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EFFECTS OF SORBITOL AND PLANT NUTRIENTS ON FRUIT RETENTION, YIELD AND QUALITY OF MANGO (*MANGIFERA INDICA* L.)

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ABSTRACT

This investigation was carried out to study the effects of foliar sprays of different chemicals such assorbitol, calcium nitrate and boron on fruit-setting, yield and fruit quality in mango *(Mangifera indica* L*).* cv. Langra, at the orchard of AICRP (STF), Bihar Agricultural University, Sabour. The experiment was laid out in Randomized Block Design (RBD), with three replications. Results revealed that maximum number of fruit-set (187) at marble stage was observed with T_6 boric acid (0.02%) + sorbitol (2.0%) and T_1 calcium nitrate (0.06%) showed minimum fruit drop (83.05%) or maximum retention (16.95%) whereas highest yield (80.73 kg/tree), TSS (20.56°Brix) and lowest acidity (0.204 %)were observed with T_2 Boric acid (0.02%)in mango cv. Langra.

Key words : Mango, calcium nitrate, boric acid, sorbitol, yield, fruit quality.

Mango (*Mangifera indica* L.) is the king of fruits of India. India is the largest producer of mango in the world, producing 181.34 lakh tonnes from an area of 24.96 lakh ha with a productivity of 7.6 mt/ha, and, shares about 44.6 % of the total mango production in the world. Several problems are associated with mango cultivation related to its bearing and quality due to an imbalance in supply of nutrients resulting in poor flowering, fruit setting, plant health, fruit quality and increase in fruit-drop. Further, unhealthy plants are more prone to insect- pests and diseases. Attempts were made by several researchers earlier to enhance productivity and quality of mango through foliar application of nutrients. Calcium spray is known to increase productivity of mango, basically due to reduced abscission (Kumar[5] *et al*, 2006). Jutamanee *et al* (2002) as well as Singh and Maurya 2004. Boron application also resulted in better fruit quality in terms of weight and TSS (Pandey and Singh, 2007; Dutta, 2004; Abd-Allah, 2006). The effects of boron also attributed in enhanced pollen germination, pollen-tube growth and sugar synthesis/accumulation. Therefore, keeping in view the importance of nutrients on fruit setting, yield and quality, this study was undertaken in mango cv. Langra with the objective of finding the most effective and optimum concentration of chemicals tested to improve fruit setting, fruit retention, yield and quality of fruits.

MATERIALS AND METHODS

The experiment was conducted in the mango orchard of AICRP (STF) at Bihar Agricultural College, Sabour, Bhagalpur, during 2008-09 and 2009-10. Twenty-six years old trees of mango cv. Langra of uniform vigor and size, planted at 10m X 10m distance and maintained under uniform cultural practices, were selected for the study. Seven treatments comprising calcium nitrate (0.06%), boric acid (0.02%), sorbitol (2.0%) alone or in combination (i.e., calcium nitrate @ 0.06% + boric acid @ 0.02%; calcium nitrate @ 0.06% + sorbitol @ 2.0%; and, boric acid @ 0.02% + sorbitol @ 2.0%) and Control (without spray) were tested as foliar spray solutions by applying at the stage of about 50% panicles initiation under Randomized Block Design, with three replications. One plant was considered as single unit. Data were recorded on percent fruit-set, yield (kg/tree), fruit weight (g), total soluble solids in °Brix (with the help of hand refractometer), acidity (calculated by titrating the fruit pulp aliquot against 0.1N NaOH (A.O.A.C., 1984), ascorbic acid (by reduction of 2,6-dichlorophenol indophenol dye) and total sugars (Ranganna, 1986).

RESULTS AND DISCUSSION

Results presented in Table-1 and the combined (pooled) data indicates that application of micronutrients and sorbitol significantly increased number of fruit-set. Highest fruit-set (186.83) was recorded with boric acid (B-0.02%) which 42.75% more than under control followed by calcium nitrate (0.06%) + sorbitol (2.0%) (173.33) and calcium nitrate (Ca 0.06%) + boric acid (0.02%), the lowest (130.75) was observed in Control.Table-1 also reveals that minimum fruit-drop (83.05%) was recorded with calcium nitrate

Table-1 : Pooled data on Effects of Micronutrients and Sorbitol on Fruit-set, Fruit drop, Yield and Quality of Mango cv. Langra.

Treatments	No. of Fruit (at fruit set)	Fruit drop % at 15 days	Fruit drop % at 30 days	Fruit drop % at 45 days	Fruit drop % at 60 days	Fruit drop % at 75 days	Total fruit drop (%)	Yield per plant (kg)	T.S.S. (% Brix)	Acidity (%)
T_1 Calcium nitrate (Ca 0.06%)	156.67	63.42	15.95	3.24	0.26	0.19	83.05	71.48	20.4	0.209
T_2 Boric acid (B 0.02%)	162	66.17	20.17	1.28	0.62	0.08	88.32	80.73	20.56	0.204
T_3 Sorbitol (20% Fine Sorbitol)	132	69.71	13.56	2.01	0.42	0.07	85.76	67.81	17.08	0.213
T_4 Calcium nitrate + Boric acid	169.83	71.67	14.6	2.62	0.1	0.27	89.24	61.22	19.45	0.215
T_5 Calcium nitrate + Sorbitol	173.33	71.52	12.81	1.91	0.98	0.2	87.4	56.96	19.09	0.21
T_6 Boric acid + Sorbitol	186.83	68.66	14.07	0.76	0.1	0.13	84.21	71.76	19.45	0.217
T_7 Control	156.665	60.61	21.73	4.27	1.4	0.48	87.97	42.06	18.34	0.232
CD at 5%	9.78	NS	NS	NS	NS	NS	3.50	9.23	0.69	0.004

(Ca 0.06%) which is 4.92% lesser than control (87.97%). Table-1 shows that plants sprayed with boric acid (B 0.02%) gave the highest yield (80.73 kg/tree) which is at par with boric acid (B 0.02%) + sorbitol (2.0%) with 71.76 kg/tree, whereas Control recorded the lowest yield (42.06 kg/tree). Similar results were obtained by Negi *et al* (2010) Boron improves pollen grain germination and pollen-tube elongation, consequently leading to higher fruit-set and, finally, the yield (Abd-Allah, 2006). It is seen in Table-1 that total soluble solids content in the fruit was significantly affected by various treatments with micronutrients and sorbitol. Pooled data for the two years showed that maximum TSS was recorded with boric acid (B-0.02%) (20.56°Brix) at par with the treatment calcium nitrate (Ca 0.06%) having TSS 20.40°Brix, and the minimum TSS (18.34°Brix) was recorded in Control. Data presented in Table-1 indicate that acidity was also affected significantly by application of micronutrients or sorbitol. However, pooled data shows that the highest acidity (0.232%) was recorded in control, and, the lowest (0.204%) with boric acid (B-0.02%). These results are in close conformity with finding of Sanna and Abd El-Megeed 2005. Negi *et al* (2009) pointed out that increase in TSS by boron could be due to a more rapid translocation of sugars from the leaves to the developing fruits.

REFERENCES

1. Abd-Allah, A.S.E. 2006. Effect of spraying some macro and micro nutrients on fruit set, yield and fruit quality of Washington Naval trees. *J. Appl. Sci. Res., 2(11):* 1059-1063.
2. A.O.A.C.1984. (*Official Method of Analysis*). 14th Edition, Association of Official Agriculturist Chemists. Washington D. C., USA, p 16.
3. Dutta, P. 2004. Effect of foliar boron application on panicle growth, fruit retention and physico-chemical characters of mango cv. Himsagar. *Indian J. Hort., 61(3):* 265-266.
4. Jutamanee, K., Eoomkham, S., Pichakum, A., Krisanapook, K. and Phavaphutanon, L. 2002. Effects of calcium, boron and sorbitol on pollination and fruit set in mango cv. Namdokmai. *Acta Hort., 575(2):* 829-834.
5. Kumar, M.R., Reddy, Y.N., Chandrasekhar, R. and Srihari, D.2006. Effect of calcium and plant growth regulators on flowering and yield of mango (*Mangifera indica* L.) cv. Baneshan. *J. Res. ANGRAU., 34(1):* 21-25.
6. Negi, S.S., Singh, A.K. and Singh, C.P. 2009. Effect of foliar application of nutrients on fruit-set, yield and quality of mango cv. Dashehari. *Haryana J. Hortl. Sci.*, *38(1&2):* 20-22.
7. Negi, S.S., Singh, A.K. and Rai, P.N. 2010. Effect of foliar application of nutrients on pollen, flowering, fruitset, fruit drop and yield in mango cv. Dashehari. *The Hort. J., 23(2):* 45-48.
8. Pandey, R. and Singh, C.P. 2007. Effect of pre-harvest foliar spray of micronutrients on chemical properties of mango fruit cv. Langra. *Pantnagar J. Res., 5:* 56-61.
9. Ranganna, S. 1986. *Handbook of Analysis and Quality Controls for Fruit and Vegetable Products*, 2nd edn., pp. 89-90, Tata McGraw Hill Co. Ltd., New Delhi
10. Sanna, E. and Abd-Migeed, M.M.M. 2005. Effect of spraying of sucrose and some nutrient elements on Fagri Kalan mango trees. *J. Appl. Sci. Res., 1(5):* 341-346.
11. Singh, J. and Maurya, A.N. 2004. Effect of micronutrients on bearing of mango (*Mangifera indica*) cv. Mallika. *Prog. Agri., 4(1):* 47-50.