International Journal of Agriculture Sciences
ISSN: 0975-3710&E-ISSN: 0975-9107, Volume 9, Issue 12, 2017, pp.-4043-4044.
Available online at http://www.bioinfopublication.org/jouarchive.php?opt=&jouid=BPJ0000217

Research Article

# EFFECT OF ROOTSTOCKS AGE ON SOFTWOOD GRAFTING IN JACKFRUIT (*Artocarpus heterophyllus* Lam.)

**PRIYANKA H.L.[1], VINAY G.M.[2], HIPPARAGI KULAPATI[3], DEEPAK G. NAYAN[4], MAMATHA N.P.[5]**

[1,2]Department of Fruit Science, College of Horticulture, University of Horticultural Sciences, GKVK Post, Bengaluru, 560 065, Karnataka
[3]Department of Fruit Science, College of Horticulture, Bagalkotm University of Horticultural Sciences, Bagalkot, 587104, Karnataka
[4]Division of Fruit Crops, ICAR - Indian Agricultural Research Institute, Pusa, New Delhi, Delhi 110012
[5]Department of Fruit Science, College of Horticulture, Arabhavi, University of Horticultural Sciences, Bagalkot, 587104, Karnataka, India
*Corresponding Author: Email-vingeegmvegs@gmail.com

Received: February 10, 2017; Revised: March 02, 2017; Accepted: March 03, 2017; Published: March 12, 2017

**Abstract-** Jack is heterozygous in nature and has long juvenile phase, true to the types can be obtained through grafting. This experiment was carried out to find out the optimum age of rootstock for carrying out softwood grafting in jack. The grafting operation was carried out at monthly intervals on two months to seven months old rootstocks. Precured scion sticks were used for grafting purpose in this experiment, seven months old rootstock recorded the maximum graft success (72.39%) when compared to all the other ages of rootstocks under study. There was no sprouting observed in case of six months old rootstock and the least success (23.60%) was in five months old rootstock. The number of days taken for bud sprouting was minimum (21.50) in case of seven months old rootstock and the maximum number of days was recorded in four months old rootstock (23.32) and five months old rootstock (23.52).Seven months old rootstock recorded the maximum number of leaves (5.60), number of buds (3.49), length (19.50cm) and girth of shoot (0.86cm), whereas the number of branches was highest (1.91) in four months old rootstock. The mortality of grafts was minimum (25.65%) in seven months old rootstock, while it was highest in case of six months old rootstock.

**Keywords**- Jackfruit, Heterozygous, Age of rootstock, Scion, Softwood grafting

**Citation:** Priyanka H.L., et al., (2017) Effect of Rootstocks Age on Softwood Grafting in Jackfruit (*Artocarpus heterophyllus* Lam.). International Journal of Agriculture Sciences, ISSN: 0975-3710 & E-ISSN: 0975-9107, Volume 9, Issue 12, pp.-4043-4044.



## Introduction

Tropical Fruits are important constituents in the daily diets of billions of people; and many such fruits are harvested from a wide range of minor species - either from wild trees or locally cultivated ones. Many such fruit trees have multi-purpose uses and their plant products satisfy a variety of local non-food purposes ranging from timber to forest. One such fruit crop is jack and the area under jack is increasing day by day due to its popularization as desert fruit, processed products and its multiple uses in health improvement and also its potential for better adaptation to diversified soil and climatic conditions. Huge variability exists in this crop due to seed propagation. Among the various constraints for expanding the jackfruit cultivation, lack of availability of suitable clonal planting materials is one of the impediments to expand the area of cultivation [1].There is great demand for genuine true-to-type planting materials in order to optimize production of quality fruits. For this reason vegetative propagation is essential to get true-to-type propagules .So, good quality planting materials having uniform characters are the utmost demand of the farmers hence, standardization of suitable vegetative propagation technique with age of scion and rootstocks is prerequisite for successful cultivation and also will help in fixing the characters of superior types[2]. Suitable vegetative propagation technique should be developed specially for the hill zones of Karnataka where much emphasis is needed where the crop is grown wildly.

## Material and methods

Studies on standardization of soft wood grafting techniques in jackfruit were conducted at the polyhouse, Department of Fruit Science, College of Horticulture, Mudigere, Karnataka State during 2012 to 2013. The age of rootstock used in the experiment varied from two to seven months with one week pre-cured scions for grafting purpose. Treatment details- $T_1$-softwood grafting with two months old rootstock. $T_2$-softwood grafting with three months old rootstock. $T_3$-softwood grafting with four months old rootstock. $T_4$-softwood grafting with five months old rootstock. $T_5$-softwood grafting with six months old rootstock. $T_6$-softwood grafting with seven months old rootstock.

After grafting the grafts were kept under polyhouse and at monthly interval percent graft success , days taken for bud sprouting , number of laves , number of bud sprouts per graft, number of branches , length of shoot (cm), girth of shoot (cm), mortality at monthly intervals (%) were taken .

Randomized complete block design (RCBD) was employed to analyze the standardization of age of rootstock for soft wood grafting. The data were subjected to ANOVA. The data in percentage were transformed to Arcsine values for statistical analysis. $Y = \sin^{-1}\sqrt{x}/100$ (Since the observed proportion fall beyond 50 per cent). Critical difference values were tabulated at 5 per cent probability for the experiment where 'F' test was significant.

## Results and Discussion

The rate of graft union success recorded on 90th DAG revealed significant differences among the rootstocks of different age groups .The maximum graft union success was reported in case of seven months old and there was no graft success observed in six months old rootstock [3]. The best results in sprouting and success obtained in seven months old rootstock may also be related to the prevailing optimum temperatures coupled with higher humidity experienced in the January month resulting in early contact of cambium layers of stock and scion,

early callus formation and initiation of subsequent growth.

The success may be attributed to the physiological maturity of rootstock which plays important role in the success and growth of grafts and graft union success varies with age of the rootstocks [4-6].

The age of rootstock has relationship with regenerating ability of a plant part which is found to be higher in younger root stocks and this is because of higher activity of meristematic cells resulting in faster formation of callus and quick healing of graft union. In general the lower graft union success could be attributed to the lack of intimate contact of cambial region of both stock and scion and to interference of exudation of latex (2).

The higher graft union success on seven month old rootstock might be due to low temperature and higher relative humidity prevailing during the month of grafting, compared to grafting on rootstocks of other age groups. The graft union success also depends on temperature and humidity to the greater extent. The temperature affects the graft union by influencing callus formation. No survivability of the grafts of 6 months old rootstock might be due to the variation among the plant species and cultivar in their grafting ability and is probably related to their ability to produce parenchyma and to differentiate the vascular systems with respect to the prevailing season of the operation, which might ultimately affect the bud sprouting. The above results are similar in tamarind [7]. The variation in grafting success with the age of the rootstock may be attributed due to the differences in the quantity of endogenous phenolic compounds and due to the differential capacity of rootstocks in the production of undifferentiated mass of parenchyma cells when grafting performed [8]. In general callus formation is optimum at about 26-29°C. Specific environmental conditions during and following grafting must be ideal for callus tissue development and leading to better graft union. The cambium of graft partners and parenchyma cell comprising important callus tissue are thin walled and tender with no provision for resisting desiccation. Further, air moisture level below the saturation point inhibits callus formation and desiccation of cell increased as the humidity drops. Possibly, the optimum thickness of the rootstocks, optimum environmental conditions influences the graft union formation satisfactorily.

**Table-1** *Effect of rootstock age on percentage of graft success in softwood grafting of jackfruit at different days after grafting*

| Treatments | | Graft success (%) | Number of days taken for bud Sprouting | Number of leaves | Number of buds | Number of branches | Length of shoot (cm) | Girth of shoot (cm) | Mortality of grafts (%) |
|---|---|---|---|---|---|---|---|---|---|
| $T_1$ | 2 months | 65.24 (53.90) | 22.51 | 4.80 | 2.35 | 1.52 | 19.24 | 0.52 | 34.76 (36.15) |
| $T_2$ | 3 months | 62.19 (52.08) | 22.67 | 3.99 | 1.84 | 1.49 | 19.08 | 0.62 | 37.81 (37.96) |
| $T_3$ | 4 months | 48.24 (44.01) | 23.32 | 3.90 | 1.75 | 1.91 | 18.02 | 0.61 | 51.76 (46.03) |
| $T_4$ | 5 months | 23.60 (29.08) | 23.52 | 3.70 | 1.66 | 1.42 | 16.88 | 0.56 | 76.40 (60.97) |
| $T_5$ | 6 months | 00.00 (00.00) | 00.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 100.00 (90.05) |
| $T_6$ | 7 months | 72.39 (58.33) | 21.50 | 5.60 | 2.92 | 1.78 | 19.50 | 0.86 | 27.62 (31.72) |
| S.Em ± | | 0.21 | 00.05 | 0.06 | 0.07 | 0.06 | 0.29 | 0.02 | 0.21 |
| C.D @ 5% | | 0.63 | 00.14 | 0.18 | 0.22 | 0.18 | 0.88 | 0.05 | 0.64 |

DAG: days after grafting

*Figures in parenthesis indicate transformed values

## Conclusion

Seven months old rootstock recorded the maximum graft success when compared to all the other ages of rootstocks under study. There was no sprouting observed in case of six months old rootstock and the least success was in five months old rootstock. The number of days taken for bud sprouting was minimum in case of seven months old rootstock and the maximum number of days was recorded in four months old rootstock and five months old rootstock. Seven months old rootstock recorded the maximum number of leaves, number of buds, length and girth of shoot, whereas the number of branches was highest in four months old rootstock. The mortality of grafts was minimum in seven months old rootstock, while it was highest in case of six months old rootstock.

## Acknowledgement

I thank Dr. Kulapati Hipparagi for support in conducting the research. I acknowledge my sincere thanks to Nayan Deepak G and Vinay G M for providing some valuable advice on writing the manuscript.

## Ethical approval

This article does not contain any studies with human participants or animals performed by any of the authors.

**Conflict of Interest:** None declared.

## References

[1] Bose T.K., Mitra S.K. and Sanyal D. (2003) Jackfruit: *In Fruits*: Tropical and Subtropical, Naya Udyog, 2, Calcutta, 541-564.

[2] Hartman H. T., Kester D. E., Devise F. T. and Geneve R. L. (1997) Plant propagation Principles and Practices. Prentice Hall of India Ltd., pp. 410-411.

[3] Bandenawaj R. Mulla (2007) Studies on softwood grafting in jamun *Syzygium cumini* skeels), *M.Sc. (Hort.) Thesis,* Univ. Agric. Sci., Dharwad.

[4] Sathish Kumar V. (2001) Studies on wedge grafting in tamarind (*Tamarindusindica.* L.).*M.Sc. (Agri.) Thesis*, Univ. Agric. Sci., Dharwad.

[5] Swamy G. S. K. and Melanta K. R. (1994) *Karnataka J. Agric. Sci*., 7(4), 471- 473.

[6] Prasad P. V., Suryanarayana V. and Naramnaidu (1990) *South Indian Hort.,* 38(1), 1-7.

[7] Bharad S.G., Gholap S.V., Dod V.N. and Bhopale S.R. (1999) *J.Appl.Hort.,* 1(1), 57-58

[8] Reddy C.V. and Melanta K.R. (1988) *South Indian Hort.*, 36(3), 143-145.