Understanding Research Techniques in Sports Turf and Their Implications on Playability and Safety

Sports turf can be defined as the turfgrass and soil environment managed for fast and aggressive sporting events such as American football and soccer. Sports turf must offer a safe playing surface for the athletes and meet the respective sport’s regulations. The playability of a sports field refers to how well the field allows for the successful, uninhibited execution of a given sport. In the July–August 2014 Agronomy Journal, researchers from Auburn University provide a compilation of research techniques attempting to quantify sports turf playability and present new ideas on the future and improvement of sports turf research.

Key components of playability include athlete and ball interactions with the sports turf; such interactions result in sports turf wear: the result of the forces applied to the turf during use. Sports turf wear promotes soil compaction, turfgrass tearing, crushing, and scuffing, with occasional plant disruption and burial. In turn, wear tolerance, or durability, is the ability of a field to resist and overcome wear, maintaining adequate playability. In addition to sporting events (games and practices), sports turf wear can be caused by non-sporting events such as concerts, ceremonies, and social gatherings.

Wear, a major component in playability, is key in sports turf research. Sporting wear can be simulated for research purposes by machines adapted to reproduce both vertical and horizontal forces applied on the sports turf. The vertical component of wear is responsible for soil compaction, while the horizontal component is responsible for tearing. The so-called “wear machines” have the following characteristics: turf compression, shearing, and tearing. One of the most common wear machines nowadays is the Cady Traffic Simulator (CTS), developed from adaptations of a walk-behind coring unit. After modifications that include replacement heads for mechanical “cleated feet,” two passes apply similar wear to one National Football League (NFL) game in between the hashes at the 40-yard line.

Turf measurements in sports turf research can be divided into turf quality and turf playability measurements. Turfgrass quality combines turf characteristics such as color, density, texture, and other stresses. The National Turfgrass Evaluation Program (NTEP) offers guidelines for subjective measurements once taken. Objective measurements such as counts and weights can also be performed.

Research techniques specific to sports turf:

- Ball rebound resilience: the ratio of height bounced vs. height dropped.
- Coefficient of restitution: the ratio of colliding objects before and after the collision. This is another way to measure ball bounce.