The Montana Conservation Seedling Nursery

Care & Planting Guide

MONTANA

Conservation plantings are successful when healthy, site-adapted plant material is used. Transplanting can significantly shock live plants which is why extra care must be taken to protect them. Improperly planted seedlings have little chance of survival. The following guide will help you care for your seedlings for optimal survival rates. When sowing seed ensure proper germination protocols are followed for germination success.

Pickup, Transportation & Storage

Seedlings will be delivered to your county's designated drop-off location by our refrigerated truck. Please pick up your seedlings on their scheduled drop-off day. For optimal care, transport your seedlings in an enclosed vehicle. If the back of a pickup truck or an exposed trailer is your only option, be sure to cover the seedlings with a tarp. This precautionary measure will shield the seedlings from direct sunlight and protect them from damage/ drying in the wind. Aim to plant your seedlings within one week of drop-off. Seed orders will be shipped to the address provided on your invoice, unless you've chosen nursery pickup in Missoula. If you're picking up your order, we'll notify you as soon as your seed is ready.

Our seedlings are grown to be planted in their intended destinations There is no need to pot up or transplant seedlings from one location to another

Small Container Seedlings

Small Container seedlings (10 - 27 cu. in.), are stored in freezers at the Nursery at 28 degrees to keep them in a dormant state. YOUR SEEDLINGS WILL BE FROZEN WHEN YOU RECEIVE THEM. To keep them in a dormant state, it's recommended to store them in a cool, dark place until planting. Do not store seedlings in a home freezer. Home freezers are too cold for seedling storage and will kill your seedlings. Do not break seedlings apart! If seedlings are still frozen and not easily separable, allow them a little more time to thaw. To speed the thawing process, open the cardboard box and remove the plastic bag containing the seedlings. Do not try to force them apart as root plugs could be damaged. You may notice white mycelium on the small container plugs. This is a positive sign indicating healthy and viable roots. Only seedlings that can be planted quickly should be brought out to the planting site.

Packaging: Small container seedlings are packaged in cardboard boxes measuring 32x10x6, 36x10x10 or 24x16x14 and will have 24 - 216 seedlings per box.



From left to right: Box of 48, 27 cu. in. A tray of 9 Ponderosa 175 cu. in. A bundle of 300 bareroot (discontinued). A tray of 9 Poplar, 175 cu. in.



Large Container Seedlings

It's important to note that 100 and 175 cubic-inch seedlings have different care requirements than small container seedlings. Larger seedlings are not stored in a cooler or freezer at the Nursery. They are instead stored indoors during the winter to protect the roots from harsh temperatures. These seedlings are then

transitioned out of indoor storage as soon as possible (usually within the first week of March). Consequently, they are not fully dormant during shipping. The Nursery will water all of these seedlings before shipping them out. Upon receipt of these seedlings, it is best to take them home immediately and place them outside. During transportation seedlings can be laid down and covered with a tarp to prevent wind damage. When storing keep the seedlings upright in these trays until the planting. Water as needed. **Protect the tips of your conifer seedlings. If the buds are damaged, the tree will fork.**

Packaging- The large container conifers and hardwoods (100 and 175 cu. in.) will be arranged in plastic trays of 9 seedlings. 175 pots are 4"x4" and 14" deep. Seedling height varies by species as depicted in photo on page 1.

We will happily reuse pots and trays. They can be dropped off at the nursery in Missoula, 2705 Spurgin Rd., building G.

Planting Site Tips

Favorable seedling sites have high soil moisture levels, little competing vegetation, and some protection from direct sun and wind. Soils rich in organic matter, proper pH, good aeration, and the ability to retain moisture are ideal. On most planting sites in Montana, water is the greatest limiting factor to survival. Reducing or eliminating weeds and grasses in your planting area is extremely important. Soil moisture levels can be greatly enhanced by plowing and discharrowing the site a year in advance. It is imperative to maintain a weed-free environment throughout the entire growing season.



Seedling Care at the Planting Site

During all seedling handling, ensure that the roots are shielded from heat, drying, and prolonged exposure to sun and air. Only transport the seedlings that can be planted in one day to the site.

Small container seedlings can remain in their bags during planting. Do not, however, allow direct sunlight to heat up the roots within the bags. If necessary, wet the plugs, but do not leave them in standing water.

Ensure that large container seedlings are watered before being transported to the planting site. Once at the planting site, place them in an open area, avoiding closed spaces. If it is hot, place them in the shade.

Planting

In Montana, early spring is the best time to plant due to high soil moisture levels, cool temperatures, and time to become established before freezing temperature set in. The ideal temperature range for planting is 33 to 55 degrees Fahrenheit. If temperatures exceed 60 degrees or become windy, it's advisable to stop planting until conditions improve.

A variety of planting tools are accessible, including a sharpshooter-type shovel for digging narrow, deep holes. Each planting hole must be large enough to accommodate the root system in a natural form.



A large seedling planted to the top of the plug and then watered 2 gallons





Western white pine, 175 cubic inch

A primary cause of poor seedling survival is incorrect planting depth.

Container seedlings should be planted so the surface of the plug's soil is a half-inch below final grade. Topping the plug with native soil will prevent rapid drying of the plug.

When planting container seedlings, it's important to leave the plug undisturbed. Despite a belief in disturbing roots for better growth, the Nursery does not recommend this practice, as container plugs were developed by the reforestation industry for successful tree planting without root disturbance. The general feedback indicates that survival improves without disturbing the plug.

Large seedlings need to be removed from their containers. To do so, gently tip the plant upside down and let the tree's weight aid in its removal. Press and massage the container's sides can help ease the seedling out, but avoid forcefully pulling on the seedling.

Other general planting tips:

- Don't put water in the planting holes immediately prior to planting. This can lead to excessive compaction when the soil is tamped around the roots.
- Do not pre-dig holes. Dig holes the same day you plant so the holes do not dry out or compress.
- If you use a mechanical tree planter, have someone follow behind the planter to adjust root-collar depth and tamp out air pockets.
- Select good microsites for the seedlings. Plant on the north and east side of downed logs or stumps to shade the seedling, especially on south-facing slopes. Avoid areas of dense sod.
- Remove all weeds and grass from an 18-inch area around each planting hole.
- Larch seedlings are very susceptible to competition. A good 3-foot square area should be cleared when planting larch, completely remove all vegetation around the tree for best survival.

Post-Planting Seedling Care

Watering: Ideally, provide one to two gallons of water per seedling immediately after planting, with additional watering in the first year being highly beneficial. In subsequent years, periodic deep watering is preferable over frequent light watering. During the summer, irrigate each plant with one to two gallons of water every one to two weeks. Gradually reduce irrigation in late summer to allow the seedlings to harden off for winter. Water the same volume of water but begin to lengthen the number of days between watering. In areas subject to Chinook winds, a final irrigation right before the ground freezes can help winter survival.

Fertilization: Fertilizer use on first-year seedlings is generally not recommended. After the first year, small applications of slow-release fertilizers with equal parts nitrogen, potassium, and phosphorus will aid plant growth. Follow recommended rates carefully and avoid mixing manure with the planting hole soil.

Mulch: Woven weed fabric is the best mulch for seedlings. It controls all weeds, reduces evaporation from the soil around the roots, and allows water and air to pass through. Other good mulch materials are wood chips, bark chips, straw, and composted sawdust. Mulch should be no deeper than three inches. Avoid using grass clippings to reduce attracting rodents.

Wildlife Damage: To deter deer and elk browse, limit access to the seedlings or apply repellents. Rigid net-like tubes are available from many reforestation suppliers. These are effective at discouraging browse of the terminal bud, but require annual maintenance. Repellents such as Plantskydd and TreeGuard have shown positive results. One application in the early spring appears to give decent protection for the season. To prevent rodent damage, control weeds around seedling bases with shallow, clean cultivation.

Be cautious of dog urine as it can burn seedlings, causing damage and killing seedlings over time.

Common Causes of Seedling Mortality

Seedlings not picked up promptly Improper Storage of Seedlings Roots drying during planting Seedlings planted to the to the wrong depth Air pockets left in the planting hole Over-compacted soil in the planting process Planting too late in the Spring or Fall

Best Practices for Successful Plantings Include

Selecting seedlings of appropriate size and species for the site Proper site preparation well in advance of planting Protecting the seedlings from heat and drying during handling Planting seedlings promptly after delivery Watering as needed, especially the first year after planting Pre-planning to account for any needed labor and supplies



Clear Existing Vegetation

- Mechanical Removal: Remove invasive and non-native vegetation by mowing, handpulling, or using mechanical tools. Solarizing with tarps is also an option.
- Herbicide (if needed): For persistent weeds, apply a targeted herbicide before seeding. Always follow safety guidelines and pollinator focused protocols.
- Repeated, shallow soil cultivation: For large sites, a tractor and disc can be used to disturb the soil and expose weed seeds. After the plants have slightly grown, weed growth is repeatedly tilled under many times (before plants go to seed).

Tilling and Soil Preparation

- Lightly till or cultivate the top 2–4 inches of soil to create a fine seedbed. Beware of deep tilling that may disturb soil structure or bring dormant weed seeds to the surface.
- Weed Control: Remove any large root systems and debris. Repeating light tilling or even solarization (if time permits) can reduce weed pressure.
- If soil tests indicate adjustments (like pH corrections or organic matter needs), incorporate amendments evenly.

Grading and Leveling

• Ensure the area is leveled to prevent water pooling. In some cases, slight grading helps with drainage.

When to Seed

- Fall Seeding (Oct-Mar): Best time to seed. Cold/ moist conditions stratify seed breaking down outer seed coat.
- Spring Seeding (Apr-Jun): In areas with a very short fall or at higher elevations, spring seeding might be preferable—ensure you seed early enough for plants to establish before the summer heat.
 - Improving Seed-to-Soil Contact: After broadcasting, lightly rake the area to incorporate the seeds into the soil. This step will help reduce seed being washed away by early spring rains, snowmelt, or consumed by predators.

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Seeding Techniques

- Broadcast Seeding: Evenly distribute the seed mix by hand or using a mechanical spreader. Consistent coverage is important to avoid bare patches.
- Divide seeding area into 2+ sections to help evenly distribute seed
- Add a filler material: sawdust, compost, sand can be used. 4 gal filler per 1,000 sqft. Mix seed with moistened filler material - do not over wet.

Watering

- If seeding late into the spring season and natural precipitation is low, provide supplemental light irrigation immediately after seeding. Keep the seedbed moist (but not saturated) until germination, especially in drier parts of the state.
- Areas seeded in fall, winter, or early spring do not need supplemental watering

Starting Plants from Seed

It takes roughly 3 months to grow a seed into a transplantable seedling

Plant seeds are equipped with outer coatings that protect the plant from germinating before the risk of frost has passed or during inhospitable conditions. In the natural environment seeds remain inactive until proper growing conditions are met.

Stratification: Many species require a coldmoist stratification to break dormancy. In the natural environment seed is stratified from cold winter temps and natural precipitation. Research stratification protocols using resources like ones on the <u>MNPS website</u>.

Scarification: Some seed needs to be rubbed with sand paper to help breakdown the outer seed coating. Naturally, this happens from rocks and soil rubbing against the seed as the ground freeze, thaws, etc.

We need to replicate these conditions to tell our seeds it is time to wake up and start growing! Each species has it own germination protocol

Sowing: Plant seeds shallowly, no deeper than double the width of the seed and keep seedlings carefully weeded. *Some native plants do not like to be transplanted and should be direct sown*.

Medium: Sterile seed-starting mix with sand, or perlite to increase drainage depending on species. Moisten medium thoroughly but not dripping wet.

Watering: Thoroughly saturate seedlings without damaging leaves, stems, etc. Allow seedlings to dry out between waterings until the soil is lightly moist. Watering frequencies varies depending on your temperature, wind, etc. conditions. Store seed in a cool dry place such as a basement, root cellar, etc.



Fertilizer: Low strength fertilizer or compost can be applied to seedlings after several true leaves have formed

Lighting: Light provided through a household window is generally not bright enough to sustain seedling growing. A grow or shop light can be mounted above seedling trays/ pots suspended by a chain. Start the light 2-4 in above germinating seedlings (some seeds require specific light conditions to break dormancy). Raise the light as the seedlings grow.

Proper airflow via a fan will help soil dry evenly, strengthen plant stems, etc. and reduce pests/ funguses

These categories are broad & general descriptions, you will need to research the plant species germination protocol and additional propagation techniques/ practices

Transplanting: Wait until seedlings have well developed roots or have become 'root tight' in their pots before transplanting. Dig holes properly spaced between plant species and water seedlings well post planting. Do not prewater holes - increases compaction.

Additional Resources

DNRC Nursery Resources https://dnrc.mt.gov/nursery

Audubon Society https://audubon.org/native-plants

MT Conservation District http://macdnet.org

MT Native Plant Society (MNPS) https://mtnativeplants.org/

MSU Extension https://www.montana.edu/extension/

National Wildlife Federation https://nwf.org/native-planthabitats

USDA NRCS

https://www.nrcs.usda.gov/resource s/guides-and-instructions/resourcesto-help-pollinators

Xerces Society https://www.xerces.org/

