



Maintaining Tree Seedling Vigor

Keep seedlings:

- **FREE FROM PHYSICAL DAMAGE**
- **MOIST (90% to 95% HUMIDITY)**
- **COOL (34° to 36° F)**

Typically, seedlings are packaged in bags or boxes

BAGS: Paper bags – 40" long, 20" diameter – hold 400 2-0 conifer seedlings, and weigh 50 lbs.

- Protect seedlings from physical damage, handle with care and do not stack more than 3 high.
- Protect from moisture loss. Keep cool (35°F).
- Protected from heat sources.

BOXES: Corrugated boxes come in a variety of sizes. Boxes provide excellent protection from physical damage and moisture loss, but exercise reasonable care.

- Keep seedlings cool (35°F).
- Protect from heat sources.

TRANSPORTATION

Refrigerated trucks or vans

Maintain cool seedling temperature (35°F) and high humidity (95%). This will assure that seedlings are delivered to the storage or planting site with the best survival potential. If refrigerated transportation cannot be provided, protect seedlings from three primary sources of heat: sun, exhaust system, and seedlings' internal respiration. If possible, transport on cool, cloudy days, early morning, late evening or at night.

Pickup truck

Large orders, several packages of seedlings

- Place styrofoam sheets on the bed of the truck to protect seedlings from engine exhaust system heat. Two sheets of plywood with cardboard sandwiched in the middle also will work.
- Place some type of spacer boards (pallets, lath, etc.) between styrofoam and first layer of packages to allow ventilation and prevent heat buildup.
- Use spacer boards or frame to separate subsequent layers of bags or boxes to allow ventilation and prevent heat buildup from respiration.
- Provide a sturdy frame for bags to avoid crushing and allow ventilation.
- Cover load with a damp canvas or cloth tarp to insulate and provide evaporative cooling.
- Cover canvas tarp with a solar reflecting tarp to protect top and sides from sun and wind.
- Securely fasten the load.
- Transport and unload into refrigerated storage as quickly as possible.

Small orders, a few packages

Transporting seedlings without protection—in a trunk, back of a pickup or cab, or crew crummy—can kill them.

- Transport small orders in the same manner as large orders, OR
- If packages fit into a large cooler, use it. Ice packs help, but don't let seedlings sit in a pool of water, OR
- Place packages in back seat, cover with reflective material; transport with air conditioning or windows open.
- Transport and unload into refrigerated storage as quickly as possible.



Seedling boxes on Styrofoam, separated with spacers • Tie down damp canvas or tarp cover

• Tie down light-reflective canvas or other material

Contact: Bill Taylor, Webster Forest Seedling Nursery 360-753-5305

SEEDLING STORAGE AND HANDLING

Respiration is the conversion of food reserves to energy.

- 60% of seedling energy is available for growing, but the remaining 40% is given off as HEAT, which can increase the temperature during storage.
- As temperature increases, respiration increases, which increases the use of the stored food reserves, weakening the seedling.

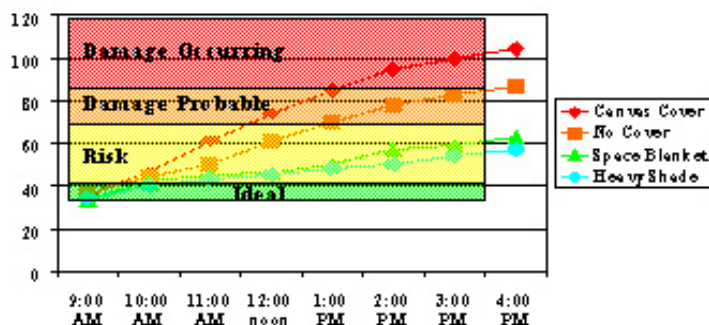
STORAGE: If seedlings will not be planted in one or two days, they must be refrigerated, maintained at 34°F to 36°F to prevent respiration and mold damage. Non-refrigerated storage in a well-ventilated shady structure will not provide adequate storage—temperature fluctuations can cause irreversible damage. Storage in a root cellar will minimize these fluctuations, but will not maintain temperatures below 40°F. If you have a large order, and inadequate storage, consider staggering your shipments.

AT THE PLANTING SITE: Store on-site one day or less. Transport only what is needed for a day's work; if storage is close to the planting site, take two trips to minimize time out of refrigerated storage.

- Protect packages from the sun – place in dense shade or wrap in a reflective tarp. A Mylar space blanket, white outer and silver inner surface, offers almost as good protection as full shade.
- Open seedling packages only when needed. If opened, reseal quickly to maintain high humidity; and repair tears or punctures.
- Do not “heel in” seedlings. This extra handling can harm seedlings.
- Minimize handling. They are most susceptible to physical damage at this time! In full shade, separate, sort culls and place seedlings in protective planting bags. If it is warm, windy or sunny, construct a temporary or mobile shelter to protect seedlings.
- If seedlings appear dry, sprinkle water on the roots or dip roots in water for one minute, but never let seedlings sit in standing water! Take care to maintain root moisture after dipping them; don't let them dry out! Roots that are visibly dry could indicate a problem.
- Place seedlings into a planting bag – a bottom layer of moist water-retaining material protects roots from warm dry air and sun. To minimize root exposure, remove one seedling at a time for planting.

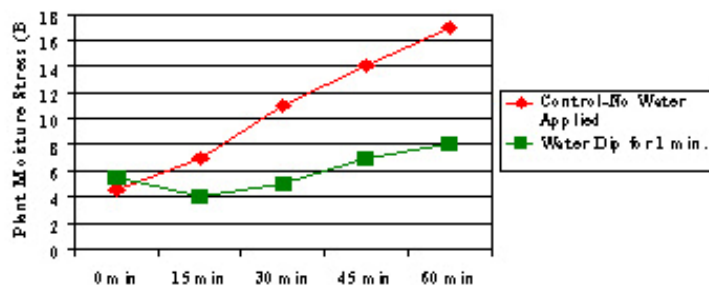
PLANT SEEDLINGS AS SOON AS POSSIBLE — THE LONGER FROM NURSERY SOIL TO PLANTING SITE SOIL, THE GREATER THE LOSS IN SURVIVAL POTENTIAL.

Sunlight Can Cause Large Increase in Seedling Temperatures



(Adapted from OSU Extension Circular 1095)

Dehydration of Water-dipped and Un-dipped Seedlings



(Adapted from OSU Extension Circular 1095)

We want satisfied customers at Webster Nursery. Please contact us if you have questions. **Seedling Sales:** 877-890-2626 **Email:** webster@dnr.wa.gov For more about DNR programs see our website: www.dnr.wa.gov; and for the Webster Webpage, type Webster into the search engine at top right.

Art from 'A Guide to the Care and Planting of Southern Pine Seedlings' (Mgmt. Bulletin R8-MB39, 1989) Cartoons by Barry Nehr.

