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EFFECT OF NUTRIENTS AND THIOUREA ON ECONOMICS OF MANGO (*MANGIFERA INDICA* L.) CV. KESAR

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Abstract: A field experiment was conducted during 2013-14 on foliar application of nutrients and Thiourea to determine their effect on yield and economics of mango fruits cv. Kesar, at College Farm of N. M. College of Agriculture, NAU, Navsari. The experiment was carried out in Randomized Block Design with nine treatments consisting foliar application of nutrients *viz.*, KNO_3 at 0.5% and 1.0%, 00:52:34 at 2.0%, 10:52:17 at 2.0% in mid October followed by spray of Thiourea at 0.5% and 1.0% in mid November along with control. The treatments were replicated thrice. Foliar application of 1.0% KNO_3 in mid October followed by 0.5% Thiourea in mid November induced early flowering and early maturity of fruits which fetches higher price in market. It also increased the yield of Kesar mango.
Keywords: Mango, Kesar, KNO_3, Thiourea, Foliar spray, Economics.

Introduction

Mango is an important fruit crop of India, being the 'King of Fruits'. Andhra Pradesh, Uttar Pradesh, Karnataka, Telangana, Bihar, Maharashtra, Gujarat and Tamil Nadu are the major mango growing states in India. It is an important foreign exchange earner, with an earning of Rs. 285.44 crore from the export of 41280.01 MT of fresh mango fruits and Rs. 772.97 crore from the export of 174860.34 MT of mango pulp (APEDA, 2013). A numbers of diverse chemicals that have growth regulating properties in plants have been tested for promoting/inhibiting flower production in mango in different countries (Chacko, 1991). It has been demonstrated that foliar spray of aqueous solutions of potassium nitrate (Sergent *et al*., 2000; Astudillo and Bondad, 1978) and Thiourea (Tongumpai *et al*., 1997; Nartvaranant *et al*., 2000) can induce flowering in certain varieties of mango. Besides increasing flowering rates, potassium nitrate can also advance the flowering and fruiting period of mango (Nagao and Nishina, 1993). Thiourea can be successfully used to develop an off season fruit production technology and to induce floral bud break in mature shoot for some mango varieties (Peiris, 2003; Tongumpai *et al*., 1997). Early harvested crop of mangoes (April-May) in India is well suited to international demand window, as there is less competition

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from other country during that period. The main objective of a mango grower is to harvest maximum quantity with good quality of marketable fruits at the lowest cost in early season. Moreover, induction of early flowering results in early maturity of the mango fruits which fetch the higher price in the market as compared to late maturing mango fruits. The present experiment was carried out to study the yield and economics of Kesar mango production in response to foliar application of nutrients and Thiourea.

Material and Methods

The present investigation was carried out on 19 year old grafted trees of mango cv. Kesar at College Farm, N. M. College of Agriculture, Navsari Agricultural University, Navsari. Trees were planted at 5m × 5m spacing. The experimental site is situated on the coast of Arabian Sea at 20º 57' North latitude and 72º 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. The experiment was laid out in Randomised Block Design with nine treatments *viz.*, T_0 (Control), T_1 (2.0 % 00:52:34 + 0.5 % Thiourea), T_2 (2.0 % 10:52:17 + 0.5 % Thiourea), T_3 (0.5 % KNO_3 + 0.5 % Thiourea), T_4 (1.0 % KNO_3 + 0.5 % Thiourea), T_5 (2.0 % 00:52:34 + 1.0 % Thiourea), T_6 (2.0 % 10:52:17 + 1.0 % Thiourea), T_7 (0.5 % KNO_3 + 1.0 % Thiourea) and T_8 (1.0 % KNO_3 + 1.0 % Thiourea). All the treatments were replicated thrice and a single tree served as a unit. Fresh solution of nutrients and Thiourea were prepared in the field dissolving the required quantity of nutrients and Thiourea in water. Fifteen liters of respective solutions were applied per tree in the form of fine spray. The spray of nutrients and Thiourea were done on 15th October and 15th November, respectively of year 2013 through tractor mounted HTP sprayer during early morning. The observations *viz.*, date of full bloom, date of harvesting and yield were recorded. The date of full boom was considered on which overall 100 per cent of the panicle emerged and the date of harvesting was noted as harvesting done during experimentation. The total produce per tree was weighted and noted the fruit yield at harvest. This result was expressed in kilogram (kg) per tree.

The gross income (Rs.) per hectare was worked out on the basis of mean yield for each treatment and the market price of mango fruits. The cost of different treatments was worked out by considering prices of labour employed for treatments, treatments cost and cultivation cost. The net income was worked out by deducting cultivation cost and the cost required for different treatments from the gross income per hectare for respective treatment and recorded accordingly.

$$BCR = \frac{\text{Net Income (Rs/ha)}}{\text{Total cost of cultivation (Rs/ha)}}$$

Results and Discussion

The application of KNO_3 in October and Thiourea in November at different concentration (T_8, T_7 and T_4) induced earliness in full blooming and date of harvest these might be due to the fact that KNO_3 and Thiourea act as a bud dormancy breaking agent (Nagao and Nishina, 1993 and Tongumpai *et al*., 1997, respectively). According to Peiris (2003) the foliar application of 0.5 % Thiourea aqueous solution to mature shoots induced off season flowering in mango varieties Carabao, Kohu-amba, Nam Doc Mai and Willard 11-21 day after application. Early maturity provides opportunities to have the commercial advantages of early marketing in season which fetches a higher price of fruits.

Yield was found highest in treatment T_8 which was statistically at par with treatment T_7 followed by treatment T_4. Phosphoric acid and potassium nitrate may have acted synergistically to increase the number of flowering shoots thereby increasing in fruit yield (Reddy and Kurian, 2012). It is also confirmed by Shaban and Haseeb (2009) that the application of potassium nitrate at 4 % after moderate pruning is preferable for improving vegetative growth, fruit set and yield of guava trees.

Economics is the major consideration for the farmers while taking a decision regarding the adoption of a new technology, hence the economics was computed for different treatments. In the present experiment the higher net return was obtained by treatment T_8 followed by T_7 due to more yield. But cost of treatment was less in treatment T_4 which led to higher BCR (6.86) followed by T_3 in compare to all other treatments. The control treatment earned less net return as well as computed lowest BCR.

Conclusion

Concerning to the production cost and yield, it could be inferred that the foliar application of 1.0 % KNO_3 in mid October followed by 0.5 % Thiourea in mid November which induced early flowering and early maturity of fruit which fetches higher price in market with lower treatment cost. It also increased the yield of Kesar mango. However, it needs to be further confirmation on multi-location large scale trials before passing as recommendations to the mango growers.

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Table 1: Effect of nutrients and Thiourea on date of full bloom and date of harvest of mango cv. Kesar

Treatments	Full bloom	Harvest
T_0	27-01-2014	25-06-2014
T_1	22-01-2014	19-06-2014
T_2	11-01-2014	07-06-2014
T_3	10-01-2014	06-06-2014
T_4	03-01-2014	31-05-2014
T_5	20-01-2014	16-06-2014
T_6	16-01-2014	12-06-2014
T_7	28-12-2013	22-05-2014
T_8	27-12-2013	20-05-2014

Table 2: Economics

Treatments	Yield (kg/ha)	Cost of treatment (Rs)	Other expenditure (Rs)	Total expenditure (Rs)	Total return (Rs)	Net return (Rs)	BCR
T_0	12972	0	44796	44796	259440	214644	4.79
T_1	20772	48720	44796	93516	415440	321924	3.44
T_2	22800	44912	44796	89708	570000	480292	5.35
T_3	24600	35940	44796	80736	615000	534264	6.62
T_4	26124	38280	44796	83076	653100	570024	6.86
T_5	21176	82320	44796	127116	423520	296404	2.33
T_6	24000	78512	44796	123308	480000	356692	2.89
T_7	29824	69540	44796	114336	745600	631264	5.52
T_8	30808	71880	44796	116676	770200	653524	5.60

Input and selling cost:

Input	Cost
KNO_3	Rs. 1950/25 kg
00:52:34	Rs. 3150/25 kg
00:00:50	Rs. 1750/25 kg
12:61:00	Rs. 2060/25 kg
Thiourea	Rs. 560/500g

Note:

- 10:52:17 was made using 00:00:50 and 12:61:00
- Retail price of Kesar mangoes were Rs. 25/kg before 10th June and Rs. 20 after 10th June