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SCHOOL OF FORESTRY

STEPHEN F. AUSTIN STATE UNIVERSITY

Nacogdoches, Texas

EXPERIMENTAL PLANTING OF EUCALYPTS IN THE RIO GRANDE VALLEY, TEXAS

by

K. Kadambi and George Richmond¹

To explore their suitability for planting as a supplemental source of raw material for Texas' expanding pulp and paper industry, five species of eucalypts were planted in the Rio Grande Valley. Survival and growth after the frosts of two winters suggest some of these species as suitable for commercial pulpwood production in this locality.

The 600 species and varieties of the Australian genus *Eucalyptus* include some of the world's most productive growers of wood fiber. Some species included in this test have been widely planted in tropical and temperate climates. Since seedlings of some of these eucalypts have been initially damaged by the sudden freezes at Nacogdoches, a major objective of the present test was to observe the effect of slightly less severe, and perhaps less erratic, winter climate on these, reputedly frost-tolerant, species.

The planting site is located in southernmost Texas, about 3½ miles west of Harlingen, and 11 miles from the Mexican border, at latitude 26° 13'N. Elevation is about 38 feet above sea level.

The country is generally very flat. The soil is "Victoria Silt Loam", black, profileless, deep and fertile, rich in CaO, K₂O, Mg and Zn, with low organic matter and nitrogen, and with pH around 7.5. It has high moisture-holding capacity. The native vegetation is scrubby forest growth of dwarf oaks, mesquite, fan palm and prickly pear.

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The climate is quasi-xerophytic, the normal annual rainfall being 26.07 inches and the annual mean temperature 74.3°F. Usual summer temperatures are no higher than 100°F and winter temperatures no lower than 27°F. Recorded all-time extremes of temperature and low rainfall are: 110° (August), 14°F (January) and 14.39 inches. In most normal years, there is no rainless month.

SPECIES TESTED

1. *Eucalyptus tereticornis* x *maculata* (generally known in West Africa as *E. cadambae* and in India, as *E. hybrid*).

Seed origin: India

This hybrid was obtained by controlled pollination in 1937 at the Nandi Hills nursery, south India (elevation 3000', rainfall 30 in., climate frost-free). Because of back crossing, some strains of the hybrid are today hard to distinguish from *E. tereticornis* Sm.

E. cadambae is a tree of medium size for a eucalypt, reaching heights of 100 feet. The bole is straight on good, deep soils but frequently somewhat crooked on shallow ones. Under suitable conditions growth is rapid. The timber is strong, moderately durable, with uniform texture and interlocked grain. Tests at the Forest Research Institute, Dehra Dun, India show that the tree makes a fair quality paper pulp, and it perhaps makes also a suitable dissolving pulp.

This hybrid is grown extensively on the tableland of Deccan (elevation 2,000-3,000 feet) in peninsular India, and has done well on the coastal plain of the Gulf of Guinea in West Africa.

2. *Eucalyptus grandis* (Hill) Maiden.

Seed origin: India

The tree grows rapidly and attains heights of 180 feet and diameters up to 5 feet. Its medium light, red, and durable timber has been extensively used for paper pulp in Africa, and tests in India show it to be satisfactory for dissolving pulp.

This Australian tree has been grown for over 50 years in South India at elevations up to 6,500 feet (approximate latitude N. 9° 50', rainfall 150 to 200 inches, soil high level laterite-loam).

3. *Eucalyptus citriodora* Hook. (Lemon scented spotted gum).

Seed origin: Australia

This tree, widely planted for its timber, and for the citronella oil in its leaves, is also suitable for paper pulp. Growth is rapid under favorable conditions. At the Ghana School of Forestry (West Africa), foot-high seedlings planted in August, 1962, were 20 feet tall by November, 1963.

E. citriodora has been planted extensively near São Paulo, Brazil, in China, U.S.S.R., South Africa and elsewhere around the world. In India it has done well at elevations up to 3,000 feet as far north as 32° north latitude, where it is exposed to annual frosts.

In the experimental area at Harlingen, also, there are two plants each of *E. robusta* Sm. (Syn. *E. multiflora* Poir.), a promising bottomland species, and *E. maculata* Hook. (one of the parents of *E. cadambae*).

Nursery Work:

The planting stock was raised at the research nursery of the School of Forestry, Stephen F. Austin State University, Nacogdoches, Texas. Seeds were sown in early April, 1968 in seed boxes, seedlings were transplanted into pots in mid-June and hardened off by regulating irrigation and sunlight. They were moved to Harlingen (350 miles away) in closed vehicles, and were planted on December 12, 1968. The seedlings were from 1 to 4 feet tall when outplanted; tops were not pruned.

Plantings and Subsequent Treatment:

The plantation site was prepared by tractor plowing, ridging, and deepening the adjoining furrows to serve as temporary, shallow, irrigation ditches. Planting was done with the balls of earth intact. The plantation was flood irrigated immediately after the planting. There was no fertilizer treatment. Irrigation was repeated as required, and the plantation was kept weeded and cultivated.

In December 1969, 1 year after outplanting, (Fig. 1) height distribution was as follows:

<i>Total Height Feet</i>	<i>Number of Plants</i>		
	<i>E. cadambae</i>	<i>E. grandis</i>	<i>E. citriodora</i>
16 and up	1	0	0
15 - 16	0	0	0
14 - 15	4	1	0
13 - 14	9	9	0
12 - 13	5	5	0
11 - 12	9	1	1
10 - 11	5	13	4
9 - 10	4	7	11
8 - 9	9	11	4
7 - 8	1	10	6
6 - 7	7	11	10
5 - 6	1	5	15
4 - 5	3	5	18
3 - 4	1	4	14
2 - 3	0	0	2

Since they were planted, the seedlings have been exposed to the following below-freezing temperatures:

Jan. 5, 1969 - 29° F
 Jan. 6, 1969 - 29° F
 Nov. 20, 1969 - 29° F
 Jan. 7, 1970 - 27° F
 Jan. 8, 1970 - 28° F
 Jan. 9, 1970 - 29° F

The species on trial are known to withstand even lower temperatures provided the temperature drop is not sudden.

Survival on December 30, 1969, was as follows:

<i>Species</i>	<i>Number planted</i>	<i>Number alive</i>	<i>Survival percent</i>
<i>E. cadambae</i>	60	59	98
<i>E. grandis</i>	90	82	91
<i>E. citriodora</i>	110	85	77
<i>E. robusta</i>	2	2	100
<i>E. maculata</i>	2	2	100

There was no evidence of frost injury resulting from the November 20 freeze, or from the freezes of the previous January. An inspection of the seedlings in February, 1970 revealed no further mortality, and no tangible evidence of injury by the freezes of January, 1970.

Absence of frost damage during two winter seasons offers promise that all five species may prove hardy in the lower Rio Grande Valley. First year growth of *E. cadambae* and *E. grandis*, under irrigation, indicate these species may have high potential for fiber production.

Variations in height growth occurred in patterns which suggested they were associated with soil factors, perhaps excessively high pH.

Figure 1. *Eucalyptus x cadambae* in irrigated plantation near Harlingen, Texas. Height was 14 feet in December 1969, 1 year after outplanting.



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