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Sampath PM
 Ph.D Scholar,
 Dept. of Fruit Science, UHSB,
 Bengaluru, India

Swamy GSK
 Professor and Head, Dept. of
 Fruit Science, COH, Mysore,
 UHSB, India

Honnabyraiah MK
 Professor and Head, Dept. of
 Fruit Science, COH, Bengaluru,
 UHSB, India

Shyamamma S
 Professor, Dept. of
 Biotechnology, UAS, GKVK,
 Bengaluru, India

Jayappa J
 Assistant Professor, Dept. of
 Entomology, COH, Bengaluru,
 UHSB, Bengaluru, India

Suresha GJ
 Assistant Professor, Dept. of
 Post-harvest Technology, COH,
 Bengaluru UHSB, Bengaluru,
 India

Tanushree S
 Dept. of Fruit Science, COH,
 Bengaluru, UHSB, Bengaluru,
 India

Corresponding Author:
Sampath PM
 Ph.D Scholar, Dept. of Fruit
 Science, UHSB, Bengaluru,
 India

Grafting response of different jackfruit genotypes to softwood grafting

Sampath PM, Swamy GSK, Honnabyraiah MK, Shyamamma S, Jayappa J, Suresha GJ and Tanushree S

Abstract

The response of different jackfruit genotypes to softwood grafting was studied in an experiment conducted in college of horticulture, Mysuru in 2018. The experimental design used was completely randomized design (CRD) with fifteen treatments (MKK-1, MKL-1, MYS-1, HCH-1, HSH-1, MDA-1, MDA-7, MCR-1, MAM-3, PAH-1, MKN-5, HGD-1 AND HGN-2) and three replications. The difference in the graft success was significant among the different genotypes. The highest graft success was noted in MCR-1 (54.78%) and the lowest was found in MDA-1 (39.24%). The graft survival was highest in MCR-1 (60.42%) and lowest in MNS-1 (35.00%). The number of leaves, number of leaves, graft height and graft girth were significantly different for the different genotypes. The number of sprouts (3.30), number of leaves (8.04), graft height (19.16 cm) and graft girth (8.31 mm) were highest in MCR-1. The number of sprouts (3.30), number of leaves (8.04), graft height (19.16 cm) and graft girth (8.31 mm) were highest in MCR-1. The genotypes MDA-1 had lowest graft success (39.24%), number of sprouts (1.71), number of leaves (5.40), graft height (14.35%) and graft girth (6.40 mm).

Keywords: genotype, softwood grafting, jackfruit, graft success, graft survival

Introduction

Jackfruit (*Artocarpus heterophyllus* L.) belongs to the family Moraceae and order Rosales. It is believed to have originated in the South Western rain forests of India (Naik, 1949)^[4] and has been introduced and cultivated in many tropical countries. Due to increasing pressure on land, important forest species are being cut indiscriminately and as a result many of the outstanding types of jackfruit genotypes have been lost. Therefore, the conservation of jackfruit and related gene pool diversity needs more attention. Softwood grafting is one of the important methods of propagation in jackfruit. The season of grafting affects the success and performance of grafts. In this experiment, the response of different genotypes to softwood grafting of jackfruit was studied.

Material and Methods

The present experiment was conducted in college of horticulture, Mysuru in 2018 to study the response of different jackfruit genotypes towards softwood grafting. The seeds of jackfruit were collected in the rainy season and the seeds were sown immediately after separation from the pulp as they are recalcitrant in nature. After six months of sowing, these plants were used as the rootstocks for softwood grafting. The experimental design used was completely randomized design (CRD) with fifteen treatments (MKK-1, MKL-1, MYS-1, HCH-1, HSH-1, MDA-1, MDA-7, MCR-1, MAM-3, PAH-1, MKN-5, HGD-1 AND HGN-2) and three replications. The six months old healthy rootstocks were selected for grafting. After the selection of rootstock, the tip was decapitated. The softwood of stock was split vertically in the form of cleft, which appeared like fork or letter "V" to a length of 4-5 cm in down word direction with a sharp knife. Scion stick girth was matched with the girth of rootstock and a gentle sloping wedge cut of about 5 cm. Prepared wedge shaped scion was slowly inserted into the "V" shaped opened slit of rootstock. The stock and scion was kept in close contact with each other and union was wrapped with 200 gauge transparent stretchable polythene strips of 1.5 cm width and 40 cm length. The scions were then covered by poly cap to increase the humidity and avoid desiccation. Every replication of the individual treatments had ten grafts each. Five grafts were selected randomly from each replication of the individual treatments

for recording observations. The per cent of graft success was recorded 60 days after grafting by formula and expressed in percentage.

$$\text{Graft success (\%)} = \frac{\text{Number of successful grafts}}{\text{Total number of grafts}} \times 100$$

The per cent of survival of the graft was recorded 90 days after grafting by the following formula and expressed in percentage.

$$\text{Graft survival (\%)} = \frac{\text{Number of grafts remaining alive}}{\text{Total number of successful grafts}} \times 100$$

The growth parameters like number of sprouts, number of leaves, graft height and graft girth were recorded at 90 days after grafting. Graft height was recorded by using centimeter scale above the one centimeter of the grafted portion for the selected grafts. The graft girth was measured using Vernier calipers. The data recorded was subjected to statistical analysis by completely randomized design (CRD). Analysis of variance (ANOVA) was conducted to determine whether significant difference existed between different treatments on the recorded data. Interpretation of data was carried as per the guidelines suggested by Panse and Sukhatme (1985) [6].

Results and Discussion

The graft success and graft survival was significantly different among the different genotypes (Table 1). The highest graft success was noted in MCR-1 (54.78%) and the lowest was found in MDA-1 (39.24%). The highest graft survival was highest in MCR-1 (60.42%) lowest in MNS-1 (35.00%). Similarly in mango, Khader showed the higher percentage of graft success (75.50%) survival (46.60%) than Mallika and Baneshan (Prashanth, 2006). The highest success per cent of

stone grafting operations was recorded by using scion-stick of cultivar 'Amrapali' of mango whereas, minimum success per cent was in cultivar 'Lucknow Safeda' under Lucknow conditions (Ram *et al.*, 2015). The number of sprouts, number of leaves, graft height and graft girth were significantly different for the different genotypes (Table 1). The number of sprouts (3.30), number of leaves (8.04), graft height (19.16 cm) and graft girth (8.31 mm) were highest in MCR-1. The genotypes MDA-1 had the lowest number of sprouts (1.71), number of leaves (5.40), graft height (14.35%) and graft girth (6.40 mm). Among the 23 sapota cultivars tried, cricket ball, PKM-2, Kalipatti and Long Oval had shown less response to soft wood grafting as against higher response to the same by Kirthi barthi, Mohangootee, Murabha and Pala (Shirol *et al.*, 2005) [7]. Among the three varieties of scion in mango, viz., BARI Aam-1, BARI Aam-3 and Langra, the number of leaves ranged from 9.20 in 'BARI Aam-1' to 12.88 in 'Langra' (Alam *et al.*, 2006) [1]. The better union of stock and scion in 'MCR-1' in the present study might have easily supplied the required nutritional quantity to the grafts for better growth. The variation also might be due to the difference in endogenous substances such as phenols and latex. Presence of more concentrated latex and hardness of rootstock which hinders the process of graft union results in maximum days to complete sprouting (Pandiyan *et al.*, 2011) [5]. The difference in cell division and differentiation capacity in the different jackfruit genotypes might have happened due to the varied growth in meristematic cells coupled with physiological processes like photosynthesis and respiration (Hartman and Kester, 1979) [3]. The difference in the number of nodes and absorption of leaf primordia also might have caused the variation in number of sprouts. Early callus formation that occurs from the rootstock component producing good union helps in the production of more number of sprouts (Asante and Barnett, 1977) [2].

Table 1: Grafting response of different jackfruit genotypes to softwood grafting.

Genotypes	Success at 60 DAG (%)	Survival at 90 DAG (%)	Number of sprouts	Number of leaves	Graft height (cm)	Graft girth (mm)
MKK-1	46.67(43.01)	65.00(53.85)	2.32	6	15.14	7.03
MKL-1	43.33(41.15)	53.33(46.93)	2.32	5.88	14.85	7.17
MYS-1	63.33(52.77)	73.81 59.44)	3.1	6.84	17.78	8.19
HCH-1	53.33(46.93)	62.22(52.10)	2.93	6.84	16.93	7.88
HSH-21	56.67(48.85)	53.33 46.93)	3.06	7.08	17.18	8.13
MDA-1	40.00(39.24)	50.00 45.00)	1.71	5.4	14.35	6.4
MDA-7	46.67(43.01)	56.67(48.85)	2.44	5.64	15.25	7.27
MNS-1	50.00 45.00)	33.33 35.00)	2.69	6.36	16.15	7.51
MCR-1	66.67(54.78)	75.40(60.42)	3.3	8.04	19.16	8.31
MAM-1	50.00(45.00)	66.67 55.00)	2.57	6.24	16.13	7.31
MAM-3	46.67(43.01)	65.00 53.85)	2.57	6.12	15.94	7.29
PAH-1	53.33(46.93)	62.22(52.10)	2.93	6.72	16.81	7.71
MKN-5	50.00(45.00)	53.33 46.93)	2.81	6.6	16.5	7.65
HGD-1	50.00(45.00)	60.00(50.76)	2.81	6.48	16.2	7.6
HGN-2	53.33 46.93)	63.33 53.07)	2.93	6.96	16.89	7.73
S.Em ±	02.72 (1.52)	04.79 (2.86)	0.15	0.29	0.47	0.25
C D @ 5%	07.86 (4.57)	13.84 (8.57)	0.43	0.84	1.36	0.72

Values in parenthesis are arc sin transformed

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