Bangladesh J. Bot. **52**(4): 971-978, 2023 (December) DOI: https://doi.org/10.3329/bjb.v52i4.70579

EFFECTS OF ORGANIC SUBSTANCE AND PLANT GROWTH REGULATORS ON YIELD ATTRIBUTES AND QUALITY OF GUAVA CV. LUCKNOW 49

DM DABHI*, MJ PATEL AND SJ MACWAN[1]

Department of Horticulture, B. A. College of Agriculture, Anand Agricultural University, Anand, 388 110, Gujarat, India

Keywords: Organic substance, Plant growth regulators, Yield, Quality, Guava

Abstract

In the present study effects of organic substance and plant growth regulators on yield attributes and quality of guava cv. Lucknow 49 were conducted during 2021-2022. Results indicated that foliar application of novel organic liquid fertilizer (40 ml/l) gave higher yield parameters *viz.* number of flowers per branch, fruit set, weight per fruit, fruit volume, fruit diameter, fruit length, pulp weight per fruit, number of fruits per plant, fruit yield (kg/plant) during both the years and in pooled data. In quality parameters, higher chlorophyll content and pulp: seed ratio were recorded with novel organic liquid fertilizer (40 ml/l) during both the years and in pooled data. However, organic substance and plant growth regulators treatments showed non-significant effect on total seed weight per fruit in both the years as well as in pooled data.

Introduction

Guava *Psidium guajava* L. one of the most important fruit crops of India next to mango and banana belongs to Myrtaceae family. It is a native fruit of tropical America from where the Portuguese introduced it to India in the early 17th century. Guava has gained notoriety as the "Poor man's apple" since it is readily available to everyone during the season at a very low price. It is pleasantly sweet and refreshingly acidic in flavor and emits a sweet aroma.

The agricultural sector is currently dealing with the simultaneous difficulties of boosting production to feed the expanding global population and increasing resource use efficiency, while lowering the environmental impact on ecosystems and human health. It necessitates increasing the production potential of guava under available resources. Besides, all available high production technologies such as use of high yielding varieties, high density orcharding, the use of organic substance and PGR's have been proved as a powerful tool to meet this demand by influencing fruit production directly or indirectly. Organic substance and PGR's are a promising approach for achieving sustainable agriculture since they are often regarded as a renewable source of plant nutrients, promote crop production.

Brassinosteroids (BRs), a class of steroidal plant hormones, are necessary for typical plant growth and development. While the primary effects of brassinosteroids are on cell expansion, they also influence cell division and cell elongation to control the growth (Clouse and Sasse 1998).

Triacontanol (TRIA) is a natural plant growth regulator found in epicuticular waxes. Triacontanol is reported to accelerate the rate of cell division, photosynthesis, transpiration, stomatal conductance and uptake of water and nutrients and other metabolic activities in plants (Ries and Houtz 1983).

A phenolic phytohormone, salicylic acid is essentially known as ‘natural plant defender’. It has been discovered to play a crucial role in the regulation of plant growth, development and vigour under biotic and abiotic stresses. Due to its stimulatory influence

*Author for correspondence: <dabhidharmeshm@gmail.com>. [1]Department of Plant Physiology, B. A. College of Agriculture, Anand Agricultural University, Anand, 388 110, Gujarat, India.

on plant growth, flowering, fruiting and yield, salicylic acid is regarded as an endogenous plant growth regulator (Hayat *et al.* 2010).

Gibberellic acid regulate fruit development in various ways and at different developmental stages. GA_3 is known to influence both cell division and cell enlargement, resulting in the growth of the plant (Adams *et al.* 1975).

Novel organic liquid fertilizer is prepared from banana pseudostem. It contains good amount of macro and micro-nutrients along with growth promoting substances like cytokinins, GA_3, *etc.* It is used for initiation of flowering, increase fruit setting and reduce fruit drop. It boosts plant growth and maximum conversion of flowers into fruits which ultimately increase yield and quality as well as decrease cost of cultivation (Desai *et al.* 2016). Keeping all these in mind, the present experiment was planned to study effects of organic substance and plant growth regulators on yield attributes and quality of guava cv. Lucknow 49.

Materials and Methods

An experiment was conducted during the year 2021 and 2022 on 4 years old uniform size guava plants planted 5 × 5 m at Horticultural Research Farm, Department of Horticulture, B. A. College of Agriculture, Anand Agricultural University, Anand, Gujarat, India which is situated geographically at 22°35' North latitude and 72°55' East longitude with an altitude of about 45.1 m above the mean sea level which is categorized under the 'Middle Gujarat Agro climatic Zone-III'. The soil of the experimental site was loamy sand, locally known as "Goradu" having pH 7.31, EC 0.22 dS/m and 0.40 % organic carbon.

The experiment was laid out in completely randomized design with eleven treatments *viz.*, T_1 : Brassinosteroids 1 mg/l, T_2 : Brassinosteroids 2 mg/l, T_3 : Triacontanol 0.005 ml/l, T_4 : Triacontanol 0.010 ml/l, T_5 : Salicylic acid 100 mg/l, T_6 : Salicylic acid 150 mg/l, T_7 : GA_3 100 mg/l, T_8 : GA_3 150 mg/l, T_9 : Novel organic liquid fertilizer 20 ml/l, T_{10} : Novel organic liquid fertilizer 40 ml/l, T_{11} : Control. The experiment was repeated thrice during the two years (2021 and 2022) of research (Table 1). Foliar spray of organic substance and plant growth regulators were imposed in two frequencies i.e. on 2nd July and 2nd August in the year 2021 and on 5th July and 5th August in the year 2022. The spray was done by using foot sprayer. Generally, three liter of solution was sufficient for 4 years old guava plant.

Table 1. Composition of novel organic liquid fertilizer.

Nutrient content		Nutrient content	
N	0.062 %	Total phenol	48.0 - 49.1 mg/100 ml
P	0.018%	Ureas activity	63 - 81 U/ml/min
K	0.180%	Gibberellic acid	110.2 - 205.0 mg/l
Ca	0.031%	Cytokinin	137.8 - 244.3 mg/l
Mg	0.092%	Total viable count	1065 x 10^3 CFU/ml
S	0.010%	PSB	1025 x 10^2 CFU/ml
Mn	5.73 ppm	*Rhizobium*	285 x 10^2 CFU/ml
Cu	0.40 ppm	*Azotobacter*	460 x 10^2 CFU/ml
Zn	2.92 ppm	Fungal count	1200 CFU/ml
Fe	109.3 ppm		

Source: Banana pseudostem processing unit laboratory, S. W. M. R. U., Navsari Agricultural University, Navsari.

The novel organic liquid fertilizer (earlier it is also known as banana pseudostem sap) used in present investigation was collected from Soil and Water Management Research Unit, Navsari Agricultural University, Navsari. For preparing 20 and 40 $ml l^{-1}$ concentration of novel organic liquid fertilizer, the required quantity i.e. 60 and 120 ml, respectively of novel organic liquid fertilizer was measured with the help of measuring cylinder separately and diluted in 3 liters of water for each plant.

Results and Discussion

The number of flowers per branch was found significantly higher with novel organic liquid fertilizer 40 ml/l (T_{10}) *i.e.* 14.42, 15.25 and 14.83 during the year 2021, 2022 and pooled result, respectively. It was at par with T_6, T_7 and T_8 in 2021, T_6 and T_8 during 2022 as well as T_8 in pooled (Table 2). A foliar application of a novel organic liquid fertilizer might have increased the number of flowers per branch because it contains macro and micronutrients as well as growth regulators. Due to that the plants remain physiologically more active to build up plenty of food stock for the developing flowers by creating a favorable C: N ratio in branches, which eventually results in an increased number of flowers per branch. This result is in accordance with the results reported by Patel *et al.* (2021) and Christian *et al.* (2022) in sapota.

Table 2 also showed that the fruit set was significantly higher with novel organic liquid fertilizer 40 ml/l (T_{10}) *i.e.* 77.48, 78.70 and 78.09 % during the year 2021, 2022 and in pooled, respectively which was at par with T_6, T_7, T_8 and T_9 during both the years and pooled. It might be due to novel organic liquid fertilizer contains a good amount of essential nutrients and growth boosters and these components are known to have a progressive effect on fruit set and fruit drop. The foliar application of novel organic liquid fertilizer, which are directly involved in various physiological processes and enzymatic activities resulting in better photosynthesis, greater accumulation of starch in fruit and other factors stimulating the formulation of fruit in the tissue of the ovary. Boron is vital in blooming, pollen tube growth, fruiting processes and hormone action, whereas zinc increases the synthesis of tryptophan, a precursor of auxin. It is responsible for the enhancement of auxin in the plant which is known to reduce fruit drop and increase the fruit set by delaying the formation of the abscission layer. This was supported by the findings reported by Patel *et al.* (2021) and Christian *et al.* (2022) in sapota.

The significantly higher fruit diameter was recorded with the treatment of novel organic liquid fertilizer 40 ml/l (T_{10}) *i.e.* 7.05, 7.11 and 7.08 cm during 2021, 2022 and in pooled results, respectively. It was at par with T_5, T_6, T_7, T_8 and T_9 in the year 2021 while, T_6, T_7, T_8 and T_9 in the year 2022 as well as T_6, T_7 and T_8 in pooled data. The significantly higher fruit length was noted with novel organic liquid fertilizer 40 ml/l (T_{10}) *i.e.* 8.01, 8.05 and 8.03 cm during 2021, 2022 and in pooled results, respectively which was at par with T_6, T_7 and T_8 during 2021, 2022 and in pooled analysis (Table 2). Increases in fruit characteristics such as diameter and length might be attributed to foliar application of novel organic liquid fertilizer elaborates directly on various physiological processes and enzymatic activity. The possible reason is due to the faster loading and mobilization of photo assimilates to fruit and involvement in cell division and cell expansion through the macro and micro nutrients and plant hormones present in novel organic liquid fertilizer and micronutrients also supply key components supplementing the higher carbohydrate levels from photosynthetic activity aiding in fruit growth which ultimately reflects in more diameter and length of fruit in treated plants. Similar findings were also reported by Chakraborty *et al.* (2021) in strawberry, Rathod *et al.* (2022) in mango and Christian *et al.* (2023) in sapota.

In Table 2, the analyzed data reflected that among different treatments, the significantly higher fruit volume *i.e.* 156.11, 157.33 and 156.72 cc was found with treatment novel organic

liquid fertilizer 40 ml/l (T_{10}) during the year 2021, 2022 and in pooled data, respectively which was at par with T_6, T_7, T_8 and T_9 during 2021 and 2022. In the pooled mean it was at par with T_6, T_7 and T_8. The novel organic liquid fertilizer that contain macro and micronutrients as well as plant growth regulators. It promotes cell division, cell elongation, and higher carbohydrate accumulation in plants during the early stages of growth, which leads to better transportation of nutrients and improves fruit volume. This finding is supported by Patel *et al.* (2018) and Rathod *et al.* (2022) in mango.

Among different treatments, application of novel organic liquid fertilizer 40 ml/l (T_{10}) significantly gave higher pulp weight per fruit *i.e.* 161.64, 161.84 and 161.74 g in 2021, 2022 and pooled result, respectively were recorded. This result is at par with T_6, T_7, T_8 and T_9 in the year 2021 and 2022. In pooled analysis it was at par with T_6, T_7 and T_8. The significantly higher weight per fruit *i.e.* 164.89, 165.11 and 165.00 g was recorded with novel organic liquid fertilizer 40 ml/l (T_{10}) during the year 2021, 2022 and in pooled data, respectively (Table 2a). During 2021 and 2022, novel organic liquid fertilizer 40 $ml l^{-1}$ was at par with T_6, T_7, T_8 and T_9. While in pooled data, it was at par with T_6, T_7 and T_8. The foliar application of novel organic liquid fertilizer increased the weight of the pulp and fruit by accelerating biochemical activities in plant parts that aid in active polar transport, encourage cell enlargement and multiplication, increase intercellular spaces, and encourage greater accumulation of carbohydrates, sugars, and water. These results are in conformity with the findings of Rathod *et al*. (2022) in mango and Christian *et al.* (2023) in sapota.

Table 2a also revealed that the number of fruits per plant was found significantly higher with novel organic liquid fertilizer 40 ml/l (T_{10}) *i.e.* 233.33, 235.00 and 234.17 during 2021, 2022 and in pooled data analysis, respectively which was at par with T_6, T_7, T_8 and T_9 during 2021, While, it was at par with T_5, T_6, T_7, T_8 and T_9 in the year 2022. Whereas, in pooled analysis it was at par with T_6, T_7 and T_8. It might be due to the use of a novel organic liquid fertilizer. It contains good amount of macro and micronutrient and plant growth hormones availability leading to an increase in the number of flowers per branch, improved fruit set and decreased fruit drop. Macro and micro nutrient and plant growth hormones that improve photosynthetic activity lead to an increase in the production and allocation of carbohydrates and photosynthate, which increase the number of fruits per plant. Results are more or less similar to the findings of Chakraborty *et al.* (2021) in strawberry, Rathod *et al.* (2022) in mango and Christian *et al.* (2023) in sapota.

Data presented in Table 2a indicated that the significantly higher yield/plant *i.e.* 36.47, 38.10 and 37.29 kg was recorded with novel organic liquid fertilizer 40 ml/l (T_{10}) during 2021, 2022 and in pooled analysis, respectively. In the first year of experiment it was at par with T_6, T_7 and T_8. In second year of investigation it was at par with T_6, T_7, T_8 and T_9, while in pooled analysis it was at par with T_6 and T_8. Novel organic liquid fertilizer contains plant growth regulators such as gibberellic acid and cytokinin, macronutrients (N, P, K, Ca, Mg and S) and micronutrients (Mn, Cu, Fe and Zn) that are crucial for plant growth and result in improving the yield and yield attributing characters. It might be due to the cumulative effect of more fruits per plant and weight of fruits, which eventually results in a higher yield per plant. It increased the efficacy of metabolic processes like photosynthesis, the production of carbohydrates and their translocation from source to sink in the trees and thus stimulated the growth of plant in general and consequently the various parts of the plant including fruit. Similar supporting findings have been reported by Chakraborty *et al.* (2021) in strawberry, Rathod *et al*. (2022) in mango and Christian *et al.* (2023) in sapota.

Effects of different organic substance and plant growth regulators on total seed weight per fruit was found non-significant during the year 2021, 2022 and in pooled analysis (Table 2a).

Table 2. Effects of organic substance and plant growth regulators on yield attributes of guava.

Treatment		Number of flowers per branch			Fruit set (%)			Fruit diameter (cm)			Fruit length (cm)			Fruit volume (cc)		
		2021	2022	Pooled	2021	2022	Pooled	2021	2022	Pooled	2021	2022	Pooled	2021	2022	Pooled
T_1		10.75	11.00	10.88	61.93	66.66	64.30	5.61	5.60	5.61	5.82	5.84	5.83	133.00	134.11	133.56
T_2		11.42	11.58	11.50	69.45	69.36	69.41	6.23	6.22	6.22	6.32	6.34	6.33	138.11	139.45	138.78
T_3		10.92	11.33	11.13	64.25	68.12	66.19	5.74	5.70	5.72	5.96	6.01	5.98	136.33	137.56	136.95
T_4		12.00	12.08	12.04	69.78	69.60	69.69	6.29	6.31	6.30	6.36	6.39	6.38	140.33	142.22	141.28
T_5		12.17	12.33	12.25	70.26	70.23	70.25	6.65	6.64	6.64	6.61	6.65	6.63	142.45	143.45	142.95
T_6		13.33	13.67	13.50	76.28	73.06	74.67	6.96	6.97	6.96	7.87	7.89	7.88	151.44	152.78	152.11
T_7		13.00	13.33	13.17	75.66	72.60	74.13	6.80	6.83	6.82	7.74	7.79	7.76	148.11	150.22	149.17
T_8		13.58	14.17	13.88	76.94	77.88	77.41	7.01	7.04	7.02	7.96	8.01	7.98	153.33	154.45	153.89
T_9		12.33	12.42	12.38	75.05	72.44	73.74	6.73	6.76	6.75	6.75	6.77	6.76	144.56	146.67	145.61
T_{10}		14.42	15.25	14.83	77.48	78.70	78.09	7.05	7.11	7.08	8.01	8.05	8.03	156.11	157.33	156.72
T_{11}		10.33	10.92	10.63	59.69	64.89	62.29	5.51	5.49	5.50	5.67	5.70	5.69	131.22	133.00	132.11
Treatment	SEM ±	0.53	0.56	0.37	2.05	2.20	1.56	0.18	0.16	0.11	0.17	0.18	0.12	4.37	4.69	3.01
(T)	C. D. (P = 0.05)	1.57	1.64	1.04	6.00	6.45	4.43	0.52	0.46	0.32	0.51	0.52	0.33	12.81	13.76	8.54
Year	SEM ±	-	-	0.16	-	-	0.64	-	-	0.05	-	-	0.05	-	-	1.37
(Y)	C. D. (P = 0.05)	-	-	NS	-	-	NS	-	-	NS	-	-	NS	-	-	NS
(Y×T)	SEM ±	-	-	0.55	-	-	2.12	-	-	0.17	-	-	0.18	-	-	4.53
	C. D. (P = 0.05)	-	-	NS	-	-	NS	-	-	NS	-	-	NS	-	-	NS
C.V. %		7.65	7.71	7.65	5.02	5.34	5.18	4.78	4.22	4.51	4.43	4.51	4.47	5.28	5.62	5.45

Table 2a. Effects of organic substance and plant growth regulators on yield attributes of guava.

Treatment		Pulp weight per fruit (g)			Total seed weight per fruit (g)			Weight per fruit (g)			Number of fruits per plant			Yield (kg/plant)		
		2021	2022	Pooled	2021	2022	Pooled	2021	2022	Pooled	2021	2022	Pooled	2021	2022	Pooled
T_1		140.85	142.38	141.62	3.59	3.62	3.61	144.44	146.00	145.22	206.67	209.33	208.00	28.10	28.87	28.49
T_2		145.16	146.44	145.80	3.51	3.56	3.53	148.67	150.00	149.33	208.00	212.00	210.00	29.01	29.84	29.43
T_3		143.99	144.43	144.21	3.56	3.57	3.56	147.55	148.11	147.78	207.33	211.33	209.33	28.78	29.14	28.96
T_4		145.97	149.28	147.63	3.47	3.50	3.49	149.44	152.78	151.11	210.00	213.00	211.50	30.24	31.49	30.86
T_5		148.35	149.90	149.13	3.43	3.43	3.43	151.78	153.33	152.56	212.67	217.33	215.00	31.08	32.27	31.68
T_6		155.80	157.51	156.65	3.31	3.37	3.34	159.11	160.89	160.00	227.67	231.67	229.67	33.00	36.21	34.61
T_7		154.21	155.49	154.85	3.34	3.39	3.37	157.56	158.89	158.22	223.33	229.67	226.50	32.10	34.91	33.50
T_8		158.72	160.46	159.59	3.28	3.32	3.30	162.00	163.78	162.89	230.67	233.00	231.83	35.50	37.10	36.30
T_9		150.39	151.58	150.98	3.39	3.42	3.40	153.78	155.00	154.39	217.33	224.67	221.00	31.37	33.54	32.46
T_{10}		161.64	161.84	161.74	3.25	3.27	3.26	164.89	165.11	165.00	233.33	235.00	234.17	36.47	38.10	37.29
T_{11}		138.70	140.89	139.80	3.63	3.66	3.65	142.33	144.56	143.45	203.67	207.00	205.33	26.85	27.81	27.33
Treatment	SEM ±	4.36	3.72	2.70	0.14	0.15	0.10	4.35	3.74	2.70	6.85	6.85	4.56	1.72	1.84	1.20
(T)	C. D (P = 0.05)	12.80	10.91	7.67	NS	NS	NS	12.75	10.97	7.66	20.10	20.08	12.95	5.04	5.39	3.40
Year	SEM ±	-	-	1.22	-	-	0.04	-	-	1.22	-	-	2.06	-	-	0.54
(Y)	C. D. (P = 0.05)	-	-	NS	-	-	NS	-	-	NS	-	-	NS	-	-	NS
(Y×T)	SEM ±	-	-	4.05	-	-	0.15	-	-	4.05	-	-	6.85	-	-	1.78
	C. D. (P = 0.05)	-	-	NS	-	-	NS	-	-	NS	-	-	NS	-	-	NS
C.V. %		5.06	4.27	4.67	7.17	7.69	7.44	4.92	4.20	4.57	5.48	5.38	5.43	9.56	9.74	9.66

Treating the plants with organic substance and plant growth regulators significantly improved the quality parameter of the guava. The significantly higher chlorophyll content after 10 days of 1st foliar spray was obtained with novel organic liquid fertilizer 40 ml/l (T_{10}) *i.e.* 49.65, 50.46 and 50.05 in 2021, 2022 and pooled analysis, respectively which was at par with T_6, T_7, T_8 in the year 2021, 2022 and pooled data. The significantly higher chlorophyll content after 10 days of 2nd foliar spray was found with novel organic liquid fertilizer 40 ml/l (T_{10}) *i.e.* 52.65, 53.35 and 53.00 in 2021, 2022 and pooled analysis, respectively (Table 3). In the year 2021, it was at par with T_6, T_7, T_8 and T_9, while it was at par with T_6, T_7 and T_8 during 2022 as well as in pooled analysis. Novel organic liquid fertilizer are major sources of macro and micronutrients (especially Fe and Mg) and they play a major role in chlorophyll formation. These nutrients help in the synthesis of chlorophyll, which is necessary for photosynthesis and the respiration process in plants. They also regulate the intake of other nutrients in plants and activate a number of enzymes and metabolic functions (Ram and Bose 2000). It also contains a good amount of growth regulators which are involved in promoting cell division and elongation, as well as enhancing metabolite accumulation in leaves, delaying senescence and enhancing photosynthesis, which leads to an increase in chlorophyll concentration in the leaves.

Table 3. Effects of organic substance and plant growth regulators on quality parameters of guava.

Treatment		Chlorophyll content 10 days of 1st foliar spray (SPAD)			Chlorophyll content after 10 days of 2nd foliar spray (SPAD)			Pulp: seed ratio		
		2021	2022	Pooled	2021	2022	Pooled	2021	2022	Pooled
T_1		37.94	37.18	37.56	38.18	39.28	38.73	39.30	39.54	39.42
T_2		41.80	42.23	42.02	43.30	45.12	44.21	41.33	41.24	41.29
T_3		41.37	39.40	40.38	40.43	41.78	41.10	40.78	40.51	40.64
T_4		42.34	42.89	42.62	44.57	46.01	45.29	42.15	42.96	42.56
T_5		44.02	43.75	43.89	46.23	47.20	46.71	43.68	43.80	43.74
T_6		47.34	47.56	47.45	50.71	50.76	50.74	47.08	46.98	47.03
T_7		47.15	46.78	46.97	49.56	50.12	49.84	46.34	46.10	46.22
T_8		48.13	49.20	48.67	51.25	51.75	51.50	48.40	48.36	48.38
T_9		44.12	45.10	44.61	47.64	48.52	48.08	44.74	44.81	44.78
T_{10}		49.65	50.46	50.05	52.65	53.35	53.00	49.76	49.58	49.67
T_{11}		36.33	35.81	36.07	37.05	38.14	37.60	38.27	38.50	38.39
Treatment	SEM ±	1.81	1.75	1.20	2.06	1.63	1.24	2.34	2.20	1.61
(T)	C. D. (P = 0.05)	5.32	5.14	3.41	6.05	4.78	3.52	6.91	6.50	4.60
Year	SEM ±	-	-	0.54	-	-	0.56	-	-	0.72
(Y)	C. D. (P = 0.05)	-	-	NS	-	-	NS	-	-	NS
(Y×T)	SEM ±	-	-	1.78	-	-	1.86	-	-	2.27
	C. D. (P = 0.05)	-	-	NS	-	-	NS	-	-	NS
C.V. %		7.19	6.94	7.07	7.83	6.07	6.99	9.26	8.70	8.99

Data presented in Table 3 also revealed that significantly higher pulp: seed ratio of guava *i.e.* 49.76, 49.58 and 49.67 was noted under treatment novel organic liquid fertilizer 40 ml/l (T_{10}) during the year 2021, 2022 and pooled analysis, respectively which was at par with T_5, T_6, T_7, T_8 and T_9 in the year 2021 and 2022. In pooled analysis it was at par with T_6, T_7 and T_8. Foliar application of a novel organic liquid fertilizer has a direct impact on various kinds of physiological processes and enzymatic activity that accumulate more carbohydrates as a result of improved nutrient supply, leading to an increase in fruit size and pulp weight, which eventually increases the pulp: seed ratio. These findings are in conformity with the results of Patel *et al.* (2018) and Rathod *et al.* (2022) in mango.

From the two years of study, it may be concluded that foliar application of novel organic liquid fertilizer 40 ml/l enhanced the yield, yield attributes and quality parameters like chlorophyll content and pulp: seed ratio of guava fruits.

Acknowledgements

The author wish to expresses gratefulness towards major advisor and to the advisory committee members for giving me proper guidance throughout the course of study.

References

Adams PA, Montague MJ, Tepfer M, Rayle DL, Ikuma H and Kaufman PB 1975. Effect of gibberellic acid on the plasticity and elasticity of avena stem segments. Plant Physiol. **56**(6): 757-760.

Chakraborty B, Sarkar M, Aklade SA and Patil HE 2021. Foliar application of banana pseudostem sap based liquid organic fertilizer enhances growth, yield and quality of strawberry (*Fragaria* × *ananassa* Duch.). Vegetos. **34**: 847-856.

Christian HJ, Tank RV, Bhanderi DR, Rathwa KN and Patel MV 2022. Response of foliar spray of nutrients on flowering and fruit set in sapota cv. Kalipatti. J. Pharm. Innov. **11**(1): 194-197.

Christian HJ, Tank RV, Parmar BR, Patel JJ and Surela VA 2023. Influence of foliar spray of nutrients on yield, quality and economics of Sapota cv. Kalipatti. J. Pharm. Innov. **12**(3): 1570-1575.

Clouse SD and Sasse JM 1998. Brassinosteroids: Essential regulator of plant growth and development. Annu. Rev. Plant Physiol. Plant Mol. Biol. **49**: 427-451.

Desai CS, Patel JM, Pawar SL, Usadadia VP, Naik VR and Savani NG 2016. Value Added Products from Banana Pseudostem. Research Scientist, Soil and Water Management Research Unit, Navsari Agricul. Univ., Navsari. pp. 55-56.

Hayat Q, Hayat S, Irfan M and Ahmad A 2010. Effect of exogenous salicylic acid under changing environment: A review. Environ. Exp. Bot. **68**(1): 14-25.

Patel MV, Parmar BR, Parmar AB and Christian HJ 2021. Effect of foliar application of nutrient sources on flowering and yield parameters of sapota cv. Kalipatti. J. Pharm. Innov. **10**(8): 545-547.

Patel RJ, Patil SJ, Tandel BM, Patel NB and Patel KA 2018. Yield and yield attributing characters influenced by foliar spray of micronutrients and banana pseudostem sap at different pH levels of on mango (*Mangifera indica* L.) cv. Kesar. Int. J. Chem. Stud. **6**(6): 1977-1980.

Ram RA and Bose TK 2000. Effect of foliar application of magnesium and micronutrients on growth, yield and fruit quality of mandarin orange (*Citrus reticulata* Blanco). Indian J. Hort. **57**(3): 215-220.

Rathod KD, Patel MJ, Macwan SJ and Patel JS 2022. Effect of biofertilizers and bioinoculants on yield and quality of mango cv. Mallika. Biol. Forum. **14**(3): 1343-1349.

Ries S and Houtz R 1983. Triacontanol as a plant growth regulator. Hortic. Sci. **18**: 654-662.

(Manuscript received on 29 August, 2023; revised on 05 November, 2023)