

THE KENYA FORESTRY RESEARCH INSTITUTE

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INTERIM RESULTS OF A PROGENY TRIAL

OF Eucalyptus grandis AT TURBO

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Summary

A progeny trial from 19 plus trees of Eucalyptus grandis selected in Zimbabwe was set in 1986. The control was a provenance raised from the seed collected locally at Turbo. At the age of 2.2 years, progenies of plus tree 303 had the best overall growth followed by 252, 292, 283, 297 and 299. Generally, selection from grasslands region had the best performance compared to plus trees from Mtao. The local Turbo provenance was the poorest indicating the need for improvement research through selection.

Introduction

Eucalyptus grandis Hill ex maiden is one of the important commercial tree species grown in Kenya. It is planted for production of building poles, fencing posts, transmission poles, and fuelwood. The species is fast growing and can attain 25 m in 9 years at Muguga (Gottneid and Thogo, 1975). Sustainability of E. grandis through coppice management is another important factor which has been observed (Howland, 1970, Dyson, 1974 and Kaumi 1983). In a fuelwood experiment at Muguga, Dyson (1974) reported a yield of 227m^3 per ha. for a six year first coppice rotation as compared to 178m^3 per ha. at the same age on first rotation from a seedling raised plantation.

However, E. grandis available locally might not be the best provenances

necessitating further studies on provenance and progeny trials. No early progeny research has been carried with the species. Mullin et al. (1981) observed that establishment of open-pollinated progeny test is more economical in species improvement programme where resources are limiting.

In 1986 seeds from open-pollinated selected plus trees in Zimbabwe were procured with two main objectives: to compare their performance with local material, and to widen the available genepool for advance tree breeding. This paper reports on the interim results of the progeny trial at 2.2 years.

Material and Methods

The experiment (E.P. 152) was planted at Turbo in 1986 with a total of 20 seedlots representing 19 Zimbabwean progenies, and one local provenance (table 1). The experimental site in Nzoia compartment 5C (lat. $0^{\circ} 25'N$, long. $34^{\circ} 40'E$) is at an altitude of 1,800 m a.s.l. with rainfall of 1300 mm and mean temperature of $18^{\circ}C$. The soils are shallow derived from Phonolite Lava and on a fairly flat topography. The site was originally planted with Pinus patula which was clear felled two years back.

Table 1: Progenies included in E. grandis trial at Turbo

Seedlot No.	Plus tree No.	Collection Site	Parentage and Origin
9670	218	Compt. H6 Mtao (1)	S/N 4196 from B 16550
9681	230	Compt. J13 Mtao (1)	S/N 4196 from B 16550
9699	248	Compt. A65 Mtao	S/N 4196 from B 16550
9702	251	Compt. A8b Mtao	S/N 4196 from B 16550
9704	253	Compt. A8a Mtao	S/N 4196 from B 16550
9705	255	Compt. A8a Mtao	S/N 4196 from B 16550
10935	292	P.test. E5 Grassland (22)	S/N 4544 from B 16550
10836	293	P.test. E5 Grassland (22)	S/N 4511 from B 16550
10937	294	P.test. E5 Grassland (22)	S/N 4529 from B 16550
10940	297	P.test. E7 Grassland (22)	S/N 4671exS/N 2545 FRC 550
10941	298	P.test. E7 Grassland (22)	S/N 4663exS/N 2507 FRC 550
10942	299	P.test. E7 Grassland (22)	S/N 4669exS/N 2609 FRC 550
10943	300	P.test. E7 Grassland (22)	S/N 4679exS/N 2524 FRC 550
10944	301	P.test. E7 Grassland (22)	S/N 4641exS/N 2608 FRC 550
10945	302	P.test. E7 Grassland (22)	S/N 4670exS/N 2557 FRC 550
10946	303	P.test. E7 Grassland (22)	S/N 4679exS/N 2546 FRC 550
10947	304	P.test. E7 Grassland (22)	S/N 4660exS/N 2551 FRC 550
10948	305	P.test. E7 Grassland (22)	S/N 4659exS/N 2569 FRC 550
E.grandis Turbo		-	

The selection sites for plus trees in Zimbabwe were at Grassland and Mtao. The two places as reported by Matheson et. al (1987) differ in environmental conditions as follows:

1. Grassland (lat. $18^{\circ} 10'S$ long. $31^{\circ} 29'E$) is at an elevation of 1,460 m, with 885 mm annual rainfall, and has deep sandy soil derived from granite.
2. Mtao (lat. $19^{\circ} 20'S$ long. $30^{\circ}35'E$) is at an elevation of 1,460 m, with 690 mm annual rainfall, and has deep aeolian Kalahari sands.

The experimental design was a complete randomised block of five replications with 25 trees per plot at a square spacing of 2.5 m. The tending of the plots was by the "shamba system". The first assessment on survival and height was done at 4 months after planting, thereafter at the age of 1.5 and 2.2

years. All the 25 trees in every plot were measured and the data analysed for variance. The assessment on diameter, system form and branch persistence was deferred till the third year.

Results and Discussions

A summary of mean heights and percentage survival at 1.5 and 2.2 years is presented in Table 2.

Table 2: Mean values for *E. grandis* progenies at 1.5 and 2.2 years

No.	Plus Trees No.	Mean Height - 1.5 years	Means at 2.2 Height (m)	years Survival (%)
1.	218	6.1	8.5	93.6
2.	230	6.0	8.8	72.8
3.	248	5.2	7.8	89.6
4.	251	4.9	7.2	74.4
5.	252	5.4	9.7	89.6
6.	253	5.4	8.2	92.0
7.	255	5.3	7.8	84.8
8.	292	6.7	9.6	89.2
9.	293	6.4	9.5	92.8
10.	294	5.4	7.8	92.0
11.	297	6.6	9.5	92.8
12.	298	6.5	9.2	77.6
13.	299	6.4	9.5	92.0
14.	300	5.7	8.4	81.6
15.	301	6.2	9.0	76.4
16.	302	6.3	9.0	84.8
17.	303	7.2	9.9	92.8
18.	304	6.1	9.1	71.2
19.	305	5.9	8.7	93.6
20.	Local provenances 4.3		6.3	85.6

L.S.D. at P=0.05

0.87

0.99

n.s.

At 1.5 and 2.2 years there was significant difference in mean height growth among the progenies. Height growth was best for progenies of plus tree 303 followed by numbers 252, 292, 297 and 299 respectively. The best progeny (303) was 57% faster in growth compared to the local provenance at 2.2 years.

The mean annual increment (M.A.I.) in height for the progenies of five leading plus trees was 4.4 m at 2.2 years. The leading progeny had a M.A.I. of 4.5 m. This was quite high compared to 3.3 m at 3.8 years and 2.8 m at 8 years reported by Konuche (1979 & 1989) for Turbo and Elburgon respectively. Gottneid et. al (1975) reported a M.A.I. of 2.8 m at 9 years which is the common felling age at Muguga for seedling raised E. grandis.

The general survival within the trial was high and there was no significant

difference among the progenies. The range was from 71.2 to 93.6 percent. Progenies of plus trees 305, 218, 303, 292 and 297 respectively had the highest survival. Generally progenies of plus trees from Grasslands were better compared to those from Mtao. The local Turbo provenance was again lower than average, with survival of 85.6 percent. The low performance of local provenance justifies the need for improvement.

Conclusion and Recommendation

Progenies of plus trees from Zimbabwe performed better than the local Turbo provenance. Within the Zimbabwean plus trees, those selected at Grasslands were generally superior to the Mtao selection.

The experiment should be well maintained and assessed regularly. It should be replicated on other sites but with

additional seedlots from locally selected plus trees. A seed orchard should be established with the best plus trees.

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