IMPROVING SPORTS TURF WEAR TOLERANCE

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Wear injury occurs immediately and results from the crushing, tearing, and shearing actions of foot and vehicular traffic, while compaction injury is chronic or long-term. Compaction stress coincides with increased soil bulk density, loss of soil structure, reduced large pore space, poor aeration, reduced oxygen diffusion rates, increased toxic gas build-up, decreased infiltration and percolation rates, and increased variation in soil temperatures.

Wear injury. Turfgrass species and cultivars differ in wear tolerance. Warm season species, like bermudagrass and zoysia-grass are more wear tolerant than cool season species. This general statement holds true as long as the warm season grasses are actively growing. Trafficking dormant turfs results in a significant decline in their turfgrass wear tolerance.

Among the cool-season turfgrass species, perennial ryegrasses and tall fescues have excellent wear tolerance. Annual bluegrass and rough bluegrass have poor wear tolerance characteristics. Perennial ryegrass, tall fescue, bermudagrass, and zoysiagrass produce higher total cell wall contents and are more fibrous than their less wear tolerant counterparts. Select wear tolerant species and cultivars, when starting new turfs or renovating old ones. If uncertain about wear tolerance of species or cultivars, select grasses that have demonstrated vigorous, well-adapted growth and quality performance in your area.

Turfgrass wear tolerance can be influenced through manipulation of cultural practices and their interactions. Turfgrass wear tolerance increases as plant tissue succulence decreases. Turfgrass wear tolerance increases with increasing plant maturity. Cultural practice that influences tissue succulence, maturity or both, influences turfgrass wear tolerance.

Wear tolerance increases with mowing height. Higher mowing heights produce greater verdure than low heights. The greater amount of verdure the greater the cushioning or insulating effect on crowns of intensively trafficked turfs. Turfs receiving frequent, low mowing are less wear tolerant than those turfs being mowed at the higher heights.

Wear tolerance increases with nitrogen nutrition until a critical point is reached. This point is associated with excess nitrogen nutrition that results in lush, succulent plant growth that is more susceptible to wear injury. Management of nitrogen nutrition for wear tolerance is dependent upon meeting the turf's nutritional needs. Excessive nutrition and nutritional deficiencies result in reduced wear tolerance.

Turfgrass wear tolerance increases with increasing potassium nutrition. Studies in Nebraska and Michigan have demonstrated increased turfgrass wear tolerance with increased potassium. Each increment of K between 0 and 8 pounds K/1000 sq/ft/growing season added to the turfgrass wear tolerance. These results were obtained even though soil test indicated high potassium

levels. Potassium treatments must be applied prior to or during the periods of intensive traffic in order to obtain wear tolerance benefits. On sandy growing media, K treatments should be applied in light, frequent applications rather than heavy infrequent ones. This application program ensures a uniform K content and reduces potential loss of K by leaching.

An overall approach to wear tolerance management should include a well-balanced nutrition program that adequately meets the nutritional needs of the turfgrass plant. Recent research results at Nebraska indicate the nitrogen and potassium levels should be maintained near a one-to-one ratio. Phosphorus and other essential nutrients should be applied as needed based on soil test recommendations.

Turfgrass wear tolerance increases with thatch accumulation up to a critical point. This critical point is not specific, but is the point when turfgrass crowns and rhizomes are located primarily in the thatch layer. Some thatch helps to turfgrass resiliency. This resilience results in a cushioning effect that protects the crown from wear injury. This cushioning effect occurs when the crown is located at or near the soil surface, but when crowns are in the thatch, the cushioning effect is lost. Thatch management is a critical part of a wear tolerance management program, particularly when highly wear tolerant species comprise the turf. The characteristics that contribute to wear tolerance (i.e., total cell wall content, verdure production, vigorous growth habit, etc.) also contribute to increased turfgrass thatching tendency.

Compaction Stress. Management of compaction stress is an important component of managment for wear tolerant turfs. Compaction stress weakens the turf, depletes its recuperative rate, decreases its stress tolerance and reduces its wear tolerance.

Cool season turfgrasses differ in their compaction stress tolerance. Compaction stress is low on perennial ryegrass and annual bluegrasss, while tall fescue has only moderate stress tolerance for compaction. These responses are interesting. Tall fescue is very wear tolerant and is often recommended for intensively trafficked turfs, but it often fails in these areas due to lack of compaction stress tolerance. On the other hand, annual bluegrass tolerates compacted soils, but has poor wear injury tolerance.

Core cultivation is an integral part of wear tolerant sports turf management. Intensively used turfs should be core cultivated at least twice yearly (i.e., spring and fall for cool season grasses) , but more frequent corings may be needed on heavily used turfs, like football, soccer and intramural fields. Core cultivation during the playing seaons, using small tines can be effectively used to alleviate compaction stress and enhance surface soil moisture conditions without disrupting play.

An important component of a wear tolerant sports turf managment program is traffic control. Spreading the intensity of traffic over a large area reduces wear injury and compaction stress. Some sports turfs have been designed with adequate size to allow the field boundaries to be manipulated and thus the wear injury can be reduced. Avoid using primary sports turfs for practice. Adequate practice facilities should be maintained, so that practice on the primary facility can be avoided. Golf course superintendents have used traffic control to their benefit for a number of years by cup placement and

movement, and minipulating traffic leaving golf cart paths.

Turfgrass managers can manipulate cultural practices to their advantage for enhanced wear tolerance. A management program that enhances turfgrass wear tolerance, involves proper grass selection, use of appropriate cultural practices, and use of traffic control procedures.