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BACK-TO-BASICS

Understanding Turfgrass Roots — Part 1

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Part 1 of this Back to Basics series on turfgrass roots details system development, function and dependence on water uptake. Part 2 in next month's issue will cover nutrients, hormonal balance and proper cultivation techniques

It might be safe to say that the secret to effective turfgrass management is developing the art of growing and maintaining healthy roots. Although roots are not generally visible, they are so essential to the well-being of turf that the turf manager who neglects them does so at considerable peril. This is the second of a three part series on turfgrass morphology, function, physiology and management. The first explored the turfgrass crown (Hull, 2000) and a future article will discuss turfgrass leaves.

Water uptake by roots is controlled by two conditions: the contact of soil water with root cell membranes and the number and permeability of aquaporins.

Development and function

In the initial article, I noted that the young turfgrass plant has two root systems: a primary system that originates from the radical (seed root) after it emerges from the germinating seed and an adventitious system initiated at the first stem node that develops in the coleoptile (shoot emerging from the seed) after its tip reaches the soil surface and experiences light (Fig. 1).

This initial node eventually develops into the crown of the grass plant (Hull, 2000). During the seedling year, both root systems are functional but thereafter the adventitious roots comprise the entire functional root system.

Adventitious roots can also emerge at the nodes of horizontal stems (rhizomes and stolons) and these too can become part of the plant's permanent root system. Nodes of a tiller just above the soil can, under favorable conditions, produce short prop roots that may penetrate the soil but their contribution to turfgrass plants is questionable.

The longevity of roots in perennial grasses is a matter of some debate. Turgeon (1999) describes Kentucky bluegrass as a perennial rooting grass while some bentgrasses, perennial ryegrass, bermudagrass and rough bluegrass experience yearly root replacement and are considered annual rooting grasses. However, in her classical studies of the annual growth cycle of perennial cool-season grasses, Stuckey (1941) concluded that perennial grasses renew their root systems each year. My own experience with cool-season grasses would lead me to agree with Stuckey but clearly under favorable conditions, roots that do survive the rigors of summer heat,

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