PLANTING OF EUCALYPTS SHOWS PROMISE IN THE SOUTHERN RIO GRANDE VALLEY

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In the next 30 years, needs for wood and wood fiber in Texas are expected to double or even triple (1). Eucalypts, known rapid producers of wood and cellulose fiber, were therefore selected for experimental introduction in the southern Rio Grande Valley with a view toward replacing the uneconomic native dwarf oaks and mesquite.

Eucalypt species selected for planting were *Eucalyptus x (cadambae),* and E. *grandis* (Hill.) Maiden, seed origin India, and *E. citriodora* Hook, seed origin Australia. *E. x (cadambae)* has been cultivated for paper and rayon pulp in India; *grandis* has been extensively used by the paper industry in South Africa; and *citriodora* (apart from being suitable for cellulose fiber and lumber) is the world's major source of citronella oil (found in its leaves). Brazil now enjoys world monopoly for this oil, with over 6 million trees under cultivation producing 15,000 lbs. of oil annually.

Raising Eucalypt Seedlings

Eucalypt seeds are tiny: about 3,000 to an oz. for *citriodora,* and 8,000 to 9,000 to an oz. for the other two species. Commercial seeds often contain up to 80 percent chaff.

Seed was sown in flats, each 12 or 15 in. square with sides 6 in. high, drained by 6-8 holes, each 1/2 inch in diameter on the undersurface. Soil was light and permeable-one part each of loam and washed builders' sand and a small quantity of 1/4 inch mesh sieved compost. For drainage purposes, a 1-in. layer of gravel was laid at the bottom of seed boxes and covered with leaves; on this was laid a 4-1/2 in. layer of soil which was leveled and lightly pressed down. The boxes were placed in a wind-sheltered, shady spot protected from rain (3).

During the first week of April 1968, four g. of seed per square foot of sowing surface was sown of *cadambae* and *grandis,* and six g. of *citridora.*

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Uniform sowing was obtained by mixing seeds of the first two kinds with twice their volume of fine sand, those of *citriodora* with equal volume of course sand, and sieving this mixture evenly over the seed bed. A layer of sand thick enough to cover the seeds was sprinkled over the seed bed surface, which was then overlaid with a thin layer of dried, screened sphagnum moss.

Watering

Seed boxes with the small seeded eucalypts were watered with a "flit gun" by allowing its mist to settle down over the seed beds; the box with the larger seed was watered with a fine spray nozzle. The once a day (late evening) watering was liberal before germination started, and moderate to conservative thereafter, as precaution against damping off.

Germination

E. citriodora began to germinate on the 6th day after sowing; *E. grandis* and *E. cadambae on* the 8th day. Germinative vigor was the highest for *citriodora,* followed by *grandis* and *cadambae.* Approximate germinative capacity was 80 percent for *citriodora,* and 55 percent for *cadambae* and *grandis* at the end of the 24 days. As germination progressed, the boxes were allowed more sunlight hours per day to harden off seedlings and prevent their damping off.

Transplanting Technique

At the end of 4 to 8 weeks, when the seedlings were 1 to 2-1/2 inches high and their third pair of leaves began to appear, they were transplanted into 8 in. (diameter) x 10-in. pots containing soil similar to that used in flats (fig. 1). The plants, fragile at this stage, were liberally watered, the soil around each seedling loosened with a wooden dibble and the seedling raised from the box by holding a top leaf between the thumb and index finger. Its root system was then lowered into a hole made with the dibble in the pot soil, and the soil firmed around the roots. The smaller seed-

Figure 1.

lings were lifted off the seed boxes with a small column of soil sticking to their root system; this was done by thrusting the blade of a table knife vertically on all four sides of the root system and carefully lifting the column of soil from below with the roots in it. Transplanting loss was 2 percent for *citriodora* and 1 percent for the others. The pots were kept shaded for 2 weeks after transplanting, then allowed more and more sunlight until by the end of October they had full overhead sunlight. Growth rate was regulated by progressively reducing weekly watering frequency from seven to six times by June's end, to five times by July's end, to three times by November's end, despite which by the date of outplanting (Dec. 12), most of the plants were 24 to 30 inches high, and a few of *citriodora* up to 48 inches high (fig. 2).

Planting in the Field

The planting site is located at the extreme southeastern corner of Texas, 11 miles north of the Mexican border and 3-1/2 miles due west of Harlingen. The country is generally flat, and 38 feet above sea level.

The soils belong to the Ramadero and Willacy series (4), sandy clay loams with clay content ranging from 22 to 30 percent. The soil is mildly to moderately alkaline, dark greyish brown, low in organic matter (less than 1 percent) and nitrogen, rich in CaO, K2O, Mg and Zn, and moderately well-drained and permeable.

Figure 2.

The climate is dry subhumid, rainfall averages 26 inches with no rainless month, annual mean temperature is 74°F. (with annual extremes 100°F. and 27°F.), and the annual P-E index range about 24 to 37.

The site was prepared by tractor plowing, ridging, and deepening the adjoining furrows to serve as temporary irrigation ditches. The plants were transported from the forest nursery at Stephen F. Austin State University, Nacogdoches, to the planting site (350 miles away) in a closed vehicle, and planted with intact balls of earth.

After planting, the area was flood irrigated; this treatment was repeated twice in 1969. There was little, if any, irrigation in 1970. The plantation was kept weeded by cultivation, without fertilizer treatment (5).

There were marked differences in survival and height growth between the northern and southern portions of the plantation, due apparently to soil differences. The soil in the southern portion with its poorer growth and higher failures has some-

what higher pH, and a much higher phosphorus and lower potassium level (table 1).

There was no evidence of frost damage resulting from freezes of 1968 up to January 15, 1971.

TABLE 1.—*Soil tests, Eucalyptus planting site*[1]

	North end	South end
Soil reaction (pH)	7.6	8.1
Calcium (CaO)		
lbs per acre	6160	>8400
percent	very high	very high
Organic matter	very low	very low
Predicted nitrogen level	very low	very low
Phosphorus (P_2O_5)		
lbs per acre	39	203
level	low	very high
Potassium (K_2O)		
lbs per acre	984	792
level	high	high
Magnesium		
lbs per acre	>500	>500
level	high	high
Salinity hazard	Nil	Nil
Zinc	high	high

[1]The values for pounds per acre are based on testing procedures used at Texas A&M Soil Testing Laboratories.

Figure 3.

Survival rates in December 1969 and December 1970 were as follows:

Kind	No. planted	Survivals Dec. '69	Survivals Dec. '70	Survivals Dec. '69	Survivals Dec. '70
		Percent		*Percent*	
E. x (*cadambae*)	60	59	56	98	93
E. grandis	90	82	75	91	83
E. citriodora	110	85	70	77	64

More failures occured nearer the southern end of the plantation. Height distribution of trees among species was as follows:

December 1969

Height range *(feet)*	Plants *cadambae number*	*grandis number*	*citriodora number*
Over 16	1	0	0
10 to 16	32	29	5
5 to 10	22	44	46
Below 5*	3	9	34

December 1970

Height range *(feet)*	Approximate tree d.b.h. *(in.)*	Plants *cadambae number*	*grandis number*	*citriodora number*
Over 25	4 -4½	6	5	0
15 to 25	3 -4	36	38	28
10 to 15	2¼-3	14	32	35
Below 10*	Under 2¼	0	0	7

*These trees are standing close to the southern end of the plantation.

Results

Unlike most forest trees, many eucalypts start bearing fertile seed in the second or third year of their life. This has advantages. *Eucalyptus x (cadambae)* (2) bore full grown flower buds by December 1970 (24 months).

Absence of frost damage during the whole or the best part of three winters, rapid growth of *cadambae* and *grandis,* and satisfactory growth of *citriodora-despite* little or no irrigation in 1970,

Figure 4.

and without fertilizer treatment-indicate that under irrigation these eucalypts have a high potential for wood and wood fiber production in the southern Rio Grande Valley (figs. 3 and 4).

Literature

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