Turfgrass research review

by Dr. James B. Beard

Effects of cutting and nitrogen levels on bluegrass varieties

Performance of Bluegrass Varieties at Two Cutting Heights and Two Nitrogen Levels.
R. L. Goss and A. G. Law. Agronomy Journal. 59(6):516-518. 1967. (from the Department of Agronomy, Washington State University, Pullman, Wash. 99163).

The game of golf demands a closely mowed, high quality turf, which is achieved through intense fertilization and irrigation. Field investigations were conducted to determine the influence of cutting height (0.5 and 1 inch) and nitrogen fertility level (2.4 and 8 pounds of actual nitrogen per 1,000 square feet a year) on the growth and development of the more erect growing versus the prostrate growing Kentucky bluegrass varieties. Park and Delta Kentucky bluegrasses represented the erect type of growth habit while Newport and Merion plus several experimental selections were of the low growing types. The nitrogen treatments were applied in four equal applications during the growing season with urea being the carrier. The data collected included shoot density, shoot growth and root growth.

A comparison between the varieties utilized in this test indicated that Merion produced the least total quantity of shoot growth. It should be noted that a high quality turf is not necessarily one which has a high rate of shoot growth. In fact, a lower rate of shoot growth would be preferred to reduce the mowing frequency. However, a certain amount of shoot growth is desirable in order for the plant to recover rapidly should an injury occur. Newport, a low growing variety, produced the greatest amount of roots and rhizomes. The erect growing varieties, Park and Delta, produced the least quantity of roots and rhizomes. Merion was intermediate in total root production.

Higher nitrogen levels resulted in increased shoot density and shoot yield, but significantly reduced the quantity of roots produced. The lower cutting height also reduced the quantity of roots produced. In general, the low growing varieties had a higher root-shoot ratio. Also, the lower growing varieties included in this test tended to respond more to higher nitrogen fertility.

Comments: This paper illustrates one of the fundamental principles guiding the culture of turfgrasses. The growth of roots and shoots is closely integrated and can be altered considerably by cultural practices. The roots are dependent on the shoots to provide carbohydrates for growth, while the shoots are dependent primarily on the root system for the absorption of nutrients and water. Both the root and shoot systems require carbohydrates for growth. Under conditions where the quantity of available carbohydrates is less than that required for root and shoot growth, the meristematic growth regions of the shoot which are closest to the photosynthetic tissues assume priority in utilization of the carbohydrates. Thus, shoot growth occurs at the expense of the root system and may even cause dieback of a substantial portion of the turfgrass root system.

Close, frequent mowing or high nitrogen fertility levels will over stimulate shoot growth. Since shoot growth is generally inversely related to root growth, the result is a reduction in the root system. Although a reduced root system is not significant in visual, above ground turfgrass quality, it can be extremely important under adverse conditions caused by turfgrass pests, environmental stress or traffic. A deep root system is not necessary for the maintenance of a high quality turf, but does greatly facilitate and minimize the management problems and costs involved in maintaining a quality turf.