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Best Management Practices for Irrigating Lawns and Urban Green Spaces with Reclaimed Water[1]

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Introduction and Purpose

The purpose of this article is to present some sound recommendations, known as best management practices (BMPs), for irrigating lawns and other green spaces with reclaimed water (RW). These BMPs are for homeowners and landscaping professionals who use RW to irrigate home lawns or other irrigated green spaces in urban landscapes. Using these BMPs in your landscape management actions will help reduce the nutrients (nitrogen and phosphorus) that enter water bodies and thus help better control occasional harmful algal blooms. While RW can also be used to irrigate some agricultural crops, this article focuses only on residential and urban irrigation with RW.

Reclaimed water is former domestic wastewater that has been treated at a wastewater treatment plant and that is then sent back to a community for various reuse applications. Reusing the water can be thought of as a way of recycling the former wastewater by putting it to a new use after it has been cleaned. In Florida, most RW is used to irrigate lawns, urban green spaces, and golf courses. By Florida law this water must have received at least secondary treatment and disinfection before it can be reused. These treatment processes remove many harmful pollutants in the water, such as pathogens that cause diseases and numerous chemicals found in wastewater. You can learn more about how RW is produced, transmitted, and used in Florida by visiting publication #SL339.

Figure 1. In Florida, more than half of reclaimed water used is for urban irrigation.
Credits: UF/IFAS file photo by Tyler Jones

Using RW for landscape irrigation is an opportunity to reduce Florida's potable water usage, especially because the state is rapidly urbanizing and facing a ~300 million gallon per day shortfall of future water needs (FDEP 2014). However, compared to potable water, at current treatment standards RW does contain elevated levels of the nutrients nitrogen (N) and phosphorus (P) (Toor et al. 2017). These nutrients are not completely removed by the wastewater treatment process and are almost always present in RW. They are also the pollutants most responsible for problems such as harmful algal blooms in fresh- and saltwater systems.

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Reclaimed water should be used in a responsible manner to avoid contributing to harmful algal blooms. If RW used for irrigation is not used wisely or if it is applied to streets and sidewalks where it can flow into stormwater drains that are connected to local ponds and other bodies of water, it can be a source of excess N and P in our water bodies, potentially contributing to harmful algal blooms like red tide. Another characteristic of RW that is often overlooked is salinity. Because RW is sourced from domestic wastewater, treated wastewater will typically have a higher concentration of salts than drinking water. Depending on soil and other environmental issues, landscape plants may exhibit "salt" stress, which requires replacing the plant with a more tolerant species or flushing the soil with freshwater during times of drought and salt buildup.

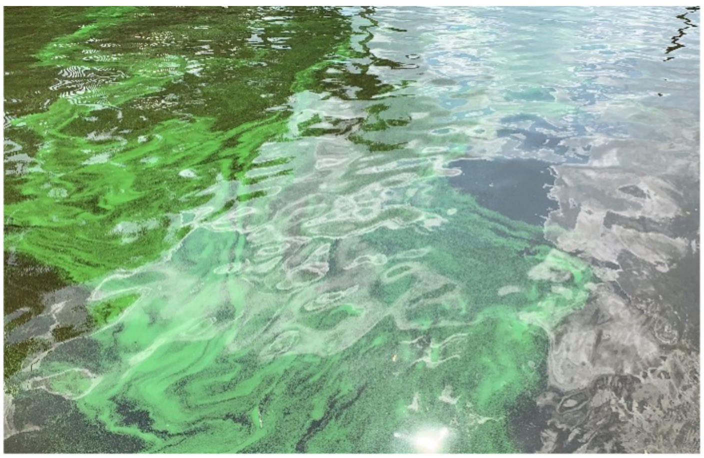

Figure 2. Excess nutrients (nitrogen and phosphorus) can lead to algal blooms in surface water bodies.
Credits: UF/IFAS Photo by Dail Laughinghouse

A Brief Background on Reclaimed Water Usage in Florida

Regulated by the Florida Department of Environmental Protection, RW is a safe and approved alternative water supply to supplement residential irrigation. It is distributed via purple-colored pipe and supplied through a water meter separate from the domestic potable supply.

Reclaimed water, also known as recycled water or reuse water, is simply domestic wastewater that has been disinfected and treated to remove solids and certain impurities. After treatment at a wastewater treatment plant, the cleansed water can be safely discharged into a nearby stream, wetland, or ocean, or this water source may be piped back into communities for reuse by various residential, industrial, and commercial users. Reclaimed water has been most often discharged to local water bodies as a means of "getting rid of it," but reuse by neighborhoods, cities, and counties for activities such as lawn irrigation is a tangible way to put this resource to use, while reducing use of potable water resources for activities such as lawn irrigation.

Reclaimed water is produced at a wastewater (sewage) treatment plant. At the treatment plant, domestic wastewater is collected from households, schools, offices, hospitals, and commercial and industrial facilities, and then undergoes several stages of treatment to prepare the water for reuse or discharge into the environment. The treatment processes are designed to ensure that reclaimed water is safe and reliable for its intended use.

The stages of treatment include the following:

- Primary treatment—the sewage is temporarily held in a basin so solid waste materials can settle to the bottom and be removed.
- Secondary treatment—after the solids are removed by primary treatment, the water left behind is further treated to remove or degrade any remaining wastes still suspended in the water.
- Tertiary treatment—a final stage that involves advanced removal of nutrients and other contaminants not fully removed by secondary treatment.

Note that the minimum requirement in Florida for treating RW is secondary treatment and disinfection, although many treatment plants use tertiary treatment for advanced removal of nutrients.

Five Best Management Practices for Irrigating with Reclaimed Water

The following are some BMPs for irrigating lawns and other urban green spaces with RW.

(1) Learn as much as you can about the source and composition of your RW. Knowing about the wastewater treatment plant that produces your RW will give you an idea about the level of treatment the water has received. If the treatment plant uses advanced or tertiary treatment, then your RW will likely contain fewer potential contaminants than RW produced by a plant that has only secondary treatment. Reclaimed water produced by tertiary treatment is especially lower in N and P than RW produced by secondary treatment only. In Florida, RW with tertiary treatment will have a N concentration that does not exceed 3 mg/L and a P concentration that does not exceed 1 mg/L. In contrast, secondarily-treated RW may have N and P levels 3–5 times higher (Toor and Lusk 2011).

You can call or search for your water provider on the internet to learn about the level of treatment your RW has undergone. You can also ask your RW provider to share any data they have on the typical chemical makeup of the RW you use. While the chemical composition of RW, including its nutrient content, may vary some by season, the RW provider should be able to give you a range of high and low expected values for N, P, and some other potential pollutants like salts. A few RW providers place data about the quality of their RW on their webpages so the data is easily accessed by the public; however, not all providers do this, and you may have to call them to specifically ask for a copy of their most recent RW quality report.

(2) Use the Florida-Friendly Landscaping™ principle of "right plant, right place." Reclaimed water can contain higher levels of salts compared to drinking water. Some landscape plants have a sensitivity to too much salt in irrigation water and soil. Therefore, if you irrigate with RW, watch your landscape for signs of salt damage. Signs of salt damage include plants that wilt even when water is plentiful, stunted growth, browning or yellowing of leaf edges, and foliar damage. If necessary, plant only salt-tolerant species. (See publication #ENH26 for a list of salt-tolerant landscape plants for Florida.) If you suspect salt injury may be a factor, you can also have your soil and irrigation water tested for salt levels by the UF/IFAS Extension Laboratory. Information on how to test your soil and water can be found at publication #SL262.

Figure 3. Oleander is a salt-tolerant landscape plant that can be grown in most areas of Florida.
Credits: UF/IFAS file photo

(3) Keep irrigation equipment working properly and regularly maintained. A good rule of thumb is to check your irrigation system two to four times a year to make sure there are no broken lines or sprinkler heads. Once every few months, audit the performance of your irrigation system to check for correct application volume and uniformity. These regular maintenance checks will not only save water by ensuring the irrigation system runs efficiently, but will also reduce the chance of excess N and P from RW being applied to landscapes by broken or misdirected sprinkler heads. Because excess N and P are carried to water resources by runoff water that flows over urban streets and sidewalks, managing the flow of runoff water can help reduce the transport of N and P to our surface water bodies. There is a simple saying that is true in many cases in Florida: "Water management is nutrient management." Publication #ENH9 has more information on how to inspect and maintain your lawn irrigation system so it runs efficiently, keeps your lawn healthy, and reduces the wasteful application of excess N and P to landscapes.

(4) Avoid irrigation overspray. Inspect sprinkler placement, pressure and device type to ensure optimal operation. Often the wrong spray head is in the wrong place, which can lead to overspray and excessive runoff. Irrigation overspray occurs when irrigation water lands on sidewalks, streets, and other nontarget areas. This wasteful use of water not only diminishes water supply but can also be a means of N and P transport to local surface water bodies (Toor et al. 2017). Irrigation overspray can pond on streets and sidewalks and be conveyed by street gutters and stormwater pipes to ponds, streams, and other water bodies, where the nutrient load in the RW can contribute to algal proliferation. You can avoid overspray by directing sprinkler heads to water only vegetated surfaces.

(5) Remember that you can still overwater landscapes even if you use RW. Schedule irrigation zone runtimes to match plant needs and soil characteristics to avoid overwatering. Depending on your RW provider, the RW you use for irrigation may be without cost or at a lower cost than drinking water. This sometimes makes it tempting to run the sprinklers more often than necessary. If you use RW for lawn irrigation, overwatering will cause the same damage as overwatering with other water sources. Only irrigate when soil and turf conditions indicate that irrigation is necessary. As a rule of thumb, only 3/4 to 1 inch of water is needed each week for most Florida turfgrasses.

A Note about Fertilizing Lawns When Reclaimed Water Is Used

A common question about irrigating urban landscapes with RW is whether the N and P found in RW can offset some of the fertilizer requirements of the landscape. For example, you may be able to calculate the N and P you add via irrigation water every season and reduce the amount of those nutrients you apply by fertilizers accordingly. However, it is important to keep in mind that not all N and P found in RW may be usable by landscape plants, and the times when you irrigate your lawn the most (fall and winter) may not be times when landscape plants and turfgrass are actively taking up N and P (summer). Therefore, the nutrients in RW may not always substitute 1:1 for fertilizer nutrients in the landscape, and further research is needed before we can make definite recommendations about how to substitute RW nutrients for a portion of fertilizer applications. We do know, however, that RW does contain some fraction of usable nutrients, and if you irrigate with RW you may want to apply fertilizers at the low end of recommended rates instead of the high end, and then watch your landscape response and only increase fertilizer applications if necessary.

Conclusions

Reclaimed water is a beneficial and safe alternative water supply to using potable (drinking) water for outdoor irrigation needs. RW provides a cost-effective water source intended to reduce our reliance on the vulnerable groundwater that suppliesour drinking water. Accordingly, RW irrigation systems should operate using the recommended UF/IFAS best management practices. RW users should continually monitor for significant salt stress and N and P concentrations that may negatively affect plant health or worsen algal problems in our state's water resources. Irrigation systems that apply RW must be kept in good repair and operation monitored routinely, avoiding overspray and overwatering issues.

Resources for Further Reading

- Some frequently asked questions about reclaimed water: publication #SL339
- Potential pollutants in reclaimed water: publication #SL338 and publication #SL337
- Managing salts and soil salinity in landscapes irrigated with reclaimed water: publication #SL340
- Understanding landscape irrigation water quality tests: publication #SL341

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