

Comparative Irrigation Requirements of 30 Cultivars of Kentucky Bluegrasses under a Large Rainout Facility in the Transition Zone

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Objectives:

1. Develop a novel method for concurrently comparing irrigation requirements among 30 cultivars of turfgrasses using a large rainout facility at Kansas State University.
2. Produce a database of relative irrigation requirements for 30 cultivars of Kentucky bluegrass.
3. Partition cultivars of Kentucky bluegrasses into irrigation-requirement categories of "high, medium, and low."
4. Conduct dry-down and genetic rooting potential experiments in a greenhouse to evaluate responses to drought and physiological characteristics among the same cultivars as those tested in the field.

Start Date: 2006

Project Duration: two years

Total Funding: \$47,058

Efficient use of irrigation water is becoming more crucial in the U.S. Information is needed about relative irrigation rates among newly-released cultivars of turfgrasses. A large rainout shelter near Manhattan, KS offers a unique opportunity to compare the irrigation requirements of multiple turfgrass cultivars in the stressful climate of the transition zone. By shielding rainfall from the turfgrasses, plots can be irrigated individually on an as-needed basis over a period of several weeks or months to determine the total irrigation requirements among cultivars given similar field conditions.

Twenty-eight cultivars of Kentucky bluegrasses and two Texas bluegrass hybrids were selected for this study based largely on performances in the 2004 NTEP tests. Plots, replicated three times per cultivar, were prepared and seeded under the rainout shelter in September 2006. Plot preparation included cultivation, fumigation, leveling, and insertion of 30-cm deep metal edging around individual plots to prevent lateral movement of water.

Plots will be initially well-watered until June 2007. Thereafter, turfgrasses will be allowed to dry down without irrigation or precipitation until the first sign of wilt. Individual cultivars will be evaluated a minimum of three times per week and plots will be irrigated with approximately one inch of water at the beginning of wilt. Plots will be evaluated daily as drydown commences and during extremely high temperatures (e.g., above 90°F). Each plot will be irrigated manually and irrigation quantity and date for each plot will be recorded. This experiment will

continue through the end of September and thus, will be conducted during both hot and cool months to determine possible interactions among cultivars with changes in atmospheric evaporative demands.

Total irrigation requirements of each cultivar for the entire study period will be summarized. This project will be repeated in 2008 to incorporate further climatic variability into results. General turf performance will be evaluated biweekly by rating turf quality visually. To account for plots that are in different stages of dry-down (e.g., cultivars irrigated on the previous day versus those that have not been irrigated for several days), quality of individual plots will be rated on the day after receiving irrigation.

The same cultivars used in the field study will be evaluated for rooting depth in a greenhouse using root tubes. This involves transplanting plugs of turfgrasses into clear polyethylene root tubes that are filled with fritted clay. Tubes are then inserted into opaque PVC pipe (sleeves). Root growth can be monitored periodically along the side of the clear root tubes. When roots in the first tube reach the bottom of its container, we will initiate a dry-down to evaluate the relative drought resistance among cultivars. Plants will then be rewetted to evaluate recovery. Finally, roots will be harvested, dried in forced-convection ovens, and weighed to compare root biomass among cultivars.

It is anticipated that this research will result in a list of NTEP's best-performing cultivars of Kentucky bluegrasses into categories with high, medium, and



A large rainout shelter at the Rocky Ford Turfgrass Research Plots near Manhattan, KS offers a unique opportunity to compare the irrigation requirements of multiple turfgrass cultivars in the stressful climate of the transition zone

low irrigation requirements. It will provide guidance to turfgrass managers who are interested in cultivars of Kentucky bluegrass that may conserve water without significantly compromising quality, and who may be faced with irrigation restrictions that could impact their turfgrasses. It will also provide information on rooting potential and relative drought resistance among cultivars.

Summary Points

- Twenty-eight cultivars of Kentucky bluegrasses and two Texas bluegrass hybrids were seeded into plots in September 2006 under a large rainout shelter located in the transition zone.
- Individual cultivars will be evaluated in the field from June through September, 2007 and 2008, for their total water use and performances during repeated dry-downs.
- Rooting studies in a greenhouse will evaluate genetic rooting potential of the same 30 cultivars, their performances during drydown, and recoveries after rewetting.
- This research is anticipated to produce a list of NTEP's best-performing cultivars of Kentucky bluegrasses into categories with high, medium, and low irrigation requirements.