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Seasonal Influence on Success of Patch Budding and Growth of Budded Jackfruit Plants (*Artocarpus heterophyllus* Lam.)

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Abstract A study was carried out to find out the effect of seasonal influence on patch budding of jackfruit (*Artocarpus heterophyllus* Lam.). Patch budding was done at monthly interval from January 2015 to December 2015 on one year old seedling rootstocks of jackfruit using jackfruit variety NSP as scion material. The budded plants were kept under open sunlight for four weeks and observed for budding success. The maximum budding success (94%) was recorded in the month of June, August and September. While minimum (30%) in the month of October. Maximum sprouting success (95.74%) was recorded in the month of June. While, minimum in the month of February. Observations on sprout length and number of leaves were recorded after sixty days of budding at 15 days interval. The results revealed that the highest number of leaves (7.33) and the lowest number of leaves (4.60) were observed in the month of June and October respectively at the final establishment stage. Whereas, the higher sprout length (24.96 cm) and diameter of bud sprout (3.38 mm) were recorded in April and December month respectively. Lower sprout length (12.27 cm) and diameter of bud sprout (2.25 mm) was observed in October month. From this study it could be concluded that patch budding during the months of June to September gave higher budding success in Bengaluru condition.

Keywords Jackfruit plants, Patch budding, Growth, Seasonal influence.

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Introduction

The jackfruit (*Artocarpus heterophyllus* Lam.) belongs to the family Moraceae, originated in India at the foot of the Western Ghats and is now very popular throughout South East Asia. Jack tree grows well in humid and warm climates of hill slopes and also one of the most suitable fruit crops for dry land horticulture. It is regarded as poor man's fruit in Eastern and Southern parts of India. It is also national

fruit of Bangladesh. The bearing habit is cauliflowers, as it is borne on the main trunk and also on primary and secondary trunk branches [1].

Jackfruit tree is tropical, evergreen, latex producing monocious tree, fruit usually reach 10-25 kg in weight, grows in summer when staple food-grains are often in short supply. The edible portion is considered as a good source of carbohydrates, proteins, vitamins and minerals. The juicy pulp of the ripe fruit consumed as fresh or preserved form viz, syrup, jam, jelly, squash. Tender fruits are popular as vegetable and in preparation of pickles. Seeds are also used in many culinary preparations as boiled or roasted food item. The matured bulbscan be used in, chips, papad, dehydrated flakes. In addition, many parts of the plant, including the bark, roots, leaves and fruits have medicinal properties. The rind is rich in pectin and sugars which is popularly used as animal feed [1].

Seed propagation is common method of propagation in jackfruit. But propagation through seeds is not widely accepted, because of high heterozygosity. Being highly heterozygous and cross pollinated, it has resulted in immense variation among populations for yield, size, shape, flesh color, quality of fruit and maturity period. To maintain the genetic uniformity and for conservation of an elite clone or cultivar, vegetative propagation is well recognized in jackfruit. Therefore the elite materials need to be multiplied in large quantities and supplied to the needy farmers. Hence, suitable vegetative propagation technique with suitable season needs to be standardized to meet the growing demand of planting material. Keeping these points in view the present study has been undertaken.

Materials and Methods

The experiment was conducted at College of Horticulture, Kolar and Department of Biotechnology, University of Agricultural Sciences, Bengaluru. Budding of jackfruit seedlings was carried out at monthly intervals from January 2015 to December 2015 using patch budding method. The experiment was laidout in complete randomized block design with three replications. The budding operation was done as per the procedure. The observations were recorded on percentage of budding success and bud sprouting success. Observations on sprout length (cm), number of leaves per budded plant and diameter of the bud sprout (mm) were recorded at an interval of 15 days.

Table 1. Effect of season of patch budding on budding and sprouting success of budded jackfruit plants. Figures in the parentheses are arc sine transformed value.

Treatments	Budding success (%)	Sprouting success (%)
T_1 : Jan 2015	86 (68.03)	37.20 (37.58)
T_2 : Feb 2015	92 (73.57)	60.87 (51.28)
T_3 : Mar 2015	74 (59.34)	64.86 (53.64)
T_4 : Apr 2015	74 (59.34)	70.27 (56.96)
T_5 : May 2015	74 (59.34)	81.08 (64.22)
T_6 : Jun 2015	94 (75.82)	95.74 (78.09)
T_7 : Jul 2015	66 (54.33)	63.64 (52.92)
T_8 : Aug 2015	94 (75.82)	89.36 (70.96)
T_9 : Sep 2015	94 (75.82)	74.47 (59.65)
T_{10} : Oct 2015	30 (33.21)	66.67 (54.74)
T_{11} : Nov 2015	46 (42.71)	52.17 (46.24)
T_{12} : Dec 2015	86 (68.03)	67.44 (55.21)
SEm±	0.39	0.54
CD at 5%	1.15	1.59

Procedure of patch budding

The disease free seedlings rootstock raised in

Table 2. Effect of season of patch budding on sprout length of budded jackfruit plants at different intervals after budding. DAB : Days after budding.

Treatments	Sprout length (cm) 60 DAB	75 DAB	90 DAB	105 DAB	120 DAB
T_1 : Jan 2015	2.29	5.29	9.31	22.65	23.88
T_2 : Feb 2015	3.75	7.22	11.89	16.17	20.69
T_3 : Mar 2015	4.18	9.24	13.35	17.37	21.06
T_4 : Apr 2015	5.21	10.39	14.86	21.85	24.96
T_5 : May 2015	2.09	5.54	10.46	16.63	21.66
T_6 : Jun 2015	4.61	9.53	13.86	18.08	21.03
T_7 : Jul 2015	2.28	4.57	8.60	10.90	13.59
T_8 : Aug 2015	3.67	6.82	12.25	14.48	16.56
T_9 : Sep 2015	4.25	7.96	12.07	14.72	17.83
T_{10} : Oct 2015	1.27	3.37	7.01	10.08	12.27
T_{11} : Nov 2015	3.49	6.52	10.26	12.64	15.23
T_{12} : Dec 2015	3.92	9.68	13.48	18.97	22.03
SEm±	0.69	0.99	1.04	1.04	1.097
CD at 5%	1.92	2.91	3.03	3.03	3.20

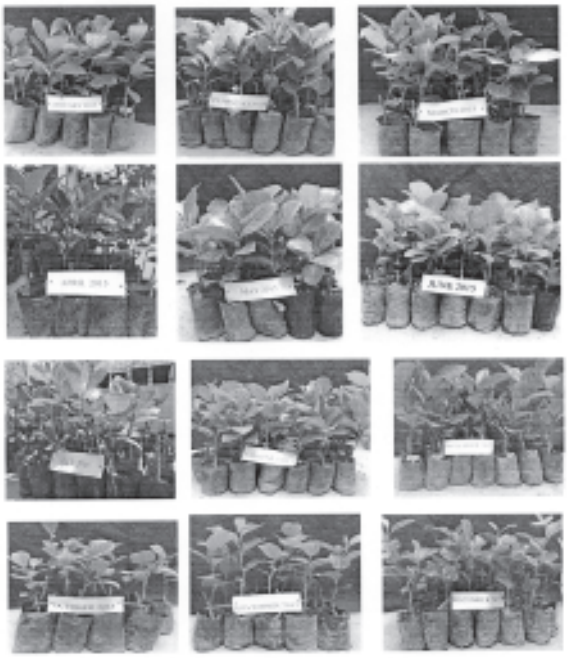

Fig. 1. Effect of season on patch budding of jackfruit plants (January 2015 to December 2015).

polythene bags were selected and the bark measuring about 0.8 to 1.0 cm horizontally and 2.0 to 2.5 cm vertically resembling a patch from the rootstocks having pencil thickness was removed at a height of 15 cm above the ground level. Immediately similar size bark with active scion bud was taken from the scion bud stick (jackfruit variety National Seed Project (NSP) as scion material) and placed on the stock and tied with polythene strip, kept it in open sun light and watering was done at regular intervals . After, proper union of bud and rootstocks, approximately one month after budding, polythene strip was removed to examine for success. If the buds are green in color, then the shoot rootstock was decapitated using secature by leaving two inch space above the bud union. Then these plants were transferred to the mist chamber to force the growth of buds. The sprouts above and below the bud union from the rootstocks were removed manually as and when they appeared. Necessary plant protection measures were taken whenever required.

Results and Discussion

The results revealed that maximum per cent of budding success was observed in the month of June (94%), August ((94%), September (94%) followed by February (92%) month however, least (30%) was noticed in October budded plants (Table 1). Whereas, sprouting success was observed highest in June (95.74%) followed by August (89.36%) however, least sprouting success was observed in January (37.20%).

The above success could be due to availability of favorable environmental conditions for callus tissue development, particularly temperature and relative humidity, which influence moisture and plant water relations. Variations observed during different months could be due to the ability of the budded plants to produce callus parenchyma and its differentiation into vascular syatem across the callus bridge [2].

Table 3. Effect of season of patch buddling on number of leaves per budded jackfruit plant at different intervals after budding. DAB : Days after budding.

Treatments	Number of leaves 60 DAB	75 DAB	90 DAB	105 DAB	120 DAB
T_1 : Jan 2015	1.40	2.07	3.80	5.00	5.60
T_2 : Feb 2015	1.33	2.13	3.80	4.80	5.60
T_3 : Mar 2015	1.73	2.73	3.80	4.80	5.65
T_4 : Apr 2015	1.67	3.40	4.87	5.80	7.00
T_5 : May 2015	1.07	2.07	3.13	4.40	5.60
T_6 : Jun 2015	1.93	4.70	5.67	6.67	7.33
T_7 : Jul 2015	1.27	2.38	4.13	5.80	6.00
T_8 : Aug 2015	1.40	1.93	3.73	4.93	5.47
T_9 : Sep 2015	1.80	3.03	4.00	5.20	6.27
T_{10} : Oct 2015	0.80	1.93	3.13	3.80	4.60
T_{11} : Nov 2015	1.78	3.07	3.93	4.87	5.87
T_{12} : Dec 2015	1.93	3.33	4.33	5.47	6.87
SEm±	0.23	0.29	0.29	0.33	0.33
CD at 5%	0.66	0.84	0.83	0.96	1.47

Table 4. Effect of season of patch budding on diameter of budded jackfruit plant at different intervals after budding. DAB : Days after budding.

Treatments	Diameter (mm) 60 DAB	75 DAB	90 DAB	105 DAB	120 DAB
T_1 : Jan 2015	1.71	2.04	2.19	2.37	2.56
T_2 : Feb 2015	1.95	2.12	2.27	2.43	2.57
T_3 : Mar 2015	1.78	2.06	2.19	2.36	2.51
T_4 : Apr 2015	1.77	2.02	2.24	2.47	2.61
T_5 : May 2015	1.76	2.12	2.29	2.40	2.59
T_6 : Jun 2015	1.87	2.07	2.24	2.42	2.52
T_7 : Jul 2015	1.41	1.73	2.13	2.56	2.63
T_8 : Aug 2015	1.80	2.01	2.21	2.47	2.69
T_9 : Sep 2015	1.85	2.25	2.35	2.50	2.71
T_{10} : Oct 2015	1.00	1.47	1.77	1.90	2.25
T_{11} : Nov 2015	1.63	1.86	2.11	2.31	2.69
T_{12} : Dec 2015	2.29	2.54	2.85	3.19	3.38
SEm±	0.12	0.11	0.07	0.09	0.33
CD at 5%	0.36	0.31	0.21	0.26	0.97

In terms of sprout length, the maximum sprout length of budlings was recorded in April and June month budded plants (Table 2). This could be due to the early sprouting, optimum temperature and relative humidity available for better growth of shoots, which leads to higher intermodal length, which might have contributed for the maximum sprout length. Higher sun shine hours and temperature may speed up the cambial activity leading to better growth, resulting in maximum shoot length. These results are in agreement with earlier findings. Where they got higher sprout length in plants budded in the month of March to April. Minimum length of budlings was recorded in October month budded plants. This may be due to lower temperature which results in poor cambial activity and late bud graft union . These results are contradictory with results in mudigere condition, where they obtained higher sprout length in December month budded jackfruit plants [3].

Significantly higher number of leaves per budded plant was recorded in plants budded during June (7.33) followed by April (7.10) (Table 3). This might be due to the availablity of favorable temperature and light condition for fast growth and production of more leaves. Further, April to June being natural period for growth, the plants have inbuilt capacity to grow and produce more leaves. These results were in accordance with earlier findings. Minimum number of leaves were observed in plants budded in October (4.60). It could be due to poor sun light and low temperature in October, leading to poor photosynthetic activity. These results were contradictory in mudigere condition [3], showing higher number of leaves in the month of December.

Shoot diameter (3.38 mm) was higher in budlings, which were budded in the month of December. However, it was on par in rest of the months (Table 4) followed by February and September month budded plants. This could be due to availability of natural spring season from June to September under Bengaluru condition and also due to optimum temperature and relative humidity prevailing during that period, resulting in early contact of cambium layers of stock and scion, early callus formation and initiation of subsequent growth. Similar results were reported in guava [4], where the maximum budding success was obtained during February. The maximum success observed in Hybrid-1 due to the prevalence of optimum atmospheric temperature that is favorable for callus formation, when compared to the low temperature during January. Similarly same results obtained in ber [5]. While, the minimum diameter

was observed in October month budded plants, reason might be due to occurrence of injury to the budded plants due to cool winter climate.

Conclusion

Seasonal effect of patch budding on budding success percentage in jackfruit budded plants recorded significant differences among the treatments. Maximum budding and sprouting success was found in June to September month budded plants. While minimum in October and November month budded plants. From this study, it could be concluded that patch budding during the months of June to September gave better budding success in Bengaluru condition.

References

1. Radha T, Mathew L (2007) Text book of fruit crops . Horticulture science series-3. New India Publ Agency, New Delhi, pp 325—330.
2. Bharad S, Mahorkar V (2011) Softwood grafting as useful method of propagation for commercial multiplication of *Syzigium cumini* L. under semi arid climatic conditions of India. Acta Hort 890 : 231—234.
3. Nataraj G (2013) Studies on different age of root stocks and month of budding in gumless jack *Artocarpus heterophyllus* Lam. MSc Hort thesis. Univ Hort Sci, Bagalkot.
4. Patel RK, Yadav DS, Singh A, Yadav RM (2007) Performance of patch budding on different cultivars/hybrids of guava under mid hills of Meghalaya. Acta Hort 735 : 189—192.
5. Ghosh SN (2009) Propagation studies in ber for commercial multiplication in nursery an *in situ.* Acta Hort 840 : 321—326.