



Management Alert 20-03

Southern Forest Nursery Management Cooperative

PLANT SEEDLINGS EARLY AS WARMER & DRIER CONDITIONS EXPECTED

Ryan Nadel, Scott Enebak, Tom Starkey, Phil Dougherty

Assistant Research Professor, Southern Forest Nursery Management Cooperative (SFNMC), School of Forestry and Wildlife Sciences (SFWS), Alabama Agricultural Experiment Station (AAES), Auburn University, Auburn, AL; Professor, Associate Dean, and Director, SFNMC, SFWS, AAES, Auburn University, Auburn, AL; Nursery Consultant and Research Fellow (retired), SFNMC, SFWS, Auburn University, Auburn, AL; Forestry Consultant, Danielsville, GA

Over the last few years, the Southern Forest Nursery Management Cooperative has examined outplanted seedlings from numerous independent sources across the southeastern United States from our members, contractors, and landowners to determine the underlying causes for seedling mortality. For many of these instances, the late planting of seedlings was a major contributing factor to seedling mortality.

Seedlings are being planted too late for several localities in the southern US. Therefore, the Nursery Cooperative **recommends that tree seedlings be planted earlier than historical dates and that seedling storage be kept as short as possible.**

This recommendation takes into account the updated hardiness zones and the effect of transplanting non-dormant seedlings. The USDA plant hardiness zones were updated in 2012 (Fig. 1), with several zones moving north 1-2 zones, yet there has been **no adjustment to the timing of seedling outplanting.** In addition, the National Oceanic and Atmospheric Administration released an advisory (10 September 2020) that the *La Niña* climate pattern has developed that will persist throughout the winter bringing both warmer winter temperatures and drier planting conditions throughout the southern US (Fig. 2). *La Niña*, plus the updated hardiness zones, will impact the survival of outplanted seedlings **if planted too late in the season.**

SFNMC research has shown that:

- Later lift dates and longer storage durations can result in reduced seedling growth and survival.
 - Seedlings should be planted early enough to allow for root growth to start before bud break while seedlings are still dormant.
 - Planting early allows seedlings to obtain adequate chilling hours for freeze tolerance.
 - Early planting generally has good soil moisture which aids in new root growth.
 - Early planting seedlings have better seedling nutrition as seedlings have the highest plant nutrition early in the planting season. The level of nutrients in the spring determines the ability of the seedling to initiate root growth.
-

Environmental factors that increase seedling survival:

- Planting season:
 - Bareroot seedlings should be planted from November to mid-February (southern US) and from December to mid-March (Atlantic Coast).
 - Planting later than these dates will increase seedling mortality and planting failures.
- Planting weather:
 - Critical at time of and/or shortly after planting.
 - Seedlings can rapidly die due to moisture loss because of temperatures, lower relative humidity, and wind speed.
 - Seedling establishment can be negatively impacted by too little or too much rainfall
 - Seedling survival is gravely affected when temperatures are either too high or below/at/or approaching freezing.
- Soil conditions:
 - Avoid dry soil at time of planting as it increases seedling mortality.
 - Never plant seedlings in soils that are frozen.
 - For high or perched water table, delay planting until soil dries and water table recedes.

Issues that decrease seedling growth and survival

Good seedling quality in the nursery can be negated with poor outplanting survival by:

- Improper planting:
 - Ignoring existing site conditions that are not favorable for seedling outplanting.
 - Planting when environmental conditions indicate otherwise.
 - Lack of site preparation.
 - Planting too soon after timber harvest.
 - Planting too soon after chemical site preparation.
- Improper transportation and on-site storage of seedlings (temperature extremes, desiccation, mechanical injuries, storage molds).

Proper planting improves seedling survival, ensuring that seedlings are placed into the ground in a manner that will optimize their survival. These are often affected by environmental factors and planting techniques, for example: root deformation and shallow planting.

Planting techniques that increase seedling survival:

- Handle seedlings with care after picking them up from the nursery, avoid conditions that may cause seedling stress.
 - Plant seedlings as soon as they arrive at the planting site.
 - Create a good planting hole (at least 8" deep on sandy dry sites, less so on wet sites) when planting loblolly, slash, and shortleaf pine.
 - Properly align the seedling in the hole.
 - Pack the soil around the seedling to ensure contact of the soil and roots.
 - Check planting quality by gently pulling the top of seedlings.
 - Don't allow hand planters to carry seedlings out of the bag from planting hole to planting hole.
 - Don't allow root pruning or stripping of seedlings.
-

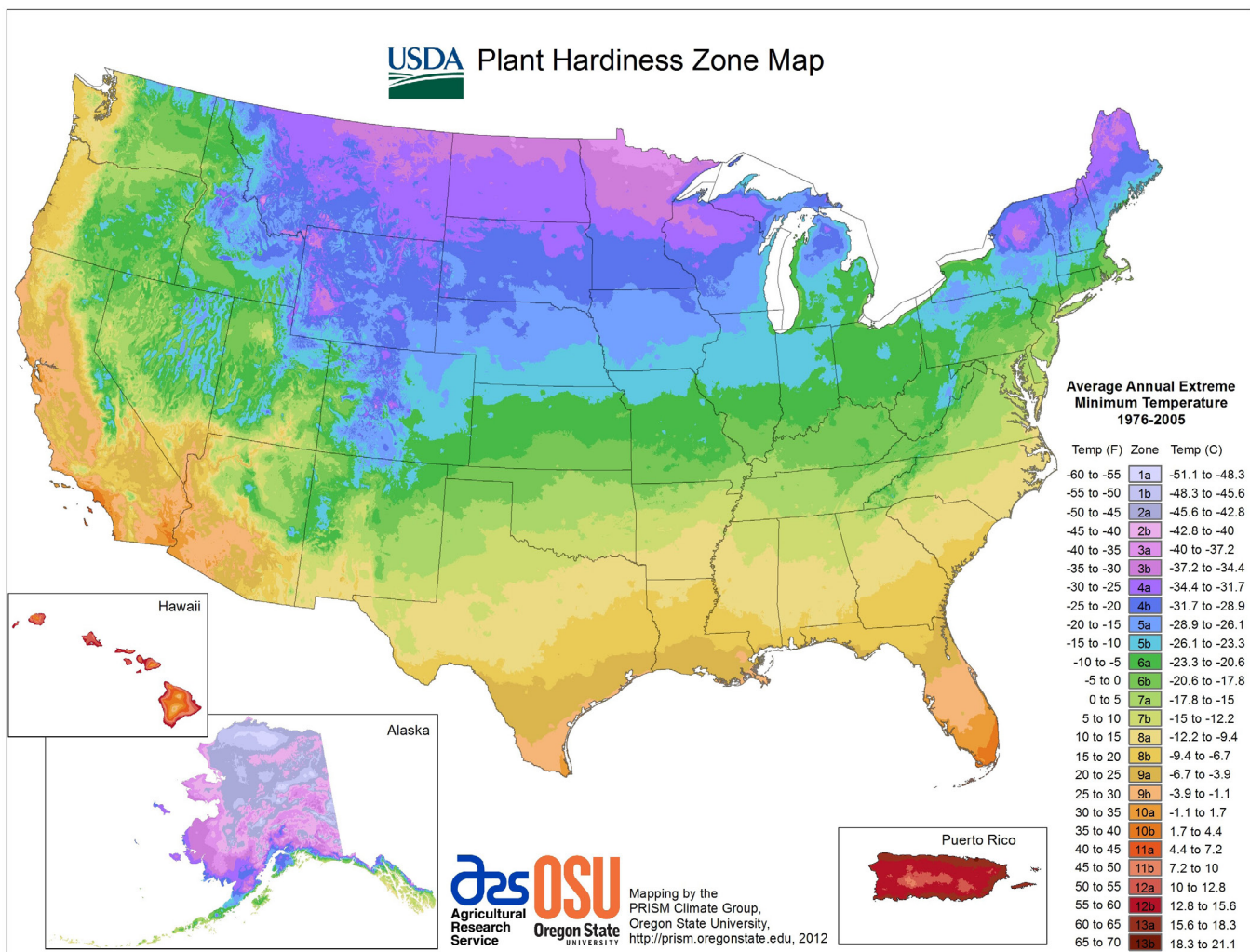


Figure 1. Plant hardiness zone map.

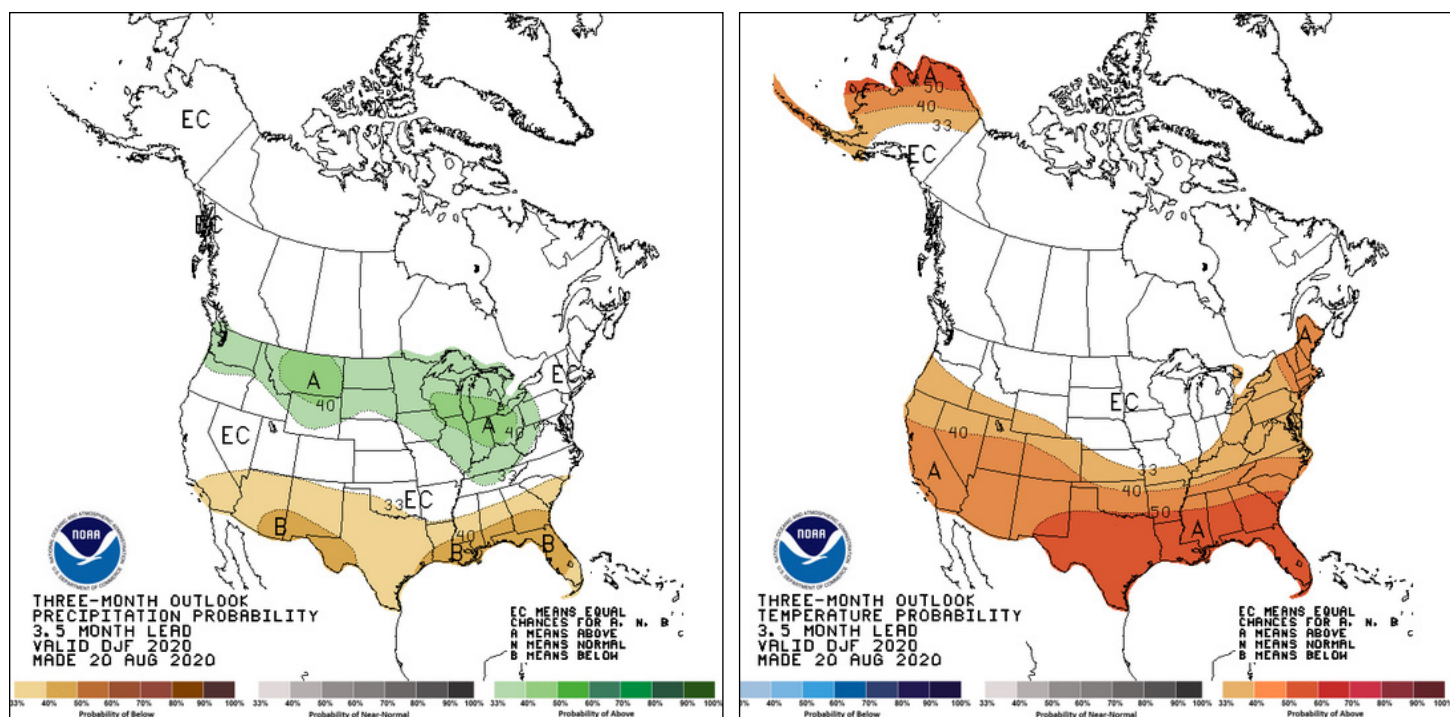


Figure 2. Predicted decrease in precipitation and increase in temperatures from Dec 2020 to Feb 2021.