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Effect of growing media on seedling growth of arecanut (*Areca catechu* L.)

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Abstract
The present experiment was conducted to study seedling growth in different growing media at College of Horticulture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli during 2022-2023. The experiment was executed in Randomized Block Design with three replications and ten treatments *i.e.,* T_1: Soil + FYM (1:3), T_2: Soil + Cocopeat + FYM (1:1:1), T_3: Soil + Cocopeat + Vermicompost (1:1:1), T_4: Soil + Sand + FYM (1:1:1), T_5: Soil + Sand + Vermicompost (1:1:1), T_5: Soil + Sand + Vermicompost (1:1:1), T_6: Soil + Rice husk + Sand (1:1:1), T_7: Soil + Cocopeat (2:1), T_8: Soil + Sand (2:1), T_9: Soil + Vermicompost (2:1), T_{10}: Soil + FYM (3:1). The treatment T_5 *i.e.,* Soil + Sand + Vermicompost (1:1:1) was found superior in all growth parameter like plant height (110.16 cm), number of leaves (6.40), girth at collar region (24.96 mm). Whereas, minimum plant height, number of leaves and girth at collar region was observed in treatment T_6 *i.e.,* Soil + Ricehusk + Sand (1:1:1).

Keywords: Arecanut, growing media, rice husk, soil, sand, seedlings, treatments, vermicompost

Introduction
Arecanut (*Areca catechu* Linn.) is growing in tropical climate, monoecious in nature and belonging to family Palmae having chromosome number 2n=32. Arecanut is also known as a Betel nut or Supari. In Sri Lanka it is called puwak. Primitively, arecanut is grown for endosperm or fruit (nut) and have commercial importance. Farmers majorly cultivate arecanut for nut purpose because of its global market and crop have tendency to provide economic backbone. Arecanut can be grown in wide range of soil but laterite, red loam alluvial soil is best because required nutrients are in this type of soil. In India area under arecanut *i.e.,* 43.01% and production *i.e.,* 50.37% (Jamanal and Murthy, 2022) [3]. Varieties like as Sumangla, Sreemangala, Swarnamangala, Shriwardhanee, Madhur Mangala and semi tall varieties like Mangala and Shatmangala and dwarf hybrids are VTLAH-1 and VTLAH-2 are planted for better production (Anon., 2023) [1].

Materials and Methods
The present experiment was conducted at College of Horticulture, Dapoli, in year 2022-2023 at Nursery no. 10 with three replications and ten treatments in Randomized Block design. Well grown, healthy, 2-3 leaf stage of arecanut seedlings were rebagged in polybags in size of 6" × 8" and filled with different media combinations with soil *i.e.,* T_1: Soil + FYM (1:3), T_2: Soil + Cocopeat + FYM (1:1:1), T_3: Soil + Cocopeat + Vermicompost (1:1:1), T_4: Soil + Sand + FYM (1:1:1), T_5: Soil + Sand + Vermicompost (1:1:1), T_6: Soil + Rice husk + Sand (1:1:1), T_7: Soil + Cocopeat (2:1),T_8: Soil + Sand (2:1), T_9: Soil + Vermicompost (2:1), T_{10}: Soil + FYM (3:1). Immediately after rebagging irrigation was done for healthy growth. To estimate the performance of arecanut seedlings in different growing media ten plants were selected randomly from replication of each treatment. Statistical analysis of the data was carried out by following the standard method of analysis of variance as given by Panse and Sukhatme (1995) [8].

Observation was recorded in the experiment like plant height, girth at collar region, number of leaves at monthly interval from rebagging of seedlings (0 days) to 270 days after rebagging (*i.e.,* at 30, 60, 90, 120, 150, 180, 210, 240 and 270 DAR). The results obtained during the present study are presented in Table 1.

Results and Discussion
Plant height is the important factor involved in seedling growth and development. At monthly intervals from 0 days to 270 days after rebagging (*i.e.,* at 30, 60, 90, 120, 150, 180, 210, 240,

270 DAR), the plant height of seedlings was observed. Significant difference was observed and presented in Table 1. The maximum plant height (110.16 cm) was obtained in media combined with Soil + Sand + Vermicompost (1:1:1) at 270 DAR which was followed by treatment T_9 and T_3 with height 105.97 cm and 104.30 cm, respectively. The minimum height 76.22 cm was observed in treatment T_6 which was containing Soil + Rice husk + Sand (1:1:1).

Due to particular organic manure plant grows wisely however, plant height is the easiest way to understand the growth of plant as well as plant height is important growth aspect of morphological character. Genetic constitution and environmental factors lead to change growth of plant. In the experiment, treatment T_5 *i.e.,* Soil + Sand + Vermicompost (1:1:1) media found maximum height all over other media combinations and result was significant due to required nutrient content of mixtures which increases the growth of plant.

Vermicompost is organic manure which is helpful for plant to grow vigorously. Mixture of soil, sand, vermicompost increases 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 (Parab *et al*. 2022) [4]. The plant receives all the nutrition, defence and root potential consequences it requires from vermicompost, and when it is coupled with sand, it can be prevented from becoming clayey and hard. (Sharma *et al*. 2023) [7]. Similar findings were observed by Parab *et al*. (2022) [4] in arecanut seedlings when planted in media Soil + Sand + Vermicompost (1:1:1).

Table 1: Effect of growing media on seedling growth of arecanut (*Areca catechu* L.)

	Treatments	Plant height (cm)	Number of leaves	Girth at collar region (mm)
T_1	Soil + FYM (1:3)	93.07	6.00	21.13
T_2	Soil + Cocopeat + FYM (1:1:1)	101.46	6.03	19.97
T_3	Soil + Cocopeat + Vermicompost (1:1:1)	104.30	6.20	22.19
T_4	Soil + Sand + FYM (1:1:1)	90.00	6.00	21.07
T_5	Soil + Sand + Vermicompost (1:1:1)	110.16	6.40	24.96
T_6	Soil + Rice husk + Sand (1:1:1)	76.22	5.87	19.77
T_7	Soil + Cocopeat (2:1)	91.96	6.07	19.90
T_8	Soil + Sand (2:1)	100.18	6.00	19.86
T_9	Soil + Vermicompost (2:1)	105.97	6.30	23.15
T_{10}	Soil + FYM (3:1)	101.78	5.97	20.73
	Mean	97.51	6.08	21.27
	S.E.	2.70	0.04	0.73
	C.D. at 5%	8.04	0.13	2.18

More number of leaves indicates that plant is having healthy life or long life and more chlorophyll content present in leaves which is directly connected to the photosynthesis process. In the experiment, number of leaves was calculated from 0 DAR to 270 DAR. Treatments had shown significant result at 270 DAR which is represented in Table 1. In the experiment, at 270 DAR, top most treatment was T_5 *i.e.,* Soil + Sand + Vermicompost (1:1:1) recorded maximum number of leaves (6.40) was at par with treatment T_9 (6.30) *i.e.,* Soil + Vermicompost (2:1). The minimum number of leaves was observed in treatment T_6 (5.87) *i.e.,* Soil + Rice husk + Sand (1:1:1).

Vermicompost contains high amount of humus, macro and micro nutrients any beneficial soil microbes like nitrogen fixing bacteria and mycorrhizal fungi, which helps to improve the growth of plant. (Rekha *et al.*, 2018) [6]. Nitrogen obtained from vermicompost accelerated the photosynthesis process, cell elongation, cell division and also increased the mass 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) [5] in arecanut seedlings grown in Soil + Sand + Vermicompost (2:1:1). Borah *et al*. (2008) [2] in arecanut seedlings raised Sand + vermicompost (2:1).

Girth of plant contributes the vigour of arecanut seedlings and important growth parameter, one can decide the morphological traits. Girth observation was taken from 0 days after rebagging (DAR) to 270 DAR, about 9 months girth growth parameter was recorded. At 0 DAR girth was recorded 8.03 mm to 6.60 mm. Nonsignificant result was recorded at first two months that means at 0 DAR and 30 DAR month interval. From 60 DAR to 270 DAR significant result was obtained and presented in Table 1. The maximum girth (24.96 mm) was observed in treatment T_5 *i.e.,* Soil + Sand + Vermicompost (1:1:1) which was at par with treatment T_9 *i.e.,* Soil + Vermicompost (2:1) with girth 23.15 mm. Minimum girth (19.77 mm) was observed in treatment T_6 *i.e.,* Soil + Rice husk + Sand (1:1:1) at 270 DAR.

The treatment T_5 *i.e.,* Soil + Sand + Vermicompost (1:1:1) reported maximum girth at collar region which was might be due to the presence of vermicompost and sand in the growing media treatment. Growing media prepared using vermicompost enhances the water holding capacity, improves aeration and availability of nutrients in the media which facilitates their absorption by roots. Increase in the nutrient content of media promotes moisture retention, increases the photosynthesis process, cell division, cell elongation and meristematic activity. The number of cells and vascular bundles increases due to meristematic activity of cells present in stem, which leads to increase in the girth of arecanut seedlings. Similar results were also recorded by Raja *et al.* (2005) [5] in arecanut seedlings grown in Soil + Sand + Vermicompost (2:1:1), Borah *et al*. (2008) [2] in arecanut seedlings raised sand + vermicompost (2:1).

Conclusion

From the present study, it can be concluded that, the treatment T_5 *i.e.,* Soil + Sand + Vermicompost (1:1:1) was found superior over rest of the treatments in the experiment with concern to maximum plant height (110.16 cm), highest number of leaves (6.40) and maximum girth at collar region (24.96 mm).

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