Shortages? Cost? Residual Response? Burn Potential? Mower Pick-Up? Application Date? Efficiency? Spreadability? Initial Response? Application Rate?

Selecting the Right Nitrogen

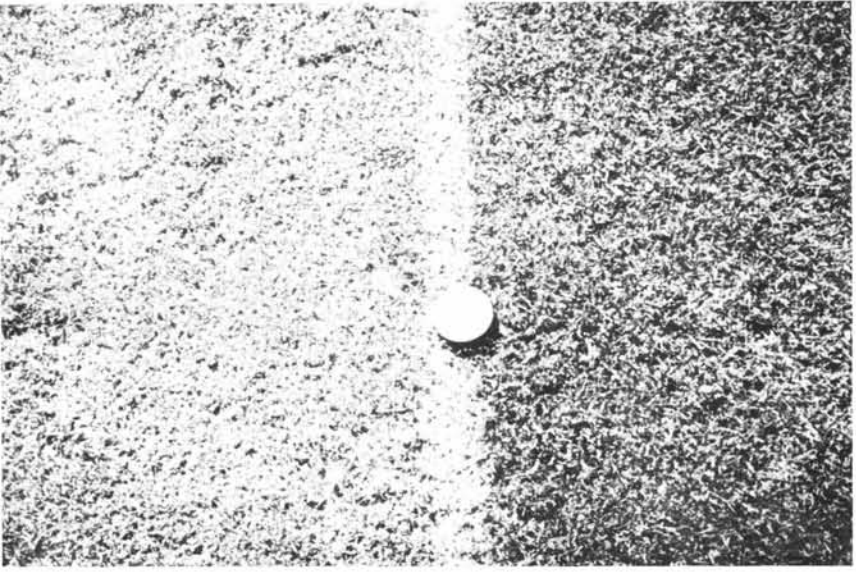
by A. J. POWELL and J F. SHOULDERS,
Turfgrass Extension Specialists V.P.I. and S.U., Blacksburg, Va.

Questions about nitrogen fertilizers are easy to ask, but the world needs answers. Shortages and increased costs have now made us fully aware of the importance and dependence of nitrogen in our turf management programs. It is necessary for the organic chemist to completely understand N fertilizer before he can effectively and safely grow quality turf. Certainly nitrogen is the TNT of turf management.

Many turf superintendents are presently purchasing specialty turf fertilizers with which they are not totally familiar. Results have often been less than desirable. Burn, streaking, lush turf, hungry turf and mower pick-up have been encountered. What does one do about these problems? Should he switch to another fertilizer, or maybe go back to the one he previously used?

Regardless of what fertilizers you may have in your storage area, they can be used. Your main problem is understanding how to use them; where to fit them in your management program. Nitrogen fertilizers have generally been classified into categories concerning their origins: e.g. chemical (synthetic) or organic (natural). Of much greater value is their classification according to their nitrogen release rate. As a general rule, the following classes can be defined:

Not only should one understand the nitrogen release properties, but when using a fertilizer-pesticide combination he must also completely understand the pesticide properties and safety requirements. Among other things, serious burn and overlap problems can develop.



To maintain superior color and quality throughout winter, nitrogen must be made available to the turf during the fall and winter seasons. The only difference in these plots was that the turf on the right received two additional applications of nitrogen in November and December; picture taken in January.

Fast release—These include the chemical nitrogen fertilizers such as ammonium nitrate, calcium nitrate, ammonium sulphate, etc. Turf is expected to respond within two days to a week after application. Although residual response depends greatly upon soil texture, rate of plant uptake, and water movement through the soil, the response would likely be greatest within the first two to four weeks.

Intermediate—These have mainly included the natural organics. The nitrogen becomes available within a few days after application and continues to release N for one to two months.

Slow release—These have mainly included the 38 per cent urea-formaldehyde fertilizers; those with a low (1.3: 1) urea to formaldehyde ratio. Nitrogen becomes available within a few days after application and continues to release nitrogen for two or even three years.

This classification is simple enough, but where does urea and the new specialty turf fertilizers fit this scheme? First, look at urea. In most all turf situations urea (an organic) should be considered immediately available—very similar to the chemical fertilizers like ammonium nitrate. The wording or representation on some fertilizer tags still attempt to mislead the customer into thinking that since urea is an organic, it therefore has a slow release capability. Within a few days after urea application, a natural soil enzyme (urease) helps hydrolize the nitrogen in urea to ammonium. Further natural transformations result in nitrate nitrogen. This total process may only require two or three days.

For the past several years, we have been evaluating certain N fertilizers as to their comparative nitrogen release in order to better understand the specialty turf fertilizers. This has been conducted on bentgrass under putting green management. The programs have been designed to furnish most of the nitrogen to the turf during fall, winter, and late spring (mid-May to late June). The following are some comparative results of these tests:

Fast release—Ammonium nitrate was used as a standard chemical fertilizer and applied during the fall, winter, and late spring in seven applications (8½# Total N). Generally, this treatment has resulted in superior turf.

Intermediate release—Milorganite, a natural organic, was applied fall, winter, and late spring in six increments (11, #N). Generally, this has resulted in

A large slow-release fertilizer pill that stays near the surface can burn and spot a bentgrass green.

slightly less color than the ammonium nitrate during the colder seasons. An exception was the 1974-75 winter (unusually mild) in which the natural organic was the superior treatment.

Slow release—The 38 per cent urea-formaldehyde treatment was applied in two increments in September and May (8# Total N). Since previous work and experience with U.F. had shown essentially no residual response during the winter, two applications of soluble N were added during winter to give 11# total N. Due to the lack of winter response of U.F. two applications of soluble N were added during winter to give 11# total N. This treatment has also resulted in very acceptable turf quality. Although one would expect a darker green color from this source during the summer months, we actually found almost no differences between any of the programs during the past four summers.

In order to assess the response of certain specialty fertilizers containing less total and differing urea-formaldehydes, we compared the Scotts Pro-Turf with both the fast and intermediate release programs. This fertilizer contains a higher urea to formaldehyde ratio (2:1); more of its nitrogen is readily available and the water insoluble portion is residual for a shorter period of time. Results from the ProTurf fertilizer have been at least as good as that of the solubles or natural organic. That is, at one to 1½# N/1000 ft.^{2} this fertilizer can be expected to respond similar to a soluble source of N. At 2# N/1000 ft.^{2} you can expect a residual response similar to the natural organics as used in the intermediate release program.

Commercially available IBDU (isobutylidene diurea) was compared to both the intermediate and slow release programs. Results were best when IBDU was used in multiple applications as was accomplished with the intermediate release program. As a result of several applications during the late fall and winter, an obvious winter color response was noted. Nitrogen from IBDU is released by a chemical hydrolysis reaction which certainly could take place (at a reduced rate) during cold weather. When applied at heavy rates according to the slow release program, it appeared to fully release its nitrogen in about three months. Therefore, when applied in September, the N was dissipated by winter and the spring green-up was very poor. According to this work, it appears that IBDU should be classified "intermediate release."

Sulphur coated urea (SCU) is a promising new source of nitrogen with several potentially different release rates. One of the SCU's tested in this experiment compared very well with U.F. except that it did give a superior winter response.

What does this all mean? You can continue to argue and ask questions about which fertilizer is best. If properly used, they can all do about the same job. The solubles and some of the specialty fertilizers will need to be frequently applied at low rates. The natural organics and some of the specialty materials can be applied somewhat less often and at higher rates. The straight (38%) U.F. fertilizers can be applied least often but with U.F., additional soluble N will be necessary if a late fall or winter response is desired. The highest priority in developing a nitrogen program is for one to fully understand the expected turf response to the Nitrogen source(s) he intends to use.

In order to obtain a color response during cold weather, certain fertilizers such as urea-formaldehyde must be supplements with quickly available N. Note turf color in December after either a urea-formaldehyde (foreground) or ammonium nitrate (background) treatment.