Mechanical and biological control methods for Japanese stiltgrass (*Microstegium vimineum*)

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Introduction

Japanese stiltgrass (*Microstegium vimineum*) is a highly invasive Asiatic grass that was introduced to the United States in the early 1900s. Since then, it has spread to 23 states in the eastern U.S. where it invades and dominates roadsides, disturbed sites, stream banks, and forest understories. While mowing is a frequently recommended control method, few studies have quantified its effects and efficacy. In this study, we aimed to quantify the effect of mowing height on regrowth and reproductive output in *M. vimineum*, as well as the effects on the surrounding plant community, in the hopes of providing information for the development of more effective control programs.

Fig 1. *Microstegium vimineum* with identifying silver midrib.

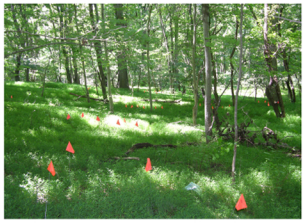

Fig 2. *Microstegium vimineum* invading a forest understory (Newark, DE).

Methods

In late August 2014, 0.5m x 0.5 m plots were established and one of four treatments was applied: (1) cut at ground level, (2) cut at 5 cm, (3) cut at 10 cm, and (4) control (no cutting). There were 5 replicates. Each plot was photographed and a plant survey was conducted. After the treatments were applied, each plot was photographed again. The plant matter that was cut during "mowing" was collected and removed from the plots. Each week, every plot was photographed.

In October, six weeks after "mowing," a second plant survey was conducted for each plot. Then the vegetation in each plot was cut at ground level and collected in labeled bags. The vegetation was separated into *M. vimineum* vegetation and "other" vegetation. *M. vimineum* seed spikelets, if present, were removed and counted. The seed spikelets, *M. vimineum* vegetation, and "other" vegetation were dried at 27°C for five weeks and weighed for reproductive and aboveground biomass data.

Results

Regrowth Capability

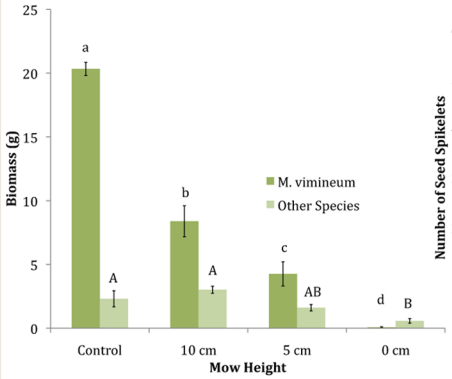

Figure 3. Aboveground dry biomass of *Microstegium vimineum* (±SEM) and all other present species (±SEM) 6 weeks after mowing at varying heights (0 cm, 5 cm, 10 cm, and no cutting). Letters indicate Tukey significance (p<0.05).

Reproductive Output

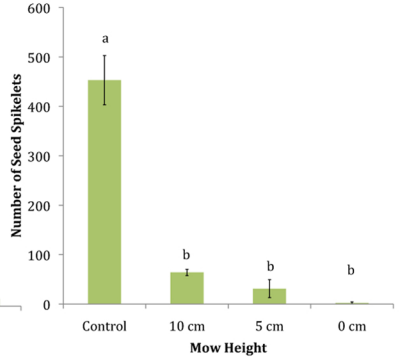

Figure 4. Total number of *Microstegium vimineum* seed spikelets (±SEM) 6 weeks after mowing at varying heights (0 cm, 5 cm, 10 cm, and no cutting). Letters indicate Tukey significance (p<0.05).

Plant Community

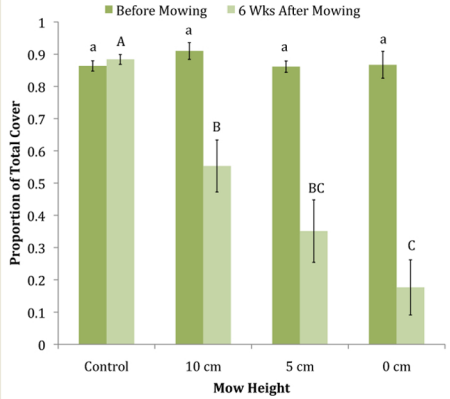

Figure 5. Proportion of total cover by *Microstegium vimineum* (±SEM) before mowing and 6 weeks after mowing at varying heights (0 cm, 5 cm, 10 cm, and no cutting). Letters indicate Tukey significance (p<0.05).

Other Species Present:

Celastrus orbiculatus
(oriental bittersweet)

Parthenocissus quinquefolia
(Virginia creeper)

Rosa multiflora
(multiflora rose)

Smilax glauca
(cat greenbrier)

Smilax rotundifolia
(common greenbrier)

Toxicodendron radicans
(poison ivy)

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Figure 6. A plot before mowing (above) and six weeks after mowing at 10 cm (below).

Figure 7. A plot before mowing (above) and six weeks after mowing at 0 cm (below).

Conclusions

- Aboveground biomass of *M. vimineum* decreased significantly with decreasing mow height
- Only mowing at ground level significantly reduced biomass of other species present in the plots
- Mowing at any height significantly reduced *M. vimineum* reproductive output
- Mowing at ground level most significantly reduced the proportion of total cover by *M. vimineum*

Future Work

During the 2015 season, we will explore the effects of mow height in conjunction with mowing time (i.e. prior to flowering vs. after flowering), as well as the effects of leaf mulch, on the regrowth and reproductive output of *Microstegium vimineum.* These factors may act synergistically to limit *M. vimineum* populations.

Acknowledgements

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