#34

The Pakistan Journal of Forestry Vol.50(1-2), 2000

OPTIMUM AGE/SIZE FOR OUT-PLANTING TUBED NURSERY PLANTS OF *EUCALYPTUS CAMALDULENSIS*

Muhammad Rafique and Muhammad Afzal[1]

Abstract

The study was designed to find out the optimum and economical age/size of *Eucalyptus camaldulensis* tubed nursery plants for transplanting in the field. Six different age groups of seedlings were planted for this purpose. Results revealed that seedlings of three months old or less are not suitable for out-planting due to their high mortality rate. Seedlings of four and a half to six months are best for transplanting in the field. Seedlings of more than six months old are also not recommended for out-planting as these gain more height alongwith more cost for retaining them for longer time in the nursery.

Introduction

Presently Pakistan is producing less wood and its products against the actual demand. The gap is being filled by imports. Huge amount of foreign exchange is spent on the import of wood products, especially pulp. A big potential exists to increase wood production in the country. International pressure of environmental protection is also forcing to increase the number of trees on public as well as private lands. A large number of seedlings are required for this purpose. Provision of low cost seedlings will contribute towards vast afforestation in the country. Nursery period of seedlings is directly related with the cost of seedlings (Sheikh, 1989). This study was, therefore, designed to find out the optimum and economical age/size of Eucalyptus tubed nursery plants for transplanting in the field.

Materials and Methods

The experiment was laid-out in Bhagat plantation in 1993 using randomized complete block design (RCBD) with seven replications. Eucalyptus plants of six different age groups (treatments) were out-planted during spring (April) 1993. The age groups are shown in Table 1.

Nursery was raised accordingly to get above mentioned age classes for field planting. No pricking was done as seedlings were raised directly in polythene bags (Qadri, 1971). To get 9 months old seedlings, seed was sown directly in polythene bags in July 1992 and for the rest of different age seedlings, seed was sown directly in

[1] Senior Research Officers, PFRI, Faisalabad, Pakistan.

polythene bags after an interval of 1½ months for each class. These tubed plants were watered twice a day in summer and once a day during monsoon and winter.

Table 1. Eucalyptus plants of six different age groups

Treatments	Age of seedlings (months	Date of sowing
T_1	1.5	15.2.93
T_2	3.0	1.1.93
T_3	4.5	15.11.92
T_4	6.0	1.10.92
T_5	7.5	15.8.92
T_6	9.0	1.7.92

These tubes plants were out-planted in April, 1993. Plant to plant distance in field was 1.8 m (6 feet) whereas row to row distance was 3.1 m (10 feet). There were 13 plants in each row/replication and 91 plants in seven row/replications for each treatment and total 546 plants in the experiment. Height and collar diameter (CD) were recorded at the time of planting. Then, data regarding height, CD/DBH and survival percentage were collected after 6 months, one year and two years, i.e. in October 1993, April 1994 and April 1995, respectively. Before out-planting the tubed plants, soil working like Jungle clearance, debris collection and burning, levelling, layout and daghbailing, earth work, etc. were carried out in the experimental area. After out-planting, irrigation water was applied once a week for the 1st month and then twice a month up to the age of one year of crop. After that the irrigation frequency was reduced to once a month for the 2nd yearlong. No fertilizer was applied to this tree crop.

Results and Discussion

Main objective of the experiment was to find out the optimum and economical age or size of transplanting Eucalyptus nursery plants in the field. Plants of six different ages were planted in the field for this purpose. Collar dia, height and survival percentage of different treatments (ages) are depicted in Table 2.

At the time of planting, average collar diameters of 1½, 3, 4½, 6, 7½ and 9 months old nursery plants were 0.13 cm, 0.22 cm, 0.28 cm, 0.28 cm, 0.34 cm and 0.36 cm respectively. Heights of the plants were 10.81 cm, 19.33 cm, 31.43 cm, 37.07 cm, 43.84 cm and 52.45 cm respectively.

Data collected after six months of field planting gave average collar dias of 0.80, 0.90, 0.92, 0.94, 0.98 and 1.04 cm for first to sixth treatment respectively. Height gained by the treatments also showed the same trend, i.e., increased from treatment first to sixth. Mortality recorded after six months showed 49, 46, 84, 83, 84 and 89 percent survival respectively for treatments first to sixth.

After one year, the survival was same except T_4 where it decreased from 83 percent to 80 percent. DBH and height were also recorded. DBH of treatments from 1 to 6 were 1.63, 1.70, 1.76, 1.74, 1.93 and 2.06 cm respectively, whereas height recorded came to be 3.71, 3.60, 3.85, 4.00, 4.11 and 4.40 m respectively.

Last data regarding DBH and height were recorded after two years of field planting. Diameter gained by 1st treatment was 2.49 cm, 2nd treatment 2.60 cm, 3rd treatment 2.98 cm, 4th treatment 2.57 cm, 5th treatment 2.78 cm and 6th treatment 2.86 cm. Height of plants for treatment 1 to 6 were 4.30, 4.38, 5.03, 4.63, 4.77 and 5.12 m respectively.

Table 2. Average dia, height and survival percentage of different treatments

Treatments	At the time of planting		After 6 months of planting			After 1 year of planting			After 2 years of planting	
	C. Dia cm	Ht. cm	Sur. %	C. Dia Cm	Ht. m	Sur. %	C. Dia cm	Ht. m	DBH cm	Ht. m
T_1	0.13	10.81	49	0.80	1.30	49	1.63	3.71	2.49	4.30
T_2	0.22	19.33	46	0.90	1.35	46	1.70	3.06	2.60	4.38
T_3	0.28	31.43	84	0.92	1.49	84	1.76	3.85	2.98	5.03
T_4	0.28	37.07	83	0.94	1.59	80	1.74	4.00	2.57	4.63
T_5	0.34	43.84	84	0.98	1.68	84	1.93	4.11	2.78	4.77
T_6	0.36	52.45	89	1.04	1.80	89	2.06	4.40	2.86	5.12

Last data collected after two years showed no significant difference among different treatments (Table 3). At the time of field planting, collar diameter and height of plants of different ages differed statistically (Table 4). After two years, the statistically significant difference of collar diameter (CD) and height became non-significant. However, a significant difference was observed in survival percentage among different treatments after 6 months.

Table 3. ANOVA table for height and DBH after 2 years of field planting

Source	df	Height			DBH		
		SS	MS	F-Value	SS	MS	F-Value
Treatment	5	5.22	1.04	0.76^{NS}	2.65	0.53	1.51^{NS}
Block	6	5.35	0.89	0.65	7.13	1.19	3.39
Error	30	41.07	1.37	-	10.34	0.35	-
Total	41						

NS Non-significant

Table 4. ANOVA table for height and collar dia at the time of field planting

Source	df	Height			Colar Dia		
		SS	MS	F-Value	SS	MS	F-Value
Treatment	5	8274.4	1654.9	84.69**	0.256	0.051	27.55**
Block	6	312.2	52.2	2.67	0.009	0.001	0.80
Error	30	586.0	19.5	-	0.056	-	-
Total	41						

** Significant at 1 percent level of significance.

Conclusions

From the results it is concluded that due to very poor (less than 50%) survival percentage, seedlings of 3 months old or less are not recommended for out-planting. Seedlings of four and a half months old, and above can be planted successfully in the field. Since retention of seedlings in the nursery for longer period increases their cost of production, so seedlings of four and half months old are more economical for out-planting. As far as the size is concerned, seedlings of four and a half months old having average height of 31.4 cm also confirmed the optimum size of seedlings for field planting.

References

Qadri, S.M.A. 1971. Nursery techniques for Eucalyptus. Pak. J. of For. 21(2): 133-154.

Sheikh, M.I. 1989. Cost of raising Eucalyptus plants in polythene tubes. Pak. J. of For. 39(1): 99-100.