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Vedika V More

College of Horticulture,
Dr. Balasaheb Sawant Konkan
Krishi Vidyapeeth, Dapoli,
Ratnagiri, Maharashtra, India

PM Haldankar

College of Horticulture,
Dr. Balasaheb Sawant Konkan
Krishi Vidyapeeth, Dapoli,
Ratnagiri, Maharashtra, India

BR Salvi

College of Horticulture,
Dr. Balasaheb Sawant Konkan
Krishi Vidyapeeth, Dapoli,
Ratnagiri, Maharashtra, India

MC Kasture

College of Agriculture,
Dr. Balasaheb Sawant Konkan
Krishi Vidyapeeth, Dapoli,
Ratnagiri, Maharashtra, India

PC Haldavnekar

College of Horticulture,
Dr. Balasaheb Sawant Konkan
Krishi Vidyapeeth, Sindhudurg,
Maharashtra, India

Corresponding Author:

Vedika V More

College of Horticulture,
Dr. Balasaheb Sawant Konkan
Krishi Vidyapeeth, Dapoli,
Ratnagiri, Maharashtra, India

Standardization of media and bag size for rebagging jackfruit (*Artocarpus heterophyllus*) grafts under Konkan agroclimatic conditions

Vedika V More, PM Haldankar, BR Salvi, MC Kasture and PC Haldavnekar

Abstract

The experiment entitled “Standardization of media and bag size for rebagging Jackfruit (*Artocarpus heterophyllus*) grafts under Konkan agroclimatic conditions” was carried out at college of Horticulture, Dapoli. Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli. Dist. Ratnagiri (Maharashtra) during 2020-21 and 2021-22. The objectives of studies were to find out the effect of potting media and to standardize bag size on sprouting, survival and growth of propagation of Jackfruit and laid out in Randomized Block Design. The experiment comprised of eleven treatments and replicated three times and revealed that in jackfruit from the pooled data of two seasons, the maximum survive (100.00%) was recorded in treatment T₈ and T₆. The significantly highest height of jackfruit grafts (110.94 cm), girth above union (12.88 mm), maximum number of leaves (41.71), number of shoots (5.32), number of nodes (12.53), fastest absolute growth rate (0.329 cm/day), relative growth rate (0.0215 cm/cm/day), maximum fresh weight of grafts (165.67 g), highest number of adventitious roots (101.88), dry weight of root (35.06 g) was recorded in treatment T₈ i.e. Bag size 10"×14" with media Soil + Vermicompost (2:1). Whereas, the longest length of root (45.97 cm) was recorded in T₁₁ i.e. Bag size 10"×14" with media Soil + FYM+ Rice husk (1:1:1).

Keywords: Jackfruit, rebagging, potting media, size of bags, growth

Introduction

Jackfruit (*Artocarpus heterophyllus* Lam.) is an important and remunerative crop commercially cultivated in eastern and southern parts of India. 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, Vietnam, Pakistan and other tropical countries (Bose and Mitra, 2002; Anonymous, 2009) [8, 5].

Considering the demand for quality planting material of these fruit crops, it is necessary to develop technology for production of healthy planting material at affordable rate. The healthy and grown up grafts prepared in bigger size polybag exhibit enhanced growth, better adaptability after transplanting as well as fetch attractive price in the market. Soil as potting mixture has limitations regarding availability, weight of grafts as well as its growth in the media. Hence, it is of prime importance to standardize the suitable media composition for commercial propagation of grafts in the nursery. Hence, the present investigation was done to find out the effect of potting media and standardize bag size for survival and growth of jackfruit grafts.

Material and Methods

The field experiment was laid out in Randomized Block Design. The experiments comprised of eleven treatments i.e., T₁- Bag size 6"×8" with media Soil + FYM (3:1)- (Absolute Control), T₂- Bag size 8"×10" with media Soil + FYM (3:1), T₃- Bag size 8"×10" with media Soil + Vermicompost (2:1), T₄- Bag size 8"×10" with media Soil + Vermicompost (1:1), T₅- Bag size 8"×10" with media Soil + Vermicompost+ Rice husk (1:1:1), T₆- Bag size 8"×10" with media Soil + FYM+ Rice husk (1:1:1), T₇- Bag size 10"×14" with media Soil + FYM (3:1), T₈ : Bag size 10"×14" with media Soil + Vermicompost (2:1), T₉ : Bag size 10"×14" with media Soil + Vermicompost (1:1), T₁₀ : Bag size 10"×14" with media Soil + Vermicompost+ Rice husk (1:1:1) and T₁₁ : Bag size 10"×14" with media Soil + FYM+ Rice

husk (1:1:1) which were replicated thrice. The experiment was conducted during 2020-21 to 2021-22. The data were analyzed statistically as per the method suggested by Panse and Sukhatme (1985) ^[17] using RBD and valid conclusions were drawn only on significant differences between treatment mean at 0.05% level of significance.

Results and Discussion

The data presented in table 1 and 2 revealed that, the effect of potting media and bag size treatments with respect to survival and growth parameters which are taken at end of the experiment for two years. Observations taken at two months interval in jackfruit.

Plant height (cm)

At 240 DAR the results showed that T₈ had the maximum height of graft (110.94 cm) whereas minimum height of graft (77.00 cm) was recorded in T₁. The highest height recorded in Soil and Vermicompost might be due to vermicompost contain bioactive principles and balanced composition of nutrients. The higher growth was in the larger polybags may be due to higher volume of rooting media. Similar finding was reported by Gawankar *et al.* (2019) ^[10] in jackfruit and Haldankar *et al.*, (2014) ^[20] in mango graft grown in polybag size 10" X 14".

Plant girth (cm)

Data regarding to the girth of jackfruit grafts presented in Table 1. T₈ recorded significantly maximum girth (12.88 mm) whereas, minimum girth (9.27 mm) was observed in T₁. The media containing vermicompost triggered growth of graft faster than soil which might have helped to increase photosynthesis activity. Hence increase in girth was obtained in media containing vermicompost and large size polybags provided greater volume of plant media with more nutrients which enhanced vigorous growth of the jackfruit grafts. Similar findings were reported by Gawankar (2019) ^[10] in jackfruit grafts, Adu-Yeboah *et al.*, (2015) for cashew in large polybag size 7.5 cm x 25 cm.

Number of leaves

Significantly maximum number of leaves at 240 DAR (41.71) was counted with the treatment T₈ which was at par with treatments T₁₁ (38.39) and T₆ (36.42). However, the treatment T₁ noted minimum number of leaves (26.54). Nutrition provided by the growing media can influence number of leaves. Similar results were noted by Rajput *et al.* (2019) found maximum number of leaves in media Soil + Vermicompost + Sand (2:1:1) with 1" Cocopeat at top for nutmeg and Haldankar *et al.*, (2014) ^[20] when mango grafts grown in larger size polybag 10" X 14".

Number of shoots

At 240 DAR the greater number of shoots (5.32) was observed in T₈ which was at par with treatment T₁₁ (4.99), T₆ (4.95) and T₇ (4.86). The lowest number of shoots (3.18) was noted in treatments T₁. These results are in agreement with the findings of Gawankar (2019) ^[10] in jackfruit, Juvekar *et al.* (2019) ^[13] in kokum.

Number of nodes

The highest nodes (12.53) were seen in T₈ which was superior over rest of the treatments. Whereas, the lowest nodes

(5.95) were found in T₁. Similar results were stated by Kelkar (2016) ^[14] in mango, Mugloo *et al.* (2015) ^[15] for spruce.

Absolute growth rate on height basis (cm/day)

The fastest absolute growth rate (0.329 cm/day) was recorded in T₈. However, the slowest absolute growth rate (0.208 cm/day) was found in treatment T₆. Similar finding was reported by Ramteke *et al.* (2016) ^[19] in papaya seedlings and Haldankar *et al.*, (2014) ^[20] for mango grafts in larger size polybag (10" X 14").

Relative growth rate on height basis (cm/cm/day)

RGR measures the efficiency of the plant to grow per unit area per unit time. T₈ recorded fastest relative growth rate at 180-240 DAR was (0.0215) cm/cm/day. The minimum relative growth rate (0.0181 cm/cm/day) was recorded in T₂. Similar findings were noted by Panchal *et al.* (2014) ^[16] in Khirmi and Haldankar *et al.*, (2014) ^[20] for mango.

Fresh weight of graft (g)

The maximum fresh weight of grafts (165.67 g) was observed in T₈ which was at par with T₁₁. The minimum fresh weight of grafts (57.92 g) was observed in T₁ (Control). Vermicompost contains growth regulating substances and humic acids (Atiyeh *et al.*, 2002) ^[6]; plant growth hormones which might have enhanced plant growth. Akshay *et al.*, (2018) ^[3] reported that the maximum fresh weight of shoot was observed in media containing soil + sand + FYM + vermicompost (1:1:1:1) in black pepper cuttings.

Root length (cm)

The longest length of root (45.97 cm) was recorded in jackfruit grafts in T₁₁ which was at par with the T₉ and T₈. The lowest length of root (27.47 cm) was noticed in T₁. This may develop soil aggregation and air flow in the soil, this type of condition provide support to fast growth of the graft due to larger bag size and availability of better nutrition with water and air in root zone. Similar results were reported by Bhardwaj (2014) ^[7] for papaya.

Number of adventitious roots

The highest number of adventitious roots was seen in T₈ (101.88) which was at par with the T₁₁. The lowest number of adventitious roots was noticed in T₁ (47.05). Similar results were reported by Ilyas *et al.*, (2015) ^[12] in budded kinnow.

Dry weight of root (g)

The maximum dry weight of root (35.06 g) was obtained in T₈. Whereas the minimum dry root weight (6.04 g) was obtained in treatment T₁. Akshay *et al.* (2014) ^[4] found the maximum dry weight of root in media comprising soil + sand + FYM + vermicompost (1:1:1:1) in black pepper cutting.

Survival (%)

From the data, it is revealed that the different potting media and bag size did not significantly influence the survival percentage. The survival was in the range of 97.50 to 100 per cent. A successful union of rootstock and scion contribute for survival hence there was no effect of size of polybags and media on survival of jackfruit grafts. Apart from the bag size, availability of nutrients and moisture in this media stimulated photosynthesis at higher rate in leaves of grafts. Considering the root data, discuss the survival percentage. Better root

development might have complementary effect on higher survival. Similar results were reported by Gholap and Polara

(2015) [11] for mango softwood grafts in Soil + FYM + Leaf mould (1:1:1).

Table 1: Effect of different potting media and bag size on growth parameters of jackfruit grafts cv. Konkan Prolific at 240 DAR

Treatment	Plant height (cm)	Girth above union (mm)	Number of leaves	Number of shoots	Number of nodes	AGR (cm/day)	RGR (cm/cm/day)
T ₁	77.00	9.27	26.54	3.18	5.95	0.281	0.0204
T ₂	84.90	10.57	33.82	3.95	8.70	0.213	0.0181
T ₃	99.56	10.57	34.31	4.53	9.35	0.269	0.0201
T ₄	90.88	10.24	32.25	3.63	7.93	0.266	0.0200
T ₅	95.39	10.90	32.21	4.05	9.05	0.246	0.0195
T ₆	98.19	11.08	37.30	4.95	9.15	0.208	0.0183
T ₇	100.23	11.18	36.42	4.86	10.30	0.239	0.0193
T ₈	110.94	12.88	41.71	5.32	12.53	0.329	0.0215
T ₉	100.59	11.29	34.02	4.19	10.48	0.265	0.0200
T ₁₀	97.96	11.23	34.01	4.43	10.70	0.267	0.0201
T ₁₁	103.15	11.89	38.39	4.99	11.08	0.279	0.0203
Range	77.00-110.94	9.27-12.88	26.54-41.71	3.18-5.32	5.95-12.53	0.213-0.329	0.0181-0.0215
S.E.±	2.36	0.19	1.45	0.25	0.43	-	-
CD at 5%	6.96	0.57	4.28	0.75	1.27	-	-

Table 2: Effect of different potting media and bag size on root growth of jackfruit grafts cv. Konkan Prolific at 240 DAR

Treatment	Fresh weight of graft (g)	Root length (cm)	No. of adv roots	Dry weight of root (g)	Survival (%)
T ₁	57.92	27.47	47.05	6.04	97.50
T ₂	66.50	34.27	81.15	15.70	99.17
T ₃	86.67	32.13	85.53	12.30	97.50
T ₄	83.50	31.92	65.35	8.51	97.50
T ₅	88.67	34.60	71.27	10.70	99.17
T ₆	133.50	36.80	94.77	16.66	100.00
T ₇	96.00	35.23	91.48	20.40	97.50
T ₈	165.67	42.25	101.88	35.06	100.00
T ₉	137.33	42.40	78.08	22.21	97.50
T ₁₀	131.33	36.40	82.95	29.55	98.33
T ₁₁	149.08	45.97	104.58	30.38	99.17
Range	57.92-165.67	27.47-45.97	47.05-101.88	6.04-35.06	97.50-100.00
S.E.±	6.52	1.77	2.40	1.47	1.42
CD at 5%	19.25	5.23	7.09	4.34	N.S.

Conclusion

During present investigation on jackfruit grafts the effect of different media and size of polybag on various growth characters viz. height of grafts, girth above union, number of leaves, total number of shoots, number of nodes, Absolute Growth Rate, Relative Growth Rate, fresh weight of graft, length of roots, number of adventitious roots and dry weight of roots were the best in the treatment T₈ i.e., (Bag size 10"×14" with media Soil + Vermicompost 2:1). It was concluded that for production of vigorous jackfruit grafts rebagging in bag size 10"×14" with media containing soil along with vermicompost (2:1).

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