

Rotala: A New Aquatic Invader in Southern Florida¹

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Introduction

Rotala is a relative newcomer to Florida and was first found in Coral Springs, which is located in Broward County, in 1996. The species has since established large—but mostly isolated—populations throughout the southern regions of Florida, and it is especially problematic in Lee and Collier Counties and along the state’s west coast (Jacono and Vandiver 2007). This aquatic weed was introduced through the aquarium and water garden industry due to its attractive stems, leaves, and flowers and its ease of cultivation. *Rotala* is listed as a FLEPPC Category II plant, meaning the species has increased in abundance or frequency but has not yet drastically altered Florida plant communities (FLEPPC 2011). It is also classified as “caution, manage to prevent escape” by the IFAS Assessment of Non-Native Plants in Natural Areas (IFAS Invasive Plant Working Group 2014).

Rotala produces extremely dense submersed populations and large thick mats that dominate the surface of the water. This greatly reduces ecosystem services, because oxygen level and light penetration are hampered. In addition, water flow is restricted because of the species’ excessive growth. Many of the south Florida canals are critically important components of the flood control system, and resource managers rely on these systems to quickly move stormwater. Because the rapid and vigorous growth of *rotala* inhibits water flow, the ability of infested canals to function properly in flood events is greatly hindered. As such, management of this aquatic weed is a major concern for resource managers.



Figure 1. *Rotala* infesting a flood control canal in Naples, Florida
Credits: Lyn Gettys

Classification

Scientific Name: *Rotala rotundifolia* (Buch.-Ham. ex Roxb.) Koehne

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Common Names: Rotala, dwarf rotala, roundleaf toothcup

Family: Lythraceae (loosestrife family)



Figure 2a. Emergent forms of rotala

Credits: Lyn Gettys



Figure 2b. Submersed forms of rotala

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Description and Habitat

Rotala is an introduced freshwater aquatic weed that persists year-round in southern Florida. This species has both submersed (underwater) and emergent (out-of-water)

forms, which differ in a number of characteristics. The small leaves (less than an inch long) are arranged in groups of two or three around both plants' hot-pink stems. However, emergent rotala has fleshy, bright-green, and rounded leaves, and submersed rotala has darker green or reddish leaves that are thin and lanceolate (sword-shaped). Growth habit differs between the forms as well. Low-growing populations of emergent rotala creep along shorelines and banks, with plant height rarely exceeding six inches. Submersed plants form tight, mounded colonies in water as deep as six feet, but they eventually grow to reach the surface of the water, where they form dense mats that block light penetration and impede water flow. Rotala produces spikes of small, bright pink to fuchsia flowers, but flowering only occurs on plant tips that are aerial or emergent.

Rotala's Latin name of *Rotala rotundifolia* is very descriptive of the emergent form of the species—"Rota" means "wheel," and "rotundifolia" means "round leaves." However, the Latin name makes little sense if one sees only the submersed form of this weed, since plants growing underwater produce leaves that are sword-shaped. Rotala invasions in Florida are most common in the southern part of the state, and this weed is especially problematic in the waters of Florida's west coast. Rotala is a tropical species and is not considered cold-tolerant. However, emergent populations cultured for research purposes outdoors in Gainesville routinely die back after multiple hard freezes during winter, and then quickly regrow when spring arrives.

Control Herbicides

Only five aquatic herbicides have been tested to date, and only two of these provided an acceptable level of control of rotala. Topped-out emergent growth can be "burned back" with foliar applications of glyphosate, but it does not result in long-term control. Submersed applications of endothall and flumioxazin do not cause measurable damage to the species, and diquat (at 400 ppb) provides only around 80% control.

Alternatively, submersed applications of triclopyr and 2,4-D (either product at 2 ppm) result in total or near-total control of rotala (Puri and Haller 2010). Both of these herbicides are organo-auxins, which are known to cause significant damage at very low concentrations to sensitive species when off-target movement through drift or the use of treated water for irrigation occurs. Although both triclopyr and 2,4-D are labeled as "general use" aquatic herbicides in Florida, the Florida Organo-Auxin Herbicide



Figure 3. Inflorescence of rotala
Credits: Lyn Gettys



Figure 4. Rotala infestation after glyphosate treatment
Credits: Lyn Gettys

Rule (5E-2.033 in the Florida Pesticide Law and Rules) outlines specific guidelines that must be followed when using these and other organo-auxin products. These restrictions and prohibitions include droplet-size criteria, distance from susceptible plants, wind speed limitations, and other applicator requirements. Section 8 of the Rule also states that “applicators who apply organo-auxin herbicides to ditches, canals, or the banks of similar waterways will assure that they are not treating water that will be directly used for irrigation of sensitive crops (Fishel et al. 2012).”

Based on this information, certain precautions should be taken before triclopyr or 2,4-D is used to control rotala in south Florida canals in order to ensure compliance with the Florida Organo-Auxin Herbicide Rule and prevent damage to sensitive, non-target plants. Many homeowners and stakeholders with canal-side property pump irrigation water from canals, so the primary challenge is preventing irrigation from treated canals until the concentration in the water has fallen below a target level (as outlined on the herbicide label). This can be accomplished by notifying homeowners and other stakeholders along the system that a herbicide treatment is imminent and that irrigation from treated canals will be prohibited until further notice. In addition, flow through the canal should be slowed to ensure that treated water does not travel into other parts of the system. Because many south Florida canals are used for flood control, treatment with an organo-auxin should be scheduled for early spring to coincide with a period of active plant growth (for best herbicide efficacy) and minimal rainfall (to reduce the risk of stormwater flow). In cases where the use of 2,4-D or triclopyr for rotala control is impractical, other management options must be explored.

Mechanical Harvesting

Although mechanical harvesting is used as a management tool to reduce a number of aquatic weed populations, using this technique for rotala control is challenging for a number of reasons. Rotala is heavier than many submersed weeds, such as hydrilla, and this puts additional stress on machinery and necessitates more trips between the infested site and the offload location. Also, offloading harvested material onto the canal bank may be an effective practice when mechanical harvesting is used to control some submersed weeds, but it can actually spread populations of rotala along the canal bank because the species grows quite well as a shoreline plant. As a result, plant material should be transported far from the water or hauled to a landfill. In addition, rotala propagates mostly by vegetative means, so the fragments produced during mechanical harvesting may result in downstream spread of the species.

Biocontrol

A biocontrol insect has been successfully used to manage populations of purple loosestrife (*Lythrum salicaria*), which is a close relative of rotala that has invaded the northeastern United States. However, there are no biological control agents that provide effective control of rotala. Rotala is a problematic weed only in south Florida—at least at the time of this publication—and the expense associated with

identifying and evaluating a biocontrol agent for this weed is not justified. Triploid grass carp, a generalist herbivore, has been evaluated on a small scale for rojala control, but there is no evidence that these fish actually eat the species thus far.



Figure 5. *Rotala* terrestrial regrowth (above) and mechanical harvesting of *rotala* (below) Credits: Lyn Gettys (above) and Ellen Allen/SWFMD (below)

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Summary

Rotala is a new and problematic weed in southern Florida that causes significant problems for resource managers. Although mechanical methods can be used to manage *rotala*, this technique is expensive and can foster the spread of the species. Two aquatic herbicides provide good control of *rotala*, but both are organo-auxins with significant irrigation restrictions, which limits their use in many of south Florida's infested canals. Future research will continue to develop feasible and improved control recommendations. An ultimate goal is to identify control options that lack the strict irrigation limitations of the organo-auxin herbicides.

Literature Cited

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