



Longleaf Note #6 - Planting Longleaf Pine on Cutover Forestland

Mark Hains, Research Coordinator, The Longleaf Alliance

Longleaf plantings have increased annually since the Longleaf Alliance started tracking seedling production and sales in 1996. At the same time, problems associated with the artificial regeneration of longleaf pine became more prevalent as landowners, tree planters, and foresters attempted to establish a tree species with which they had little previous experience. To successfully plant longleaf on a cutover or old-field site one must be aware of several seedling attributes unique to longleaf pine.

An early focus of the Longleaf Alliance was the close examination of widely held beliefs or theories about the artificial regeneration of longleaf pine. Generalizations were commonly accepted that kept people from planting longleaf pine, or, led to planting failures when varied environmental conditions showed these theories to be inconsistent. We have identified some of the more persistent **misconceptions** as:

- #1 Longleaf pine is impossible to plant successfully.
- #2 Bareroot longleaf is impossible to plant successfully.
- #3 Seedlings will stay in the grass-stage for several years.
- #4 Container-grown seedlings are too expensive.
- #5 Container-grown seedlings are always better than bareroot seedlings.
- #6 It is OK to plant longleaf in the spring as long as you use container-grown seedlings.
- #7 Planting seedlings deep is better than planting shallow.
- #8 Clean-old fields or pastures are easier to reforest than trashy cutover sites.

From our experiences, these statements are often false.

Contrary to popular belief, it is much easier to establish longleaf pine on cutover sites than in fertile old fields recently removed from row cropping or pasture use. Ag sites have particularly aggressive weed species that are usually not prominent on cutover sites. The additional effects of residual herbicides, fungal pathogens, insect pests, drought, a wide range of pH's, make old agricultural sites some of the most challenging areas imaginable for longleaf restoration efforts.

Whether the site is a cutover or an agricultural site, observations, research, surveys, and practical experience have demonstrated that a few key factors, if properly addressed, will almost always result in successful longleaf pine plantings.

- #1 **Apply the proper site preparation prior to planting;** through mechanical, chemical, or fire-related means.
- #2 **Plant early.** Having all your seedlings in the ground before Christmas greatly increases your chances of a successful planting. Good quality container-grown seedlings planted at the Solon Dixon Center in December 2000 had 4" of new root growth by mid-March, 2001. Even if a prolonged drought ensues this summer, these seedlings will probably survive.

#3 **Plant good quality seedlings.** Container grown seedlings improve your chances of success. However, a good quality bareroot seedling is more desirable than a poor quality container grown seedling. Ask around. The nursery should be able to provide references from tree planters, satisfied landowners, and foresters.

#4 **Plant the seedlings at the correct depth.** Research conducted by the Longleaf Alliance indicates “deep planting” which covers the terminal bud is severely detrimental to seedling survival and growth.

#5 **Control competition through the first growing season.** Late germinants may be particularly problematical in old fields. Agricultural sites may require two herbaceous releases the first growing season.

In general, even inexperienced foresters or landowners should be successful planting longleaf pine on cutover sites. Planting longleaf pine does not require extraordinary site preparation or herbaceous release. From direct experience planting longleaf pine on several cutover sites at the Solon Dixon Center, and numerous plantings we have visited across the Southeast, we have developed a simple formula for consistently establishing longleaf pine on cutover sites.

Start with the correct site preparation. We have found that a chemical site preparation is a good first step. A chemical site preparation has three main advantages over a mechanical site preparation.

First, a chemical site preparation tends to yield better and longer-lasting control of woody and shrubby competition on most sites. While we want to maintain as much of the herbaceous community as possible, it is to our advantage to control offsite oaks, gums, hollies, and other unwanted hardwoods species. Mechanical site preparation may give you a site that looks clean, but subsequent sprouting and competition will typically be more severe when compared to a good chemical site preparation.

Second, chemical site preparations tend to retain more of the native perennial herbaceous community that is especially valuable for wildlife food and diversity. For instance, most native legumes are tolerant of two of the three most commonly used chemicals: hexazinone and imazapyr. Following a chemical site preparation, legume rootstocks often remain intact and viable, and will frequently bloom profusely one to two years after the site preparation was applied. On the other hand, an intensive mechanical site preparation will generally eliminate many of these root systems, and many of the species that invade the site will be weedy annuals.

Third, a chemical site preparation causes less soil movement. Less soil movement means more consistent planting depth and seedling placement. Since incorrect, planting depth or seedling placement frequently causes planting failures, the decreased soil movement associated with a chemical site preparation is a major advantage. The Longleaf Alliance has now established 3 separate studies looking at the effects of planting depth on container longleaf pine seedlings. From these out-plantings, survival and growth rates suffer when seedlings are planted with the terminal bud beneath the soil surface. On the other hand, seedlings planted with the plug exposed tended to perform as well as seedlings planted at the “correct” depth. Ideally, the plug should be slightly covered or slightly exposed, and the terminal bud should be well above the surface once the soil has finished settling.

A consistent formula for artificially establishing longleaf pine on cutover sites without a longleaf overstory is: clearcut, apply chemical site prep., burn, and hand-plant good quality container-grown seedlings early in the planting season.

Even in drought years, we have witnessed excellent survival rates among seedlings that went 6-8 weeks with no significant precipitation the spring following planting. Good quality container grown seedlings appear to handle the stress of extended dry periods better than do

bareroot seedlings. For example, in 1998 three sites on the Solon Dixon Center were clearcut and site prepared using chemical only, mechanical only, or chemical and mechanical site preparation methods. The sites were then divided in half and planted equally between bareroot and container longleaf pine. The following spring was very dry and 1-year bareroot survival averaged 55% across the three sites. Container seedling survival averaged 95%.

Where container seedlings allow the landowner to be successful in one planting versus two plantings with bareroot seedlings, a large differential in seedling price is easily justified. On these three sites it was significantly cheaper to plant once with container seedlings as compared to buying seedlings twice, planting twice, and losing one year's growth in the areas originally planted to bareroot seedlings.

When selecting container-longleaf seedlings, an emphasis must be placed on *quality*. Unfortunately, we have witnessed numerous examples of exceptionally poor quality container-grown longleaf pine seedlings being shipped to landowners and tree planters over the last 3-4 years. Oftentimes, people assume that because the seedlings are container-grown, they are always superior to bareroot seedlings. This could not be further from the truth. A good quality bareroot seedling is almost always superior to a poor quality container-grown seedling. Paying 2 or 3 times as much for a container longleaf pine seedling does not insure you will receive a seedling that is worth twice or three times as much as a bareroot seedling. Luckily, most container nurseries produce good quality seedlings. The Forest Service and the Longleaf Alliance have worked with longleaf nurseries to develop criteria for identifying good quality container grown seedlings. Please call the Longleaf Alliance for a free copy of these seedlings guidelines.

Whether you select bareroot or container stock, the earlier seedlings are planted, the better they appear to handle spring droughts. Late planted seedlings (February or March), have less developed root systems and are more likely to perish from moisture stress incurred by spring droughts or herbaceous competition. We recommend planting as early as October, given the site has adequate soil moisture.

When selecting your planting contractor for cutover sites, hand-planting crews are strongly recommended. On sites that were chemically site prepared or bedded, hand planting will typically yield more consistent planting depth and the resultant increased seedling survival and growth. Gulf States Paper is a good example of one company that utilizes this regimen. Gulf States generally tries to have all their container longleaf in the ground by Christmas.

An exception to the hand-planting rule may be areas subjected to intensive mechanical site preparation. Mechanical tree planting is a viable option on these "clean" sites, especially when planting bareroot seedlings. Cedar Creek Land & Timber is one example of a timber company that mostly machine plants bareroot seedlings on mechanically prepared, cutover sites. Cedar Creek and other companies that consistently achieve good survival rates with bareroot longleaf know that bareroot seedlings should be planted within hours of lifting from the nursery. At the longest, try to have your bareroot planted within 2 days of lifting. Don't stack bundles of seedlings, and the shorter the distance between your planting site and the nursery, the better.

After planting your seedlings, you need to consider applying a herbaceous release the spring following planting. The most commonly used herbicides for herbaceous release on cutover sites are hexazinone (Velpar DF or L), sulfometuron (Oust), and imazipyr (Arsenal). Hexazinone and sulfometuron are also premixed and sold as Oustar.

The Longleaf Alliance has examined the effects of herbaceous release utilizing Oust and Velpar on bareroot seedlings on a cutover site. Seedlings that were not released in the first growing season averaged 5.4' in height 4 ½ years post-planting. Seedlings that were released with Velpar and Oust in the first growing season averaged 9' in height at age 4 ½. With near total weed control in the first two growing seasons, seedlings averaged 12.1' in height at 4 ½

years post-planting. Contrary to what many foresters may say or think, we have found that the majority of longleaf pine seedlings will initiate height growth within 2 years if weeds are controlled in the first growing season.

These are some general recommendations for successfully establishing longleaf pine on cutover sites. Follow these guidelines, and you should be successful planting longleaf pine the vast majority of the time. In the next issue of *Wildlife Trends*, we will discuss artificial regeneration of longleaf pine in old fields and pastures.

The Longleaf Alliance has just completed production of a video on artificial regeneration of longleaf pine. To purchase a copy of this video, or to acquire information on seedling availability, planting depth, herbaceous release, or any other aspect of longleaf pine management, please call us at 334-427-1029. Email: lla@alaweb.com. Or, visit our website at: <http://www.longleafalliance.org/>