Breeding Turf-type Annual Ryegrass for Salinity Tolerance

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Objectives:

1. To identify improved salt-tolerant genotypes and introgress the tolerance into adapted turf-type genotypes of annual ryegrass and increase seed of these populations for experimental testing.
2. To select plants of turf-type annual ryegrass which are infected with a fungal endophyte and determine if presence of the endophyte provides this population with increased tolerance to high salt concentrations.
3. To test the experimental lines of annual ryegrass under high salinity growing conditions in hydroponic and field conditions and release the line as a salt-tolerant variety.

Start Date: 2008
Project Duration: three years
Total Funding: $88,276

Research findings from this project are a continuation of earlier research from past years. Screening germplasm and cultivars for salt tolerance is an important aspect of the ryegrass turf breeding program in Texas. Results indicate a good correlation between field screening and greenhouse screening. Methods studied were planting seed in the field in a high salinity soil and irrigating with high salinity water at Pecos, Texas.

Each entry was planted in 5 ft rows at a seeding rate of 2 g/5 ft. Plants were grown in sand in cone-tainers (4-cm wide and 20-cm tall) which were placed in a salt tank where salt concentration was gradually increased over time. Plants were immersed every 3 to 4 days in salt water. Seed were planted in rows in sand in flats on December 14, 2007. The first immersion (4000 ppm salt water, or 6.4 dS m^{-1}) of flats occurred on January 25 when plants were in 3-leaf stage. Thereafter, salt water concentration was gradually increased as flats were immersed for 2 minutes every 3 days.

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Each entry was rated on several dates on a 1 to 9 scale, where 9 = dead plants. Results from the first year of experimentation indicated that the field trial and the greenhouse immersion technique are correlated and are a good indication of salinity tolerance of genotypes tested.

We will continue to screen genotypes using both of these techniques in the future. We will also screen segregating populations for salt tolerance with the goal of developing and releasing a salt-tolerant cultivar in the future. We will also increase seed from the latest and hopefully salt-tolerant populations for further testing.

Screening germplasm and cultivars for salt tolerance is an important aspect of the ryegrass turf breeding program in Texas. Results indicate a good correlation between field screening and greenhouse screening.

Summary Points

- Field and greenhouse screening of genotypes for salinity tolerance ratings were correlated.
- A greenhouse screening technique where plants in flats were immersed in salt water for 2 minutes every 3 days holds promise for future research.