



From the Field: Mowing and Fertilizing Your Way to a Better Field

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Welcome to From the Field - A Guide to Athletic Field Safety and Care.

Throughout this series, we will focus on a sometimes overlooked but critical component affecting the safety and performance for athletes of all ages – the playing surface.

Our goal is to provide you with simple, helpful tips about playing conditions that maximize both safety and performance.

Mowing and fertilizing are two of the most basic components of managing grass football fields.

On the surface, these maintenance practices seem simple enough – mow to keep the grass short and fertilize to make it grow.

But, with proper knowhow, these seemingly simple tasks can be utilized to produce a field that both looks good and maximizes athlete safety.

Mowing your field

Let's start with mowing. One of the most common mistakes that people make is not mowing often enough. During the times that grass is actively growing, mowing once per week simply doesn't cut it.

- How often should a field be mowed?

In most cases, a football field should be mowed at least twice per week. NFL Fields are mowed a minimum of three times per week and often as many as five times depending on game and practice schedules.

Mowing promotes a healthy, dense playing surface, and it avoids post-mowing clumps from being left behind. These clumps not only smother the grass and block necessary sunlight from the turf plants, but they also can become tripping hazards during play.

Clumping can be reduced by mowing when the grass is dry. Mowing when the grass is dry also results in a healthier turf plant that is better able to withstand the wear and tear of football.

One of the first things turfgrass science students learn in class is the one-third rule, which says that at no time should more than one-third of the leaf blade be removed during mowing. Removing more than that amount will harm the plant and likely cause clumping. Mowing often reduces the risk of removing more than one-third of the leaf blade.

- What is the right mowing height?

Unfortunately, there is not a one-size-fits-all answer to this question. The proper mowing height is largely determined by your location, the type of grass on your field and the level of overall field maintenance.

In the South, bermudagrass is typically grown on football fields. Bermudagrass should generally be mowed at a height between $\frac{3}{4}$ and $1\frac{3}{4}$ inches.

Bermudagrass is an aggressive grass that grows quickly during hot weather, so it is important to mow frequently to avoid removing more than one-third of the leaf blade during mowing.

In cooler climates, football fields commonly contain Kentucky bluegrass, perennial ryegrass or tall fescue (or a mixture of these). These grasses should be mowed at a height between $1\frac{1}{2}$ to 3 inches.

These height ranges are a guide. Site-specific conditions and level of overall field maintenance determine the optimum height.

Height of cut affects a number of turfgrass characteristics. For example, mowing height affects the wear tolerance of the turf. Wear tolerance refers to how fast the field will wear out during use.

A field mowed at a lower mowing height will wear out faster than a field mowed at a higher height.

Mowing height also affects the depth of turf roots: The lower the mowing height, the shorter the roots.

If your field can be watered regularly, the field can be mowed at the lower end of the recommended range because the shorter roots, which result in reduced drought tolerance, can be compensated for with watering.

However, remember that a lower mowing results in less wear tolerance.

If your field cannot be watered on a regular basis, a height at the upper end of the range should be used to help encourage deeper roots that allow the plants to better deal with dry conditions.

Another turfgrass characteristic that is affected by mowing height is density. Turf density refers to the number of plants in a given area – the thickness of the turf.

Higher mowing heights produce less dense turf. Conversely, the lower you mow, the denser the turf.

Think about golf greens, which are typically mowed at less than an eighth of an inch. Grass mowed that low is extremely dense. (The type of grass on golf greens is either creeping bentgrass in the north or ultra-dwarf bermudagrass in the South.)

Mowing is a balancing act. Mow too high because you want greater wear tolerance and deep roots, and your turf will not be dense. Mow too low to increase density, and your turf will wear out faster, and you will have shallow roots, which requires more watering.

Also, remember that lower mowing heights mean that you need to mow more often in order to not remove more than one-third of the leaf. That is why golf greens are mowed every day.

Table: Recommended mowing heights for football fields.

Turf surface	Recommended mowing height
Bermudagrass	¾ to 1¾ inches
Kentucky bluegrass, Perennial ryegrass, Tall fescue	1 ½ to 3 inches

Table: Summary of the effects of mowing heights within the ranges listed in Table 1.

	Low mowing height	High mowing height
Mowing frequency	High	Low
Wear tolerance	Low	High
Rooting depth	Shallow	Deep
Watering requirement	High	Low
Turf density	High	Low

As you can see, there is more to mowing than making sure that there is enough gas in the mower.

Fertilizing Your Field

A regular fertilization program is needed to maintain a quality, safe playing surface. Lack of fertilization results in thin, weak turf that easily wears away during football games.

Just like with mowing, the most common problem with fertilizing football fields is that it is not done enough. Remember, though, too much fertilizer can lead to rapid turf growth and a host of other problems.

Determining the proper amount of fertilizer is more complex than coming up with a mowing schedule, but with a little knowhow, you can make a drastic improvement in your field.

- Understanding the fertilizer label

Let's start with the basics. The three nutrients that turf plants need most are nitrogen, phosphorus (phosphate) and potassium (potash). When you look at a bag of fertilizer, you will see three numbers – that is the fertilizer grade.

The fertilizer grade designates the percentages of nitrogen, phosphate and potash – in that order.

For example, a 20-5-10 fertilizer contains 20 percent nitrogen, 5 percent phosphate and 10 percent potash.

The nutrient that turf plants generally need most in quantity and frequency is nitrogen. Nitrogen gives plants a dark green color and more importantly is needed for vegetative growth, photosynthesis and a number of other plant processes.

- Soil testing

The first step in developing a fertilizer plan is to get your soil tested.

Soil testing often is conducted through your state's land-grant university. In most cases, if the university has an agricultural program, it will likely have a soil testing program (such as [Penn State's soil testing lab](#)).

You can contact your [local Agricultural Cooperative Extension office](#) for more information and soil test kits.

A test kit typically comes with instructions on how to gather a sample. Keep in mind you are not required to send your sample to a lab in your state.

When you receive the results, you will see your nutrient levels, fertilizer recommendations, pH and other information. In general, fertilizer recommendations are often given in terms of amount of nitrogen because nitrogen is used in larger quantities than the other nutrients.

- How much fertilizer do you need?

Fertilizer recommendations are typically given in terms of pounds per 1,000 square feet. So, let's say your fertilizer recommendation calls for one pound of nitrogen per 1,000 square feet. This is a typical amount to be applied in one application.

Here is how you go about determining how much fertilizer you need:

Scenario:

The grade of your fertilizer is 20-5-10. You want to apply one pound of nitrogen per 1,000 square feet onto a regulation-size football field (57,600 square feet).

Step 1:

Determine how much total nitrogen is needed

$(57,600 \text{ square feet} \times \text{one pound of nitrogen}) \div 1000 \text{ square feet} = 57.6 \text{ pounds of nitrogen needed to apply one pound of nitrogen per 1,000 square feet over the entire field}$

Step 2:

Determine how much fertilizer is needed

$57.6 \text{ pounds of nitrogen} \div 0.2 = 288 \text{ pounds of 20-5-10 fertilizer for the entire field (about six 50 pound bags)}$. In this equation, 0.2 represents 20 percent nitrogen.

Fertilizers come in a wide variety of grades. You can replace the 0.2 in the previous equation to match the nitrogen amount in your fertilizer.

- When should fertilizer be applied?

Proper timing for fertilization is primarily influenced by the type of grass on your field. A general rule of thumb is to fertilize when the grass is actively growing.

For bermudagrass fields, that means to fertilize primarily in the summer months. Your first fertilization should occur in the spring once the danger of frost has passed.

In general, one pound of nitrogen per 1,000 square feet every four to six weeks during the growing season is recommended. Once the bermudagrass begins to lose its green color in the fall, it is time to stop fertilizing for the year.

For grasses grown in the north (Kentucky bluegrass, perennial ryegrass, tall fescue), the periods of active growth are the spring and the fall. As a result, those are the best times to fertilize, with the majority of fertilizer being applied in the fall.

Try to shoot for around a total of three to five pounds of nitrogen per 1000 square feet per year on these grasses, with the first application sometime in May and the final application late in the fall. Avoid applying any fertilizer during the summer months or any other time the grass looks stressed from heat or drought.

Regardless of your grass type, it is important that the fertilizer be watered in as soon as possible after it has been applied. If the field cannot be manually watered, try to time your fertilizer application to be completed before rain. Not watering-in fertilizer can result in turf burn.

For more information on any of the topics covered in this addition of From the Field, visit the [Penn State Center for Sports Surface](#) .

Mowing turfgrasses

<http://plantscience.psu.edu/research/centers/turf/extension/factsheets/mowing>

Fertilizing Basics: <http://plantscience.psu.edu/research/centers/turf/extension/factsheets/fertilization>

Spreader set-up

<http://plantscience.psu.edu/research/centers/turf/extension/factsheets/calibrating-spreader>

Fertilizer Calculations

<http://plantscience.psu.edu/research/centers/turf/extension/factsheets/calculations-turfgrass-fertilization>