THE KENYA FORESTRY RESEARCH INSTITUTE

TECHNICAL NOTE NO. 6

Kenya Forestry Research Institute (KEFRI) Headquarters - Muguga

Kenya Forestry Research Institute (KEFRI)

KENYA FORESTRY RESEARCH INSTITUTE

Technical Note No. 6

November, 1989

RESULTS OF EUCALYPTUS SPECIES TRIAL AT LONDIANI

P.K.A. KONUCHE

Introduction

Eucalypts play an important role in Kenya in provision of fuelwood, building poles, transmission poles, plywood and pulpwood. In the early years, the most widely grown species were Eucalyptus saligna Sm and E. globulus Labill. The former was mainly planted at altitudes of 1,600 to 2,00°m while the latter was planted above this elevation. However, due to susceptibility to eucalyptus snout beetle (Gonopterus scutellatus) planting of E. globulus was suspended sometimes in the sixties.

In an effort to identify other eucalypts for higher elevation, preliminary results from old trials indicated that E. regnans F. Muell (mountain ash) and E. fastigata Dean ex Maiden (brown barrel) were growing very fast and merited a provenance trial. Attempts were therefore made to procure seed for establishment of a provenance trial. This was not

successful as seed of only one provenance of each of the two mountain eucalyptus was obtained. A decision was therefore made to establish a species trial since seed of some other eucalypts was available. The objective of the trial was to observe and compare the performance of various eucalypts for production of poles. Although not clearly spelt out, the main interest was on the performance of the mountain ash eucalypts compared with the commonly grown eucalypts such as "E. saligna" and E. grandis Hill (Maiden). The trial was Planted in 1970 at Londiani and the results are presented in this report.

Methods and Material

The experiment (R.E. 303) was located at Masaita, compartment 10 (G) of Londiani Forestry College. The site is located at 0° 10'S latitude and 35° 36'E longitude. The altitude is 2,300 m above sea level. The mean annual rainfall at the College is 1,266 mm falling from March to November with peaks in April and August. A three-month dry season occurs from December to February. The mean annual temperature is 15°C.

The trial was sited at the foot of a hill on imperfectly drained loam soils.

There were seven species tried and these included: three mountain ash eucalyptus (E. fastigata, E. regnans and E. delegatensis), E. decaisneana, E. grandis, E. botryoides and a local provenance of E. saligna. The seed of all the species except the latter came from

Australia but their actual origins were unknown.

The experiment was planted in May 1970. The design was randomised blocks of four replications. Due to insufficient seedlings, the layout was not complete but each species was represented in every block. Generally there were thirty six trees per plot in 2.0 m by 2.0 m espacement.

All species except E. delegatensis and E. regnans were fully replicated. E. delegatensis had six trees per plot in each replication while E. regnans had fifty four trees distributed among the four blocks.

Management

Seedlings were raised in boxes but they were neglected at the nursery stage and were in poor condition at the time of planting out. The planting site was prepared by slashing the vegetation and pitting. However, at the time of planting, half the planting area (two blocks) had not been cleared and trees were planted into dense weeds. Weeding was by vegetation slashing and this was quite inadequate. Heavy damage to seedlings by rats and antelopes occurred soon after planting. The duration of the experiment was fifteen years.

Assessment and Data Analysis

Survival counts and height measurements were assessed during the first two years. Height and diameter at breast height (d.b.h.) were also measured at five,

seven, ten and fifteen years. Visual estimates of stem form were also made during measurements. Because of the poor survival shown by the majority of the species, analysis of variance was not carried out on height and diameter but it was done on survival after arc sine transformation.

Results and Discussion

Table 1 gives summary of percentage survival, mean height and diameter (d.b.h.) at various ages.

Table 1: Mean values for survival, height (Ht.) and diametre (d.b.h.) at the age of 2, 5, 10 and 15 years

Species	2 Years		5 Years			10 Years			15 Years		
	Ht. m	Survival %	Ht. m	d.b.h. cm	Survival %	Ht. m	d.b.h. cm	Survival %	Ht. m	d.b.h. m	Survival %
E. fastigata Australia	3.8	80	13.2	11.0	78	26.1	18.8	70	30.9	20.5	70
E. botryoides Australia	2.3	31	11.7	10.6	28	23.7	16.0	25	28.1	17.5	25
E. decaisneana Timor	3.6	12	11.8	12.2	12	26.1	23.0	10	27.8	26.5	10
E. grandis Australia	2.3	24	10.7	10.3	24	23.6	18.8	24	29.3	25.8	21
E. regnans Australia	6.3	48	15.5	15.3	48	27.5	24.0	48	32.4	28.3	46
E. delegatensis Victoria/Australia	4.9	33	-	-	-	-	-	-	-	-	-
E. saligna Kenya	1.4	36	9.4	8.1	26	22.6	16.5	17	26.0	18.4	17
L.S.D. at P = 0.05	-	10.1	-	-	16.0	-	-	16.8	-	-	16.4

Survival

At two years, E. fastigata had high survival which was significantly different from other species. E. regnans had moderate survival but the remaining species had poor survival of less than forty percent. E. delegatensis had failed by the fifth year.

Difference between blocks was also significant. The block which had not been cleared at the time of planting gave the poorest survival.

At fifteen years, survival of E. fastigata was still good and was significantly different from the others. With survival of seventy percent, the stocking stood at 1,750 stems per hectare. The survival of E. regnans was fair and the stocking was 1,150 trees per hectare.

The poor survival of the remaining species (E. botryoides, E. decaisneana, E. grandis. E. delegatensis and E. saligna) was due to the poor health of seedlings at planting, inadequate site preparation, damage by rats and antelopes and ineffective methods of tending. It is however, clear from the results that E. fastigata and E. regnans survived better under difficult establishment conditions compared to E. saligna and E. grandis.

Height and Diameter Growth

Height growth at two years was fairly fast for the mountain ash eucalypts particularly E. regnans. Throughout the fifteen year period, E. regnans maintained the best height and it also had the best diameter from the age of five to fifteen years. E. fastigata was the second best in height from the fifth year and maintained this position upto the fifteenth year. In diameter, E. fastigata ranked third at five and ten years but was the fourth best at fifteen years. Its diameter growth was good considering its high stocking compared to the other species. Growth in height of E. decaisneana and E. botryoides was intermediate between that of E. saligna and E. grandis.

E. grandis had better growth than E. saligna but the two species were inferior in growth compared to E. regnans and E.

fastigata. In the early years, the growth of E. saligna and E. grandis was probably affected by the browsing by antelopes. From ten to fifteen years, E. grandis appeared to have better increment than E. fastigata although the latter was still taller by 1.6 m.

At fifteen years, E. regnans and E. fastigata had mean annual increment (m.a.i.) of 2.2 m and 2.1 m respectively. Their performance was better than at Muguga where m.a.i. for dominant height at thirteen years was about 1.7 m for the two species (Gottneid and Thogo 1975). The same report by Gottneid and Thogo also indicated that E. grandis was superior to E. regnans and E. fastigata under drier condition at Muguga.

Although the mountain ash (E. regnans) had the best growth at Londiani, its performance was not as impressive as at South Kinangop where the species reached

height of 60 m (m.a.i. of 2.2 m) at twenty seven years (FAO 1974). This could be attributed to the rather poorly drained soils at Londiani.

Stem Form

Both E . regnans and E. fastigata had good stem form which compared well with that of E. saligna and E. grandis. They can therefore be used in the production of poles at much shorter rotation because of their faster growth.

Conclusion

At about 2,300 m elevation, E. regnans and E. fastigata grow better than the local E. saligna and E. grandis.

At altitudes below 2,300 m, however, E. grandis is likely to do better. E.

fastigata and *E. regnans* seem to establish well under conditions of minimum site preparation and tending. The two species should therefore be used for planting in high altitudes (2,300 m and above). Where weeding is likely to be a major problem on such sites, *E. regnans* and *E. fastigata* should be preferred.

References

Gottneid, D. and Thogo, S. (1975). The growth of eucalypts at Muguga Arboretum. EAAFRO For. Tech. Note No.33, 62pp.

FAO (1974). Report on the FAO/DANIDA Training Course on Forest Tree Improvement, Kenya, 344pp.


KENYA FORESTRY
RESEARCH INSTITUTE
H.Q.T.S
P.O.Box 20412
NAIROBI.