The Nutrition-Disease Connection

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We're nearing the end of an unusually cool season with very low disease pressures on turfgrass. Dollar spot seems to have been the only disease of any notable incidence this year. Climatologists tell us to expect another cool summer next year. How cool will depend on how quickly the upper stratosphere is cleansed of volcanic ash from Mt. Pinatubo. So why write about the nutrition-disease connection at this time? Simply because the connection is strongest when weather is not ideal for disease development.

Read no further if you expect me to say that nutrition can prevent disease in turfgrass. The role of nutrition is to reduce disease injury and speed recovery. Diseases occur when three conditions are satisfied: (1) the disease-causing organism is present; (2) weather is favorable for active growth of the organism; and (3) the turfgrass is susceptible to attack by the pathogen. Nutrition can alter the microenvironment of turf, but its primary effect is on the ability of the turfgrass plant to fight off pathogen invasion and to replace damaged tissues.

To further complicate matters, the nutrition-disease connection depends not only on weather, but on cultural practices as well. Many turfgrass cultural practices are stressful and stressed turfgrass is disease susceptible. It is this interplay of weather and cultural practices that has made it so difficult for researchers to clearly define the nutrition-disease connection. You've likely heard or read statements such as "excessive N favors leaf spot" or "low N favors dollar spot". Why don't turf specialists define "excessive" or "low" N levels? To answer this question, consider the results from a recent research report. In this instance the concern was with brown patch in Kentucky bluegrass mowed at 1.5 or 3.0 inches and treated with different levels of N. At the 1.5-inch cutting height, there was 46% more damage from brown patch than at the 3.0-inch cutting height and N level had no influence on the incidence of the disease. On the other hand, at the 3.0-inch cutting height brown patch was increased 19% by increasing the annual N rate from 3 to 5 lb/M. Thus, one might say that 5 lb N/M were excessive at the 3-inch cutting height but not at the 1.5-inch height of cut.

The foregoing example illustrates why you don't encounter concise statements about what rate of application of a nutrient such as N minimizes

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"Peace" — Dave Garroway

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disease incidence. There are, however, some useful guidelines regarding the nutrition-disease connection. For the diseases we commonly encounter, the general effects of nutrition are as follows.

Dollar spot: Incidence of the disease does not appear be influenced by soil pH or P levels. Nitrogen is the key nutrient. Low levels of N favor the disease. Adequate to high N rates are advised during periods when the disease is most active. Soluble N sources are more effective than slow-release N carriers.

Red thread: Low soil pH, P, and K favor the disease. Regulation of N nutrition is particularly important. Levels should be adequate to high but not excessive. High soil K levels or use of a high K fertilizer tends to enhance the positive effect of N applications.

Gray and pink snow mold: Timing of late season N is important here, particularly if application rates are in the range of 1.0 to 1.5 lb N/M. Fertilization should not occur until topgrowth has ceased. This means after the last mowing of the season or after several successive days in which the mean daily air temperature is 60°F or less. Fertilization just prior to cold weather induced dormancy is not advised. Use of slow-release N carriers is generally recommended, but I found no difference last spring when I had applied 1.0 lb late season N as IBDU or urea the previous fall. I did observe slightly less gray snow mold when soluble rather than coated slow-release KCl was applied in the absence of chemical control. A single 3.0 oz application of Calo-Clor reduced snow mold damage more than 70% and eliminated any effects of N or K carriers on the incidence of the disease.

Anthracnose: This scourge of *Poa annua* is notably suppressed by adequate nutrition. The disease is favored by low soil levels of P and K and by heavy N applications during periods of high temperature and humidity.

Summer patch: High soil K levels and moderate rates of slow-release N often reduce the amount of damage done by summer patch diseases. However, as noted earlier, cultural practices can override any nutritional effects on the disease. Summer patch diseases seem to be so highly favored by low mowing heights and/or light frequent irrigation that these cultural practices over-shadow effects of adjustments in N fertilization rates.

Necrotic ring spot: Balanced turfgrass nutrition is important with this disease, but N carrier is of even greater significance. Frequency of the disease is often reduced substantially by switching from a soluble to a slow-release N fertilizer.

Pythium diseases: Environmental conditions exert a controlling influence on the extent of damage to turf by these diseases. Moderate rates of slow-release N fertilizer are advised. This recommendation coincides with my observations over three successive seasons that 4.8 lb N/M/season on creeping bentgrass consistently resulted in less Pythium than did 2.4 or 7.2 lb N.

This summarizes what we currently know about the influences of nutrition on the incidence and severity of common turfgrass diseases. Nutrition also influences recovery from disease. As long as P and K supplies are adequate, N is the key to rapid recovery from disease. From approximately April to August, relatively high N rates speed the healing process. But during the normal heat of August, moderate N rates are more effective. Time of N application appears to be vital as far as recovery from snow mold damage is concerned. This past spring bentgrass recovery from extensive snow mold damage in my research plots was essentially complete by mid-May when 1.0 lb N was applied the previous October 15. In the absence of late season N, snow mold scars did not heal until late June despite an April 28 application of the same amount of N.

Now we return to where we began —with the idea that the nutrition-disease connection in turfgrass is a diffuse relationship. The relationship is strongest when weather and cultural practices do not favor the activity of disease organisms or unduly stress the turfgrass. In the long run, proper nutrition is complementary to but not a replacement for biological or chemical disease control in turfgrass.

"Christmas time, the only time I know of, in the long calendar of the year, when men and women seem by one consent to open their hearts freely, to think of the people below them as if they really were fellow passengers... and not another race of creatures bound on other journeys." — Charles Dickens, "A Christmas Carol"