

# EFFECT OF NUTRIENTS AND THIOUREA ON GROWTH, FLOWERING, FRUIT SET AND YIELD OF MANGO CV. KESAR

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## ABSTRACT

The effect of foliar application of nutrients and Thiourea on flowering and fruiting of mango cv. Kesar was studied. Nine treatments, involving; Control, 2.0 % 00:52:34 + 0.5 % Thiourea, 2.0 % 10:52:17 + 0.5 % Thiourea, 0.5 % KNO<sub>3</sub> + 0.5 % Thiourea, 1.0 % KNO<sub>3</sub> + 0.5 % Thiourea, 2.0 % 00:52:34 + 1.0 % Thiourea, 2.0 % 10:52:17 + 1.0 % Thiourea, 0.5 % KNO<sub>3</sub> + 1.0 % Thiourea and 1.0 % KNO<sub>3</sub> + 1.0 % Thiourea were tried. The spray of nutrients was done in 15<sup>th</sup> October and Thiourea in 15<sup>th</sup> November respectively. Results revealed that foliar application of 1.0 % KNO<sub>3</sub> in mid October followed by 1.0 % Thiourea in mid November was found best for controlling the growth of vegetative shoot (0.70) and improving flowering shoots (0.85) as well as length of flowering shoots (48.67 cm). It also increased the number of fruit set at pea (14.56 %), marble (3.15 %), maturity stage (0.87 %), numbers of fruit per tree (281.30) and yield (77.02 kg/tree). Hence foliar application of 1% KNO<sub>3</sub> on 15<sup>th</sup> October followed by 1 % Thiourea on 15<sup>th</sup> November resulted in minimum vegetative growth, induced early flowering with higher yield.

## INTRODUCTION

Mango (*Mangifera indica* L.) is an important fruit crop of India, being the 'King of Fruits'. Mangoes are considered alternate bearers, management of off season flowering in mango tree is being accomplished in the tropics by successfully synchronizing shoot initiation through tip pruning and use of nitrate sprays coupled with management of the stem age to induce flowering such a way it can be accomplished during any desired week of the year (Davenport, 2007). Chemicals induced vegetative growth in many fruit crops (Gurung *et al.*, 2014). It has been demonstrated that foliar spray of aqueous solutions of potassium nitrate (Sergent *et al.*, 2000) and Thiourea (Tongumpai *et al.*, 1997) can induce flowering in certain varieties of mango. Mango flowering was determined by the condition of the terminal bud or the environmental conditions at the time of application and also genotypic differences among trees exist with regard to flowering responses to potassium nitrate (Nagao and Nishina, 1993). Covering to past researches, nutrients especially potassium nitrate and Thiourea can promote or induce flowering must be tested under South Gujarat conditions for commercial cultivar Kesar. Hence, present study was undertaken to understand the flowering and fruiting behaviours of Kesar mango in response to foliar application of nutrients and Thiourea.

## MATERIALS AND METHODS

The present investigation was carried out at College Farm, N.

M. College of Agriculture, Navsari Agricultural University, Navsari during the year 2013-14 which is situated on the coast of Arabian Sea at 20°57' North latitude and 72°54' East longitude and has an altitude of about 10 meter above the mean sea level which is in agro-ecological situation-III under heavy rainfall zone. 19 years old grafted trees of mango cv. Kesar at spacing 5 × 5 m with uniform size were selected for the experiment. The experiment was laid out in Randomised Block Design with nine treatments viz., T<sub>0</sub> (Control), T<sub>1</sub> (2.0 % 00:52:34 + 0.5 % Thiourea), T<sub>2</sub> (2.0 % 10:52:17 + 0.5 % Thiourea), T<sub>3</sub> (0.5 % KNO<sub>3</sub> + 0.5 % Thiourea), T<sub>4</sub> (1.0 % KNO<sub>3</sub> + 0.5 % Thiourea), T<sub>5</sub> (2.0 % 00:52:34 + 1.0 % Thiourea), T<sub>6</sub> (2.0 % 10:52:17 + 1.0 % Thiourea), T<sub>7</sub> (0.5 % KNO<sub>3</sub> + 1.0 % Thiourea) and T<sub>8</sub> (1.0 % KNO<sub>3</sub> + 1.0 % Thiourea). All the treatments were replicated thrice and a single tree served as a unit. The spray of nutrients and Thiourea was done on 15<sup>th</sup> October and 15<sup>th</sup> November, respectively in year 2013. The data on parameters like number of vegetative and flowering shoots, fruit set percentage at pea, marble and maturity stage and fruit retention percentage. Total 20 terminal shoots were tagged (5 terminal/direction) for recording number of new emerged vegetative and reproductive shoots. Counting was done at end of January after flowering and average value was worked out. Five terminals per each direction were randomly tagged and counted the fruit set at sorghum stage per emerged panicle which was taken as 100 per cent and then the fruits were counted at pea, marble and maturity stage and their average values were worked out for recording fruit set per panicle and converted into fruit set percentage.

**Table 1: Effect of nutrients and Thiourea on vegetative growth, flowering, fruit set and yield of mango cv. Kesar**

Treatments	No. of shoots/terminal Vegetative	Flowering panicle	Vegetative shoots (%)	Flowering shoots (%)	Panicle length (cm)	Pea stage	Fruit set (%) Marble stage	Maturity stage	Fruit retention (%)	No. of fruits/tree	Average fruits/tree	Yield (kg/tree)
T <sub>0</sub>	1.27	0.43	33.33	60.00	25.42	7.01	2.48	0.09	3.94	141.81	230.46	32.43
T <sub>1</sub>	1.03	0.55	23.33	68.33	25.84	8.62	2.55	0.32	12.42	214.35	242.93	51.93
T <sub>2</sub>	0.98	0.57	15.00	75.00	32.03	10.19	2.74	0.48	17.48	229.97	249.15	57.00
T <sub>3</sub>	0.90	0.61	13.33	78.33	37.04	12.60	2.99	0.61	20.53	239.90	257.93	61.50
T <sub>4</sub>	0.80	0.65	11.67	78.33	39.34	12.36	3.32	0.72	21.67	246.23	266.32	65.31
T <sub>5</sub>	1.00	0.56	21.67	70.00	29.29	8.52	2.60	0.31	11.94	215.99	244.89	52.94
T <sub>6</sub>	0.96	0.58	13.33	76.67	36.52	11.11	2.88	0.48	16.52	235.55	254.01	60.00
T <sub>7</sub>	0.73	0.83	8.33	86.67	44.82	14.28	3.43	0.86	25.16	278.36	268.90	74.56
T <sub>8</sub>	0.70	0.85	6.67	93.33	48.67	14.56	3.51	0.87	25.20	281.30	273.48	77.02
S.Em ±	0.06	0.05	1.69	4.12	2.75	1.00	0.17	0.04	1.33	16.53	13.24	4.27
C.D. at 5%	0.19	0.14	5.06	12.35	8.24	2.99	0.51	0.11	3.99	49.54	NS	12.79
CV %	12.1	12.59	17.96	9.35	13.44	15.68	9.92	11.88	13.4	12.37	9.02	12.49

$$\text{Fruit set (\% at pea/marble/maturity stage)} = \frac{\text{No. of fruits at sorghum stage}}{\text{No. of fruits at sorghum stage}} \times 100$$

The fruit retention per cent was calculated at harvesting stage by considering number of fruits at marble stage as 100%.

$$\text{Fruit retention (\% at harvesting)} = \frac{\text{No. of fruits at marble stage}}{\text{No. of fruits at marble stage}} \times 100$$

The recorded data on different parameters of the experiment were tabulated and were subjected to statistical analysis as per the method of Panse and Sukhatme (1967).

## RESULTS AND DISCUSSION

In present study, the lesser vegetative growth was noted in all the treatments having spray of nutrients during October and Thiourea during November as compared to control. The minimum number of vegetative shoots (0.70) and per cent vegetative shoots (6.67 %) was recorded in treatment T<sub>8</sub> which was statistically at par with treatment T<sub>7</sub> and treatment T<sub>4</sub> (Table 1). While the maximum number of vegetative shoots (1.27) and per cent vegetative shoots (33.33 %) were observed in treatment T<sub>0</sub> (Control). It could be attributed to the nitrogen effect on plants during rainy season and bud break of dormant terminals of mango was induced in between 0.5 and 1.5 % Thiourea (Tongumpai *et al.*, 1997). Whereas chemical sprays reduced percentage of vegetative shoots and increased percentage of flowering shoot in mango cv. Alphonso (Reddy and Kurian, 2012).

Similarly, the maximum number of panicles per terminal (0.85) and flowering shoots per cent (93.33 %) were noted in treatment T<sub>8</sub> and which was statistically at par with T<sub>7</sub>. The control treatment had recorded less number of panicles per terminal (0.43) and flowering shoots percentage (60.00 %) in compare to other treatments (Table 1). These result suggested that spray of nutrients and Thiourea did not induce flowering but probably stimulated growth of terminal buds (Sergent *et al.*, 2000 and Nagao and Nishina, 1993; Mishra *et al.*, 2011 and Tongumpai *et al.*, 1997); however these chemicals has showed better response as compared to control due to early bud break (Patel *et al.*, 2016). Weather parameters also affect the flowering, fruiting and quality behaviour of mango (Singh

*et al.*, 2014). All the treatments showed remarkable improvement in flowering and length of panicle in mango over control. The highest percentage as well as length of panicle was recorded in treatment spray application of KNO<sub>3</sub> and Thiourea (T<sub>8</sub>, T<sub>7</sub> and T<sub>4</sub>), the reason behind it is that the foliar application of KNO<sub>3</sub> promotes ethylene biosynthesis which encourage floral induction (Swamy, 2012) and the favourable effect of Thiourea on plant growth and flowering might be due to its bio-regulatory effect chiefly through mobilization of dry matter and translocation of photosynthates to sink (Mishra *et al.*, 2011). The application of various chemicals had effectively increased the induction of panicle which ensured an increase in fruit production at harvest as compared to control. The maximum fruit set at pea (14.56 %), marble (3.51 %) and maturity stage (0.87 %) was registered in treatment T<sub>8</sub> which was statistically at par with treatment T<sub>7</sub>, with fruit set at pea (14.28 %), marble (3.43 %) and maturity stage (0.86 %) respectively (Table 1). This might due to potassium nitrate and Thiourea may have acted synergistically to increase the number of flowering shoots, thereby increasing fruit sets at different stages (Reddy and Kurian, 2012). The maximum fruit retention was observed in treatment T<sub>8</sub> (25.20 %) which was statistically at par with treatment T<sub>7</sub> (25.16 %) followed by treatment T<sub>4</sub> (21.67 %). Spraying of nitrogenous chemicals are more effective in increasing fruit yield, which may be attributed to a higher number of hermaphrodite flowers, fruit set and number of fruits/tree (Sudha *et al.*, 2012). The highest numbers of fruit per tree (281.30) and yield per tree (77.02 kg) was found in treatment T<sub>8</sub> which was statistically at par with treatment T<sub>7</sub> (278.36 and 74.56 kg respectively); however control recorded lowest numbers of fruit per tree (141.81) and yield per tree (32.43 kg). It was noted from the experiment that there were insignificant difference in average weight of mango fruits.

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