USGA Green Section Research

Initial Investigations of Mowing Height And Greens Rolling on Ball Roll of Penncross

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Increased ball speed is one of the greatest demands on the modern golf course superintendent. This is due in part to 1.) the increased popularity of the sport, 2.) increased competition within the sport, 3.) better mowing practices and specialized equipment, and 4.) more precise greens construction specifications. One such cultural practice is the use of rollers to increase ball speed of putting greens. Rolling turf is not new, but renewed interest has resurfaced in the last few years. The claimed benefits of rolling include 1.) increased ball speed, 2.) a truer ball roll, 3.) increased speeds at higher mowing heights, and 4.) consistency of performance from green to green.

With these considerations in mind, a study was devised to investigate the effects of mowing height, rolling, rolling frequency, and intial testing of surface hardness levels of greens as they relate to ball (distance) speed.

The effects of mowing height and rolling on ball speed performance were evaluated on a sand-based USGA "Penncross" putting green. Three tests were conducted addressing mowing height and rolling combinations, frequency of mowing (number of passes), and surface hardness measurements among treatments using a Clegg surface hardness decelerator.

When plots were rolled at one pass (twice per week) ball speed was generally increased by 8-11 percent at higher cut Penncross (11/64 inch). Plots rolled at one pass at low mowing heights (9/64 inch) showed increases in ball speed distances by 5-10 percent. While rolling did improve ball speeds for both mowing heights, rolling at the higher height of cut did not increase ball speed over unrolled low cut turf. Double rolled turf did not produce greater ball speeds than single rolled turf, when double rolling was performed once.

The effects of rolling on enhanced ball speed appear to last 48 hours at most. Surface hardness was positively correlated to ball speed for high cut turf, which received a single rolling event and was strongly negatively correlated when mowed at low height when double rolled.

Test One Results. The roll, low-cut treatment was fastest followed by no-roll, low-cut treatment. Generally there was a ten percent difference between these two treatments. The roll, high-cut treatment was faster than the no-roll, high-cut treatment. The average distance between these two treatments was 15 percent. Roll treatments did have greater speed than non-roll counterparts in all cases.

Test Two Results. Height of cut alone had a greater effect on ball speed than rolling alone. However, rolling did increase ball speeds at each cutting height considerably (6-11 percent).

Test Three Results. Rolling frequency increased surface hardness, more at the low mowing height.

Tolerance of Warm-Season and Alternative Turfgrasses to Salinity

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As fresh water becomes more scarce, increasing use of brackish water sources and sewage effluent for irrigation has resulted in an increasing need for salt-tolerant turfgrasses. Though there are broad differences in salt tolerance among turfgrasses, little is known about how grasses adapt to salinity. Also, there are some alternative grasses which might hold promise for use as turfgrasses in extreme environments. (e.g. high salinity, extreme drought). This project was done to determine the relative salinity tolerances of a broad range of warm-season grasses adapted to Arizona.

Eight species of turfgrasses or turfgrass alternatives were examined for salinity tolerance by growing them in hydroponics culture in a greenhouse. Salinity tolerance decreased in the following order: alkaligrass (*Distichlis spicata*), alkali sacaton (*Sporobolus airoides*), Arizona common bermudagrass (*Cynodon dactylon*), Meyer zoysiagrass (*Zoysia japonica*), sand dropseed (*S. cryptandrus*), Prairie buffalograss (*Buchloe dactyloides*), Haskell sideoats grama (*Bouteloua curtpendula*), and black grama (*B. eriopoda*).

Rooting parameters (depth and weight) were directly associated with salinity tolerance. Root weights increased under salinity in two grasses: alkaligrass and alkali sacaton. Leaf osmotic potential (a measure of the amount of saline ions and other solutes) was highest in the most salt-sensitive grasses, indicating that salt tolerance in turfgrass is associated with salt exclusion from leaves.

Alkaligrass and alkali sacaton are a bit too coarse for many turfgrass scenarios, but make good ground covers and golf course roughs. We are currently selecting strains of alkaligrass that are finer and denser.

Rooting is an important salt tolerance mechanism in these grasses. The more salt tolerant grasses had greater rooting depth and greater total root dry weight under salinity stress. Perhaps this is an evolutionary mechanism to seek out less salty water occurring deep in the soil profile. Finally, in salt-tolerant grasses, osmotic potential was controlled (kept at lower levels) better than in susceptible plants. This means that saline ions were excluded from shoots to a greater degree in salt-tolerant grasses.

Alkaligrass and alkali sacaton are suitable grasses to use as ground covers in extremely saline areas. However, bermudagrass and zoysiagrass can also be successfully grown using poor quality irrigation water under relatively high saline conditions.

Tolerance of Common Bermudagrass To Confront Herbicide

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Alternatives to non-phenoxy type herbides are receiving greater interest among users for control of broadleaf weeds. The commercial product Confront (mixture of triclopyr and clopyralid) was applied to common bermudagrass turf to assess the response to the herbicide. Triclopyr alone, especially in the ester formulation, often affects bermudagrass by producing off-colored turf, slight twisting or spiraling of leaves, and reduced growth. Trimec Classic was included as an industry standard.

Two rates of Confront liquid herbicide, one rate of a granular formulation with fertilizer (Confront-On), and Trimec Classic were applied to common bermudagrass turf. At 11 and 17 days after treatment (DAT), Confront products tended to have slightly higher mean turf color scores than Trimec, although differences were subtle.

Confront-On herbicide had decreased color scores at 7 DAT, perhaps due to the higher rate of active ingredient applied (0.84 lbs. ai/a) or an unknown amount of fertilizer in the carrier. Turfgrass quality was significantly affected by herbicide treatments at 7 and 15 DAT, but not at 21 DAT.

Confront alone at 0.56 lbs. ai/a produced some discoloration, leaf curling and cupping at 7 DAT. By 11 DAT, overall color scores were not significant due to treatments. All treatments showed some marginal discoloration over the check.

By 15 DAT, discoloration was no longer noticeable and turfgrass color and quality was equal or greater to that of the bermudagrass control plots.

By 21 DAT, color differences due to treatments exhibited the greatest effect. Confront at 0.38 lbs. ai/a had the highest mean color score (7.0) followed by the 0.56 lbs. ai/a rate (6.8). Nitrogen in the compounds or regrowth may have increased color response by 21 DAT.