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Effect of pre harvest application of plant growth regulators on yield of pomegranate (*Punica granatum* L.) CV. Bhagawa

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Abstract

The present investigation was carried out at Department of Horticulture, VNMKV, Parbhani during *Mrig bahar* of the year 2017-18 and 2018-19. The experiment was laid out in Randomized Block Design (RBD) with thirteen treatments replicated thrice. Three foliar sprays of all the treatments given at 45, 90 and 135 days after flowering and observations were recorded. The results of the investigation revealed that, amongst the different treatments GA₃ 100 ppm recorded maximum length of fruit (8.94 cm), diameter of fruit (8.06 cm), and volume of fruit (253.74 ml), number of fruits per plant (78.83), average weight of fruit (298.52 g), yield per plant (23.05 kg), yield per hectare (17.06 Mt/ ha), weight of arils per fruit (232.86 g), weight of 100 arils (50.75 g) while treatment control recorded minimum values for all above parameters. The treatment Spermidine 15.0 mM/Lit exhibited significantly maximum rind thickness (3.30 mm) and rind weight (66.08 g) over rest of the treatments while minimum rind thickness (2.41 mm) and rind weight (48.53 g) was observed in treatment control and treatment 6BA respectively.

Keywords: Plant growth regulators, yield parameters, pomegranate

Introduction

Pomegranate (*Punica granatum* L.) is one of the favourite table fruit of tropical and subtropical regions of the world. It belongs to the family punicaceae and thought to be originated in Iran. India ranks first in the world with respect to pomegranate area and production. The area under pomegranate cultivation in India is 1.97 lakh ha with annual production of 23.06 lakh tonnes in the year 2015-16.

Although, India is global leader in area and production under pomegranate but still lower having low productivity and export than some of the countries of the world. Therefore, to promote pomegranate quality production and export a multi-pronged strategy involving high-tech horticultural practices, 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 of pomegranate so many factors are responsible *viz.* size of fruit, number of fruits per plant, yield per plant and yield per hectare 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 on yield of pomegranate (*Punica granatum* L.) CV Bhagawa.

Material and methods

The present investigation was carried out at Department of Horticulture, VNMKV, Parbhani during *Mrig bahar* of the year 2017-18 and 2018-19. The experiment was laid out in Randomized Block Design (RBD) with thirteen treatments replicated thrice. The five plant growth regulators with different concentrations included as treatments *viz.* GA₃ 75 ppm (T₁), GA₃ 100 ppm (T₂), CPPU 10 ppm (T₃), CPPU 15 ppm (T₄), 6BA 05 ppm (T₅), 6BA 10 ppm (T₆), Putrescine 5.0 mM/Lit (T₇), Putrescine 10.0 mM/Lit (T₈), Putrescine 15.0 mM/Lit (T₉), Spermidine 5.0 mM/Lit (T₁₀), Spermidine 10.0 mM/Lit (T₁₁), Spermidine 15.0 mM/Lit (T₁₃) and control (T₀). Three foliar sprays of all the treatments given at 45, 90 and 135 days after flowering and observations were recorded.

Results and Discussion

The results of the investigation revealed that, there were significant variations in yield contributing parameters due to application different plant growth regulators. The application of GA₃ 100 ppm recorded maximum length of fruit (8.94 cm), diameter of fruit (8.06 cm), and volume of fruit (253.74 ml), number of fruits per plant (78.83), average weight of fruit (298.52 g), yield per plant (23.05 kg), yield per hectare (17.06 Mt/ ha), weight of arils per fruit (232.86 g), weight of 100 arils (50.75 g) followed by treatment GA₃ 75 ppm while treatment control recorded minimum values for all above parameters.

Increase in length and diameter of fruit might be due to influence of GA₃ which increased the cell wall plasticity thus creating water diffusion pressure deficit, which might resulted in increased water uptake, thereby causing cell elongation. The increase in volume of fruits could be due to nature of gibberlic acid which is to promote the growth by increasing plasticity of the cell wall followed by the hydrolysis of starch into sugars which reduces the cell water potential, resulting in the entry of water into the cell and causing the elongation. The result of present study are in line with those of Hoda and Hoda (2013) [1], Lal and Ahmed (2012) [3], Reddy (2010) [6]

and Pawar (2005) [5] in pomegranate which confirms present investigation.

The beneficial effects of GA₃ in increasing weight of fruit, number of fruits per plant ultimately yield Mt per ha seems to be through enhanced rapid mobilization of food reserves from the plant during the vegetative growth by gibberellic acid. This might also be due to more accumulation of food material and increase in size of fruit, as fruit weight positively correlated with fruit size. The present results obtained through spraying of GA₃ are in accordance with Reddy (2010) [6], Lal and Ahmed (2012) [3], Mohamad (2003) [4] and Pawar (2005) [5] in pomegranate.

The treatment Spermidine 15.0 mM/Lit (3.30 mm) exhibited significantly maximum rind thickness (3.30 mm) and rind weight (66.08 g) followed by treatment Spermidine 10.0 mM/Lit while minimum rind thickness (2.41 mm) and rind weight (48.53 g) was observed in treatment control and treatment 6BA respectively. Increased rind thickness might be due to influence of exogenous application of polyamines applied at various fruit development stages regulates the endogenous levels of free polyamines and total polyamines. These findings are in line with Hussain and Singh (2015) [2] in sweet orange. The increase in the weight of rind might have occurred due to increased rind thickness and fruit size.

Table 1: Effect of pre harvest application of plant growth regulators on yield attributes of pomegranate.

Treatment No.	Treatment details	Length of fruit (cm)	Diameter of fruit (cm)	Volume of fruit (ml)	Number of fruits per plant	Average weight of fruit (g)	Yield per plant (Kg)	Yield per hectare (Mt/ ha)	Rind thickness (mm)	Rind weight (g)	Weight of aril (g)	weight of 100 aril (g)
Pooled means												
T ₁	GA ₃ 75 ppm	8.77	7.57	247.41	76.50	291.07	21.80	16.13	2.91	58.22	229.86	46.57
T ₂	GA ₃ 100 ppm	8.94	8.06	253.74	78.83	298.52	23.05	17.06	2.95	60.10	232.86	50.75
T ₃	CPPU 10 ppm	7.84	6.48	220.47	71.17	259.37	18.70	13.84	2.85	57.06	202.31	38.91
T ₄	CPPU 15 ppm	8.17	6.49	229.68	68.00	270.22	19.03	14.08	2.83	56.75	213.47	40.53
T ₅	6BA 05 ppm	7.46	6.07	206.26	68.17	242.65	16.46	12.18	2.43	48.53	194.12	36.40
T ₆	6BA 10 ppm	7.70	6.23	211.93	65.67	249.33	17.43	12.90	2.49	49.50	199.46	37.40
T ₇	Putrescine 5.0 mM/Lit	7.31	5.89	200.15	68.00	235.48	15.57	11.52	3.06	61.02	174.25	35.32
T ₈	Putrescine 10.0 mM/Lit	7.89	5.91	200.94	66.67	236.40	16.25	12.02	2.99	59.10	177.30	35.46
T ₉	Putrescine 15.0 mM/Lit	7.32	5.87	199.70	66.67	234.95	16.24	12.02	2.82	56.39	178.56	37.59
T ₁₀	Spermidine 5.0 mM/Lit	7.50	5.66	192.42	68.67	226.38	15.72	11.63	2.60	52.07	174.31	33.20
T ₁₁	Spermidine 10.0 mM/Lit	7.84	5.90	200.73	65.17	236.16	15.58	11.53	3.07	61.40	174.75	35.42
T ₁₂	Spermidine 15.0 mM/Lit	7.61	5.66	200.61	66.33	236.01	15.87	11.74	3.30	66.08	169.93	35.40
T ₀	Control	6.71	4.98	176.35	64.83	207.47	13.61	10.07	2.41	60.16	147.30	31.69
SE ±		0.03	0.03	1.16	1.14	1.37	0.23	0.17	0.02	0.32	1.06	0.21
CD at 5%		0.09	0.09	3.22	3.17	3.79	0.65	0.48	0.06	0.98	2.94	0.57

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