Nitrogen in reclaimed water can benefit turfgrass

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As competition for fresh water increases and fertilizer prices rise, the horticulture industry is looking to reclaimed wastewater as a valuable resource for supplying irrigation and necessary nutrients for urban landscapes. In the U.S., Florida is a leading user of recycled water; more than 50% of the state's reclaimed water is being put to use for irrigation of recreational areas such as golf courses, parks, and residential landscapes. New research suggests that recycled wastewater can actually be beneficial for turfgrass growth because it contains nutrients—such as nitrogen and phosphorous—that are essential to plant health.

According to the authors of a study published in *HortScience*, there are three stages of wastewater treatment: primary, secondary, and advanced. Reclaimed water (RW) is defined as wastewater that has gone through at least secondary treatment. "The main difference between RW that has received secondary treatment versus advanced treatment is the reduced level of nutrients and other chemicals remaining in water subjected to advanced treatment," explained Jinghua Fan and George Hochmuth, corresponding authors of the study. "Water receiving advanced treatment typically has 25% of the nitrogen (N) and phosphorus (P) and less soluble salts than contained in secondary treatments. Increasingly, the reclaimed water used for irrigation is from advanced wastewater treatment facilities."

As production and testing of reclaimed water increases, there is more interest in using the resource to irrigate residential lawns and urban landscapes. One benefit to using reclaimed water containing nitrogen is

that it may allow for reductions in the amount of other sources of nitrogen fertilizers. "It is important to determine the optimum combinations of water and nutrient applications to support turfgrass production without impairing groundwater through losses of nutrients from the landscape," Fan and Hochmuth explained. They noted that few studies focused on the degree to which residential turfgrass can use the nitrogen from reclaimed water following advanced treatment.

A University of Florida research team designed greenhouse experiments using 'Floratam' st. augustinegrass (*Stenotaphrum secundatum*) and 'Empire' zoysiagrass (*Zoysia japonica*.). Treatments included irrigation with tap water (control), irrigation with reclaimed water from a university wastewater treatment facility, irrigation with reclaimed water with additional nitrogen supplied from ammonium nitrate (to achieve 5, 9, and 13 $mg \cdot L^{-1}$ N solutions), and a dry prilled fertilizer treatment.

Results showed that turfgrass growth responded positively to nitrogen concentration in the irrigation water. The concentration of nitrogen in the unamended wastewater was not sufficient for optimal turfgrass growth. Measurements showed no difference in turfgrass growth with the base level nitrogen in the delivered reclaimed water compared with tap water. The data showed that as more N was added to the base recycled water, turfgrass growth increased.

"The nitrogen concentrations in reclaimed water from advanced wastewater treatment facilities in the study were too low to benefit turfgrass and achieve acceptable quality," the scientists said. Grass quality and turfgrass clippings yield maximized when the total nitrogen concentration in the irrigation water was at least 5 $mg \cdot L^{-1}$. Turfgrass receiving dry synthetic N fertilizer resulted in greater growth and 2-fold greater N leaching than with the remaining treatments for both turf types, though leaching of nitrogen was determined to be negligible with all treatments.

The authors said that their greenhouse studies show that nitrogen from recycled water can be beneficial for turfgrass growth and health, but the concentration of nitrogen in recycled water with advanced treatment needs to be at least 5 $mg \cdot L^{-1}$. They recommended outdoor field-scale experiments to validate the results of the greenhouse studies.

More information: The complete study and abstract are available on the ASHS *HortTechnology* electronic journal web site: horttech.ashspublications.org/ … nt/24/5/565.abstract

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