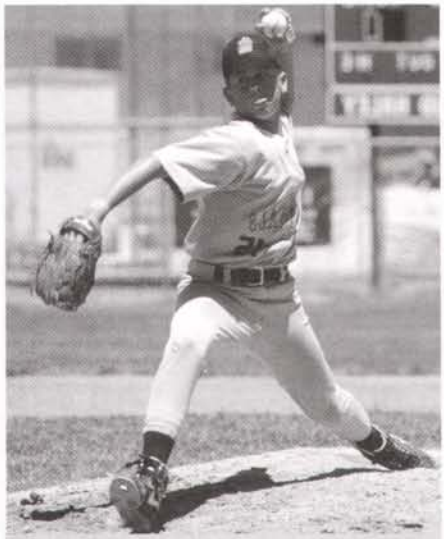
MANAGING FUNCTIONAL ATHLETIC FIELDS

WATER RESTRICTIONS MAKE IT INCREASINGLY DIFFICULT FOR SPORTS TURF MANAGERS TO PROVIDE ACCEPTABLE FIELDS



Functional: not necessarily aesthetic nor pleasing, but serving a purpose.

Safe: free of danger or risk (for athletes)

Durable: resists wear (weather and competition)

Enhance: heighten or intensify (the game)

The responsibilities of sports turf managers go well beyond maintaining and managing healthy turfgrasses. Field performance plays a major role in determining whether playing conditions enhance the game as well as providing a safe playing surface. Over the last several years, restrictions have been placed on the use of pesticides and also water in some areas. This causes me great concern, that as sports turf managers, we are finding it increasingly more difficult to provide acceptable playing fields for varying levels of play.

An issue I would like to address is the use of terms such as *aesthetic purposes*, *non-essential*, *cosmetic* and *lawngrasses*. These are descriptions often used to define limitations on the use of pesticides or water. Unfortunately to date, sports turf is typically combined with lawngrasses and general parkland when it comes to language surrounding restrictions. It is fairly obvious to sports turf managers that athletic fields are not lawngrasses, but functional turfgrass areas designed specifically to host and support athletic events.

I choose to categorize turfgrasses into three areas. They are 1) utility turf: medians, erosion control, etc.; 2) lawngrasses: residential and commercial properties, general parkland; and 3) athletic turf: a) golf turf, b) sports turf.

As mentioned above, the sports turf manager must be aware of much more than cultivating healthy turfgrasses. It is my opinion that we should be providing "safe, durable athletic fields that enhance and support the game." This article will focus mainly on the role of water and how it relates to field performance.

Can we use these definitions when describing our fields? As the level or intensity of competition increases, so does the demand on the athletic surface to perform – or allow athletes to perform safely and to the best of their ability. I break down performance of an athletic field into three areas: 1) impact absorption; 2) traction, footing and stability; and 3) enhancing the game.

Athletic Turf, Soils, Moisture and Related Performance

In order to provide safe fields and in turn improve field performance, we must first be able to successfully maintain a healthy turfgrass community. The three simple or basic needs that the plant requires are light, nitrogen and **water**. Without any, or all, it is absolute – the turf community will fail. Why is it imperative that we provide a healthy stand of turfgrass? What does the turfgrass provide for athletes?

Turfgrass Density

It is the turfgrass density of the field, or the individual number of plants per square unit of measure, that greatly enhances the impact absorption capabilities and reduces abrasiveness of the surface. Impact testing equipment such as the Clegg Hammer measures deceleration of the internal hammer dropping, which in turn measures surface hardness (GMAXX). Through research, we know that GMAXX ratings upwards of 200 pose greater risks for athletes (Consumer Safety Authority). Not only acute injuries, but medical information also points to chronic injuries due to exposure to poor surfaces. This exposure weakens tissues and can lead to muscle and sprain injuries. Dense turfgrass provides a cushion for athletes. Interestingly enough, as high school fields face maintenance challenges, I was approached by regional athletic directors at area high schools seeking advice for concerns they had over witnessing increases in shoulder, ankle and concussion injuries suffered by their varsity athletes.

The density of the field also plays a major role in providing an athlete with traction (linear and rotational), footing and stability. This can be referred to as the torque characteristics of a playing surface. Stops and starts and changes in direction are all part of sport. Poor footing exposes athletes to a greater risk of tears and sprains.

Note: 1). Not only general density, but individual turfgrass varieties exhibit different shear strength ratings under the same cultural inputs. National Turfgrass Evaluation Program trials (NTEP) provide a good starting point for selection of premium athletic turf varieties. 2). At times of high heat, fields high in *Poa Annua* content can be syringed to reduce stress and maintain density during summer

Soils and Soil Moisture

Soils and soil moisture play an important role on impact absorption and traction/footing, etc. Coupled with turfgrass density, the moisture content and soil texture determine the ultimate impact rating of a field. The higher the moisture content and the lighter the soil texture, the "softer" the field will play. Take football for example. The argumentative object of the game is to put your opponent on the ground as quickly and aggressively as possible. Why do elite football players prefer to play on natural surfaces versus artificial, especially earlier generation synthetic turfs? A lack of resiliency in the playing surface significantly increases the risk of impact injuries.

Field construction specifications are gradually improving in Canada, with more "engineered soil" fields being constructed, but many existing and new fields are native soil based with high clay content. As soil moisture is depleted on these fields, surfaces begin to harden. Depending on the level of play, ET based irrigation practices may sustain healthy turfgrass, but may at times leave the immediate playing surface firmer than one would like. Lighter textured rootzones provide more favourable impact characteristics under depleting soil moisture, but must be managed much more carefully due to water holding capacity characteristics.

Enhancing the Game

Ultimately, field performance, as it relates to turf, is influenced by cultural practices, turfgrass density, rootzone composition and soil moisture. Field performance will determine how the playing surface enhances or supports the game. I mentioned previously how turf density impacts footing and traction for safety purposes. I also mentioned that fields that look great may not perform very well. Remember, we're managing functional athletic turf, not lawngrasses or general parkland.

Cultural practices such as mowing (frequency, quality and height of cut), overseeding (frequency and species/varietal selection), thatch levels, topdressing (frequency and material selection), fertility and irrigation practices (overall turfgrass health/density and soil moisture) etc. all greatly influence every athletic event. The ability of the playing surface to support stops and starts and changes in direction determine the stability or torque strength of a field.

Obviously, elite athletes require greater stability from the field than youth recreational athletes. The speed, weight and forces generated by athletes at higher levels of play create these demands. The skill, precision and speed of the game is greatly affected by poor playing conditions (hence the NFL tarping policy). I spoke with George Toma, retired NFL groundskeeper and now charged with installing the playing surfaces for the Superbowls, for over an hour specifically on how he advises on the size and number of cleats to wear in relation to torque characteristics of the field. (A modified torque wrench fitted with cleats provides readings).

Turfgrass rooting, rootzone composition and topdress applications factor in determining field stability. Sand provides much greater friction for a playing surface, especially under wet conditions, than does heavier soils (1/4" - 1/2" of thatch may provide a soil buffer and increase footing). The flipside can be that heavier soils will provide more root stability than sands. Tear out and divoting are sometimes an issue, more often on sand based systems, but native soils too high in upper profile water content are prone to divoting and lack of stability as well. Although organics may be beneficial in increasing water/nutrient holding capacity and "loosening" tight soils, layering of these materials by continual application of high organic matter topdress blends can adversely affect the stability of the root system. Establishing athletic fields on the Holland Marshes would produce less than desirable playing surfaces. Furthermore, excessive organic matter may reduce percolation rates or cause water repellency in sand based systems.

Ball response is also influenced significantly by how sports turf managers manage the playing surface. Field sports such as baseball (will discuss infield skins later), soccer and field hockey all rely on surface uniformity and consistency, as a

large portion of the game is played with the ball rolling across the playing surface. An example would be how high mow heights and/or surface non-uniformity lead to soccer players taking a completely different approach to the game. It becomes played more through the air versus along the ground. This not only impacts the quality of game for elite athletes, but also influences how our youth are trained and learn the game. It affects how the ball is fielded, passed or dribbled over the surface. Safety implications also exist by the way of unexpected ball responses leading to ball strikes, especially in baseball.

Infield Skin Management

Unfortunately, the importance that water plays in managing baseball infields is not often realized in Canada. As with culturing turfgrass, looks can be completely misleading as to the performance and safety of the surface. Although somewhat off topic, I feel it necessary to quickly brief readers on infield management techniques before discussing the **important role water plays**. The four key areas I like to focus on when managing baseball infields are: 1) selection of material; 2) conditioning products; 3) moisture management; and 4) surface preparation.

A baseball infield must perform in a similar fashion as turfgrass. The field manager must be concerned with impact absorption, traction, footing, stability and also how the skinned surface will enhance or support the intended level of play. All four of the above criteria combine to determine infield performance. Although this is not a discussion specifically on cultural practices for managing athletic fields, it does need to be mentioned that the demands of the intended user require different approaches to design and management.

Ascertaining the intended level of play, selection of material and implementation of a management program is key for an infield to perform well. The capability to apply correct amounts of water and the infield to absorb and hold these amounts becomes more critical as the level of play increases. The information below leans towards managing infields for elite play.

Selection of Material

The type or composition of the infield blend will factor heavily in the success of the field. The typical "stone dust" infield would certainly not enhance or may even in fact create safety concerns for higher levels of play, while a more favourable infield blend or "professional" type blend may be excessive for lower levels of play. Very briefly, an infield blend or product should not be overly abrasive for lower levels of play and have the ability to provide a "tight" surface, hold adequate moisture and exhibit drainage characteristics for higher levels. The infield blend I like to use and have had success with consists of 60% sand, 25% clay and the rest silt screened to 1/8".

Conditioning Products

The use of specifically designed products that condition infields greatly improve the quality of the playing surface, absorb

excess water and also reduce the amount of water required to manage an infield for elite play. Calcined clay products are my choice due the stability of the product over time. Industrial absorbents do not provide the same characteristics and will break down gumming up your infield skin.

I'd like to mention two types of calcined clay. First, drying agents, which are used to absorb excess water from the field during play and secondly, infield conditioners, which greatly improve the workability of the surface and provide water absorption characteristics as well. The latter is important as the conditioner will release stored water into the infield skin as it begins drying out. Conditioners are incorporated into the skin and infields and then "capped" or topdressed with about a 1/4" of infield conditioner to "seal" in the sub-base moisture and provide an optimum surface.

Moisture Management

Managing the moisture content of the infield skin on a day-to-day basis would be what I consider the most difficult, yet strategic task for providing a top notch playing surface. In this paragraph, I discuss practices for the highest levels of play that I have encountered from major league facilities and national teams down to our oldest age groups for inter-city all-star programs. Moisture content of the infield skin is what provides a resilient playing surface, yet binds the blend together to provide stability. Watering an infield is somewhat similar to irrigating turfgrass – evaporation from the infield skin is proportional to heat, sunlight, humidity and wind. When preparing an infield, the amount of water we use on calm, overcast days with temperatures around 18°C is much less than 32°C windy, sunny days. The real trick is to moisten the sub-base (infield soil from 1/2" to 4") and keep it consistently at this level (you'll have to "read" your own infield).

Quick Tip. Sub-surface irrigation operated by a gate valve with rapid speed turf rotors will provide water to the skin without the cost of labour involved with hand watering.

This is what enables the field to perform well. Light surface watering is simply to moisten the conditioner and help seal in sub-base moisture.

Surface Preparation

The concept is simple – spike drag and cocoa mat to finish. In my opinion, this process actually has little to do with how the field plays or performs. To truly provide an optimum surface, the critical inputs are material selection, use of conditioners and moisture management. No matter how well the surface is prepared, without fulfilling these criteria, the infield will not perform to the highest standard. Timing is however, very important. When spike dragging, finding that optimum time when the field is dry enough for spiking, but before it begins to set up is key. This allows proper scarification of the top 1/4". Drag matting provides the finished playing surface.

Infield Performance

Managing infields – how does this relate to impact absorption, traction, footing, stability and enhancement of the game? **Water is the key resource when it comes to the performance of an infield**. An infield may be designed properly utilizing a quality blend, infield conditioners incorporated, topdressed on the skin, and the surface properly spike dragged and matted. But without water, the infield will still not provide a safe surface for athletes to perform or enhance the game.

Penn State research identifies infields with 5% moisture content as having a GMAXX in excess of 300 (remember, over 200 is considered high injury potential). Infields with 23% moisture (a properly watered field) had readings of 140. We reduce by half the surface resiliency by the proper application of water. As discussed previously, excessively firm playing surfaces leave athletes at a higher risk for both acute and chronic injuries as the forces are returned to the athlete as opposed to absorption by the field. Furthermore, the majority of baseball injuries are generated by ball strikes. Improperly managed infields can lead to a serious risk from inconsistent ball bounces at high speeds. At top levels of play, the ball can be fielded at speeds exceeding 80 miles per hour. I have witnessed some serious facial injuries due to an unexpected bounce of the ball. Water provides the consistency in ball response that allows fielders to become comfortable and confident and enables them to play the ball much more aggressively.

Footing, stability and traction affect an athlete's performance in the same fashion as turfgrass does in conjunction with field sports. The "tightness" of the infield enables both runners and fielders to stop, start, change direction, plant and make throws. An infield with little moisture not only plays hard, but becomes brittle, unstable and may "blow out" when force is applied by an athlete.

Conclusion

We, as sports turf managers, know the important role water plays in athletic field management programs. In contrast to ornamental turf areas, **water plays a very vital and functional role in providing safe, durable athletic fields that enhance the games of our intended users**. There are many more variables in managing athletic fields than simply maintaining healthy turfgrass. I feel it is our responsibility as sports turf managers to improve field performance and increase awareness to all involved while striving to minimize the injury risks associated with athletic competition. It is also our responsibility to use all available research and resources to minimize the mismanagement of water at our facilities.

I'd like to leave everyone with a final thought: I've never seen an injured golfer carried off the course, or chronically injured, due to poor playing conditions. ♦

~ Tim Ernst, Former Supervisor of Sports Turf, City of Kitchener