



# ***In - situ* Propagation Technique - A Boon for Mango Growers of Panchmahal District of Gujarat**

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## **ABSTRACT**

Panchmahal district of Gujarat is having 44.05 per cent population of tribal farmers namely Nayak, Rathva, Baria etc. Male members of the family migrate in the urban areas for their livelihood. Women and old persons remain at home. Therefore, in other seasons, the land remains unutilized. Many institutions aware and motivate them for growing fruit crops with intercropping but costly planting material is the main reason for not getting desired level of popularity of horticultural crops among the tribal farmers which are in-habitant of interior villages those away from KVK, Horticulture Centers or other fruit plant nurseries. Transportation and labour are costly factors in the remote areas of tribal farming community. Therefore, KVK-Panchmahal conducted training, advisory services, demonstrations at the farmers' field since the year 2014-15 to 2016-17 to standardize the *in-situ* propagation technique through soft wood grafting in mango (*Mangifera indica* L.) at farmers field and analysis of input cost and technology adoption ratio. Kesar, Alphonso, Mallika and Rajapuri varieties in mango were selected. *In situ* soft wood grafting was performed in the month of September. The highest success per cent was noted in Mallika (86.0) followed by Kesar (84.0). Similar trend was recorded in respect of number of leaves per plant; which was recorded highest in Mallika. This technology ascertains the purity of the variety and gives certainty of quality planting material and also minimizes other problems like transportation, wastage of time and mental stress of the farmers. It has become an effective means to confine the migration of the tribal farmer in other areas. As a result, *in-situ* propagation technique is doing well and adoption rate is satisfactorily among the tribal farmer for enhancing livelihood security in interior tribal areas of Panchmahal.

**Key Words:** Kesar, Alphonso, Mallika, Rajapuri, Semi-arid environment, Soft wood grafting, Livelihood security.

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## **INTRODUCTION**

Panchmahal is one of the densely populated districts of Gujarat, where 44.05 per cent population falls under tribal community namely Nayak, Rathva and Baria. Most of them are small farmers with a land holding unit of <1ha and the crops like maize, pigeon pea and black gram are grown by them during monsoon and afterwards they migrate in the urban areas of Gujarat and neighboring states as well. They showed least interest in growing horticultural crops and therefore, KVK Panchmahal identified this problem and motivated them for growing fruit crops under rain fed conditions. Lack of genuine planting material and its availability in the adjoining areas were the main problems

for establishment of orchards. Non availability of elite planting materials and its cost are the main reasons for not getting desired level of popularity horticultural crops among the farmers.

Of various methods of propagation, grafting is of paramount importance in fruit trees as it results the highest success and field establishment of jamun (*Syzygium cuminii* Skeels), custurd apple (*Annona squamosa* L.), aonla (*Emblica officinalis* Gaertn), tamarind (*Tamarindus indica* L.) and jackfruit (*Artocarpus heterophyllus* Lam.) (Singh and Singh, 2006; Ghosh *et al*, 2004; Roshan *et al*, 2008; Singh and Singh 2007 ; Silvi *et al*, 2008). Mango is grown successfully in the tribal areas of Panchmahal district and experiment was conducted

at the farmers' field during the year 2014-15 to 2016-17 to standardize *in-situ* softwood grafting in mango with Kesar, Alphonso, Mallika and Rajapuri varieties.

## MATERIALS AND METHODS

Farmers were suggested to raise *in-situ* mango seedlings through locally available mango stones at the spacing of 6m x 6m. The irrigation, weeding and other desired intercultural operations were done time to time. For raising the rootstocks sowing of seeds was done in the month of June and grafting was done in the month of September in every reported year. *In-situ* softwood grafting was performed with Kesar, Alphonso, Mallika and Rajapuri varieties. The experiment was laid out in randomized block design with five replications. Success per cent was recorded 3 months after grafting. Length and diameter of sprout, number of leaves and sprouts per plant were recorded at the interval of 180, 210 and 240 days after grafting operation. The collected data pertaining to input analysis and adoption of the technology were subjected to basic statistical analysis as suggested by Snedecor and Cochran (1989).

## RESULTS AND DISCUSSION

The perusal of the data (Table 1) revealed that days required for bud sprouting differed significantly due to different varieties. It was observed that in case mango, grafted plants of Mallika took least time to sprout (17.80 d) followed

by Kesar. Maximum time for bud sprouting was taken in mango cv. Rajapuri. The difference in time of sprouting in different varieties might be due to varietal character. The highest sprouting (89.10 %) was recorded in Mallika followed by Kesar. Data exhibited maximum percentage of graft success in Mallika mango (86.00 %). This finding was in agreement with the findings of Singh *et al* (2007), Mulla *et al* (2011) and Chandra and Jadhav (2012) in jamun, lasoda, mandarin (*Citrus reticulata* Blanco) and pomegranate. Such a wide variation in sprouting and graft success may positively be attributed due to varietal variation. The data on growth parameters like length of sprout, diameter of sprout, number of leaves and sprout per plant were recorded at the interval of 180, 210 and 240d interval after grafting. At the final observation, length of sprout ranged between 87.00-93.10 cm. The maximum mean length of sprout was recorded in variety Rajapuri followed by Alphonso, Kesar and Mallika. The diameter of sprout also showed same trend being highest in Rajapuri (1.32 cm) and lowest in Mallika (1.26 cm). At the final observation (240d, number of sprout ranged between 6.66-7.66 being highest in Rajapuri. The number of leaves also increased with increasing days after grafting. The maximum number of leaves per plant was recorded in cv Rajapuri (50.00) at the final date of observation while, the minimum number of leaves per plant was observed in Mallika (38.00). The quick and strong union formation and better nutrient uptake might have caused for higher plant

**Table 1. Effect of cultivars on *in-situ* soft wood grafting and budding on bud sprouting, time taken for bud sprout and survival per cent.**

Sr. No.	Mango cultivar	Time taken for bud sprout (days)	Bud sprout (%)	Success (%)
1.	Kesar	18.2	87.5 (69.3)	84.00 (66.4)
2.	Rajapuri	20.8	77.0 (61.3)	75.00 (60.0)
3.	Alphonso	22.6	74.2 (59.4)	73.10 (58.7)
4.	Mallika	17.8	89.1 (70.7)	86.00 (63.0)
	CD (P= 0.05)	0.5	1.5	1.1

Figures in parentheses are angular transformed values.

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**Table 2. Effect of cultivars on length and diameter of sprout (cm).**

Sr. No.	Mango cultivar	Length of sprout (cm)			Diameter of sprout (cm)		
		180 d	210 d	240 d	180 d	210 d	240 d
1.	Kesar	56.0	72.0	89.0	1.1	1.1	1.2
2.	Rajapuri	60.1	74.2	93.1	1.1	1.2	1.3
3.	Alphonso	57.0	73.4	90.1	1.1	1.1	1.3
4.	Mallika	53.2	70.1	87.0	1.1	1.1	1.2
	CD (P= 0.05)	1.0	1.1	1.7	0.02	0.04	0.06

**Table 3. Effect of time of grafting on number of sprouts and number of leaves.**

Sr. No.	Mango cultivar	Number of sprouts			Number of leaves		
		180 d	210 d	240 d	180 d	210 d	240 d
1.	Kesar	5.3	6.0	7.0	24.3	32.0	40.0
2.	Rajapuri	5.6	6.6	7.6	28.0	38.0	50.0
3.	Alphonso	5.0	6.3	7.3	26.0	36.1	45.0
4.	Mallika	4.0	5.0	6.6	20.0	28.6	38.0
	CD (P= 0.05)	0.06	0.1	0.1	0.8	0.5	1.2

growth and more number of leaves per plant. Singh *et al* (2018) and Singh (2018) recorded similar findings in propagating arid fruits commercially under different agro climatic conditions.

Many tribal farmers were suggested to visit those *in-situ* established orchards. KVK arranged farmers visit for those *in-situ* plantation. After observing the success of technique, farmers were motivated for *in-situ* plantation. In Panchmahal district, tribal farmers adopted this technique and have very good orchard of mango.

### Studies on the impact analysis

The data (Table 4) reveal that there was significant effect on the conventional method and *in-situ* propagation technique in mango. It was observed that a sum of Rs 3100/- (Three thousand one hundred only) was saved by adopting *in-situ* softwood grafting over conventional method. It was also observed that KVK imparted trainings to 100 farmers in the district and there was adoption of 80 per cent through *in-situ* establishment of plants of mango orchard ( Table 5) .

### CONCLUSION

From the studies, it was observed that in Panchmahal district the success of *in-situ* technique, many farmers especially women farmers are accepting this cost and drudgery effective technology. There was 80% adoption through this technique in establishment of mango orchard. This technology ascertains the purity of the variety and gives certainty of quality planting material and also minimizes other problems like transportation, wastage of time and mental stress of the farmers. It has become an effective means to confine the migration of the tribal farmer in other areas. As a result, *in-situ* propagation technique is doing well and adoption rate is satisfactorily among the tribal farmer for enhancing livelihood security in interior tribal areas of Panchmahal.

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## Input analysis of the study

Table 4. Expenditure through methods of propagation for 0.25 ha area.

Particulars	Cost on Conventional method			Cost on In-situ method			Net savings over conventional method (Rs.)
	No of inputs	Rate (Rs.)	Cost (Rs.)	No of inputs	Rate (Rs.)	Cost (Rs.)	
A	B	C	D	E	F	G	H
Grafted plants	70 plants	40.0 / plant	2800.0	-	-	-	2800.0
Transportation	100 km goods carriage	10 /km	1000.0	100 km Two wheeler	-	150.0	850.0 (D-G)
Bud Stick	-	-	-	70 buds	5.0 / bud stick	350.0	(-) 350.0
Labourer charges for procurement	-	-	-	One labour	200.0	200.0	(-) 200.0
Total Savings							3100.0

Table 5. Adoption of the technology by farmers.

Year	Farmers trained	Technology adopted by farmers	Adoption per cent
2014-15	177	100	56.5
2015-16	117	86	73.5
2016-17	181	105	58.0

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