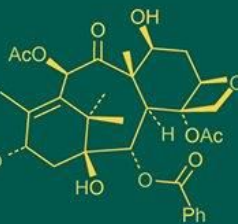
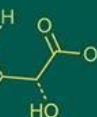
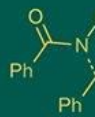


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Effect of pre-harvest treatments on various attributes of guava fruits cv. Allahabad Safeda

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Abstract

The present experiment was carried out at Precision Farming Development Centre (PFDC), Department of Fruit Science, College of Agriculture, IGKV, Raipur (C.G) with the objective to study the effect of Pre-Harvest treatments on physical attributes of guava fruits cv. Allahabad Safeda. The experiment was replicated thrice using Two- Factor Factorial experiment in RBD where Factor 1 is Treatment and Factor 2 is Direction. The selected fruits were subjected to foliar spray of different chemicals i.e., Calcium chloride (CaCl_2), Calcium nitrate ($\text{Ca}(\text{NO}_3)_2$) and Ascorbic acid at different concentrations as per treatment details at 30 days before harvest of fruits. Significant effects of pre- harvest treatments were observed on physical attributes of guava fruits. The maximum fruit weight, fruit length, fruit diameter, specific gravity and pulp weight were recorded under T_4 ($\text{Ca}(\text{NO}_3)_2$ @ 2%) treatment (137 g, 6.66 cm, 6.73 cm, 1.18 g/cc, 97.4 g respectively). However, the highest seed weight of 45.5 g was seen in fruits treated with T_3 ($\text{Ca}(\text{NO}_3)_2$ @ 1%) closely followed by treatment T_4 ($\text{Ca}(\text{NO}_3)_2$ @ 2%). Fruited sprayed with T_4 ($\text{Ca}(\text{NO}_3)_2$ @ 2%) and T_2 (CaCl_2 @ 2%) demonstrated larger size and were graded as 'A' as compared to fruits under T_0 (control).

Keywords: Guava, pre-harvest treatments, physical attributes, $\text{Ca}(\text{NO}_3)_2$

Introduction

Guava (*Psidium guajava* L.) is a common tropical fruit cultivated in many tropical and subtropical regions. This may be due to the high nutritive value of fruits, good source of vitamin C, minerals, and pleasant aroma. The common guava is a small tree in the myrtle family (Myrtaceae), native to Mexico, Central America, the Caribbean and northern South America. It is also known as 'Apple of the tropics' or 'Poor man's apple.' In India, Guava is the fourth most important fruit crop in area and production after mango, banana and citrus with production of 49.16 lakh tonnes from an area of 3.15 lakh ha. It is an important fruit crop cultivated all over India, especially in the regions of Uttar Pradesh, Madhya Pradesh, Bihar, Maharashtra, West Bengal, Punjab, Chhattisgarh, Haryana, Karnataka, and Gujarat. In Chhattisgarh, guava is grown in an area of 20.5 thousand hectares, with an annual production of 201.3 thousand MT.

Guava fruits are highly perishable and have less shelf life of 5-7 days. Application of suitable chemicals as a pre-harvest spray is required to conserve and enhance the fruit yield, quality at harvest as well as post-harvest life of fruits. Pre-harvest calcium spray is one of the most important practices of new strategies applied in the integrated fruit production systems, improving fruit characteristics, and minimizing fungicides sprays towards the end of the harvest period, since they improve fruit resistance to brown rot (Conway *et al.*, 1994) [6]. Application of Ascorbic acid had many stimulating effects on growth and physiological activities of various plants (Dewick, 2000, Ismail, 2008 and Abdou *et al.*, 2015) [7, 9, 1]. Ascorbic acid is a good antioxidant that keeps fruit from darkening and improves destruction of bacteria. Antioxidants are used instead of auxins for improving fruit growth, development and fruiting of trees (Maksoud *et al.*, 2009) [13].

Hence, present investigation was conducted to find out the effect of pre-harvest spray of Calcium chloride, Calcium nitrate and Ascorbic acid on physical attributes and post-harvest behaviour of guava cv. Allahabad Safeda.

Materials and Methods

The field experiment was carried out during the year 2023-24 in winter season at Precision Farming Development Centre (PFDC), Department of Fruit Science, College of Agriculture, IGKV, Raipur (C.G.). The experiment consists of total 7 pre-harvest treatments i.e., T₀ (control), T₁ (CaCl₂ @ 1%), T₂ (CaCl₂ @ 2%), T₃ (Ca(NO₃)₂ @ 1%), T₄ (Ca(NO₃)₂ @ 2%), T₅ (ascorbic acid @ 150 ppm) and T₆ (ascorbic acid @ 300 ppm) which were randomly assigned to different guava trees with three replications across the fertility gradient. Foliar application of these treatments was done on guava fruits selected from all four directions of each tree at 30 days before harvest of fruits. Observation for physical attributes was recorded immediately after harvest and statistically analyzed.

Result and Discussion

Fruit Weight (g)

Maximum mean of fruit weight (137 g) was recorded in T₄ (Ca(NO₃)₂ @ 2%) followed by T₂ (CaCl₂ @ 2%) with 123 g mean fruit weight whereas minimum fruit weight (108 g) was recorded in T₀ (Control). T₅ (ascorbic acid @ 150 ppm) and T₆ (ascorbic acid @ 300 ppm) with mean values 110 g and 114 g respectively were found to be statistically at par with the control treatment. T₁ (CaCl₂ @ 1%) and T₃ (Ca(NO₃)₂ @ 1%) were also at par with T₂ (CaCl₂ @ 2%) having mean values of 120 g and 120 g respectively. The results obtained in present study align with the outcomes reported by Roychaudhary (1992)^[14] in guava fruits, Alila and Achumi (2010)^[2] in litchi, Tripathi and Shukla (2011)^[16] in Aonla and Kaur *et al.* (2019)^[10] in guava.

Fruit length (cm)

The highest mean fruit length (6.66 cm) was recorded under T₄ (Ca(NO₃)₂ @ 2%) followed by 6.39 cm length in T₂ (CaCl₂ @ 2%) which is statistically at par with T₁ (CaCl₂ @ 1%), T₃ (Ca(NO₃)₂ @ 1%) and T₆ (Ascorbic acid @ 300 ppm) with mean values 6.26cm, 6.21cm and 6.18cm respectively. The lowest mean fruit length (5.58cm) was observed in T₀ (control) found to be at par with T₅ (Ascorbic acid @ 150 ppm) having 6.08cm length. Similar results were reported by Roychaudhary (1992)^[14] in guava fruits, Alila and Achumi (2010)^[2] in litchis, Lal *et al.* (2015)^[12] in kinnow mandarins, and Sidhu *et al.* (2020)^[15] in strawberries.

Fruit diameter (cm)

After the statistical analysis, it is revealed that T₄ (Ca(NO₃)₂ @ 2%) had the highest mean fruit diameter (6.73 cm) followed by 5.53 cm diameter in T₂ (CaCl₂ @ 2%) which is found to be at par with T₁ (CaCl₂ @ 1%), T₃ (Ca(NO₃)₂ @ 1%) and T₆ (Ascorbic acid @ 300 ppm) with mean values 6.44cm, 6.42 cm, 6.28 cm respectively. However, T₄ showed significant difference with the lowest mean fruit diameter (5.64 cm) recorded under control (T₀). Similar outcomes were noted in studies conducted by Roychaudhary (1992)^[14]

on guava fruits, Koul and Muthoo (1999)^[11] on peaches, Alila and Achumi (2010)^[2] on litchis, and Sidhu *et al.* (2020)^[15] on strawberries.

Specific Gravity (g/cc)

The data revealed a significant difference between treatments with maximum mean specific gravity (1.18 g/cc) observed under T₄ (Ca(NO₃)₂ @ 2%) followed by T₂ (CaCl₂ @ 2%) with mean value 1.11 g/cc while the minimum mean specific gravity (0.99 g/cc) was recorded in T₀ (Control). The present results agree with research conducted by Roychaudhary (1992)^[14] in guava fruits, Koul and Muthoo (1999)^[11] in peach, Alila and Achumi (2010)^[2] in litchi, Lal *et al.* (2015)^[12] in kinnow mandarin, and Sidhu *et al.* (2020)^[15] in strawberry.

Pulp weight (g)

According to the statistical analysis of the data, T₄ (Ca(NO₃)₂ @ 2%) recorded the maximum mean pulp weight of 97.4 g followed by T₂ (CaCl₂ @ 2%) with 83.6 g of mean pulp weight whereas minimum (63.1 g) was recorded under control treatment (T₀). Moreover, T₁ (CaCl₂ @ 1%), T₃ (Ca(NO₃)₂ @ 1%), T₅ (Ascorbic acid @ 150 ppm) and T₆ (Ascorbic acid @ 300 ppm) with mean values 76 g, 74.1 g, 72.2 g and 69 g respectively showed no significant difference with each other. Similarly, Tripathi and Shukla (2011)^[16] also concluded that higher pulp content was observed under calcium nitrate @ 1.5% in Aonla cv. Banarasi.

Seed weight (g)

The outcome of statistical analysis showed that maximum mean of seed weight (45.5 g) was recorded in T₃ (Ca(NO₃)₂ @ 1%) followed by T₄ (Ca(NO₃)₂ @ 2%) with 41 g mean seed weight. On the other hand, minimum mean seed weight (33.2 g) was recorded in T₀ (Control) and T₅ (ascorbic acid @ 150 ppm) with mean values 35.1 g was found to be statistically at par with the control treatment. T₁ (CaCl₂ @ 1%), T₂ (CaCl₂ @ 2%) and T₆ (Ascorbic acid @ 300 ppm) with mean values 38.2 g, 38.2 g and 36.2 g respectively showed no significant difference with each other. These findings mirror those reported by Bisen *et al.* (2014) in guava plants.

Fruit grading

The fruits were graded as A, B and C according to the fruit size (fruit diameter) and appearance. where, 'A' - ≥ 6.5cm, 'B' - 6.5 – 6cm, 'C' - ≤ 6 cm. The data revealed that the fruits treated with high concentration of calcium shows better quality and increased fruit size hence, fruits treated with T₄ (Ca(NO₃)₂ @ 2%) and T₂ (CaCl₂ @ 2%) are found to be graded as 'A' while the lowest grade 'C' was given to the fruits of T₀ (control). T₁ (CaCl₂ @ 1%), T₃ (Ca(NO₃)₂ @ 1%), T₅ (ascorbic acid @ 150 ppm) and T₆ (Ascorbic acid @ 300 ppm) had no significant difference and were graded as 'B'.

Table 1: Effect of pre-harvest treatments on physical attributes of Guava cv. Allahabad Safeda.

Treatment details	Fruit weight (g)	Fruit length (cm)	Fruit diameter (cm)	Specific gravity (g/cc)	Pulp weight (g)	Seed weight (g)	Fruit grading
T ₀ (control)	108	5.58	5.64	0.99	63.1	33.2	C
T ₁ (CaCl ₂ @ 1%)	120	6.26	6.44	1.08	76.0	38.2	B
T ₂ (CaCl ₂ @ 2%)	123	6.39	6.53	1.11	83.6	38.2	A
T ₃ (Ca(NO ₃) ₂ @ 1%)	120	6.21	6.42	1.07	74.1	45.5	B
T ₄ (Ca(NO ₃) ₂ @ 2%)	137	6.66	6.73	1.18	94.7	41.0	A
T ₅ (ascorbic acid @ 150 ppm)	110	6.03	6.11	1.03	69.0	35.1	B
T ₆ (Ascorbic acid @ 300 ppm)	114	6.18	6.28	1.04	72.2	36.2	B
SE(m) ±	4.26	0.135	0.118	0.0084	3.71	2.33	
C.D. (5%)	12.07	0.382	0.334	0.0238	10.51	6.606	

Conclusion

On the basis of findings reported upon completion of the research, the effect of pre-harvest treatments had significant influence on the physical attributes of guava fruits. However, calcium sprays proved to be the most effective among all the pre-harvest treatments. Therefore, it can be concluded that treatment T₄ (Ca(NO₃)₂ @ 2%) followed by T₂ (CaCl₂ @ 2%) showed the best results with regard to fruits physical parameter i.e., fruit weight, fruit length, fruit diameter, specific gravity, pulp weight and fruit grading. However, T₃ (Ca(NO₃)₂ @ 1%) showed the best results with regard to seed weight.

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