

# EARLY LIFTING AND EARLY PLANTING CAN CONTRIBUTE TO PLANTATION FAILURES

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Abstract. --Several thousand acres of slash pine (*Pinus elliotti engelmann*) and loblolly pine (*Pinus taeda* L.) did not survive initially. Data and observations strongly indicate the most probable cause was a combination of weather conditions and sparse root systems.

## INTRODUCTION

Early in March, 1976, it was observed that an unusually large acreage of recently planted seedlings were dead and dying. This problem was located near Monroeville, Alabama, Bay Minette, Alabama, and Wiggins, Mississippi, and covered a wide range of soils and drainages. The species involved were slash pine and loblolly pine and there appeared to be no difference between machine and hand planting or between contractor and Company crews. There was, however, a difference in the percent survival between the species.

The seedlings were obtained from the Alabama Forestry Commission. Normal and routine nursery practices were used to produce these seedlings and no changes were noted as compared to past practices. The seedlings were morphological grades 1 and 2, Wakely (1) and from all appearances were dormant.

No change was noted in lifting, packing, care or handling of these seedlings.

Seedlings lifted and planted between mid-November and mid-December 1975 failed while those lifted and planted after mid-December 1975 through March 1976 are showing excellent initial survival. In years past, lifting and planting have commenced in mid-November and continued through March with no noticeable variation in initial survival.

Generally, the weather was not "average" for this planting season in this vicinity. There were more days at or below freezing, less rainfall, and same extremely low relative humidity readings.

Seedlings were picked up at other nurseries and planted with acceptable initial survival during this problem period.

This is a complex and complicated situation.

## METHOD

First, it was important to find out how many acres were going to need replanting, etc. Second, what caused this failure. Third, how can we guard against such failures in the future.

Plots were taken throughout the problem areas by counting dead and live seedlings going down random rows. Ten seedlings were counted and the number of live seedlings was recorded as the percent survival. Then another random row was taken and so on.

Many people contributed time, effort, observations and comments which led to the conclusions. **Seedling** lifting dates, planting dates, percent survival and weather data ere plotted on graphs.

#### ANALYSIS

Immediately, it was **recognized** that many variables existed and that there was probably no one cause for this failure.

The following are trends picked up from the graphs:

1. Problem period - around mid-November to around mid-December 1975.
2. After about mid-December 1975, survival jumped from less than 65% to 80 and 90%.
3. During problem period slash pine survived about 18% better than loblolly pine. (Reason unknown at this time.)
4. Almost no rainfall during problem period as compared to a fair amount after this period.
5. Temperature and relative humidity lower during the problem period than after.

The following are trends picked up from field observations:

1. Early-lifted and early-planted seedlings, dead, dying and live, had not broken dormancy when observed in March, April and May.
2. Drooping of the foliage.
3. Wilting or shriveling of immature needles.
4. Bleaching to yellowish or grayish tint.
5. Browning of all the foliage.
6. Tip of seedling turning purple to bronze and turning down.
7. Observations 1 through 6 are, according to Wakeley (1) symptoms of drought not only from lack of rain but also from other circumstances which increase water out-go over water in-take.
8. Seedlings planted early and late were very carefully dug up and their root systems compared. Early-planted seedlings had sparse to no root system with no new root development and no visible mycorrhizae. Seedlings planted after the problem period had a good to excellent root system, new root development and in most cases an abundance of mycorrhizae.
9. There is a very dramatic difference in initial growth between November and December planted seedlings compared with January, February, and March plantings. The early ones will average about 1 1/2 flushes while the later ones (even March) average about 2 1/2 flushes from June observations.

10. Vigorous healthy seedlings with two or more flushes have extensive root systems with ample new growth and mycorrhizae. Small chlorotic seedlings did not compare in this regard.
11. Observations 8 through 10 were made throughout the problem area and in areas which did not have problems. Also, in making these observations both live and dead seedlings were dug up.

#### CONCLUSIONS

The lack of rainfall, along with low temperature, low relative humidity and wind, probably caused desiccation. According to Wakeley (1) root growth of southern pine nursery seedlings increases about the time top growth decreases in the fall, and remains very active throughout the lifting and planting season. Root systems of seedlings planted during the problem period were sparse while those planted later were considered adequate.

It can be said that the sparse root system could not sustain the top of the seedling when the above weather conditions hit it. Symptoms of freezing and drought, as described by Wakeley (1) were very definitely observed throughout the problem area.

It must be said that all around these conclusions, one can find bits and pieces of conflicting information and data.

1. Very carefully study Planting the Southern Pines by Philip C. Wakely, Agriculture Monograph No. 18, 1954, Forest Service, U. S. Department of Agriculture.
2. Do not lift and/or plant pine seedlings before December 15.
3. Prior to mass lifting examine root system
  - a. Important - Plant only Grades I and II seedlings, Blair and Cech (2)
4. Do not plant sites which have been without rainfall for as long as three weeks, depending on soil type and drainage.
5. After planting has commenced, if drought conditions occur, stop planting and wait for rain.
6. Do not plant immediately before, during, or immediately after predicted hard freezes.
7. Seedling care:
  - a. Seedlings packed in bales should be stored so as not to freeze in the bales.
  - b. Water seedlings often enough to keep roots damp throughout the bale.
  - c. In preparing to load planting machine, carefully separate the seedlings so as not to rip off roots and mycorrhizae. Do not beat seedlings against the machine to get the soil off and make them separate better.

- d. Take water and some kind of covering material to the field to keep broken bundles of seedlings damp and unexposed.
- e. Use a temperature probe to check temperature in the bales. Don't allow temperature to get above 80° F.

#### DISCUSSION

In the past, early planting (mid-November) has been done with good results. It is felt that if either the weather or the root systems had been "normal", these plants would have survived. This season it just happened that this planting got caught in a cross fire.

Since we cannot control the weather, but can manipulate the root system, it seems reasonable to take this route. This can be done by certain nursery practices and waiting a period, if necessary, for adequate root development.

Indications are that, if this planting had not started until after December 15, 1975, initial survival would have been upwards of 80%.

In the final analysis, it seems that the incident of the 1975-76 Plantation Failure, its economic loss and cost of replanting can be taken as an expensive warning. It is felt that closer communication with nurserymen is needed and that planting supervisors and planters need to tighten up on all practices and techniques which affect initial survival. **Also**, new techniques should be investigated or monitored such as the Portable Oscilloscope Technique for Detecting Dormancy in Nursery Stock. A technical report on this by Ferguson, Ryker and Ballard has been published by the U. S. Forest Service. (Intermountain Forest & Range Exp. Sta. Rept. INT-26 1975)

#### LITERATURE CITED

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"Planting the Southern Pines"
2. Blair, Roger and Cech, Franklin  
"Morphological Seedling Grades Compared After Thirteen Growing Seasons"  
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