

Effect of Pre-harvest Application on Physical Attributes of Guava (*Psidium guajava* L.) in cv. L-49: Plant Growth Regulators and Bagging

ABSTRACT

The present investigation was conducted to study the Effect of pre-harvest application of plant growth regulators (PGR) and bagging on Physical attributes of Guava (*Psidium guajava* L.) in cv. L - 49. The research was carried out at the main experiment station Horticulture, Department of Fruit Sciences, Acharya Narendra Deva University of Agriculture and Technology, Narendra Nagar, Kumarganj, Ayodhya 224229 (U.P.) India during the year 2022-23. The experiment was conducted in a Randomized Block Design with three replications and 8 treatments GA₃ (50 ppm) and NAA (20 ppm) and GA₃ (50 ppm) +NAA (20 ppm), GA₃ (50 ppm) with bagging, and NAA (20 ppm) with bagging. GA₃ (50 ppm) + NAA (20 ppm) with bagging, bagging (white polythene), and control applied on spray 45 days before harvesting. It is concluded that among the different treatments, T₆ GA₃ (50 ppm) + NAA (20 ppm) with bagging, was recorded maximum Fruit length (4.90cm), Fruit width (6.62cm), Fruit weight (158.20 gram), Fruit volume (161.60 cm³), Specific gravity (0.98 g/cm³) therefore, recommended for application to the Guava tree in the sub-tropical region of Uttar Pradesh in order to obtain better quality fruit.

Keywords: Guava; Pre-harvest; NAA; GA₃; Bagging.

1. INTRODUCTION

“Guava (*Psidium guajava* L.) is the apple of the tropics and is one of the popular fruits grown in tropical, sub-tropical and some parts of arid regions of India. Guava fruit belongs to the family Myrtaceae” (Agnihotri *et al.*, 2005). “It grows in a variety of soil types, from sandy loam to clay loam pH ranging from 5.5 to 7.5 without any irrigation. It can stand maximum above 46°C temperature and lowest 12°-14°C. Best-quality Guava is obtained where the night temperature (10°C) is low during the winter season” (Dhaliwal and Single, 2002). “Guava is grown on 262,000 hectares in India, with an annual production of 3,648 thousand metric tonnes and a productivity of 13.9 metric tonnes/ha. With an annual production of 919.94 metric tonnes, Uttar Pradesh has the most area under guava cultivation (49.01 thousand ha.). Madhya Pradesh and Bihar are the next largest producers. Punjab has the highest productivity, at 22.46 tonnes per hectare” (NHB-2016-17).

“Guava is a climacteric fruit and an excellent source of ascorbic acid. Vitamin C, dietary fibre, pectin and minerals. Guava fruits are used as fresh fruit as well as making jam, jelly, paste, toffees, candy etc. Guava fruits, leaves and roots are used for curing diarrhoea, dysentery and other traditional medicines. Guava is available at a cheap rate and is popularly known as the ‘apple of plains and poor man’s apple’. In north India agro-climate conditions guava flowers twice a year—first in April-May for the rainy season crop and then, in September-October for the winter season crop. Generally, fruit yield is higher in rainy season crops compared to the winter season” (Rathore and Singh, 2009), Guava fruits are most commonly harvested by hand. Firm yellow to half-yellow mature fruits are harvested. Guava fruits can be kept in ventilated polyethylene bags for 10 days at an ambient temperature of 18°-20°C. Guava is very popular as a fresh fruit because of its excellent taste, high vitamin content and 100 per cent edibility.

“In this modern area use of plant growth regulators is becoming quite popular in the field of horticulture; plant growth regulators play a significant role in many physiological phenomena. There has been widespread application of plant growth regulators in service of the fruit industry. These are used in vegetative propagation, artificial induction of seedlessness, increase in fruit set, prevention of pre-harvest drop, regulation of flowering, fruit size, inhibition of growth, and thinning of flower and fruit. Various types of plant growth regulators like NAA, 2,4-D, 2,4,5, T, GA₃ and TIBA are used for improving the flowering, fruit set, fruit quality as well yield. Recently it was observed that foliar application of plant growth regulator (GA₃) exerted a favourable effect on the physico-chemical characteristics of guava fruits at harvest” (Kher *et al.*, 2005)

“Though the fruit quality of rainy seasons is insipid, watery, and poor in quality, owing to the cold, fruits don't ripen, become too little, or become too hard. To further boost fruit quality throughout the wet season, practices must therefore be standardized. Apical dominance, flower and fruit set, cell growth, geotropism, and photoperiod are all impacted by growth regulators like GA₃ and NAA. In both the winter and rainy seasons, GA₃ has the maximum fruit retention and yield, followed by acetone, activated dry yeast, and NAA.

In addition to increasing fruit weight, total soluble solids (TSS), and lowering sugars, total sugar, and vitamin C, the growth regulators spray also reduces tannin and fruit acidity. Fruit's total soluble solids content, vitamin C concentration, and acidity are all enhanced and decreased by the addition of NAA" (Sharma and Tiwari, 2015)

2. MATERIAL AND METHODS

The present investigation was conducted at the Department of Fruit Sciences, Acharya Narendra Deva University of Agriculture and Technology, Narendra Nagar, Kumarganj, Faizabad 224229 (U.P.) India during the year 2022-23. The experiment was laid out in randomized block design with 8 treatments, namely: T₀- Control (water spray), T₁- GA₃ (50 ppm), T₂- NAA (20 ppm), T₃- GA₃ (50 ppm) + NAA (20 ppm), T₄- GA₃ (50 ppm) with Bagging, T₅- NAA (20 ppm) with Bagging, T₆- GA₃ (50 ppm) + NAA(20 ppm) with Bagging, T₇- Bagging (White polyethene).

The experiment was replicated three times. The region enjoys a sub-humid and subtropical climate, with an average annual rainfall of about 1200 mm, of which about 85 per cent is concentrated from mid-June to late September. The winter months are cold and dry and there are occasional frosts during this period, with westerly warm winds starting from July and continuing till the onset of monsoon. Ten-year-old plants were used in the experiment. The spraying of the different combinations was done 45 days before harvesting. The data was collected on physical parameters under the following heads: Fruit length (cm), Fruit breadth (cm), Volume of fruit (cm³), Specific gravity, and Fruit weight (g). The data obtained during experimentation were statistically analyzed as per the method given by (Panse and Sukhatme).

3. RESULTS AND DISCUSSION

3.1 Fruit length (cm):

Fruit length, as clearly presented in Table 1, revealed that the response of the maximum fruit length (4.90 cm) was recorded in GA₃ (50ppm) + NAA (20ppm) with Bagging followed by GA₃ (50 ppm) + NAA (20 ppm) (4.80 cm) minimum fruit length was recorded in control (3.25).

The same outcomes were also observed for fruit length, which was (7.79 cm) in NAA 225 ppm, which was comparable to GA₃ (60 ppm) in the control. The longer fruit length in the rainy season was significantly impacted by the higher dose spray of NAA and GA₃. Fruit length increases as a result of an increase in cell division, larger-sized cells, and increased metabolic activity brought on by chemical stimuli.

3.2 Fruit width (cm):

It is evident from the data presented in Table 1, that the application of all treatments considerably increased fruit width when The GA₃ (50 ppm) + NAA (20 ppm) with Bagging treatment recorded the widest fruit at (6.62 cm,) followed by the GA₃ (50 ppm) + NAA (20 ppm) at (6.48 cm) and the Minimum fruit width by control at (4.39 cm.).

The same finding is supported by the observation that during the wet season, NAA 200 ppm recorded maximum fruit width (7.77 cm), whereas control recorded minimum fruit width (5.77 cm). The fruit width varied from (5.77 to 7.77cm) across all treatments. The fruit width increased with higher concentrations of NAA and GA₃ and reduced with higher concentrations of GA₃. Wider fruits may result from more cell division, larger cells, and increased metabolic activity when chemical stimuli are present. (Singh *et al.*, 1996).

3.3 Fruit weight (g):

The results shown in Table 1, make it very evident that as compared to the control all the treatments had significantly higher fruit weights. The maximum fruit weight (158.20 g) was recorded in GA₃ (50 ppm) + NAA (20ppm) with Bagging followed by (151.80 g) obtained from the pre-harvest application by GA₃ (50 ppm) + NAA (20 ppm) while the minimum fruit weight found in control (121.80 g).

The same result was supported by the findings of Yadav *et al.*, (2001), and Sharma *et al.*, (2016) in Guava. Reported increased fruit weight in Sardar guava when NAA and GA₃ with nutrients were applied before fruit set. The current findings are also in agreement with the results proposed by Ranjan *et al.*, (2003). Who confirmed that stimulated cell division and cell elongation due to the application of NAA and GA₃ may be the reason behind increased fruit size.

3.4 Fruit volume (cm³):

The data collected on fruit volume are clearly displayed in Table 1, showing that all treatments had a significant impact on fruit volume. The highest fruit volume (161.60 cm³) was recorded in GA₃ (50 ppm) +

NAA (20 ppm) with Bagging, followed by GA₃ (50 ppm) + NAA (20 ppm) (153.70 cm³), while the minimum fruit volume (124 cm³) was found in the control.

Fruit's increasing moisture content and TSS content are to blame for their consistent weight and volume increases. The increase in intercellular gaps, which causes the maximum amount of food substances and water to accumulate as maturity advances, is what causes the rapid growth from 90 to 150 days.

3.5 Specific gravity (g/cm³):

The findings in Table 1, make it abundantly evident that the various treatments had a considerable impact on specific gravity. The highest fruit specific gravity (0.98 g/cm³) was observed in GA₃ (50 ppm) + NAA (20 ppm) with bagging, followed by GA₃ (50 ppm) + NAA (20 ppm) (0.96 g/cm³), and the lowest specific gravity (0.90 g/cm³) was discovered in control.

The change of insoluble starch into soluble sugars probably is what causes the drop in the specific gravity of fruits as they develop. Consequently, pre-harvest application losses assisted in maintaining a greater value of specific gravity (Godge and kale, 1991).

Table 1: Show Fruit length, Fruit width, Fruit weight, Fruit volume and Specific gravity in Guava

No.	Treatments	Fruitlength (cm)	Fruitwidth (cm)	Fruitweight (g/fruit)	Fruitvolume (cm ³)	Specificgravity (g/cm ³)
T ₀	Control (water spray)	3.25	4.39	121.80	124.10	0.90
T ₁	GA ₃ (50 ppm)	4.00	5.40	135.40	139.80	0.92
T ₂	NAA (20 ppm)	4.10	5.54	138.00	142.50	0.93
T ₃	GA ₃ (50 ppm) + NAA (20 ppm)	4.80	6.48	151.80	153.70	0.96
T ₄	GA ₃ (50 ppm) with Bagging	4.60	6.21	145.70	150.50	0.94
T ₅	NAA (20 ppm) with Bagging	4.50	6.08	139.80	142.60	0.95
T ₆	GA ₃ (50 ppm) + NAA (20 ppm) with Bagging	4.90	6.62	158.20	161.60	0.98
T ₇	Bagging (White polythene)	3.90	5.27	129.60	132.60	0.91
SEm±		0.16	0.18	0.96	0.50	0.012
CD at 5%		0.48	0.56	2.94	1.53	0.038

4. CONCLUSION

Based on the results of this present investigation, it can be concluded that treatment is evident from the observation above that foliar application of GA₃ (50 ppm) + NAA (20 ppm) with bagging produced the maximum GA₃ (50 ppm) + NAA (20 ppm) with bagging, was recorded maximum Fruit length (4.90 cm), Fruit width (6.62 cm), Fruit weight (158.20 gram), Fruit volume (161.60 cm³) and Specific gravity (0.98 g/cm³), is the most effective combination to increase growth parameters in guava. Therefore, these treatments can be recommended for Guava growers for better growth of trees in their orchards.

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6. COMPETING INTERESTS

The authors have declared that no competing interests exist.

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