UT Extension

W161-A

Turfgrass Maintenance

Basic Turfgrass Requirements

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In Tennessee, high-quality turfs are most often maintained in fertile, well-drained soils located in sunny, open areas of the landscape. These turfs may also be irrigated to supplement natural rainfall. One reason turfgrasses perform well year after year is that the basic requirements for their growth, survival and reproduction are being met.

A question often asked of students studying turfgrass management is "Which of the following – light, temperature, water, atmospheric carbon dioxide or nutrition – is most important for turfgrass survival?" One correct answer is, "All are equally important."

Light. Turfgrasses capture light energy and use it to produce compounds that can be stored in reserve for use at a later date. They produce carbohydrates through photosynthesis, the combination of carbon, hydrogen and oxygen from carbon dioxide and water in the presence of light. Photosynthesis cannot occur without an appropriate amount of light of specific (e.g., red, violet and blue) wavelengths. Aerial shoots of healthy, actively growing turfgrasses reflect green light, contributing to the turf's color.

Temperature. Turfgrass seed germination and growth are restricted to a specific range of temperatures. Turfgrass species are broadly categorized as warm-season or cool-season, depending on the temperatures at which they thrive. Creeping bentgrass, Kentucky bluegrass, ryegrasses and the fescues are cool-season turfgrasses. They are best adapted to air temperatures from 60 to 75 degrees F. Warm-season turfgrasses, including bermudagrass, centipedegrass, St. Augustinegrass and *Zoysia,* grow best at air temperatures from 80 to 95 degrees F. Warm-season turfgrasses lose their color and are dormant during cold winter months.

Water. Water moves from the soil solution into roots. Once inside plants, water helps protect them from sudden changes in temperature. Roots contain the least amount of water, and stems the most. Nutrients and sugars move through plants in water. Actively growing turfgrasses often contain more than 75 percent water on a dry-weight basis and use from 1/10 to 3/10 inch of water each day. An estimated 1 to 3 percent of the total amount of water taken up by turfgrasses every day is required for growth and development. The rest moves through the plants to the atmosphere. Warm-season turfgrasses have a very efficient photosynthetic system compared to the cool-season turfgrasses. Cool-season turfgrasses need about three times more water than warm-season turfgrasses to produce equal amounts of shoot and root tissue.

Atmospheric carbon dioxide. The atmosphere contains several very important gases including nitrogen (~78 percent), oxygen (~21 percent) and carbon dioxide (~0.03 percent). Some plants (legumes) capture and use nitrogen from the atmosphere. Animals take in oxygen and exhale carbon dioxide. Plants obtain carbon from atmospheric carbon dioxide. Carbon, a component of amino acids, proteins, sugars and starch, is also found in the walls of plant cells.

Nutrition. In addition to carbon (C), hydrogen (H) and oxygen (O), turfgrasses require at least 13 mineral nutrients for survival and seed production. Turfgrasses obtain the majority of each from the soil. Nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg) and sulfur (S) are classified as macronutrients according to the amount of each used by turfgrasses. Of these, N, P and K are primary essential nutrients. Calcium, Mg and S are secondary essential nutrients. Note that although the required quantity varies among the six macronutrients, each is equally important. The amount of each primary nutrient found in turfgrass tissue, in descending order, is N > K > P. Seven other essential nutrients are required in minor amounts. Boron (B), chlorine (Cl), copper (Cu), iron (Fe), manganese (Mn), molybdenum (Mo) and zinc (Zn) are essential minor or micronutrients. Most recently, nickel and sodium have received attention as essential micronutrients.

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