

MANAGING TURFGRASS FROM THE ROOTS UP
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Roots play important roles in plant growth. They take up water and nutrients from the soil to support shoot growth and function. Roots also synthesize hormones such as cytokinins that are transported to shoots and regulate many physiological activities. Healthy turf requires healthy root systems. It is, therefore, important to manage turfgrass from the roots up.

Roots growing underground are affected by many soil factors, including soil physical, chemical, and biological factors. Major soil physical factors influencing root growth include drought, waterlogging, soil temperature, and poor soil aeration caused by over-irrigation and compaction; poor soil quality, such as fine-textured soils or layered soils with poor drainage; or layering in high-sand-content putting greens that can result in perched water table. Major soil chemical factors that restrict root growth include salinity, high acidity, nutrient deficiency and toxicity. Biological factors mainly are diseases. Poor soil physical, chemical, and biological conditions can restrict root growth and function in water and nutrient uptake, and hormone synthesis, which, in turn, affect turf quality. Therefore, good soil environments are essential for root and shoot growth. Cultural practice that can improve soil conditions would enhance root growth and turf quality.

Deficit irrigation may lead to drought stress while excessive irrigation can cause waterlogging and poor soil aeration. To maintain high quality turf, proper irrigation is important. Irrigation quantity and frequency should be determined based on water requirements of plants and weather conditions. It is better to water less than water too much. Adding water to the soil is easier than removing excess water, especially in poorly drained soils.

High soil temperature is more detrimental than high air temperature for root and shoot growth in cool-season grasses. Low soil temperature limits growth of warm-season grasses. Any cultural practices that could help maintain lower soil temperature during summer would be beneficial to cool-season turfgrasses and that could maintain higher soil temperature would help warm-season turfgrass better survive the winter.

Roots require sufficient oxygen in order to produce energy in the respiration process to support plant growth. However, roots of turfgrass often are exposed to soils with poor aeration. Compacted, layered, or fine-textured soil restricts oxygen supply to roots, which inhibits root growth. Poor soil aeration caused by poor drainage, soil compaction and layering could be improved by aeration.

Salinity is a common problem in arid climates. The use of recycled, effluent water for irrigation in turfgrass also causes salinity. Saline soil, particularly sodium and chloride, results in water stress and is toxic to roots growing in high salt soils. Toxicity is often noted as leaf burn, turf thinning, and other symptoms. Improving drainage and leaching of soils by infrequent, deep irrigation could alleviate salinity problems.

In summary, to develop the most management strategies in turfgrass management, turfgrass managers must identify soil stress factors on their sites. Any cultural practices that could provide good soil environments would facilitate plant growth.