

Controlled burns increase invasive grass in hardwood forests

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Controlled burning is widely used to maintain biodiversity and enhance regeneration of important deciduous tree species such as oak and hickory, but a recent University of Illinois study found that this practice also increases the growth of an aggressive species of invasive grass.

Microstegium vimineum (also called Japanese stiltgrass or Nepalese browntop) is an abundant non-native grass in southern Illinois where the study was conducted.

"We found that [fire](#) promotes the recruitment and growth of *M. vimineum*, particularly under moist soil conditions," said U of I landscape and ecosystem ecologist Jennifer Fraterrigo. "The Shawnee Hills region was never glaciated. Consequently, there are many places on the landscape that collect moisture and are highly vulnerable to [invasion](#)," she said. "Burning these areas will likely result in large invasions if seeds are present. In drier areas, burning has a weaker effect so invasions will be less severe."

In the study, burning increased grass biomass by 214 percent in wetter sites compared to 135 percent in drier sites.

"*M. vimineum* can produce a dense carpet of growth that shades out tree seedlings and other resident plants," Fraterrigo said. "It also competes well for nitrogen, thereby limiting the amount available of this nutrient to other species. Unfortunately, there do not appear to be many herbivores that eat this particular grass. So once it is established, it can

be difficult to eradicate."

Fraterrigo said that although most plants in deciduous forests are perennials, *M. vimineum* is an annual grass that produces copious amounts of tiny seeds that can be easily moved by vehicles, wildlife, and even water.

"Following burning, uninvaded areas will be highly vulnerable to invasion by *M. vimineum* if there is a nearby seed source. Even without fire, these places may eventually be invaded, but fire can speed up the process and intensify the invasion," Fraterrigo said.

"Invasion also alters fire behavior. The thatch from dead grasses is highly flammable and increases fire temperature. Hotter fires may result in reduced survival rates for tree seedlings and germination rates for seeds banked in the soil."

Fraterrigo hopes that this research will create an awareness that invasion is a potential side effect of burning. "Fire is one of the best management tools that land managers have at their disposal so we can't expect managers not to burn at all," Fraterrigo said. "Several rare [native plant species](#) thrive following controlled burning, which reduces dominant competitors. If we stop burning, those species may disappear.

"However, we need to be more cautious about when and where we use prescribed fire," she said. "And we may need to combine fire with other management techniques to prevent large invasions from happening. Harvesting is labor intensive and costly, but using herbicides post-fire may lessen the extent to which fire promotes invasion."

Provided by University of Illinois at Urbana-Champaign

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