BAREROOT PLANTING OF EUCALYPTUS

Ron Hunt
Research Coordinator,
International Paper Company,
Natchez, Miss.

Three species of *Eucalyptus*, planted in December, January, and February as bareroot, bedgrown seedlings, had 66 percent survival compared to 23 percent for container-grown seedlings.

In the tropics, *Eucalyptus* seedlings are grown in containers. *Eucalyptus* do not possess distinct resting buds and are capable of growing wherever climatic factors are favorable. Since the eucalypts have no true "dormant" period, the shock of transplanting as a bareroot seedling often results in heavy mortality. Thus, if it is possible to induce a state of dormancy with reduced leaf transpiration, the survival of bareroot planted seedlings should be enhanced.

In New Zealand, where there is a cool winter, *Eucalyptus* seedlings are successfully grown in open nursery beds and planted as bareroot seedlings (*1*). Conditioning is accomplished by root-wrenching, a process of repeatedly undercutting the seedling with a vibrating undercutter and pruning the lateral roots with rolling coulters. Th6 final product is a stiff, upright plant with leathery foliage and calloused roots that will not wilt when lifted and transplanted in direct sunlight (*2*).

This study was conducted because little success has been achieved with bareroot plantings of Eucalyptus in the Southeastern United States. Some success was shown with "washed" containerized seedlings in South Florida (*3*). This study was designed to grow eucalypt seedlings in an open nursery bed, undercut them during the late summer, plant them throughout the winter months along with container-grown seedlings, and monitor survival and early height growth.

Procedures

Seed of three freeze-hardy species—*Eucalyptus viminalis*, *E. nova-anglica,* and *E. macarthurii*—were planted in containers and sown in rows on fumigated nursery beds in May 1977. A wooden frame covered with 50-percent shade cloth was erected over the beds and seedlings were thinned to a final density of eight per square foot. Container seedings were grown outdoors in 2-by 2-inch Todd seedling trays at a density of 36 per square foot. The same seed provenance of each species was used in the bareroot and the container phase.

Undercuttings were done in July, August, September, and November. The 3-point hitch undercutter used in this study was a thick-bladed undercutting seedling lifter as opposed to the thin-bladed vibrating type used in New Zealand. In wet soil, this undercutter dragged the roots rather than slicing them, destroying portions of the beds. Irrigation followed each undercutting. No pruning of lateral roots was done in this study due to lack of proper equipment. Even with repeated undercuttings, the seedlings reached a height of 2 to 2 ½ feet by December, larger than desired and perhaps too large to plant operationally. Container seedlings averaged a height of 10 inches at the time of outplanting. Since grown outdoors, the soil plugs had frozen repeatedly though the seedlings remained green and unharmed.

The outplanting phase consisted of four replications of three treatments of three species planted at monthly intervals throughout the winter. Treatments tested were: (1) seedlings lifted and packaged moist inside a plastic bag and coldstored at 35° F for 4 days (96 hours), (2) seedlings lifted and planted the same day, and (3) standard container-grown seedlings used as a check. Coldstored seedlings were lifted 4 days prior to the planting date to allow all seedlings of all treatments to be planted the same day.

Destroyed portions of nursery beds caused during undercutting resulted in different numbers of seedlings per species. Consequently, *E. viminalis* was planted in December, January, February, March, and April; *E. macarthurii* in December, January, February, and April; and *E. nova-anglica* in December, February, and April (table 1).

Table. 1.—*Average height and survival of four replications of five-tree row plots by species, treatment, and planting date after* one *growing season.*

Planting date	Seedling treatment	E. viminalis ht. (ft.)	E. viminalis % surv.	E. nova-anglica ht. (ft.)	E. nova-anglica % surv.	E. macarthurii ht. (ft.)	E. macarthurii % surv.
December	Container	2.7	5	2.1	35	—	0
	F.L.-C.S. [1]	4.8	85	3.4	50	3.3	60
	Fresh-lifted	4.9	70	4.3	80	3.5	55
January	Container	2.2	20	—	—	1.7	5
	F.L.-C.S.	4.1	70	not planted		3.6	85
	Fresh-lifted	3.2	60	—	—	3.5	65
February	Container	3.4	65	2.1	45	1.4	10
	F.L.-C.S.	4.1	70	3.2	50	4.2	60
	Fresh-lifted	4.0	45	3.8	70	3.8	80
March	Container	3.0	45	—	—	—	—
	F.L.-C.S.	3.3	45	not planted		not planted	
	Fresh-lifted	0	0	—	—	—	—
April	Container	2.6	55	1.8	50	1.6	15
	F.L.-C.S.	4.3	20	2.4	20	2.7	55
	Fresh-lifted	2.2	25	4.1	5	3.0	10

[1]Fresh—lifted-stored 35° F for 96 hours.

Seedlings of each treatment and species were hand-planted in five-tree row plots in four replications. Forty grams of 14-14-14 Osmocote, a slow-release fertilizer, were placed in a dibble hole 3 inches from each planted seedling and the hole was closed. The spacing of trees was 8½ by 8½ feet to allow for clean disk-cultivation throughout the growing season. This study was conducted on lands of the International Paper Company at Southlands Experiment Forest near Bainbridge, Georgia.

Results

Average height and percent survival of seedlings after one growing season in the field varied by planting date and treatment (table 1). Survival of the bareroot seedlings planted in March and April was considerably poorer than survival of those planted earlier in the .winter. Warm temperatures in March and April may have caused the seedlings in the nursery beds to break dormancy, causing severe transplanting shock.

The average survival for all bareroot seedlings in this study after one growing season was 52 percent. The survival of bareroot seedlings for the months of December, January, and February only was 66 percent. As a comparison, the average survival of over 3,100 containerized seedlings of these same three species outplanted in other trials in the spring of 1978 after one growing season was 70 percent. Average survival of all containerized seedlings in this study was only 34 percent; average survival for December, January, and February was 23 percent. Low survival of the containerized seedlings was probably due to the fact they froze in the containers, but succulent seedlings grown in containers in a greenhouse and planted in the outdoor winter environment would have resulted in higher mortality. Survival of the container seedlings was slightly better in March and April.

Cold storage of moist bareroot seedlings for 96 hours did not lessen their survival from those planted as fresh-lifted.

Summary

Eucalyptus seedlings can be planted in the lower coastal plain as bareroot, bed-grown seedlings in early winter with

confidence of success. Seedlings are sturdy, easy to plant, and tall enough to be seen from a tractor (which facilitates culti vation). Survival after 4 days of cold storage is as good as that of fresh-lifted seedlings.

Research on bareroot planting of *Eucalyptus* during the early winter should be continued. The potential savings in cost of production, packaging, storage, transportation, and planting make the prospect very attractive.

Literature Cited

1. Bunn, E. H., and J. C. van Dorsser. 1969. Eucalypt nursery practice. *In* Forest Nursery and Establishment Practice in New Zealand, Forest Research Institute Symposium 9, New Zealand Forest Service, p. 142-147.

2. Bunn, E. H., and J. C. van Dorsser. 1969. Eucalypt nursery practice. *In* Forest Nursery and Establishment Practice in New Zealand, Forest Research Institute Symposium 9, New Zealand Forest Service, p. 148-155.

3. Meskimen, George. 1974. Breaking the size barrier in containerization-"washed" eucalyptus seedlings. Great Plains Agriculture Council Bulletin 68, p. 200-204.