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Coppice Productivity in *Eucalyptus tereticornis* sm. in relation to environment

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The *Eucalyptus tereticonenis* Sm plantations in Sengeerai-Arimalam and Rajendram river padugai regions showed variation not only in the growth of the seedling plantation but also in the coppice productivity. While the range in the per month growth rate of former seedling plantation varied from 0.27 cm to 0.82 cm, it was from 0.54 to 1.48 cm in the latter. The possibility of obtaining coppice wood yield in the padugai region in about half to two thirds the period required under semi-arid situation is indicated. The usefulness of including the selection for coppice potential besides superior seedling crop production in the breeding programme for evolving high yielding strains has been indicated.

Tree breeding programme for the genetic improvement of biomass production in eucalyptus must include potentiality for yield of wood not only in the first generation but also in subsequent coppice generation. In trees such as *E. tereticornis* Sm. which offers scope of biomass production through multiple harvests, selection of choice trees should be based on better growth of the seedling stand followed by better productivity of coppice shoots. Work on this line have been initiated in a comprehensive manner with a multiple approach to bring about higher out-turn in eucalyptus plantations. Initial studies have indicated that larger the diameter of the tree of the first crop, larger was the number of coppice clusters developing from the cut-stem and on an average more than half of the shoots produced dried up by an inherent process of self-thinning in a period of about ten months (Rathinam and Surendran, 1981). Bud potential of the cut stem, genotypic and environmental influence on coppice productivity and rate of growth were the factors that appeared to decide the rotation period Studies on this line were conducted in the coppice plantations at Sengeerai-Arimalam of Pudukkotty district and at Rajendram of Trichy district in Tamil Nadu and the observations made are presented in this paper.

MATERIAL AND METHODS

The details of the eucalyptus plantations chosen for the study are presented in Table 1. A two-year old coppice stand (Firstcoppice rotation) developed from a ten-year old seedling plantation at sengeerai-Arimalam and an year old coppice stand developed from a five year old seedling plantation at Rajendram were chosen for the biometrical study on the growth of the coppice shoots. Following the stratified sam-

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pling technique, a total number of 70 stools at random were chosen in each of the plantations for the study. The data on the diameter of the stool, number of coppice shoots and their transectional area at breast height were recorded. The girth at breast height was taken into consideration to assess the rate of growth as the path coefficient analysis of the tree characters indicated the CBH to exert maximum influence on the biomass prodnction. (Rathinam *et al*. 1981), The stool basal area and the percentage of total treansectional area of the shoots at breast height over the stool basal area were worked out.

RESULTS AND DISCUSSION

The observation on the coppice productivity in the two plantation, made from the total transectional area of the shoots at breast height, the stool basal area and their relationships under the various classes of stool diameter are presented in Tables II and III. At Sengeerai-Arimalam, the stool diameter varied from 9.0 cm to 33.5 cm with the larger percentage of stools occuring in the range of diameters from 21.0 cm to 24.0 cm. The growth rate by girth at base varied from 0.27 to 0.82 cm per month in the stand. The basal area of the stools ranged from 63.6 cm^2 to 881.4cm^2. The total transectional area of shoots at breast height varied from 20.48cm^2 to 297.20cm^2 and the percentage of total transectional area of shoots at breast height over stool basal varied from 6.67 to 74.97. There were stools with coppice shoots having potentiality for the expression of coppice vigour producing as high as 75 per cent of the basal area of the mother tree within a period of about two years. The mean for the total population of 70 stools considered for the study was 34.34 percent and based on this growth the yield of the seedling plantation is likely to be obtained in the coppice crop in about six years' growth under dry land situations.

In the coppice stand of the river padugai region at Rajondram, the stool diameter varied from 10.0 cm to 30.0 cm (Table III) almost similar to the former plantation though its seedling plantation was half the age of the former plantation. The growth rate by girth at base varied from 0.54 cm to 1.48 cm per month in the stand. 57.1 per cent of the population showed a rate of growth more than 1.00 cm by base per month. The basal area of the stools ranged from 78.57 cm^2 to 707.14 cm^2. The percentage of total transectional area of shoots at breast height over stool basal area varied from zero to 46.47. The data indicated that there were trees with potentiality for the expression of coppice vigour developing as high as 46 percent of the basal area of the mother tree in a period of about an year. The mean for the population was 19.66 per cent and based on this growth. the coppice crop in about five years' growth is likely to give as much yield of wood as the seedling plantation under conditions, existing in the river padugai region as in Rajendram, unless the rate of growth increases in the second or third years. The presence of indi-

vidual trees showing high potentiality in these plantations offer scope as superior germplasm for utilization in breeding for increased rate of growth and that, possibility of obtaining from the coppice crop wood yield equivalent to the first seedling stand yield in a much shorter period. is indicated. Taking advantage of the variation in coppice potentiality, the genetic improvement effected through selection and breeding will not only improve the biomass production (first rotation) of the seedling plantation but also the coppice productivity in the subsequent generation.

The wood that is produced under semi-arid situation as in Sengeerai-Arimalam, can be obtained in about half to two thirds of the period under favourable situations of soil and climate as in river padugai region.

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Table 1-Deteils of Eucslyptus plantations

Name of the plantations	Agro-climatic type	Age of the seedling	Age of the firstcoppice	Annual rainfall
Sengeerai-Arimalam	Dryland plantation	plantation 10 years	plantation 2 years	500-600 mm
Rejendram	River padugai plantation	5 years	1 year	600-750 mm

Table II - Growth parameter of a two year old coppice plantation at Sengeerai-Arimalam

Class Center of stool diameter in cm	Frequency of stools	Per month frowth rate in girth in cm	Mean stool basal area stool	Mean No.of shoots per	Mean t.s. area of shoots at$_2$ B.H. in cm per stool	Percentage t.s.area of shoots over stool basal area	Range in percentage of t.s area at B.H. over stool basal area
10.25	2	0.27	79.30	1.00	27.88	35.15	32.2 — 37 14
13.25	6	0.35	161.77	1.33	53.05	32.80	15.02 — 53.74
16.25	14	0.43	236.16	2.43	74.36	31.50	10.21 — 74.97
19.25	15	0.50	322.12	3.80	122.73	38.10	6.67 — 73.22
22.25	24	0.58	296.88	3.38	146.79	49.44	7.60 — 60.89
25.25	5	0.66	503.00	4.00	181.31	36.05	28.18 — 45.12
28.25	3	0.74	679.73	6.33	206.76	30.42	22.34 — 45.00
31.25	1	0.82	881.4	5.00	187.92	21.32	—
Range	—	—	63.6 cm^2 - 881.4 cm^2	1-7	20.48 cm^2 297.20 cm^2	—	—

t.s. transectional area
B.H. Breast height

Table III — Growth parameters of an year old coppice plantation at Rajendram

Class center of stool diameter in cm	Frequency of stools	Per month growth in girth in cm	Mean stool basal area in cm^2	Mean No.of stools per stool	Mean t.s. area of shoots at B. H. in cm_2 Per stool	Percentage of t.s. area of shoots over stool besal area	Range in percentage of t.s. area over stool basal area
1	2	3	4	5	6	7	8
10.25	10	0.54	97.35	1.9	24.62	25.29	1.00 — 46.47
13.25	10	0.69	165.71	2.2	28.56	17.24	8.82 — 32.44
16.25	10	0.85	227.70	2.9	46.36	20.36	12.31 — 31.20
19.25	10	1.01	320.73	3.5	60.73	18.94	8.71 — 35.61
22.25	10	1.17	412.73	3.8	83.62	20.26	8 14 — 32.83
25.25	10	1.32	511.26	4.1	64.81	20.04	7.22 — 3.65
23.25	10	1.48	661.41	5;3	102.48	15.49	8.67 — 24.32
Range	—	—	78.57 cm^2 to 707.14 cm^2	1.7	11.45 cm^2 to 149 85 cm^2		

t.s.= transectional area

B.H.= Breast height.