



# Effective Renovation of Bermudagrass Athletic Fields

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**B**ermudagrass (*Cynodon* spp.) is the primary turfgrass choice for use on athletic fields in North Carolina. Its superior heat and drought tolerance, as well as its excellent recuperative capacity, allow it to withstand many of the stresses often associated with recreational turf. However, if bermudagrass athletic fields are subjected to excessive amounts of traffic, over time they will eventually produce unacceptable and even unsafe playing conditions. When this occurs, partial or complete renovation is often necessary to correct the problem.

Many factors play a role in deciding what level of renovation is needed to provide a safe and aesthetically pleasing playing surface. Among these factors are the amount of damage, desired level of play, timing, available resources and budget. Proper consideration of each of these factors before field renovation will result in a field that is safe, attractive and within budget.

## Field evaluation

Athletic field managers are often faced with situations out of their control that make it impossible for even the best turfgrass managers to produce a high-quality field. Poor weather, lack of resources, too many events and improper scheduling can devastate a field, resulting in the need for partial or complete renovation.

Unfortunately, budget constraints are often the most limiting factor when renovating a field. Therefore, it is imperative that field managers properly assess the problem and find out how to get the most for their money.

Before spending a large amount of money renovating an existing field, it is first important to determine if renovation is even necessary. Problems that are large enough to result in field renovation can be broken into two main categories: turf problems and grade/soil problems.

Problems associated with the turf involve anything that directly results in the death of the turfgrass plant. This would include winterkill, excessive traffic/wear and disease/insect damage. Late winter or early spring is a good time to evaluate a field to assess damage from winterkill and/or spring dead spot. Early summer is a good time to evaluate a field for excessive wear/traffic from the previous season.

Problems associated with the grade/soil are somewhat different. These would include problems such as an insufficient crown, poor surface/subsurface drainage and soil compaction. Problems such as these are a result of poor grading or soil conditions and can be indirectly responsible for the death of the turfgrass plant. They can also be responsible for other problems such as standing water, rainouts and player injury. Many of these problems can be addressed at any point during the year.

## Problems associated with the turf of a field

### Winterkill

Winterkill occurs when temperatures fall below freezing for extended periods of time. If soil temperatures reach below 27°F,

underground plants such as rhizomes can be significantly harmed. Plants less than 12 months old and plants that receive excessive nitrogen (N) after late August are more susceptible to winter kill. Inadequate levels of potassium (K) in the plant have also been linked to increased susceptibility to winter kill.

### Spring dead spot

Spring dead spot appears in the spring after the grass resumes growth. It appears as spots that slowly expand and develop into rings. Infected areas recover slowly and are often invaded by weeds during the summer. Spring dead spot has also been linked to excessive applications of N after late August and inadequate levels of K (see related story on page 10).

### Excessive traffic/wear

Excessive levels of play can cause a field to become worn, especially in high-wear areas such as the mouths of soccer goals and between the hash marks on football fields. In situations such as these, the crown of the turfgrass plant, which is where growth originates, will become damaged to the point of death. This results in overall death of the plant and field.

### How to evaluate your field for turf problems

Field evaluation for winterkill and/or spring dead spot can be done by the following method:

- 1) As soon as the soil warms up in early spring, remove several plugs from different areas of your field.
- 2) Place the plugs in a greenhouse or south-facing window that receives adequate light, and allow them to grow.
- 3) Healthy plants should turn green in two to three weeks.
- 4) If plants do not green up, this could be an indication of sufficient damage to your field from winterkill and/or spring dead spot. If this is the case, then you can begin planning for sprigging or sodding in the summer.

Field evaluation for other problems associated with the turf, such as excessive wear/traffic, can be performed in early summer, two to three weeks after greenup. During this period, examine your field to see if sufficient bermudagrass is present. In extreme wear areas, look for any green tissue that may be present on the plants. Also, scratch beneath the surface to see if any live rhizomes are present. Rhizomes are lateral stems that grow beneath the soil surface, allowing the

plant to spread. Even though the aboveground parts of the plant may appear dead or damaged there could be enough rhizomes present to fill in any bare areas.

Many times, sprigging or sodding can be avoided by encouraging the bermudagrass that is already there through proper cultural practices such as fertilization, irrigation and aerification. Early summer is the best time to begin a management plan that will encourage good bermudagrass growth. It is also the best time to sprig or sod if it is necessary. This is the period in which bermudagrass is actively growing and will allow plenty of time during the summer months for the sprigs or sod to be ready for fall play. Recommendations on how to successfully sprig or sod, as well as how to implement a proper management plan, are given in the Bermudagrass Athletic Field Maintenance Calendar. This resource can be found on the NCSU TurfFiles website at the following address: <http://www2.turffiles.ncsu.edu>.

Guidelines in the Bermudagrass Athletic Field Maintenance Calendar are given as suggestions and should be suited to fit your individual field. There are also many other helpful articles on the TurfFiles website involving weed control, pest management and overall maintenance practices.

#### Problems associated with the grade/soil of a field

##### Insufficient crown or grade

Fields are crowned to promote adequate surface drainage. The typical percentage of slope for sports fields runs between 1% and 1.75%. When relying on surface drainage alone, it is best to use a slope at the higher end of the range. Slopes of 1% or less generally require some sort of internal drainage system to allow use of the field during periods of wet

weather. Renovating the crown or grade of a field can be broken into three categories: renovation of the entire field, renovation of a small area of the field and minor leveling.

##### Renovation of the entire field

Certain situations call for total re-grading of the entire field to achieve adequate surface drainage. These situations are best dealt with by hiring a licensed sports turf contractor. These contractors often have laser-grading equipment that will achieve the desired slope with extreme accuracy. Laser-grading costs about 15¢ per square foot.

##### Renovation of small areas

If the overall grade of a field is relatively close, and if only small problem areas such as goal mouths or midfields are of concern, then you can address these issues much more easily. First, remove the existing sod from the poorly graded area and aerify. Aerify until the soil is loose enough to crumble. Drag the area with a mat until the material is spread evenly across the surface. If the soil now on the surface from aerifying is enough to raise the grade to the correct level, then replace the sod.

If the problem area is significantly lower than the correct grade, it may be necessary to bring in more soil. If this is the case, it is very important to bring in and incorporate soil very similar to the existing soil. Failure to do so will result in layering. Layering causes decreased water movement through the soil profile and poor rooting. In effect, you will have made the problem worse. After bringing in the correct material, raise the soil to the proper grade (be sure to allow for settling) and replace the sod. It may be necessary to use grade stakes when doing this, or you may be able to do it by sight in some situations.

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**Minor leveling**

If the overall grade of the field is adequate but simply uneven, then one way to correct this problem is through heavy aeration. Using a core aerator, aerify the field in several different directions until the field appears to be covered with plugs. Drag the plugs with a mat or leveling bar until they are incorporated back into the field. This is the same as topdressing without buying the material, and you get the obvious benefits of aeration. You can also aerify and topdress with additional material, again making sure it is very similar to the existing soil. However, this is more costly.

**Poor Drainage**

Inadequate drainage is probably one of the most common causes of poor field conditions and game cancellations. Many different types of drainage systems are available, ranging from low cost to high cost. Two types of installed drainage systems are French drains and sand-channel drainage.

French drains consist of 4" perforated pipe placed into a trench filled with gravel and topped with coarse sand. The French drain is usually placed around the field and is tied into a catch basin, allowing any surface water draining from the crown of the field to intercept the French drain and leave the site. French drains cost about \$4.50 per linear foot.

Sand-channel drainage consists of a series of sand channels running across the direction of the field's surface drainage. The sand channels intercept water draining across the surface of the field. The sand channels are tied into a French drain, allowing the water to then be moved off site. Sand-channel drainage costs about 50¢ per linear foot.

**Compaction**

Compaction is a significant concern on most athletic fields. Many fields, especially at the high school level, play host to several different activities such as football, band practice, gym class, etc. In order to keep healthy turfgrass on these fields, it is necessary to battle compaction through aeration. Compacted soil restricts air and water movement to the roots. If the roots do not receive adequate levels of both air and water, the turfgrass plant will die.

Several different aeration options are available, including solid tine, core and deep tine. These aeration variations are all suitable options in compaction relief, but they each offer their own distinct advantages and disadvantages.

Solid-tine aeration does not remove an actual core, so it has less surface disruption than core aeration, however it is not as effective. Over long periods of use, solid tines may also cause a hard pan (compaction zone) in the soil. A good idea is to incorporate solid-tine aeration into an overall aeration program as a means of short-term water infiltration and percolation with minimal surface disruption. Solid-tine aeration costs about 1.5¢ per square foot.

Core aeration is much more effective than solid-tine aeration at relieving compaction and allowing air and water to get to the roots. The disadvantage is that core aeration must be scheduled so it does not interfere with field events. Also, more labor is involved in dragging the cores into the field. Several tine sizes are available, ranging from 1/4" to 3/4" in diameter and 3" to 6" in depth. Core aeration (mechanical) costs about 2¢ per square foot. Drum-type roller aerators are cheaper and more commonly used on athletic fields.

Deep-tine aeration is, by far, the most effective means of battling



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compaction; however, it is also the most costly. These machines have core and solid tines with diameters ranging from 1/2" to 1" and depths ranging from 8" to 12". This equipment can be especially useful in aerating deeply compacted areas such as soccer goal mouths and between the hashes of football fields. They are effective at breaking up any subsurface layers, allowing air and water to percolate deep into the root zone. Deep-tine aerification costs about 25¢ per square foot.

**Other things to consider**

- Check with local golf courses for advice and equipment. Many times, golf course superintendents are willing to donate their time, knowledge and even equipment to help out local schools. Many superintendents have children that may play sports at your school and will want them to have a safe and attractive field.
- Develop an equipment-sharing program. If you can coordinate with other local schools, you can share equipment as well as costs. For example, if one school has an aerator to share with others, then another school could buy a spreader to share, and so on. Much of this equipment is specialized and is only used a few times a year anyway. This means that it should be relatively easy to schedule equipment use between several schools.
- Contact and join professional organizations such as the Sports Turf Managers Association (STMA) and the Turfgrass Council of North Carolina (TCNC). These are good resources for finding information and networking with others in turfgrass management. Also, by being a member in these organizations, you are eligible to receive free magazines such as *SportsTURF*, *TurfSouth*, *Athletic Turf*, *Grounds Maintenance*, *Landscape Management* and others. These magazines are full of articles addressing problems that turfgrass managers face every day.
- DO NOT let just anyone willing to help work on your field. Although they may have good intentions, they could do more harm to your field than good. Only allow licensed sports-turf contractors to perform major renovations. By renovating correctly the first time, you can avoid the costly process of hiring someone to renovate a second time.
- Keep records. Keeping records of fertilizer and irrigation programs, as well as the amount of play a field receives, will increase your chances of success and help you avoid future renovations. \*

**HELPFUL WEBSITES:** NCSU TurfFiles - <http://www2.turffiles.ncsu.edu/>  
 ENCSTA - <http://www.easternncsportsturf.org/>  
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