

EFFECT OF CHEMICALS ON YIELD AND QUALITY OF MANGO (*Mangifera indica* L.) cv. MALLIKA

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Abstract: Amongst the different chemicals used, treatment with KH_2PO_4 1 % + KNO_3 1 % produced maximum (510.67) average fruit weight whereas highest number of fruits per panicle (3.44) per plant (93.80) and yield (46.71 kg/plant) was noted with K_2HPO_4 1 % + KNO_3 1 %. The acidity of fruits was observed minimum (0.24 percent) equally with all the treatment combinations with 1% thiourea. The treatment KH_2PO_4 1% + KNO_3 1% again recorded maximum TSS (20.70 °Brix), reducing sugar (8.07g/100g pulp), non-reducing sugar(9.93g/100g pulp), total sugar(18.01g/100g pulp) and sugar-acid ratio (67.72) while the highest ascorbic acid (39.94 mg /100 g pulp) recorded with KH_2PO_4 1.5 % + KNO_3 1% .

Keywords: Mango, potassium, thiourea, yield, quality.

Introduction

The phenomena of normal and shy bearing in alternate years are seen in many varieties of mango including 'Mallika'. Improved fruit quality of mango is important issues next to the productivity. Foliar sprays of chemicals have been found to induce flowering and fruiting in mango. Considering its importance in tropical and sub-tropical fruit plants the present investigation was undertaken to study the influence of the foliar sprays of K_2HPO_4 , KH_2PO_4 , KNO_3 and thiourea on fruit yield and quality of mango (*Mangifera indica* L.) cv. Mallika.

Material and Methods

The present investigation was carried out at Nursery-Cum- Orchard of the Department of Horticulture, Ranchi Agriculture College, Kanke, Ranchi on 09 years old, healthy and normal mango orchard of cv. Mallika during October, 2015 to July, 2016. The experiment was laid out in a Randomized Block Design with fourteen treatments including two controls (one with water spray and another without any spray) and three replications with one plant per treatment. The foliar spray treatment details are given in Table1. Two dilutions (1 and 1.5%) of chemicals K_2HPO_4 and KH_2PO_4 were sprayed on 15th October, 2015 (at fruit bud differentiation stage) whereas, above four treatments in combinations with 1% KNO_3 and 1% thiourea were sprayed during bud break stage i.e. on 15th January, 2016. All standard cultural practices and fertilizations in soil were followed for all and the observations regarding yield and quality attributes of fruits were recorded.

Result and Discussion

The data regarding yield and quality of mango fruits is presented in Table 1. Significantly maximum (510.67g) average fruit weight was recorded with T₅ (KH₂PO₄ 1 % + KNO₃ 1 %) and all other treatments were at par to this except both of controls. Maximum number (3.44) of fruits retained per panicle, per plant (93.80) was harvested with the treatment T₇ (K₂HPO₄ 1 % + KNO₃ 1 %) followed by the treatments T₈ and T₆. The highest yield (46.71 kg) per plant was also recorded with the same treatment T₇ (K₂HPO₄ 1 % + KNO₃ 1 %) but its following treatments were different i.e. T₆, T₅ and T₈ (46.38 and 45.86 and 45.40 respectively) which were at par also. Similar results have been reported by several workers (Jogdand and Garad, 2014 in Kesar, Reddy and Kurian, 2012 in Alphonso, Kumar and Reddy, 2008 in Baneshan and Jognande et al, 2003 in Pairi cv. of mango) with K₂HPO₄ alone or with KNO₃ spraying. They reported that, spraying mango trees with potassium led to an increment in the fruits number per tree, thereby increasing the yield of the tree and reached to the maximum productivity. The role of potassium treatments in increasing fruit retention percentage, number of fruits/tree as well as the greatest tree yield may be due to the catalytic factor of the potassium for many biological processes within trees which reflect on the nutritional status of the trees (Baiea et al, 2015).

Maximum TSS (20.70 °Brix) was recorded due to the treatment T₅ (KH₂PO₄ 1 % + KNO₃ 1 %) followed by the treatments T₇ (19.87 °Brix) and T₆ (19.53 °Brix) which were at par to each other's. The results are in conformity with those of the lowest acidity (0.24 %) was recorded equally due to all four treatments combined with thiourea (T₉, T₁₀, T₁₁ and T₁₂) which were at par also to each other. The highest acidity (0.28 %) was recorded with T₁ and T₂ and these were at par to 0.27 % acidity noted in both controls (T₁₃ and T₁₄). The results are in conformity with those of Kumar and Reddy (2008). Neutralization of organic acids due to high potassium level might have reduced the acidity (Tisdale and Nelson, 1966).

Maximum reducing sugar content (8.07 g/100g pulp) was observed with T₅ (KH₂PO₄ 1 % + KNO₃ 1 %) followed by treatments T₆ (7.61), T₈ (7.54), T₇ (7.40) and T₉ (7.17). The minimum reducing sugars (5.96 g/100g pulp) was observed in control T₁₃ (water spray). The highest non-reducing sugar (9.93 g/100g pulp) in the treatment T₅ (KH₂PO₄ 1 % + KNO₃ 1 %) were observed which was closely followed by the treatments T₇ (9.84 g/100g pulp), T₆ (9.31 g/100g pulp) and T₉ (9.14 g/100g pulp) which were at par to each other. The minimum non-reducing sugars (8.72 g/100g pulp) was observed with control T₁₄ (no spray). Kumar and Kumar (2007) reported that, foliar spray of potassium salt at higher concentration increased

reducing sugars content in banana cv. Neypoovan. Highest (18.01g/100g pulp) total sugar content was noted with T₅ (KH₂PO₄ 1 % + KNO₃ 1 %) which was at par with the treatments T₇ (17.24 g/100g pulp) and T₆ (16.92 g/100g pulp). However, there were non-significant difference between these two treatments. Similar result was obtained by Kumar and Kumar (2007). Tisdale and Nelson (1966) reported that, higher sugar content could be due to the role of potassium in carbohydrate metabolism, protein synthesis and neutralization of organic acids.

The treatment T₅ (KH₂PO₄ 1 % + KNO₃ 1 %) recorded highest sugar-acid ratio (67.72) which was at par with all the treatment combinations with 1 % KNO₃ and thiourea. Similar results were reported due to Pathak and Mitra (2008).

Highest ascorbic acid content (39.94 mg /100 g pulp) was recorded with the treatment T₆(KH₂PO₄ 1.5 % + KNO₃ 1 %) and was at par with the treatments T₁₀ (39.40 mg 100 gpulp), T₂(39.18 mg 100 g") and T₁ (38.26 mg / 100 g pulp). Significantly lowest ascorbic acid (35.47 mg /100 gpulp) was observed in control T₁₃ (water spray) followed by control T₁₄ (35.47 mg /100 g pulp), T₈ (36.26 mg /100 g pulp), T₅ (36.83 mg /100 g pulp), and T₉ (37.14 mg /100 g pulp). Sharma et al. (1990) also observed that, potassium nitrate improved ascorbic acid content in mango cv. Langra.

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Table1. Effect of different chemicals on yield and quality attributes of mango cv. Mallika

Treatment	Number of Fruit retained / panicle	Av. Fruit Wt. (g)	No. of fruit/ plant	Yield/ plant (Kg)	T.S.S. (^o Brix)	Acidity Percent (%)	Ascorbic acid (mg /100g pulp)	Reducing Sugar (g/ 100g pulp)	Non-Reducing Sugar (g/100g pulp)	Total Sugar(g/ 100g pulp)	Sugar-Acid Ratio
T ₁ -KH ₂ PO ₄ (1%)	2.85	487.67	82.07	39.97	18.73	0.28	38.26	6.96	9.24	16.21	57.98
T ₂ -KH ₂ PO ₄ (1.5%)	2.93	462.67	84.60	39.08	18.20	0.28	39.18	6.58	9.03	15.61	56.40
T ₃ -K ₂ H PO ₄ (1%)	2.84	492.76	81.14	39.97	18.17	0.27	38.15	6.61	8.97	15.58	57.05
T ₄ -K ₂ H PO ₄ (1.5%)	2.98	508.33	85.80	43.59	18.27	0.27	38.13	6.62	8.99	15.62	57.95
T ₅ -KH ₂ PO ₄ (1%) + KNO ₃ (1%)	3.22	510.67	89.89	45.86	20.70	0.27	36.83	8.07	9.93	18.01	67.72
T ₆ -KH ₂ PO ₄ (1.5%) + KNO ₃ (1%)	3.31	506.16	91.55	46.38	19.53	0.26	39.94	7.61	9.31	16.92	65.17
T ₇ -K ₂ H PO ₄ (1%) + KNO ₃ (1%)	3.44	498.33	93.80	46.71	19.87	0.26	37.49	7.40	9.84	17.24	67.43
T ₈ -K ₂ H PO ₄ (1.5%) + KNO ₃ (1%)	3.42	490.33	92.48	45.40	19.47	0.25	36.26	7.54	9.09	16.62	66.85
T ₉ -KH ₂ PO ₄ (1%) + Thiourea (1%)	3.09	507.67	86.12	43.70	19.23	0.24	37.14	7.17	9.14	16.32	67.10
T ₁₀ -KH ₂ PO ₄ (1.5%) +Thiourea (1%)	3.04	502.07	84.53	42.52	18.50	0.24	39.40	6.63	9.11	15.74	65.73
T ₁₁ -K ₂ H PO ₄ 1% +Thiourea (1%)	3.18	497.43	87.44	43.37	18.37	0.24	38.03	6.50	9.02	15.51	65.50
T ₁₂ -K ₂ H PO ₄ (1.5% +Thiourea (1%)	3.14	489.40	86.80	42.54	18.23	0.24	37.92	6.48	9.07	15.55	63.93
T ₁₃ -Control (water Spray)	2.73	424.41	75.27	31.95	17.50	0.27	35.47	5.96	8.82	14.78	56.83
T ₁₄ -Control (No Spray)	2.71	425.34	77.61	32.99	17.57	0.27	35.60	6.09	8.72	14.81	56.87
SE m(±)	0.11	17.10	2.43	1.78	0.41	0.01	0.80	0.32	0.31	0.44	2.34
CD at 5%	0.32	49.70	7.06	5.17	1.19	0.02	2.33	0.94	0.90	1.27	6.79