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GB Gaikawad
PG Student, Department of Horticulture, College of Agriculture, Badnapur, Jalna, Maharashtra, India

RV Nainwad
Research Station, Department of Fruit, Aurangabad, VNMKV Parbhani, Maharashtra, India

AM Hinge
PG Student, Department of Horticulture, College of Agriculture, Latur, Maharashtra, India.

AV Khote
PG Student, Department of Horticulture, College of Agriculture, Latur, Maharashtra, India

LA Girase
PG Student, Department of Horticulture, College of Agriculture, Badnapur, Jalna, Maharashtra, India

NB Wadhekar
PG Student, Department of Horticulture, College of Agriculture, Badnapur, Jalna, Maharashtra, India

Corresponding Author:
GB Gaikawad
PG Student, Department of Horticulture, College of Agriculture, Badnapur, Jalna, Maharashtra, India

Effect of plant growth regulators and chemicals on quality of mango (*Mangifera indica* L.) var. Kesar

GB Gaikawad, RV Nainwad, AM Hinge, AV Khote, LA Girase and NB Wadhekar

Abstract

The present investigation was carried out at Fruit Research station Aurangabad, during *Ambebahar* of the year 2020-21.The experiment was laid out in Randomized Block Design (RBD) with nine treatments replicated thrice. Two foliar spray of plant growth regulators and micronutrients at pea and marble stage of fruit development. The result of the investigation revealed that, different treatment showed positive response on chemical quality attributes of mango. The maximum value of chemical quality parameters like total soluble solids (18.7%), total sugar (15.20%), reducing sugar (4.57%), non-reducing sugar (10.63%), TSS: acid ratio (74.8) were reported in treatment T_1 *i.e.* (GA_3 35 ppm). The minimum titratable acidity was observed under treatment T_1 and T_5*i.e.* (0.25%). The maximum ascorbic acid content reported in treatment T_8 (NAA 25 ppm + Borax 0.2%) *i.e.* (46.38 mg/100 g). The minimum physiological loss in weight of fruit was reported in treatment T_4 (triacontanol 750 mg/l) *i.e.* (6.41%) which was superior over treatment T_9 (9.16%).

Keywords: Plant growth regulators, triacontanol, ascorbic acid, Kesar

Introduction

Mango (*Mangifera indica* L.) is one of the favourite table fruit of tropical and subtropical regions of the world. It belongs to the family *mangiferae* and thought to be originated in Asia. India is the largest producer of mango globally with the production of 21822.3 thousand MT from an area of 2258.1 thousand ha having productivity of 9.7 MT/ha and Maharashtra state production of 791.36 thousand MT from an area of 166.76 thousand ha, having productivity of 4.75 MT/ha, (Anonymous 2018) [1]. Total area of mango under cultivation was 2212.24 thousand ha and total mango production in India was 19506.20 thousand MT in the year 2016-17. Total export of mango from India in 2017-18 was 49.18 thousand MT and it gives about 38234.02 lakh rupees.

Although, India is global leader in area and production under mango but still having low productivity and export than some of the countries of the world. Therefore, to promote mango quality production and export a multi-pronged strategy involving high-tech horticultural practices *i.e.* ultra high density plantation, storage and value addition are very crucial. Hence, in recent years increasing productivity coupled with quality is becoming very essential to get more returns from unit area. The farmers are become aware about the value of quality production, as quality fruits fetches higher price in the market. To achieve higher yield and quality of mango so many factors are responsible *viz.* TSS, Acidity, Sugars, Ascorbic acid, pulp percentage, Shelf life etc. All these attributes in response to so many pre harvest practices, the application of plant growth regulator play important role, but the exact information about the specific plant growth regulator and its concentration is lacking. In view of the above specific problems, it was felt necessary to assess the effect of pre harvest application of plant growth regulators and chemicals on quality of mango (*Mangifera indica* L.) var. Kesar.

Materials and Method

The present investigation was carried out at Fruit research station, Aurangabad during *Ambebahar* of the year 2020-21. The experiment was laid out in Randomized block design (RBD) with nine treatments replicated thrice. The five plant growth regulators with different combination of micronutrients included as treatments *viz.* GA_3 35 ppm (T_1), CPPU 5 ppm (T_2), CPPU 10 ppm (T_3), Tricontanol 750 mg/L (T_4), NAA 50 ppm (T_5), NAA 25 ppm + $ZnSO_4$ 0.5% (T_6), NAA 25 ppm + $FeSO_4$ 0.5% (T_7), NAA 25 ppm + Borax 0.2% (T_8) and Control (T_9).

Two foliar spray of all the treatments at were applied pea and marble stage of fruit development andThe direct and indirect effects both at genotypic and phenotypic levels were estimated by taking seed yield as Observation were recorded at full ripe stage of fruits.

Result and Discussion

The result of investigation revealed that there was variation in quality contributing parameters due to application different plant growth regulators and micronutrients. Maximum value of chemical quality parameters like total soluble solids (18.7%), total sugar (15.20%), reducing sugar (4.57%), non-reducing sugar (10.63%), TSS: Acid ratio (74.8) were reported in treatment T_1 *i.e.* (GA_3 35 ppm). The minimum titratable acidity was observed under treatment T_1, T_5*i.e.* (0.25%). The maximum ascorbic acid content reported in treatment T_8 (NAA 25 ppm + Borax 0.2%) *i.e.* (46.38 mg/100g). The minimum physiological loss in weight of fruit was reported in treatment T_4 (triacontanol 750 mg/l) *i.e.* (6.41%) which was superior over treatment T_9 (9.16%).

The promotive effect of gibberlins to increase the TSS might be due to the influence of gibberlins in activation of the amylase enzyme which is responsible for the conversion of starch into sugars have influenced the physiological process, particularly respiration and photosynthesis, which ultimately leads to accumulation of more dry matter, minerals and carbohydrates in the fruit and this may be due to increase in activity of amylase. The beneficial effects of plant growth regulators in improving TSS content in pomegranate was also observed by Lal and Ahmed (2012) [5], Reddy (2010) [7] and Pawar *et al.* (2005) [6]. GA_3 play the role in respiration and photosynthesis which accumulate carbohydrates, minerals and dry matter leads to increase the total sugar in fruits and increase in sugar conversion of reserved starch and other polysaccharide into soluble form of sugar. Similar results were also noted by Katiyar *et al.* (2010) [4] and Pawar *et al.* (2005) [6]. The maximum total soluble solids reported under treatment T_1 (GA3 35 ppm) *i.e.* (18.7%). This might be due to, hydrolysis of polysaccharides, conversion of organic acid in soluble sugars and enhanced solubilisation of insoluble starch and pectin present in cell wall and middle lamella. Similar results were found by Bhalekar *et al.* (2016) [2] in Kesar mango, Sharma *et al.* (2008) [8] in Apple. Maximum ascorbic acid content observed under treatment T_8 (NAA 25 ppm + Borax 0.2%) *i.e.* (46.38), This might be due to catalytic influence of growth regulators on its bio-synthesis from its precursor glucose-6-phosphates throughout the development of fruit which is precursor of vitamin C. Similar trend were found by Chovatiya *et al.* (2015) [3] in mango, Sud and Thakur (1999) [10] in peach, Singh *et al.* (1996) [9] in litchi.

Table 1: Effect of plant growth regulators and chemicals on quality attributes of mango

Treatment no.	Treatment details	Total soluble solid (%)	Titratable acidity (%)	Total sugar (%)	Reducing sugar (%)	Non reducing sugar (%)	TSS: Acid ratio	Ascorbic acid (mg/100 g pulp)	PLW (%)
T_1	GA_3 35ppm	18.7	0.25	15.20	4.57	10.63	74.8	43.77	7.16
T_2	CPPU 5ppm	16.77	0.28	12.84	3.86	8.98	59.89	43.29	8.13
T_3	CPPU 10ppm	17.91	0.26	13.89	4.17	9.71	68.88	44.19	7.78
T_4	Triacontanol 750mg/L	18.08	0.27	14.4	4.33	10.07	66.96	45.74	6.41
T_5	NAA 50ppm	18.4	0.25	14.78	4.44	10.34	73.6	45.68	6.74
T_6	NAA 25ppm + $ZnSO_4$ 0.5%	17.66	0.27	12.97	3.99	8.98	65.41	46.14	7.96
T_7	NAA 25ppm + $FeSO_4$ 0.5%	17.55	0.28	13.15	4.05	9.10	62.68	44.26	8.29
T_8	NAA 25ppm + Borax 0.2%	17.37	0.27	13.35	4.17	9.18	64.33	46.38	7.59
T_9	Control (No treatment)	16.3	0.29	12.48	3.84	8.64	56.21	42.24	9.16
SE ±		0.08	0.004	0.061	0.05	0.10	0.77	0.34	0.30
CD at 5%		0.23	0.012	0.19	0.16	0.29	2.34	1.02	0.90

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