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Influence of Growth Regulators on Quality and Fruit Attributes of Custard Apple (*Annona squamosa* L.) Cv. Balanagar

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Abstract

The field study was conducted on a well-established custard apple orchard of eight years age at Custard Apple Research Station, Ambajogai, Dist. Beed, during 2016–17, to study the influence of growth regulators on quality and fruit attributes of custard apple (*Annona squamosa* L.) Cv. Balanagar. The experiment framed was concentrated to find out effective concentration of GA₃ and NAA as well as their combination for getting high quality of custard apple fruits. The maximum length of fruit, diameter of fruit, weight of pulp, weight of peel was recorded under the treatment T₇ (GA₃ 25+NAA 10 ppm). In present study, it had been observed that the foliar application of growth regulators was found beneficial for increasing quality of custard apple fruits. While, the combine spraying of GA₃ 25+NAA 10 ppm twice i.e. before flowering (second fortnight of may) and one month after the first spray is beneficial for getting higher quality of custard apple Cv. 'Balanagar' under Marathwada region of Maharashtra.

Keywords: Growth regulators, quality, fruit attributes, custard apple

1. Introduction

Custard apple (*Annona squamosa* L.) is the most ancient dry land fruit crop in India. It was originated from tropical region of America and widely distributed throughout the tropics and subtropics. In India, the area under custard apple cultivation is about 35000 ha with the production of 271000 MT. Out of these Maharashtra state contributes 8660 ha area with 59300 mt productions (Anonymous, 2016). The plant growth regulators are effective at very low concentration, hence they are cost effective. Presently growth regulators are given considerable importance for their value in regulating the various growth and development processes in plants. The plant growth regulator like GA₃ is also useful to increase the fruit setting per branch, number of fruits per tree, fruit weight and ultimately increase the fruit yield (Shinde et al., 2008). Application of NAA checks the fruit drop and thereby increased the fruit retention, fruit weight and TSS of the fruits (Singh and Chohan, 1984).

2. Materials and Methods

A field trial on custard apple Cv. Balanagar was conducted at Custard Apple Research Station, Ambajogai, Dist. Beed, during 2016-17. The 8 year old plants grown at 4x4 m² spacing were used for the experiment. The experiment was laid out in a Randomized Block Design with 10 treatments viz., T₁: GA₃

25 ppm, T₂: GA₃ 50 ppm, T₃: GA₃ 75 ppm, T₄: NAA 10 ppm, T₅: NAA 20 ppm, T₆: NAA 30 ppm, T₇: GA₃ 25 + NAA 10 ppm, T₈: GA₃ 50+NAA 20 ppm, T₉: GA₃ 75+NAA 30 ppm and T₁₀: control (water spray) with three replications. The statistical analysis of the data in respect of quality and fruit attributes was done according to the standard procedure given by Panse and Sukhatme (1985).

3. Results and Discussion

3.1. Influence on quality attributes

The different treatments of foliar application of growth regulators showed (Table 1) positive response on quality attributes of custard apple fruit. The maximum value of TSS (25.29%) was recorded in the treatment T₈ (GA₃ 50+NAA 20 ppm). These findings are also supported by result obtained by Ghosh et al. (2009) in pomegranate and Rawat et al. (2015) in aonla. The results revealed that significantly maximum reducing sugar (20.18%), non-reducing sugar (2.07%) and total sugars were recorded in the treatment T₉ (GA₃ 75+NAA 30 ppm). These results controversy reported by Srivastava et al. (2009) in aonla and Prajapatiet al. (2016) in custard apple. Acidity of fruit was not significantly influenced due to application of plant growth regulators. However, it was maximum (0.27%) in the treatment T₁₀ i.e. control (water spray). While, it was minimum (0.22 %) in the treatment T₇



Table 1: Influence on quality attributes

Treatments	TSS (%)	Acidity (%)	Reducing sugar (%)	Non-reducing sugar (%)	Total sugar (%)
T ₁	23.17	0.23	19.40	1.92	21.32
T ₂	23.50	0.29	17.80	1.76	19.56
T ₃	19.52	0.31	14.10	1.44	15.54
T ₄	18.00	0.29	13.87	1.39	15.26
T ₅	22.61	0.27	16.75	1.69	18.44
T ₆	21.80	0.23	16.14	1.63	17.77
T ₇	24.03	0.22	15.27	1.58	16.85
T ₈	25.29	0.25	15.20	1.61	16.81
T ₉	20.40	0.24	20.18	2.07	22.25
T ₁₀	17.68	0.27	12.60	1.37	13.97
SEm±	2.02	0.02	0.67	0.09	0.68
CD (p=0.05)	5.44	0.06	1.99	0.28	2.03

(GA₃ 25+NAA 10 ppm). The results are in agreement with the findings with Srivastava et al. (2009) in aonla, Memane and Pujari (2013) in custard apple and Osama et al. (2015) in mango.

3.2. Influence on fruit attributes

The data revealed from (Table 2) the significant variations in the physical attributes of custard apple fruits viz., fruit length, fruit diameter, weight of pulp, weight of peel, seed to pulp ratio, peel (%), number of seed, weight of seed and fruit volume were observed. The maximum fruit length (9.10 cm) and fruit diameter (8.65 cm) was noted under the treatment T₇ (GA₃ 25+NAA 10 ppm) as compared to control. The results are in close conformity with findings of Reddy and Prasad (2011) in pomegranate. The maximum weight of pulp (90.56 g) and weight of peel (110.20 g) were recorded under the treatment T₇ (GA₃ 25+NAA 10 ppm). Minimum values of most of these attributes were observed in control (T₁₀). These findings are also supported by the results obtained by Brahmachari and Kumar (1997) in Guava. Also Katiyar et al. (2010) in Ber. The seed to pulp ratio, per cent of peel, number of seeds, weight of seeds and fruit volume were found significant by the application of plant growth regulators. The results are

Table 2: Effect of plant growth regulators on economics of custard apple

Treatments	Fruit length (cm)	Fruit diameter (cm)	Wt. of pulp (g)	Wt. of peel (g)	Seed: pulp ratio	Percent of peel (%)	No. of seeds (No.)	Wt. of seeds (g)	Fruit volume (cc)
T ₁	5.44	4.60	71.92	90.16	0.37	47.69	42	26.96	155.08
T ₂	7.80	7.30	81.33	102.04	0.29	49.40	38	23.19	166.12
T ₃	6.90	6.10	73.18	93.26	0.35	48.42	41	26.16	157.90
T ₄	7.56	7.00	76.80	95.72	0.32	48.49	39	24.90	161.50
T ₅	8.80	8.04	85.21	107.31	0.24	50.23	34	21.12	174.92
T ₆	8.94	8.46	87.12	108.60	0.23	50.25	33	20.36	177.70
T ₇	9.10	8.65	90.56	110.20	0.21	50.00	31	19.64	180.87
T ₈	8.21	7.85	83.67	104.52	0.26	49.72	35	22.01	172.10
T ₉	7.18	6.70	75.00	95.08	0.33	48.73	41	25.02	160.00
T ₁₀	4.86	4.23	68.06	91.12	0.40	48.18	43	27.88	145.16
SEm±	0.41	0.50	3.11	3.21	0.03	2.16	2.54	1.56	5.33
CD (p=0.05)	1.23	1.50	9.26	9.53	0.11	6.42	7.56	4.66	15.86

in agreement with the findings with Garasiya et al. (2013) in guava and Prajapati et al. (2016) in custard apple.

4. Conclusion

In the light of the results obtained from this investigation, it can be inferred that spraying of GA₃ 25+NAA 10 ppm twice i.e. before flowering (second fortnight of may) and one month after the first spray is beneficial for getting higher physical fruit attributes of custard apple and maximum quality recorded in high concentration of GA₃ and NAA under Marathwada region

of Maharashtra. As the results of the present investigation are based on one season data, further detailed experimentations are necessary to confirm findings.

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