Biological Control of Giant Salvinia Using the Salvinia Weevil

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Giant salvinia (*Salvinia molesta*) is an invasive species of aquatic fern native to southeastern Brazil. The plant has light green leaves that bear dense egg-beater-shaped trichomes (leaf hairs) on the upper surface. Giant salvinia does not have true roots, but modified leaves that absorb nutrients from the water column. Thick salvinia mats choke waterways, prevent boat access and disturb freshwater ecosystems. Fragments of the mat break off and reproduce vegetatively by growing new shoots, which float freely on the water surface. Over time, plant mats affect water quality by reducing sunlight and dissolved oxygen, which negatively impacts native submersed (growing underwater) vegetation as well as fish, arthropods, and waterfowl. Giant salvinia has been spreading throughout Louisiana and other Gulf Coast states since 1998. Currently, it inhabits nearly every parish in Louisiana.

The salvinia weevil (*Cyrtobagous salviniae*) is a Brazilian beetle that is an effective biological control agent of giant salvinia. The salvinia weevil's host range is limited exclusively to plants in the genus *Salvinia*, making it safe to release. Smaller than a sesame seed, this shiny black weevil spends its whole life associated with giant salvinia plants. Adults feed on growing tips and lay eggs in small crevices on the plant. The larvae feed on all parts of the plant, even burrowing inside the rhizome (underwater stem) to intercept the flow of nutrients from the "roots" to the growing tips. Feeding injury from the weevil causes salvinia mats to yellow, then turn brown and eventually sink. Once the mat sinks, native submersed vegetation can repopulate the area, restoring the habitat for other freshwater species.

Salvinia weevils are mass-reared by the LSU AgCenter in outdoor ponds and are released annually into public and private waters to manage giant salvinia. Salvinia weevils are a tropical to subtropical species, therefore their distribution is limited to areas with mild winters. In south Louisiana, weevils can control infestations in a period of several months to a year once they reach population densities of 40-60 adult weevils per kilogram of giant salvinia. In northern parts of the state, weevils experience colder winters and suffer high overwinter mortality compared to those in the southern parts of the state. Because of this, weevil population growth is slower and cannot keep up with the growth rate of the giant salvinia plant mat.

Annual weevil releases are frequently necessary to restore portions of the population lost during the winter and to increase the spatial distribution of the weevil. Monitoring is an essential tool for understanding how the weevil population is responding to its environment. Estimating weevil population density by taking periodic samples of the plant mat can inform aquatic plant managers whether the weevils are doing their job, if more releases are necessary or if they need to integrate biological control with other methods, such as mechanical and chemical control. Monitoring can also help managers identify new infestations and take early action before the infestation becomes severe. The best time to release salvinia weevils is in the spring before the plant mat begins to grow vigorously. This helps the weevils maintain spatial control over the plant mat and gives the population the longest amount of time to feed and reproduce before winter approaches.

For more information, see the LSU AgCenter website on giant salvinia.