. *Annals Plant Soil Res.*, **15**, 149-151.

Hazarika, T.K., Nautiyal B.P. and Bhattacharya R.K. (2011). Effect of integrated nutrient management onproductivity and soil characteristics of tissue cultured banana *cv*. Grand Naine in Mizoram, India. *Progressive Horticulture*, **43(1)**, 30-35.

Jain, N., Mani A., Kumari S., Kasera S. and Bahadur V. (2017). Influence of integrated nutrient management on yield, quality, shelf life and economics of cultivation of strawberry (*Fragaria× ananassa* Duch.) *cv*. Sweet Charlie. *J. Pharmacog. Phytochem.*, **6(5)**, 1178-1181.

Jeyabaskaran, K.J., Pandey S.D., Mustaffa M.M. and Sathiamoorthy S. (2001). Effect of different organic manures with graded levels of inorganic fertilizers on ratoon of Poovan banana. *South Indian Horticult.*, **49**, 105-108.

Kamatyanatti, M., Kumar A. and Dalal R.P.S. (2019). Effect of integrated nutrient management on growth, flowering and yield of subtropical plum *cv*. Kala Amritsari. *J. Pharmacog. Phytochem.*, **8(1)**, 1904-1908.

Katiyar, P.N., Tripathi V.K., Sachan R.K., Singh J.P. and Chandra R. (2012). Integrated nutritional management affects the growth, flowering and fruiting of rejuvenated ber. *HortFlora Research Spectrum*, **1**, 38-41.

Lahav, E., Bareket M. and Zamet D. (1981). The effects of organic manure, KNO_3 and poly-feed on the nutritional balance of a banana plantation under drip irrigation. *Fruits*, **36(4)**, 209-216.

Lindner, R.C. (1944). Rapid analytical method for some of the more common inorganic constituents of plant tissues. *Plant Physiology*, **19**, 76-89.

Lodaya, B.P. and Masu M.M. (2019). Effect of biofertilizer, manures and chemical fertilizers on fruit quality and shelf life of guava (*Psidium guajava* L.) *cv*. Allahabad Safeda. *Int. J. Curr. Sci.*, **7(4)**, 1209-1211.

Magwaza, L.S. and Opara U.L. (2015). Analytical methods for determination of sugars andsweetness of horticultural products-A review. *Scientia Horticulturae*, **184**, 179-192.

Marathe, R.A., Sharma J., Murkute A.A. and Babu K.D. (2017). Response of nutrient supplementation through organics on growth, yield and quality of pomegranate. *Scientia Horticulturae*, **214**, 114-121.

Marwaha, B.C. (1995). Biofertilizers- A supplementary source of plant nutrient. *Fert News*, **40**, 39-50.

Mitra, S.K., Gurung M.R. and Pathak P.K. (2008). Guava production and improvement in India: An overview. In: *Proc. Int. Workshop Trop. Subtrop. Fruits*, **787**, 59-66.

Moustafa, M.H. (2002). Studies on fertilization of Washington Navel orange trees (*Doctoral dissertation*, *Ph.D. Dissertation*, Faculty of Agriculture, Moshtohor, Zagazig University, Benha Branch, Egypt).

Naik, M.H. and Sri Hari Babu R. (2005). Feasibility of organic farming in guava (*Psidium guajava* L.). In : *I International Guava Symposium*, **735**, 365-372.

Ojewole, J.A., Awe E.O. and Chiwororo W.D. (2008). Antidiarrhoeal activity of *Psidium guajava* Linn. (Myrtaceae) leaf aqueous extract in rodents. *J. Smooth Muscle Res.*, **44(6)**, 195-207.

Osman, S.M. and Abd El-Rhman I.E. (2010). Effect of organic and Bio N- fertilization on growth, productivity of Fig tree (*Ficus carica* L.). *Res. J. Agricult. Biolog. Sci.*, **6(3)**, 319-328.

Pal, A.K., Mishra S., Singh S., Kumar R. and Vikram B. (2019). Effect of different organic manure on vegetative growth, flowering and fruiting of intercropped strawberry (*Fragaria × ananassa* Duch.) *cv*. Sweet Charley inside Banana Orchard. *Asian J. Agricult. Horticult. Res.*, **3(4)**, 1-5.

Panelo, B.C. and Diza M.T. (2017). Growth and yield performance of banana (*Musa acuminata* L.) as affected by different farm manures. *Asia Pac. J. Multidiscipl. Res.*, **5(2)**, 199-203.

Poonia, K.D., Bhatnagar P., Sharma M.K. and Singh J. (2018). Efficacy of biofertilizers on growth and development of mango plants *cv*. Dashehari. *J. Pharmacog. Phytochem.*, **7(5)**, 2158-2162.

Prabakaran, C. and Pichal G.J. (2003). Effect of different organic nitrogen sources on pH, total soluble solids, titrable acidity, crude protein reducing and non- reducing sugars and ascorbic acid content of tomato fruits. *J. Soils Crops*, **13(1)**, 172-175.

Ram, R.A. and Nagar A.K. (2003). Effect of different organic treatments on yield and quality of guava *cv*. Allahabad Safeda. *Organic Farming in Horticulture for Sustainable Production*, 29-30.

Ram, R.A., Bhriguvanshi S.R., Garg N. and Pathak R.K. (2005). Studies on organic production of guava (*Psidium guajava* L.) *cv*. Allahabad Safeda. In : *I International Guava Symposium*, **735**, 373-379.

Rana, H., Sharma K. and Negi M. (2020). Effect of organic manure and biofertilizers on plant growth, yield and quality of Sweet orange (*Citrus sinensis* L.). *Int. J. Curr. Microbiol. Appl. Sci.*, **9**, 2064- 2070.

Rana, R.K. and Chandel J.S. (2003). Effect of bio-fertilizer and nitrogen on growth yield and fruit quality of strawberry. *Progressive Horticulture*, **35**(1), 25-30.

Ranganna, S. (1979). *Handbook of analysis and quality control for fruit and vegetables products*. 2nd Edition. Tata McGraw Hill Publication Company Limited, 7 West Patel Nagar, New Delhi,pp. 9- 10 and 105-106.

Rashid, M.H.A. (2018). Optimisation of growth yield and quality of strawberry cultivars through organic farming. *J. Environ. Sci. Nat. Resources*, **11(1-2)**, 121-129.

Rathore, D.S. and Singh, R.N. (1974). Flowering and fruiting in three cropping patterns of guava. *Indian J. Horticult.*, **3**, 331-336.

Ratna, S.M. and Bahadur V. (2019). Effect of chemical fertilizers, bio-fertilizers and organic manure on growth, yield and quality of guava under Prayagraj agro- climatic condition. *J. Pharmacog. Phytochem.*, **8(4)**, 3154-3158.

Sahu, P. and Sahu T.R. (2019). *Biodiversity and Sustainable Utilization of Biological Resources*. Scientific Publisher, Jodhpur, India. pp 205

Sharma, A., Kher R., Wali V.K. and Bakshi P. (2009). Effect of biofertilizers and organic manures on physico-chemical characteristics and soil nutrient composition of guava (*Psidium guajava* L.) *cv*. Sardar. *J. Res., SKUAST-J*, **8(2)**, 150-156.

Sharma, A., Wali V.K., Bakshi P. and Jamwal M. (2011). Effect of organic manures and biofertilizerson leaf and fruit nutrient status in guava (*Psidium guajava* L.) *cv*. Sardar. *J. Horticult. Sci.*, **6(2)**, 169-171.

Sharma, A., Wali V.K., Bakshi P. and Jasrotia A. (2013). Effect of integrated nutrient management strategies on nutrient status, yield and quality of guava. *Indian J. Horticult.*, **70(3)**, 333-339.

Sharma, A., Wali V.K., Bakshi P., Sharma V., Sharma V., Bakshi M. and Rani S. (2016). Impact of poultry manure on fruit quality attributes and nutrient status of guava (*Psidium guajava*) *cv*. L- 49 plant. *Indian J. Agricult. Sci*., **86(4)**, 533-540.

Shukla, S.K., Adak T., Singha A., Kumar K., Singh V.K. and Singh A. (2014). Response of guava trees (*Psidium guajava*) to soil applications of mineral and organic fertilisers and biofertilisers under conditions of low fertile soil. *J. Horticult. Res.*, **22(2)**, 105-111.

Sidahmed, O.H. and Kliewer W.M. (1980). Effects of defoliation, gibberellic acid and 4- chlorophenoxyacetic acid on growth and composition of Thompson Seedless grape berries. *Amer. J. Enol. Viticult.*, **31**, 149.

Singh, A., Patel R.K. and Singh R.P. (2003). Correlation studies of chemical fertilizers and biofertilizers with growth, yield and nutrient status of olive trees (*Olea europea)*. *Indian J. Hill Farming*, **16**, 99-100.

Singh, G. (2013). *Guava*. Westville Publishing House, New Delhi, pp. 64-65

Singh, J.P., Tomar S., Chaudhary M. and Shukla I.N. (2018). Effect of organic, inorganic and bio- fertilizers on physico-chemical properties of fruits of guava *cv.* L-49. *Int. J. Curr. Sci.*, **6(3)**, 3233-3238.

Singh, Kirad K., Barche S. and Singh D.B. (2008). Integrated nutrient management in papaya (*Carica papaya* L.) *cv*. Surya. In : *II International Symposium on Papaya*, **851**, 377-380.

Singh, R., Sharma R.R., Kumar S., Gupta R.K. and Patil R.T. (2008). Vermicompost substitution influences growth, physiological disorders, fruit yield and quality of strawberry (*Fragaria* x *ananassa* Duch.). *Bioresource Technology*, **99(17)**, 8507-8511.

Soni, S., Amit K., Rajkumar C., Praval S.C. and Rahul K.S.D. (2018). Effect of organic manure and biofertilizers on growth, yield and quality of strawberry (*Fragaria* X *ananassa* Duch) *cv*. Sweet Charlie. *J. Pharmacog. Phytochem.*, **2**, 128-132.

Subba Rao, N.S. (1993). *Biofertilizers in Agriculture and Forestry*. Oxford Publishing Company Private Limited, New Delhi, pp 72-73.

Sunita, Meena M.L.,Choudhary A. and Meena N. (2021). Impact of plant growth regulator on root development of dragon fruit cutttings (*Hylocereus constaricens* (Web.) britton and rose). *J. Plant Develop. Sci*., **14(1)**, 51-58. 2022.

Sunita, Meena M.L.,Choudhary A., Nagori A. and Nishad U. (2022). Impact of Plant Growth Regulator on Development of Dragon fruits cutting. *Annals Horticult.*, **15(2)**, 162-167.

Ulrich, R. (1970). Organic acids, the biochemistry of fruit and their products. *Hulme*., **1**, 89-115.

Yadav, R.I., Singh R.K., Jat A.L., Choudhary H.R., Pal V. and Kumar P. (2013). Effect of nutrient management through organic sources on productivity and profitability of guava (*Psidium guajava* L.) under Vindhyan region. *Environment and Ecology*, **31(2A)**, 735-737.

Zothansiami, A. and Mandal D. (2021). Organic Nutrition with Biofertilizer Enriched Poultry Manure Caused High Yield of Quality Giant Cavendish Banana. *Res. J. Agricult. Sci.*, **12(1)**, 303-306.