

Replanting in Burn Areas: Tips for Safety and Success

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Many private landowners, volunteer organizations and other groups plant seedling trees to reforest areas burned by Colorado wildfires. Before heading out into the field to plant, the Colorado State Forest Service (CSFS) recommends that everyone involved familiarize themselves with the following information.

Safety Considerations

Falling Trees:

Falling trees represent the primary risk to individuals working in burn areas. Trees that have been even partially burned may have weakened trunks and/or roots, and can fall at any time, putting anyone on site at risk. Even unburned trees may fall unexpectedly due to increased exposure to wind after a fire.

The CSFS recommends removing all hazard trees at a planting site prior to planting. This is especially important when badly burned, dead trees are in the vicinity. It is advisable to hire a qualified tree feller to cut down these hazard trees. Partially burned or dead trees often contain rot in the stump sections, making tree felling especially hazardous. Besides reducing the risk to life safety, another benefit of removing hazard trees prior to planting is that it reduces the risk of damage to new plantings when the trees fall or are removed. Felled trees also can be used as contour logs to control erosion in a planting area.

When electing to plant in an area that still contains hazard trees, the following guidelines can help reduce safety risks:

- **Never enter burn areas on windy days!** Even if you have a large group ready to plant, it is best to cancel to ensure everyone's safety if high winds are predicted.
- Always include a "spotter" during planting operations. The sole job of the spotter is to watch the standing trees above those doing the planting. The spotter can shout to others if they see trees swaying, or if winds are increasing and could escalate the overall falling risk. If the wind increases, everyone should move to a designated safety zone.
- **Assume that every tree in a burn area is a hazard tree.** However, trees with obvious defects should be especially avoided. Don't work in the vicinity (closer than 1.5 times the height of the tree) of dead and blackened trees or any trees with:
 - Less than 50 percent live foliage
 - Trunk injuries or large broken branches
 - Lightning scars below the top fork
 - Root rot or significant root damage
- Consider flagging around obvious hazard trees in advance to make them more identifiable to anyone working in a burn area. This might be done by creating a ring of flagging tape at a safe distance around each identified hazard tree.
- Avoid any physical contact with hazard trees.
- Maintain personal awareness. If the wind increases, stop planting and look up at the trees around you. If the trees are swaying or you are concerned about the falling risk, leave the area immediately for a pre-designated safety zone.

Tripping/Rolling Hazards:

Steep, barren slopes in burned landscapes can be difficult to navigate. Always move with caution in burn areas, and be sure to not dislodge rocks or logs that could roll down-slope into someone working below you. Conversely, do not work directly underneath anyone else on steep, unstable slopes. If you ever dislodge a rock on a slope, immediately shout "ROCK!" to alert others to the danger. Also, beware of hidden underground hazards where stumps have burned out in the fire, which leave hollow areas underfoot that are tripping hazards.

Storms/Lightning:

Badly burned hillsides may not effectively absorb rainwater. During a rainstorm, these slopes may become dangerous due to mudslides, rolling and sliding logs, rocks and other debris, and high volumes of running water. Avoid planting if significant rain is in the forecast and cease operations if heavy rains develop while working.

Approaching thunderstorms also can bring erratic, powerful winds and lightning. Be especially alert to the risk of falling trees in strong winds before a storm, and observe the 30/30 rule: if you hear the thunderclap within 30 seconds of a lightning strike, stop working outside until 30 minutes after the storm has passed. Vehicles or fully enclosed buildings provide the safest shelters.

Other Risks:

Do not approach within 5 feet of electrical wire, fences, man-made structures or other physical property on the site. Risks in these areas include broken glass, nails, live electrical wires, severed barbed wire, and jagged edges where structures have burned.

Personal Protective Equipment:

The CSFS recommends that, at a minimum, the following equipment be worn by anyone entering a burn area:

1. Hardhat
2. Leather gloves
3. Sturdy hiking boots
4. Eye protection
5. Long-sleeve shirt and long pants

Personal Responsibility:

Whether working by yourself or with a large group, always assume responsibility for your own safety. If anything about a planting site seems threatening, use your best judgment to avoid a potential accident. Do not wait for a leader to make safety calls for you.

Tips to Improve Planting Success

Seedling Selection:

Only plant seedlings that are likely to thrive on the planting site, based on shade requirements, spacing concerns, soil type, etc. A local CSFS forester can offer suggestions on the best species for your property, and provide information on the number of trees to plant based on landowner objectives and species chosen.

When to Plant:

When planting in burned areas you may need to wait to plant, depending on the burn severity, to allow the soils to first recover and grass cover to become re-established. The best times to plant seedling trees in Colorado are in the spring and fall – usually the months of March, April and October. The CSFS does not recommend planting seedlings in the summer months, when temperatures are much hotter and seedlings are expending a lot of energy during the growing season. **If drought conditions exist during and/or after planting, the seedlings may require frequent hand watering.** To obtain long-range weather predictions, go to <http://www.cpc.ncep.noaa.gov/products/predictions/90day/>. To view the current U.S. Drought Monitor map, go to <http://droughtmonitor.unl.edu/>.

Care and Storage of Seedlings:

Improper care of seedlings between the time of delivery and when they are planted is one of the greatest causes of mortality. It is best to get seedlings in the ground as soon as possible after pick-up. Until planting, keep seedlings cool and moist. Do not store seedlings in heated buildings or where they are exposed to warm air, sun or wind. Also, water potted trees frequently to keep the soil moist; one method is to submerge an entire 30-seedling tray in water for 10 to 15 minutes.

**Special Considerations for Bare-Root Seedlings: If planting is to occur within 48 hours of delivery, leave bare-root bundles intact and store in a cool place (under 50°F). If planting is not planned for more than two days, open the bundle and place the seedlings in a trench, then cover the roots with loose soil. Keep the soil in the trench moist and protect the roots from exposure to air.*

Site Selection and Preparation:

If planting on a slope, **make sure erosion control measures are in place prior to planting**, to prevent loss of soil and recently planted trees. Erosion control measures include spreading mulch and installing contour logs/log terracing after trees are felled. Log terracing can be used on burned slopes of up to 70-percent grade, if there are enough trees of adequate size, to increase infiltration, add roughness and reduce erosion. For more information about log terracing, contact the Natural Resources Conservation Service office. For general information about erosion control measures after a fire, go to <https://csfs.colostate.edu/media/sites/22/2018/07/06308.pdf>

Choose favorable micro-sites when determining planting locations to take advantage of ideal soils, appropriate moisture/shade levels for each species, depressions to collect moisture, and protection from wind and wildlife. Micro-sites often can be found near burned woody debris, stumps, logs and large rocks. If suitable micro-sites are not available, create them by moving logs and other natural debris to desirable locations. *Micro-site selection is extremely important to increase seedling survival rates!*

Some tree species, such as spruce and fir, are considered shade-tolerant and naturally grow best under the protection of existing trees. If planted in direct sunlight (which is often the case in post-burn sites), these species can be damaged from sun scorch. When planting shade-tolerant species, either select micro-sites that can provide at least partial shade, or plan on providing shade by placing large wood shingles or commercial tree shades on the southwest side of the seedlings.

Competing vegetation may be present, including established native grasses or non-native grasses and weeds. Avoid disturbing the regeneration of any native vegetation, and select planting sites that will not compete directly with native regrowth. If non-native weeds/grass are present, cut or scrape away the vegetation off the planting site, down to ground level, to a minimum 18-inch diameter area. Although weeds and grasses take

much-needed moisture away from newly planted seedlings, their roots also help retain soil. For this reason, only remove vegetation at each planting location, and even there leave all roots intact.

When reforesting burned areas, avoid planting sites that are dominated by tree and shrub species that will soon reoccupy the site from developing root sprouts, such as aspen and Gambel oak. Also, do not plant seedlings below power lines.

On Planting Day:

1. Dig a round hole 6-12" in diameter. Test the depth based on the potted seedlings, or the length of the root system for bareroot seedlings.
2. Remove seedlings from containers just prior to planting. For seedlings packed in foam blocks, grasp the main stem of the seedling near soil level and gently pull while pushing up through the slot in the bottom of the block. Cut away the plastic foam with a knife if the seedlings cannot be pulled out. Do not break the root ball or leave seedlings in sun or wind following removal from the block.
3. Place the seedling in the hole. Be sure the seedling root collar (where it was planted in the nursery) is at ground level and that the stem is vertical.
4. Pull loose soil back over the roots, filling the hole halfway. If desired, a slurry polymer can be added to the hole at this point to help with seedling hydration.
5. Lightly tamp soil down, then backfill the rest of the hole and tamp soil again. DO NOT add topsoil or peat moss, as the seedling needs to adjust to the soil it will grow in for the rest of its life.
6. Water at a rate of 1-2 gallons per seedling. Watering is the best method to settle the soil, eliminate air pockets and provide moisture to the root system. (Note: Do not compact the soil by tamping wet soil. Soil compaction eliminates oxygen, which roots need to survive!)
7. Make sure the roots do not become exposed after final watering. If so, add additional soil around the seedling to cover any exposed roots.
8. Place organic mulch (such as wood chips or pine needles) to a maximum depth of 2" around the seedlings, or install fabric mulch when appropriate, to reduce weed competition and soil-water loss.
9. Optional: If desired, dissolve and water low-nitrogen fertilizer into the seedlings. Avoid high-nitrogen fertilizers (i.e., lawn fertilizer).

**Special Considerations for Bare Root Seedlings: Create slurry by mixing a shovelful of soil (or two tablespoons of polymer) in a five-gallon bucket half-filled with water. Open the bundle, immediately place seedlings into the bucket and submerge the roots completely in the slurry. From here, plant as quickly as possible (do not store seedlings this way for more than two hours or root death may occur).*

Long-Term Seedling Care:

Watering

Periodically check soil moisture by digging up soil near the planted seedlings. Water as often as needed, at a rate of 1-2 gallons per seedling, to prevent the soil from drying out. This usually means watering every 1-2 weeks in the absence of adequate precipitation.

Fertilizing

Applying fertilizer is not necessary for most seedlings. If planning to fertilize, infrequently apply low-nitrogen fertilizer that can be dissolved and watered into the soil.

Mulching

Maintain a layer of organic or fabric mulch. Organic mulches that help block out weeds and retain moisture include wood chips, straw, peeler shavings, corn cobs and rotted sawdust. Mulch should be applied no more than 2" deep to avoid rodent problems.

Weed Control

Regularly eliminate any non-native weeds growing closer than two feet from each seedling. This can be done by hand-pulling, mulching, mowing (watch out for the seedling) or hoeing. Be careful not to damage shallow roots when hoeing. (Note: Try to leave all returning native plants intact to help with natural site regeneration.)

Wildlife/Livestock Damage

Wildlife damage will be a concern for the first few years after planting. To minimize damage from deer and elk, consider fencing off the entire planting area, if feasible. If the area is being grazed by livestock, it will be necessary to fence the area or defer grazing for a few years to allow seedlings to grow without being browsed or trampled. Commercial tree guards also can be purchased from the CSFS or a local nursery. An effective deer repellent can be made by mixing whole eggs with tap water to form a 20-percent solution; strain and spray on seedlings. Another homemade method to consider is the use of 6.2-percent hot sauce (Capsicum pepper concentrate). These products may need to be reapplied following rain. Rodent damage can be minimized by using window screening to make a rodent guard.

Common Causes of Seedling Mortality:

It is common for a high percentage of newly planted seedlings to die in the first year, due in part to the dramatic change in growing conditions after transplant. However, you can improve the success rates for your seedlings if you are aware of the most common causes of mortality:

- Improper storage before planting (i.e., roots exposed to hot, dry air)
- Lack of available water/moisture
- Seedlings planted too shallowly or too deeply
- Insect damage
- Roots tangled or not spread out
- Seedlings accidentally mowed down
- Deer/elk/livestock/rodents
- Weed-killer spray
- Competing weeds/vegetation
- Sun scorch/desiccation of shade-tolerant species

For More Information

If you have questions or concerns about post-fire replanting, please contact your local CSFS field office for more information. Field office contact information is available at <https://csfs.colostate.edu/areas>.



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