



P-ISSN: 2349-8528

E-ISSN: 2321-4902

IJCS 2018; 6(4): 685-688

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Received: 05-05-2018

Accepted: 05-06-2018

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Effect of different grafting dates and wrapping materials on days for sprouting of graft, sprouting percent, number of open leaves and survival percent of softwood grafting in custard apple (*Annona squamosa* L.) cv. GJCA-1 under Saurashtra condition

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Abstract

An investigation was carried out to see the effect of different grafting dates and wrapping materials on success of softwood grafting in Custard apple (*Annona squamosa* L.) cv. GJCA-1 under Saurashtra condition during Feb- August of the year 2017 at Lalbaugh Farm, Department of Horticulture, College of Agriculture, Junagadh Agricultural University, Junagadh (Gujarat). The treatments comprised of seven different grafting dates and two different wrapping materials. The experiment was laid out in Completely Randomized Design with factorial concept and replicated three times. The results revealed that amongst different grafting dates and wrapping materials grafting done on 01.04.2017 with graft tied with degradable tape observed significantly minimum days for sprouting (12.66), maximum sprouted graft (100%) at 60 and 90 DAG, highest no. of opened leaves (20.49 and 21.80) on scion at 60 and 90 DAG and graft survival (90%) at 60 and 90 DAG as compared to other treatments.

Keywords: Custard apple, Gujarat Junagadh custard apple-1, different grafting dates, wrapping materials

Introduction

Custard apple (*Annona squamosa* L.) belongs to family Annonaceae and is one of the finest fruits gifted to India by tropical America. It is cultivated in Mexico, Philippines, New Guinea, Malaysia, India and South American countries in the world. It has adopted well in India where a considerable variability is found in Aravali hills and Southern India. Custard apple plants can also be seen wild in Uttar Pradesh, Rajasthan, Karnataka, Madhya Pradesh, Maharashtra, Tamil Nadu, Gujarat and Orissa.

The variety of custard apple named Gujarat Junagadh Custard apple-1 (GJCA-1) was developed by Department of Horticulture, Junagadh Agricultural University, Junagadh during year 2009 and recommended for cultivation. Gujarat covers 5081 hectares area of custard apple with the annual production of 51906 MT and productivity was 10.21 MT/ha during the year 2014-15.

It is known that custard apple is a drought resistant plant and is normally grown under without any irrigation, but it may not be applicable for the newly planted grafts and irrigation may be essential for the first few years for their proper establishment. Artificial irrigation is neither practical nor economical in the arid region and harvesting of rain water and *in situ* conservation of soil moisture is only the variable alternative in this regards. It is popular by virtue of its spread in forests, wastelands, rocky slopes and other uncultivated places; it is generally classified as semi wild fruit (Kudmulwar *et al.*, 2008) [7].

Custard apple is a sub-tropical fruit preferring warm climate with moderate winter and humidity for high production. The tree remains dormant during cold season for a short period, yet frost and prolonged cool weather adversely affects the growth. It can tolerate temperature several degrees below freezing, but temperatures beyond 40 °C causes heavy flower abscission in northern India. Areas with an annual rainfall of 125-250 cm are highly suitable for its commercial cultivation. The optimum temperature requirement is between 15° to 25 °C.

It has a wide range of adaptability and can be grown successfully upto 1000 meters altitude (Bose *et al.* 2002; Joshi *et al.*, 1999 and 2000) [1, 4, 5].

The present investigation was carried out to find out suitable date of grafting and wrapping material for obtaining maximum success through softwood grafting in custard apple.

Materials and method

The experiment was conducted at the Lalbaugh Farm, Department of Horticulture, College of Agriculture, Junagadh Agricultural University, Junagadh (Gujarat) during Feb-August month of the year 2017. Junagadh is situated at 21.5 °N latitude and 70.5 °E longitude with an altitude of 60 meters above MSL on the western side at the foot hill of mountain Girnar sierra (Gujarat). Climate is typically subtropical, characterized by fairly cool and dry winter, hot and dry summer and warm and moderately humid monsoon.

The treatment comprised of seven different grafting date (D₁ – 15.2.2017, D₂ – 01.3.2017, D₃ – 15.3.2017, D₄ – 01.4.2017, D₅ – 15.4.2017, D₆ – 01.5.2017 and D₇ – 15.5.2017) and two wrapping material (W₁ - Polythene strip and W₂- Degradable tape). The experiment was laid out in Factorial Completely Randomized Design (FCRD) with fourteen treatment combinations and three replications.

Potting mixture of soil and FYM with a ratio of 1:1 was used for raising seedlings of custard apple rootstocks for softwood grafting. 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 25 mm width and 40 mm length which is self-adhesive, stretches easily. Self-adhesion is activated when stretched and shrinks to fit after application.

Defoliated scion sticks (10 days prior) were collected without damaging the buds. The length of scion stick was kept 8- 10 cm. The lower end of the scion stick was prepared in the form of wedge of about 3 cm. The top portion of custard apple (*Annona squamosa* L.) cv. *Sindhani* rootstock plant was selected and then top portion of the stem was split vertically about 3 cm in length forming 'V' shape. The wedge of scion was inserted into the slit of the rootstock and tied with polythene strip and degradable tape as per treatment details. The prepared grafts were kept in partial shady condition.

Five plants were selected at random from each treatment and tagged for recording the observations. Required observations were recorded from each repetition of different treatments and average value was calculated. The analysis of variance for experimental design was carried out for all the characters under study.

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

Treatment No.	Symbol	Details of treatment
T ₁	D ₁ W ₁	Date 15-2-2017 X Polythene strip
T ₂	D ₁ W ₂	Date 15-2-2017 X Degradable tape
T ₃	D ₂ W ₁	Date 01-3-2017 X Polythene strip
T ₄	D ₂ W ₂	Date 01-3-2017 X Degradable tape
T ₅	D ₃ W ₁	Date 15-3-2017 X Polythene strip
T ₆	D ₃ W ₂	Date 15-3-2017 X Degradable tape
T ₇	D ₄ W ₁	Date 01-4-2017 X Polythene strip
T ₈	D ₄ W ₂	Date 01-4-2017 X Degradable tape
T ₉	D ₅ W ₁	Date 15-4-2017 X Polythene strip
T ₁₀	D ₅ W ₂	Date 15-4-2017 X Degradable tape
T ₁₁	D ₆ W ₁	Date 01-5-2017 X Polythene strip
T ₁₂	D ₆ W ₂	Date 01-5-2017 X Degradable tape
T ₁₃	D ₇ W ₁	Date 15-5-2017 X Polythene strip
T ₁₄	D ₇ W ₂	Date 15-5-2017 X Degradable tape

Experimental result and discussion

The experimental findings obtained from the present study have been discussed here in following heads:

Effect of grafting dates:

Among the different grafting dates 01.04.2017 (T₄) was found maximum Number of open leaves (19.60 and 20.99) at 60 and 90 DAG and maximum survival (87.00% and 85.50%) at 60 and 90 DAG (Table.2). Whereas, significantly minimum days for sprouting (15.19) and higher sprouted grafts (93.33% and 92.17%) were recorded at 60 and 90 DAG (Table.2) when grafting was date (T₃) 15-03-2017. This result may be attributed due to the optimum temperature (29 - 31 °C) and moderate humidity (45 - 55%) prevailed during these dates. This finding is in conformity with the results obtained by Chovatia (1994) [2], Kudmulwar *et al.* (2008) [7] and Khopade and Jadhav (2013) [6] in custard apple.

Effect of wrapping materials

Among wrapping materials, custard apple grafts tied with degradable tape (W₂) recorded significantly maximum sprouted graft (56.36%) at 60 DAG (Table.2) and the highest number of opened leaves (16.20) were found when grafts tied

with polythene strip (W₁) (Table.2). Whereas, for other characters days for sprouting of graft and survival percent, the wrapping materials *i.e.* polythene strip (W₁) and degradable tape (W₂) was found non-significant.

Interaction effect of different grafting dates and wrapping materials:

In the interaction effect of grafting dates and wrapping materials, interaction between grafting date 01-04-2017 and degradable tape (D₄W₂) recorded significantly maximum sprouting of grafts (100%) at 60 and 90 DAG. The minimum days for sprouting of graft (12.66) followed by interaction of grafting date 15-03-2017 along with degradable tape (D₃W₂) as wrapping material. The highest number of opened leaves (20.49 and 21.80) recorded an interaction of 01.04.2017 and degradable tape (D₄W₂) at 60 and 90 DAG followed by interaction of grafting date 01-04-2017 along with polythene tape (D₄W₁) as wrapping material and an interaction of grafting date 01.04.2017 and wrapping material degradable tape (D₄W₂) was found significantly maximum survival of grafts (90.00 %) at 60 and 90 DAG (Table.2) followed by interaction of grafting date 15-03-2017 along with polythene tape (D₃W₁) as wrapping material. These significant

differences may be attributed due to combination of congenial weather conditions prevailed during grafting in the month of March and April and proper wrapping material degradable tape, which prevented desiccation of cut surface and increased

callus formation that has positive effect on the growth of custard apple (Zenginbal *et al.*, 2006)^[11]. The results obtained are in conformity with the results of Kumar and Shukla (2008)^[8] and Singha (1990)^[9].

Table 2: Effect of different grafting dates and wrapping materials on days for sprouting of grafts, Sprouted graft (%), number of open leaves and survival percent.

Treatments	Days for sprouting of graft	Sprouted graft (%)		Number of open leaves		Survival percent	
		60 DAG	90 DAG	60 DAG	90 DAG	60 DAG	90 DAG
Grafting dates (D)							
D1: 15.2.2017	17.53	30.00	28.83	6.81	9.12	51.00	48.50
D2: 01.3.2017	16.98	32.33	28.83	11.31	13.87	73.00	70.33
D3: 15.3.2017	15.19	93.33	92.17	17.06	18.32	80.67	80.00
D4: 01.4.2017	16.42	90.33	90.00	19.60	20.99	87.00	85.50
D5: 15.4.2017	21.37	45.00	45.00	14.18	16.31	75.67	71.67
D6: 01.5.2017	24.08	35.42	32.08	7.70	9.68	58.17	57.17
D7: 15.5.2017	21.46	55.17	43.25	16.78	18.64	63.83	52.33
S. Em.±	0.53	1.07	1.37	0.46	0.42	2.24	1.95
C.D. at 5%	1.55	3.10	3.97	1.35	1.24	6.49	5.66
Wrapping materials (W)							
W ₁ : Polythene strip	19.34	52.67	50.43	13.63	16.20	71.29	67.10
W ₂ : Degradable tape	18.66	56.36	52.48	13.07	14.35	68.52	65.90
S. Em.±	0.28	0.57	0.74	0.24	0.22	1.19	1.04
C.D. at 5%	NS	1.66	NS	NS	0.66	NS	NS
D × W interaction							
D ₁ W ₁	18.08	30.00	29.33	7.07	10.52	53.67	50.00
D ₁ W ₂	16.98	30.00	28.33	6.56	7.72	48.33	47.00
D ₂ W ₁	17.40	27.67	25.67	11.67	15.64	75.67	72.67
D ₂ W ₂	16.57	37.00	32.00	10.95	12.10	70.33	68.00
D ₃ W ₁	16.53	100.00	100.00	18.50	20.00	87.33	87.33
D ₃ W ₂	13.84	86.67	84.33	15.62	16.64	74.00	72.67
D ₄ W ₁	20.17	80.67	80.00	18.71	20.18	84.00	81.00
D ₄ W ₂	12.66	100.00	100.00	20.49	21.80	90.00	90.00
D ₅ W ₁	20.64	45.00	45.00	15.19	17.24	74.33	70.00
D ₅ W ₂	22.09	45.00	45.00	13.18	15.37	77.00	73.33
D ₆ W ₁	19.39	30.33	28.17	8.73	12.00	56.33	54.33
D ₆ W ₂	28.76	40.50	36.00	6.67	7.36	60.00	60.00
D ₇ W ₁	23.21	55.00	44.83	15.54	17.85	67.67	54.33
D ₇ W ₂	19.70	55.33	41.67	18.02	19.43	60.00	53.33
S.Em.±	0.76	1.51	1.96	0.66	0.60	3.16	2.76
C.D. at 5%	2.20	4.39	5.68	1.91	1.75	9.17	8.01
C.V. %	6.93	4.82	6.61	8.58	6.86	7.85	7.20

Conclusion

On the basis of results obtained from the present investigation, it can be concluded that treatment combination of grafting date and wrapping material D₄T₂ (01.4.2017 (D₄) and degradable tape (T₂) as wrapping material) recorded significantly minimum days for sprouting, maximum sprouted grafts percent, no. of opened leaves, highest survival percent in custard apple grafts under saurashtra conditions. Hence, the date 01.04.2017 and degradable tape are suitable for success of softwood grafting and to obtain more number of grafts in custard apple in Saurashtra condition of Gujarat.

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