"Before You Can Mow It, You Gotta Grow It"

by Jim Hermann, CSFM

Mowing management is one of the most important considerations in an effective athletic turf management program. Far too often proper mowing technique and its impact on turf quality is not adequately addressed when developing a program.

A widely accepted misconception is that aggressive top growth is merely a product of the application of nitrogen fertilizer. Continued turf development, recuperation and therefore top growth are the results of many influences, the most important of which are soil pH, air (oxygen), moisture and nutrient availability. Outside influences affecting turf quality include height of cut and intensity of use. A turf grown in a balanced environment with proper soil pH, adequate aeration, soil moisture and nutrients is healthier, more aggressive and more resilient than a turf either over or under fortified with any one of the individual components, providing of course it is mowed properly and not over played.

As you develop your turf management program it is important that you continually reevaluate your program and address the limiting factor. Any of the influences, pH, air, moisture, nutrients, height of cut or intensity of use has the ability to become the limiting factor. I consider the limiting factor in a program to be that influence which is most restricting in the future improvement of your field.

Think of it this way. If you were stranded in the desert, air would not be the limiting factor in your survival. If you were submersed in a tank full of water, chances are you wouldn't die of thirst. On the other hand, if you were confined to a room with all the air you could breath and all the water you could drink, food would ultimately become the limiting factor in your survival, providing of course that Dominos doesn't deliver in your area. I once heard, "although the primary objective may be to drain the swamp, it's sometimes difficult to do when you're up to your butt in alligators". Alligators could be a very limiting factor.

Here is a question to ponder. If the football team destroys the field because they played when the field was too wet, what is the limiting factor, poor drainage or poor communication and cooperation?

In light of this philosophy it is vital to understand that turf management is site specific. Influences specific to each individual field impact greatly on the cause and effect of different applications and procedures. Some fields may have more alligators than others.

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Word to the wise; always keep your eye on the biggest alligator.

You must keep in mind that there are no steadfast rules on athletic turf management, only concepts and principles, which can vary, based on individual field conditions.

I am sure that many of you have certain fields that grow faster or slower than others. Different fields may have different usage schedules or different soil conditions and therefore need to be treated differently. As a sports field manager it is your job to evaluate each individual field and address the limiting factor based on the site-specific influences you have observed. You may have to aerate one field more often than another or cut back on the fertilizer for one field as compared to another. Irrigation strategies are very dependent on site-specific influences.

In general an athletic field consisting of cool season turf, being provided adequate air, water and nutrients can be maintained at a height of 2 ¼ " – 2 ¾ " throughout the growing season while being mowed on a twice per week schedule, closely conforming to the 1/3 rule which states "no more than 1/3 the leaf should be removed at any one time". Periodic evaluation of turf density, color and growth habit is the bottom line in any maintenance program.

The very best way to address both air and moisture availability in the soil is soil cultivation. The most typical form of soil cultivation for established sports turf is aeration. Aeration comes in many different forms such as aeravation, core, slice, solid tine, deep tine, water injection etc. The main purpose of aeration is to increase the percentage of macro or large pore space in the soil and by doing so decrease bulk density. Micro or small pore space in the soil retains moisture and nutrients. The larger macro pore spaces allow good air (oxygen) to enter the soil while allowing bad air (gases) to exit the soil. In addition excess soil moisture is capable of draining or percolating from the soil's macro pores, minimizing (not eliminating) the potential for a saturated situation in wet conditions. Moisture is also able to enter or infiltrate the soil more efficiently through macro pores.

Another benefit, which is coupled with the efficient exchange of air (oxygen), gases and water, is the efficient utilization of naturally available and applied nutrients. This increased efficiency in the utilization of available nutrients, developed through effective aeration can increase vitality and growth rate without the need for additional fertilization. Aeration is in my opinion the most under rated overlooked procedure available to the sports field manager.

Here's a little tid bit. Oxygen diffuses 10^4 times faster through air than through water. (Adams, W.A. and R.J. Gibbs. 1994. *Natural Turf for Sports and Amenity.* CAB International, Wallingford UK, 1st ed.)

I think that means 10,000 times faster. An example of oxygen diffusion through water would be by the use of an air pump in a fish tank to oxygenate the water. Unfortunately this is very impractical on an athletic field. When you see standing water in you turf you can be assured the development of that turf is being compromised. Utilization of nutrients by the turf can effectively cease under saturated conditions until "field capacity" is regained in the soil after substantial rain.

I would like to stray from the subject of turf nutrition for a brief definition of the term "field capacity".

Field capacity is considered the point at which all "free water" or gravitational water has drained from the soil due to the force of gravity. Free water drains through the macro or large pores in the soil. At field capacity all remaining water in the soil is held in the micro or smaller pores against the force of gravity due to adhesion and cohesion. Adhesion is the attraction of one material to another. Adhesion is why you are still wet when you walk out of the shower. The water adheres to your skin like it adheres to the soil particles. Adhesion is the attraction your skin or the soil exerts on the water. The adhesive quality of the towel is greater than that of your skin so it dries you. If the adhesive force or attraction of a material to water is great enough it will draw or hold water against the force of gravity, (like a wet towel). Such is the relationship between remaining moisture and *soil at or below field capacity.*

Cohesion or surface tension as it is also referred to is the attraction of water to itself. Cohesion is why water beads up on a surface. The individual water molecules are

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attracted to each other creating a bead or water drop.

Example: If you spill water on the kitchen counter, the water stays in a puddle due to surface tension or the cohesive quality of water. When you use a paper towel (preferably the quicker picker upper) the adhesive quality of the paper towel is greater than that of the counter top so it soaks up the water. Did you ever try to soak up water with wax paper? If you answered yes, you better read this twice. These few facts are some of the fundamentals necessary for a basic understanding of effective drainage technique. Now, back to nutrition.

If you have read the other articles in this issue of "SFMANJ Update", you can see there are many sources of nitrogen, phosphorous and potassium. The selection of your nitrogen source is another important aspect of mowing management. Consideration should be given to nitrogen availability in an application and not strictly the total amount of nitrogen applied.

Example. I want to apply a light application of nitrogen in late May to aid the turf in producing the top growth necessary for carbohydrate production to get it through the summer. A relatively light application based on applications I have made would be considered 1/2 lb. actual nitrogen per thousand square feet of a water-soluble nitrogen source, which would feed the turf for approximately three or four weeks. The more soluble a nitrogen source is, the more quickly it is available to the turf. The flip side is that the more soluble the material, the shorter the amount of time is that the material remains available to the turf. From an environmental point of view, soluble forms of nitrogen are more likely to leach beyond the root system or off target. A good understanding of your individual soil is necessary to make an educated decision on the source and amount of nitrogen you use.

For a late May application, I would be more inclined to choose a product that incorporates a slowly available nitrogen source. Due to the potential for hot dry weather at this time of year, I would be looking for a product with a lower salt index. A less salty product would minimize the potential for burn. Two products would be at the top of my list. One product would be IBDU and the other would be

methylene urea. Due to the slower rate of availability, I would apply either of these products at a higher rate of 1 ¼ - 1 ½ lb. per thousand square feet. *Product selection and Individual rates could vary based on site-specific factors.* A suitable nitrogen source could effectively feed the turf for a longer period of time, reduce the potential for burn and provide for controlled growth.

Another option that does exist to the sports turf manager is the option of spoon-feeding the turf. This option would include periodic applications of a water soluble nitrogen source typically applied at an increased frequency, at lower rates, with the objective of more closely controlling nutrient availability while minimizing product cost. A much higher level of expertise along with increased labor resources is necessary to implement this type fertility program.

Site-specific influences determining the rate of a nitrogen application and also a contributing factor in product selection and frequency of applications would be:

1. Do I have irrigation?
2. What sports are played on the field and when?
3. How intense is the level of play?
4. Have I recently seeded?
5. What is my mowing schedule?
6. How aggressive is my maintenance program?
7. What is my maintenance budget?
8. What is the current condition of the turf?
9. Do I want to improve quality of maintain quality?

Example: I maintain a soccer complex that was not treated with a late season fertilizer last fall. I wanted to jump start the turf in the early spring due to the practice schedule for Lacrosse. The same fertilizer considerations were made but in this case I chose to use ammonium sulfate as my nitrogen source. It is a very soluble form of nitrogen with excellent cool weather response. I applied ½ lb. per thousand square feet. The Turf responded well with no excessive top growth. I define excessive as being a rate of growth, which goes beyond my ability to maintain quality given my anticipated mowing schedule. Again, periodic inspection of the turf to determine health and vigor along with a consideration for site specific and environmental conditions is the bottom line in determining

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the effectiveness of your program.

One last example: I want to make a fertilizer application around Labor Day to boost the turf and help to prepare it for fall sports. This application is typically made as the nights start to cool down in the fall and adequate soil moisture is available. Salt index of your nitrogen source is not a critical consideration due to the cooling trends and adequate moisture availability. In general, the turf has about another eight weeks of substantial top growth before the onset of dormancy so fertilizer that incorporates virtually any of the "slow release" nitrogen sources will provide adequate sustained growth. There are many standard formulations readily available that incorporate potassium, phosphorous and micronutrients.

Agricultural fertilizer blends are also very effective while being able to incorporate any necessary potassium and phosphorous and keep costs down. Agricultural blends of fertilizer that I am aware of are typically blended with soluble forms of nitrogen such as urea, ammonium sulphate or DAP (diammonium phosphate). These blends are usually higher in potassium and phosphorous than are many standard turf maintenance blends due to their use in the agricultural market place. Agricultural produce generally removes potassium and phosphorous from the soil as the crop is grown and harvested. Therefore, higher application rates of these nutrients are generally necessary for proper management of the soil. Typical blends may include 5-10-10, 15-15-15, 10-20-20, 20-10-10 and 19-19-19 (corn starter). Another benefit of locating a supplier for this type of fertilizer is that some suppliers have the ability to custom blend formulations based on your needs.

I believe that regardless of the nutrient source you choose, as long as it is applied properly using sound agronomic principles, it would rarely have the potential to become the limiting factor in your program. However, a lack of knowledge and understanding, causing the inappropriate or ineffective use of a nutrient source would certainly have the ability to become the alligator in you swamp. Make it a point or rather a challenge to understand the products you or your contractor chooses.

The objective of your sports turf management program should be to develop and maintain an adequate base fertility level. This fertility level should consist of proper soil pH along with optimum levels of potassium, phosphorous and micronutrients while maintaining minimum nitrogen levels sufficient for sustained turf growth and development. This fertility level should be augmented with additional nitrogen during periods of time favorable to turf recuperation and root development while providing an environment conducive to efficient nutrient uptake and utilization through the administration of proper cultural practices. In the vernacular of the layman "Give it what it needs".

It is important to realize that nutrition, aeration, drainage and irrigation are all concepts that are closely interrelated. Acquiring a basic understanding of all these principles and how they affect one another is a major step toward becoming a successful sports field manager. ▲

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Test Your Understanding of the preceding article. (Answers on page 15)

1. Six factors affecting turf quality are:
   1. _____
   2. _____
   3. _____
   4. _____
   5. _____
   6. _____
2. Effective mowing management relies on following the rule. _____
3. _____is the most typical form of soil cultivation for established athletic field turf.
4. _____pores are large pores in the soil.
5. _____pores are small pores in the soil
6. Aeration increases ___ ____ ___ and decreases the _ _____ _____ of soil.
7. Water soluble nitrogen has the potential to _____ beyond the root system.
8. The _____ _____ of a fertilizer source is an important consideration in product selection for summer application when irrigation is not available.
9. Over application of nitrogen fertilizer may cause _____ top growth
10. _____ are a limiting factor when attempting to drain the swamp.