

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

The identification of turfgrass cultivars that can tolerate irrigation with alternative water sources while maintaining safe, acceptable quality would result in a community and industry more accepting of voluntarily utilization of alternative water sources. Cultivars of perennial ryegrass, creeping bentgrass, and Kentucky bluegrass are being tested under both greenhouse and field conditions. This research will provide recommendations to golf course superintendents regarding salt tolerant cultivars, advance turfgrass breeding and genetics, as well as help conserve our natural resources.

Two greenhouse screening runs were conducted on clones from five perennial ryegrass cultivars at four salinity levels (1, 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. 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 (1, 6, 9, and 12 dS/m). The cultivars exhibiting the highest percent green ratings were 'Eagleton', 'Liberator', and 'Cabernet' and 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.

Two greenhouse screening runs were conducted on clones from eight bentgrass cultivars at four salinity levels (1, 4, 8, and 12 dS/m). Unlike perennial ryegrass and Kentucky bluegrass, individ-



Cool-season turfgrasses were evaluated for salt tolerance by treating them with a salt solution three times per week through the growing seasons of 2007, 2008, and 2009.

ual clones of bentgrass cultivars responded variably to salinity stress. In all greenhouse runs for all cool-season turfgrass species, there were significant differences between salinity treatments with higher salinity treatments causing more injury to turfgrass plants. Additionally, percent green ratings were highly correlated to clipping yields, root weights, and shoot weights for all species.

Twenty-one Kentucky bluegrass cultivars, 22 perennial ryegrass cultivars, and 15 bentgrass cultivars were established in the fall of 2006 and spring of 2008. They were evaluated for salt tolerance in the summer of 2007, 2008, and 2009 by treating with a salt solution (EC = 10 ds/m) three times per week throughout the growing season of each year. Significant differences were observed among cultivars and selections for all species under field conditions. Field results were significantly correlated to greenhouse salt chamber results.

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 and indicates that a large proportion of the variation could be contributed to genetic effects.

Summary Points

- Significant differences were observed in clones of five perennial ryegrass cultivars treated with 4 different salinity levels (1, 5, 10, and 15 dS/m) under greenhouse conditions.
- Four clones of 'Palmer III' and one clone of 'Applaud' exhibited the highest percent green ratings compared to clones of 'Paragon GLR', 'Brightstar SLT', and 'Nui'.
- Significant differences were observed in 21 Kentucky bluegrass cultivars treated with 4 different salinity levels (1, 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.
- In all greenhouse runs for all cool-season turfgrass species, there were significant differences between salinity treatments with higher salinity treatments causing more injury to turfgrass plants. Percent green ratings were highly correlated to clipping yields, root weights, and shoot weights for all species.
- Significant differences were observed among cultivars and selections for all species under field conditions.
- Results were significantly correlated to greenhouse salt chamber results and indicate that we may use the greenhouse screening technique to select cultivars with improved salinity tolerance that will also exhibit similar field responses.
- Initial broad-sense heritability of salinity tolerance in perennial ryegrass was estimated to be 0.78.