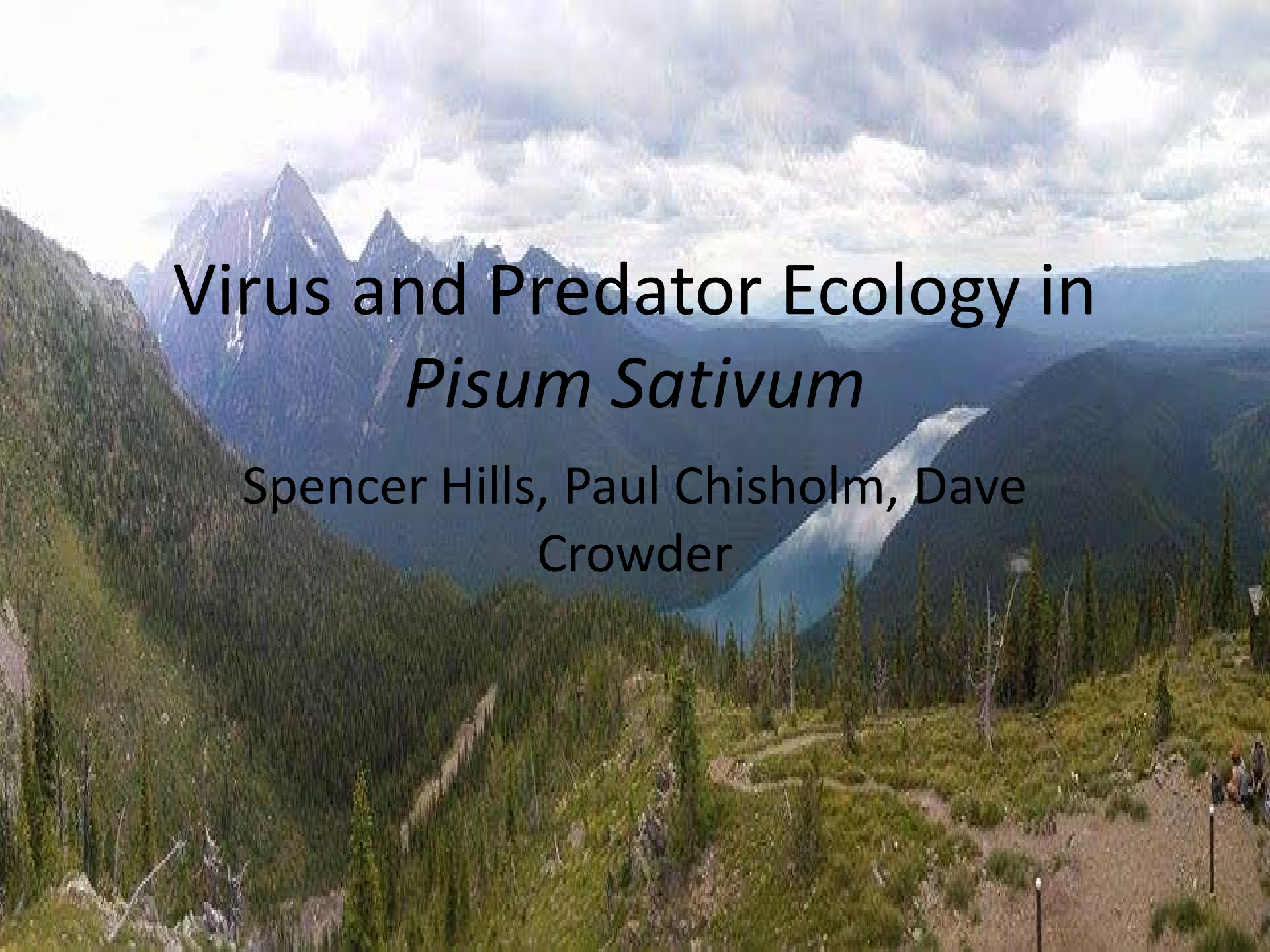
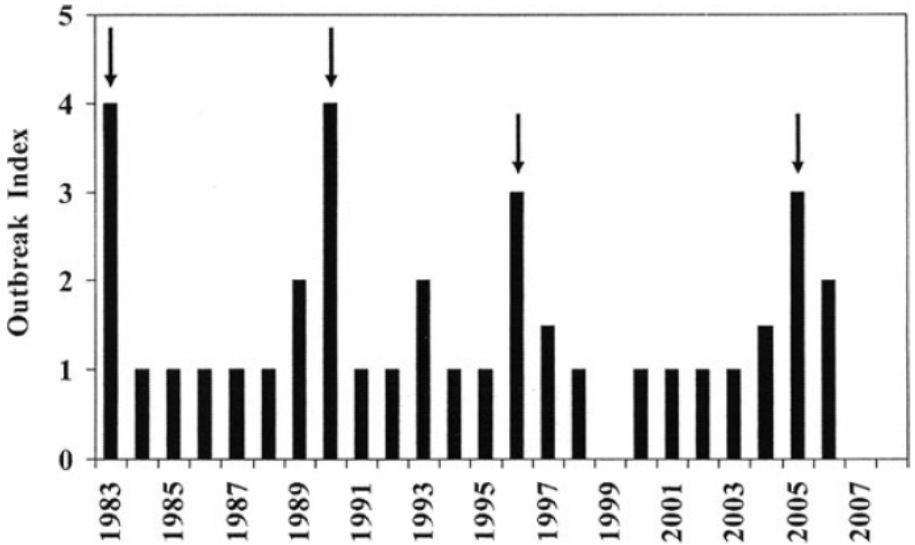


Virus and Predator Ecology in *Pisum Sativum*

Spencer Hills, Paul Chisholm, Dave Crowder

Viral Epidemics in Plants

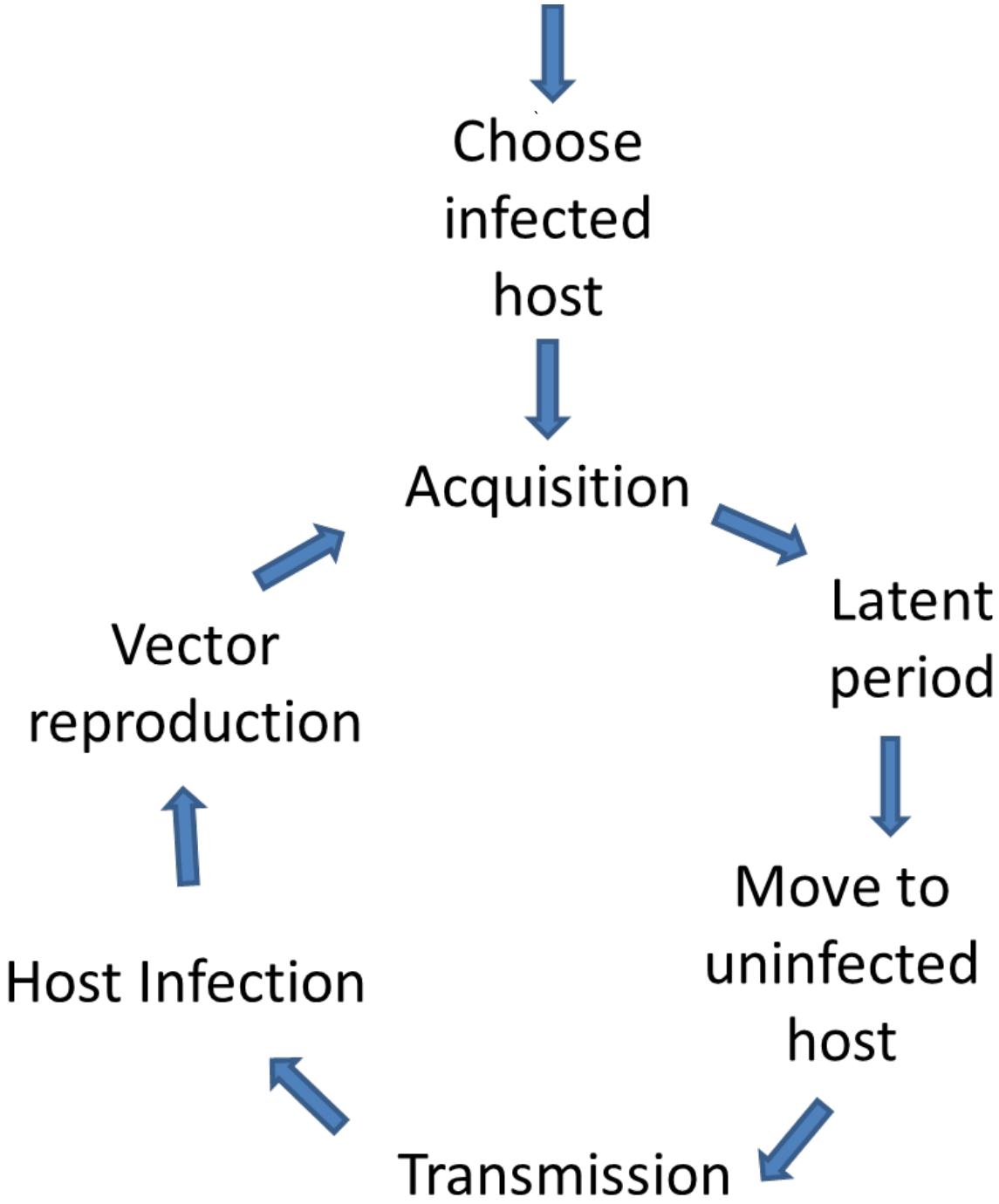
- Insect vectored
- Spatially patchy
- Temporally variable
- Difficult to predict

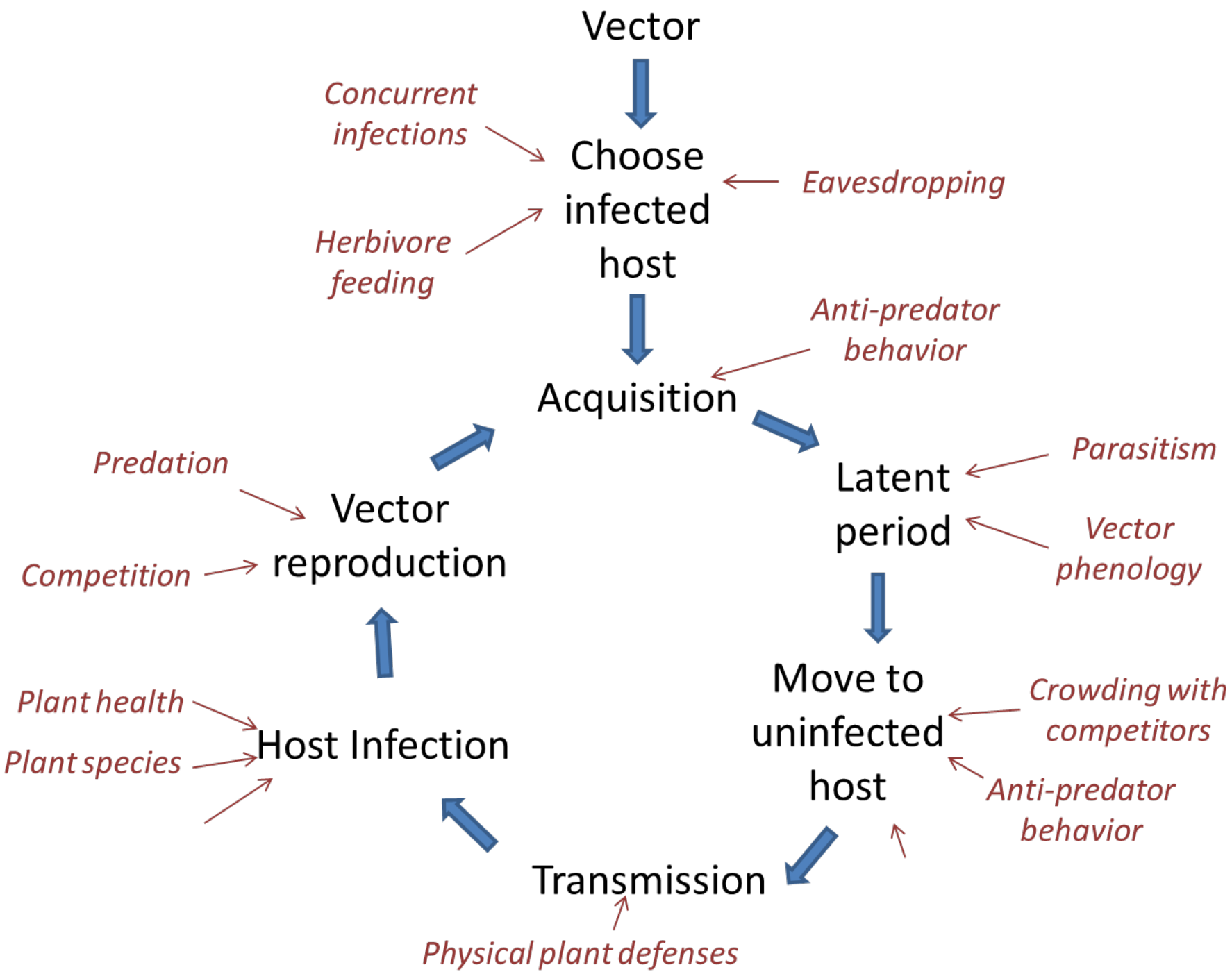


Clement 2006

Fred Crowe, Oregon State University

McLean et al. 1986, Irwin & Kampmeier 1989, Nutter 1997, Madden et al. 2000


Choose infected host
Acquisition
Latent period
Move to uninfected host
Transmission
Host Infection
Vector reproduction


Vector
Concurrent infections
Choose infected host
Eavesdropping
Herbivore feeding
Anti-predator behavior
Acquisition
Predation
Parasitism
Vector reproduction
Latent period
Competition
Vector phenology
Plant health
Move to uninfected host
Crowding with competitors
Plant species
Host Infection
Anti-predator behavior
Transmission
Physical plant defenses

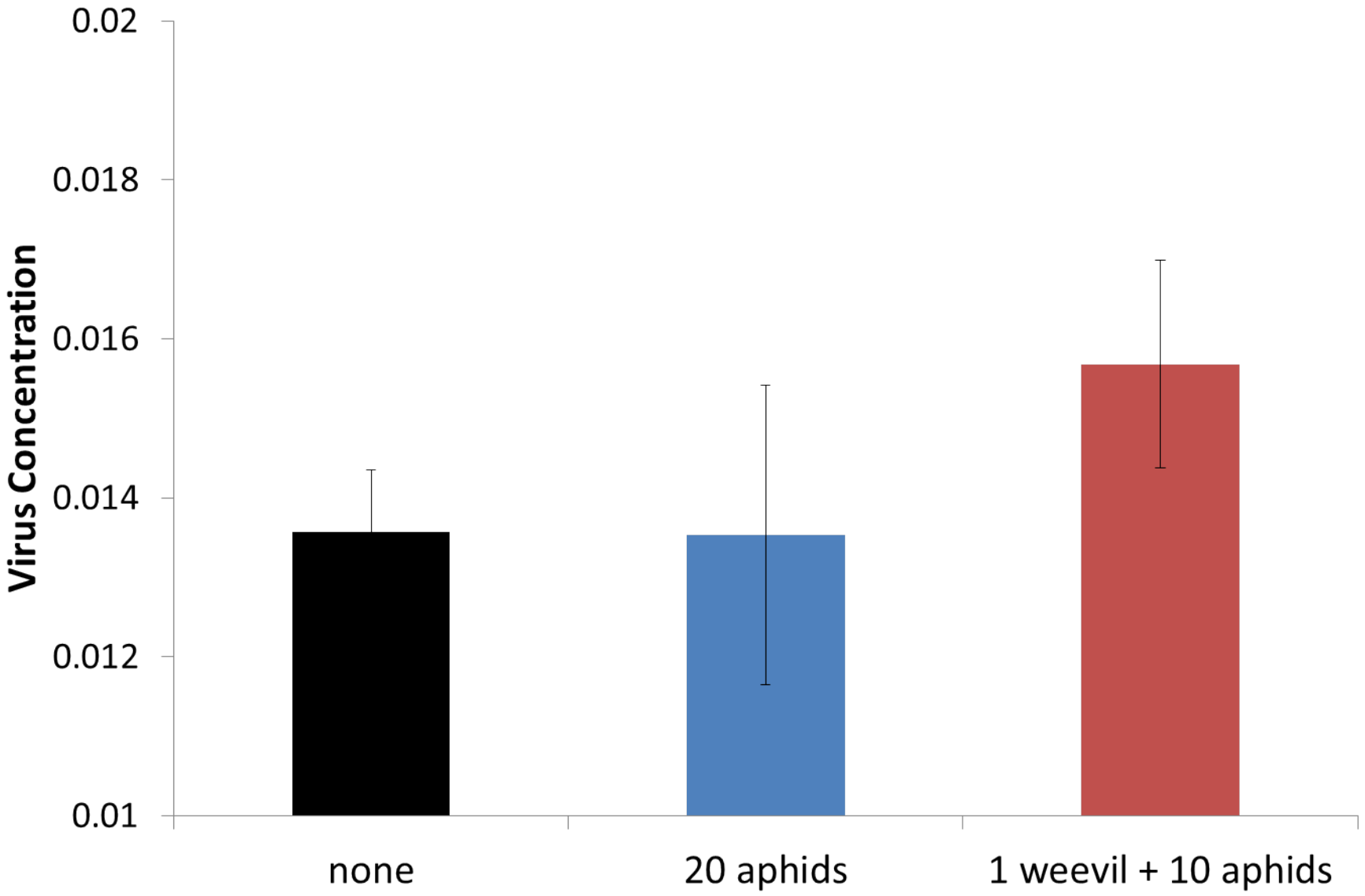
Ecological Players

- Pea leaf aphid
  - Major crop pest
  - Viral vector
- Pea leaf weevil
  - Pea pest
  - Feeds on bottom leaves
- PEMV (pea enation mosiac)
  - Aphid-transmitted virus
  - Crop damaging

Acyrthosiphon pisum

Sintona lineatus

Weevil feeding increases PEMV

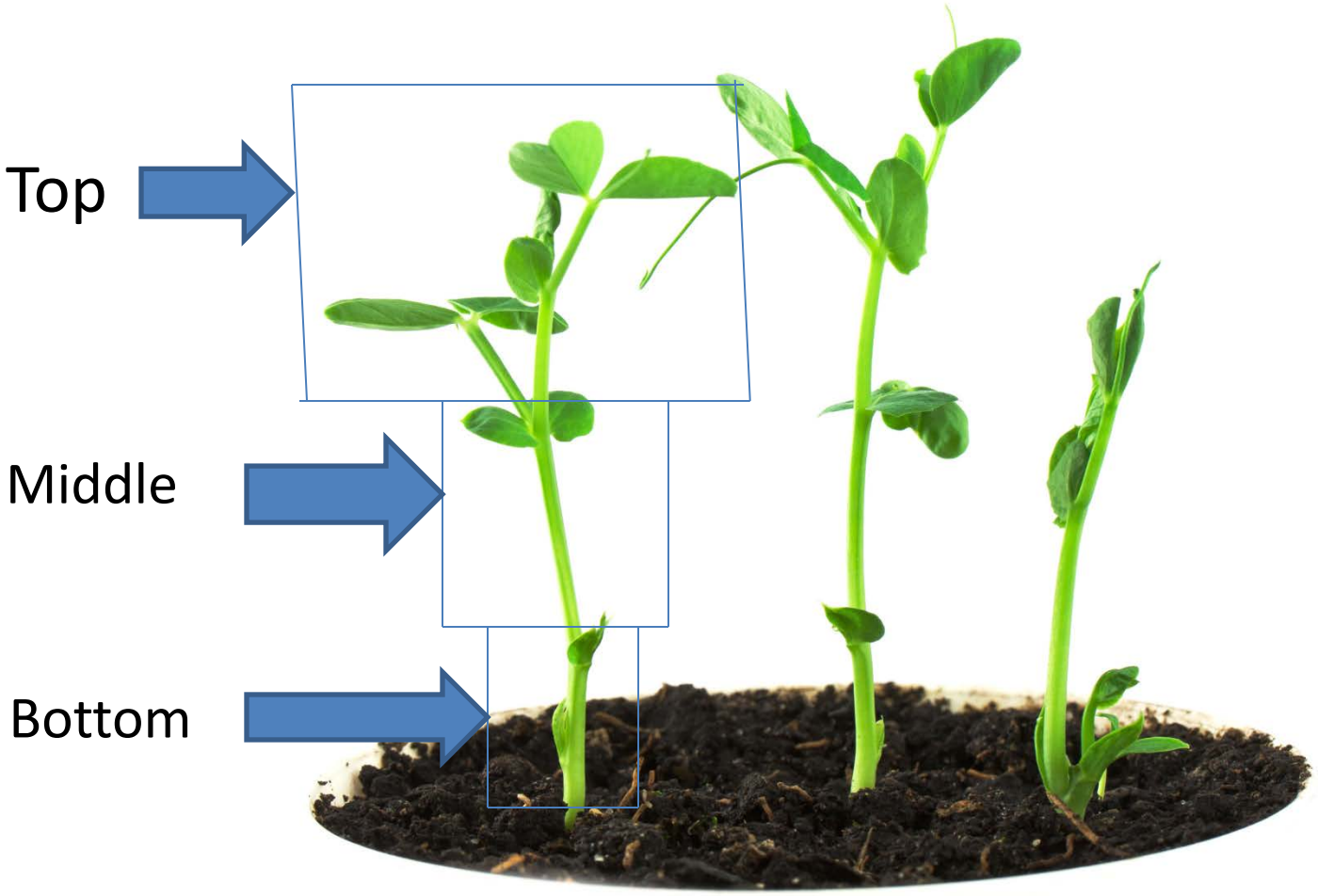


Research Questions

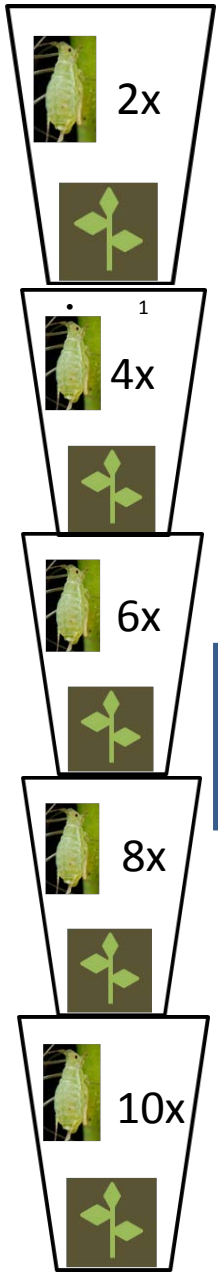
- How does aphid feeding location affect:
  - Virus transmission?
- Factors that influence viral buildup
- Ecological impact of weevil feeding

Methods

- Cage plants in 3 different locations

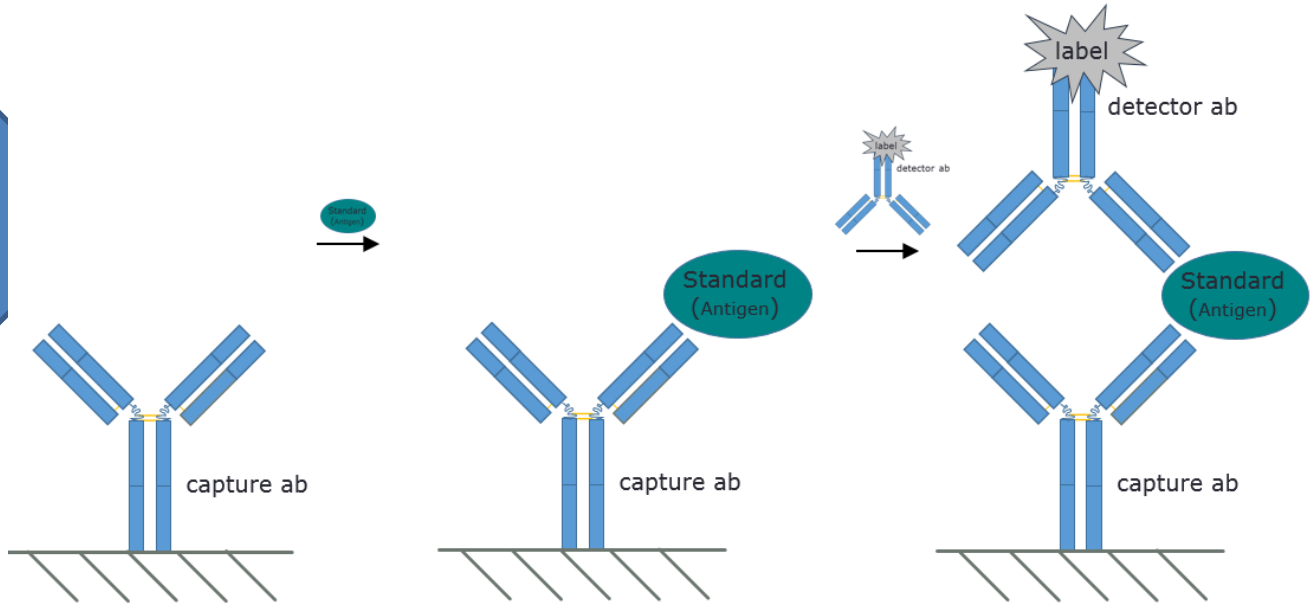


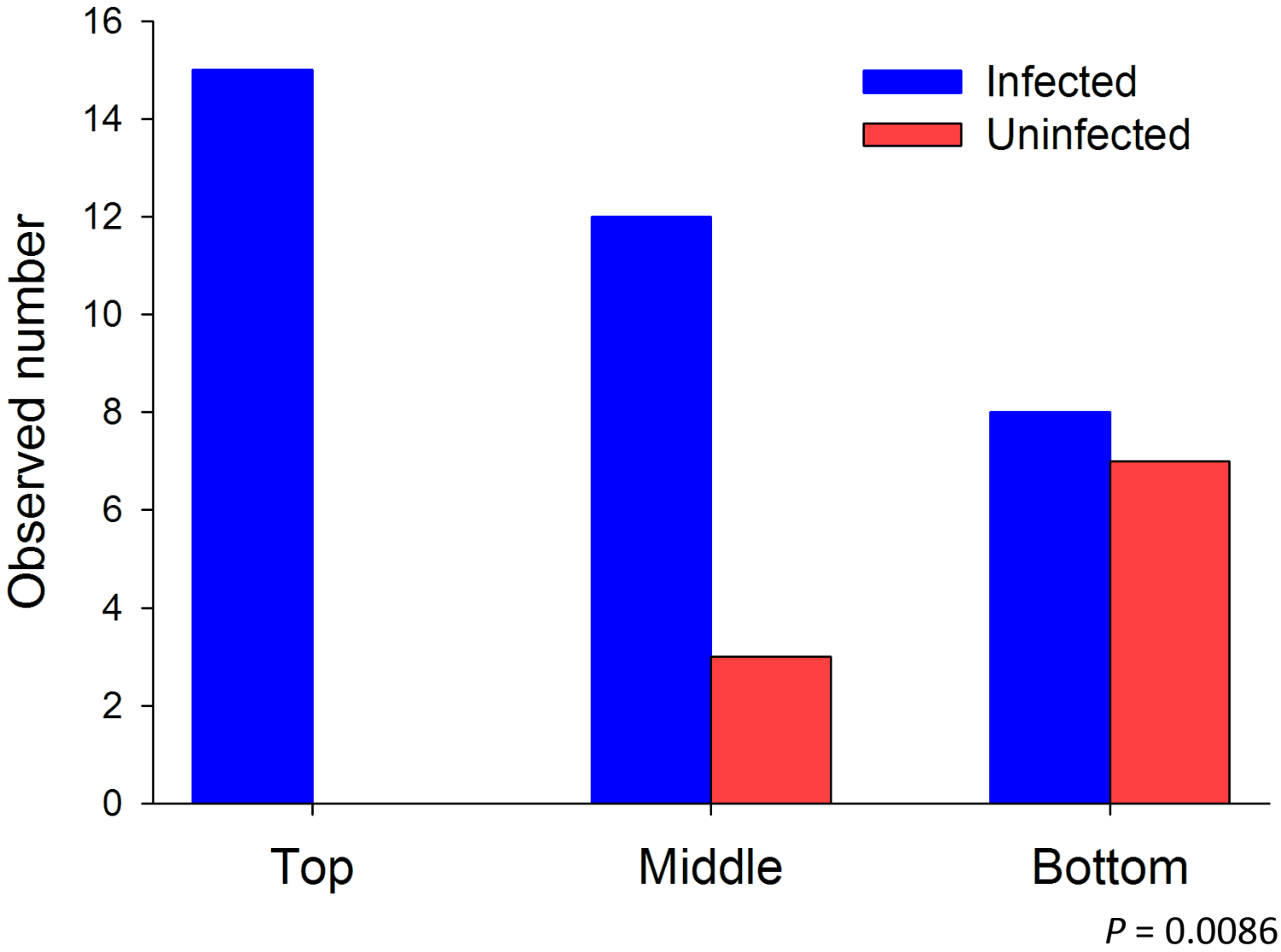
Methods

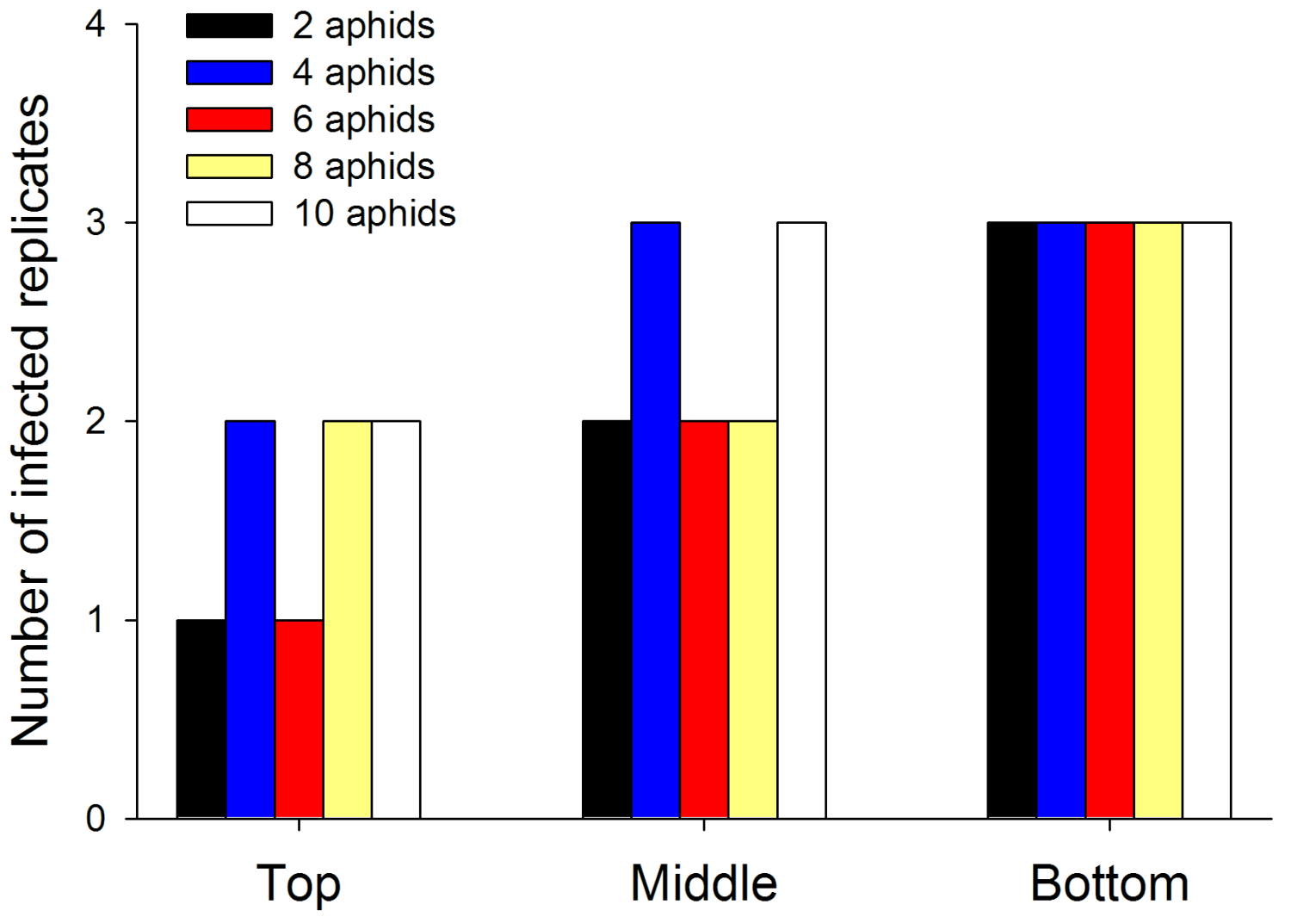


Cut at stem, grind up, add to buffer

ELISA Sandwich




Observed number
16
14
12
10
8
6
4
2
0
Infected
Uninfected
Top
Middle
Bottom
P = 0.0086


2 aphids
4 aphids
6 aphids
8 aphids
10 aphids
Number of infected replicates
0
1
2
3
4
Top
Middle
Bottom

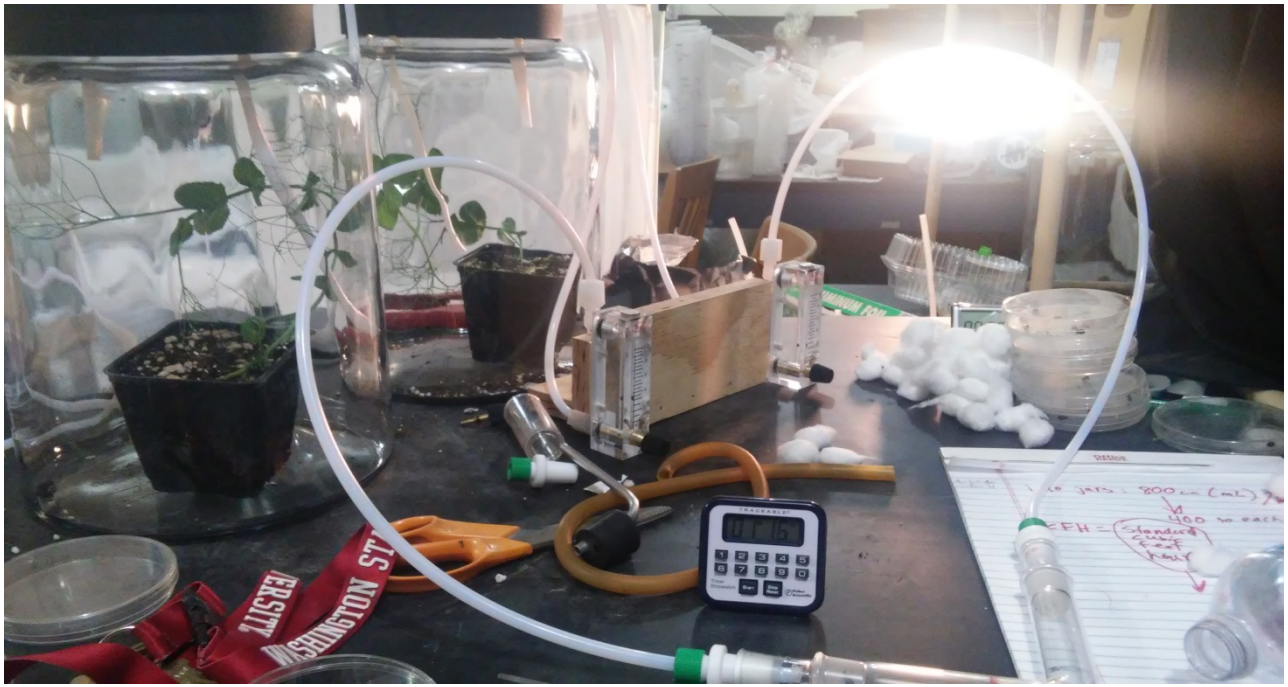
P = 0.39

Discussion

- Hypothesis for increased transmission:
  - New growth cell division
  - Weakened physical defenses
  - More intense aphid feeding
- Further study needed!

Ladybeetle Experiment

- Does PEMV influence the volatile headspace of peas?
- Some preference towards infected plants
- Equipment problems, in need of re-do.



Questions?