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Short communication

Effect of pruning and chemicals on flowering and fruit yield in mango cv. Alphonso

Y.T.N. Reddy and Reju M. Kurian
Division of Fruit Crops
Indian Institute of Horticultural Research
Hessaraghatta Lake Post, Bangalore-560089, India
E-mail : nreddy@iihr.ernet.in

ABSTRACT

A field trial was conducted from 2005 to 2009 on pruning and spray of various chemicals to study their effects on flowering and fruit yield in 'Alphonso' mango, at Indian Institute of Horticultural Research, Bangalore. Seven treatments were imposed, with pruning of fruited shoots as a common treatment, followed by chemical sprays and a control. Over the five years, flowering parameters (% vegetative, dormant or flowering shoots) were found to be non-significant among different treatments. Treatments increased fruit yield compared to control. The best treatment was T_3 (Pruning + 1% K_2HPO_4 + 1% KNO_3 spray) which recorded mean fruit yield of 63.9 kg / plant, compared to a fruit yield of 33.0 kg / plant in control.

Key words: Fruit quality, pruning, mango, chemicals, fruit yield

Mango is an important fruit crop of India, being the 'king of fruits'. India is the global leader in mango production, with 104.1 million tonnes from an area of 12.02 million ha (NHB, 2009). Our national average productivity is estimated at 6.42 t/ha. Reasons for the low productivity are many, an important one being that most of our commercial varieties are alternate or irregular bearers. To combat the alternate bearing habit in mango, many investigations have been made. Use of chemicals and pruning is one of them. However, results on effect of pruning and chemicals vary depending on the variety, location, dose of the chemical and time of application (Maas, 1989; Rao and Ravishankar, 1992; Srihari and Rao, 1996, 1996a; Rao *et al*, 1997; Joganande *et al*, 2003; Jayavalli, 2006)

In varieties like 'Alphonso', not much work has been done on pruning or on use of chemicals. Hence, the present investigation was carried out on mango flowering and fruit yield.

A field trial was conducted from 2005 to 2009 on 16-year old Alphonso mango crop raised on the polyembryonic rootstock 'Peach'. Trees were spaced at 10m × 5m under rain-fed condition on red loamy soil of pH 7.21 and available N - 249 kg/ha, available P - 14 kg/ha and available K - 149.4 kg/ha. Seven treatments were applied as follows:

T_1: Pruning + 1% K_2HPO_4
T_2: Pruning + 1% KH_2PO_4
T_3: Pruning + 1% K_2HPO_4 + 1% KNO_3
T_4: Pruning + 1% KH_2PO_4 + 1% KNO_3
T_5: Pruning + 1% K_2HPO_4 + 1% Thiourea
T_6: Pruning + 1% KH_2PO_4 + 1% Thiourea
T_7: Control (No pruning or chemical spray)

Pruning treatments were imposed after fruit harvest during August by pruning 15-20 cm of fruited shoots, followed by spray of 1% K_2HPO_4 or 1% KH_2PO_4 during October (T_1 and T_2); Treatments T_3 to T_6 at the time of bud-break (December). Spray solution @ 4 litres / tree was used along with a wetting agent. The trial was laid out in RBD design with 4 replications and a single tree as a unit / treatment. Regular and uniform cultural practices were followed. Flowering parameters were recorded in January-February and fruit yield parameters during the fruiting seasons 2006-2009. Data were statistically analyzed as per standard procedure of Panse and Sukhatme (1986).

Type of shoots: Percentage of vegetative, dormant and flowering shoots were found to be non significant among various treatments during the different years of observation. However in general, pruning along with chemical sprays reduced percentage of vegetative shoots and increased percentage of flowering shoots compared to control. Similar results were reported by Maas (1989); but, on the contrary,

Table 1. Fruit yield in mango cv. Alphonso as influenced by pruning and chemical sprays

Treatment	No. of fruits / plant						Fruit yield (kg / plant)					
	2006	2007	2008	2009	Cumulative	Mean	2006	2007	2008	2009	Cumulative	Mean
Pruning+1% K_2HPO_4	200.1	183.7	27.7	388.5	800.0	200.0	42.8	43.5	7.1	71.0	164.4	41.1
Pruning+1% KH_2PO_4	210.2	156.0	58.2	438.0	862.4	215.6	44.9	38.7	14.2	78.7	176.5	44.1
Pruning+1% K_2HPO_4+ 1% KNO_3	198.5	299.7	91.7	647.5	1237.4	309.3	40.0	79.5	21.9	114.5	255.9	63.9
Pruning+1% KH_2PO_4+ 1% KNO_3	178.5	247.5	68.0	481.7	975.7	243.9	39.5	62.0	17.0	89.2	207.7	51.9
Pruning+1% K_2HPO_4+ 1% Thiourea	195.6	235.0	85.7	465.0	981.3	245.3	40.6	56.5	19.3	83.2	199.6	49.9
Pruning+1% KH_2PO_4+ 1% Thiourea	189.1	210.0	67.5	486.2	952.7	238.1	42.1	52.7	17.0	92.5	204.3	51.0
Control (No pruning or chemical spray)	141.5	121.2	24.0	348.2	634.9	158.7	30.4	28.4	6.1	67.2	132.1	33.0
F-test	NS	*	NS	*	*		NS	*	*	*	*	
S. Em ±	8.1	23.9	18.7	29.4	42.3		5.9	6.6	3.7	10.5	18.3	
C.D. (P= 0.05)	-	72.0	-	90.5	127.6		-	20.1	10.9	30.9	54.7	

*Significant at 5% NS: Non-Significant

Table 2. Effect of pruning and chemicals on cost:benefit ratio in mango cv. Alphonso

Treatment	Gross returns (Rs.)	Net returns (Rs.)	Cost: benefit ratio
Pruning + 1% K_2HPO_4	102750	75250	1:2.25
Pruning + 1% KH_2PO_4	110250	82750	1:2.50
Pruning + 1% K_2HPO_4 + 1% KNO_3	159750	129500	1:3.80
Pruning + 1% KH_2PO_4 + 1% KNO_3	129750	98750	1:2.65
Pruning + 1% K_2HPO_4 + 1% Thiourea	124250	93250	1:2.45
Pruning + 1% KH_2PO_4 + 1% Thiourea	127500	96500	1:2.60
Control (No pruning or chemical spray)	82500	54250	1:1.54

beneficial effects of pruning + chemicals spray were reported in mango by Joganande *et al* (2003) and Chadha and Pal (1993). The difference in response to pruning and chemicals was due to the varieties studied under varying environmental and growth conditions.

Panicle length, shoot length and number of days to 50% flowering during different years were found to be non-significant among treatments. Similar results were earlier reported (Maas, 1989; Chadha and Pal, 1993). These attributes were not influenced by pruning or chemical sprays.

Fruit yield: Fruit yield as affected by pruning and spray of chemicals is presented in Table 1. Number of fruits/plant and fruit yield/plant was found to be significant between treatments in the years 2007 to 2009. Cumulative fruit yield was also significantly different in treatments compared to control. All the treatments increased fruit yield, and, the most pronounced effect was seen in the treatment Pruning + 1% K_2HPO_4 + 1% KNO_3. Hence, mean fruit yield was almost twice (63.9 kg / plant) that in the control (33.0 kg / plant). Similar results have been reported by several workers (Jaganande *et al*, 2003; Chadha and Pal, 1993). Increased fruit yield owing to pruning and chemicals was due to increased number of flowering shoots and reduced vegetative / dormant shoots, in general, compared to the control. Phosphoric acid and potassium nitrate may have acted synergistically to increase the number of flowering shoots, thereby increasing fruit yield.

Cost-benefit ratio: Mean cumulative fruit yield for four years and cost:benefit ratio were worked out and are presented in Table 2. Maximum cost:benefit ratio (1:3.8) was obtained with the treatment Pruning + 1% K_2HPO_4 + 1% KNO_3, whereas, control treatment recorded the least cost:benefit ratio (1:1.54) indicating superiority of the treatment.

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