



Effect of Weather Condition on Vegetative Propagation of Black Plum (*Syzygium cumini*) and Glue Berry (*Cordia myxa*)

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Abstract: The experiment on effect of growing season on propagation of glue berry (*Cordia myxa*) and black plum (*Syzygium cumini*) was conducted at the regional research station, CCS Haryana Agricultural University, Hisar during 2017-2023. There were two treatments i.e., time of planting (eight months i.e., February to September) and method of propagation. The maximum success rate of budding 63.3 % was during August and July in black plum and glue berry, respectively over the years. The per cent success rate of soft wood grafting was maximum 53.3 and 56.3 % in August and July in black plum and glue berry respectively. However, in black plum lowest budding and soft wood grafting success was as 10.0 % in February, 2017-23. Similarly, in glue berry minimum budding and soft wood grafting success was 13.3 % in February. Positive and significant correlation existed between percent success budding with minimum temperature ($r=0.826$) while a negative and significant correlation existed between percent success budding with sun shine hours ($r=-0.808$) in black plum and glue berry. There was non-significant correlation existed between percent success soft wood grafting with maximum temperature, humidity, rainfall and evaporation weather parameters.

Keywords: *Syzygium cumini*, *Cordia myxa*, Propagation, Temperature, Sunshine

There is a plenty of scope for quantum jump in fruit production in semi-arid areas. These fruits are source of income and nutritional security to inhabitants in arid and semi-arid regions. The importance of underutilized fruits is increasing because people are realizing the potential of these fruits. Looking into the importance of these fruits, the demand of their genuine planting material is increasing day by-day. To meet the demand of planting material, vegetative propagation techniques have been standardized for commercial multiplication. The variability has been observed in plants raised through seeds. Except few plant species, vegetative methods of propagation are used for their multiplication. Propagation through vegetative methods, viz. stem cutting, layering, stooling and grafting have been described for many semi-arid fruits. Under dryland condition, in-situ establishment of black plum orchard has been found successful with better survival (Singh et al., 2020). It is established fact that to harness the maximum efficiency from a crop cultivation, use of genuine planting material is foremost requirement. However, information on propagation techniques for these species is scantily available. Further vegetative propagation is essential for due to heterozygous nature of fruit plants (Tripathi et al., 2022). In order to optimize the production of semi-arid fruit crops, propagation techniques of black plum, glue berry mimusops (*Mimusops hexandra*), elephant apple (*Limonia acidissima*), Madras thorn (*Pithecellobium dulce*), custard apple (*Annona squamosa*), mahua tree (*Madhuca longifolia*), stone apple (*Aegle marmelos*), cuddapah almond (*Buchanania lanzan*)

have been standardized for large scale multiplication of plants. For better success and survival of semi-arid fruits, in-situ budding and grafting has been found better with vigorous growth of grafted plants under arid and semi-arid conditions (Singh et al., 2014). Since no attempt has been made earlier to standardized the propagation method of several wild fruits and very little information is available on multiplication of these fruits. The success and subsequent growth of grafted saplings depend on many factors including environmental conditions, variety, method of grafting and selection of scion and rootstock materials (Hartmann et al., 2002). The prevailing environmental conditions are primarily governed by the seasons under which budding and grafting is performed. The climatic factors like light, temperature, rainfall and humidity have a significant influence on the percentage of survival and establishment of grafts (Singh et al., 2020). In view of above present study was undertaken to find out the suitable method of propagation with respect to growing season in black plum and glue berry fruit crops.

MATERIAL AND METHODS

The experiment was conducted at CCS Haryana Agricultural University, Regional Research Station, Rewari during 2017-2023 on glue berry (*Cordia myxa*) and black plum (*Syzygium cumini*) This region is characterized by arid regions with hot and dry summer and cold winter. The experiment was completely randomized design with ten replications of each treatment. The two methods of propagation i.e. T-budding and soft wood grafting in both the

crops and also to standardized time of vegetative propagation with eight treatments each viz. middle of February, March, April, May, June, July, August and September (eight dates of budding) were taken. The mature fruits were collected during their season. The freshly collected seeds were sown in poly bags. In grafting, One year-old rootstocks were selected was used with 3-4-month-old scion sticks. The data on success and survival of both the methods with respect to growing seasons were recorded. The statistical analysis was done using software OP STAT (Sheoran 2004).

RESULTS AND DISCUSSION

In black plum the maximum success rate of budding (63.3 %) and graft success (53.3 %) was in August over the years whereas the minimum bud intake and graft union success was during the February. The per cent success rate of soft wood grafting was maximum 56.3 % in July glue berry. The maximum bud intake success was in July in glue berry over the years. Similarly, in glue berry minimum budding and soft wood grafting success was 13.3 % in February, 2017-2023. It might be due the variation in graft and bud success in black plum and glue berry due to variation of temperature and relative humidity during different months and seasons. The maximum graft and bud success is directly related to prevailing optimum temperature and higher relative humidity. These congenial weather conditions facilitate early contact of the cambium layer of rootstock and scion resulting in early callus formation and initiation of subsequent growth. Mulla et al. (2011) on softwood grating in black plum observed the highest graft success (100%) in November and May and highest graft survival (93.33%). Uchoi et al. (2012) reported the highest graft survival (90.50%) during January in black plum.

There was positive and significant correlation between %

success budding (T) with minimum temperature ($r=0.826$) in black plum and ($r=0.858$) glue berry while a negative and significant correlation existed between % success budding (T) with sun shine hours ($r= -0.808$) in black plum and ($r=0.919$) in glue berry . There was non-significant correlation existed between % success budding with other weather parameters (Table 1).

There was positive and highly significant correlation between percent success soft wood grafting with minimum temperature($r=0.872$) in black plum and ($r=0.769$) in glue berry, while a negative and highly significant correlation existed between percent success soft wood grafting with sun

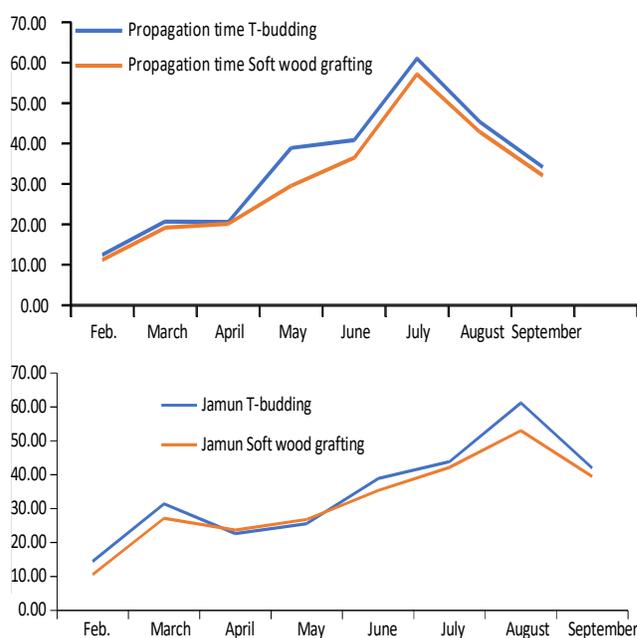


Fig. 1. Effect of seasonal variation on budding and grafting in glue berry and black plum

Table 1. Correlation of success budding (%T) in black plum (*Syzygium cumini*) and Glue berry (*Cordia myxa*) with different weather parameters

Percent budding success	Max T	Min T	Humidity (%) M	Humidity (%) E	Wind velocity	Sun shine	Evaporation	Rainfall
Black plum	0.215 ^{NS}	0.826 [*]	0.205 ^{NS}	0.650 ^{NS}	0.599 ^{NS}	-0.808 [*]	-0.028 ^{NS}	0.513 ^{NS}
Glue berry	0.316 ^{NS}	0.858 ^{**}	0.102 ^{NS}	0.598 ^{NS}	0.597 ^{NS}	-0.919 ^{**}	0.154 ^{NS}	0.750 [*]

*,** Significant at $p < 0.05$ and < 0.01 ; NS: Non-significant

Table 2. Correlation of success soft wood grafting (%) Black plum (*Syzygium cumini*) & Glue berry (*Cordia myxa*) with different weather parameters

Percent success soft wood grafting	Max T	Min T	Humidity (%) M	Humidity (%) E	Wind velocity	Sun shine	Evaporation	Rainfall
Black plum	0.234 ^{NS}	0.872 ^{**}	0.181 ^{NS}	0.678 ^{NS}	0.664 ^{NS}	-0.867 ^{**}	0.014 ^{NS}	0.599 ^{NS}
Glue berry	0.163 ^{NS}	0.769 [*]	0.237 ^{NS}	0.720 [*]	0.548 ^{NS}	-0.946 ^{**}	-0.016 ^{NS}	0.765 [*]

*,** Significant at $p < 0.05$ and < 0.01 ; NS: Non-significant

Table 3. Regression equations for percent success T- budding (T) and soft wood grafting in black plum (*Syzygium cumini*) and glue berry (*Cordia myxa*)

$$Y_1 = 3.018 X_1 + 1.82 X_2 - 1.063 X_3 - 0.126 X_4 - 0.008 X_5 - 8.928 X_6 - 14.148 X_7 - 0.053 X_8 + 121.27$$

$$Y_2 = 1.997 X_1 + 1.338 X_2 - 0.901 X_3 - 0.311 X_4 + 4.394 X_5 - 6.459 X_6 - 12.197 X_7 - 0.008 X_8 + 105.485$$

$$Y_3 = 0.714 X_1 - 1.792 X_2 + 0.567 X_3 + 3.578 X_4 - 22.435 X_5 - 2.415 X_6 + 24.103 X_7 - 0.216 X_8 - 153.691$$

$$Y_4 = 1.839 X_1 - 2.574 X_2 - 0.428 X_3 + 3.201 X_4 - 15.222 X_5 - 5.166 X_6 + 13.102 X_7 - 0.163 X_8 - 53.041$$

where Y_1 = % success budding (T) in Black plum, Y_2 = % success soft wood grafting in Black plum, Y_3 = % success budding (T) in Glue berry, Y_4 = % success soft wood grafting in Glue berry, X_1 = max temp., X_2 = min temp., X_3 = humidity (%) morning, X_4 = humidity (%) evening, X_5 = wind velocity, X_6 = sun shine hours, X_7 = evaporation and X_8 = rainfall

shine hours ($r = -0.867$) in black plum and ($r = 0.946$). There was non-significant correlation existed between % success soft wood grafting with other weather parameters (Table 2). The success/failure of grafting is highly correlated with the environmental conditions under which it is performed. The most important conditions for successful grafting are the selection of the appropriate season of grafting which is conducive to rapid graft healing and subsequently the formation of the graft union.

CONCLUSION

The July month is best for propagation in glue berry whereas August is best for black plum propagation by means of budding and grafting.

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