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Abhay Kumar Bhardwaj
Department of Horticulture,
Sam Higginbottom University of
Agriculture, Technology &
Sciences, Allahabad, Uttar
Pradesh, India

VM Prasad
Department of Horticulture,
Sam Higginbottom University of
Agriculture, Technology &
Sciences Allahabad, Uttar
Pradesh, India

Sandeep Singh
Department of Horticulture,
Sam Higginbottom University of
Agriculture, Technology &
Sciences, Allahabad, Uttar
Pradesh, India

Sandeep Kumar
Department of Horticulture,
Agriculture University of Kota,
Rajasthan, India

Neeraj Kumar
Department of Horticulture,
Sam Higginbottom University of
Agriculture, Technology &
Sciences, Allahabad, Uttar
Pradesh, India

Correspondence

Abhay Kumar Bhardwaj
Department of Horticulture,
Sam Higginbottom University of
Agriculture, Technology &
Sciences, Allahabad, Uttar
Pradesh, India

Effect of foliar spray of urea and zinc on plant growth, yield and quality of guava (*Psidium guajava* L.) cv. Allahabad safeda under high density planting

Abhay Kumar Bhardwaj, VM Prasad, Sandeep Singh, Sandeep Kumar and Neeraj Kumar

Abstract

An experiment was conducted at the central research farm, Department of Horticulture, Sam Higginbottom University of Agriculture Technology and Science, Allahabad during (July-December 2017) to study the “Effect of foliar spray of urea and zinc on plant growth, yield and quality of guava (*Psidium guajava* L.) cv. Allahabad safeda under high density planting” Experiment was laid out in randomized block design with 16 treatments replicated thrice. The results revealed that maximum plant height (246.47 cm), number of branches (23.00), no of days for flowering (74.33 days), numbers of flower per plant (74.33), no of fruits per plant (42), on fruits set percentage (54.44%), fruits weight (155.61g), fruits yield per plant (6.57kg), acidity (0.55%), ascorbic acid (267.30mg/100g), total soluble solid (12.25 °Brix), and sugar (8.15%) were recorded in T₁₂ (Urea 2% + zinc 0.6%) followed by T₁₁ (Urea 2% + zinc 0.4%). The least values were recorded in the control.

Keywords: Guava, foliar spray, urea, zinc, acidity, ascorbic acid, yield quality

Introduction

Guava (*Psidium guajava* L.) is the member of myrtaceae family and it is one of the most common fruit in India. It claims to be the fourth most important fruit in area and production after mango, banana and citrus. The guava is considered is one of the most delicious fruit and in India it occupies an area of 260 thousand ha, production 3826 thousand million tons & productivity 13.94mt/ha. Uttar Pradesh is one of the major guava producing states in India with Area of 49.01 thousand ha, total production 919.94 thousand mt and productivity 18.77mt/ha (Horticulture at a glance- 2017) [2]. Guava has earned the popularity as “Poor man’s apple” available in plenty to every person at very low price during the season. It is no inferior to apple for its nutritive values. It is pleasantly sweet and refreshingly acidic in flavor and emits sweet aroma. It is wholly edible along with the skin. Several delicious preserved products like Jam, Jelly, Cheese, Puree, Ice cream, canned fruit and Sharbat are prepared from ripped fruits of guava. Guava juice wine and guava pulp wine are also prepared from guava fruits. The seeds yield 3 to 13% oil, which is rich in essential fatty acid and can be used as salad dressing. In some countries the leaves are used for curing diarrheas and also for dyeing and tanning. Foliar feeding of nutrients to fruit plants has gained much importance in recent years which is quite economical and obviously an ideal way of evading the problems of nutrients availability and supplementing the fertilizers to the soil. Nutrients like nitrogen, phosphorus and potash play a vital role in promoting the plant vigour and productivity, whereas micronutrients like zinc, boron, copper and molybdenum perform a specific role in the growth and development of plant, quality produce and uptake of major nutrients. Keeping in view the importance of application of micronutrients for improving fruit quality.

Materials and Methods

The experimental site is situated at of latitude of 20° and 15° north and longitude of 60° 3” East and at an altitude of 98 meters above mean sea level (MSL). The maximum temperature of the location reaches up to 46 °C- 48 °C and seldom falls as low as 4 °C- 5 °C. The relative humidity ranged between 20 to 94 percent. The average rainfall in this area is around 1013.4 mm annually. The soil of experimental area had sand 60%, Silt 26%, Clay 14%, pH 7.2, Soil EC. (dSm-1) at 25 °C is 0.28, organic carbon 0.35%.

Table 1: Treatments combination

Notations	Treatment combination
T ₁	Urea 0% + zinc 0% (control)
T ₂	Urea 0% + zinc 0.2%
T ₃	Urea 0% + zinc 0.4%
T ₄	Urea 0% + zinc 0.6%
T ₅	Urea 1% + zinc 0%
T ₆	Urea 1% + zinc 0.2%
T ₇	Urea 1% + zinc 0.4%
T ₈	Urea 1% + zinc 0.6%
T ₉	Urea 2% + zinc 0%
T ₁₀	Urea 2% + zinc 0.2%
T ₁₁	Urea 2% + zinc 0.4%
T ₁₂	Urea 2% + zinc 0.6%
T ₁₃	Urea 3% + zinc 0%
T ₁₄	Urea 3% + zinc 0.2%
T ₁₅	Urea 3% + zinc 0.4%
T ₁₆	Urea 3% + zinc 0.6%

Results and Discussion

Table -2 and Fig-1 show the growth of guava plant was significantly influenced by urea and zinc. Maximum plant height (246.47 cm, number of branches (23.00), minimum days for first flower appearance (74.33), maximum number of flower per plant (74.33), were recorded by the application of the treatment T₁₂ (Urea 2% + zinc 0.6%) followed by

treatments comprising of T₁₁ (Urea 2% + zinc 0.4%) where maximum plant height (236.67 cm), number of branches (21.33), minimum days for first flower appearance (75.33), maximum number of flower per plant (73.33), then number of fruits per plant (42.00), fruit set % (54.44%), were recorded by the application of the treatment T₁₂ (Urea 2% + zinc 0.6%) followed by treatments comprising of T₁₅ (Urea 3% + zinc 0.4%) where number of fruits per plant (33.67), fruit set % (53.73%), Table -3 and Fig -2 show the maximum fruit weight (155.61 g) similar result also found by Trivedi *et al.* (2012) [6], fruit yield per plant (6.57 kg) similar result also found by Singh *et al.* (2004) [5], fruit yield per hectare (73.03 quintal), total acidity % (0.55%) similar result also found by Singh *et al.* (1989) [4], ascorbic acid (267.30 mg/ 100 g) similar result also found by El-sherif *et al.* (2000) [1], and sugar % (8.15%) were recorded by the application of the treatment T₁₂ (Urea 2% + zinc 0.6%) followed by treatments comprising of T₁₁ (Urea 2% + zinc 0.4%) where fruit weight (153.78 g), fruit yield per plant (5.89 kg), fruit yield per hectare (59.69 quintal), total acidity % (0.52%), ascorbic acid (255.60 mg/ 100 g), and sugar % (7.90%) then total soluble solid (T.S.S.) (12.25 °Brix) were recorded by the application of the treatment T₁₂ (Urea 2% + zinc 0.6%) followed by treatments comprising of T₁₅ (Urea 3% + zinc 0.4%) where total soluble solid (T.S.S.) (12.16 °Brix) The least values were recorded in the control

Table 2: Effect of foliar spray of urea and zinc on plant growth of guava under high density planting

Notations	Plant height (cm)	Number of branches	Days of first flowering appearance	No. of flowers plant ⁻¹	No. of fruits plant ⁻¹	Fruit set %
T ₁	136.47	17.33	85.00	57.00	27.67	33.47
T ₂	180.83	17.67	83.67	72.33	29.33	40.13
T ₃	170.55	17.84	82.15	67.67	30.00	38.60
T ₄	177.67	17.00	81.00	69.67	32.00	43.24
T ₅	196.47	17.67	81.67	63.00	35.33	33.29
T ₆	204.77	15.33	79.45	54.33	24.00	38.44
T ₇	205.73	17.67	78.67	58.33	25.00	43.77
T ₈	208.13	18.33	78.67	64.00	27.92	43.51
T ₉	196.60	19.00	81.00	72.00	31.00	39.02
T ₁₀	215.17	20.67	75.33	69.33	31.67	45.17
T ₁₁	236.67	21.33	75.33	73.33	33.00	47.10
T ₁₂	246.47	23.00	74.33	74.33	42.00	54.44
T ₁₃	204.47	19.33	80.33	65.00	32.00	44.45
T ₁₄	155.37	19.67	85.00	58.33	31.53	45.74
T ₁₅	171.10	19.67	75.67	70.33	33.67	53.73
T ₁₆	156.67	20.33	75.67	63.00	32.00	41.69
F- test	S	S	S	S	S	S
S. Ed. (±)	23.06	1.15	1.89	6.23	4.17	0.42
C. D. (P = 0.05)	47.09	2.35	3.86	12.72	5.82	0.85

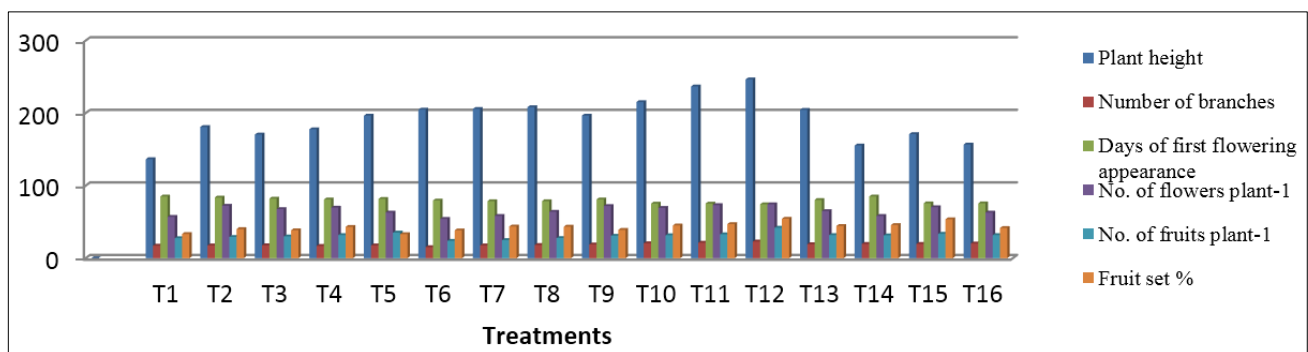
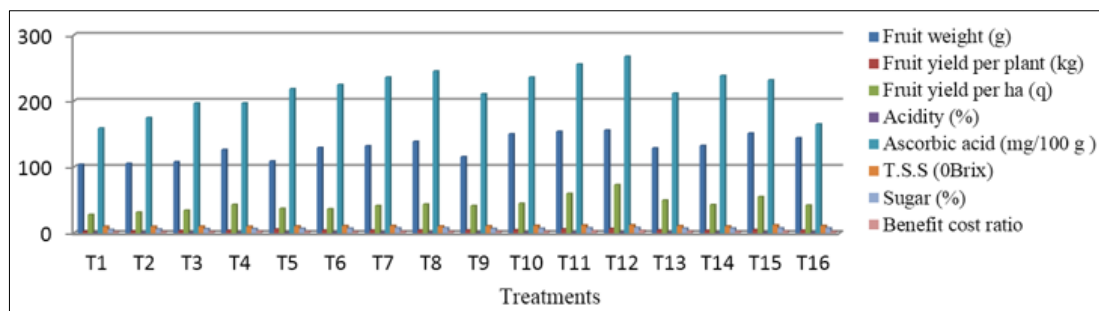


Fig 1: Effect of foliar spray of urea and zinc on plant growth, flowering and fruiting of guava under high density planting

Table 3: Effect of foliar spray of urea and zinc on yield and quality of guava under high density planting

Notations	Fruit weight (g)	Fruit yield per plant (kg)	Fruit yield per ha (q)	Acidity (%)	Ascorbic acid (mg/100 g)	T.S.S (°Brix)	Sugar (%)	Benefit cost ratio
T ₁	103.67	2.49	27.77	0.37	158.64	9.85	5.22	1.70
T ₂	105.33	2.83	31.42	0.45	174.50	9.95	5.80	1.78
T ₃	107.83	3.42	34.33	0.39	196.50	10.10	6.32	1.91
T ₄	126.23	3.87	43.03	0.37	196.70	9.96	6.50	2.70
T ₅	108.77	5.72	37.17	0.46	218.23	10.40	6.82	2.18
T ₆	129.35	4.14	36.46	0.47	224.60	11.00	7.15	2.00
T ₇	131.87	4.21	41.36	0.47	235.80	11.06	7.80	2.22
T ₈	138.57	4.38	43.64	0.52	245.00	10.30	7.96	2.28
T ₉	115.47	4.39	41.44	0.44	210.60	10.65	6.70	2.35
T ₁₀	149.93	4.62	44.71	0.51	235.80	11.21	7.12	2.37
T ₁₁	153.78	5.89	59.69	0.52	255.60	11.98	7.90	3.11
T ₁₂	155.61	6.57	73.03	0.55	267.30	12.25	8.15	3.71
T ₁₃	128.55	4.47	49.67	0.50	211.60	10.75	7.20	2.73
T ₁₄	132.26	3.82	42.65	0.51	238.30	10.25	7.40	2.20
T ₁₅	151.03	4.94	54.94	0.48	231.50	12.16	7.65	2.78
T ₁₆	144.00	4.06	42.11	0.49	164.92	11.05	7.72	2.08
F- test	S	S	S	S	S	S	S	
S. Ed. (±)	7.3	0.74	6.62	0.04	13.93	0.64	0.42	
C. D. (P = 0.05)	14.97	1.50	13.52	0.08	28.44	1.30	0.85	

**Fig 2:** Effect of foliar spray of urea and zinc on yield and quality of guava under high density planting

Conclusion

On the basis of results obtained, It is concluded that the treatment T₁₂ (urea 2% + zinc 0.6%) was found to be the best in terms of plant height, number of branches, First flower opening, no. of flower per plant, no. of fruit per plant, fruit set percentage, fruit weight, fruit yield, ascorbic acid, T.S.S., acidity % and sugar percentage.

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