



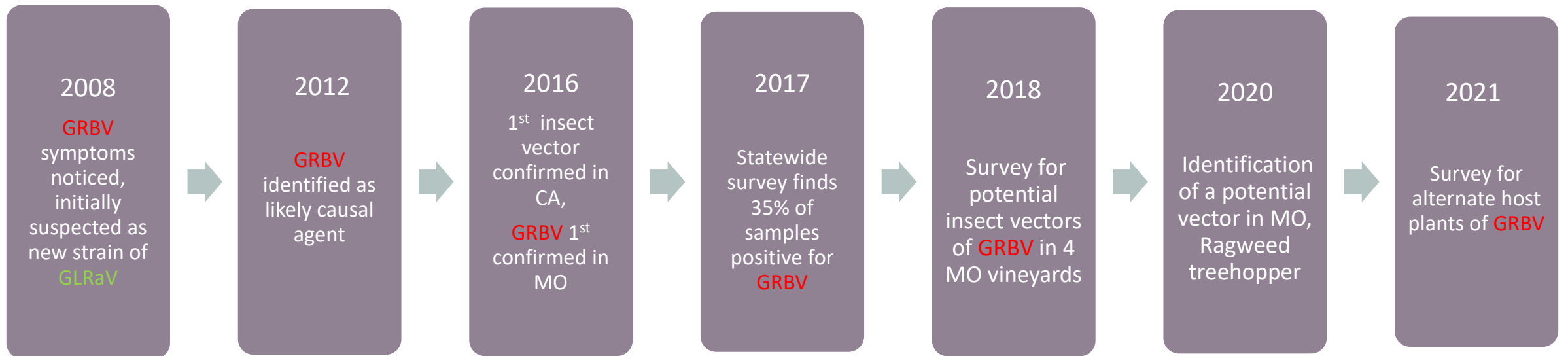
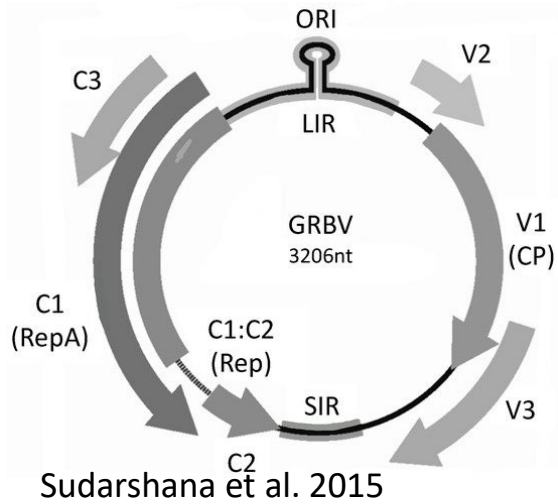
ALTERNATE HOST PLANTS OF GRAPEVINE  
RED BLOTCH VIRUS IN MISSOURI  
VINEYARDS



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Show Me Grape & Wine Conference - March 9, 2022



## Background

- Symptoms/fruit effects in *Vitis vinifera*
  - Delayed ripening
  - Stalled sugars in berries
  - Altered anthocyanins in berry skins
- Asymptomatic hybrid cultivars
  - Norton
  - Cooper's research!



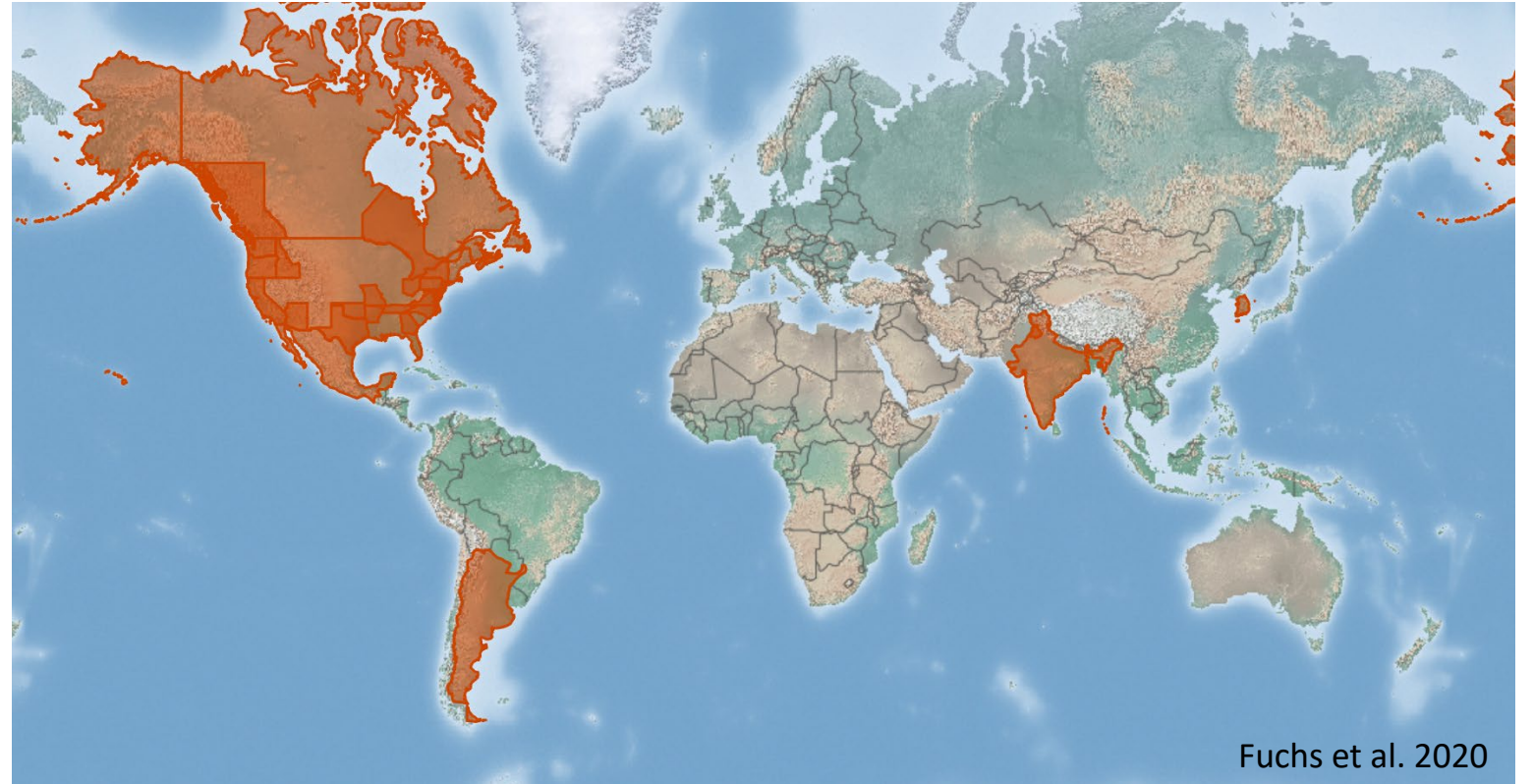
Raul Girardello, UC Davis



Schoelz et al, 2017

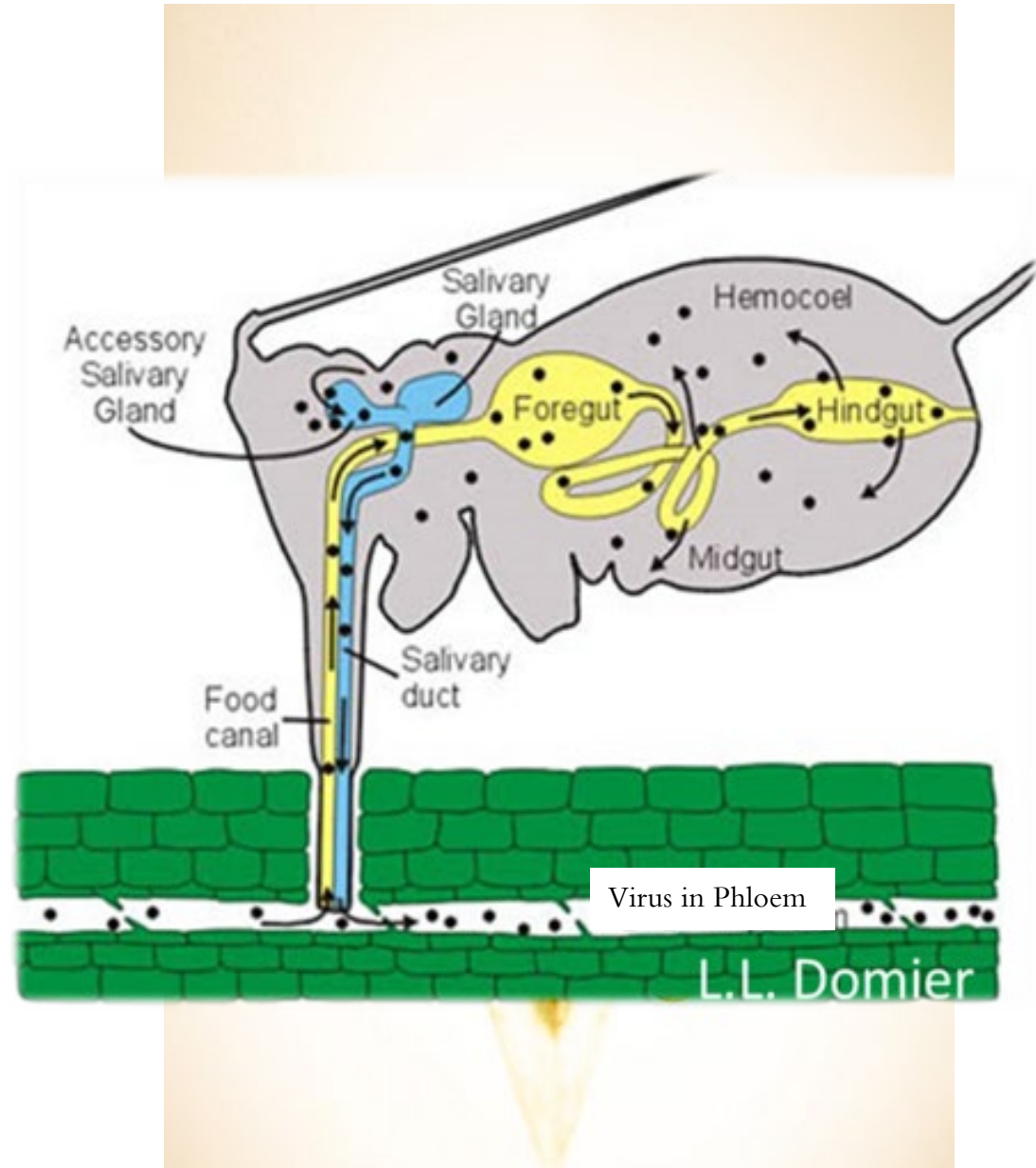
## Background

- Initial spread likely due to nurseery operations
  - Not a novel virus
- Not spread via normal vineyard maintenance
  - i.e. pruning



## Background

- Most plant viruses require an insect vector
- Piercing-sucking mouthparts
  - Order: Hemiptera (the true bugs)
- Gemini Viruses are transmitted in a circulative, non-propagative mode
  - Virus doesn't replicate inside the insect



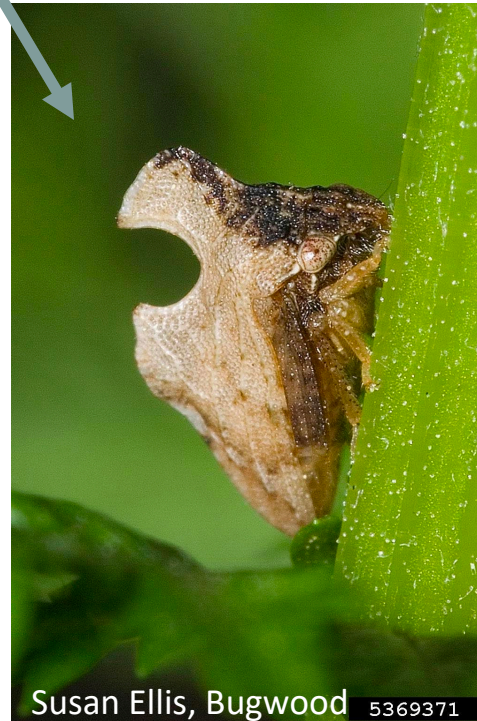
## Background

- One confirmed insect vector out of CA, the Three-cornered alfalfa treehopper (*Spissistilus festinus*)
- 2018-2019 surveys of insect community in four MO vineyards
- One confirmed vector, three-cornered alfalfa treehopper was NOT present
- Transmission assays of two candidate treehopper species
  - 1) Two-marked treehoppers (*Enchenopa binotata*)
  - 2) Ragweed treehoppers (*Entylia carinata*)



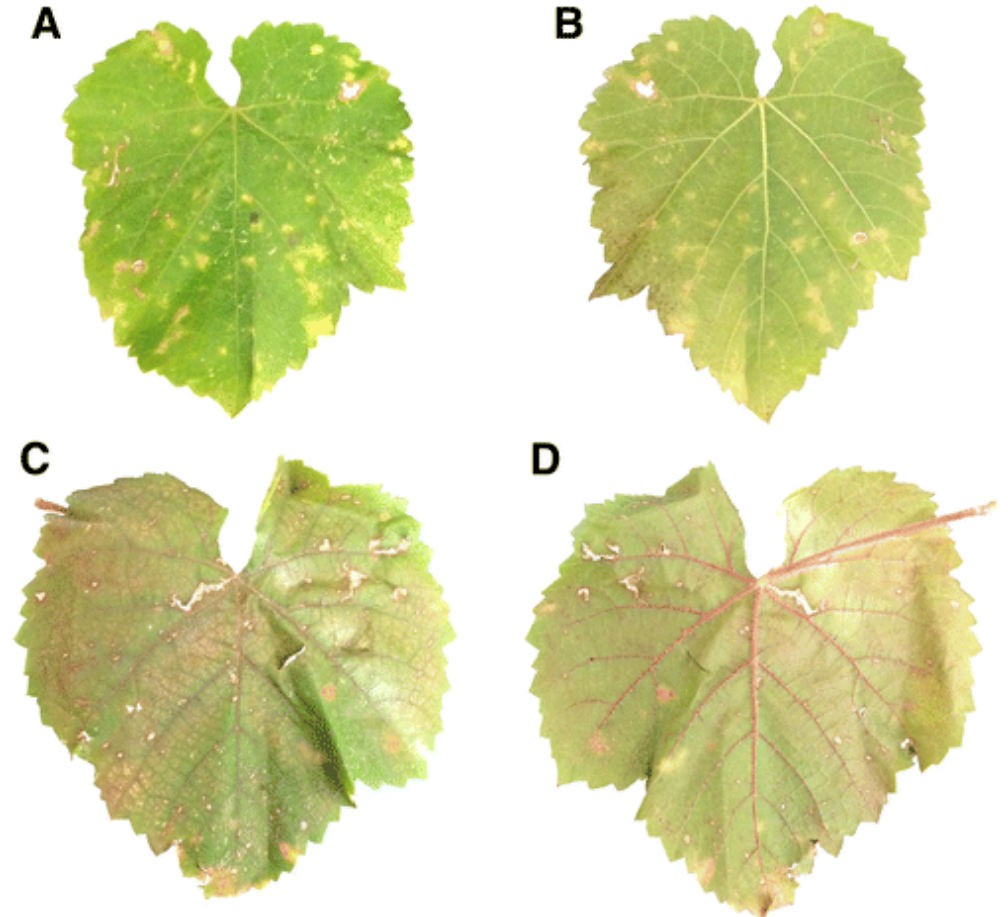
# Background

- Two-marked treehoppers and the Ragweed treehoppers transmitted **GRBV** to virus-free vines
- Ragweed treehopper = 2<sup>nd</sup> most abundant treehopper found inside vineyards
- 2 samples of ragweed treehoppers pulled off sticky cards inside the vineyards tested positive for **GRBV**



## Background

- Survey of 13 plant species in CA, two species tested positive **GRBV**
  - Wild grapes (*V. californica* x *V. vinifera*)
  - American blackberry (*Rubus armeniacus*)\*
  - 28% of wild grape tested positive
- Survey of wild Vitis in NY found 0% of samples positive for **GRBV**



Bahder et al. 2016



## Objectives

- 1) Identify and test for GRBV alternative host plants of Ragweed treehoppers and Two-marked treehoppers
  - a. Common ragweed (*Ambrosia artemisiifolia*)
  - b. Giant ragweed (*Ambrosia trifida*)
  - c. Horse nettle (*Solanum carolinense*)
  - d. Canadian horseweed (*Conyza canadensis*)
- 2) Test for **GRBV** in Wild grape (*Vitis sp.*) and Raccoon grape (*Ampleopsis cordata*)



UGA1120248



Ohio State weed lab, Bugwood

1556354

Canadian horseweed (*Conyza canadensis*)



Rob Routledge, Sault College, Bugwood 3499292



Dean Volenberg, 2021

## Raccoon Grape (*Ampleopsis cordata*)



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## Wild grape (*Vitis* sp.)

- 8 sp. in MO

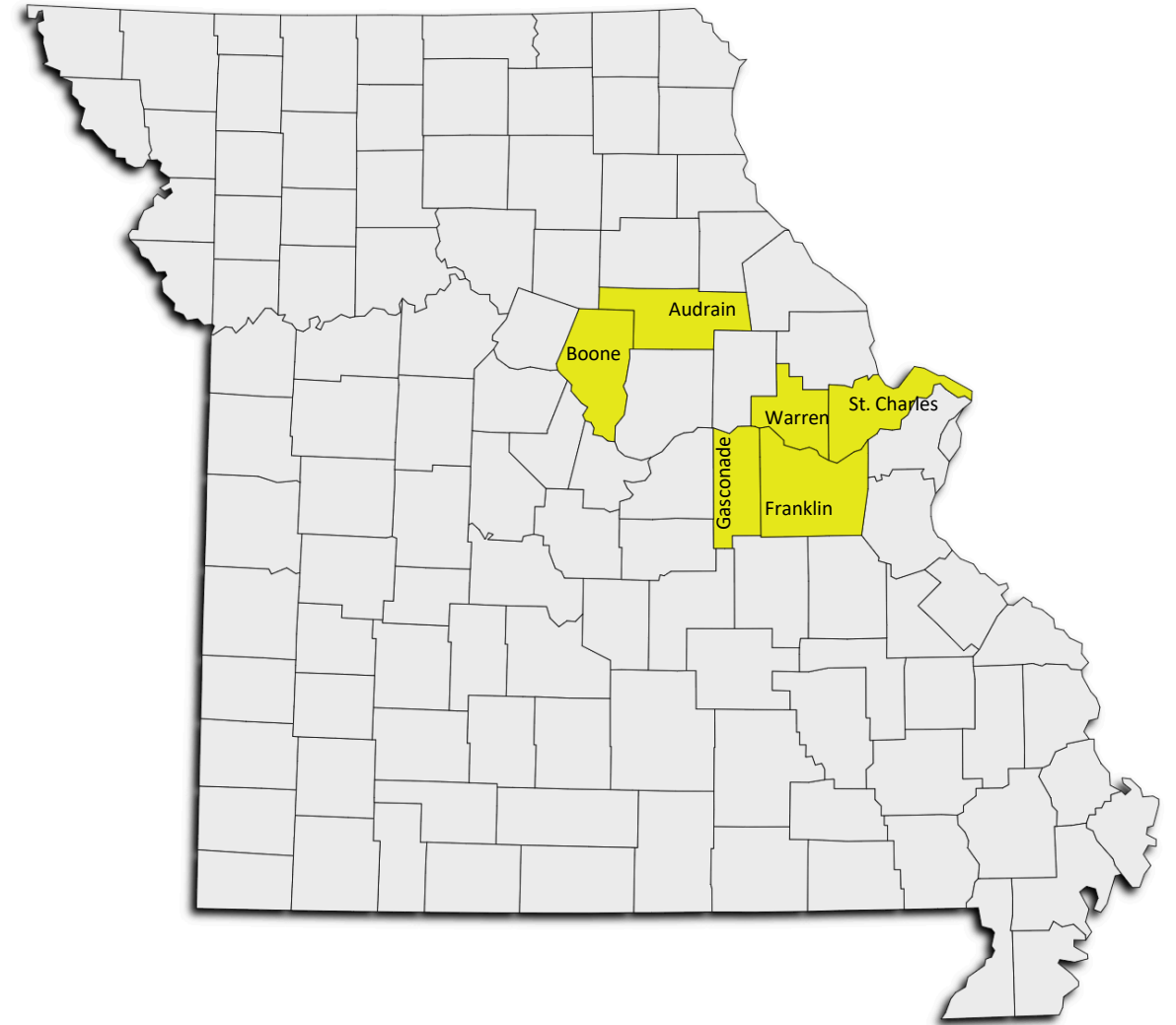


Michigan State University

## Methods

- 13 vineyards sampled in July & August 2021
- Edge habitats surrounding cultivated vineyards
- Collected leaves with petioles attached
- DNA extraction and PCR testing for **GRBV**

*Counties Surveyed, 2021*



# Results

- 18 of 137 samples of wild grape (*Vitis sp.*) were positive for **GRBV**
  - % 13.14 of samples
- None of the 4 species of weeds tested positive
- 1 of 7 samples of Raccoon grape (*Ampleopsis cordata*) tested positive for **GRBV**
  - %14.29 of samples



Species	# of samples	# positive (GRBV)	% positive (GRBV)
Wild <i>Vitis sp.</i>	137	18	13.13868613
<i>Ampleopsis sp.</i>	7	1	14.28571429
Horse Nettle	5	0	0
Horsetweed	20	0	0
Common Ragweed	30	0	0
Giant Ragweed	16	0	0
<b>Total samples</b>	<b>215</b>		

## Conclusions

- Wild grape in edge habitat is a source of inoculum for **GRBV**
- Raccoon grape (*Ampleopsis sp.*) may be another source of inoculum
- 4 Roundup® resistant weeds are not a source of **GRBV** for insect vectors
- Removal of these weedy vines in edge habitat may be futile



## Upcoming Research

- Sequencing wild grape (*Vitis sp.*) **GRBV** DNA to compare with cultivated vine **GRBV** for evidence of spread
- Additional surveys of Raccoon grape (*Ampleopsis sp.*)
- Repeat transmission assays
  - Different feeding intervals
  - Testing different plant tissue



Thank you!

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