

Evaluation of Perennial Ryegrass, Creeping Bentgrass and Kentucky Bluegrass Cultivars for Salt Tolerance

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Objectives:

1. Evaluate salinity stress tolerance of cultivars of several turfgrass species, including perennial ryegrass, creeping bentgrass, and Kentucky bluegrass using a combination of greenhouse and field screening techniques.
2. Begin studies to understand physiological basis for salt tolerance among these cool-season turfgrass cultivars.
3. Develop cultivar recommendations of salt tolerant cultivars for turfgrass managers.
4. Initiate inheritance studies of salt tolerance.

Start Date: 2007

Project Duration: three years

Total Funding: \$75,000

Water conservation is a necessary and responsible practice especially in high water-using urban landscapes and golf courses. As water conservation efforts increase, the need for identifying turfgrasses with salt tolerance is necessary. The goal of this project is to evaluate and screen commercial cultivars of perennial ryegrass, creeping bentgrass, and Kentucky bluegrass for salt tolerance and initiate inheritance and physiological studies.

Two greenhouse screening runs were conducted on clones from five perennial ryegrass cultivars ('Palmer III', 'Brightstar SLT', 'Nui', 'Paragon GLR', and 'Applaud') at four salinity levels (0, 5, 10, and 15 ds/m). Significant differences were observed between salinity treatments with the highest salinity treatments causing the most injury to perennial ryegrass plants. Significant differences were also observed between clones. Clones of 'Palmer III' exhibited the highest percent green ratings compared to other cultivars.

The first greenhouse screening run of 24 Kentucky bluegrass cultivars was completed in the spring of 2007. Additionally, Sigma Scan was used to quantify the % green ratings taken. The second run of this cultivars study is currently being conducted. The bentgrass cultivar screening study is scheduled for the spring of 2008.

A field study to evaluate cultivars of perennial ryegrass, Kentucky bluegrass and creeping bentgrass was established in the fall of 2006. Twenty-two Kentucky bluegrass cultivars, 22 perennial ryegrass, and 15 bentgrass cultivars were established. They were evaluated for salt tolerance in the summer of 2007 by treating with a salt solution (EC = 10 ds/m) three times per week throughout the summer.

Cultivars such as 'Bewitched', 'Langara', 'Bedazzled', 'Jefferson', and 'Diva' exhibited the highest percent green ratings under field conditions. 'Julia' and 'Cabernet' were among the most sensitive cultivars. This evaluation will also be conducted in 2008. This past summer was a wet season which caused leaching of the salt solution and lack of build-up of saline conditions in the soil. For this reason, there were no significant differences

between bentgrass and ryegrass cultivars. These will be re-evaluated in 2008 and most likely be continued through 2009. Physiological measurements including electrolyte leakage, chlorophyll content, and florescence are being taken on a selection of Kentucky bluegrass cultivars to determine the effects of salt stress.

One hundred and fifty clones of perennial ryegrass were established in a randomized complete block design with 12 replications. Six replications received a salt solution (EC = 10 ds/m) applied over top of the plants to simulate irrigation on a golf course. The other six replicates received fresh water. Percent green ratings were taken as an evaluation of salt tolerance.

Broad-sense heritability estimates were calculated using variance components of the Mixed Procedure using Restricted Maximum Likelihood (REML) in SAS. Broad-sense heritability was estimated to be 0.78. This indicates that a large proportion of the variation could be contributed to genetic effects but that there was also some effects of the environment.

Summary Points

- Significant differences were observed in five perennial ryegrass cultivars treated with 4 different salinity levels (0, 5, 10, and 15 ds/m).
- Clones of 'Palmer III' exhibited greater percent green ratings compared to other cultivars.
- Twenty-two Kentucky bluegrass cultivars, 22 perennial ryegrass cultivars, and 15 bentgrass cultivars were established in a field trial in the fall of 2006 to evaluate for salinity tolerance under field conditions.
- Initial broad-sense heritability of salinity tolerance in perennial ryegrass was estimated to be 0.78 from replicated clones.



Salt injury on perennial ryegrass clones evaluated under field conditions