

Report: *Oplismenus* Bio-Control Project

Francis Marion National Forest, SC 8/2016, by Nick Yoder

I marked a spot on the map in the Northern part of the Francis Marion National Forest where I expected to find *Oplismenus hirtellus* ssp. *setarius* (shortleaf basketgrass) in the hopes of ultimately discovering a biological control that could help mitigate the spread of the invasive *Oplismenus undulatifolius* in Maryland and other Northeastern States. The location was based on information in a study titled 'Natural Vegetation of the Carolinas' (Boyle, et al), from October 2007, where *O. hirtellus* was documented as a component of 2 of the 54 forest plots studied. An assumption was made that the grass would still be in the area and, since it would have been there for ten years or more, if the plant has any invasive qualities (even though it's a native) perhaps they would be exhibited there. If not, the reasons why might be apparent, as well.

On a grand scale, Francis Marion Forest is not a contiguous forest (though there are some very large forested areas), it is rather cut-up by farms, houses, roads, trails, businesses, utilities, recreation areas, reforestation efforts, and even areas designated as timber-lands. This prevalence of edges creates a spatial condition that would ostensibly be prime habitat for invasive species, but much of the forest, as I saw it at least, was pristine or at most sparsely integrated with invasive forbs, herbs, shrubs, vines, and non-native canopy trees. Even in areas that had been recently 'clearcut', a common condition, a native plant called *Eupatorium capillifolium* (dogfennel) dominates the land, acting like an invasive in terms of establishing a monoculture. The landscape made an impression on me because of the limited amount of the usual suspects in my research; stiltgrass, wavyleaf basketgrass, garlic mustard, wisteria and others. Though it was in no way free of invasives, none of the approximately 20 varied sites I visited and explored were dominated by any invasive species. This is not to say they do not have significant invasives problems. In that regard the most conspicuous plant I saw attacking the forest edge anywhere along the stretches of highway was Kudzoo.

View of the two ecosystems bordering the area w/ *O. hirtellus*



As a relative amateur in regards searching a big, unfamiliar area for a specific, little species of grass, when driving I got the impression I was window shopping at all these different ecosystem types in between developments. Unfortunately, many of the roads in that part of the park are un-maintained, bearing occasional two-foot-deep potholes and felled trees, so it proved challenging to get within more than three or four miles of the intended study plot without a very long hike through rugged terrain. I drove slowly on forest roads toward the spot on the map, which was a small ridge between Echaw creek and Santee river in Berkeley County, SC, stopping to venture into the woods every mile or two, or if I saw a noticeable change in canopy cover, understory vegetation, topography. I looked for *O. hirtellus* at each stop. It was difficult to walk too deep into the forest. Each time I got out to explore, I walked perpendicularly outward from the road until I ran into a swampy inpass, typically populated by bald cypress trees settled in blackish water, or some other obstacle like a fence or a threatening sign, so I had to turn around. The general flatness of the area perpetuates the patchy condition as water has a hard time moving away, creating terrain and forest types that would ideally call for waders or a kayak to traverse, and even then with some caution because of uncertain depth and gators, etc.

O. hirtellus on forest floor w/ pine needle and other leaf litter



O. hirtellus underside, *Q. hemisphaerica* seedlings



The patchy character of the landscape is reinforced by the alternating plots of pine trees (*Pinus elliotii*, *taedas*, *palustris*, others) and deciduous forest (*Quercus hemisphaerica*, *Quercus nigra*, *Carya cordiformis*, still interspersed with some common native pine species). In other words, there are a diverse set of forest types in this area, mostly with some population of pine, some dominated by it. Other parts of the terrain are inundated or periodically flooded, around those areas there are slightly elevated ridges where dry-loving species take advantage of this extra foot or two of elevation. I wondered as I looked for the grass, if perhaps this gradient of varied edges plays a role in limiting invasive dominance, along with the affects that the pine and swamp laurel oak and other leaves has on the permanence and depth of that medium and the ph of the soil.

After driving and hiking for several hours, I noticed a patch of cinnamon ferns out the window, and stopped to explore because we often find *O. undulatifolius* in fern valleys in MD. In addition to the larger cinnamon ferns there were several smaller native ferns as well, new york, netted chain, and ebony spleenwort. Only twenty feet off of the road, I found the only significant patch of *O. hirtellus* that I found on whole the trip. The patch was between significant acreage of what appeared to be reforested 'slash pine' consisting of a low understory indicative of seasonal controlled burns to facilitate future lumber efforts, and on the other side, a periodically flooded bald-cypress grove interspersed with areas of swamp. The ridge where I found *O. hirtellus* was approximately 50 feet wide, with a few maple, oak, and hickory trees, and very little pine, though the needles from neighboring pine areas could still be seen scattered in the leaf litter. There was a limited understory, and the ground-plane was somewhat open compared to the pine/burn area and the damp seasonally flooded areas on the other side of the patch.

Largest patch of *O. hirtellus setarius*



There are also several native grasses that grow in the various forest ecosystems including *Carex obscondia*, *Arundinaria gigantea* (a species of bamboo), *Chasmanthium sessiflorum*, *Dicanthelium commutatum*, and others. Perhaps the role and spread of these grasses have an affect on the establishment of the *O. hirtellus*, but this type of relationship was not clearly visible, I only considered it as a possible factor of several. The largest patch of *O. hirtellus*, about 30 square feet, just dissipated at its edges, as opposed to being 'stopped' by some other species or terrain edge, as though it was either recently established or it did not have the desire or capability to dominate the area, not as if it was being 'outcompeted'. In other words, the edges around the patch were similar to the composition of the rest of the forested ridge, as noted in the previous paragraphs.

As it relates to finding a biocontrol, there was little apparent damage to any of the leaflets, indicating that there are currently no insects using the leaves as a food source, from my limited observations. I examined the leaflets in each of the few small patches of the grass i found in that area, but did not see any apparent visual damage from other pathogens. There were a few very small dead spots on a couple of the leaves that were orange around the edges; specimens were collected. The most significant abnormality in any of the specimens was a red discoloration in a group of leaves on one of the plants, where the entire leaf was a noticeable shade of red; but the plant appears to be otherwise healthy, and this could just be a sign of some nutritional deficiency in the soil. This specimen was collected as well, along with a soil sample which was decidedly sandy.

Small desiccated spots with orangish edge

Red discoloration on leaflets of specimen, possible nutrient issue



From my observations, a combination of factors concerning the overall climate and habitat of that region perhaps help mitigates the spread of many of the invasives that we see in Maryland, including *Oplismenus*. For example, even in places where I found

Japanese stiltgrass (*Microstegium vimineum*), it did not dominate, and it was relatively hard to find compared to its ubiquity in many Northern states. The overall lack of stiltgrass is of note here because in Maryland, *O. undulatifolius* is typically interspersed with that invasive; it is obvious that they tend to like the same growing conditions. This leads me to question whether the same environmental factors that are keeping Stiltgrass from overwhelming the natives in the the sites i visited is part of the reason why *O. hirtellus* is kept in balance as a part of the forest communities here. Another observation is that some patches of *O. undulatifolius* we have treated in Carroll and Prince George's county MD had gone to seed 1 or 2 weeks prior to this trip, and conversely, no seeds were found on the *O. hirtellus* in SC. This could also impact the spread of the plant, perhaps limiting the time the seeds can be dispersed by wildlife and humans.

In comparing the two types of basketgrass, the most apparent visual difference in the two plants is that setarius has reddish-brown mostly smooth stems while undulatifolius has greenish-white hairy stalks. In the small amounts I found, the leaves also appeared to be slightly farther apart giving the runners a 'leggier' appearance. The leaves are nearly identical, both about two inches long iat maturity, but the setarius is perhaps slightly narrower more often than not and comes to a minutely finer point, at least in the case of the species I found.

In terms of the broader implications, obviously, this limited study leaves much to be explored in terms of searching for a bio-control for *O. undulatifolius* by studying the native plant in the same genus. Perhaps closer and further examination of the leaves or soil will reveal some pathogen or insect that can be researched further for development. However, at this time, in the absence of those discoveries, I'm of the opinion that the larger climate and ecosystem elements of the region, perhaps even the growth habit and genetics of hirtellus itself are the limiting factors currently preventing it from taking over the forest floors as its cousin is doing in the forests of the Northeast.

Comparison of *O. undulatifolius* (top) with *O. hirtellus* ssp. *setarius*



O. hirtellus ssp. *setarius*



Comparison of *O. undulatifolius* (top) with *O. hirtellus* ssp. *setarius*



Leaf comparison, undulatifolius (top) vs. setarius



Fern valley near O. h. setarius



Impassable forest road



High quality forest road near patch of O. hirtellus



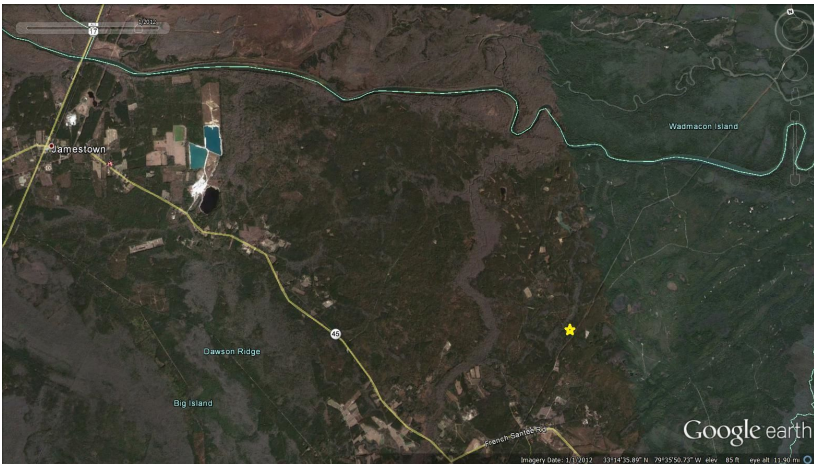
Native Dogfennel monoculture typical of clearcut sites in the study area



Small patch of stiltgrass, fern, deer tongue, others near basketgrass



Northern Francis Marion National Forest



Location of Oplismenus hirtellus ssp. Setarius

