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Research Article

EFFECT OF FOLIAR APPLICATION OF GROWTH SUBSTANCES ON YIELD AND QUALITY OF GUAVA FRUITS

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Abstract: An experiment was carried out during 2018 at, Main Garden farm and Post-Harvest Technology and Analytical Laboratory, Department of Horticulture, Dr P.D.K.V. Akola. The experiment was laid out in Randomized Block Design with nine treatments and four replications. The different foliar application of growth substances treatments *viz*., T_1 (1% Potassium Nitrate), T_2 (2% Potassium Nitrate), T_3 (1% Calcium Nitrate), T_4 (2% Calcium Nitrate), T_5 (GA_3 50 ppm), T_6 (GA_3 100 ppm 2,), T_7 (NAA 50 ppm), T_8 (NAA 100 ppm), T_9 (Control) were used in research programme. The foliar application of growth substances during rainy crop of guava was done in the month of August. Observations on fruit, qualitative and post-harvest parameters were recorded periodically. Results obtained in the present investigation revealed that, the number of fruits per plant (273.50) and fruit yield (32.34 kg/plant) was maximum in treatment in T_8 (NAA 100 ppm). The fruit weight (142.25 gm), fruit length (7.16 cm), fruit diameter (7.19 cm) and specific gravity (1.17 g/cc) was maximum in the treatment T_6 (GA_3 100 ppm). Fruit qualitative parameters *viz*., maximum total soluble solids (°Brix), acidity (%), ascorbic acid (mg/100g pulp), reducing sugars (%), non-sugars (%) and total sugars (%) content was found in foliar application of 2% Calcium Nitrate during 0, 2nd, 4th, 6th, 8th and 10th at ambient storage condition. Fruits post-harvest parameters *viz*., significantly minimum physiological loss in weight (%), and fruit decay (%), colour changes (days) and highest shelf life (days) was found in foliar application of 2% Calcium Nitrate during 0, 2nd, 4th, 6th, 8th and 10th at ambient storage condition.

Keywords: *Fruit qualitative parameters, Post harvest parameters, Foliar Application*

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Introduction

Guava (*Psidium guajava* L.) is one of the important fruit crops of tropical and subtropical regions of India. It is popularly known as "Apple of Tropics" and claims to be the fourth most important fruit in respect of area and production after mango, banana and citrus. The less shelf life of fruit crop is due to their highly perishable nature and improper handling during storage, transport and these losses are further enhanced by infection of post-harvest diseases. Hence, there has to be need to use standardize technique for enhance shelf life, thereby maintaining the quality of product.

Guava fruits are required to be managed appropriately in order to get a regulated market supply through judicious use of pre harvest treatments. The role of calcium in the physiology of plant tissue is very important. It contributes to improve the rigidity of cell wall and retard tissue softening and delay ripening. Higher activity of cell wall degrading enzymes results in fruit softening, which subsequently lead to fruit delay. Calcium is important in the maintenance of cell wall integrity in plants. Heavy influx of external or internal calcium inhibits ripening process due to reduction in enzymatic activity. Application of growth substances (potassium nitrate, calcium nitrate, GA_3, and NAA) reduced delay losses in guava fruits.

The fruit production during rainy season is generally high but the fruits harvested from rainy season crops are small in size, inferior in quality, having insipid taste, low keeping quality and highly susceptible to diseases and pest specially fruit fly is the most serious pest of guava production resulting in poor income to the farmers. For those various efforts have been made to application of growth regulators to rainy season crop for increase the production and quality of winter season crop. Guava bears fruit almost round the year with three different flowering seasons that in the month of February–March is called Ambia Bahar, in June-July is called Mrig Bahar and in October is called as Hast Bahar. The fruiting of Ambia Bahar takes place in July- September *i.e*., in rainy season, fruiting of Mrig Bahar takes place in October-December *i.e*., in winter season, and the fruiting of Hast Bahar takes place in February-April *i.e*., summer season. Changes in physico-chemical properties occur during different stages of ripening and storage. There is an increasing demand of fruits for fresh as well as processing purpose in domestic and international markets. The world is currently producing about five million metric tonnes of food for the hungry teeming millions. A considerable proportion (30-50%) of the produce in the developing countries never reaches the consumer, mainly because of pre and post-harvest loss [1]. As estimated by Lashley, (1984) [2] an approximately 30-40% fruit goes wastage during post-harvest, handling, storage and ripening. This post-harvest loss is highly prominent in guava because of its high perishability. Once it is fully ripe, the fruit become soggy, nonedible and marketing quality deteriorates rapidly.

Under ambient condition the fruit keeps well for only 2 to 3 days as it attains full ripe stage. Guava being soft skinned fruit is subjected to various post-harvest diseases. Like other tropical fruits guava fruits are biologically active even after harvest and carry out respiration, transpiration and other bio-chemical processes, deteriorating its quality and finally marketing it unmarketable. If the rates of such changes are reduced to some extent, the shelf life of the fruits can be effectively increased.

The objective of successful storage is to delay the ripening process, retard the biochemical changes, reduce the microbial growth and finally enhance the shelf life of the fruit. Due to heavy pre-harvest losses, there is a considerable gap between production and availability of fruit to consumers. Post-harvest losses are occurring in the period between harvesting and consumption. Due to lack of storage facility, hence there is an urgent need to spray like potassium nitrate, calcium nitrate nutrient and growth regulators like gibberellic acid, NAA to enhance shelf life and storability of post-harvested fruits.

Table-1 *Effect of foliar application of growth substances on number of fruits per plant*

Treatment		Number of Fruits per plant	Fruit Weight (gm)	Fruit length (cm)	Fruit diameter (cm)	Specific Gravity (g/cc)	Fruit yield (kg/plant)	Shelf life (Days)
T_1	Potassium Nitrate 1%	121.1	6.32	6.68	1.07	28.2	121	8
T_2	Potassium Nitrate 2%	125.7	6.03	6.64	1.09	30.8	126	7
T_3	Calcium Nitrate 1%	123.2	6.02	6.5	1.11	27.1	123	10.5
T_4	Calcium Nitrate 2%	130.7	6.47	6.63	1.13	29.8	131	11.5
T_5	GA_3 50 ppm	135.9	7.1	7.12	1.15	27.8	136	9
T_6	GA_3 100 ppm	142.3	7.16	7.19	1.17	29.4	142	8.5
T_7	NAA 50 ppm	119.8	6.26	6.55	1.06	31.2	120	8.75
T_8	NAA 100 ppm	118.2	6.32	6.64	1.08	32.3	118	9.25
T_9	Control	94.7	5.37	5.07	1.02	18.1	94.7	5.75
'F' test		Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig
SE (m) ±		1.88	1.43	0.15	0.16	0.02	0.41	0.87
CD at 5 %		5.68	4.31	0.45	0.48	0.08	1.25	2.63

Table-2 *Effect of foliar application of growth substances on fruit quality during storage*

Treatment	Total Soluble Solids (˚Brix)		Titratable acidity (%)		Ascorbic acid (mg/100g pulp)		Reducing sugar (%)		Non reducing sugar (%)		Total sugar (%)		Physiological loss in weight (%)	
	Storage (days)													
	0	10 th		10th	0	10th	0	10th	0	10th	0	10th	2nd	10th
T_1	10.13	10.75	0.516	0.174	248.44	169.82	3.21	2.82	3.9	3.6	7.1	6.4	3.95	12.94
T_2	10.03	10.53	0.532	0.243	252.67	202.38	3.27	2.91	3.9	3.7	7.2	6.58	3.73	12.65
T_3	10.3	11.08	0.553	0.281	253.33	203.28	3.32	3.02	4	3.8	7.3	6.74	3.47	12.14
T_4	10.53	11.23	0.556	0.283	255.76	205.04	3.33	3.03	4	3.8	7.3	6.86	3.42	12.05
T_5	10.18	10.65	0.54	0.225	249.25	195.5	3.25	2.92	3.9	3.7	7.2	6.61	3.68	12.49
T_6	10.2	10.45	0.523	0.201	243.57	178.68	3.2	2.82	3.9	3.6	7.1	6.39	3.84	12.76
T_7	10.25	10.83	0.551	0.198	242.83	176.05	3.27	2.78	4	3.4	7.2	6.23	3.97	12.83
T_8	10.15	10.15	0.511	0.25	242.64	184.26	3.3	2.98	4	3.7	7.3	6.7	3.58	12.36
T_9	9.83	10.2	0.507	0.144	240.09	164.53	3.11	2.42	3.7	2.3	6.8	4.92	4.08	15.16
'F' test	Sig.	Sig.	Sig	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	0.09	0.15	0.001	0.0011	1.05	0.9	0.01	0.02	0	0	0	0.04	0.02	0.024
CD at 5%	0.29	0.47	0.004	0.0032	3.17	2.72	0.03	0.07	0	0.1	0	0.13	0.05	0.074

Keeping this in view present investigation undertaken with following objectives to study the effect of foliar application of different growth substances on yield and quality of guava fruits and to find out suitable growth substance for enhancing yield and quality of winter season guava fruits.

The biochemical changes in the fruits after harvest occur at a faster rate and fruit become unfit for consumption within the short period of transportation to distant market. If such changes are slowed down to certain extent without any damage to quality, their shelf life can be extended guava fruits are perishable in nature and is the main constrain affecting net return from the crop. Most of the post-harvest losses can be overcome by adopting proper picking and grading technique.

Pre-harvest growth substances treatments are safe and effective method for improving the quality and extending the storage shelf life of fresh fruits. Calcium spray during fruit development provides a safe mode of supplementing endogenous calcium to fresh fruits [3,4]. $CaCO_3$ at ambient storage condition retard softening and increase shelf life of fruit by decreasing the chance of infection of post-harvest disease. Calcium compound extend the shelf life of several fruits by maintaining their firmness and minimizing the rate of respiration, protein breakdown and rotting incidence [5]. There-fore the proposed investigation was study for evaluating the yield and quality of winter season guava fruits.

Material and Methods

The experiment was carried out at Main Garden, guava orchard, Department of Horticulture, Dr. PDKV Akola, on uniform size guava crop having spacing of 5 x 5 m of 'L 49' variety. Thirty-six healthy trees, uniform in size and vigour were selected for the trial from guava plantation. All trees were subjected to same cultural practices such as irrigation, nutrition, weeding and insect pest and disease control during the experiment. Foliar application of growth substances was done in the month of August. Adopting Randomized Block Design (RBD) replicated four times with nine treatments. Randomized distributed 36 plants of guava cv. 'L-49' of uniform age, and vigour were selected. The selected plants were sprayed with KNO_3 solutions at the concentration of 1% and 2%, Ca $(NO_3)_2$ solutions of 1% and 2%, GA_3 solutions of 50 ppm and 100 ppm and NAA solution at 50 ppm and 100 ppm at fruit setting stage during third week of August.

The treated matured medium size homogenous guava fruits of mrig bahar (cv. L-49) were harvested from the guava tree. Fruit harvested in December were kept in post-harvest laboratory at ambient temperature condition for conducting experiment in December. For recording fruit qualitative and post-harvest parameters at every alternate day were selected and same fruit were used for recording various fruit parameters, qualitative parameters and post-harvest parameters of guava fruit during storage. The data collected on various observations, during the course of investigation were statistically analyzed by Randomized Block Design as suggested by Panse and Sukhatme (1985) [6].

Result and Discussion

Effect of foliar application of growth substances on fruit quality.

During the course of investigations, the observation was recorded on various aspects *i.e.*, fruit, qualitative and post-harvest parameter of fruit and are presented and discussed. The observations regarding fruit parameters in terms of number of fruits per plant, fruit weight, fruit length, fruit diameter, specific gravity and fruit yield, influenced by pre-harvest foliar application of growth substances.

The data regarding the number of fruits per tree was recorded and presented in [Table-1] was clearly indicated that, the number of fruits per tree was significantly influenced by foliar application of growth substances treatments. The maximum number of fruits harvested per plant (273.50) was recorded in treatment T_8 (NAA 100 ppm) which is followed by treatment T_7 (NAA 50 ppm) was record (260.50) fruits, while minimum number of fruits per plant (191.00) was recorded in control treatment.

As the fruit setting were influenced by foliar application of growth substances of rainy crop of guava, the reserved food materials and auxins force the plant to produce more flowers of winter crop due to production of a greater number of flowers that can be supported by more vegetative growth which resulted to high photosynthesis and remobilization produce a greater number of fruits per tree. The maximum fruit was observed in the treatment T_8 (273.50) might be due to fact that the more food reserves are available to the plant. These results are similar with the findings of Kacha *et al.*, (2014) [7] who reported that application of NAA 150 ppm significantly increased number of flower and fruit of guava crops reported maximum number of flower (151.21) and minimum number of flowers was recorded (32.17) in control [8,9].

The maximum fruit weight (142.25 gm) recorded under treatment T_6 (GA_3 100 ppm) followed by treatment T_5 (GA_3 50 ppm) which record (135.92 gm) fruit weight, increase in fruit weight during the winter season crop after 2015, Sharma and Tiwari (2015) [10] who also observed the similar findings in guava. The application of GA_3 50 and 100 ppm treatment on rainy crop might be due to maximum food reserve available to the fruits during their growth and development. These results are similar with the findings of Katiyar *et al*., (2009) [11], Ramezani and Akhtar (2009) [12], Singh, (2009) [12], Gill and Bal, (2010) [13], Kumar *et al*., (2010) [14] and Sharma and Tiwari (2015), who observed that foliar application of growth substances of guava crops by various treatments increases fruit weight in next season as compared to other treatments.

The treatment T_6 (GA_3 100 ppm) recorded maximum fruit length (7.16 cm) which was at par with treatment T_5 (GA_3 50 ppm). While minimum fruit length (5.37 cm) was observed in control treatment. The enlargement of fruit in terms of length was due to both cell elongation and cell division. During initial stage of fruit growth, cell division continued to take place and at later stage, only cell elongation occurred due to foliar application of GA_3. These findings are in agreement with observations recorded by of Katiyar *et al*., (2008) [15] who found that maximum fruit diameter was recorded in 90 ppm GA_3 (6.32) as compared to control treatment in guava crops. These results are similar with the findings of Jain and Deshora, (2011) [16], Agnihothri *et al*., (2013) [17], Lal *et al*., (2013) [18] and Bisen *et al*., (2014) [19] who also observed the similar findings in guava.

The data regarding fruit diameter effect of foliar application of growth substances treatment showed significant variation. The treatment T_6 (GA_3 100 ppm) recorded maximum fruit diameter (7.19 cm) which was at par with treatment T_5 (GA_3 50 ppm) (7.12 cm) While minimum fruit diameter (5.07 cm) was observed in control treatment. The enlargement of fruit in terms of diameter was due to both cell elongation and cell division. During initial stage of fruit growth, cell division continued to take place and at later stage, only cell elongation occurred due to foliar application of GA_3.

These findings are in agreement with observations recorded by of Katiyar *et al*., (2008) who found that maximum fruit diameter was recorded in 90 ppm GA_3 (6.79) as compared to control treatment in guava crops. These results are similar with the findings of Jain and Deshora (2011) in guava, Bisen *et al*., (2014) in guava and Meena *et al*., (2014) [20] in aonla. Significantly maximum specific gravity (1.17 g/cc) was recorded in treatment T_6 GA_3 100 ppm) followed by T_4 (1.15 g/cc) and T_3 (1.11 g/cc) whereas, minimum specific gravity (1.02 g/cc) was recorded in treatment control. The increased in fruit specific gravity in treatment T_6 (GA_3 100 ppm) might be due to higher fruit size. These findings are in agreement with observations recorded by of Kher and Bhat (2005) [21] and Katiyar *et al*., (2008) who found that foliar application of GA_3 on guava crop increases specific gravity of subsequent winter season crop. Singh (2009) also found the similar findings with specific gravity in guava fruits. The data showed that fruit yield per plant was significantly different among the various treatment during Mrig Bahar. Significantly maximum fruit yield (32.34 kg/plant) was recorded in treatment T_8 (NAA 100 ppm) which is at par with T_7 (31.21 kg/plant) whereas, minimum fruit yield (18.07 kg/plant) was recorded in treatment control. The higher yield was due to a greater number of fruits. These findings are in agreement with observations recorded by of Katiyar *et al*., (2009) and Kacha *et al*., (2014) who found that maximum fruit yield in foliar application of NAA as compared to control. Mohammed Suleman *et al*., (2006) [22] also found the similar findings with fruit yield in guava fruits.

Effect of foliar application of growth substances on fruit qualitative parameters during storage

The guava fruit treated with calcium nitrate 2% (T_4) had maximum total soluble solids during storage recorded (10.50, 11.15, 11.53, 11.60, 11.25 and 11.23 °Brix) which was found at par with calcium nitrate 1% (T_3) and NAA 50 ppm (T_7) in all day of storage while minimum total soluble solids was noticed in control treatment fruit (9.83, 10.23, 10.55, 10.60, 10.30 and 10.20 °Brix).

Higher TSS level was retained by 2% Calcium nitrate treated fruits during storage and shelf-life which was due to the role of Calcium nitrate treated in maintaining the lowest metabolic activity during storage of fruits [23]. The increase in TSS during storage may possibly be due to hydrolysis of starch into sugars as on complete hydrolysis of starch no further increase occurs and subsequently a decline in TSS is predictable as they along with other organic acids are primarily substrate for respiration. The results are conformation with Jayachandran *et al*., (2005a) [24], Rajput *et al*., (2008) [25], Rajput (2010) [26] in guava, Siddaqui *et al*., (1989) [27] in ber, Gupta *et al*., (1987) [28] in ber.

From the data presented in table revealed that, pre-harvest foliar application of growth substances treatments affects the titratable acidity significantly. The titratable acidity of guava fruits was recorded on alternate day during storage and observed that in treatment (T_4) 2 % calcium nitrate recorded the maximum titratable acidity (0.556, 0.509, 0.485, 0.619, 0.386, 0.281% recorded at 0, 2nd, 4th, 6th, 8th and 10th day of storage) which was found at par with treatments (T_3) calcium nitrate in all the day of storage and treatment (T_7) NAA 50 ppm in 0, 2nd day of storage while minimum acidity was noticed in control treatments. (0.507, 0.416, 0.393, 0.440, 0.261, 0.144 % respectively). It is harvested from the plant treated with Calcium nitrate maintained higher acidity during storage probably due to delay in ripening process and low respiration rate. The decrease in titratable acids during storage may be due to marked increase in malic enzyme and pyruvate decarboxylation reaction during the climacteric period [29, 30]. There was gradual declining trend in acidity with the increasing period of storage. The results are conformation with, Jayachandran *et al*., (2005b) [31], Rajput (2010), Rajput *et al*., (2008) in guava, Gupta *et al*., (1980) in grape, Rajkumar *et al*., (2006) [32] in papaya and Ramakrishna *et al*., (2001) [33] in papaya.

The data presented in table clearly indicated that, there was a significant influence on pre-harvest foliar application of growth substances on the ascorbic acid content of fruit during storage. During the 10 day storage life the ascorbic acid content recorded at alternate days and revealed that, fruits harvested from the plant treated with calcium nitrate 2% (T_4) had significantly maximum ascorbic acid content (255.76, 252.90, 242.28, 227.80, 217.59, 205.04 mg/100g pulp respectively) which was found at par with treatment (T_3) calcium nitrate 1% (253.33, 251.18, 241.50, 224.68, 215.59 203.28 mg/100g respectively) in all the days and in treatment (T_2) potassium nitrate 2% (252.67, 202.38 mg/100g) during 0, 10th days of storage while minimum ascorbic acid content was recorded in control (240.69, 224.31, 212.91, 202.91 188.94, 164.53 mg/100g pulp respectively). Calcium nitrate probably retarded oxidation process and hence the rate of conversation of L- ascorbic acid was slowed down. (The results are conformity with Rajput *et al*., (2008), Rajput (2010) in guava, Gupta et. al., (1987) ber, Singh *et al*., (1982) [34], Gupta *et al*., (1984) [35] in peach. The data presented in table showed that, there was significant influence of pre-harvest foliar application of growth substances treatment on reducing sugars during storage during of guava fruits. The fruits stored in ambient conditions showed the increasing trend in the reducing sugars up to 4th day of storage and thereafter decline gradually with advancement in storage period.

The observation of reducing sugars recorded on alternate day during storage up to 10 days. The guava fruits harvested from plant treated with calcium nitrate 2% (T_4) recorded maximum reducing sugars (3.23, 3.50, 3.60, 3.38, 3.13, 3.02% respectively) recorded at 2nd, 4th, 6th, 8th and 10th day of storage and which was found at par with treatment calcium nitrate 1% (T_3) on all the storage and NAA 100 ppm (T_8) on 10th day of storage. While minimum reducing sugar (3.11, 3.12, 3.24, 3.10, 2.80, and 2.42% respectively) in control treatments. The initial increase in reducing sugar content might be due to conversion of starch into sugar, while subsequent decline was due to consumption of sugar for respiration during storage. Jayachandran *et al*., (2005a). These results are in conformity with Agrawal and Jaiswal (2012) [36], Rajput (2010), Yadav *et al*., (2009) [37] in ber, Bhat *et al*., (2012) [38]. From the data presented in table revealed that there was significant influence of pre-harvest foliar application of growth substances treatments on non-reducing sugar during storage of guava fruits. During stored all the fruits stored in ambient conditions the increasing trend in the non-reducing sugars up to 3th day of storage and thereafter decline gradually with advancement in storage period. The non-reducing sugar was recorded on alternate day during storage up to 10 days, the treatment of calcium nitrate (2%) recorded maximum reducing sugars (4.01, 4.26, 4.49, 4.15, 3.93 and 3.76% respectively) which was found at par with calcium nitrate 1% (T_3) in 0^{th}, 2^{nd}, 4^{th}, 6^{th}, 8^{th} and 10^{th} day of storage and potassium nitrate 2% (T_2) in 4^{th} day of storage. While minimum was noted in control fruits (3.69, 3.70, 3.92, 3.07, 2.78 and 2.32 % respectively). The increase in the non-reducing sugar might be due to the hydrolysis of starch and conversion in the pectin substances from water soluble fraction. These results are conformation with Agrawal and Jaiswal (2012), Rajput (2010) in guava. The data presented in table showed that, there was significant influence of pre-harvest foliar application of growth substances treatment on total sugars during storage during of guava fruits.

During stored all the fruits stored in ambient conditions the increasing trend in the non-reducing sugars up to 3^{th} day of storage and thereafter decline gradually with advancement in storage period. Maximum total sugars content was observed in fruit harvested from plant treated with calcium nitrate 2% (T_4) in all days of storage (7.32, 7.78, 8.14, 7.53, 7.10, 6.86% respectively).which are at par with calcium nitrate 1% (T_3) Whereas minimum total sugars was recorded in control fruits (6.80, 6.71, 7.20, 6.16, 5.58 and 4.92% respectively) Fruit treated with calcium nitrate as pre-harvest treatments retained highest total sugars (Agrawal and Jaiswal, 2012).Total sugars of the fruits initially increase and thereafter decrease in storage at room temperature. This might be due to calcium pectate. The results are conformation with Agrawal and Jaiswal (2012), Rajput (2010), Bisen *et al*., (2012) [39] in guava, Yadav *et al*., (2009) in ber, Lal *et al*., (2013) [40], Abdrabboh *et al*., (2012) [41] in apricot. The data presented in table clearly indicated that the pre-harvest foliar application of growth substances had significantly influence on physiological loss in weight during storage of guava fruits. The physiological loss in weight recorded on 2nd, 4th, 6th, 8th, 10th, days of storage and observed that, the guava fruits harvested from the plants which had sprayed with calcium nitrate 2% (T_4) had minimum physiological loss in Wight (3.42%, 5.18%, 7.07%, 9.15%, 12.05% respectively) which was found at par with the treatment T_3 in 4th day of storage. Whereas maximum physiological loss in weight was recorded in untreated fruits (4.08%, 7.97%, 9.58%, 11.34%, 15.16% respectively). The decreased loss in weight might be due to the fact that calcium is known to retard the rate of respiration, decay and prevents cellular disintegration by maintaining protein and nucleic acid synthesis [42-44]. The above results are in conformation with Jayachabdran *et al*., (2005b) in guava, Kher and Bhat (2005) in guava and Ramakrishna *et al*., (2001) in papaya. The data in respect to shelf life presented in table revealed that, shelf life was significantly influenced by different pre-harvest foliar application of growth substances. The maximum shelf life (11.50 days) was recorded with T_4 (calcium nitrate 2%) which was found at par with T_3 (calcium nitrate 1%) (10.50 day) whereas minimum shelf life was noted in control fruits (5.75 day).Calcium being a divalent caution readily enter the apoplast and is bound in exchangeable form to cell wall and exterior surface of the plasma membrane. In the cell wall calcium serve as a binding agent in the form of calcium pectates. Calcium compound helps in reducing ripening and senescence, increase firmness, vitamin "C" and phenolic content, reduce respiration, incidence of physiological disorders and storage rots and there by extends the shelf life. The results are in conformation with Agrawal and Jaiswal (2012), Rajput *et al*., (2008) in guava and Ramakrishna *et al*., (2001) in papaya.

Conclusion

On the basis of findings reported in present investigation the effect of growth substances had significant influence on the yield and quality of guava fruits. Fruit parameters *viz*., maximum number of fruits and fruit yield was found in foliar application of 100 ppm NAA and maximum fruit weight, fruit length, fruit diameter and specific gravity was found in foliar application of 100 ppm GA_3.

Application of research:

Fruit qualitative parameters *viz*., maximum total soluble solids, titrable acidity, ascorbic acid, reducing sugars, non-sugars and total sugars content was found in foliar application of 2% Calcium Nitrate during 0, 2^{nd}, 4^{th}, 6^{th}, 8^{th} and 10^{th} at ambient storage condition. Fruits post-harvest parameters *viz*., significantly minimum physiological loss in weight, and fruit decay, colour changes and highest shelf life was found in foliar application of 2% Calcium Nitrate during 0, 2^{nd}, 4^{th}, 6^{th}, 8^{th} and 10^{th} at ambient storage condition.

Research Category: Horticulture

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Study area / Sample Collection: Main Garden farm and Post Harvest Technology and Analytical Laboratory

Cultivar / Variety / Breed name: Guava (*Psidium guajava* L.)

Conflict of Interest: None declared

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