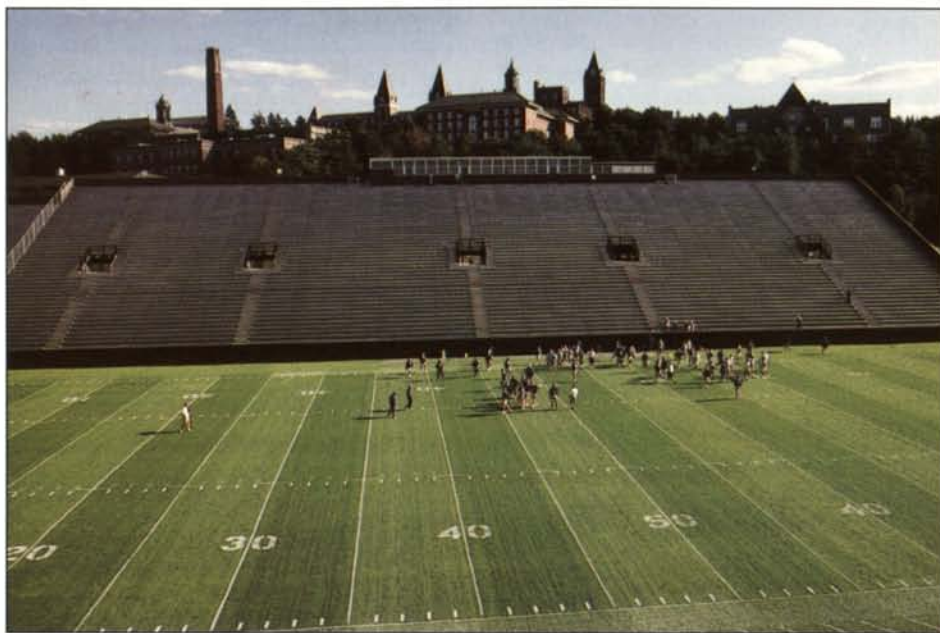




Fall Fertilization:



For cool-season fields, such as this football field at College of the Holy Cross in Worcester, MA, both fall and late fall fertilization should be considered.

Breakfast for Champions

By Dr. Paul E. Rieke

Sports turf managers have a variety of projects which require their time and attention during the fall. Turf management practices done in the fall and late fall have a major effect on the quality of turf the following spring. Fertilization is one of the most important fall practices.

Some turf consultants have suggested that phosphorous (P) and potassium (K) are the key nutrients to apply in the fall, but most acknowledge that nitrogen is the most important nutrient in fall fertilization. Of course, if P is recommended (based on soil tests) this would normally be applied as needed, split into several applications over the year.

Because K is so important in stress tolerance, application of some K in late fall programs should be considered on high-maintenance turfs like athletic fields. On sandy soils, some late fall K should be a regular part of the program. Potassium is easily leached from sands, so regular applications are needed and should be made in the fall and late fall as well as throughout the year. This is especially important for turfs which receive heavy traffic, such as athletic fields.

To be confident the soil contains adequate potash, use a soil test for medium and fine-textured soils. If tests suggest potash is needed, appropriate rates should be applied based on recommendation and common sense. Recommen-

dations for P_2O_5 and K_2O given in soil test reports are for the amount needed for an entire year. In fall to late fall, apply reasonable and safe amounts to achieve the total needed over the year. If soil tests have been taken in late summer, the recommended amounts should be applied over the next 12 months as a general rule.

When late fall nitrogen fertilization is practiced, some potash should also be applied along with the nitrogen on high-use turfs. Without the benefit of soil-test recommendations on finer-textured soils, apply potash at about half the rate of nitrogen. On sands, use equal quantities of nitrogen and potash.

Fall Nitrogen

Both fall and late fall fertilization are beneficial on cool-season grasses. Depending on location and weather conditions, fall nitrogen can be applied in early September. The appropriate date will be later for the transition zone, perhaps a little earlier for short summer locations. With shorter days and cool nights, the grass tends to grow laterally to fill in open areas and will begin to accumulate carbohydrates more efficiently. Fall is probably the most important time of year to apply nitrogen. This helps not only to improve turf density but builds up the plant for next year. Unfortunately, turf managers often overlook fall fertilization as they are busy with other projects and do not want to encourage more growth.

How much nitrogen should be applied in the fall? Consider the density of the turf. If it is thin, use one pound of N per 1,000 square feet. If the density is very good, a lower rate can be applied. Usually a minimum of 1/2 pound of N per 1,000 square feet should be used. For new turfs or others which need more nitrogen, another application can be made two to three weeks later.

In October, we normally suggest no nitrogen be applied. During this time, the plant is hardening off and preparing for winter. As the plant hardens off, it becomes less susceptible to frost injury caused by a hard frost after several weeks of excellent growing weather.

Timing of Late Fall Applications

There are different ideas as to how and when to use late fall nitrogen applications. In part, this occurs because of differences in climatic zones and variations from one season to the next. Perhaps the more important reason for variation in late fall fertilization is the objective for this practice.

In my opinion, the most important objective of late fall nitrogen fertilization is to *supply nitrogen to the turf after growth has ceased but when photosynthesis can still occur*. This will normally take place anywhere from the last week of October in northern Michigan to the second week of November farther south in Ohio and Indiana, for example. Some additional short growth spurts may

require mowing after that time, but regular mowing is no longer necessary. At this time, the root system is still active since the soil is warmer than the air. While top growth has ceased, photosynthesis can continue, and roots can take up nutrients.

The appropriate timing for fall N will vary by a week or more depending on the particular year. In 1994, for example, cool weather in October led some to consider applying the late fall application earlier than usual, but then the weather turned warmer in November and growth continued later than normal.

With the root system still active, nitrate nitrogen can still be taken up and utilized by the plant. If proper nitrogen fertilization has been practiced during the fall (September) period, the turf should still be green and physiologically active in the late fall. This permits the plant to continue photosynthesis whenever conditions of moderate temperature and some sunlight occur. Carbohydrates manufactured during this time are not "burned off" with growth and clippings but are stored. This builds up the plant for next year, which permits root growth initiation in the spring even before top growth begins.

Late fall N also reduces the need for early spring N, which enhances growth and mowing requirements at a time of year when growth is likely to be very rapid anyway. Carbohydrates lost with the clippings in the spring are obviously no longer available to the plant. It makes real sense to hold these carbohydrates in the plant as long as possible. As the hot weather of summer comes, the carbohydrates will be lost readily. Keeping the carbohydrate level in the plant high enhances stress tolerance and keeps some reserves in the plant for recovery of turf density if needed.

Nitrogen Carrier

The choice of carrier is another important factor in late fall nitrogen fertilization. To accomplish the objective of getting a significant portion of the applied nitrogen into the plant right after application necessitates that the major portion of the nitrogen be from fast acting, soluble sources. The balance (preferably 25 percent or less) can be slow-release. This slow-release carrier will provide a small amount of N next spring, but will not result in any major response or flush of growth. Any of the slow-release carriers should be acceptable for this portion of the fertilizer.

If straight slow-release N sources are applied during this late fall period, not enough N will be available to the plant to provide the response desired of enhancement of photosynthesis and carbohydrate storage. Some golf course

superintendents like to use natural organic fertilizer right after Thanksgiving and have been pleased with the responses observed the next spring. This approach has been used with success for years but does not accomplish the objective of carbohydrate storage during the late fall provided by the earlier application.

Rate of Nitrogen Application

How much nitrogen should be applied with the late fall application? Rate of application of N will again vary with turf conditions and philosophy of the turf manager. For golf greens, 1/2 pound N per 1,000 square feet may be sufficient. Lawns and general grounds can receive 3/4 to one pound N. Some agronomists may encourage even higher rates as a general practice, but the increased potential for leaching of nitrates would suggest caution against using higher rates of N. An exception might be football and soccer fields which have been thinned by fall play and need the extra boost from N. Rates as high as 1.5 pounds N per 1,000 square feet may be needed on these turfs.

If late fall N has been applied, the need for early spring N will be reduced. Many turf managers do not fertilize again until just before Memorial Day since the residual effect from fall and late fall applications has provided good color and density without the spring growth flush caused by early spring applications.

Late Fall N for All Turfs?

Some turfs may perform better without the late fall nitrogen. Some lawn care companies cannot sell the late fall nitrogen program because of cost. However, those who buy the late fall application will surely be happy with the condition of their turf the next spring.

What about the early spring application at the time of preemerge crabgrass applications? A little lower rate of N could be used with the late fall N application, then use a light rate (perhaps 1/2 pound N per 1,000 square feet) with the preemerge treatment. Turf quality should be very good with less growth and reduced mowing. Turf density should also be good, providing sufficient competition with weeds.

For sites that are very wet in the early spring and where mowing is limited, late fall N rates should be reduced. Still, there will be considerably less mowing than after an early spring fertilization. This should be evaluated on a site-by-site basis.

Increased snow mold has been observed where late fall nitrogen has been applied. However, research done by Dr. Joe Vargas demonstrates that while in most years the late fall nitrogen may

increase the amount of snow mold, there is much quicker recovery from any injury caused than on unfertilized plots. The snow mold damage seems to be more superficial with the late fall nitrogen. The next spring, the turf returns to a better quality condition sooner with late fall nitrogen.

Other Problems

Other potential problems with late fall fertilization include the potential for leaching of applied nitrogen, late fall growth which would require more mowing, increased potential for desiccation, greater thatch accumulation, and more growth in the spring. For most of these concerns the potential is small, and they are not considered major problems.

For example, a study being conducted at Michigan State by Eric Miltner and Bruce Branham compared late fall nitrogen treatments with those emphasizing spring applications. The study found no significant leaching of nitrates from either treatment. If the nitrogen is applied while the plant is still physiologically active, the soluble nitrogen should be taken up and used so it will not be available for leaching over the winter. These results are relieving objections to late fall fertilization expressed by environmentalists and some agronomists.

While there may be a small increase in growth during the fall or spring, most turf managers are satisfied the benefits far outweigh any potential negative effects. There is no evidence that late fall N applications increase susceptibility to low temperatures or crown hydration injury. In fact, if such winter injury does occur, late fall N application may speed recovery.

Benefits of late fall nitrogen include good carbohydrate levels in the turf the next spring, good early spring root growth, good fall and spring color and good turf density, so there is less potential for establishment of spring weeds. Since spring root growth of cool-season grasses begins before top growth, it is essential that a high level of carbohydrates exists in the plant to initiate that root growth.

With many advantages apparent for late fall nitrogen and few disadvantages, it is clear why so many turf managers have adopted this practice. I have not talked to anyone who has tried late fall nitrogen fertilization who has not continued to utilize the practice for agronomic reasons. This is the best testimonial for late fall fertilization. □

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