

What Research Has Found about Cogongrass Spread and Control in the Longleaf Pine Ecosystem

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Cogongrass can invade and spread in disturbed (e.g. cutover) or undisturbed longleaf pine ecosystems (e.g. longleaf pine ecosystem with native understory) irrespective of the species richness/diversity of the community: Charles Elton hypothesized that invasion resistance and compositional stability of communities increase with diversity (Elton 1958). We conducted a study in northwest Florida to examine this diversity-invisibility hypothesis with respect to cogongrass invasion. We hypothesized that as vegetation cover (closely correlated with biomass) and functional diversity increased the rate of cogongrass invasion would decrease. Field studies were conducted at two sites, a logged site and an unlogged site in Santa Rosa County, Florida, U.S.A. The unlogged site, a longleaf pine forest, was at the Blackwater River State Forest. Both the logged site and unlogged site showed no significant relationship between the rate of cogongrass spread and native plant species richness, functional richness, and cover of the invaded community. Increased species or functional richness may increase the use of resources; however, the extensive rhizome/root network possessed by cogongrass and its ability to thrive under shade may allow for its persistence in a diverse community. The results from both the logged and unlogged sites do not support the general hypothesis of Elton that invasion resistance and compositional stability increase with diversity. Biodiversity does not appear to be an important factor for resisting cogongrass invasion in the southern United States (Collins et al., 2007).

Although fire is a tool used in the management and restoration of the longleaf pine ecosystem, fire can accelerate the spread of cogongrass if control measures are not used: In a recent research study by Yager (2007), two longleaf pine communities (pine-bluestem and pine-shrub vegetation) were examined with respect to vegetative spread of cogongrass with and without burning. Mean vegetative encroachment of cogongrass was less than 2 meters/yr for both communities; however, vegetative spread was more than double in burned plots compared to unburned plots.

Once cogongrass is established in a longleaf pine community, the infestation can significantly alter understory and overstory species composition and productivity: Our preliminary research data showed that cogongrass could significantly reduce native understory species cover in longleaf pine forests (Figure 1). Yager (2007), in her studies of the longleaf pine-blue stem and longleaf pine-shrub communities in Mississippi, observed lower species diversity and abundance of herbaceous vegetation in cogongrass infestations compared to uninfested adjacent areas. Lippincott (1997) also reported reduced herbaceous and woody cover within cogongrass patches compared to adjacent uninfested sandhill communities.

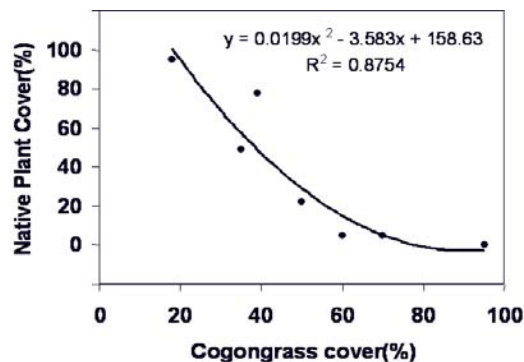


Figure 1. Native plant cover as a function of cogongrass cover in a longleaf pine forest in northwest Florida.

Past research has shown that cogongrass infestation can increase fire related mortality of longleaf pine seedlings and saplings (Figure 2). Lippincot (1997) compared fire related mortality of longleaf pine seedlings and saplings in areas infested with cogongrass and with native understory in longleaf pine sandhills and observed that mortality was significantly higher in the presence of cogongrass. Lippincot also observed that cogongrass burned hotter than the native understory species, which caused the significantly higher mortality of the overstory seedlings and saplings. As in Lippincot's (1997) study, Yager (2007) also observed that abundance of longleaf seedlings was less in cogongrass.

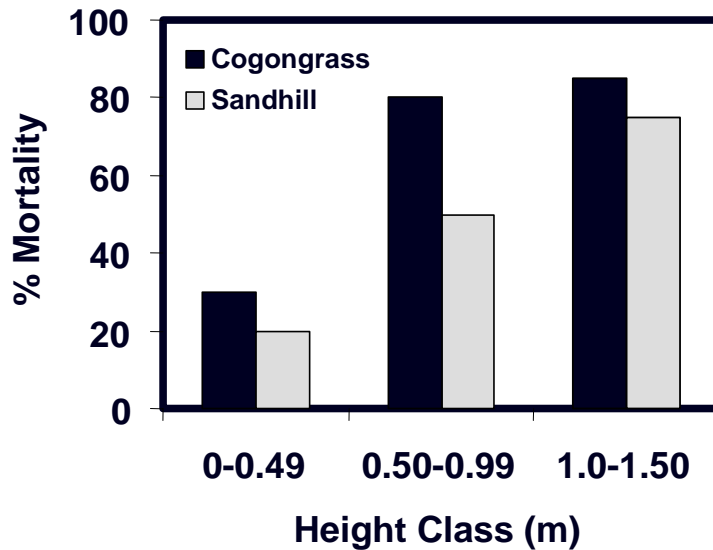


Figure 2. Mortality of longleaf pine seedlings following fire in cogongrass infested vs. non-infested (native understory) longleaf pine sandhills (Redrawn from Lippincot, 1997)

Cogongrass control in the longleaf pine ecosystem requires an integrated management strategy: Since Dr. Jim Miller and others have discussed about herbicide treatments that are effective in controlling cogongrass, I will focus on recent research findings from our research related to potential for revegetation following fire (if thatch is dense) and herbicide applications. Planting native species after herbicide or other treatments may facilitate recovery, especially if the native species can inhibit establishment or growth of cogongrass. Additionally, where eradication of the cogongrass is not feasible, restoration of some desirable ecosystem functions or diversity may be possible if native species capable of persisting within cogongrass swards are identified (Yager, 2007).

We conducted a mesocosm experiment to test if species richness or species identity is more important in resisting invasion by cogongrass. We used native understory species found in the longleaf pine ecosystem and created 10 different treatments with different species richness (including single species-monocultures) and functional richness (Daneshgar, 2007).

The results indicated the same as our prior research in that species richness was not a major factor in contributing to community resistance to invasion. Rather, it was the sampling effect or the effect of a particular species.

- **Whenever we had one particular species, such as broomsedge (*Andropogon virginicus*), as a single species (monoculture) or in mixed species treatments, cogongrass establishment and spread were reduced substantially.**

- **Broomsedge competed with cogongrass heavily belowground by allocating a large proportion of the carbon belowground. In other words, it used the same strategy that cogongrass uses in outcompeting other vegetation, but more effectively than cogongrass.**

This offers promise to use broomsedge and similar species in restoration efforts following chemical control of cogongrass. Species that were not very effective in resisting invasion in our study included wiregrass (*Aristida beyrichiana*), partridge pea (*Chamaecrista fasciculata*), narrowleaf silk grass (*Pityopsis graminifolia*), and gallberry (*Ilex vomitoria*).

Literature cited

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