

Effect of nutrients and plant growth regulators on physico-chemical parameters and yield of guava (*Psidium guajava* L.) fruit cv. ALLAHABAD SAFEDA

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ABSTRACT

The experiment was conducted to study the effect of nutrients and plant growth regulators on the physico-chemical characters and yield of guava cv. ALLAHABAD SAFEDA. Nutrients viz. urea 2%, K_2SO_4 1%, borax 0.2%, $ZnSO_4$ 0.2% and plant growth regulators viz. GA_3 150 ppm, ethrel 250 ppm and NAA 100 ppm were taken for experimentation. Two years pooled data revealed that the highest yield was observed in urea 2 per cent + NAA 100 ppm.

Key words : Nutrients, NAA, GA, Ethrel, Urea, K_2SO_4 , $ZnSO_4$, Yield, Quality, Guava.

INTRODUCTION

Guava "Apple of tropics" is one of the most important fruits of India. It is very hardy and can be grown under adverse conditions also. But the yield and quality of fruit is poor as it has not received the deserved attention in its cultivation. Mineral nutrients and phytohormones affect plant growth, development, yield and quality of fruits. Nitrogen is essential for plant growth, zinc for growth and development, boron for effective fruit set and potassium is necessary for photosynthetic activities and translocation of photosynthates influencing the quality attributes (Sharma *et al.*, 2005 and Pathak and Mitra, 2008). Plant growth regulators play important role in fruit set, fruit production, fruit weight and fruit size without causing any adverse effect in fruit quality. NAA induces more fruiting, promotes flowering, whereas, GA_3 increases fruit retention. Ethrel a ripening hormone induces early and uniform ripening (Jensen *et al.*, 1975). Different nutrients in association of plant growth regulators increase economic yield facilitating harvesting (Pandey *et al.*, 1988). It is therefore, necessary to standardize the most effective combination for increased yield of quality fruits of guava under the north gangetic plains of the country.

MATERIALS AND METHODS

The experiment was carried out in guava orchard of Horticulture Garden, C.S.A. University of Agriculture and Technology, Kanpur during the year 2004-05 and 05-06. The soil of the orchard was sandy loam with medium fertility having a pH of 7.8. The trial was laid out in a Factorial Randomized Block Design (FRBD) taking one plant as unit with three replications. There were 12 treatment combinations comprising four nutrients (urea 2%, potassium sulphate 1%, borax 0.2%, $ZnSO_4$ 0.2%) and three growth regulators (GA_3 150 ppm, Ethrel 250

ppm and NAA 100 ppm). The combination of nutrients and plant growth regulators were sprayed four times. First and second spray were given at the initiation of flowering and after 50 per cent flowering and third and fourth at fruit setting and three weeks after fruit set, respectively. Size of fruit was recorded by vernier callipers, weight on a physical balance, volume by water displacement method and the specific gravity by dividing the weight of fruit with their volume and T.S.S. were determined with the help of a hand refractometer (0-32° Brix). The titrable acidity was determined by titrating the fruit sample against 0.1N NaOH using phenolphthalein as an indicator. Ascorbic acid and total sugars were estimated as per A.O.A.C. (1990).

RESULTS AND DISCUSSION

Significantly increased yield and improved fruit quality could be observed with different combinations of nutrients and plant growth regulators (Table 1). Highest yield (95.39 kg/tree) was observed with foliar sprays of urea 2% + NAA 100 ppm. Doraipandian and Shanmugavelu (1972) reported that foliar application of urea @ 2% increased the yield of guava fruits. Recently Pathak and Mitra (2008) explained that the nitrogen increased the potassium uptake which enhanced the yield as N and K have synergistic effect. NAA on the other hand induced flowering and fruiting thereby increasing the yield.

The maximum fruit weight (198.36 g) was recorded with urea and NAA combination. Increase in fruit weight may be attributed to the strengthening of middle lamella and consequently cell wall which later might have increased the free passage of solutes to the fruit. Increase in fruit size has been recorded with the help of NAA in different fruits like guava (Rajput *et al.*, 1977), litchi (Sarkar *et al.*, 1984) and ber (Bal *et al.*, 1982).

Table 1 : Effect of nutrients and PGRs on yield and physico-chemical parameters of guava fruit

Treatments	Fruit wt. (g)	Fruit volume (cc.)	Pulp (%)	Seed (%)	Yield (kg)	Specific gravity (g/cc)	TSS (°brix)	pH	Total sugar (%)	Acidity (%)	Ascorbic acid (mg/100 g)	Pectin content (%)
Urea 2%	183.22	187.76	96.22	3.88	70.69	0.97	10.80	7.27	10.93	0.32	240.00	0.77
Urea 2% + GA 150 ppm	161.83	169.79	97.31	2.69	69.58	0.95	10.98	7.18	10.09	0.41	256.21	0.74
Urea 2% + Ethrel 150 ppm	190.26	201.34	97.21	2.79	86.29	0.94	12.56	6.89	11.82	0.30	241.96	0.73
Urea 2% + NAA 100 ppm	198.36	202.99	98.33	1.77	95.39	0.98	13.21	6.45	12.21	0.29	260.36	0.78
Urea 2% + Borax 0.2%	185.24	195.26	97.28	2.72	67.89	0.95	11.23	7.13	10.23	0.39	249.21	0.74
Urea 2% + ZnSO ₄ 0.2%	186.31	193.36	97.31	2.69	68.29	0.96	11.31	7.19	10.18	0.36	259.33	0.69
K ₂ SO ₄ 1%	180.29	185.21	97.26	2.74	66.93	0.97	13.00	7.00	10.23	0.31	258.21	0.73
K ₂ SO ₄ 1% + GA ₃ 150 ppm	173.22	179.32	97.30	2.70	62.49	0.96	12.93	7.11	11.01	0.38	260.12	0.71
K ₂ SO ₄ 1% + Ethrel 250 ppm	175.33	181.98	97.28	2.72	69.27	0.96	12.31	6.88	11.13	0.31	253.26	0.73
K ₂ SO ₄ 1% + NAA 100 ppm	197.23	203.36	98.69	1.31	63.39	0.97	13.62	6.25	12.23	0.28	248.24	0.76
K ₂ SO ₄ 1% + Borax 0.2%	190.21	198.21	97.18	2.82	72.38	0.96	11.91	7.23	11.21	0.36	260.32	0.71
K ₂ SO ₄ 1% + ZnSO ₄ 0.2%	186.23	197.32	97.68	2.32	73.21	0.94	11.89	7.18	11.36	0.33	247.21	0.721
C.D. (P=0.05)	3.69	2.98	0.14	0.16	2.89	0.021	0.610	0.133	0.210	0.122	5.213	0.023

Endogenous auxin is responsible for increasing the volume of guava. The rapid growth of fruit synchronized with the maximum amount of auxin present therein. Pandey *et al.* (1988) recorded maximum fruit weight with foliar application of borax 0.2% in guava and Srivastava *et al.* (1973) confirmed the effective role of NAA in enhancing the weight of fruit in peach.

Pulp and seed percentage were significantly influenced by different treatments. The former was greater in K₂SO₄ 1% + NAA 100 ppm (98.69) and the later was greater in urea 2% (3.88%). The specific gravity and total soluble solids were also significantly influenced. The maximum specific gravity was observed under urea 2% + NAA 100 ppm (0.98 g/cc), where as, highest total soluble solids (13.62°B) was recorded with the foliar sprays of potassium sulphate 1% accompanied by NAA 100 ppm. More or less similar trend of results has been indicated by Sharma *et al.* (2005). Total sugar content was also maximized under K₂SO₄ 1% + NAA treatment. Potassium being responsible for increasing sugar content might have promoted translocation of newly synthesized photosynthates causing a beneficial effect on the mobilization of stored metabolites. The findings are in agreement with the reports of Pathak and Mitra (2008). Foliar sprays of urea 2% + NAA 100 ppm in the present investigation produced the maximum ascorbic acid and pectin contents and these findings are in agreement with the reports of Rajput *et al.* (1977) in guava.

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