Nitrogen fertilization of bentgrass greens

by Charles H. Darrah

Few turf surfaces today receive the care and attention of a golf course putting green. The overall performance of the green is highly dependent on its nutritional status, mowing, irrigation and syringing programs, and topdressing and aerification schemes. In addition verticutting, slicing, and spiking practices, as well as pesticide applications are important in maintaining the proper surface for the game of golf. However, none of these practices is more talked about than nitrogen fertility.

Nitrogen fertilization practices may be the key to the successful management of putting greens or the ax of their destruction. It is rare to find two superintendents who follow the same nitrogen program, and rightly so. Nitrogen fertilization must be tailored to the climatic conditions of the course, the bentgrass variety in use, and the soil used in the green. These conditions will vary from course to course and quite often from green to green on the same course. In addition the availability of other plant nutrients, mowing, watering, cultivation, and other management practices will influence the nitrogen needs of a putting green.

With all of these factors influencing the nitrogen requirement and interacting with the amount of nitrogen used, nitrogen fertilization of bentgrass putting greens becomes more of an art than a science. Still there are scientific principles to be kept in mind, and research data on which to base the design of a nitrogen program.

Creeping bentgrass has a nitrogen fertility requirement which varies from 0.8 to 1.4 pounds per 1,000 square feet per growing month on greens and 0.5 to 1.0 pound on higher cut turfs. (J.M. Duich and H.B. Musser, 1960) If we assume an 8-month growing period, such as in Maryland, from mid-March to mid-November, the yearly nitrogen requirement on a bentgrass green would be from 6 to 11 pounds of actual nitrogen per 1,000 square feet annually. Certainly one would not consider applying this amount in equal increments over the entire growing season. Instead, research has shown that one-half to three-quarters of the total nitrogen should be applied during the fall and early winter. (A.J. Powell, 1967; A.J. Powell, R.E. Blaser, and R.E. Schmidt, 1967)

In experiments conducted in Virginia, root growth rate of bentgrass maintained at ¼ inch was greatest from October to December, increased only slightly from late December through February, and then increased at a moderate rate until June. This response was found under nitrogen rates ranging from 0 to 8 per 1,000 square feet over the fall and early winter. It is interesting to note that this root growth response occurred even when no nitrogen was applied. In fact, it was found that applications of nitrogen in the fall and early winter reduced the immediate root growth but enhanced the future root production in the early spring. Another important finding was that the amount applied — 1 or 2 pounds per 1,000 square feet — made little difference in spring root production, however lower root weights were measured for monthly rather than bimonthly additions of nitrogen.

These studies emphasize the importance of providing nitrogen to bentgrasses in the fall. Once temperatures have begun to decline in late September or early October, bentgrass greens should receive 1 to 1 ½ pounds of nitrogen per 1,000 square feet. One to two additional bimonthly applications of similar amounts of nitrogen should then be applied to promote the best total root growth in the spring. Using less nitrogen in the fall and early winter will result in poor color and a lower photosynthesis rate, which results in less carbohydrates being available for foot growth. (A.J. Powell, R.E. Blaser, and R.E. Schmidt, 1967)

Nitrogen fertilization in the late spring and early summer must be tailored on an individual basis. Although it is important to maintain a green, actively growing surface on a putting green during the summer,
Flowable fungicide

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over-stimulation of growth may lead to disease and other problems which may totally destroy the bentgrass.

Some superintendents have been made so acutely aware of the results of over-use of nitrogen during the summer that they no longer apply any summer nitrogen. As a result, color is lost, which is usually masked by the liberal use of iron, and most importantly growth and hence recuperative ability is greatly diminished. There is another group of superintendents who say that they do not apply nitrogen during the summer, but are on liberal programs of Milorganite.

In most instances there is a need for additional nitrogen through the problem growing months from May through September. Nitrogen may be supplied as very low rates (less than ½ pound per 1,000 square feet) of soluble fertilizers, as residuals from earlier applied synthetic organic fertilizers (UF, IBDU, SCU), or as natural organic fertilizer (Milorganite). The amount and timing will be highly dependent upon the weather, the particular soils in the green, and other management programs being used. The important consideration is to maintain the growth rate of the bentgrass so that actively growing leaf tissue is present and scars will heal in a reasonable length of time. In this way the bentgrass should provide the optimum surface for the golfer.

(From The Agronomist, Cooperative Extension Service, Agronomy Dept., University of Maryland, College Park.)