Pre-Game Agronomic Field Safety Assessment For Sports Fields: Future Implications For Risk Management

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One of the most difficult turfgrass areas to manage is sports fields due to the intense traffic they receive by players on a regular basis. Sports played on turfgrass athletic fields can easily result in injury to players, and there have been many cases where these injuries could be blamed on turf field conditions (Christians, Patton, & Law, 2016). Due to high expectations regarding player safety by players and coaches, field safety and maintenance checklists need to be developed specifically for sports turf fields that ascertain agronomic properties of the turf. Currently, checklists consist mainly of facility-based questions regarding goals/goal posts, field markings, out of bound or transition areas, fencing, lighting, and rarely address turfgrass field conditions (Schlotthauer, n.d.). The purpose of this study was to (1) develop an agronomic pre-game field safety assessment, (2) determine whether agronomic improvements made to the field indeed reduce player injury, and (3) determine if coaches, players, and grounds staff found the pre-game assessment beneficial.

A pilot study was conducted in the fall of 2016 on a midwestern United States university football field by undergraduates. Soil compaction and soil moisture was measured prior to each home game to determine the agronomic field conditions of the turf and underlying soil. Soil compaction was measured using a Field-Scout SC 900 soil compaction meter (Spectrum Technologies). Volumetric water content percentage was measured using a FieldScout TDR 300 (Spectrum Technologies).

Compaction measurements greater than 300 psi indicate severe soil compaction (Duiker, 2002) When the percentage of data points greater than 300 psi exceeds 70%, soil cultivation is recommended to improve field conditions. Soil compaction readings greater than 300 psi were measured on 50% of the field (moderate compaction) before the first home game. By the second home game, soil compaction readings greater than 300 psi were measured on 70% of the field. The recommendation to aerify the field was made to the grounds crew and by the third home game of the season soil compaction readings greater than 300 psi were less than 10%. By the fourth and last home game soil compaction readings greater than 300 psi had increased again to 50%. Field capacity (moisture content when downward water movement has ceased) for a silty clay loam is 19–40% volumetric water content. Soil moisture readings indicated volumetric water content ranged from 70–100% over the course of the season due to significant rainfall and over irrigation.

Field conditions such as soil compaction and soil moisture can have an impact on player safety. Conditions that are too hard or too soft can result in player injuries. Soil compaction of athletic fields results in a surface becoming increasingly hard. Playing surface hardness can affect both player performance and player safety by limiting a player's ability to cut sharply and increase injury from falls and tackles. Wet turf can cause players to lose traction, which is critical to generating and controlling player speed, making sharp turns, and stopping. Poor traction can also lead to muscle pulls and other injuries. Improving field conditions identified by the pre-game field safety assessment should improve overall player safety and decrease player injuries during sport activity. Therefore, the next step of this project is to determine the impact field improvements identified by the pre-game assessment have on player injury.

There are three popular assessments of player injuries: prevalence, incidence, and incidence proportion (i.e., risk; Knowles, Marshall, & Guskiewicz, 2006). Prevalence refers to the proportion of a team who is injured at a given time. Incidence refers to new injury occurrences during a specified period of time. Incidence proportion, or risk, refers to the proportion of athletes who have at least one injury during a fixed period of time. Player injury data will be obtained from athletic trainers after home games over the course of the season. Trainers will be asked to provide information related to severity of injury, what was the cause, and describe how it happened (e.g., was it field-related). Prevalence, incidence, and incidence proportion (risk) will be calculated once all data is collected.

At the conclusion of this study, the grounds crew, players, and coaches will be asked to complete a survey to assess whether they felt the pre-game agronomic assessment and implementation of field improvements was beneficial in reducing player injury. Being able to quantify the relationship between the agronomic and risk assessments will lead to strategies intended to improve turfgrass field conditions. Identifying and implementing these strategies will be beneficial to facility managers by reducing the risk of player injuries.

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