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 hastened 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 T1: Soil + FYM + Sand (2:1:1) (Control), T2: Soil + FYM + Sand (2:1:1) with 1” cocopeat at top, T3: Soil + Vermicompost + Sand (2:1:1) with 1” Cocopeat at top, T4: Soil + FYM + Vermicompost + Sand (1:1:1) with 1” Cocopeat at top, T5: Soil + FYM + Vermicompost + Rice husk (1:1:1) with 1” Cocopeat at top, T6: Soil + FYM + Vermicompost + Cocopeat (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) 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 Savant Konkan Krishi Vidypaveeth, 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 context 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 Konkan Krishi Vidyapeeth, 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 T1: Soil + FYM + Sand (2:1:1) (Control), T2: Soil + FYM + Sand (2:1:1) with 1” cocopeat at top, T3: Soil + Vermicompost + Sand (2:1:1) with 1” Cocopeat at top, T4: Soil + FYM + Vermicompost + Rice husk (1:1:1:1) with 1” Cocopeat at top, T5: Soil + FYM + Vermicompost + Rice husk (1:1:1:1) with 1” Cocopeat at top, T6: Soil + FYM + Vermicompost + Cocopeat (1:1:1:1). Soft wood grafts of nutmeg grown in 6”×8” size polybags of 3 months old were used for the experimental purpose. Such grafts were transfer in 9”×11” 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. ±) 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 T5 (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 T6 (78.00%). Treatment T6 (64.00%) which was at with T3 (57.50%). The minimum survival percentage was found in treatment T2 (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) [18]. According to Ebaid and El-refae (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 internodal length of nutmeg grafts

The maximum internodal girth was observed in treatment T3 (6.95 mm) i.e. Soil + FYM + Vermicompost + Rice husk 1:1:1:1 with 1” Cocopeat at top which was at par with T2 (6.31 mm). Treatment T4 (6.21 mm), T6 (6.15 mm) and T3 (6.12 mm) were at par with each other. The minimum graft girth was noticed in treatment T5 (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.


Effect of different potting media on shoots of nutmeg grafts

In present study more number of shoots were found in treatment T3 (2.05) i.e. Soil + FYM + Vermicompost + Rice husk 1:1:1:1 with 1” Cocopeat at top which was at par with T1 (1.97) and T2 (1.67). The less number of shoots were observed in treatment T1 (1.10) i.e. Soil + FYM+ Sand 2:1:1 and was at par with T4 (1.17) and T5 (1.30).

In the present investigation treatment T3 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 T3 (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 T4 (3.56 cm), T5 (3.25 cm) and T6 (3.44 cm). Minimum internodal length was observed in treatment T1 (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.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Survival percentage (%)</th>
<th>Height (cm)</th>
<th>Per cent increment in height (%)</th>
<th>Girth (mm)</th>
<th>Number of shoots</th>
<th>Inter nodal length (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 Soil + FYM + Sand (2:1:1) (Control)</td>
<td>50.50 (45.28)</td>
<td>43.80</td>
<td>130.52</td>
<td>4.80</td>
<td>1.10</td>
<td>2.46</td>
</tr>
<tr>
<td>T2 Soil + FYM + Sand (2:1:1) with 1” Cocopeat at top</td>
<td>47.00 (42.26)</td>
<td>42.05</td>
<td>129.90</td>
<td>6.31</td>
<td>1.67</td>
<td>3.25</td>
</tr>
<tr>
<td>T3 Soil + FYM + Vermicompost (2:1:1) with 1” Cocopeat at top</td>
<td>57.50 (64.94)</td>
<td>38.70</td>
<td>98.15</td>
<td>6.12</td>
<td>1.97</td>
<td>3.44</td>
</tr>
<tr>
<td>T4 Soil + FYM + Vermicompost + Sand (1:1:1:1) with 1” Cocopeat at top</td>
<td>78.00 (62.08)</td>
<td>38.72</td>
<td>102.72</td>
<td>6.21</td>
<td>1.17</td>
<td>2.88</td>
</tr>
<tr>
<td>T5 Soil + FYM + Vermicompost + Rice Husk (1:1:1:1) with 1” Cocopeat at top</td>
<td>82.00 (64.94)</td>
<td>43.87</td>
<td>107.91</td>
<td>6.95</td>
<td>2.05</td>
<td>3.83</td>
</tr>
<tr>
<td>T6 Soil + FYM + Vermicompost + Cocopeat (1:1:1)</td>
<td>64.00 (53.15)</td>
<td>41.02</td>
<td>131.62</td>
<td>6.15</td>
<td>1.30</td>
<td>3.56</td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Number of leaves</th>
<th>Root length (cm)</th>
<th>Initial (at rebagging)</th>
<th>Final (at 360 DAB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 Soil + FYM + Sand (2:1:1) Control</td>
<td>20.30</td>
<td>13.50</td>
<td>24.00 (77.77)</td>
<td></td>
</tr>
<tr>
<td>T2 Soil + FYM + Sand (2:1:1) with 1” Cocopeat at top</td>
<td>21.30</td>
<td>14.50</td>
<td>29.20 (101.37)</td>
<td></td>
</tr>
<tr>
<td>T3 Soil + Vermicompost + Sand (2:1:1) with 1” Cocopeat at top</td>
<td>24.77</td>
<td>11.00</td>
<td>21.00 (90.90)</td>
<td></td>
</tr>
<tr>
<td>T4 Soil + FYM + Vermicompost + Sand (1:1:1:1) with 1” Cocopeat at top</td>
<td>25.80</td>
<td>22.00</td>
<td>38.30 (74.09)</td>
<td></td>
</tr>
<tr>
<td>T5 Soil + FYM + Vermicompost + Rice husk (1:1:1:1) with 1” Cocopeat at top</td>
<td>19.22</td>
<td>13.00</td>
<td>39.80 (198.46)</td>
<td></td>
</tr>
<tr>
<td>T6 Soil + FYM + Vermicompost + Cocopeat (1:1:1:1)</td>
<td>21.55</td>
<td>21.50</td>
<td>37.20 (73.02)</td>
<td></td>
</tr>
</tbody>
</table>

**SEM ±** 1.40 1.16 1.98
**CD 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
Effect of different potting media on number of leaves
The maximum number of leaves were observed in treatment T₄ (25.80) i.e. Soil + FYM + Vermicompost + Sand 1:1:1:1 with 1” Cocopeat at top and it was at par with T₃ (24.77). The minimum number of leaves was recorded in treatment T₅ (19.22) which was at par with T₁ (20.30), T₂ (21.30) and T₆ (21.55).

Effect of different potting media on root length of nutmeg grafts
Maximum root length was observed in treatment T₅ (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 T₁ (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) (T₁) 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) [1] with Soil + Coir dust + Sand + Vermicompost (1:1:1:1) in nutmeg, Gholap and Polara (2015) [7] in mango having media containing Soil + FYM + leaf mould (1:1:1), Meena et al. (2017) [9] 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.

References
14. www.spiceboard.com