

It Might Be Worth Saving

Transplanting Trees and Shrubs-Part 2: Making the Move

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Weeks or months have now passed since you made the decision to move the tree or shrub and hopefully prepared that plant for the journey. I'm sure that to some people, all of this planning seems a bit excessive. If all you are doing is moving a 24 inch Potentilla, I'd have to agree with you. Just dig it up and move it anyway you can...it WILL live. However, since a lot of other readers may be thinking about moving a 12 foot spruce, or 20 old lilacs or a 5 inch caliper basswood, the excessive planning is much more necessary.

A lot has been happening below ground since you root-pruned that tree or shrub a few weeks or months ago, but unless you have x-ray vision it hasn't been obvious. Every root that you cut during that process has rewarded you ten-fold...at least. The two photographs at left show the effect of timely root pruning. The image on top is of a green ash, immediately after root pruning. The image below is the same tree, four months later. The net result is not only a much more extensive root system, but one that is contained in a much smaller area. This visually exhibits why root-pruned plants survive transplanting so much better than those not pruned.

Before you transplant, take a look up, around and beneath. It's impossible to avoid talking about tree or shrub placement in a transplanting primer. After all, the plant is theoretically being moved to a "better" site than before. Add these next steps to your checklist:

1. **Look up.** Don't plant in a site where the mature tree or shrub can interfere with utility lines or views from windows. And don't fool yourself by thinking that regular pruning can keep the plant size in check. Too much work, too hard on the plant, too easy to forget.
2. **Look around.** Will the new placement create a blocked sight line? For instance, as it matures, will it block the view of the street from your driveway as you back out? Or the clear view at an intersection of streets? If so, don't plant it there.

If the proposed planting site is within 60 of the street, the street is a busy street and you know from past experience that a lot of deicing salt is used, don't plant the tree or shrub there unless it's known to be tolerant of Minnesota's main source of pollution. For a list of trees and their tolerances to deicing salt exposure, refer to "Minimizing De-Icing Salt Injury to Trees," (Johnson, Sucoff, 1995).

If the plant could get so broad that it would interfere with pedestrians walking by or lawn maintenance, don't plant it there thinking that pruning would contain the problem.

3. **Look down.** Actually, have Gopher State One Call look down and deep for you. I should have mentioned this in part I before you root-pruned, and hopefully none of you severed any utilities. Definitely contact them now at: 651-454-8388, or 800-252-1166, or www.gopherstateonecall.org. It seems like a bit of an annoyance, but it's cheap insurance.

While you're looking down, check the soil for compaction or drainage problems. If you can dig two

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spades lengths deep into the soil, you don't have a compaction problem. If you need to jump up and down on the shovel and have your 300 pound neighbor do it, too...you have a compaction problem. Compaction problems can be alleviated somewhat by an extensive site preparation (e.g., loosening the soil in an area 10 feet in diameter), and it's so much easier to do that before you move the new tree or shrub. Poor drainage is another story, though.

To check for drainage, dig or auger a hole 24 inches deep. Fill with water and allow it to completely drain. Fill a second time. That second filling should be drained within 24 hours. If it isn't, drainage **may** be an issue. If the transplanted tree is a sugar maple...it's an issue. If it's a silver maple, it probably isn't. Correcting soil drainage problems is difficult and often expensive. Your best move is to avoid them if they could become problematic for tree or shrub health.

Might as well have that soil tested, too. The most critical thing to determine is the soil pH (whether it's acidic or alkaline), and don't think that just because the native soils are acidic that your soil will be acidic. Most "urbanized" soils are alkaline, some just slightly and others obscenely. If the soil pH is 7.5 or so, and the transplanted tree is a river birch...don't plant it there! It WILL decline and die prematurely. And as with poor drainage, soil alkalinity is difficult and expensive to change.

(Soil testing lab: <http://soiltest.coafes.umn.edu/submitti.htm>)

I'm ready to transplant the tree but it's autumn now. Should I wait until spring? In Part I, I hinted that time of year may be more of a perceived problem, rather than a real problem. Certainly, there are some plants that are best and most successfully moved in the spring (see Part I for a partial listing), but quite honestly, there's little documented research that success or failure rates differ dramatically by seasons (obvious exceptions would be mid-winter and mid-summer).

Most of you reading this live in the southeastern part of Minnesota. That's just a demographic fact, not a location prejudice. Upstate New York is very similar climate-wise to much of Minnesota, especially the southeastern part of Minnesota. In a documented, two-year research experiment conducted by Cornell University in upstate New York (Buckstrup and Bassuk, 2000), hackberry (*Celtis occidentalis*), ironwood (*Ostrya virginiana*) and bicolor oak (*Quercus bicolor*) survived and grew just as well when transplanted in the autumn as they did in the spring. Sometimes better in the autumn. That's research-based information. It's not inclusive for every tree or shrub imaginable, but it is factual and more reliable than memory or "my neighbor said" information.

What ARE the most important factors for transplant success?

- * **Transplant as many roots as possible.**
- * ***Never* let them dry out.**
- * **Prepare the new site for root growth.**
- * **Plant the tree or shrub at the right depth.**
- * **Take care of the plant after the move, for the life of the plant (figuratively and literally).**

Transplant as many roots as possible. If you root-pruned the tree or shrub at least one season before the move, the plant now has a much more concentrated root system in a more confined area. This means that you will be able to move a much more extensive root system. The way it is moved depends on species and size.

Bare-root transplanting is just as the term implies: moving the plant's root system with little to no soil attached. Whenever possible, this is the preferred method because it is relatively simple, the (lighter) plant is easier to handle and move, any root problems become obvious and easier to

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correct, and in fact, you can usually move a larger root system this way. It is **not usually recommended** for moving conifers or trees larger than 2 inches in caliper (but those rules can be bent).



Loosening the soil.
Photo credit: Gary Johnson

Step One: If possible, dig down a few inches beyond that root-pruning trench that you dug a season ago. You will hit some new roots, but the majority of the roots will be contained within the diameter of the root-pruned area. As you are digging down, pry the shovel to lift the roots and loosen the soil.

Step Two: Loosen the soil within the diameter of the new trench. If the soil is very dry, it sometimes helps to moisten it a few inches deep the day before you dig. My implement of choice for loosening the soil is a "potato fork," which is similar to a short pitchfork with broad and flat tines. Loosening the soil is walking a fine line between freeing the roots and cutting them. You don't want to cut all the roots off, just loosen the soil from them so the plant can be lifted.

Step Three: If there are any roots growing down, slip under the root mass with your shovel or use a loppers to cut those roots. Now the plant should be free from the growing site and you can shake most of the remaining soil off.



Bare-root apple tree.
Photo credit: Gary Johnson

Step Four: Keep the roots moist. Immediately after freeing the plant from the soil, "heel" it back in with loose soil and moisten it. An alternative would be to cover the roots with wet straw or woodchips and cover with a tarp or plastic. Those roots can die in minutes when exposed to air.

Now, I've left a couple "holes" that need filling.

***Caliper.** This is the thickness of the stem, which is measured approximately 6 inches above the ground line. However, if the stem measurement taken at that point is greater than 4 inches thick, move up the stem another 6 inches and record the stem thickness at that point.

***Diameter of root mass.** The American Association of Nurserymen has developed the "American Standard for Nursery Stock." (reference and address in concluding reference section). According to the standards, a tree with a 1 inch caliper should have a 18 inch diameter bare root system...AS A MINIMUM. A 2 inch caliper tree should have a 28 inch diameter bare root system...AS A MINIMUM. For a 3 inch caliper tree, at least 38 inches. For a 3 foot tall shrub, 14 inches in diameter; 16 inches for a 4 foot shrub; 18 inches for a 5 foot shrub; and 20 inches for a 6 foot shrub.

Keep in mind that these are MINIMUM dimensions. The more roots you transplant with the tree or shrub, the more successful the move will be.

Balling and burlapping (B&B) the root system requires much more skill, patience and muscles! For those larger trees and/or conifers that traditionally move better with a soil ball surrounding the roots, this and moving the plants with a tree spade (mechanical digger) are the preferred methods. The irony of it is that the root system is actually *smaller* (according to the Standards) for B&B dug versus bare-root dug plants. For instance: 2 inch caliper B&B should have a minimum soil ball diameter of 24 inches (compared to 28 for bare-rooted).

If the plant traditionally does better as a B&B transplant, if you will not be able to immediately

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replant the dug tree or shrub and need to store it temporarily, or if you are digging when the plant has leafed out, then those are good reasons to B&B it. In my opinion, however, if you have the option to successfully move the plant bare-rooted, bare-root it. Referring again to the study by Cornell University, in most cases they had equal success with bare-rooted and B&B plants, and those results have been confirmed by several other research experiments at other universities and botanical gardens for many years.

If you decide to ball and burlap the plant, the process is a bit different.

* Again, if the soil is dry, moisten it to a depth of several inches the day before the move. Carefully scrape away all excess surface soil until you find the first branch root/s. This should be the very top of your soil ball when the plant is finally dug.



Tie up the foliage and branches to reduce breakage during the transplanting operation



The soil ball has been shaved and tapered to where the roots are concentrated.



Slipping burlap under the soil ball.



Pull the burlap under and up to cradle the soil ball.



Tie the corners of the burlap together.

Photos: Gary Johnson

* Use a flat spade, similar to a "sod-cutting" spade, instead of a rounded or "spoon" shovel. Turn the face of the shovel away from the stem of the plant as you dig down around the minimum root ball diameter.

* As you sink the spade into the soil and cut the roots, press the handle back toward the stem and scoop the soil out *away from the soil ball*. This is the opposite action taken when bare-rooting a plant. This action compacts the soil into a solid root/soil ball with each spade of soil scooped away.

* After the first "lap" around the root ball diameter, begin a second lap digging down deeper. In effect, you will be digging this trench around the soil ball two spade-lengths deep.

* Begin "shaving off" soil from the soil ball. Don't try to move a soil ball if there are no roots to hold it intact, because it won't stay intact! Shave off soil until you hit enough roots that you can be confident that it will hold together. Then, begin cutting down and into the bottom center of the soil ball. This is known as "tapering" the soil ball, and again, if you don't hit any roots, don't try to move that soil with the soil ball. Keep tapering in until you begin cutting roots.

*Once the soil ball is shaved and tapered, fold up a sheet of burlap or an old sheet, slip it down into the hole against one side of the soil ball and roll the soil ball back onto the burlap or sheet. Pull half of the burlap or sheet under the soil ball and up around the opposite side.

*Pull up the four corners of the burlap or sheet, tie them to each other and snug up the wrapping. Sometimes it is necessary to "bind up" the burlap or sheet with twine or a rope to hold it all together.

*Get some help and lift the plant out of the hole.

That sounds like a lot of work and very confusing! You're right! It took me about four months to learn how to ball and burlap professionally when I started working for a nursery as a college student. It's very hard work, frustrating at times, and every tree and shrub is a bit different. I'd recommend that you hire someone experienced at this art if it needs to be done, or have it moved with a tree spade.

The move. As mentioned earlier, if the soil is compacted, loosen it as much as you can tolerate. Then pass the shovel or roto tiller off to someone else and have them loosen it as much as they can tolerate. This will pay off in the form of a shorter transplant shock period and a healthier, longer-lived tree or shrub.

Replanting the shocked tree or shrub is at least as important as the digging process. For detailed information on the best planting practices, refer to "Planting Trees and Shrubs for Long-Term Health," which is listed in the concluding reference section. The steps are simple, however.

Step one: Measure the depth of the root system if it's bare-rooted, or the soil ball depth if it's B&B or tree spade dug.

Step two: That measured depth is the deepest that the new planting hole should be. If you are to err,

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err on the side of planting high. This doesn't mean that the roots will be sticking up out of the ground. You will just need to haul in more good soil to cover those higher roots, creating a planting berm.

Step three: The width of the hole depends on the nature of the soil, the compacted nature to be specific. If the new planting site has beautiful, loose soil, the width of the planting hole is not a big issue. It should be large enough to place the soil ball/roots into it and work the backfill soil in around those roots. If the soil is very compacted, then the wider the planting hole, the better.

Step four: Double-check that planting depth and make sure those first branch roots are no deeper than the landscape surface. Don't worry, they're not going to die; they will end up with a light dressing of mulch over them.

Step five: If the tree or shrub has been balled and burlapped, backfill about half way up the soil ball depth and then cut off the remaining burlap or sheet above that point.

Step six: Complete the backfilling, water the soil ball/root area thoroughly and mulch the planting site with 2-4 inches of the mulch of your choice. Don't pile ANY mulch up against the stem, however.

Step seven: Religiously water, sometimes every day depending on the season, soil drainage and size of the transplant. Allow the soil to drain after each irrigation, but never allow the roots and the soil around the roots to completely dry out.

***Don't** prune off branches to compensate for root loss! This practice may seem logical, but it's not bio-logical. If branches subsequently die, then prune them off.

There is a "magic bullet!" Everyone wants to know what they can do to ensure transplant success. Is it fertilizer? No. Is it soil fungi or bacteria? No. Is it cow manure, peat moss, composted leaves? No. It's water. Not too much, not too little, not once a week, not one inch of water per week, not just before planting, not only after planting. It's the amount needed to keep the roots moist from the time you begin digging until the tree or shrub is safely beyond transplant shock (at least one year). And then after that, for the life of the tree. **When** water is maintained at an optimum level, then fertilizers, soil amendments, microbial inoculations may be beneficial. If water is lacking or excessive, those other amendments are either worthless or damaging to plant health.

Occasionally, trees may need some support via stakes for a short period of time after transplanting. For more information on staking and guying trees, refer to the Forest Resources Extension web site listed in the reference section. **Often**, trees and shrubs need some winter protection from hungry critters. Again, refer to the Forest Resources Extension web site.

References:

- American Association of Nurserymen. American Standard for Nursery Stock, ANSI Z60.1. 1250 I Street, N.W., Suite 500, Washington, D.C. 20005.
- Buckstrup, Michelle J. and Nina L. Bassuk. 2000. Transplanting Success of Balled-and-Burlapped Versus Bare-Root Trees in the Urban Landscape. *Journal of Arboriculture*, 26(6): November, 2000. P. 298-308.
- Hargrave, Rebecca, Gary Johnson and Michael Zins. 2002. Planting Trees and Shrubs for Long-Term Health. University of Minnesota Extension Service, MI-07681. 13 pages. <http://www.extension.umn.edu/distribution/horticulture/DG7681.html>
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- Forest Resources Extension, University of Minnesota. <http://fr.cfans.umn.edu/extension>. Click on Urban and Community Forestry, then click on Tree Care, Tree Stem Protection, Planting, Planting Methods, and Staking and Guying.