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## Effect of potting media on growth of arecanut (*Areca catechu* L.) seedlings

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### Abstract

The present study entitled “Effect of potting media on growth of arecanut (*Areca catechu* L.) Seedlings” was conducted at College of Horticulture, Dapoli, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli during 2021-22. The experiment consisted of eight treatments which were replicated thrice. The treatments were prepared with combination of different media such as Soil, Sand, Vermicompost, Ricehusk, Cocopeat and Farm yard manure (FYM). The results of the experiment revealed that growth of arecanut seedlings was superior in the treatment T<sub>6</sub> i.e., Soil + Vermicompost + Sand (1:1:1). Maximum plant height (86.52 cm) and number of leaves (6.07) were recorded at 180 days after rebagging when arecanut seedlings were raised in Soil + Vermicompost + Sand in 1:1:1 proportion (treatment T<sub>6</sub>). Further it can be concluded that, the growth of arecanut seedlings was significantly influenced when raised in different potting media. The treatment T<sub>6</sub> i.e., Soil + Vermicompost + Sand (1:1:1) was superior in comparison to others for raising vigorous and healthy arecanut seedlings.

**Keywords:** Arecanut, media, vermicompost, seedlings, growth

### Introduction

Arecanut (*Areca catechu* Linn.) is a tropical monoecious palm belonging to family Palmae. It is considered as important cash crop & popularly known as “betel nut” or “supari”. Arecanut is primarily cultivated for its kernel or fruit (endosperm) which has commercial importance. Arecanut is highly profitable commercial plantation crop and provides economic backbone to a substantial number of farm families. India is the world’s leading arecanut producing as well as consuming country. India is traditionally an arecanut growing country and hold first position in area (5, 27,336 ha) and production (904.73 thousand metric tons) in the world (Anonymous, 2020a) [1]. Commercial production of arecanut is dominated in south western and north eastern regions of India. Kerala, Karnataka and Assam account for more than 90% of the total area and production in our country. Maharashtra has an area of 3,000 hectares under this crop and has an annual production of 4.75 thousand metric tons. (Anonymous, 2020 b) [2]. In Maharashtra, arecanut cultivation in large numbers is found in the Konkan region mainly in Raigad, Ratnagiri and Sindhudurg districts.

Arecanut is a perennial, seed-propagated crop. Production of quality planting material includes selection of mother palm, selection of seed nut, raising and selection of seedlings, and adoption of proper nursery techniques. The first step to establish successful plantation, obtain higher production and productivity in arecanut is through production of better quality planting material (Reddy *et al.*, 2001) [10]. Raising of seedlings in polybags is found to be an effective technique for production of vigorous seedlings as they will establish very well in the field. Optimal growth and development of plant is highly dependent on potting media as a key factor.

### Materials and Methods

The present field investigation was conducted at College of Horticulture, Dapoli, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri from 2021 to 2022. Potting media was prepared separately using different media components such as soil, sand, farm yard manure (FYM), vermicompost, rice husk and cocopeat. The required quantities of different media components were mixed together on volume basis.

Well grown, 6 month old healthy seedlings having 2-3 leaves were selected for experiment purpose. Seedlings were rebagged in polythene bag of size 8” x 10” which were filled with potting media as per the treatment details. Immediately after rebagging, irrigation was given to

to avoid stress and to help the seedling adjust into new environment. To evaluate the effect of potting media on growth of arecanut seedling, five arecanut seedlings were selected randomly from replication of each treatment. Morphological characters (plant height and number of leaves) of these seedlings were studied for a period of 180 days from rebagging (180 DAR) of seedlings. Statistical analysis of the data was carried out by following the standard method of analysis of variance as given by Panse and Sukhatme (1995) [7].

## Results and Discussion

Observation regarding the effect of different media treatments on the growth of arecanut seedlings with regard to plant height and number of leaves was recorded at monthly interval from rebagging of seedlings (0 days) to 180 days after rebagging (*i.e.*, at 30, 60, 90, 120, 150 and 180 DAR). The results obtained during the present study are presented and discussed along with tables and figures.

### Plant height

Plant height is one of the key factors in the growth and development of a seedling. Significant difference among the various treatments was observed in the experiment. Data regarding the plant height of arecanut seedlings in relation to the different potting media is presented in Table 1 and depicted in Fig. 1. The maximum height (86.52 cm) was recorded in in treatment T<sub>6</sub> (86.52 cm) *i.e.* Soil + Vermicompost + Sand (1:1:1) at 180 days after rebagging (DAR), which was followed by treatment T<sub>7</sub> (81.13 cm) *i.e.*,

Soil + Vermicompost + Cocopeat (1:1:1). However, the minimum plant height was recorded in treatment T<sub>5</sub> (66.34 cm) *i.e.* Soil + F.Y.M + Ricehusk (1:1:1).

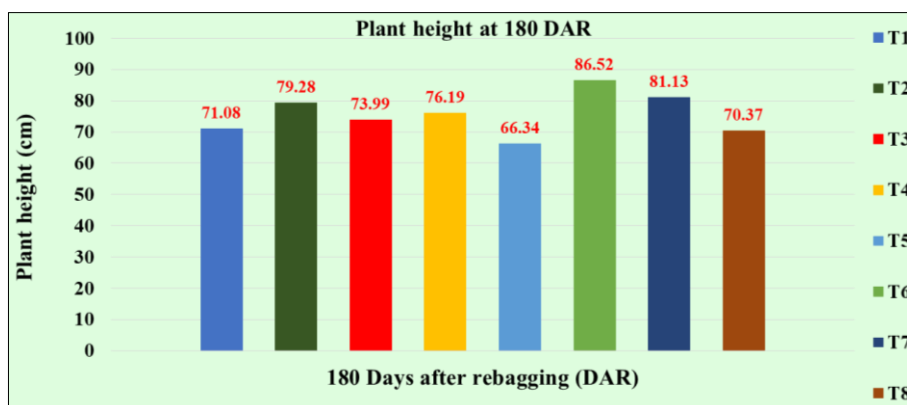
Plant height is the most important morphological character of seedling. Results of the present experiment revealed that, plant height responded positively to different potting media combinations. Treatment T<sub>6</sub> consisting of Soil + Vermicompost + Sand (1:1:1) was found statically significant in relation to plant height which might be due to optimum nutrient content of media which influences the growth of plant.

The vermicompost and soil have high organic matter content which enhances the nutrient availability and improves the permeability, aeration and water holding capacity of the growing medium (Bhardwaj, 2014). Sand is beneficial in the potting mixture because it increases the drainage and reduces the water retention. Vermicompost is enriched with diversity of soil micro-organisms. These micro-organisms produce growth promoting hormones (auxins, cytokinins and gibberellins), which are responsible for influencing the growth of seedling (Frankenberger Jr. and Arshad, 1995) [5]. Vermicompost accelerates the growth of seedlings by conversion of mineral nutrients into plant available forms (nitrates, phosphates, soluble potassium & magnesium and exchangeable phosphorus & calcium). Similar findings were reported by Raja *et al.* (2005) [8] in arecanut seedlings grown in soil + sand + vermicompost (2:1:1), Borah *et al.* (2008) [4] in arecanut seedlings raised sand + vermicompost (2:1), Karthikeyan *et al.* (2009) [6] in coconut seedlings raised in sand + vermicompost (3:1) medium.

**Table 1:** Effect of different potting media on height of rebagged arecanut seedlings

Treatments	Plant height (cm)						
	0 DAR	30 DAR	60 DAR	90 DAR	120 DAR	150 DAR	180 DAR
T <sub>1</sub> Soil + FYM (3:1) [Control]	32.29	36.53	43.69	51.55	56.03	61.12	71.08
T <sub>2</sub> Soil + FYM + Sand (1:1:1)	33.21	38.90	48.47	57.06	63.32	69.18	79.28
T <sub>3</sub> Soil + FYM + Vermicompost (1:1:1)	32.42	37.07	42.72	53.44	58.18	65.31	73.99
T <sub>4</sub> Soil + FYM + Cocopeat (1:1:1)	31.85	36.76	44.03	52.61	60.64	66.93	76.19
T <sub>5</sub> Soil + F.Y.M + Ricehusk (1:1:1)	32.74	36.56	42.30	49.70	53.17	58.65	66.34
T <sub>6</sub> Soil + Vermicompost + Sand (1:1:1)	34.02	38.42	46.65	59.17	66.95	75.20	86.52
T <sub>7</sub> Soil + Vermicompost + Cocopeat (1:1:1)	31.54	37.66	44.91	55.26	62.39	70.75	81.13
T <sub>8</sub> Soil + Vermicompost + Ricehusk (1:1:1)	31.95	36.14	41.12	48.25	55.32	62.04	70.37
Mean	32.50	37.26	44.23	53.38	59.50	66.15	75.61
S.Em. <sub>±</sub>	0.57	0.68	0.91	0.99	1.23	0.93	1.4
C.D. at 5%	N.S	N.S	2.77	2.99	3.74	2.81	4.26

DAR: Days after rebagging



T<sub>1</sub>: Soil + FYM (3:1)

T<sub>2</sub>: Soil + FYM + Sand (1:1:1)

T<sub>3</sub>: Soil + FYM + Vermicompost (1:1:1)

T<sub>4</sub>: Soil + FYM + Cocopeat (1:1:1)

T<sub>5</sub>: Soil + FYM + Ricehusk (1:1:1)

T<sub>6</sub>: Soil + Vermicompost + Sand (1:1:1)

T<sub>7</sub>: Soil + Vermicompost + Cocopeat (1:1:1)

T<sub>8</sub>: Soil + Vermicompost + Rice husk (1:1:1)

**Fig 1:** Effect of different potting media on plant height of rebagged arecanut seedling

### Number of leaves

The number of leaves in different treatments recorded at monthly interval and presented in Table 2 and illustrated in figure 2. The maximum number of leaves (6.07) were recorded in treatment Soil + Vermicompost + Sand (1:1:1), which was at par with Soil + Vermicompost + Cocopeat (1:1:1). Whereas, the minimum number of leaves (4.80) was reported in treatment Soil + Vermicompost + Ricehusk (1:1:1) and treatment T<sub>5</sub> i.e., Soil + F.Y.M + Ricehusk (1:1:1).

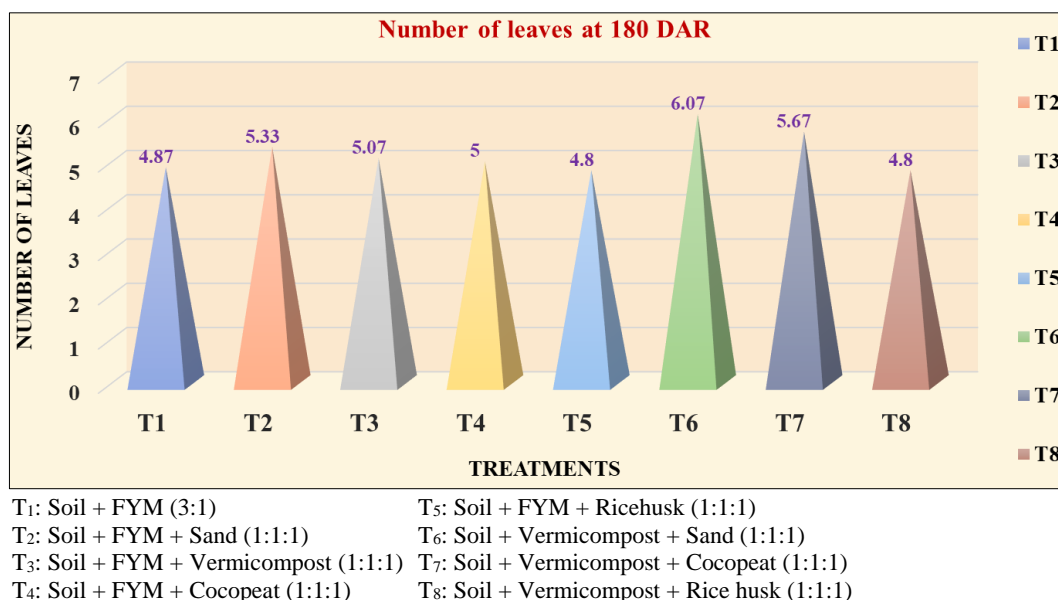
Results from the present study indicate that potting media of various treatments had statistically significant effect on the number of leaves in the arecanut seedlings. Maximum number of leaves were recorded in treatment (6.07) consisting of Soil + Vermicompost + Sand (1:1:1). Nutrients content in potting media play important role in influencing the number of leaves produced in the arecanut seedlings. Vermicompost and cocopeat improved the physical and chemical properties of

media, resulting in adequate supply of nutrient to the plant for better growth and development. Vermicompost contains high amount of humus, macro and micro nutrients and beneficial soil microbes like nitrogen fixing bacteria and mycorrhizal fungi, which helps to improve the growth of plant. (Rekha *et al.*, 2018). Nitrogen obtained from vermicompost accelerated the photosynthesis process, cell elongation, cell division and also increased the biomass production which led to increase in the number of photosynthetically active leaves in the arecanut seedlings. Similar findings were reported by Raja *et al.* (2005)<sup>[8]</sup> in arecanut seedlings grown in soil + sand + vermicompost (2:1:1), Borah *et al.* (2008)<sup>[4]</sup> in arecanut seedlings raised sand + vermicompost (2:1), Karthikeyan *et al.* (2009)<sup>[6]</sup> in coconut seedlings raised in sand + vermicompost (3:1) medium and Rajamanickam *et al.* (2010)<sup>[9]</sup> in papaya seedling raised in mixture treated with vermicompost.

**Table 2:** Effect of different potting media on number of leaves of rebagged arecanut seedlings

Treatments		Number of leaves						
		0 DAR	30 DAR	60 DAR	90 DAR	120 DAR	150 DAR	180 DAR
T <sub>1</sub>	Soil + FYM (3:1) [Control]	2.40	2.93	3.13	4.07	4.33	4.60	4.87
T <sub>2</sub>	Soil + FYM + Sand (1:1:1)	2.07	2.40	3.67	4.40	5.03	4.87	5.33
T <sub>3</sub>	Soil + FYM + Vermicompost (1:1:1)	2.20	2.87	3.47	4.27	4.40	4.60	5.07
T <sub>4</sub>	Soil + FYM + Cocopeat (1:1:1)	2.20	3.07	3.53	4.20	4.47	4.80	5.00
T <sub>5</sub>	Soil + F.Y.M + Ricehusk (1:1:1)	2.33	2.67	3.40	3.93	4.07	4.47	4.80
T <sub>6</sub>	Soil + Vermicompost + Sand (1:1:1)	2.20	2.33	3.60	4.27	4.60	5.27	6.07
T <sub>7</sub>	Soil + Vermicompost + Cocopeat (1:1:1)	2.27	3.13	3.73	4.27	4.53	5.00	5.67
T <sub>8</sub>	Soil + Vermicompost + Ricehusk (1:1:1)	2.33	2.97	3.07	3.93	4.13	4.33	4.80
Mean		2.25	2.80	3.45	4.17	4.45	4.74	5.20
S.Em.±		0.20	0.20	0.20	0.19	0.20	0.14	0.16
C.D. at 5%		N.S	N.S	N.S	N.S	N.S	0.43	0.48

DAR: Days after rebagging



**Fig 2:** Effect of different potting media on number of leaves of rebagged arecanut seedling

### Conclusion

From the present experiment result it can be concluded that, the growth performance of arecanut seedlings was significantly superior when raised in media treatment T<sub>6</sub> i.e., Soil + Vermicompost + Sand in 1:1:1 proportion, with respect to plant height and number of leaves. Vigorous grown, better quality and healthy arecanut seedlings are beneficial for better field establishment.

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