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EFFECT OF GROWTH REGULATORS ON FLOWERING AND YIELD ATTRIBUTING CHARACTERS OF MANGO CV. AMRAPALI

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ABSTRACT

This experiment was carried out with objective to study the effect of foliar application of growth regulators on flowering and yield attributing characters of mango cv. Amrapali. Application of NAA 20 ppm resulted earliness in panicle emergence, increased duration of panicle emergence, earlier higher percentage of flowering shoots and high sex ratio, where as length, breadth, weight and size of fruits were enhanced by the application of GA @ 100 ppm.

Key words : *Growth regulators, flowering and yield attributing characters, mango.*

In India mango **(***Mangifera indica* Linn.) is still regarded as the king of fruits. It is the fruits of tropics and sub tropics. Due to its attractive colour, marvellous flavour and peculiar taste occupied premier position in our country and also in the international market. Amrapali is gaining immense popularity and area under the cultivation is increasing due to its desirable attributes like dwarf stature, regular and prolific bearing, good fruit quality and its suitability for high density orcharding and also for kitchen garden. Now days, exogenous foliar application of growth hormones plays a major role in enhancing flowering, growth and development of fruits and finely increasing the yield of fruits.Very little work in this regards have been done under agro-climatic condition of Jharkhand. Therefore, present experiment was carried out to study the effect of foliar application of different growth regulators on flowering and yield attributing characters of mango cv. Amrapali.

MATERIALS AND METHODS

The experiment was conducted at the plot no. 09 of the department of horticulture, Ranchi Agriculture College under Birsa Agricultural University, Kanke, Ranchi (Jharkhand) during 2003 and 2004 on Amrapali mango. The trees were healthy and of uniform growth and vigour. Experiment was conducted under RBD design with eighteen treatments replicated thrice. A single tree comprised a treatment. There were four concentration of both NAA and 2,4-D i.e. 10,20,30 and 40 ppm, four concentration of 2,4,5-T i.e. 20,40,60 and 80 ppm and four concentration of GA_3 i.e. 50,100,150 and 200 ppm with two control, first was water spray and second was absolute control i.e. without any spray. The spraying was done during the early morning hours, when dew drops had evaporated and there was no blowing of the wind. For every application, the fresh solutions were prepared just before the spraying at the experimental site. There were two spraying first was done before start of flowering i.e. on 15th November and second just after fruit set i.e. on 15th April. All the treatments were applied in the same manner during both the year.

RESULTS AND DISCUSSION

The data presented in table-1 showed that early initiation of panicle, flowering and longer duration of panicle emergence were found better with NAA 20 ppm. This might be due to hormonal effect of this chemical. Physiological events are governed by different bio-regulators and the nutrients status. Application of 2,4-D might have brought floral promotion through the promotion of bud growth, as it is well known that endogenous auxin levels are raised by 2,4-D application and high level of internal auxins stimulated early flowering (Leopold, 1958). Auxin, having their ability to terminate dormancy, initiated panicle emergence earlier. The effect of flowering is not direct but is mediated through the formation of ethylene. This results is in conformity with Chen and Ku (1988) in Litchi.

Increase in the percentage of flowering shoots with NAA might be due to high level of internal auxin which is responsible for radial growth of stem, by promoting cell division, cell elongation and cell differentiation (Snow, 1935).

The sex ratio was least in the panicles treated with NAA 20 ppm. The effect of NAA in minimizing sex ratio was due to production of ethylene which in turn helped

Table-1 : Effect of growth regulators on flowering in mango cv. Amrapali.

Treatments		Date of panicle emergence		Duration of panicle emergence		Date of flowering		Percentage of flowering shoots		Sex ratio	
		1st year	2nd year	1st year	2nd year	1st year	2nd year	1st year	2nd year	1st year	2nd year
T_1	NAA 10 ppm	14.01.03	13.01.04	30	31	14.02.03	13.02.04	83.10	86.70	3.27	2.91
T_2	NAA 20 ppm	10.01.03	11.01.04	35	36	08.02.03	10.02.04	85.60	87.30	2.60	2.30
T_3	NAA 30 ppm	11.01.03	12.01.04	32	34	11.02.03	11.02.04	84.50	80.10	3.43	3.13
T_4	NAA 40 ppm	15.01.03	16.01.04	31	32	13.02.03	14.02.04	72.10	71.10	3.76	3.28
T_5	2,4-D 10 ppm	14.01.03	13.01.04	30	31	14.02.03	15.02.04	79.30	82.90	3.83	3.52
T_6	2,4-D 20 ppm	10.01.03	12.01.04	34	34	11.02.03	12.02.04	84.70	86.00	2.86	2.50
T_7	2,4-D 30 ppm	15.01.03	16.01.04	29	30	15.02.03	14.02.04	80.10	85.40	4.07	3.63
T_8	2,4-D 40 ppm	15.01.03	14.01.04	29	28	17.02.03	16.02.04	76.30	80.30	4.32	3.79
T_9	2,4,5-T 20 ppm	16.01.03	15.01.04	28	29	20.02.03	20.02.04	78.00	78.10	4.14	4.10
T_{10}	2,4,5-T 40 ppm	17.01.03	19.01.04	27	28	20.02.03	20.02.04	77.20	76.80	4.41	3.91
T_{11}	2,4,5-T 60 ppm	19.01.03	18.01.04	27	29	21.02.03	22.02.04	76.10	76.20	4.81	4.55
T_{12}	2,4,5-T 80 ppm	19.01.03	17.01.04	27	28	21.02.03	21.02.04	74.60	75.10	4.99	4.67
T_{13}	GA_3 50 ppm	15.01.03	16.01.04	28	30	19.02.03	18.02.04	80.20	81.60	4.76	4.45
T_{14}	GA_3 100 ppm	15.01.03	16.01.04	29	30	17.02.03	18.02.04	81.30	83.20	4.83	5.78
T_{15}	GA_3 150 ppm	16.01.03	15.01.04	28	27	20.02.03	21.02.04	79.10	79.40	5.40	5.90
T_{16}	GA_3 200 ppm	18.01.03	17.01.04	28	27	20.02.03	20.02.04	78.50	79.00	5.66	5.98
T_{17}	Water spray	22.01.03	20.01.04	25	24	18.02.03	20.02.04	71.50	73.30	5.27	5.54
T_{18}	Control (No spray)	24.01.03	23.01.04	25	27	20.02.03	19.02.04	70.40	70.70	5.36	5.73
CD at 5%		-	-	3.7094	4.9503	-	-	5.67	6.90	0.09	0.22

Table-2 : Effect of growth regulators on yield attributing characters of mango Cv. Amrapali.

Treatments		Length of fruits (cm)		Breadth of fruits (cm)		Weight of fruits (g)		Yield (kg/plant)	
		1st year	2nd year	1st year	2nd year	1st year	2nd year	1st year	2nd year
T_1	NAA 10 ppm	9.70	9.96	5.98	6.10	213.68	222.82	8.53	9.04
T_2	NAA 20 ppm	9.87	9.99	6.02	6.22	215.72	226.52	9.26	9.62
T_3	NAA 30 ppm	9.71	9.89	5.92	6.18	206.50	221.90	7.00	7.42
T_4	NAA 40 ppm	9.47	9.59	5.80	5.94	211.41	215.25	7.42	7.76
T_5	2,4-D 10 ppm	9.62	9.80	5.65	6.25	209.84	216.42	6.93	7.35
T_6	2,4-D 20 ppm	9.70	9.92	5.94	6.53	214.33	221.17	8.75	9.09
T_7	2,4-D 30 ppm	9.42	9.58	5.80	6.04	210.30	214.58	6.90	7.30
T_8	2,4-D 40 ppm	9.35	9.53	5.89	6.01	193.60	212.25	6.40	7.16
T_9	2,4,5-T 20 ppm	9.27	9.01	5.76	5.82	181.00	200.20	6.55	6.67
T_{10}	2,4,5-T 40 ppm	8.98	8.56	5.63	5.77	180.55	198.25	5.94	6.56
T_{11}	2,4,5-T 60 ppm	8.72	8.60	5.60	5.70	183.66	192.16	5.61	6.39
T_{12}	2,4,5-T 80 ppm	8.69	8.57	5.49	5.67	181.50	191.86	5.60	6.16
T_{13}	GA3 50 ppm	9.00	9.28	5.74	6.10	190.43	204.53	7.62	8.34
T_{14}	GA3 100 ppm	10.19	10.05	6.15	6.62	223.88	235.46	9.35	9.71
T_{15}	GA3 150 ppm	9.88	10.04	6.04	6.26	220.45	233.25	8.10	8.40
T_{16}	GA3 200 ppm	9.81	9.91	5.78	5.90	215.60	221.26	7.46	7.94
T_{17}	Water spray	8.32	8.56	5.30	5.48	178.40	185.64	5.29	5.56
T_{18}	Control (No spray)	8.12	8.38	5.18	5.42	177.25	183.11	5.10	5.18
CD at 5%		1.11	1.06	0.45	0.51	17.84	22.11	0.85	0.95

in the production of more hermaphrodite flowers involving in DNA synthesis resulting in to a narrower sex ratio (Das and Das, 1995). This is in accordance with the findings of Shannon and Gurdia (1969).

Perusal of data presented in table-2 reveal that the application of various growth substance increased the length and diameter of fruits. The length and diameter of fruits were maximum in GA_3 100 ppm. Sprays of 2,4-D 20 ppm and NAA 20 ppm were also responsive in enhancing the size of fruits, Auxin and Gibberellins have been found highly potent in increasing size of fruits in many species (Maurya *et al.,* 1973 and Brahmachari *et al.,* 1996).

Improvement in fruit size following application of chemicals was probably due to faster rate of fruit growth owing to rapid cell division and cell enlargement which is regulated either by gibberellins or auxins or both. The exogenous application of gibberellins and auxin might have increased the endogenous level of growth promoting substances, which in turn stimulated cell division and elongation consequently rate of growth and development of fruit was enhanced resulting in larger size of fruits. The present result is in corroboration with the observations made by Suryanarayana and Das (1971) and Singh et al. (1976) who reported increase in size of mango fruits with NAA. Similar views were expressed by Sharma *et al.* (1990) in Langra mango and Ahmad (1999) in amrapali mango with NAA, whereas Daulta *et al.* (1986)in mandarin with 2,4-D spray.

Foliar application of various chemicals resulted in enhancement in weight and volume of fruits as compared to unsprayed fruits. Heaviest fruit was achieved with the foliar application of GA_3 100 ppm. Spray of NAA 20 ppm and 2,4-D 20 ppm were also very promising in this regard. The probable reason behind the increase in fruit weight might be the rapid cell division and cell enlargement and accumulation of more sugar and water under the influence of exogenous application of growth promoting substances. Bollard (1970) and Singh (1980) were expressed the same views.

The maximum yield was obtained by spraying of GA_3 100 ppm. The result is in accordance with Rajput and Singh (1989) in mango, who also recorded high yield with GA application. Increase in yield is in conformity with those of Maurya and Singh (1979) in Langra mango. The chemical might have enhanced the fruit length, diameter, weight and volume and size of fruits thereby increased the yield of fruits.

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