The Effect of Soil Composition on Competition between Native and Invasive Plants

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Invasive plants such as Nandina domestica are a danger to native ecosystems. Controlled burns in Hot Springs National Park have restored some invaded areas to their original state, which is believed to have been composed mostly of sparse short leaf pine trees and herbaceous plants like little bluestem (Schizachyrium scoparium). To ensure long term success for restored ecosystems, knowledge of complex soil interactions is essential. One important player in these interactions is mycorrhizal fungi, a type of soil microorganism that forms a mutualistic relationship with plant roots and is associated with increased plant performance in suboptimal conditions. These relationships can be species specific. This leads to the question: how does the soil microbiome affect competition between native and invasive plants? To answer this, soil was taken from a restored area of the park and a nearby area invaded by Nandina. Each soil type was tested for nutrient levels, then little bluestem seedlings were grown in each type and measured after two months, along with any non-little bluestem seedlings that were already present in the soil. Statistical analysis showed that non-little bluestem seedlings performed better in invaded soil than in native soil, while little bluestem fared equally well in either type. This difference could be partially explained by the nutrient level increase for invaded soil compared to native soil, but mycorrhizal fungi symbiotic with little bluestem could also contribute. Further research, such as root staining to determine percent colonization, is necessary to determine the role these fungi play in native plant hardiness, and to what extent these benefits can be accessed by invasive species.

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