Original Research Article

Impact of Front Line Demonstration on Effect of Pruning on Yield Attributes and Quality of Mango cv. Benishan

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A B S T R A C T

Keywords

Mango, Front line demonstration, pruning, quality canopy management and yield

The Front line demonstration was conducted on impact of effect of pruning practices on yield attributes in mango cv. Benishan and economics at farmer's fields of Nellore district, Andhra Pradesh during the year 2010-11 to 2012-13. The main objective of front line demonstrations (FLDs) was to demonstrate study the effect of pruning on yield attributes and quality of mango cv. Benishan and to introduce the pruning practice for regular bearing and getting good yields. The results showed that when pruning of criss cross and dried branches along with left over fruit stalks & Spraying of 1% Bordeaux mixture, recommended dose of fertilizers (1.8kg urea,4.5kg SSP and 1.35Kg MOP/tree), timely irrigations and spraying of 2g zinc sulphate + 10g Urea/ 1 of water (T_1) all the yield attributing characters were high in demo plot *viz.*, fruit weight (304.11 g), number of fruits tree^{-1} (131.33), fruit yield tree^{-1} (37.22 kg), fruit yield ha^{-1} (14.77 t). The minimum of all these characters and fruit weight were obtained in control (T_2) where pruning of dried branches only. Net returns and B: C ratios were found to increased in demonstrated plots over farmers practice.

Introduction

Mango occupies the same position in tropic and semi tropics as enjoyed by apple in the temperate regions of the world. It is commonly known as "King of Fruits" Singh (1996), a popular tropical, especially in Asia. Due to its high palatability, excellent taste, flavour and exemplary medicinal and nutritive values it is said to be the king of tropical fruits. In India, it is cultivated from ancient times. India is also a major exporter of mango pulp in the world. The country has exported 1, 47, 815.70 MT of mango pulp to the world worth Rs 608.49 crores during the year 2012-13 (Anonymous, 2013a).

Unripe fruits are used in making chutney and pickles. Mango butter, which resembles cocoa butter, is extracted from mango kernels.

India is the largest producer of mango in the world. In India, mango contributes nearly 22.1 per cent to the total fruit production. The estimated area under mango is about 2500.0 thousand hectares with a production of 18002.4 thousand million tones and a productivity of 7.2 MT/ha. Major mango growing states are Andhra Pradesh, Uttar Pradesh, Karnataka, Bihar and Gujarat.

Consequent upon the continuous and long span of mango orcharding in the country, a large number of orchards have become old and unproductive. Severe pruning of old, non-productive mango trees coupled with subsequent tip pruning for rapid restoration of orchard production Davenport *et al.,* (1997).

However, overcrowding of orchards has been recorded after 20 years in the absence of regular canopy management. High yield and good quality of mango is desired by the mango manufactures for commercial cultivation. Pruning is an important practice in mango plants for quality of mango production, controlling tree size and high yield of mango. Essentially, pruning should maintain a good balance between growth and fruiting Uddin *et al.,* (2014).

The beneficial effects of pruning on light penetration of mango trees of cv. Amrapali have been also reported (Sharma *et al.,* 2006). Shoot initiation is stimulated by pruning, defoliation, irrigation during dry conditions, and application of nitrogen fertilizers Davenport *et al.,* (1997).

Pruning is also effective in diverting organic substances, mineral nutrients and water to productive branches Uddin *et al.,* (2014). Consequently, the mango trees have earlier and more uniform flushing, faster flush maturation, better response to flower induction, better fruit set and higher yield. Rejuvenation of old and unproductive mango orchard through pruning has already been standardized in traditionally grown vigorous mango cultivars.

With all these background, an investigation was carried out at to study the effect of pruning on yield attributes and quality of Mango and to introduce the pruning practice for regular bearing and getting good yields.

Materials and Methods

Krishi Vigyan Kendra, Nellore, has conducted 11 locations under real farming situations (Irrigated red soils) between 2010-11 and 2012-13 in 7 different villages located in different blocks under KVK operational area. Experimental research design was used for the study total population of 11 farmers (N=11) in whose plots FLDs were conducted along with control plot was taken into consideration for the study to find out the effect of pruning on yield attributes of mango. The area under each demonstration was 0.8 ha (8000 m^2) from each location consisting of 0.2 ha (2000m^2) each of demo and control plots. The details are given in Table.1 The demonstration comprised of two treatments *viz*., T1-Pruning practice (Pruning of criss cross & dried branches along with left over fruit stalks & Spraying of 1% Bordeaux mixture), Recommended dose of fertilizers (1.8kg urea, 4.5kg SSP and 1.35Kg MOP/tree), Timely Irrigations and Spraying of 2g zinc sulphate +10g Urea/ l of water and T2-Farmers practice (only removal of dried branches). Eighteen years old mango plants of cv. Benishan planted at a spacing of 10.0 m x 10.0 m. The mango plants were grafted plants where scions were grafted on seedling rootstocks at a height of 30-45 cm above the ground level. Before the pruning operation the orchard was overcrowded and the plants had attained a height of more than 6.0 m from the ground. All the trees had scaffold branching below the post pruning heights. The method used for the experiment involved Pruning of criss cross & dried branches along with left over fruit stalks and followed by spraying of 1% Bordeaux mixture. Application of recommended dose of fertilizers (1.8kg Urea, 4.5kg SSP and 1.35 Kg MOP/tree), Timely Irrigations and Spraying of 2g zinc sulphate +10g Urea/ l of water. Data on yields, expenditure incurred

by the farmer on control (Farmer's practice) and demo plots were collected and analyzed. Gross income was calculated based on local market prices of banana and net income by subtracting the total cost of cultivation from gross income. Benefit: cost ratio was computed by dividing gross returns with cost of cultivation. The main aim of effect of pruning on yield attributes and quality of Mango and to introduce the pruning practice for regular bearing and getting good yields.

Results and Discussion

Yield attributes

Due to application of recommended dose of fertilizers after pruning of criss cross and dried branches along with left over fruit stalks, followed by spraying of 1% Bordeaux mixture, Timely Irrigations and spraying of 2g zinc sulphate +10g Urea/ l of water marked effect on fruit yield in mango cv. Benishan was observed in the present demo.

The yield performance indicators are presented in Table 2. The data presented in Table 2 revealed that under demo plot, the performance of mango yield was found to be substantially higher than that under control (farmer practices) during all the years (2010-11 to 2012-2013). The fruit weight (g) of mango cv. Beneshan under demo recorded were 296.00 g, 314.14 g and 302.20 g, in compared to control 248.00 g, 252.30 g and 261.00 g during 2010-11, 2011-12 and 2012-13 respectively. The cumulative effect of technological intervention over three years, revealed an average fruit weight were 304.11 g in compared to control 253.77 g. The numbers of fruits tree^{-1} under demo recorded were 132, 124 and 138, compared to control 108, 110 and 115 during 2010-11, 2011-12 and 2012-13 respectively. The cumulative effect of technological

intervention over three years, revealed an average number of fruits tree^{-1} 131.33, whereas in control 111.00. The fruit yield tree^{-1} under demo 35 kg, 38.95 kg and 37.71 kg in compared to control 23.80 kg, 25.00 kg and 34.00 kg during 2010-11, 2011-12 and 2012-13 respectively. The cumulative effects of technological intervention over three years, revealed an average fruit yield tree^{-1} were 37.22 kg, in compared to control 27.60 kg. The fruit yield ha^{-1} under demo 13.60 t, 14.21 t and 16.50 t in compared to control 9.86 t, 9.00 t and 11.20 t during 2010-11, 2011-12 and 2012-13 respectively. The cumulative effects of technological intervention over three years, revealed an average fruit yield ha^{-1} were 14.77 t, in compared to control 10.02 t. 47.71% increase in yield over control. The year-to-year fluctuations in yield and cost of cultivation can be explained on the basis of variations in prevailing social, economical and microclimatic condition of that particular village. Similar to the present findings Bikash Das and B.R. Jana stated (2013) that pruning at 1.0 m height, 60 cm length of primary shoot and no control on length of secondary shoot were found to be most appropriate treatments to attain an adequate canopy architecture in unproductive mango plants of cv. Amrapali planted at close spacing. Maintenance of canopy size could later be achieved and can be maintained through regular shoot tipping after fruit harvesting. Similar findings were also stated by Uddin *et al.,* (2014), Gross (1997), Lal *et al.,* (2000), Sharma *et al.,* (2006), Shi *et al.,* (1996) and Shinde *et al.,* (2002).

Economic parameters

Economic indicators i.e. gross expenditure; gross returns, net returns and BC ratio of Front Line Demonstration are presented in Table 3.

Table.1 Particulars of Front Line Demonstration

Sl. No.	Year	No. of Villages	No. of locations	Area (ha.) Demo	Area (ha.) Check
1	2010-11	3	3	2.4	0.6
2	2011-12	2	4	3.2	0.8
3	2012-13	2	4	3.2	0.8
Total		**7**	**11**	**8.0**	**2.4**

Table.2 Effect of Pruning on yield attributes of mango cv. Benishan

Year	Fruit weight (g) Demo	Fruit weight (g) Check	No. of Fruits tree^{-1} Demo	No. of Fruits tree^{-1} Check	Fruit yield tree^{-1} (Kg) Demo	Fruit yield tree^{-1} (Kg) Check	Fruit yield ha^{-1} (t/ha) Demo	Fruit yield ha^{-1} (t/ha) Check	% increase in yield
2010-11	296.00	248.00	132	108	35.00	23.80	13.60	9.86	37.93
2011-12	314.14	252.30	124	110	38.95	25.00	14.21	9.00	57.88
2012-13	302.20	261.00	138	115	37.71	34.00	16.50	11.20	47.33
Average	**304.11**	**253.77**	**131.33**	**111.00**	**37.22**	**27.60**	**14.77**	**10.02**	**47.71**

Table.3 Cost economics of Canopy management practices in Mango cv. Benishan

Year	Fruit yield ha^{-1} (t/ha) Demo	Fruit yield ha^{-1} (t/ha) Check	Gross expenditure ha^{-1} (Rs.) Demo	Gross expenditure ha^{-1} (Rs.) Check	Gross returns ha^{-1} (Rs.) Demo	Gross returns ha^{-1} (Rs.) Check	Net returns ha^{-1} (Rs.) Demo	Net returns ha^{-1} (Rs.) Check	B:C ratio Demo	B:C ratio Check
2010-11	13.60	9.86	26000	24000	114240	82824	88240	58824	4.39	3.45
2011-12	14.21	9.00	30000	26500	122206	77400	92206	50900	4.07	2.92
2012-13	16.50	11.20	32000	26400	138600	94080	106600	67680	4.33	3.56
Average	**14.77**	**10.02**	**29333.33**	**25633.33**	**125015.33**	**84768.00**	**95682.00**	**59134.67**	**4.27**	**3.31**

Table.4 Significant difference between important parameters in demo over control for three years (2010-11 to 2012-13) (n-11)

Sl. No.	Parameters	Mean Demo	Mean Check	Mean difference	't' – cal value
1	Fruit weight (g)	304.11	253.77	50.34	**5.24**
2	No. of Fruits tree^{-1}	131.33	111.00	20.33	**2.04**
3	Fruit yield tree^{-1} (Kg)	37.22	27.60	9.62	**3.11**
4	Fruit yield t ha^{-1}	14.77	10.02	4.75	**4.00**

The data clearly revealed that, the net returns from the demo plot were substantially higher than control plot, *i.e.* farmers practice during all the years of demonstration. Average net returns from demo plot were Rs. 1,25,015.33 /ha in compared to control i.e. Rs 84,768.00/ha. The gross expenditure from the demo plot were Rs. 29333/ha in compared to control Rs. 25633/ha. The gross returns from the demo plot were Rs. 1,25,015.33/ha in compared to control Rs. 84,768.00/ha.

Economic analysis of the yield performance revealed that benefit cost ratio of demonstration plots were observed significantly higher than control plot *i.e.*, farmer practice. The benefit cost ratio of demonstrated and control plots were 4.39, 4.07 and 4.33 and 3.45, 2.92 and 3.56 during 2010-11, 2011-12 and 2012-13 respectively. The cumulative effect of technological intervention over three years, revealed an average benefit cost ratio were 4.27 in compared to control 3.31.

Significance of differences among demo and control plots with respect to important indicators

In order to test the effectiveness of pruning on yield attributes of mango cv. Baneshan statistically 't' test was applied to find out, whether there is any significant difference existed between the demo and control plots in terms of fruit weight (kg), number of fruits tree^{-1}, yield tree^{-1} and Yield t ha^{-1}, which is presented in Table.4. From the results it was revealed that timely pruning, timely application of recommended dose of fertilizers, timely irrigations and spraying of spraying of 2g zinc sulphate +10g Urea/ ltr of water very effective for good fruit size and fruit quality. Higher yields were recorded by adopting this pruning technique. By pruning practices we can manage desired tree canopy which is very important for tree management practices. Higher Fruit weight (g), more number of fruits per tree^{-1}, high yield ha^{-1} (t) and economic parameters as compared to control.

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