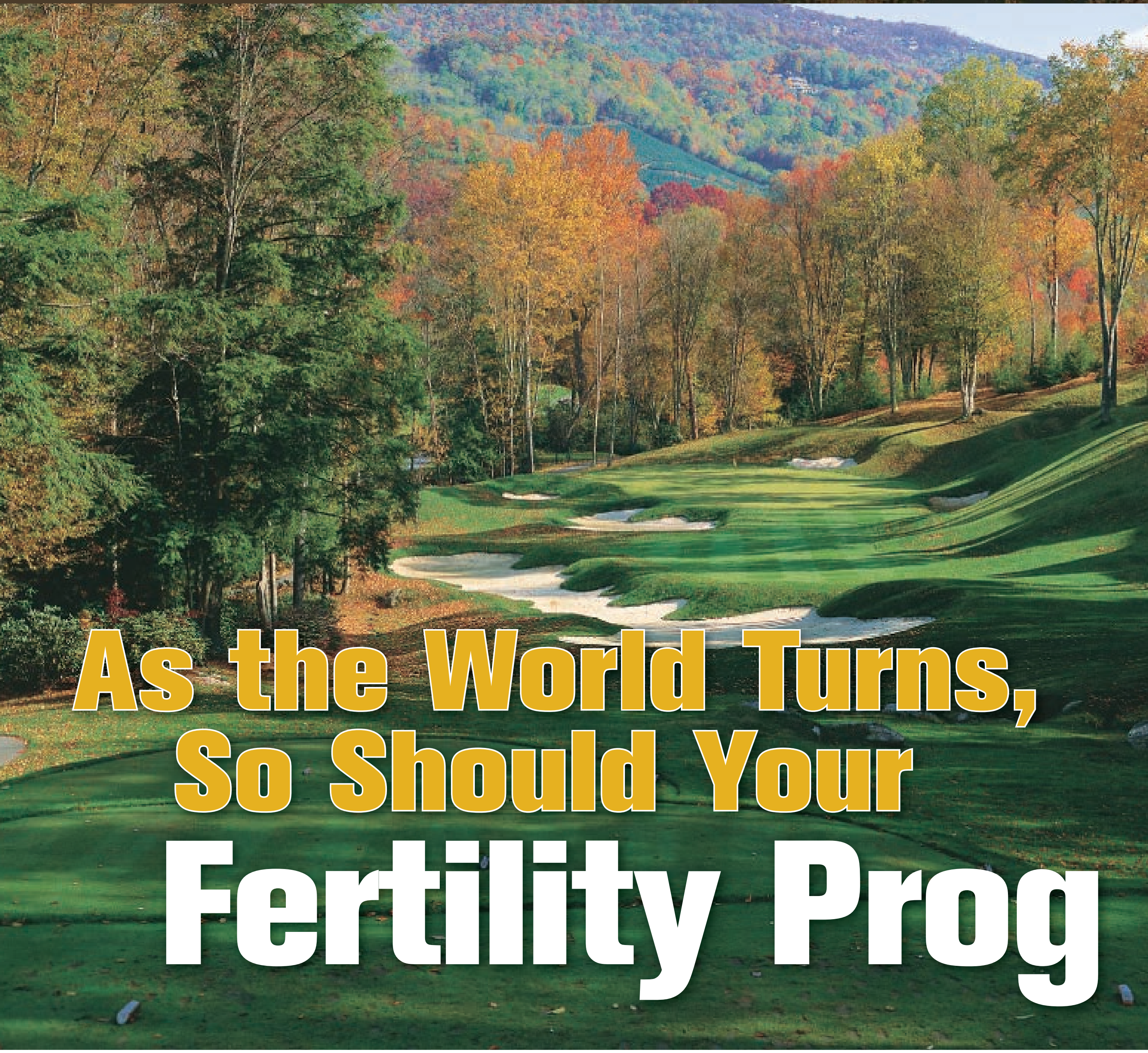

As the World Turns, So Should Your Fertility Prog

Turf professor vows that late fall is the most important time for a fertilizer application to bentgrass

BY KARL DANNEBERGER, SCIENCE EDITOR

NITROGEN FERTILIZATION PROGRAMS, like most turf-management programs, should be based on the turfgrass species and the primary stress period for the turf community. In the northern United States, creeping bentgrass (*Agrostis stolonifera*) is the primary turfgrass species found alone or in combination with Poa annua on putting greens. The stress period associated with creeping bentgrass

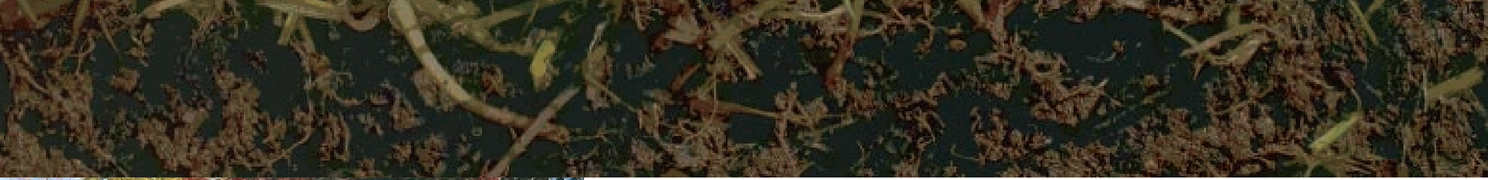

PHOTO BY: MIKE KLEMME

is summer heat and moisture stress.

Given that it's impossible to develop a fertilization program that fits all situations because of changes in climate, soil type, individual management programs, duration of the summer stress period and budget, it's still possible to develop a general program. For creeping bentgrass, developing a fertilization program is based on its growth habit.

The start of the fertilization season in the northern U.S. begins in the fall after the summer stress period. As average soil temperatures drop below 70 degrees Fahrenheit, creeping bentgrass root growth occurs. The period of root growth actually peaks a little later in the fall for bentgrass than the other cool-season turfgrasses (Koski, 1983). At the same time, shoot growth moderates and slows. It's at this time that applications of nitrogen become extremely beneficial to creeping bentgrass recovery and health going into the next year. An important application during the fall is known as late-season fertilization (LSF). Defined here as applying nitrogen in late fall when the turf is still green but no shoot growth is occurring, LSF is the most important nitrogen application of the year.

> » The fall application should carry into to mid- to late spring, just in time for the start of the summer stress period.

Historically, light and frequent fertilization was practiced during the fall. The rationale was to apply nitrogen to match the shoot growth rate potential of the turf. That changed with the first research studies that reported the benefits of LSF (Powell et al., 1967). Given that the common LSF application rate is normally between 1 pound and 1.5 pounds of nitrogen per 1,000 square feet, the benefits associated with LSF could not be matched with light, frequent fall applications.

The major reported advantages of late-season nitrogen fertilization include:

- extending the greening period later into fall;
- initiating spring greenup as much as a month sooner;
- increasing stand density late into the fall and thus reducing weed pressure; and
- increasing root growth.

Metabolically, LSF is associated with increased carbohydrate levels. Normally, carbohydrate levels increase in stems and roots during the winter months, with decreasing levels occurring in shoots. The real benefit of LSF in carbohydrate metabolism is the lack of excessive carbohydrate use in response to early-spring fertilization.

Increased shoot density and root growth is demonstrated indirectly from one of the by-

Continued on page 52

Continued from page 51

products of LSF — thatch. Although increased thatch layers are detrimental to turf health, thatch accumulation does provide insight into the dynamics of LSF. Thatch is composed of dead and living stems (rhizomes, stolons), crowns, leaves and roots between the zone of green vegetation and the soil surface. Living and dead roots comprise the greatest percentage.

A drawback to late-season fertilization is the increased threat of pink snow mold.

PHOTO BY: JOE RIMELSPACH, THE OHIO STATE UNIVERSITY

For example, 61 percent of a Baron Kentucky bluegrass thatch layer was comprised of roots (Koski, 1986). Most likely, LSF favors root growth during the spring and early summer, while early-spring nitrogen applications discourage root development. In Koski's study, the relative percentages of roots, stems and tillers didn't vary between treatments. Thus, the associated increase in thatch also meant an increase in tiller and rhizome development.

In relation to a biological stress, a previous study found that nitrogen programs containing a late-season application had less anthracnose than a program where late-season fertilization was excluded (Danneberger, et al.,1984). The desirable amount of nitrogen applied for the season was 3 pounds of nitrogen per 1,000 square feet.

A disadvantage to LSF is the potential for increased winter disease injury. The primary winter disease associated with LSF is microdochium patch, also known as pink snow mold and fusarium patch. Its threat is highest when the fall nitrogen applications are made while shoot growth is still occurring. Succulent, rapidly growing turfgrass plants going into the winter would be more susceptible. But correctly timed LSF actually reduces the severity of other spring and summertime diseases.

Although the benefits of LSF are primarily associated with nitrogen, potassium is an element commonly applied during late season. Fall applications of potassium are associated with winter hardening. Conflicting reports exist, but potassium is associated with winter hardening of warm-season turfgrasses, including bermudagrass. On cool-season turfgrasses, the benefits of exogenous applications of potassium when soil levels are adequate have not been reported.

With any turfgrass-management practices, the advantages need to be weighed against the disadvantages. In the case of LSF, especially on cool-season turfgrasses, the positives often greatly outweigh the negatives.

With the arrival of spring, creeping bentgrass is much slower to start top growth than Poa annua and most cool-season turfgrasses (Koski, 1983). It's this time that care needs to be taken in fertilizing creeping bentgrass. Given that while the other turf species, especially Poa annua, are actively growing and the creeping bentgrass is not, the first inclination is to jump start the creeping bentgrass with a heavy dose of nitrogen. This is a major mistake in that the creeping bentgrass will not respond with top growth. In addition, the nitrogen may actually be detrimental to root growth during a time when root growth is most active.

The LSF application should carry into mid- to late spring, just in time for the start of the summer stress period. At this point, the most popular and maybe the most effective method of reducing stress, in this case basal rot anthracnose, is light, frequent applications of nitrogen (Inguagiato, et al., 2008). The rate most cited is one-tenth of a pound of nitrogen per 1,000 square feet per week.

As the seasonal circle is completed and we're back to the beginning of fall, the combination of LSF and light, frequent applications of nitrogen through the summer stress period with a total seasonal application of 3 pounds per 1,000 square feet is a good base line to start developing a strong nitrogen fertility program based on your conditions. ■

Danneberger, Ph.D., is Golfdom's science editor and a turfgrass professor from The Ohio State University.

REFERENCES

Danneberger, T.K., J.M.Vargas, Jr., P.E. Rieke, and J.R. Street. 1984. Anthracnose development on annual bluegrass in response to nitrogen carriers and fungicide application. Agronomy Journal 75:35-38.

Inguagiato, J.C., J. A. Murphy, and B. B. Clarke. 2008. Anthracnose Severity on Annual Bluegrass Influenced by Nitrogen Fertilization, Growth Regulators, and Verticutting. Crop Science 48(4): p. 1595-1607.

Koski, A.J. 1983. Seasonal Rooting Characteristics of Five Cool-Season Turfgrasses. M.S. Thesis: Ohio State University. 133 pp.

Koski, A. J. and J.R. Street. 1986. Late season fertilization. November. 7(11): p. 40-43.

Powell, A.J., R.E. Blaser, and R.E. Schmidt. 1967. Effect of nitrogen on winter root growth of bentgrass. Agronomy Journal 59:529-530.

Sweeney, P., K. Danneberger, D. Wang, and M. McBride. 2001. Root weight, nonstructural carbohydrate content, and shoot density of High – density creeping bentgrass cultivars. HortScience 36(2): 368-370.