Improved Techniques Developed for Grafting Slash and Longleaf Pine

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Difficulties encountered in grafting mature longleaf pine *(Pinus palustris* Mill.) for establishment of seed orchards are well known. To circumvent the problems created by the "grass stage" in longleaf pine, seedlings grown from windpollinated seed from a natural hybrid of slash *(P. elliottii* Engelm.) and longleaf pine can be used for rootstock. The seed is sown at 10by 10-inch spacing in the nursery bed in the spring. The resulting seedlings do not have a grass stage and reach sufficient diameter in one growing season for use as grafting stock for longleaf scions. These seedlings are lifted with a council tool and potted in the fall after height growth ceases. They are then placed in the greenhouse, where grafting is done in February. After grafts become established, they are put outside to harden off. Grafts can be outplanted in the seed orchard in spring or early summer. Longleaf grafts grow well on this rootstock.

Our grafting experiments at Olustee with these two species are described in the following paragraphs.

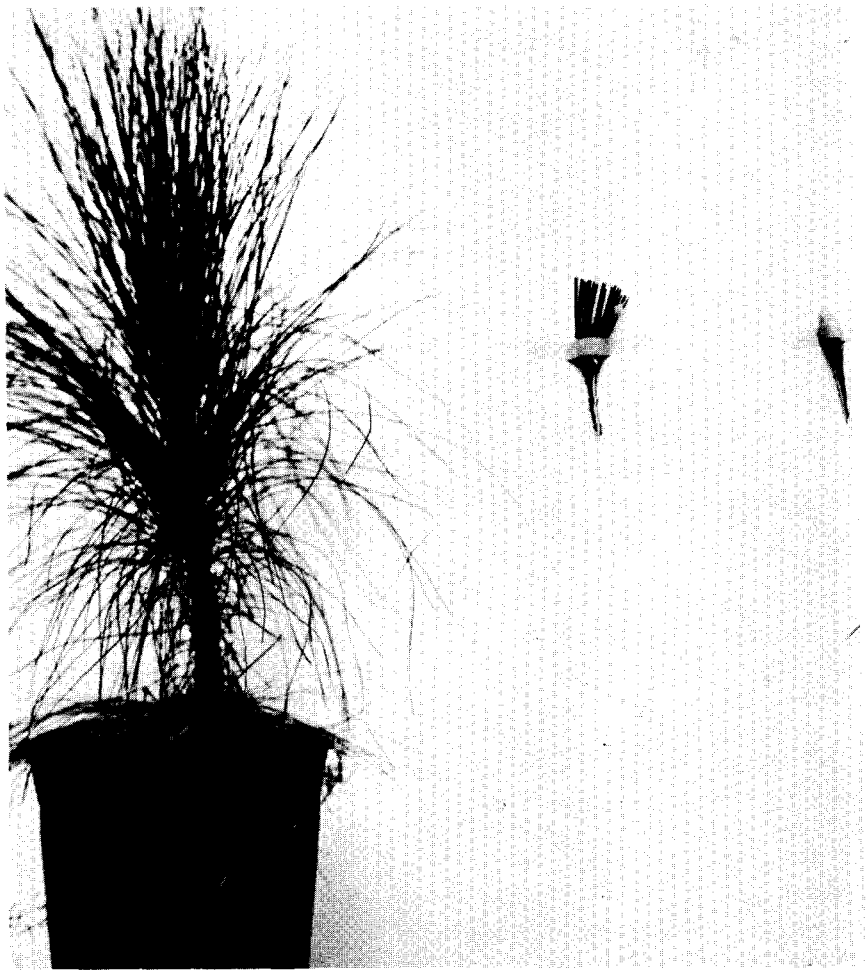

Figure 1.—Potted seedling from slash-longleaf hybrid and longleaf scions (with and without needles) prepared for grafting.

Experiment 1

Methods

Previous to 1969, slash pine grafts were made on widely spaced seedlings in the nursery bed. These grafts were lifted with a large council tool in the summer and outplanted in the seed orchard after summer rains started in June. Mortality after outplanting sometimes posed a problem, especially during dry seasons. In 1969, an experiment was initiated with potted seedlings for grafting stock. In November, 567 seedlings were lifted and potted. Two hundred were placed under lath shade, and 367 were placed in the greenhouse. Cleft grafting was started in January and completed in February.

Results

Of the 200 slash pine cleft-grafted under lath shade, 113 (56.5 percent) survived. In the greenhouse, 361 (98.4 percent) of the 367 cleft grafts survived.

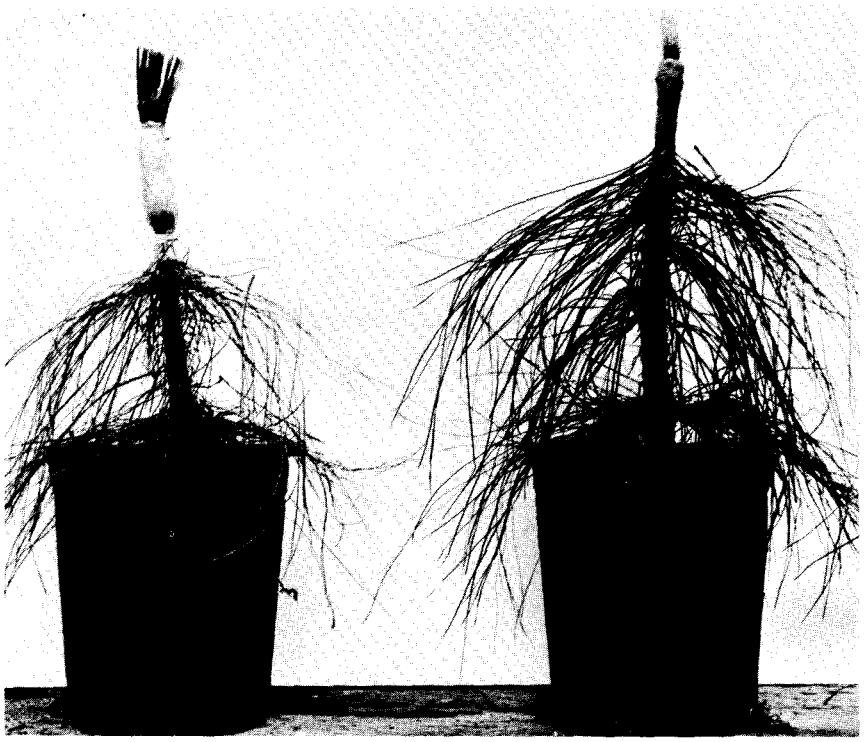

Figure 2.—Completion of uncovered graft of longleaf scion without needles and of covered graft with needles left on the scion.

Experiment 2

Methods

A preliminary study with longleaf pine was conducted in 1970 to determine the relative merits of grafting in the nursery bed versus grafting on potted material under partial shade or in the greenhouse. Thirty scions were cut from each of six selections of mature longleaf. Ten scions from each were cleftgrafted in the nursery bed, 10 tinder a lath shade, and 10 in the greenhouse. Seedlings from the natural hybrid were used .for rootstock in all cases.

Grafting techniques included leaving a few clipped needles on all scions and covering the trees under lath shade and in the nursery bed with a plastic bag plus a kraft hag cover. Grafts in the greenhouse were left uncovered. Previous experience with greenhouse grafting of slash pine indicated that cover ing here did not improve survival significantly.

Results

Survival in the field after one growing season was 9.4 percent overall. Survival was 12 percent for material grafted in the greenhouse and 8 percent for that grafted under lath shade or in the nursery bed. The poor survival may be attributed in part to the needles and the older wood left on the scions. Greenhouse grafting is performed on actively growing rootstock, while grafting under partial shade or in the nursery bed is performed on relatively dormant rootstock.

Experiment 3

Methods

In 1971, five of the same trees were again used as a source for scion material. The rootstock was handled as described in the opening paragraph. However, because a late planting of seed from the natural hybrid resulted in insufficient rootstock of suitable size, slash pine rootstock was used to supplement the supply. All grafts were made in the greenhouse in February on actively growing rootstock. Thirtyone cleft grafts were made with scions without needles and 23 were made with scions on which a few clipped needles were left. Of the 31 grafts with no needles left on the scion, 15 graft unions were wrapped with wet sterile cotton covered with a polyethylene film sheet, as is done with airlayers. The other 16 grafts without needles on the scions remained uncovered except for the rubber grafting bands. Of the 23 grafts with clipped needles, 12 were covered with the polyethylene film sheet, while 11 were left uncovered except for the bands.

Results

The best survival was obtained

by using scions with no needles attached:

Grafting treatment	*Percentage survival*
Scions without needles (graft union uncovered)	56
Scions without needles (graft union wrapped)	53
Scions with needles (graft union uncovered)	18
Scions with needles (graft union wrapped)	33

No differences in survival were noted between slash versus hybrid rootstocks, and both types were used in all treatments. The use of a wrap did not improve survival of scions without needles. However, when needles were left on the scion, the wrap did increase survival significantly. When the cleft graft is used on scions without needles, it is important that the wedge be started at the base of the bud to eliminate as much old-growth material as possible, especially when using scions from old trees (70-plus years) which contain very little new growth. This method of preparing the scion material was also used by Smith and Smith (1) for grafting longleaf scions on longleaf rootstock.

Discussions and Conclusions

Mature scions of longleaf pine can be grafted in the greenhouse onto seedlings of slash pine or those of a wind-pollinated slash-longleaf hybrid. Expected survival with either rootstock is 50 percent or

Figure 3.-Established longleaf graft on rootstock of slash-longleaf hybrid.

better. The hybrid rootstock is preferred because of a greater expected compatibility with the longleaf scion material. The time required from the sowing of seed for rootstock to the outplanting of grafts in the seed orchard is a little over 1 year. Availability of suitable hybrid seed may pose a problem. Not all slash-longleaf hybrids produce seedlings of sufficient size for rootstock in one growing season. There are seven cone-bearing hybrid trees at Olustee from which suitable seedlings can be produced. Limited amounts of this seed are available to those who wish to experiment with this method.

Two other techniques that can be used to improve survival of longleaf grafts deserve mention. Jim Hickman, Tree Improvement Forester for Owens-Illinois Glass Company, White Springs, Fla., suggests enclosing the entire graft including the pot in a large plastic bag. Use of the bag practically eliminates the watering chore. At Olustee, use of our best grafting techniques in conjunction with covering a hard-to-graft selection with a plastic bag resulted in two of six grafts being successful. Six grafts made without the cover were all unsuccessful. The other technique came through Edward G. Branch, Reforestation Chief, Alabama Forestry Commission, Montgomery, Ala., and Robert G. Hitt, State and Private Forestry, USDA Forest Service, Atlanta, Ga. They suggest fertilizing both the rootstock and the ortet 1 to 2 months prior to grafting. This fertilization promotes new growth in scions and rootstock, which tend to callous and heal quicker.

Literature Cited

1. Smith, H. D., and Smith, L. F. 1969. Grafting longleaf pine. USDA For. Serv. Tree Plant. Notes 19(4): 21-23.

Champion Nutall Oak