

## Original Research Article

# Effect of Organic Nutrient Sprays on Growth, Survival Percentage and Percentage of Sealable Grafts of Nutmeg (*Myristica fragrans* Houtt)

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## ABSTRACT

The experiment was conducted at nursery no. 04, College of Horticulture, Dapoli under Dr. B. S. K. K. V. Dapoli, Dist. Ratnagiri during the year 2018-2019 to assess the Effect of organic nutrient sprays on growth of softwood grafts of nutmeg. The experiment was laid out in Randomized Block Design with two replications and thirteen nutrient treatments namely T<sub>1</sub>- Control (No any Spray), T<sub>2</sub>- Cow urine 5%, T<sub>3</sub>- Cow urine 10%, T<sub>4</sub>- Cow urine 15%, T<sub>5</sub>- Humic acid 0.2%, T<sub>6</sub>- Humic acid 0.4%, T<sub>7</sub>-Humic acid 0.6%, T<sub>8</sub>- Vermiwash 5%, T<sub>9</sub>- Vermiwash 10%, T<sub>10</sub>- Vermiwash 15%, T<sub>11</sub>- Jeevamrut 5%, T<sub>12</sub>- Jeevamrut 10%, T<sub>13</sub>- Jeevamrut 15%. The result revealed that the best performance of nutmeg softwood grafts was observed in nutrient Humic acid 0.4%. Among the control and other treatments under the study, humic acid 0.4% significantly increased the plant height, plant girth, number of leaves, primary root length, survival percentage and percentage of saleable grafts of nutmeg.

### Keywords

Nutmeg, Nutrients,  
Humic acid

## Introduction

Nutmeg (*Myristica fragrans* Houtt.) is one of the popular spice crop which belongs to family Myristicaceae (Periasamy *et al.*, 2016). Nutmeg tree commonly available in Malaysia, India, Indonesia (Al-Rawi *et al.*, 2011). Nutmeg tree grows up to the height of 10-20m. Dried kernel of nutmeg is known for its aromatic properties (Tajuddin *et al.*, 2003). India occupied an area of about 19000 ha under nutmeg with the production of

12000 MT in the year 2018-19. Kerala is the leading state in area and production followed by Karnataka and Andrapradesh ([www.nhb.gov.in](http://www.nhb.gov.in)).

Nutmeg trees are dioecious plants which are propagated both sexually (seed) and asexually (cutting or grafting). Sexual propagation yields 50% male seedlings, which are unproductive. As there is no reliable method for early sex detection before flowering hence grafting is the preferred

method of propagation. Softwood grafting, approach grafting and patch budding have proved successful methods of propagation with higher success. Air layering is also used but has low (35-40%) success. Though softwood grafting is commercially adopted method of propagation. The growth of the grafts is slow and hence percent survival is low. To hasten the growth at nursery stage it is indispensable to use exogenous nutrient sprays or to enrich soil media. organic nutrient sprays proved beneficial to hasten the growth in most of crops at nursery stage hence it is inescapable to test the role of organic nutrients like cow urine, humic acid, vermiwash and jeevamrut in hastening the growth of nutmeg grafts.

The organic nutrients viz. cow urine, humic acid, vermiwash and jeevamrut plays important role in growth of plants. The growth of nutmeg graft in nursery is slow. It requires more period for nurturing to become saleable. Nutrient sprays during nursery stage help better growth, absorption of water and nutrients and ultimately make plants capable of producing more vegetative growth.

### **Materials and Methods**

The experiment was conducted at nursery no. 04, College of Horticulture, Dapoli under Dr. B. S. K. K. V. Dapoli, Dist. Ratnagiri during the year 2018-2019. The experiment was laid out in Randomized Block Design with two replications and thirteen nutrient treatments namely T<sub>1</sub>- Control (No any Spray), T<sub>2</sub>- Cow urine 5%, T<sub>3</sub>- Cow urine 10%, T<sub>4</sub>- Cow urine 15%, T<sub>5</sub>- Humic acid 0.2%, T<sub>6</sub>- Humic acid 0.4%, T<sub>7</sub>-Humic acid 0.6%, T<sub>8</sub>- Vermiwash 5%, T<sub>9</sub>- Vermiwash 10%, T<sub>10</sub>- Vermiwash 15%, T<sub>11</sub>- Jeevamrut 5%, T<sub>12</sub>- Jeevamrut 10%, T<sub>13</sub>- Jeevamrut 15%. Soft wood grafts of nutmeg grown in 6"×8" size polybags of 3 months old were used for the experimental purpose. A unit of 50 grafts was replicated 2

times to forms replications. The recommended cultural practices (Irrigation, weeding and plant protection, etc.) were followed uniformly to experimental plots. The Spraying with different organic nutrient sprays was done at 60 days interval up to 360 days. The observations were recorded randomly selected five plants from each replication treatment wise. Statistical analysis of the data was carried out by standard method of analysis of variance as given by Panse and Sukhatme (1995).

### **Results and Discussion**

#### **Effect of organic nutrient sprays on height of nutmeg graft**

Data pertaining to the height of nutmeg graft as influenced by different organic nutrient sprays are presented in Table 1. Data revealed that the highest nutmeg graft height was noticed in the treatment T<sub>6</sub> (48.39 cm) i.e. humic acid at 0.4% and was significantly superior over T<sub>13</sub>, T<sub>12</sub>, T<sub>10</sub>, T<sub>8</sub>, and T<sub>1</sub>, however at par with T<sub>3</sub>, T<sub>4</sub>, T<sub>5</sub>, T<sub>9</sub>, T<sub>11</sub>, T<sub>2</sub> and T<sub>7</sub>. The lowest nutmeg graft height was recorded in the treatment T<sub>1</sub> i.e. control (40.94 cm).

Thus, the height of nutmeg graft was increased in all the treated graft with organic nutrient sprays over control. The treatment T<sub>6</sub> having 0.4% humic acid noticed significantly the highest nutmeg graft height throughout the period of study. Further, it was observed that in the nutmeg graft treated with humic acid, graft height was increased with an increase in concentration from 0.2% to 0.4%.

However, it was further decreased with increase in the concentration from 0.4% to 0.6% of humic acid. Higher graft height is an attribute of higher vigour. The reason for getting maximum graft height in the treatment of 0.4% humic acid may be due to

humic acid has positive effect, which assimilates changes in membrane permeability and these features of humic acid might have resulted in more plant growth in terms of plant height. (Sher and Abdur, 2013). Similar findings were also reported by Baskar and Sankaran (2005) in turmeric with NPK + soil application of humic acid @ 10 kg/ha + 0.1 % foliar spray at 90 and 120 days + 0.1 % rhizome dipping, Kazemi (2013) in cucumber with 20 ppm humic acid + 100 ml L, K, Paunovic *et al.*, (2013) in grafted walnut with application of humisol, Fatima and Denesh (2013) in chilli with humic acid spray @ 6.0 ml L<sup>-1</sup> at 35 DAP, Denre *et al.*, (2014) in pungent pepper with HA + Zn + B, Sani (2014) in canola with 0.5% humic acid, Ali *et al.*, (2017) in gladiolus with 350 ppm humic acid, Ramya *et al.*, (2018) in mango with 10 ml humic acid /L.

#### **Effect of organic nutrient sprays on girth of nutmeg graft**

In the present study the girth of nutmeg graft was significantly influenced by different organic nutrient sprays (Table 1). The maximum girth of the grafts was noticed in the treatment i.e. T<sub>6</sub> (6.33 mm) i.e. humic acid 0.4% and was significantly superior over T<sub>13</sub>, T<sub>2</sub>, T<sub>8</sub>, T<sub>5</sub>, T<sub>4</sub> and T<sub>1</sub>, however at par with T<sub>9</sub>, T<sub>3</sub>, T<sub>7</sub>, T<sub>10</sub>, T<sub>12</sub> and T<sub>11</sub>.

The lowest nutmeg graft girth was recorded in the treatment T<sub>1</sub> i.e. control (4.27 mm). The treatment T<sub>6</sub> having 0.4% humic acid noticed significantly the highest nutmeg graft girth throughout the period of study.

Height and girth are simple and important attributes which can indicate the influence of organic nutrient sprays on overall growth of grafts. In current investigation treatment T<sub>6</sub> i.e. 0.4% humic acid spray favoured longitudinal as well as horizontal growth i.e. height and

girth. Such a phenomenon is decided by cell division, expansion and elongation of cell which are naturally under the influence of auxins, gibberellins and cytokinins within the plants. The promoter effect imparted by humic acid warrants that these components favour production of natural growth promoting substances.

Humic acid has positive effect, to increase in cell multiplication, and elongation of crop and these features of humic acid might have resulted in more plant growth in terms of plant girth. (Thakur *et al.*, 2018). Similar findings were reported by Rengrudkij and partida (2003) in avocado with 12% humic acid and 29% phosphoric acid + 26% potassium, Paunovic *et al.*, (2013) in walnut with foliar humisol spraying, Taha (2017) in walnut with Humic acid at 4 ml L<sup>-1</sup>, Ramya *et al.*, (2018) in mango with 10 ml humic acid /L.

#### **Effect of organic nutrient sprays on number of leaves of nutmeg graft**

In present study more number of leaves were found in the treatment T<sub>6</sub> (23.3) i.e. humic acid 0.4% and was significantly superior over T<sub>9</sub>, T<sub>2</sub> and T<sub>13</sub>. The lowest number of leaves of nutmeg graft was recorded in the treatment T<sub>1</sub> i.e. control (16).

The treatment T<sub>6</sub> having 0.4% humic acid noticed significantly the highest number of leaves of nutmeg graft throughout the period of study. Emergence and expansion of leaves is occurring under the influence of nutrition supply from the nutrient spray. Humic acid contains auxins which improve growth and nutrient intensity of plant. Humic matter has been shown to increase the nitrogen uptake by plants, and to increase soil nitrogen utilization efficiency, and therefore increasing the vegetative growth of plants i.e. number of leaves.

**Table.1** Effect of different organic nutrient sprays on survival percentage and percentage of saleable nutmeg grafts at 360 days after spraying

Treatment	Height (cm)	Girth (cm)	Number of leaves	Primary root length (cm)	Survival (%)	Saleable grafts (%)
T <sub>1</sub> Control (No spray)	40.94	4.27	16.00	24.00	88.90 (70.54)	86.81
T <sub>2</sub> Cow urine 5%	43.75	5.12	20.40	30.75	92.25 (74.11)	96.38 (79.06)
T <sub>3</sub> Cow urine 10%	47.94	5.62	18.30	33.50	92.90 (74.55)	96.74 (79.53)
T <sub>4</sub> Cow urine 15%	47.71	4.68	16.70	26.50	92.70 (74.32)	95.36 (77.62)
T <sub>5</sub> Humic acid 0.2%	47.42	4.92	18.20	51.50	94.00 (75.82)	95.37 (77.62)
T <sub>6</sub> Humic acid 0.4%	48.39	6.33	23.30	54.50	96.40 (79.06)	98.48 (87.97)
T <sub>7</sub> Humic acid 0.6%	43.47	5.55	18.70	32.50	95.17 (77.34)	94.37 (76.31)
T <sub>8</sub> Vermiwash 5%	41.07	5.06	17.70	40.00	90.38 (71.95)	95.29 (77.48)
T <sub>9</sub> Vermiwash 10%	46.94	5.77	20.70	54.00	92.15 (73.78)	97.42 (80.72)
T <sub>10</sub> Vermiwash 15%	41.54	5.54	17.80	41.00	93.75 (75.58)	96.14 (78.61)
T <sub>11</sub> Jeevamrut 5%	44.37	5.43	16.98	44.50	91.34 (72.74)	94.26 (76.19)
T <sub>12</sub> Jeevamrut 10%	41.65	5.50	16.10	51.00	91.90 (73.46)	92.15 (73.78)
T <sub>13</sub> Jeevamrut 15%	41.95	5.36	19.80	49.50	92.00 (73.57)	93.27 (75.00)
<b>Mean</b>	<b>44.39</b>	<b>5.32</b>	<b>18.51</b>	<b>41.02</b>	<b>92.6</b>	<b>94.77</b>
<b>F Test</b>	<b>Sig</b>	<b>Sig</b>	<b>Sig</b>	<b>Sig</b>	<b>Sig</b>	<b>Sig</b>
<b>S.Em±</b>	<b>1.74</b>	<b>0.28</b>	<b>0.58</b>	<b>0.75</b>	<b>0.34</b>	<b>0.19</b>
<b>C.D. at 5%</b>	<b>5.38</b>	<b>0.87</b>	<b>1.80</b>	<b>2.31</b>	<b>1.03</b>	<b>0.58</b>

The auxins activated shoot growth by rapid cell division and cell elongation which might have resulted in increase in number of leaves through cell division (Jackson, 1997). Similar findings were reported by Paksoy *et al.*, (2010) in okra with k3 and HA3 (humic acid), Kazemi (2013) in cucumber with 20 ppm humic acid + 100 ml L.K., Taha (2017) in walnut with humic acid at 4 ml L<sup>-1</sup>, Ramya *et al.*, (2018) in mango with 10 ml humic acid /L.

**Effect of organic nutrient sprays on primary root length of nutmeg graft**

Data pertaining to the primary root length of nutmeg graft as influenced by different organic nutrient sprays. The highest primary root length of nutmeg graft was noticed in the

treatment i.e. T<sub>6</sub> (54.5 cm) i.e. humic acid 0.4% and was significantly superior over T<sub>5</sub> and T<sub>12</sub>, however at par with T<sub>9</sub>. The lowest primary root length of nutmeg graft was recorded in the treatment T<sub>1</sub> i.e. control (24 cm).

The treatment T<sub>6</sub> having 0.4% humic acid noticed significantly the highest primary root length of nutmeg graft throughout the period. Humic acid contains many elements, which improve the soil fertility and increasing the availability of nutrient elements and consequently affects the plant growth. In many studies, humic acid preparations are reported to increase the uptake of mineral elements to promote the root length (Memon and Khetran, 2014). Similar findings were also reported by Taha (2017) in walnut with

humic acid at 4 ml L<sup>-1</sup>, Ramya *et al.*, (2018) in mango with 10 ml humic acid /L.

### **Effect of organic nutrient sprays on survival percentage of nutmeg graft**

The highest survival percentage of nutmeg graft was noticed in the treatment T<sub>6</sub> (96.40%) i.e. humic acid 0.4% and was significantly superior over T<sub>7</sub>. The lowest survival percentage of nutmeg graft was recorded in the treatment T<sub>1</sub> i.e. control (88.90%). Similar finding were reported by Paunovic *et al.*, (2013) in walnut with soil and foliar application of humisol.

### **Effect of organic nutrient sprays on percentage of saleable grafts nutmeg**

The highest percentage saleable grafts was noticed in the treatment T<sub>6</sub> (98.48%) i.e. humic acid 0.4% and was significantly superior over T<sub>9</sub>. The lowest percentage of saleable graft was recorded in the same treatment T<sub>1</sub> i.e. control (86.81%).

On the basis of the result obtained from the above investigation, it could be concluded that among the various sprays of organic nutrients the treatment T<sub>6</sub> i.e. humic acid 0.4 percent was found to be the best over other nutrient sprays. It recorded maximum graft height (48.39 cm), girth (6.33 mm), number of leaves (23.3), primary root length (54.5 cm), survival per cent (96.40%) and Percentage of sealable grafts (98.48%).

Among these organic nutrient sprays, humic acid at 0.4 % (T<sub>6</sub>) showed overall better performance followed by cow urine at 10% (T<sub>3</sub>), vermiwash at 10% (T<sub>9</sub>) and cow urine at 5% (T<sub>2</sub>), superior over T<sub>3</sub>, T<sub>8</sub>, T<sub>6</sub>, T<sub>7</sub> and T<sub>12</sub>, however at par with T<sub>9</sub>, T<sub>13</sub> and T<sub>4</sub>. The lowest number of shoots of nutmeg graft was recorded in the same treatment T<sub>1</sub> i.e. control (1.35).

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