



Evaluation of potting mixtures for raising arecanut seedlings in polybags

(Manuscript Received: 06-12-05, Revised: 25-07-06, Accepted: 28-05-08)

Keywords: Arecanut, FYM, polybags, potting mixture, vermicompost

In India, the annual production of arecanut is around 5.59 lakh tonnes from an area of 3.97 lakh ha with the productivity of 1409 kg per ha (for the year 2006-07, Anon., 2007). In Assam, arecanut is cultivated in about 0.71 lakh ha, with production of 0.65 lakh tonnes and productivity of 915 kg per ha. Though Assam contributes significantly to the arecanut sector, the productivity is very low compared to the national average of 1.41 tonnes per ha. Among the various factors affecting productivity, planting material plays an important role. Production of vigorous seedlings is always the first step to achieve better establishment, higher production and productivity in arecanut. Raising of seedlings in polybags is found to be an effective technique for production of vigorous seedlings (Srinivasa Reddy *et al.*, 2001) as they will establish very well in the field as the root system is not disturbed during planting. A study was under taken to test the feasibility of using sand along with other organic manures in different ratios as potting mixture for production of vigorous seedlings during kharif seasons of 2003-'04 and 2004-'05 at CPCRI, RC, Kahikuchi, with Kahikuchi Local variety of arecanut raised in polybags under partially shaded condition in the nursery. The experiment comprised of five treatments, viz., T_1 - sand, T_2 - sand + soil + FYM (1:1:1), T_3 - sand + soil + vermicompost (1:1:1), T_4 - sand + vermicompost (2:1) and T_5 - sand + vermicompost (3:1) replicated thrice. Sixty polybags per treatment were arranged in three rows in a completely randomized design.

Seed nuts were collected during the months of May and June of corresponding years from selected mother palms maintained in the farm. They were stored in shade

for a week before sowing. Good nuts of uniform size were collected and sown in polybags (30 × 25 cm size, 200 gauge, transparent polythene) filled up to two-third with different media as per treatments. The lower half of each bag was provided with 10-12 holes to allow excess water if any, to drain off. The nut was placed vertically in the centre of polybags and the sides were compacted around the nut. The bags were irrigated uniformly at frequent intervals during rainless days.

Observation on growth parameters such as plant height, number of leaves, and girth at collar were taken at 9th and 12th months after sowing. Root volume, dry root weight, dry shoot weight, number of primary roots and number of secondary roots were taken at 12th month after sowing. All these parameters were taken from 10 seedlings per treatment per replication. The seedling selection index was worked out using the formula: Number of leaves X 40 - plant height (Bavappa, 1970). ANOVA was worked out as per the procedure given by Panse and Sukhatme (1985) for the above observations.

The germination percentage of the seednuts (three months after sowing) was more or less similar irrespective of treatments ranging from 90-95 % for both the years which indicated that different rooting media did not have any significant influence on germination. Seedling growth in terms of number of leaves and girth at collar varied significantly among the treatments, whereas, seedling height did not differ significantly during both the years (Table 1). The girth at collar and number of leaves were found to be significantly the highest in sand + vermicompost (2:1) and was on par with sand + soil + vermicompost (1:1:1) and sand + soil

Table 1. Seedling growth and vigour of arecanut as influenced by potting mixtures in arecanut at 9th and 12th month after sowing

Treatments	Seedling height (cm)				No. of leaves				Girth (cm)			
	2003-04		2004-05		2003-04		2004-05		2003-04		2004-05	
	9 th month	12 th month	9 th month	12 th month	9 th month	12 th month	9 th month	12 th month	9 th month	12 th month	9 th month	12 th month
T ₁ : Sand	28.50	52.83	29.1	52.63	2.8	3.7	2.5	3.5	3.51	5.63	3.04	5.50
T ₂ : Sand+soil+ FYM (1:1:1)	29.66	52.50	29.2	52.13	3.0	4.5	2.8	4.7	4.10	6.76	3.90	6.80
T ₃ : Sand+soil+ vermicompost (1:1)	30.33	55.00	29.16	53.66	3.7	4.8	2.8	4.6	4.20	7.20	3.83	7.10
T ₄ : Sand+ vermicompost (2:1)	30.00	54.80	29.43	53.83	3.7	5.5	3.2	5.1	5.09	7.63	4.96	7.30
T ₅ : Sand+ vermicompost (3:1)	28.66	52.93	29.53	53.20	3.3	4.7	2.9	4.2	4.28	6.40	3.86	6.20
CD(P=0.05)	-	-	-	-	0.62	0.81	0.40	0.62	0.61	0.56	0.62	0.480

+ FYM (1:1:1) during both the years. This could be due to better nutrient availability leading to higher production of photosynthetically functional leaves in these treatments, finally resulting in higher accumulation of photosynthates in morphological growth components. The seedlings raised in sand medium had reduced seedling vigour, in terms of girth at base and number of leaves, which could be due to moisture deficit and lack of nutrition in this medium. The treatments sand alone and sand + vermicompost (3:1) had significantly lower girth and number of leaves during both the years. The seedling selection index was significantly higher in T4 followed by T3 (Table 2), which indicated the superiority of quality seedlings. Bavappa (1970) also suggested that seedlings having higher index with maximum number of leaves (> four) and minimum height may be selected to the extent practically possible.

The number of primary roots did not differ significantly among the treatments, whereas, the

secondary roots per seedlings were found to be significantly higher in T4 (sand + vermicompost: 2:1) and was on par with T3 (sand + soil + vermicompost : 1:1:1) and T2 treatments during both the years (Table 2). The seedlings raised in sand medium alone had less number of primary and secondary roots. The dry root and shoot weight were also found to be significantly higher in T4 during both the years whereas, it was the lowest for seedlings raised in sand only. The results corroborate the findings of Srinivasa Reddy *et al.* (2001) in coconut seedlings. Though seed nuts contain adequate nutrients for germination and growth, it has been shown that growth and vigour of seedlings can be improved through the addition of manures. In this study, seedlings grown in sand + vermicompost (2:1) had better root system as indicated by higher number of secondary roots and root dry weight.

The study indicated that use of rooting mixtures such as sand + soil + FYM (1:1:1) or sand + soil +

Table 2. Root and shoot parameters of arecanut as influenced by different potting mixtures at 12th month after sowing

Treatments	Seedling selection index		No. of primary roots		No. of secondary roots		Dry weight of roots (g/seedling)		Dry weight of shoot (g/seedling)	
	2003-04	2004-05	2003-04	2004-05	2003-04	2004-05	2003-04	2004-05	2003-04	2004-05
T ₁ : Sand	95.2	87.4	8.2	5.9	43.0	33.7	3.77	3.63	8.67	7.80
T ₂ : Sand+soil+ FYM (1:1:1)	127.5	135.9	8.5	6.7	52.0	43.3	5.60	5.63	12.35	11.76
T ₃ : Sand+soil+ vermicompost (1:1:1)	137.2	130.3	9.5	5.6	54.7	47.6	5.19	5.63	12.01	11.93
T ₄ : Sand+ vermicompost (2:1)	157.2	150.7	10.2	6.9	76.7	54.9	6.71	6.70	13.20	13.30
T ₅ : Sand+ vermicompost (3:1)	135.1	114.8	8.8	6.1	52.3	40.9	4.75	4.83	11.28	11.06
CD(P=0.05)	30.49	24.57	2.61	2.37	19.76	13.08	0.74	0.58	1.89	1.19

vermicompost (1:1:1) or sand + vermicompost (2:1) mixture was superior in comparison to others to improve seedling growth and the final seedling vigour. Therefore, above rooting mixtures are suitable potting media to raise arecanut seedlings in polybags and possibly it may also result in better field establishment of the seedlings.

Acknowledgements

Authors are thankful to Dr. V. Rajagopal, Former Director, and Dr. George V. Thomas, Director, CPCRI, Kasaragod for providing the facilities. The financial support of the Central Sector scheme on Mini Mission – I is highly acknowledged.

Central Plantation Crops Research Institute,
Research Centre, Kahikuchi,
Guwahati-781 017, Assam

References

- Anonymous, 2007. Area and production of Arecanut. Directorate of Statistics and Economics, Government of India. New Delhi.
- Bavappa, K.V.A. 1970. Mother palm selection in arecanut cultivation. *Indian Fmg.* **20** (3):31.
- Panse, V. G. and Sukhatme, P.V. 1985. *Statistical Methods for Agricultural Workers*. pp: 147-165. Indian Council of Agricultural Research, New Delhi.
- Srinivasa Reddy, D. V. S., Naresh Kumar, S. and Prabhu, S.R. 2001. Evaluation of alternative media to potting mixture for raising coconut seedlings in polybags. *J. Plantn. Crops* **29** (1) : 62-65.

A.S. Borah¹,
A. Nath²,
A.K. Ray³,
Ravi Bhat⁴,
H.P. Maheswarappa^{*5},
P. Subramanian⁶,
V. Krishnakumar⁷

¹ and ²Research Associates

³ Sr. Scientist (Pathology)

⁴ Sr. Scientist (Agronomy), CPCRI, RS, Vittal, Karnataka.

⁵ and ⁶ Sr. Scientists (Agronomy), CPCRI, Kasaragod, Kerala, ^{*}Corresponding author

⁷ Sr. Scientist (Agronomy), CPCRI, RS, Kayamkulam, Kerala