 ISSN: 2581-3749 (online)

Effect of Different Doses and Sources of Potassium on Yield, Spongy Tissue and Nutrient Content of Alphonso Mango

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Abstract

An experiment was conducted to study the effect of different doses and sources of potassium on yield and quality of Alphonso mango at Central Experiment Station, Wakawali during 2003 to 2007. Soil application of different doses of potassium (MOP, SOP) alongwith recommended N, P was applied in the month of June. The foliar application of KNO_3 and K_2SO_4 was given at peanut, marble and egg stage of fruits. The four years pooled results revealed that the soil application of fym (50kg), 1.5 kg N, 0.5 kg P_2O_5 and 1 kg K_2O through Sulphate of Potassium/ tree in the first fortnight of June, application of recommended dose of Paclobutrazol @ 0.75 g a.i.·m^{-1} canopy diameter and foliar spray of 0.9 % K_2SO_4 at peanut, marble and egg stage recorded highest fruit yield (83.40 kg·tree^{-1}) due to maximum flowering, fruit set, individual fruit weight than other sources of potassium. This treatment reduced the spongy tissue in Alphonso mango. This treatment also increased potassium, calcium, magnecium and sulphur content of pulp, soil and leaves than control.

Keywords: Potassium, yield, quality, Mango.

Introduction

Mango (*Mangifera Indica L.*) is most important fruit of Asia and Worldwise ranks fifth in total production among major fruit crops (FAO 1993). It is grown in about 111 countries spead over five continents with total production of 26.10 million metric tonnes. India ranks first in production with its alone share near about 38% of total world mango production. Alphonso is rated as one of the choicest and prime variety of India with its alone share of over 80% in total mango export. It is internationally accepted because of its typical sugar acid blend, attractive colour, pleasant aroma, highly acceptable flavour, taste and long keeping quality. However, this variety has serious draw back of alternate bearing habit, low productivity and existence of spongy tissue in ripe fruits. Potassium has an important role in major plant processes such as photosynthesis, respiration, protein synthesis, enzyme activation, water uptake, transpiration, growth and development. It also imparts quality characters like attractive colour, flavour, sugar texture, weight and keeping quality of fruits (Balasubramanian 1985). With a view to improve the yield and quality of Alphonso mango experiment was conducted from 2003-04, 2006-07 by using different doses and sources of potassium at Central Experiment Station, Wakawali.

Materials and Methods

The field experiment was conducted for 4 years (2003-04 to 2006-07) at Central Experiment Station, Wakawali which is situated in subtropical region on 17º North latitute and 73º East longitude having elevation 250 m above MSL. The soil is lateritic having pH 5.8 with good drainage. Alphonso mango trees of uniform size (30 years age) were selected for the study. Organic (50 kg FYM) and inorganic fertilizers (N, P, K) were applied in manuring ring in the first fortnight of June using two sources of potassium (MOP and SOP).

Recommended paclobutrazol 0.75 g a.i.·m^{-1} canopy diameter was applied in August. The soil and leaf samples were collected at initial, before flowering and post harvest stage. The foliar application of 1 % KNO_3 and K_2SO_4 was done at peanut, marble and egg size fruit stage. The experiment was laid out in RBD with 3 replications. The data was statistically analysed as per Panse and Sukhatme (1985). There were 10 treatments as detailed below.

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Revised Received Date: 4.1.2018; Accepted Date: 2.4.2018

Treatment Details

T_1- Absolute control (No fertilizers).

T_2- Recommended dose of NP without K (i.e. 1.5 kg N, 0.5 kg P_2O_5 and 0 kg K_2O $tree^{-1}$).

T_3- Recommended dose of NPK but K though muriate of potash (i.e. 1.5 kg N, 0.5 kg P_2O and 0.5 kg K_2O $tree^{-1}$).

T_4- Recommended dose of NPK but K though sulphate of potassium (i.e. 1.5 kg N, 0.5 kg P_2O and 0.5 kg K_2O $tree^{-1}$).

T_5- Recommended dose of NP+1kg of K_2O through sulphate of potassium (SOP) $tree^{-1}$.

T_6- Recommended dose of NPK (K_2O through SOP) $tree^{-1}$ + 1% KNO_3 through foliar application.

T_7- Recommended dose of NPK (K_2O through SOP) $tree^{-1}$ + 0.9% K_2SO_4 through foliar application.

T_8- Recommended dose of NPK (K_2O through SOP) $tree^{-1}$ + 1.8% K_2SO_4 through foliar application.

T_9- Recommended dose of NP+ 1 kg K_2O through SOP $tree^{-1}$ + 0.9% K_2SO_4 through foliar application.

T_{10}- Recommended dose of NP+ 1 kg K_2O through SOP $tree^{-1}$ + 1% KNO_3 through foliar application.

Results

Effect on flowering and fruit setting

The days to occurrence of full bloom was significantly affected by various dose and sources of potassium (Table 1). Treatment T_7 (Recommended dose of NPK (K_2O through SOP) $tree^{-1}$ + 0.9% K_2SO_4 through foliar application) recorded late occurrence of full bloom (221.75 DAF) which was at par with T_5, T_8, T_9, T_{10} and T_4 over other treatments and control (210.9 DAF).

There was significant variation in flowering by potassium treatment. Treatment T_9 (Recommended dose of NP + 1 kg K_2O through SOP per tree + 0.9% K_2SO_4 through foliar application) recorded significantly higher flowering (88.34 %) which was at par with all other treatments over control (72.92%).

The fruit set at peanut, marble and final fruit retention significantly varied by doses and sources of potassium. At marble stage treatment T_8 (Recommended dose of NPK (K_2O through SOP) $tree^{-1}$ + 1.8 % K_2SO_4 through foliar application) recorded significantly higher fruit set (5.67) per panicle which was at par with T_9, T_6, T_{10}

Table1. Effect of different doses and sources of potassium on flowering and fruiting behaviour of Alphonso. (Figures in parentheses are arcsine transformed values.)

Treatment	Days to occurrence of full bloom (DAF)	Flowering	Initial fruit set $panicle^{-1}$		Fruits retained at harvest (numbers $panicle^{-1)}$	Total fruits (Numbers $tree^{-1}$)	Yield (kg $tree^{-1}$)
			Peanut size	Marble size			
T_1	210.92	72.92 (58.87)	9.37	2.29	0.25	171.42	42.86
T_2	215.25	79.59 (62.53)	11.72	2.83	0.33	231.58	57.94
T_3	215.92	85.00 (68.26)	12.42	3.25	0.33	264.50	66.13
T_4	216.58	81.67 (66.24)	14.25	3.83	0.41	310.28	76.00
T_5	219.83	82.50 (67.64)	12.88	4.25	0.42	289.17	72.29
T_6	215.28	81.25 (65.48)	12.79	5.17	0.47	299.00	74.75
T_7	221.75	85.42 (69.76)	14.29	5.17	0.44	285.42	71.36
T_8	217.67	80.00 (64.88)	15.19	5.67	0.49	297.25	74.31
T_9	217.25	88.34 (72.91)	14.61	5.50	0.48	333.59	83.40
T_{10}	220.30	82.70 (68.10)	14.50	5.40	0.46	289.6	77.80
Mean	217.10	81.93 (66.44)	13.20	4.33	0.40	278.90	69.39
SE±	1.84	3.92	1.05	0.23	0.29	16.02	2.98
C.D. 0.05	5.266	11.9	2.94	0.938	0.075	45.94	8.331

and T_7 over rest of the treatments and control (2.29). Similarly, T_8 recorded higher fruit retention (0.49) per panicle which was at par with T_9, T_5, T_6, T_{10} and T_7 over rest of the treatments and control (0.25).

Effect on fruit yield

Yield data recorded in terms of total number of fruits per tree and fruit yield (kg tree^{-1}) are presented in Table 1. Treatment T_9 (recommended dose of NP + 1 kg K_2O through SOP per tree + 0.9 % K_2SO_4 through foliar application) exhibited significantly higher number of fruits tree^{-1} (333.59) which was at par with T_4, T_5, T_6, T_{10} and T_8 over rest of the treatment and control (171.42). Treatment T_9 (Recommended dose of NP+ 1 kg K_2O through SOP per tree + 0.9% K_2SO_4 through foliar application) produced significantly higher fruit yield (83.40 kg tree^{-1}) which was at par with T_4 and T_{10} over rest of the treatments and control (42.86 kg tree^{-1}). Similar results were recorded by Kanwar *et al.* (1987) and also by Syamal and Mishra (1989). They tested 17 year old *Langra* variety of mango with two levels of Nitrogen (0.5 or 1.0 kg), Phosphorus (1 or 2 kg), Potassium 0.5 or 1.0 kg K_2O tree^{-1}. Higher application of fertilizers resulted in higher shoot growth, fruit set and yield.

Effect on fruit weight

Fruit weight showed significant variation among treatments (Table 2). Treatment T_9 (Recommended dose of NP+ 1 kg K_2O through SOP tree^{-1} + 0.9% K_2SO_4 through foliar application) recorded higher individual fruit weight (302.7 g) which was at par with T_5, T_6, T_7, T_{10} and T_8 over rest of the treatment and control (246.86 m).

Effect on pulp recovery, PLW and shelf life

There was significant variation in pulp recovery and shelf life of fruit due to potassium treatment, however, PLW did not varied significantly. Maximum pulp recovery (75.64%) was observed in treatment T_5 which was at par with T_9, T_8, T_4, and T_6 over rest of the treatment and control (70.44%). The maximum shelf life of fruit (13.63 days) was recorded in T_9 which was at par with T_5, T_6, T_{10}, T_7 and T_8 over rest of the treatment and control (10.63 days).

Effect on TSS, Acidity and Ascorbic acid

The data presented in Table 3 indicated that TSS and Acidity did not varied significantly due to potassium treatments. However, increased in values of TSS

Table 2. Effect of different doses and sources of potassium on post harvest fruit measurements. Figures in parentheses are arcsine transformed values.

Treatment	Average fruit weight (g)	Pulp recovery (%)	Physiological loss in weight (%)	Shelf life (days)
T_1	246.86	70.44 (57.07)	20.21 (26.5)*	10.63
T_2	262.90	73.79 (59.24)	18.50(25.26)	11.33
T_3	263.80	73.14 (58.78)	18.38(25.36)	12.38
T_4	265.91	74.60 (59.78)	18.45(25.43)	12.34
T_5	277.27	75.64 (60.41)	17.87(25.04)	13.34
T_6	278.92	74.54 (59.90)	17.64(24.77)	13.59
T_7	279.64	73.03 (58.54)	18.27(25.03)	12.88
T_8	283.61	75.06 (59.91)	18.04(25.48)	13.00
T_9	302.70	75.62 (60.21)	18.09(24.54)	13.63
T_{10}	286.4	74.8 (59.84)	17.80(25.00)	13.4
Mean	273.87	74.06 (59.83)	18.32(25.10)	12.65
SE±	9.8	0.49	0.52	0.32
C.D. 0.05	28.2	1.46	NS	0.90

and Acidity was observed due sulphate of potassium treatments (T_4 to T_9). There was a significantly variation in ascorbic acid due to potassium treatments. Maximum ascorbic acid (35.26 mg·100g^{-1}) was recorded in T_3 (Recommended dose of NPK but K through muriate of potassium (i.e. 1.5 kg N, 0.5 kg P_2O and 0.5 kg K_2O tree^{-1})) which was at par with T_2, T_5, T_8, T_{10} and T_9 over rest of the treatments and control (27.30 mg·100 gm^{-1}).

Effect on reducing sugar, total sugar and ß carotene

There was no significant difference in reducing sugar and total sugar due to potassium treatment. Maximum reducing sugar was recorded in T_8 (4.41%) and minimum in T_1 (3.82%). Similarly, maximum total sugars was recorded in T_5 (11.91%) and minimum in T_1 (10.02%). There was a significant variation in ß carotene due to potassium treatment. Treatment T_6 recorded higher ß carotene content (17858.84 µg 100g^{-1}) which was at par with T_3, T_5, T_7, T_{10} and T_9 over rest of the treatments and control (11816.08 µg 100g^{-1}).

Effect on occurrence of spongy tissue

There was a significant variation in occurrence of spongy tissue due to potassium treatment. Treatment T_8 recorded minimum occurrence of spongy tissue (4.28%) which was at par with T_6 (4.84%) and T_9 (6.04%) over rest of the treatments and control (15.74). Treatment T_3 recorded higher spongy tissue occurrence in fruits (13.43%). Burondkar *et al.* 2002, Jadhav *et al* 2004 and Shinde *et al* 2005 recorded similar results for reduction of spongy tissue.

Effect on nutrient content in mango leaves at different stages

There was a significant difference in Nitrogen content of leaves at initial, before flowering and post harvest stage (Table 4). At initial stage maximum N content was observed in T_9 (1.13%) which was at par with T_2, T_5, T_8, T_{10} and T_6 over rest of the treatment and control (0.81%). Similarly, at before flowering stage T_8 (1.47%) recorded maximum N which was at par with, rest of the treatment over control (1.16%). At post harvest stage T_9 recorded maximum N content (1.0%) which was at par with T_2, T_3, T_5, T_6, T_2, T_7, T_8 and T_{10} over rest of the treatment and control (0.76%). The average N content at initial before flowering and post harvest stage were 0.99%, 1.36% and 0.88% respectively. There was a significant variation in P content of leaves at post harvest stage due to potassium treatments. All the treatments showed significantly higher P content (0.08%) than T_6 and T_1 i.e. control

Table 3. Effect of different doses and sources of potassium on quality parameter of fruits-chemical properties.

Treatment	TSS (°Brix)	Acidity (%)	Ascorbic acid (mg·100g^{-1})	Reducing sugar (%)	Total sugar (%)	Occurrence of spongy tissue (%)	ß carotene (µg·100g^{-1})
T_1	16.17	0.23	27.30	3.82	10.02	15.74 (23.37)	11816.08
T_2	16.34	0.26	35.09	4.11	11.82	12.70 (20.91)	13343.17
T_3	16.68	0.30	35.26	4.03	11.61	13.43 (21.34)	17370.75
T_4	17.34	0.30	30.51	4.16	10.83	7.41 (14.36)	14708.17
T_5	17.06	0.30	34.11	3.93	11.91	8.43 (16.86)	17618.00
T_6	16.82	0.31	29.18	4.09	10.96	4.84 (12.62)	17858.84
T_7	17.91	0.32	30.32	4.04	10.60	8.81 (17.19)	16085.08
T_8	17.39	0.31	34.02	4.41	11.53	4.28 (14.39)	15042.33
T_9	17.78	0.30	35.00	4.13	11.54	6.04 (13.10)	16326.50
T_{10}	17.3	0.31	31.60	4.10	11.30	7.36 (14.16)	16880.0
Mean	17.07	0.29	32.21	4.08	11.21	8.90 (16.83)	15704.89
SE±	0.43	0.020	1.32	0.226	0.502	1.03	679.434
C.D. 0.05	NS	NS	3.71	NS	NS	2.94	1908.949

Table. 4 Effect of different doses and sources of potassium on nutrient content of mango leaves at different stages (oven dry basis).

	Initial						Before flowering						Post-harvest					
	N %	P %	K %	Ca (meq• $100g^{-1}$)	Mg (meq• $100g^{-1}$)	SO_4–S (mg• $100g^{-1}$)	N %	P %	K %	Ca (meq• $100g^{-1}$)	Mg (meq• $100g^{-1}$)	SO_4 –S (mg• $100g^{-1}$)	N%	P%	K%	Ca (meq• $100g^{-1}$)	Mg (meq• $100g^{-1}$)	SO_4–S (mg• $100gm^{-1}$)
T_1	0.81	0.06	0.42	63.33	59.15	20.46	1.16	0.08	0.42	73.63	54.05	22.01	0.76	0.06	0.39	70.83	54.17	21.73
T_2	1.04	0.08	0.48	64.17	58.45	24.48	1.31	0.10	0.51	70.58	64.92	24.32	0.95	0.08	0.46	76.25	56.92	24.87
T_3	0.96	0.08	0.49	70.58	51.37	26.36	1.33	0.10	0.58	73.58	68.42	25.96	0.89	0.08	0.48	78.42	50.67	26.35
T_4	0.93	0.07	0.48	75.42	59.95	26.03	1.37	0.11	0.54	71.09	68.67	27.45	0.85	0.08	0.45	78.92	54.17	26.27
T_5	1.02	0.08	0.57	70.00	61.30	26.29	1.37	0.10	0.56	66.08	55.42	26.43	0.92	0.08	0.51	78.17	56.92	26.94
T_6	1.00	0.07	0.59	71.92	57.12	25.39	1.39	0.10	0.57	75.75	63.09	28.03	0.88	0.07	0.53	81.43	57.59	26.14
T_7	0.96	0.07	0.55	66.43	51.79	25.28	1.39	0.09	0.58	68.92	72.50	29.83	0.87	0.08	0.54	73.77	52.25	25.43
T_8	1.00	0.08	0.48	66.42	56.59	26.18	1.47	0.09	0.53	69.09	64.17	31.02	0.87	0.08	0.51	66.17	55.84	27.82
T_9	1.13	0.08	0.59	65.75	57.60	24.10	1.42	0.10	0.59	68.67	52.08	25.30	1.00	0.08	0.53	74.42	55.84	25.18
T_{10}	1.05	0.08	0.56	70.00	57.10	25.80	1.40	0.09	0.58	70.10	60.20	26.10	0.89	0.08	0.52	77.08	55.10	26.30
Mean	0.99	0.07	0.52	68.40	57.04	25.03	1.36	0.09	0.54	70.74	62.35	26.84	0.88	0.07	0.49	75.61	54.94	25.70
SE±	0.055	0.005	0.038	5.86	3.960	1.78	0.060	0.007	0.033	7.08	5.94	1.55	0.049	0.004	0.032	5.415	3.925	1.608
C.D. 0.05	0.157	NS	0.108	NS	NS	NS	0.169	NS	0.091	NS	NS	4.712	0.142	0.010	0.082	NS	NS	NS

(0.06%).

There was a significant difference in potassium content at initial, before flowering and post harvest stage due to potassium treatment. At initial stage, T_9 and T_6 recorded maximum K content (0.59%) which was at par with T_5, T_7, T_{10} and T_3 over rest of the treatments and control (0.42%). Similarly at before flowering stage T_9 recorded maximum K content (0.59%) which was at par with T_2 to T_8 and T_{10} over the control (0.54%) which was at par with T_9, T_{10}, T_8, T_6, T_5, and T_2 over T_4 and T_1 (0.39%).

The calcium and magnesium content did not vary significantly during all the stages. Maximum calcium content was recorded in T_4 (75.42 meq·100 g^{-1}) during initial stage and in T_6 (75.75 meq·100 g^{-1}) and 81.43 meq·100 g^{-1} respectively) during before flowering and post harvest stage. The sulphur content during before flowering stage varied significantly for potassium treatment. Treatment T_8 recorded maximum sulphur content (31.02 mg·100gm^{-1}). Similar results were reported by Thakur *et al.* (1983). He applied potassium 2 kg KCl $tree^{-1}$·$year^{-1}$ in two splits in October & January to mature *Dasheri* variety of mango trees and reported that potassium leaf concentration increased by 43 percent.

Effect on nutrient content in mango pulp

Nitrogen, phosphorus and pH content of fruit pulp did not vary significantly due to potassium treatment. (Table 5)

The potassium content of fruit pulp varied significantly for various potassium treatments. Treatment T_8 recorded maximum K content (0.78%) which was at par with T_9, T_7, T_6, T_5, T_4, T_{10} and T_3 over T_2 and T_1 (0.53%). Significantly higher Ca content was recorded by T_6 (84.59 meq·100 g^{-1}) which was at par with T_7, T_8, T_{10} and T_9 over rest of the treatments.

Maximum magnesium content was observed in T_7 (69.08 meq·100 g^{-1}) which was at par with T_3, T_4, T_5, T_6, T_8, T_{10} and T_9 over T_2 and T_1 (47.42 meq·100 g^{-1}).

Significantly higher sulphur content was recorded in T_7 (11.14 mg·100 g^{-1}) which was at par with T_6, T_8, T_9, T_{10} and T_3 over rest of the treatment and control (6.00 mg·100 g^{-1}).

Effect on soil chemical properties

Table 5. Effect of different doses and sources of potassium on nutrient content in mango pulp. (oven dry basis).

Treatment	Pulp pH	N %	P %	K %	Ca (meq·100g^{-1})	Mg (meq·100g^{-1})	SO4-S (meq·100g^{-1})
T_1	4.50	0.76	0.08	0.53	73.42	47.42	6.00
T_2	4.48	0.81	0.08	0.61	76.42	52.25	7.47
T_3	4.60	0.91	0.09	0.69	73.17	58.42	8.70
T_4	4.66	0.86	0.09	0.71	75.92	65.00	7.94
T_5	4.59	0.85	0.10	0.70	75.33	66.00	7.44
T_6	4.53	0.80	0.09	0.76	84.59	66.33	11.03
T_7	4.58	0.81	0.09	0.73	83.00	69.08	11.14
T_8	4.63	0.87	0.10	0.78	84.09	63.50	10.70
T_9	4.63	0.88	0.08	0.77	82.00	61.75	9.45
T_{10}	4.62	0.86	0.09	0.72	83.0	66.80	10.1
Mean	4.58	0.84	0.08	0.70	79.09	61.65	8.99
SE±	0.119	0.058	0.008	0.049	2.57	4.41	0.913
C.D. 0.05	NS	NS	NS	NS	7.31	13.360	2.664

Table 6. Effect of different doses and sources of potassium on chemical properties of soil at initial and post harvest stage.

Treatment	pH (1:2:5)		EC (dSm^{-1})		Organic Carbon (%)		N %		P %		K %		Exchangeable calcium ($meq \cdot 100g^{-1}$)		Exchangeable Magnesium ($meq \cdot 100^{-1}$)		Available Sulphur ($mg \cdot kg^{-1}$)	
	Initial	Post harvest	Initial	Post harvest		Post	Initial	Post harvest	Initial	Post harvest	Initial	Post harvest		Post harvest	Initial	Post	Initial	Post
T_1	5.58	5.54	0.06	0.07	1.84	2.08	326.01	348.71	5.00	4.71	261.89	257.05	3.84	4.11	1.54	1.28	2.65	3.49
T_2	5.47	5.58	0.06	0.07	2.12	2.023	351.98	376.16	6.49	5.54	275.23	266.82	4.06	4.37	2.21	2.00	3.86	4.65
T_3	5.47	5.54	0.06	0.07	2.22	2.30	338.10	364.56	6.78	5.94	317.99	318.88	3.81	4.35	2.20	2.18	4.02	4.77
T_4	5.57	5.58	0.06	0.07	2.16	2.24	364.40	386.61	6.20	5.33	322.66	307.94	3.51	3.85	2.89	2.93	3.82	4.49
T_5	5.64	5.65	0.06	0.07	2.25	2.38	347.20	380.92	6.40	5.89	333.93	331.51	3.51	3.93	2.49	2.37	4.42	4.95
T_6	5.68	5.72	0.06	0.08	2.24	2.34	370.61	382.04	5.58	5.21	371.96	363.21	3.66	3.98	2.24	2.23	4.56	5.47
T_7	5.64	5.73	0.05	0.06	2.25	2.18	314.42	348.39	6.75	6.06	340.23	348.74	3.40	3.98	2.12	2.03	5.47	6.21
T_8	5.65	5.64	0.07	0.07	2.33	2.19	322.41	357.83	7.06	6.46	348.29	336.20	3.67	3.96	2.46	2.34	5.90	6.86
T_9	5.68	5.71	0.06	0.07	2.26	2.21	324.49	349.70	6.07	5.47	321.75	330.40	3.26	3.73	2.22	2.29	5.23	6.57
T_{10}	5.63	5.70	0.06	0.07	2.30	2.18	320.50	356.10	6.50	5.50	330.20	333.40	3.50	3.40	2.30	2.20	5.41	6.10
Mean	5.60	5.63	0.06	0.07	2.19	2.23	338.01	365.10	6.28	5.61	322.41	319.41	3.62	4.01	2.26	2.18	4.53	5.35
SE±	0.087	0.076	0.005	0.007	0.16	0.16	22.91	22.40	0.593	0.59	23.20	23.064	0.307	0.280	0.280	0.282	0.585	0.56
C.D. 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	65.553	65.800	NS	NS	NS	0.798	1.758	1.657

There was no significant difference in pH, electrical conductance and organic carbon due to potassium treatment at initial and post harvest stage (Table 6). The nitrogen and phosphorus content of soil did not vary significantly due to potassium treatments during initial and post harvest stage.

There was a significant difference in potassium content of soil due to potassium treatment at both the stages. At initial stage treatment T_6 recorded maximum K content (371.96 kg·ha^{-1}) which was at par with all potassium treatment (T_3 to T_{10}) over control (261.89 kg·ha^{-1}). Similarly at post harvest stage, T_6 recorded higher K content (363.21 kg·ha^{-1}) which was at par with all potassium treatments (T_3 to T_{10}) over control (257.05 kg·ha^{-1}).

Exchangeable calcium content did not vary significantly due to potassium treatments at both stages. The magnesium content varied significantly during post harvest stage due to potassium treatment. The maximum magnesium content (2.34 meq·100g^{-1}) was recorded by T_4 which was at par with T_3, T_5, T_6, T_8, T_9, T_{10} over control (1.28 meq·100g^{-1}).

The available sulphur content varied significantly due to potassium treatments at both the stages. At both the stages T_8 recorded maximum sulphur content which was at par T_6, T_7, T_{10} and T_9 over rest of the treatments and control.

In confirmation to above study, it was reported that most woody species and mango in particular, are highly sensitive to chloride toxicity. Hence, K_2SO_4 is generally preferred instead of KCl (Tandon and Kemmler 1986; Tandon 1987). Potassium sulphate also supplies the much needed sulphur. Jamdar *et al* 2002 reported that the soil application of potassium through sulphate of potash and foliar spray of 1 per cent KNO_3 at peanut, marble stage increased fruit yield and cause reduction of spongy tissue in Alphonso mango. Nitrogen and potassium fertilization increased dry matter content and plant nitrogen and potassium uptake, although with higher nitrogen and potassium rates, potassium uptake decreased. In 4 year trials, Singh *et al*. (1983) applied nitrogen, phosphorus and potassium (each at 1, 2, and 3 %) to 15 year old trees in September and again in April, concluded that although leaf nitrogen, phosphorus and potassium increased with increasing fertilizer spray rates, the number of fruits produced by 1 per cent N, P, K was higher than 3 per cent N, P, K spray. Thus from above 3 years study it can be concluded that for increasing yield quality, nutrient status and reduction of spongy tissue in Alphonso mango K_2SO_4 should be preferred than KCL along with foliar spray of 1 per cent peanut, marble and egg stage of fruit.

Acknowledgement

Authors are very much thankful to SOPIB, Washington for financial support.

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