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Mechanisms of Competitive Effects of an Invasive Grass on Native Vegetation in a Restored Upland Mississippi Forest

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Summary

Overview:

My name is Griffin Williams, and I am a second year PhD student studying plant ecology in the Biology Department. My research focuses on forest restoration through the reintroduction of fire by prescribed burnings and the management of invasive plants in North Mississippi upland forests. Open oak woodlands in Mississippi are a historically fire maintained ecosystem, where fires were important in regulating the growth of a forest. These fires, a beneficial disturbance in maintaining the fire adapted ecosystem, can have a negative side effects, in that they can sometimes increase the spread and dominance of invasive plants. I will focus specifically on studying the competitive ability of the invasive plant *Microstegium vimineum*, Japanese stiltgrass, to uncover more information about the specific mechanisms by which it becomes so dominant in restored open oak woodlands.

Intellectual Merit:

Microstegium vimineum is a competitively dominant invasive grass found frequently in disturbed areas or the understories of forests across the Eastern United States. This grass spreads quickly, suppressing native plant communities. However, the specific mechanism that make *M. vimineum* so dominant in invaded ecosystems are unknown. Two current hypotheses are that 1) *M. vimineum* outcompetes native plants, by growing faster, denser, and taller and thus shading or crowding out smaller plants (or seedlings of larger plants), and 2) *M. vimineum* suppresses native plants via belowground effects, either by belowground resource competition or by chemicals secreted by the plant that may directly or indirectly inhibit the growth of native plants. Although suggested in the literature, no study has examined whether *M. vimineum* has allelopathic effects, or produces chemicals that are inhibitory to the growth of nearby plants and/or fungi. I will conduct a transplant study of native plants into natural patches of *M. vimineum* in a fire maintained open oak woodland in northern Mississippi. To test for aboveground effects of *M. vimineum*, I will compare performance responses to removal of aboveground parts of *M. vimineum* from the vicinity of the transplants. To test for belowground effects of *M. vimineum* in invaded patches, I will compare performance responses of the transplants planted in invaded soil versus those planted in transplanted, uninvaded soil. This will allow for the results to determine whether there is an aboveground, belowground, or interaction of both affecting the native plants as the *M. vimineum* spreads.

External Opportunity:

The Sigma Xi international honor society offers two funding opportunities each year. The Sigma Xi Grants in Aid of Research program, due March 15th and October 1st annually, awards grants up to \$1,000 to students in all fields of science and engineering. I will apply to the March 15th deadline with the goal of securing additional funding for travel and necessary field equipment for a future experiment on the fire-oak hypothesis at Strawberry Plains. The Sigma Xi Grant in Aid of Research is a well-known grant that will not only allow for additional research opportunities, but will also show the strength of and professional approval for the study and area of conservation.