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Research Article

Effect of mulching and chemicals for improving yield and quality of mango cv. KESHAR

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ABSTRACT : In the present investigation mulching was done with black polythene in the first week of October, 2009. Spraying of chemicals like $CaCl_2$ (2, 4 and 6 %), $Ca(NO_3)_2$ (4 %), K_2SO_4 (1 %) and borax (1 %) was carried out one month prior to harvesting *i.e.* in 1st week of April, 2010. The maximum average number of fruits per tree (576) were recorded in T_1 (mulching). The treatment T_5 (mulching + $Ca(NO_3)_2$, 4 %) recorded maximum average length of fruit (10.50 cm), average weight of fruit (275 g), yield per tree (150.62 kg) and yield per ha. (15.06 tonnes). The maximum average diameter of fruit (7.30 cm) was recorded in T_3 (mulching + $CaCl_2$, 4 %).The significant differences with respect to TSS, acidity, total sugars and reducing sugars were recorded. However, statistically non-significant differences with respect to non-reducing sugars were recorded. The maximum TSS (20.97 0Brix), total sugars (16.77 %), reducing sugars (4.29 %) and non-reducing sugars (12.48) and the minimum acidity (0.20 %) were recorded in T_5 (mulching + $Ca(NO_3)_2$, 4 %).The minimum TSS (17.42 0Brix), total sugars (15.17 %), reducing sugars (3.47 %) and non-reducing sugars (11.70 %) and the maximum acidity (0.35 %) were recorded in T_8 *i.e.* control. Mulching and pre-harvest spray of Ca salts, $Ca(NO_3)_2$ (4%) was beneficial in improving yield and yield contributing parameters.

KEY WORDS : Mulching, Calcium salts, Pre-harvest spray, Yield

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INTRODUCTION

Mango (*Mangifera indica* L.) the king of fruits, is one of the oldest tropical fruits. Mango is considered as the choicest fruit in India because of it's excellent flavour, appealing fragrance, beautiful skin colour and delicious taste. The total area under mango is 2.29 million ha. with the total production of 15.88 million metric tonnes. Average productivity of mango in India is 6.6 tones per ha (Annonymous, 2011).

In Maharashtra, the area under mango cultivation is 4,77,000 ha. with production of 3,31,000 MT. Average productivity of mango is 0.7 tonnes per ha. (Annonymous, 2011). Keshar, the queen of mangoes, is under cultivation on a large area in Maharashtra. This variety has export potential.

Mulches are used for water conservation (increase soil moisture content), erosion control, improve soil structure and reduce the evaporation. Mulching is reported to minimize spongy tissue in mango (Katrodia and Sheth, 1989).Chemicals like $CaCl_2$, $Ca(NO_3)_2$, K_2SO_4 and borax play an important role in physico-chemical and biochemical processes in fruits. Potassium is important for cell growth due to its role in cell expansion and development of thick epidermal cell walls (Salisbury and Ross, 1992). Boron improves translocation of sugar and synthesis of cell wall material (Shek, 1958). Considering the importance of mulching and chemicals like Ca, K and B as pre-harvest treatment, experiment was conducted to study the effect of mulching and chemicals for improving yield and quality of mango cv. KESHAR.

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EXPERIMENTAL METHODS

The present experiment was carried out at Instructional-Cum-Research Orchard of the Department of Horticulture, Central Campus of Mahatma Phule Krishi Vidyapeeth, Rahuri in 2009- 10.The experiment was carried out on 20 years mango trees cv. Keshar during October, 2009 to June, 2010. The experiment was conducted in Randomized Block Design with three replications and eight treatments (Table 1). Mulching with black polythene of 100 micron thickness was done in the 1st week of October, 2009 and entire canopy shedding area was covered. Chemicals as per the treatments were sprayed in 1st week of April, 2010 *i.e.* one month prior to harvesting.

EXPERIMENTAL RESULTS AND ANALYSIS

It was observed from the data that treatments had statistically significant effect on yield and yield contributing characters and quality parameters.

The maximum average number of fruits per tree (576) were recorded in T_1. The minimum average number of fruits per tree (435) were recorded in T_8 and was at par with T_4 (478) and T_6 (489) (Table 1). Application of mulching at an early stage in month of October might have increased soil moisture content and there by leading to higher fruit retention and thus recorded higher average number of fruits per tree. This is in accordance with the results of Bhattacharya and Madhowa Rao (1985) and Gurung and Chattopadhyay (1994) in banana.

The maximum average length of fruit (10.50 cm) was recorded in T_5 and was at par with T_3 (10.30 cm), T_2 (10.10 cm) and T_6 (9.9 cm) (Table 1). The minimum average length of fruit (9.10 cm) was recorded in T_8 which was at par with T_1 (9.30 cm), T_7 (9.50 cm) and T_4(9.70 cm).The maximum average diameter of fruit (7.30 cm) was recorded in T_3 which was at par with T_5 (7.10 cm) and T_2 (7.00 cm). The minimum average diameter of fruit (6.20 cm) was recorded in T_8 and was at par with T_1 (6.30 cm), T_7 and T_4 (6.50 cm, each) and T_6 (6.70 cm).The maximum average weight of fruit (275 g) was recorded in T_5 which was at par with T_3 (270 g), T_2 (268 g), T_6 (264 g) and T_1 (260 g). The minimum average weight of fruit (220 g) was recorded in T_8 and it was at par with T_4 (225 g) and T_7 (235 g). This could be attributed to more Ca in fruits resulting in increased the fruit size as length and diameter by increasing the cell density in the cortex area of fruit as reported by Singh and Rajput (1991). This is in accordance with the results of Rani and Brahmachari (2004) in mango.

Increase in weight with calcium might be due to enhanced absorption of water and mobilization of sugar in expanded cell and increased volume of intercellular space in the pulp as

Table 1 : Effect of mulching and different chemicals on yield and yield contributing characters of mango cv. KESHAR

Sr. No.	Treatments	Av. no. of fruits per tree	Av. length of fruit (cm)	Av. diameter of fruit (cm)	Av. wt. of fruit (g)	Yield per tree (kg)	Yield per ha. (t)
1.	Mulching (100 micron black plastic)	576	9.3	6.3	260	148.51	14.85
2.	Mulching +$CaCl_2$, $6H_2O$ (2 %)	525	10.1	7.0	268	141.91	14.19
3.	Mulching + $CaCl_2$, $6H_2O$ (4 %)	538	10.3	7.3	270	144.38	14.44
4	Mulching + $CaCl_2$, $6H_2O$ (6 %)	478	9.7	6.5	225	108.61	10.86
5.	Mulching + $Ca(NO_3)_2$ (4 %)	548	10.5	7.1	275	150.62	15.06
6.	Mulching + K_2SO_4 (1 %)	489	9.9	6.7	264	128.41	12.84
7.	Mulching + Borax (1 %)	522	9.5	6.5	235	123.37	12.34
8.	Control	435	9.1	6.2	220	94.92	9.49
	S.E . $\pm$	26.83	0.29	0.24	13.13	8.10	0.81
	C.D. (P=0.05)	80.33	0.88	0.71	39.55	24.39	2.44

Table 2 : Effect of mulching and different chemicals on quality characters of mango cv. KESHAR

Sr. No.	Treatments	TSS (^{0}Brix)	Acidity (%)	Total sugars (%)	Reducing sugars (%)	Non reducing sugar (%)
1.	Mulching (100 micron black plastic)	18.53	0.28	15.96	3.67	12.29
2.	Mulching +$CaCl_2$, $6H_2O$ (2 %)	20.03	0.26	16.14	3.98	12.16
3.	Mulching + $CaCl_2$, $6H_2O$ (4 %)	20.43	0.22	16.59	4.15	12.44
4.	Mulching + $CaCl_2$, $6H_2O$ (6 %)	19.92	0.25	15.72	3.86	11.86
5.	Mulching + $Ca(NO_3)_2$ (4 %)	20.97	0.20	16.77	4.29	12.48
6.	Mulching + K_2SO_4 (1 %)	19.54	0.30	15.35	4.06	11.29
7.	Mulching + Borax (1 %)	19.07	0.27	15.49	3.58	11.91
8.	Control	17.42	0.35	15.17	3.47	11.70
	S.E. $\pm$	0.53	0.01	0.30	0.11	0.31
	C.D. (P=0.05)	1.59	0.02	0.90	0.30	NS

NS=Non-significant

reported by Rani and Brahmachari (2001).

The maximum yield (kg) per tree was recorded in T_5 (150.62 kg) and was at par with T_1 (148.51 kg) (Table 1). The minimum yield per tree (94.92 kg) was recorded in T_8 and it was at par with T_4 (108.61 kg). The maximum yield per hectare (15.06 t) was recorded in T_5 and was followed by T_1 (14.85 t), T_3 (14.44 t), T_2 (14.19 t), T_6 (12.84 t) and T_7 (12.34 t).All these treatments were at par with each other. The minimum yield per hectare (9.49 t) was recorded in T_8 which was at par with T_4 (10.86 t).

The maximum TSS (20.97^{0}Brix) was observed in T_5 (Table 2). The minimum TSS (17.42 ^{0}Brix) was recorded in T_8 and was at par with T_1 (18.53^{0}Brix).The minimum acidity (0.20%) was recorded in T_5 which was at par with T_3 (0.22 %). The maximum acidity (0.35 %) was observed in T_8 *i.e.* control. Significantly maximum total sugars (16.77 %) were recorded in T_5 which was followed by T_3 (16.59 %) and T_2 (16.14 %). The minimum total sugars (15.17 %) were recorded in T_8 and was at par with T_6 (15.35 %), T_7 (15.49 %) T_4 (15.72 %), andT_1 (15.96 %). The maximum reducing sugars (4.29 %) were recorded in T_5. The minimum reducing sugars (3.47 %) were recorded in T_8 which was at par with T_7 (3.50 %) and T_1 (3.67 %).The non-significant differences in non reducing sugars were recorded. The maximum non-reducing sugars (12.48 %) were recorded in T_5.The minimum non reducing sugars (11.70 %) were recorded in T_8. The pre-harvest foliar application might have increased the concentrations of the nutrients *viz.*, Ca, K and B and might have retained in the fruit. The role of calcium in reducing or minimizing physiological and biochemical activities was reported by many workers. This might have reduced respiration as there by lesser utilization of organic substance and resulted in higher TSS content of the fruits. This is in accordance with the results of Kumar *et al.* (1990) in grapes, Waskar *et al.*(1994) in grapes. The calcium treated fruits recorded the minimum acidity. Reduction in acidity might be due to changes in enzymatic activities as reported by Singh *et al.* (1981). The presence of calcium in fruit might have reduced enzymatic activities and led to lower or decreased acidity as reported by Kumar *et al.* (1990). The result is in accordance with the result of Singh *et al.* (1981) in guava.

The maximum formation of sugars with ripening of fruits is evident as disappearance of starch as reported by Joshi and Roy (1985). Increased sugars might be due to slow hydrolysis of starch to sugars and the gradual build up of sugars during ripening in calcium treated fruits as reported by Jayachandran *et al.* (2005). This is in accordance with the results of Singh and Rajput (1991) in mango, Bhanja and Lenka (1994) in sapota and Ramkrishna *et al.* (2001) in papaya.

Conclusion:

Thus, it could be concluded that, earlier mulching with pre-harvest spray of $Ca(NO_3)_2$, 4 per cent was beneficial in improving yield and yield contributing parameters and quality of mango.

REFERENCES

Anonymous (2011). Indian Horticulture Database.

Bhanja, P.K. and Lenka, P.C. (1994). Effect of pre and postharvest treatments on storage life of sapota fruits cv. OVAL. *Orissa J. Hort..*, **22** (1 & 2) : 54-57.

Bhattacharyya, R.K. and Madhava Rao, V.N. (1985). Soil cover increases banana production. *Indian J. Hort.*, **30** : 5- 8.

Gurung Sarad and Chattopadhyay, P.K. (1994). Influence of soil cover on production and quality of banana. *Ann. Agric. Res.*, **15**(4) : 445-447.

Jayachandran, K.S., Srihari, D. and Narayana Reddy, Y. (2005). Pre-harvest sprays of different sources of calcium to improve the shelf life of guava. *Indian J. Hort.*, **62** (1) : 68-70.

Joshi, G.D. and Roy, S.K. (1985). Effect of existing method of harvesting on chemical composition and palatability of mango (*Mangifera indica* L.) cv. ALPHONSO fruits.*Indian Fd. Packer*, **39**(4) : 26-31.

Katrodia, J.S. and Sheth, I.K. (1989). Spongy tissue development in mango fruit of cultivar 'Alphanso' in relation to temperature and its control. *Acta Horticulturae*, **281** : 827-834.

Kumar, Ranjit, Singh, Satya Pal and Chharia, A.S. (1990). Effect of pre-harvest application of different chemicals on the quality of grapes cv. Delight during storage. *Haryana J. Hort. Sci.*, **19** (1-2) : 62-70.

Ramkrishna, M., Haribabu, K., Reddy, Y.N. and Purushotham, K. (2001). Effect of pre-harvest application of calcium on physico-chemical changes during ripening and storage of papaya. *Indian J. Hort.*, **58**(1) : 228- 231.

Rani, Ruby and Brahmachari, V.S. (2001). Effect of foliar application of calcium, zinc and boron on tracking and physiochemical composition of litchi. *Orissa J. Hort.*, **29**(1) : 50-54.

Rani, Ruby and Brahmachari, V.S. (2004). Effect of growth substances and calcium compounds on fruit retention, growth and yield of Amrapali mango. *Orissa. J. Hort.*, **32**(1) : 15-18.

Salisbury, F.B. and Ross, C.W. (1992). *Plant physiology*. Wadsworth, Belmont, California.

Shek, J. (1958). *Trace elements*. Academic Press, New York, U.S.A.

Singh, A.K. and Rajput, C.B.S. (1991). Effect of GA3, BA and calcium on flowering, fruiting and fruit quality of mango (*Mangifera indica* L.) cv. LANGRA. *Punjab Hort. J.*, **31**(1-4) : 45-52.

Singh, Kartar and Chauhan, K.S. (1981). Effect of pre-harvest application of calcium, potassium and alar on pectin content and activity of PME and cellulose of guava fruits during storage. *Haryana. J. Hort. Sci.*, **10**(3-4) : 177-181.

Waskar, D.P., Damame, S.V., Masalkar, S.D. and Gaikwad, R.S. (1994). Effect of pre-harvest spray of calcium on extending the shelf life of grape. *Orissa J. Hort.*, **22**(1 & 2) : 50-53.

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