UT Extension

W161-C

Turfgrass Maintenance

Developing a Turf Fertilization Plan

Tom Samples, Professor and John Sorochan, Associate Professor
Plant Sciences

Turfgrasses often require greater amounts of one or more nutrients than the soil can provide. In Tennessee, the nutrient requirement of turfgrasses is often cyclic, varying by season and plant growth rate. These and other factors deserve consideration when developing an effective fertilization plan for turf.

Soil and Tissue Test Results. Unlike nitrate (NO_3^-), phosphorus (P) and potassium (K) are relatively immobile, moving downward very, very slowly in most native soils. The amounts of these two essential primary elements available for uptake by turfgrasses can be determined by soil test. If soil test results indicate a low level of P and K, the nutrients can be applied to turf at rates greater than the turfgrass requirement for each. This will increase the amounts of P and K in the soil. Equipment (e.g., mass spectrophotometry) is also available in many soil testing laboratories to determine the amounts of essential secondary (calcium, magnesium and sulfur) and selected trace (e.g., boron, copper, iron, manganese, molybdenum and zinc) elements in the soil. These tests are especially beneficial when managing turfgrasses in sandy soils with a limited nutrient-holding capacity. Dry clippings may also be submitted for nutrient analysis. A tissue test serves as a 'snapshot' of the nutrient content of turfgrasses at the time the sample was taken. In addition to reporting the results of nutrient tests, both soil and tissue test reports usually contain specific fertilizer recommendations.

Turfgrass Species and Varieties. The nitrogen (N) fertility requirement varies among the turfgrasses. Hybrid bermudagrass and creeping bentgrass require a higher level of N to maintain an appropriate growth rate and stand density compared to fine fescues (chewings, creeping red, hard and sheep) or centipedegrass. Turfs low in N are usually weak and thin, while those receiving excessive amounts of N are often diseased, weedy and prone to insect attack. Turfgrasses requiring relatively high levels of N often have a higher requirement for P than those with a low N fertility requirement.

Nitrogen fertility requirement of several turfgrasses.

Turfgrass	Relative nitrogen fertility requirement	Pounds of nitrogen required per 1,000 square feet per growing month
Annual ryegrass	Medium	2/5 to 1
Bermudagrass	High	½ to 1½
Centipedegrass	Very low	1/10 to 4/10
Chewings fescue	Low	1/5 to 3/5
Creeping bentgrass	High	½ to 1½
Creeping red fescue	Low	1/5 to 3/5
Kentucky bluegrass	High	½ to 1½
Perennial ryegrass	Medium	2/5 to 1
Tall fescue	Medium	2/5 to 1
Zoysia	Medium	2/5 to 1

Turf Quality Expectation. The desired level of turfgrass quality influences the amount of fertilizer applied annually. Fertilization can affect both the visual and functional quality of a turf. Aerial shoot density, color, smoothness and uniformity of a turf often increase with increasing soil fertility (provided nutrients are applied at appropriate rates and do not reach excessively high levels in the soil). Inadequate or excessive N fertility can limit the ability of a turfgrass to recover from damage caused by disease, insects and wear. Fertilization also influences the rate of thatch accumulation in turfs. This layer of undecomposed and partially decomposed organic residues enables turfgrasses to absorb shock, a very important attribute of sports turf.

Soils. Heavy, fine-textured soils containing large amounts of clay usually hold more nutrients than lighter, sandy soils. Greens-grade fertilizers containing small or micro-sized granules of slowly soluble or slow-release N and K sources are popular among golf course superintendents interested in extending the release of these nutrients to bentgrasses or ultra-dwarf bermudagrasses growing in porous, high-sand content golf green soils with limited nutrient holding ability. Similarly, turfgrass professionals managing heavily trafficked, bermudagrass at slightly higher (e.g., > 5/8-inch) cutting heights on sandy soils may broadcast medium-sized or fairway-grade granules containing extended-release N and K sources to maintain uniform growth of aerial shoots and roots while reducing the potential for loss of these nutrients by leaching.

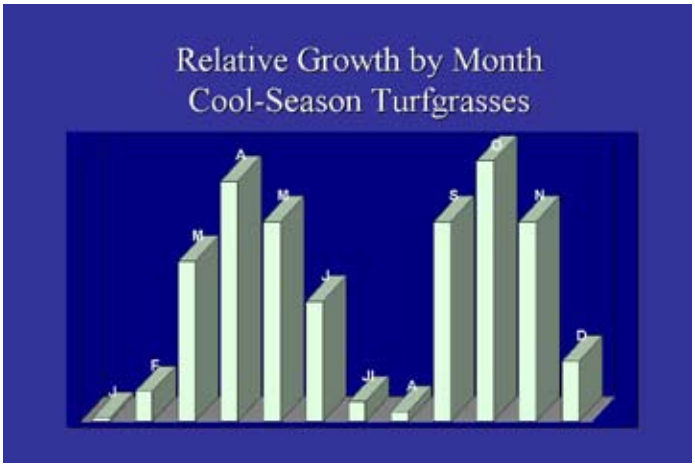
Use. Sports turfs receiving extra-heavy use most often require a much higher level of N fertility than turfs valued for their beauty and function that receive little, if any, traffic. Utility and roadside turfs may not receive any fertilizer after they are established.

Budget. Product cost often affects fertilizer selection, frequency of fertilization and application rates.

Extended-release (e.g., methylene urea, polymer-coated urea, sulfur-coated urea and urea formaldehyde) N sources are generally more expensive per pound of N compared to highly water-soluble sources such as urea and ammonium sulfate.

However, due to the greater potential to burn turfgrass leaves, quick-release N sources must be applied more frequently at much lower rates compared to extended-release sources. Bulk, blended fertilizers containing quickly available N sources and muriate of potash may be much less expensive than bagged fertilizers formulated using polymer-coated or methylene urea and potassium sulfate.

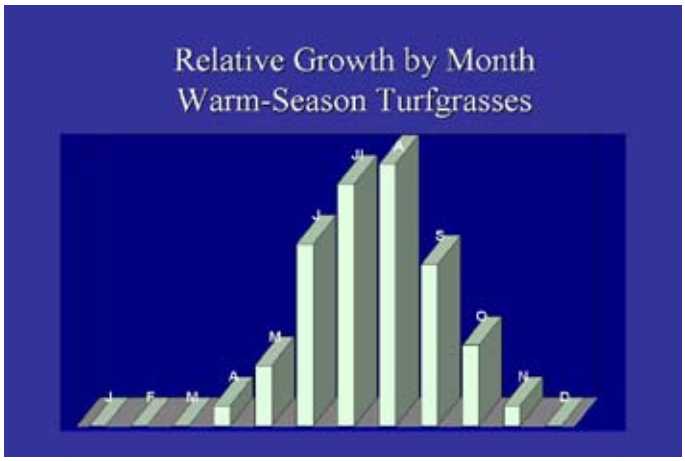
Climatic Conditions. The fescues, Kentucky bluegrass and perennial ryegrass grow best at air temperatures from 60 F to 75 F. In summer, high temperatures often slow the rate of growth of these cool-season turfgrasses. Warm, moist weather favors the growth of bermudagrass, centipedegrass and *Zoysia*. These warm-season turfgrasses grow best at air temperatures from 80 to 95 degrees F and are dormant during cold winter months. A successful fertilization plan is one that delivers an appropriate level of fertility to support plant growth during favorable environmental conditions and to sustain turfgrasses exposed to climatic stresses.



Example high-intensity fertilization plan for maintaining a tall fescue lawn by applying a nitrogen-containing fertilizer and a fertilizer with a 2-1-1 nitrogen (N)-phosphate (P_2O_5)-potash (K_2O) ratio based on soil test results.

Suggested application date	Nitrogen application rate [pound of N per 1,000 square feet]	Suggested fertilizer ratio to use when the soil test level of available phosphorus (P) or potassium (K) is: low	medium or high[a]
Early March	½	1-0-0	1-0-0
Early April	½	1-0-0	1-0-0
Early September	1	2-1-1[b]	2-1-1[b]
Mid-October	1	2-1-1[b]	1-0-0
Mid-November	1	1-0-0	1-0-0
Total yearly application (per 1,000 square feet)	4 pounds N	1 pound P_2O_5 1 pound K_2O	½ pound P_2O_5 ½ pound K_2O

[a] When either P or K test in the very high range, no further applications of the nutrient testing very high are recommended. If both P and K test in the very high range, only N applications are recommended.
[b] If clippings are collected and removed, apply twice the amount of K_2O suggested at each application date.



Example high-intensity fertilization plan for maintaining a hybrid bermudagrass lawn by applying a nitrogen-containing fertilizer and either a fertilizer with a 2-1-1or 4-1-1 N-P_2O_5-K_2O ratio based on soil test results.

Suggested application date	Nitrogen application rate [pound of N per 1,000 square feet]	Suggested fertilizer ratio to use when the soil test level of available phosphorus (P) or potassium (K) is: low	medium or high[a]
Mid-April	1	2-1-1[b]	4-1-1[b]
Early June	1	1-0-0	1-0-0
Mid-July	1	1-0-0	1-0-0
Early September	1	2-1-1[b]	4-1-1[b]
Total yearly application (per 1,000 square feet)	4 pounds N	1 pound P_2O_5 1 pound K_2O	½ pound P_2O_5 ½ pound K_2O

[a] When P or K test in the very high range, further applications of the nutrient testing very high should be omitted. When both P and K test in the very high range, only N is needed.
[b] If clippings are collected and removed, apply twice the amount of K_2O suggested at each application date.

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