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# Hard summer mowing weakens bentgrass turf

Short grass needs more energy, but produces less.

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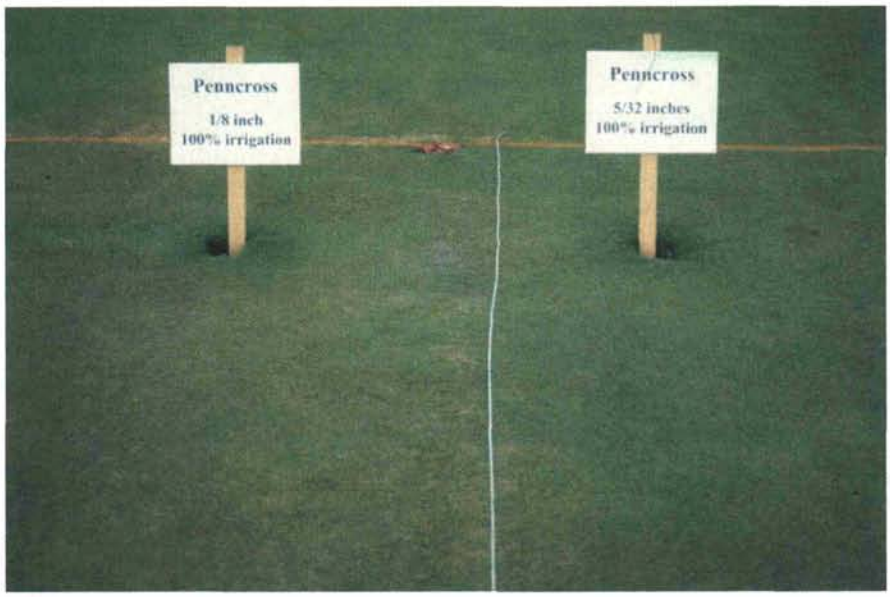



Photo courtesy of Bingru Huang

Turf mowed at 5/32 inch (right) shows less stress at midsummer than turf mowed at 1/8 inch.

## KEY POINTS

- During midsummer, mowing at 1/8 inch saps bentgrass turf's energy by removing leaves where photosynthesis occurs, and, according to this study, increasing turf's energy consumption.
- An extra 1/32 inch in mowing height (5/32 vs. 1/8 inch) is enough to improve bentgrass quality in midsummer.
- Daily watering may be unnecessary to maintain bentgrass quality in summer heat.

Creeping bentgrass (*Agrostis palustris*) grows vigorously when air and soil temperatures are within its preferred range. During July and August, however, when temperatures increase to 90 F or higher, root production slows, many roots die, and the turf canopy may begin to thin and turn brown. Decline in quality of creeping bentgrass during midsummer is a primary concern of golf course superintendents in and south of the transition zone.

Factors contributing to bentgrass decline include high temperatures and humidity, poor soil aeration, restricted air movement, localized dry spots, high soluble salts and disease (1, 3, 7).

Mowing bentgrass at heights less than 5/32 inch or irrigating excessively when temperature and humidity are high can exacerbate turf decline (2, 5, 6). We conducted a field study in 1997 and 1998 to evaluate mowing heights and irrigation frequencies for their effects on summer performance and physiology of Penncross and Crenshaw creeping bentgrass.

Turf growing on a USGA-style green was mowed daily at 1/8 or 5/32 inches, and irrigated daily or every other day to replace water lost since the last irrigation. We monitored bentgrass metabolism by measuring numerous physiological responses to these treatments and also rated turf quality visually.

## Mowing

Regardless of mowing height, bent-

grass quality and photosynthesis declined to the lowest levels in July and August. However, turf mowed at 1/8 inch was more adversely affected than that at 5/32 inch. Beginning in mid-October, bentgrass quality started to recover under both mowing regimes.

Crenshaw and Penncross had lower turf quality and green canopy cover when mowed at 1/8 inch compared with 5/32 inch. Decline in turf quality at the lower mowing height was more severe for Penncross than Crenshaw.

All plants maintain food production (photosynthesis) equal to or greater than respiration (food consumption). When food consumption exceeds production, starvation results and decline is inevitable.

Mowing at 1/8 inch reduced photosynthesis in both cultivars by removing a large amount of leaf surface area. The most interesting and unexpected finding was that mowing at 1/8 inch also caused an increase in respiration. In fact, respiration exceeded photosynthesis in July and August when soil surface temperatures were above 90 F, which could account for the decline in turf quality.

Bentgrass mowed at 5/32 inch maintained a photosynthesis rate greater than its respiration, even during the hottest periods. This resulted in production and retention of additional carbohydrates, which prevented bentgrass starvation and allowed maintenance of shoot and root growth.

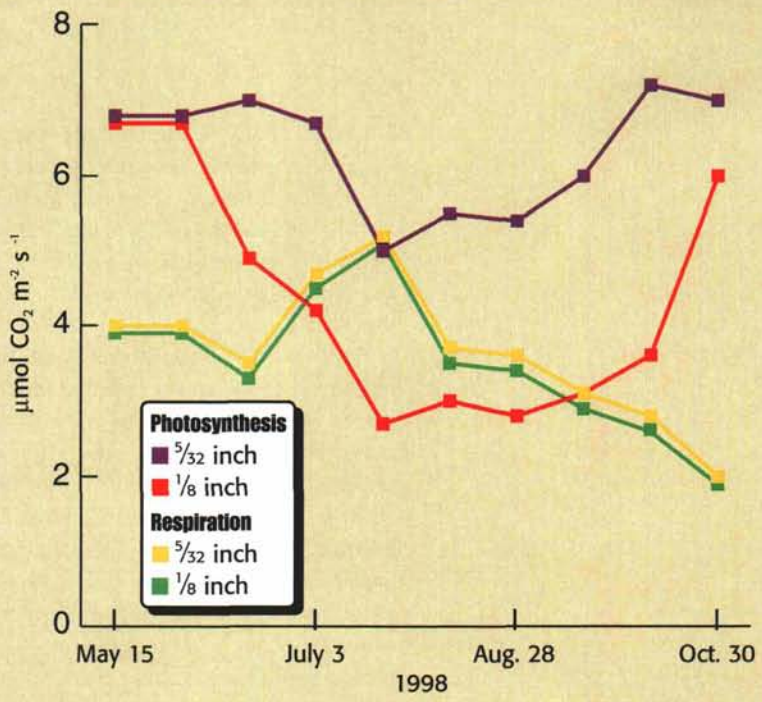
Others have suggested that there is no need to mow bentgrass above 1/8 inch during summer months, claiming that additional leaf tissue retained under higher mowing heights imposes additional stress on roots that supply them with water and nutrients (4). However, our research shows that raising the mowing height by only 1/32 inch during summer can have a significant, positive effect on bentgrass physiology and quality. These results suggest that internal food consumption is much more likely to exceed food production during summer months in Penncross and Crenshaw if mowing height is less than 5/32 inch.

If raising the mowing height is not feasible, reducing respiration rates (perhaps by reducing soil and canopy temperatures or increasing carbohydrate use efficiency) could increase bentgrass survival during summer. In a separate study, we observed that bentgrass maintained its quality when roots were in a soil temperature of 68 F, even while shoots were in 100 F air. Quality was maintained because photosynthesis exceeded respiration.

Overwatering can also contribute to bentgrass decline. Bentgrass growing in wet soils during high temperatures may exhibit leaf yellowing, limited photosynthesis and poor turf quality and root growth (5, 6).

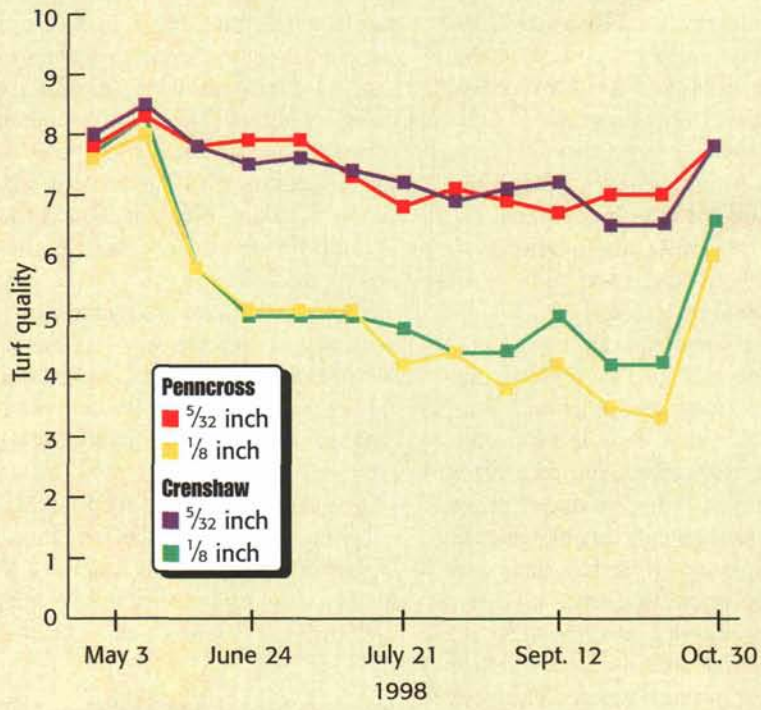
Our studies demonstrated that daily irrigation or alternate-day irrigation to replace 100 percent daily water loss had no effects on turf quality or physiology for either Penncross or Crenshaw.

## Lost energy




In July and August, respiration exceeded photosynthesis in creeping bentgrass mowed at 1/8 inch.

## Lost quality




Turf quality of bentgrass mowed at 1/8 inch is noticeably lower than that of grass mowed at 5/32 inch.

Bentgrass is often watered daily, regardless of prevailing environmental conditions, but watering only on alternate days to replace water lost since the last irrigation was sufficient to maintain quality turf under the conditions of this study.

Preventing bentgrass decline remains a challenge to superintendents where high summer temperatures are common. Mowing at the highest acceptable height in midsummer will allow bentgrass to maintain the needed balance between food production and consumption. Irrigation practices will vary by site, but superintendents should evaluate whether daily midsummer irrigation is needed. ■

**Acknowledgments**

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