



ISSN Print: 2664-844X
 ISSN Online: 2664-8458
 NAAS Rating (2026): 4.97
 IJAFA 2026; 8(10): 214-217
www.agriculturaljournals.com
 Received: 30-07-2026
 Accepted: 26-09-2026
 Published: 08-10-2026

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

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DOI: <https://www.doi.org/10.33545/2664844X.2026.v8.i10c.2022>

ABSTRACT

The investigation was performed at College of Horticulture, Dapoli, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli during 2025-2026. The experiment was laid out in Randomized Block Design (RBD) which consisted eight treatments i.e., T_1 (Soil + Sand + Vermicompost 1:1:1), T_2 (Soil + Cocopeat + Vermicompost 1:1:1), T_3 (Soil + Rice husk + Sand 1:1:1), T_4 (Soil + Rice husk + FYM 1:1:1), T_5 (Soil + FYM + Sand 1:1:1), T_6 (Soil + Vermicompost 3:1), T_7 (Soil + FYM + Cocopeat 1:1:1) and T_8 (Soil + FYM 3:1) with three replications. The results of the experiment showed that the treatment T_1 i.e., Soil + Sand + Vermicompost (1:1:1) was significantly superior in all growth parameters at 180 days after planting (DAP). Maximum plant height (85.87 cm), girth at collar region (17.99 mm), number of leaves (6.13) was found in treatment T_1 .

Keywords: Arecanut, Media, Vermicompost, Seedlings, Growth

Introduction

Arecanut is one of the important plantation crop grown in India, scientifically known as *Areca catechu* Linn. It is a tropical plant that belongs to the palmar family, has a chromosome number of $2n = 32$ and monoecious in nature. Arecanut is also referred to as betelnut or supari in India and pawak in Sri Lanka. Arecanut is primarily cultivated by seeds (nuts) which holds commercial importance and farmers mainly grown it for its out due to its high demand in the global market. The total area under arecanut cultivation in India is about 10,97,000 ha and production 1534 thousand metric tons (Anon., 2025) [1]. Over 90% of the country's total arecanut area and production is concentrated in the Kerala, Karnataka and Assam. In Maharashtra, arecanut is grown on around 3.354 thousand hectares area which producing 4.813 thousand tons annually (Anon., 2025) [1]. It is mainly cultivated in Raigad, Ratnagiri and Sindhudurg districts of Konkan region of Maharashtra. Also, it is sparsely cultivated in Vasai, Thane and Palghar districts (Nagwekar, 2015) [2]. Propagation of arecanut is exclusively through seeds. The process of selecting and growing high quality arecanut seedlings involve selection of suitable mother palm, choose the best seed nuts raise healthy seedlings, select the strongest ones and use proper nursery techniques. Mother palm should be early and regular bearer, have a high fruit set percentage, large number of leaves, distance between nodes is shorter and weight of nut should be more than 35g from selected palm. Growing seedlings in polybags is a standard, highly effective practice for establishing a vigorous orchard. Plant growth is dependent on media as well as water and essential nutrient availability.

Material and Methods

The present study was conducted at College of Horticulture, Dapoli, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri from 2025 to 2026. The potting media was prepared separately using different media components i.e. soil, FYM, vermicompost, cocopeat, sand and rice husk in desired quantity. The beds are prepared with different specific media for sowing of nut for the experiment. After that mixture was filled into polythene bags measuring 9" x 11" according to the treatment details for planting of arecanut seedling. Irrigation was given immediately after planting to reduce stress and help them to adjust into new environment. To assess the effect of potting media on arecanut seedling growth, 5 seedlings were randomly selected from each replication of every treatment. Morphological characters such as plant height, girth at collar region and number of leaves of these seedlings were monitored for 180 days after planting. Data was statistically analysed by the standard method of analysis of variance as given by Panse et al. (1995) [3].

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Result and Discussion

Observations regarding the influence of different media treatments on the growth of arecanut seedlings with respect to plant height, girth at collar region and number of leaves was recorded at monthly interval from planting of seedlings upto 180 days after planting. The results of study are presented and discussed along with tables.

Plant height

Plant height is an important growth parameter that shows the overall development and vigour of arecanut seedlings. Significant differences in plant height were observed among the various potting media throughout the experimental period. The results are presented in Table 1. At 180 DAP, the maximum plant height (85.87 cm) was recorded in treatment T₁ *i.e.*, soil + sand + vermicompost (1:1:1). Whereas, the minimum plant height (48.28 cm) was observed in treatment T₃ *i.e.*, soil + rice husk + sand (1:1:1). Overall, the variation in plant height

among the different potting media treatments at 180 DAP was found statistically significant. The results of the present investigation indicated that plant height was positively affected by different potting media combinations. Among the treatments, T₁ *i.e.*, soil + sand + vermicompost (1:1:1), recorded a significantly greater plant height. It might be due to optimum nutrient availability and favourable physical properties of the growing medium, which promoted better root development, nutrient uptake and overall vegetative growth. The vermicompost and soil having its high organic matter content which enhances nutrient availability and improves essential physical properties such as permeability, aeration and water-holding capacity (Bhardwaj, 2014) [4]. The sand improves the growing medium by enhancing drainage and preventing water logging. Similar findings were reported by Parab *et al.* (2022) [5] in arecanut seedlings cultivated in soil + vermicompost + sand (1:1:1). Pore *et al.* (2023) [6] also in arecanut seedlings raised in a soil + sand + vermicompost (1:1:1).

Table 1. Influence of media on plant height of arecanut seedlings

Treatments		Plant height (cm)					
		30DAP	60DAP	90DAP	120DAP	150DAP	180DAP
T ₁	Soil + Sand + Vermicompost (1:1:1)	30.97	34.83	47.20	58.17	79.00	85.87
T ₂	Soil+ Cocopeat+ Vermicompost (1:1:1)	28.83	33.47	46.80	57.27	68.13	78.42
T ₃	Soil + Rice husk + Sand (1:1:1)	23.65	27.59	33.67	41.40	47.26	48.28
T ₄	Soil + Rice husk+ FYM (1:1:1)	26.47	31.07	43.23	53.03	63.30	64.67
T ₅	Soil + FYM + Sand (1:1:1)	25.78	29.43	39.27	47.87	63.52	69.04
T ₆	Soil + Vermicompost (3:1)	25.38	28.23	39.00	46.47	55.07	64.90
T ₇	Soil + FYM + Cocopeat (1:1:1)	28.24	32.43	45.40	56.47	66.63	72.18
T ₈	Soil + FYM (3:1) (Control)	24.17	28.07	38.07	46.17	50.00	53.40
Mean		26.69	30.64	41.58	50.85	61.61	67.09
S.Em.		1.10	0.60	1.21	1.55	1.83	1.12
C.D.at 5%		N.S.	1.83	3.68	4.70	5.54	3.39

DAP: Days after planting

Girth at collar region

Girth is considered an important parameter contributing to the vigour and overall growth performance of arecanut seedlings. The data on girth at collar region under different treatments were recorded and are presented in Table 2. The girth was observed significant at 180 DAP among the different treatments. The treatment T₁ *i.e.*, soil + sand + vermicompost (1:1:1) recorded maximum seedling girth of 17.99 mm and it was at par with treatment T₂ (17.20) *i.e.*, soil cocopeat + vermicompost (1:1:1) while minimum seedling girth was found in treatment T₃ (13.70) *i.e.*, soil + rice husk + sand (1:1:1). In the present investigation, treatment T₁ *i.e.*, soil + sand + vermicompost (1:1:1), recorded the highest collar girth among all the treatments which was might be due to the inclusion of vermicompost and sand in the potting mixture. The incorporation of vermicompost into the potting media improves

water retention capacity, enhances aeration and increases the availability of essential nutrients, thereby promoting better nutrient uptake by plant roots. Improved nutrient availability in the growing media supports moisture conservation, enhances photosynthetic activity and promotes cell division, cell elongation and meristematic development. The meristematic activity in the stem cells increases number of cells and vascular bundle formation, which enhanced the girth of arecanut seedlings. (Raghavan, 1957) [7]. Similar observations have been reported by Raja *et al.* (2005) [8] in arecanut seedlings grown in soil + sand + vermicompost (2:1:1). Borah *et al.* (2008) [9] in arecanut seedlings cultivated in sand + vermicompost (2:1). Parab *et al.* (2022) [5] in arecanut seedlings cultivated in a soil + vermicompost + sand (1:1:1). Pore *et al.* (2023) [6] also in arecanut seedlings raised in soil + sand + vermicompost (1:1:1).

Table 2. Influence of media on girth at collar region of arecanut seedlings

Treatments		Girth at collar region					
		30DAP	60DAP	90DAP	120DAP	150DAP	180DAP
T ₁	Soil + Sand + Vermicompost (1:1:1)	7.19	8.48	11.57	12.90	14.83	17.99
T ₂	Soil + Cocopeat+ Vermicompost (1:1:1)	6.91	8.42	10.78	12.00	14.10	17.20
T ₃	Soil + Rice husk + Sand (1:1:1)	5.87	7.17	8.57	9.95	11.73	13.70
T ₄	Soil + Rice husk+ FYM (1:1:1)	6.66	8.05	10.30	11.89	13.43	16.27
T ₅	Soil + FYM + Sand (1:1:1)	6.76	7.91	9.93	11.61	13.23	15.54
T ₆	Soil + Vermicompost (3:1)	6.41	7.64	9.58	11.30	12.38	15.19
T ₇	Soil + FYM+ Cocopeat (1:1:1)	6.76	8.33	10.50	11.95	13.76	16.61
T ₈	Soil + FYM (3:1) (Control)	6.21	7.40	9.29	10.56	11.93	14.09
Mean		6.60	7.93	10.07	11.52	13.18	15.82

(continued on next page)

Treatments	Girth at collar region					
	30DAP	60DAP	90DAP	120DAP	150DAP	180DAP
S.Em.	0.11	0.14	0.32	0.22	0.31	0.29
C.D.at 5%	0.32	0.43	0.96	0.66	0.94	0.87

DAP: Days after planting

Number of leaves

The ability of a plant to grow, function and survive is largely dependent on the presence and performance of its leaves. The data on leaf number under different treatments were recorded at monthly intervals and are presented in Table 3. At 180 DAP, the number of leaves in arecanut seedlings was significantly influenced by the different potting media treatments. The highest number of leaves (6.13) was recorded in treatment T₁ i.e., soil + sand + vermicompost (1:1:1), which was statistically at par with treatment T₂ (5.87) i.e., soil + cocopeat + vermicompost (1:1:1) and T₇ (5.67) i.e., of soil + FYM + cocopeat (1:1:1). However, the lowest number of leaves (5.00) was observed in treatments T₈ i.e., soil + FYM (3:1). The findings of the present study showed that different potting media treatments had statistically significant influence on the number of leaves in the arecanut seedlings. Among the various treatments, the maximum number of

leaves (6.13) was observed in treatment T₁ i.e., soil + sand + vermicompost (1:1:1). The availability of essential nutrients in the potting media plays a crucial role in enhancing the number of leaves production in arecanut seedlings. Vermicompost contains a combination of macro- and micro-nutrients and the uptake of the nutrients has a positive effect on plant nutrition, growth, photosynthesis and chlorophyll content of leaves (Rekha et al., 2018) [10]. The nitrogen supplied through vermicompost enhances photosynthetic activity, promotes cell division, cell elongation and increases biomass accumulation, thereby contributing to the development of a greater number of photosynthetically active leaves in arecanut seedlings. Similar observations were reported by Rajamanickam et al. (2010) [11] in papaya seedlings grown in vermicompost-amended media. Parab et al. (2022) [5] in arecanut seedlings cultivated in soil + vermicompost + sand (1:1:1). Pore et al. (2023) [6] also in arecanut seedlings raised in soil + sand + vermicompost (1:1:1).

Table 3. Influence of media on number of leaves of arecanut seedlings

Treatments	Number of leaves					
	30DAP	60DAP	90DAP	120DAP	150DAP	180DAP
T ₁ Soil + Sand + Vermicompost (1:1:1)	2.27	3.07	4.07	4.87	5.60	6.13
T ₂ Soil + Cocopeat+ Vermicompost (1:1:1)	2.13	3.07	4.00	4.60	5.40	5.87
T ₃ Soil + Rice husk + Sand (1:1:1)	2.00	2.53	3.47	3.80	4.53	5.13
T ₄ Soil + Rice husk+ FYM (1:1:1)	2.07	3.00	3.87	4.20	5.07	5.33
T ₅ Soil + FYM + Sand (1:1:1)	2.00	2.87	4.00	4.13	4.87	5.20
T ₆ Soil + Vermicompost (3:1)	2.00	2.80	3.87	4.33	5.13	5.47
T ₇ Soil + FYM+ Cocopeat (1:1:1)	2.13	3.00	3.93	4.53	5.33	5.67
T ₈ Soil + FYM (3:1) (Control)	2.00	2.67	3.60	4.00	4.73	5.00
Mean	2.08	2.88	3.85	4.31	5.08	5.48
S.Em.	0.06	0.04	0.09	0.12	0.12	0.16
C.D.at 5%	N.S.	N.S.	0.28	0.36	0.37	0.49

DAP: Days after planting

Conclusion

From this investigation result can be concluded that, the influence of media on growth of arecanut seedlings was significantly superior in treatment T₁ i.e., soil + sand + vermicompost (1:1:1), with respect to plant height, number of leaves and girth at collar region. Raising seedlings through this medium gives stronger, healthier planting material for better survival after transplanting in main field.

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How to cite this article: Jadhav PG, Thorat S, Gajbhiye R, Ghavale S, Kunkerkar R, Palav M. Studies on potting media on growth of arecanut (*Areca catechu* L.) seedlings. *International Journal of Agriculture and Food Science*. 2026;8(10):214-217. doi: <https://www.doi.org/10.33545/2664844X.2026.v8.i10c.2022>

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