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## Effect of pre-soaking treatments and wrapping materials on days taken to germination, germination percent, days to shoot emergence, success and survival percent in softwood grafting in mango

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### Abstract

The experiment was conducted at Fruit Research Station, Lal Baug, Department of Horticulture, College of Agriculture, Junagadh Agricultural University, Junagadh during the year 2017-18. The treatment comprise of five pre-soaking treatments and two wrapping materials. The experiment was laid out in a Completely Randomized Design with factorial concept with three replications. The results revealed that pre-soaking with panchagavya 3 % gave significantly highest result in days to taken to germination (12.43), germination percentage (75.37), days to shoot emergence (13.43), success percentage (70.90), and survival percentage (84.55). While, days taken to shoot emergence (13.98), success percentage (66.99), and survival percentage (80.03) observed significantly higher in graft tied with degradable tape as wrapping materials.

**Keywords:** Mango, pre-soaking treatments, wrapping materials

### Introduction

The Mango (*Mangifera indica* L.) is belongs to family anacardiaceae originated in South East Asia. The mango is one of the most common and important fruit crop cultivated all over India. It is also called the king of fruits and known as national fruit of India. The fruit can be grown in Indian sub continents for well over 4000 years (De Candolle, 1984) and has been favourites for king and commencer. India is the major producer of mango in the world with an area of 22.12 lakh hector and annual production is 195.6 lakh MT. In Gujarat total area under mango cultivation is about 1.42 lakh hector and production about 11.25 lakh MT (Anon., 2017) <sup>[1]</sup>. Mostly, mangoes are vegetative propagated by inarching, veneer grafting, epicotyl grafting, softwood grafting etc. Among different method softwood grafting has distinct advantages over other methods of propagation which is an efficient, economics; rapid method and grafts can be ready within a year. So, softwood grafting gives an excellence response in initial success with least possibility of mortality, better and uniform orchard establishment (Ram and Pathak, 2006). Best pre-soaking treatment was stone soaked with panchagavya. Wrapping material also play a most important role as from which wrapping material are used in grafting operation can be done for maximum success and its subsequent growth. Hence, considering the above facts, it is highly essential to standardize the pre-soaking treatments and wrapping materials on softwood grafting in mango.

### Materials and Methods

The present investigation entitled "Effect of pre-soaking treatments and wrapping materials on softwood grafting in mango" was conducted at Fruit Research Station, Lal Baug, Department of Horticulture, College of Agriculture, Junagadh Agricultural University, Junagadh during the year 2017-18. It was laid out in completely Randomized Design (FCRD) with Factorial concept having three repetitions. Ten treatment combinations involve two factors among these first factor contains five pre-soaking treatments of water soaking (S<sub>1</sub>), KNO<sub>3</sub> @ 1 % (S<sub>2</sub>), GA<sub>3</sub> 100 ppm (S<sub>3</sub>), cow urine (S<sub>4</sub>) and panchagavya at 3 % (S<sub>5</sub>). Second factor contains two wrapping materials of polythene stripe [200 gauge (W<sub>1</sub>)] and degradable [tape 25 mm (W<sub>2</sub>)].

Regular clear polythene strip of 200 gauge having width of 1.5 – 2.0 cm which normally nurserymen uses for grafting and a newly introduced degradable tape of 25mm roll contains 1000 perforated sections each of 40 mm length which is self-adhesive, stretches easily up to 6 times of its original length. Self-adhesion is activated when stretched and shrinks to fit after application. It degrades after 4-5 months thereby eliminating the need for tape removal purpose was used to tied scion and root stock at the graft union. For experiment purpose twenty grafts were prepared in each treatment. For rootstock purpose the stone are removed from the pulp and they were immediately planted on the polythene bags of 12 inch x 10 inch and 300 gauge thicknesses containing potting mixture of soil and F.Y.M. in the ratio of 2:1. The stones were sown in the 25<sup>th</sup> may 2017 and the seedlings were ready for grafting on 4 month after sowing. The mature healthy, terminal, vigorous and 3-4 month old shoots were selected for scion and leaves were defoliated 7-10 days before for grafting. The tree scion shoots were collected from mother trees in the morning time on the day of grafting. Immediately after separation of the scions from the mother tree, they were wrapped in moist cloth and carried in polythene covers to the site of grafting. Grafting was performed on the same day of separation. Five representative plants from each treatment

were selected and observed for different growth characters, viz. days taken to germination, germination percentage, days to shoot emergence, success percentage of grafts, shoot length of scion, number of leaves, plant height, scion girth, stock girth and survival percentage. The observation was recorded 30 days after grafting operation at intervals of 30 days until 90 days after grafting. The data were analyzed as per method suggested by Panse and Sukhatme (1985)<sup>[5]</sup>.

**Table 1:** Treatment combination of different grafting dates and wrapping materials

S. No	Treatments	Treatment details
1.	S <sub>1</sub> W <sub>1</sub>	Water soaking + Polythene strip
2.	S <sub>2</sub> W <sub>1</sub>	KNO <sub>3</sub> + Polythene strip
3.	S <sub>3</sub> W <sub>1</sub>	GA <sub>3</sub> + Polythene strip
4.	S <sub>4</sub> W <sub>1</sub>	Cow urine + Polythene strip
5.	S <sub>5</sub> W <sub>1</sub>	Panchagavya + Polythene strip
6.	S <sub>1</sub> W <sub>2</sub>	Water soaking + Degradable tape
7.	S <sub>2</sub> W <sub>2</sub>	KNO <sub>3</sub> + Degradable tape
8.	S <sub>3</sub> W <sub>2</sub>	GA <sub>3</sub> + Degradable tape
9.	S <sub>4</sub> W <sub>2</sub>	Cow urine + Degradable tape
10.	S <sub>5</sub> W <sub>2</sub>	Panchagavya + Degradable tape

## Result and Discussion

**Table 2:** Effect of pre-soaking treatments on days to germination, germination percentage, shoot emergence, success and survival percentage of mango at different growth stage

Treatments	Days taken to germination	Germination percentage	Days to shoot emergence	Success percentage of graft	Survival percentage of graft
S <sub>1</sub> : Water soaking	17.10	59.70	15.02	60.86	70.98
S <sub>2</sub> : KNO <sub>3</sub> 1 %	14.43	68.07	14.59	61.53	76.86
S <sub>3</sub> : GA <sub>3</sub> 100 ppm	13.37	72.20	14.04	66.17	80.90
S <sub>4</sub> : Cow urine	15.13	66.73	14.35	64.96	77.31
S <sub>5</sub> : Panchagavya 3 %	12.43	75.37	13.43	70.90	84.55
S.Em±	0.47	2.16	0.28	2.09	1.91
C.D. at 5%	1.49	6.81	0.83	6.17	5.63
C.V. %	5.68	5.48	4.85	7.90	5.98

**Table 3:** Effect of wrapping materials on shoot emergence, success and survival percentage of mango graft

Treatments	Days to shoot emergence	Success percentage of graft	Survival percentage of graft
W <sub>1</sub> : Polythene strip	14.59	62.78	76.21
W <sub>2</sub> : Degradable tape	13.98	66.99	80.03
S.Em±	0.18	1.32	1.21
C.D. at 5%	0.53	3.90	3.56
C.V. %	4.85	7.90	5.98

The experimental results revealed that the success of grafting was found to be significantly influenced due to pre-soaking treatments and wrapping materials.

### Effect of pre-soaking treatments

The significantly minimum number of days (12.43) required for germination was found in pre-soaking mango stone with panchagavya (S<sub>5</sub>) for 3 hrs, which was statistically at par with the treatment GA<sub>3</sub> @ 100 ppm (S<sub>3</sub>) for 10 min., whereas maximum number of days (17.10) required for germination was recorded in water soaking (S<sub>1</sub>). Similar trend was also observed for germination percentage (75.37). This could be due to that seedling emergence is primarily function of moisture available to stone and temperature affects. The relative advantage of treating the mango stones, with chemicals before sowing to reduce the period taken for germination and to remove the obstructions in embryo growth had been reported in mango by Padma and Narayana Reddy (1998)<sup>[4]</sup> and Shalini *et al.* (1999)<sup>[8]</sup>. This pre-soaking

treatment might have affected and altered the enzymatic reaction involved in germination process. Thus, the enhanced enzymatic reactions along with suppression of inhibitors might have acted in the faster germination.

The effect of pre-soaking treatments was found significant on days to shoot emergence (13.43 days) in panchagavya 3 % (S<sub>5</sub>) which was at par with GA<sub>3</sub> @ 100 ppm (S<sub>3</sub>). It is due to higher meristematic activity and also because of the optimal weather condition prevailing during that period due to which early sprouting occurs. Similar results were observed by Sappandi (2005)<sup>[7]</sup> in wood apple and Devechandra, (2006)<sup>[2]</sup> in Jamun.

There were significant differences observed among the different bio-organics and chemical treatments. Maximum graft success was noticed in panchagavya three per cent (70.90 %) followed by GA<sub>3</sub> – 100 ppm (66.17 %). Significantly least graft success was noticed in water soaking (60.86 %). Similar trend was also observed for graft survival percentage (84.55) (Table 2). The influence of weather

parameters like humidity and temperature on graft survival and grafting has been observed by Patel and Amin (1981). They found that temperature range of 23.15 - 25.870 C was most favourable for success and same reason may be resulted in higher success and survival in the present investigation.

#### Effect of wrapping materials

The data revealed that the variation due to treatment like different wrapping materials was found significant influence on days to shoot emergence. However, minimum days (13.98 days) required for sprout initiation when grafting with degradable tape 25 mm (W<sub>2</sub>). As the degradable tape is elastic tying or wrapping material which prevents humidity loss and drying of scion stick due to this callus is produced more easily for healing of wound and increase in callus formation there is earliest and good wound healing tissue formation on cut surfaces, cambial connectivity between stock and scion set rapidly. This finding is in conformity with the results as reported by Zenginbal *et al.* (2006)<sup>[10]</sup> and Wazarkar (2009)<sup>[9]</sup>. The maximum percentage of graft success (66.99) was recorded when grafts tied with degradable tape 25 mm (W<sub>2</sub>). While, minimum success percentage was noted in graft tied with polythene strip 200 gauge (W<sub>1</sub>). Similar trend was also observed for graft survival (Table 3). This might be due to degradable tape prevents humidity loss and drying of scion stick and callus is produced more easily for healing of wound and cambial connectivity between stock and scion set rapidly which results in maximum success and survival of grafts. This finding is in conformity with the results as reported by Oliveira *et al.* (2004) and Ewens and Felker (2003)<sup>[3]</sup>.

#### Conclusion

Result from the above, it can be concluded that better performance in parameter like days taken to germination, germination percentage, days to shoot emergence, success percentage and survival percentage were observed in pre-soaking of mango stone with panchagavya 3 % at 3 hrs (S<sub>5</sub>) and tied graft with wrapping material degradable tape 25 mm (W<sub>2</sub>) individually. Hence, it is recommended that to prepare the mango graft under softwood grafting technique on pre-soaking of mango stone with panchagavya 3 % at 3 hrs and tied graft with degradable tape 25 mm.

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