

IMPACTS OF THE INVASIVE ANNUAL GRASS *MICROSTEGIUM VIMINEUM* (JAPANESE STILTGRASS) ON NATIVE TREES AND HERBACEOUS SPECIES: SOME PRELIMINARY RESULTS. S. Luke Flory and Keith Clay, Indiana University, 1001 East 3rd Street, Bloomington, IN 47405.

Invasions of non-native plant species have often been correlated with major alterations in the biodiversity, structure, and function of native ecosystems. However, studies that experimentally manipulate invasions are needed to clarify the specific negative effects of exotic plant invasions. The purpose of this study is to determine if invasion by the exotic annual grass *Microstegium vimineum* (Japanese stiltgrass) reduces the germination, growth, and survival of native trees and herbaceous species.

Invasions of *Microstegium* are an increasing threat to eastern deciduous forests. First documented in Tennessee in 1918, *Microstegium* is currently found in at least 22 states in eastern North America and is listed as a noxious weed in two states. *Microstegium* is a highly shade tolerant C₄ annual grass that produces up to a thousand seeds per plant. When it invades it creates near monospecific stands that are highly resistant to recolonization by native species.

This experiment was designed to answer the following specific questions: 1) What are the effects of *Microstegium* invasion on tree seed germination and subsequent seedling survival and growth?; 2) What are the effects of *Microstegium* invasion on 2-year old tree sapling survival and growth?; and 3) How does *Microstegium* invasion affect the diversity and abundance of native herbaceous species? This experiment can also be used to answer questions about the potential effect of *Microstegium* on forest community composition by ranking the relative impact of invasion on survival and growth among species. If there are effects of *Microstegium* invasion on native tree survival and growth, forest succession may be slowed or stopped. In addition, differences among the nine tree species would suggest that invasions of *Microstegium* can change the composition of forest communities. Finally, there could be analogous effects on native herbaceous species such that invaded areas have lower total numbers of native plants or decreased diversity.

In October of 2005, thirty-two 5.25m x 5.25m research plots were established 2.5m apart at the Indiana University Bayles Road Botany Experimental Field north of Bloomington, Indiana. Plots were located in an old field that had been dominated by *Poa pratensis*, *Lolium arundinaceum*, and various old field weeds for at least the previous 20 years. Late in 2005, seeds of nine species of native trees were planted in 16 plots. The five large-seeded species were planted on a 12 x 12 grid with 0.4m between each seed. The smaller seeded species were sown haphazardly throughout the plots. A mixture of 12 species of native grasses, sedges, and forbs, together with a cover crop of winter wheat, was sown into all plots. In the early spring of 2006, four 2-year old seedlings of each of the 9 species of trees were planted in a 6 x 6 grid 0.75m apart in the other 16 plots. Half of all tree seed plots and half of the sapling plots were seeded with *Microstegium* in late fall 2005.

To evaluate the impacts of *Microstegium* invasion, a destructive harvest was conducted in September 2006 by removing all of the herbaceous vegetation from eight 30 cm x 30 cm quadrats within each plot. The plants were sorted to species, dried, and weighed to determine the impact of invasion on productivity, diversity, dominance, and species richness. Trees that had been sown into the plots were counted within the quadrats and in an additional 20 cm outside the quadrats for a total of two square meters of sampling area per plot. Preliminary analysis of the data indicates that invasion by *Microstegium* reduced tree survival after one growing season by more than 20%. *Acer negundo* (box elder), *Platanus occidentalis* (sycamore), and *Liriodendron tulipifera* (tulip poplar) were negatively affected by invasion while *Liquidambar styraciflua* (sweetgum) and *Fraxinus pennsylvanica* (green ash) had equal survival between invaded and uninvaded plots. Analysis of effects of invasion on herbaceous vegetation is ongoing. Future work will include determining seedling survival of sown and planted seeds, sapling survival and growth, and effects on herbaceous species each year through 2008.