

Planting Trees and Shrubs for Long-Term Health

Rebecca Hargrave • Gary Johnson • Michael Zins



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Note: Detach the card, “Quick Tips for Planting Trees and Shrubs,” from the back cover to use as a handy reference at the planting site.

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The average life span of landscape trees is much shorter than the life span of forest trees. Although many factors affect tree health, landscape trees often die prematurely because they were planted incorrectly or were unhealthy from the start.

Transplanting Is a Shock!

Even healthy and correctly planted trees¹ must recover from the shock of transplanting before they can live long, healthy lives. When a tree is transplanted, many roots are lost. The tree has to regenerate its root system and may need to become acclimated to a new soil type. Although it may put out new leaves, it usually will not grow normally while in shock. Larger trees take longer to recover from transplant shock than smaller ones. As a rule of thumb, allow at least one year of recovery per inch of stem diameter.

To help trees overcome transplant shock and start on the road to long-term health:

- Purchase healthy, problem-free plants.
- Dig the planting hole the correct depth and as wide as possible.
- Remove twine, burlap, wire, and plastic where they could interfere with roots, stems, or branches.
- Water after planting, and regularly when the soil is dry.
- Mulch around the base of the tree.
- Maintain a stress-free environment.



Wilting is a common symptom of transplant shock.

¹References to trees in this publication are intended to include shrubs as well.

Healthy, Problem-Free Plants

Healthy stems should:

- Be free of wounds, cankers (dead areas), and other damage.
- Have a single leader (main stem) if it's a tree. Even though some trees develop multiple leaders as they age, most shouldn't when they're young. Low, multiple leaders often have poor branch attachments that are more likely to fail in wind or ice storms as the tree gets larger.

Graft unions often give the base of the tree trunk a crooked appearance. This is okay and usually disappears in a few years. **Do not** bury the graft union when planting.

Wounds increase the chances of decay in the stem and predispose the tree to structural and health problems.

Healthy roots should:

- Be at or near the surface of the container or balled and burlapped (B&B) soil ball. Don't assume the first, main roots (usually at least the thickness of a pencil) are at the top, because often they are not. If you can't see the main roots, use a piece of wire as a probe to ensure they are not buried by more than 4 inches of soil. Avoid buying trees with more than 4 inches of soil over their roots.
- Be alive, unbroken, and light-colored (at the tips).
- Grow away from the stem. In container stock, look for and remove roots circling around the container's inside edge.



▲ The graft union will disappear as the tree grows. Burying it when planting places the roots too deep in the soil.



▲ Circling roots, if not removed, can cause a tree to develop a limited root system, which decreases its capacity for healthy growth. Both photos show plants with encircling roots.



▲ Avoid buying trees with stem wounds or cankers such as those on this willow.



▲ A root system may be coarse, such as the black walnut on the left, or fibrous, such as the green ash on the right. Both are healthy.

Dysfunctional Root Systems

When tree roots are buried too deep, new roots grow toward the surface where there is more oxygen and water. These new roots tend to grow back toward, or circle around, the trunk. As the trunk and roots grow, the roots form stem-girdling (restricting) roots. These roots can greatly reduce the water and nutrient flow from the roots to the leaves and lead to early tree death.



Planting the Tree

Trees are generally sold in one of three conditions:

bare-root, container, or balled and burlapped (B&B). Bare-root trees are usually smaller than B&B and container trees and are often the easiest to plant with the best results.

Bare-Root Stock

Step 1. Prune damaged, diseased, or girdling roots before planting.

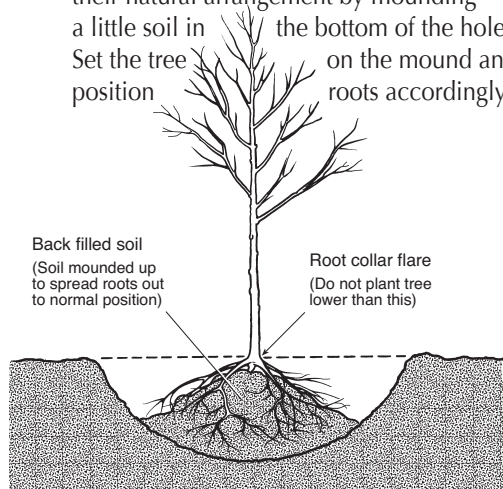
Step 2. Dig the hole wide enough to accommodate the length of all the roots.

Step 3. Stabilize the tree and keep the roots in their natural arrangement by mounding a little soil in the bottom of the hole. Set the tree on the mound and position roots accordingly.

Dig the hole only as deep as the root system, so the first-order roots are at grade. Otherwise, settling may result in the tree being planted too deep. ▼



Note: If the soil is compacted, consider widening the hole before filling it in to provide loosely packed soil for root penetration. See page 6 for information on planting in wet soils.



Sweating Bare-Root Stock

If your bare-root trees are dormant, you'll need to sweat them to simulate the warming that occurs in spring.



◀ Place trees on burlap or a layer of wood chips.



Douse with water. ▶



◀ Cover with more burlap or wood chips and a layer of thick plastic.



▶ Leave in a warm place (45°F to 70°F) out of the sun until the buds swell. After buds start to swell, uncover the stems and branches, and keep trees moist and shaded for a few days.

Species that commonly need to be sweated are birch, hackberry, oak, hawthorn, and ironwood.

Container and Balled and Burlapped (B&B) Trees

To help prevent formation of stem-girdling roots, plant the tree with its first-order roots even with, or slightly above, the soil surface.

Step 1. Find first-order roots by gently probing for their location from the soil surface with a piece of wire. Measure the length of the wire corresponding to the distance to the first-order roots. Subtract this distance from the height of the soil ball to determine the depth of the planting hole. ▼

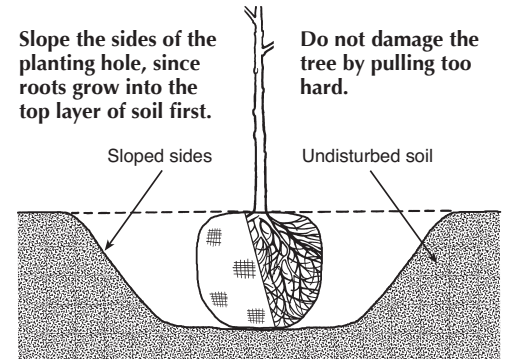
Step 2. Measure the depth of the soil and root ball. ▼



Step 4. Dig the planting hole 2 to 5 times the width of the ball (depending on soil type) to allow the roots to penetrate and establish more easily. Most soils will only need a hole 2 to 3 times the width of the soil ball. Heavily compacted soils need holes 3 to 5 times the width of the soil ball. ▼



Step 3. Dig the hole no deeper than your calculated depth. If the hole is too deep, the first-order roots will end up below grade when the soil settles. ►



Planting in Wet Soils

If your soil is poorly drained (constantly wet) or heavily compacted, you may want to plant the tree with one-third of the soil ball above grade. If your soil is severely compacted, consider planting with two-thirds of the ball above grade. This will allow the roots to grow into the mounded soil, away from the compaction or water.

To plant one-third high:



◀ Mound soil around the sides, but not the top, of the soil ball sloping away from the tree.

▲ Dig the hole two-thirds of the calculated depth (height of soil ball minus depth to first order roots).

▲ Smooth the soil until it is even with the surrounding grade.

Container Trees

Step 1. If the soil ball is dry, water it.

Step 2. Remove the tree from the container by pulling up on the tree while pushing the container off with your other hand. ►

Step 3. Look for roots circling around the edge of the soil ball once the container is off. If circling roots are present, slice the sides (left photo) and bottom of the ball (right photo) in four places, pressing in about 1 inch. This will reduce the chances of the plant developing stem-girdling roots as it grows. ►

Step 4. Place the tree in the hole, backfilling with a little soil to stabilize it. Make sure the tree is not leaning.



Helpful Hint if Struggling With Containers

If the container does not slide off easily, or if the tree starts to come out without the soil:



Cut the bottom off of the container and put the tree into the planting hole.



Cut the container away from the soil ball.



Remove and discard ALL of the container.

B&B Trees

Step 1. Carefully move the tree using a tree cart, dolly, or baling hooks. Do not drag the tree by the stem; this damages the root system.



Step 2. Slide the plant off the cart and center it in the hole.



Step 3. Backfill some soil around the tree to stabilize it. Make sure the tree is not leaning.



Step 4. Remove the twine that is holding the ball together. If it is not removed, it can girdle the stem as the tree grows.



B&B Trees continued

Step 5. If there is a wire basket, use wire cutters or an old pair of loppers to remove as much of the basket as possible.

Step 6. Cut away and discard as much of the wrap, e.g., burlap, as possible.

Step 7. Push any part of the basket and wrap that you couldn't remove down into the ground. This will allow the roots to grow into the soil without having to force their way through the wrappings.



Filling In

Backfill the rest of the soil. Compact the soil with your hands, feet, or water as you fill. If the soil is dry you may want to water as you go. This will remove air pockets that could impede root development and also help stabilize the plant. Only fill around the sides of the soil ball, not on top.

Most planting soils do not need amendments other than water. If the soil is particularly droughty and nutrient-poor, composted organic materials (e.g., leaves) can be mixed into the backfill soil as you plant the tree. If soil tests show that nitrogen is deficient, a slow-release (e.g., organic) source of nitrogen at a low rate (2 pounds of nitrogen per 1,000 square feet of soil) may be added to the backfill soil. However, it's better to add nutrients after the plants are established.

Care After Planting

Your job is not done when the tree is in the ground. Ongoing care is important to get your planting off to a good start.

Watering

After all the soil has been replaced, thoroughly water the tree. Soak the soil close to the trunk.

Water often during the first growing season. Adjust the watering schedule for the season and your soil type. Poorly drained soils require less frequent watering. The best way to determine when to water is to feel the soil where the roots are growing. If it is dry, water it.

Never let established trees and shrubs become moisture stressed, no matter how long they've been in your landscape. Check the soil for moisture by digging a hole 6 to 8 inches deep and 3 to 6 feet from the trunks of mature trees. If it feels dry, water deeply (at least 6 to 8 inches). Plants can be watered whenever the ground is not frozen, and fall watering often helps the trees through long winters.

Mulching

Hardwood wood chips or other organic mulches are the best way to retain moisture while slowly adding nutrients to the soil.

Add mulch periodically. Keeping 2 to 4 inches of mulch over the root systems of plants greatly reduces the need for fertilization, irrigation, and weeding. And mulch is a perfect barrier to lawn mowers and string trimmers. However, NEVER pile mulch up against the stems of your plants.



As a rule, use 1 to 1-½ gallons of water per inch of tree diameter per watering.



Place mulch 3 to 4 inches deep in a ring that covers the entire planting area. ►



Pull mulch away from the trunk of the tree to prevent injury from excess moisture and temperature, and potential stem cankers. ►

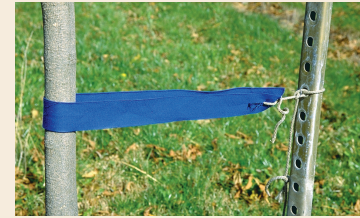
Staking

Trees will not need to be staked unless they cannot stand up by themselves, are in a very windy area, or need to be protected. If you do stake, remove all straps and lines after the trees are established, usually one year.

If the tree is still unstable after one year, be sure to loosen the straps and lines to allow for stem growth.



Staking straps should be wide and flat, and attached one-third to two-thirds of the way up the stem.



Lines should be loose enough to allow for some wind movement.

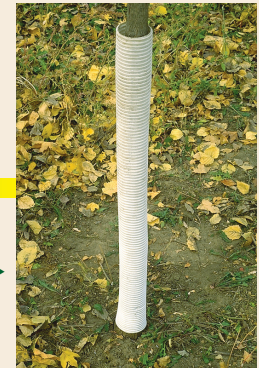
Pruning

The first 15 to 20 years of a tree's life are the most important years for development. Inspect trees annually and remove any dead wood, rubbing branches, multiple leaders (with few exceptions, such as crabapples), and weakly attached branches. ►



Protecting Stems

Hardware cloth and/or light-colored, loose winter stem protection devices can reduce damage to stems from winter critters and cold. When necessary, put them on in the late autumn and remove them at the end of the winter. ►



For More Information

Tree Selection

Visit your state or local arboretum, especially the library there, for tree recommendations. Local Extension offices are often very helpful, too.

Pruning

Contact the USDA Forest Service for a copy of *How to Prune Trees*. You can also access this publication on the Web site www.na.fs.fed.us/spfo/pubs/howto.htm (click on "How to Prune Trees").

Staking

Visit the University of Minnesota, College of Natural Resources, Department of Forest Resources Extension Web site, www.cnr.umn.edu/FR/extension/. Click on "Urban and Community Forestry," then "Planting," then "Staking and Guying Trees."

Preparing the Planting Site, Amending Soils, and General Care

Refer to *Arbiculture: Integrated Management of Landscape Trees, Shrubs, and Vines*, 3rd edition, by R.W. Harris, J.R., Clark, and N.P. Matheny. This book is available in most public libraries or can be purchased through any bookstore.



Acknowledgments:

The authors are grateful to the following people who provided constructive reviews and comments on this publication:

Tom Faust (Bachman's, Inc.)

Jeff Gillman (University of Minnesota)

James and Nancy Hargrave (home gardeners)

Rich Hauer (Minnesota Department of Agriculture)

Jeff Iles (Iowa State University)

Barb Kirkpatrick (Minnesota Tree Care Advisor)

Also, the authors wish to thank Marie Jones (Research Specialist), Emily Barbeau (Lab Assistant), and Chad Giblin (Nursery Manager) of the University of Minnesota for their invaluable assistance in the preparation of the plant materials and field sites for the photographs.

Product Manager: Gail M. Tischler

Editor: Mary Hoff

Designer and Illustrator: John Molstad

Photographer: Don Breneman

Quick Tips

for Planting Trees and Shrubs

Save this planting guide.
Use it at the planting site.

Planting Hole Depth

Main roots, often buried during propagation, should end up at the surface of the soil. Using a piece of wire, probe through the burlap and/or soil with a piece of wire until you find roots approximately the width of a pencil. This refers to both B&B and container stock. ▼



Measure the distance from the surface to these roots and subtract it from the height of the soil ball. This is how deep the hole needs to be dug. ▼



Planting Hole Width

Dig the hole 2 to 5 times the width of the soil ball (3 to 5 times for heavily compacted soils, 2 to 3 times for loamy soils). ▼



After the hole has been dug to the correct measurements, carefully center the tree in the hole. Do not drag the tree by the stem; this will damage the root system.

Container Trees

Remove the container by either pushing or cutting off. If there are roots circling around the surface of the soil, score four times around the ball and across the bottom. ▼



Balled and Burlapped (B&B) Trees

Stabilize the tree. Cut and remove as much of the twine, wire, and burlap as possible. Shove remaining wire and burlap down into the soil where it will be out of the way of growing roots. ▼



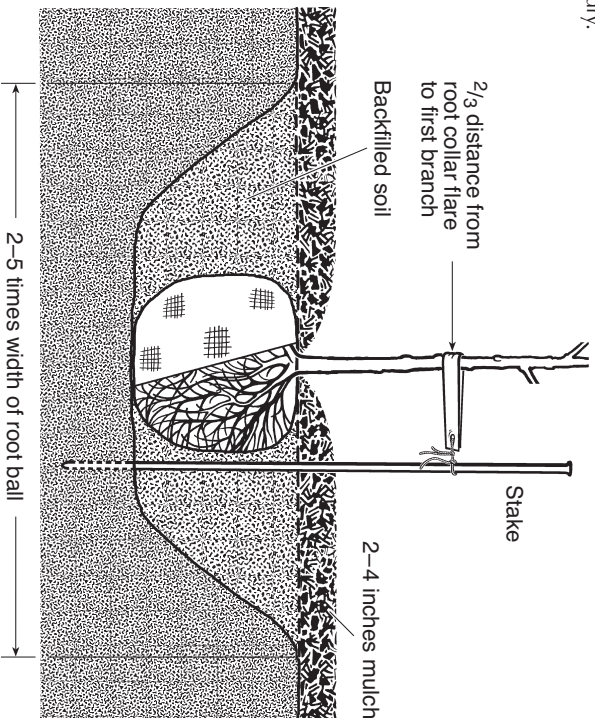
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Quick Tips *continued*

Finish Planting

Backfill, tamping or watering the soil as you go to remove air pockets and help stabilize the tree. When finished, water the tree thoroughly and place organic mulch around the base. Pull the mulch back so that it is not touching the trunk.

If necessary, stake the tree with wide, flat straps and attachments that allow it to move a little in the wind. Water regularly for the first couple of months, then periodically when the soil is dry.



Produced with the support of:

USDA Forest Service, Northeastern Area, State and Private Forestry
College of Natural Resources, University of Minnesota
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Insert to: MI-07 681-S
2002

Partial funding for this publication provided by: _____

Northeastern Area, State and Private Forestry, USDA Forest Service, Midwest Center
for Urban and Community Forestry Technology Transfer Grant Program

Minnesota Turf and Grounds Foundation

Minnesota Society of Arboriculture

Minnesota Shade Tree Short Course Program

Minnesota Tree Care Advisor Program

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MI-07681-S
2002