

Deep Roots of Landscape Trees

A Comprehensive Guide to Current Research and Practice

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Proper Planting will Prevent Deep Roots

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Getting the Roots Right at Planting

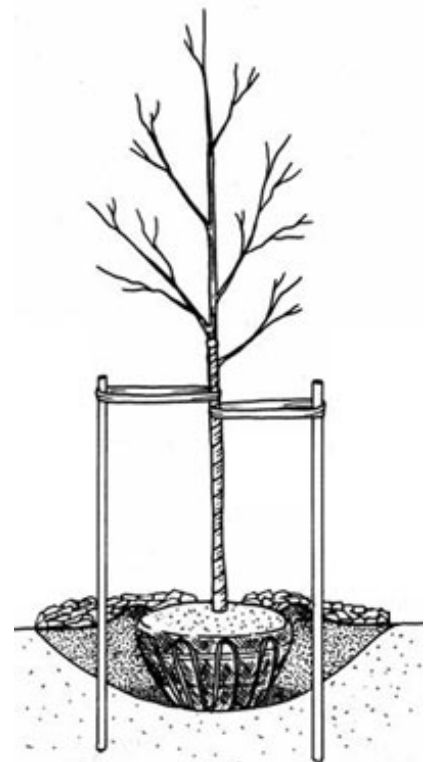
It takes only a short time to plant a tree, but how it is done can have a lasting influence. Mistakes made when planting trees are usually impossible to correct later, including planting the roots too deep. Shortcutting the planting process can cause the tree to fail after a short time, or to struggle for many years and never reach its full potential as a healthy vigorous addition to the landscape. Attention to detail taken at planting time will pay dividends for years.

If the Roots Are Right

Even when trees meet the requirements of American Standard for Nursery Stock (2004, <https://www.anla.org/publications/index.cfm>) which states that “soil above the root flare shall not be included in the root ball depth measurement”, there can still be excess soil over the structural roots. You may have to adjust planting techniques so that the structural roots will be at the correct depth. (*illustration by: S. Wegener*)

For additional tree planting information:

- Watson, G. W. and E.B. Himelick. 1997. *Principles and Practice of Transplanting Trees and Shrubs*. International Society of Arboriculture, Savoy, Illinois. 200pp.
- Watson, G.W. and E.B. Himelick. 2005. *Best Management Practices: Tree Planting*. International Society of Arboriculture, Champaign, Illinois.
- Tree planting details and specifications on the web— www.isa-arbor.com/publications/cadDetails.aspx



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If the Roots Are Not Right

Even when trees meet the American Standard for Nursery Stock (2004, <https://www.anla.org/publications/index.cfm>) which states that “soil above the root flare shall not be included in the root ball depth measurement”, there can still be excess soil over the structural roots. You may have to adjust planting techniques so that the structural roots will be at the correct depth.

When root balls arrive on site, the depth of the structural roots should be checked before placing the tree in the planting hole. [Probing the root ball](#) can be very effective.



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Many grafted cultivars, and some seedling and cutting trees, are cut back during production. Evidence of the ‘dogleg’ in the stem and bark texture change should be approximately 1-2 inches above the soil surface for a young tree.



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The first priority is to have the structural roots at the correct depth when the planting job is finished. If the structural roots have been located within three inches of the surface, the root ball should be planted with the surface no lower than the same level as existing grade. Slightly higher is usually preferable to allow for settling and ‘flattening’ of the root ball. Do not plant so high that the cut ends of the structural roots at the edge of the root ball are above the surrounding grade.



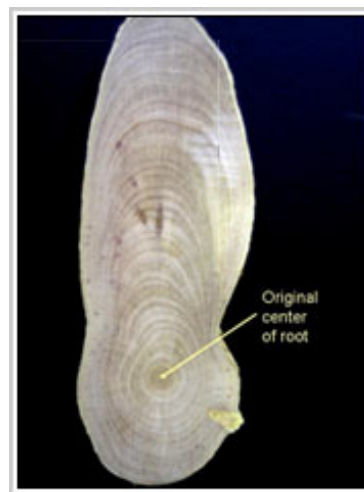
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When planting, the roots should also not be too close to the soil surface. Roots without enough soil over them may become exposed and killed soon after planting.



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Though the roots may be covered with a couple of inches of soil when planted, as a tree grows, roots thicken faster on the top side. Each year the amount of soil covering them is less. Indirect evidence of this process was provided by a study of nursery trees where the roots of 2 year old trees were a half-inch shallower (See [Rathjens](#) [pdf]). If planted too shallow, both thickening and frost heaving can eventually result in excessive surface roots.



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If the structural roots are found deeper than three inches below the root ball surface, the root ball and the planting depth will have to be adjusted. Elevate the root ball so that the structural roots are at the correct depth relative to surrounding grade.



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Of course, there will be times when the roots are just too deep and the tree must be rejected. (*photo by: V. Phillips*)



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What if there is an adventitious root flare several inches deep, with some remaining laterals or adventitious roots over them? If the adventitious root flare is more than 3 or 4 inches below the laterals, and the laterals are small, it may be best to remove the lateral roots and plant high. There will always be a great deal of judgement involved in the decision. (*photo by: V. Phillips*)



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Pitfalls

Removing excess soil over the roots could be problematic for a variety of reasons.



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If this soil is included in the root ball depth measurement, but has no roots, the root system will be undersized.



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Whether B&B or containerized, the extra soil over the structural roots could also be filled with fibrous roots which, if removed suddenly, could cause extra stress. (photo by: D. Fare)



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When the extra soil is suddenly removed from the base of the trunk (this could actually be a portion of the original primary root in some cases), there have been reports of cold damage, sunscald and borer problems in the newly exposed tissue. Late fall plantings may be the most susceptible to cold damage. Earlier plantings may have time to harden off normally. Thin-barked trees may be most susceptible to sun injury.



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Until this situation is more fully understood, exercise caution when removing soil and exposing tissue that is accustomed to being below grade.

- Leaving the extra soil in place above grade to be removed slowly or erode away, as described above, may help to protect sensitive trunk tissues. In one study, there were no adverse effects of the exposed rootballs reported. (See [Bryan](#) [pdf])
- Mulch can be used to hide the protruding root ball. If the soil is removed, replacing it with organic mulch may help to protect from sun and cold damage.



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Trunk protection may help to prevent sunscald.



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Aggressive Procedures

One of the most controversial topics centers around methods used to remove the excess soil from B&B and container root balls. Some have advocated removal of nearly all the soil, to the point of making them bare root plants.

This does allow thorough examination of the root structure, and makes it easy to see where the roots are when planting. There must also be certain drawbacks. The cost of buying a more expensive tree, plus the cost of removing the soil may not be practical. Survival may be good in spring and fall, traditional bare root planting times, but it may not be possible to use this method in summer. *(photos by: B. Appleton)*



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