

Quantifying the potential allelopathic effects of cogongrass on mycorrhizal associations

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Introduction

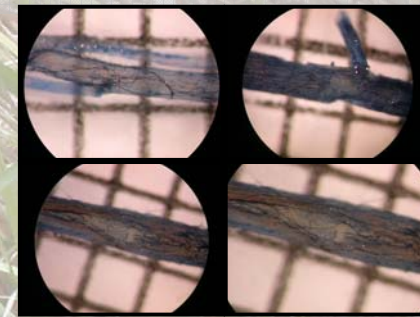
Cogongrass, *Imperata cylindrica*, is considered to be the world's seventh most important weed (Holm et al., 1999), is native to Asia (Brewer and Cralle 2002) and is invasive in the southeastern United States. Cogongrass forms monotypic stands, out-competing native plants; how cogongrass is able to do this is not completely understood. One study by Brewer and Cralle (2003) found that the addition of phosphorus to natural study plots resulted in reduced cogongrass above-ground mass and growth rates. Because mycorrhizal fungi increase a plant's ability to capture essential nutrients like phosphorus, it is hypothesized that cogongrass may have an allelopathic effect on the mycorrhizae of native plants, allowing cogongrass to be competitively dominant. In an attempt to test this theory, the percent colonization by mycorrhizal fungi of native and nonnative plants within cogongrass stands was compared to plants of the same species just outside of these stands.



Sampled stand of cogongrass near Ackerman, MS

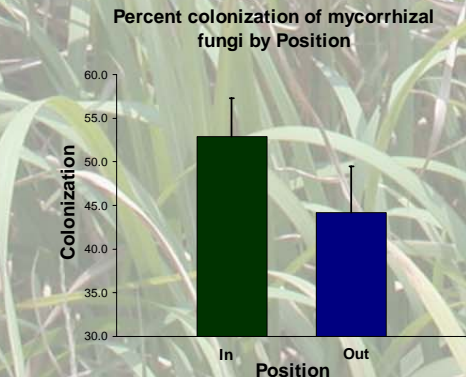
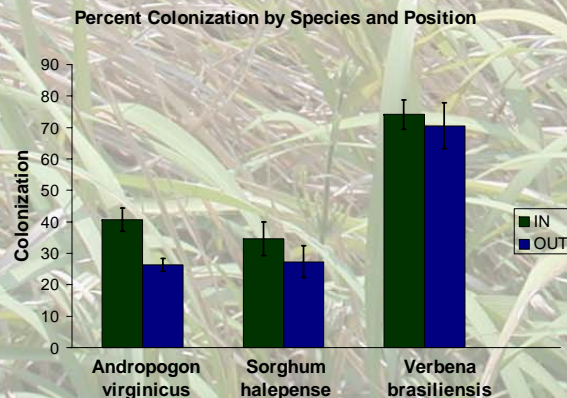
Methods

Samples of native and nonnative plants were taken from within cogongrass swards, where the density of cogongrass was greater than 85%. Plant samples also were taken from outside the swards of cogongrass but within five meters of the edge of the sward. Five plants of the same species were taken from within and outside of each sward. The roots of these samples were stained and percent colonization by mycorrhizal fungus was determined for twenty one-centimeter sections of roots for each plant.

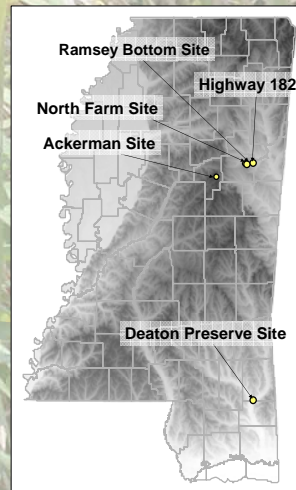


Sections of roots with 100% colonization on a grid with 1 mm squares.

Results



Stands of Cogongrass from which samples were taken



Percent colonization by mycorrhizal fungi differed among species ($P < 0.001$) and between plants growing inside and outside cogongrass swards ($P = 0.058$).

The results were opposite of what was expected, with colonization within patches higher than outside of the cogongrass patches.

This trend was evident for each of the three species found at five sites throughout Mississippi.

Discussion

Analyses indicated that site, species, and position influenced the extent of mycorrhizal fungi colonization. Analysis of soil samples indicated that the five sites were not significantly different in soil composition; the same was true for soils within vs. outside cogongrass swards. So the differences in colonization rates are thought to be due to species differences.

Literature Cited

Brewer J.S. and Cralle S.P. 2003. Phosphorus addition reduces invasion of a longleaf pine savanna (Southeastern USA) by a non-indigenous grass (*Imperata cylindrica*). *Plant Ecology*. 167: 237-245.

Holm L.F., Plucknett D.L., Pancho J.V. and Herberger J.P. 1977. *The World's Worst Weeds: Distribution and Biology*. The University of Hawaii Press, Honolulu, HI USA, 609 pp.

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