

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 cultivars for salt tolerance and initiate inheritance and physiological studies. A greenhouse and a field screening technique for salt tolerance developed at Rutgers will be compared for their ability to evaluate salt tolerance in cool-season turfgrasses.

Cultivars of perennial ryegrass, creeping bentgrass, and Kentucky bluegrass are being tested under both greenhouse and field conditions. Two greenhouse screening runs were conducted on clones from five perennial ryegrass cultivars 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.

Two greenhouse screening runs were conducted on 21 Kentucky bluegrass cultivars at four salinity levels (0, 3, 6, and 9 dS/m). The cultivars exhibiting the highest percent green ratings were 'Eagleton', 'Liberator', and 'Cabernet'. The cultivars and selections with the lowest percent green were a Texas x Kentucky bluegrass selection, A03TB-246, 'Baron', and the Kentucky bluegrass selection A03-84.

One greenhouse run was conduct-



Salt injury on cool season turfgrasses evaluated under field conditions.

ed on clones from eight bentgrass cultivars at four salinity levels (0, 3, 6, and 9 dS/m). The second run is scheduled for the spring of 2009.

A field study to evaluate cultivars of perennial ryegrass, Kentucky bluegrass, and creeping bentgrass was established in the fall of 2006. Twenty-one Kentucky bluegrass cultivars, 22 perennial ryegrass cultivars, and 15 bentgrass cultivars were established. They were evaluated for salt tolerance in the summer of 2007 and 2008 by treating with a salt solution (EC=10 dS/m) three times per week throughout the summer.

By the end of the season in 2007, the soil EC reached levels above 3 dS/m which caused significant stress on the turfgrass plants. Significant differences were observed among cultivars and selections under field conditions. 'Bewitched', the experimental selection, A03-84, 'Langara', 'Bedazzled', 'Jefferson', 'Diva', P105, 'Rhythm', and 'Liberator' had the highest percent green leaf tissue under these conditions while 'Julia' had the least.

The field results were not strongly correlated to greenhouse salt chamber results. We hope to identify the critical

factors influencing salinity tolerance under field conditions in order to develop efficient selection techniques for improving salinity tolerance in cool-season turfgrasses. Clones of perennial ryegrass were established in the fall of 2007 and treated with a salt solution with an EC of 10 dS/m. Initial broad-sense heritability was estimated to be 0.78, indicating a large proportion of the variation could be contributed to genetic effects. Narrow-sense heritability studies have also been established and will be calculated after the data has been analyzed.

Summary Points

- Significant differences were observed in five perennial ryegrass cultivars treated with 4 different salinity levels (0, 5, 10, and 15 dS/m) under greenhouse conditions.
- Clones of 'Palmer III' exhibited the percent green ratings compared to other cultivars.
- Significant differences were observed in 21 Kentucky bluegrass cultivars treated with 4 different salinity levels (0, 3, 6, and 9 dS/m) under greenhouse conditions. The cultivars exhibiting the highest percent green ratings were 'Eagleton', 'Liberator', and 'Cabernet'. The cultivars and selections with the lowest percent green were a Texas x Kentucky bluegrass selection, A03TB-246, 'Baron' and the Kentucky bluegrass selection A03-84.
- Twenty-one 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. Data was collected in 2007, 2008, and will continue through 2009.
- Initial broad-sense heritability of salinity tolerance in perennial ryegrass was estimated to be 0.78 from replicated clones.