



## Advancing maturity and improving quality of kokum (*Garcinia indica* Choisy) fruits by post flowering foliar sprays

(Manuscript Received: 09-06-08, Revised: 22-04-09, Accepted: 08-06-09)

**Keywords:** Kokum, mono potassium phosphate, potassium nitrate, urea

Fruits of kokum (*Garcinia indica* Choisy) have many medicinal properties. Butter extracted from seeds remains solid at room temperature and also has nutritive and medicinal values. Kokum rind is a rich-source of hydroxycitric acid (HCA). In spite of various beneficial properties of kokum, it is neglected by the farmers for various reasons and the most important one is the pre monsoon rains that adversely affect the quality of fruits. Though there is no precise statistical data, about 50 per cent of crop is damaged in rains and ultimately spoiled. Further, though the fruits are exclusively used for processing, the fruits which are affected by rains are not useful for value addition.

Large quantities of fruits are required for processing to meet the rapidly increasing demand for kokum products. Hence, the present study was conducted at the Department of Horticulture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri during 2006 – 2007 with an objective to advance maturity and improve quality of fruits through post flowering sprays of chemicals.

The material for the present study consisted of twenty eight year old bearing kokum trees. The experiment was conducted in RBD with seven treatments viz., T<sub>1</sub>: (Urea - 0.5 %), T<sub>2</sub>: (Urea - 0.5 % twice), T<sub>3</sub>: (KNO<sub>3</sub> - 0.5 %), T<sub>4</sub>: (KNO<sub>3</sub>-0.5 % twice), T<sub>5</sub>: (Mono potassium phosphate 0.5 %), T<sub>6</sub>: (Mono potassium phosphate 0.5 % twice) and T<sub>7</sub>: Control (No spray). All the treatments were replicated thrice with two trees per treatment per replication. The sprayings were undertaken at pea grain stage i.e. when the fruits are of pea grain size (3-5 mm) and the second one 20 days after the first spray. Observations on fruit retention (%), advancement in maturity (days), fruit length (cm), fruit breadth (cm), fruit circumference (cm), fruit weight (g), T.S.S. (° Brix),

acidity (%), and sugars (%) were recorded. The statistical analysis was conducted as per the methods suggested by Panse and Sukhatme (1995).

The data on fruit retention and days required for ripening are presented in Table 1. The fruit retention was the highest in T<sub>2</sub> (69.33 %) which was at par with T<sub>4</sub> (67.17 %) and significantly superior over rest of the treatments. The fruits of T<sub>6</sub> ripened 34 days earlier than control (126 days). Both mono potassium phosphate and potassium nitrate at all the levels advanced ripening in kokum. It was evident that in kokum, potassium and phosphorus advances maturity and nitrogen delays maturity. The results are in agreement with the findings of Samara *et al.* (1977) in mango and Bose *et al.* (1988) in grapes.

The data on effect of foliar sprays of nutrients on physical parameters of kokum fruit are presented in Table 2. The maximum fruit length (3.98 cm) was noticed in

**Table 1.** Effect of foliar sprays on fruit retention (%), days required for ripening and advancement or delay in harvesting of kokum fruits (days)

Treatments (concentration @ 0.05 %)	Fruit retention (%)	Days required for ripening	Advancement or delay in harvesting of kokum fruits over control
T <sub>1</sub> - Urea once	63.00 (51.45)	128.00	2
T <sub>2</sub> - Urea twice	69.33 (56.41)	130.33	4.33
T <sub>3</sub> - KNO <sub>3</sub> once	62.83 (52.44)	117.33	-8.67
T <sub>4</sub> - KNO <sub>3</sub> twice	67.17 (55.08)	115.50	-10.5
T <sub>5</sub> - MPP once	60.67 (51.16)	112.33	-13.67
T <sub>6</sub> - MPP twice	63.67 (52.95)	92.00	-34
T <sub>7</sub> - Control	60.17 (50.86)	126.00	
S.Em±	1.16	2.14	
CD (P = 0.05)	3.57	6.61	

MPP = Mono potassium phosphate

T<sub>2</sub> (Urea twice), which was significantly superior over rest of the treatments while the lowest fruit length (3.24 cm) was noticed in T<sub>6</sub> (MPP twice). The treatment T<sub>2</sub> (Urea twice) resulted in the highest fruit breadth (4.24 cm) and was minimum (3.93 cm) in T<sub>6</sub> (MPP twice). Similarly, the maximum fruit circumference was noticed in T<sub>2</sub> (13.22 cm) and minimum in T<sub>6</sub> (12.32 cm). The maximum fruit weight was noticed in T<sub>2</sub> (32.67 g) whereas, minimum was recorded in T<sub>6</sub> (24.63 cm). Nitrogen is believed to give impetus to the formation of new cells and therefore the growth in size, volume and mass are associated with nitrogen. Similar increase in fruit weight by foliar application of one per cent urea and KNO<sub>3</sub> were reported by Vijayalakshmi and Srinivasan (1998) in mango cv. Langra.

**Table 2. Effect of foliar sprays on physical parameters of kokum**

Treatments (concentration @ 0.05 %)	Physical parameters of fruit			
	Length (cm)	Breadth (cm)	Circumference (cm)	Weight (g)
T <sub>1</sub> - Urea once	3.63	4.05	12.61	30.18
T <sub>2</sub> - Urea twice	3.98	4.24	13.22	32.67
T <sub>3</sub> - KNO <sub>3</sub> once	3.67	4.05	12.68	29.74
T <sub>4</sub> - KNO <sub>3</sub> twice	3.64	4.16	13.01	30.42
T <sub>5</sub> - MPP once	3.53	4.06	12.74	30.08
T <sub>6</sub> - MPP twice	3.24	3.93	12.32	24.63
T <sub>7</sub> - Control	3.59	4.03	12.66	29.50
S.E.m±	0.09	0.03	0.102	0.780
CD (P = 0.05)	0.27	0.09	0.313	2.402

MPP = Mono potassium phosphate

The effect of foliar nutrient spray on chemical parameters of kokum fruit is presented in Table 3. The highest TSS was recorded in T<sub>2</sub> (15.93°B) while the least was found in T<sub>7</sub> (14.97°B). The lowest acidity was noticed in T<sub>6</sub> (3.73 %) while the highest was recorded in T<sub>5</sub> (4.15 %). The highest reducing sugar content was recorded in T<sub>6</sub> (6.05 per cent), which was significantly superior over remaining treatments. The lowest reducing sugar (5.38 per cent) was found in control which was at par with T<sub>3</sub> (5.4 per cent). The highest non-reducing sugar content was found in T<sub>6</sub> (5.54 per cent), which was significantly superior over rest of the treatments. The fruits in control T<sub>7</sub> (control) recorded the lowest (5.11 per cent) non-reducing sugar. The highest total sugar in the kokum fruits was noticed in T<sub>6</sub> (11.59 per cent) while the lowest was

Department of Horticulture,  
College of Agriculture, Dapoli - 415 712, Maharashtra  
Email: parag5663@rediffmail.com

**Table 3. Effect of foliar nutrient sprays on chemical parameters of kokum**

Treatments (concentration @ 0.05 %)	Chemical parameters					
	T.S.S. (°Brix)	Acidity (%)	Reducing sugar (%)	Non reducing sugar (%)	Total sugar (%)	Antho- cyanin (%)
T <sub>1</sub> - Urea once	15.15	4.06	5.39	5.17	10.56	2.38
T <sub>2</sub> - Urea twice	15.93	3.77	5.54	5.27	10.81	2.44
T <sub>3</sub> - KNO <sub>3</sub> once	15.09	4.13	5.40	5.18	10.58	2.33
T <sub>4</sub> - KNO <sub>3</sub> twice	15.63	3.79	5.44	5.22	10.66	2.41
T <sub>5</sub> - MPP once	15.25	4.15	5.42	5.19	10.61	2.42
T <sub>6</sub> - MPP twice	15.39	3.73	6.05	5.54	11.59	2.31
T <sub>7</sub> - Control	14.97	4.10	5.38	5.11	10.49	2.38
S.E.m±	0.173	0.124	0.010	0.014	0.02	0.12
CD (P = 0.05)	0.532	0.381	0.031	0.044	0.06	N. S.

NS = Not Significant

MPP= Mono potassium phosphate

found in control (10.49 per cent). The anthocyanin content did not vary significantly among the treatments. In the present investigation, the chemical composition of kokum trees sprayed with different foliar nutrients was significantly superior than control. This could be attributed to enhanced carbohydrate metabolism. In foliar feeding the nutrients are applied directly to the site of metabolism. Whereas 'K' acts as a catalyst which is used as accelerator of reactions. It influences many physiological processes like cell division, photosynthesis and respiration (Jones, 1979). Treatment of KNO<sub>3</sub> (3 %) was a step ahead to reduce days required for harvesting by increase in total soluble solid and sugars during earlier period.

### References

- Bose, T.K., Mitra, S.K. and Sadhu, M.K. 1988. Grape. pp. 245. In: *Mineral nutrition of fruit crops*. Naya Prokash Publication, Calcutta.
- Jones, U.S. 1979. Potassium – The Catalyst, *Fertilizers and soil fertility*, Reston Publishing Company, Virginia, U.S.A. pp. 189-191.
- Panase, V.G. and Sukhatme, P.V. 1995. Statistical methods for agricultural workers. Published by I.C.A.R., New Delhi.
- Samara, J.S., R.S. Thakur and Chadha, K.L. 1977. Mango. pp.313. In: *Mineral nutrition of fruit crops*. Naya Prokash Publication, Calcutta.
- Vijayalakshmi, D and Srinivasan, P.S. 1998. Improving the quality attributes of 'off' year Alphonso mango through chemicals and growth regulators. *The Orissa J. of Hort.* 28(1): 31-33.

P.M. Haldankar,  
S.R. Shinde,  
M.M. Burondkar,  
A.D. Rangwala,  
A.V. Somavanshi,  
S.D. Nimbalkar