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AGRONOMIC TECHNIQUES FOR PRODUCTION OF VIGOROUS SEEDLINGS OF WCT COCONUT*

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An experiment was conducted at CPCRI, Kasaragod for two consecutive years (1996-1998) to manipulate method of sowing and media for production of vigorous seedlings in WCT coconut. The study indicated that sowing in potting mixture either in polybag or cement tank led to production of more vigorous seedlings which have early germination and higher dry matter production/seedling. The number of roots and their dry weight/seedling were significantly higher in plants sown in polybag irrespective of growing media. The mean recovery of vigorous seedlings indicated higher recovery in polybag with potting mixture and lowest in conventional field nursery. The cost of production for 100 seednuts ranged from Rs.740 in conventional method to Rs.1,688 in polybag with potting mixture. Though, the cost of production was higher in polybag treatment, the cost of production/seedling was relatively less due to higher recovery of vigorous seedlings. The advantages of polybag seedlings in reducing field transplanting shock and early flowering and nut bearing, sufficiently compensates for higher production cost at later stage. Production of seedlings in polybag with potting mixture could be preferred over conventional nursery.

INTRODUCTION

Seedling vigour in coconut is associated with establishment, early flowering, nut yield and copra production. Production of vigorous seedlings is warranted to achieve higher productivity in coconut. In this direction, raising of coconut seedlings in polybags was introduced in 1969 in the Ivory Coast (Wuidart, 1981). An earlier study at CPCRI, Kasaragod had shown that the recovery of vigorous seedlings was significantly higher in nuts sowed in coir dust either in cement tank or polybag compared to conventional nursery. River sand was found a successful alternative to the more expensive potting medium currently used in polybags (Peries and Everard, 1991). Potting mixture containing river sand, cow dung and coir dust at 3:2:1 ratio was shown to be the best. However, a recent study indicated that river sand could be successfully used as an alternative to topsoil in polybag potting mixtures. The current study was designed to manipulate the media and method of sowing for production of vigorous WCT coconut seedlings in nursery.

MATERIALS AND METHODS

A field study was conducted during 1996-98 at CPCRI farm, Kasaragod in an open space with shade during summer months, to know the

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influence of different methods of sowing and different media on production of vigorous WCT coconut seedlings. The study comprised 10 treatments (T1- conventional, T2- polybag with sand, T3- polybag with coir dust, T4-polybag with potting mixture (1:1:1 proportion of red earth: sand: cow dung), T5-polybag with sand and coir dust in 1:1 proportion, T6-cement tank with sand, T7- cement tank with coir dust, T8- cement tank with potting mixture, T9- cement tank with sand and coir dust and T10-nursery germination bed technique). Soil used in T-1 and T-10 was littoral sand.

The trial was conducted in randomized block design with three replications. Seednuts of WCT coconut of uniform age were collected during April to May from the selected mother palms and stored under shade. Sowing in the nursery was done during the second fortnight of June in both the years. Seed nuts were sown directly in all the treatments except in T-10 where the nuts were laid vertically at a close spacing in a pre-nursery bed. Sprouted nuts were collected at fifth month from the pre-nursery bed and planted in the well prepared bed of 7.5 m length at a spacing of 0.4 x 0.3 m. In other treatments, nuts were allowed to germinate up to five months and at fifth month ungerminated nuts were removed. Nuts were sown vertically in a 7.5 m long cement tank filled with media to a depth of one metre at a spacing of 0.4 x 0.3 m. Polybags of 60 x 45 cm size made up of 500 gauge black polyethylene were filled up to two third with different media as per treatments and the lower half portion of each bag was provided with 10 to 12 holes to allow excess water to drain off. The nut was placed vertically in the centre of the two third filled bags and the sides filled with media and compacted around the nut.

Table 1. Germination percentage of seednuts as influenced by the treatments

T. No.	Germination (%) 1997		1998	
	3*	5	3	5
T-1	2.3	90.0	6.5	85.0
T-2	8.0	81.3	12.5	83.7
T-3	35.7	94.0	36.0	94.3
T-4	26.3	89.0	20.8	94.0
T-5	25.0	91.0	23.2	94.0
T-6	6.3	90.0	19.1	88.3
T-7	14.7	90.3	31.6	95.3
T-8	18.3	88.4	21.0	90.7
T-9	19.0	88.7	24.5	94.0
T-10	-	-	-	-
C.D.at P=0.05:	11.0	5.8	5.9	6.6

*months after sowing

Germination count was recorded at third and fifth month after sowing. Observations on growth parameters such as seedling height, number of leaves/seedling and collar girth at ninth month were monitored. Apart from growth characteristics, number of leaves showing splitting, above ground dry matter production (DMP), leaf area (LA), number of roots and their dry weight/seedling were also recorded at twelveth month. Leaf area was calculated using the formula developed by Satheesan *et al.* (1983). Cost of production was calculated considering the mean recovery of vigorous seedlings, prevailing labour wages and market prices of inputs. Cost of construction of cement tank was apportioned for 20 years with interest on capital invested at the rate of 13 per cent per annum which closely approximates the opportunity cost of capital.

RESULTS AND DISCUSSION

Germination at third and fifth month varied significantly due to the treatments in both the years (Table 1). Data revealed that germination was maximum in coir dust potting medium in polybags followed by cement tanks. Early and higher germination may be due to water holding capacity of coir dust and potting mixture. Seedling growth in terms of height, number of leaves and collar girth varied significantly among the treatments (Table 2). Rapid growth was observed between nine and twelve months.

Table 2. Growth characters influenced by method of sowing and growing media

T. No.	Height (cm)				No. of Leaves/seedling				Collar girth (cm)				LA(cm^2)	
	1997		1998		1997		1998		1997		1998		1997	1998
	9*	12	9	12	9	12	9	12	9	12	9	12	12	12
T-1	70.0	125.9	94.8	138.6	3.1	4.8	3.8	4.8	8.0	11.1	8.5	10.6	2206	2991
T-2	64.3	115.8	85.3	132.3	3.5	5.3	3.3	5.1	8.0	10.8	8.8	10.9	2224	2647
T-3	87.1	132.7	100.4	141.4	3.7	5.4	3.9	5.4	9.2	12.0	9.8	11.8	4309	3744
T-4	99.4	153.9	114.1	166.0	4.0	5.6	4.3	5.6	10.0	13.1	10.8	13.4	4564	4523
T-5	78.5	118.8	110.2	156.0	3.6	5.3	3.7	5.3	8.5	11.1	9.4	11.4	2769	3824
T-6	77.5	127.3	94.3	142.3	3.5	5.3	3.7	5.3	8.5	11.7	9.5	11.2	3026	3048
T-7	83.0	134.7	105.5	155.7	3.4	5.2	4.1	5.6	9.0	12.5	9.9	11.8	3713	4385
T-8	96.7	159.5	116.1	165.1	3.8	5.7	3.9	5.4	9.7	13.8	10.3	12.6	4923	5006
T-9	87.2	140.0	115.3	166.6	3.6	5.6	3.9	5.4	9.3	12.9	10.2	12.5	4197	4860
T-10	75.9	120.1	86.2	129.0	3.4	4.9	3.2	4.8	8.4	11.0	8.6	10.6	2538	2347
C.D at P=0.05:	8.6	18.7	10.7	16.6	0.3	0.4	0.6	0.4	0.8	0.8	0.7	1.1	1021	608

* months after planting

Growth characteristics of coconut seedling were found consistent in T-4 and T-8 during 1997 and 1998. In both the cases, potting mixture was used either in polybag or cement tank. Early germination and rapid growth of the seedling may be due to the nutrients available in the potting mixture. 1Leaf area was significantly higher in T-8 followed by T-4 in both the years (Table 2). Increased LA in T-8 and T-4 is due to potting mixture while LA was lowest in T-2, T-10 and T-1 where seedlings were raised in littoral sand as growing media.

Number of roots per seedling was significantly higher in seedlings grown in polybags, irrespective of growing medium (Table 3). Dry weight of the roots was significantly higher in the plants grown in cement tank followed by polybags with potting mixture. Early leaf splitting is positively associated with early flowering which significantly varied among the treatments only in 1998 and that too in seedlings raised in potting mixture in polybag and cement tank. Drymatter production above the ground was significantly higher in T-8 (Table 3).

Table 3. Root mass, leaf splitting and drymatter production as influenced by method of sowing and media

T. No.	Root mass				Leaf splitting		Dry matter production (g/ seedling)	
	No. of roots		Dry Wt. (g/seedling)		Per cent			
	1997	1998	1997	1998	1997	1998	1997	1998
T-1	9.0	10.3	6.9	11.1	6.1	5.3	80.0	97.9
T-2	19.0	13.0	17.5	13.9	2.7	2.7	92.0	88.6
T-3	16.3	13.7	36.7	24.6	10.0	6.3	161.8	159.7
T-4	12.3	13.7	32.7	27.9	8.0	25.3	220.8	231.9
T-5	15.0	12.0	27.0	16.2	5.7	11.7	108.9	148.8
T-6	11.7	8.3	4.6	7.8	11.5	6.7	114.4	119.1
T-7	11.3	10.7	16.2	20.5	7.4	13.7	162.7	190.2
T-8	12.0	8.7	8.6	12.3	17.3	22.3	269.4	292.4
T-9	7.3	11.0	13.5	11.3	14.8	16.3	164.0	177.7
T-10	9.0	10.0	9.1	12.3	6.5	2.7	102.7	117.1
C.D. P=0.05:	4.3	NS	17.0	7.9	NS	6.0	74.2	31.3

Table 4. Recovery of vigorous seedlings and cost of production as influenced by sowing method

T. No.	Recovery percentage			Costof production (Rs./100 seednut)	(Rs. per seedling)
	1997	1998	Mean		
T-1	45.7	65.0	55.4	740	13.4
T-2	52.7	59.7	56.2	1323	23.5
T-3	75.0	76.3	75.7	1548	20.5
T-4	82.0	83.0	82.5	1688	20.5
T-5	64.3	80.7	72.5	1592	21.9
T-6	52.7	63.3	58.0	1545	26.6
T-7	67.7	72.3	70.0	1645	27.4
T-8	68.3	73.7	71.0	1647	23.1
T-9	69.3	77.3	73.3	1641	22.3
T-10	64.3	82.0	73.1	780	10.7
C.D.*	8.0	10.8	-	-	-

*Significantly different at five per cent level

Despite the seed nuts containing adequate nutrients for germination and growth, it has been shown that growth and vigour of seedlings can be improved through the additon of fertilizer (Mathew and Ramadasan, 1964; Maravilla, 1986; Reddy *et al.*, 1998). Nuts sowed in potting mixture exhibited early germination and better root system. Early production of photosynthetically functional leaves diverted higher amount of photosynthates towards the growth components. Seedling raised in sand media had reduced vigour (Peries and Everard, 1991). Reduced seedling vigour could be due to moisture deficit and lack of nutrition which led to delayed germination and rapid growth, respectively.

Recovery percentage of vigorous seedlings was significantly higher in nuts sowed in polybag with potting mixture (Table 4). Cost of production for 100 seednuts ranged from Rs.740 (in conventional method) to Rs.1,688 (in polybag-potting mixture). High cost of production in polybags and cement tank is mainly due to the cost of polybag and construction of cement tanks. Cost of production per seedling was lower in T-10 followed by that of the conventional method. Despite the cost of production for 100 seednuts was higher in T-4; the cost of production/seedling was relatively less due to higher recovery and germination percentage. Therefore, polybag with potting mixture may be preferred in coconut nurseries owing to its advantages.

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