How to Properly Plant a Tree – Part 1

Find the Root Flare

Image 1. A container tree with the graft point circled. This is not the root flare.

Tree roots need oxygen to grow. When properly planting a tree, placing the root flare slightly above ground level provides the best opportunity for the tree to grow and thrive. What is the root flare? Imagine a child's drawing of a tree. The tree flares out (is wider) at ground level; it does not grow straight out of the ground like a telephone pole. This flare is what must be located before digging a hole and planting the tree.

Container trees often have too much soil over their root system. This is due to the 'potting-up' process done by nurseries as the seedling grows larger and is potted into larger containers. As a result, it's important to find the tree's root flare before digging the hole and planting the tree.

The tree in Image 1 is currently planted too deep in the container. The bulge in the trunk at soil line is the grafting point. This is where the root stock was grafted to the desired tree species when the plant was very young. The root flare is **not** visible.

Step 1. Remove the soil to expose the root flare.

Use your fingers and hand tools to gently remove soil from around the trunk to find the root flare. Make sure you don't damage the trunk as you work.

Image 2. The visible roots are growing from adventitious buds on the trunk. This is not the tree's root flare

After digging in the soil you'll likely find roots growing from the trunk, but these may not be part of the tree's root flare.

In Image 2, the small roots growing from the trunk are from adventitious buds that are normally dormant. These adventitious roots (roots that grow from any non-root tissue) are growing due to soil and moisture being present against the trunk. They can be left exposed and will dry out and die or you can remove them with a sharp pruning tool.

Keep digging to find the true root flare and the tree's first structural root which is much larger than the adventitious roots.

Image 3. The root growing across the trunk is considered a girdling root. It needs to be removed to allow proper future trunk growth.

Step 2. Remove any circling roots

It is critical to remove any roots that cross or circle the trunk.

Do not be fooled by adventitious roots that have increased in size. Some roots may be very thin in this area of the root ball but all roots growing around or across the trunk need to be removed to prevent future issues.

As the tree trunk and girdling root grow larger in size, the root can start to grow into the trunk. This may damage the tree's vascular system, which moves food and water up and down the tree, causing significant crown die-back or tree death.

In Image 3, a root is shown growing next to the trunk. If this root is left in place, it will grow into the trunk and cause damage to the trunk tissue. To remove, simply cut the root with a sharp pruning tool at its point of origin on the trunk. It is important to sanitize your pruning tools before cutting roots and between cuts to minimize the chance of introducing bacterial or fungal diseases. Lysol spray is an easy and effective way to sanitize your pruning tools.

All roots growing around or across the trunk need to be removed to prevent future issues.

Image 4. The root growing off the trunk is part of the tree's root flare. It is important that these roots are located prior to planting.

Image 4 shows the tree's root flare. This large root is part of the tree's original root system and is not an adventitious root.

This flare is what must be located before digging the hole and planting the tree. **The flare is planted slightly above ground level.**

Remember, tree roots need oxygen to grow. By placing the root flare at or slightly above ground level when planting the tree, you give the tree the best opportunity to grow and thrive.

Image 5. Approximately three inches of soil and roots were removed to locate the tree's original root flare.

The tree's original root flare can be many inches deep in the root ball.

By removing the soil above the root flare, it can shorten/shrink the size of the root ball. In most cases, it's more important to locate the root flare than to worry about the size of the root ball. However, if you are concerned about the root ball being too small, you may consider returning the tree to where you purchased it and selecting a new tree.

In Image 5, the root flare was located approximately 3 inches below soil level. There were many adventitious roots and girdling roots growing above this point that were removed.

Now that the root flare has been identified, the depth of the planting hole can be determined. This should be measured from the bottom of the root ball to the root flare. **The root flare should sit slightly above ground level**. This is done to prevent the flare from moving below soil grade as the soil settles after planting.

To learn the next step in tree planting, view **How to Properly Plant a Tree – Part 2, root ball shaving to remove girdling roots**.

How to Properly Plant a Tree – Part 2

Shave the Root Ball

Once you have identified the tree's root flare, (How to Properly Plant a Tree – Part 1) there are a few more steps you need to take before planting the tree for optimal results.

Image 1. Depth of the planting hole is the distance between the root flare and the bottom of the root ball. Photo credit: CSU CO-Horts Blog.

Step 1. Determine the depth and width of your planting hole.

To determine the depth of the planting hole, you can either remove the container or leave it in place. Either way, you need to measure from the bottom of the root ball to the root flare. Use a stick, a measuring tape, or the handle of your shovel to determine the depth.

The tree's root flare should sit slightly above ground level by 1-2 inches. Disturbed soil tends to settle as it's watered, and if a tree was planted at ground level, it may sink below grade as the soil settles. Planting above grade ensures the root flare stays above ground level.

Therefore, to find the proper planting hole depth, measure the root ball and subtract 1-2 inches to ensure your tree sits slightly above ground level when it is planted.

The width of the planting hole should be at least 3 times the width of the root ball. New roots can grow into disturbed and loosened soil much easier than undisturbed and compacted soil. By loosening the soil around the hole, the tree can become established much more quickly.

Image 2. Remove the tree from the container.

Step 2. Remove the tree from its container.

Be careful when grabbing the trunk to not damage it.

Image 3. This is an example of a girdling root. It needs to be removed before planting.

Step 3. Assess the root ball.

With the tree out of its container, you'll be able to see if there are any large roots you need to remove before planting.

Step 4. Remove any circling roots.

Larger roots, like those seen in Image 3, should be removed using a sharp pair of sanitized pruners. **The cut should be made at the point before the root turns and begins circling the root ball**. Cut the portion of the root that is facing outward, so new roots will grow away from the trunk and not continue to grow around the root ball.

Many tree failures we see now are a result of girdling roots that weren't addressed at the time of planting. These roots can act like a tourniquet on the trunk, cutting off water and nutrient transport. Circling roots present at planting will continue to grow in that circle, and not out into the soil.

Image 4. Remove approximately 1 inch of soil from the outside of the root ball.

Step 5. Shave the root ball.

The old recommendation to address girdling roots was to take something sharp and slice through the roots, but research proved that was ineffective. It doesn't change the direction of the new roots and they continue to circle the root ball and the planting hole.

The new recommendation is to **shave off about 1 inch** of the outer periphery of the root system or until you no longer see circling roots. This will physically *remove* any smaller circling roots and the outward facing cuts will encourage the tree to develop new roots growing out into the soil.

Make sure to use a sharp, sanitized blade to make these cuts. Most arborists have a dedicated saw for working with soil and shaving root balls. If a root you need to remove is too large to make a clean cut with the pruning saw or with hand pruners.

To reduce the amount of cleanup while making these cuts, place the tree in the planting hole. The edges of the root ball that are cut off are organic matter and soil that can be used as backfill when planting the tree.

After removing the outer inch of soil, your root ball may be more square or hexagon-like than circular. Now that you shaved the root ball and cut back any potentially girdling roots, the tree is ready to plant.

Image 5. Once the root ball has been shaved, ensure the root flare is placed slightly above ground level.

Step 6. Position the tree in the planting hole.

Place the tree in the planting hole and check from several angles to make sure it's straight. The root flare should be sitting slightly above ground level (1-2 inches).

Step 7. Backfill soil into the planting hole

Add the soil you removed while digging the hold back into the hole. It's not necessary or recommended to add compost or other soil amendments to the backfill. These additions can discourage roots from growing into the site soil as it will not be as nutrient-rich. Too much organic matter can be detrimental since it can hold too much water and decomposes more rapidly. As a general rule, you want 5 percent organic matter or less in the backfill soil.

When you're backfilling, don't put too much soil on top of the root ball. You've gone through a lot of work to identify the root flare and plant the tree at the correct depth. Adding soil over the root ball now is undoing all the work you just did.

After adding the backfill, water gently to allow the soil to settle, then add more backfill, water and repeat as necessary. You may have to do this several times to get the tree to its final grade and firmly planted.

Image 6. Do not place any soil or mulch over the root ball. Keep grass away from the trunk to prevent damage from lawn maintenance equipment.

Step 8. Add mulch

Add organic mulch, about 3-4 inches deep. It helps keep weeds down, stabilizes soil moisture, and adds organic matter back into the soil as it breaks down.

Just like the backfill, **keep mulch off the top of the root ball and away from the trunk and root flare**. Mulch on the root flare can increase the potential for adventitious roots which can later become circling roots. It also allows moisture to sit against the trunk which can cause rot. When you're finished, you should clearly see the root ball.

Grass should also be kept away from the trunk. This prevents damage from lawn maintenance equipment.

For the first growing season, focus your watering on establishing healthy roots growing out into the site soil from the root ball. Do this by watering the planting hole (which should be 2-3 times larger than the root ball) so the roots are encourage to grow into it.

The general rule for newly planted trees is to apply 1-2 gallons of water per inch of trunk diameter 3-4 days/week, depending on the temperature and wind. Don't let your carefully planted tree dry out if there has not been any precipitation. After a season or two, start watering beyond the planting hole since the roots will be growing outward from the trunk and into the site.

Image 7. Putting stakes on a tree for support is not always required. If you do use them, take them off after one growing season.

Step 9. Add stakes (optional)

Staking can be added to support trees planted on windy sites, near activities (like a busy park), or are too small or fragile to support their own weight. For the most part, a tree in a homeowner's yard should not need to be staked.

If used, stakes should be placed as low on the tree trunk as possible. Their purpose is to keep the root ball in place. They should be removed after one growing season (1-year). Leaving stakes on for too long or improper placement can damage the tree.

If you do decide to stake the tree, follow these simple guidelines:
- Use fabric straps around the trunk to prevent damage
- Do not make the wires between the trunk and the stakes too tight
    - The tree needs to be able to move in the wind,
    - This will encourage the tree to grow strong roots and a strong trunk.
- Remove all stakes and straps after 1 growing season.

For more information or questions on tree planting and care, visit: https://csfs.colostate.edu/forest-management/community-urban-forestry/

https://planttalk.colostate.edu/youtube-videos/tree-videos/

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