CHALKBOARD

TIPS FROM THE PROS

Late Season Nutrient Utilization by Warm Season Turfgrasses

By C.H. Peacock and J.M. DiPaola

The ideal nutritional strategy for turfgrasses is to sustain enough growth to match turf wear, while maintaining a favorable root to shoot ratio. This is best obtained by stabilizing the nutritional balance within the plant.

Over the past 30 years, broad ranges of fertilizer needs have been established for the more common turfgrass species. These fertilization programs are based on maintenance situations under "average" climatic conditions. However, seldom do environmental conditions approximate an "average" based upon weather data accumulated over a number of years.

Fertilization practices are now being recommended which make use of current knowledge about preconditioning the plant for stress situations. An example in the "upper southern" U.S. is late season fertilization. This describes the period in the fall from early September to November. During this period a number of factors influence cultural practices, especially fertilization, They include environmental influences, plant growth patterns, seasonal stress and turf use.

Environmental influences are not controlled by the turf manager. However, a knowledge of the plant's response to these influences can be the difference between sustaining growth versus decreasing plant vigor.

During the fall, there is a decrease in photosynthetic irradiance as both daylength and sunlight intensity decline. This is accompanied by a lowering of air and soil temperatures. There are also changes in precipitation patterns. Although the turf is using less water than during the summer, there is still a substantial irrigation requirement.

Growth of warm-season grasses starts to decline once the temperature drops below 78 degrees F. Other physiological changes include increased storage of food, particularly in the lateral stems. Even though low temperatures may cause complete discoloration and cessation of topgrowth, root growth may continue for about 30 days.

Environmental stress during the fall can affect warm-season grasses in several ways. Chilling injury is most common and is often seen as loss of topgrowth. It occurs when soil temperatures range from 50 to 55 degrees F. Higher nitrogen rates prior to reaching this temperature can delay or mask chilling injury. However, higher nitrogen rates can be detrimental to overall low temperature hardiness.

Direct low temperature kill can take place when plants are exposed to temperatures below 27 degrees F. Studies from several southern states have demonstrated that increased nitrogen levels resulted in greater low temperature kill during winter months. This could have been caused by the effect of nitrogen on physiological processes and/or thatch accumulation caused by increased biomass production. However, these same studies established that increased nitrogen rates *when combined with increased potassium* lessen low temperature injury.

Proper nutrition may also improve the plant's ability to prevent winter desiccation. Low relative humidity and reduced precipitation can severely damage the warm-season grasses literally by drying them out. More winter injury is observed with increased nitrogen or decreased potassium prior to the dormant winter period.

The primary consideration for warm-season grasses during the fall should be physiological hardening for maximum cold tolerance (winter survival). Nitrogen application may improve fall color retention and be desirable from an aesthetics viewpoint, but the effects of increased nitrogen levels may be too detrimental to take the risk. Since the fall is a period of decreased nutrient uptake, there is also an increased potential of nitrate leaching.

Potassium fertilization, while having little to no visual effect, dramatically improves cold tolerance. Yet the long term effects of increased potassium levels are unknown.

There is some indication that phosphorus nutrition during the late season can lower cold tolerance, but research indicates that the the balance between phosphorus and potassium is more critical than absolute amounts. For example, research carried out at North Carolina State University in the early 1970s found that bermudagrass with a 4-1-6 (N-P-K) in the tissue was the most cold tolerant. Other investigations with St. Augustinegrass have found a high P:K ratio resulted in increased winter injury.

Nutritional guidelines should also be based upon turf use. If the turf is going to be overseeded for winter use, the base grass should not receive any fertilization for at least 30 days prior to overseeding. The rationale is to avoid stimulating growth of the warm-season turf to lessen its competitive edge. Wait until two weeks after seedling emergence before fertilizing. Then apply no more than 1/2 pound of nitrogen per 1,000 square feet. There is enough nutritional carry-over from the seed and fertilizer remaining in the soil for the overseeded turfgrass. Withholding additional nitrogen allows time for the warm-season turf to harden and slow its growth.

In summary, apply the following strategy. Avoid aggressive fertilization of warm-season turfgrasses during the summer months. Maintain sustained growth with a well-balanced nutritional program.

If nitrogen is applied for fall color retention during the late season, limit application rates to no more than 0.5 pounds of nitrogen per 1,000 square feet no later than October 15 (for North Carolina). Also consider an equivalent potassium rate at the same time.

Adjust the fertilization program if the turf is to be overseeded for winter. Finally, do not apply fertilizer in the late season on bahiagrass and centipedegrass.

Editor's Note: Drs. Peacock and DiPaola are turf specialists at North Carolina State University, Raleigh.

CHECK POTASSIUM LEVELS

Don't let soil potassium levels go unchecked until spring, says the turf team at North Carolina State University. Potassium improves the winter hardiness of turfgrass plants. If soil potassium levels were marginal during the previous spring, apply two pounds per thousand square feet of potassium sulfate without nitrogen to bermudagrass or a 4-1-2 complete fertilizer (one pound of nitrogen per thousand square feet) to tall fescue or Kentucky bluegrass.

Other steps you can take to reduce winter kill are raising cutting height on mowers and avoiding unnecessary irrigation. Do continue to mow at the higher height when necessary. The one-third rule still applies. For example, cut two-inch-high turf when it reaches three inches. Typical winter heights are two-and-one-half inches for Kentucky bluegrass, three to four inches for tall fescue and one to one-and-one-half inches for bermudagrass.