A Note on Florida's Latest Waterprimrose, *Ludwigia hexapetala*

Figure 1. Emergent rosettes of *Ludwigia hexapetala* abound on Lake Harney, Florida. Photo courtesy of Kelli Gladding, FWC.

by Colette Jacono, PhD

As the days lengthen and temperatures rise, the plant life around our lakes and rivers is starting to stir. Before our green friends shift into full spring throttle, now is a good time to survey shorelines and offshore zones for a growth form that could later spell trouble – trouble by the name of *Ludwigia hexapetala*, Uruguayan waterprimrose. This vigorous emergent is the most recent aquatic plant to be tagged a Category I invasive species by the Florida Exotic Pest Plant Council (FLEPPC 2013). While its luxuriant leaves and bright flowers attract more attention in summer, its rosette form may be the best indicator of what is in store for the season ahead.

Floating rosettes are the early growth form, and in mild climates, the winter resting form, for a number of the most aquatic of species within the generic group of plants called *Ludwigia*. A floating rosette is a dense, circular arrangement of radiating leaves clustered near the tip of a floating stem. Very early rosettes lie on the water surface, yet they soon rise to become more emergent than floating. Their leaves are nearly orbicular or spoon shaped, with the tips rounded and the edges quickly tapering to the base. The leaf edges are smooth and their upper surfaces shiny due to protective cells that repel water. As the season progresses, the stems emerge higher and higher from the water and the stems and foliage change in character which, along with successive flowers and fruit, lend to the ability to delineate individual species within *Ludwigia*. So while simply the presence of floating rosettes does not mean an invasion of *L. hexapetala*, it is a signal that note should be made of its location and percent coverage so that monitoring can be continued until characters develop for species identification.

When spring turns to summer, the stems of *L. hexapetala* often extend upright to a meter above the water. At the same time they will sprawl across and under the surface to form floating mats, yet consider this – the proportion of emergent material is small compared to the mass of buoyant stems and roots that have been developing underwater, and out of sight. In this manner, not only does *L. hexapetala* blanket open water and native plants, but it occludes the complex structure of the littoral zone that offers the best fish habitat. Not too sparse, yet not too dense, undisturbed communities of Kissimmee grass, *Paspalidium geminatum,* provide excellent structure for supporting and distributing periphyton and epiphytic macroinvertebrates up through the water column, where they can be eaten by fish (in Florida: Schramm and Jirka, 1989; Welch 2009, and in Tanzania: Bailey et al., 1978; Bowker and Denny, 1978). Yet, with the encroachment of *L. hexapetala* into offshore zones of Kissimmee grass, as has happened in the Kissimmee Chain of Lakes (KCOL), fish habitat may also have been hit hard.

Through the height of the summer

Figure 2. Pollen bearing flowers of *Ludwigia hexapetala* on Lake Harney, Florida. Photo courtesy of Kelli Gladding, FWC.

Figure 3. Luxurious with flowers and nearly glabrous summer growth, *Ludwigia hexapetala* penetrates beds of pickerelweed and giant bulrush off the western shore of Lake Tohopekaliga, Florida. Photo courtesy of Keshav Setaram, SFWMD.

season, the emergent stems and leaves, now large and elliptic in shape, are succulent and glossy (nearly devoid of hairs) as flowering begins. Later in the season though, the stems become tough and reddish-brown, the leaves appear more lance-like or pointed in shape, and most importantly, plants put on hairs across the leaf and stem surfaces. From this point it is difficult to detail the subtle nuances between *L. hexapetala* and the closely related species, *L. grandiflora*, which has previously been recorded in Florida. Both bear clear yellow flowers that develop on short stalks directly off the stem. Distinction between the two becomes problematic when the measurements of their floral characters overlap or when leaf shape and degree of surface hairs vary because of the growth stage or changes in the aquatic environment. In the southeastern states, this is more often than not the case. Emphasis placed on character traits that are "more or less …" holds little exactitude as intermediate types seem to be are more common than plants that are true to type in the southeast (Zardini et al, 1991; Nesom and Kartesz, 2000; author's data). Also, seed capsules, an important character for identification, typically are not produced. Use of an entire population, rather than individual specimens, will often be needed, as well as chromosome karyotyping to help distinguish identity, which can be difficult even for experts.

The new *Ludwigia* in the KCOL and in central lakes of the St. Johns River drainage may seem familiar to those who have fished or traveled the large lakes of North and South Carolina's coastal plain. Specimens from the Carolinas compare best with Florida material, indicating that region as the likely source. The question remains as to whether *L. hexapetala* is native to the southeastern US. Its earliest record dates back to 1844, from South Carolina, and 20 years later, to Georgia, but whether these records reflect the simple lack of early collection or a historical introduction is not clear. With certainty, *L. hexapetala* was introduced to France in the 1840s and later carried to Spain and Belgium. The ornamental trade carried *L. hexapetala,* as well as *L. grandiflora*, to the Pacific coast where regions of northern California, Oregon and Washington have been sorely affected.

AFLP analysis of Pacific coast populations demonstrates that the two species have remained genetically distinct in their rather newly introduced range, where clonal reproduction and spread predominates (Okada et al., 2009). Meanwhile, the prevailing theory in the southeastern US is that hybridization, or introgression between the two species, may explain the propensity of intermediate morphology displayed by so many specimens (Nesom and Kartesz, 2000; author's data). Such speculation is not out of line since natural hybrids between *L. grandiflor*a and *L. hexapetala* have been demonstrated (by chromosome number) at three independent sites in Brazil, a central region of native range.

What's to come next with the *Ludwigia* saga in Florida? Herbicide warriors are already making good strides and even mechanical harvesting has had an impact. High water levels have been effective in temporarily reducing biomass and sequestering flowering in the KCOL, yet occurrences at new locations continue and the resulting need for field recognition and identification remains. Flowering specimens, pressed and labeled, may be sent for identification to the Herbarium at the Florida Museum of Natural History, 379 Dickinson Hall, PO Box 110575, Gainesville, FL 32611-0575.

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