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G02-1452-A Landscaping around Established Trees

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NebGuide

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Landscaping Around Established Trees

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This NebGuide examines how tree roots grow and how they can be damaged by landscaping activities, and suggests ways to prevent such damage.

While trees are valuable assets to our landscaped homes in Nebraska, they nevertheless have a hard life in this prairie state. Our climate, with its extremes of summer heat and drought, early freezes in the fall and late cold snaps in the spring, combined with severe weather, all conspire to damage and stress trees. But trees also can be damaged in ways we don't expect.

Landscaping under and around established trees can severely damage tree roots, seriously reducing tree vigor and health. This NebGuide can help you to better protect your valuable trees as you landscape around your home.

The Importance of Protecting Tree Roots

The leading cause of tree death during landscape construction is damage to roots. Several large roots grow downward to support the tree, but 90 percent of a tree's roots occupy the top 12 to 18 inches of soil. These fine feeder roots spread out, pancake-like, away from the trunk. Roots can extend from the trunk to a distance of 1 to 3 times the height of the tree (*Figure 1*). Roots take up water,

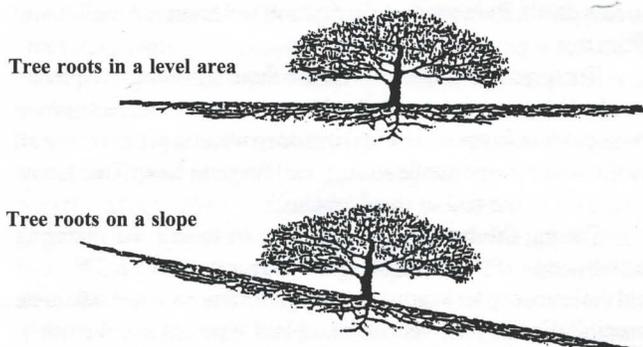


Figure 1.

nutrients and oxygen, and release carbon dioxide. Because roots need oxygen, any activity that compacts the soil or raises/lowers the existing soil level can damage tree roots and diminish tree health.

Before beginning any major landscaping or construction project, consider contacting a certified arborist, horticulturist or forester for suggestions on ways to minimize damage to valued trees. These experts will assist in establishing a Protected Root Zone which is the entire root zone area shadowed by the canopy (*Figure 2*). Within the PRZ, landscaping construction must be avoided.

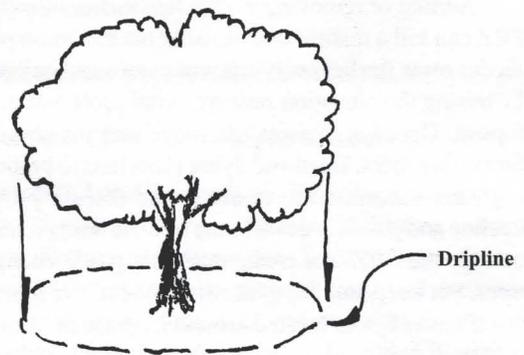


Figure 2.

Gardening Under Trees

Most trees are adapted to stable conditions in forests, where soil disturbance rarely occurs. In a garden, repeated disturbance of soil under trees can damage roots and reduce overall tree vigor. Activities which cause extensive damage to tree roots include: 1) rototilling under the tree canopy; 2) tearing away tree roots to make planting room for annuals; 3) adding soil to create planting spots or raised flower beds; and 4) cutting trenches 6 or more inches deep to install edging materials or to create a natural edge. These practices cut a tree's fine feeder roots which are responsible for water and nutrient uptake. Planting annuals like impatiens or

begonias every year damages tree roots. In their place, use perennials or groundcovers which do not have to be planted each year. You can minimize root damage by using smaller seedlings. Smaller plants will take longer to fill in, but will preserve tree health. Not growing any plants beneath trees and simply mulching the area is another alternative. These techniques will cause less disruption to tree roots.

The Problem of Above-Ground Roots

Like a tree's trunk or branches, tree roots grow in girth over time. A root that was once well below the soil surface can increase in circumference and appear above the soil line. Also, tree roots that are growing over a dense, compacted soil layer may eventually emerge above the soil. If turfgrass is in this area, care must be taken not to scalp tree roots with the lawnmower. Removing even one large root can cause the loss of 5 to 20 percent of the tree root system. Cutting tree roots reduces the ability of the tree to take up water and nutrients and affects the stability of the tree during high winds and ice/snow storms. Adding soil to rebury the root is not a long-term solution. Shallow roots will eventually resurface and deeper roots can be deprived of oxygen. A better alternative is to plant perennials or groundcovers, or mulch with a 2 to 4 inch layer of wood chips (or other organic mulch). This eliminates the need to mow, reduces tree root and trunk damage and allows roots to obtain needed oxygen, while hiding the shallow roots.

Dealing With Grade Changes

Adding or removing even a few inches of soil within the PRZ can kill a mature tree. Raising the elevation puts surface feeder roots further away from moisture and oxygen sources. Lowering the elevation removes vital roots and nutrient-rich topsoil. Decay organisms can move into the severed ends of remaining roots. Dead and dying roots lead to branch dieback, a greater susceptibility to insect and disease problems, and decline and possible death to the tree. Building retaining walls outside the PRZ can create desirable grade changes around trees, yet keep soil depth at existing levels (Figure 3).

Planter boxes created around the base of trees do a great

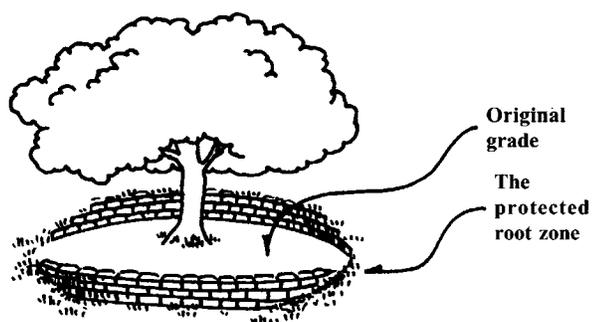
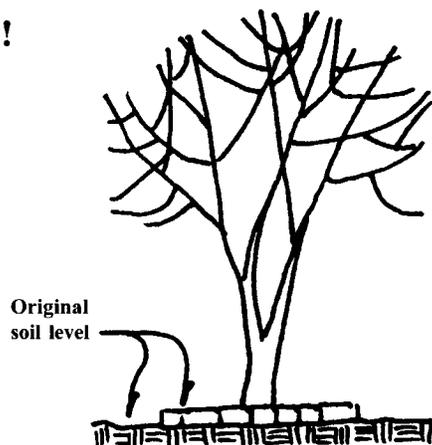


Figure 3.

job of reducing mower damage to the trunk and beautifying the landscape. Planter boxes that create raised planting beds around established trees, however, can cause damage to roots by depriving them of oxygen. If you build a planter box around

your landscape tree, take care to maintain the soil at the original level and make sure the installation of edging materials does not sever tree roots (Figure 4).

Yes!



No!

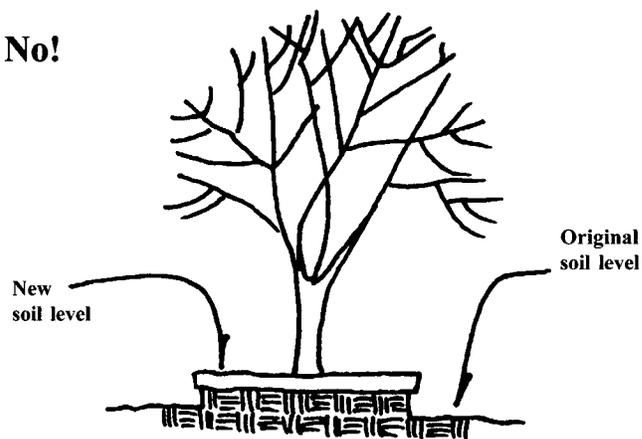


Figure 4.

Managing Water Needs

Changes in soil levels around the tree root zone also change the way water drains around trees. Standing water creates an anaerobic condition (absence of oxygen) that leads to root death. Rainwater and irrigation water should drain away from trees.

Turfgrass and trees differ in their watering frequency needs. While turfgrass responds well to two to three applications per week, trees benefit from deep watering, providing all of the water in one application. (See "Steps to Keep Tree Roots Healthy" at the end of this NebGuide.)

Zoning the home irrigation system to suit the differing water needs of trees and turfgrass is recommended. This will aid the homeowner in adjusting irrigation levels when adequate precipitation is received for one plant type but not the other, or when the heat of summer increases turfgrass's water demands.

Dealing With Utility and Irrigation Lines

Wherever possible, all utility lines should be laid in one corridor, being careful to stay outside the PRZ. An even greater distance is recommended with highly-valued mature trees. When utility lines must be installed through the PRZ, tunneling or boring two feet below grade is preferable to trenching. Trenching can cut as much as 40 percent of the tree's root system, severely compromising the tree's stability and health.

Irrigation lines also should be routed outside the PRZ. As with utility lines, an even greater distance is recommended for highly-valued mature trees.

Tree-Friendly Pavement

Concrete driveways and patios that encroach on the PRZ risk the tree's health by obstructing oxygen and water penetration to the roots. Root health is further compromised when the base laid for concrete construction involves removing topsoil and any unlucky roots. Damage to surviving roots is compounded when subsoil is tamped down with heavy equipment, reducing gas exchange and water infiltration.

When constructing driveways, patios or sidewalks, consider using a pervious material, such as turf-stone or gravel. A good substitute for a conventional sidewalk is a walkway that bridges over tree roots. A brick or patio walkway that uses a sand base and a geotextile underlay allow oxygen and water to penetrate into the soil below (Figure 5). Sidewalks that must pass within the PRZ should be located a minimum of 3 feet away from the tree trunk. Raised wood decks are an excellent alternative to concrete patios because tree root disruption is minimized.

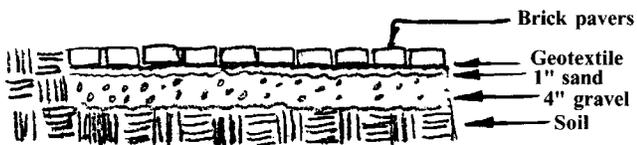


Figure 5. Utilizing a geotextile underlay.

Symptoms of Tree Root Damage

Evidence of landscape construction damage to trees includes one or more of the following: branch dieback; discoloration or early fall coloration of leaves; ongoing infestations of insects or diseases; premature leaf drop; an increase in seed production; the formation of suckers on the trunk; a decrease in annual growth and/or death to the tree. **Trees can be slow to react to stress.** Symptoms may not appear until two to three years after root damage has occurred. Examining annual growth on twigs can determine if a tree's growth and vigor are declining (Figure 6). The growth rate for old trees slows down as they age. If, however, the slowdown of growth can be traced to the year a landscape project began, the most likely cause for diminished growth can be attributed to construction damage.

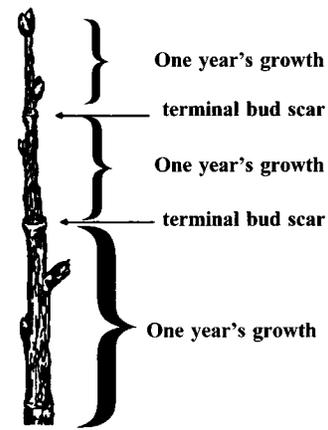


Figure 6. Diminished tree growth may indicate root problems.

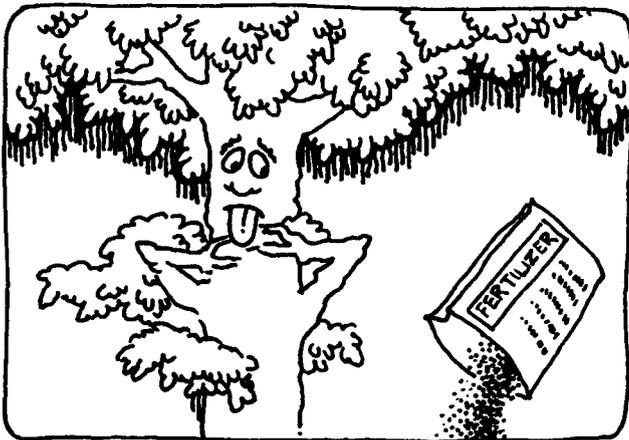
Homeowners who suspect tree decline caused by excess soil fill should inspect the base of the tree. All trees have a natural root flare at the base where the trunk meets the roots. Trees that have no flare and appear to enter the soil much like a telephone pole are too deep. Recently deposited excess fill should be removed. If the fill is less than 12 inches deep, soil should be carefully excavated with shovels and rakes. Soil fill deeper than 12 inches can be removed with mechanical equipment, although the final 12 inches should then be excavated with hand tools. Little success is achieved by removing excess fill that has been in place for more than two years. Tree health is permanently compromised for trees that have excessive amounts of fill or excavation at their root zone. Vigor is reduced and the tree may eventually die.

Steps to Keep Tree Roots (and Trees) Healthy

- Avoid soil fill or excavation around trees.
- Lay a 2- to 4-inch layer of organic mulch, such as wood chips or shredded bark, at the base of the tree, extending as far outward as possible. Rock mulches are not a good choice because they increase soil temperature and retain less soil moisture than organic mulches. Organic mulches have the added benefit of increasing soil friability and fertility over time. Do not pile the mulch up against the tree trunk. Mulches heaped against the trunk keep the bark wet and become a haven for bacteria and fungi. Also, avoid mulches piled in excess of 4 inches deep, which increase the likelihood of tree roots growing into the mulch. During a drought, tree roots growing in excessive mulch are more likely to dry out and die than roots growing in soil.
- Don't use landscaping fabric or sheet plastic beneath mulch. These products inhibit the penetration of oxygen and water to the roots.
- Prune out dead, low and rubbing branches. Removing healthy branches to reduce wind resistance is not recommended. Research shows that trees grow and

develop to minimize their wind resistance. Pruning heavily can disrupt a tree's natural ability to withstand heavy winds. Wound dressings do not prevent wood decay and are not recommended.

- Irrigate in the absence of precipitation. In the fall, continue this practice until the ground freezes. Deep watering is best. In areas with clay or loam soils, trees need 1 inch of water per week. Trees in sandy soils that drain quickly need up to 2 inches of water per week. Homeowners should make certain their automatic irrigation system does not apply more water to trees than needed. Regardless of soil type, it is extremely important that tree roots are not in soil that is constantly saturated, but instead have periods where the soil is allowed to dry.
- Wait 2 years after construction damage has occurred before fertilizing. Once this time period has elapsed, trees can be fertilized with 1.5 pounds of actual nitrogen per 1,000 square feet per year. Fertilizing at heavier rates is detrimental to trees. Excessive fertilization makes trees more susceptible to insect and disease problems, and more prone to drought injury. Liquid



fertilizers applied as soil injections work best, although broadcast applications of a granular fertilizer also can be done. Research shows fertilizer spikes, while convenient, can cause root burn and for this reason are not recommended. Homeowners who fertilize nearby turfgrass do **NOT** need to apply additional fertilizer for their trees.

- Stressed trees are more prone to insect and disease problems. This is because natural tree defenses fail under stress. Monitor closely and take appropriate steps to control insect and disease problems.
- Turfgrass roots will strongly compete with tree roots for available nutrients, water and space. To reduce competition, locate turfgrass areas as far away from trees as possible. This also creates irrigation zones that can be set for different watering volumes, keeping both trees and turfgrass healthy. Also, keep in mind that regular lawn aeration of turfgrass located beneath trees will cause damage to tree roots.

Where To Go For Help

Questions on tree concerns can be directed to:

- The University of Nebraska Cooperative Extension office in your county or your city forester;
- Certified arborists affiliated with the International Society of Arboriculture (search for a certified arborist by Zip code by accessing the ISA Web site at <http://www.isa-arbor.com>);
- Certified arborists affiliated with the Nebraska Arborist Association, Lincoln, Neb., (402) 476-3852;
- Nebraska Forest Service, University of Nebraska-Lincoln, 109 Plant Industry, P.O. Box 830815, Lincoln, NE 68583-0815, (402) 472-3745.

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Elbert C. Dickey, Dean and Director of Cooperative Extension, University of Nebraska, Institute of Agriculture and Natural Resources.

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