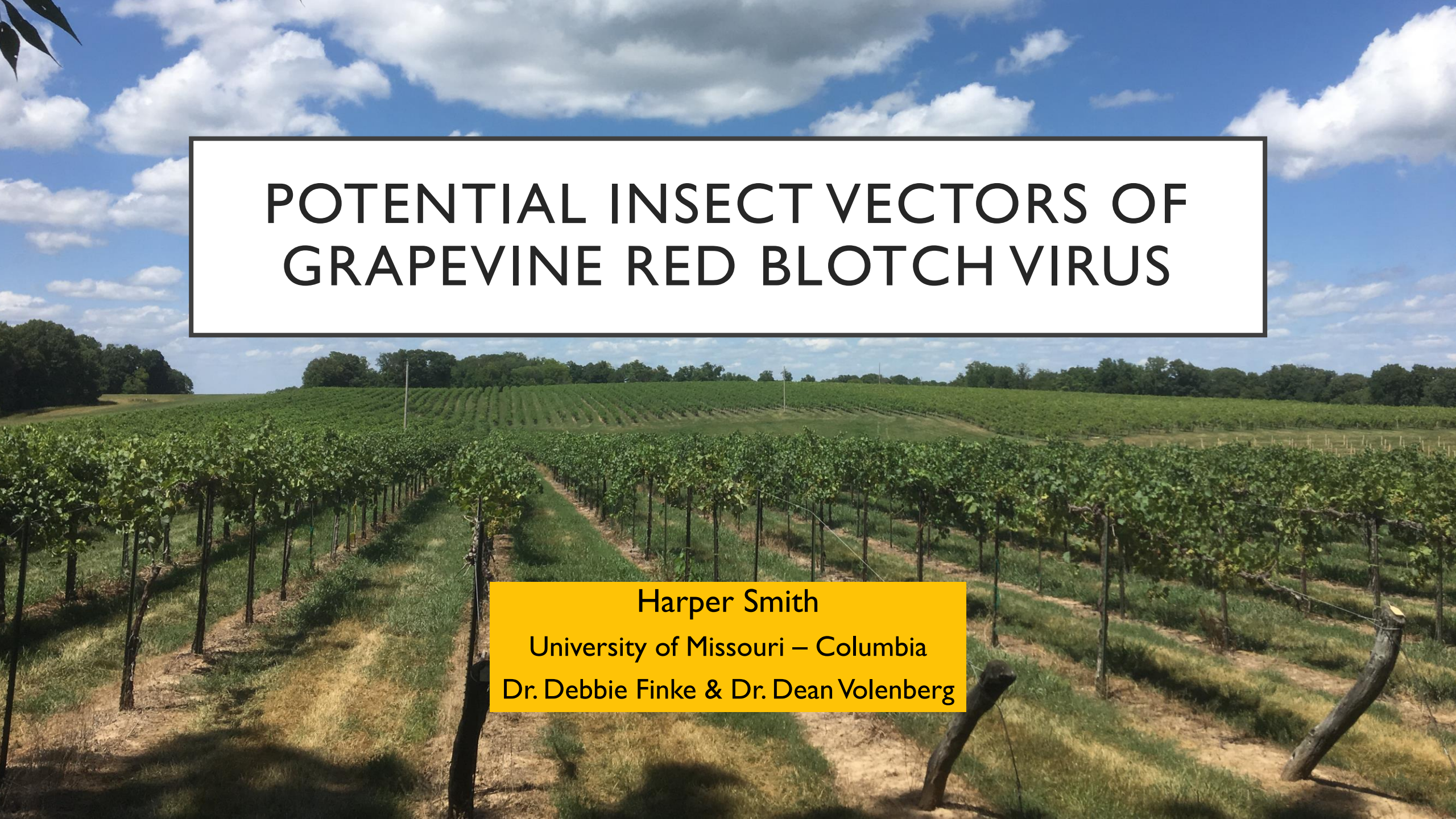


# POTENTIAL INSECT VECTORS OF GRAPEVINE RED BLOTCH VIRUS

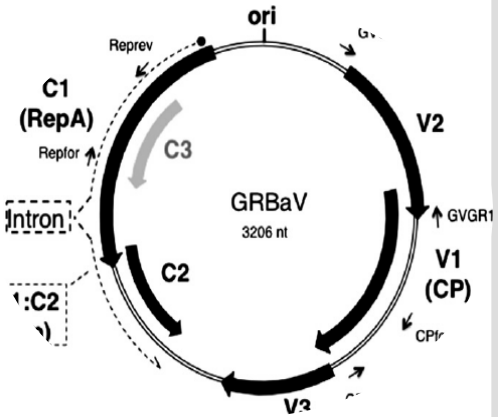
Harper Smith

University of Missouri – Columbia

Dr. Debbie Finke & Dr. Dean Volenberg

2008

Red blotch suspected to be new strain of Leafroll




2012

Grapevine red blotch associated virus (GRBaV) identified as the likely causal agent

2016

Insect vector confirmed in CA, Red blotch confirmed in MO vineyards

2017

Virus survey across MO, 35% of samples positive for Red blotch

2018-2019

Survey for insect vectors in Gasconade, Franklin and Boone Counties

# BACKGROUND: THE VIRUS

- Single-stranded, circular DNA virus
- Family: Geminiviridae, genus: *Grablovirus*
- Foliar symptoms of red blotch similar to the leafroll virus complex in *Vitis vinifera*
  - Red blotches – red berried cultivars
  - Light green/yellow blotches – white berried cultivars

(Bahder et al., 2016 & Cieniweicz et al., 2017)

Dean Volenberg, Crimson Cabernet

# BACKGROUND: THE VIRUS

- Altered berry chemistry
  - Reduced Brix, anthocyanins
- Overall vine decline
- Some asymptomatic hybrid cultivars
  - Norton

(Sudarshana et al., 2015, Al Rawhinih et al., 2015

& Schoelz et al., 2019)


Missouri Wine & Grape Board, 2018 Award Winners

# BACKGROUND: THE VECTOR

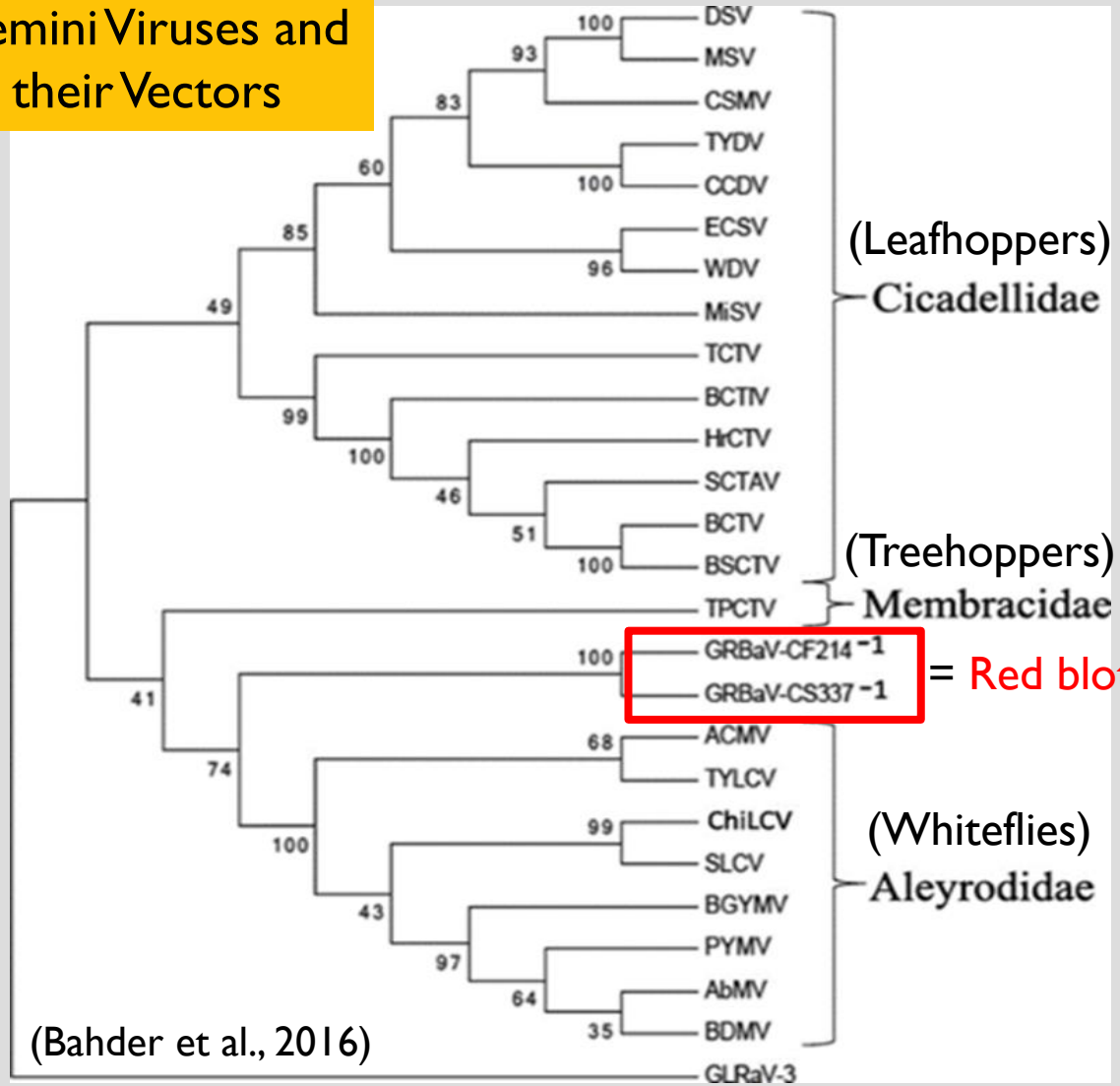
- Three-cornered Alfalfa Treehopper,

  *Spissistilus festinus*

- Confirmed as a vector in CA in 2016


Three-cornered Alfalfa Treehopper,
*Spissistilus festinus*

Gemini Viruses and their Vectors



# OBJECTIVES

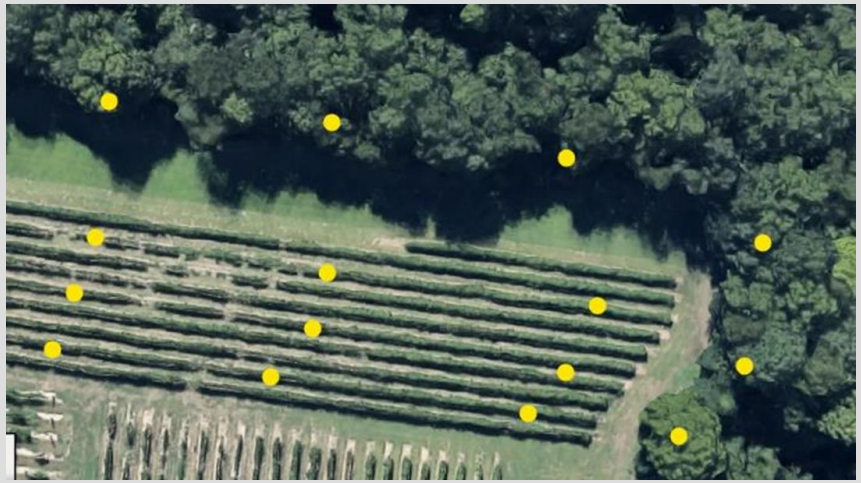
- Characterize the treehopper community in Missouri vineyards
- Determine if potential vectors from vineyards are carrying red blotch
- Determine if potential vectors can

(a) acquire red blotch and

(b) transmit red blotch to virus-free grapevines

# STUDY DESIGN

- 2018 & 2019 sampling using unbaited yellow sticky card traps
- 4 commercial vineyards with confirmed red blotch infection
- Along edge habitat and within vineyard rows



Kyle Kittelberger

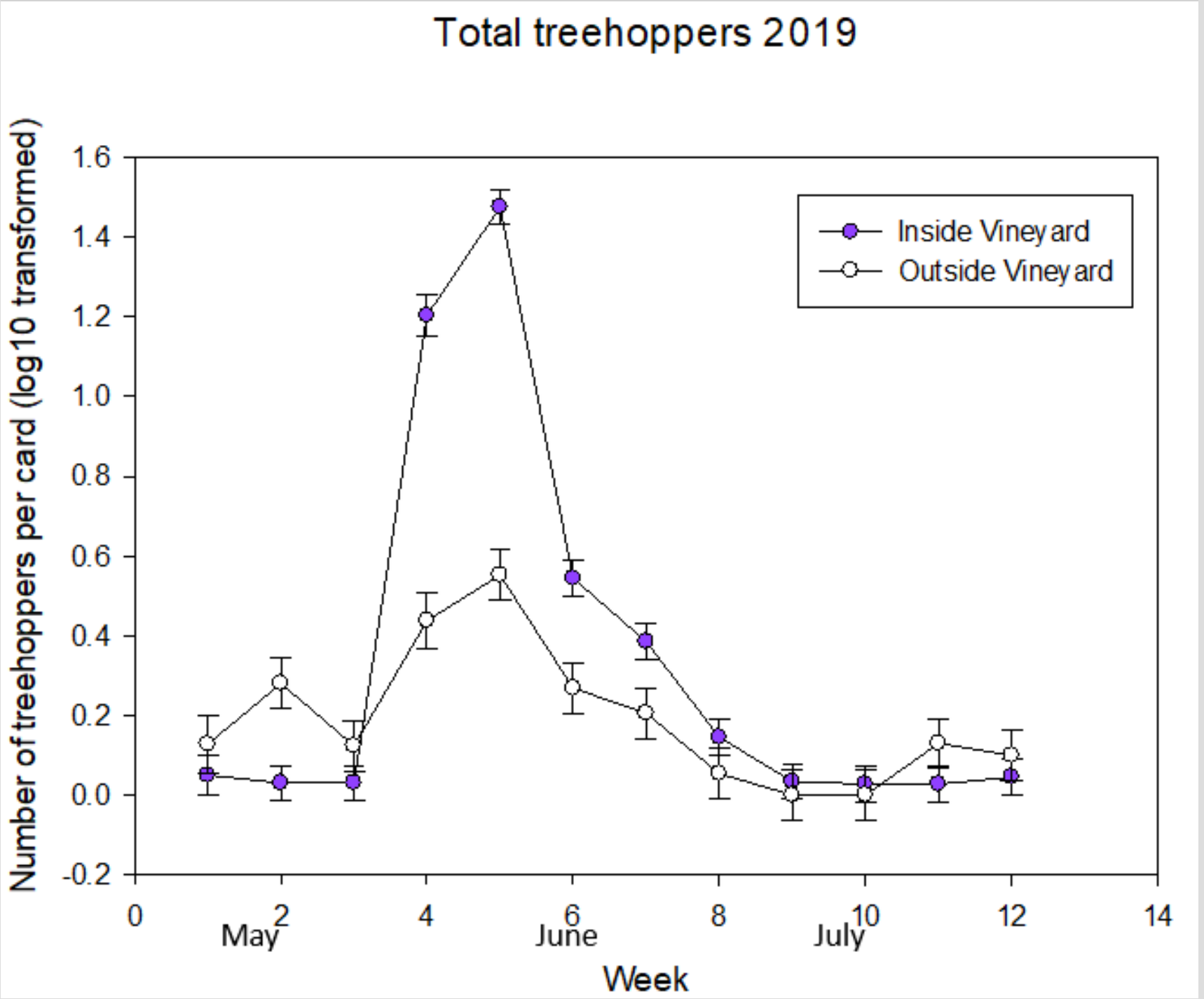
Nicolas Gompel

Ken Childs

Kyle Kittelberger

Kyle Kittelberger

Kyle Kittelberger



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# METHODS: TESTING INSECTS FROM VINEYARDS FOR RED BLOTCH

- Insects were removed from sticky cards
- Stored in a -80°C freezer
- Pooled samples of one species from different cards
- Total insect DNA extracted
- PCR for presence of red blotch viral DNA

D-Vac sampling for insects

# RESULTS: TESTING INSECTS FROM VINEYARDS FOR RED BLOTCH

- 2 pooled samples of field caught *Entylia carinata* (Ragweed Treehopper) positive for red blotch
  - From one vineyard in 2019

*Entylia carinata*

# OBJECTIVES

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(b) transmit red blotch to virus-free grapevines

# METHODS: ACQUISITION ASSAYS

- Vector candidates fed on red blotch positive grapevines for 72 hrs.
- Removed and stored in -80°C until ID and PCR
- 8 treehopper spp. and 1 leafhopper sp. were tested
  - 5 treehopper spp. tested positive for red blotch after 72 hrs.

# RESULTS: ACQUISITION ASSAYS

## Tested positive for red blotch:

*Entylia carinata*

*Enchenopa binotata*

*Acutalis tartarea*

*Pubilia reticulata*

*Campylenchia latipes*

## Tested negative for red blotch:


*Archasia pallida*


*Graphocephala coccinea*

## Ongoing molecular work:


"Buffalo treehopper"


*Micrutalis calva*

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- Determine if potential vectors can

(a) acquire red blotch and

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# METHODS: TRANSMISSION ASSAYS

- 48 hr. acquisition feed on +red blotch vine
- 48 hr. inoculation feed on -red blotch vine
  - *Entylia carinata* and *Enchenopa binotata*
- Tested grapevines for red blotch 4 months post inoculation



*E. carinata* feeding on grape

# RESULTS: TRANSMISSION ASSAY

Collecting phloem scrapings from recipient vines (Crimson Cabernet)

- *Entylia carinata* (Ragweed Treehopper) successfully transmitted red blotch
  - 2 of the 3 vines
- *Enchenopa binotata* (Two-marked Treehopper) successfully transmitted red blotch
  - 2 of the 3 vines


# CONCLUSIONS

- *Enchenopa binotata* (Two-Marked Treehopper) transmits red blotch
  - Rare and only in edge habitats
- *Entylia carinata* (Ragweed Treehopper) transmits red blotch and found positive in a vineyard
  - 2nd most abundant treehopper inside vineyards
- Further monitoring efforts
  - Secondary spread rates
  - Alternate sources of inoculum around cultivated vineyards?

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University of Missouri

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University of Missouri

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