Journal of Pharmacognosy and Phytochemistry
Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2020; 9(2): 297-299
Received: 25-01-2020
Accepted: 27-02-2020

Basavaraj Padeshetti
Assistant Professor,
Department of Fruit Science,
College of Horticulture,
Bagalkot, Karnataka, India

Kulapati KH
Professor and Head,
Department of Fruit Science,
College of Horticulture,
Bagalkot, Karnataka, India

Gollagi SG
Assistant Professor,
Crop Physiology, Directorate of Education, UHS Bagalkot,
Karnataka, India

Sateesh Pattepur
Assistant Professor,
Department of Fruit Science,
College of Horticulture,
Bagalkot, Karnataka, India

Oying Jamoh
Department of Fruit Science
College of Horticulture,
UHS Bagalkot, Karnataka,
India

Corresponding Author:
Basavaraj Padeshetti
Assistant Professor,
Department of Fruit Science,
College of Horticulture,
Bagalkot, Karnataka, India

Effect of grafting methods on physiology, time on Bud break, scion sprouting and graft success of pomegranate (*Punica granatum* L.) Cv. Kesar

Basavaraj Padeshetti, Kulapati KH, Gollagi SG, Sateesh Pattepur and Oying Jamoh

Abstract
An experiment on standardization of grafting techniques in pomegranate (*Punica granatum* L.) was carried out at Main Horticultural Research and Extension centre (MHREC) UHS, Bagalkot (Karnataka) during June 2018- February 2019. One year old seedlings of Ganesh were used as a rootstock for present study, The result of the experiment, T_3 (Softwood grafting on 15th July) proved to be the most effective for early bud break(16.17 days) and increasing sprouting percentage (58.33%) at 150 DAG, grafting success (75%) at 60 DAG, When compare between softwood and whip & tongue grafting method, softwood grafting was more effective with respect to bud break, sprouting percentage, grafting success.

Keywords: Physiology, time on Bud break, scion sprouting, pomegranate

Introduction
Pomegranate (*Punica granatum* L.) belongs to the family Lythraceae, with a chromosome number 2n=18. It is one of the ancient and highly praised favourite fruits. It is commonly called as "friendship fruit". It is an important commercial fruit preferred by the consumer all over the world for its sweet- acidic taste, fine dessert quality and excellent blend. The fruit is also popular due to the organoleptic characteristics of the arils (i.e. the seeds), nutritional and therapeutic values for its usefulness in cancer, indigestion and leprosy cure. The total area under this fruit crop at present accounts to 2.34 lakh hectare with an annual production of 2865 thousand metric ton (NHB data 2018-19). Maharashtra is the leading producer of pomegranate in India which contributes more than 75 % of the total area and production followed by Karnataka and Andhra Pradesh. Pomegranate is mainly propagated by air layering. Recently, wilt has emerged as a major threat to the pomegranate industry in Maharashtra, Karnataka and Andhra Pradesh. Presently, neither any standard grafting techniques nor suitable rootstock is available by which the wilt problem could be controlled. Looking into this whole issue, an attempt was made to evaluate the vegetative propagation of pomegranate by grafting (softwood and whip/tongue grafting).

Materials and Method
Experiment was conducted at Division of Fruit Science, MHREC, University of Horticultural Sciences, Udyanagiri, and Bagalkot, which comes under Northern dry zones of Karnataka (zone 3) located at 16° 46 North latitude, 74° 59 East longitude and at an altitude of 533 meters above the mean sea level. Two grafting method (Softwood and Whip & tongue grafting) was used in the month of June, July and August at every forth nightly interval. The experiment was laid out in complete randomized block design with twelve treatments and three replications under shade net condition. Observation on bud break, sprouting percentage was recorded at 30, 60, 90, 120 and 150 days after grafting, grafting success percentage was recorded at 60 days after grafting. The data was statistically analyzed using Fischer's method of analysis of variance techniques.

Results and Discussion
Among the different treatments, early bud break (16.17 days) was recorded in T_3 (softwood grafting on 15th July) where as T_9(whip and tongue grafting on July-15) took maximum number of days(24.67) for bud break, the maximum sprouting percentage (58.33 %) was recorded in T_3 (softwood grafting on 15th July) at 150 DAG and minimum sprouting percentage (12.5%) was recorded in T9 (whip and tongue grafting on 15th July) at 150 DAG (Table 1&2.) The results indicate that both the method and season had profound effect on bud break and

sprouting percentage of pomegranate grafts. This could be attributed to high humidity and high temperature prevailed during this period. The high temperature and high humidity had profound effect on graft intake (Hartman and Kester, 1986) [3]. The results of present investigation are supported by Patil *et al*. (2010) [10], Sonawane *et al*. (2012) [11] and the reason for late bud break and lower sprouting percentage in tongue and whip grafting might be due to the fact that scion and stocks are not interlocked properly resulting in less intimate contact of both scion and stock resulting in no callus formations. Similar result was reported by Husain *et al*. (2016) [4].

With respect to grafting success, the maximum grafting success percentage (75%) was recorded in T3 (softwood grafting on 15th July) at 60 days after grafting (Table 3). The minimum grafting success percentage (12.50 %) was recorded in T9 (whip and tongue grafting on 15th July (Table 3.). It is due to the optimum temperature and relative humidity, which are the two major factors which plays a greater role in the grafts union formation. Higher humidity prevents scion from desiccation and thus helps in maintaining cell turgidity and help in quick callus formation between stock and scion during July month. Similarly Ghosh *et al*. (2010) [2] noticed, higher grafts success during July (72 %) in softwood grafting in sapota, Nitish *et al*. (2019) [9] also observed higher grafting success percentage in the month of July (80.00 %) in softwood grafting, Patil *et al*. (2010) [10] recorded the highest grafting success (63.33 %) in softwood grafted plants in sapota.

Shoot length was recorded maximum (57.00 cm) in T_3 at 150 DAG. However at 60 DAG, the maximum shoot length (25.66 cm) was recorded in T5 (softwood grafting on 15th August). The minimum shoot length was recorded in treatments where whip and tongue grafting was done (Table 4) It is evident from (Table 4.) that softwood grafted plants gave maximum shoot length compare to whip and tongue grafted plants. It might be due to higher humidity and higher temperature inside the shade net which leads to higher metabolic activity of cells which leads to extension of growth of scion. These findings are correlated to the findings of Sonawane *et al*. (2012) [11] in carambola, Nitish *et al*. (2019) [9] in sapota, Patil *et al*. (2010) [10] in sapota where they reported the maximum scion growth in softwood grafting done in July month.

The maximum scion diameter (6.83 mm) was recorded in T4 (softwood grafting on 30th July) at 150 DAG and the minimum scion diameter (6.10 mm) was recorded in T12 (whip and tongue grafting on 30th August) Table 5.This might be due to higher carbohydrates accumulation due to early growth, more number of leaves in softwood grafted plants. And during July month temperature and humidity was also favourable for the grafts to grow. This result is in conformity with the findings of Patel *et al*. (2010) in mandarin where they recorded the maximum scion diameter in softwood grafted plants during July month. Similarly, Hussain *et al*. (2016) [4] in chestnut reported that scion diameter was minimum for tongue and whip grafting.

Conclusion

It can be concluded that the softwood grafting performed on 15th July gave the best result under shade net condition. Hence, softwood grafting can be used as commercial method of propagation by utilising the wilt resistant rootstocks.

Table 1: Number of days required to bud break

Treatments	Number of days required to bud break
T_1: softwood grafting on June-15	19.39
T_2: softwood grafting on June-30	17.22
T_3: softwood grafting on July-15	16.17
T_4: softwood grafting on July-30	18.83
T_5: softwood grafting on August-15	19.53
T_6: softwood grafting on August-30	17.43
T_7: whip and tongue grafting on June-15	0.00
T_8: whip and tongue grafting on June-30	0.00
T_9: whip and tongue grafting on July-15	24.67
T_{10}: whip and tongue grafting on July-30	0.00
T_{11}: whip and tongue grafting on August-15	24.51
T_{12} : whip and tongue grafting on August-30	23.65
S. E m±	1.27
CD 5%	3.72

Table 2: Effect of grafting on sprouting percentage (%) at different days after grafting

Treatment	Sprouting percentage (%) at DAG				
	30	60	90	120	150
T_1	25.00 (30.00)	33.33 (35.17)	29.17 (32.59)	29.16 (32.59)	25.00 (29.49)
T_2	33.33 (35.17)	33.33 (35.17)	33.33 (35.17)	33.33 (35.17)	33.33 (35.17)
T_3	54.17 (47.41)	75.00 (60.54)	62.50 (52.24)	58.33 (49.82)	58.33 (49.83)
T_4	12.50 (20.70)	25.00 (30.00)	25.00 (30.00)	25.00 (30.00)	25.00 (30.00)
T_5	37.50 (37.76)	37.50 (37.76)	37.50 (37.76)	37.50 (37.76)	37.50 (37.76)
T_6	50.00 (45.00)	54.17 (47.41)	50.00 (45.00)	45.83 (42.58)	45.83 (42.59)
T_7	0.00	0.00	0.00	0.00	0.00
T_8	0.00	0.00	0.00	0.00	0.00
T_9	16.67 (23.80)	12.50 (20.70)	12.50 (20.70)	12.50 (20.70)	12.50 (20.70)
T_{10}	0.00	0.00	0.00	0.00	0.00
T_{11}	41.67 (40.17)	54.17 (47.41)	54.17 (47.41)	54.16 (47.41)	54.17 (47.47)
T_{12}	41.67 (40.17)	37.50 (37.76)	33.33 (35.17)	33.33 (35.17)	33.33 (35.17)
S. E m±	1.43	2.12	1.84	1.80	2.13
CD 5%	4.18	6.22	5.39	5.27	6.25

Values in the parenthesis are arcsine value

Table 3: Grafting success at 60 DAG.

Treatment	Grafting success (%)
T_1: softwood grafting on June-15	33.33 (35.17)
T_2: softwood grafting on June-30	33.33 (35.17)
T_3: softwood grafting on July-15	75.00 (60.54)
T_4: softwood grafting on July-30	25.00 (30.00)
T_5: softwood grafting on August-15	37.50 (37.76)
T_6: softwood grafting on August-30	54.17(47.41)
T_7: whip and tongue grafting on June-15	0.00 (0.00)
T_8: whip and tongue grafting on June-30	0.00 (0.00)
T_9: whip and tongue grafting on July-15	12.50 (20.70)
T_{10}: whip and tongue grafting on July-30	0.00 (0.00)
T_{11}: whip and tongue grafting on August-15	54.17 (47.41)
T_{12} : whip and tongue grafting on August-30	37.50 (37.76)
S. E m±	2.12
CD 5%	6.22

Values in the parenthesis are arcsine value
DAG- Days after grafting

Table 4: Effect of grafting on shoot length at different DAG.

Treatment	Shoot lenght (cm) at DAG				
	30	60	90	120	150
T_1	16.62	21.01	33.43	39.34	48.15
T_2	15.36	19.81	30.73	39.66	49.15
T_3	17.58	21.50	41.51	45.20	57.00
T_4	17.30	21.25	29.85	36.18	52.53
T_5	12.78	25.66	28.09	34.16	45.22
T_6	15.76	22.42	28.59	44.62	50.76
T_7	0.00	0.00	0.00	0.00	0.00
T_8	0.00	0.00	0.00	0.00	0.00
T_9	12.73	18.53	27.00	31.80	43.07
T_{10}	0.00	0.00	0.00	0.00	0.00
T_{11}	9.93	20.82	29.87	36.24	45.16
T_{12}	15.73	20.75	25.66	35.23	48.85
S. E m±	0.70	1.00	1.28	2.16	2.25
CD 5%	2.07	2.93	3.76	6.34	6.59

DAG- Days after grafting

Table 5: Effect of grafting on scion diameter (mm) at different days after grafting.

Treatments	Scion diameter (mm) at DAG				
	30	60	90	120	150
T_1	5.63	5.83	6.07	6.33	6.45
T_2	5.72	6.09	6.33	6.46	6.77
T_3	6.18	6.22	6.29	6.47	6.56
T_4	6.74	6.38	6.45	6.82	6.83
T_5	5.66	5.93	6.29	6.44	6.66
T_6	5.69	5.78	5.98	6.16	6.23
T_7	0.00	0.00	0.00	0.00	0.00
T_8	0.00	0.00	0.00	0.00	0.00
T_9	6.08	6.19	6.27	6.38	6.47
T_{10}	0.00	0.00	0.00	0.00	0.00
T_{11}	5.54	5.74	5.80	6.02	6.42
T_{12}	5.58	5.48	6.06	6.03	6.10
S. E m±	0.13	0.19	0.07	0.10	0.11
CD 5%	0.38	0.55	0.19	0.30	0.32

DAG- Days after grafting

References

1. Chandra R, Jadhav VT, Sharma J, Marathe RA. Effect of grafting methods and time on scion sprouting, graft success and subsequent growth of grafted pomegranate (*Punica granatum* L.) 'Bhagawa'. Acta Hort. 2011; 890:83-86.
2. Ghosh SN, Bera B, Roy S, Banik BC. Effect of cultivars and season on grafting success in sapota under Paschim Midnapur conditions of West Bengal. J Hort. Sci. 2010; 5(2):138-139.
3. Hartmann HS, Kester DE. Plant propagation. Prentice Hall of India, Pvt. Ltd. New Delhi. India, 1986, pp. 399-447.
4. Hussain S, Mir MM, Bhat R, Wani SA, Shameem R. Standardization of propagation techniques in chestnut (*Castanea sativa* Mill.). Eco. Env. And Cons. 2016; 22(2):911-915.
5. Kar PL, Singh RP, Chadha TR. Studies on the standardization of top working technique in wild pomegranate trees. Hort. J. 1989; (1):68-70.
6. Karimi HR, Homayoun F. study of pomegranate (*Punica granatum* L.) propagation using Bench Grafting. J of fruit and ornamental plant res. 2011; 19(2):67-72.
7. Karimi HR, Nowrozy M. Effect of rootstock and scion on graft success and vegetative parameters of pomegranate. Scientia Horti. 2017; 214:280-287.
8. Karimi R. Stenting (cutting & grafting): A new technique for propagating pomegranate (*Punica granatum* L.). J, Fruit Ornam, Plant Res. 2011; 19:73-79.
9. Nitish HT, Murthy V, Goudappanavar PB, Deeksha RN. Standardization of softwood grafting techniques in sapota (*Manilkara achras* L.) on invigorated khirni rootstock under polyhouse and shade net conditions. International J Chemical studies. 2019; 7(2):2079-2081.
10. Patil SN, Suryawanshi AB, Phad GN. Effect of season of grafting on percent graft-take and growth of scion shoot of sapota on khirni rootstock. International J Pl. Sci. 2010; 5(1):6-9.
11. Sonawane GR, Khandekar RG, Korake GN, Haldankar PM, Mali PC. Effect of season on softwood grafting in carambola (*Averrhoa carambola* L.). The Asian J Hort. 2012; 7(2):412-415.
12. Vazifeshenas M, Khayyat M, Jamalian S. Effects of different scion rootstocks combinations on vigour, tree size, and yield and fruit quality on three Iranian cultivars of pomegranate. Acta Hort. 2009; 463:143-152.