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Phylogenetically novel species are more successful due to high competitive ability at local and regional scales

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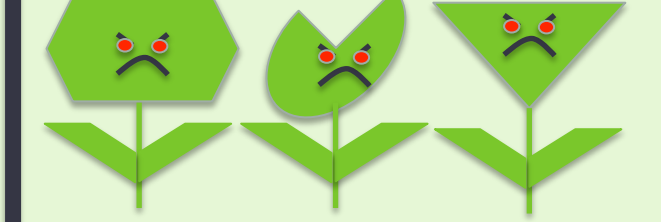
Phylogenetically novel species are more successful due to high competitive ability at local and regional spatial scales

By Amy Patterson |

Advisor: Dr. Tiffany Knight, Washington University Department of Biology
Mentors: Cassandra Galluppi, Sam Levin, Erynn Maynard

Introduction

Just a few kinds of invasive species



Threaten

- Biodiversity
- Ecosystem function
- Recreation

How and why did these species become invasive?

Many hypotheses exist, but there is no certain consensus...

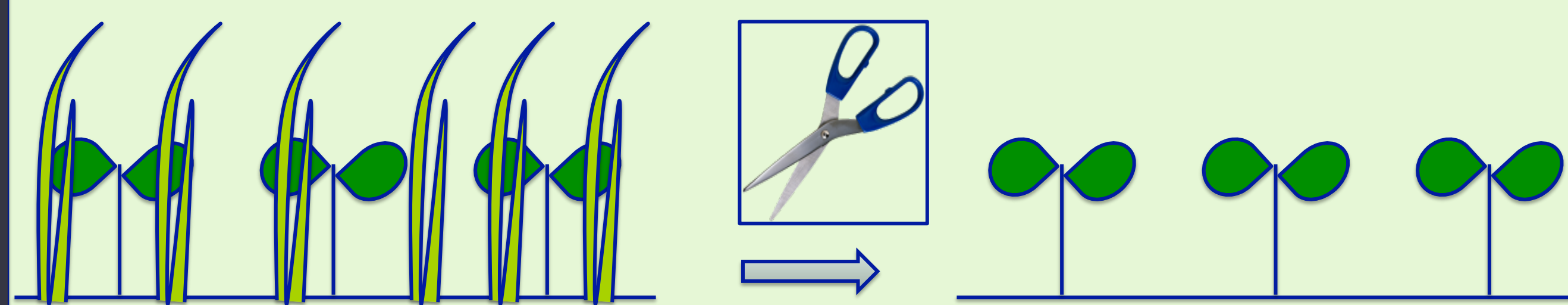
Our Framework

= Darwin's Naturalization Hypothesis
+ mechanistic approach
+ multiple spatial scales.

Research Questions

- Does phylogenetic novelty correlate with high competitive ability?
- Does this relationship differ when novelty is assessed at regional versus local spatial scales?
- How does this mechanism differ between native and invasive species.

Field Methods



Time: summer 2013, summer 2014

Place: Tyson Research Center (Washington University in St. Louis)

Conclusions

- Increased phylogenetic novelty correlates with decreased effect of competitor reduction treatment
- This pattern is driven by effect sizes in native species
- Our study is the first study to experimentally manipulate competition in the field and correlate the effect size to phylogenetic novelty, thus we are the first to show that novel species are more successful due to competitive ability

Focal species

Family	Fabaceae	Rosaceae	Caprifoliaceae	Asteraceae	Lamiaceae
Invasive Exotic	Lespedeza cuneata	Potentilla recta	Lonicera maackii	Carduus nutans	Teucrium canadense
Common Native	Desmodium perplexum	Geum canadense	Symphoricarpos orbiculatus	Cirsium discolor	Perilla frutescens

Photographs from www.illinoiswildflowers.info/

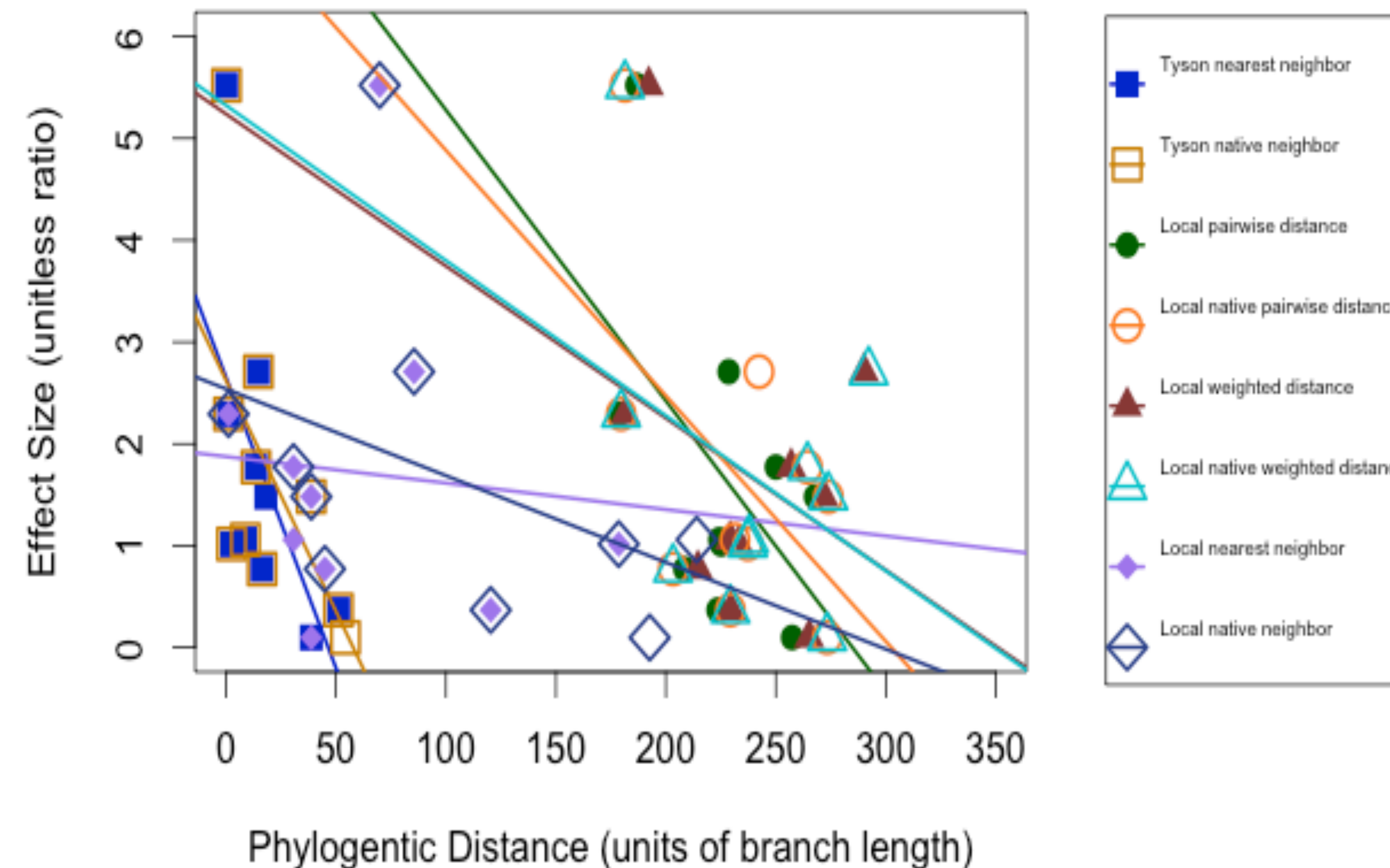
Finding phylogenetic distance

Lespedeza cuneata local community (Red invasive, black native)

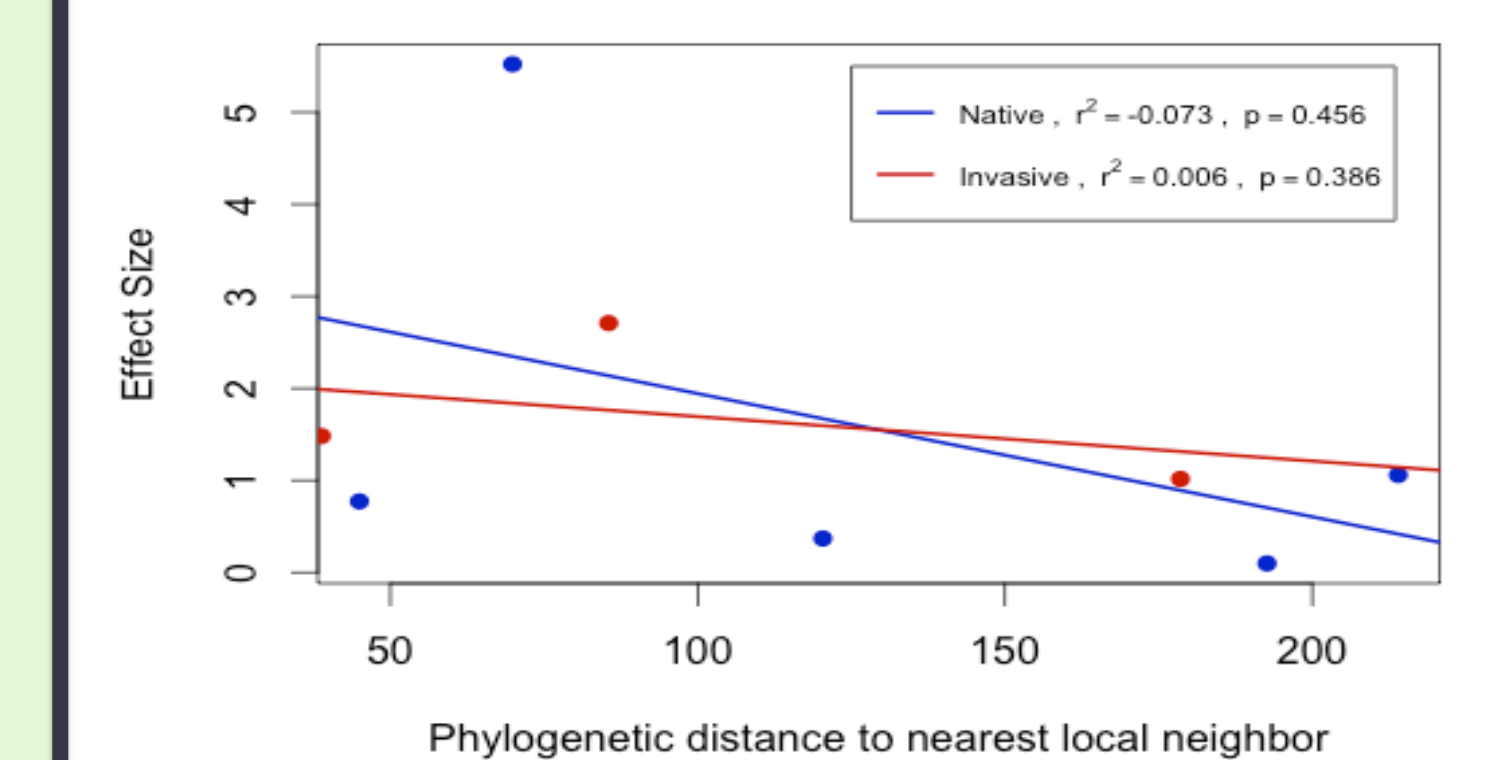
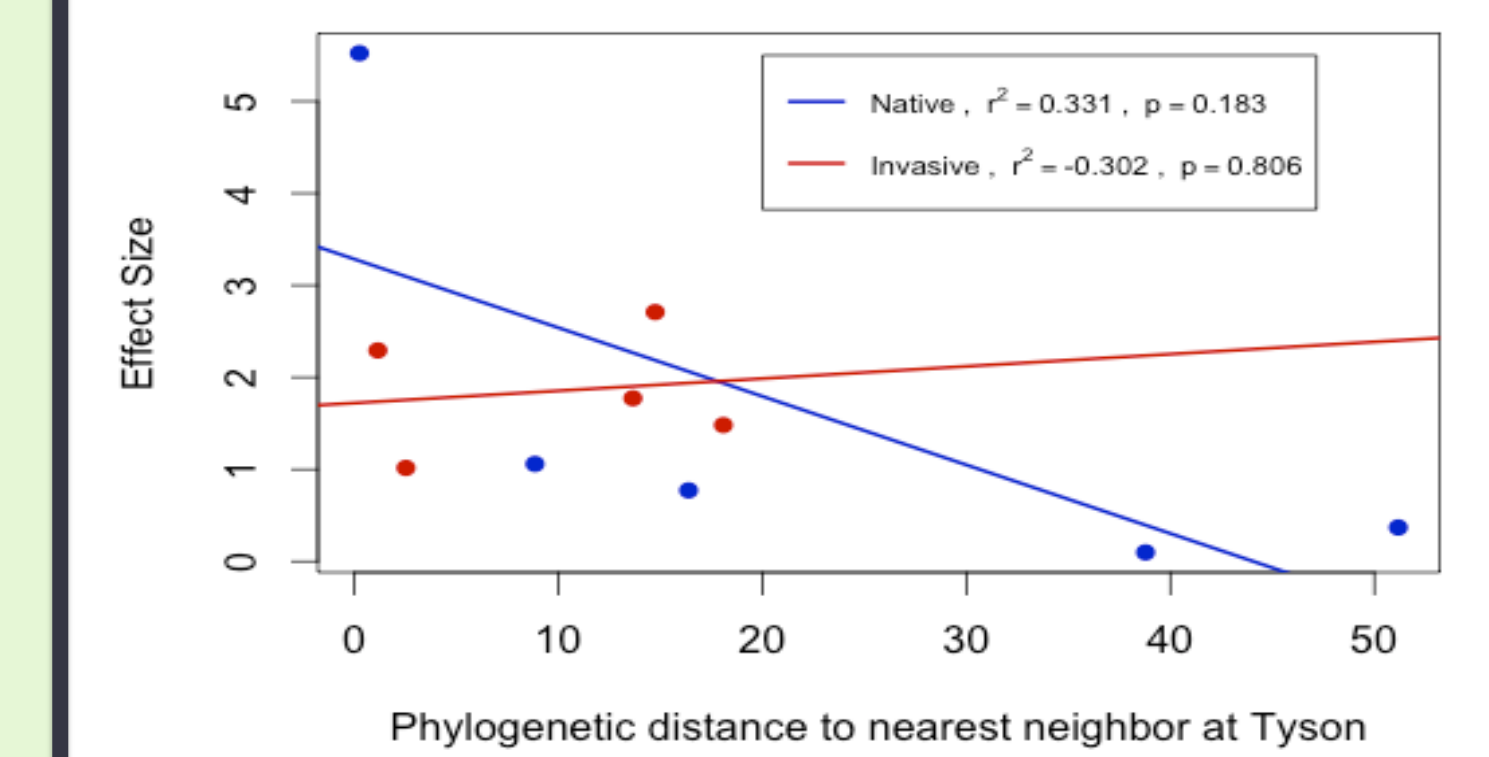


The distance between *Lespedeza cuneata* and *Aclypha gracilis* is less than the distance between *L. cuneata* and *Teucrium canadense*

High Phylogenetic Novelty
= Low effect of Competitor Reduction
= High Competitive Ability



Driven by native species, especially at Tyson scale



Acknowledgments

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