The LIVING ROADWAY TRUST FUND

Recognizing the value of native plants in roadsides, the Iowa Legislature established the Living Roadway Trust Fund (LRTF) in 1989. This annual, competitive grant program provides funding for integrated roadside vegetation management (IRVM) activities, including the preservation, establishment and maintenance of native vegetation along Iowa's roadsides. To learn more about the LRTF and the projects it funds, visit **www.iowalivingroadway.com**.

This poster series, illustrated by Iowa native Mark Müller, is one of many educational tools provided by the LRTF to promote public awareness of native prairie and the benefits it provides in highway rights-of-way. Iowa residents may order a complimentary set of posters at **www.iowalivingroadway.com**.

What is a root anyway ?

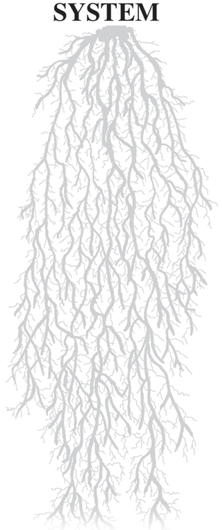
The next time you are gazing at a stand of tallgrass prairie you might consider that you're not getting the whole picture. You are actually only seeing less than one third of each plant in front of you. Don't worry, your eyes are just fine, but what you can't see are the extensive root systems below ground that comprise over 70 percent of the bulk of a plant. If you could view the subterranean world of the prairie you would see a vast, intertwined network of roots and roothairs plunging downward five, ten, even twenty feet or more.

Roots serve as an anchor, provide water, nutrition and store food for the vegetative parts of the plant. They also create pore space in the soil allowing water to infiltrate deep into the soil profile. Surface roots die and decompose on a regular basis adding to the detritus layer which over time creates deep, rich, fertile soil.

There are many different shapes and sizes of roots but there are two basic types of root systems, the taproot system and the fibrous root system.

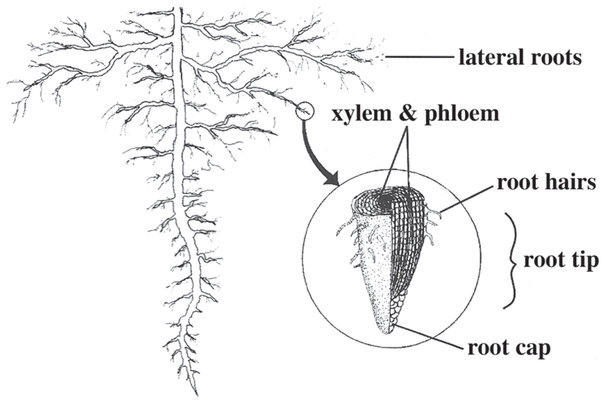
TAPROOT SYSTEM

FIBROUS ROOT SYSTEM



A seedling's first roots grow straight down. Its lateral roots grow out from the base of the plant in a crisscross pattern which anchors the plant in the ground. As the soil warms in the spring the roots grow millions of new root hairs which absorb water and nutrients from the soil. A square yard of big bluestem sod may contain over 25 miles of fine root hairs and rootlets. In one year the rootlets that decay along with surface litter may add up to 500 pounds of organic matter per acre and return calcium, phosphorous and other nutrients to the soil.

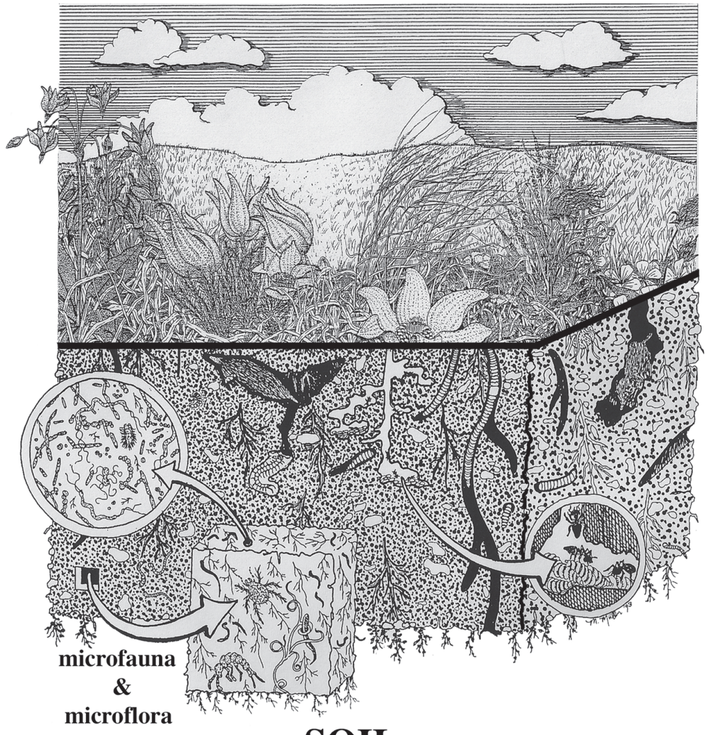
Each root tip has a root cap that protects the root as it grows, pushing forward into the soil. Roots are able to grow longer and wider thanks to special cells called cambium cells. As these cells divide, the root gets bigger. Cells on the outside of the cambium layer become phloem cells which transport nutrients to the plant. Cells on the inside of this layer become xylem cells which transport water to the plant. This growth by dividing cells in the root tip enables the root to spread down and out in search of more water and food for the plant above.



Most prairie plants are perennials - plants that grow back every year from the roots - rather than annuals which start a new plant from seed every year. Some individual prairie plants can be hundreds of years old.
Even though some of the root hairs and rootlets die and decay annually the main root stock of perennials just goes dormant in the winter. As soon as the soil warms in the spring the roots start pumping food and water allowing the vegetative part of the plant to spring to life once again.

The perennial nature of prairie roots allows them to reach deep into the soil which helps the plants survive extreme drought, drying winds and bitter cold temperatures which are all common on the Midwest landscape. The tough, deep prairie roots also allow prairie plants to survive fire which is occasionally used to manage prairies. In addition, the extensive, deep, root systems allow even heavy rainfalls to easily soak into the soil rather than running off and causing erosion.

Prairie roots were a curse to the early settlers who plowed up the virgin prairie. New Jersey Tea was known as "pest of the plowman" or "rupture root" because the huge, burl-like taproot would damage plows. Leadplant was called "prairie shoestring" because of the sharp snapping sound made when a plow point tore through the rootlets. We may very well understand more about the surface of the moon than we do about the underworld of a prairie but we do know that this world of roots helped create the most fertile soils on the planet and the few existing remnants and restorations continue to work their magic.



SOIL

A simple dictionary definition for soil is: " the portion of the earth's surface in which plants grow." But soil is much more interesting and complicated than that. Soil, especially in the top layer called topsoil, is literally alive. Along with different mixtures of sand, silt, clay and various minerals, topsoil contains high amounts of humus, or organic matter. And a handful of topsoil contains billions of microorganisms.

There are the more obvious, larger creatures that live in the soil like moles and gophers, insects, arachnids and worms but the majority of the soil dwellers are tiny, most are microscopic, called microfauna and microflora. There are thousands of species of bacteria, fungi, molds, and mites, etc. in just a teaspoon of soil. All of these critters have specific niches and all work together in a complex web of activity that provides plants a fertile growing medium. They chew up the detritus releasing nutrients that plants need (13 of the 16 elements plants need are derived from the soil). These microorganisms also secrete substances that glue together smaller grains of soil into larger aggregates that permit easy passage of water and air. And finally they too die and decompose adding to the fertility of the soil.

Soil quality has been seriously degraded since the plowing of the prairie. With a high percentage of the sponge-like organic matter, prairie soils may have soaked up six inches of rain without shedding runoff. Modern soils are more bulky and compacted with 60% to 80 % less organic matter and shed runoff after very little rain has occurred. To have clean water and reduce flooding we must have healthy soils. We simply must think of soil as green infrastructure no less important than roads, bridges, sewer systems, power grids, and communication systems, etc. which are considered fundamental to an enterprise or community. Green infrastructure - the network of natural ecosystems such as soil - are essential to the health and sustainability of our communities.