NATURAL GRASS FIELDS: PURDUE PERSPECTIVE

Clark Throssell
Department of Agronomy
Purdue University
West Lafayette, Indiana

A better title for this article would be Clark Throssell's perspective on athletic fields. This paper contains my beliefs about proper athletic field construction and maintenance. One starting point for this paper is to discuss Prescription Athletic Turf (PAT) since it was developed and patented by Dr. Bill Daniel during his career at Purdue University.

A PAT system field is constructed by excavating and removing the existing soil to a depth of approximately 12" below the proposed final grade. Next a layer of plastic is placed over the entire subgrade and the plastic is extended at the sides of the field to the surface. All seams in the plastic sheets are sealed to create a closed system. An extensive system of drain tile is then placed on top of the plastic. Individual drain lines are connected to main drainage lines. The main drain lines are in turn connected to pumps which can be activated to draw water off the field during periods of excessive rainfall. Twelve inches of sand is then placed on top of the plastic and drain tile. Turf is established from seed or sod on top of the rootzone.

Benefits of a PAT system field are excellent drainage, resistance to soil compaction, and a nearly level playing field since only a very low crown is needed to facilitate surface drainage. A PAT system field is especially well suited for use during rainy periods. The sand rootzone facilitates excellent infiltration and percolation of water to the drain tile. Once water reaches the drain tile it can be removed quickly through the drainage system by operating the pumps. PAT system fields are used by many major universities and professional sports teams across the country.

Like all systems of athletic field construction there are drawbacks associated with a PAT system field. The major drawback is the expense to build a PAT field. Only organizations with a fairly large budget can afford a PAT field. Other drawbacks observed on some PAT fields are difficulty maintaining turf and poor footing. These difficulties can be surmounted through experience and research.

Since building a PAT system field is to expensive for all except a few organizations, it is important to discuss construction and maintenance operations for native soil fields. The two major agronomic problems associated with an athletic field built on native soil are soil compaction and poor drainage. Understanding these two problems will allow athletic field managers to formulate effective strategies to deal with them.

Soil compaction on an athletic field occurs primarily in the upper 1 or 2 inches of the soil profile. Soils with a high clay content are the most prone to soil compaction. A moisture content near field capacity creates conditions most favorable for compaction.

Aerification remains the only effective means of relieving soil compaction. When developing your aerification program keep in mind that you want to focus your efforts on the upper 2 or 3 inches of the soil profile. Do not ignore the benefits of deep aerification, but plan your efforts to concentrate on the upper portion of the soil profile. An athletic field should be aerified on several occasions throughout the growing season. Start the aerification program by aerifying the football field four to six times following the last game. Leave soil cores on

the surface and allow them to disintegrate over the winter. Aerify the field on 3 or 4 occasions in March through early June, weather permitting. Each time the field is aerified concentrate on the most heavily trafficed areas. When aerifying the field in spring, make 2 or 3 passes with the aerifier each time aerifying is scheduled. If possible aerify once more before the start of the football season. This late summer aerification should be done only if the weather is favorable for turf recovery.

Since clay soils are prone to compaction many people are tempted to try to modify the soil by adding sand to the soil profile. Resist the temptation to try this. Very large quantities of sand are needed to improve soil properties. This is a very expensive undertaking and unless done properly, soil conditions could actually be worse after adding sand.

Soil with a moisture content near field capacity is most susceptible to compaction. It is possible to avoid some compaction by properly timing irrigations. Following an irrigation, allow 48 hours before the field is subjected to use. This will allow the soil to dry beyond field capacity and minimize potential for soil compaction without stressing the turf.

Drainage concerns on an athletic field can be addressed during construction and through proper maintenance. Surface drainage, or horizontal movement of water across the soil surface, is the most important aspect of drainage on athletic fields. Rainfall prior to or during an athletic event is most rapidly and efficiently moved off the field through surface drainage. Tile drains installed beneath the soil surface are of limited use when rainfall occurs prior to or during a game or practice. This is because it takes water too long to percolate through the soil profile to reach the drain tile. By the time water drains internally, the game or practice is long since over.

A proper crown on the field is the starting point to create good surface drainage. The crown in the center of the field should be 10 to 15 inches higher than the sidelines. There should be a uniform slope from the crown to the sidelines and the sidelines should be level. Once the crown is created great care should be taken to maintain the crown. At the end of the playing season soil should be added, if needed, so the crown retains the proper elevation and shape. If this is not done, the crown will wear away over time.

After the crown has been created a drain tile line should be placed near the sideline, outside the playing field, running the length of the playing field. The purpose of this tile line is to receive surface water as it drains off the crown toward the sideline. The trench in which the tile is laid should be backfilled with gravel to the soil surface. Grates, with small slots, should be placed over the gravel to keep it in place. The purpose of the grates and gravel are to facilitate, rapid movement of water to the drain tile. Placing soil over the drain tile will not allow water to move to the tile rapidly enough to provide the desired drainage.

Maintaining turf on an athletic field built from native soil can be very challenging. Keys to success in a situation such as this are to aerify vigorously on a regular schedule and provide excellent surface drainage of water. Excellent surface drainage can be created by building and maintaining a crown and having drain tile lines on the perimeter of the field to collect water as it flows off the crown.