

## Proper Planting of Trees and Shrubs

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### Typical Tree Planting Detail

Proper planting is critical to the establishment and long-term health of trees and shrubs. In fact poor planting and follow-up care likely leads to more tree and shrub death than all other causes combined. Common problems include planting too deep, failure to address soil problems, failure to fix circling and girdling roots, improper staking and guying, poor mulching and improper watering. To help people get new trees and shrubs off to a good start, the following planting guidelines have been developed. The recommendations are based on nationally recognized standards as well as experience and information compiled by the Nebraska Statewide Arboretum and the UNL Nebraska Forest Service

### Species Selection

Perhaps the most important aspect of successful tree or shrub planting is the selection of the right type of plant that will thrive on the planting site. It is important to realize that many trees and shrubs have particular soil, water, sun exposure and other siting requirements. Most importantly, a plant has to be genetically "hardy" or acclimated to the region it is planted in. It won't matter how well something is planted if it is the wrong species or type of plant for the site. Fortunately there are many great resources to help with selection including nursery and landscape professionals, arboretum and botanical garden people, the Nebraska Statewide Arboretum, the local public library and of course, internet resources (a Google search is a good place to start).

### Preparing the Site (Digging the Hole)

Once the right plant has been selected for the planting site, it is time to get the shovel ready. In recent years, however, the emphasis has change from "digging a hole" to "preparing a site". Since a tree or shrub's roots will extend well beyond the planting hole, it is important to address the suitability of the broader planting area. Soil and drainage limitations should always be addressed before digging the hole. A few digging recommendations include:

- Whenever possible, trees and shrubs should be placed in a wide and relatively shallow hole. Think of a bowl or crater shaped depression that is two to three times wider than the root system of the plant (see diagram). A wider hole allows for easier planting and also provides for quicker root establishment.
- The root system should rest on undisturbed or solid soil and the base of the trunk or stems should end up at the same level as the surrounding soil or just slightly higher (no more than 2").
- Planting too deep is a major cause of tree death and decline. Typically, the first lateral roots of woody plants should be just under the soil surface and the root collar (or flair) at the base of the trunk should be visible at ground level. It is sometimes necessary to remove some of the soil or planting medium from the top of the pot or root ball to find the root collar and to insure that proper planting depth is achieved.

### Setting the Plant

All containers, including plastic pots, peat pots, grow bags, burlap and wire baskets, should be removed as much as possible before planting is completed. Whenever possible, plants should be carried by their containers or root balls, not by their trunks or stems.

- Girdling and/or circling roots are typical in plastic containers. Such roots should be loosened by hand and spread out as much as possible before backfilling.
- For balled-and-burlapped stock (B&B), it is important to remove as much of the burlap and wire retaining basket (now common on bigger stock) as possible without damaging the roots. The preferred method of doing this is to remove the bottom part (1/4 to 1/3) of the basket and burlap before sliding the plant in the hole. Once the plant is stabilized in the hole, the remaining burlap and wire basket should then be cut off and removed. Another method is to place the plant in the hole with the burlap and wire completely intact. Once the tree is stabilized, the wire basket and burlap are cut off and removed as deep into the hole as possible (no more than the bottom 1/4 of the burlap or wire should remain). It is also important to remove all rope, wire and/or twine from around the base of the trunk

during the process. Note: a wider planting hole will be appreciated here since it allows for easier access to the root ball.

- In almost every instance, the soil removed to dig the planting hole should be used to backfill around the plant. The soil should be added gradually with water used to help settle it around the roots. Care should be taken not to tamp or compact the soil after the plant has been watered.

#### **Soil Amendments/Site Modifications**

Soil amendments such as peat moss, compost, sand, or water absorbing polymers should not be routinely added to the backfill. Adding soil amendments can create a pot-like situation where roots may struggle to grow outside of the original planting hole. Although soil amendments should not be added directly to a planting hole, some planting sites may need modification to support trees and shrubs if the existing soil is found to be compacted, poorly drained or relatively inorganic. In such cases, the goal is to prepare the wider planting area and not just individual planting holes.

- For excessively compacted soils, it may be advisable to loosen the top several inches of the planting site whether by hand or with mechanical equipment.
- Organic matter in soils has proven to be beneficial to the establishment and good health of most tree and shrubs. For soils that are low in organic matter, materials such as compost, leaf shreddings, grass clippings, etc., can be worked into the top several inches of soil over the wider planting site before planting is undertaken.
- If poor drainage is the problem, then the planting site can be raised a few inches. In such a case organic materials can be combined with a few inches of good topsoil with the mix then worked into the top few inches of the planting area.

#### **Fertilizing**

Fertilizers are not generally necessary for most tree and shrub plantings. It has been demonstrated that most native soils have sufficient nutrients to support appropriately selected species. However, in soils with low organic matter or in situations where a soil test has revealed a nutrient deficiency, a slow-release, low-nitrogen fertilizer (such as Osmocote®) may possibly be beneficial. Such soils are sometimes encountered around new construction where topsoils may have been replaced by nutrient poor sub soils. If fertilizers are used, they should be incorporated into the top layer of the soil rather than deeply in the planting hole. High nitrogen fertilizers can burn roots of new plants if they are placed in direct contact with the roots.

#### **Staking and Guying**

Staking and guying of new trees should not be considered an automatic activity, but rather should only be done if it is necessary to prevent a tree from blowing over. Many trees are lost because guying materials are improperly installed or are not removed. In addition, the natural swaying of a tree trunk in the wind is important to establishing a healthy trunk caliper and root system. However, in the windy Great Plains, especially on open or exposed sites, trees often do need staking. A few tips for staking include:

- Staking is more common on exposed sites where there is very little wind protection.
- Staking is typically less critical for B&B trees with heavy root balls and for fall planted deciduous trees that have lost their leaves. Such trees have less surface area to catch the wind and don't blow over as easily as trees in full leaf. Trees not staked should be regularly checked for leaning for several weeks after planting
- To help determine if a tree may need support, the trunk should be vigorously swayed after planting. If the root ball is moving in the hole, then the tree likely needs staking. Another option is to wait after planting until a good wind blows to see if it will tip or dislodges the tree. This method works well for container grown trees that can easily be righted.
- If a tree does need staking, the guying material used should have a broad surface at the point of contact with the tree trunk (see diagram). Canvas strapping, cloth strips and manufactured tree ties are good choices. Do not use rope, wire or wire through hose since they can cause rubbing damage.
- Guying materials can be anchored to two wood or steel t-posts that are driven into the ground on the south and north sides of the tree just beyond the root ball. The guying materials should be attached so that some free movement of the tree is maintained.
- A single stake driven at an angle across the tree should not be used since significant

rubbing injuries can occur.

- All guying materials should be removed by the end of the first growing season. Stakes can be left in the ground for a longer period of time since they can provide another barrier of protection against mowers and trimmers.

### **Mulching**

Mulching has proven to be significantly beneficial to the healthy establishment of young trees and shrubs and is now considered a standard part of planting and post-planting care. Mulch has many benefits including the conservation of moisture in the root zone, insulation of roots from temperature extremes, reduced weed and turfgrass competition, addition of organic matter to the soil and prevention of "mower blight" (the damage caused to trunks and stems from mowers and string trimmers).

- Only organic mulches such as wood chips, wood shavings, bark and leaf matter should be used. Non-organic mulches like gravel, white rock or lava rock provide no benefits to plants and should be avoided.

- Mulch should be applied in a layer no deeper than 2-4" (see diagram). Mulch piled more deeply can cause the root zone to remain too wet and can also act as another layer of soil, thus causing roots to suffocate or conversely to grow into the mulch where they can quickly desiccate.

- Mulch should be kept away from direct contact with the trunk or stems.

- For individual trees, mulch rings should extend at least to the drip line (canopy edge of the plant) and preferably four to five feet wide for the first few years after planting. As trees mature, this circle can be expanded as desired - perhaps using the drip line as the edge. As the circle expands, shade tolerant perennial plants can be incorporated in the mulch.

- For trees and shrubs planted close together, mulching should be done in mass - so that the entire group is mulched in one large bed. This significantly reduces mower conflicts.

- Mulching should be considered not a one-time effort but rather an ongoing process.

Mulch should be reapplied every year or two, depending on how fast it breaks down.

- Weeds in a mulch bed should be removed by hand or only with very careful use of herbicides such as Roundup that have very little soil activity.

### **Landscape Fabric and Weed Barriers**

Other than with windbreak or large conservation plantings where the use of organic mulches is not possible, landscape fabrics and plastic weed barriers are not recommended. Studies show that such products have several problems including: keeping the soil too moist during wet periods; limiting moisture absorption during a rain; reducing the healthy exchange of atmospheric gases important to root health; and girdling the base expanding tree trunks. In addition, plastic barriers inevitably shred and become unsightly over time, thus becoming an added maintenance task themselves. If a landscape fabric is used, it should be a type that is proven to biodegrade within a few years of placement.

### **Trunk Wrapping**

General use of trunk wrap to prevent winter frost-cracking is not recommended on newly planted trees. Research has shown that such wrapping is usually not effective and can actually increase the harm from some diseases and insects. In addition, tree wrap can block the photosynthetic food production of the trunk, which is important to the establishment of a young tree. However there are two good reasons for the temporary use of tree wrap on the lower trunk: 1) to prevent damage during the time a tree is being transported and handled; and 2) to prevent rabbit damage during the winter. Paper, plastic or foam based wraps are common for these purposes. If wrap is used, it should be removed as early as possible the following spring.

### **Trunk Guards**

In places where trunk damage from animals and/or mechanical equipment is an ongoing concern, semi-permanent guards can be used to protect the trunk. Such guards are available at most nursery or tree care supply businesses. In addition a simple guard can be made from perforated drain tile (or other thin plastic tubing) cut in sections and split down the side so that it can be placed around the tree trunk. Plastic guards should be placed only on the lower 10" to 18" of the trunk and they should be monitored regularly to prevent rubbing and/or girdling injuries. Guards should be removed completely when a trunk reaches five to six inches in diameter.

**Pruning**

General pruning or crown thinning should not be done to newly planted trees and shrubs except to remove damaged branches or to address obvious structural deficiencies such as a double leader. Lower limbs should remain on a tree for as long as possible after planting since they manufacture critically needed food and help shade/protect the lower trunk.

**Watering**

Proper watering is critical to the healthy establishment of newly planted trees and shrubs. Unfortunately both over watering and under watering are common causes of tree and shrub decline. The best way to determine if a new plant needs water is to poke a finger or probe (such as a screwdriver) several inches into the ground. If the probe comes out wet, don't add more water. It is important to check for dryness in the root zone of the plant since the porous medium often used to grow plants can dry out much faster than the native soil surrounding it. Other watering suggestions include:

- On average, newly planted trees and shrubs need about one inch of water per week applied naturally by rain or by human watering. Less frequent but deeper watering is generally more beneficial than frequent light watering for most woody plants.
- Trees and shrubs planted in sandy, porous conditions will typically need more water than those planted in clay or heavy soils.
- Containerized plants are usually grown in a porous medium that can dry out quickly in hot, windy weather. Such plants will require more frequent watering than B&B or bare-root stock.
- Mulch will help keep a root zone moist for longer periods. As such, it is easier to over water mulched plantings.
- It is important to realize that turf irrigation requirements are different from those of trees, shrubs and other landscape plants. In fact, many landscape plants are killed when their roots are drowned in heavily irrigated yards. Ideally plants should be grouped according to their water requirements and the irrigation system designed and zoned accordingly. Reducing turf watering and planting trees and shrubs slightly higher than the surrounding grade can help when planting within irrigated lawns.

**Reference Sited:** *Woody Landscape Plants: Selection and Planting*. University of Nebraska-Lincoln Cooperative Extension, NebGuide # G98-1349-A. - <http://ianrpubs.unl.edu/forestry/g1349.htm>

Additional information can be found on-line at <http://arboretum.unl.edu/> (Nebraska Statewide Arboretum), <http://www.nfs.unl.edu/> (UNL Nebraska Forest Service), <http://www.tree-planting.com/tree-planting-4.htm>, [http://www.treesaregood.com/treecare/tree\\_planting.asp](http://www.treesaregood.com/treecare/tree_planting.asp) (International Society of Arboriculture).