



STUDY ON SUITABILITY OF COCO-PEAT PELLETS AS NURSERY POTS FOR CINNAMON (*Cinnamomum zeylanicum* BLUME)

*P.K.D. Pabasara**, *D.N. Samaraweera*

National Cinnamon Research and Training Center, Department of Export Agriculture, Sri Lanka

INTRODUCTION

Cinnamon is a very unique and popular spice in the world. With a high and continuously improving demand, Sri Lanka holds the monopoly in the world market for true cinnamon. According to the Department of Export Agriculture from 2010 to 2020, there is a 15.5% expansion of cinnamon land area extent within the country (DEA, 2018, 2021). To keep up with this expansion there should be a continuous production of healthy and vigorous nursery plants. Cinnamon nursery plants potting mixture recommended by the Department of Export Agriculture comprises topsoil, sand, cow dung and coir dust in a 1:1:1:1 ratio. But there is a problem in procuring these materials due to legal boundaries, high cost, low availability, environmental limitations, etc. Thus, there is a requirement for an alternative nursery medium to meet the nursery plant demand.

Coir, a waste product of coconut industry, is being used as a perfect substrate for the growth media of several crops (Srinivasan & Hamza, 2000). Therefore, investigation of coco peat as a possible alternative to current cinnamon nursery growing media will be an important strategy for the progress of the cinnamon industry. The objectives of the present study were to identify the nursery media and the fertilizer schedule to enhance the growth performances of cinnamon seedlings.

METHODOLOGY

The present study was conducted from 2018 to 2021, at National Cinnamon Research and Training Center, Palolpitiya, Thihagoda, and included two sub-experiments.

Experiment one:

Two-factor factorial Complete Randomized Design was used to arrange the first experiment where factor one was the nursery media type (three types included 50 mm x 60 mm coco peat pellet, 60 mm x 120 mm coco peat pellet and department recommended potting mixture; 200 mm x 125 mm poly bags filled with top soil: dried cow dung: coir dust: sand into 1:1:1:1 ratio) and the factor two was different concentrations of Albert's solution applied as foliar applications (three concentrations included 0, 37.5 and 75 g/l per pot), replicated four times. Seeds of *Cinnamomum Zeylanicum* were used as genetic materials. Five cinnamon seeds per pot were planted. Pots were arranged on a wire mesh table according to the experimental design. Fertilizer application was started 2 months after planting and continued at two-week intervals until the sixth month.

In the plot layout of the experiment 9 treatment combinations and 4 replicates, creating 36 plots with 25 nursery pots per each were arranged. A net house was used to place the pots, in order to maintain a uniform shade. Growth parameters were recorded in a three-week interval. Irrigation and other recommended management practices were followed. When required, fungicides and pesticides were applied.

Experiment two:

Two types of potting media; 60mm x 120mm size coco-peat pellets and recommended media as the control were used as planting pots for seeds germination. Albert's solution was directly applied to the pellets in 0, 0.5, 1, 2, 3, 4, 5 and 6 g/L concentrations starting from 2 months after

planting and continued at two-week intervals until the sixth month. Growth parameters were recorded in a one-month interval.

Data collection and analysis

Number of leaves per plant, shoot length, root volume, shoot dry weight and root dry weight were collected as growth data. Occurrences of weeds, pests and diseases were observed. Leaf area and leaf color were recorded in experiment two. Data were statistically analyzed using the ANOVA procedure in SAS OnDemand for Academics.

RESULTS AND DISCUSSION

Experiment one

Media types and fertilizer levels were compared to select best performing treatments.

Table 1: Mean growth performance data of cinnamon seedlings, six months after planting

Factor	Levels	Number of leaves	Shoot length (cm)	Root volume (cm ³)	Shoot dry weight (g)	Root dry weight (g)
Media	Recommended (A ₁)	7.06 ^a	21.21 ^a	0.4467 ^b	0.6047 ^a	0.1435 ^b
	50mmx60mm (A ₂)	4.32 ^c	14.61 ^c	0.4539 ^b	0.4255 ^b	0.1682 ^b
	60mmx120mm (A ₃)	5.83 ^b	17.66 ^b	0.6028 ^a	0.6150 ^a	0.2178 ^a
Significance (α=0.05)		****	****	*	**	**
Fertilizer	B1 (0g/pot)	5.27 ^b	16.82	0.5490	0.5599	0.1856
	B2 (1g/pot)	6.00 ^a	18.09	0.4516	0.5213	0.1684
	B3 (2g/pot)	5.94 ^a ^b	18.57	0.5028	0.5641	0.1754
Significance (α=0.05)		*	NS	NS	NS	NS
Significance (α=0.05)	Media	NS	NS	NS	NS	NS
	Fertilizer	*				
CV%		15.64	14.31	31.83	27.75	28.79

Data superscripted by the same letter are not significantly different at the significance level α=0.05.

There was no significant interaction (P<0.05) effect between the two treatments of media and fertilizer level. At the stage of transplanting in the field (6 months old); number of leaves, shoot length and shoot dry weight were significantly lower in plants of small pellets. When comparing the plants in large pellets with plants in recommended media, the number of leaves and shoot lengths were significantly lower in the former. But shoot dry weight was significantly similar in both media. Both root measurements indicated that they were significantly high in large pellets than in the other two media. For the fertilizer level other than the lower number of leaves in control, other parameters were similar in all three levels. Although the plant growth parameters showed little or no response to the fertilizer level, plants grown with no fertilizer, didn't have a healthy greenish appearance.

It was evident that plants in large 60mm x 120mm coco-pæat pellets had shown similar growth performances to recommended media. Even though they survived till the end, plants in 50mm x 60mm coco-peat pellets had shown significantly poor performance than plants in the other two media. Also, in small pellet size, the plant root system was coiled and tangled around the netting. Based on the Growth performances of cinnamon seedlings 60mmx120mm pellets can be selected as a nursery pot for cinnamon seedlings.

When different levels of Albert solution were applied as a foliar application, seedlings in coco-peat pellets didn't perform well. Therefore, the trial was repeated with an application of Albert solution to the coco-peat pellet itself.

Experiment two

Table 2: Mean growth performance data of cinnamon seedlings - six months after planting; when fertilizer applied to the pellets

Treatment	Number of leaves	Shoot length (cm)	Root volume (cm ³)	Shoot dry weight (g)	Root dry weight (g)	Leaf Area (cm ²)
A1 (Recommended)	6.67	21.00 ^a	0.697	0.730	0.173	11.16
F ₀ (0gL ⁻¹)	5.33	17.57 ^{ab}	0.782	0.540	0.206	9.23
F _{0.5} (0.5gL ⁻¹)	5.33	14.73 ^b	0.596	0.491	0.192	7.42
F ₁ (1gL ⁻¹)	5.00	14.90 ^b	0.416	0.566	0.228	7.82
2F ₂ (2gL ⁻¹)	5.00	14.07 ^b	0.596	0.501	0.164	8.83
F ₃ (3gL ⁻¹)	6.33	17.33 ^{ab}	0.536	0.512	0.171	10.05
F ₄ (4gL ⁻¹)	7.33	20.73 ^a	0.825	0.666	0.206	9.16
F ₅ (5gL ⁻¹)	7.00	20.17 ^a	0.625	0.553	0.176	9.77
F ₆ (6gL ⁻¹)	6.67	17.83 ^{ab}	0.667	0.539	0.180	10.38
Significance	NS	*	NS	NS	NS	NS
CV%	18.2	16.35	36.35	29.65	33.73	22.46

Data superscripted by the same letter are not significantly different at the significance level $\alpha=0.05$.

At the final stage of the nursery period (6 months old), there was a significant difference in shoot length between different fertilizer levels. Higher shoot lengths can be observed in F₄, F₅ and F₆ fertilizer levels. Although other recorded growth performance data of cinnamon seedlings were significantly similar to the recommended, the highest number of leaves, shoot length, root volume and shoot dry weight were recorded at 4g/l fertilizer level.



0 g/L	0.5 g/L	1 g/L	2 g/L	3 g/L	4 g/L	5 g/L	6 g/L	Recommended
5 GY	5 GY	5 GY	5 GY	5 GY	7.5 GY	7.5 GY	7.5 GY	7.5 GY
5/8	6/8	5/6	4/8	4/6	4/4	4/4	4/6	3/4
Strong Yellow Green		Moderate Yellow Green	Deep Yellow Green	Olive Green	Moderate Olive Green			

Figure 1: Leaf color variation with applied Albert Solution concentration (Munsell Color Charts for Plant Tissues, 1977), (Ferguson, 2012)

Higher fertilizer levels of 4, 5 and 6g/l resulted in a healthy greenish appearance of leaves with the color of Moderate Olive Green which was similar to the recommended.



CONCLUSIONS / RECOMMENDATIONS

Coco-peat pellets (60mm x 120mm size) can be used as nursery pots for cinnamon seedlings with an external fertilizer application of 4g/l Albert solution.

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