GRAFTING LONGLEAF PINE

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Grafting has been the most successful technique for preserving and enlarging clones of all major southern pines except longleaf *(Pinus palustris* Mill.) . Graft failures in this species are at least partially attributable to the large size of stock and its slow growth, selection of scion material, timing of grafting, and care of the grafts. This paper describes a cleft-grafting method developed at the Institute of Forest Genetics. Approximately 40 percent of first-year grafts (adequate for seed orchard work) have survived.

Production of Understock

To produce understock, longleaf seedlings are grown in nursery beds for 2 years. Understock of other southern pines is not suitable for grafting longleaf. At age 5 or 6 months, the seedlings are ,thinned to about I per square foot. Roots are pruned in August of the first year and supplemental nitrogen fertilizer is added; otherwise seedlings are given standard nursery care.

Longleaf understock should have at least 6 inches of shoot growth for grafting. The 2-0 seedlings may be grafted in the nursery, transplanted to the field for grafting, or transferred to pots and grafted in the greenhouse. The understock is potted during the dormant season when soil is moist. When seedlings are lifted carefully with the roots in a ball of soil, survival of potted trees is high.

Preparation of Scions

Scions should be collected from about December 15 to March 15. Vigorous terminal shoots with succulent tissue should be selected from the upper part of the crown. They should be at least 8 inches long and have a large white bud. Stunted leaders with small grayish buds and hard woody stems are unsuitable.

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To prevent moisture loss in transit, the cut ends of scions should be covered with damp peat moss held in place with heavy nursery paper. The bundles of scions should be placed in a large polyethylene bag, tied tightly with cord. Unless used promptly, scions should be placed in cold storage at temperatures ranging from about 35° to 40° F.

Both cleft and veneer longleaf grafts were tried at the Institute, but few veneer grafts were successful. In the procedure recommended, all needles are removed from the scions and the lower end is cut back to expose fresh tissue. Tapering cuts about 4 inches long are then made on opposite sides of the scion to produce a wedge-shaped section for insertion in the cleft (fig. 1, A). Sides of the wedge are slightly concave. The understock bud is clipped and needles are stripped from the upper 6 inches of the shoot. The stock is cut down the center with a sharp knife and the scion inserted; cambium zones of scion and understock are carefully aligned. While the scion is held firmly in place, the graft is wrapped securely with rubber grafting tape (fig. 1, B).

If the scion is smaller than the understock, the cambium zones of both are aligned and joined on one side. All needles on the understock below the graft are left intact to support new growth of the seedling.

Grafting in the Greenhouse and in the Field

For grafting in the greenhouse, the 2-0 seedlings are lifted early in December and placed in 8-inch metal pots with pushup bottoms. The pots are placed in watertight vats that permit periodic flooding and draining. The greenhouse is heated to keep temperatures above freezing. Grafting starts about February 1 and continues until about March 15. Understock is potted at least 2 months before grafting so that seedlings can develop new roots and start bud growth; both processes are essential for successful grafting. In early April, grafted trees are transplanted permanently to the field (fig. 2).

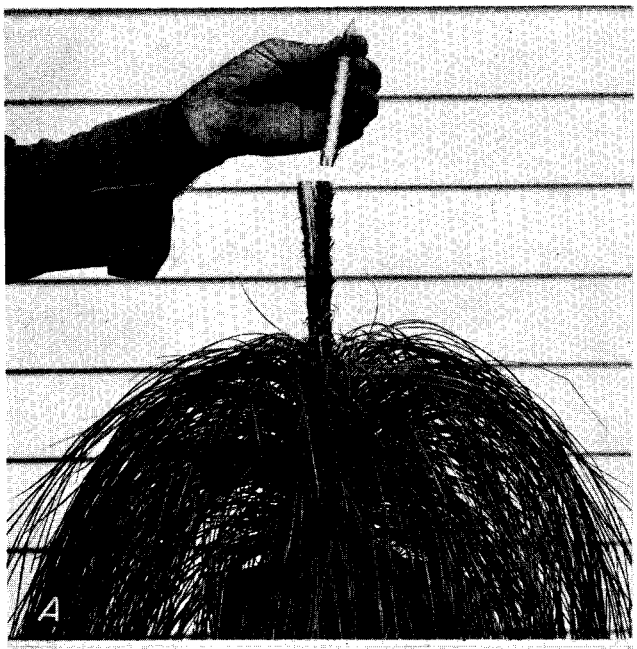

Figure 1.—*A*, Potted understock and scion prepared for grafting; *B*, graft wrapped with rubber grafting tape before applying the aluminum foil cover; *C*, aluminum foil cover on longleaf graft.

For field grafting on the Gulf Coast, 2-0 nursery seedlings to be used as understock are potted in December, grown in the lath house for 2 or 3 months, then outplanted. The trees may be grafted immediately after transplanting, but scion growth will be more rapid if grafting is deferred for a year. If 2-0 nursery stock is not available, 1-0 seedlings may be planted at permanent locations; with cultivation and fertilization they attain grafting size in 2 or 3 years.

Field grafting should begin when the terminal bud of the understock starts to grow. Grafting can continue until about April 1 on the Gulf Coast.

Protection and Care of Grafts

Wrapping new grafts in strips of heavy-grade aluminum foil costs little and is good field protection

Figure 2.—A graft made in the greenhouse 2 years after planting in the field.

against wind, rain, and heat. The strips also protect against high temperature in greenhouses (fig. 1, C). They are about 1.5 inches wide and long enough to cover the graft completely. The foil is placed around the base of the graft and wrapped tightly in a spiral to the base of the bud. The wrap is continued to about 2 inches above the bud in a loose spiral, then closed, and folded to form an air pocket. When the bud begins to grow, it will usually force the foil cap up without injuring itself. Tape and aluminum covers should be removed when height growth has begun.

Intensive cultivation and fertilization promote growth of grafted longleaf. Sprays for brown spot control are usually needed. Lateral shoots that develop near the graft should be removed to permit the scion to achieve apical dominance.

Height Growth of Grafts

Rate of height growth of successful grafts is closely related to size and vigor of the understock. At the Institute, height growth of grafts was more rapid on 2-0 seedlings transplanted in the field for 1 or 2 years before being grafted than on potted understock held in the greenhouse (table 1). On field grafts growth was most rapid on 5-year-old longleaf seedlings that ranged from 3 to 5 feet tall.

TABLE 1.—*Average growth of grafts in field and greenhouse* [1]

Location	Understock height	Scion growth	
		1st year	2nd year
	Feet	*Feet*	*Feet*
Greenhouse _____	3.5	1.7	3.1
Field _____	.5	.7	2.1

[1] Mean growth of 23 field grafts and 22 greenhouse grafts.