

ORIGINAL ARTICLE

Effect of Meteorological Factors and Inter-Relationship of Quality Parameters in Wedge Grafting of Mango

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ABSTRACT

In order to standardize the height and time of wedge grafting of mango under Western U.P. conditions of northern India, experiment were conducted on six different months (15 July, 15 Aug, 15 Sept, 15 Oct, 15 Feb, and 15 Mar) during 2004-05 and 2005-06 at four different heights (15cm, 25cm, 35cm, and 45 cm) on the rootstock. There were 40 prepared grafts under all twenty four-treatment combinations with four replications. Estimates of correlation coefficient were worked out for effect of temperature, relative humidity and rainfall at the time of grafting on sprouting and success of grafts at 6- months after grafting during 2004-05 and 2005-06. Inter-relationship of physical graft quality parameters (growth and vigour) was also worked out. Results revealed that increase in number of days from grafting to sprouting decreased the sprouting and success percentage of grafts. Graft growth and vigour were positively correlated with success of grafted plants. Rainfall and humidity were positively correlated with sprouting and success of grafted plants.

Keywords : Meteorological Factors, Mango, Grafting

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INTRODUCTION

Mango (*Mangifera indica* L.) the premier fruit has also been recognized as “National fruit of India” long back because of its delicious taste, excellent flavors, attractive fragrance and excellent source of vitamin A and C. Wedge grafting in mango has been standardized by the R.S. Amin [1] under Gujrat condition and reported very promising results. Amin [2] and Patil & Amin [10] recommended this method for in situ grafting. Primarily this technique is adopted for rejuvenation of old orchards by top working the trees. The thicker part, which is not fit for other grafting technique, is used in this method of grafting [14]. The grafts success varies with the environmental condition (Like temperature humidity rainfall etc.). Temperature and humidity appear to be the major limiting factors affecting the success of wedge grafting. The success of grafts varies with the period of grafting [3, 15, 13, 16, 6]. An attempt was made at the Horticulture Research Center of Sardar Vallabh Bhai Patel University of Agriculture and Technology, Meerut to assess the effect of meteorological factors on success of grafts and interrelation of various graft parameters in order to standardize the height and time of wedge grafting under Western U.P. condition of northern India.

MATERIAL AND METHODS

The experiment was conducted at the Horticultural Research Center of Sardar Vallabh Bhai Patel University of Agriculture and Technology, Meerut (U.P.) during 2004-05 and 2005-2006. Six month old and 15 cm long pre-activated shoots of Dashhari variety of mango was grafted on one year old rootstock at 15 cm, 25 cm, 35 cm, and 45 cm heights above ground level. The top was spilted by a sharp knife to a length of about 5cm. Grafting was done on 15 July, 15 August, 15 September, 15 October, 15 February and 15 March during 2004-05 and 2005-06. A total of 40 grafts were prepared under all twenty four-treatment combinations with four replications. Averages of all replication of data for all the different heights on respective dates of grafting were used to compute correlation coefficient for both the years of experiments separately. Periodical observations on sprouting, success and physical quality parameters of grafts were recorded. Simple correlation coefficient among different physical quality parameters of wedge grafted plants after six month of grafting was worked out. Effect of meteorological parameters, viz; Temperature, Relative Humidity and Rainfall were worked out by computing simple correlations between

meteorological parameters at the time of grafting and sprouting and success of grafted plants at 6 months after grafting for 2004-05 and 2005-06.

RESULTS AND DISCUSSION

Inter-relationship among graft quality parameters:

Values of simple correlation coefficient among various physical quality parameters of wedge-grafted plants for the year 2004-05 and 2005-06 are presented in Table-1. It is evident from the data that number of days from grafting to sprouting was negatively correlated with sprouting and success of grafted plants indicating that delay in sprouting period caused decreased in sprouting and survival of grafts. It was probably because of this fact that reduced translocation of solutes and non-availability of vital biochemical compounds in the graft scion for longer period resulted in desiccation, late sprouting and defective translocation bridge between graft component and mortality of wedge grafted plants. Sprouting percentage of grafts was positively correlated with survival percentage of graft and number of leaves per grafts. As a result of increased sprouting percentage, the percentage of survival was naturally increased. Sprout length was positively correlated with number of leaves per graft. Because of the fact that more area was available for emergence of more number of laves per graft, more number of leaves naturally resulted in increased sprout length in a synergistic manner. Significantly positive correlation between number of leaves per graft with sprouting percentage as well as survival percentage of sprouted grafts indicated that increased sprouting helped in production of more leaves which synthesized vital biochemicals components essential for faster healing of cut ends and perfect union between grafts components and resulted in increased survival of grafted plants. These findings are quite comparable to the findings made by Pandey and Singh [9] who also found similar results in stone grafting in mango. Almost similar pattern was worked out for the 2005-2006 also.

Table 1. Correlation coefficient between different graft quality parameters.

		DTS	SP	SUP	NL	SL	PL
DTS	2004-05	1.00	-0.93**	-0.93**	-0.91**	-0.89**	-0.85**
	2005-06	1.00	-0.91**	-0.91**	-0.92**	-0.91**	-0.82**
SP	2004-05		1.00	0.98**	0.90**	0.88**	0.78**
	2005-06		1.00	0.97**	0.89**	0.88**	0.82**
SUP	2004-05			1.00	0.92**	0.89**	0.82**
	2005-06			1.00	0.90**	0.87**	0.77**
NL	2004-05				1.00	0.99**	0.89**
	2005-06				1.00	0.99**	0.90**
SL	2004-05					1.00	0.90**
	2005-06					1.00	0.92**
PL	2004-05						1.00
	2005-06						1.00

DTS = Days taken for sprouting, SP = Sprouting percent, SUP= Success percent, NL = Number of leaves
SL = Scion stem length, PL = Plant length, * = Significant at $p < 0.05$, ** = Significant at $p < 0.01$

Effect of meteorological factors on sprouting and success of wedge graded mango plants:

Simple correlation coefficient between temperature, relative humidity and rainfall with days taken for sprouting, Sprouting percent and success percent for the year 2004–05 and 2005-06 were studied and it was noticed from the Table-2 that climatic factors exhibited more significant correlation with these said parameters of wedge grafting. The climatic factors (Rainfall, relative humidity and temperature) had negative correlation with the days taken for sprouting and had positive correlation with the sprouting and success percentage. The increase in sprouting of graft scion and success of wedge grafts seem to be due to meteorological factors especially mid temperature and high humidity during August. Mid temperature and high humidity might have reduced the desiccation of tissue and facilitated faster cell division and proliferation of meristematic tissue at the cut surface of both the stock and scion leading to rapid and better union of graft components which reduced the mortality of sprouted grafts and increased the survival of wedge grafted plant. Temperature plays an important role in high cell activity. In spring and monsoon, the plant tissues especially, the cambiums are in naturally active state. The new callus tissue arising from the cambial region is composed of thin walled turgid cells which can easily become desiccated and die. It is important for the production of theses parenchyma cells that the humidity in the vicinity of the cambial region of graft union is kept at a high level [4]. Lal, [7] and Singh *et al.* [12] have also reported, temperature and relative humidity conditions as limiting factors for success in stone grafting and subsequent survival of stone grafted mango plants. Similarly, the seasonal effect on various

methods of mango propagation has been reported by Ismail and Rao [5] and Rajan and B. Lal [11]. The appropriate period for stone grafting of cashew has been reported to be between 15 June to 31 July when rainfall and relative humidity are very high [8]. Srivastava [16] observed temperature and relative humidity as the major limiting factors for the success in mango propagation. The study suggests that for interpreting the impact of climatic factors on wedge grafting not only the meteorological data at the time of grafting are important but the climate of subsequent days has a significant role in determining the days taken for sprouting and success percentage.

Table 2. Correlation between meteorological factors and wedge grafting.

		DTS	SP	SUP
MAX.TEMP	2004-05	-0.48*	0.45*	-0.28
	2005-06	-0.40*	0.45*	-0.26
MIN.TEMP.	2004-05	-0.59**	0.58**	-0.08
	2005-06	-0.60**	0.56**	-0.16
R.H.	2004-05	-0.68**	0.61**	0.58**
	2005-06	0.47*	0.49*	0.54**
R.F.	2004-05	-0.73**	0.68**	0.52**
	2005-06	-0.66**	0.74**	0.47*

DTS = Days taken for sprouting; SP = Sprouting percent

SUP= Success percent; R.H. = Relative Humidity

R.F. = Rain fall, * = Significant at $p < 0.05$, ** = Significant at $p < 0.01$

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