

Volume 34: Number 3 > 2018

The Quarterly Journal of the Florida Native Plant Society



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Sawgrass and the Crocodilians

Article and photos by George Rogers

What plant is most emblematic of Florida? Not the ubiquitous palm tree, but the dominant marsh plant of the Everglades, sawgrass (*Cladium jamaicense*). As a keystone species, sawgrass has been the object of much study, and a tidbit from research is that sawgrass's ability to dominate does not come from being the biggest nutrient-sucking bully in the mud, but rather, the opposite. It competes on its ability to thrive on less, and is perhaps even curtailed by too much phosphorus.

Everglades waters experience nutrient pollution from points north, especially phosphorus. Unlike sawgrass, competing plants use the phosphorus enrichment to achieve great vigor – examples of the interlopers include cattails, dollarweed, hemp-vine, and others. And to make it worse, cattails are less fussy than sawgrass about unnatural water fluctuations.

Sawgrass is not limited to the Everglades. In Florida, there is plenty around Palm Beach County and points northward, although generally in mixed mosaics with other marsh-dwelling plants. Outside of Florida, its overall range extends from South America to Virginia. A similar species lives in the western states, and a smaller cousin, *Cladium mariscoides* is found from Florida to Canada.

The most famous thing about sawgrass is its sawtooth leaves, not that serrations are unique to this species. Sawgrass is the Saw King, however. You have to feel sorry for chain gang escapees chased by bloodhounds into the Everglades. I know the painful experience from recreational botanizing, not from draining the swamp. In an odd coincidence, Hamilton Disston, the conqueror of the sawgrass Everglades, was a Saw King himself, coming as he did from the Disston (Saw Company) family.

The serrations angle forward. Why do they exist? The kneejerk answer is protection from herbivores, or from larger critters crashing through the marsh. When thinking about leaf structure, the mental checklist should cover water, light, and wind. The

answer I like, derived from earlier botanists, is vine severance. Take a walk in a marsh, and you will find vines everywhere on everything. There are no vines on sawgrass. It is pristine and vineless. Any vine braving those wind-slashed Ginsu knives would shred.

Sawgrass is not a grass, but is in the Sedge Family, Cyperaceae. *Cladium* means “branched,” referring to the flower cluster. The flowers are pretty and have an odd feature. Sedge flowers tend to mature their female pollen-receiving stigmas before the male pollen-producing stamens. In sawgrass an entire stem tends to have flowers at the same phase. Contrary to the usual sedge female-first pattern, however, the flowering stems start out mostly male, then go almost 100% female, and then wind up mostly male again mixed with maturing fruits. They switch predominant sex twice.

Are those mostly-male-first stems violating the ladies-first rule? (The proper term is protogyny). Not really. The flowers actually do start out female, but it all goes awry in an odd turn of events. The flowers are in pairs, with one member of the pair older or more developed. The older member starts developing female-first like a good sedge, but most of these flowers have their female units stop developing while the male stamens proceed to maturity, giving the stem a predominantly male-first outcome. The percentage of females aborting might be highly variable or sensitive to environmental influences, and on this point there's room for study.

Next, the younger members of the flower pairs mature their female stigmas with no mishaps, allowing the stalks to switch to mainly the female phase. Finally, after the female phase begins developing fruits, the male phase of the younger flowers arrives, with the grand finale being functionally male flowers mixed with maturing fruits.

Having one sex mature before the other is common in wind-pollinated plants, promoting cross-pollination and

minimizing self-pollination. So female-first sedges are no big whoop. It may be mere ignorance, but I can't think of any other triphasic plants. The book-end male phases would keep pollen in the air through the population's entire flowering and early fruiting season, while still minimizing self-pollination.

Sawgrass reproduces clonally by rhizomes, as do most marsh plants. So then, what is the role of such a complex sexual pollination cycle? The cycle allows seed dispersal to create new establishment opportunities, and studies have shown even within a marsh blanketed with sawgrass, multiple genetically separate individuals can be interlaced. In a marsh where sawgrass clumps mix with competing species, the seed-grown clumps are potentially each distinct genetic experiments in the competitive context. Sawgrass practices survival of the fittest to then spread by rhizome and make more seeds.

The seedlike fruits, called achenes, are a little puffy, probably for flotation. Do animals help with dispersal, externally or internally? Bird dispersal is fair to presume, and the achenes have the roughened surfaces typical of small wetland fruits and seeds, speculatively there to cling to moist and muddy creatures. But take a guess who else may be influential in matters of the marsh? Wildlife biologist S.G. Platt and collaborators in 2013 documented plant dispersal by crocodilians, and found sawgrass fruits among the mix in alligator fecal matter. That's the way to conquer the marsh! Pre-fertilized, naturally acid-treated, and relocated by armored carrier.

Further Reading

Richards, J. H. (2002). Flower and Spikelet Morphology in Sawgrass, *Cladium jamaicense* Crantz (Cyperaceae). *Annals of Botany*, 90(3), 361–367.

Online at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4240397/pdf/mcf197.pdf>

About the Author

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Above, top to bottom: The most famous thing about sawgrass is its sawtooth leaves, with serrations that are angled forward. Flowers in the female phase have fuzzy white stigmas. As the female phase dwindles, the male anther can be seen (arrow).

This article is adapted from:
<https://treasurecoastnatives.wordpress.com/author/georgekingrogers/>