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TURF ROOTS

TECHNICAL TURF REPORT

BY JOHN HOBAN



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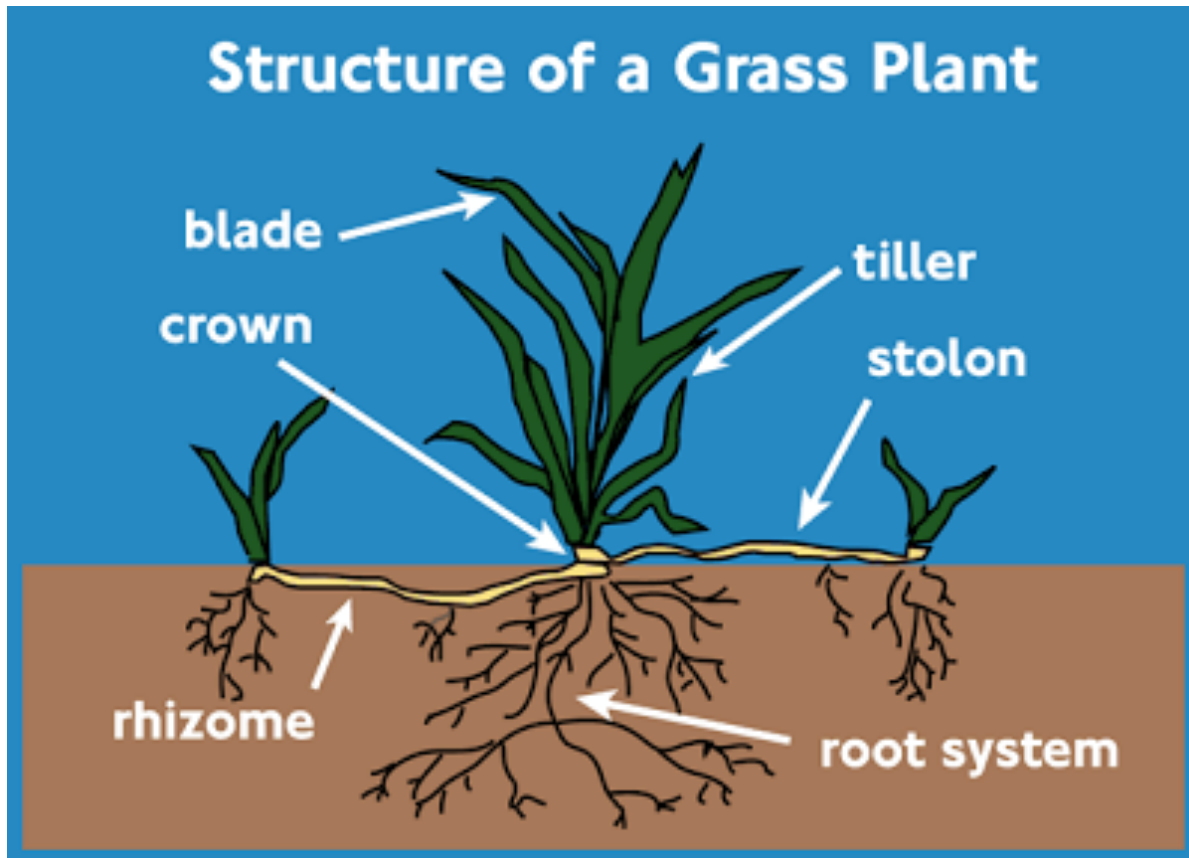
Abstract

Which part of the turf are your constituents going to grade you on: the thriving, green foliage above the soil or the length and density of roots below the surface? At the end of the day, your constituents want the greenest turf possible. Very few pay attention to what occurs below the surface. However, roots are important not only for the good of your turf but also for the environment. Learn to use your soil and roots as an asset and make it one of your major considerations when designing your programs.

Introduction – Turfgrass and roots

Turf is a living organism. It needs to be fed. It needs to breath. It needs a place to store its food. In many ways, turfgrass is just like you and I. Turfgrass grows vertically but will also branch out horizontally to uptake necessary nutrients. The roots contain a single growing point located at the tip of the root known as the meristern. Cell division and differentiation occur at this crucial growing point; meaning that the meristern is the youngest part of the plant. This is different when considering the green foliage or shoot, where the youngest part is located at the base, directly above the surface.

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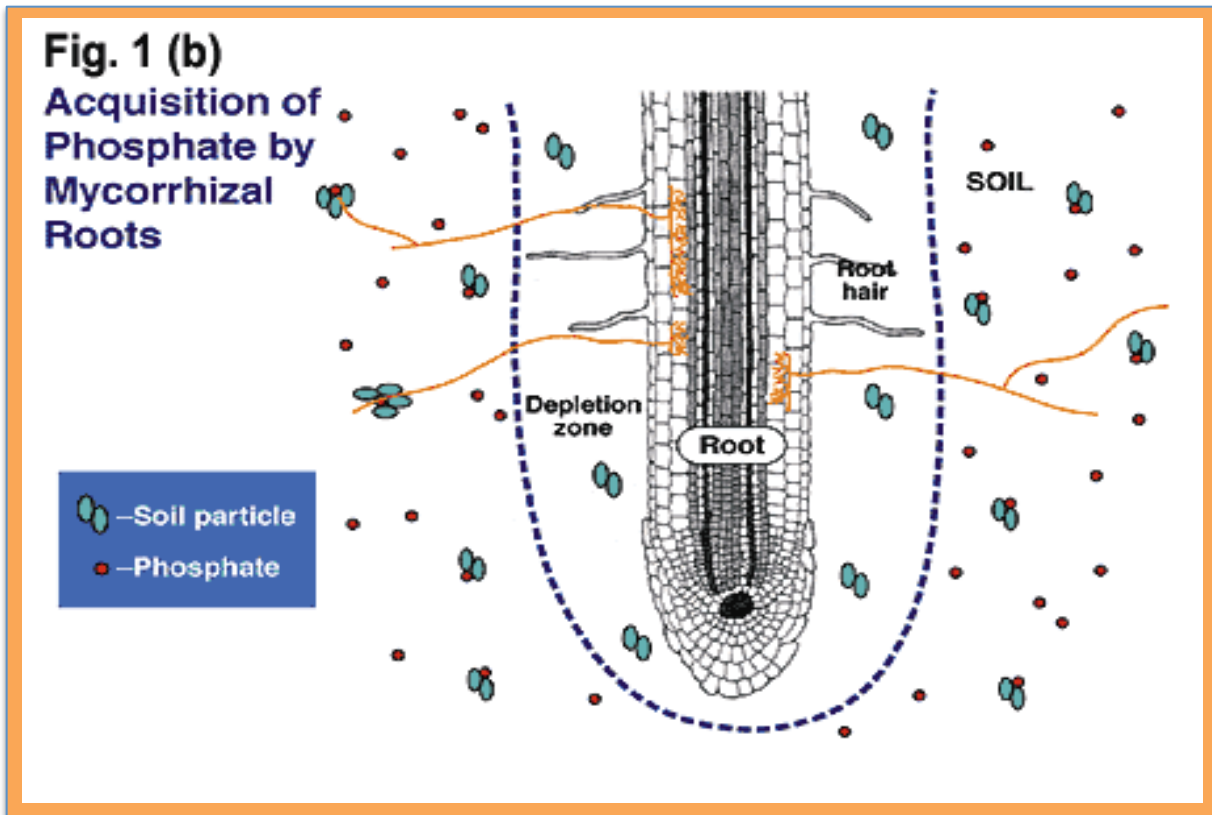


Root hairs – A neglected but important aspect of the root

An often-neglected aspect of the root are root hairs. These tiny hairs are where most nutrient and water uptake occurs. That means, it's not just important to have deep roots but fibrous roots with many root hairs as well.

Root hairs are small and delicate. Chemical formulations can easily damage root hairs. For example, when turf professionals apply pre-emergents like prodiamine, root pruning sometimes occurs, especially with vulnerable root hairs.

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Roots – The storage centers of the plant

Roots also serve as the primary storage point for carbohydrates and other nutrients within the plant. Carbohydrates are, in turn, excreted from roots into the soil to feed microorganisms. In return, microorganisms will perform beneficial tasks for the plant. It's a symbiotic and crucial partnership for the plant. For example, mycorrhizae fungi form a symbiotic relationship with the plant, providing more efficient nutrient and water uptake by the roots. In exchange, the roots provide sugars as food for the fungi.

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Roots – The food delivery system

The majority of essential elements that are taken up by the plant (with the exception of carbon) are by roots. This includes elements found in fertilizers such as nitrogen, potassium and phosphorous. All of these elements serve vital purposes within the plant. Essential nutrients will come into contact with the roots through one of three primary ways. The first method is through root interception. Root interception occurs when the root comes in direct contact with the nutrient. Another method is through mass flow where ions flow through the soil with the movement of water (the primary uptake mechanism for nitrogen). The final method is diffusion. In diffusion, ions move from areas of high to low concentrations (potassium and phosphorus are taken up in this matter).

Erosion control

The roots of turfgrass, when grown densely and appropriately can provide one of the best solutions for erosion control. The roots latch on to the soil surface and secure the soil in place. For example, look at the numerous mudslides occurring in California. Land where mudslides occur usually lack vegetation so when rain comes there is nothing to keep it from displacing the soil. Turfgrass could act as a solution, holding the soil on these hillsides.

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Roots and soil – Another symbiotic relationship

While the living biology within or added to the soil is one of the key ways to improve soil quality, roots also play a role. Roots secrete sugars, attracting microorganisms, which in turn help increase soil quality. The turf roots and microorganisms that roots help support, will begin aging the soil and over time, improving the soil for plants.

Age is crucial because older soils are generally better for nurturing plant growth. For example, when contractors are building houses they often utilize the sub-surface soil dug for the basement, for the front yard. This sub-surface soil does not provide optimal growing conditions. Turf roots and microorganisms help to age the soil, ultimately providing better soil for plant growth.



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Sustainability

By building longer, denser root systems turf professionals are able to create more sustainable turf. Turf with healthy root systems are often better able to resist weeds, disease and stress. Having a healthier root system also allows the plant to better resist drought, which means less water/irrigation is needed. Furthermore, by having healthy roots the plant is often able to come out of dormancy in the summer and winter faster.



Meet the author

John Hoban

I am a Turf Science student at Purdue University with minors in entrepreneurship, soil science and crop science. I am always eager to learn about the ever developing green industry as well as the people that continue to evolve it.

If you have any questions or wish to discuss anything in regards to this article drop me an email at jhoban@holganix.com. I am always always looking for ambitious people to talk and learn from.



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Resources:

Dr. George Van Scoyoc, Professor of Soil Science, Purdue University

Dr. Randy Molina, Professor Soil Biology, Oregon State University Harrison et al. 1999