

Tall Fescue Salinity Germination Study

How is the germination of tall fescue cultivars affected by differing levels of saline water used for irrigation.

MATERIALS AND METHODS

Forty-four tall fescue cultivars and experimentals were surveyed for germination under saline conditions. This study was conducted to evaluate differences in ability to germinate in high salt environments. Total germination and germination rate were measured under three different treatments: a highly saline treatment (15,750 ppm), a moderately saline treatment (10,500 ppm) and a distilled water treatment (0 ppm).

Fifty seeds from each entry were germinated in each of three treatments. Round germination paper discs were placed in petri dishes and saturated with one of three solutions; distilled water, moderately saline water (10,500 ppm, $\approx 30\%$ sea water), or highly saline water (15,750 ppm, $\approx 45\%$ sea water). Water salinization was achieved by adding Instant Ocean Aquarium Sea Salt Mixture (United Pet Group, Blacksburg, VA 24060) to distilled water until desired concentration was reached.

Germination paper was saturated in the dishes and excess water was decanted off. Fifty seeds were selected that had adequate seed fill from each variety were placed onto the saturated germination paper. Each dish contained one variety and one treatment for a total of forty-one dishes for each of the three treatments. Following seed placement the lid was placed on the dish and sealed with parafilm. Dishes containing seeds were placed under 24-hour light regiment supplemented with fluorescent lights at night. Germination scoring was conducted daily by counting the number of seeds that had germinated. Germination was considered to have occurred when the coleoptile had extended at least 1mm. Once a variety had no new seeds germinate for three consecutive days that variety was considered fully germinated and was not counted further. The experiment was conducted in two separate but identical runs.

RESULTS AND DISCUSSION

Saline water slows germination rate when compared to distilled water. Combined analysis of all entries in this study showed that at 8 days after seeding over 80% of seeds in the distilled water treatment had germinated. It took 12 days and 19 days for germination to reach this level in the moderately saline and highly saline treatments, respectively. In addition to slowing germination rate, saline water also affected the total germination at high levels. As a whole, pooled total germination for all entries in the study was significantly higher in the distilled treatment, at 91%, than in the highly saline treatment which only reached 80% (Figure 1).

Varietal differences in germination rate as well as total germination under saline conditions were also observed. Nine days after seeding, varieties such as Black Tie and Firecracker SLS, and Titanium showed very little difference between the distilled and moderately saline treatments, suggesting that these varieties likely exhibit increased salinity tolerance. Similarly, twelve days after planting, these three varieties exhibited the smallest differences between

germination in the control and the moderately saline treatments. These findings further support the presence of improved genetic salinity tolerance in these varieties.

Varietal differences in germination rate and total germination were also present in distilled water treatment. Differences here were likely a result of older seed. In order to account for these differences, care should be taken to compare germination in the distilled water treatment to germination in the salt treatment.

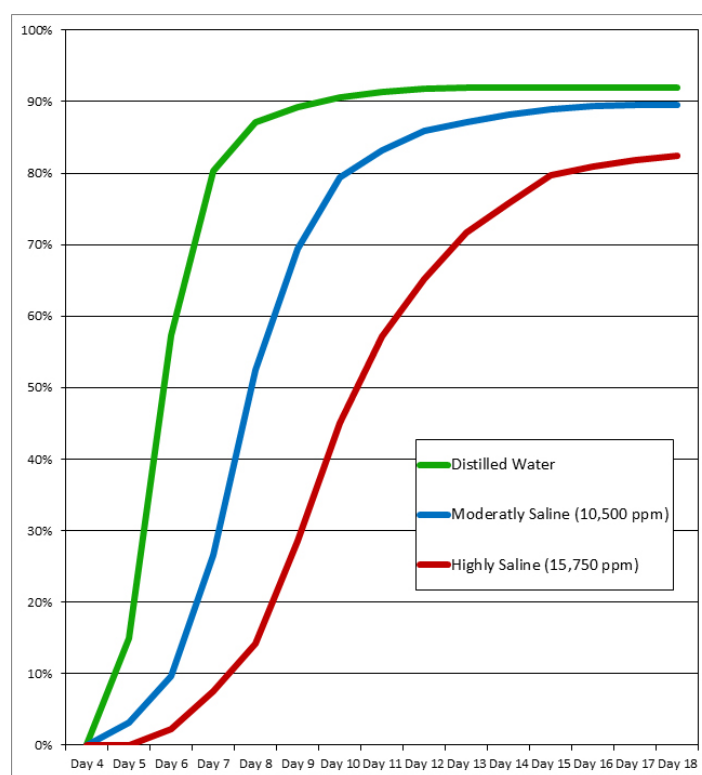


FIGURE 1: Pooled germination over time under three different treatments

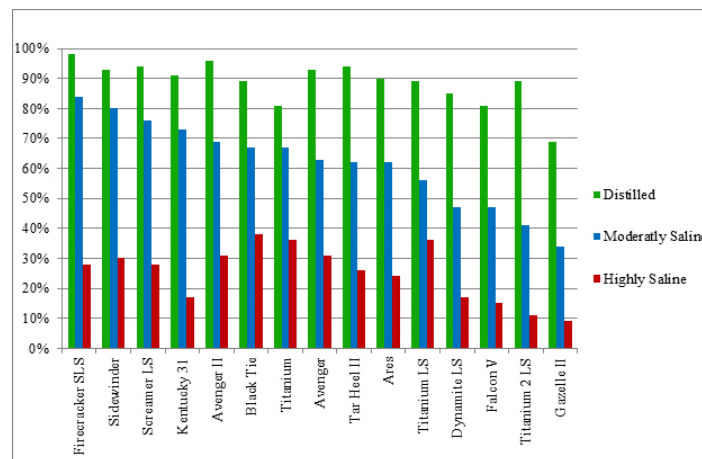


FIGURE 2: Germination among named varieties under three different treatments nine days after planting.

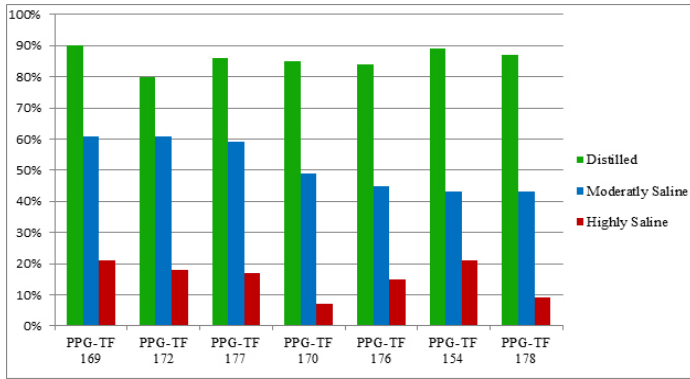


FIGURE 3: Germination among experimentals under three different treatments nine days after planting.

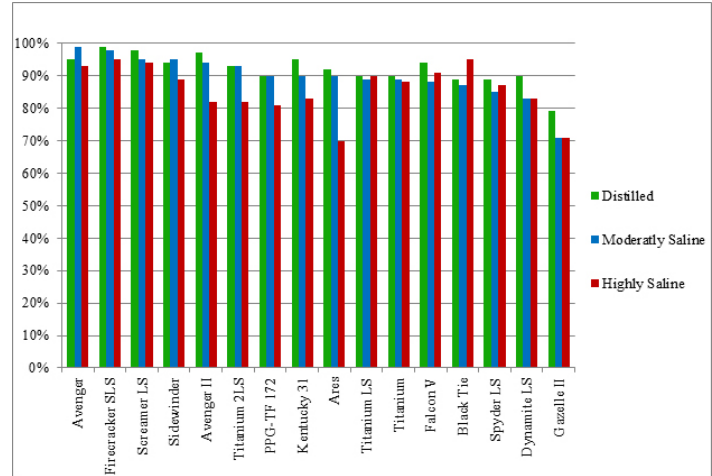


FIGURE 6: Total germination among named varieties under three different treatments.

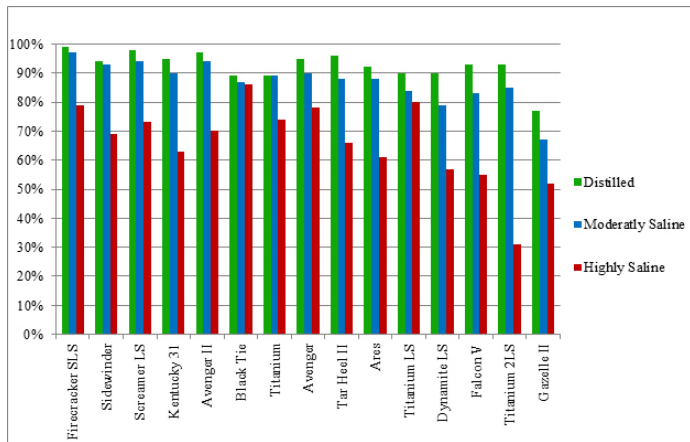


FIGURE 4: Germination among named varieties under three different treatments twelve days after planting.

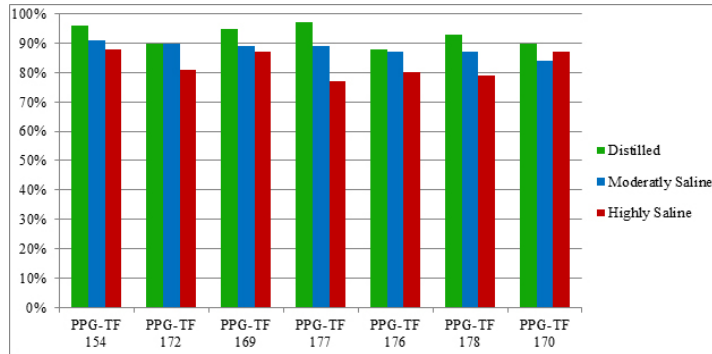


FIGURE 7: Total germination among experimentals under three different treatments.

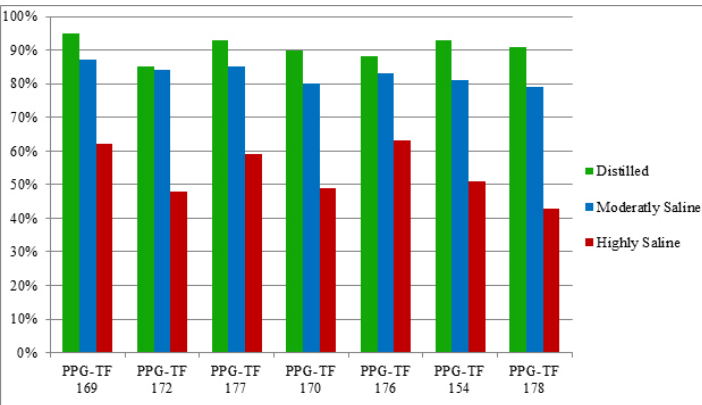
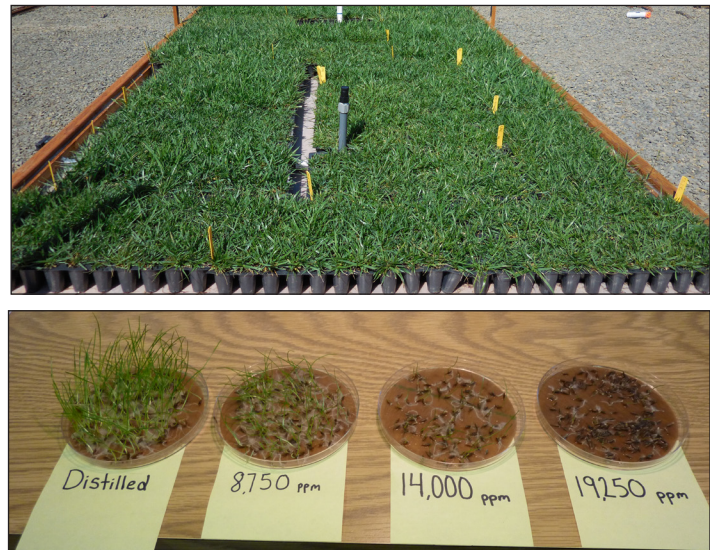


FIGURE 5: Germination among named experimentals under three different treatments twelve days after planting.

Photos at right: (Top) Tall fescue varieties under saline irrigation. (Bottom) Germination results of a single variety at different salinity levels 14 days after seeding.



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