

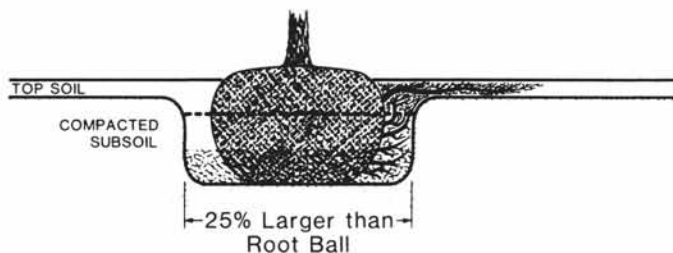
# Predicting and Reducing Drought-Related Plant Problems

by **Kris R. Bachtell & Charles A. Lewis**  
Part 2 — continued from April

## PROPER TRANSPLANTING TECHNIQUES

Transplanting may result in great moisture stress on landscape plants. When normal nursery practices are followed, less than 5% of the root system may be moved with the tree. The extreme state of imbalance between the root system and the crown results in an extended period of stress and slow growth, often described as "transplant shock." Recently transplanted trees and shrubs with limited root systems are particularly prone to drought-related injury. Proper transplanting techniques and follow-up maintenance can have a significant positive influence on root growth and development, thus helping to reduce the severity and duration of this period of post-transplanting stress.

Poor soils make successful transplanting still more difficult. Urban planting sites are often characterized by severely compacted subsoil and a thin topsoil layer. Root regeneration following transplanting in a disturbed site is difficult, because water is often in excess, and oxygen is unavailable in sufficient quantities to support good root growth. Water applied during transplanting — and subsequent irrigations or rainfall — cannot easily infiltrate into the subsoil and eventually flows to the lowest point of the planting hole, where it can remain for weeks, killing the root system (Figure #1). Even when drought conditions exist, the lower portion of the soil ball is often slow to dry out. Only in the upper portion of the planting hole is there enough oxygen and the proper amount of water to support the new, regenerating roots.



Plants transplanted into disturbed soils must be planted properly to increase their chances of root regeneration and survival. The wider that the planting hole is dug, the better. A width of two to three times the diameter of the soil ball or container is recommended. The depth should be no deeper than the soil ball or container, so the plant rests on the compacted surface of the soilball. Sloping the sides of the hole is also helpful (Figure #2). If these recommendations are followed, the volume of soil favorable for root regeneration may amount to ten times the volume of the conventional hole.

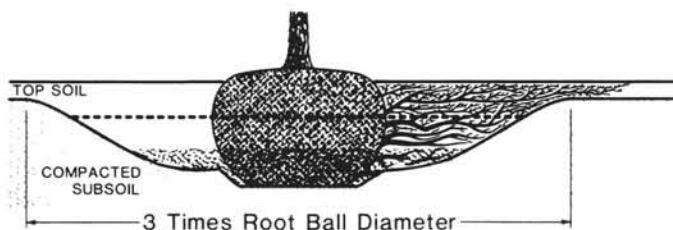


FIGURE 2 (cont'd. page 8)

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When placing the plant into the planting hole, make sure the basal root flare (where the roots spread at the base of the stem or trunk) is at or slightly above the ground line. Plants that are planted too deeply often fail soon after transplanting. Those that do survive may grow for many years, but can be more subject to disease during periods of drought. During the drought summer of 1988, some large declining sugar maples in the Arboretum that were apparently planted too deeply over 30 years ago died quite suddenly. When planting a tree, if you observe that the basal root flare is more than two inches below the soil surface of the root ball, remove the excess soil until the flare is exposed and plant accordingly.

On sites that tend to flood after heavy rainfall, the root ball can be planted so that at least one-third is above the original grade (Figure #3). This planting technique keeps the majority of the newly planted tree's root system out of saturated soil even during very wet periods. If the planting site is properly mulched (discussed later), the planting soil will be less prone to drying during dry weather.

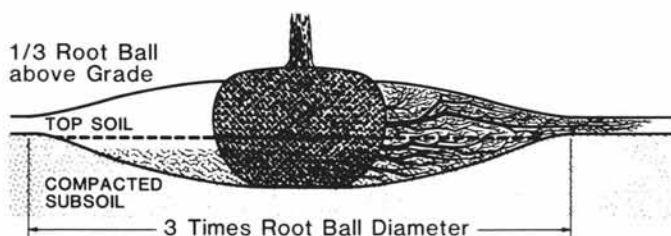


FIGURE 3

### WATERING NEWLY TRANSPLANTED AND ESTABLISHED PLANTS

Newly transplanted trees possess only a small percentage of their original roots and need to be watered carefully and monitored closely. The best way to determine the need for water is to check moisture of the soil ball or the container medium frequently. A hand trowel or soil probe is a useful tool for doing this. If the soil is dry, apply enough water to re-wet the soil ball or container mix thoroughly. Commercially available root feeding/watering probes are useful for watering recently transplanted plants. Insert the probe directly into the soil ball or growing medium, and deliver the water at a low rate. Do not over-water; as mentioned earlier, the subsoil may not allow the irrigation water to drain and the root ball can quickly become too saturated. Newly transplanted trees should be checked once a week to determine if watering is necessary, more often during hot, dry weather.

During periods of drought, large established trees also need to be watered. A single large tree can transpire more than 100 gallons of water per day. Thus, it is important to water properly.

Before watering it is best to check the soil moisture by carefully digging a 6"-diameter hole to a depth of 12-18 inches with a narrow spade about midway between the trunk of the tree and the edge of the branch spread or by taking a sample with a soil sampling probe. If the soil is dry, water with a sprinkler or slow-running hose to a depth of at least 18 inches, including an area at least as wide as the branch spread. Root feed/watering probes are only useful as long as they are not placed deeper than 12 inches into the soil and if they are moved frequently. When surface watering, be sure to water at a rate slow enough to allow

(cont'd. on page 10)

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the water to soak into the soil rather than to run off the surface. Apply additional water only when there is insufficient rainfall and the soil probe sample is again dry to the touch. One long thorough watering is more effective than more frequent, short term waterings. Deeper watering will enhance the development of deeper roots that are less subject to heated soil surface and surface evaporation. *Do not apply water that has been chemically softened.*

#### **MULCHING NEWLY TRANSPLANTED AND ESTABLISHED PLANTS**

Organic mulches applied to the soil around newly transplanted trees will often increase transplanting success. Properly applied mulch creates an excellent zone for root regeneration and thus helps increase drought tolerance. Mulches encourage root growth in a number of ways, including: greater soil moisture retention (reducing the need for supplemental watering); reduced soil temperature fluctuations (keeping the soil cool in summer and warm in winter); reduced weed and turf grass competition for moisture and nutrients; increase soil fauna activity (allowing for better availability and use of oxygen and water).

Readily available and acceptable kinds of organic mulches include: leaves, grass clippings, mushroom compost, wood chips, hardwood and coniferous bark, composted manure, and composted sewage sludge. Composted mulches are preferable to fresh, non-composted materials because they usually possess a more favorable texture and chemical composition. If only fresh mulch is available, do not incorporate it into the planting soil. Apply the mulch to cover the planting-hole area to a depth of three to four inches. Keep the mulch six inches away from the trunks of trees, to discourage rodents feeding on the trunk. Plan on renewing the mulch layer every two or three years. If ground

Applying an organic mulch beneath established, large plants is also helpful in reducing drought stress. In a recent mulching experiment conducted at the Arboretum, we determined that mulch applied to 20-year-old trees significantly increased the root growth in the soil layer beneath the mulch. In mulched sugar maples, the root surface area in the top six inches of soil was increased by 195 percent, compared to plants of the same species grown in a lawn. A common concern expressed about this type of treatment is that roots which are closer to the soil surface could be more prone to drying out. This is not the case — this same experiment determined that the moisture content beneath the organic mulch is greater than it is in a lawn.

Before applying mulch to larger trees, first eliminate grass with glyphosate herbicide (Brand Names: Round-up, Kleen-up, and others). Do not dig up the grass, as this would disturb the surface roots of the tree. Follow the label instructions carefully (do not increase the concentration of the herbicide beyond the recommended amount, or you could kill the tree), and be sure to use only this chemical and not another type of herbicide that could be harmful to the tree. After waiting a week for the herbicide to work, apply three to four inches of mulch over the sprayed area. Consider renewing the mulch every few years and periodically spot-spray glyphosate to eliminate weeds that emerge.

#### **CONCLUSION**

No one is certain of future weather patterns. While it is true that we can do little about the weather, in order to grow plants successfully, we need to use better cultural and landscape management practices. Through proper plant selection and use, our landscape plants will have a better chance to survive during a drought.

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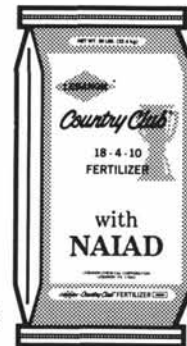
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