**Introduction**

Cool season turfgrasses have necessary functions in the landscape, but are associated with excessive water use. Cities have begun to reuse water for outdoor purposes as a response to a shrinking water supply, this ‘effluent’ water has higher salt content. This high salt content puts turfgrasses under increased stress. The focus of our research is to investigate the involvement of two genes in salt tolerance among turfgrass species: an H-type thioredoxin (Trx) that reduces oxidative damage within salt stressed cells, and a vacuolar (v-type) ATPase subunit that transports +H ions across the vacuole membrane to maintain osmotic potential under higher salt conditions.

In this experiment we test if the gene expression of these two genes is higher in tolerant turf species and cultivars vs. susceptible species and cultivars under salt stress.

**Methods**

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>CULTIVAR</th>
<th>SALT TOLERANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poa pratensis (Kentucky bluegrass)</td>
<td>Midnight</td>
<td>Susceptible</td>
</tr>
<tr>
<td></td>
<td>p603</td>
<td>Tolerant</td>
</tr>
<tr>
<td>Lolium perenne (Perennial ryegrass)</td>
<td>Linn</td>
<td>Susceptible</td>
</tr>
<tr>
<td></td>
<td>SR4600</td>
<td>Tolerant</td>
</tr>
<tr>
<td>Puccinellia distans (Alkaligrass)</td>
<td>Fultz</td>
<td>Tolerant (check)</td>
</tr>
</tbody>
</table>

**The treatments:** 9 dS/m was applied for salt stress, and 1 dS/m for control. Both solutions contained appropriate fertilizer with micronutrients included. Plants were irrigated with either these treatments over a 4-week period in September 2014. Soil type was a sandy golf-course green. The experiment was a 4-rep split plot design.

**Results**

**V-type ATPase**

After 4 weeks of treatment, plant cores were harvested, quickly washed (<30 seconds), shoot were separated and flash frozen in liquid nitrogen.

**H-type Thioredoxin**

RNA was extracted using the Zymo RNA extraction kit.

**Conclusions**

The primers for both genes amplified across three species with similar amplification efficiencies.

There were no species differences in gene expression.

The most susceptible sample, Kentucky bluegrass cv. Midnight, showed decreases in expression of both genes under salt stress.

The anti-oxidant gene Thioredoxin was somewhat upregulated in all other samples, consistent with predicted response to salt stress.

**Future Studies**

1) Expand tests to other cultivars to see if the gene expression profiles are ubiquitous.

2) Test similar genes. There are other vacuolar-type ATPase subunits, and Thioredoxins are also part of a large gene family.

3) Make salt-tolerant x elite hybridizations and begin to improve current elite turfgrass cultivars using marker assisted selection.

**References**
