Tailored Water Effect on Turfgrass Establishment

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Effluent water is rapidly becoming a "valuable resource" for turfgrass managers. Across the Southwest as a whole, more than 40% of all golf courses receive treated effluent water. As communities grow in size, the amount of reusable water generated increased (Devitt et al., 2007). [1] Using reuse water for irrigation is an environmentally preferred alternative to discharging such waters back into rivers and lakes.

The research conducted this summer examined the effects of tailored water on the establishment of bermudagrass (*Cynodon dactylon* L.) variety Princess 77 and buffalograss (*Bouteloua dactyloides*). Besides looking at the effects of tailored versus potable irrigation water, the type of propagation was also investigated (seeded or sodded). Tailored water is defined as treated effluent with a nitrate level of 15 mg l^{-1}. This is higher than the EPA's (Environmental Protection Agency) recommended threshold of 10 mg l^{-1}. Both bermudagrass and buffalograss are drought-resistant, heat and salinity tolerant warm-season turfgrasses. Buffalograss was added to the study, due to the general big push to use more native turfgrasses. The goals of this experiment were to determine if tailored water can be used to establish turf from either seed or sod and thus decrease the current strain on potable irrigated water.

One of the reasons why tailored or effluent water has not been used in the establishment process of turfgrasses is because of fear of ground water contamination. Without established grass plants roots cannot take up the nitrate added and will thus leach out into the ground water.

The study was conducted inside a greenhouse in order to provide a controlled environment free of variables such as precipitation and large temperature changes. Twenty-four 5 gallon buckets had holes drilled at ten and twenty centimeters below the soil surface, as well as at the bottom to allow for drainage. The containers were then filled with loamy sand, a soil typical for desert areas. Suction cup lysimeters were placed in the 10 and 20 cm holes. A drip pan placed below the buckets collected the water that would filter through the soil. The buckets were subsequently either seeded or sodded. The sod was collected from the turfgrass research site. The buckets were daily irrigated with 600 mL of either potable or tailored water which consisted of treated effluent water spiked with calcium nitrate to 15 ppm Container irrigated with potable water were fertilized every two weeks with granular calcium nitrate.

Leachate was collected weekly and analyzed for nitrate, electrical conductivity, and sodium adsorption ratio (SAR). From these analyses we can establish the amount of salts and nitrogen that were metabolized by the plants and the amount that moved through the soil. The turfgrasses were trimmed every week back to 2 inches of height. The clippings were collected and biomass was determined to determine which of the plants were growing fastest. Photos were taken after trimming of the seeded container and analyzed for percent coverage using a software package SigmaScan. These measurements were used to determine growth over time.

Results:

Irrigation water quality did not affect establishment and growth of buffalograss. However, similar to last year's results, bermudagrass irrigated with tailored water established faster compared irrigation with potable water and granular fertilization.

The concentrations of nitrate at soil depths of 20 and 50 cm were not affected by irrigation water quality for both grasses and propagation types.. At 50 cm depth however (Figure 1.), container that were irrigated with tailored water never exceeded the 10 ppm EPA threshold.

[1] Devitt, D.A., Lockett, M., Morris, R.L., Bird, B.M (2007) Spatial and temporal distribution of salts on fairways and greens irrigated with reuse water. Agron. J. **99**: 692-700.

Nitrate levels in container irrigated with potable water and fertilized with granular Calcium nitrate, exceeded the threshold on 2 sampling dates.

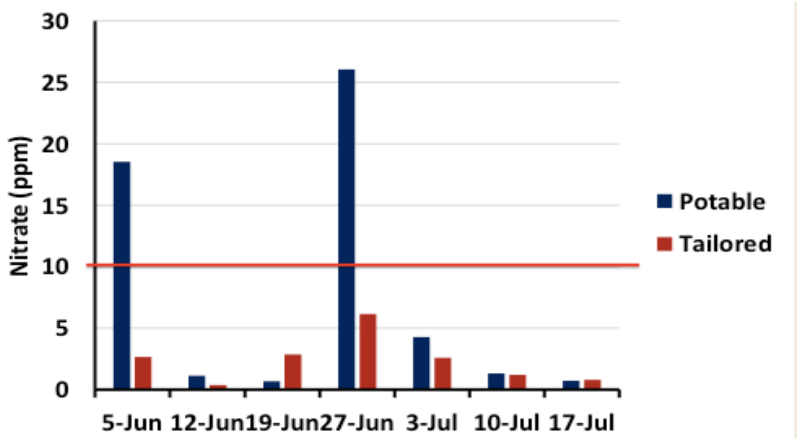
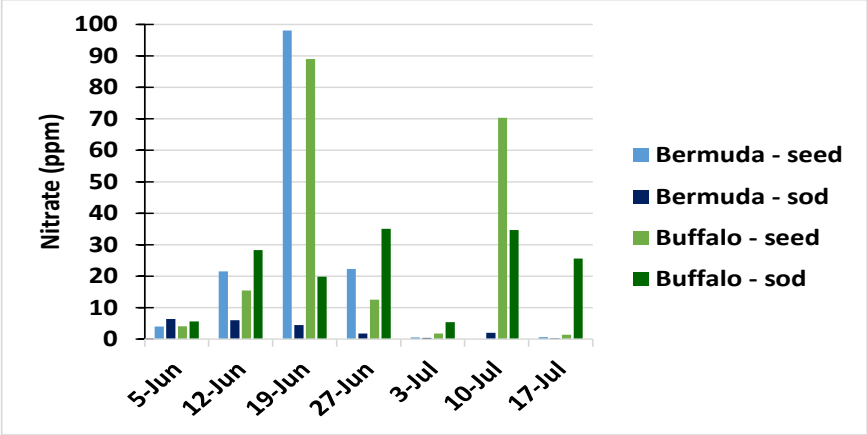


Figure 1. Nitrate concentrations at 50 cm soil depth for grasses irrigated with either potable water (and fertilized granularly) or with tailored water (treated effluent with 15 ppm of Nitrate). Bars represent values averaged over 2 propagation types (seeded and sodded) and 2 turfgrass species (buffalograss and bermudagrass).

The concentration of nitrate at a depth of 10 cm was once again not significantly different between the two irrigation water qualities, however there was a significant difference between the types of propagation (seeded or sodded). Generally, the sodded grasses had lower levels of nitrate than the seeded grasses (Figure 2).

Figure 2. Nitrate concentrations at 10 cm soil depth for bermudagrass and buffalograss propagated



from either seed or sod. Bars represent values averaged over 2 irrigation water qualities (potable water and fertilized granularly or tailored water which consisted of treated effluent with 15 ppm of Nitrate).

Conclusion:

Based on our findings, the use of tailored water during establishment will not result in any greater nitrate leaching or groundwater contamination compared to the standard practice of using potable water and granular fertilizer. For bermudagrass the growth and establishment rate increased significantly when tailored water was applied. Therefore, using tailored water is not only on par with the current standards for establishment, but can even result in a faster establishment.