

Roots and Planting Trees

By Edward F. Gilman

Department of Environmental Horticulture

University of Florida

<http://hort.ufl.edu/woody/planting>

Topics covered in this presentation

- **Introduction to tree root growth**
- Root depth in root ball
- Root depth at planting
- Mulch depth and root growth
- Defects from and effects of burying roots and planting too deeply
- Deep planting treatment options

Introduction to root growth

- Roots are generally not as deep as you think
- Deep roots are typically under the trunk and under the canopy
- The majority of roots are in the **top two feet** of soil
- Roots are typically above the water table and above any hardpan
- Many of the small diameter roots are in the top 12 inches



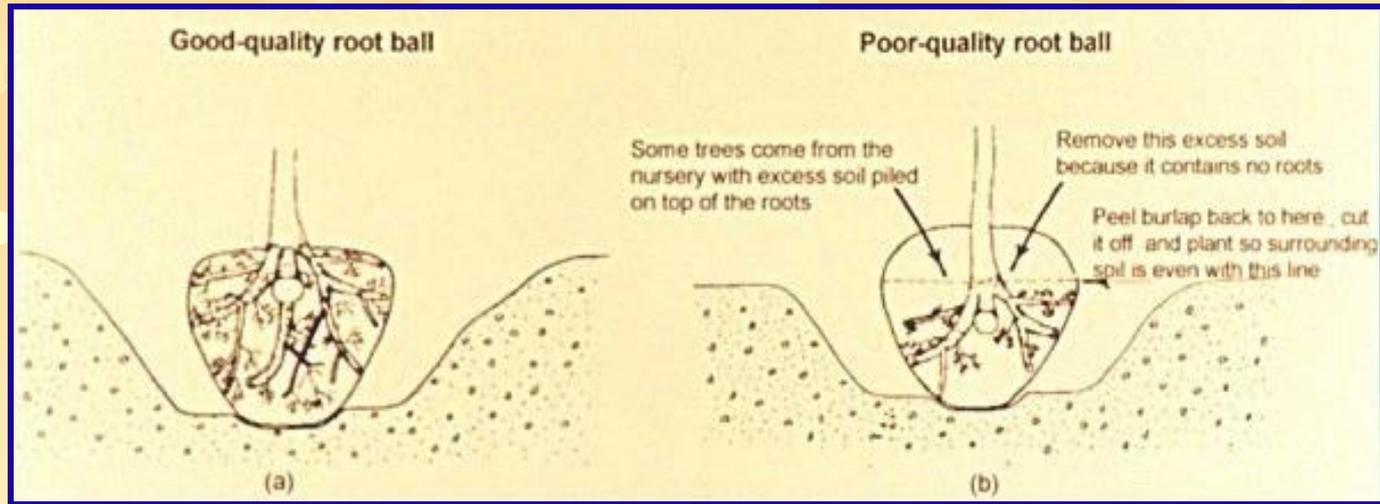
Topics covered in this presentation

- Introduction to tree root growth
- **Root depth in root ball**
- Root depth at planting
- Mulch depth affects on root growth
- Defects from and effects of burying roots and planting too deeply
- Deep planting treatment options

Roots too deep in the root ball

- Trees can perform poorly in the landscape if the point where the top-most root emerges from the trunk is too deep in the root ball
- Trees may grow fine in the nursery because soil aeration is adequate but can struggle when planted in the landscape because of poorer soil aeration
- This presentation is intended to help you gain an understanding of appropriate root depth in the root ball and in the planting hole

Root depth in the root ball



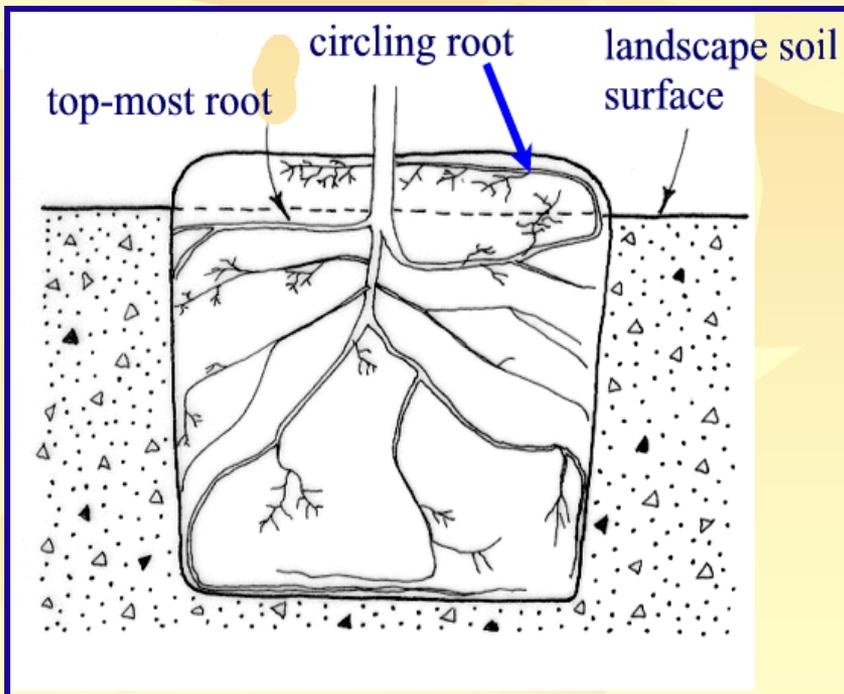
- In the highest-quality root balls the point where the top-most root emerges from the trunk is within two inches of the surface as shown at left
- In poorer-quality root balls the the top-most root and root flare (if present) are buried down inside the root ball as shown at right

Roots too deep in a B&B root ball

- There are no surface roots evident where the trunk meets the root ball
- The moist, darkened area on the trunk base indicates the portion of the trunk buried with soil
- Remove soil from on top of ball so the point where the top-most root emerges from the trunk is within the top 2 inches
- Cut roots that circle, those that are kinked, or those that cross over major roots



Planting trees that are too deep in the container



- Remove some soil next to trunk to see where first root emerges
- Cut or spread out any circling or kinked roots growing across main roots
- Position the top-most root about even with or slightly above the top of the landscape soil; plant even higher in soil that drains poorly

Roots too deep in a container root ball

- There were no roots evident where the trunk met the root ball; suspect deep planting
- Three inches of black media on the ground to the left of the container was just removed to expose the top-most root and the swollen root flare
- After cutting the circling roots growing at the base of the trunk, this tree is ready for planting



Topics covered in this presentation

- Introduction to tree root growth
- Root depth in root ball
- **Root depth at planting**
- Mulch depth affects on root growth
- Defects from and effects of burying roots and planting too deeply
- Treatment options

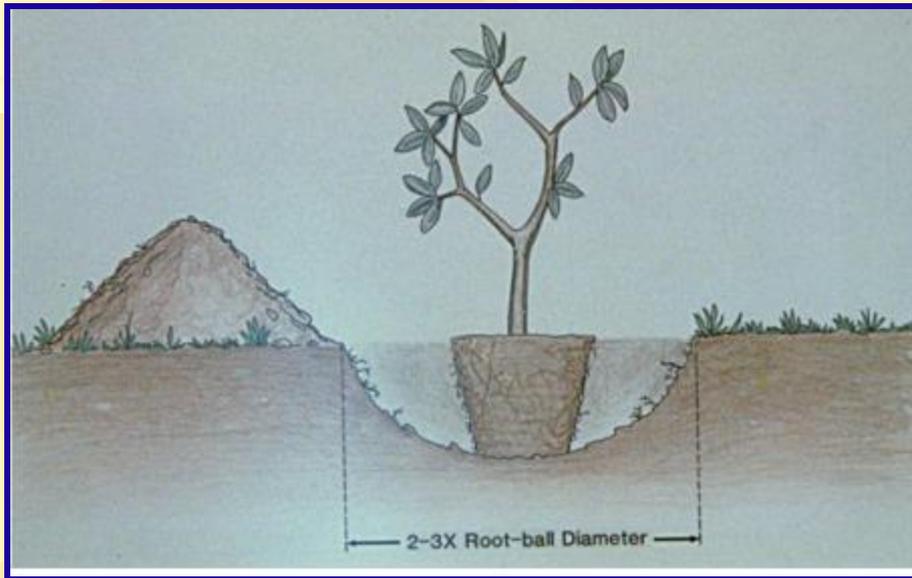
Roots at proper depth in the landscape

- Set the root ball at the appropriate depth in the landscape to establish plants quickly
- Trees set too deep in the landscape often become unthrifty soon after planting because
 - roots can not access adequate oxygen
 - roots can be cut off from adequate moisture
 - roots may remain too wet in poorly drained soils

The objective

- When finished planting, the point where the top-most root in the root ball meets the trunk should be slightly above the surrounding landscape soil.

Roots set at the right level?

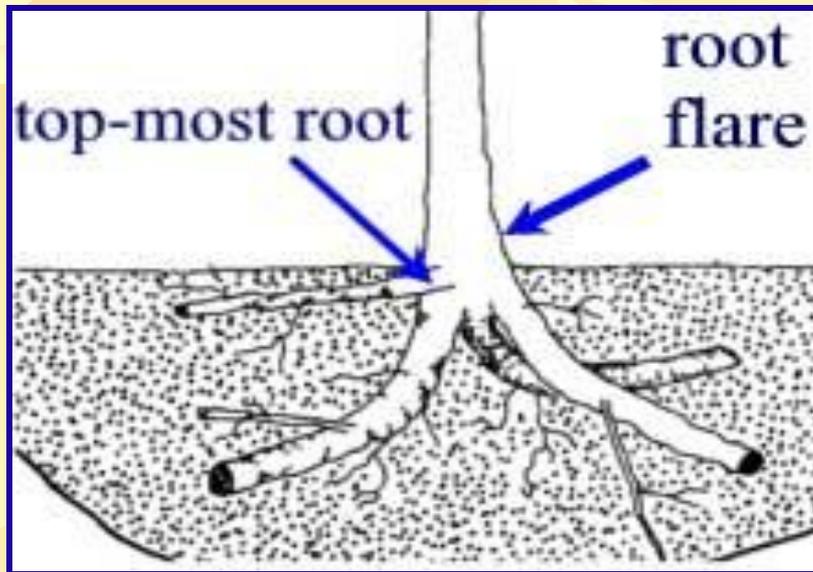


- If the root flare is at the surface of the root ball, this plant is set at about the right depth
- If the root flare is not at the surface but is buried too deeply in the ball, this plant is set too deep

Locate the top-most root before planting

- The point where the top-most root in the root ball emerges from the trunk should be within two inches of the surface
- This zone has been called the root collar, root crown, or root flare
- There should be no roots circling or crossing over the top-most roots in the root ball
- You might have to remove soil above the top-most root during the planting process in order to check for circling roots

Locate the top-most root before planting

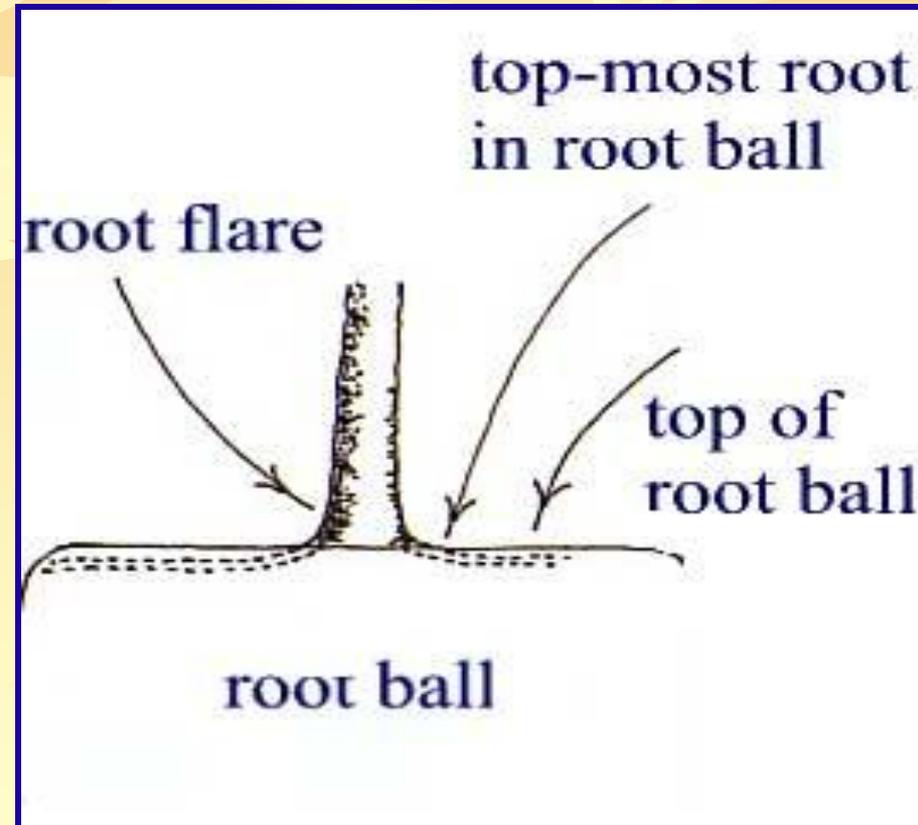


Bare root or B&B tree

- The top-most root in this illustration may be adventitious in nature; if this is the case you might consider removing it, especially if it is small
- Then plant the tree so the three major original roots are closer to the soil surface

Locate the top-most root before planting

- Root flare is often visible on trees more than about 4 to 6 inches in caliper but may not be apparent on smaller nursery trees
- The top-most root on quality nursery trees is located within the top 2 inches of the root ball



Container grown tree

Root ball is set correctly

- The point where the top-most root emerges from the trunk may not be within 2 inches of the surface
- To adjust for this, set the top of the ball several inches higher than the landscape soil, and remove excess soil over the roots
- A shovel handle provides a convenient tool for gauging proper height



Root ball is ready to check for root defects



- Close-up shows the unevenness of the top of a B&B root ball-- this is normal
- If the top-most root emerges from the trunk within two inches of the root ball surface, check for and treat circling roots if necessary, cover the sides of the root ball with soil or mulch, and finish the planting

Point where top-most root meets trunk is at surface

- The point where the top-most root emerges from the trunk (arrow) is at the surface after removing excess soil
- Although exposing the top-most root is not necessary, it is a convenient method of checking for root defects such as circling roots
- Now the root ball is ready to receive soil and/or mulch to cover the sides of the root ball



Ready to apply mulch



- Backfill soil has been added to the planting hole so it is even with the landscape soil
- The top of the root ball is a couple inches above the soil surface; this helps insure that even if the point where the top-most root emerges from the trunk is an inch or two below the root ball surface, the top-most root is set no deeper than the landscape soil

Berm needed for high volume irrigation

- When using a hose for irrigation, a 3- to 4-inch high berm should be constructed at the edge of the root ball to prevent water from running off the top of the root ball (as shown here)
- The berm, which is not yet in place in this photo, will ensure that water penetrates to where it is needed most, i.e. in the root ball.



Soil berm to retain irrigation

- Berms made from soil allow water to soak into the root ball
- To prevent berm erosion apply a 3- to 4-inch layer of organic mulch over the berm
- Even better, construct the 3- to 4-inch high berm from mulch, not soil



Tree too deep



- The root flare (arrow) is exposed but the top of the ball is several inches below grade
- In many cases soil from the berm will be pushed onto the root ball; rain and irrigation will erode soil onto the root ball
- This buries roots too deep and could cause long term tree health problems

Soil improperly placed over the root ball



- Never place soil over the root ball
- This cuts off air, could reduce the amount of water reaching the roots, or could keep too much moisture in the root ball

Still too deep

- Arrow indicates where top of root ball was when the tree was dug from the nursery
- Installer removed some soil that was above the point where the top-most root emerged from the trunk, but not enough was removed
- Roots are still too deep



Soil over root ball



- The root ball was buried with about 8 inches of soil, then mulch was added on top of the soil
- This placed the top-most root in the root ball about 10 inches too deep
- Suspect deep planting when there is no visible swelling (trunk or root flare) where the trunk enters the mulch as shown here

Soil over root ball

- Root ball was buried 12 inches deep
- The green tape marks the location of the root ball surface after this tree was planted
- The main roots emerged from the trunk about 12" lower down
- This tree died two years after it was planted



Topics covered in this presentation

- Introduction to tree root growth
- Root depth in root ball
- Root depth in planting
- **Mulch depth effects on roots**
- Defects from and effects of burying roots and planting too deeply
- Treatment options

Too much mulch over the root ball



Too much mulch was placed over the root ball; this can result in the following problems:

- encourages development of stem girdling roots
- keeps trunk tissue too wet
- increases rodent damage on the buried portion of the trunk
- intercepts rain and irrigation meant for the roots
- keeps poorly drained soils too wet
- encourages surface roots

Appropriate mulch over the root ball

- It might look like there is too much mulch over the root ball at first glance
- But these trees were planted fairly high on a mound in this poorly drained clay soil (note the soil exposed on the second mound - arrow)
- This is a recommended technique to aid tree establishment in wet soils



Inappropriate mulch over the root ball



- This declining tree has too much mulch over the root ball: 16” was piled against the trunk
- Kill the grass, pull mulch away from the trunk, and spread the mulch out under the canopy to help the tree recover

Not recommended

- Never pile mulch against trunk
- This cuts off oxygen to roots, can keep out water, can keep roots too wet in poorly drained soils, and can rot the trunk
- Some rodents, such as voles, can cause damage to the trunk if mulch is piled there
- Trees are likely to decline as a result



Very good mulch management



- Note that the edge of the mulch is beyond the canopy
- This allows for tree roots to expand without turf competition
- Turf roots are very competitive with tree roots and can dramatically slow establishment
- Once the tree is established, the mulch area can shrink some

Topics covered in this presentation

- Introduction to tree root growth
- Root depth in root ball
- Root depth in planting
- Mulch depth affects roots
- **Defects from and effects of burying roots and planting too deeply**
- Deep planting treatment options

Root defects resulting from deep planting

- Some roots grow up toward the soil surface
- Some can grow against the trunk
- These can become stem-girdling roots
- Defective roots should be cut



Aggressive surface roots from deep planting



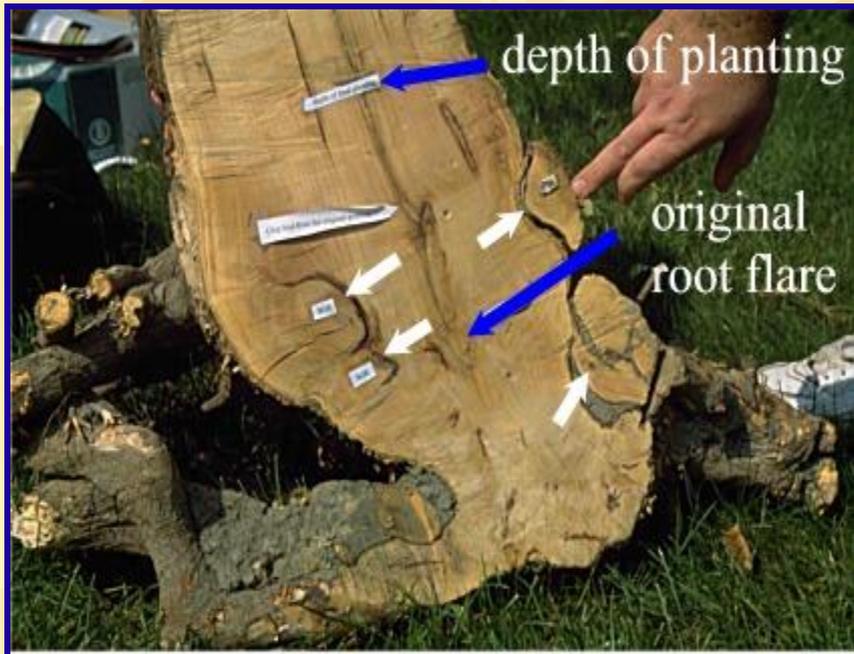
- Excavation (using an air spade) of root collar on trees planted too deeply can show severe defects such as these
- If this tree does not currently show above ground symptoms, it is likely to soon

Girdling roots from deep planting

- This mass of roots is a maze of girdling roots mostly originating from deep roots growing up toward the soil surface
- The next slide shows this same root system cut longitudinally



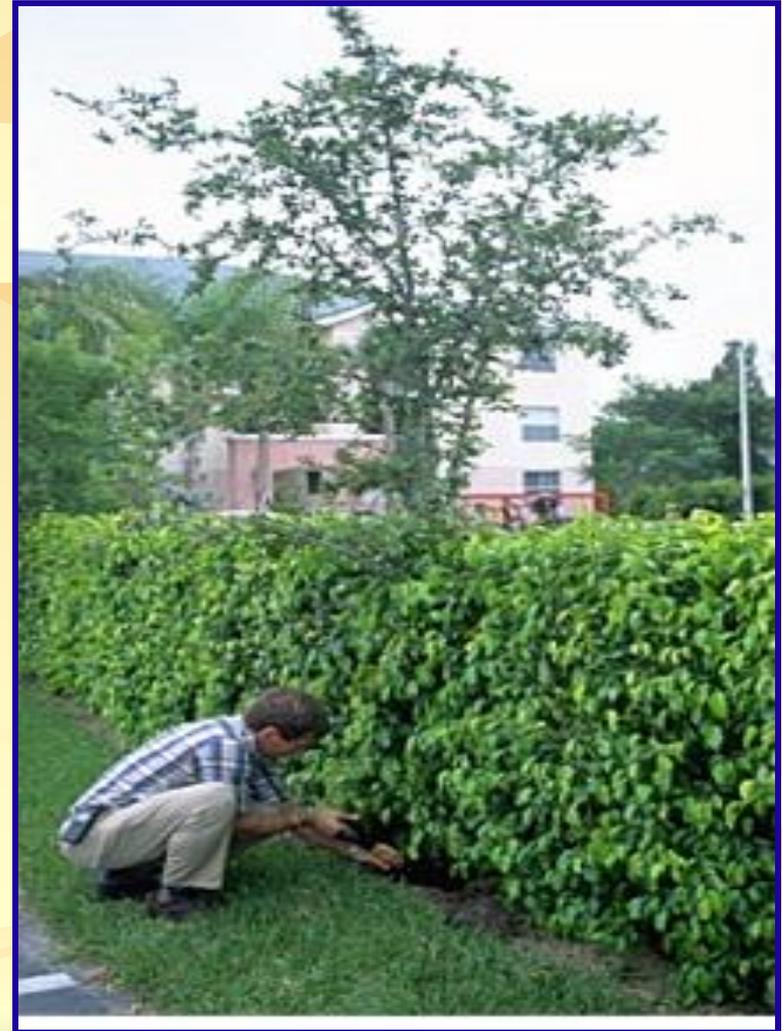
Extreme example of girdling roots



- Tree was planted about 10 inches too deep
- The four roots proliferated in the loose soil above root ball
- Roots often grow well along a small, well aerated crack adjacent to the trunk on deeply planted trees
- This helps cause what you see in this slide

Negative effects from planting too deep

- The most common symptom of deep planting is unthrifty or dead trees
- Tree appears to "sit there" for years without growing
- This oak was planted 13 inches too deep
- This tree is probably too deep for any treatment other than replanting at the proper depth



Topics covered in this presentation

- Introduction to tree root growth
- Root depth in root ball
- Root depth in planting
- Mulch depth on roots
- Defects from and effects of burying roots and planting too deeply
- **Deep planting treatment options**

Treatment options for deep planting

- **Option one:** The best treatment for trees planted too deeply is to replant at the proper depth
 - Dig the tree as you would transplant it, remove soil and surface roots growing above the root flare, and set at the proper depth

Treatment options for deep planting



- **Option two:** Soil can be removed from the root flare
- Remove soil that is on top of the main surface roots
- Remove roots that circle or cross over the main roots
- Create a saucer 8-12 feet wide
- Add a 2-3" of mulch

Roots and Planting Trees

By Edward F. Gilman

Department of Environmental Horticulture

University of Florida

<http://hort.ufl.edu/woody/planting>