

Effect of Foliar Application on Physical and Yield Attribute of guava (*Psidium guajava* L.) cv. Chittidar and Allahabad Safeda

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Abstract: The experiment was conducted during 2017-18 at the *Instructional cum Research Fruit Orchard*, Department of fruit Science, College of Horticulture, Mandsaur (M.P.) on eleven year- old guava tree cv. Chittidar and Allahabad Safeda. The experiment was laid out in Factorial Randomized Block Design (FRBD) with three replication and number of treatment was 18 and each replicated 8 times where each treatment consists one plant. The results were found maximum in parameters like fruit volume (218.22ml) pulp thickness (12.32mm) pulp weight (221.60g) average fruit weight (225.87g) under V₂N₈ (Allahabad Safeda with boron@0.4%) and the minimum values were found in V₁N₀, respectively. Similarly maximum seed weight (4.28g), number of seed per fruit (333.10) under V₂N₀ (Allahabad Safeda with boron@0.4%).

Keywords: Cultivation, Fruit, Foliar Application, Seed Weight.

INTRODUCTION

The Guava is one of the most important fruit crop cultivated all over India. It is fourth most important fruit crop in area and production after mango, banana and citrus. It is classified under genus *Psidium* which contains 150 species, but only *Psidium guajava* exploited commercially. It was introduced in 17th century in India by Portuguese people. Guava is hardy, prolific bearer and remunerative fruit. This fruit is considered to be a poor man's apple because of its high nutritive value and comparatively low price. Guava is rich source of vitamin C, vitamin A, vitamin B₂ (Riboflavin) and minerals like calcium, phosphate and iron. The vitamin C content of Guava fruit is 212 mg/100 g and pectin content (1.15%). Guava fruit is also utilized to make products like jam, jelly, ice-cream and toffee (Zagade *et al.* 2018).

Micronutrients are important in production, and their deficiency reduces productivity. Guava

fruit plant also shows micronutrient deficiency symptoms, which may be the cause of poor growth and development, yield, and quality. Foliar feeding of nutrients to fruit plants has gained much importance in recent years because is quite economical and obviously an idea way of avading the problems nutrients availability issues and supplementing soil fertilizers. Nutrients such as nitrogen, phosphorus, and potassium are important in promoting plant growth, vigour and productivity, whereas micronutrients such as zinc, boron, copper, and iron play a specific role in plant growth and development, yield, and quality, as well as nutrients uptake (Zagade *et al.*, 2020).

Zinc is an important micronutrient involved in enzymatic system essential for protein synthesis, seed production and rate of maturity in plants. It is required for synthesis of tryptophan, which is precursor of indole acetic acid. It is

also play important role in starch metabolism in plants (Sachin *et al.*, 2019).

Boron plays an important role in flowering, fruiting, photosynthesis, and cell division, hormone movement and differentiation and development, sugar translocation, pollen germination, pollen tube growth and active salt absorption (Sachin *et al.* 2019).

Calcium is important nutrient for root development and cell division as well as chromosome stability. It also seems to have a regulating role in respiration and several metabolic disorders. It also plays a great role in the neutralization of some organic acid. In plant, it prevented the accumulation of oxalic acid. Calcium is essential for the development of fruit quality (Shanker *et al.*, 2019).

Potassium is a unique mineral element in plant biology. It has a pertinent role in many metabolic processes, like carbohydrate synthesis and development of meristematic tissues, as well as encourages lignifications and regulates water absorption and transpiration. Also, it plays an active role in cellular protein metabolism. Appearance fruit quality factors are very important from the marketing point of view to fetch higher price. It includes size, shape, colour, gloss and freedom from defects and decay (Mitra *et al.* 2009).

MATERIAL AND METHODS

The experiment was conducted during 2017-18 at the *Instructional cum Research Fruit Orchard*, Department of fruit Science, College of Horticulture, Mandsaur (M.P.) on eleven year-old guava tree cv. Chittidar and Allahabad Safeda which are planted at 6.0 × 6.0 m spacing. This experiment was laid out in Factorial Randomized Block Design (FRBD) with three replication comprised eighteen treatments including two variety V₁- Chittidar, V₂- Allahabad Safeda and nine levels of nutrients- N₀- Control, N₁-Zinc sulphate @ 0.3%, N₂- Zinc sulphate @ 0.4%, N₃- Calcium nitrate @ 1%, N₄- Calcium nitrate @ 2%, N₅-Potassium sulphate @ 1%, N₆- Potassium sulphate @ 2%, N₇- Boron @ 0.2%, N₈- Boron @ 0.4%. The nutrients were applied through foliar spray on 25th September 2017 in guava plant. The observations on Physical and Yield parameters

of guava plants were recorded as per standard procedures.

RESULTS AND DISCUSSION

Physical attribute

The results obtained in present investigation revealed from Table- 1 that various parameters, i.e. fruit volume, specific gravity, fruit length, fruit diameter, pulp thickness, seed weight, pulp weight, seed/pulp ratio and number of seed per fruit.

Fruit volume (ml)

The fruit volume was found significantly influenced by both varieties. The maximum fruit volume (192.42 ml) was recorded in Allahabad Safeda (V₂) as compared to Chittidar (V₁) (177.28ml). Whereas, the maximum fruit volume (207.98ml) was recorded with the N₈ (Boron@0.4%) was found significantly superior to other treatments and the minimum fruit volume (151.97 ml) was recorded in control (N₀). But interaction between varieties and nutrients on fruit volume was found significant. The maximum fruit volume (218.22ml) were recorded with V₂N₈ (Allahabad Safeda with boron@0.4%) and minimum fruit volume (144.08ml), were recorded with V₁N₀ (Chittidar with control). The results are in conformity with the findings of Suman *et al.* (2021) in guava in cv. Allahabad Safeda, Pratap *et al.* (2022) in guava in cv. L-49 and Dongre *et al.* (2022) in guava..

Specific gravity

The specific gravity was significantly influenced by both varieties. The maximum specific gravity (1.04) was recorded in Allahabad Safeda (V₂) and minimum specific gravity (1.03) was recorded in Chittidar (V₁). Nutrients on specific gravity was found non significant. The interaction between varieties and nutrients on specific gravity was found significant. The maximum specific gravity (1.052) was recorded under V₂N₂ (Allahabad Safeda with zinc sulphate@0.4%) and minimum specific gravity (1.00) was recorded in V₁N₀ (Chittidar with control). The results are in conformity with the findings of Suman *et al.* (2021) in guava in cv. Allahabad Safeda and

Patel and Singh (2021) in guava in cv. Allahabad Safeda

Fruit length (cm)

The fruit length was found significantly influenced by both varieties. The maximum fruit length (6.31cm) at the harvest was recorded in Allahabad Safeda (V_2) and minimum fruit length (6.15cm) at the harvest was recorded in Chittidar (V_1). Nutrients were also found significant regarding fruit length. The maximum fruit length (6.61cm) at harvest was recorded in N_8 (Boron@0.4%) while the minimum fruit length (5.87cm) at harvest was recorded in N_3 (Calcium nitrate @ 1%). The interaction between varieties and nutrient on fruit length at harvest was found non-significant. The results are in conformity with the findings of Suman *et al.* (2021) in guava in cv. Allahabad Safeda, Pratap *et al.* (2022) in guava in cv. L-49 and Dongre *et al.* (2022) in guava.

Fruit diameter (cm)

The fruit diameter was found significantly influenced by both varieties. The maximum fruit diameter (6.28cm) at the harvest were recorded in Allahabad Safeda (V_2) and minimum fruit diameter (6.09cm) at the harvest were recorded in Chittidar (V_1). Nutrients were also found significant regarding fruit diameter. The maximum fruit diameter (6.51 cm) at harvest was recorded in N_8 (boron@0.4%) while the minimum fruit diameter (5.88cm) at harvest was recorded in N_3 (Calcium nitrate @ 1%). The interaction between varieties and nutrient on fruit diameter at harvest was found non significant. The results are in conformity with the findings of Suman *et al.* (2021) in guava in cv. Allahabad Safeda, Pratap *et al.* (2022) in guava in cv. L-49 and Dongre *et al.* (2022) in guava..

Pulp thickness (mm)

The pulp thickness was found significantly influenced by both varieties. The maximum value of pulp thickness (10.72 mm) were observed in Allahabad Safeda (V_2) and minimum value of pulp thickness (10.50 mm) were observed in Chittidar (V_1). Nutrients were also found significant regarding pulp thickness.

The maximum pulp thickness (11.92mm) was recorded with the N_8 (Boron@0.4%) whereas, the minimum pulp thickness (9.38mm) was recorded in Calcium nitrate @ 1% (N_3). The interaction effect of varieties and nutrients of pulp thickness were found to be significant. The maximum pulp thickness (12.32mm) were recorded with V_2N_8 (Allahabad Safeda with boron@0.4%) and minimum pulp thickness (9.10mm), were recorded with V_2N_3 (Allahabad Safeda with Calcium nitrate @ 1%). The present study is in closely conformity with the finding of Rawat *et al.* (2010) in guava cv. L-49 and Hada *et al.* (2017) in guava in L-49.

Seed weight (g)

The seed weight was noticed significantly influenced by both varieties. The maximum seed weight (3.28g) was recorded in Allahabad Safeda (V_2) and the minimum seed weight (2.00g) was observed in Chittidar (V_1). Effect of nutrients was also found significant regarding seed weight. The maximum seed weight (3.35g) was recorded with the N_0 (control) whereas, the minimum seed weight (1.81g) was recorded in zinc sulphate @ 0.4% (N_2). The interaction effect of varieties and nutrients of seed weight were found to be significant. The maximum seed weight (4.28g) was recorded with V_2N_0 (Allahabad Safeda with control) and minimum seed weight (1.41g), was recorded with V_1N_1 (Chittidar with zinc sulphate @ 0.3%). The results are in close conformity with the finding of Yadav *et al.* (2017) in guava cv. Gwalior-27 and Hada *et al.* (2017) in guava in L-49.

Pulp weight (g)

The pulp weight was found significantly influenced by both varieties. The maximum pulp weight (196.49g) were observed in Allahabad Safeda (V_2) and minimum pulp weight (180.11g) were observed in Chittidar (V_1). Effect of nutrients was also found significant regarding pulp weight. The maximum pulp weight (211.03g) was recorded with the N_8 (Boron@0.4%) whereas, the minimum pulp weight (154.58g) was recorded in control (N_0). The interaction effect of varieties and nutrients of pulp weight were found to be significant. The maximum pulp weight (221.60g)

was recorded with V_2N_8 (Allahabad Safeda with boron@0.4%) and minimum pulp weight (143.68g), was recorded with V_1N_0 (Chittidar with control). The present study is in closely conformity with the finding of Rawat *et al.* (2010) in guava cv. L-49 and Hada *et al.* (2017) in guava in L-49.

Seed/pulp ratio

The seed/pulp ratio was recorded significantly influenced by both varieties. The maximum seed/pulp ratio (0.02) was observed in Allahabad Safeda (V_2) and minimum seed/pulp ratio (0.01) were observed in Chittidar (V_1). Effect of nutrients was also found significant regarding seed/pulp ratio. The maximum seed/pulp ratio (0.021) was recorded with the N_0 (control) whereas, seed/pulp ratio per fruit (0.008) was recorded in zinc sulphate @ 0.4% (N_2). The interaction effect of varieties and nutrients of seed/pulp ratio were found to be significant. The maximum seed/pulp ratio (0.0259) were recorded with V_2N_0 (Allahabad Safeda with control) and minimum seed/pulp ratio (0.0071), were recorded with V_1N_8 (Chittidar with Boron @ 0.4%). The results of the present study are in line with the finding of Rawat *et al.* (2010) in guava cv. L-49 and Hada *et al.* (2017) in guava in L-49.

Number of seed per fruit

The number of seed per fruit was found significantly influenced by both varieties. The maximum number of seed per fruit (286.82) was observed in Allahabad Safeda (V_2) and minimum number of seed per fruit (196.20) was observed in Chittidar (V_1). Effect of nutrients was also found significant regarding number of seed per fruit. The maximum number of seed per fruit (290.26) was recorded with the N_0 (control) whereas, minimum number of seed per fruit (172.42) was recorded in zinc sulphate @ 0.4% (N_2). The interaction effect of varieties and nutrients of number of seed per fruit were found to be significant. The maximum number of seed per fruit (333.10) were recorded with V_2N_0 (Allahabad Safeda with control) and minimum number of seed per fruit (134.53), were recorded with V_1N_1 (Chittidar with zinc

sulphate @ 0.3%). The results are in close conformity with the finding of Yadav *et al.* (2017) in guava cv. Gwalior-27 and Hada *et al.* (2017) in guava in L-49.

Yield attribute: The results obtained in present investigation revealed from Table- 2 that various parameters, i.e number of fruits per tree, average fruit weight (g) and yield of fruit per tree .

Number of fruits per tree

The number of fruits per tree was noticed significantly influenced by both varieties. The maximum number of fruits per tree (252.72) was recorded in variety of Chittidar (V_1) as compared to variety of Allahabad Safeda (V_2) (186.47). Nutrients were also found significant regarding number of fruits per tree. The maximum number of fruits per tree (232.83) was recorded with the N_8 (Boron@0.4%) while, minimum number of fruits per tree (205.53) was recorded in calcium nitrate @ 1% (N_3). The interaction between of varieties and nutrients on number of fruits per tree was found non significant. The results are in conformity with the findings of Maurya and Wilson (2020) in guava and Patel and Singh (2021) in guava in cv. Allahabad Safeda.

Average fruit weight (g)

The average fruit weight was observed significantly influenced by both varieties. The maximum average fruit weight (202.34g) was observed in Allahabad Safeda (V_2) and minimum average fruit weight (184.76g) was observed in Chittidar (V_1). Effect of nutrients was also found significant regarding average fruit weight. The maximum average fruit weight (214.31g) was recorded with the N_8 boron @ 0.4% whereas, minimum average fruit weight (175.01g) was recorded in control (N_0). The interaction outcome of varieties and nutrients on for average fruit weight was found to be significant. The maximum average fruit weight (225.87g) was recorded with V_2N_8 (Allahabad Safeda with boron @ 0.4%) and minimum average fruit weight (170.09g) was recorded with V_1N_0 (Chittidar with control). The results are in conformity with the findings of Suman *et al.* (2021) in guava in cv. Allahabad Safeda, Patel and Singh (2021) in guava in cv.

Table 1: Effect of foliar application on physical attribute of guava (*Psidium guajava* L.) cv. Chittidar and Allahabad Safeda

Treatment	Fruit volume (ml)	Specific gravity	Fruit length at harvest (cm)	Fruit diameter at harvest (cm)	Pulp thickness (mm)	Seed Weight (g)	Pulp Weight (g)	Seed/pulp ratio	Number of seed per fruit
Varieties									
V ₁	177.28	1.03	6.15	6.09	10.50	2.00	180.11	0.01	196.20
V ₂	192.42	1.04	6.31	6.28	10.72	3.28	196.49	0.02	286.82
S.Em±	0.79	0.003	0.05	0.06	0.07	0.04	1.26	0.0002	2.69
CD at 5%	2.29	0.008	0.15	0.18	0.22	0.12	3.62	0.0006	7.74
Nutrients									
N ₀	151.97	1.02	5.90	6.00	10.54	3.35	154.58	0.021	290.26
N ₁	194.49	1.03	6.30	6.28	10.72	1.99	198.29	0.009	181.59
N ₂	199.87	1.03	6.49	6.42	11.36	1.81	206.40	0.008	172.42
N ₃	171.82	1.02	5.87	5.88	09.38	3.29	172.56	0.019	279.37
N ₄	175.58	1.03	6.05	5.94	10.05	3.19	178.66	0.017	267.26
N ₅	178.53	1.03	6.15	6.10	10.19	2.87	182.59	0.015	264.14
N ₆	182.09	1.04	6.35	6.19	10.38	2.92	188.20	0.015	261.43
N ₇	201.26	1.02	6.30	6.29	10.92	2.29	202.40	0.011	241.30
N ₈	207.98	1.03	6.61	6.51	11.92	2.01	211.03	0.009	215.81
S.Em±	1.69	0.006	0.11	0.13	0.16	0.09	2.67	0.0005	5.71
CD at 5%	4.87	NS	0.33	0.39	0.47	0.26	7.68	0.0014	16.43
Interactions									
V ₁ N ₀	144.08	1.00	5.97	6.10	10.98	2.42	143.68	0.016	247.43
V ₁ N ₁	186.89	1.01	6.22	6.13	10.32	1.41	187.83	0.007	134.53
V ₁ N ₂	190.64	1.02	6.37	6.23	11.30	1.62	193.49	0.008	165.75
V ₁ N ₃	169.00	1.01	5.75	5.78	09.66	2.39	169.57	0.014	235.65
V ₁ N ₄	171.87	1.04	5.93	5.83	09.89	2.30	177.02	0.013	223.43
V ₁ N ₅	170.42	1.04	6.03	6.06	10.05	2.31	177.36	0.013	218.64
V ₁ N ₆	173.30	1.05	6.38	6.10	10.11	2.27	180.49	0.012	214.10
V ₁ N ₇	191.53	1.01	6.15	6.19	10.65	1.84	191.12	0.009	182.42
V ₁ N ₈	197.75	1.02	6.52	6.37	11.54	1.43	200.47	0.007	143.86
V ₂ N ₀	159.86	1.04	5.83	5.90	10.12	4.28	165.48	0.025	333.10
V ₂ N ₁	202.10	1.04	6.39	6.45	11.12	2.57	208.75	0.012	228.65
V ₂ N ₂	209.11	1.05	6.61	6.62	11.43	2.01	219.33	0.009	179.10
V ₂ N ₃	174.65	1.03	6.00	5.98	09.10	4.20	175.66	0.024	323.09
V ₂ N ₄	179.31	1.03	6.17	6.07	10.22	4.09	180.31	0.022	311.10
V ₂ N ₅	186.65	1.02	6.28	6.14	10.34	3.44	187.83	0.018	309.64
V ₂ N ₆	190.89	1.04	6.33	6.29	10.65	3.58	195.91	0.018	308.78
V ₂ N ₇	211.00	1.04	6.47	6.39	11.21	2.75	213.69	0.012	300.19
V ₂ N ₈	218.22	1.04	6.71	6.65	12.32	2.61	221.60	0.011	287.77
S.Em±	2.39	0.009	0.16	0.19	0.23	0.13	3.78	0.0007	8.08
CD at 5%	6.89	0.026	NS	NS	0.66	0.37	10.86	0.0020	23.23

Table 2: Effect of foliar application on yield attribute of guava (*Psidium guajava* L.) cv. Chittidar and Allahabad Safeda

Treatment	Number of fruits per tree	Average fruit Weight (g)	Yield of fruit per tree (kg)
Varieties			
V ₁	252.72	184.76	46.76
V ₂	186.47	202.34	37.90
S.Em±	2.42	1.22	0.57
CD at 5%	6.97	3.50	1.65
Nutrients			
N ₀	215.03	175.01	37.50
N ₁	223.00	201.19	44.49
N ₂	230.35	208.81	47.70
N ₃	205.53	186.02	38.02
N ₄	210.01	190.86	39.80
N ₅	213.86	176.99	37.70
N ₆	218.55	182.59	39.80
N ₇	227.16	206.15	46.41
N ₈	232.83	214.31	49.49
S.Em±	5.15	2.58	1.21
CD at 5%	14.80	7.44	3.50
Interactions			
V ₁ N ₀	246.67	170.09	41.97
V ₁ N ₁	257.33	190.10	48.91
V ₁ N ₂	262.37	195.32	51.26
V ₁ N ₃	239.67	179.63	43.04
V ₁ N ₄	242.33	182.09	44.14
V ₁ N ₅	247.37	171.00	42.31
V ₁ N ₆	254.40	179.31	45.59
V ₁ N ₇	259.33	192.54	49.94
V ₁ N ₈	265.00	202.75	53.72
V ₂ N ₀	183.40	179.93	33.03
V ₂ N ₁	188.67	212.29	40.09
V ₂ N ₂	198.33	222.31	44.15
V ₂ N ₃	171.40	192.42	30.02
V ₂ N ₄	177.70	199.64	35.46
V ₂ N ₅	180.37	183.00	33.10
V ₂ N ₆	182.70	185.87	34.06
V ₂ N ₇	195.00	219.76	42.90
V ₂ N ₈	200.67	225.87	45.28
S.Em±	7.28	3.66	1.72
CD at 5%	NS	10.52	NS

Allahabad Safeda and Pratap *et al.* (2022) in guava in cv. L-49.

Yield of fruit per tree (kg)

The yield of fruit per tree was recorded significantly influenced by both varieties. The maximum yield of fruit per tree (46.76kg) was recorded in variety of Chittidar (V_1) as compared to variety of Allahabad Safeda (V_2)(37.90kg). Nutrients were also found significant regarding number of fruits per tree. The maximum yield of fruit per tree (49.49kg) was recorded with the N_8 (Boron@0.4%) while, minimum yield of fruit per tree (37.50kg) was recorded in control (N_0). But interaction between varieties and nutrients on yield of fruit per tree was recorded non significant. The results are in conformity with the findings of Patel and Singh (2021) in guava in cv. Allahabad Safeda, Suman *et al.* (2021) in guava in cv. Allahabad Safeda, Pratap *et al.* (2022) in guava in cv. L-49 and Dongre *et al.* (2022) in guava.

CONCLUSION

Based on the results. It may be concluded from the results obtained in investigation that cv. Allahabad Safeda (V_2) and nutrients in (N_8) (Boron@0.4%) was found to be most effective to fruit volume, fruit length, fruit diameter, average fruit Weight, Pulp thickness and Pulp weight and interaction effect of varieties and nutrients had significant increased the fruit volume, pulp thickness, pulp weight, fruit weight with (V_2N_8) Allahabad Safeda with boron@0.4%.

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