The Pharma Innovation Journal 2022; 11(3): 55-59

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(3): 55-59

www.thepharmajournal.com
Received: 16-01-2022
Accepted: 24-03-2022

Kiran R Huddar
M.Sc., Research Scholar, Department of Floriculture and Landscape Architecture, KRC College of Horticulture Arabhavi, UHS Bagalkot, Karnataka, India

Rudragouda Patil
Assistant Professor, Department of Floriculture and Landscape Architecture, KRC College of Horticulture Arabhavi, UHS Bagalkot, Karnataka, India

BC Patil
Professor and Head, Department of Floriculture and Landscape Architecture, KRC College of Horticulture Arabhavi, UHS Bagalkot, Karnataka, India

Mukund Shiragur
Assistant Professor, Department of Floriculture and Landscape Architecture, KRC College of Horticulture Arabhavi, UHS Bagalkot, Karnataka, India

Sumangala Koulagi
Assistant Professor, Department of Horticulture Plant Pathology, KRC College of Horticulture Arabhavi, UHS Bagalkot, Karnataka, India

Anil Sabarad
Assistant Professor, Department of Fruit Science, KRC College of Horticulture Arabhavi, UHS Bagalkot, Karnataka, India

Corresponding Author:
Kiran R Huddar
M.Sc., Research Scholar, Department of Floriculture and Landscape Architecture, KRC College of Horticulture Arabhavi, UHS Bagalkot, Karnataka, India

Influence of season of grafting on stenting of Dutch rose var. top secrete

Kiran R Huddar, Rudragouda Patil, BC Patil, Mukund Shiragur, Sumangala Koulagi and Anil Sabarad

Abstract
An experiment on "Influence of season of grafting on stenting of Dutch Rose var. Top Secrete" was carried out at Kittur Rani Channamma College of Horticulture, Arabhavi, Gokak, Karnataka during 2020-2021. The results revealed that, grafts performed in five different seasons varied significantly. The experiment was laid out in a Complete Randomized Design (CRD) with four replications with the view to find out the best season of grafting on graft success and survivability in Dutch Rose var. Top Secrete. The scion Top Secrete was grafted on Natal Briar rootstock. January month of grafting recorded minimum number of days taken for sprouting (11.83), maximum sprouting per cent (79.38%), maximum number of roots (24.00) highest length of the root (11.93 cm), maximum graft survival percentage (70.63%) at 60 days after grafting and maximum saleable plant per cent (66.47%) at 90 days after grafting. Whereas, in terms of highest shoot length (8.55 cm), maximum number of leaves per graft (21.14) was recorded in grafts prepared in the month of February at 60 days after grafting. January month showed superior performance with respect to different growth parameters followed by February month of grafting.

Keywords: Stenting, rose, scion, rootstock, grafting, season, month

Introduction
The world's most favourite flower 'Rose' belongs to the family Rosaceae and genus Rosa, which comprises nearly 120 species and 30,000 cultivars. Roses are found throughout the northern hemisphere's temperature zones, from the Pacific coast of North America to the Arctic Circle. Rose is considered as the leading cut flower in international flower trade and have become more popular now a days because of its diverse; attractive form, beautiful colours, growth habits and delightful fragrance (Muhammad *et al.*, 1996) [11]. Besides enjoying top position in cut flower trade, roses are grown for loose flower, making garlands, bouquets, flower arrangement, vase decoration, hair adornment, preparing rose products (gulkand, pankhuri, essential oil, attar and rose water) and worshipping (Arora, 1990) [2].

Top Secrete belongs to Dutch rose group and it is grown for its tight compact petals and bright red stunning colour that is a symbol of love. A further attraction of the rose is its very long vase life and its impressive stem length. This flower has broad petals, it has a bud size of 4 cm and bud diameter of 3 cm and a stem length of 40-60 cm (Anon, 2021) [1]. Natal Briar is native to South Africa and belongs to the group *Rosa hybrida*. It has a vigorous and very prickly shrub having stout stem, foliage toothed all round margins and this gives longer stems and very high production in warmer climate. But this may not be continuous, as from second year onwards this would produce smaller buds on a number of varieties.

The conventional method of nursery production takes almost two years for all rose plants to attain saleable size i.e., from raising through cutting in raised bed for rootstock and then after few months transplanting to the polybags to optimum sapling growth of rootstock in the first year and further in grafting or budding in the subsequent year to saleable size. On the other hand, stenting is a method of rapid multiplication of plants where rooting and graft union occurs side by side (Van de Pol and Breukelear, 1982) [14]. Hence, keeping above points in mind the experiment was carried out with an objective to study the influence of season of grafting on graft success and survivability in Dutch Rose var. Top Secrete.

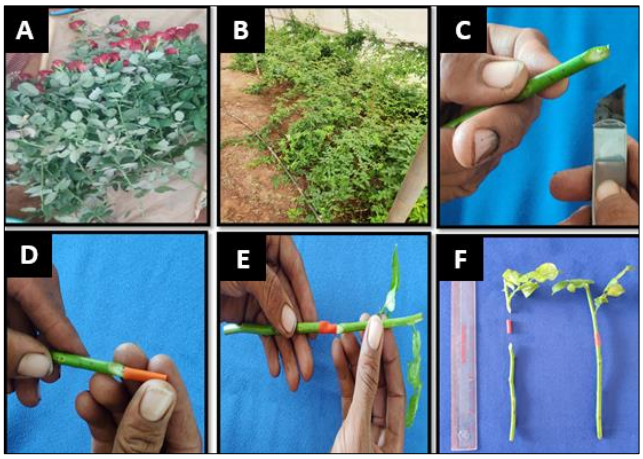


Fig 1: The course of stenting used in preparation of harvested scion (A) and rootstock (B); C, both base of the scion and top of the stock cut at 45° angle for grafting; D, inserting silicon tube to the rootstock; E, uniting the scion and rootstock; F, the whip grafted stent

Materials and Methods

The present study on "Influence of season of grafting on stenting of Dutch Rose var. Top Secrete" was undertaken during the year 2020-21 in the mist house of Department of Floriculture and Landscape Architecture, Kittur Rani Channamma College of Horticulture, Arabhavi, Gokak taluk, Belagavi district, UHS Bagalkot, Karnataka. Arabhavi is situated in northern dry tract of Karnataka state at 16º15´ North latitude and 94º45´ East longitude and at an altitude of 612.03 m above the mean sea level (MSL). The average annual mean rainfall of this area is about 530 mm and the minimum and maximum temperatures are about (14.96 ℃ and 36.89 ℃, respectively). The minimum and maximum humidity of this area is about (70.03% and 94.92%, respectively). The minimum and maximum light intensity of the open field (58912.08 lux and 88598.41 lux, respectively) and mist house (21277.51 lux and 46297.30 lux, respectively). The propagation house used for the study had a misting facility arranged to mist intermittenenly for 30 seconds at every five minutes interval between 9.00 AM and 6.00 PM depending on daily temperature.

The experiment was laid out in a Complete Randomized Design (CRD) with four replications and five treatment combinations. Container used for the experiment was portrays of size 3" cavity. A propagation medium, coco-peat produced from waste product of coconut palm (*Cocos nucifera*) was used. The experiment involved whip grafting (splice grafting) method. The top cut of the rootstocks and the bottom end cut of the scions were cut at angle of 45° so as to fit the cut surfaces of one partner exactly with that of the other to facilitate the joining process. For best cambial contact scion and rootstock, the two partner were fixed with silicon tubes. The bottom end of grafted cutting were then scrap off (wound making, slant cut) with knife to make wound and facilitate root induction. Top Secrete as scion was grafted on Natal Briar rootstock, conducted in five different seasons. The treatment details are as follows (S_1: January, S_2: February, S_3: March, S_4: April and S_5: May). The wrapping material used for the study was silicon tubes of size (3.5 mm x 4.5 mm, 4.5 mm x 5.5 mm and 5.5 mm x 6.5 mm, respectively). The whip grafted stents were dipped in IBA+NAA @ 1000 ppm for 60 seconds to enhance fast rooting. Stenting was done on every 2nd week of every month (January - May).

The observations like number of days taken for sprouting, number of sprouts per graft, sprouting percentage (%), shoot length (cm), number of leaves per graft, number of roots, length of the root (cm), root fresh weight (g), root dry weight (g), graft survival percentage (%) and saleable plant percentage (%) were evaluated against the treatments. For that purpose, stentlings were carefully uprooted and media particles adhered to roots were removed with great care by hand and the above parameters were recorded. All statistical analysis was performed using ICARGOA version 2.0. Standard error of the mean's (S.Em±) were computed in each case and critical difference (C.D) at 5 per cent level of significance was calculated for significant results (Cochran and Cox, 1957) [9].

Results and Discussion

All the parameters studied were significantly differed. The minimum number of days taken for sprouting (11.83) was observed during January month followed by February month (14.20) of grafting and the maximum number of days taken for sprouting (28.48) was recorded in April months of grafting. This may be due to the favourable weather conditions prevailed during these months in terms of modern temperature (29.62 ºC) as compared to the later months. During this period, the rose stents initiate its growth after the resting period and therefore the scions should have high levels of carbohydrate and other biochemical constituents which might have helped in early sprouting of scion. Contrary results were seen by Chakraborty and Singh (2011) [6] in peach. The maximum sprouting per cent (79.38%) was recorded in January month followed by February month (71.88%) of grafting. Whereas, minimum sprouting per cent (33.69%) was observed during March month of grafting. The differences in sprouting percentage among stents, may be due to the reserve food material present in stents which provide the sufficient amount of food for bud sprouting or may be due to their varied dormancy behaviour. Similar results were obtained by Sharma (2018) [13] in peach and Chandra *et al.* (2011) [8] pomegranate using cv. Phule Arakta.

The maximum height of the graft at 60 days after grafting was recorded in February month (17.40 cm) followed by January month (16.83 cm). The minimum height of the graft was observed during the April month of grafting (11.31 cm). January month was statistically on par with February months of grafting. The higher numbers of leaves are found to be associated with more supply of nutrient and water to the plant, which enhances the growth leading to more plant height. The food in the form of photosynthates provides the required energy for cell division and cell elongation, which results again in more plant height. Contradictory results were seen by Gill *et al.* (2014) [10] and Brar and Khehra (2017) [4] in peach cv. Shan-e-Punjab. The number of leaves produced per graft at 60 days after grafting were significantly higher in February month (21.14) followed by January month (19.32) of grafting. Whereas, the minimum number of leaves per grafts (15.35) was observed during April month of grafting. The stored food materials utilized to produce leaves which then start photosynthesis thereby, contribute to the increasing food requirement of the growing plant. When such scions with possibly higher quantity of stored food materials used for grafting, they produce longest shoot. Good sap flow conditions of plants and favourable climate might have favoured the healing process and established the continuity of

cambial and vascular tissues for the graft take resulted in earlier sprouting of grafts, thereby produced higher number of leaves as compared to the grafts prepared during later months. The results are in concurrence with Brar (2017) [4] in rose cuttings.

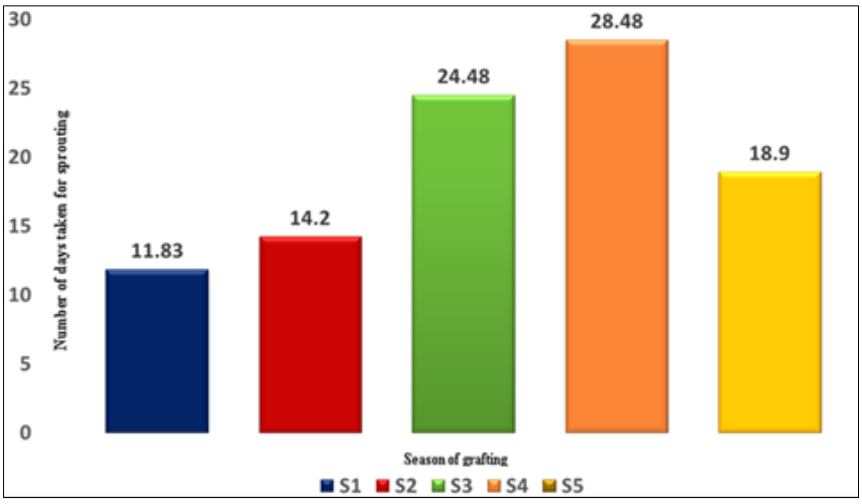
At 60 days after grafting, the maximum number of roots per plant was recorded in January month (24.00) followed by February month (19.50) of grafting and the minimum number of roots per plant (11.25) was noticed during March month of grafting. The presence of higher levels of carbohydrate and other biochemical constituents in scions might have helped in maximum number of roots after grafting. The results are in concurrence with Brar (2017) [4] in rose cuttings. The maximum length of the root at 60 days after grafting was noticed in January month (11.93 cm) followed by February month (9.29) of grafting and the minimum length of the longest root (6.25 cm) was observed during April month of grafting. The optimum temperature (29.62 ºC), humidity (94.92%) and light (39587.09 lux) occurred during January month might have helped in mobilization of reserve food materials, elongation of meristematic cells and differentiation of cambial initials into root primordial (Younis and Riaz, 2005) [15]. Similar results were seen by Brar (2017) [5] in rose cuttings.

The maximum root fresh weight of the roots at 60 days after grafting was recorded at February month (1.98 g) followed January month (1.46 g) of grafting and the minimum root fresh weight was observed during April month of grafting (0.62 g). The grafts prepared during January month was on par with the February months of grafting. This might be attributed to congenial weather condition of the rootstock and scion coincide with synthesis of required quantities of secondary metabolites like phenolic and alkaloid compounds which are required for the protection of the rootstock with less root attack by the soil-borne pathogens and insect-pests. The results are in concurrence with Brar (2017) [5] in Rose cuttings. The maximum root dry weight (1.36 g) was recorded in February month followed by January month (1.07 g) of grafting and the minimum root dry weight (0.31 g) was observed during April month of grafting. This is due to the varying amount of biomass produced under different seasons varying from January to May, which accumulates more stored carbohydrates for root initiation, growth and development of roots in each graft. The results are in concurrence with Brar (2017) [5] in rose cuttings.

At 60 DAG, the maximum graft survival was noticed in January month (70.63%) followed by February month (63.13%) of grafting and the minimum graft survival per cent of the graft was observed during March month of grafting (21.25%). Highest survival may be attributed to the congenial weather conditions i.e., moderate temperature (29.62 ºC) and high humidity (94.92%) prevailed during these months, which resulted in increased cell activity after grafting leading to better union of stock and scion. The plants have higher carbohydrate contents and are in physiologically active conditions with better sap flow in this season. Therefore, the stents prepared during January months, obtained climatic as well as plant biological benefits naturally that leads to higher graft survival percentage for the grafts. Survival of the grafts depends to the greatest extent on the environmental conditions which may vary from region to region. Similar results were obtained by Chalise *et al.* (2013) [7] in mandarin (*Citrus reticulata* Blanco), and Bharatkumar (2017) [3], Panchbhai *et al.* (2006) [12] in aonla (*Phyllanthus emblica* L.), and Chandra *et al.* (2011) [8] pomegranate using cv. Phule Arakta. The maximum saleable plant per cent of the stent (66.47%) was recorded in January month followed by February (58.57%) month of grafting, and the minimum saleable plant per cent of the graft (16.73%) was recorded during March month of grafting. This might be due to the presence of congenial conditions inside mist house and greenhouse might have received favourable temperature (29.62 °C), humidity (94.92%) and some extent light (39587.09 lux). The light usually affects the level of endogenous auxins and mobilization of reserve food material in scion shoots and thus helping the success in graft union. This might have resulted in higher success by way of increased cell activity coupled with active growth of stock plants and scion shoots during these months which has encouraged better cambial activity and resulted in higher graft union formation. Higher sprouting per cent in the January grafted stents and highest number of roots, maximum rooting per cent made the plant which helped the stents in the easy establishment after transplantation. Contradictory results were seen by Chakraborty and Singh (2011) [6] in peach.

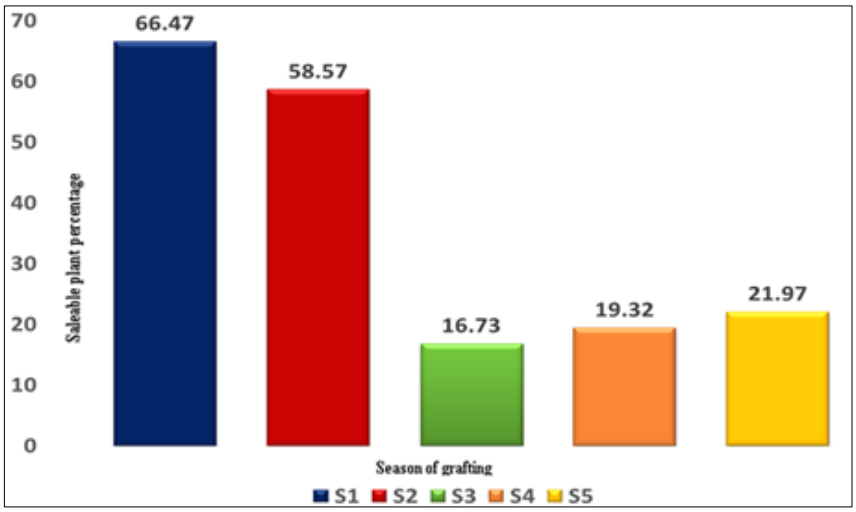
S- Season of grafting
(S_1: January, S_2: February, S_3: March, S_4: April, S_5: May

Fig 2: Effect of season of grafting (S) on shoot and root growth 60 DAG



S- Season of grafting S_1: January month, S_2: February month, S_3: March month, S_4: April month, S_5: May month)

Fig 3: Number of days taken for sprouting as influenced by different seasons in rose var. Top Secrete



S- Season of grafting S_1: January month, S_2: February month, S_3: March month, S_4: April month, S_5: May month)

Fig 4: Saleable plant percentage as influenced by different seasons in rose var. Top Secrete at 90 DAG

Table 1: Growth parameters as influenced by the different seasons of grafting in Rose var. Top Secrete at 60 days after grafting

Treatments	Sprouting percentage (%)	Shoot length (cm)	Number of leaves per graft	Number of roots per graft	Length of root (cm)	Root fresh weight (g)	Root dry weight (g)	Graft survival percentage (%)
S_1	79.38	7.48	19.32	24.00	11.93	1.46	1.07	70.63
S_2	71.88	8.55	21.14	19.50	9.29	1.98	1.36	63.13
S_3	33.69	5.42	15.40	11.25	7.03	0.67	0.39	21.25
S_4	40.50	3.68	15.35	12.00	6.25	0.62	0.31	30.63
S_5	45.19	4.16	18.08	14.50	8.25	0.70	0.47	33.38
Mean	54.13	5.86	17.86	16.25	8.55	1.09	0.72	43.80
S.Em±	1.60	0.39	0.48	0.76	0.33	0.20	0.09	1.80
CD @ 5%	4.81	1.18	1.44	2.29	0.99	0.60	0.26	5.43

S_1 – January 2021
S_2 – February 2021
S_3 – March 2021
S_4 – April 2021
S_5 – May 2021

Conclusion

From the presented study it can be inferred that, January month recorded the overall superior performance with respect to the various growth parameters like minimum number of days taken for sprouting (11.83), maximum sprouting per cent (79.38%), maximum number of roots (24.00) highest length of the root (11.93 cm), maximum graft survival percentage (70.63%) at 60 days after grafting and maximum saleable plant per cent (66.47%) at 90 days after grafting. Hence it is recommended to graft in the month of January for the production of quality plants of rose.

References

1. Anon, 2021. https://www.indiamart.com/proddetail/taj-mahal-rose-1150018874.html
2. Arora JS. Introductory Ornamental Horticulture, Kalyani Publishers, New Delhi, 1990, 54-62.
3. Bharathkumar TR. Studies on effect of different seasons on softwood grafting in aonla (*Phyllanthus emblica* L.), European J Biotechnol and Biosci. 2017;5:83-84.
4. Brar JS, Khehra S. Stenting: A technique for rapid multiplication of peach (*Prunus persica* L. Batsch) plants. J Curr. Microbiol. Appl. Sci. 2017;6(8):1449-1453.
5. Brar JS. Effect of IBA and planting time on propagation of rose (*Rosa hybrida* Vill.) M.Sc. thesis, Punjab Agri. Univ., Ludhiana, India, 2017.
6. Chakraborty B, Singh PN. Effect of rootstock and time of grafting in low chill peach cultivars. Progres. Hort. 2011;43(2):281-284.
7. Chalise B, Baral DR, Gautam DM, Thapa RB. Effect of grafting dates, methods on success and growth of mandarin (*Citrus reticulata* Blanco.) sapling. Nepal J Sci. and Technolo. 2013;14(1):23-30.
8. Chandra R, Jadhav VT, Sharma J, Marathe RA. Effect of grafting methods and time on scion sprouting, graft success and subsequent growth of grafted plants of pomegranate (*Punica granatum* L.) Bhagawa. Acta Hort. 2011;890:83-86.
9. Cochran WG, Cox GM. Experimental designs. John Willey and Sons. Inc., New York, 1957, 546-568.
10. Gill JK, Singh H, Thakur A, Jawandha SK. Studies on simultaneous grafting and rooting of peach on Florda Gourd rootstock. Hort. Flora Res. Spect. 2014;3(3):259-262.
11. Muhammad SM, Hiroyasu S, Shahzad N. Diversity in Roses. Nat. Agri. Res. Center, Islamabad, 1996, 1-2.
12. Panchbhai DM, Roshan RK, Mahorkar VK, Ghawade SM. Effect of rootstock age and time of grafting on grafting success in aonla. In: Proceedings of the national symposium on production, utilization and export of underutilized fruits with commercial potentialities, Kalyani, Nadia, West Bengal, India, 2006, 106-110.
13. Sharma J. Relative performance of chip and T-budding over tongue grafting in peach (*Prunus persica* L.) cv. Shan-e-Punjab. M.Sc. Agri. (Hort.) thesis, G.B. Pant Univ. Agri. and Technol., Pantnagar, Uttarakhand, India, 2018.
14. Van de Pol PA, Breukelaar A. Stenting of roses; A method for quick propagation by simultaneously cutting and grafting. Sci. Hort. 1982;17(2):187-196.
15. Younis A, Riaz A. Effect of various hormones and different rootstocks on rose propagation. Caderno de Pesquisa. Série Biologia. 2005;17:111-118.