NC STATE UNIVERSITY College of Agriculture and Life Sciences

Assessing non-chemical strategies to increase an important predator in flue cured tobacco

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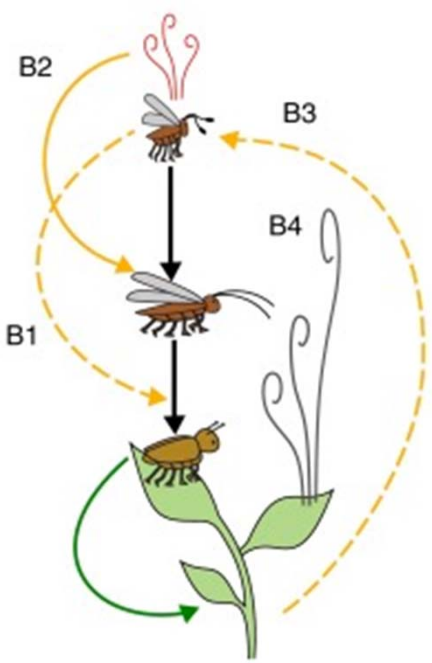
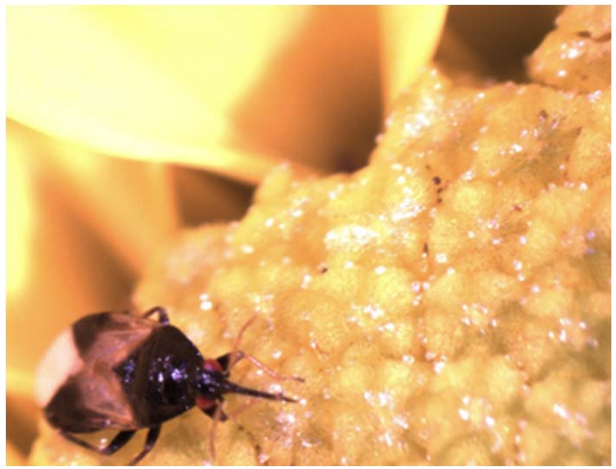
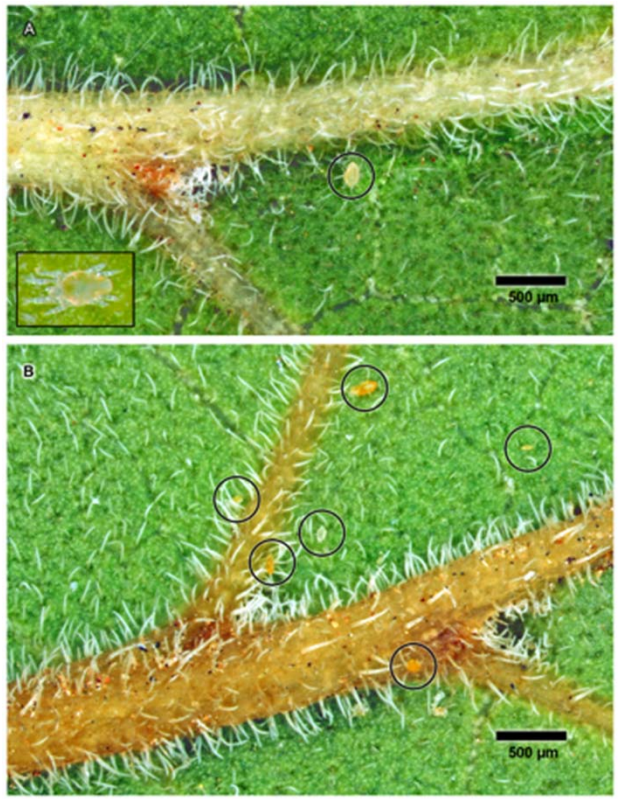
Tri-trophic interactions & biological control



Frago 2016

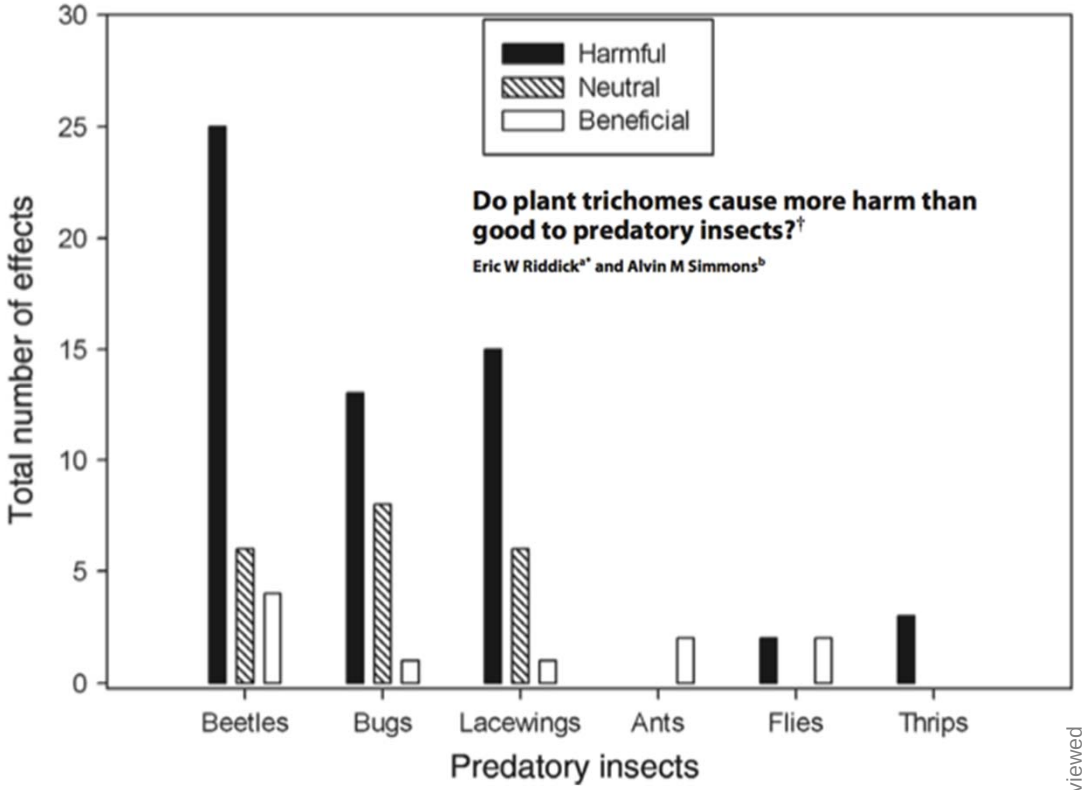


greenhouseipm.org



Tilney et al. 2012

Trichomes & natural enemies

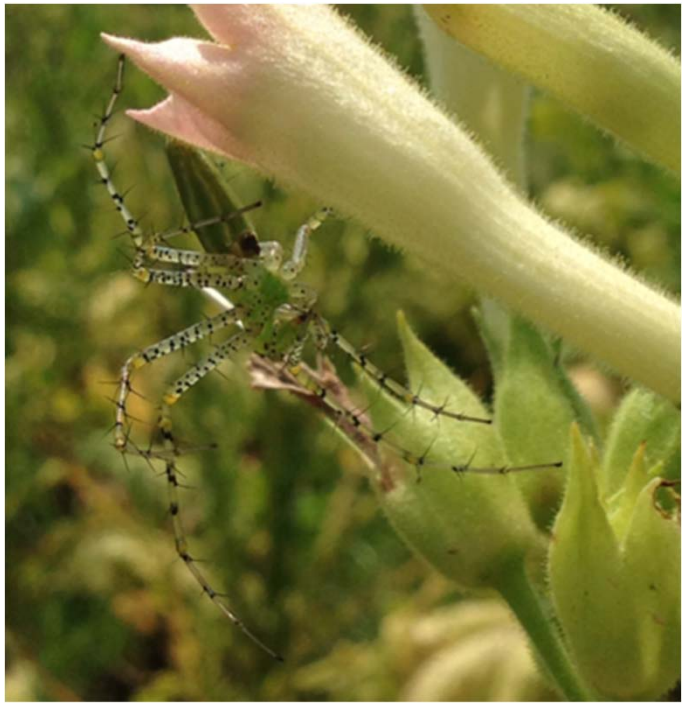


Riddick and Simmons 2014

Trichomes & natural enemies

Jeremy Slone

Trichomes & natural enemies



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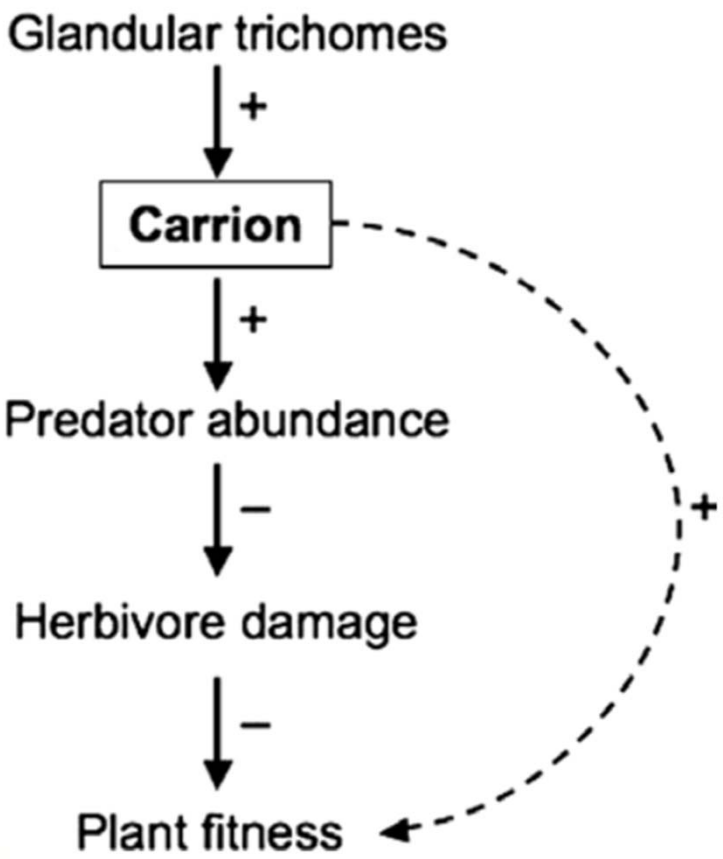
Protective mutualism



Krimmel and Pearse 2013

Nicotiana tabacum predators and pests

Mike Jackson

Clyde Sorenson

Objectives

- Assess mutualism in tobacco
- Individual plant experiment
  - Treated with or without imidacloprid
- Whole plot experiment
  - Multiple rates of carrion augmentation
- Assess abundance mechanism

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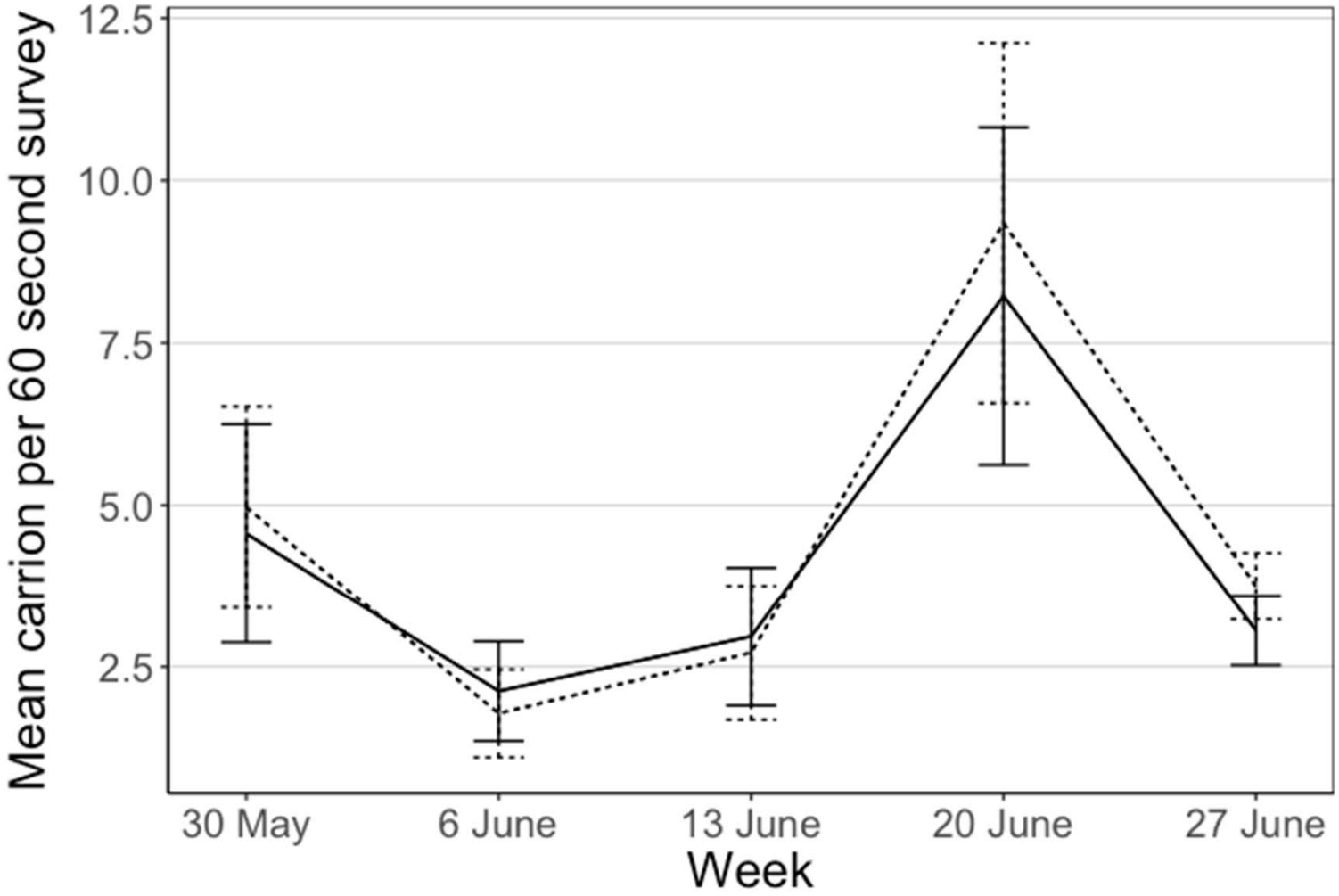
Individual plant experiment

- Insecticide treatments
  - Imidacloprid, 7.6 ml/1000 plants
  - UTC
- Carrion treatments
  - Weekly carrion addition (0.05g = ~30 *Drosophila*)
  - Control (ambient carrion)

Individual plant experiment

- Timed carrion surveys
- Pest and predator surveys
- Reproductive structure damage assessment

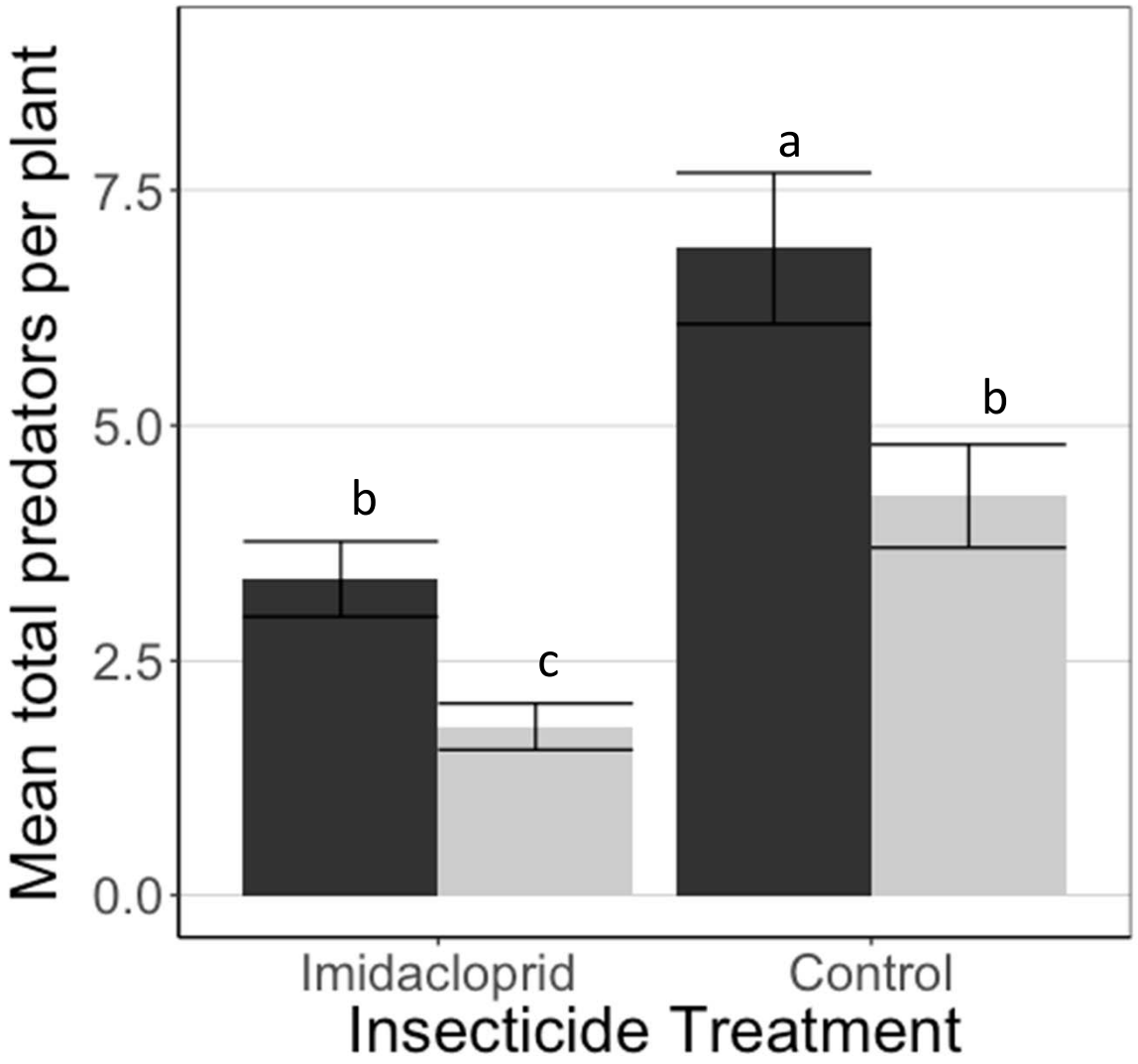
Individual plant: carrion



Treatment
— Control
···· Imidacloprid

P=0.562

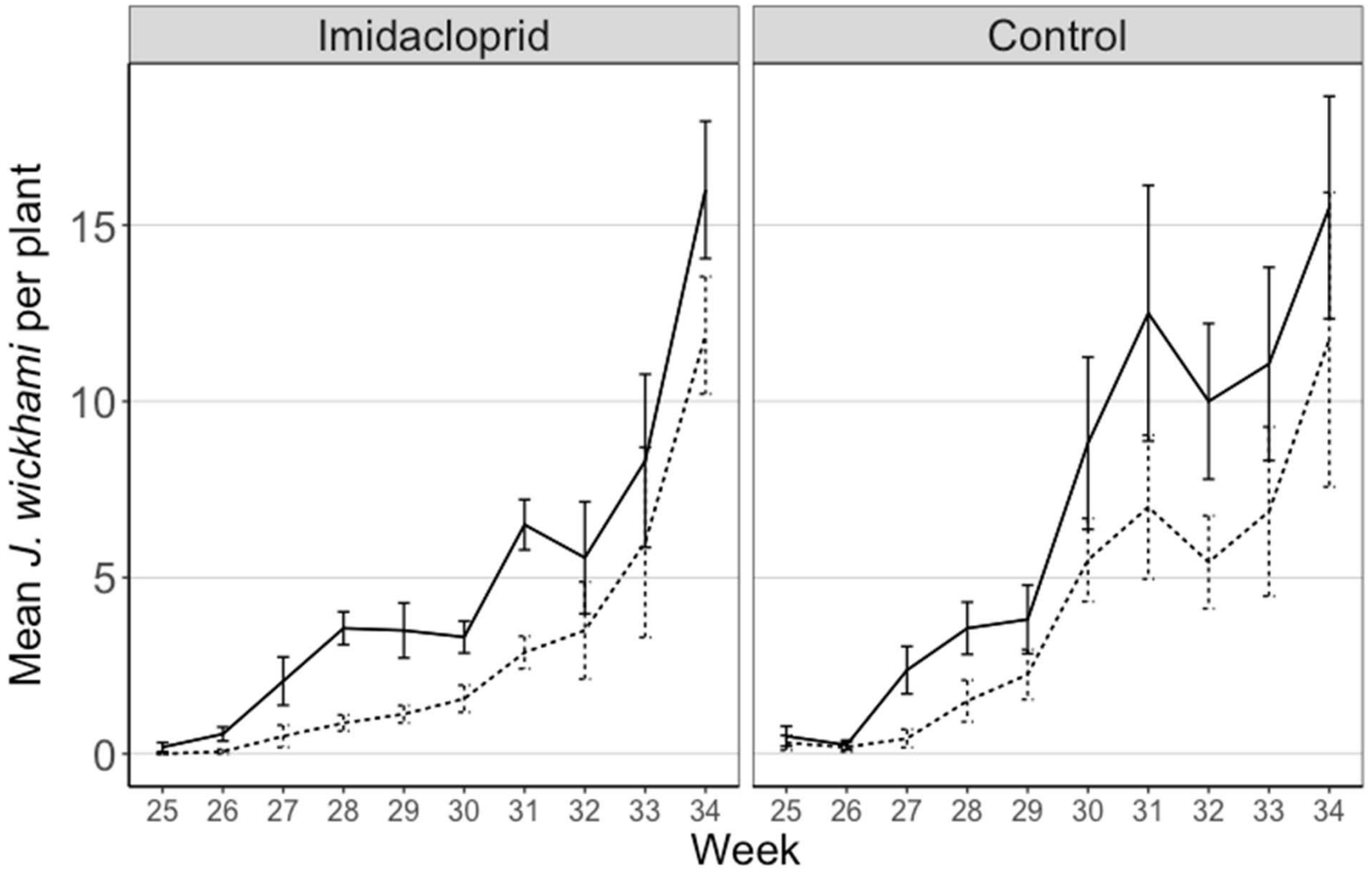
Individual plant: predators



Carrion Treatment
Addition
Ambient

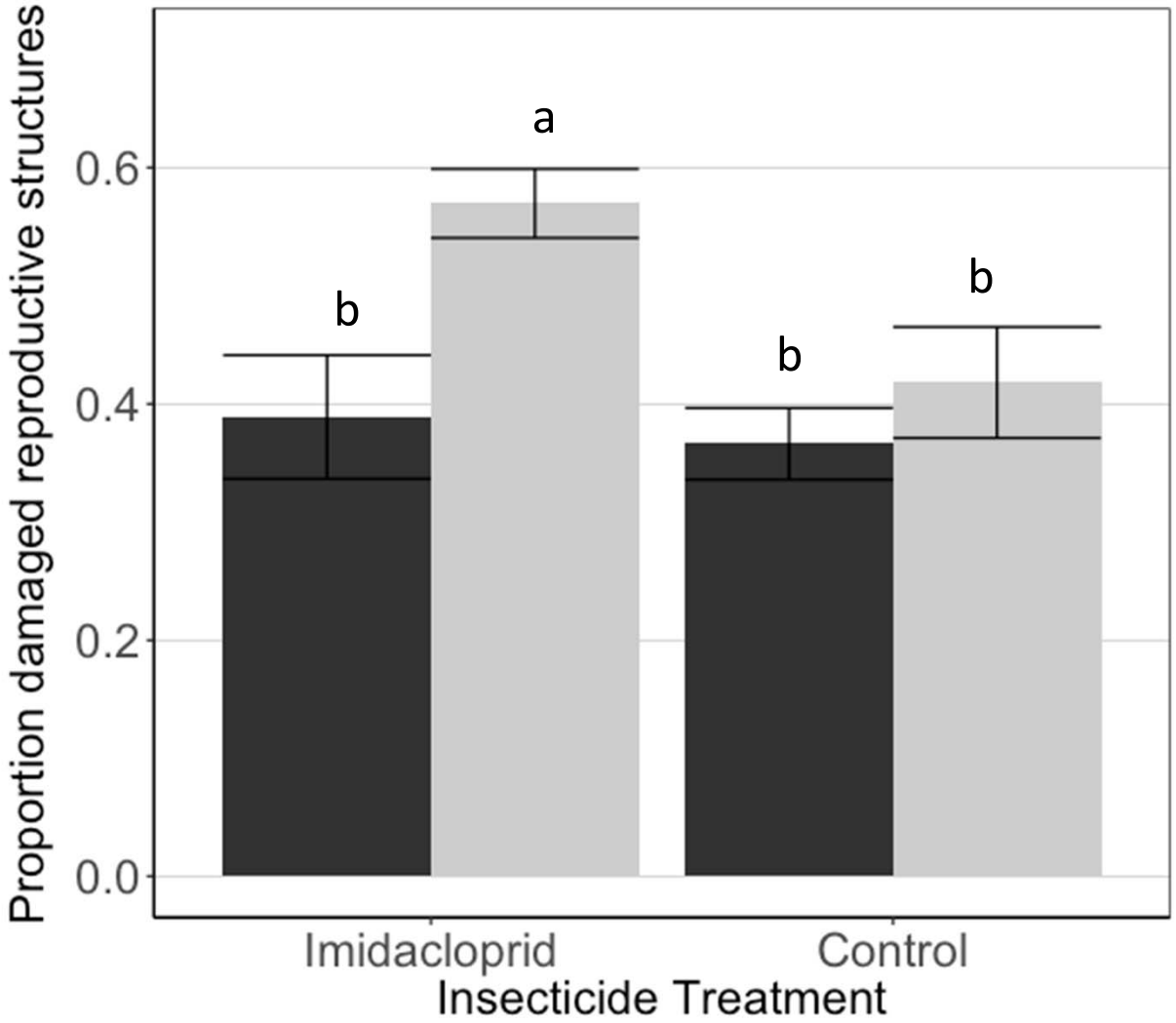
P=0.0139
Tukey's HSD, α=0.05

Individual plant: *Jalysus wickhami*



Carrion Treatment
— Addition
---- Ambient
P=0.0215

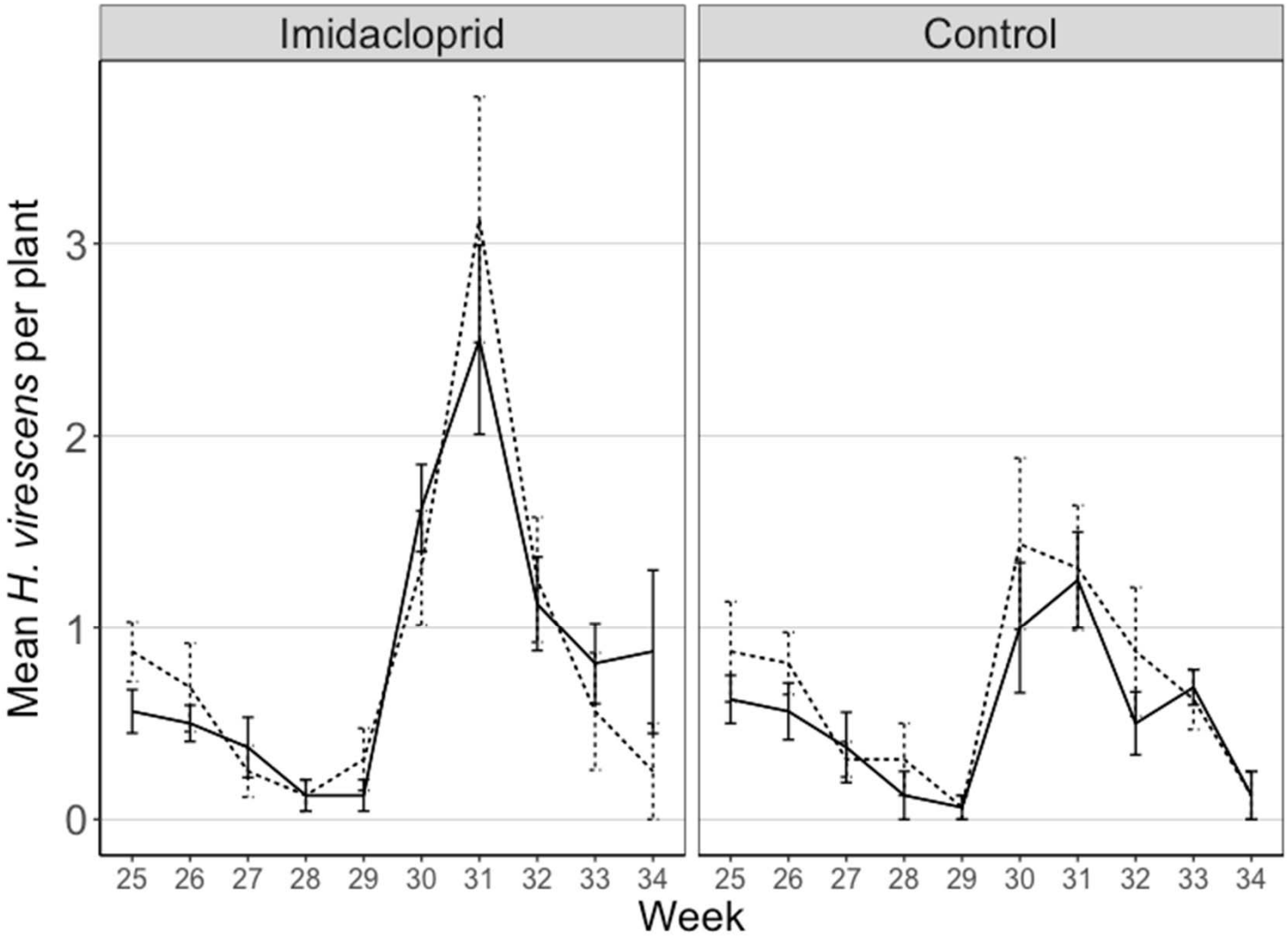
Individual plant: plant damage



Carrion Treatment
Addition
Ambient

P=0.0215
Tukey's HSD, α=0.05

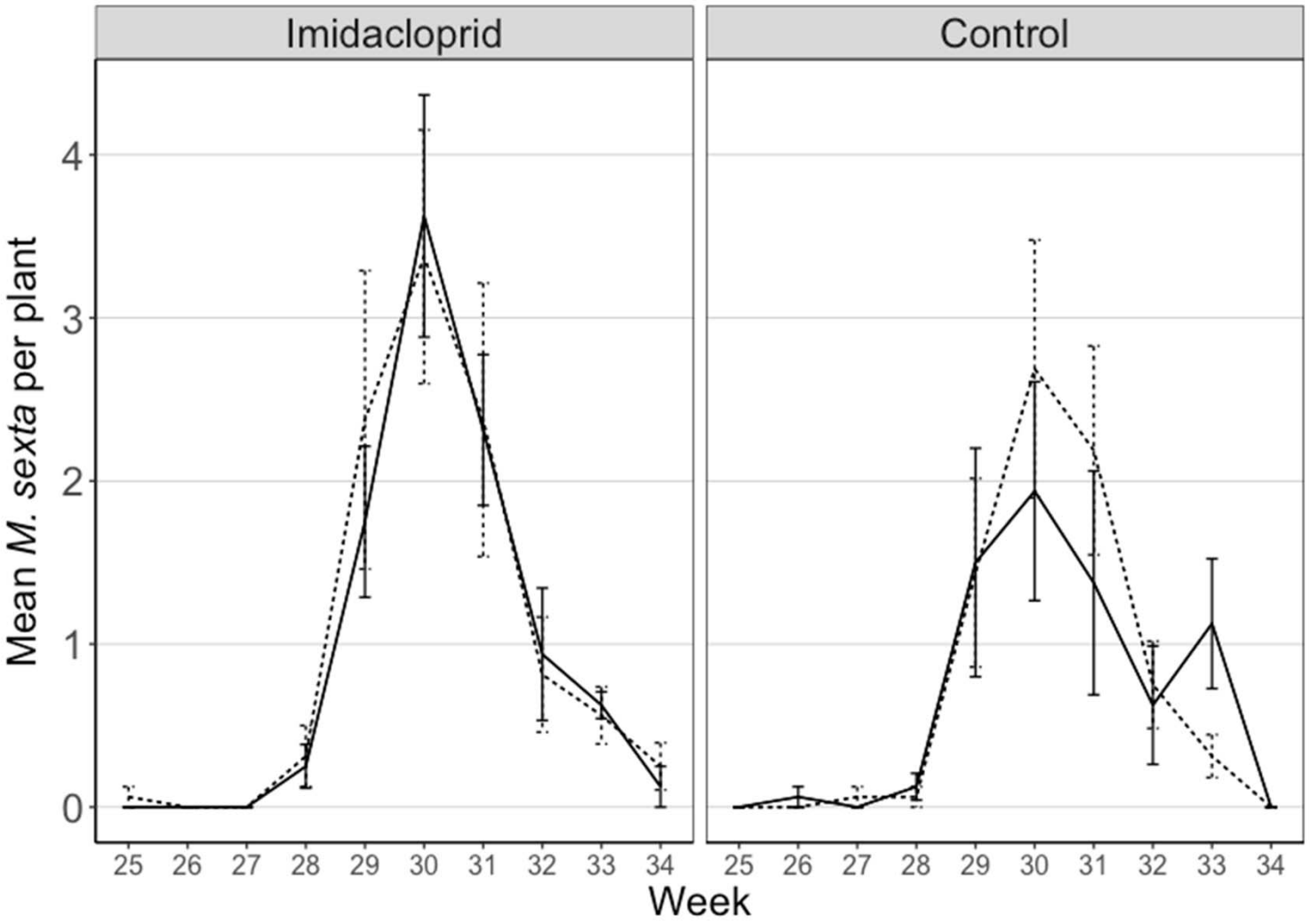
Individual plant: *Heliothis virescens*



Carrion Treatment
— Addition
···· Ambient

P=0.104

Individual plant: *Manduca sexta*

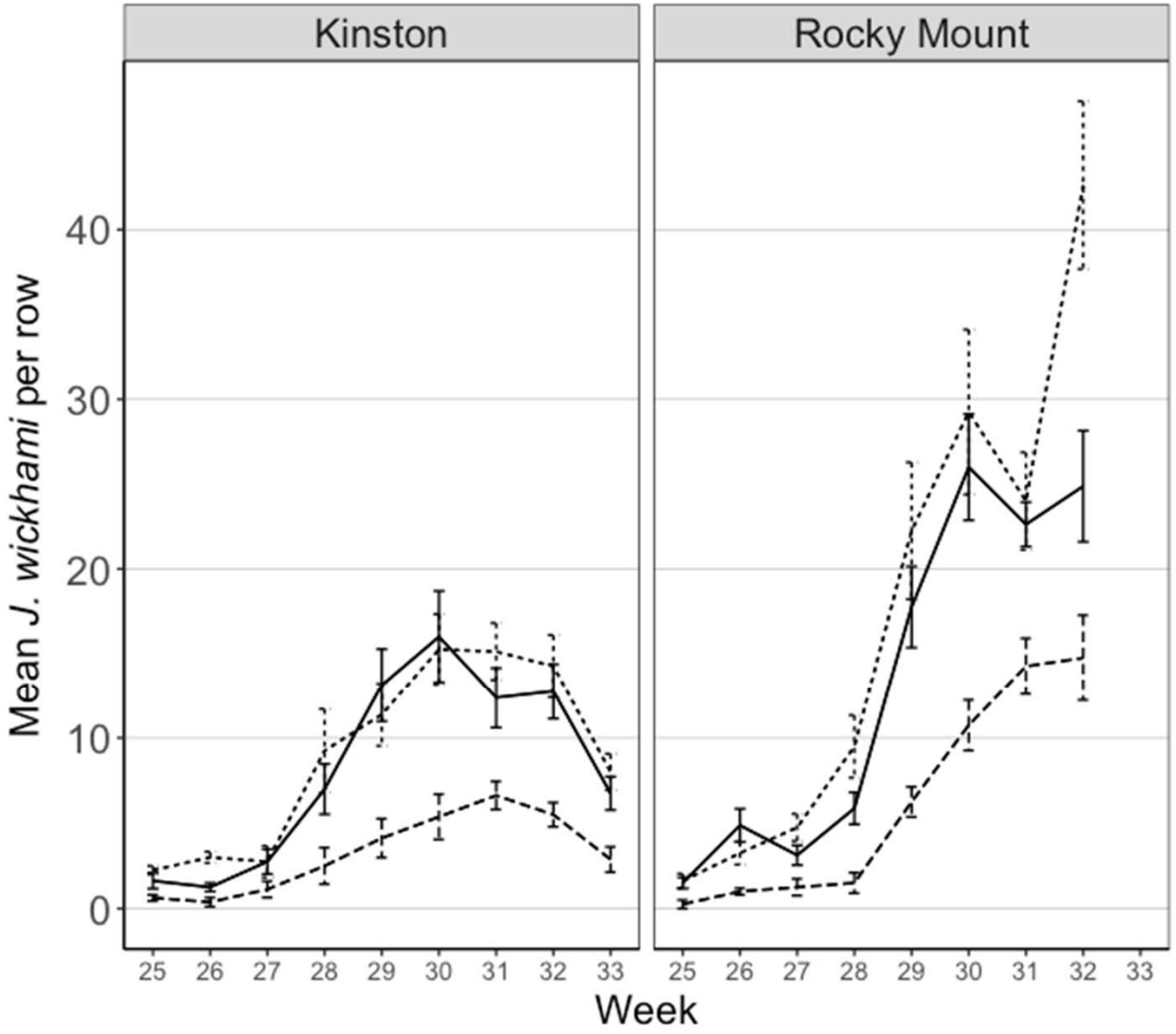


Carrion Treatment
— Addition
···· Ambient
P=0.0811

Whole plot experiment

- Tray drench: Imidacloprid, 7.6 ml/1000 plants
- Carrion treatments (weekly)
  - 1x: (0.05g = ~30 *Drosophila)*
  - 3x: (0.20 g = ~90 *Drosophila)*
  - Control (ambient carrion)
- Weekly surveys
- Plant Damage

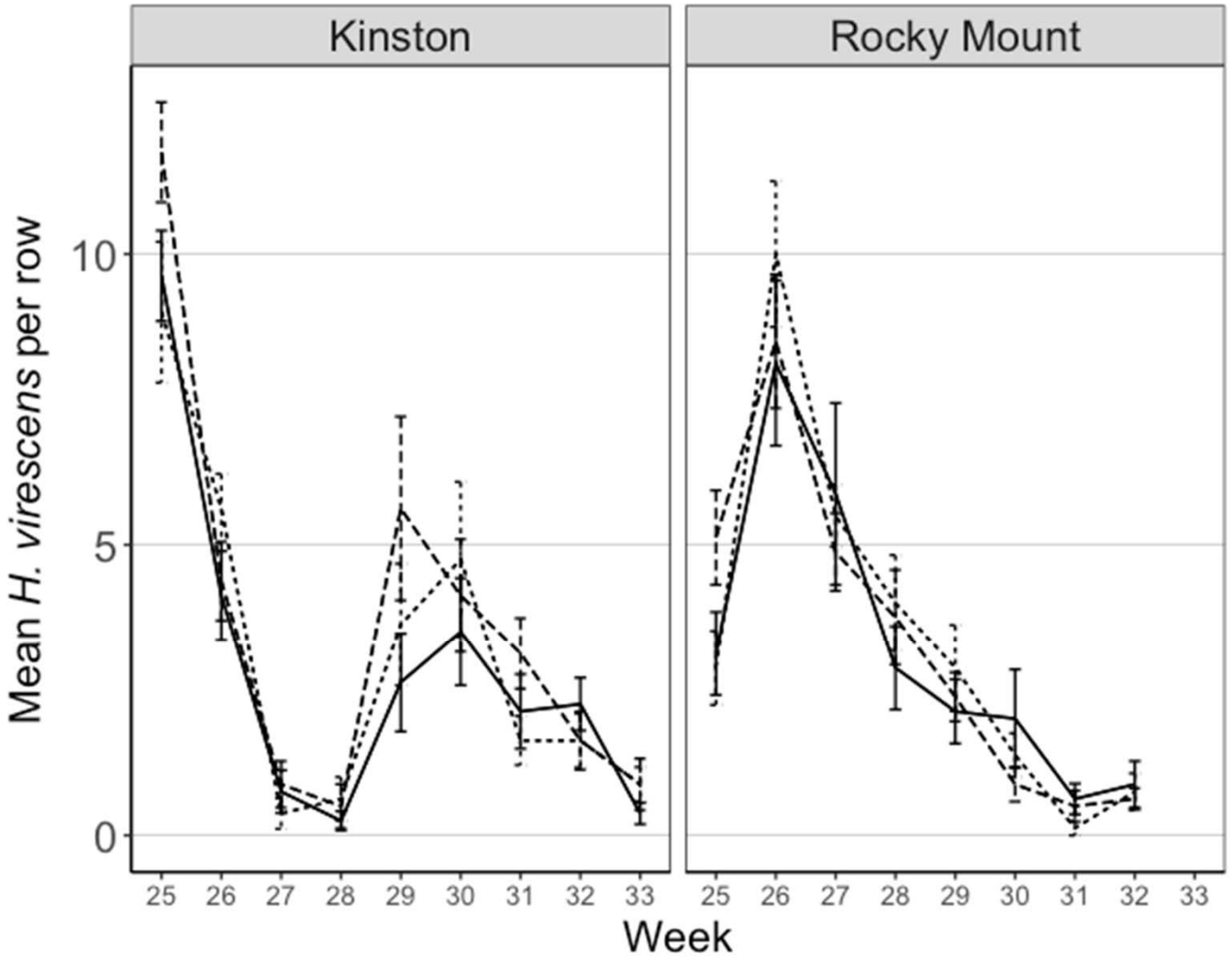
Whole plot: *Jalysus wickhami*



Carrion Treatment
— 1x addition
···· 3x addition
- - - Ambient

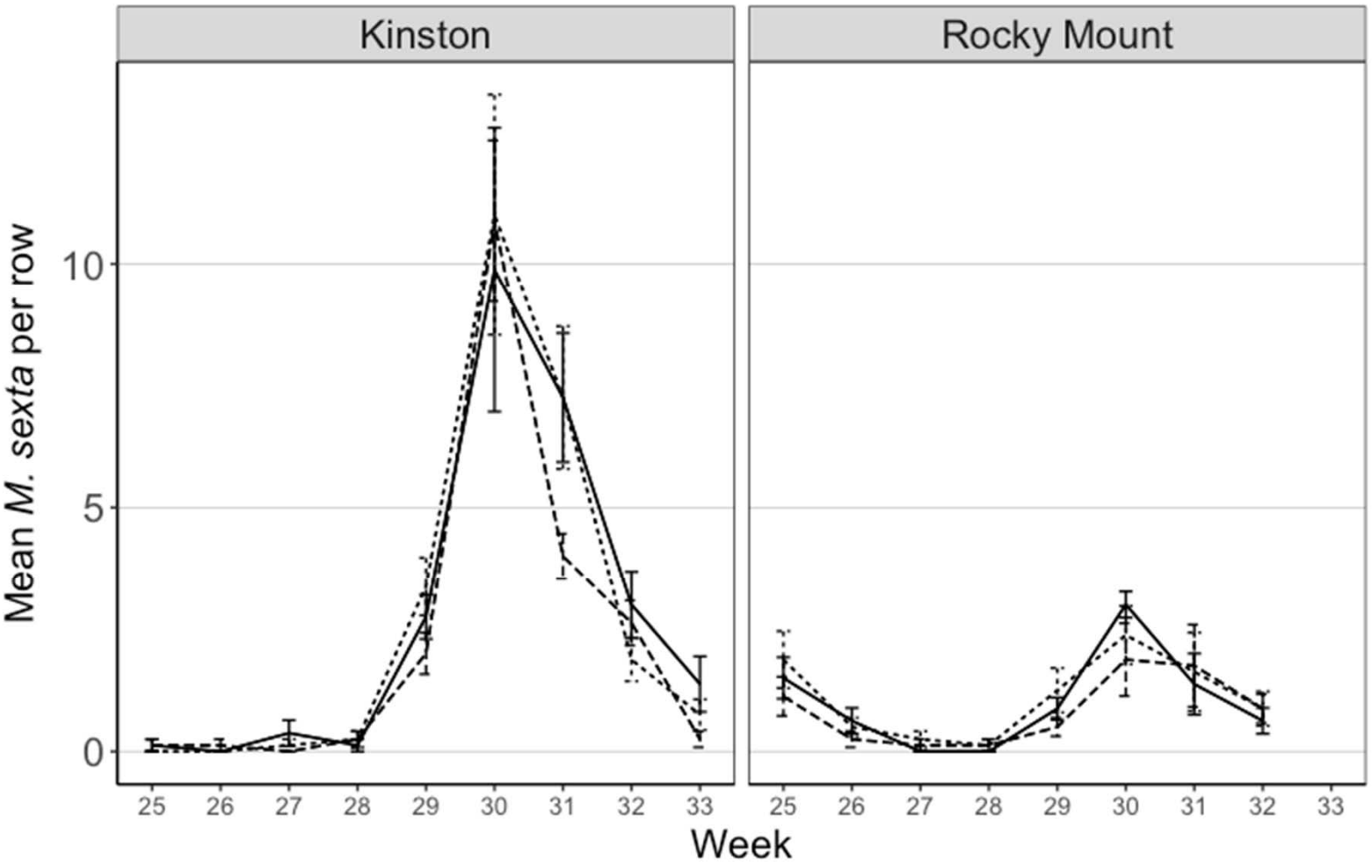
P=0.0124

Whole plot: *Heliothis virescens*



Carrion Treatment
— 1x addition
···· 3x addition
-·- Ambient
P=0.0915

Whole plot: *Manduca sexta*



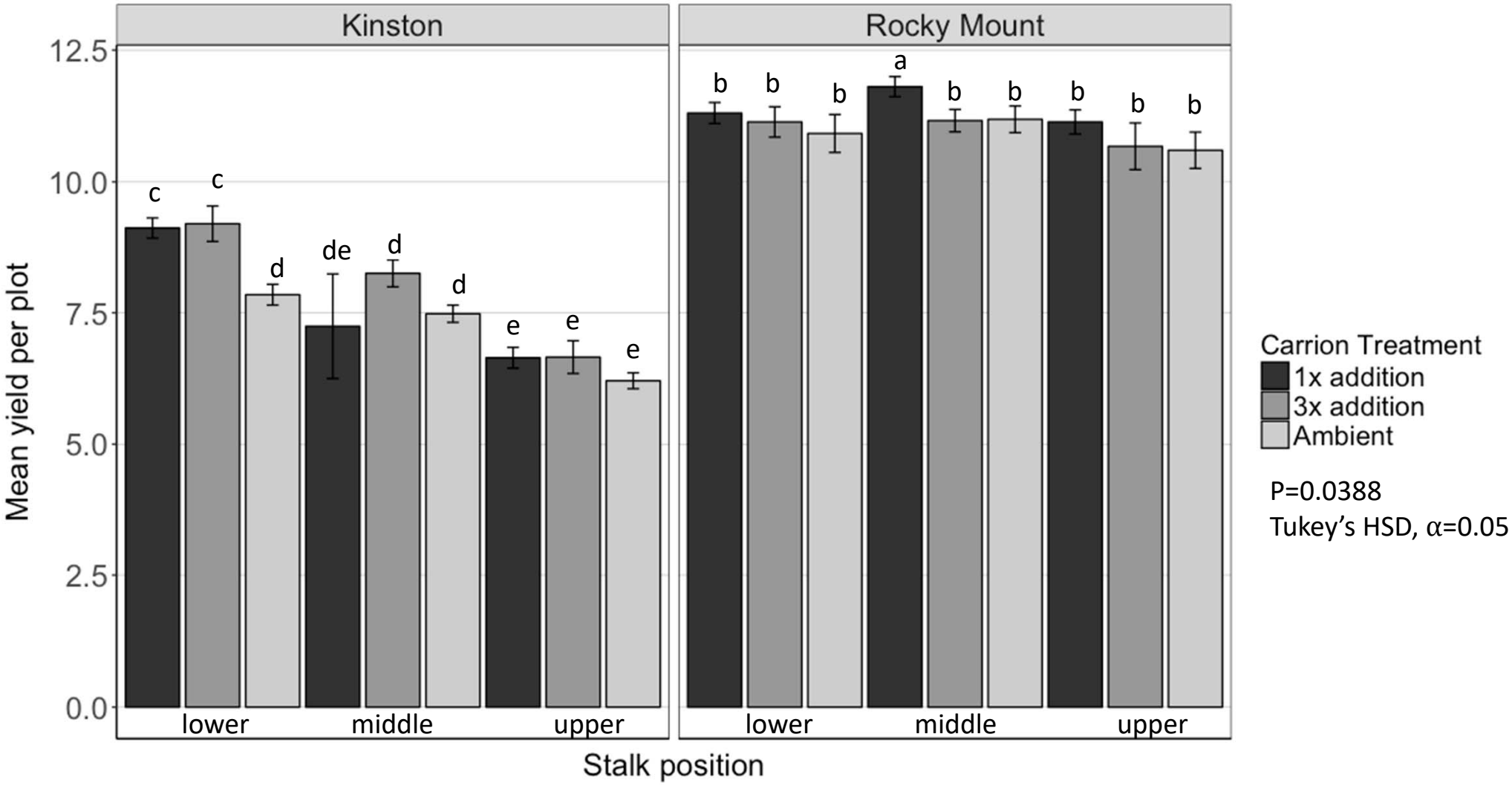
Carrion Treatment
— 1x addition
···· 3x addition
-·- Ambient

P=0.0895

Whole plot: plant damage

- Green leaf weight: yield
- Lower, mid, upper stalk positions: 6 leaves
- 8 plants/plot

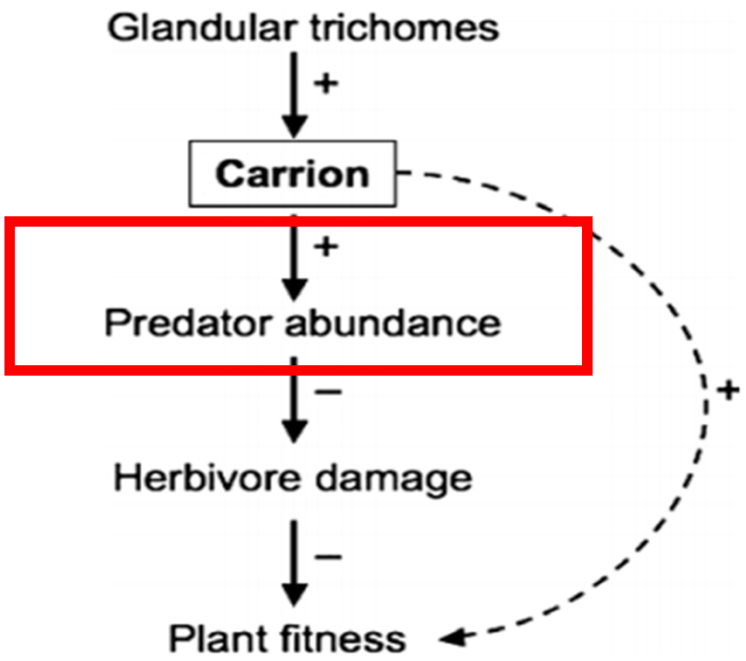
Whole plot: green leaf weight



P=0.0388

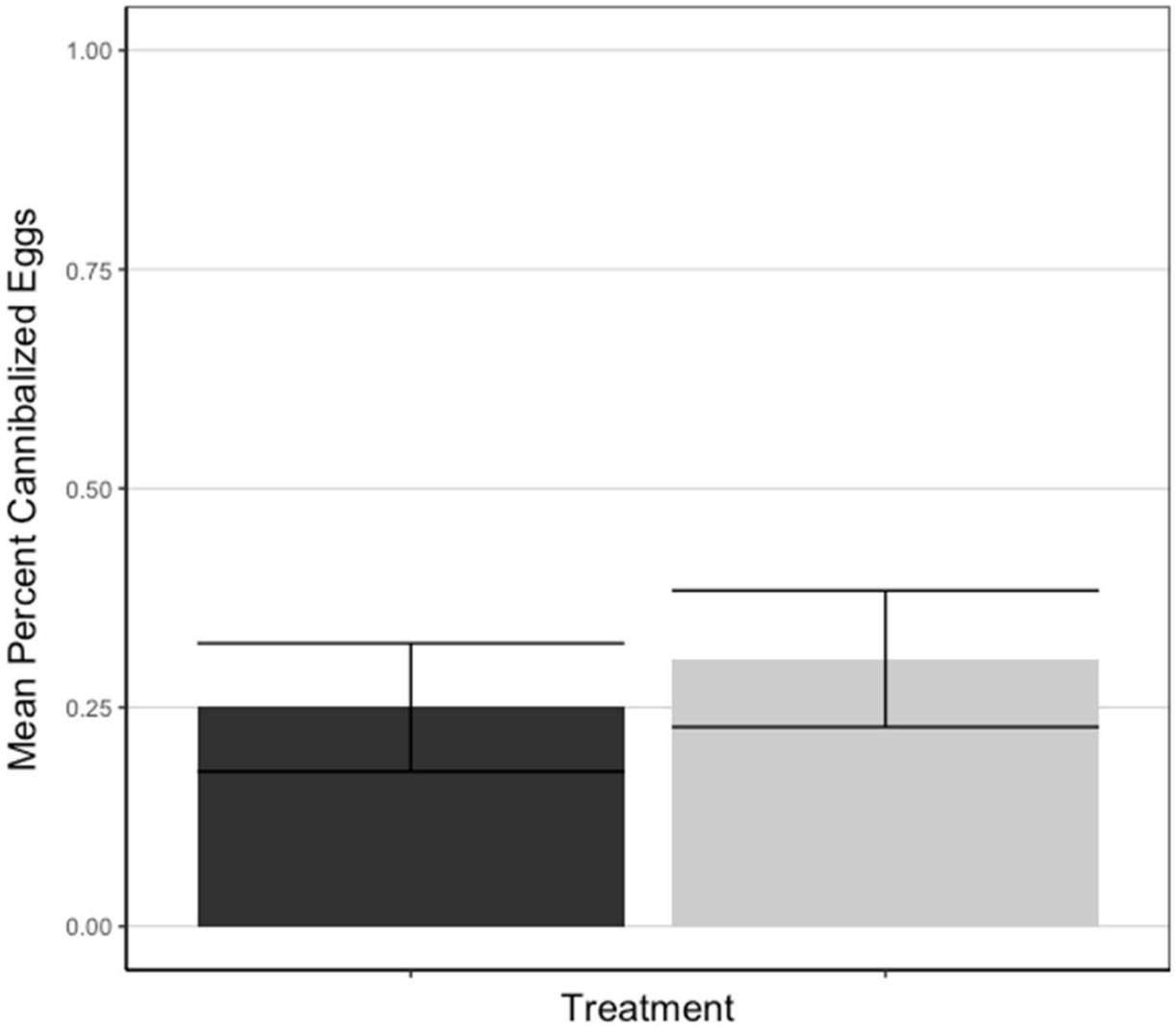
Tukey's HSD, α=0.05

Abundance mechanism



Krimmel and Pearse 2013

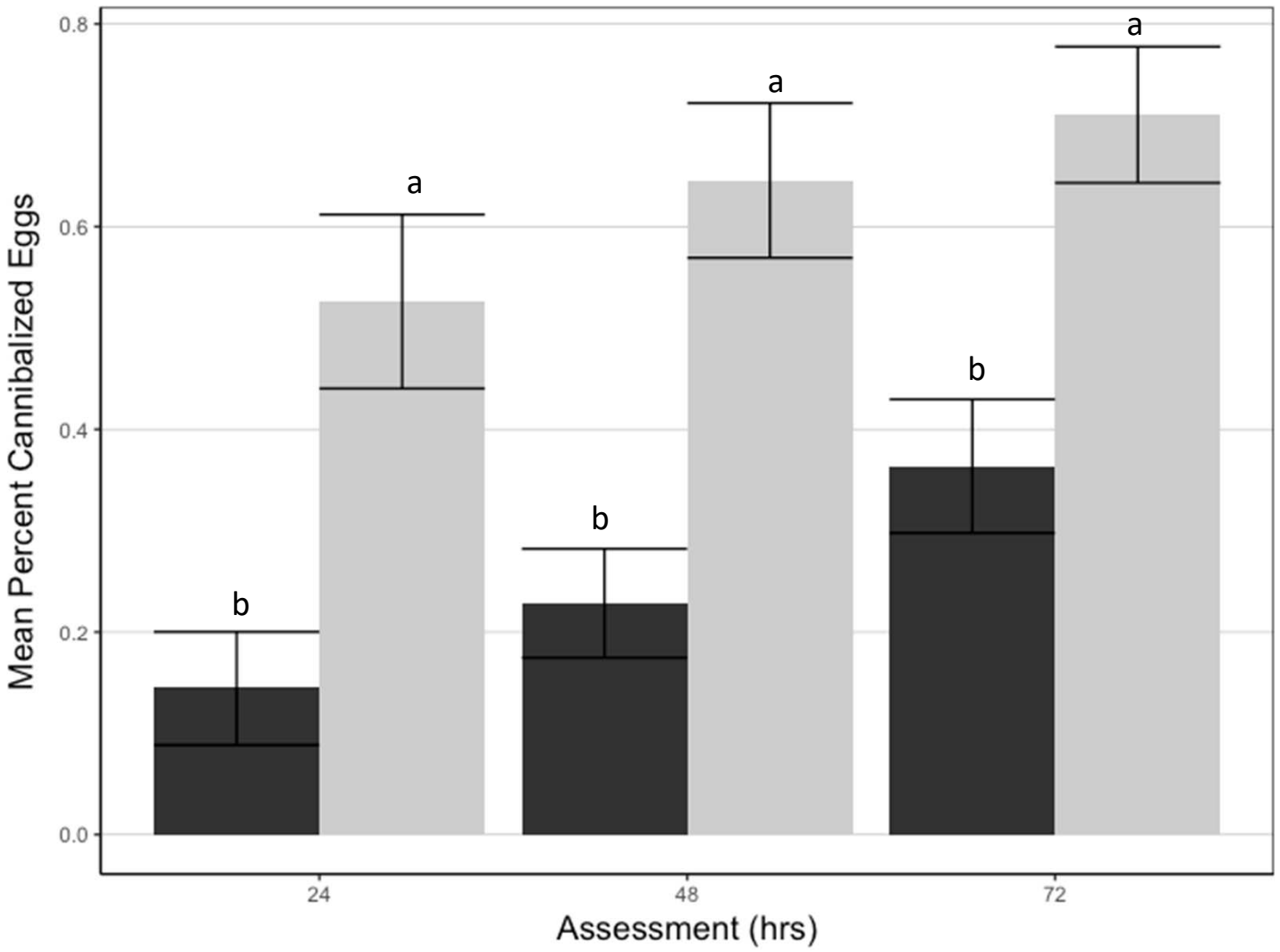
Abundance mechanism: adults



Carrion Treatment
Carrion
Control

P=0.248

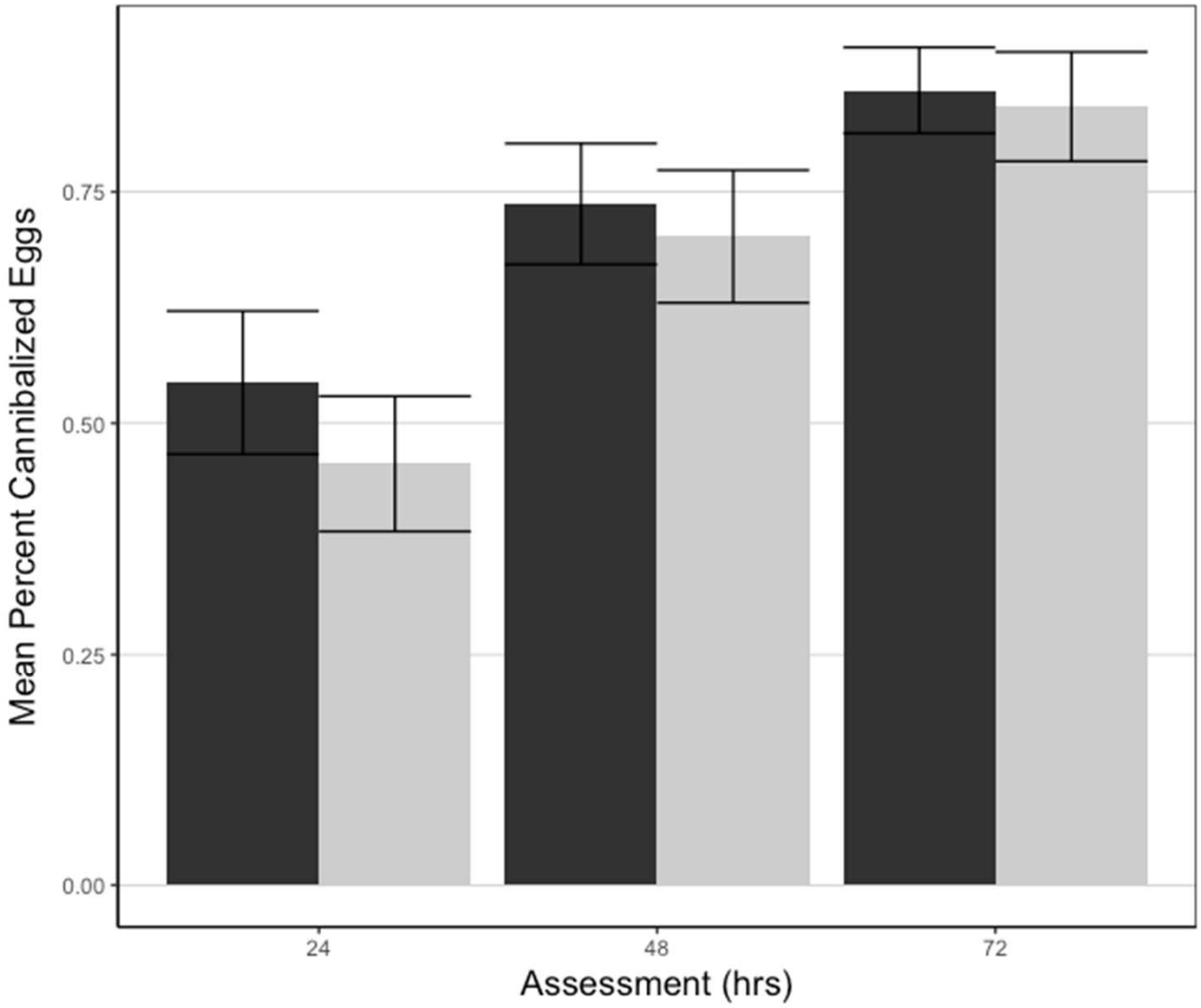
Abundance mechanism: adults, simple habitat



Carrion Treatment
Carrion
Control

P<0.01

Abundance mechanism: nymphs, simple habitat



Carrion Treatment
Carrion
Control

P=0.674

Discussion

- Mutualism exists!!, but…
- Impacts on herbivores: non-consumptive?
- Higher rate of carrion didn’t reduce herbivores
- Generalists & herbivores: utilizing carrion

Discussion

- Abundance increase: reduction in egg cannibalism?
- Other mechanisms increasing abundance?

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Questions?

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