

AGROFORESTRY INSIGHTS

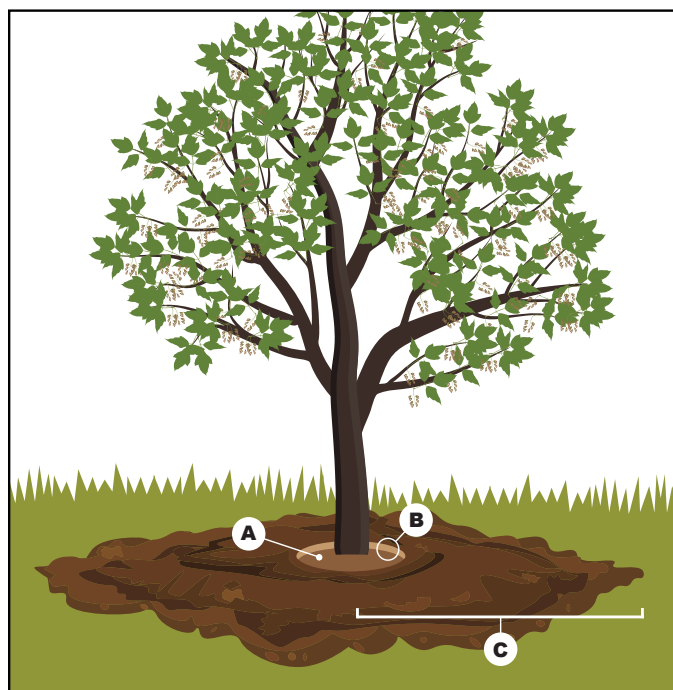
INCREASING TREE VITALITY

Establishing healthy trees is at the center of many NRCS agroforestry practices.

Getting newly planted trees to survive their first few years can be a significant challenge for land managers. Studies have estimated that average post-planting survival rates can be as low as 32%.¹ While some level of seedling mortality can be expected, producers can take steps to protect and support their new plantings. The strategies outlined below highlight ways to increase tree vitality and reduce tree mortality in agroforestry systems. This information is based on a [webinar](#) hosted by the USDA Northeast Climate Hub in December 2024, featuring Austin Unruh of Trees for Grazers.

MULCHING: The year after a tree is planted is the most critical period for tree establishment. One way to set a tree up for success is by adding sufficient mulch to cover the root area. Mulch can improve tree survival and growth by conserving soil moisture, moderating soil temperature, adding nutrients to the soil as it decomposes, and reducing soil compaction and erosion. Mulch also suppresses vegetation, limiting competition for resources during tree establishment, an especially significant challenge in silvopasture systems. Techniques to encourage vitality include mulching to a 2-4 inch depth and leaving a 3-4 foot diameter of mulch around a tree with a 6 inch gap around the trunk of the tree to prevent rot, decay, and pest damage. If using a plastic tree shelter, however, the mulch can be piled up against the shelter, bringing the benefits of the mulch closest to the tree.

Mulching Best Practices ►



Proper mulching techniques are necessary to prevent rot, animal damage, and maximize mulching benefits. For best results: (A) pull mulch 6 inches back from trunk, (B) maintain depth of 2-4 inches, and (C) cover a 3-4 foot diameter around tree. Photo by USDA Northeast Climate Hub.

Land manager checks on young trees protected in plastic tree shelters (above). Photo by Brandon O'Connor, USDA-NRCS.

VOLE CONTROL: Unfortunately, creating ideal conditions for newly planted trees can also create ideal conditions for voles and other rodents. Small rodents will chew on stems and root systems, which cause damage and can even kill young trees. Preventing vole damage typically requires producers to use a multi-pronged approach.

- ▶ **Trimming or mowing:** Removing tall grass and weeds around newly planted trees will reduce cover for voles to hide under.
- ▶ **Wire mesh and plastic vole guards:** Installing ¼ inch stiff wire mesh called hardware cloth or plastic guards (tree shelters or tree guards) can also protect the lower trunk. Expert recommendations can vary on the placement of these guards. Some suggest installing a guard encircling the tree 4-6 inches below ground and extending 18-24 inches above ground. This ensures protection of the roots and trunk, even when snow cover is present. Some suggest an exclusively above ground placement. This prevents the tree guard from becoming enmeshed in tree roots and difficult to remove.
- ▶ **Rodent repellents:** Rodent repellents made from blood meal, castor oil, or capsaicin can be used as well. It is worth noting that some land managers feel they have great success with repellents. However, there is limited data-driven research proving the effectiveness of repellents. Therefore, using in tandem with other methods of vole control may be most effective.
- ▶ **Biological control:** Options can create habitat for vole's predators (ie. owls, hawks, foxes, snakes, weasels, raccoons) or reduce vole reproduction abilities through hormone manipulation.

Vole Control Methods ▶



Six-foot plastic tree shelters reinforced by stakes can prevent browsing until trees are taller than browse height. Photo by Austin Unruh, Trees for Grazers.

DEER AND LIVESTOCK PROTECTION - TREE SHELTERS: Deer and livestock are a significant threat to new plantings because of their tendency to browse on the leaves of trees shorter than six feet. Once browsed, trees often struggle to recover. The young trees will divert energy away from root growth and into vertical growth in an effort to escape browsing pressure. Six-foot plastic tree shelters reinforced by fiberglass posts can prevent browsing until trees are taller than browsing height. In field trials, these shelters reduced tree mortality rates from 34.6% to 3.2%.² However, tree shelters must be installed correctly to avoid damaging young trees.

Benefits and Tradeoffs of Tree Shelters ▶

UTILIZING ELECTRIC FENCE: When planting trees in areas grazed by livestock, fiberglass posts add stability to tree shelters. These also act as a structure on which to run electric fence wire. Fiberglass posts are both durable and flexible. They will not rot in wet conditions and won't break if livestock or deer push against tree shelters. This approach can help subdivide pastures, supporting managed grazing systems and promoting healthy productive pastures.

To keep livestock away from new trees, electric poly-wire can also be wrapped around the tree shelter as an added layer of protection without grounding out the fence. When not electrified, the poly-wire can rest on the top of the tree shelter, allowing livestock to move freely below. Some producers also choose to use electrified fence systems to fence off paddocks with new trees for long periods of time to reduce tree damage.

Installation of plastic or mesh vole guards can protect the lower trunk from rodents (left). Photo by Austin Unruh, Trees for Grazers.

Three-dimensional electric fences can protect new plantings from deer. Fences made of three electrified strands of poly-wire in two rows disrupt deer's depth perception. This deters deer from jumping over the fence, limiting the risk they pose to newly planted trees.

Electric Deer Fence Tips ►

PLANTING TALLER TREES IN HIGH-BROWSE AREAS: Using older and taller nursery stock can significantly reduce tree mortality in areas with heavy browsing pressure from livestock or deer. Planting 8-10 foot trees can reduce losses and limit the need for tree shelters, decreasing the amount of plastic used on a property. However, in places prone to deer, trees should still be protected until they are large enough to withstand deer rubbing their antlers on them.

LIVE STAKES: Producers can also grow tall live stakes from cuttings of willows, poplars, cottonwoods, sycamores, and other species capable of rapid, straight growth. These can sometimes be purchased from nurseries or grown by producers on site. Live stakes require minimal soil disturbance to plant, needing only a small-diameter hole. This makes them particularly well-suited for planting in riparian buffer systems where soil disturbance can lead to challenges with erosion on sloped banks.

LONG-TERM MAINTENANCE: To encourage tree growth and improve survival, producers continue to pay attention to and care for their trees well after planting. Although trees generally require less care as they mature, regular inspection and maintenance ensure they continue to provide benefits to the agroforestry system and the farm as a whole. Pruning, thinning, or other management and maintenance may be needed. Long term maintenance activities include:

- **Regular mulching:** Some land managers choose to continue mulch applications after planting. Some prefer to maintain 2-4 inches of mulch over the root zone; others feel that applying one thick mulch application (approximately ten gallons per tree) is sufficient. If choosing to continue regular mulching, make sure mulch and leaf litter are pulled a few inches away from the trunk to prevent decay.
- **Weed and vegetation control:** Producers aim to maintain a 3-4 foot weed-free zone surrounding each tree for the first 3-5 years. This prevents competition for resources and discourages rodent activity near the trees.
- **Vole and wildlife damage checks:** Regular checking of root and trunk guards surrounding trees can allow managers to take action early if branches or roots are starting to grow into the devices. Producers can try new protection methods if wildlife (voles, nesting birds, insects) are causing damage to trees.
- **Pruning:** For the first two years, producers prune only dead, diseased, damaged, or crossing branches. Later, from years three to five, pruning can be used to develop a strong central leader and appropriate branch spacing.

Pruning Healthy Trees ►

References:

- ¹ Plocher, Allen E. 2003. Planted and natural tree seedling survival and density in three floodplain restorations on abandoned agricultural fields. 13th Central Hardwood Forest Conference; Gen. Tech. Rep. NC-234. St. Paul, MN: U.S.D.A., Forest Service, North Central Research Station: 431-437
- ² Ret, Erik E.; Shea, Kathleen L., 1998. Effects of deer browsing, fabric mats, and tree shelters on *Quercus rubra* seedlings. *Restoration Ecology*. 6:29-34.

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Continued attention and management of trees for years after planting encourages tree growth and increases survival. Photo by Austin Unruh, Trees for Grazers.



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