International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2017; 5(5): 680-682

Received: 05-07-2017
Accepted: 06-08-2017

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Effect of foliar sprays of urea, potassium sulphate and zinc sulphate on quality of guava cv. Taiwan pink

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Abstract
The present study entitled "Effect of foliar sprays of urea, potassium sulphate and zinc sulphate on quality of guava cv. Taiwan Pink" was carried out at Farmer's field at Manchili village near Athili with the support of Department of Post Harvest Technology at College of Horticulture, Dr. Y.S.R. Horticultural University, Venkataramannagudem, West Godavari District of Andhra Pradesh during 2016-2017. The experiment was laid out in randomized block design with three replications and ten treatments. The results revealed that foliar spray of plant nutrients improved quality parameters over the control. The highest fruit firmness (7.33 kg/cm^2), total soluble solids (10.09 ^{0} Brix), total sugars (7.35%), pectin content (0.86%) and ascorbic acid content (235.38 mg /100 g) and lowest acidity (0.35%) was recorded in plants sprayed with potassium sulphate @ 3%.

Keywords: Guava, Taiwan Pink, Urea, Potassium sulphate, Zinc Sulphate

Introduction
Guava (*Psidium guajava* L.) belongs to the family Myrtaceae. It is also known as 'Apple of the Tropics' or 'Poor man's apple' and is one among the fruits widely grown in India. It is the fourth most important fruit crop both in area and production after mango, banana and citrus. Guava has great demand as a table fruit, as a raw material in processing industries and also earns good foreign exchange (Purseglove, 1974) [14]. In India, guava is cultivated in an area of about 2.68 lakh ha with a production of 36.67 lakh tonnes and productivity of 13.7 MT/ha (NHB, 2015). Nitrogen is important in oxidation–reduction reactions and is involved in formation of chlorophyll molecule through synthesis of porphyrin ring structure. The development of green colour in leaves is associated with an increase in nitrogen content of the leaves. Potassium plays an important role in various physiological and biochemical process vital to the plant growth, yield and quality and in stress conditions (Marschner 1995) [10]. Similarly, zinc also increases the chlorophyll content of leaves and plays an important role in the activation of enzymes like catalase, peroxidase and cytochrome oxidase. The application of urea, potassium and zinc showed favourable effect on yield and quality in fruit crops. So, the judicious applications of both macro and micro nutrients are essential for getting better growth, productivity and quality produce. However, response of plant to these nutrients may vary from plant to plant. The present study was carried out to enhance the quality of guava with various plant nutrient sprays.

Material and Methods
An investigation was carried out on in Farmer's field at Manchili village near Athili with the support of Department of Post Harvest Technology at College of Horticulture, Dr.Y.S.R. Horticultural University, Venkataramannagudem, West Godavari District of Andhra Pradesh during mrig bahar season 2016-2017. The experiment was laid out in randomized block design with three replication and ten treatments viz., T_1- plants sprayed with urea @ 2%, T_2- plants sprayed with urea @ 3%, T_3- plants sprayed with urea @ 4%, T_4- plants sprayed with potassium sulphate @ 1%, T_5- plants sprayed with potassium sulphate @ 2%, T_7- plants sprayed with potassium sulphate 3%, T_8- plants sprayed with zinc sulphate @ 0.2%, T_9- plants sprayed with zinc sulphate 0.4%, T_{10}-plants sprayed with water (control).First spray of different concentrations of plant nutrients were sprayed after the emergence of first flesh after

pruning and second spray at 15 days after the first spray. The chemicals were properly dissolved in water before spray. The fruits were harvested based on their maturity indices *viz.*, change in colour of fruit from dark green to yellowish green. Observations were recorded and statistically analyzed as per the methods given by Panse and Sukhatme (1967) [12].

Results and Discussion

In the present investigation, all treatments of plant nutrients significantly increased the quality attributes of guava as compared to control (Table 1).

Significantly the highest fruit firmness (7.33 kg/cm^2) was observed in T_6 (plants sprayed with potassium sulphate @ 3.0%) followed by T_5 (7.17 kg/cm^2) plants sprayed with potassium sulphate @ 2.0% which might be related to an increase in fruit tissue pressure potential (Lester *et al*., 2006) [7] as well as enhanced phloem transport of calcium to fruits following potassium applications. The present result elucidates the previous work of John and Gene (2011) [5] in cantaloupes. The lowest acidity (0.35%) percentage was noticed in T_6 (plants sprayed with potassium in the form of potassium sulphate @ 3.0%) followed by T_5 (0.36%) plants sprayed with potassium in the form of potassium sulphate @ 2.0%. The guava fruit pulp showed lower acidity with potassium treatments compared to urea and zinc sulphate treatments. It might be due to higher accumulation of sugars, better translocation of sugars into fruit tissues and conversion of organic acids into sugars. Neutralization of organic acids due to high potassium level in tissue could have also resulted in a reduction in acidity (Tisdale and Nelson, 1966) [17]. The maximum total soluble solids (10.09 ° Brix) were found in fruits harvested from the plants sprayed with potassium in the form of potassium sulphate @ 3.0% (T_6) followed by T_5 (9.78 °Brix) plants sprayed with potassium in the form of potassium sulphate @ 2.0%. Potassium has a prominent role in translocation of photo-assimilates, sugars and other soluble solids which lead to an increase in total soluble solids. The present results regarding to total soluble solids are in accordance with the earlier findings of Mandal *et al*. (2012) [8] and Jitendra *et al*. (2015) [4] in guava.

The highest per cent of reducing sugars (4.63%) were noticed in T_6 (plants sprayed with potassium in the form of potassium sulphate @ 3.0%) followed by T_5 (4.59%) plants sprayed with potassium in the form of potassium sulphate @ 2.0%. An increase in reducing sugars percentage in guava pulp with the application of nutrients through foliar sprays might be involved in the enhancement of photophosphorylation and dark reaction of photosynthesis by potassium which resulted in accumulation of more carbohydrates in the fruits and helps in better accessibility of nutrients to the developing fruits. Similar observations have been reported by Singh *et al*. (2002) [15] in peach, Bhat *et al*. (2012) [2] and Prasad *et al*. (2015) [13] in pear and Manivannan *et al*. (2015) [9] in guava. The highest per cent of non reducing sugars (2.72%) was noticed in T_6 (plants sprayed with potassium in the form of potassium sulphate @ 3.0%) followed by T_5 (2.69%) plants sprayed with potassium in the form of potassium sulphate @ 2.0%. non-reducing sugars in the pulp of guava fruits with the application of nutrients might be due to activation of enzymes involved in hydrolysis of polysaccharides into simpler form i.e., mono and disaccharides and better transportation of assimilates and nutrients to the fruits i.e., from leaves to their place of utilization, which increase the availability of nutrients and eventually resulted in better quality of fruits. The present results are in corroboration with the earlier findings of Kumar *et al*. (1990) in grape cv. Delight, Kaur and Dhillon (2006) in guava.

Significantly the highest per cent of total sugars (7.35%) were found in T_6 (plants sprayed with potassium in the form of potassium sulphate @ 3.0%) followed by T_5 (7.28%) plants sprayed with potassium in the form of potassium sulphate @ 2.0%. The possible reason for increase in per cent total sugars in guava pulp by pre harvest sprays of potassium might be due to the conversion of starch and acid into sugars in addition to the continuous mobilization of sugars from leaves to fruits. The results are in confirmation with the findings Manivannan *et al*. (2015) [9] and Jitendra *et al*. (2015) [4] in guava. Significantly the highest pectin content (0.86%) was found in T_6 (plants sprayed with potassium in the form of potassium sulphate @ 3.0%) which was on par with T_5 (0.83%) plants sprayed with potassium in the form of potassium sulphate @ 2.0%. Potassium increased the pectin content of the fruits as it facilitates the process of translocation of photosynthates from leaves to young fruits, which are partly used in the synthesis of pectic substances (Whiting, 1970). Significantly the highest ascorbic acid content (235.38 mg / 100 g) was found in T_6 (plants sprayed with potassium in the form of potassium sulphate @ 3.0%) which was on par with T_5 (233.77 mg / 100 g) plants sprayed with potassium in the form of potassium sulphate @ 2.0%. The increase in ascorbic acid content in the pulp of guava fruits with foliar sprays of different nutrients might be attributed to the higher synthesis of some metabolites and some intermediate substances which promotes the synthesis of precursors of ascorbic acid. The results are in line with the earlier findings of Bhatia *et al.* (2001) [3], Kaur and Dhillon (2006), Agarwal (2012) [1] and Manivannan *et al*. (2015) [9] in guava fruits.

Table 1: Effect of urea, potassium sulphate and zinc sulphate on quality of guava cv. Taiwan Pink

Treatments	Fruit firmness (kg/cm^2)	Acidity (%)	TSS (°Brix)	Reducing sugar (%)	Non reducing sugar (%)	Total sugar (%)	Pectin content (%)	Ascorbic acid content (mg/ 100g)
T_1 : Plants sprayed with Urea @ 2.0%	5.83	0.52	9.06	4.31	2.14	6.46	0.69	213.20
T_2 : Plants sprayed with Urea @ 3.0%	5.65	0.55	8.86	4.29	2.07	6.36	0.66	212.50
T_3 : Plants sprayed with Urea @ 4.0%	5.40	0.58	8.82	4.24	1.83	6.07	0.65	209.12
T_4 : Plants sprayed with Potassium sulphate @ 1.0%	6.93	0.41	9.64	4.52	2.66	7.18	0.79	228.34
T_5 : Plants sprayed with Potassium sulphate @ 2.0%	7.17	0.36	9.78	4.59	2.69	7.28	0.83	233.77
T_6 : Plants sprayed with Potassium sulphate @ 3.0%	7.33	0.35	10.09	4.63	2.72	7.35	0.86	235.38
T_7 : Plants sprayed with Zinc sulphate @ 0.2%	6.23	0.47	9.07	4.32	2.19	6.52	0.71	221.33
T_8 : Plants sprayed with Zinc sulphate @ 0.4%	6.40	0.46	9.23	4.35	2.52	6.87	0.72	224.42
T_9 : Plants sprayed with Zinc sulphate @ 0.6%	6.68	0.45	9.50	4.37	2.54	6.90	0.75	227.58
T_{10} : Plants sprayed with water (control)	5.18	0.60	8.39	4.05	1.72	5.77	0.64	211.18
S.E m ±	0.09	0.006	0.12	0.08	0.02	0.08	0.01	0.70
CD (P= 0.05)	0.26	0.017	0.37	0.25	0.06	0.25	0.04	2.11

Conclusion

On the basis of results obtained in the present study of foliar application of urea, potassium sulphate and zinc sulphate on guava cv. Taiwan Pink, it can be concluded that the foliar application of potassium sulphate @ 3% was found to be promising for improving quality of guava cv. Taiwan Pink.

References

1. Agarwal V. Effect of pre harvest sprays and post harvest dip of different chemicals on shelf life of guava. International Journal of Agriculture Sciences. 2012; 8(1):247-249.
2. Bhat MY, Hafiza A, Banday FA, Dar MA, Wani AI, Hassan GI. Effect of harvest dates, pre harvest calcium sprays and storage period on physico-chemical characteristics of pear cv. Bartlett. Journal of Agricultural Research and Development. 2012; 2(4):101-108.
3. Bhatia SK, Yadav S, Ahlawat VP, Dahiya SS. Effect of foliar application of nutrients on the yield and fruit quality of winter season guava cv. L-49. Haryana journal of Horticultural Science. 2001; 30(1-2):6-7.
4. Jitendra K, Rajesh K, Ratna Rai, Mishra DS. Response of Pant Prabhat Guava tree to foliar sprays of zinc, boron, calcium and potassium at different Plant growth stages. The Bioscan. 2015; 10(2):495-8.
5. John L Jifon, Gene E Lester. Effect of foliar potassium fertilization and source on cantaloupe yield and quality. Better Crops. 2011; 95(1):13-15.
6. Kumar R, Tiwari JP, Shantlal. Influence of zinc sulphate and boric acid spray on vegetative growth and yield of winter season guava (*Psidium guajava* L.) cv. Pant Prabhat. Pantnagar Journals of Research. 2010; 8(1):135-138.
7. Lester GE, Jifon JL, Makus DJ. Supplemental foliar potassium applications with and without surfactant can enhance netted muskmelon quality. Hort Science. 2006; 41(3):741-744.
8. Mandal G, Dhaliwal HS, Mahajan BVC. Effect of pre-harvest application of NAA and potassium nitrate on storage quality of winter guava (*Psidium guajava* L.). Indian Journal of Agricultural Science. 2012; 82(11):985-89.
9. Manivannan MI, Irulandi S, Shoba K. Studies on the effect of pre- harvest application of plant growth regulators and chemicals on yield and quality of guava. International Journal of Agricultural Sciences. 2015; 11(1):138-40.
10. Marschner H. Mineral Nutrition in Higher Plants. Academic Press, New York. 1995, 299-312.
11. NHB. Indian Horticulture Data Base, 2014-15. National Horticultural Board, Department of Agriculture and Co-operation, Government of India, New Delhi. 2015, 79.
12. Panse VG, Sukhatme PV. Statistical method of Agricultural workers, ICAR Publication. New Delhi. 1967, 381.
13. Prasad B, Dimri DC, Bora L. Effect of pre harvest foliar spray of calcium and potassium on fruit quality of pear. cv. Pathernakh. *Scientific Research and Essays*. 2015; 10(11):376-80.
14. Purseglove JW. *Tropical Crops Dicotyledons*. Longman, London, 1974, 208-210.
15. Singh C, Sharma VP, Usha K, sagar VR. Effect of macro and micro nutrients on physico-chemical characters of grapes cv. Perlette. Indian Journal of Horticulture. 2002; 59(3):258-60.
16. Singh NP, Rajput CBS. Chemical composition of guava fruits as influenced by nitrogen application. Progressive Horticulture. 1977; 9(2):67-70.
17. Tisdale SL, Nelson WL. Soil fertility and fertilizers. Macmillan Company. London, 1966, 81.
18. Whiting GC. Sugars In: The Biochemistry of fruits and their products, Hulme AC, (ed). Academic press, London, 1970; 1:22-63.