

Variation in plant responses to grasshopper herbivory among the cultivars of the introduced *Miscanthus sinensis*

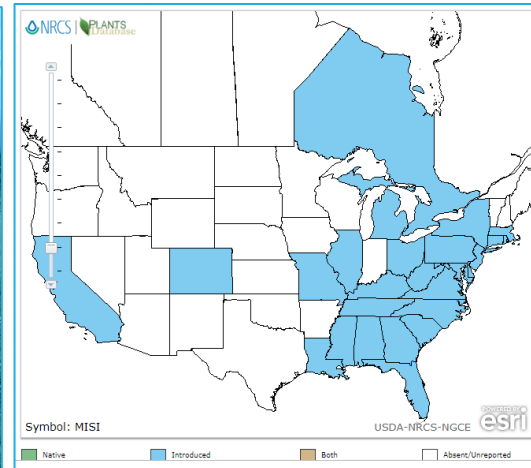


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Miscanthus sinensis Andersson

Chinese silvergrass



- Native to Japan
- 1893: introduced to Asheville NC; 1894: Washington DC
- 1940: naturalized populations in New York, Washington DC, Florida, West Virginia
- 2018: reported in 27 states
- disturbed areas, open fields, forest understories (in Maryland)

Miscanthus sinensis cultivars

- one of the most popular ornamental plants
 - > 100 cultivated varieties
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- Striped pattern
- Less vigorous, less invasive



- 'all-green' plants
- More aggressive

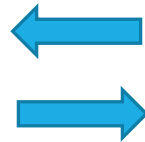
Why?

Research focus: the interaction between introduced *M. sinensis* and native insect herbivores



Melanoplus grasshoppers
(Orthoptera: Acrididae)

Native



Miscanthus sinensis
(Poaceae)

Introduced

Our previous research results



Plant responses to grasshopper herbivory:

Introduced plants \leq Native plants

Introduced grasses demonstrated lower resistance to grasshopper herbivory than native grasses, while they tolerated the herbivory similar to native grasses



Grasshopper preferences:

Introduced plants $>$ Native plants

Grasshoppers do not avoid introduced plants, and even prefer to feed more on introduced plants than on native plants

Interactions between native *Melanoplus* grasshoppers and introduced *Miscanthus sinensis* cultivars

RQ. Do *M. sinensis* cultivars differ in their resistance and tolerance to grasshopper herbivory?



'Zebrinus'



'Dixieland'



'Autumn Anthem'



'Gracillimus'



'Morning Light'



Field experiments



Melanoplus spp.



Greenhouse experiments

Field Experiments

- 5 cultivars
- 150 plants: 30 plants/cultivar
- measured plant growth and leaf damage at 4 time points



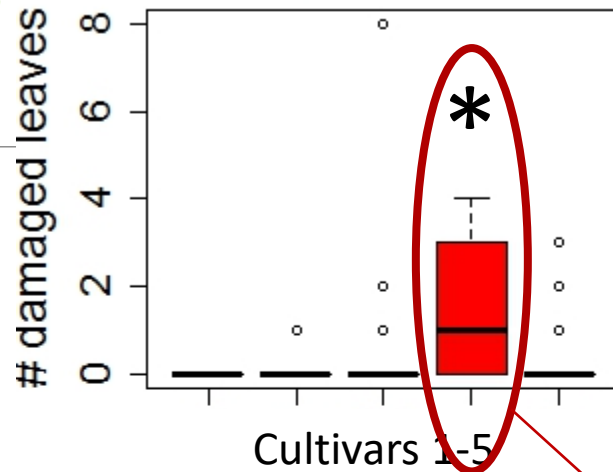
June 2018



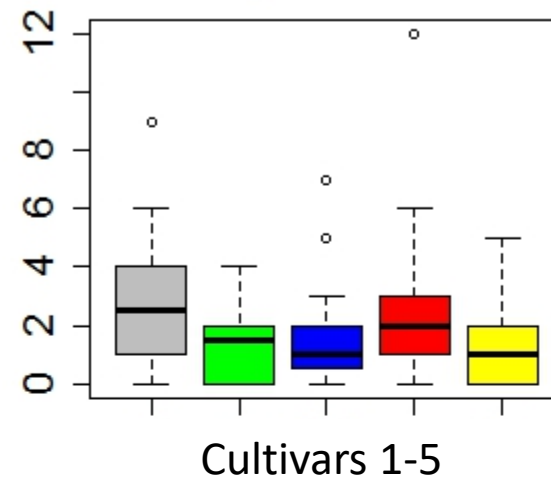
August 2018



July 12, 2018

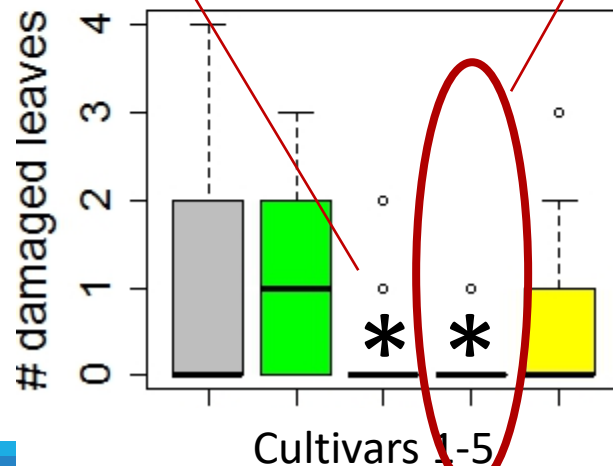


Aug 3, 2018



'Gracillimus'

Aug 22, 2018



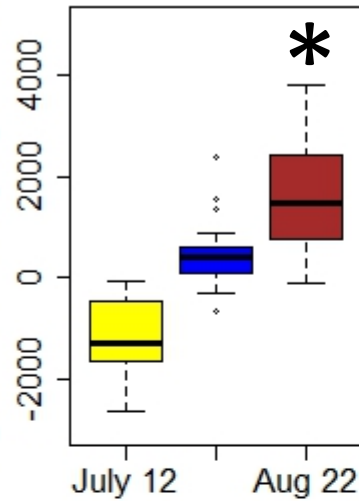
'Morning Light'

Plant resistance to herbivory: field



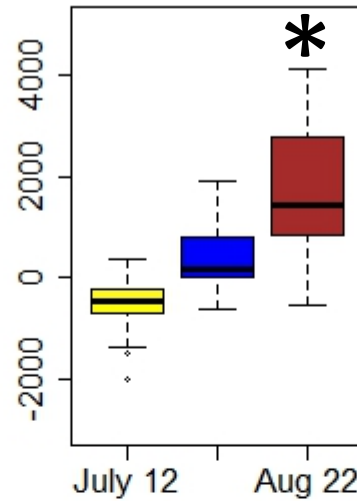
Changes in biomass, [height x #leaves]

Cultivar 1



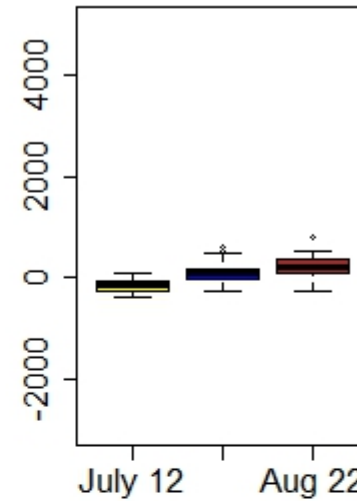
'Gracillimus'

Cultivar 2



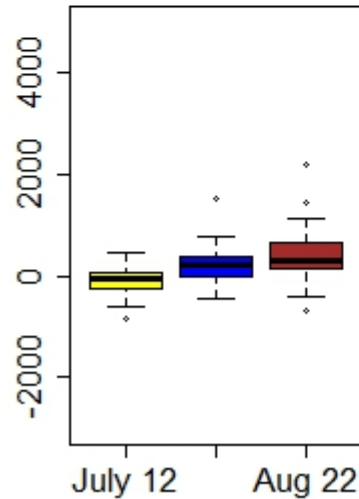
'Autumn Anthem'

Cultivar 3

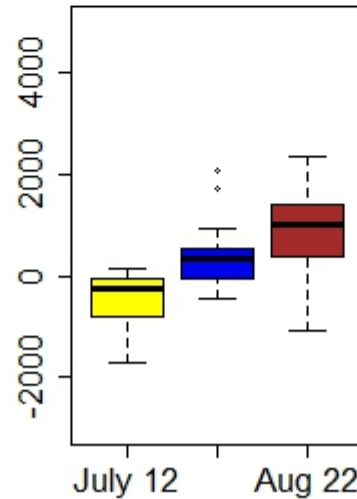


Cultivar 4

Changes in biomass, [height x #leaves]



Cultivar 5



Plant tolerance to herbivory: field

Greenhouse experiments



- 5 cultivars
- 150 plants: 30 potted plants/cultivar

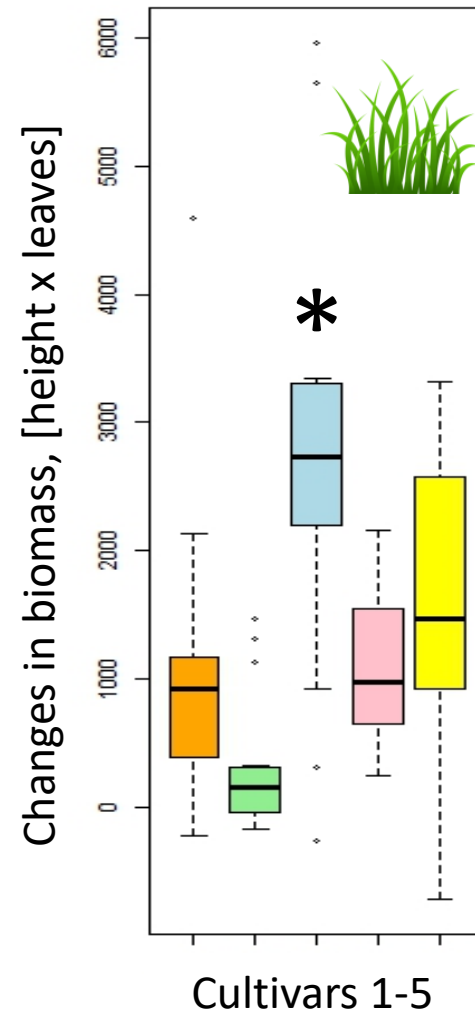
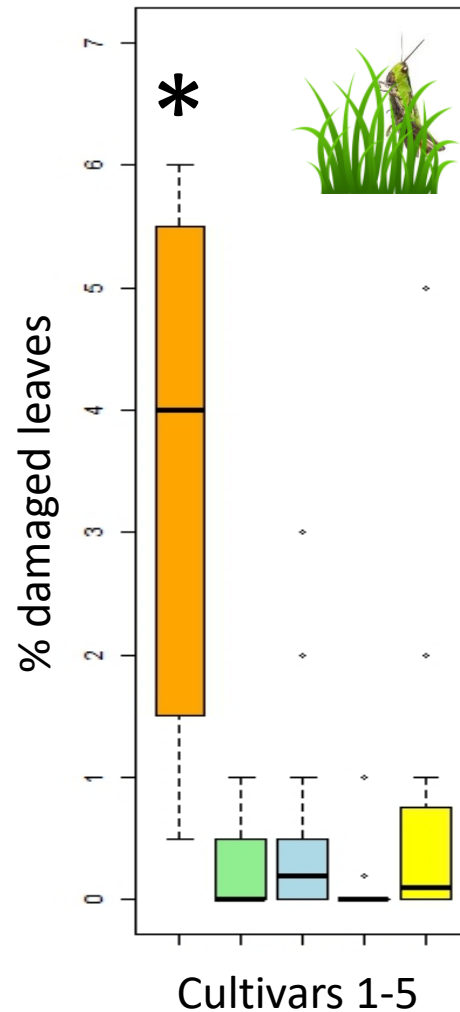
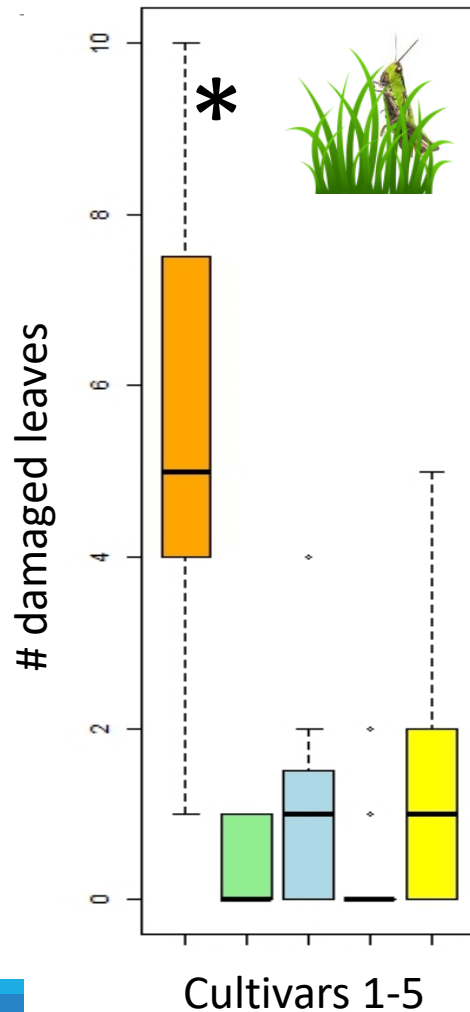


Days 1-3



Plant Resistance and Plant Tolerance to Herbivory: Greenhouse

'Autumn Anthem'



'Gracillimus'

Conclusions



- Grasshoppers feed on all the cultivars
- Plant responses differ among the cultivars

Plant resistance :

- plant resistance to herbivory in 'Gracillimus', 'Morning Light', and 'Autumn Anthem' ('all-green' cultivars) is significantly lower than that in other cultivars in the beginning of the season, but it is significantly higher at the end of the season

Plant tolerance:

- plant tolerance in 'Gracillimus' and 'Autumn Anthem' ('all-green' cultivars) is significantly higher than that in other cultivars



Potential for invasiveness

Future direction

RQ1. Do *M. sinensis* cultivars differ in their resistance and tolerance to grasshopper herbivory?



M. sinensis
wild type



M. sinensis
cultivars



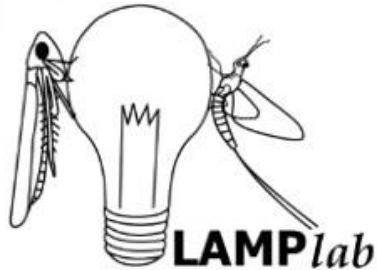
RQ2.

Evolutionary changes:

Do the plant responses to herbivory in *M. sinensis* cultivars differ from the plant responses in *M. sinensis* wild type?



Thank you!



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