

The Six Seasonal Stages of Bentgrass Nitrogen Fertilization

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NITROGEN FERTILIZATION is necessary for the best performance of bentgrass, and how we use it has profound effects on quality and survival. The purpose of this article is to give guidelines on the use of this nutrient that are based on my research and observations on many different golf courses in the northeast.

It seems some golf course superintendents have little or no interest in the intricacies of nitrogen fertilization. Yet, this part of the turfgrass program ranks with the first five or six causes of success or failure in the profession. Possibly we do not maintain adequate awareness of the subtleness of this nutrient. There is little research now being conducted on the questions that remain on nitrogen and bentgrass management.

Some growers have the attitude that every golf course is different — that nitrogen use is a wide-open procedure of their choice. Or on occasion there is failure to appreciate the special or delicate benefits of nitrogen use. Possibly more superintendents have walked out of lectures dealing with nitrogen use than any other turf subject.

While there are many different programs with nitrogen, and you may be happy with yours, evaluate comments of others and observe results obtained by those growing bentgrass in your region and elsewhere. All this gives more perspective on what can and cannot be done with nitrogen on bentgrass.

Since harm from high nitrogen use has been implied, a brief review of these types may help maintain a balance of favorable results. While several turfgrasses have high tolerance for nitrogen, bentgrass has a comparatively poor tolerance. In general, diseases, heat injury, cold injury, and drought injury are increased by high-nitrogen pro-

grams. More specifically, encroachment and dominance of annual bluegrass in bentgrass turf is one of the certain and most objectionable results of generous nitrogen (Figure 1).

Basic Guideposts on Nitrogen Fertilization of Bentgrass

1. Maintain slow, steady growth as the weather permits. Bentgrass does not need high totals of nitrogen. With good growing conditions, it grows well with comparatively low levels of nitrogen.

2. Since medium to low annual totals of nitrogen are best, use nitrogen only to regenerate bentgrass and maintain a satisfactory putting surface. Reach the seasonal total with smaller but more frequent applications.

3. The season of nitrogen application affects results. Unless more growth is needed for the playing surface, limit nitrogen application to seasons that cause the least failure and annual bluegrass encroachment.

The "Six Seasons" of Nitrogen Application on Bentgrass Turf

The four seasons of the calendar are inadequate to delineate the seasonal reactions of bentgrass to nitrogen fertilization, at least in the New Jersey area. The following six bentgrass seasonal stages will help planning of the bentgrass nitrogen program for the New Jersey area and similar weather patterns.

1. *Late winter - early spring (late February - early April)* — Pushing growth response at this season increases tillering and an abundance of annual bluegrass seedhead development in mid-to-late spring. Since roots have not reached maximum regrowth at this early date, it is expected nitrogen use would hinder their optimum development. Use no

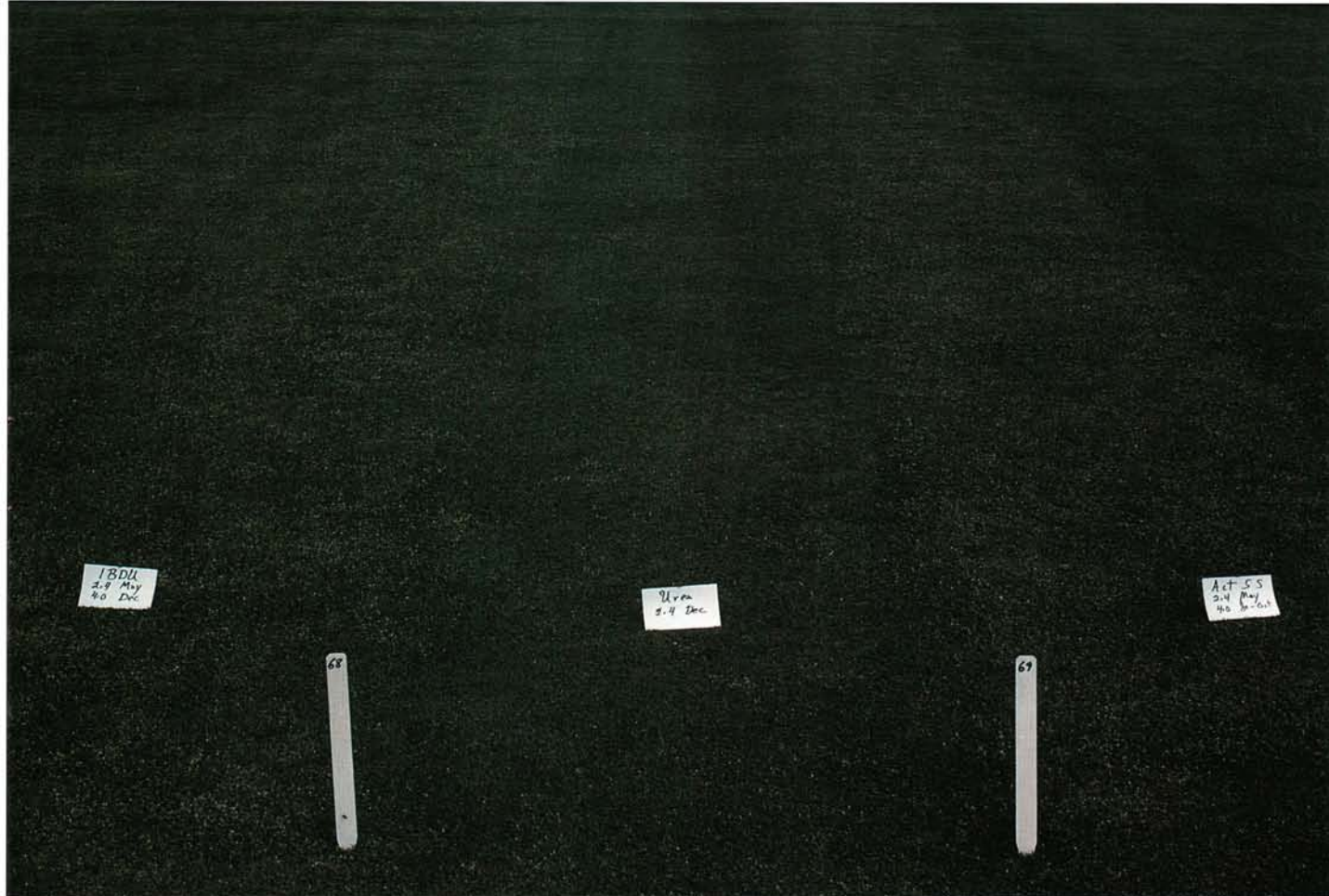
nitrogen in this very early stage unless major growth is needed for situations such as recovery from winter injury or more growth on a new green.

2. *Mid-spring (last week of April - early May)* — This is a recommended season for starting nitrogen on bentgrass in New Jersey and similar areas. While annual bluegrass seedheads begin in this season, they will not be increased by nitrogen stimulation at this stage. Seedheads are reduced proportionately with increased available nitrogen. Generous amounts of available nitrogen keep annual bluegrass vegetative (Figure 2). Apply ½ to ¾ pound of nitrogen per 1,000 square feet (no more than 25% slow-release nitrogen). Nitrogen only, nitrogen-potassium or N-P-K fertilizer can be used according to soil tests. A second application can be made in May if growth is slow or appearance "hungry." This is usually unnecessary if a topdressing supplies significant nitrogen, such as found in a mushroom soil-base material.

3. *Late spring - early summer (late May - July 10)* — Usually nitrogen is inadvisable in this season (especially until the first prolonged hot, wet, flush period of growth is over). If nitrogen is used, apply lighter rates.

4. *Mid-summer (mid-July - early August)* — A natural organic fertilizer like Milorganite at ¼ pound of nitrogen per 1,000 square feet is suggested. In the New Jersey area, apply one to four applications at one- to two-week intervals as weather permits. Usually nitrogen stimulation of bentgrass is undesirable at this season in the hotter climates. The goal of nitrogen use in the cooler climates is maintaining good bentgrass cover without tender growth.

5. *Late summer - fall (late August - October)* — Carryover nitrogen in the soil and topdressing nitrogen have con-



(Top) Less annual bluegrass with a dormant application of urea nitrogen for four years as compared with higher annual totals of nitrogen with varied seasons of application.

(Above) Note reduction of annual bluegrass seedheads in the greener nitrogen-treated plot on the left.

siderable influence on nitrogen need in this season. Agronomically, low nitrogen is preferred to avoid stimulating annual bluegrass that germinates in this time period. Limit nitrogen strictly to such needs as: a) Growth required for an acceptable putting surface. b) Regeneration of new shoots on bentgrass before cold weather dormancy. Remember, both nitrogen and phosphorus favor young annual bluegrass growth. Thus, use nitrogen, nitrogen-potassium, or N-P-K fertilizers as tests permit at rates of ¼ to ½ pound nitrogen per 1,000 square feet to satisfy growth needs.

6. *Dormant fertilization (early December in the New Jersey area . . . after the last mowing)*— a) Gives growth through open winters. b) Encourages good cover for late winter and early spring play. c) Use of urea in early December in New Jersey has given significant reduction in annual bluegrass as compared with slow-release nitrogen (Figure 3). Rates of one to two pounds nitrogen per 1,000 square feet are commonly used. d) This is a special treatment that is useful on some occasions for courses in New Jersey and other areas.

Suggestions on the “Six Seasons” Nitrogen Program and Others

The main thrusts of the “six seasons” fertilization program are bentgrass survival and minimizing annual bluegrass. As with other programs, it should not be used as a fixed “cookbook” type recipe. Yet some of the principles should be respected on a regular basis. General comments and suggestions on nitrogen fertilization of bentgrass are:

1. Use smaller and more numerous nitrogen applications to reach the annual total of nitrogen.
2. Use of slow-release nitrogen spreads nitrogen stimulation but reduces “watering in.”
3. Ease off nitrogen use in cloudy, wet weather.
4. Black layer lectures have led to a surprisingly few remarks on nitrogen use. Without benefit of research on the nitrogen relationship to this problem, it is suggested that small, infrequent nitrogen treatments be used when needed where this concern exists.
5. Watch color and growth through the growing season. Nature’s ways of releasing nitrogen for plant use will vary

and necessitate occasional adjustments. If growth is good, do not use nitrogen only for a darker bentgrass color to please the eye. Often iron application will suffice and avoid increasing the nitrogen total.

6. If you are in other types of climate, some different nitrogen procedures may be required. Certainly, zero or lower totals of nitrogen will be used in the warm portion of the season in hotter climates. In different climatic areas, some parallels of temperatures and growth pattern regimes will exist as reported for the New Jersey area. These can be used or avoided as needed in your nitrogen program.

7. More research is needed on the best seasons for applying nitrogen stimulation to bentgrasses. Factors such as rainfall, irrigation requirements, day and night temperatures, soil types, amount of play, length of season, and many others all create the need for a superintendent to use and expand his good judgement in bentgrass fertilization. Striking the proper balance and touch with nitrogen on bentgrass is one of the many challenges for the golf course superintendent.

Reduced annual bluegrass seedheads in May of bentgrass turf receiving four different nitrogen carriers for three years in early December versus the same total of nitrogen applied in the months of September, October and November.

A Comparison of 2.4 Pounds of Nitrogen Applied In December Versus September-October-November

SOURCE	ANNUAL BLUEGRASS, PERCENT	
	SEPT./OCT./NOV.	DEC.
Urea	17	9
Ureaform	37	26
IBDU	31	20
Sewage Sludge	39	32