

# **Comparative Irrigation Requirements of 30 Cultivars of Kentucky Bluegrass 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 on turfgrasses 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, Kansas 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 turf, 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. Turfgrasses with similar visual qualities but with lower irrigation requirements may offer significant water savings to turfgrass managers.

Twenty-eight cultivars of Kentucky bluegrasses and two Texas bluegrass hybrids were selected for this study from among and within 11 different phenotypic groups, based largely on performances in the 2004 NTEP tests. Plots, replicated three times per cultivar, were pre-

pared 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 were well-watered until early June 2007, after which turfgrasses were allowed to dry down without irrigation or precipitation until the first sign of wilt. Individual cultivars were evaluated daily and irrigated with one inch of water when approximately 50% of the plot area showed visible symptoms of wilt. Each plot was manually irrigated, and irrigation quantity and date was recorded. General turf performance was also evaluated daily by visually rating turf quality.

The total amount of water applied to individual cultivars in the first year varied significantly, and ranged from 8 to 22 inches during the four-month period from June through September. Visual quality also varied substantially among cultivars. When considering both visual quality and water requirements, cultivars in the Compact America and Mid-Atlantic groups performed better (higher quality, lesser water requirements) and "Common" types poorer (lower quality, greater water requirements) among phenotypic groups although there was significant variability even among cultivars within each group.

The same cultivars used in the field study are being evaluated for rooting depth in a greenhouse at Kansas State University using root tubes. Plugs of turfgrasses were transplanted into clear polyethylene root tubes that were

filled with fritted clay. Polyethylene tubes were then inserted into opaque PVC pipe (sleeves). Root growth is being 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-air 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 low irrigation requirements.

## **Summary Points**

- Twenty-eight cultivars of Kentucky bluegrasses and two Texas bluegrass hybrids were established under a large rainout shelter located in the transition zone.

- Individual cultivars were evaluated in the field from June through September, 2007 for their visual quality and total water requirements during repeated dry-downs.

- Cultivars in the Compact America and Mid-Atlantic groups generally performed better (higher quality, lesser water requirements), and "Common" types poorer (lower quality, greater water requirements) among phenotypic groups although there was significant variability even among cultivars within each group.

- This study will be repeated in 2008 to integrate effects of climatic variability and to evaluate cultivars in their second year of establishment.

- Greenhouse rooting studies are underway where genetic rooting potential of the same 30 cultivars, performances during dry-down, recovery after rewetting, and root biomass by depth will be evaluated.



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.