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## Effect of potting media on growth of soft wood grafts of nutmeg (*Myristica fragrans* Houtt.)

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**Abstract**

Nutmeg (*Myristica fragrans* Houtt.) performs well under humid tropical climate. Agro climatic conditions of Konkan are suitable for cultivation of nutmeg. Nutmeg and mace both are used as condiment particularly in sweet foods, baking etc. The initial growth of nutmeg grafts is very slow which needs to be hasten for getting quality planting material and better price in a short span of nursery stage. With this view the experiment on effect of potting media on growth of soft wood grafts of nutmeg was laid out at College of Agriculture, Dapoli during the year 2018. The Randomized Block Design with six treatments and four replications was tried to evaluate the effect of different media on the growth of soft wood grafts of nutmeg. The different media combinations namely T<sub>1</sub>: Soil + FYM + Sand (2:1:1) (Control), T<sub>2</sub>: Soil + FYM + Sand (2:1:1) with 1" cocopeat at top, T<sub>3</sub>: Soil + Vermicompost + Sand (2:1:1) with 1" Cocopeat at top, T<sub>4</sub>: Soil + FYM + Vermicompost + Sand (1:1:1:1) with 1" Cocopeat at top, T<sub>5</sub>: Soil + FYM + Vermicompost + Rice husk (1:1:1:1) with 1" Cocopeat at top, T<sub>6</sub>: Soil + FYM + Vermicompost + Cocopeat (1:1:1:1) were tried. The results revealed that the best performance of nutmeg soft wood graft was observed in the media having Soil + FYM + Vermicompost + Rice husk (1:1:1:1) with 1" Cocopeat at top. This combination had maximum survival percentage of grafts (82.00%), graft height (43.87 cm), girth (6.95 mm), number of shoots (2.05) and internodal length (3.83 cm) at 360 DAB. However, maximum increment in height over initial height (131.62%) was noticed in Soil + FYM + Vermicompost + Cocopeat media at 1:1:1:1 proportion.

**Keywords:** Graft height, media, shoots and graft survival

**Introduction**

Nutmeg (*Myristica fragrans* Houtt.) is an important evergreen, aromatic tree spice that produces distinctly different spices viz., nutmeg and mace. Nutmeg is the kernel of the fruit and mace is waxy red coloured dried aril that surrounded a single seed within a fruit (Andrzej *et al.*, 2012) [2]. It belongs to the family myristicaceae with 18 genera and 300 species. The genus *Myristica* consists of about 120 species of which five described from India viz. *M. fragrans*, *M. malabarica*, *M. magnifica*, *M. beddomei* and *M. contoita*.

Area occupied by nutmeg in India is 22,640 ha with the production of 14,060 tonnes. Kerla is the leading state in area and production followed by Karnataka, Andaman and Nicobar. (www.spices board.com)

Nutmeg is propagated mainly by seed nevertheless, as it is dioecious in nature alternative method of asexual propagation like epicotyl grafting and softwood grafting have been standardized by Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli. Epicotyl grafting method cannot be followed after rainy season (June –September) due to low success under high temperature conditions. Hence soft wood grafting is the only alternative method which could be followed for prolonged period.

Though the agro climatic condition of Konkan are suitable for nutmeg cultivation, the initial growth of nutmeg grafts is very slow in the nursery as well as under field conditions which needs to be hasten for getting quality planting material, better price and precocity in fruiting.

Potting mixture plays an important role in growth of any horticultural crop at nursery stage. It helps to produce quality planting material on large scale and fetch good price. Soil, sand, vermicompost, cocopeat, rice husk etc., are various media which could be used as potting mixture. Very little work has been done in respect of use of media for hastening growth of nutmeg grafts in this contest an experiment on effect of potting media on growth of soft wood grafts of nutmeg (*Myristica fragrans* Houtt.) was carried out during the year 2018.

## Material and Methods

The experiment was conducted at Horticulture, College of Agriculture, Dr. Balasaheb Sawant Konkon Krishi Vidyaapeeth, Dapoli, Dist. Ratnagiri 415 712 (MS.) during the year 2018. The experiment was laid out in Randomized Block Design with four replications and six treatment namely T<sub>1</sub>: Soil + FYM + Sand (2:1:1) (Control), T<sub>2</sub>: Soil + FYM + Sand (2:1:1) with 1" cocopeat at top, T<sub>3</sub>: Soil + Vermicompost + Sand (2:1:1) with 1" Cocopeat at top, T<sub>4</sub>: Soil + FYM + Vermicompost + Sand (1:1:1:1) with 1" Cocopeat at top, T<sub>5</sub>: Soil + FYM + Vermicompost + Rice husk (1:1:1:1) with 1" Cocopeat at top, T<sub>6</sub>: Soil + FYM + Vermicompost + Cocopeat (1:1:1:1). Soft wood grafts of nutmeg grown in 6"x8" size polybags of 3 months old were used for the experimental purpose. Such grafts were transfer in 9"x11" size Polythene having different media combination of soil, FYM, vermicompost, sand, cocopeat and rice husk as per the treatment. Potting mixture was prepared separately for each treatment. A unit of 50 grafts was replicated 4 times to forms replications. Statistical analysis of the data was analyzed by following standard method of analysis of variance described by Panse and Sukhatme (1985) [10]. The standard error of mean (S.E.  $\pm$ ) was worked out and the critical difference at 5 per cent level of significance was calculated wherever the results were found significant.

## Results and Discussion

### Effect of different potting media on survival percentage of nutmeg grafts

The data pertaining to survival percentage of nutmeg grafts as influenced by different potting mixture treatments were presented in Table 1. Data revealed that the maximum survival percentage was recorded in treatment T<sub>5</sub> (82.00%) i.e. in the media having Soil + FYM + Vermicompost + Rice husk 1:1:1:1 with 1" Cocopeat at top which was at par with T<sub>4</sub> (78.00%). Treatment T<sub>6</sub> (64.00%) which was at with T<sub>3</sub> (57.50%). The minimum survival percentage was found in treatment T<sub>2</sub> (47.00%) i.e. in Soil + FYM + Sand 2:1:1 with 1" Cocopeat at top.

The study revealed that the media containing for the Soil + FYM + Vermicompost + Rice husk 1:1:1:1 with 1" Cocopeat at top had shown better survival percentage which may be due to favorable medium for better growth of the graft. Rice husk is reported to be rich in silicon and also known to be a source of tricontanol, cellulose and lignin which can exert the influence so that better graft survival and healthy grafts were obtained (Hwang and Chandra, 1997) [8]. According to Ebaid and El-refaee (2007) [5] the use of rice husk as an organic fertilizer, might have played a vital role in improving soil physical condition thus enhancing efficiency of grafted plant for nutrient absorption. Similar finding were reported by Gawankar (2019) [6] for jackfruit in Soil + Vermicompost + Rice husk (2:1:1) media.

### Effect of different potting media on height of nutmeg grafts

In the present study the height of nutmeg graft was significantly influenced by different potting mixture (Table 1). The maximum height of the grafts (43.87 cm) was observed in treatment T<sub>5</sub> (Soil + FYM + Vermicompost + Rice husk 1:1:1:1 with 1" Cocopeat at top) which was at par with T<sub>1</sub> (43.80 cm), T<sub>2</sub> (42.05 cm) and T<sub>6</sub> (41.02 cm). The minimum graft height (38.70 cm) was recorded in treatment T<sub>3</sub> (Soil + Vermicompost + Sand 2:1:1 with 1" Cocopeat at top) which was at par with T<sub>4</sub> (38.72 cm).

The study revealed media having Soil + FYM + Vermicompost + Rice husk with 1" Cocopeat layer at top increased the graft height nevertheless, media containing Soil + FYM + Vermicompost + Cocopeat (1:1:1:1) showed the highest percentage of increment in height (131.62%). Purwantoro (2016) [11] suggested rice husk as natural silica fertilizer due to high organic matter and silica content while Chaudhary (1996) [4] advised FYM as a main source of organic matter for the supply of essential minerals for the plant growth.

Similar finding were reported by Gawankar (2019) [6] in jackfruit with media containing Soil + Vermicompost + Rice husk (2:1:1) media.

### Effect of different potting media on girth of nutmeg grafts

The maximum graft girth was observed in treatment T<sub>5</sub> (6.95 mm) i.e. Soil + FYM + Vermicompost + Rice husk 1:1:1:1 with 1" Cocopeat at top which was at par with T<sub>2</sub> (6.31 mm). Treatment T<sub>4</sub> (6.21 mm), T<sub>6</sub> (6.15 mm) and T<sub>3</sub> (6.12 mm) were at par with each other. The minimum graft girth was noticed in treatment T<sub>1</sub> (4.80 mm) i.e. in Soil + FYM + Sand at 2:1:1 proportion.

The results revealed that the media containing Soil + FYM + Vermicompost + Rice husk with 1" Cocopeat at top was the best for enhancing graft girth. More the girth stronger is the vascular bundle of the plant which facilitates better translocation of solute within plant and ultimately produced vigorous grafts.

Similar finding were reported by Abhirami *et al.* (2010) [1] in nutmeg with Soil + Coir dust + Sand + FYM (1:1:1:1), Bhagat *et al.*, (2013) [3] with Soil + FYM + Cocopeat (1:1:1) in rough lemon. Ramteke *et al.*, (2013) in papaya with Soil + Sand + Vermicompost (1:1:1), Gholap and Polara (2015) [7] with Soil + Sand + FYM (1:1:1) in mango and Meena *et al.*, (2017) [9] in papaya with Soil + Vermicompost + Vermiculite (1:1:1) with 2 cm Cocopeat at top as media.

### Effect of different potting media on shoots of nutmeg grafts

In present study more number of shoots were found in treatment T<sub>5</sub> (2.05) i.e. Soil + FYM + Vermicompost + Rice husk 1:1:1:1 with 1" Cocopeat at top which was at par with T<sub>3</sub> (1.97) and T<sub>2</sub> (1.67). The less number of shoots were observed in treatment T<sub>1</sub> (1.10) i.e. Soil + FYM + Sand 2:1:1 and was at par with T<sub>4</sub> (1.17) and T<sub>6</sub> (1.30).

In the present investigation treatment T<sub>5</sub> i.e. Soil + FYM + Vermicompost + Rice husk with 1" Cocopeat at top produced maximum number of shoot this could be due to high vigour of graft because of balance nutrient content in growing media.

### Effect of different potting media on internodal length of nutmeg grafts

The maximum internodal length was observed in treatment T<sub>5</sub> (3.83 cm) i.e. in media having Soil + FYM + Vermicompost + Rice husk at 1:1:1:1 proportion with 1" Cocopeat at top. However, it was at par with T<sub>6</sub> (3.56 cm), T<sub>2</sub> (3.25 cm) and T<sub>3</sub> (3.44 cm). Minimum internodal length was observed in treatment T<sub>1</sub> (2.46 cm) i.e. Soil + FYM + Sand 2:1:1. Similar finding were reported by Sadula (2014) in cashew variety VRI-2 where red earth + FYM + Sand + custard apple seed powder (1:1:1:1) was used as a media.

Data pertaining to effect of different potting mixtures on the root length of nutmeg grafts as influenced by different potting mixture treatments are presented in Table 2.

**Table 1:** Effect of different potting media on survival percentage (%) and growth of nutmeg grafts.

	Treatments	Survival percentage (%)	Height (cm)	Per cent increment in height (%)	Girth (mm)	Number of shoots	Inter nodal length (cm)
T <sub>1</sub>	Soil + FYM + Sand (2:1:1) (Control)	50.50 (45.28)	43.80	130.52	4.80	1.10	2.46
T <sub>2</sub>	Soil + FYM + Sand (2:1:1) with 1" Cocopeat at top	47.00 (42.26)	42.05	129.90	6.31	1.67	3.25
T <sub>3</sub>	Soil + FYM + Vermicompost (2:1:1) with 1" Cocopeat at top	57.50 (64.94)	38.70	98.15	6.12	1.97	3.44
T <sub>4</sub>	Soil + FYM + Vermicompost + Sand (1:1:1:1) with 1" Cocopeat at top	78.00 (62.08)	38.72	102.72	6.21	1.17	2.88
T <sub>5</sub>	Soil + FYM + Vermicompost + Rice Husk (1:1:1:1) with 1" Cocopeat at top	82.00 (64.94)	43.87	107.91	6.95	2.05	3.83
T <sub>6</sub>	Soil + FYM + Vermicompost + Cocopeat (1:1:1:1)	64.00 (53.15)	41.02	131.62	6.15	1.30	3.56
SEm ±		2.52	1.30		0.24	0.23	0.28
CD @ 5%		7.62	3.94		0.72	0.72	0.86
(Figures in parenthesis indicate arcsine transformed values)							

**Table 2:** Effect of different potting media on root length (cm) of nutmeg grafts

Treatments		Number of leaves	Root length (cm)	
			Initial (at rebagging)	Final (at 360 DAB)
T <sub>1</sub>	Soil + FYM + Sand (2:1:1) Control	20.30	13.50	24.00 (77.77)
T <sub>2</sub>	Soil + FYM + Sand (2:1:1) with 1" Cocopeat at top	21.30	14.50	29.20 (101.37)
T <sub>3</sub>	Soil + Vermicompost + Sand (2:1:1) with 1" Cocopeat at top	24.77	11.00	21.00 (90.90)
T <sub>4</sub>	Soil + FYM + Vermicompost + Sand (1:1:1:1) with 1" Cocopeat at top	25.80	22.00	38.30 (74.09)
T <sub>5</sub>	Soil + FYM + Vermicompost + Rice husk (1:1:1:1) with 1" Cocopeat at top	19.22	13.00	39.80 (198.46)
T <sub>6</sub>	Soil + FYM + Vermicompost + Cocopeat (1:1:1:1)	21.55	21.50	37.20 (73.02)
S. Em ±		1.40	1.16	1.98
C.D. at 5%		4.24	3.91	5.98
(Value in parenthesis indicate per cent increase initial root length)				

**Plate 1:** Randomly selected 3 months old nutmeg soft wood grafts for rebagging





**Plate 2:** Comparative performance of nutmeg grafts in different potting media 360 DAB

### Effect of different potting media on number of leaves

The maximum number of leaves were observed in treatment T<sub>4</sub> (25.80) i.e. Soil + FYM + Vermicompost + Sand 1:1:1:1 with 1" Cocopeat at top and it was at par with T<sub>3</sub> (24.77). The minimum number of leaves was recorded in treatment T<sub>5</sub> (19.22) which was at par with T<sub>1</sub> (20.30), T<sub>2</sub> (21.30) and T<sub>6</sub> (21.55).

### Effect of different potting media on root length of nutmeg grafts

Maximum root length was observed in treatment T<sub>5</sub> (39.80 cm) in Soil + FYM + Vermicompost + Rice husk 1:1:1:1 with 1" Cocopeat at top indicating 198.46 per cent increase in length over initial root length. The minimum root length was observed in treatment T<sub>3</sub> (21.00 cm) with 90.90% increase in root length over initial root length i.e. in Soil + Vermicompost + Sand 2:1:1 with 1" Cocopeat at top. However, media containing Soil + FYM + Sand (2:1:1) (T<sub>1</sub>) showed least per cent increase in root length over initial root length (77.77%).

Among the various media combinations media containing Soil+ FYM + Vermicompost +Rice husk (1:1:1:1) with 1" Cocopeat at top has shown better results for root growth. This may be due to organic amendment in potting mixture which improved the physical property like aeration, water holding capacity, drainage, pH that encourage better root growth and nutrient absorption favorable media. Similar finding were reported by Abhirami *et al.* (2010)<sup>[1]</sup> with Soil + Coir dust + Sand + Vermicompost (1:1:1:1) in nutmeg, Gholap and Polara (2015)<sup>[7]</sup> in mango having media containing Soil + FYM + leaf mould (1:1:1), Meena *et al.* (2017)<sup>[9]</sup> in papaya with Soil + Vermicompost + Vermiculite (1:1:1) with 2 cm Cocopeat at top treatment.

### Conclusion

It could be concluded that the media containing Soil + FYM + Vermicompost + Rice husk at 1:1:1:1 proportion with 1" Cocopeat at top is the best option for better growth of nutmeg grafts by which soil in media can be replaced by 75 per cent.

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