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Maximizing the Benefits of Reclaimed Water for Irrigating the Landscape and Protecting the Environment[1]

George Hochmuth, Don Rainey, Laurie Trenholm, Esen Momol, Claire Lewis, and Brian Niemann[2]

This publication is part of a series developed to assist Florida homeowners with managing their landscapes to reduce environmental impacts. This is a joint publication of multiple departments and programs in UF/IFAS, including the Florida-Friendly Landscaping™ program, the Department of Soil and Water Sciences, the Environmental Horticulture Department, and the Center for Landscape Conservation and Ecology. This fact sheet was produced with support from the Florida Turfgrass Association through a Florida Department of Agriculture and Consumer Services Specialty Crops Block Grant.

For the rest of this series, visit https://edis.ifas.ufl.edu/topic_series_environmental_landscape_management.

Introduction

Reclaimed water is water that has been treated in municipal wastewater facilities and is safe to use for designated purposes, including residential landscape irrigation. "Water reuse" is the term used to describe the beneficial application of reclaimed water. Approximately 884 million gallons of reclaimed water are used daily in Florida (Florida Department of Environmental Protection [FDEP] 2020). According to FDEP, 408 domestic wastewater treatment facilities reported making reclaimed water available for reuse by 442,277 residents, 489 golf courses, 1005 parks, and 384 schools (https://floridadep.gov/sites/default/files/2020Reuse_Inventory_Report_Approved_2.pdf). Florida is a national leader in using reclaimed water, and in 2006 Florida's reuse program received the first U.S. Environmental Protection Agency (EPA) Water Efficiency Leader Award. Using reclaimed water in Florida meets a state objective for conserving freshwater supplies and preserves the water quality of rivers, streams, lakes, and aquifers. This publication discusses the benefits of using reclaimed water to irrigate the landscape and explains how using reclaimed water helps to protect the environment.

History and Legal Support

Florida has been using reclaimed water since 1966 shortly after the Tallahassee Reclaimed Water Farm was constructed to provide irrigation water for agricultural purposes. In 1977, the first large-scale urban reuse system was constructed in St. Petersburg. In the mid-1980s, Orange County started to develop water reuse systems that later became catalysts for other Central Florida utilities and counties to follow suit. The 1990s saw the development of reclaimed water systems in southern Florida. The 2000s brought increased support and encouragement for water reuse from the state government and scientific communities.

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2. George Hochmuth, professor, Department of Soil and Water Sciences; Don Rainey, Extension agent, UF/IFAS Extension Sarasota County; Laurie Trenholm, professor, Environmental Horticulture Department; Esen Momol, director, Claire Lewis, senior information specialist, Florida-Friendly Landscaping™ Program; and Brian Niemann, Extension agent, UF/IFAS Extension Pinellas County; UF/IFAS Extension, Gainesville, FL 32611.

Section 403.064 of the Florida Statutes is the main law dealing specifically with reclaimed water. Under this law, reusing water is considered to be "in the public interest," and the law establishes water conservation and reuse of water as formal state objectives (Figure 1). The law further states that reuse systems, designed and operated according to FDEP guidelines, are environmentally friendly and do not pose a threat to public health and safety.

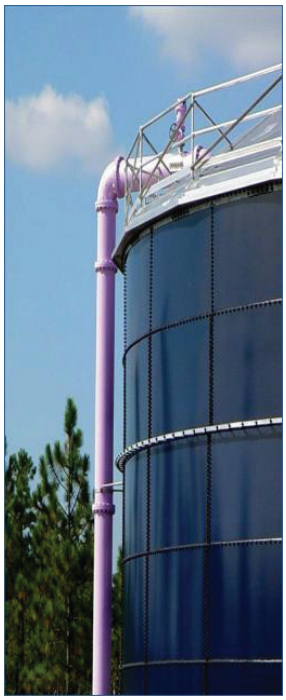

Figure 1. Reclaimed water reuse storage tank.
Credits: Shanin Speas, FDEP

The rules governing the land application of reclaimed water in Florida are found in Chapter 62-40.416 of the Florida Administrative Code. Florida's rules are consistent with national guidelines for water reuse published by the EPA in 1992 and have been deemed fully protective of public health and environmental quality.

Why use reclaimed water?

The main reason to use as much reclaimed water as reasonable is to conserve Florida's potable water supplies. Florida receives a large quantity of rainfall compared to other states. Approximately half of Florida's rainfall occurs from June to September. The remaining half falls during the other eight months of the year. Florida's population is estimated to increase from 21.78 million in 2021 to 26.35 million in 2040. As a result, Florida's water supply needs will increase by approximately 22% (573.3 million gallons per day) for various residential and commercial use needs.

Reusing wastewater helps conserve potable water supplies because drinking-quality water is not used for non-drinking water purposes. As much as 50% of our clean drinking water goes to non-potable needs, including lawn and landscape irrigation. Irrigating with reclaimed water reduces the demand for potable water supplies. Reclaimed water also can be used for industrial cooling water, groundwater recharge, and preventing saltwater intrusion in coastal groundwater aquifers. The idea behind water reuse is simple: Use the right water for the right use. Many municipalities have few timing or quantity restrictions on using reclaimed water for irrigation.

Reclaimed water contains nutrients, such as nitrogen (N), phosphorus (P), and potassium (K), which are commonly found in fertilizers In particular, turfgrass and landscape plants require these nutrients for normal growth and are typically applied using fertilizers. Taking advantage of the nutrients in reclaimed water for plant use may help to reduce the amount of fertilizers used on Florida's landscapes. See Toor and Lusk, 2020a https://edis.ifas.ufl.edu/publication/SS542 for more information on the constituents found in reclaimed water.

Finally, reusing water in the terrestrial environment (e.g., irrigation) helps reduce the environmental degradation of lakes, rivers, streams, and coastal waters. If reclaimed water is used on plants, the plants can use the nutrients in the reclaimed water, reducing the amount of nutrients directly discharged to natural systems.

What are the concerns with using reclaimed water for irrigation?

Wastewater is typically treated in three stages called primary, secondary, and advanced (sometimes called tertiary treatment) in order to be used as reclaimed water. Toor and Lusk (2018b), describe the production of reclaimed water in Florida. Reclaimed water is wastewater that, at a minimum, has received secondary-level treatment, which includes basic disinfection at a wastewater treatment facility. The treatment processes are designed to ensure that reclaimed water is safe and reliable for its intended use. Constituents of concern in reclaimed water are described by Toor and Lusk (2018a) https://edis.ifas.ufl.edu/publication/SS543.

Using reclaimed water for landscape irrigation can significantly reduce the demand for high-quality freshwater supplies. This allows those freshwater resources to be conserved for more important uses, such as potable water for human consumption. For some landscapes, the landscape irrigation system uses reclaimed water instead of potable water. These homes and communities are said to have a "dual system." In a dual system, one pipe supplies

potable water for home use, and another supplies reclaimed water for irrigation.

Depending on the level of treatment and storage, reclaimed water may contain significant amounts of nutrients. Plants in the landscape can use the nutrients present in reclaimed water, potentially reducing the need for purchasing fertilizer. All nutrient applications to the landscape should be accounted for, whether they are in the form of fertilizers or are associated with reclaimed water.

One of the most important issues with reclaimed water is preventing over-irrigation. If excessive amounts of irrigation are applied, then the nutrients that come with the reclaimed water can leach through the soil or runoff from the landscape. Over-irrigation with reclaimed water could also lead to losses of nutrients previously applied as fertilizer, even if the homeowner is following UF/IFAS fertilization recommendations. Nutrient management and irrigation management are closely linked (for more information, see (Hochmuth et al., 2016, https://edis.ifas.ufl.edu/ss586). This linkage is especially important with reclaimed water because reclaimed water contains N and P, which, even in low concentrations, can lead to pollution of nearby water bodies if lost from the landscape.

Avoid spraying reclaimed water onto impervious surfaces such as roads, driveways, and sidewalks. This action results in reclaimed water entering the stormwater system, increasing nutrient loads to retention ponds and streams, and increasing plant and algal growth.

Recommendations for Reclaimed Water Use

Reclaimed water generally has a low cost to the homeowner, and there is an ample supply; therefore, over-watering with reclaimed water is a common problem. When using reclaimed water for landscape irrigation, always follow UF/IFAS recommendations for irrigation quantities. For more information, see https://edis.ifas.ufl.edu/ss586 and https://edis.ifas.ufl.edu/publication/SS704. Two additional factors to consider when using reclaimed water are the salt and nutrient content of the water.

Salinity

All reclaimed waters contain dissolved mineral salts, for example calcium carbonate, sodium chloride, calcium sulfate, among others. These soluble salts come from the salts in the original potable water and the salts added during its use as potable water. The salinity of reclaimed water may be an important parameter in determining its suitability for irrigation (U.S. EPA 2012). This statement may be especially true for dry climates in the country. However, soluble salt content may not be the primary concern for using reclaimed water in Florida. This is because Florida usually receives large amounts of rain that can leach soluble salts from the soil before the salts build up to levels high enough to injure plants.

Plants differ in their sensitivity to salinity in the soil, so the salt content of reclaimed water should be evaluated to determine any potential problems (Toor and Lusk, 2020b https://edis.ifas.ufl.edu/publication/SS545) . Many turfgrasses grown in Florida show moderate to high tolerance to saline soils, so irrigating with reclaimed water should not impact the growth of turfgrass. However, other landscape plants may be sensitive to saline soils. Before purchasing landscape plants, the salt sensitivity should be determined by consulting the nursery staff.

Nutrients

The amount of nutrients in reclaimed water varies from utility plant to utility plant. Nutrient content can vary according to the facility's type and degree of treatment and storage. Nutrient content also can vary during the year. Knowing the nutrient content of the water can help you incorporate this nutrient source into a landscape fertility plan.

Your local water utility company must test the nutrient content of its reclaimed water and can provide you with the results. You can also test your irrigation water for pH, salinity, and nutrient content (Toor and Lusk, 2020c, https://edis.ifas.ufl.edu/publication/SS546). One option is to have the water tested through your local UF/IFAS Extension office (find your local office at http://sfyl.ifas.ufl.edu/find-your-local-office/). Make sure to apply the correct amount of water to your landscape, so that nutrient leaching or runoff does not occur.

Using reclaimed water for irrigation can provide a portion of the nitrogen and all the phosphorus required by turfgrass (Menzel and Broomhall 2006). Accounting for nutrients from reclaimed water in the nutrient budget can reduce nitrogen fertilizer applications, resulting in lower costs.

Summary

The basis for water reuse is straightforward: Use the right water for the right use in the landscape. As the population in Florida continues to grow, the demand for freshwater continues to grow. Alternative sources of irrigation water,

such as reclaimed water, are essential tools that help conserve the limited freshwater supplies in Florida. Reclaimed water contains mineral salts and nutrients, so reclaimed water irrigation must be managed to minimize plant stress and the loss of these nutrients to the environment.

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