

## **KEYS TO THE ESTABLISHMENT OF TREES IN THE LANDSCAPE**

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Most of the trees used in today's landscapes are exceptionally tough and adaptable. Honey locusts, maples, flowering pears, crabapples, ash and many others can be propagated and produced from New Jersey to Tennessee to Illinois to Oregon. As finished liners they are ripped out of the ground bareroot and stored for as long as six months before being shipped to nurseries all across the country. The nurseries growing these trees may have sandy soils or clay soils and they may be in Georgia or Minnesota. Only a small percentage of them have irrigation systems. After being grown in the nursery for an average of 2-5 years they are dug with a soil ball that leaves 95% of their roots at the nursery.

AND YET 90-100% OF THESE TREES ARE CAPABLE OF SURVIVING AND GROWING IN THE LANDSCAPE. These trees are so tough and adaptable that even after going through all this, we have to do something wrong to kill them.

This is the first of a two-part series that will cover the key points of successfully establishing trees in the landscape.

### **Part 1: Nursery Practices**

Only trees grown in nurseries should be purchased for use in landscapes. Collected trees have less fibrous roots in their soil balls because they were never root pruned. Because of competition from weeds and other trees they are usually tall, thin, and do not have as high stored nutrient and carbohydrate levels as nursery grown trees.

Unfortunately, some nurseries make mistakes during the production cycle of their trees that may cause problems in the landscape. The following is a summary of some of the key nursery practices and some related problems in the landscape if they are not done properly:

1. **Spacing.** Trees should be planted far enough apart to allow normal canopy development and operation of maintenance and digging equipment. Trees grown too close together grow too tall and thin to make attractive landscape plants, and it may not be possible to dig an adequate size ball. Proper height: caliper relationships are presented in the American Association of Nurserymen (AAN) publication "American Standard For Nursery Stock". The bark may also be damaged by equipment if there is not sufficient room to maneuver.
2. **Depth of planting.** Trees should be planted no more than three inches deeper than they were before. If the tree is planted to deeply in the nursery and then dug with a tree spade, most of the roots will be in the lower part of the ball, which also happens to be the narrowest part. The top of the ball, with the largest soil volume, will have few roots. Basically, a 30 inch soil ball will have a 24 inch root ball. Result - poor survival and growth.
3. **Root distribution.** Tree roots should be spread as uniformly as possible throughout the planting hole. Trees whose roots are forced or twisted into their planting holes can not develop a normal root structure. Circling or girdling roots can develop that then reduce the structural strength and water and nutrient movement in the tree. Trees with fibrous root systems that are stuck in the ground behind a planter that is moving too fast may end up J-rooted. Because the root system was dragged through the soil instead of being carefully placed, all of the roots end up on one side of the plant. When the tree is dug, only half of the soil ball contains roots.

4. Fertilization and weed, insect, and disease control. All of these should be parts of a crop management program designed to produce healthy plants with high levels of stored nutrients and carbohydrates (energy source). These are needed for trees to develop the roots and leaves needed to get all plant systems functioning in its new site. If the weed control is poor, the trees are not fertilized or leaves or roots are lost to insects or diseases, the plant is going to be weak and stressed. It may not survive the 95% loss of roots that occurs during the digging process, and even if it does, its performance in the landscape is likely to be poor.
5. Pruning. Trees should be pruned to develop a strong, well-spaced, structural branch system. They should not be indiscriminately cut back to a mass of crossing and parallel branches. Stubs should not be left but neither should large wounds be made. Pruners should know what the “branch bark ridge” is and should make their cuts just outside of it.
6. Harvest. Trees should be dug with an adequate size ball that is tightly secured with burlap and twine. Wire baskets can be used for added safety. Guidelines for minimum ball size: tree size are presented in the AAN publication “American Standard For Nursery Stock.” There are several mistakes that can be made at the nursery that can lead to problems later. If the soil is too dry when the tree is dug, the ball may partially fall apart, causing the death of some roots. Leaving the trees setting in the field or in holding areas without water after digging can also kill roots and reduce the ability of the tree to easily recover. Using plastic burlap inside wire baskets creates problems for the landscape crews. The basket and the burlap must be removed. Plastic burlap should not be used. Nylon twine should not be used to secure soil balls around trees. If not removed at planting it kills trees.

If the trees are spaced and planted properly in the nursery; fertilized; protected from weeds, insects, and diseases; pruned properly; and harvested and handled with care you will have a plant that has the potential to survive and thrive in the landscape.

## Part 2: Shipping, Handling , and Planting Practices

This section will start with the assumption that the plants were properly grown, harvested, and handled in the nursery. High quality plants were loaded on a truck and now must get safely to your base of operations.

**Shipping.** Bareroot stock must be kept cool (35-45 degrees) and moist to keep the roots and buds from drying out. This means they should be shipped in refrigerated trailers if they are being transported for long distances. Balled-in-burlap (B&B) and containerized stock should be thoroughly watered just prior to loading on the truck. Deciduous plants that are not in leaf can be transported uncovered for relatively short distances (100 miles?), but should be covered with a tarp if going farther. All plants in leaf should be shipped in closed trailers, or if in open trailers they should be covered with a tarp to prevent tearing and desiccation of the leaves. Plants that are shipped from warm areas to cold areas in early spring may be subject to cold injury. If their buds are swollen or leaves are already present, the plants should be protected from freezing.

**Handling.** Bareroot plants should be placed in refrigerated storage if at all possible. If refrigerated storage is not available, put them in the coolest place possible, like a moist basement or the lower level of a barn. They should be kept out of sunlight and wind. “‘Heeling in’ plants by digging a trench, laying in the plant roots, and covering them with soil is an old standard method of holding bareroot plants. The most important part about storing bareroot plants at this point is to keep the storage time as short as possible; especially if they are ‘heeled in’ outside. Get them graded to remove any plants that aren’t worth planting for one reason or another (too small, poor form, poor root system, etc.). Roots should be trimmed to remove broken roots and to get them to a size to fit your planting system. Leave as many roots as possible, but don’t leave them so long that they have to be twisted or forced into the planting hole. The tops of bareroot plants should be pruned to remove broken or crossing branches. Bareroot plants being placed in the landscape should not be pruned as heavily as those lined out in nurseries to be grown to larger sizes. When transporting bareroot plants to the planting site keep the roots moist and protected from the sun and wind. One way to keep the roots moist is to dip them in a slurry of one of the gels available for his use at planting. Though there is still debate about the benefits of these gels after planting, there is no doubt that they help keep the roots moist prior to planting. Again, at the planting site, keep the roots moist and protected from the sun and wind until the plants are in the ground.

Because of their weight B&B plants are often handled very roughly. However, to prevent damage to the soil ball and the roots inside, they must be handled very carefully when unloading, moving around the holding area, and when transporting to the planting site. They should be handled like babies - don’t pick them up by the neck and don’t drop them. Lift the soil ball from the bottom, either by hand or with equipment, and set it down gently. When storing B&B plants for any length of time, keep the soil ball moist. Plants in leaf will require more frequent watering than dormant plants. To thoroughly soak the soil ball, water lightly for a long period of time. You do not

want the soil ball to get too dry between applications of water because dry soil is extremely hard to rewet and will actually repel water initially. Surrounding the soil ball with a bark or leaf mulch will help hold water in the soil ball. If B&B plants are held so long that the burlap around them decomposes, the soil balls should be carefully rewrapped prior to moving them again.

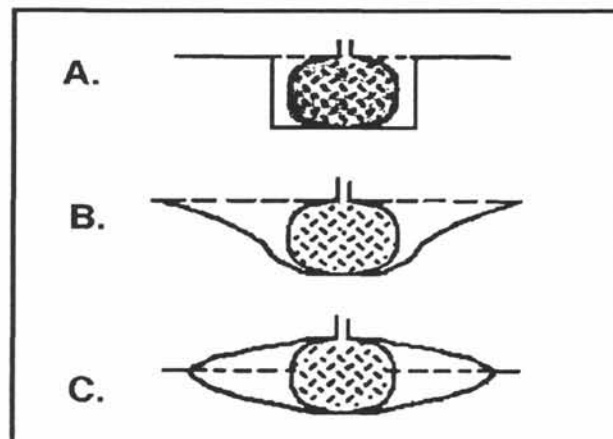
Container grown nursery stock is relatively easy to handle compared to bareroot or B&B stock. Most containers can be lifted and carried by one person. There is little risk of injury to the root system if the container is accidentally dropped. A large amount of plants can be stored in a small area and watered by a timer-controlled irrigation system. Since plants grown in containers are frequently watered and fertilized, they develop very soft growth. This means they must be protected from drying out, freezing, and in some cases, sun. Plants shipped in from southern areas should be placed in poly-covered quonset huts to protect them from late frosts. Shade-loving plants like azaleas and rhododendrons hold best if kept under about 50% shade. As with the other types of plants, water is the key element in keeping the plants looking good throughout the holding period. In hot, windy periods during the summer container-grown plants may have to be watered every day. Allowing them to dry out one time may cause severe leaf scorch that can make the plant unsaleable for some time. As with B&B plants, most container media are hard to rewet if allowed to get too dry.

**Planting Practices.** There are a number of key planting practices that should be highlighted.

1. There has been much debate in recent years about what the size and shape of the planting hole should be. Standard practice in the past was to dig the hole at least a foot deeper than the soil ball of the plant. Currently, our standard recommendation is to dig the hole no deeper than the plant is to be placed. In well drained soils with good structure, plants should be placed at the same depth at which they were grown in the nursery. If the soil is poorly drained or compacted, the plants should be placed higher. How high depends on how bad the conditions are - as much as 50% of the ball could be above grade. Fill around the exposed ball with good soil and mulch.

The hole must be wide enough to allow for shifting the plant and getting it properly oriented. In most cases this is about six inches wider than the ball all around.

To help plants get established in poor soils, several people have recommended digging the holes very wide and shallow at the top and tapering to a standard width hole at the bottom. The theory is that since most of the roots grow close to the soil surface, this is where the most of the soil should be loosened.



**Figure 1.** Modification of the plant hole. A. Standard recommended planting hole. B. If soils are rocky or compacted, prepare a wider hole. C. If soils are severely compacted or wet, prepare a shallow, wider hole and plant above grade.

2. There has also been much debate in recent years about whether or not backfill soil should be amended with peat moss or some other organic material. Standard practice in the past was to add it; standard practice now should be to leave it out when planting bareroot or B&B plants. In most cases backfilling with the soil from the site should be adequate. The plant is going to have to grow in the native soil eventually, and the amended backfill creates another interface that the roots must penetrate. When planting container-grown plants, which have soil balls that are mostly or all organic matter. This is a personal opinion, unsupported by research results at this time. But it does seem to me there could be

some benefit to creating a transition zone between the 100% organic material the plant was grown in and the soil at the site. One last point to consider is that many customers think you're cutting corners and not doing the job right if you don't amend the backfill with peat moss. In these cases, amend, it won't hurt.

3. Remove all plastic burlap, nylon twine, and wire or plastic labels from the soil ball and branches. These can girdle and kill individual branches or the entire tree. I think it is a shame to see a tree that has been in a landscape for 5-8 years die just at the time it should be having a significant effect in the design of the site, simply because someone forgot to remove a piece of rope at the time of planting. Plastic burlap used to be shiny and green and easy to distinguish from natural burlap. Now there is a plastic burlap on the market that is brown and looks just like natural burlap. Be on the lookout for it. If in doubt, burn a small piece of it. If it turns to ash and blows away, it is natural burlap. If it forms a shiny bead, it is plastic. A major problem I have encountered is nurseries that use plastic burlap inside wire baskets. When planting a tree like this, place the tree in the planting hole and cut off the top half of the wire basket. Then push the burlap down into the bottom of the hole and fill in on top of it.
4. What should be done with wire baskets? Some people say they should be removed because they will girdle the roots and stunt or kill the tree. Others say the roots will be unaffected as they grow around the pieces of wire like their trunks grow around wire fences. If the handles of the basket are not folded over the top of the ball, I don't think the basket will cause the tree any problems. However, to be on the safe side, I recommend cutting off the top row or two of squares that could affect the buttress roots or trunk of the tree.
5. When backfilling the hole, firm the soil around the root ball with your foot. Do not follow the old recommendation of getting the hole half full and then thoroughly soaking it and working the slurry with the shovel 'to get out all the air pockets.' As long as the soil is firmed around the ball there is nothing wrong with having a few air pockets in the soil. Roots actually grow better in air pockets than in tight soil.
6. Minimize pruning at the time of planting. Remove dead, crossing, and parallel branches and scaffold branches that are growing too closely together. Do not severely head back branches. There is no truth to the old recommendation that trees need to be cut back hard to compensate for their loss of roots.
7. Keep grass as far away from the base of newly planted plants as is possible. Grass is not only extremely competitive with woody plants, but there is very good reason to believe it is allelopathic, which means it produces chemicals which inhibit their growth.
8. Do not stake plants unless you have reason to believe it is necessary. Most plants stand up perfectly alright with no help from stakes. If you do use stakes, make sure the wires attaching them to the tree are kept from rubbing the bark off the tree with something like a piece of rubber hose. There are better staking systems available now that use materials that pose less risk to trees. One system uses a material similar to that used to make seatbelts.
9. Apply a layer of mulch 2-4 inches thick to hold in moisture and limit weed growth.