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Impact of demonstration of protected irrigation during fruit development in mango cv. Alphonso

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Abstract

The demonstrations were conducted in hard lateritic rocky area in different 4 villages of each Deogad and Malvan tahsils of Sindhudurg district of Maharashtra during the fruiting season 2019-20. The results of demonstration were analyzed and the response of farmers was also assessed. The highest fruit retention (5.47 per cent) was observed in the trees receiving irrigation and in untreated trees (Control) the fruit retention was 3.35 per cent. The yield was 34.08 kg/tree in the irrigation practice and it was significantly increased by 28.51 per cent over control due to irrigation. The maximum fruit weight (229.49 g) was recorded in irrigation practice and minimum fruit weight was in control (216.74 g). The highest net return Rs. 83940/- with highest B:C ratio (1.54) was gained by giving protective irrigation during fruit development stage of Alphonso mango. Among the respondents, 68.00 percent respondent farmers were ready to adopt the demonstrated technology. However, 2.67 per cent farmers were refused for adoption as they pointed the constraints in adoption and 29.33 per cent farmers were partially agreed to adopt the technology after demonstration.

Keywords: Demonstration, irrigation, mango cv. Alphonso

Introduction

Mango (*Mangifera indica* L.) is prime fruit of India belonging to Anacardiaceae. It is known as “King of fruits” and considered as national fruit of India. Mango crop occupies a leading position in global fruit trade. It is extensively cultivated in India occupying more than 45 per cent of total world production. In India, thousands of mango cultivars exist however, specific cultivars are dominant in different regions. Among those cultivars, ‘Alphonso’ is the choicest cultivar due to its unique characteristic like attractive colour and shape, sugar-acid blend, pleasant aroma, superior fragrance, delicious taste and extended keeping quality. Alphonso has major contribution in entire mango export. It is commercially cultivated in Maharashtra, Goa, Gujarat and Karnataka. The Alphonso mango from Konkani region of Maharashtra has inimitable worth in the mango trade. The Alphonso mango fruits produced in the unique geographic territory having hard lateritic rocky area are getting prime rates (Malshe *et al.*, 2017) [3]. But, there are certain demerits in Alphonso cultivar as it is irregular bearer, sensitive to climate aberration and occurrence of spongy tissue disorder. The flowering and fruiting in mango is complex and are governed by several internal and external (Biotic and abiotic) factors. The proper management during fruit development stage is also crucial in mango production. Several management practices during fruit development stage like irrigation, spray of nutrients and growth promoters, etc. are recommended for yield and quality improvement. The mango crop especially grown on hard lateritic rocky area of Konkani region is a site-specific plantation and management of crop during fruit development stage is essential and it gives better response to irrigation. The protected irrigation of 150 to 200 litre of water at fortnight interval starting from pea grain stage to one month before harvesting time is recommended for reducing fruit drop (Anon. 2009) [1]. However, the geographical situation, availability of irrigation water, etc. are the major constraints in the region. The diffusion of such technology to mango grower community, demonstration is an ideal tool. The present comparative study was undertaken to assess the impact of demonstration of protective irrigation on mango yield cv. Alphonso under hard lateritic rocky area of Deogad and Malvan tahsils of Sindhudurg district.

Methodology

The demonstrations were conducted in hard lateritic rocky area in different 4 villages of each Deogad and Malvan tahsils of Sindhudurg district of Maharashtra during the fruiting season

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2019-20. For demonstration, from each village two orchards having uniform 30 years old mango trees of cv. Alphonso were selected and recommended management practices *viz.* nutrient management, application of paclobutrazol, plant protection, etc. were followed unvaryingly. The protective irrigation @ 150 lit water at 15 days interval starting from pea grain stage to one month before harvesting time. However, one block of mango trees in same orchards was considered as control for comparing. The observations on fruit retention, fruit weight and yield were recorded. The data were analysed using paired 't' test. The economics of the demonstration was calculated on hectare basis. After the demonstration, the response of farmers towards the adoption was noted.

Results and Discussion

The data presented in Table 1 indicate the comparison between irrigation during fruit development stage and control (Check) in terms of fruit retention percentage, days required for maturity from fruit set, average fruit weight and yield per tree in mango cv. Alphonso. From the data, it is cleared that there was significant influence on fruit retention at harvest stage in mango cv. Alphonso. The highest fruit retention (5.47 per cent) was observed in the trees receiving irrigation. However, in untreated trees (Control) the fruit retention was 3.35 per cent. The increased fruit retention percentage was due to reduction in the fruit drop. The supplementary moisture supply during fruit development stage might be responsible for control of fruit drop and fruit retention improvement.

From the data, it is also observed that the maturity period was delayed by five days in irrigation practice. Water supply is the most critical during the first 42 days of fruit development (Wei *et al.*, 2017)^[8]. The similar results are also reported by Uddin and Amin (1994)^[7] and Malshe *et al.* (2020)^[2].

The average fruit weight was also improved due to irrigation during fruit development stage (Table 1). The maximum fruit weight (229.49 g) was recorded in irrigation practice and minimum fruit weight was in control (216.74 g). This designates that the irrigation during fruit development stage of mango helped to improve the fruit weight as adequate water during fruit growth and development period is needed for cell enlargement and division. The fruit weight improvement due

to irrigation was also observed by Wei *et al.* (2017)^[8].

The yield in control was 26.52 kg/tree while it was 34.08 kg/tree in the irrigation treatment (Table 1). The yield of mango fruits was significantly increased by 28.51 per cent over control due to irrigation. The irrigation might be helpful for maintaining favourable water balance which is essential for the growth and development of the fruit as there is high water requirement particularly towards maturity. The similar findings were earlier reported by Sarkar and Rahim (2013)^[5], Wei *et al.* (2017)^[8] and Malshe *et al.* (2020)^[2] in mango.

The data on economics of the demonstration on hectare basis was estimated and presented in Table 2. The highest net return Rs. 83940/- with highest B: C ratio (1.54) was gained by giving protective irrigation during fruit development stage of Alphonso mango. The lowest B: C ratio (1.22) was in threes where irrigation was not given. The increased yield by supplementary irrigation led to higher economic returns. The benefit cost ratio of demonstration plots was observed significantly higher than control plot by Narayana Swamy *et al.* (2018)^[4] in demonstrating pruning in mango.

The data regarding to response of farmers towards adoption of irrigation practice during fruit development stage in mango cv. Alphonso are presented in Table 3 revealed that 68.00 percent respondent farmers were ready to adopt the demonstrated technology. However, 2.67 per cent farmers were refused for adoption as they pointed the constraints in adoption and 29.33 per cent farmers were partially agreed to adopt the technology after demonstration. The response of the farmers towards the adoption of technology might be based on socioeconomic background of the concerned farmers. This can be seen as positive indicator for formatting demonstrations and enriching knowledge level of mango growers. Singh *et al.* (2010)^[6] assessed the extent of adoption of improved mango production technology.

From the present assessment, it is concluded that in mango cultivation under hard lateritic rocky area, the irrigation during the fruit development period (@ 150 lit water at 15 days interval starting from pea grain stage to one month before harvesting time) is beneficial for increasing fruit retention, fruit weight and yield.

Table 1: Influence of irrigation during fruit development stage on fruit retention, and days to maturity of fruits, fruit weight and yield in mango cv. Alphonso

Parameters	Irrigation during fruit development	Control	't' value
Fruit retention at harvest stage (%)	5.47 (\pm 0.45)#	3.35 (\pm 0.31)	14.9*
Average fruit weight (g)	229.49 (\pm 5.48)	216.74 (\pm 5.19)	8.1*
Days for fruit maturity	101.2 (\pm 0.55)	96.2 (\pm 0.29)	7.2*
Yield (kg/tree)	34.08 (\pm 5.11)	26.52 (\pm 3.19)	9.1*
Improvement in yield over control (%)	28.51	-	-

(# Standard deviation, * Significant at 0.05%)

Table 2: Economics of demonstrations of irrigation during fruit development stage in mango cv. Alphonso

Treatment	Yield (t/ha)	Returns (Rs./ha.)	Cost of production (Rs./ha.)	Net profit (Rs./ha.)	B: C Ratio
Irrigation during fruit development	3.91	238560	154620	83940	1.54
Control	2.65	185640	151620	34020	1.22

Table 3: Willingness of farmers to adoption of irrigation practice during fruit development stage in mango cv. Alphonso

Response of farmers	Frequencies (n = 75)
Agreed to adopt technology	51.00 (68.00)#
Partially agreed to adopt technology	22.00 (29.33)
Refuse to adopt technology	2.00 (2.67)

(# indicates the percentage)

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