

USE OF TREE SPADE

Oliver W. Buckles 1/

Almost every seed orchard manager has at one time or another attempted to transplant established grafts. Some have found it convenient to move a few individual ramets while others have been forced to relocate entire orchards. Longleaf workers have often found it necessary to move 3 or 4 year old plants. Success has been quite variable.

The Francis Marion Seed Orchard, located near Moncks Corner, S.C. was established to supply genetically superior pine seed to the National Forests of the coastal plain and piedmont regions of North Carolina, South Carolina, and Georgia. When completely established, the orchard will contain some 13,000 loblolly, shortleaf, and longleaf ramets, about 4500 of which will be longleaf.

At the Francis Marion Seed Orchard, efforts have centered around mechanizing the transplanting of longleaf. After using hand tools, and a home-made lifting device, a hydraulic tree spade has now been adopted for the transplanting operation. The advantages of the spade over manual transplanting are considerable when time, materials, and eventual survival are considered. This machine does an excellent job of transplanting with a minimum of shock.

Longleaf ramets previously were established in the Francis Marion Orchard by field grafting. The 1-0 longleaf rootstock was planted 3 to each site in the orchard and grafted as soon as height growth began. Thus rootstock was usually grafted 2 to 3 years following planting. Success has generally been good with this method but field grafting is rather slow as compared to bed or bench grafting. Also, the irregularity with which longleaf rootstock begins height growth requires working over the same areas two or more times in order to complete all grafts.

If an orchard site becomes vacant because of graft failure, incompatibility, or failure of the rootstock to initiate height growth, and the adjacent sites are occupied, the vacant site should be filled as quickly as possible. Otherwise, management problems may develop when a wide age differential exists between adjoining ramets. Much time can be saved by transplanting an established graft into the vacant site. Grafts up to 6 to 8 years old can conceivably be moved with the balled transplant technique using the spade. Keithley reports that using a 40" spade they are able to move 18-20 foot loblolly with a survival in excess of 90%. Thus, depending on availability of replacement grafts, vacancies could be filled for several years longer than would be possible using field grafting methods. In addition to the time saved, management problems could be held to a minimum.

1/ Orchard Manager, stationed at the Francis Marion Seed Orchard, which is maintained at Moncks Corner, South Carolina, by the Francis Marion and Sumter National Forest, Forest Service, U.S. Department of Agriculture.

The tree spade consists of 4 hydraulically operated steel spades mounted within a frame. The spades can be pushed into the ground under the roots to form a variety of ball sizes. When the 4 converging blades meet, the tree and ball are lifted and are ready for transplanting. The spade at the Francis Marion Orchard is mounted on the rear of a rubber-tired tractor and can dig a maximum ball size of 30 inches. Smaller ball sizes may be dug by hydraulically lifting the spade frame before digging.



Figure 1.--A 2 year old longleaf graft being transplanted with the tree spade.

Once the tree is lifted it can either be transported to the new location in the spade or transferred to a container. Many different types of containers are available. Wooden wire-bound boxes and boxes made of heavy corrugated organic material are made to receive the cone shaped ball lifted by the spade. Contour formed burlap bags with aluminum wire baskets are available. Home-made containers can be fashioned out of woven wire or single strand wire with a burlap liner. Home-made containers are cheaper and are satisfactory where rehandling and holding in a staging area are held to a minimum. Where the grafts can be transported to the new planting site in the spade, costs of labor, equipment, and materials are held to a minimum. An operator and helper can move 45-55 plants per day at the Francis Marion Orchard where distances average .25 to .5 mile. Longer moving distances would require transfer to containers and hauling by truck or trailer. Ball size and weight dictate some sort of mechanical lifting device where containers are used.



Figure 2.-- Longleaf being grafted in beds for later transplanting to permanent planting sites.

Due to the high degree of success in transplanting with the tree spade, bed grafting with subsequent transplanting to the orchard has been adopted as standard procedure for longleaf and loblolly at the Francis Marion Orchard. Rootstock is lined out in beds allowing adequate room for lifting (3' X 3'). These beds are located adjacent to the orchard to reduce transport time. Cost of rootstock production is reduced as a result of the centralized location of seedlings in a bed. The rootstock is grafted in the bed and after one growing season transplanted to permanent orchard locations. As an additional benefit, longleaf rootstock seems to come into height growth sooner in a bed than it does in the field due to more intensive cultural treatment.

At transplanting time the receiving hole for the tree is dug at the permanent planting location and the graft is then lifted and set in the predug site, paying attention to eliminate air pockets. The spade is equipped with a watering system designed to lubricate the cutting blades while lifting. Using this system, a root stimulator solution is applied to the ball to aid in recovery of the root system. The clean shearing cut of the spades does a minimum of damage to the root system and provides optimum conditions for healing and new root development.

Transplanting success is high. In moving longleaf and loblolly grafts 3-5 feet in height we have not experienced any mortality. To date, some 1025 longleaf and loblolly grafts have been moved. The increased efficiency with which one can establish an orchard, plus the ability to replace lost ramets, makes the tree spade a most valuable piece of equipment.