



SEASONAL VARIATION IN SUCCESS OF VENEER GRAFTING OF MANGO UNDER ANDHRA PRADESH (INDIA) CONDITIONS

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Abstract

An experiment was conducted at Horticultural College and Research Institute, Dr. Y. S. R. Horticultural University during the year 2012-2013 to study the success of mango grafts during different months of grafting. For commercial multiplication of mango, veneer grafting performed on July and January proved significantly superior with respect to survival of grafts, sprout length, days taken for sprouting, percent graft take number of functional leaves and leaf area. The performance of grafts was found to be better in the above months across the different propagation structures *viz.*, open condition, 50% shade net, 75% shade net, naturally ventilated polyhouse and partial shade under coconut.

Key words : Mango, veneer grafting, season, success.

Introduction

Mango (*Mangifera indica* L.) belongs to the family Anacardiaceae, with a chromosome number $2n = 40$. It is the choicest among all fruits of India and enjoys a great popularity. It is considered as the “king of fruits”. Besides, having delicious taste, captivating flavor with multifarious colour, it is an excellent source of dietary nutrients. It is grown in almost all parts of the world and occupy a unique place amongst the fruit crops grown in India.

Several workers reported that success rate of veneer grafting was more during the months of July and August under open conditions in Andhra Pradesh. This was mainly attributed to optimum temperature and relative humidity but detailed studies were not made to develop technology to produce the grafts throughout the year. As demand for planting material/veneer grafts is increasing every year, it is important to produce grafts throughout the year by creating optimum temperature and relative humidity conditions. Therefore, it is felt necessary to evaluate the effect of time and shade level on success of veneer grafting in mango in order to correlate with the prevailing temperature and relative humidity. Hence, the present investigation was taken up to study the “Effect of time and propagation structure on success of veneer

grafting in Mango cv. Banganpalli under southern zone of Andhra Pradesh”.

Materials and Methods

An experiment was conducted at Horticultural College and Research Institute, Dr. Y. S. R. Horticultural University, Anantharajupet, Y.S.R. district of Andhra Pradesh (India) during the year 2012-2013 in a Factorial Completely Randomized Design with three replications. Local Banglora seedlings of one year old were raised in polythene bags (13 cm × 10 cm) and used as a rootstock. A total of 3150 healthy mango seedlings were used for this experiment. The veneer grafting of mango was done using Banganpalli as scion at an interval of one month for seven consecutive months from 15th July to 15th January under five different structural conditions *i.e.* open condition, 50% shade in net house 75% shade in net house, naturally ventilated poly house and partial shade under coconut trees. Observations were recorded on five grafts randomly selected 30, 60 and 90 days after grafting. The data were subjected to statistical analysis as per the procedure outlined by Panse and Sukhatme (1985) and the treatment means were compared by critical difference values computed at 5% level of significance.

Table 1 : Effect of time and propagation structure on percent graft take and days taken for sprouting of veneer grafts in Mango cv. Banganpalli.

PS Time	Days taken for sprouting						Percent graft take						
	OC	SN 50 %	SN 75 %	NVP	PSC	Mean	OC	SN 50 %	SN 75 %	NVP	PSC	Mean	
July	10.80	11.40	10.87	10.80	11.60	11.09	87.77	84.44	80.00	83.33	70.00	81.11	
August	11.00	11.60	11.33	11.27	11.53	11.35	47.77	41.11	70.00	61.11	68.89	57.77	
September	11.20	11.67	11.27	10.60	11.80	11.31	53.33	77.77	47.78	67.78	58.88	61.11	
October	11.67	12.53	12.60	12.07	14.53	12.68	38.88	36.66	42.22	53.33	35.55	41.33	
November	14.13	15.60	17.53	15.87	16.67	15.96	66.66	72.22	73.33	78.88	65.55	71.33	
December	16.00	13.47	11.40	11.20	15.67	13.55	74.44	70.00	72.22	83.33	76.66	75.33	
January	15.23	15.67	15.33	13.00	12.40	14.28	65.55	55.55	77.78	71.11	73.33	68.66	
Means	12.87	13.13	12.90	12.11	13.46		62.06	62.54	66.19	71.27	64.12		
			F-test	SEm ±	C.D.(5%)				F-test	SEm ±	C.D. (5%)		
Time of grafting (M)			*	0.25	0.71				*	1.04	0.88		
Propagation structures (P)			*	0.21	0.60				*	2.34	2.95		
Interaction (M x P)			*	0.56	1.59				*	2.49	6.60		

PS - Propagation structures, OC - Open Condition, SN 50% - Shade net 50%, SN 75% - Shade net 75%, NVP- Naturally Ventilated Polyhouse, PSC - Partial Shade Coconut. *Significant at 5% level, NS - Non significant.

Results and Discussion

Days taken for sprouting

There were significant differences among the times of grafting, propagation structures and their interactions with respect to number of days taken for sprouting of grafts (table 1). Grafting on 15th July was found to produce earliest sprouts with only 11.09 days taken for sprouting of grafts. This was on par with 15th September (11.31 days) and 15th August (11.35 days). On the other hand grafting on 15th November took maximum number of days for sprouting (15.96). The lowest number of days taken for sprouting was observed by grafting on 15th September under naturally ventilated polyhouse (10.60), with regard to interactions. The greatest delay for sprouting was observed by grafting on 15th November under shade net 75% (17.53) followed by grafting on 15th November in partial shade under coconut (16.67 days).

Sprouting of grafts was found to show maximum delay by grafting under open field conditions 15th September onwards, which might be due to very low temperature that slowed down the process of bud sprouting. Optimum temperature plays an important role in photosynthetic activity and also in bud sprouting. Optimum temperature and water availability increase the rate of photosynthesis leading to production of more food material that facilitate improved growth and development

of graft sprout. The advantages of such nature were found to benefit those grafts grafted on 15th July under naturally ventilated polyhouse conditions in the present study as evident from the weather data. Similar results were reported by Singh and Singh (2007) in jamun, Syamal *et al.* (2013) in bael.

Per cent graft take

The per cent graft take or the number of grafts sprouted was found to vary significantly among different times of grafting, propagation structures and their interactions (table 1). The highest mean number of grafts sprouted was recorded by grafting on 15th July (81.11%) and the lowest number of grafts sprouted was recorded on 15th October (41.33%). Among the interactions, the highest number of grafts sprouted was observed by grafting on 15th July under open condition (87.77%) followed by grafting on 15th July under shade net 50% (84.44%). The lowest was recorded by grafting on 15th October in partial shade under coconut (35.55%). The highest number of grafts sprouted in July under open condition might be due to the favorable climatic conditions in terms of high temperatures and high relative humidity values. Similar opinion was also expressed by Iqbal (1982) in mango, Gowda and Melanta (1991) in cashew and Shinde *et al.* (2010) in jamun.

Table 2: Effect of time and propagation structure on leaf parameters of veneer grafts in Mango cv. Banganpalli at 90 DAG

PS Time	Number of leaves/graft						Leaf area (cm ²)/graft						
	OC	SN 50%	SN 75%	NVP	PSC	Mean	OC	SN 50%	SN 75%	NVP	PSC	Mean	
July	24.60	18.67	20.53	21.60	12.33	19.55	344.34	475.98	444.26	478.96	247.74	398.26	
August	19.47	17.20	17.87	22.20	13.07	17.96	310.92	322.61	303.24	328.79	230.54	299.22	
September	15.20	14.80	15.27	16.93	12.47	14.93	240.88	302.50	328.99	279.40	182.99	266.95	
October	12.53	13.73	11.27	16.07	11.93	13.11	184.17	273.63	214.88	273.50	180.15	225.27	
November	11.40	14.00	12.47	13.93	10.07	12.21	155.26	203.29	208.06	213.86	122.06	180.50	
December	12.93	12.93	11.73	15.93	11.87	13.08	173.46	189.30	197.57	188.39	156.76	181.10	
January	13.40	13.47	14.47	14.73	13.13	13.89	197.98	284.59	288.88	262.09	198.04	246.32	
Means	15.64	14.97	14.83	17.34	12.01		229.57	293.13	283.70	289.20	188.33		
			F-test	SEm±	C.D. (5%)				F-test	SEm±	C.D. (5%)		
Time of grafting (M)			*	0.47	1.32				*	9.68	27.31		
Propagation structures (P)			*	0.40	1.12				*	8.18	23.08		
Interaction (M x P)			*	1.05	3.00				*	21.65	61.08		

PS - Propagation structures, OC - Open Condition, SN 50% - Shade net 50%, SN 75% - Shade net 75%,

NVP- Naturally Ventilated Polyhouse, PSC - Partial Shade Coconut

*Significant at 5% level.

NS - Non significant; DAG: Days after grafting.

Leaf parameters

Number of leaves per graft

The data on number of leaves per graft showed significant differences among different times, propagation structures and their interactions at 90 days after grafting (table 2). The highest number of leaves (19.55) was recorded by grafting on 15th July, whereas the lowest (12.21) was recorded by grafting on 15th November. Among the interactions, the highest number of leaves was observed by grafting on 15th July under open condition (24.60) whereas the lowest (10.07) was recorded by grafting on 15th November in partial shade under coconut.

Leaf area per graft

The differences in the leaf area per graft due to times of grafting, propagation structures and their interaction were found to be significant (table 2). The highest (398.26 cm²) leaf area was recorded by grafting on 15th July. The lowest leaf area was recorded by grafting on 15th November (180.50 cm²). The leaf area per graft at 90 days after grafting was found to be highest (478.96 cm²) by grafting on 15th July under naturally ventilated polyhouse followed by grafting on 15th July under shade net 50% (475.98 cm²), whereas the lowest leaf area (122.06 cm²) was recorded by grafting on 15th November

in partial shade under coconut at 90 days after grafting.

A perusal of results presented in table 2 indicated that higher number of leaves per graft coupled with high leaf area was recorded by grafting in July under naturally ventilated poly house. Though, there was a slight increase in leaf area under shade net 50%. It was not significantly superior to naturally ventilated poly house. This could be attributed to the quick and strong formation of graft union and better nutrient uptake which intern might have caused better sprout growth. The highest leaf area was recorded when grafting was performed in July under 75% shade. An examination of corresponding data on humidity brings a light fact that higher humidity level might have acted as driving forces for cell elongation and multiplication that favoured leaf expansion. Similar opinion was expressed by Patel and Amin (1981) in mango, Chovatia and Singh (2000) in jamun, Palande *et al.* (2004) in tamarind, Gadekar *et al.* (2010) in jamun.

Sprout length

The data obtained on sprout length revealed that there were significant differences among different times of grafting, propagation structures respect to sprout length (table 3). The highest sprout length (6.66 cm) was observed by grafting on 15th January, which was on par with 15th August (6.48 cm) whereas, the lowest value

Table 3 : Effect of time and propagation structure on sprout length (cm) and survival percentage of veneer grafting in Mango cv. Banganpalli at 90 DAG.

PS Time	Sprout length (cm)						Survival percentage					
	OC	SN 50 %	SN 75 %	NVP	PSC	Mean	OC	SN 50 %	SN 75 %	NVP	PSC	Mean
July	5.33	5.60	6.64	7.37	6.79	6.34	76.66	85.44	77.22	88.25	77.00	80.91
August	6.46	6.36	5.39	7.42	6.78	6.48	62.33	71.11	63.33	85.55	77.22	71.93
September	5.82	4.92	5.00	6.16	5.44	5.46	45.55	63.33	67.70	62.22	46.66	57.11
October	4.27	5.04	5.37	5.05	5.95	5.14	33.33	32.22	37.77	41.11	31.11	35.11
November	4.14	4.16	3.70	4.54	5.28	4.36	61.11	66.66	64.44	70.00	64.44	65.33
December	4.40	5.14	5.82	5.00	5.34	5.14	48.88	58.89	55.55	42.22	53.33	51.77
January	6.03	6.93	7.50	6.01	6.83	6.66	74.00	73.33	68.89	80.90	61.78	71.81
Mean	5.21	5.45	5.63	5.93	6.06		57.41	64.42	62.14	67.18	58.80	
			F-test	SEm ±	C.D. (5%)		F-test			SEm ±	C.D. (5%)	
Time of grafting (M)			*	0.25	0.70		*			1.44	4.07	
Propagation structures (P)			*	0.21	0.59		*			1.22	3.44	
Interaction (M x P)			NS	0.52	-		*			3.23	9.11	

PS - Propagation structures, OC - Open Condition, SN 50% - Shade net 50%, SN 75% - Shade net 75%, NVP- Naturally Ventilated Polyhouse, PSC - Partial Shade Coconut, *Significant at 5% level, NS - Non significant, DAG: Days after grafting.

(4.36 cm) was recorded by grafting on 15th November. The highest sprout length (6.06 cm) was recorded by grafting under partial shade under coconut followed by naturally ventilated polyhouse (5.93 cm) while the lowest (5.21 cm) sprout length was recorded by grafting under open conditions at 90 days after grafting. The interaction effect due to time of grafting and propagation structures was found to be non significant.

Percentage of survival of grafts

The differences in percentage of survival of grafts due to times of grafting, propagation structures and their interaction were found to be significant (table 3). Among the different times of grafting, the highest (80.91%) percentage of survival of grafts was recorded by grafting on 15th July whereas, the lowest (35.11%) percentage of survival of grafts was recorded by grafting on 15th October. Among propagation structures, the highest (67.18%) percentage of survival of grafts was recorded by grafting under naturally ventilated polyhouse, which was followed by grafting under shade net 50% (64.42%) and the lowest (57.41%) was recorded by grafting under open condition. Among the interactions, the highest graft survival (88.25%) was observed by grafting on 15th July under naturally ventilated polyhouse followed by grafting on 15th August under naturally ventilated polyhouse (85.55%), July under shade net 50% (85.44%) and January under naturally ventilated polyhouse (80.90%). Grafting on 15th October in partial shade under coconut was found to record the lowest graft survival (31.11%).

Under Anantharajupeta conditions, veneer grafting in mango was found to be highly successful by performing the grafting work on 15th July under naturally ventilated poly house. Higher survival percentage (88.25%) was due to the environmental condition prevailed during this month under naturally ventilated poly house.

These observations are conformity with the fact that shade, humid and warm conditions after grafting will result in increased survival percentage of grafts as reported by Singh *et al.* (1989), Islam *et al.* (2004) in mango and Ghosh *et al.* (2010) in sapota.

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