

WELCOME

The Stewardship Network's Monthly Webcast

“Causes and Consequences of *Microstegium vimineum* (Japanese stiltgrass) invasions”

By: Luke Flory
Indiana University

Wednesday, June 9, 2010

12:00 Noon to 1pm Eastern Time

If you experience technical difficulties,
please call Meghan at 734-996-3190



The Stewardship Network

Pulling together for nature

Lisa Brush,
Executive Director,
The Stewardship Network



S. Luke Flory
Indiana University

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Stewardship Network

Garlic Mustard Challenge 2010

Pulling together for nature...

What: Collectively pull
**150,000 lbs of garlic
mustard**

When: April 14th- July 9th, 2010

Where: Anywhere there is
invasive garlic mustard

Who: You! Pull with a volunteer
group, on your own in your
backyard, with your grounds or
landscaping crew, with a school
group... **anyone** can get
involved!

How it works: Anytime that you or a group pull garlic
mustard, **report how many bags or pounds** to the
Stewardship Network at...

www.stewardshipnetwork.org/2010Challenge





The Stewardship Network was established in 1998 to build the capacity of organizations, individuals, and businesses to preserve, restore, and manage natural lands and waters.

The Network collaborates with nonprofits large and small, governmental agencies and units, private business, and dedicated individuals to achieve that goal.

connect to protect our natural areas



Webcasts are one of the many ways the Network brings people together.

The Network also sponsors

- Hands-on Trainings
- Online Resources – Forum, Searchable Events Calendar, etc.
- Local Stewardship Clusters
- Stewards Circles
- Stewardship Services

connect to protect our natural areas



Our Local Clusters



Cluster Areas

- Headwaters Cluster
- Huron Arbor Cluster
- Raisin Cluster
- Southwest Corner Cluster
- West Michigan Cluster
- Lakeplain Cluster
- Mid-Michigan Cluster
- ThrEE County Cluster

Upcoming Events

Headwaters Cluster

- **Lunch and Learn:** to participate in future webcasts
 - Each **second Wednesday** of 2010
Oakland County Parks Admin Building, Waterford, MI
- **Event Name, Date @ Location**

Huron Arbor Cluster

- **Stewards' Circles –**
 - **Second Tuesdays** of 2010, 7:30-8:30am, @
Brueggers Bagels, N. University, Ann Arbor
- **Name of Event, Date @ Location**

Lakeplain Cluster

- **Name of Event, Date @ Location**

Mid-Michigan Cluster

- **Name of Event, Date @ Location**

Raisin Cluster

- **Name of Event, Date @ Location**

Southwest Corner Cluster

- **Name of Event, Date @ Location**

West Michigan Cluster

- **Name of Event, Date @ Location**

**Lisa Brush,
*Executive Director,
The Stewardship Network***



**S. Luke Flory
Indiana University**

**Causes and consequences of
Microstegium vimineum (Japanese
stiltgrass) invasions**



Biological invasions as agents of global environmental change

Potential effects:

- Declines in biodiversity and habitat quality
- Changes in ecosystem functions
- Pathogen epidemics/outbreaks

***Invasions provide unique opportunities for ecological and evolutionary research**



Approaches to evaluating effects of biological invasions

1. Comparative – invaded and invader-free areas

- Quick and easy
- Provide broad patterns
- Cause and effect may be hard to disentangle

2. Removal experiments

- Removal method may determine results
- Possible effects of invasion that cannot be removed

3. Experimental invasions

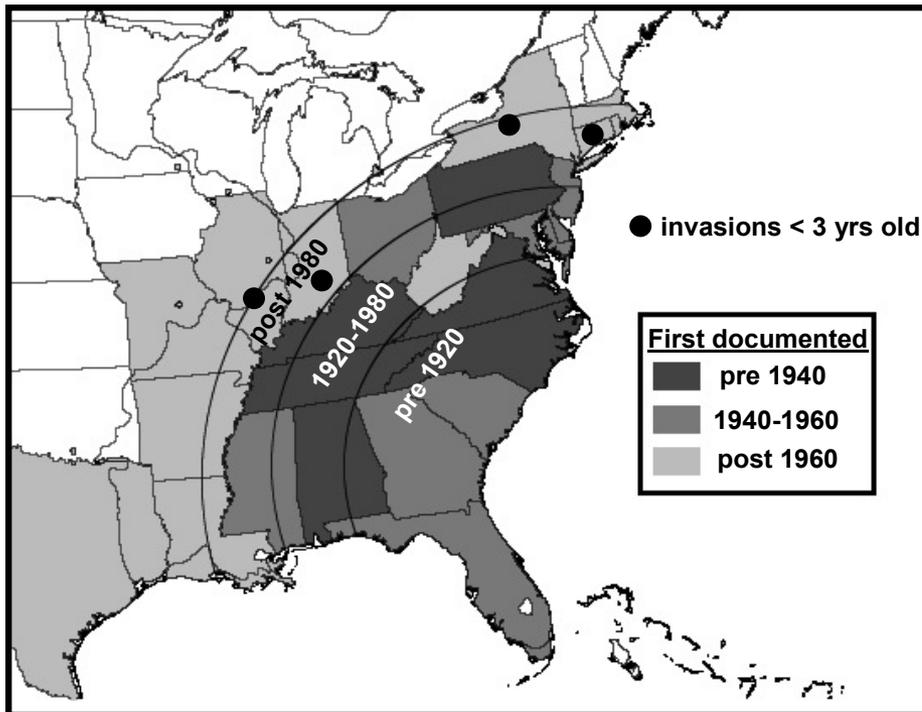
- Provide controlled, realistic situation
- Ethical concerns



Microstegium vimineum (Japanese stiltgrass)

Characteristics

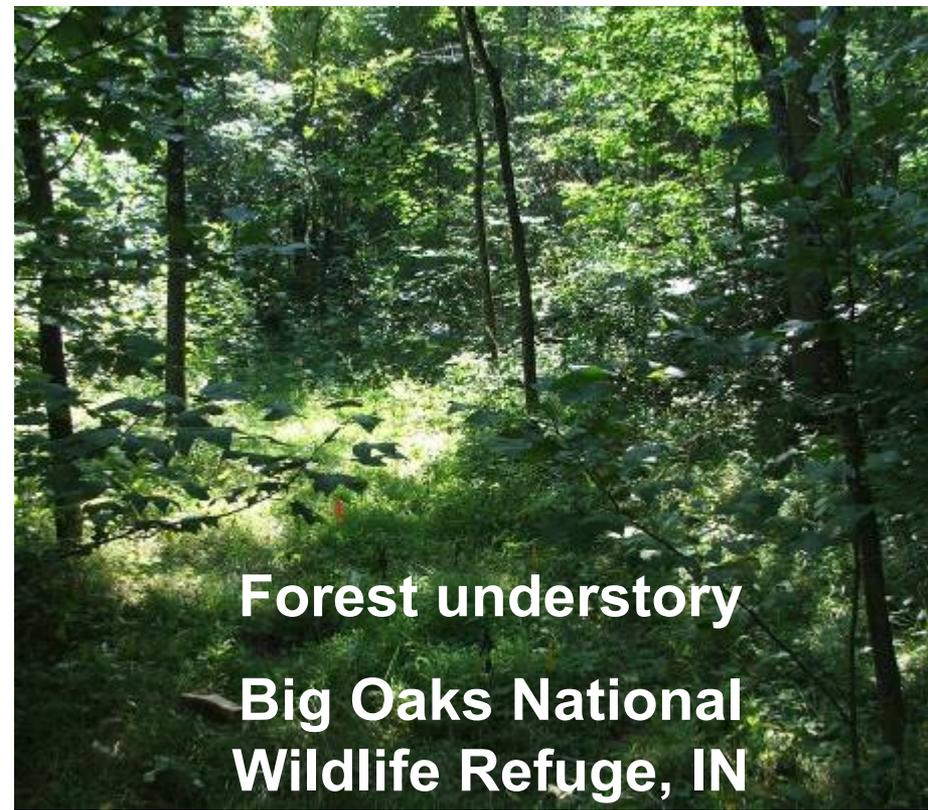
- Annual “warm season” grass
- Shade tolerant
- Produces millions seeds/m²
- Native to southeast Asia
- Few herbivores/pathogens





Microstegium invades a wide range of habitats

- disturbed riparian areas, along streams and rivers
- roadsides, trails
- shaded undisturbed forests and full sun habitats





Big Oaks National Wildlife Refuge, IN

Outline

1. Effects of *Microstegium* invasions
2. Management options and response of native species
3. Fire and invasions
4. Pathogens on *Microstegium*
5. What you can do



Invasion experiment: Design

All plots
9 tree sp
12 herb sp

tree saplings	tree saplings + <i>Microstegium</i>
tree seeds	tree seeds + <i>Microstegium</i>

x 8 replicates





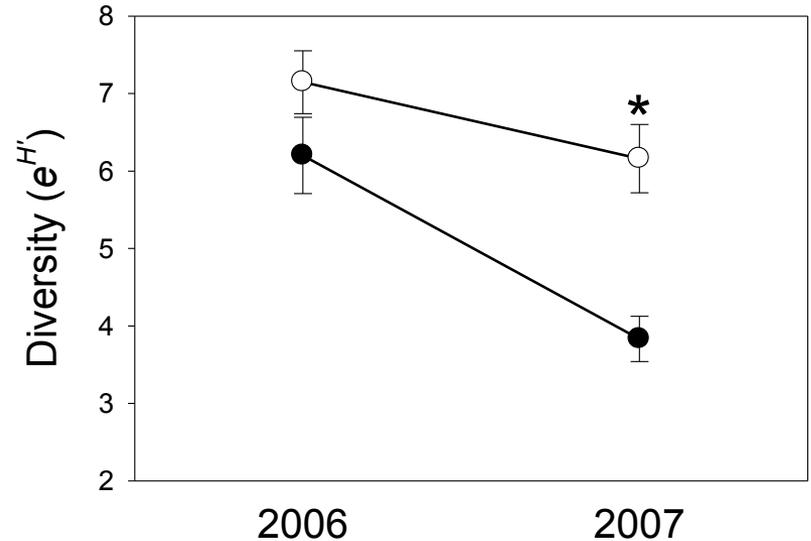
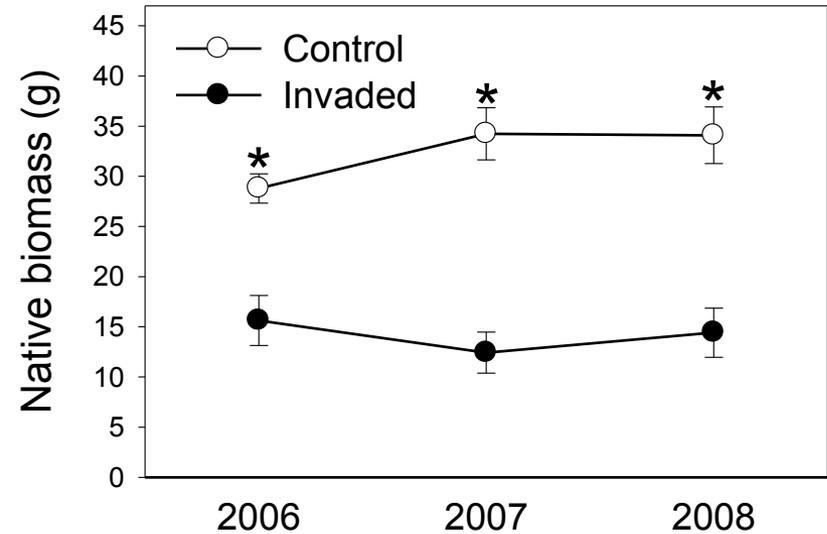
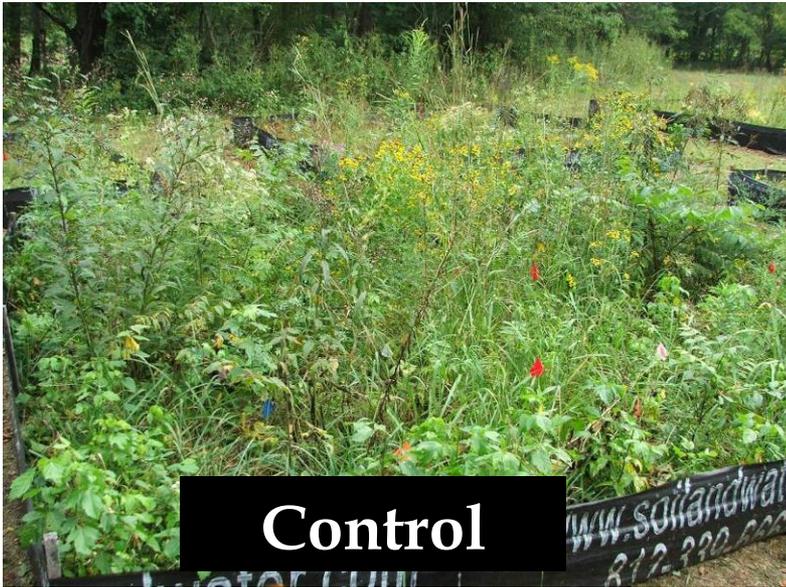
Control



Invaded

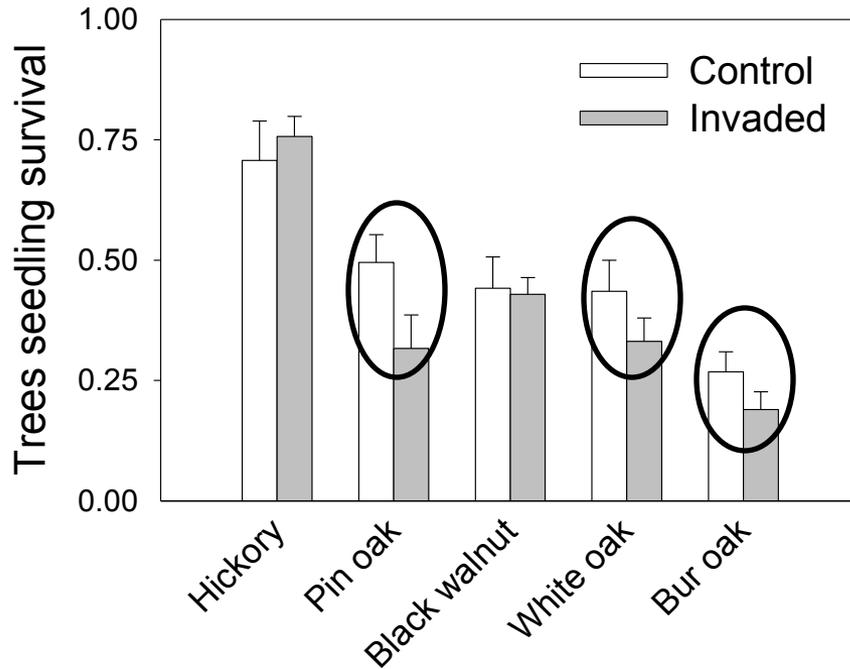
IU Research and
Teaching Preserve
Bayles Road

Results: *Microstegium* reduces native plant productivity and diversity



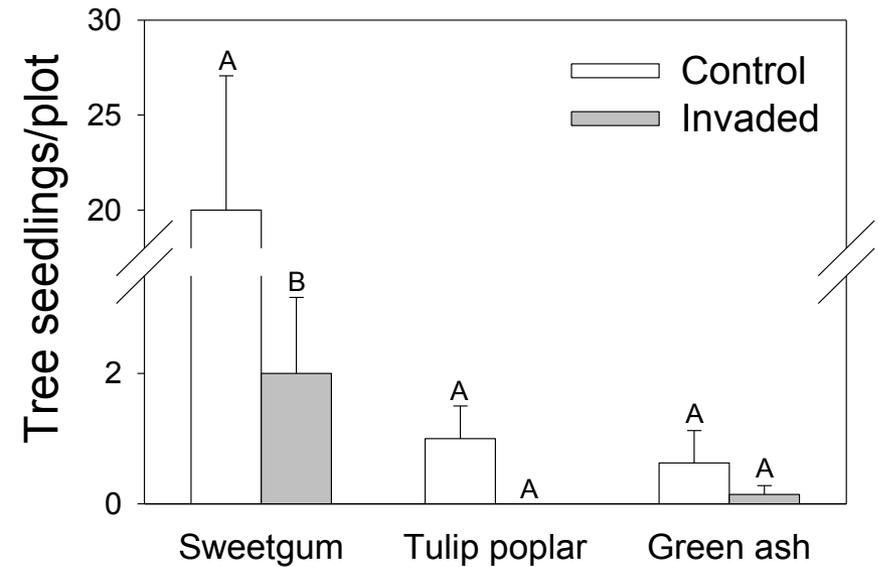
Microstegium inhibits small-seeded tree regeneration

Large-seeded species



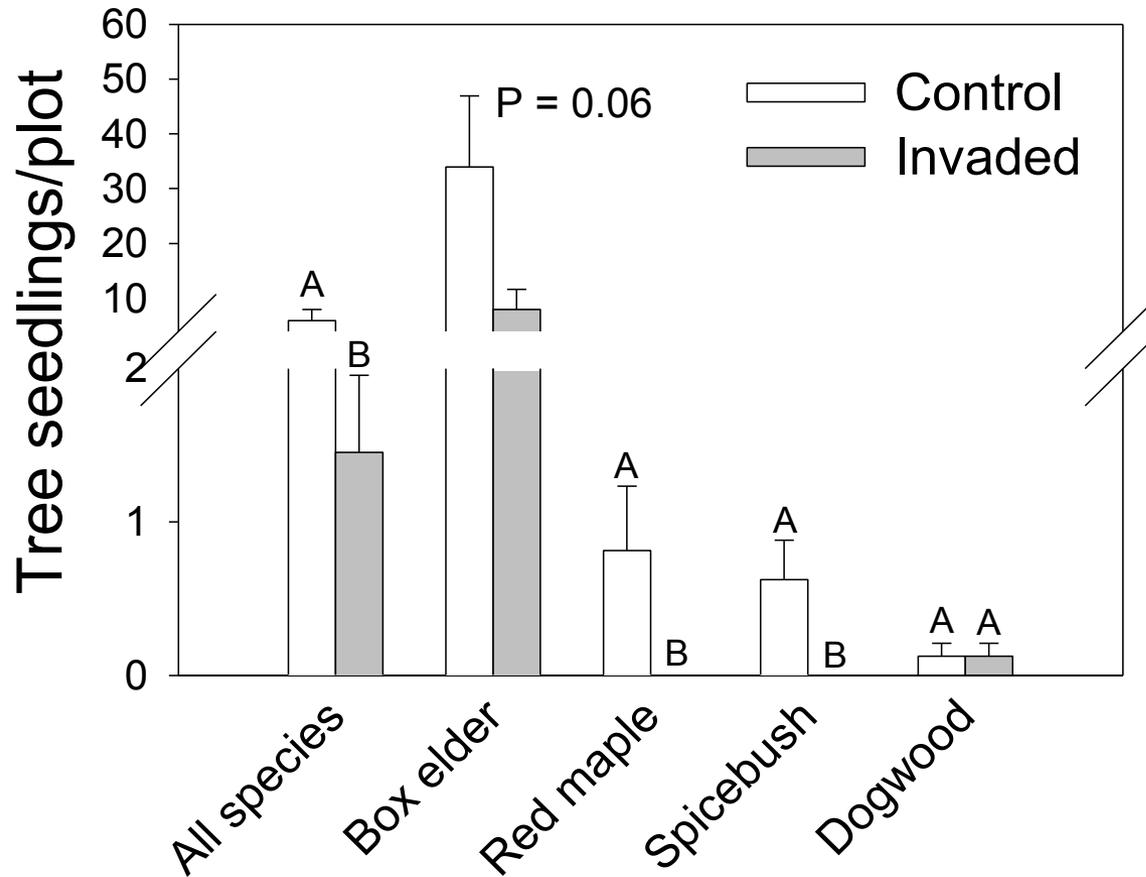
No reduction in large-seeded species survival

Small-seeded species



Significant declines in survival of small-seeded species due to invasion

Microstegium reduces natural tree regeneration



*But no effect on the survival or growth of tree saplings

Potential mechanisms

- Changes in light availability
- Altered native herbivore behavior
- Accumulation of *Microstegium* thatch
- Nitrogen cycling



Early season
High light availability



Late season
Very low light (<3%)

Results: *Microstegium*
reduces the survival of two
tick species



Dave Civitello
Indiana University

Civitello, D., S.L. Flory and K. Clay
Journal of Medical Entomology, 2008

Results: *Microstegium*
reduces arthropod
abundance and diversity



Carolina Simao
Undergraduate at
Rice University

Simao, C., Flory, S.L and J. Rudgers, *Oikos* 2010

Consequences of *Microstegium* invasion

- ✓ Native plant diversity
- ✓ Forest succession
- ✓ Arthropod diversity
- Nutrient dynamics
- ✓ Decomposition
- ✓ Disease vectors
- ✓ Fire behavior
- Carbon storage



Removal Experiment Methods

4 Treatments

Reference
(control)



Hand-weeding



POST
herbicide

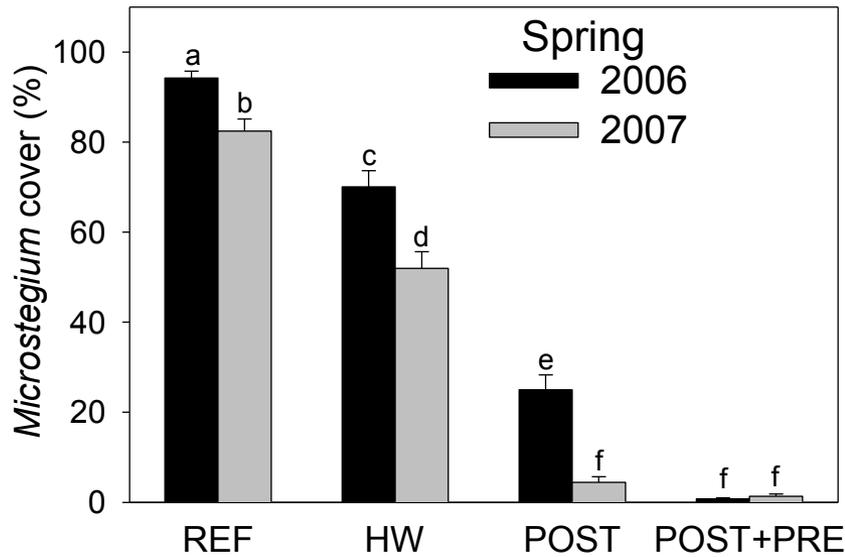
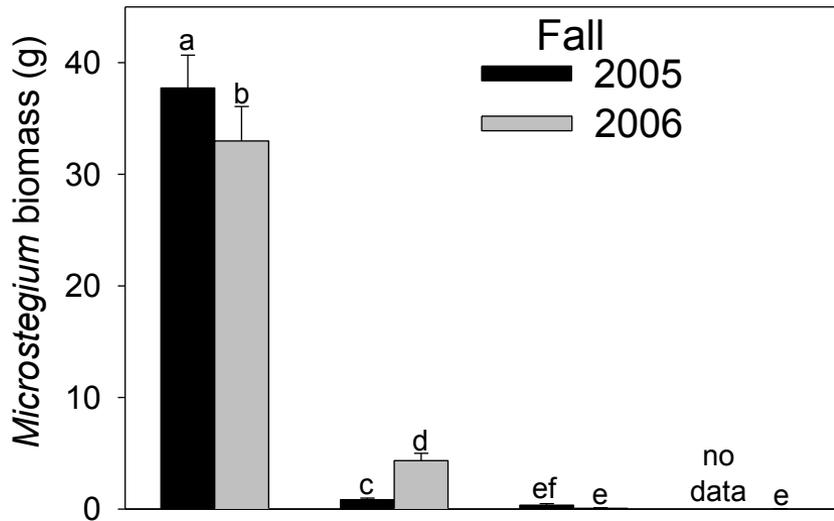


2m
POST + PRE
herbicide

2m

Grass specific
Post-emergent
herbicide
plus
Pre-emergent
herbicide

Results: Efficiency of removal



Results: Native community responses



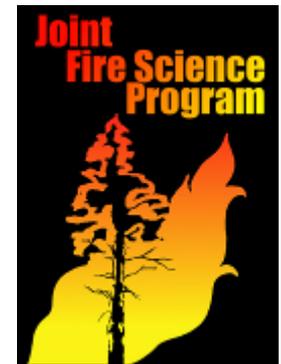
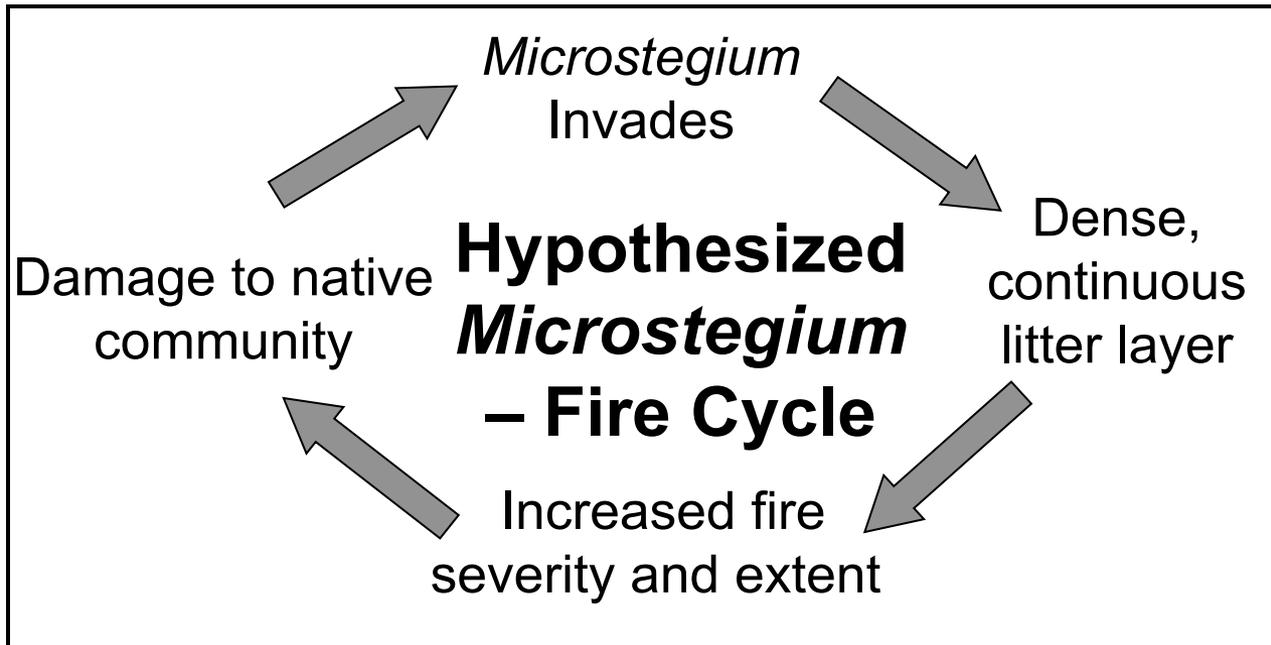
- Increase in native species abundance with all three removal treatments
- Positive response in native community diversity only with hand-weeding and post-emergent herbicide
- 123% increase in native tree regeneration with post-emergent herbicide

Management of *Microstegium* invasions

- *Microstegium* can be effectively and efficiently removed using grass specific herbicide
- Removal of *Microstegium* results in the return of native species and promotes tree regeneration
- Return of native species after *Microstegium* removal suggests suppression by *Microstegium*



Fire and *Microstegium* invasions



Microstegium invasions increase prescribed fire intensity

- Increased peak fire temperature
- Higher flame heights
- Greater percent of habitats burned



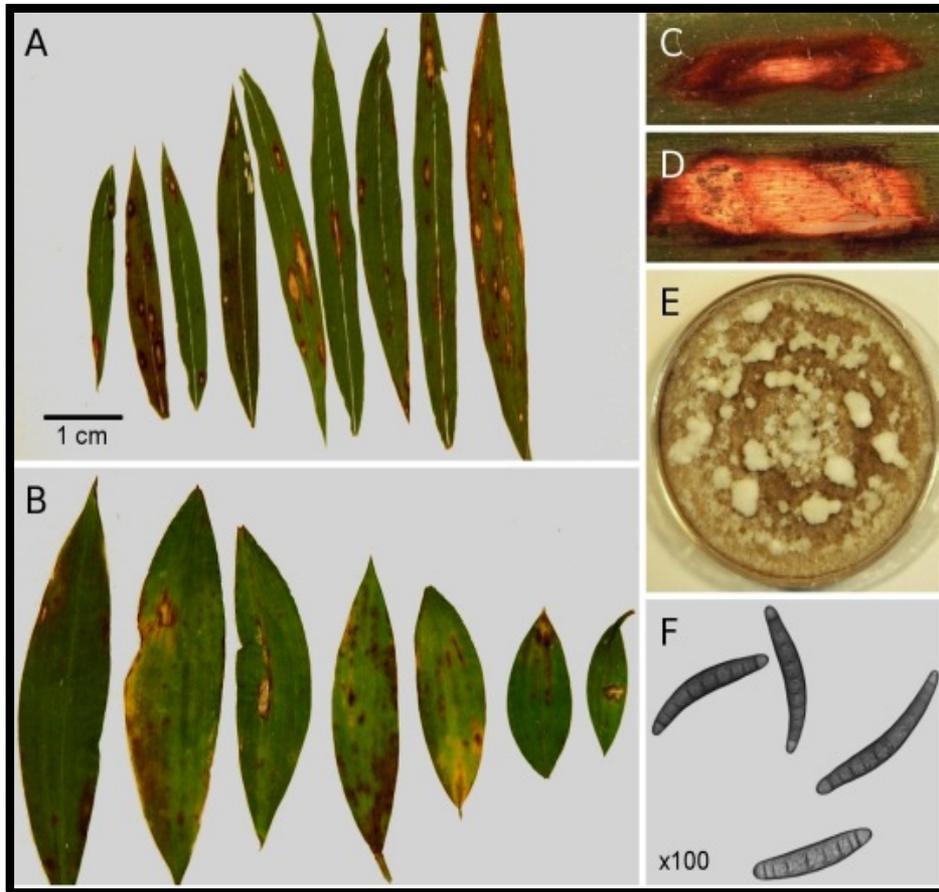
Microstegium invasions and fire

Ongoing research will determine:

- How fire and the timing and frequency of fires affect *Microstegium* population dynamics
- How the fire/invasion interaction affects native species
- Management options



Identification of a *Microstegium* pathogen



***Bipolaris* sp.**

Web site to report disease sightings:
www.indiana.edu/~mivi/

Methods for controlling *Microstegium* invasions

Method	Recommended?	Notes
Fire	NO	Not currently recommended; more information is needed to determine if properly timed fires might help control invasions
Glyphosate (e.g. RoundUp)	NO	Results in damage to native species; equally effective selective herbicides are available
Grass-specific herbicides	YES	Mix 22 ml herbicide with 15 ml of surfactant and apply at 40 psi with a backpack sprayer*
Hand-weeding	YES	Practical only for very small invasions, must be repeated throughout the season
Mowing	YES	Can be used late in the season when plants begin to flower but before seed has matured; must be repeated yearly
Pre-emergent herbicides	NO	Effective at eradicating invasions but prevents establishment of native species

*Grass-specific herbicides include those with the active ingredients fluazifop-P-butyl, sethoxydim, or fenoxaprop-ethyl. Recommendation above is for fluazifop-P-butyl; check labels for proper application rates and regulations. Generally, *Microstegium* is effectively killed at much lower application rates than what is recommended on labels.

*** PDF on identification and management of
Microstegium available from www.lukeflory.com**

What you can do

1. Monitor natural areas for new invasions of *Microstegium*
2. Remove invasions with grass-specific herbicide to promote native species recovery
3. Reduce seed dispersal by limiting mowing during seed production and by cleaning seeds from boots and hand tools

THANKS FOR JOINING US!



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**Join us next month:
Wednesday [Date], [Year]
11:45 to 1pm Eastern Time**

Topic:

[Next Month's Topic]

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