



## Tree Seedling Planting Guide

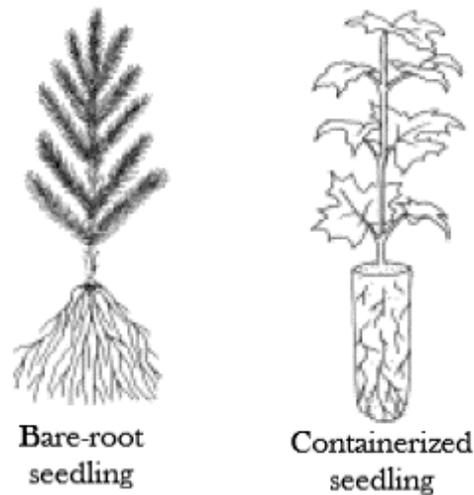
By Gabrielle Harden and Michael Kuhns

A seedling is a tree less than three feet in height. This fact sheet covers obtaining, planting, and caring for small seedling trees and other woody plants. These trees can be sold and planted as bare-root or containerized stock.

### Bare-Root and Containerized Seedling Trees

The roots of bare-root seedlings are grown close together in specially prepared beds. When dug, the seedlings are lifted and shaken, removing the soil around the root system. These seedlings have as much as 90 to 100% of their roots still intact. As they are grown, they are conditioned throughout the season to have improved physiological adaptability, controlled size, and root-to-shoot ratio, resulting in an inexpensive product.

Containerized seedlings are similar in size to bare-root seedlings (Figure 1), but they are grown and sold in small containers, with all the roots and soil (usually a soilless potting mix) still intact. Containerized seedlings, with their protected root systems, often have increased survival rates of 90% or more when compared to other transplant types. They also show improved growth on adverse sites when compared with bare-root seedlings, though they cost more than bare-root seedlings. When containerized seedlings are removed from the container they are called “plugs.”



**Figure 1.** Bare-root seedling vs. containerized seedling. Courtesy of the University of Nebraska-Lincoln.

### Site Preparation

Faster-growing plants can outcompete small seedling trees without proper soil and site preparation and care. Competition will come from fast-growing annuals and herbaceous perennials, as well as from other woody plants. Site preparation may include using herbicides to kill existing plants or to kill weeds as they germinate (called pre-emergent). Tillage is another common site preparation practice, which is done both for weed control and to loosen the soil, making planting easier and ensuring good root growth. Mowing may also be a part of site preparation, though it is more commonly used after planting to

control weed competition and as an alternative to herbicides.



### Obtaining Seedling Trees and Pre-Planting Care

Sourcing bare-root or small containerized seedlings can be difficult, as few nurseries sell these products. Many states or conservation organizations no longer grow or make seedlings available through spring plant sales. Asking local foresters is one way to find sources. The Colorado State Forest Service Nursery<sup>1</sup> has bare-root and small containerized seedlings available for purchase that can be ordered through a nursery cooperating agency or directly through the nursery. The University of Idaho Pitkin Forest Nursery<sup>2</sup> and a few other nurseries<sup>3</sup> also have small, containerized seedlings available for purchase.

Seedlings are packed and shipped in various ways, with materials surrounding roots that keep them moist and cool. Check with the grower about what to expect when your trees arrive. Either plant them immediately or put them in cold storage to decrease mortality. Store seedlings in a cool place without exposure to the sun, warm air, or wind. Seedlings can be kept in a bundle for up to a week or more if stored correctly. Keep seedlings cold (about 35 degrees F) but above freezing. Do not remove seedlings from their cold storage area until they are ready for planting. Handle seedlings with care to prevent root damage and ensure seedling success. When planting begins, only remove the seedlings that will be planted that day from

storage. While on the planting site, keep the seedlings cool, moist, and out of the sun for as long as possible. As planters head out to plant, rubber-lined bags can be used to carry seedlings. Only remove seedlings from the bag after digging the hole.

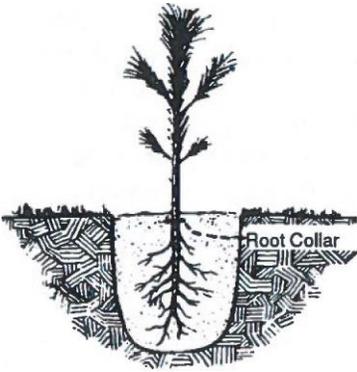
### When to Plant

The optimal time for planting containerized seedlings is in the spring. Seedlings are typically still dormant early in the spring, and the moderate temperatures and adequate soil moisture provide favorable conditions for establishment. Fall planting is possible, though the weather is less likely to be favorable for good root system establishment. If you choose to plant in the fall, proper watering is critical, as fall conditions may be too dry. Bare-root seedlings should only be planted in the spring. Fall planting does not allow bare-root seedlings enough time to establish their root systems before dormancy and frost.

### How to Plant

Using a spade, shovel, or hoedad, dig an amply sized hole. Avoid compacting the soil as this can hinder root development. Ensure that the hole is free of any debris such as leaves, rocks, sticks, or snow. Place the seedling in the center of the hole, making sure to remove containerized seedlings from the container. The top of the plug should be roughly 0.5 to 1 inch beneath the soil line (top of the root collar if using bare-root seedlings) (Figure 2). Be sure that the hole is deep enough that the bottom of the root system does not bend upward (causing J-roots). Root pruning is preferred over bending the root system if the hole cannot accommodate the root system as-is. Root-bound seedlings or circling roots can result in girdling, which can eventually kill the tree. Once the seedling is properly placed in the hole, begin refilling with soil. If planting a containerized seedling, completely fill the hole with soil and gently tamp the soil to eliminate air pockets. If planting a bare-rooted seedling, fill with soil halfway, gently tamp, fill completely, and gently tamp again. Water the seedling deeply, applying

water to the entire planting area with a hose or bucket and letting it soak in well to encourage root growth development. Should any soil settle after watering, fill the holes with additional soil, being careful to not pack the wet soil.



**Figure 2.** Proper planting depth.  
*Illustration courtesy of the University of New Hampshire.*

### Common Planting Mistakes

Common mistakes that occur during planting include shallow planting, planting too deep, and planting too loose. Planting a seedling tree too shallow will expose the root system as erosion occurs, causing the roots to dry out and feeder roots to die. When planted too deep, a seedling tree will have poor root health due to less oxygen availability and decreased soil temperature. Poor root health leads to problems such as reduced growth, susceptibility to insects and diseases, and decreased cold hardiness. Planting a seedling in loosened soil will cause the tree to settle, which can result in a tree that is planted too deeply.

### Post-Planting Care

Creating a good microclimate for your seedling tree following planting will promote growth and survival. Place seedlings on the north/northeast side of large rocks, stumps, or other similar items found on the landscape to provide protection and avoid sunscald on the south/southwest side of the tree. Prevent damage from animal browsing by placing a wire-mesh or plastic tube over the seedling. A layer of mulch surrounding the base of the seedling discourages weed growth and

provides a protective layer to prevent soil moisture loss, but rodents may tunnel under mulch in winter and feed on tree root collars they encounter. Controlling weeds for the first three years of growth will improve the chances for survival by eliminating competition. If using herbicides for weed control, ensure the seedling is compatible with the chemical or is shielded from it when applied.

During a tree's first spring and summer, provide water every 2 to 4 days. If you have water available for irrigation, water the seedlings for the first couple of years to improve establishment and initial growth. Watering needs will vary with weather, drainage, and planting season. The soil should be moist several (6-12) inches below the surface. If water availability is limited, then only plant trees that can survive with natural precipitation.

Fertilizer is not recommended in the first year of growth as it can decrease root growth. After the first year, base any fertilizer need on soil test results.



## Long-Term Care

Within one to three years, the seedling will become established and require less care. Pruning can be introduced if desired. Pruning of dead or dying branches can benefit the overall health of a tree by reducing the spread of decay while promoting new growth. Pruning can also maintain a certain shape and appearance. Being aware of species-specific pests and diseases can help prevent damage and possible death. Iron chlorosis, slime flux, root rot, aphids, and borers are some typical problems to be mindful of. For more information on the identification and control of diseases, disorders, and insect pests of common trees, reference the Utah Pests website ([utahpests.usu.edu](http://utahpests.usu.edu)).

## REFERENCES

- Colorado State Forest Service. Planting guide. Colorado State University. <https://csfs.colostate.edu/seedling-tree-nursery/planting-guide/>. Accessed March 16, 2020.
- Dumroese, R.K., Wenny, D.L., & Barkley, Y.C. (2001). Plant your seedlings right. University of Idaho, College of Natural Resources, Forest Research Nursery.

Smith, D.M., Larson, B.C., Kelty, M. J. & Ashton, M.S. (1997). *The practice of silviculture: Applied forest ecology*. John Wiley & Sons.

## Purchasing Seedlings

<sup>1</sup>Colorado State Forest Service Nursery  
3843 Laporte Ave.  
CSU Foothills Campus, Bldg. 1060  
Fort Collins, CO 80521  
Phone: (970) 491-8429  
Email: [CSFS\\_Trees@mail.colostate.edu](mailto:CSFS_Trees@mail.colostate.edu)  
[www.csfs.colostate.edu/seedling-tree-nursery/](http://www.csfs.colostate.edu/seedling-tree-nursery/)

<sup>2</sup>Pitkin Forest Nursery  
University of Idaho  
P.O. Box 441137  
Moscow, ID 83844  
Phone: (208) 885-3888  
Email: [seedlings@uidaho.edu](mailto:seedlings@uidaho.edu)  
[www.marketplace.uidaho.edu](http://www.marketplace.uidaho.edu)

<sup>3</sup>Native Plant Nurseries  
[www.forestry.usu.edu/rural-forests/native-plant-nurseries](http://www.forestry.usu.edu/rural-forests/native-plant-nurseries)

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