International Journal of Plant & Soil Science

Volume 36, Issue 7, Page 232-240, 2024; Article no.IJPSS.118078
ISSN: 2320-7035

Influence of Fertilizers and Bioinoculants on Growth Parameters of Guava (*Psidium guajava* L.) cv. L-49

Ram Kumar Rai [a++], S. K. Pandey [a#], C. S. Pandey [a†*], R. K. Samaiya [b#] and A. K. Upadhyay [c†]

[a] Department of Horticulture, CoA, JNKVV, Jabalpur, (M.P.), India.
[b] Department of Plant Physiology, CoA, JNKVV, Jabalpur. India.
[c] Department of Soil Science and Agricultural Chemistry, CoA, JNKVV, Jabalpur (MP), India.

Authors' contributions

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

Article Information

DOI: https://doi.org/10.9734/ijpss/2024/v36i74725

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/118078

Original Research Article

Received: 26/03/2024
Accepted: 01/06/2024
Published: 05/06/2024

ABSTRACT

The experiment was conducted to study the influence of fertilizers and bioinoculants on growth characteristics of guava cv. L-49 at Fruit Research Station Imaliya, Jawaharlal Nehru Agriculture University, Jabalpur, Madhya Pradesh, during 2022-23 and 2023-24 on twelve-year-old guava trees planted at 3.0 m x 3.0 m spacing. The experiment was carried out in factorial RBD with three replications. The data revealed that different levels of nutrients and bioinoculants alone and in combinations significantly influenced the growth parameter. The maximum increase in plant height (12.16%) & (12.46%), canopy spread E-W (14.15%) & (14.45%), canopy spread N-S (14.33%) & (14.72%) and stem girth (11.19%) & (10.07%) were recorded in N_2 (100%RDF), during both years

[++] PhD Scholar;
[#] Professor & Head;
[†] Scientist;
**Corresponding author: E-mail: cspandeyjnkvv@gmail.com;*

Cite as: *Rai, Ram Kumar, S. K. Pandey, C. S. Pandey, R. K. Samaiya, and A. K. Upadhyay. 2024. "Influence of Fertilizers and Bioinoculants on Growth Parameters of Guava (Psidium Guajava L.) Cv. L-49". International Journal of Plant & Soil Science 36 (7):232-40. https://doi.org/10.9734/ijpss/2024/v36i74725.*

of experimentation respectively. With respect of bioinoculants, the maximum plant height (11.48%) & (11.71%), canopy spread E-W (13.24%) & (13.61%), canopy spread N-S (14.05%) & (14.44%) and stem girth (9.72%) & (8.85%) were observed in B_5 (Bactobooster 200 ml), during both years respectively. Among the treatment combinations, T_{10} (100% RDF + Bactobooster200ml) was found superior with respect of the maximum increase in plant height (12.86%) & (13.09%), in canopy spread E-W (15.77%) & (16.11%), canopy spread N-S (16.16%) & (16.66%) and in stem girth (12.54%) & (11.01%) during both the years of experimentation respectively followed by T_{15} (75% RDF + Bactobooster 200 ml) and minimum was recorded in control.

Keywords: Guava; fertilizers; bioinoculants; growth parameters.

1. INTRODUCTION

Guava (*Psidium guajava* L.) belonging to the Myrtaceae family is a tropical fruit tree and is widely grown in many parts of the world for its delicious fruits and numerous health benefits. Among various cultivars, Guava cv. L-49 is known for its high yield potential and quality fruit production. However, to achieve maximum yield and quality, appropriate nutrient management is crucial. Fertilizers and bioinoculants play significant roles in improving soil fertility and promoting plant growth. The application of nitrogen, phosphorus, potash, manures, and bio-fertilizer to synthesize amino acids acts as a precursor of polyamine and secondary messengers in growth characters. Synthesis of this amino acid is also influenced by phytohormones which are formed in plants due to the application of chemical and biofertilizers as reported in guava by Dwivedi et al. (2018), Goswami et al. [1] and Surage et al. [2]. The significant increase in plant height, canopy spread and trunk girth might be due to the active and rapid multiplication of bacteria especially in the rhizosphere creating favourable conditions for nitrogen fixation and phosphorus solubilization at a higher rate through nitrogen supply by nitrogenous fertilizers and supply of other nutrients, bacterial secretion, hormone production and supply of antibacterial and antifungal compounds, which were favourable for growth and ultimately increased yield.

2. MATERIALS AND METHODS

The experiment was carried out on twelve years old guava orchard with planting distance of 3 (m) x 3 (m) at Fruit Research Station Imaliya, Department of Horticulture, Jawaharlal Nehru Agriculture University, Jabalpur, Madhya Pradesh during the year 2022-23 and 2023-24 during mrig bahar of Guava. The experimental site was situated at 23.100 North latitude, 79.500 East longitudes and at an altitude of 411.76 meters above the mean sea level. The site is typically semi-arid with little rainfall during the rainy season (July to September). The Experiment was conducted in Factorial Randomized Block Design with three replications. The experiment consists of two factors, factor A - Doses of Nutrients (04), Control(N_1), 100%RDF ie NPK 600:400:300 g/plant (N_2), 75%RDF(N_3), 50%RDF(N_4) and Factor B - Levels of Bioinoculants (05) No Bioinoculant/control(B_1), Biofertisol 100ml Plant^{-1}(B_2), Bactobooster 100ml Plant^{-1} (B_3), Biofertisol 200ml Plant^{-1} (B_4), Bactobooster 200ml plant^{-1}(B_5) having 20 different treatment combinations. The plant height of guava was measured using measuring tape from the base to the apex of the trees. The stem girth of guava was recorded using Vernier Calipers. Plant Canopy spread (E-W and N-S) were measured with the help of measuring tape. Soil physicochemical parameters including soil pH, electrical conductivity (dSm^{-1}), organic carbon (%) and available NPK (kg ha^{-1}) were recorded at the initiation of the experiment. Soil pH was determined by using glass electrode pH meter (Jackson, 1973), electrical conductivity of soil by using standard precision conductivity bridge (Jackson, 1973), organic carbon content by Walkley and Black (1934) wet digestion method, available Nitrogen (kg/ha) by using alkaline Potassium Permanganate method (Subbiah and Asija, 1956), available soil Phosphorus (kg/ha) by Olsen et al. (1954), available potassium content (kg ha^{-1}) by Flame Photometer (Metson, 1956). The data obtained during the experiment were subjected to statistical analysis using Fisher's analysis of variance technique.

3. RESULTS AND DISCUSSION

3.1 Plant Height

Data on plant height as influenced by nutrients and bioinoculants and their combinations are

presented in Table 2. The data revealed that plant height was considerably increased during both consecutive years of experimentation. Among different levels of nutrients, the maximum increase in plant height (12.16%) & (12.46%) were found in N_2 (100% RDF). Regarding bioinoculants, the maximum increase in plant height (11.48%) & (11.71%) was recorded in B_5 (Bactobooster 200ml). Among the treatment combinations, T_{10} (100% RDF + Bactobooster 200ml)) was found superior with respect to the maximum increase in plant height (12.86%) & (13.09%), followed by T_{15} (75% RDF + Bactobooster200ml) with increase in plant height (12.81%) & (12.89%). The minimum increases in plant height (9.14%) & (9.34%) was recorded in control (T_1). Similar results were reported in sweet orange, banana and guava by Jugnake et al. [3], Patil and Shinde, [4] and Rani et al. [5] respectively. The increase in vegetative characteristics of the plant may be attributed to the increased availability of nutrients such as N, P and K in plants leading to increased formation of plant metabolites that might have helped to build up the plant tissue [6]. In mango, the application of Azotobacter along with Phosphorus Solubilizing Bacteria (PSB) and Vermicompost at the concentration of 50g, 50g, 3kg respectively can increase the plant growth parameters particularly girth of the rootstock, height of the plant of the mango tree [7]. The inoculation of three biofertilizers viz; *Azospirillum*, *Pseudomonas fluorescence* and Vesicular Arbuscular Mycorrhiza (VAM) in the potting mixture of grafted Alphonso mango enhance the height of the plant [8].

Table 1. Physico-chemical properties of experimental soil

Particulars	Values		Method employed
	2022-23	2023-24	
Soil pH	7.53	7.45	Glass electrode pH meter (Jakson, 1973)
Electrical conductivity (dSm^{-1})	0.321	0.287	Electrical conductivity meter (Jakson, 1973)
Organic carbon ($g\ kg^{-1}$)	5.15	5.0	Walkley and Black rapid titration method (1934)
Available nitrogen ($kg\ ha^{-1}$)	263.42	234.96	Alkaline permanganate method (Subbiah and Asjja,1956)
Available phosphorus ($kg\ ha^{-1}$)	14.95	12.70	Soils were extracted with 0.5 M $NaHCO_3$ & colour development by Ascorbic acid (Watanabe and Olsen' s, 1965)
Available potassium ($kg\ ha^{-1}$)	321.57	271.19	Neutral normal ammonium acetate method by using flame photometer (Jakson, 1973)

Table 2. Influence of levels of nutrients and bioinoculants on Plant height (m) of guava cv. L-49

Treatments	Influence of levels of nutrients and bioinoculants on Plant height (m)					
	Initial height 2022-23	Height at harvest stage 2022-23	Increase in height (%) 2022-23	Initial height 2023-24	Height at harvest stage 2023-24	Increase in height (%) 2023-24
Factor A (Level of nutrients)						
N1	4.08	4.48	10.00	4.13	4.56	10.34
N2	3.86	4.32	12.16	3.91	4.39	12.46
N3	4.03	4.49	11.59	4.11	4.58	11.80
N4	3.73	4.10	10.10	3.78	4.16	10.30
SEm±	0.13	0.13	0.47	0.13	0.13	0.41
CD (5%)	0.38	0.38	1.35	0.37	0.38	1.18
Factor B (Bioinoculants)						
B1	3.96	4.36	10.23	4.00	4.42	10.66
B2	3.83	4.24	10.94	3.91	4.34	11.16
B3	4.05	4.50	11.10	4.10	4.56	11.31
B4	4.03	4.47	11.07	4.08	4.54	11.29
B5	3.77	4.19	11.48	3.81	4.25	11.71
SEm±	0.15	0.15	0.53	0.15	0.15	0.46
CD (5%)	0.43	0.42	1.51	0.42	0.42	1.32

Treatments	Influence of levels of nutrients and bioinoculants on Plant height (m)					
	Initial height 2022-23	Height at harvest stage 2022-23	Increase in height (%) 2022-23	Initial height 2023-24	Height at harvest stage 2023-24	Increase in height (%) 2023-24
Interaction (A x B)						
N1B1	4.52	4.93	9.14	4.55	4.98	9.34
N1B2	3.86	4.22	9.45	3.89	4.27	9.70
N1B3	4.11	4.50	9.48	4.18	4.60	10.13
N1B4	3.71	4.06	9.76	3.75	4.11	10.04
N1B5	4.26	4.68	9.90	4.32	4.74	9.96
N2B1	3.69	4.11	11.40	3.72	4.16	11.83
N2B2	3.93	4.37	11.52	4.10	4.56	11.52
N2B3	3.92	4.37	11.81	3.98	4.44	11.83
N2B4	3.89	4.38	12.60	3.95	4.46	12.91
N2B5	3.76	4.24	12.86	3.82	4.32	13.09
N3B1	3.75	4.13	10.52	3.81	4.20	10.63
N3B2	4.10	4.58	11.75	4.15	4.65	12.09
N3B3	3.87	4.33	11.91	3.92	4.40	12.27
N3B4	4.18	4.67	11.82	4.22	4.73	12.22
N3B5	3.80	4.27	12.81	3.85	4.34	12.89
N4B1	3.87	4.26	10.08	3.92	4.32	10.14
N4B2	4.33	4.76	10.28	4.35	4.80	10.66
N4B3	3.86	4.27	10.61	3.89	4.32	11.13
N4B4	3.48	3.84	10.71	3.52	3.91	11.01
N4B5	3.65	4.04	10.88	3.73	4.15	11.15
SEm±	0.30	0.29	1.06	0.29	0.29	0.92
CD (5%)	0.85	0.84	3.03	0.84	0.84	2.64

3.2 Canopy Spread (East-West)

Data recorded on canopy spread E-W as influenced by nutrients and bioinoculants and their combinations are presented in Table 3. The data revealed that canopy spread E-W was significantly increased during both years of experimentation. Among different levels of nutrients, the maximum increase in canopy spread E-W (14.15%) & (14.45%) was found in N_2 (100%RDF). With respect to bioinoculants, the maximum increase in canopy spread E-W (13.24%) & (13.61%) was found in B_5 (Bactobooster 200ml) respectively during both years. Among the treatment combinations, T_{10} (100% RDF + Bactobooster 200 ml)) was found superior with respect to the maximum increases in canopy spread E-W (15.77%) & (16.11%) followed by T_{15} (75% RDF + Bactobooster 200ml) with increase in canopy spread E-W (14.89%) & (15.21%). The minimum increase in canopy spread E-W (9.76%) & (10.08%) was recorded in control (T_1). Biofertilizers produce growth-promoting substances viz., auxin, gibberellins and cytokinins, which contribute toward the vigorous growth of the plant [9].

Table 3 Influence of levels of nutrients and bioinoculants on Canopy Spread (m) (E-W) of guava cv. L-49

Treatments	Influence of levels of nutrients and bioinoculants on Canopy Spread(m) (E-W)					
	Initial Canopy Spread (E-W) 2022-23	Canopy Spread (E-W) at harvest stage 2022-23	Increase in Canopy Spread (E-W) (%) 2022-23	Initial Canopy Spread (E-W) 2023-24	Canopy Spread (E-W) at harvest stage 2023-24	Increase in Canopy Spread (E-W) (%) 2023-24
Factor A (Level of nutrients)						
N1	3.48	3.87	11.72	3.54	3.95	12.14
N2	3.39	3.85	14.15	3.46	3.93	14.45
N3	3.62	4.07	12.75	3.69	4.16	13.03
N4	3.58	4.00	12.14	3.63	4.08	12.54
SEm±	0.17	0.17	0.65	0.18	0.18	0.65
CD (5%)	0.49	0.50	1.87	0.50	0.50	1.85

Treatments	Influence of levels of nutrients and bioinoculants on Canopy Spread(m) (E-W)					
	Initial Canopy Spread (E-W) 2022-23	Canopy Spread (E-W) at harvest stage 2022-23	Increase in Canopy Spread (E-W) (%) 2022-23	Initial Canopy Spread (E-W) 2023-24	Canopy Spread (E-W) at harvest stage 2023-24	Increase in Canopy Spread (E-W) (%) 2023-24
Factor B (Bioinoculants						
B1	3.89	4.34	11.79	3.95	4.42	12.08
B2	3.59	4.00	12.35	3.65	4.08	12.68
B3	3.45	3.88	12.84	3.51	3.95	13.23
B4	3.34	3.78	13.23	3.38	3.83	13.60
B5	3.32	3.75	13.24	3.40	3.86	13.61
SEm±	0.19	0.19	0.73	0.20	0.20	0.72
CD (5%)	0.55	0.55	2.09	0.56	0.56	2.07
Interaction (A x B)						
N1B1	4.08	4.46	9.76	4.15	4.54	10.08
N1B2	4.25	4.72	11.17	4.32	4.81	11.46
N1B3	3.67	4.09	11.57	3.71	4.15	11.98
N1B4	3.35	3.74	11.71	3.41	3.82	12.30
N1B5	3.42	3.81	12.00	3.46	3.87	12.45
N2B1	3.22	3.64	13.46	3.28	3.74	13.96
N2B2	3.45	3.91	13.51	3.52	4.00	13.82
N2B3	2.90	3.30	13.78	2.96	3.37	14.20
N2B4	3.15	3.61	14.76	3.22	3.70	15.07
N2B5	3.05	3.50	15.77	3.11	3.58	16.11
N3B1	3.65	4.09	12.14	3.71	4.16	12.41
N3B2	3.58	4.03	12.71	3.65	4.11	12.95
N3B3	3.38	3.81	13.63	3.45	3.90	13.91
N3B4	3.25	3.70	14.10	3.32	3.79	14.41
N3B5	3.22	3.65	14.89	3.28	3.74	15.21
N4B1	3.68	4.09	11.12	3.72	4.15	11.53
N4B2	3.65	4.06	11.33	3.71	4.14	11.68
N4B3	3.75	4.17	11.71	3.81	4.25	12.09
N4B4	4.10	4.58	11.81	4.16	4.66	12.03
N4B5	3.57	4.01	12.84	3.63	4.09	13.16
SEm±	0.39	0.39	1.46	0.39	0.39	1.45
CD (5%)	1.10	1.11	4.18	1.12	1.12	4.14

3.3 Canopy Spread (North-South)

Data regarding canopy spread N-S as influenced by nutrients and bioinoculants and their combinations are presented in Table 4. The data revealed that canopy spread N-S was considerably increased during two consecutive years of experimentation. Among different levels of nutrients, the maximum increases in canopy spread N-S (14.33%) & (14.72%) was found in N_2 (100%RDF). With respect to bioinoculants, increase in canopy spread N-S (14.05%) & (14.44%) was recorded in B_5 (Bactobooster 200 ml). Among the treatment combinations, T_{10} (100% RDF + Bactobooster 200 ml)) was found superior with respect to the increase in canopy spread N-S (16.16%) & (16.66%), followed by T_{15} (75% RDF + Bactobooster 200 ml) with increase in canopy spread N-S (16.07%) & (16.38%). The minimum increase in canopy spread N-S (9.16%) & (9.55%) was recorded in control (T_1). The obtained results are in accordance with Chandra et al. [10], Godage et al. [11], Kumar et al. [12], Ram et al. [13] and Tyagi et al. [14] in guava.

3.4 Stem Girth

Data regarding stem girth as influenced by nutrients and bioinoculants and their combinations are presented in Table 5. The data revealed that stem girth was considerably increased during both years of experimentation. Among different levels of nutrients, the maximum increase in stem girth (11.19%) & (10.07%) was recorded in N_2 (100%RDF). With respect to bioinoculants the maximum increase in stem girth (9.72%) & (8.85%) was recorded in B_5 (Bactobooster 200ml), Among the treatment combinations, T_{10} (100% RDF + Bactobooster 200ml)) was found superior regarding the

maximum increase in stem girth (12.54%) & (11.01%) followed by T_{15} (75% RDF + Bactobooster 200ml) with increase in stem girth (11.93%) & (10.69%), whereas minimum increase in stem girth (6.68%) & (6.30%) was recorded in control (T_1).The biofertilizers help in fixing atmospheric nitrogen and also solubilization of phosphorus and potassium by producing organic acids through their metabolic process [15]. Biofertilizers, particularly the inoculation of Biofertisol and Bactobooster have a beneficial impact on the structural growth of guava trees [16,17,18]. The enhancement in growth parameters might be due to a continuous supply of nutrients by the quick release of inorganic fertilizers (level of nutrients) in the initial stages and the slow release of organic fertilizers (Bioinoculants- Biofertisol & Bactobooster) at later stages. Our results are in agreement with the findings of Atom A. [19], Dutta et al. [20], Goswami et al. [1], Naik and Babu [21] and Ram et al. [22] in guava.

Table 4 Influence of levels of nutrients and bioinoculants on Canopy Spread(m) (N-S) of guava cv. L-49

Treatments	Influence of levels of nutrients and bioinoculants on Canopy Spread(m) (N-S)					
	Initial Canopy Spread (N-S) 2022-23	Canopy Spread (N-S) at harvest stage 2022-23	Increase in Canopy Spread (N-S) (%) 2022-23	Initial Canopy Spread (N-S) 2023-24	Canopy Spread (N-S) at harvest 2023-24	Increase in Canopy Spread (N-S) (%) 2023-24
Factor A (Level of nutrients)						
N1	3.81	4.22	11.17	3.86	4.30	11.53
N2	3.27	3.72	14.33	3.33	3.80	14.72
N3	3.40	3.86	13.89	3.47	3.94	14.21
N4	3.67	4.07	11.36	3.72	4.14	11.76
SEm±	0.16	0.16	0.67	0.16	0.16	0.68
CD (5%)	0.46	0.46	1.92	0.46	0.46	1.95
Factor B (Bioinoculants)						
B1	4.00	4.45	11.53	4.06	4.52	11.89
B2	3.59	4.01	12.15	3.65	4.09	12.51
B3	3.50	3.91	12.62	3.56	3.99	12.97
B4	3.36	3.79	13.09	3.42	3.87	13.46
B5	3.23	3.68	14.05	3.29	3.75	14.44
SEm±	0.18	0.18	0.75	0.18	0.18	0.76
CD (5%)	0.51	0.51	2.15	0.52	0.52	2.18
Interaction (A x B)						
N1B1	4.18	4.56	9.16	4.22	4.62	9.55
N1B2	4.42	4.84	9.88	4.47	4.92	10.25
N1B3	3.98	4.37	9.89	4.06	4.47	10.16
N1B4	3.88	4.28	10.39	3.95	4.37	10.72
N1B5	3.63	4.04	11.33	3.69	4.12	11.70
N2B1	3.65	4.12	12.90	3.72	4.21	13.19
N2B2	3.35	3.80	13.55	3.42	3.89	13.94
N2B3	3.12	3.55	14.88	3.18	3.63	15.24
N2B4	2.87	3.31	15.74	2.93	3.39	16.07
N2B5	2.88	3.34	16.16	2.92	3.40	16.66
N3B1	3.88	4.32	11.63	3.93	4.39	12.10
N3B2	3.88	4.35	12.38	3.93	4.42	12.75
N3B3	2.92	3.33	14.76	2.97	3.40	15.22
N3B4	2.90	3.35	15.43	2.97	3.43	15.74
N3B5	2.82	3.25	16.07	2.89	3.34	16.38
N4B1	3.58	3.98	11.49	3.62	4.04	11.93
N4B2	3.68	4.10	11.49	3.72	4.16	11.94
N4B3	3.62	4.04	11.87	3.67	4.11	12.24
N4B4	3.48	3.91	12.37	3.54	3.98	12.71
N4B5	4.03	4.51	12.38	4.10	4.60	12.61
SEm±	0.36	0.36	1.50	0.36	0.36	1.52
CD (5%)	1.03	1.02	4.30	1.04	1.03	4.35

Table 5. Influence of levels of nutrients and bioinoculants on Stem girth (cm) of guava cv. L-49

Treatments	Influence of levels of nutrients and bioinoculants on Stem girth (cm)					
	Initial Stem girth (cm) 2022-23	Stem girth (cm) at harvest stage 2022-23	Increase in Stem girth (%) 2022-23	Initial Stem girth (cm) 2023-24	Stem girth (cm) at harvest stage 2023-24	Increase in Stem girth (%) 2023-24
Factor A (Level of nutrients)						
N1	31.44	33.72	7.47	33.69	36.00	6.97
N2	30.65	33.90	11.19	33.90	37.17	10.07
N3	34.20	37.48	10.23	37.47	40.77	9.19
N4	33.01	35.67	8.30	35.67	38.35	7.70
SEm±	2.06	2.06	0.61	1.95	1.94	0.47
CD (5%)	5.89	5.89	1.75	5.57	5.56	1.35
Factor B (Bioinoculants)						
B1	32.96	35.79	8.78	35.84	38.70	8.08
B2	32.57	35.29	9.13	35.29	38.04	8.30
B3	34.05	36.99	9.23	37.00	39.96	8.35
B4	31.05	34.01	9.63	33.97	36.96	8.82
B5	31.00	33.87	9.72	33.81	36.70	8.85
SEm±	2.30	2.30	0.68	2.18	2.17	0.53
CD (5%)	6.59	6.58	1.96	6.23	6.22	1.51
Interaction (A x B)						
N1B1	34.18	36.44	6.68	36.51	38.79	6.30
N1B2	33.54	35.87	7.10	35.81	38.17	6.63
N1B3	32.53	34.89	7.26	34.78	37.16	6.85
N1B4	34.00	36.54	7.62	36.54	39.11	7.14
N1B5	28.60	30.77	8.13	30.78	32.97	7.46
N2B1	34.33	37.62	9.70	37.51	40.82	8.90
N2B2	31.67	34.93	10.37	34.95	38.23	9.41
N2B3	30.00	33.09	11.22	33.09	36.19	10.15
N2B4	29.67	33.05	11.60	33.04	36.44	10.39
N2B5	29.67	32.90	12.54	32.85	36.10	11.01
N3B1	37.67	40.77	9.55	40.78	43.90	8.46
N3B2	32.33	35.52	9.91	35.57	38.78	9.05
N3B3	37.67	41.03	9.91	41.06	44.44	8.76
N3B4	32.60	35.97	10.38	35.96	39.34	9.44
N3B5	28.67	32.03	11.93	32.04	35.42	10.69
N4B1	36.33	39.04	7.97	39.07	41.80	7.34
N4B2	33.67	36.29	8.16	36.34	39.00	7.57
N4B3	28.33	30.61	8.20	30.59	32.90	7.61
N4B4	31.67	34.33	8.45	34.30	36.99	7.86
N4B5	29.40	32.14	9.30	32.11	34.87	8.59
SEm±	4.60	4.60	1.37	4.35	4.34	1.05
CD (5%)	13.18	13.16	3.92	12.46	12.44	3.01

4. CONCLUSION

Based on the results proved that different levels of nutrients and bioinoculants alone and in combinations significantly influenced the growth parameter. The maximum increase in plant height (12.16%) & (12.46%), canopy spread E-W (14.15%) & (14.45%), canopy spread N-S (14.33%) & (14.72%) and stem girth (11.19%) & (10.07%) were recorded in N_2 (100%RDF), during both years of experimentation respectively. With respect to bioinoculants, the maximum increase in plant height (11.48%) & (11.71%), canopy spread E-W (13.24%) & (13.61%), canopy spread N-S (14.05%) & (14.44%) and stem girth (9.72%) & (8.85%) were observed in B_5 (Bactobooster 200 ml) during both years respectively. Among the treatment combinations, T_{10} (100% RDF + Bactobooster 200 ml) was found superior with respect to maximum increase in plant height (12.86%) & (13.09%), in canopy spread E-W (15.77%) & (16.11%), canopy spread N-S (16.16%) & (16.66%) and in stem girth (12.54%) & (11.01%)

during both the years of experimentation respectively followed by T_{15} (75% RDF + Bactobooster 200ml) and minimum was recorded in control (T_1).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Goswami AK, Lal S, Misra KK. Integrated nutrient management improves growth and leaf nutrient status of guava cv. Pant Prabhat, Indian J Hort. 2012;69(2):168 172.
2. Surage A, Sharma S, Singh R. Impact of Bioinoculants on Growth Parameters of Guava (*Psidium guajava* L.). Journal of Agricultural Science. 2017;14(3):215-223.
3. Jugnake MO. Effect of Bio-fertilizer and chemical fertilizers on growth, yield and quality of Sweet Orange (*Citrus sinensis* L.) Doctoral dissertation, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani; 2017.
4. Patil VK, BN. Shinde. Studies on integrated nutrient management on growth and yield of banana cv. Ardhapuri (Musa AAA). Journal of Horticulture and Forestry. 2013;5(9):130-8.
5. Rani M, Kaur G, Kaur K, Arora NK. Effect of organic manures and biofertilizers on growth, fruit quality and leaf nutrient status of guava. Agric. Res. J. 2021;58:835-839.
6. Claypool LL. Irrigation orchards. Proc. Wash, A. Hort. Soc. 1938;30:78-10.
7. Poonia KD, Bhatnagar P, Sharma MK, Singh J. Efficacy of biofertilizers on growth and development of mango plants cv. Dashehari. Journal of Pharmacognosy and Phytochemistry. 2018;7(5):2158-2162.
8. Shankarappa TH, Reddy RN, Subramanyam B, Sreenatha A, Reddy NA. Biofertilizers for Growth and Establishment of Alphonso Mango Grafts under Nursery Condition. Int. J. Curr. Microbiol. App. Sci. 2018;7:5205-5211.
9. Azcon R, Barea JM. Synthesis of auxins, gibberellins and cytokinins by *Azotobacter beijerinckii* related to effects produced on tomato plants. Plant and Soil. 1975;43(3): 609-19.
10. Chandra V, Sharma HG, Dikshit SN. Effect of chemical fertilizers, organics manure and biofertilizers on growth, yield and quality of mrig bahar guava (*Psidium guajava*); 2016.
11. Godage SS, Parekh NS, Nehete DS. Influence of bio-fertilizers and chemical fertilizers on growth, flowering and fruit characters of guava (*Psidium guajava* L.) cv. Allahabad Safeda. International Journal of Agricultural Sciences. 2013;9(1):309-313.
12. Kumar V, Mukherjee S, Paliwal R, Gupta S. Effect of integrated nutrient management on growth and quality of guava (*Psidium guajava* L). International Journal of farm Sciences. 2022;12(2):1-5.
13. Ram RA, Bhriguvanshi SR, Pathak RK. Integrated plant nutrient management in guava (*Psidium guajava* L.) cv. Sardar. In International Guava Symposium. 2005; 735:345-350.
14. Tyagi SK, Kulmi GS, Khire AR. Effect of integrated nutrient management on growth, yield and economics of guava (*Psidium guajava* L.). Journal of Krishi Vigyan. 2021; 10(1):69-72.
15. Verma M, Sharma S., Prasad R. Liquid biofertilizers Advantages over carrier-based biofertilizers for susainable crop production. International Society of Environmental Botanists. 2011;17(2):16-18.
16. Sahu R, Kumar S, Thakur R, Mitra N. Effects of Bioinoculants on Total Chlorophyll Content, Yield of Soybean and Fertility Status of a Vertisols. J. Exp. Agric. Int. 2023;45(12):266-72.
Available:https://journaljeai.com/index.php/JEAI/article/view/2292
[Accessed on: 2024 May 24]
17. Khandare R, Shirale S, Gajbhiye B, Yerma S. Different Fractions of Sulphur, Their Correlations with Soil Properties and Yield of Soybean and Safflower Influenced by Long Term Fertilizers Experiment under Vertisol. AJSSPN. 2024;10(1):88-100.
Availablehttps://journalajsspn.com/index.php/AJSSPN/article/view/214
[Accessed on: 2024 May 24].
18. Gupta R, Bisaria VS, Sharma S. Response of rhizospheric bacterial communities of Cajanus cajan to application of bioinoculants and chemical fertilizers: A comparative study. European Journal of Soil Biology. 2016;75:107-14.
19. Atom A. Effect of inorganic and biofertilizers on growth, yield and quality of Sardar Guava (*Psidium guajava* L.) M.Sc. Thesis, College of Agriculture, Latur; 2013.

20. Dutta P, Kundu S, Bauri FK, Talang H, Majumder D. Effect of bio-fertilizers on physico-chemical qualities and leaf mineral composition of guava grown in alluvial zone of West Bengal. J Crop Weed Sci. 2014;10(2):268-271.
21. Naik MH, Babu RS. Feasibility of organic farming in guava (*Psidium guajava* L.). Acta Horticulturae. 2007;735:365-372.
22. Ram RA, Bhriguvanshi SR, Pathak RK. Integrated plant nutrient management in Guava (*Psidium guajava* L.) cv. Sardar. Acta Horticulturae. 2007;735:345-350.

© Copyright (2024): Author(s). The licensee is the journal publisher. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/118078