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Effect of graft union under different growing conditions in jackfruit (*Artocarpus heterophyllus* L.) Var. Palur-1

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Abstract

An experiment was conducted during 2016–17 at Horticultural College and Research Institute, Periyakulam for determining the suitable condition for graft union and success in jack fruit softwood grafts. Experiment was laid out on factorial completely randomized design (FCRD) with three replications. Growth parameters like days taken for graft union, graft success (%), days taken for sprouting, number of sprouts, length of sprouts (cm), plant height (cm), girth of rootstock (cm), girth of scion (cm), number of leaves, leaf length (cm), breadth of leaf (cm), leaf area (cm²), graft survival (%) at 30, 60 and 90 days after grafting were recorded. On comparing the effect of propagation structures namely mist chamber and shade net, mist chamber conditions gave considerable improvement in growth parameters of softwood grafts.

Keywords: Effect of graft union, different growing conditions, during 2016–17, Horticultural College, and Research Institute

Introduction

Jackfruit is a popular fruit in several tropical and sub-tropical countries. It is regarded as “poor man’s fruit” in eastern and southern parts of India. Jackfruit is believed to be native of India, originating in Western Ghats and is widely cultivated in Malaysia, Myanmar, Indonesia, Bangladesh, Sri Lanka, Brazil, West Indies, Vietnam, Pakistan and other Tropical countries (Bose and Mitra 2002; Anonymous 2009) ^[2, 1]. In India, the total area under jackfruit cultivation is approximately 1,51,000 hectares (Ministry of Agriculture and Farmers welfare, 2016). In Tamil Nadu, jack fruit is considered as the second most important fruit after mango in the triple fruit concept (Mango, Jackfruit and Banana) mentioned in Hindu scriptures.

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 [Anonymous. 2009] ^[1]. There is great demand for genuine true-to-type planting materials in order to enhance the 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.

Materials and Methods

The studies on softwood grafting in jackfruit plants were carried out 2016 - 17 at the Department of Fruit crops, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Periyakulam. The experiment location is situated at an elevation of 300 m above mean sea level, at 100 North latitude and 77.80 East latitude. Seeds were collected from local and the rootstocks were raised in polythene bags. Scions of Palur-1 jackfruit variety were grafted in the raised rootstock in different period. Plumpy and healthy jack seeds weighing 4 to 7 g were collected place and were utilized for raising seedling rootstock. These seeds were soaked in water for 24 hours to enhance germination and sown in the polythene bags. Polythene bags of 250 gauge (5”-7”) thickness were used for raising jack rootstocks.

The pot mixture for rooting medium was prepared with red earth, sand, well decomposed farmyard manure (2:1:1) and filled in the poly bag. The selected large sized healthy seeds were laid flat on the medium with their hilum part facing down. The pot mixture for rooting medium was prepared with red earth, sand, well decomposed farmyard manure (2:1:1) and filled in the poly bag. The selected large sized healthy seeds were laid flat on the medium with their hilum part facing down. The seeds which were sown on 27.09.2016 in the polythene bags and the softwood grafts were grown in different growing conditions viz., mist chamber (C1) and shade net house (C2). Grafting parameters and physical parameters were recorded at three different stages viz., 30th, 60th and 90th days after grafting. The grafting operation was done at 15 days interval using precured scion sticks of Palur-1 jack on the raised rootstock.

Results and Discussion

In this study, an attempt has been made to propagate Palur-1 (Scion) the ruling variety of Tamil Nadu through softwood grafting with different age of rootstocks. The results showed that mist chamber grown plants got early graft union (25.51 days) whereas in shade net house it took 27.94 days. The minimum number of days and maximum graft union was noticed under mist chamber plants grafting on 30 days old rootstock (Table 1). This is because of high humidity and optimum temperature around the propagating materials with assured evapotranspiration and turgor pressure led to a successful graft union in 30 days old rootstock in the mist chamber. Further mist chamber condition recorded the maximum success rate of grafts with 75.86 per cent on 30th day followed by shade net house of 73.89 percent on 30th

day. The graft success was relatively on par with the mist chamber, in the shade net house for 30 days old root stock among the other root stocks tried. This might due to the conducive microclimate with graft environment interaction, uniform shade and less temperature of 4-50 C than outside the shade net house which brings an ideal growing condition for multiplying jack soft wood graft. Minimum number of days taken for sprouting was recorded under mist chamber found to be 19.48 days but in shade net house it took 20.58 days for sprouting (Table 1).

The maximum plant height (17.20 cm) observed on 90th day under mist chamber on 30 days old rootstock and the maximum girth of the rootstock and scion of 0.93 cm and 0.90 cm respectively were recorded on 30th day. Highest number of leaves (3.62) on 90th day was recorded under mist chamber conditions. Among the different growing conditions used, mist chamber had effective influence on the leaf length of 3.97 cm on 90th day as well as the maximum leaf breadth of 0.96 cm on 60th day. Maximum leaf area and graft survival percentage of 3.65 cm² on 90th day 64.43 per cent on 30th day were recorded under mist chamber grown grafts (Table 2). The growth traits revealed the maximum values under mist chamber till mid-February when compared with shade net house as growing conditions are concerned (George Acquah, 2002 and Selvi, 2008)^[3, 4]. In this study 30 days old rootstock under mist chamber had performed well when compared to shade net house condition. Thus successful grafts of Palur-1 jackfruit, soft wood grafting can be recommended during the month of November on 30 days old rootstock using precured scion and the graft should be kept under mist chamber condition for 90 days to have an effective growth and graft union.

Table 1: Effect of growth parameters under different growing conditions

Treatment (T)	Graft union (days) 30 DAG		Graft success (%) 30 DAG		Days taken for sprouting		Plant height (cm) 90 DAG		Girth of Rootstock (cm) 30 DAG		Girth of scion (cm) 30 DAG	
	C1	C2	C1	C2	C1	C2	C1	C2	C1	C2	C1	C2
A1	25.57	27.86	72.92	70.56	19.54	20.45	18.23	17.83	0.76	0.75	1.06	1.03
A2	22.42	25.72	86.95	83.86	18.38	20.03	19.54	18.77	0.83	0.81	1.02	1.01
A3	29.87	27.86	72.44	70.45	19.25	20.23	18.29	15.23	0.87	0.85	0.98	0.95
A4	29.72	27.60	79.86	76.36	19.55	20.86	17.23	15.85	0.90	0.89	0.94	0.92
A5	29.72	27.67	82.73	80.17	19.31	20.65	17.52	16.22	0.94	0.92	0.91	0.86
A6	25.26	28.27	76.67	74.72	19.72	20.28	16.29	15.22	0.97	0.96	0.87	0.83
A7	26.29	28.83	72.26	70.25	19.61	20.82	17.76	15.20	1.02	1.01	0.85	0.82
A8	26.38	28.22	70.67	69.30	19.76	20.42	15.28	14.28	1.06	1.05	0.81	0.78
A9	26.42	29.51	68.24	66.38	20.26	21.49	14.73	13.07	1.10	1.07	0.74	0.73
Mean	25.51	27.94	75.86	73.56	19.48	20.58	17.20	15.74	0.93	0.92	0.90	0.88
S.Ed	0.575		2.920		0.238		0.698		0.003		0.004	
CD @0.05	0.171		NS		0.485		1.422		NS		NS	

C1: Mist chamber, C2: Shade net house

A1: 15 DORS, A2: 30 DORS, A3: 45 DORS, A4: 60 DORS, A5: 75 DORS, A6: 90 DORS, A7: 105 DORS, A8: 120 DORS, A9: 135 DORS; DORS - Days Old Root Stock, DAG - Days After Grafting

Table 2: Effect on growth parameters under different growing conditions

Treatment (T)	Number of leaves 90 DAG		Leaf length (cm) 90 DAG		Leaf breadth (cm) 60 DAG		Leaf area (cm ²) 90 DAG		Graft survival (%) 30 DAG	
	C1	C2	C1	C2	C1	C2	C1	C2	C1	C2
A1	3.85	3.20	4.77	3.83	0.98	0.84	3.16	3.09	65.21	62.52
A2	4.72	4.10	4.97	4.77	1.14	1.09	4.83	4.75	72.91	65.27
A3	3.26	3.02	4.75	4.20	1.09	1.03	4.14	4.12	65.42	58.43
A4	3.56	3.16	4.73	4.24	1.05	0.93	4.35	4.34	62.22	54.21
A5	4.22	4.02	4.27	3.87	0.88	0.85	3.26	3.21	72.86	64.23
A6	3.58	3.21	4.07	3.73	0.85	0.81	3.63	3.61	68.60	62.19
A7	3.27	3.12	4.16	3.25	0.97	0.93	3.76	3.73	62.21	56.51
A8	3.36	3.13	4.07	3.24	0.87	0.83	2.90	2.83	58.29	53.38
A9	2.84	2.26	4.02	3.14	0.83	0.77	2.85	2.83	52.23	49.47

Mean	3.62	3.24	3.97	3.85	0.96	0.89	3.65	3.61	64.43	58.46
S.Ed	0.291		0.196		0.053		0.377		2.621	
CD @0.05	NS		0.384		NS		NS		NS	

C1: Mist chamber, C2: Shade net house

A1: 15 DORS, A2: 30 DORS, A3: 45 DORS, A4: 60 DORS, A5: 75 DORS, A6: 90 DORS, A7: 105 DORS, A8: 120 DORS, A9: 135 DORS;
DORS - Days Old Root Stock, DAG - Days After Grafting

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