Lower Mowing Heights Don't Influence Player Speed

By Kevin Trotta

Superintendents who feel they're alone in battling low mowing heights can take solace in a recent study of high-school field managers. Athletic field groundskeepers are being pressured by coaches who believe that their athletes can run faster on shorter cut grass to mow turf too low. This leads to scalped fields and damaged turf.

The athletic field is an unusual turfgrass situation. It is subjected to tremendous demands, undreamed of in a residential lawn setting. As explained by Goss and Cook (1993), the field must be able to "withstand intensive traffic under a range of climatic conditions." To support this activity, the field must first be designed and constructed properly (Indyk, 1986). Realistic scheduling of the use of the field is also critical since an irresponsible overuse of living turfgrass will cause it to fail (Goss & Cook, 1993).

Equal in importance to initial development and subsequent scheduling of use is the implementation of sound maintenance programs. A poorly maintained field will be less able to sustain and recuperate from the wear and tear of sports activities. To endure these pressures, turfgrass must be vigorous, dense, and deeply rooted. Proper mowing practices play an integral role in realizing these objectives. Cockerham (1989) noted this relationship: The first and most apparent result of mowing on grass is that some of the photosynthetically active tissue is removed, reducing the plant food-production capability. A direct result of that removal is a reduction in root growth. Indeed, the relationship between mowing and root development was established early on in pioneering turfgrass research.

A 1961 experiment by Deal clearly showed the influence of higher mowing on *Poa pratensis* (Kentucky bluegrass) root quantity. The study compared 2-inch and 1-inch clipping heights and the resulting increase in root mass associated with the higher cut. That investigation, and others like it, contributed to the basic understandings contained in modern textbooks that instruct today's turfgrass students. As explained by Hull (1996), a closely mowed turf will have a less-developed root system and will be less wear tolerant. For the cool-season species used for sports turf, a cutting height above 2 inches will produce more root mass than a height below 2 inches. This root/shoot relationship becomes a critical factor on football fields where stress is the norm, and each management decision requires a careful consideration of consequences. Nowhere is the attention to this detail more important than in the maintenance of school athletic facilities. A poorly developed root system is less able to access the water and nutrients needed for sustenance. This requires additional expenditures for the materials and labor needed to intensify fertilization and irrigation programs. Clearly then, on facilities with limited resources, mistakes made in basic procedures are magnified, becoming not only wasteful but also difficult to rectify and potentially devastating.

Despite its merits, the proposal to raise football field mowing heights is met with resistance from coaches and players. Joe Casarella, the athletic director of the North Rockland Central School District, believes that most coaches are convinced lower heights of cut will enhance the athletes running performance. He also feels that these coaches are unaware that low mowing practices can negatively affect the playing field.

According to a survey of football coaches, "the overwhelming attitude of the coaches was that a higher cut turf would somehow impede the speed of the athletes (especially fast running backs) and thus somehow affect the outcome of the contest" (Caton, 1993). This belief persists despite the lack of data to support it. In their athletic field cooperative extension publication, Goss and Cook (1993) wrote: "Shorter mowing will provide a denser turf and a faster playing surface. Higher mowing will provide a slower surface but increased rooting depth." It is unclear if the authors are referring to running speed or perhaps to ball roll. Canaway and Baker (1993) linked ball roll and mowing height.

It is accepted in the golf world that low-cut heights are vital to playability, and superintendents

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manage turf for low heights. At a different (mowing) level, that holds true in other sports like soccer. Cockerham, Weston, and Kiesling (1995) constructed an apparatus for ball roll measurement in preparation for World Cup Soccer USA. Their device showed an increase in ball roll distance with a decrease in mowing height. However, there is nothing in the literature which links mowing height and foot speed.

Mowing cool-season high school football fields at 2 inches should be a standard, justifiable procedure.

The purpose of this study is to investigate the influence of clipping height on player speed and turfgrass quality on high-school football fields.

In reviewing the literature, two key issues emerge which argue for the enhanced vigor associated with higher mowing on tight-budgeted school football fields. In light of the fact that there is no evidence that lower mowing increases foot speed, these fields should be mowed at 2 inches to promote safer fields of better playing quality and produce more pest-resistant turfgrass stands.

Harper, Morehouse, Waddington, & Buckley (1984) determined that a relationship exists between maintenance factors, surface and vegetative characteristics and field-related injuries in high-school football. A follow-up study demonstrated that greater shear resistance [traction] and lower impact values [more resilient field surface] were related to maintenance practices (Rogers, Waddington, & Harper, 1988). While traction and hardness will influence sport participant perceptions of playing quality (Canaway & Baker, 1993), their greater importance clearly lies in field safety. Those practices, like proper mowing that contributes to improved turf cover, must be encouraged. Sifers and Beard (1996) acknowledged that "many impact-type injuries are related to varying degrees of surface hardness." They also demonstrated that surface hardness is decreased with increasing heights of cut.

With limited budgets, the margin for error narrows, making it all the more important to adhere to sound mowing practices. A 1994 industry profile survey conducted by the Sports Turf Managers Association reported that the average cost per acre for the maintenance of professional sports facilities was $4,333. The figure for school fields was $658 per acre. Player safety, as well as enjoyment, needs to be considered in the efficient, effective and responsible management of school facilities.

An unpublished study by Gramckow (1966) showed no correlation between height of cut and foot speed. Conducted at Cal-Turf Nurseries in Camarillo, Calif., the study investigated characteristics of turfed areas such as impact energy absorption, shear strength and wear tolerance in addition to the clipping height/running speed relationship. Running tests were performed on 100-yard tracks with eight tracks laid out on bermudagrass, six on fescue and six on bluegrass for a total of 20 separate lanes. These lanes were cut at heights ranging from 1 inch to 3 inches in half-inch increments, with two additional lanes on the bermudagrass at one-half inch each.

Ten high school football players were timed in a 100-yard sprint, running once on each track. Randomly selected, the track order was different for each runner. The 10 running times for each track were then averaged. The results showed no significant difference in sprint times. The conclusion was that cutting height had no appreciable affect on running speed.

Considering the location and time elapsed since the California study, it is apparent that further research is needed to verify the important inference that mowing below 2 inches does not enhance athletic performance.

Results and discussion

To test the hypothesis that there would be no difference in running speed on turfgrass mowed at the three different heights, a recent study in New York recorded sprint times of 2,000 high school students and evaluated them to determine whether they were statistically significant.

The stability of individual sprint times is consistent with the hypothesis. There was no statistically significant difference in the comparison. When the subsample of only the 14 football players is examined, the data are equally supportive. The average time (rounded to the nearest tenth) for the 40-yard sprint of 14 high school football players was 5.7 seconds at each clipping height.

The study clearly showed their nearly identical performances in running the 40 yards regardless of mowing height. When the data were examined in this subgroup manner, the cross-country results seemed at first glance to indicate an association between height of cut and foot speed.

The study also showed what appeared to be a gradual improvement in running times as the height was lowered with lane averages of 5.36 seconds at 3 inches, 5.33 seconds at 2 inches and 5.26 seconds at 1 inch.

The significance of these means was tested. The statistical technique reveals that the one-tenth of a second difference in times is of no significance.

What may be worth noting, however, is the fact that 67 percent of the spikeless shoe cross-country runners clocked their best time on the one-inch turf. Considering the fact that only a third of the cleated subjects recorded their best times at this height, as might be expected in a three-lane experiment design, the possible influence of shoe type and traction suggests further study.

Indeed, it is possible that shoe type may have played a role in the origin of the belief in a clipping height/foot-speed correlation.

Conclusion

This study was conducted to determine if lower cutting heights on high-school football fields might be justified by a corresponding enhancement of athletic performance. No such relationship was observed.

Cool-season turfgrasses, like Kentucky bluegrass, grow most of their roots in spring and fall. It is during these times, which coincide with the outdoor school sports season, that cutting height will have its greatest influence on root growth.

The results of this study argue for sensible mowing practices that provide safer fields, promote better quality and produce healthier turf. Therefore, mowing cool-season high school football fields at 2 inches should be a standard, justifiable procedure.

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