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Horticultural Tips: Tree Roots and Grade Changes

by Jeff Iles, Extension Horticulturist, Iowa State University

Trees are important in the school landscape. Aboveground parts of trees are highly valued for their spring flowers, cooling shade in summer, and vibrant fall leaf colors. But healthy root systems below ground are vital for tree vigor and longevity. Roots are responsible for water and mineral uptake, energy storage, and anchorage. If tree roots are damaged, tree health is jeopardized.

Because roots are underground, most people have a poor understanding of this important subterranean network. In general, roots grow where their resources (water, oxygen, and mineral elements) are available. They usually do not grow where there is no oxygen or where the soil is compacted and hard to penetrate. This need for oxygen explains why a majority of tree roots are located in the top 12–18 inches of soil.

Root systems are extensive; they often extend outward from the trunk to occupy an area 4 to 7 times larger than the crown (branch) spread. It is easy to see why any type of soil disturbance near trees can, and usually does, cause damage.

As trees mature in the landscape, they attain a rather delicate balance with their environment. In fact, trees grow best in an environment of minimal change. Unfortunately, our urban, suburban, and even rural landscapes are places where drastic changes occur frequently. A few of the most common site disruptions include driveway, sidewalk, or playground installation; grade changes; road widening; and utility trenching. Such construction activities near trees can cause substantial root injury that may be fatal to established trees.

Of all the soil disturbances previously mentioned, grade changes and their impact on tree roots may be the least understood. Because roots are near the surface and depend on oxygen from the atmosphere, raising or lowering the soil level around an established tree can have serious impact. Scraping soil away from a tree removes or injures important absorbing and transport roots, eliminates nutrient-rich topsoil, and exposes other roots to desiccating (drying) conditions. And if heavy equipment is used during the grading process, additional tree injury occurs from soil

Soil compaction and direct injury to tree from construction activities.

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Tree well indicates soil addition to a site.

compaction. Instead of lowering the grade, valuable trees might be protected by changing the project specifications and raising the grade elsewhere. If soil removal becomes necessary, grade changes should be limited to areas outside the branch spread (canopy) of trees.

Soil fills that raise the ground around trees are equally harmful. Soil additions reduce the oxygen supply to roots, compact the soil, and often raise the water table. Soil additions 6 inches or less probably do not harm "fill-tolerant" trees, especially if the fill material is good topsoil, high in organic matter, and loamy in texture. But irreparable damage results if as little as 2 inches of clay soils is used as fill, particularly around "fill-intolerant" trees. If fills deeper than 6 inches are necessary, it is still best to limit the grade changes to areas outside the branch spread of the tree. Where significant soil additions will occur close to the trunk, elaborate aeration systems can be used to protect trees; however, these methods are largely unproven. Often, the most practical solution is to remove trees that will experience significant root injury from grade changes.

Fill-tolerant Trees
Colorado spruce
Green ash
River birch
catalpa
Eastern cottonwood
Red maple
Silver maple
Swamp white oak
Black willow

Fill-intolerant Trees
White fir
White pine
Scotch pine
Ironwood
Linden
Sugar maple
Red oak
White oak
Serviceberry

Interior Pests: Spider Management in Schools

by Ken Holscher, Extension Entomologist, Iowa State University

Spiders come in all shapes, sizes, and colors. Although pest identification is a key component of integrated pest management, this process can be simplified for spiders. All you have to know is that spiders found in the upper Midwest can be placed into two major groups, depending on their biology and behavior: web builders and hunters.

Web builders. As their name implies, web builders construct webs made of silk and are rarely found away from their webs. These spiders have poor vision and rely on their webs to capture insects for food. Several small to moderate-sized web builders, such as the cobweb spiders, can live and reproduce inside buildings if an adequate insect food supply is present. Because these spiders must rely on their webs to capture food, effective management is based on frequent mechanical removal of their webs. Removal of the unsightly webs also guards against an impression of poor cleaning practices in schools. Web removal should be started in early spring when spider populations are just starting to increase, rather than during peak populations in summer or early fall. Managing insects that are the food source also aids in the management of indoor web-building spiders.

Hunters. Hunting spiders, such as the common wolf spider, do not construct webs to capture food. These spiders are fast, strong, and have excellent vision that allows them to actively hunt for insect prey, generally at night. During the day, these spiders hide in cracks, crevices, under stones, or other similar outdoor areas. Because of their hunting behavior, these spiders may accidentally enter a building through gaps or cracks around windows and doors or through other openings. Once inside a building, hunting spiders cannot live for more than a day or two and cannot reproduce. Effective management of hunting spiders starts with locating and eliminating entry points into the building. Removing hiding places from around the outside foundation and trimming back plants that directly contact the building reduce the number of hunting spiders around the outside

An example of a web-building spider, the long-jawed orb weaver. Photo by Scott Bauer, ARS/USDA.

perimeter and thus the likelihood of accidental entry indoors. Replace ultraviolet-emitting mercury vapor exterior lights with yellow, high-pressure sodium vapor lights to help reduce the number of insects and associated hunting spiders attracted to school buildings.

The wolf spider is an example of a hunting spider. Photo by Richard Seaman (www.richard-seaman.com).

Any hunting spiders found inside the building can be vacuumed and discarded. Nontoxic glue boards placed inside potential entry points also can aid in the management of hunting spiders.

Insecticides for spider management. Insecticide applications as residual sprays either inside or outside a structure and insecticide fogging ("bombs") inside a building are not recommended for the management of spiders. These treatments are generally ineffective in eliminating existing spider problems and do not serve as good preventative method.

Exterior Pests: Weed Management in Prairie Plantings

by Joyce Hornstein, Extension Program Specialist, Iowa State University

Establishing a prairie planting may take 2 to 5 years. Patience and extra attention during development are important, but once established little maintenance is needed. A prairie planting can provide erosion control in problem areas; a living teaching resource where students can study the plants, insects, and other "critters" in the planting; and enjoyment for parents and other visitors to your school or park. Keeping weed problems in check is important for successful prairie establishment.

Sources of weeds in prairie plantings. Weed seeds are in the soil and may germinate when soil is tilled before planting. Seed also may blow in by the wind or may be a contaminant in the prairie seed mix. Initial weed growth in a new planting is mainly composed of annuals; fortunately, these plants disappear within a few years as the prairie plants outcompete weeds for water, nutrients, and root space. Bluegrass or other

Established prairie (photo by Joyce Hornstein).

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perennials in the site that have survived mechanical or chemical treatment may be an additional source of weeds.

Because you have planted a mixture of prairie seed, learn to identify the plants when they are in bloom so that you can distinguish prairie plants from weeds. Students, teachers, or interested parents that helped with the planting may be trained to identify the plants. Some perennial weeds such as Canada thistle, reed canarygrass, bluegrass, bromegrass, and birdsfoot trefoil may be more of a problem. If you notice problems with perennial weeds, enlist students or parents for weed-pulling sessions. If you have an aggressive weed that doesn't diminish over time, you may need to spot treat with a herbicide. Ask for advice for product selection and follow all instructions that are written on the product label.

Mowing and prairie planting establishment. The simplest way to manage weeds in your prairie planting is to mow regularly. You may need to mow for several years, with the first year being the most important. Mowing helps suppress weeds and allows the prairie plants to gain a competitive edge. Because most prairie plants are perennials, it takes several seasons for them to develop their extensive root systems. Over time the prairie plants will dominate the planting and thus minimize future weed problems.

During the establishment year, mow at least three or four times beginning in June. A rotary or sickle-bar mower can be used. Early in the season, set the mowing height at 3–4 inches. As the prairie plants develop, raise the equipment to mow at 6–8 inches. During the second year, check the planting for weeds and mow if necessary.

If you need help with identification of weeds or prairie plants, contact local plant experts within your community, ISU Extension staff or Master Gardener volunteers, or County Conservation Board staff. A good reference on prairie plantings is *A Practical Guide to Prairie Reconstruction*. The author is Carl Kurtz and the book was published in 2001 by the University of Iowa Press.

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