

Module 3.4-1 Foliar application of potassium sulfate improves mango quality in West Bengal

Potassium (K), one of three major nutrients, influences yield and quality of most fruits. However, growers often neglect to include K in their fertilization schedule for orchards. This leads to lower yield and quality of fruits. Several studies have also pointed out that sources of applied K influence the quality parameters of fruits. Mango is a major fruit crop grown in the West Bengal State of Eastern India. Amrapali, a hybrid mango variety, is popular among the growers for its distinctive taste and prolific bearing habits. The reported investigation was undertaken at the Horticultural Research Station, Mondouri, and in the Post Harvest Technology Laboratory of Faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya, West Bengal, India, to study the effect of different sources of K on fruit quality and shelf life of mango cv. Amrapali.

Plants were fertilized with fixed doses of nitrogen (500 g N/tree) and phosphorus (250 g P₂O₅/tree), and various K salts—K₂SO₄, KCl and KNO₃ (0.5 and 1.0%)—were applied as a foliar spray four times during September to December.

The present study showed that application of K decreased the starch and phenol content and increased the total soluble solids, total sugar and β-carotene content of fruit (**Table 1**) as compared to the control. Application of K₂SO₄ significantly increased the total soluble solids, total sugar and β-carotene content of fruits over KCl and KNO₃ treated trees. However, titratable acidity, ascorbic acid, starch and phenol content in fruits were not affected by sources of K. Higher fruit quality, especially higher sugar content can be explained by the role of K in carbohydrate synthesis, breakdown and translocation and synthesis of protein and neutralization of physiologically important organic acids. Besides K is involved in phloem loading and unloading of sucrose and amino acids and storage in the form of starch in developing fruits by activating the starch synthase enzyme. The timing of this study's foliar K application also favored the conversion of starch into simple sugar during ripening by activating the sucrose synthase enzyme. Neutralization of organic acids due to high K level in tissues could have also resulted in a reduction in acidity.

The physiological loss in weight (PLW) from harvested fruits, especially under tropical condition, causes severe economic losses. Mango trees receiving foliar spray of K₂SO₄ (1% concentration) had a significant reduction in PLW and recorded a maximum (8 days) shelf life at ambient room temperature as compared to the other treatments (**Table 2**). This might be due to the fact that K₂SO₄ contains considerably more SO₄-S than the other sources. This study suggests the added advantage of using K₂SO₄ as a source of K to improve fruit quality and shelf life of mango.

Table 1. Biochemical changes on ripening of mango fruit as influenced by foliar spray of different potassium salts.

Treatment	Total soluble solids, °Brix	Total sugar, % fresh wt.	Acidity, % fresh wt.	Starch, % fresh wt.	Total phenol, % dry wt.	Ascorbic acid, mg/100 g pulp	β-carotene, µg/100 g
K ₂ SO ₄ 0.5%	19.80	14.83	0.24	1.93	0.68	39.14	7,200
K ₂ SO ₄ 1.0%	20.40	15.11	0.23	1.81	0.66	38.11	7,412
KCl 0.5%	17.40	13.12	0.27	1.94	0.71	39.00	7,100
KCl 1.0%	17.80	13.72	0.24	1.84	0.67	38.72	7,215
KNO ₃ 0.5%	17.20	14.00	0.27	1.93	0.74	39.72	7,110
KNO ₃ 1.0%	17.80	14.14	0.26	1.92	0.69	38.14	7,310
Control	16.80	13.11	0.31	2.10	0.72	49.14	6,340
SEm ±	0.004	0.003	0.003	0.01	0.02	0.50	18.02
C.D. at 5%	0.012	0.009	0.010	0.03	0.06	1.52	54.73

Table 2. Effect of different sources of potassium on shelf life and physiological loss in weight of ripe fruit.

Treatment	Shelf life in days	Physiological loss in weight, %
K ₂ SO ₄ 0.5%	6	11.7
K ₂ SO ₄ 1.0%	8	10.4
KCl 0.5%	4	12.1
KCl 1.0%	5	12.0
KNO ₃ 0.5%	4	12.4
KNO ₃ 1.0%	4	12.1
Control	3	13.1
SEm ±	0.6	0.48
C.D. at 5%	1.5	1.46

Source: Dutta, P., Ahmed, B. and Kundu, S. 2011. Better Crops – South Asia, Vol. 5, No. 1, pp. 16-18.

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