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INFLUENCE OF GENOTYPE AND SEED WEIGHT ON THE PERFORMANCE OF ROOTSTOCK AND THE SUCCESS OF SOFTWOOD GRAFTING IN JACK (*ARTOCARPUS HETEROPHYLLUS* LAM.)

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Abstract

An experiment was carried out to standardize the genotype and seed weight on root stock production was laid out in a factorial completely randomized block design, replicated thrice with twenty treatment combinations. It consisted of five different genotypes of jack collected from Panruti (G1), Virdhachalam (G2), A. Puthur (G3), Kadampuliyur (G4) and Neyveli (G5) with four different seed weight 4 g (W1), 5 g (W2), 6 g (W3) and 7 g (W4). The results of the experiment revealed that among these genotypes, G1 (AH-1) was the promising genotype in achieving maximum value for the characters like germination percentage, shoot length, root length, plant height, vigour index, number of leaves, leaf length, leaf breadth, stem girth, fresh and dry weight of seedling, which was followed by G4 (AH-4). Among the various seed weight tried, the above said characters were favourably enhanced by W4 (7g) followed by W3 (6g). Among the various factorial combinations, rootstocks produced from 7g seed of Panruti collection (G1W4) recorded the maximum values for these growth characters. This was followed by 7g seed of Kadampuliyur collection achieved (G4W4) the next best value for these characters. Further, after doing soft wood grafting, the characters like graft success and graft survival percentage, days taken for first and last sprouting, number of sprouts, sprouting percentage, number of leaves, leaf area, plant height and stem girth were maximum in the factorial combination of G1W4 and it was followed by G4W4.

Key words : Jack, propagation, rootstock, genotype, seed weight.

Introduction

Jack fruit (*Artocarpus heterophyllus* Lam.) belongs to the family Moraceae. It is indigenous to India and bears the largest fruit among the edible fruit and is quite a heavy yielder. Being a staple food, it is very popular among the poor classes and house wives for culinary preparation and it is known as the poor man ?s food in the eastern and southern parts of India. The ripe fruit has high nutritive value and contain minerals, vitamin A and C. It is used for preparation of pickles, dehydrated leather, thin papads, canned fruits and nectar from the pulp. Jack fruit tree is widely grown in southern states *viz*., Kerala, Tamil Nadu, Karnataka and Andhra Pradesh. It is also cultivated in other states like Assam, Bihar, Orissa, Maharashtra and West Bengal. The total area under jack fruit cultivation in India is around 32,600 ha. In Tamil Nadu, it is grown in an area of about 1.882 ha. The significance of vegetative propagation for the maintenance of genetic uniformity and preservation of identity of a clone or cultivar is well recognized in horticultural crops. Amin (1978) developed softwood grafting in mango at the Anand campus of Gujarat Agricultural University and it has very good success in the drier tracts of Gujarat State. This method of grafting would be useful even in jack, for rootstocks raised in polythene container with suitable media. Hence, an investigation was conducted to evaluate the performance of various genotypes and weight of the seeds for rootstock production and success of softwood grafting.

Materials and Methods

The experiment was conducted in the Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalainagar (Tamil Nadu), India; during 2013-2015. The experiment was conducted in the factorial completely randomized block design with three replication. Five jack genotypes were collected from various places of Cuddalore district of Tamil Nadu, which is the major

jack growing area where could observe more variability on fruits, seed size and quality. The genotypes have been coded as mentioned below: AH – 1 from Panruti (AH-*Artocarpus heterophyllus* Lam.), AH – 2 from Vridhachalam, AH – 3 from A. Puthur, AH – 4 from Kadampuliyur and AH – 5 from Neyveli. Jack seeds were collected from fully ripened healthy fruits. Seeds weighing 4 to 7g were collected and used for raising seedlings. Seeds were extracted from the fruit and thoroughly washed with water to remove their slimy coating and soaked in water for 24 hours to enhance germination. Polythene bags of 200 gauge 25 × 15 cm thickness were used for raising jack rootstocks. The pot mixture comprised of sand, red earth and farm yard manure (FYM) in equal proportion. The selected, healthy seeds from the five genotype were laid flat on the medium with their hilum part facing down. The seeds which were sown in the polythene bags were maintained in the shade net with necessary care. Watering was done once in two days for the seeds, which were sown in the polythene bags. Germination of seeds started from 15 days to 20 days after sowing and continued for 30 to 40 days. Precured scions collected from cv. PLR-1 from Vridhachalam, KVK were grafted on three months old rootstocks produced from various genotypes with different seed size.

Results and Discussion

The data pertaining to germination percentage was recorded and presented in table 1. Significant response among various genotypes was observed in germination per cent. The highest value for germination per cent (83.37%) was obtained by G1 (AH-1). The least value (73.25%) was observed for in G3 (AH-3). Significant response among various seed weight was observed for germination per cent. The highest value for germination per cent (87.05%) was observed in W4. The least value (70.70%) was observed in W1. The combination of genotypes and seed weight showed the maximum germination percent in G1W4 (93.09%). It was followed by G4W4 (90.00%). The lowest germination percent was observed in G3W1 (67.41%). The early germination was recorded in heavy weight seed because it has got direct relation with the seed weight, where the heavy seed weight resulted in higher germination percentage and there was an advantage to be gained by selecting heavy sized seeds in preference to smaller ones. The similar results have been reported by Sonwalker (1951) in jack, stated that big sized seeds showed higher germination and earlier sprouting than small sized seeds. Khan (2003) reported that variation in seed size clearly influenced the seed germination in jack. Large sized seeds germinated faster and achieved greater germination percentage than small seeds. Rapid and greater germination of heavy seeds might be attributed to large food reserves of these seeds. Seedlings from large seeds have sufficient reserves to sustain growth for a much longer period as reported by Saverimuttu and Westoby (1996). Differences in seed content such as starch and proteins are responsible for germination and differences of the above ground portion of the seedling, while physiological processes are involved in breaking dormancy or onset of germination as reported by Dyer (2004).

The data on graft success rate on 30 days after grafting are presented in table 2. The graft success rate on 30 days after grafting showed significant difference among the treatments. Significant responses among genotypes were observed in graft success percentage. The maximum graft success (62.66%) was observed in G1. This was followed by G4 (60.03%). The minimum graft success (55.84%) was observed in G3. Significant difference between various seed weight was observed in graft success. The highest value for graft success was (62.45%) observed in W4. The least value for graft success (55.38%) observed in W1. The interaction between different genotypes and seed weight showed, the maximum graft success (65.15%) was envisaged in G1W4. This was followed by G4W4 (62.06%). The lowest graft success was observed in G3W1 (50.00%). The data on graft survival percentage rate on 60 days after grafting are presented in table 2. The graft survival percentage rate on 60 days after grafting showed significant difference among the treatments. Significant responses among genotypes were observed in graft survival percentage. The maximum graft survival (75.17%) was observed in G1. This was followed by G4 (73.12%). The minimum graft survival (64.78%) was observed in G3. Significant difference among seed weight was observed in graft survival percentage. The highest value for graft survival percentage was (77.11%) observed in W4. The least value for graft survival (63.92%) was observed in W1. The interaction between different genotypes and seed weight showed, the maximum graft survival (82.74%) was envisaged in G1W4. This was followed by G4W4 (80.24%). The lowest graft survival was observed in G3W1 (60.09%). The similar results obtained by Mahunu *et al*. (2009) reported in cashew that seedling emerged from heavy sized nut was most suitable for grafting. The graft success and survival percent were also maximum in seedling emerged from heavy sized seed and the vegetative growth also faster in seedling from heavy weight seeds because

Table 1: Effect of genotype and seed weight on germination percentage in jack

Weight of seed (W) / Genotype (G)	Germination percentage				
	W1 (4 g)	**W2 (5 g)**	**W3 (6 g)**	**W4 (7 g)**	**G Mean**
G1 (AH-1)	(59.72) 74.00	(64.62) 81.62	(66.77) 84.00	(74.87) 93.09	(65.92) 83.37
G2 (AH-2)	(56.25) 69.16	(59.88) 74.75	(60.90) 76.00	(66.51) 84.10	(60.92) 76.00
G3 (AH-3)	(55.18) 67.41	(58.31) 72.00	(60.73) 72.60	(64.56) 81.00	(58.81) 73.25
G4 (AH-4)	(58.12) 72.14	(63.30) 79.87	(64.67) 81.78	(72.13) 90.00	(64.09) 80.94
G5 (AH-5)	(57.15) 70.80	(61.98) 77.94	(63.52) 80.10	(68.94) 87.06	(62.52) 78.97
W Mean	(57.24) 70.70	(61.57) 77.35	(62.99) 79.37	(68.92) 87.05	

Values in parentheses are arc sin transformed

Factor	SED	CD (P = 0.05)
G	1.17	2.34
W	1.37	2.74
G × W	1.46	2.92

G– Genotype, **W**- Weight, **GXW**- combination of genotype and seed weight.

Table 2 : Effect of genotype and seed weight on graft success and graft survival percentage in jack.

Weight of seed (W) / Genotype (G)	Graft success (%)					Graft survival (%)				
	W1 (4 g)	**W2 (5 g)**	**W3 (6 g)**	**W4 (7 g)**	**G Mean**	**W1 (4 g)**	**W2 (5 g)**	**W3 (6 g)**	**W4 (7 g)**	**G Mean**
G1 (AH-1)	(50.98) 60.15	(51.59) 61.00	(51.43) 61.16	(53.80) 65.15	(52.18) 62.66	(55.11) 67.00	(56.95) 70.09	(64.11) 80.03	(65.31) 82.74	(60.13) 75.17
G2 (AH-2)	(46.78) 53.14	(48.63) 56.10	(49.87) 58.49	(50.92) 60.00	(49.24) 57.18	(52.23) 62.65	(52.79) 63.75	(60.20) 75.21	(62.25) 78.54	(56.54) 69.90
G3 (AH-3)	(45.16) 50.00	(48.09) 55.45	(49.36) 57.92	(49.39) 59.18	(48.18) 55.84	(50.94) 60.09	(51.56) 61.51	(58.35) 72.38	(53.95) 65.14	(53.51) 64.78
G4 (AH-4)	(49.42) 57.75	(50.97) 60.17	(51.06) 60.45	(52.34) 62.06	(51.08) 60.03	(54.03) 65.70	(55.73) 68.00	(62.22) 78.00	(63.70) 80.24	(58.90) 73.12
G5 (AH-5)	(48.18) 55.60	(49.75) 58.00	(50.25) 59.16	(51.42) 61.15	(50.02) 58.47	(53.30) 64.20	(54.52) 66.30	(60.89) 76.09	(63.06) 79.46	(57.76) 71.51
W Mean	(48.20) 55.38	(49.82) 58.55	(50.31) 59.54	(52.24) 62.45		(52.88) 63.92	(54.08) 65.93	(60.97) 76.62	(61.57) 77.11	

Values in parentheses are arc sin transformed.

Factor	SED	CD (P = 0.05)
G	1.22	2.45
W	1.32	2.64
G × W	1.35	2.70

Factor	SED	CD (P = 0.05)
G	1.00	2.00
W	0.19	0.38
G × W	1.24	2.48

G – Genotype, **W**- Weight, **GXW**- combination of genotype and seed weight.

of the optimum thickness of the rootstock. It is concluded that based on the observations, among the five genotypes tried, AH -1 collected from Panruti was adjudged as the promising genotype and 7 g of seed was selected as the suitable seed weight for producing rootstocks.

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