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Studies on the effect of foliar spray of micronutrients and plant growth regulators on chemical parameters of guava (*Psidium guajava* L.) cv. Allahabad Safeda

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Abstract
A field experiment was conducted during 2017 at Horticulture Research Farm-1, BBAU, Lucknow on 11- year- old guava plants, Studies on the effect of foliar spray of micronutrients and plant growth regulators on chemical parameters of guava (*Psidium guajava* L.) cv. Allahabad Safeda", revealed that T.S.S (^{0}B), reducing sugar, non-reducing sugar, total sugars, ascorbic acid and acidity were maximized when foliar spray was done with GA_3 100 ppm, NAA 100 ppm, $CaCl_2$ (2%) and $ZnSo_4$ (1%).

Keywords: Guava, GA_3, NAA, $CaCl_2$, $ZnSo_4$, and chemical parameters

Introduction
Guava (*Psidium guajava* L.) is the apple of the tropics, is one of the most popular fruits grown in tropical, sub-tropical and some parts of arid regions of India. Guava belongs to the family Myrtaceae. It has been in cultivation in India since 17th century and has originated in tropical America perhaps from Mexico to Peru and introduced in India by Portuguese. It can withstand drought up to some extent but only few degree of frost. The importance of guava is due to the fact that it is a hardy fruit and which can be grown in poor alkaline soil or poorly drained soils and pH 8.5, it can with stand to the maximum temperature at 46^0c and annual rainfall of less than 25 mm. Guava fruits are also used for preparation of jam, jelly, RTS, nectar etc. The guava bears flowers and fruits on current season growing twinges and highly cross-pollinated crop and pollination occurs through honey bees and andirona insect, fruit of guava developed from inferior ovary on exhibited double sigmoid growth curve, fruit with many seed berry, the fruit take nearly 4-5 month from dark green to yellowish green. The common guava is a diploid 2n=22, but natural and artificial triploid (2n=33) and aneuploid exist triploid generally produce seedless fruit. In northern India guava plant bears flower twice or sometimes thrice in a year. The spring flowering is called "Ambe Bahar" June or monsoon flowering is called "Mrig Bahar" and third flowering which comes in October is called "Hast Bahar" Ambe Bahar fruit ripen from July to September and Mrig Bahar fruit ripen in from November to February, however, Hast Bahar fruit ripen in spring season, which also known as summer season crop**.**

Materials and methods
11- year- old uniform guava plants of Allahabad Safeda cultivar planted at 6x6 m a part growing in Horticulture Research Farm-1of Babasaheb Bhimrao Ambedkar University Lucknow- 226025 were taken for the investigation. T_1 GA_3 100 ppm, T_2 NAA 100 ppm, T_3 $CaCl_2$ 2% T_4 $ZnSO_4$ 1%, T_5 GA_3 100 ppm + $CaCl_2$ 2%, T_6 GA_3 100 ppm + $ZnSO_4$ 1%, T_7 NAA 100 ppm + $CaCl_2$ 2%, T_8 NAA 100 ppm + $ZnSO_4$ 1% along with T_0 Water spray. First spraying of micro nutrients and plant growth regulators were done before flowering (first week of August) and second after fruit set (second week of September) during 2017. The experiment was laid out in R.B.D. with three replications. Observations recorded to be T.S.S (^{0}B), Reducing sugar, Non-reducing sugar, Total sugar, Ascorbic acid and Acidity. The data so obtained were analysed statically.

Results and discussion
A perusal of data presented in Table 1 shows that significant response in the maximum TSS content was observed due to treatment T_5 GA_3 100 ppm + $CaCl_2$ 2% (13.60^0Brix) followed by

T_6 GA_3 100 ppm + $ZnSO_4$ 1% (11.18). While minimum TSS content was recorded in control (water spray) T_0 (7.32). The TSS contents of guava fruits varied from 7.32 to 13.60 in control.

The maximum reducing sugar content (3.63%) was obtained with foliar application of T_5 GA_3 100 ppm + $CaCl_2$ 2% followed by (3.42 %) T_6 GA_3 100 ppm + $ZnSO_4$ 1% (T_5). The minimum value (2.87 %) was found in control (T_0). The reducing sugar contents of guava fruits varied from 2.87 to 3.63 in control.

The highest non-reducing sugar content (3.61%) was measured with the foliar application of T_5 GA_3 100 ppm + $CaCl_2$ 2%, followed by (3.33%) T_6 GA_3 100 ppm + $ZnSO_4$ 1%. The minimum value (2.89%) was found in control (T_0). The results, further, advocated that higher concentration of all treatments proved effective as compared to the lower concentrations.

The maximum total sugars content of fruit (7.24%) was recorded with foliar application of T_5 GA_3 100 ppm + $CaCl_2$ 2%, followed by (6.75%) T_6 GA_3 100 ppm + $ZnSO_4$ 1%. The minimum value (5.76%) was found in control (T_0).

The highest ascorbic acid (174.37mg/100g fruit pulp) was recorded with higher concentration of T_5 GA_3 100 ppm + $CaCl_2$ 2%, followed by (173.06mg/100g fruit pulp) T_6 GA_3 100 ppm + $ZnSO_4$ 1%. The lowest (153.22mg/100g fruit pulp) under control (T_0).

The minimum acidity was recorded with the application of T_5 GA_3 100 ppm + $CaCl_2$ 2% (0.50) followed by (0.52%) T_6 GA_3 100 ppm + $ZnSO_4$ 1%. However, produced significantly less acidic fruits when compared with rest of the treatments. The fruits under control gave significantly maximum control (water spray) T_0.

Table 1: Effect of foliar spray of micronutrients and plant growth regulators on chemical parameters of guava (*Psidium guajava* L.*)* cv. Allahabad Safeda"

Treatments	T.S.S (^{0}B)	Reducing sugar (%)	Non-reducing sugar (%)	Total sugars (%)	Ascorbic acid (%)	Acidity (%)
T_0 Water spray	7.32	2.87	2.89	5.76	153.22	0.68
T_1 GA_3 100 ppm	8.48	3.25	3.07	6.32	159.09	0.63
T_2 NAA 100 ppm	9.92	3.36	2.93	6.28	163.38	0.58
T_3 $CaCl_2$ 2%	7.91	3.00	3.13	6.07	160.27	0.66
T_4 $ZnSO_4$ 1%	8.58	2.90	3.15	6.04	157.55	0.61
T_5 GA_3 100 ppm + $CaCl_2$ 2%	13.60	3.63	3.61	7.24	174.37	0.50
T_6 GA_3 100 ppm + $ZnSO_4$ 1%	11.18	3.42	3.33	6.75	173.06	0.52
T_7 NAA 100 ppm + $CaCl_2$ 2%	10.59	3.30	3.14	6.44	166.96	0.60
T_8 NAA 100 ppm + $ZnSO_4$ 1%	10.04	3.28	3.23	6.51	164.18	0.57
S.Em. ±	0.310	0.131	0.068	0.139	4.006	0.035
C.D. at 5%	0.936	0.395	0.205	0.420	12.115	0.105

Conclusion

The chemical parameters of fruit with respect T.S.S (^{0}B), Reducing sugar, non-reducing sugar, Total sugar, Ascorbic acid and Acidity were obtained maximum with the foliar spray T_5 GA_3 100 ppm + $CaCl_2$ 2% and followed by T_6 GA_3 100 ppm + $ZnSO_4$ 1%. Therefore, combined spray of T_5 GA_3 100 ppm + $CaCl_2$ 2% can be advocated to guava growers for serving higher yield and better of quality of fruits.

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