

Foliar Nitrogen Use Efficiency of Warm-Season Putting Green Turf under Salinity Stress

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Objectives:

Evaluate three ultradwarf bermudagrasses (*Cynodon dactylon* (L.) Pers. X *C. transvaalensis* Burt-Davy) ‘Champion’, ‘Mini-Verde’, ‘Tif-Eagle’, ‘Seadwarf’ seashore paspalum (*Paspalum vaginatum* Swartz.), and ‘Diamond’ zoysiagrass (*Zoysia matrella* (L.) Merr.) under salinity stress with two nitrogen fertility regimes and foliar and root applied N.

Start Date: 2011

Project Duration: 2 years

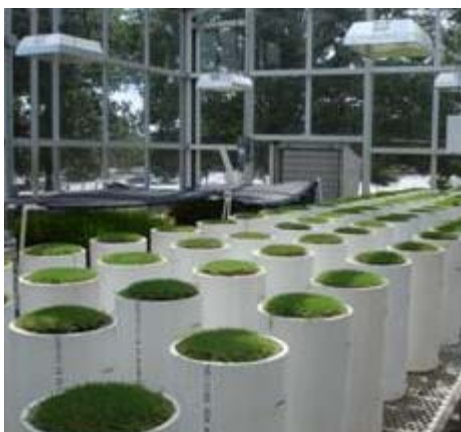
Total Funding: \$6,000

Salinity stress is a widespread turfgrass management problem in coastal areas and environments where water use restrictions are common. However, little is known about salinity stress and how it affects foliar and root fertilization of turfgrasses.

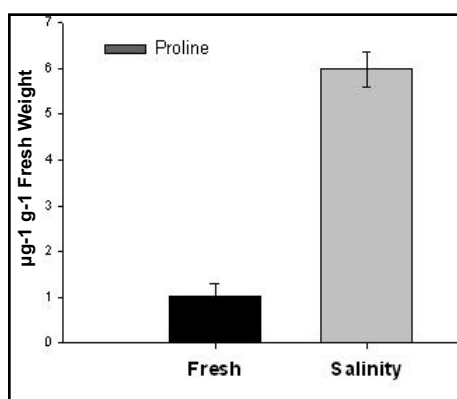
A two-year study was conducted in the greenhouse facilities at Clemson University. The objective was to evaluate three ultradwarf bermudagrasses (*Cynodon dactylon* (L.) Pers. X *C. transvaalensis* Burt-Davy) ‘Champion’, ‘Mini-Verde’, ‘Tif-Eagle’, ‘Seadwarf’ seashore paspalum (*Paspalum vaginatum* Swartz.), and ‘Diamond’ zoysiagrass (*Zoysia matrella* (L.) Merr.) under salinity stress with two nitrogen fertility regimes.

Foliar and root applications of urea-N at 9.76 kg ha⁻¹ were applied weekly for 12 weeks. Two salinity levels (0 and 8,000 ppm NaCl) were applied every 48 hours to replenish ET losses. Parameters measured included turf quality, tissue nutrient content, proline accumulation, and electrolyte leakage.

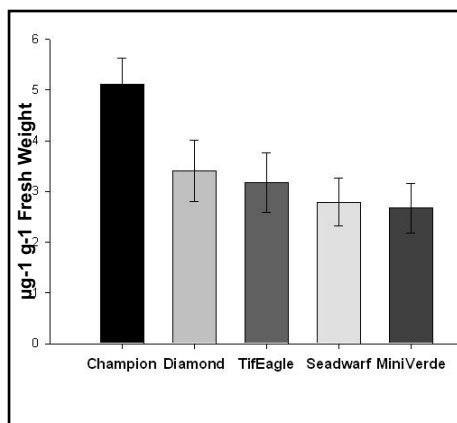
Saline irrigation significantly reduced N, P, and K concentrations in leaf



A two-year study was conducted in the greenhouse facilities at Clemson University.



Overall proline accumulation of turfgrasses grown under non-saline (fresh) versus saline (8,000 ppm NaCl) irrigation conditions.



Proline accumulation of turfgrasses irrigated under saline (8,000 ppm NaCl) irrigation conditions.



Relative electrolyte leakage of turfgrasses grown in non-saline (fresh) and saline (8,000 ppm NaCl) irrigation conditions.



‘Champion’ ultradwarf bermudagrass maintained under non-saline (left) and saline (right) conditions of 8,000 ppm NaCl.

tissues at the conclusion of both years. Under salinity stress, ‘Seadwarf’ seashore paspalum exhibited significantly higher N, P, and Na concentrations in leaf tissues under foliar applications of urea. Tissue K concentrations in ‘Champion’ were reduced in the greatest amount by saline irrigation at 6 and 12 weeks in both years of the study.

By the conclusion of the study, all turfgrasses exhibited significantly higher levels of proline under salinity stress, with ‘Champion’ displaying the greatest increase in accumulation from > 1 µg /g FW under fresh water irrigation to over 9 µg /g FW.

Summary Points

- Turf quality and macronutrient concentration were significantly decreased by salinity stress.
- Fertility regimes of foliar or root applied N had no effect on macronutrient concentration of leaf tissue.
- Root applications of urea nitrogen significantly increased sodium concentration in leaf tissue at the conclusion of the study.
- Salinity stress significantly increased overall electrolyte leakage and proline accumulation.
- ‘Champion’ exhibited significantly higher proline in leaf tissue than all other species tested at the conclusion of the study.
- The correlation of Na content and proline accumulation illustrates the plant response to salinity stress.