Plant Growth Regulator and Soil Surfactant Effects on Drought and Salinity Stressed Bermudagrass and Seashore Paspalum

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Objectives:

1. *Study the effect of a plant growth regulator (PGR) and a wetting agent on turf quality, fall color retention, and spring green–up of Princess 77 bermudagrass and Sea Spray seashore paspalum irrigated with either saline or potable water*
2. *Determine the effect of wetting agents on turf quality and soil moisture distribution in turfgrass rootzones irrigated with either potable or saline water from either a drip or a sprinkler system*

As part of a comprehensive effort to conserve potable water, strategies to reduce or eliminate potable water for golf course irrigation are considered and implemented. First, replacing potable water entirely with recycled or low quality ground water unfit for human consumption would have the largest impact of all measures in reducing potable water used for irrigation. Second, turfgrasses that are adapted to local climates and can survive on less water than traditional turfgrasses can be used. Third, using chemicals such as soil surfactants or plant growth regulators that assist in increasing irrigation efficiency and in lowering evapotranspiration rates (ET) can help in reducing the amounts of water necessary to maintain adequate turf quality.

A study is under way at New Mexico State University´s Turfgrass Salinity Research Center in Las Cruces, NM (USDA Plant Hardiness Zone 8b) to investigate the effect of Revolution soil surfactant and Primo Maxx plant growth regulator on performance of drought stressed bermudagrass (*Cynodon dactylon* cv. ´Princess 77´) and seashore paspalum (*Paspalum vaginatum* cv. ´Sea Spray´). Irrigated blocks measured 20 feet by 20 feet and were watered from either Toro Precision™ Series Rotating Nozzles (PRN–TA) or from a TORO DL 2000 subsurface drip system with either potable (EC = 0.6 dS m^{-1}, SAR 1.9) or saline ground water (EC = 2.3 dS m^{-1}, SAR = 5.6). During summer and early fall of 2011 plots were treated monthly with either Revolution (6 fl oz/1000 ft^2) or trinexapac–ethyl (0.3 fl oz/1000 ft^2). A control plot received water only. In order to subject the plants to drought stress irrigation was applied at 50% ET_0. Nine soil moisture readings per plot were taken monthly by means of a Time Domain Reflectometer (TDR) (Fieldscout TDR300, Spectrum Technologies, Inc) 24 hours after an irrigation event. Normalized Difference Vegetation Index (NDVI) readings were collected monthly to substantiate visual quality ratings by means of a Greenseeker. Visual ratings on a scale from 1 (worst) to 9 (best) were collected and photographs were taken biweekly during Summer and Fall.

Analysis of soil moisture data revealed that Revolution soil surfactant improved water distribution uniformity (lower standard deviation values) compared

Figure 1. The effect of Revolution soil surfactant and Primo Maxx plant growth regulator on the performance of drought stressed Princess 77 bermudagrass and Sea Spray paspalum.

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to the untreated control for both irrigation systems and water qualities. Soil moisture uniformity was greater on plots irrigated from sprinklers and on plots irrigated with saline water compared to plots irrigated from a subsurface drip system or plots watered with potable water, respectively.

Bermudagrass irrigated with potable water and treated with trinexapac–ethyl performed best during the summer months and exhibited an average quality rating of 7.1 (Figure 2), followed by seashore paspalum irrigated either with potable (6.8) or saline (6.6) water and bermudagrass irrigated with saline water (6.6). Revolution increased turf quality only on bermudagrass irrigated with saline water but had no effect on seashore paspalum. Sprinkler irrigated plots showed greater quality (6.4) compared to drip irrigated plots (6.0). Dark Green Color Index (DGCI) did not differ between treatments, but plots treated with Primo showed greater NDVI compared to the other treatments.

Generally, water quality did not affect fall color retention. Plots treated with trinexapac–ethyl showed darker green color in November than those treated with Revolution or the untreated control. Seashore paspalum irrigated from the subsurface drip system had greater fall color retention than sprinkler irrigated. Also, seashore paspalum showed greater fall color retention than bermudagrass regardless of the irrigation system or water quality.

Summary

- Revolution soil surfactant improved soil moisture distribution but did not affect turf quality.
- Primo Maxx improved turf quality and fall color retention of drought stressed warm–season turfgrasses.
- Sprinkler irrigated plots showed greater turf quality and greater soil moisture distribution than drip irrigated. However, pop–up sprinklers for this project were spaced uniformly 15 feet apart on square plots which allowed for a highly uniform irrigation pattern.

Figure 2. Bermudagrass irrigated with potable water and treated with Primo Maxx performed best during summer months followed by seashore paspalum irrigated either with potable or saline water and bermudagrass irrigated with saline water.

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