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Effect of new generation PGR's and micronutrients in organoleptic parameter of guava cv. G-27

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Abstract
"The research program entitled Effect of new generation PGR's and micronutrients in organoleptic parameter of guava cv. G-27 was carried out in 2021-22 and 2022-23 in Horticulture research farm, College of Agriculture, Gwalior. This program comprised of 20 treatment combination of different PGR's and micronutrients. This experiment conclude that Maximum value of all the organoleptic parameters was reported in combination P_{4M3} (Salicylic acid @ 600 ppm + Borax @ 0.4%) followed by P_{3M3} (Salicylic acid @ 500 ppm + Borax @ 0.4%)."

Keywords: Guava, New generation PGR's, Micronutrients, Organoleptic parameter

Introduction

Micronutrient insufficiency is a serious problem in soil and plants all over the world (Imtiaz *et al.*, 2010) [1] although proper distinction of micronutrients is compulsory for better growth, and improved physical and qualitative aspects of fruit crops (Ram *et al.*, 2000; Raja, 2009; Sourour, 2000; Shekhar *et al.*, 2010) [2, 3, 4, 5] whereas its deficiency leads to a reduction in the productivity (Zagade *et al.*, 2017) [6]. Aside from the basic plant nutrients, there are eight important nutrients that plants require in extremely small amounts. Boron not straight forward connected to photosynthesis compound execution, yet it is connected to the plants' carbohydrate chemistry and reproductive system. A suitable level of micronutrients is required for better plant growth, which results in a larger yield because of improved growth, better flowering, and fruit set (Ram *et al.*, 2000) [2].

The catalytic effect of micronutrients, especially at greater concentrations, may be responsible for the improvement in fruit quality. Foliar treatments with micronutrients boosted macronutrient uptake in tissues and organs quickly, which in turn improved fruit crop quality (Anees *et al.*, 2011) [7]. At present, micronutrients are slowly but surely in advance impetus among the fruit growers for the reason of their valuable nutritional holdup and at the same time make sure improved yield and profits. The increased demand for fruit will necessitate a full understanding of the link between micronutrients and crop growth. Foliar application of oligo-elements is one of the implements to sustain or augment the nutritional position of the fruit plants for the duration of the growing season. To increase the yield of high-quality fruits and vegetables, contemporary crop husbandry practices have included the use of plant growth regulators. Foliar use of plant growth regulators improves fruit crop output and quality because fruits are a high-value crop. It is possible to maintain a good fruit setting with the use of exogenous plant growth regulators Anti-fruit drops agents like auxin and gibberellins are commonly utilized. There are several ways in which plant growth regulator sprays can be used for fruit size improvement, including directly encouraging cell division, or indirectly by reducing fruit number via treatment with plant growth regulators to facilitate inhibiting flower and fruit abscission, thereby increasing the size of the fruit. Fruit set, fruit retention, and yield are examples of physical attributes, while total soluble solids is an example of chemical properties. It has been demonstrated that plant growth regulators including Naphthalene Acetic Acid (NAA), Gibberellic Acid (GA_3), 6-Benzylaminopurine (BAP), 6-Benzyladenine (BA), and 2- chloro-4-pyridyl-*N*-phenylurea (CPN) increase total sugars, acidity, reducing sugar, etc (CPPU). It was found that the foliar application of GA_3 considerably improved the retention of mango fruits as well as other fruit species such as citrus, apples, guavas, and pomegranates (Iqbal *et al.*, 2009) [8].

Method and Materials

6 year old fruits were taken of guava variety Gwalior-27 and total 60 plants were taken for 3 replication and 20 treatment. Pre-harvest spray of new generation pgr and micronutrients are done and mrig bahar guava was taken.

Leaf samples were collected from the middle of the current season's growth around the periphery of the tree. Samples were cleaned, dried, ground and stored according to the procedure laid down by Chapman (1964).

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The digestion of the leaf samples for various nutrient elements was done in di acid mixture (Nitric acid: Perchloric acid 4:1). For nitrogen estimation, a separate digestion was carried out using concentrated H_2SO_4 and digestion mixture as suggested by Jackson (1967). Total nitrogen was estimated by micro-kjeldahl's method (Jackson, 1973). Phosphorus was determined by Vanado-molybido phosphoric yellow colour method (Jackson, 1973) estimated under spectrophotometer; potassium was estimated under flame photometer and zinc, iron, manganese was determined on Atomic Absorption Spectrophotometer AAS4141. Macro and micro nutrients were expressed on dry weight basis as per cent and ppm, respectively.

S. No.	Notation	Treatment combination
1	P_{0M0}	Control
2	P_{0M1}	$CaCl_2$ (1.5%)
3	P_{0M2}	$ZnCl_2$ (0.4%)
4	P_{0M3}	Borax (0.4%)
5	P_{1M0}	Brassinosteroid (0.5 ppm)
6	P_{1M1}	Brassinosteroid (0.5 ppm)+$CaCl_2$ (1.5%)
7	P_{1M2}	Brassinosteroid (0.5 ppm)+$ZnCl_2$ (0.4%)
8	P_{1M3}	Brassinosteroid (0.5 ppm)+Borax (0.4%)
9	P_{2M0}	Brassinosteroid(1.0 ppm)
10	P_{2M1}	Brassinosteroid (1.0 ppm)+$CaCl_2$ (1.5%)
11	P_{2M2}	Brassinosteroid (1.0 ppm)+$ZnCl_2$ (0.4%)
12	P_{2M3}	Brassinosteroid (1.0 ppm)+Borax (0.4%)
13	P_{3M0}	Salicylic acid(500 ppm)
14	P_{3M1}	Salicylic acid(500 ppm) +$CaCl_2$(1.5%)
15	P_{3M2}	Salicylic acid (500 ppm)+ $ZnCl_2$(0.4%)
16	P_{3M3}	Salicylic acid(500 ppm)+Borax(0.4%)
17	P_{4M0}	Salicylic acid(600 ppm)
18	P_{4M1}	Salicylic acid(600 ppm) +$CaCl_2$(1.5%)
19	P_{4M2}	Salicylic acid (600 ppm) + $ZnCl_2$(0.4%)
20	P_{4M3}	Salicylic acid(600 ppm)+Borax(0.4%)

Result and Discussion

Appearance: Maximum value of score on appearance was reported in combination P_4M_1 (Salicylic acid @ 600 ppm + $CaCl_2$@1.5%)i.e.8.04,7.85 and 7.95 followed by P_3M_1 (Salicylic acid @ 500 ppm + $CaCl_2$ @ 1.5%) i.e. 7.84, 7.61 and 7.67 while minimum score on appearance was reported in P_0M_0 (control) i.e. 4.98, 4.32 and 4.65.

Table 1. Interaction effect of PGR and micronutrients on appearance

	Appearance				
	New generation PGR's				
	1st year				
Micronutrients	**P0**	**P1**	**P2**	**P3**	**P4**
M0	4.98	6.69	6.92	6.96	6.80
M1	7.40	7.23	7.39	7.84	8.04
M2	7.06	6.95	7.18	7.47	7.54
M3	6.93	6.72	7.00	7.14	7.14
			2nd year		
M0	4.32	7.35	6.83	6.97	7.11
M1	7.04	7.33	7.45	7.61	7.85
M2	6.85	7.15	7.29	7.44	7.62
M3	6.65	6.86	7.11	7.22	7.39
			Pooled data		
M0	4.65	7.02	6.88	6.97	7.46
M1	7.22	7.28	7.42	7.67	7.95
M2	6.96	7.05	7.24	7.45	7.58
M3	6.79	6.79	7.05	7.18	7.26
	1st year		2nd year		Pooled
S.E(M)±	0.304		0.346		0.279
CD (5%)	0.869		0.990		0.800

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Taste

Maximum value of score on taste was reported in combination P_4M_3 (Salicylic acid @ 600 ppm + Borax @ 0.4%) i.e. 8.86, 8.31 and 8.59 followed by P_4M_2 (Salicylic acid @ 600 ppm + $ZnCl_2$ @ 0.4%) i.e. 7.62, 7.55 and 7.59 while minimum score on taste was reported in P_0M_0 (control) i.e. 5.13, 4.55 and 4.84.

Table 2. Interaction effect of PGR and micronutrients on taste

	Taste				
	New generation PGR's				
	1st year				
Micronutrients	**P0**	**P1**	**P2**	**P3**	**P4**
M0	5.13	6.65	7.02	7.17	7.38
M1	6.38	6.89	7.19	7.39	7.56
M2	6.46	7.05	7.23	7.41	7.62
M3	6.54	7.13	7.30	7.51	8.86
			2nd year		
M0	4.55	6.84	7.01	7.14	7.34
M1	6.73	6.97	7.15	7.30	7.48
M2	6.76	7.02	7.19	7.36	7.55
M3	6.82	7.07	7.23	7.41	8.31
			Pooled data		
M0	4.84	6.74	7.02	7.16	7.36
M1	6.55	6.93	7.17	7.34	7.52
M2	6.61	7.03	7.21	7.39	7.59
M3	6.68	7.10	7.27	7.46	8.59
	1st year		2nd year		Pooled
S.E(M)±	0.217		0.188		0.167
CD (5%)	0.621		0.537		0.478

Colour

Maximum value of score on colour was reported in combination P_4M_1 (Salicylic acid @ 600 ppm + $CaCl_2$@ 1.5%) i.e. 8.64, 8.76 and 8.70 followed by P_4M_1(Salicylic acid @ 600 ppm + Borax @ 0.4%) i.e. 7.74, 7.72 and 7.73 while minimum score on colour was reported in P_0M_0 (control) i.e. 5.29, 5.47 and 5.38

Table 3. Intraction effect of PGR and micronutrients in colour of guava

	Color				
	New generation PGR's				
	1st year				
Micronutrients	**P0**	**P1**	**P2**	**P3**	**P4**
M0	5.29	6.74	6.93	7.06	7.31
M1	6.66	7.04	7.26	7.39	8.64
M2	6.56	6.95	7.15	7.29	7.54
M3	6.79	7.17	7.39	7.52	7.74
			2nd year		
M0	5.47	6.78	6.97	7.11	7.39
M1	6.62	7.02	7.25	7.39	8.76
M2	6.55	6.96	7.16	7.31	7.59
M3	6.75	7.15	7.39	7.51	7.72
			Pooled data		
M0	5.38	6.76	6.95	7.08	7.35
M1	6.64	7.03	7.25	7.39	8.70
M2	6.55	6.96	7.16	7.30	7.57
M3	6.77	7.16	7.39	7.52	7.73
	1st year		2nd year		Pooled
SE(M) ±	0.185		0.189		0.184
CD (5%)	0.530		0.542		0.526

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Aroma

Maximum value of score on aroma was reported in combination P_4M_3 (Salicylic acid @ 600 ppm + Borax @ 0.4%) i.e. 8.22, 8.62 and 8.42 followed by P_4M_2(Salicylic acid @ 600 ppm + $ZnCl_2$ @ 0.4%) i.e. 7.32, 6.72 and 7.02 while minimum score on aroma was reported in P_0M_0(control) i.e. 4.09, 4.42 and 4.26.

Table 4. Intraction effect of PGR and micronutrients in aroma of guava

	Aroma				
	NewgenerationPGR's				
	1st year				
Micronutrients	**P0**	**P1**	**P2**	**P3**	**P4**
M0	4.09	7.05	6.53	6.67	6.81
M1	6.35	6.56	6.81	6.92	7.09
M2	6.55	6.85	6.99	7.14	7.32
M3	6.74	7.03	7.15	7.31	8.22
	2nd year				
M0	4.42	6.45	5.93	6.07	6.21
M1	5.75	5.96	6.21	6.32	6.49
M2	5.95	6.25	6.39	6.54	6.72
M3	6.14	6.43	6.55	6.71	8.62
	Pooled data				
M0	4.26	6.75	6.23	6.37	6.65
M1	6.05	6.26	6.51	6.62	6.65
M2	6.25	6.55	6.69	6.84	7.02
M3	6.44	6.73	6.85	7.01	8.42
	1st year		**2nd year**		**Pooled**
SE(M) ±	0.339		0.340		0.385
CD (5%)	0.972		0.975		1.101

Overall acceptability

Maximum value of score on overall acceptability was reported in combination P_4M_3 (Salicylic acid @ 600 ppm + Borax @ 0.4%) i.e. 8.69, 8.13 and 8.41 followed by P_4M_2
(Salicylic acid @ 600 ppm + $ZnCl_2$ @ 0.4%) i.e. 7.62, 7.69 and 7.66 while minimum score on overall acceptability was reported in P_0M_0 (control) i.e. 6.01, 5.12 and 5.57.

Table 4. Interaction effect of PGR and micronutrients in overall acceptability of guava

(A) PGR's	**Overallacceptability**		
	1st year	**2nd year**	**Pooled**
P0	6.51	6.55	6.41
P1	6.95	6.98	6.97
P2	7.17	7.18	7.18
P3	7.34	7.33	7.34
P4	7.81	7.71	7.76
SE(m)±	0.086	0.079	0.072
CD (5%)	0.247	0.225	0.205
(B) Micronutrients			
M0	6.91	6.92	6.81
M1	7.10	7.11	7.11
M2	7.19	7.21	7.20
M3	7.43	7.36	7.39
SE(m)±	0.077	0.070	0.064
CD (5%)	0.221	0.201	0.183

Conclusion

The interaction effect of the two factors i.e. PGR's and micronutrients was found to give significant effect on all the organoleptic parameters which are appearance, taste, colour, aroma and overall acceptability. Maximum value of all the organoleptic parameters was reported in combination P_4M_3 (Salicylic acid @ 600 ppm + Borax @ 0.4%) followed by P_3M_3 (Salicylic acid @ 500 ppm + Borax @ 0.4%) while minimum scores was reported in P_0M_0 (control).

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