United States
Department of
Agriculture

Forest Service
Southern Region

Management
Bulletin
R8-MB39

A Guide to the Care and Planting of Southern Pine Seedlings

Revised October 1996

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FOREWORD

This publication is a revision and modification of *Selecting and Planting Pine Seedlings* by David J. Moorhead (Cooperative Extension Service Bulletin 983, April 1988, Athens, GA). Members of a Technology Transfer Team on seedling care from lifting to planting are responsible for the writing and technical review of the material presented. Team members are:

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Our sincere thanks to other individuals who made suggestions and improvements and who furnished photos and other graphics. We also appreciate the fine work of Louise Foley and John Currie who did most of the editorial and layout work.

(Cartoons by Barry Nehr.)

Contents

Key Points

- Survival in southern pine plantations has declined significantly in recent years because of poor seedling care. At various points between the nursery bed and the planting site, seedlings are "critically wounded" by events that nursery workers, truck drivers, and planters consider insignificant.
- Good care begins with conditioning, lifting, and packing in the nursery, includes transportation and storage, and ends when the seedling roots are in proper contact with the soil.
- Like other living plants, a tree seedling can live only briefly in the absence of moisture, nutrients, sunlight, or air.

Planning

- The first step in the planting process is to obtain the best species and seed source for the site. Poorly adapted seedlings grow poorly or die.
- The planting season in most of the South starts in December and ends in March. In Kentucky, Tennessee, and Virginia, planting often continues into April or early May.
- Seedlings should be ordered from the nursery well in advance to get the species, seed source, and type of seedlings that are needed.

Nursery Operations

- High-quality seedlings consistently survive and grow better than seedlings of lower quality.
- Nursery seedlings must be dormant if they are to be stored.
- Gentle lifting of seedlings from the nursery beds is critical for their future survival and growth.
- Pine seedlings are commonly packed in open-end bales, kraft-polyethylene (K/P) bags, or wax-coated boxes to protect them during transport and storage.
- Dipping or spraying seedling roots with kaolin clay or a synthetic gel improves storability and field performance.

Storage and Shipping

- The ideal system includes cold storage at the nursery, refrigerated trucks for shipping, and cold storage at the district or distribution center. Seedlings in bales are able to dissipate heat better than those in bags or boxes.
- Longleaf pine seedlings and sand pine seedlings, seedlings with insufficient chilling hours, sources from, or seedlings grown near the Gulf and South Atlantic Coasts, and seedlings lifted late in the season are EXTREMELY PERISHABLE. If storage is unavoidable, it should be as short as possible.
- When there are no cold storage facilities at the planting site, take only as many seedlings as can be planted in a day.

Planting

- Roots should never be pruned after the seedlings leave the nursery.
- Delay planting if the soil is dry. To survive, a newly planted seedling must begin taking up water and nutrients quickly, and it cannot do so if the soil is dry.
- Large, level, open tracts are most easily planted by machine. Smaller or irregularly shaped tracts, sites with minimal site preparation, and rocky sites are more easily hand-planted.
- J-rooting and L-rooting slow early seedling growth. Slash, loblolly, shortleaf, and sand pine seedlings can be planted with root collars up to 3 inches below the surface of well-drained soil. In wet soils, plant only to 1 inch above the root collar.
- Plant longleaf seedlings so the bud is not buried or the root collar exposed. Their large root systems require larger and deeper planting holes than other pines.
- Maintain assigned seedling spacing.
- Pack soil firmly around roots to eliminate air pockets.
- Have a written contract that details all planting specifications, including transport and handling of seedlings, planting dates, spacing, and conditions when planting is to be suspended.

Safety

- Using the proper procedures and precautions will help ensure a completed job without injuries.
- Be very careful with pesticides.

Introduction

Despite constantly improving reforestation technology, many public and private forestry organizations report declines in early survival in southern pine plantations. Experienced managers have come to expect lower survival than they were used to 20 to 30 years ago, and they are seeing failures that cannot be attributed to insects, diseases, or adverse weather. The most common reasons for these failures are breakdowns in what can be thought of as the "reforestation system." At various points between the nursery bed and the field planting site, seedlings are "critically wounded" by events that workers consider to be insignificant. Combinations of these "insignificant events" add up to poor seedling survival or complete plantation failure.

This booklet is designed to encourage landowners, land managers, county foresters, forestry consultants, and nursery managers to be certain that their seedlings receive proper care. As a reminder, it reviews the elements of seedling care in an idealized reforestation system. For our purposes here, the system begins with lifting and packing in the nursery, includes transportation and storage, and ends when the seedling roots are in proper contact with the soil.

Despite recent progress in container seedling technology, the vast majority of southern pines raised for reforestation are bareroot seedlings. The use of container seedlings may some day reduce some of the quality-control problems described here. Most of the discussion in this booklet, however, applies to bareroot seedlings.

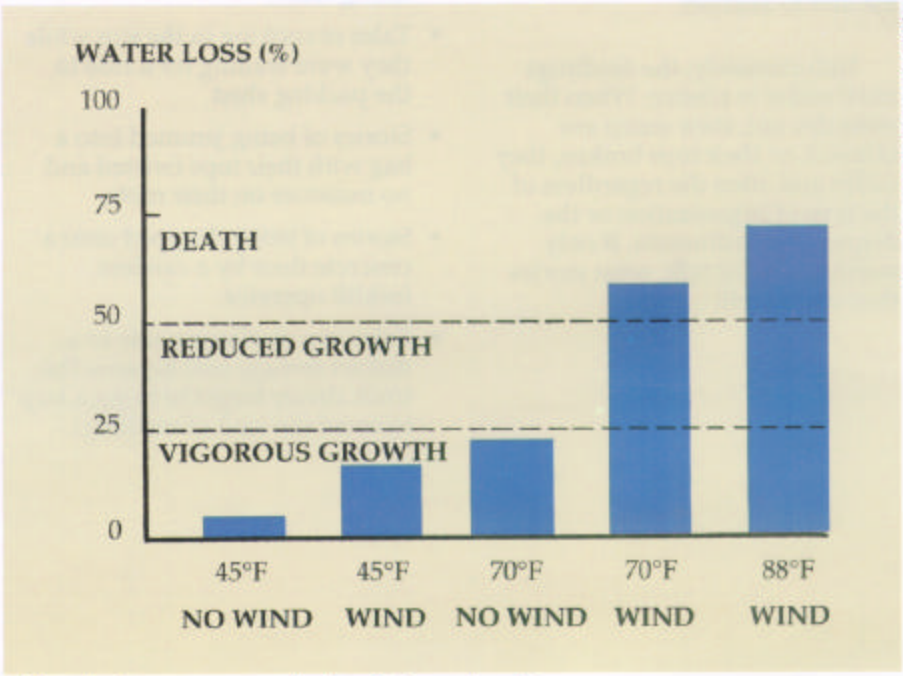
Concepts of Seedling Care

A pine seedling is a living plant. Like other plants, it can live only briefly in the absence of moisture, nutrients, sunlight, or air. When it is lifted from the nursery bed, it is deprived of nutrients, and its supplies of moisture and oxygen are highly artificial. Seedlings must be prepared in the nursery bed for the shocks they will have to endure, and they must be treated in ways that minimize those shocks. Even with the best of care, a seedling's ability to survive under these abnormal conditions is extremely limited.

The key concepts of seedling care are:

1. Conditioning seedlings in the nursery for lifting, shipping and storage.
2. Careful lifting and packing.
3. Minimizing seedling exposure to extreme temperatures, sunlight, and dry air.
4. Minimizing storage time.
5. Careful planting.

REMEMBER
The results o f harmful events are cumulative. Short exposures may seem unimportant, but several harmful events can add up to a significant loss in survival and growth.



Five-minute exposure vs. water loss in bareroot conifers.

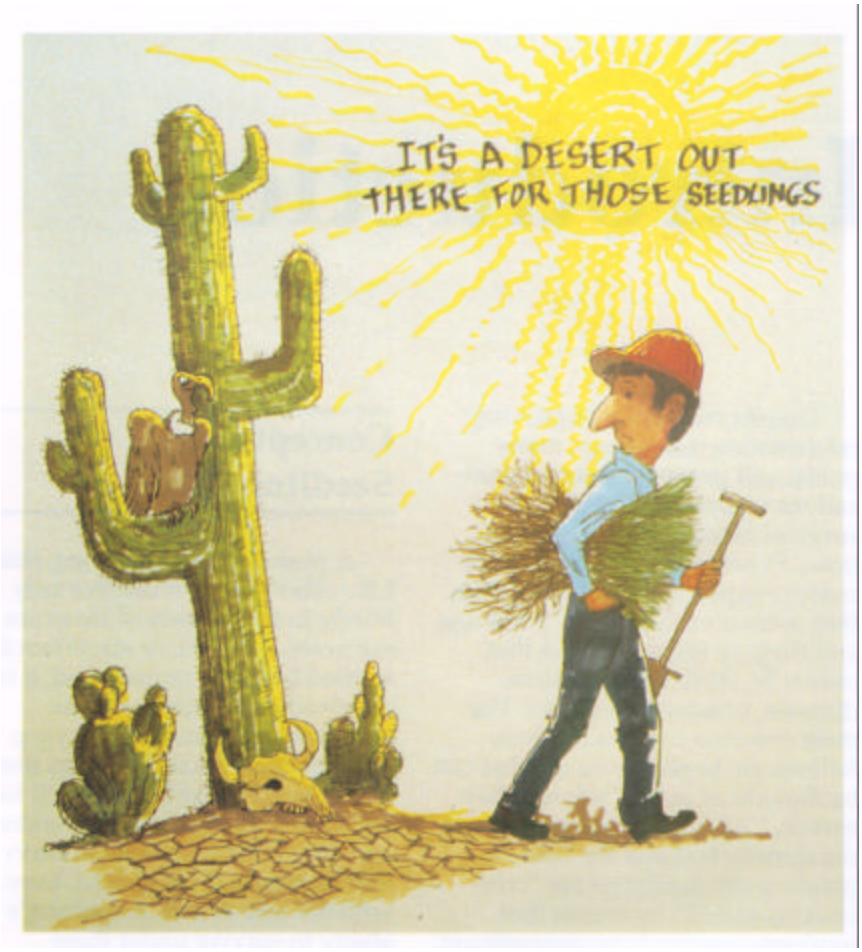
The Reforestation System

A typical reforestation system in the South includes the following components:

- A seed orchard where genetically improved seeds are grown.
- A nursery where high-quality seedlings are grown.
- A transportation and storage network that may include district storage units as well as storage at the nursery.
- Planting contractors (vendors) who plant the seedlings.

Often there are several organizations involved in this system and the coordination between the different organizations may be less than ideal. Sometimes there is a lack of coordination between units of the same organization! If, for example, an agency fosters the attitude that each branch is an independent unit, the responsibility and concern for seedling care must be passed on when the seedlings are shipped from one unit to another.

Unfortunately, the seedlings must suffer in silence. When their roots dry out, their stems are skinned, or their tops broken, they suffer and often die regardless of the type of organization or the degree of coordination. If only seedlings could talk, what stories they would tell!



- Stories of getting their roots "snatched" off by a careless lifting crew.
- Tales of cooking in the sun while they were waiting for a ride to the packing shed.
- Stories of being jammed into a bag with their tops twisted and no moisture on their roots.
- Stories of being dropped onto a concrete floor by a careless forklift operator.
- Tales of a sweltering ride to a district storage unit because the truck driver forgot to bring a tarp to cover the load of seedlings.
- Stories of being yanked out of a planting bag and then exposed to the sun and wind while the planter walked to the next field.

Successful reforestation depends on providing meticulous care throughout the system, regardless of the organization.

REMEMBER

Seedlings are highly perishable!