HortNote No. 1

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Issued May 2002

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Tree and shrub planting season is upon us and I thought a review of a common establishment problem might be timely. An often overlooked aspect of the windbreak and shelterbelt installation process is temporary storage and handling of plant materials from the time they are received by the landowner until they are installed in the ground. Bareroot stock is particularly sensitive because its roots are subject to desiccation and rapid deterioration if stored and handled improperly. Many claims of "poor quality stock" are more likely the result of seedling deterioration while in the care of the landowner or producer. Here are a few tips to increase the survival, health, and performance of windbreak and shelterbelt bareroot seedlings. Remember, our goal is to have plants thrive, not merely survive in their new location.

 Coordinate planting dates with seedling delivery dates. The site should be prepared and all equipment, supplies, and labor in-place well in advance of seedling delivery. The interval from seedling drop-off (delivery) to planting should be minimized, generally 24 to 72 hours. Nurseries often provide shipping date information prior to delivery. If the local Conservation District is the drop-off point for conservation seedlings, they typically have delivery information available 1 to 2 weeks prior to shipment. The urgency of timely pickup depends on the quality of the storage facilities at the drop-off point. If an environmentally controlled cooler is available, storage for several days to perhaps 2+ weeks is possible. Optimum storage conditions vary by species, but most bareroot material stores well at 33° to 35°F with relative humidity in the 90 to 95+ percent range. If the seedlings are merely stored in a cool room, garage or shed, pick-up should occur within 24 to 48 hours - maximum. If conditions at the planting site will not be favorable for planting at the time of seedling shipping, request ground shipping directly to the location as conditions become more favorable.

 Immediately inspect the seedlings at the point of receipt! Whether the seedlings are delivered to a central drop-off point or mailed directly to the planting location, they should be thoroughly inspected upon receipt. Inspect the tops (foliage and stems) for signs of mechanical damage, weather-induced stress, and insect or disease infestation. Bareroot seedlings should be fully dormant with very little to no evidence of bud scale separation or green, actively growing tissue. The stems should be firm and smooth without a wrinkled or water-soaked appearance. A small, shallow slice of the stem should reveal a healthy green cambium layer. There should be several fibrous roots originating from the stem with no signs of insects or disease. Saprophytic white molds (fungi) are typically harmless and can be washed off the roots and foliage without incidence. Black molds cause seedling mortality, and need to be treated with an approved fungicide or, contaminated seedlings discarded. After a brief inspection, close and seal the box the way you found it. Contact the nursery supplier or County Extension office immediately (even at the pick-up point) if you have questions or concerns. (Note: Some nurseries recommend not to open sealed boxes until the day of planting, assuming proper storage conditions and less than 7 days since receipt. This may prove acceptable depending on the nursery, stock quality and other factors. I prefer to briefly inspect the stock to assure condition. Use your judgement.)

 Avoid plant stress during transport to the planting site. In Montana, farmers and ranchers often travel many miles to a central location to obtain their seedlings. They typically bring an open pickup truck to transport the seedlings and a list of errands to perform while in town. Seedlings should not sit in direct

sun, even inside a protective box, for any length of time that results in an increase in seedling temperature. Nor should the box be left open so that the seedlings are desiccated on the highway trip home. Do not crush seedlings by stacking the boxes too high. If possible, store the seedlings in boxes inside an air-conditioned cab, out of direct sun and with the air conditioning "on". Transporting boxed seedlings in the back of a pickup or car trunk is acceptable if air temperatures in these locations are less than ~45°F, perhaps as much as 60°F for short intervals (<2 hours). Wrapping the boxes with insulation or blankets will help keep the seedlings cool. A cooler(s) with ice in bags is a great way to store seedlings until they reach the planting site.

 If necessary, moisten the roots upon arrival at home. Most bareroot plants have their roots surrounded with sphagnum, peat moss, shredded newspaper, bark, or some other water-holding substrate to maintain moisture. Even dormant stock transpires moisture, although the highest moisture demand begins with active growth. The roots should never have a dry, white appearance. At the other end of the spectrum, the roots should never be saturated or water-logged. For peat based media, a good rule of thumb is that proper media moisture occurs when a handful of squeezed peat produces 1 to 2 drops of water. There should never be standing water in the bottom of the box or sack. Inspect the seedlings every 2-3 days and lightly moisten all roots as needed. The better the environmental control (cool temperatures and high humidity), the longer the interval between watering.

 If bareroot seedlings are not to be planted immediately that day, they should be stored in a cool, humid location. The sooner seedlings are planted in the ground, the better! As a rule of thumb, seedlings should be placed in the ground within ~72 hours of leaving cold storage. As an example, if seedlings where shipped by ground mail to the homeowner 48 hours prior to receipt, they should be planted within 24 hours of arrival, if refrigeration is unavailable. If planting is delayed, a refrigerator maintained at 33° to 37°F works well for short-term storage of small lots of seedlings. A cool garage, root cellar or basement also works, although shelf-life and subsequent out-planting success depends on prevailing temperatures and humidity. Even the shaded north side of a building can be used if temperatures remain cool. Keep the seedlings sealed in the original box and only open briefly to inspect and add water. Avoid freezing. Long-term storage (more than ~7 days) is not advised unless environmental control is provided. Although seedlings may be "lined-out" or "heeled-in" in a shallow trench for long term storage, this can be a tricky proposition resulting in additional plant stress (see *Windbreaks for Montana*). Your best bet is to use good planning to avoid the need for long-term storage.

 Remove from cold storage only as many seedlings as can be planted in a given time frame. If planting is planned for the cool morning hours, remove only enough seedlings from cold storage to meet the anticipated need for that time period. Always keep the root systems covered with a moist substrate (even burlap) or media until they are put in the ground. Bareroot seedling mortality can occur in literally seconds, and conifer seedlings are particularly sensitive. If seedlings are to be hand planted, transport them in a bucket or container filled with moist media. Seedlings should be stored in buckets or trays in a similar fashion when using mechanical transplanters.

 Handle bareroot seedlings with caution. Young seedlings have delicate roots that are easily damaged during handling. Never pull a seedling by the top (foliage and stems) to separate from a bundle or from packing material. Carefully open bundles, untie if necessary, and then remove individual seedlings carefully without pulling.

These few steps can make all the difference between a fully successful planting and a complete failure. When in doubt, call your USDA/NRCS field office, County Extension agent or local nursery.

See also : Laursen, S.B. and H.E. Hunter. 1986. *Windbreaks for Montana – a landowner's guide*. Bulletin 366 (July 1986), Cooperative Extension Service, Montana State University, Bozeman, MT.