

## **Effect of Growth Regulators and Their Concentration on Fruiting Yield, Size and Quality of Mango cv Langra**

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### **Abstract**

Experiment was conducted to study the effect of foliar spray of gibberellin (20, 30 and 40 ppm), 2, 4-D (10, 15 and 20 ppm) and NAA (5, 10 and 15 ppm) alone on mango Cv Langra tree. Spraying of chemicals were applied at fortnightly interval starting from 15 September to 15 April during the investigation. Among different chemicals, NAA 10 ppm was found significantly effective in enhancing the growth of new shoot (29.66 sq/ m), number of leaves (32.66) and flower (1,490) per shoot over control. Fruit set was responded to maximum in tree sprayed with NAA 10 ppm followed by NAA 15 ppm and 2, 4-D at 15 ppm. The fruit size (106.33 × 77 mm), fruit weight (201.66 g), pulp content (77.15%) and yield (20.98 kg and 102.33) were significantly higher with NAA (10 ppm) applied in comparison to other treatments. The TSS/acid ratio was significantly higher with NAA (10 ppm) applied while the highest ascorbic acid content in fruit (31.65 mg) was recorded in NAA (15 ppm) followed by 2,4-D (15 ppm).

**Key words :** Gibberelline, NAA , 2, 4-D, Foliar spray, Mango.

Mango is the most popular, important and choicest fruit of India and occupies a pre-eminent place amongst fruit crops grown. But in spite of its popularity, the production capacity of mango has not been attained to the fullest extent due to various problems which adversely affect the economic potentialities of its production. The shedding of flowers and pre-mature fruit drop is regarded as one of the various problems confronting the fruit growers at present. Plant growth substances are known to control or stimulate the physiological process and also help in better expression of genetic ability under different environmental regimes by bringing about a change in nutritional and hormonal status of the plant. Although a lot of work has been done to elucidate the significance to plant growth regulator to improve the quality and quantity of produce in many fruit crops (1 — 4), yet a universally accepted solution is still lacking. These studies were therefore aimed to provide an easily practicable solution of these problems.

### **Methods**

These studies were conducted in the Horticulture Indian Under Birsa Agricultural University, Kanke, Ranchi situated at location of 265 meters above man sea level. Uniform healthy and disease free

mango trees of 15—20 years age were selected for recording observations. Following treatments of plant growth regulators were applied at fortnight starting from 15 September to 15 April during the investigation : GA2 : 20, 30 and 40ppm; 2, 4-D : 10, 15 and 20 ppm; NAA : 5, 10 and 15 ppm; and Control : No Spary.

The chemicals were applied by water solution spray method. For making solutions of these chemicals distilled water, absolute alcohol and diethanalamine were used as solvents. A few drops of tween-20 were also added into the spray solution to ensure its uniform dispersion and absorption. The experimental solutions were sprayed to a run off condition. Ten shoots on either side of the tree were randomly selected to record data on growth, flowering and fruit characters. Standard methods were used for computing data on different parameters. The experiment was laid out in randomized block design. There were ten treatments along with control and each treatment was replicated thrice. A tree was taken as a unit of a treatment in a replication.

### **Results and Discussion**

The mean data on growth, flowering, fruiting, yield and chemical composition as influenced by spray of various plant growth regulators at different

**Table 1.** Effect of different concentration of growth regulator on growth, flowering and yield of Langra mango.

Treatments (ppm)	Number of new shoot/ Sqm	Number of leaves/ shoot	Number of flowers/ shoot	Fruit set (%)	Yield of fruit/plant (kg)	Yield of fruit/plant (number)
Gibberellin 20	19.66	19.00	1431.33	0.33	13.58	77.33
Gibberellin 30	18.66	15.33	1431.00	0.36	13.07	75.33
Gibberellin 40	23.33	24.66	1440.40	0.38	17.85	91.33
2, 4-D 10	20.00	22.00	1430.00	0.39	14.21	82.00
2, 4-D 15	24.66	24.66	1465.00	0.43	17.99	92.00
2, 4-D 20	19.33	22.66	1432.00	0.40	13.40	83.66
NAA 5	20.00	23.66	1435.00	0.50	12.52	83.33
NAA 10	29.66	32.66	1490.00	0.60	20.98	102.33
NAA 15	26.33	29.33	1481.66	0.53	19.08	96.66
Control	16.66	14.33	1426.00	0.30	10.20	68.66
CD at 5%	3.26	8.71	12.10	0.062	3.07	5.43

concentration on mango cv Langra are presented in Tables 1 and 2.

#### *Growth and Flowering*

It is revealed from the mean data that growth number of new shoot/sq m and number of leaves/shoot and flowering (number of flowers/shoot) Characters were significantly influenced by the use of various plant growth regulators at different concentration (Table 1). The application of NAA 10 ppm attained the maximum number of shoot per sqm (29.66) which was significantly superior to any other treatment and produced significantly more number of leaves per shoot (32.66) which was at par with NAA 15 ppm, similarly, maximum number of flowers/shoot (1,490.00) was in the favor of treatment NAA 10 ppm

also. However, minimum number of new shoot/sq m number of leaves and flower per shoot were recorded under control. Among 2, 4-D and gibberellin treatments, 2, 4-D at 15ppm induced highest number of new shoot/sq m number of leaves and flower per shoot just followed by gibberellin 40ppm. Similar effect of increase in number of new shoot and leaves per shoot as result of NAA application was also reported earlier (5,6) and it might be because NAA enhanced the growth of new shoot by cell enlargement and cell elongation mechanism (7).

#### *Physical Characters*

The data presented revealed that NAA 10 ppm produced that biggest in size (106.83 × 71.00 mm), heaviest fruits (201.66 g) and highest pulp (77.15%)

**Table 2.** Effect of different concentration of growth regulator on fruit and fruit quality of Langra Mango.

Treatments (ppm)	Size of fruits		Weight of fruits (g)	Pulp (%)	TSS/Acid ratio	Vit C mg/ 100 g of fruits
	Length (cm)	Width (cm)				
Gibberellin 20	98.33	63.66	174.66	68.69	32.10	31.26
Gibberellin 30	95.33	62.00	172.33	69.12	31.03	31.36
Gibberellin 40	103.66	64.66	193.33	72.34	36.54	31.61
2, 4-D 10	102.66	61.33	173.33	69.18	32.11	31.32
2, 4-D 15	104.66	67.66	195.33	74.71	39.32	31.63
2, 4-D 20	101.66	66.66	160.33	66.29	30.36	31.45
NAA 5	100.66	65.63	150.33	66.23	31.43	31.23
NAA 10	106.33	71.00	201.66	77.15	48.13	31.50
NAA 15	105.66	69.33	198.33	75.59	42.35	31.65
Control	91.33	61.00	140.66	59.34	27.12	30.00
CD at 5%	1.95	NS	10.57	3.34	4.03	0.83

content whereas minimum size ( $91.33 \times 61.00$  mm) and pulp content (59.34%) were found in control (Table 2). The next effective treatments in increasing these attributes were 15 ppm of NAA and 40 ppm of gibberellin spray. The magnitude of increase in fruit weight and pulp content by spray of NAA at 10 ppm were nearly 30.15 and 17.81% respectively than the control. The reasons for the increase in size may be due to increased nutrition and consequently rapid cell division and enlargement caused by the presence of growth substances. This finding are in accordance of findings reported earlier (8). Moreover, reason for the increase in weight may be due to increase in cells of tissue of fruit. It may also probably due to more accumulation of sugar and high pulp percentage in sprayed fruits. The increase in weight on account of various growth regulator treatments were recorded earlier also (9, 10).

#### *Fruiting and Yield Characters*

It is evident from the mean data that the application of growth regulator had significantly increased the fruit set. The maximum fruit set (0.60%) was recorded at 10 ppm NAA treatment as compared to minimum at control i.e. fruit set 0.30%. Among the various plant growth regulator treatments attempted, the highest yield (20.98 kg fruits and 102.33 fruit per plant) was recorded at 10 ppm NAA which was followed by 15 ppm NAA treatment and both of them were found significantly at par. However, the lowest fruit yield of mango fruit (10.20 kg fruit and 68.66 fruit per plant) was obtained at control. Other most effective treatments were 2, 4-D at 15 ppm and gibberellin at 40 ppm both of them were statistically at par.

The possible cause of increased fruit set might be inhibition of abscission by plant growth regulator and improvement in plant vigour. The results are in agreement with the earlier findings (11, 12).

Results on increased yield due to application of NAA was reported earlier (13—15). The increase in yield by the application of growth regulator particularly with NAA may be attributed to the reason that partitioning by plant growth regulator more forwards the fruit development which may lead to improvement of yield contributing characters like size and weight of fruit which ultimately increased yield.

#### *Chemical Composition*

The data indicated that foliar spray of growth regulator significantly improved the chemical composition of mango (Table 2). It was more pronounced by the use of NAA at 10 ppm which was closely followed by NAA at 15 ppm. The estimated values for TSS/acid ratio and vitamin C were 48.13 and 31.50 mg/100g pulp respectively. Among various concentrations of hormone, NAA 10 ppm increased the vitamin C by 8.23% over control. The improved quality of fruit through different plant growth regulators might be attributed to cell expansion accompanied by considerable increase in carbohydrate content. The increase in TSS/acid ratio may be due to high conversion of starch to sugar. These findings were also accordance to results reported earlier (16,17).

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