EARLY-SEASON FERTILIZATION

Depending on desired turf quality, and amount of spring and early summer activity, many situations call for spring nitrogen fertilization.

by Anthony J. Koski, Ph.D., Colorado State University

Spring time brings daffodils, crocuses, and—hopefully—the greening of grass. Along with the wide acceptance of late-season fertilization, many turf managers seemed to have developed a fear of fertilizing in the spring.

While it is true that improper nitrogen use in the spring can bring about a host of problems, adopting a late-season fertilization philosophy generally does not allow you to eliminate spring nitrogen (N) applications.

Pink patch and red thread can become severe during the spring on N-deficient turf.

Not to excess

Stimulating shoot growth during the spring can detrimentally affect the depth and number of roots. Since this is the time of year when most of the roots for cool-season turfgrass species are being formed (Fig. 1), it is important that root formation not be discouraged.

Large applications (greater than one pound of N/1000 sq. ft.), especially of quickly-available N sources, can substantially reduce root growth of cool-season species. Excessive spring shoot growth shifts carbohydrate use from the roots to the shoots, thus reducing the number and health of new roots. The root and shoot growth patterns of warm-season grasses are different, and spring N applications are less apt to negatively affect root formation (Fig. 2).

Overuse of nitrogen during spring, resulting in high shoot growth, necessitates frequent mowing.

Diseases may increase

The incidence and severity of some diseases may be increased by overfertilization in the spring. The leafspot (Helminthosporium) diseases, patch diseases, and high- and low-temperature pythiums are favored by excessive N applications. Recovery from damage caused by these diseases is more difficult, since exhaustion of carbohydrate reserves is a consequence of N overuse.

Reduced stress tolerance: The zealous use of N in spring may reduce summer drought resistance and heat tolerance. This is partly attributable to effects on the roots, but also because of lowered carbohydrate levels and the formation of excessively hydrated leaves.

Effects on lateral growth: High N rates can diminish the number and vigor of lateral stems (stolons and rhizomes). The ability for a trafficked or divoted turf to recuperate from injury is lowered. Low carbohydrates and hydrated leaves may effect sod strength.

When spring N?

Late-season N doesn't last forever. Even when late-season N fertilization is practiced, the effects of the previous year's application will begin to "wear off" during the following spring. Just *when* the effect begins to wear off depends on a host of factors, including:

- residual activity of the N source used the previous year,
- the amount of N applied at the time,
- the species of grass,
- soil type (sand vs. clay, and leaching potential), and
- level of winter and early spring precipitation.

If a quickly-available source was used in the fall, the effect may begin to dissipate during early to late May, especially if the turf is growing on a sandy soil and winter/spring rain is high. If higher rates of slowly-available products such as IBDU or sulfur-coated urea were used, the residual activity may persist longer into the spring, perhaps into early summer. In either case, some N should be applied in the spring, either to maintain quality during the spring, or to provide an N source that would release slowly during the following summer.

The new customer

When a lawn care company retains a

new customer during the winter, it is probably unwise to depend on the client's memory of "what kind, how much and when" fertilizer was applied the previous season.

You are in the business of growing green grass, and those new customers give you their business because, in many cases, they were unhappy with the last company. A spring N application will insure that the lawn is green and growing in the spring. Don't bet on the possibility that what the other company applied last season will be enough to provide a high quality turf this spring.

Mite, winter damage

Winter-damaged turf may require supplemental spring N to promote recovery, even if late-season applications were made. Where foliage has been killed by desiccation or snow mold (but crowns and roots are still living), fertilization may hasten recuperation. Of course, nitrogen will not resuscitate dead turf, so make sure it is still alive before fertilizing.

In some areas of the country, various species of mites cause turf damage. Quite often the turf is dead by the time the cause has been determined, but in some cases only the foliage has been damaged and a bit of nitrogen can hasten recovery and promote growth that will outpace the injury being caused by the mites. Remind clients that fertilizer applications cannot be expected to "kick in" unless sufficient precipitation occurs, or irrigation is provided, following fertilization.

Athletic applications

Football fields are often used for practice or games late in the fall, long after temperatures have cooled to the point that recuperation is possible. These same fields are often used early the following year for spring games and drills, resulting in even greater damage.

On these fields, spring fertilization is necessary to promote growth and recovery of the damaged turf. Similiarly, spring baseball can be devastating to slow-growing fields, espcially if the same field is used for both practice and games.

Other high-use athletic areas, such as soccer fields and multi-use fields in city parks, can also benefit from springtime fertilization. On such heavy-use fields it is not unusual to fertiilize with as much as 8 to 10 lbs. N/1000 sq. ft. over the course of a growing season.

Averting diseases

Certain disease problems can be averted, or at least be decreased in severity, by wise spring N applications. Turf damaged by snow mold may recover more quickly with spring fertilization, especially if little or no N had been applied the previous fall.

Red thread and pink patch can be especially severe during a cool, moist spring on N-deficient turf. The severity of zoysia patch disease, most common on intensively-managed zoysia in the transition zone, may be reduced by spring and summer nitrogen applications.

Amount and frequency

The goal of any spring fertilization program should be to promote greenup and a pre-determined growth level, without producing a fast-growing, succulent turfgrass plant. This can be difficult for a number of reasons, the main one being that shoot growth is naturally rapid at this time of year. A complicating factor is the unpredictability of spring weather, most importantly temperature and precipitation. Since release of N from all fertilizer sources more or less depends on moisture, with some also being quite temperature dependent, the choice of a fertilizer (and determination of how much to apply) for spring use can be difficult.

Ideally, one would use a quickly-available fertilizer to apply small amounts of N (1/8 to 1/4 lb./1000 sq. ft.) on a frequent basis, perhaps every 7 to 14 days. The amount and frequency could be varied, depending on turf response. Quickly-available nitrogen sources can always be counted on to provide a predictable response, but unless they can be applied at lower rates and more frequently than the slowly-available fertilizers, their use might result in an undesirable rate of shoot growth.

With the exception of some golf course superintendents and a few sports turf managers, there are a few situations where this type of program can be practically implemented. This "spoon-feeding" approach can be approximated, however, via the use of slowly-available nitrogen fertilizers.

This generally works well, but remember: you are depending on Mother Nature to provide conditions conducive to release of N for the turfgrass plant.

Slowly-available nitrogen sources that do not work well (or predictably) during early spring would be ideal for late spring or summer use, since you can count on warmer and moister conditions to prevail at those times. Some natural organic fertilizers and those with a high percentage of their N as longer-chain ureaformaldehyde polymers (Nitroform) must be applied at relatively high rates (1.5 to 2 lbs. N/100 sq. ft.) in order to elicit a noticeable short term response from the turf, even under conditions favoring the release of their nitrogen.

If you are able to make light, frequent spring N applications, using a quickly-available N source (urea, ammonium sulfate) would be ideal. If you are locked into making one or two applications during the spring, consider using a 1/2 or 3/4 rate of a quickly-available source early, and a more slowly-available N source (1 lb. N or

FIGURE 1

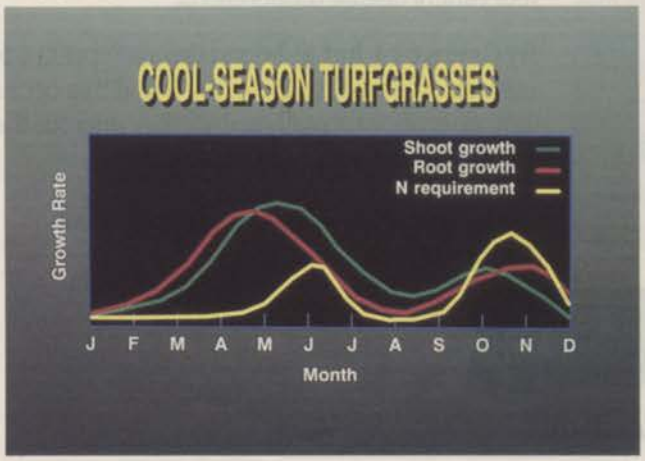
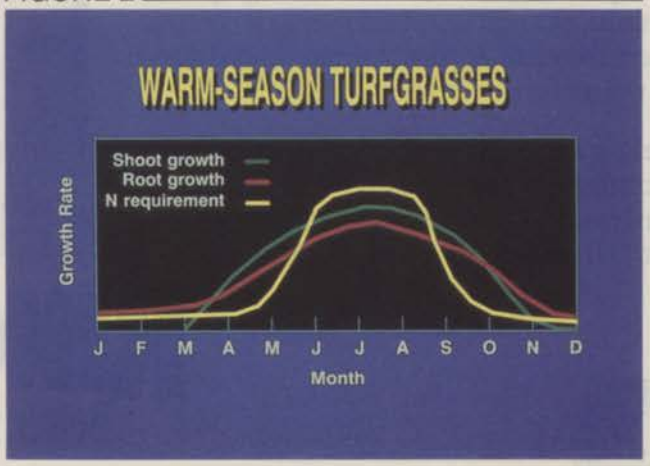


FIGURE 2



Slow and quick release fertilizers

Quickly-available sources: These are water-soluble and not dependent on temperature to release their nitrogen.

Some, such as potassium nitrate, contain N in the form of nitrate (NO_3). Others, such as urea, ammonium sulfate, mono- and diammonium phosphate, have nitrogen in the form of ammonium (NH_4).

Ammonium nitrate contains both forms of nitrogen. Urea is an important N source, since it forms the basis for nearly all of the slowly-available nitrogen fertilzers, with the exception of the natural organic fertilizers.

The quickly-available nitrogen sources are ideal for "spoon feeding" and for use under cold conditions, when many many slowly-available sources do not perform adequately. They are relatively inexpensive, but may result in higher labor costs if they are applied frequently. The potential for "burn" is also greater with the quickly-available sources, mainly due to their higher salt indexes.

Slowly-available sources: It is more difficult to keep up with the types of fertilizers in this category, since changing technologies continue to result in new fertilizers. Within this category are *slow-release (or controlled release) fertilizers* that encapsulate a quickly-available fertilizer (usually urea) with a sulfur or plastic coating that degrades over time, slowly releasing the enclosed nitrogen source. Examples include the sulfur-coated and resin-coated fertilizers. These types of fertilizers generally contain enough free urea, or other soluble N source, to provide adequate short-term response, while providing the benefits of long-term, slow-release fertilization. Sulfur-coated urea has a history of performing well in lawn care and many golf course applications.

A new product from Grace-Sierra, with the trade name Once, can be applied once during the year to provide season-long feeding. In two years of testing at Colorado State University this resin-coated product has performed very well. These coated products require adequate soil moisutre to aid in breakdown of the coating, as well as to allow for solubilization of the enclosed N source and its subsequent movement into the root-zone. They will not perform well under dry conditions. On heavily-trafficked turf (especially if compacted and with little thatch), the coated products are subject to mechanical breakage, thus negating the slow-release characteristics of the fertilizer. On very close-cut turfs, such as tees or putting greens, the particles may be damaged (or picked up) during mowing.

Slowly-soluble: This category would include such fertilizers as IBDU and ureaformaldehyde. The N in these fertilizers is released via the action of hydrolysis (water) and/or microbial activity. Both types are quite moisture dependent. The UF fertilizers are also temperature-dependent, since the level of microbial activity is governed by soil temperature, in addition to the presence of adequate moisture. Thus, IBDU should work effectively under cool, moist conditions, while long-chain UF types will not perform nearly as well. Fertilizers containing UF are better-suited to summer use.

Natural organics popular

Natural organic fertilizers have become quite popular in recent years. Derived from plant or animal by-products, they include products like activated sewage sludge (Milorganite), dehydrated poultry waste (Richlawn products, Sustane), and dried blood, bone and seed meals (the Ringer products). These fertilizers depend on microbial activity to release much of the nitrogen contained in them. Interestingly, the Ringer and Richlawn products have performed very well under cool condintions in Colorado testing, probably because blood meal will release N quite quickly. These products require good levels of soil moisture to work well, and may not perform up to expectations under dry conditions (even if temperatures are warm).

—*Dr. Koski*□

Characteristics of Nitrogen Fertilizers

Fertilizer Source	N Percentage	N Source	Moisture Dependence	Temperature Dependence	Residual Activity	Burn Potential
QUICKLY-AVAILABLE N						
Ammonium nitrate	33	ammonium nitrate	low	low	short	high
Ammonium phosphates	11-21	mono/di-amm. phos.	low	low	short	high
Ammonium sulfate	21	ammonium sulfate	low	low	short	high
Urea	46	urea	low	low	short	high
SLOWLY-AVAILABLE N						
Slow-Release Sources						
Sulfur-coated	14-38	urea, ammoniacal N	moderate	moderate	long	low
Resin-coated (ONCE™)	24-35	ammoniacal N, urea, nitrate	moderate	moderate	long	low
Slowly-Soluble Sources						
IBDU	31	IBDU	high	low	long	low
Ureaform Products						
Nitroform	38	ureaformaldehyde	high	high	long	low
FLUF	18	ureaformaldehyde/urea	moderate	moderate	medium	low
Nutralene	40	methylene urea polymers	moderate	low	medium-long	low
Scotts methylene urea	39	methylene urea polymers	moderate	moderate	medium-long	low
CoRoN	28	methylene urea/urea	low	low	medium	low
Formolene Plus	30	methylene urea/urea	low	low	medium	low
N-Sure	28	triazone/urea	low	low	medium	low
Natural Organic Products						
Ringer fertilizers	6-10	blood, bone, seed meals	high	high	long	low
Sustane	6	composted turkey waste	high	high	long	low
Richlawn fertilizers	6-14	DPW, blood & bone meal	high	high	long	low
Milorganite	6	activated sewage sludge	high	high	long	low

Source: The author

more, depending on the source) later in the spring when it becomes warmer. Alternatively, use a mixture of slowly- and quickly- available N when you cannot make frequent spring applications (see sidebar).

Other nutrients

Most often, other nutrients are applied with (or in addition to) regular nitrogen applications. Potassium (K) applications, even when soil tests say levels are adequate, have been touted in recent years as providing an added degree of drought resistance and/or heat tolerance.

Many turf managers believe that they see this effect in the field, although

In cases of mite damaged turf, recovery can sometimes occur with adequate spring fertilization and watering.

research on the subject has not proven conclusively that supplemental K provides such benefits.

Less has been said about phosphorus (P) in this regard, but many turf managers provide regular supplements of potassium in their programs. It is unlikely that these higher levels of K or P can cause any harm, but one should consider whether any benefit is gained by using high levels of either, especially when one considers the extra cost involved. Routine use of both is encouraged, however, on those sites where grass clippings are regularly removed.

Iron applications can enhance turf color without stimulating excess shoot production. Iron in the spring can be advantageous if it allows you to reduce the amount of N applied. Research by Wehner and Haley at the University of Illinois found that iron can be substituted for a portion of some N fertilizers (urea and Formolene), while still attaining a response equivalent than that obtained from a full rate of nitrogen.

In certain parts of the country where iron chlorosis is prevalent (high pH soils), it may be necessary to apply iron at least once per year. Nitrogen applications to a chlorotic (yellow), iron-deficient turf will worsen the chlorotic condition.

Iron is most effective when applied as a foliar spray. **LM**

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