

## Effects of plant growth regulators on induction of flowering in pomegranate (*Punica granatum L.*) cv. Bhagwa



### Horticulture

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### ABSTRACT

An investigation was carried out during 2014-15 to study the beneficial effects of plant growth regulators on induction of flowering in pomegranate cv. Bhagwa. Nine treatments with three growth regulators, viz., Ethrel at 150, 200 and 250 ppm, GA<sub>3</sub> at 30, 40 and 50 ppm, NAA at 50, 100 ppm and control (water spray) were sprayed at the time of initiation of new sprouts. Results revealed that application of ethrel at 250 ppm gave significantly maximum number of hermaphrodite flowers (25.22), minimum days taken for 50 (12.67) and 100 per cent (30.44) flowering and NAA at 100 ppm resulted in maximum length and diameter of the flowers as against control.

### Introduction

Pomegranate (*Punica granatum L.*) belongs to the family Punicaceae and it is one of the favourite table fruits in the world, due to its refreshing juice with nutritional and medicinal properties. This fruit crop has wide adaptability and it grows in tropical, sub-tropical and even temperate regions. In India, pomegranate is commercially cultivated in Maharashtra and parts of Karnataka where good quality fruits are produced due to dry and hot climate. Recently, the area under pomegranate in Karnataka is increasing in a large extent due to its drought hardy nature, wider adaptability and suitability to marginal lands. 'Bhagwa' has gained popularity by virtue of its larger fruit, pink and sweet aril and soft seeded characters. Due to non adoption of improved cultivation practices and several other horticultural practices, the flowering is generally poor. Among different elite horticultural practices, growth regulators have been advantageously used in the recent time to increase the flowering, to increase size of the flowers and to minimize the dropping of hermaphrodite flowers. Hence, an attempt has been made to evaluate suitable growth regulators and their doses for improving the hermaphrodite flowers and to increase the size of the flowers in pomegranate cv. Bhagwa.

### Materials and Methods

The experiment was conducted at farmers field Hosayalanadu, Hiriyur, Chitradurga district during 2014-15 on Bhagwa planted at a spacing of 12ft × 10ft. The experiment was laid out in a Randomized Complete Block Design with different concentrations of three growth regulators with a control (water spray) comprising of 9 treatments with three replications. The growth regulators were sprayed during the initiation of new sprouts. Three plants were sprayed in each treatment. Total number of flowers were counted after full bloom, duration of flowering was recorded at 50 and 100 per cent flowering and observations on flower dropping was taken at four days interval upto 32 days after flower induction. The data were statistically analysed and interpreted.

### Results and discussion

#### Duration of flowering

Results revealed that treatments with different plant growth regulators significantly influenced the number of days taken for 50 per cent and 100 per cent flowering (Table 1). Application of ethrel 250 ppm resulted in minimum days taken for 50 (12.67) and 100 per cent flowering (30.44) which was *on par* with ethrel 200 ppm. This can be attributed to the environmental effects like temperature, photoperiod and flower inducing substances in the plants, also more mitotic activity leading to early formation of floral organs. These results are in conformity with reports of Gawankar *et al.* (2010) in cashew where they had used 100 ppm ethrel.

#### Production of flowers

The present investigation showed that, the number of male flowers produced was highest in control as compared to different growth regulators. Application of ethrel 250 ppm resulted in increase of hermaphrodite flowers as well as intermediate flowers where as maximum total number (154.56) of flowers was observed in control. This might be due to greater accumulation of dry matter which is certainly suggestive to better photosynthetic activity, other metabolic activities and uptake of nutrients from soil. The role of GA<sub>3</sub> and NAA (Patil *et al.*, 1983) in cucumber also has been reported. In the current study however, the effect of GA<sub>3</sub> and NAA are not prominently observed in production of more number of flowers in pomegranate.

#### Size of the flowers

Different growth regulators treatments resulted in an increase in the size of the flowers. The highest length and diameter of male, intermediate and hermaphrodite flowers was observed in the treatment NAA 100 ppm which was *on par* with NAA 50 ppm. The significant increase in size of flowers might be due to drawing of photosynthates to the flower as a consequence of intensification of the sink (Table 2).

**Table 1. Effects of plant growth regulators on induction of flowering in pomegranate cv. Bhagwa.**

Treatments	Duration of flowering (%)		Production of flowers (Number)			
	50	100	Male	Intermediate	Hermaphrodite	Total
T <sub>1</sub> - Control (Water spray)	16.44	32.96	95.55	11.00	48.00	154.56
T <sub>2</sub> - Ethrel 150 ppm	13.44	30.75	62.22	20.44	57.66	140.32
T <sub>3</sub> - Ethrel 200 ppm	13.33	30.51	56.22	22.66	64.33	143.22
T <sub>4</sub> - Ethrel 250 ppm	12.67	30.44	53.66	25.22	68.33	147.22

T <sub>5</sub> - GA <sub>3</sub> 30 ppm	13.89	31.22	75.66	12.44	48.66	136.77
T <sub>6</sub> - GA <sub>3</sub> 40 ppm	15.22	31.48	69.33	12.66	50.44	132.44
T <sub>7</sub> - GA <sub>3</sub> 50 ppm	15.33	31.52	68.00	15.66	52.11	135.78
T <sub>8</sub> - NAA 50 ppm	15.89	31.88	67.11	17.33	52.55	137.00
T <sub>9</sub> - NAA 100 ppm	16.00	32.15	65.00	19.11	54.11	138.23
S.Em±	0.85	1.95	3.46	1.60	1.88	2.92
C.D @ 5%	2.54	NS	10.36	4.68	5.65	8.76

### Flowers dropped

Different growth regulator treatments resulted in reducing the dropping of flowers in pomegranate. Observations were made at different intervals from four days of flower induction upto 32 days. The results were found to be significant for the dropping of flowers on all the days of observations (Table 3).

It is very clear from the table 3 that number of male flowers dropped was highest (77.00) in the ethrel 250 ppm treatment which was followed by ethrel 200 ppm (75.55). The least number of flowers dropped in the treatment control (71.00).

Similarly, the data obtained on dropping of intermediate flowers resulted highest (48.66) in control followed by GA<sub>3</sub> 30 ppm (46.22), 40 ppm (45.22) and 50 ppm (43.22). The least number of flowers dropped was with treatment ethrel 250 ppm (27.44).

It is observed from the table 3 that number of hermaphrodite flowers dropped was lowest (42.33) in the ethrel 250 ppm treatment which was *on par* with 200 ppm (42.77) and 150 ppm (46.33). The highest number of hermaphrodite flowers dropped was in the treatment control (59.11).

**Table 2. Effects of plant growth regulators on size of the flowers in pomegranate cv. Bhagwa**

Treatments	Length (cm)			Diameter(cm)		
	Male	Intermediate	Hermaphrodite	Male	Intermediate	Hermaphrodite
T <sub>1</sub> - Control (Water spray)	4.28	4.28	5.29	1.31	1.34	1.53
T <sub>2</sub> - Ethrel 150 ppm	4.38	4.37	5.47	1.40	1.39	1.55
T <sub>3</sub> - Ethrel 200 ppm	4.35	4.34	5.32	1.41	1.35	1.53
T <sub>4</sub> - Ethrel 250 ppm	4.40	4.34	5.41	1.43	1.37	1.55
T <sub>5</sub> - GA <sub>3</sub> 30 ppm	4.35	4.46	5.43	1.34	1.40	1.54
T <sub>6</sub> - GA <sub>3</sub> 40 ppm	4.42	4.47	5.35	1.42	1.38	1.56
T <sub>7</sub> - GA <sub>3</sub> 50 ppm	4.45	4.48	5.49	1.43	1.42	1.62
T <sub>8</sub> - NAA 50 ppm	4.47	4.49	5.50	1.44	1.42	1.64
T <sub>9</sub> - NAA 100 ppm	4.55	4.58	5.58	1.47	1.45	1.66
S.Em±	0.05	0.04	0.06	0.02	0.02	0.02
C.D @ 5%	0.14	0.11	0.16	0.05	0.05	0.07

The reduced flower drop in case of intermediate and hermaphrodite flowers might be due to delay in abscission through preservation of loss of pectin material in middle lamella (Kachave and Bhosale, 2007) and increase in hermaphrodite flowers was reported by Choudhari and Desai (1993) in pomegranate.

**Table 3. Effects of plant growth regulators on dropping of flowers from the day of flower induction in pomegranate cv. Bhagwa**

Treatments	Flowers dropped (Number)		
	Male	Intermediate	Hermaphrodite
T <sub>1</sub> - Control (Water spray)	71.00	48.66	59.11
T <sub>2</sub> - Ethrel 150 ppm	74.66	35.22	46.33

T <sub>3</sub> - Ethrel 200 ppm	75.55	32.99	42.77
T <sub>4</sub> - Ethrel 250 ppm	77.00	27.44	42.33
T <sub>5</sub> - GA <sub>3</sub> 30 ppm	72.00	46.22	52.22
T <sub>6</sub> - GA <sub>3</sub> 40 ppm	73.00	45.22	51.44
T <sub>7</sub> - GA <sub>3</sub> 50 ppm	73.33	43.22	49.44
T <sub>8</sub> - NAA 50 ppm	73.44	39.11	48.66
T <sub>9</sub> - NAA 100 ppm	74.44	37.55	47.66
S.Em±	0.42	0.67	0.49
C.D @ 5%	1.26	2.02	1.47

**Conclusion:**

Based on the investigations, it may be concluded that application of ethrel 250 ppm was found to be better for increasing the hermaphrodite flowers and also reducing the days taken for flowering in pomegranate var. Bhagwa. The results also revealed that the application of NAA 40 ppm had significantly increased fruit desirable characters ultimately resulted in higher fruit yield and improved the quality characters.

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