

Seasonal Rooting and Mowing Height Effects on 'Penncross' Bentgrass in the Southern United States

Fred Yelverton

Bentgrass root growth is of particular concern to all golf course superintendents. In the warmer climates of the United States, such as in the transition zone, or other areas of the world with climates where bentgrass is marginally adapted, the loss of bentgrass roots during summer months is very important. Any cultural practice, pesticide, or other stress that increases or decreases root growth of bentgrass during periods of stress is extremely important.

Several questions arise regarding bentgrass root growth during the summer. For instance, how much root loss occurs in the summer; how much root loss can occur without loss of foliar density; what temperature will result in bentgrass root loss; and what is the soil temperature when air temperatures are in the 90s?

A study was initiated during 1997 near Pinehurst, North Carolina to answer some of these questions. Of course, some of the answers to the questions above are already known. For instance, when root zone temperatures exceed approximately 75°F (24°C), bentgrass root loss can occur. However, this study was initiated to develop a seasonal bentgrass rooting pattern for 'Penncross' bentgrass under three different mowing heights and also to examine the effects of plant growth regulators (Primo, TGR Turf Enhancer™, and Cutless™) on bentgrass root growth. The effects of plant growth regulators will be discussed in later issues of TurfFax.

This study was initiated from April 1997 to April 1999 on a native soil that was 94% sand and was conducted on a two-year-old stand of 'Penncross' creeping bentgrass (*Agrostis stolonifera*) at the Sandhills Research Station near Pinehurst. Samples for root biomass were collected every month for 2 consecutive years. Root biomass was measured by collecting 2 cores/plot, separating root growth from thatch, washing roots, drying roots, followed by weighing root mass, then ashing the root material to burn off the organic matter, and reweighing the root material. Root weight was determined by the difference in pre-ashing weight and post-ashing weight.

In this study, **maximum root biomass occurred in May** (Figure 1). Root loss started to occur in late May and **by the June measurement date, 35% of the root biomass had already been lost.** Root biomass continued to decline in the summer months, and reached a minimum in September. **From May to September, 'Penncross' creeping bentgrass lost 76% of its root biomass.** Soil probes placed 2 in. (50 mm) below the bentgrass indicated temperatures exceeded 75°F (24°C) in late May and never consistently dropped below 75°F (24°C) until late September.

Root growth was reinitiated in late September and by the October measurement date, root growth increased 39%. Root growth continued to increase through January, although root growth in the autumn never reached the maximum level that was

obtained in the spring. Also of interest was the **root loss that occurred from January to March. During this period, a 15% root loss occurred.** It is unclear why this effect was seen. In this environment, temperatures do not drop low enough to result in cold injury to bentgrass. **However, light intensity can be very poor during this period and may be a more plausible explanation for bentgrass root loss in the winter.**

Also of interest was the effects of mowing heights on 'Penncross' root biomass. Three mowing heights were utilized in this study; 1/8 in., 5/32 in., and 3/16 in. (3.2 mm, 4.0 mm, and 4.8 mm). Figure 2 shows the effects of mowing height on bentgrass root biomass over a 2-year period. **There was no difference in root biomass between the 5/32 in. and 3/16 in. mowing height.** However, **the 1/8 in. mowing height had significantly less root biomass than did the higher mowing heights.** While this effect may or may not apply to other bentgrass cultivars, it is obvious that an 1/8 in. mowing height for 'Penncross' bentgrass in this environment is too low. Although the data are not shown, **bentgrass turf quality was lower for the 1/8 in. mowing height.** This was mainly due to a loss of foliar density from this low mowing height. The loss of foliar density also may have affected bentgrass root biomass.

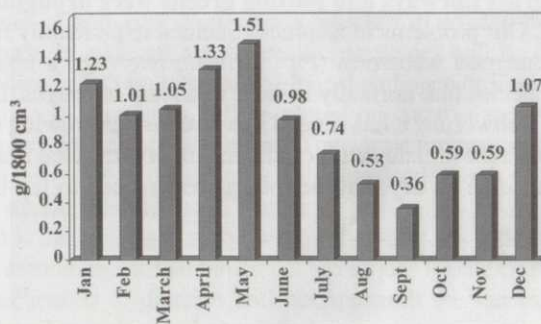


Figure 1. Seasonal Rooting Pattern for Penncross Creeping Bentgrass.

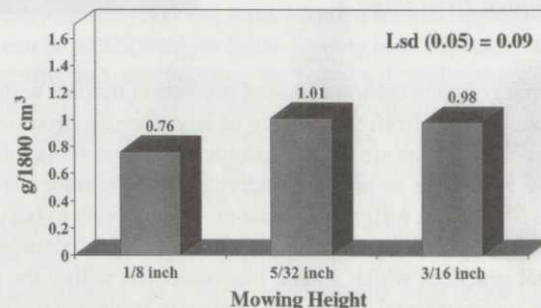


Figure 2. Effects of Mowing Heights on Penncross Creeping Bentgrass Root Biomass.