

TURF HEIGHT - "Now You See It — Now You Don't"



by
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As we travel through the East Coast and Mid-Atlantic States diagnosing problems with athletic fields, we are repeatedly confronted with an age old problem — cool season turf grasses suffering from excessively low cutting heights.

For the purpose of this article we shall construe cool season turfgrass species to be predominately Kentucky bluegrass, improved varieties of turf-type ryegrass, and improved varieties of tall fes-

cue. Our reference to excessively low cutting height would be turf grasses that are cut to a height of one (1) inch or less. The title "Now You See It — Now You Don't" refers to our experience with seeing fields with thick and hearty stands of turfgrass in the spring and summer which turn into badly worn and poorly performing fields after only a few games in the fall.

In an attempt to come to grips with the dilemma, we tried to determine why the phenomenon was so widespread and what, if anything, we could do to combat the problem. Height of mowing was noted to be a common problem associated with this condition.

We spoke to many sports turf managers and grounds keepers covering all levels of competition, i.e., professional, colleges, universities, public schools and municipal facilities. We wanted to know what rationale existed for mowing turfgrass at a height of an inch or lower and if they thought maintaining this height was best for the survival of the turf.

Our assumption was that this low height reduced the impact absorption qualities of the turf, reduced the shear or traction qualities, increased compaction ratios, and vastly decreased the wear tolerance and recovery time after competition. In addition, associated with low mowing was a significant reduction in the turfgrass root system. We are pleased to report that none disagreed with these assumptions. All agreed that they would prefer to have the turf maintained at higher levels, but there was little agreement as to the ideal or proper height.

This controversial situation led us to an attempt to determine if there were any standards imposed by formal sanctioning agencies or leagues as regards turf height or the overall quality of a playing field to be determined acceptable for athletic competition. While we were not surprised by our finding, it is lamentable to report that no such standards exist.

Athletic field maintenance and preparation for games is largely guided by an apprenticeship of folklore with most respondents suggesting that it was the coaches who wanted the grass cut "as low as we can get it" and they indicated that all other levels of administration or governance support the coaches position.

Our interest then turned to the coaches in an attempt to determine their reasoning for seeking the lowest cutting heights achievable.

The overwhelming attitude of the coaches was that a higher cut turf would somehow impede the speed of the athletes, (especially fast backs in football) and thus the outcome of the contest. Soccer and field hockey coaches were inordinately concerned with "ball roll" and this is understandable. It was also clear in our observations of many soccer and hockey fields that they would have been better off with a slightly higher turf height, with a thicker and more uniform stand. Clumpiness tended to occur on low cut fields when the grass dissipated due to inability to recover after play. This condition became more pronounced when fields were used in very wet weather after the recovery ability had already been weakened.

It appeared our task was clear; — study the literature to find research to

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support our assumption and to prove that the coaches were wrong in persisting to dictate such low cutting levels.

In speaking with Dr. Donald Waddington, Research Professor in Turfgrass Science, Penn State University, he totally agreed with the need to maintain higher cutting levels for cool season turf grasses for all the reasons previously cited. Dr. Waddington cited research that was performed on turf height and its effect on the speed of the athletes. This research was conducted at California Turf Nurseries in Camarillo, California under the direction of Tobias Grether, President of Cal-Turf, Inc. The actual testing was conducted and the research report written by Juergen Gramckow, an engineering student at Stanford, California.

The study dealt with all the concerns we cited initially. The study attempted to answer the question: What constitutes a good athletic field? They suggested that, "the probable answer would be, an area covered with a self-regenerating plant capable of withstanding wear and affording sufficient traction to athletic shoes. Traditionally, the surface should eliminate mud, dust and dirt, as well as

absorb some of the impact of the falling or tackled player. Traction should be of such a nature as to release cleats before ankle or knee injuries are sustained". In order to conduct their study, they considered four basic physical characteristics of the cover and its associated growth medium. They are as follows:

1. Impact energy adsorption of the surface
2. Shear strength of the grass and growth medium (traction)
3. Wear qualities of the turf grass
4. Total downward displacement of turf and soil upon impact

The study was painstakingly conducted and graphs containing quantitative data were prepared to support the conclusions drawn from all of the testing.

The portion of the study of greatest interest to us was the section on the effect of turf height on the speed of running football players:

Ten (10) high school football players were arbitrarily run twenty (20) times on (20) different tracks over a two day period. The tracks differed in height of cut from three (3) inches to one-half (1/2) inch. Six (6) tracks contained fescue; six

(6) contained bluegrass; and eight (8) contained Bermuda grass. The ten (10) running times for each track were averaged in order to determine the average track speed. No significant difference in time could be attributed to either the height of the stand or the variety of grass contained on the track.

Certainly these data make it abundantly clear that cool-season turf grasses could be cut at higher levels without impeding the speed of athletes. Our recommendation would be to keep Kentucky bluegrass, ryegrass and tall fescue at a height of two (2) to two and one-half (2 1/2) inches for general maintenance with the game heights never lower than one and one-half (1 1/2) inches. A higher level of one and three quarter (1 3/4) or two (2) inches would be even more desirable.

The Grether and Gramckow study further concluded that in order to improve the impact absorption and shear qualities of the field "the turf grass should be held between 1 1/2 to 2 inches and kept moderately moist". It was also obvious in their study on wear tolerance that the

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higher the turf grass the longer it took for testing apparatus to wear it out.

Simply stated, the health and vigour of a turfgrass stand can be measured in the amount of leaf surface exposed, and raising the height of cut increases the amount of leaf surface. More leaf surface also enables the plant to produce more buds, thus providing better recuperative power.

The following pros and cons of clipping practices are reprinted from an article by Dr. Eliot C. Roberts, former Executive Director of the Lawn Institute, Pleasant Hill, Tennessee.

Increase height of cut:

- Generally more leaf area
- More upright, less compact growth habit — more spindly, less tillering, less dense stand
- Greater root growth
- Less rapid regrowth
- More hardy turf
- Within limits more resistant to weed infestation
- Within limits more resistant to insects and disease
- Less costly to maintain through reduced mowing costs

Decrease height of cut:

- Generally less leaf area
- Within limits, less upright, more compact growth habit, less spindly, more tillering, and more dense stand
- At the extreme: thin non-aggressive open stand, subject to injury
- Less photosynthetic capacity
- Less root growth
- Generally more rapid regrowth
- Less hardy turf

- Less resistance to weeds, insects and disease
- More costly to maintain

In drawing conclusions based upon this inquiry we would like to state the following:

1. The height of cut does not impede the running speed of athletes as supported by the results of the Grether-Gramckow study cited herein.
2. There is a direct relationship between the height of cut and the quality of the natural turf playing surfaces.
3. Mowing heights of cool season turfgrasses with the exception of bentgrass below 1 1/2 inches produces a negative impact on the playing surface. Impact absorption, traction (shear strength), wear tolerance, root growth, and survivability are all negatively affected by excessively low cutting.
4. Mowing management is an important and vital consideration in the proper maintenance of natural turf athletic fields.

Finally, we contend that coaches, athletic directors, parents, administrators, ground maintenance supervisors, governing bodies and professional consultants must continue to work individually and collectively to improve the condition of playing fields. We must develop and adopt standards that will enable us to produce a safer and more consistent environment for athletic activities. Simply avoiding excessively low cutting would, in itself, contribute significantly toward improved natural turf playing surfaces.

(This is the text of an address presented by Dr. Caton to the Third Sports Turf Information Day, Dec. 4, 1990).

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