Spread of *Xylella fastidiosa* by the glassy-winged sharpshooter in the San Joaquin Valley of California

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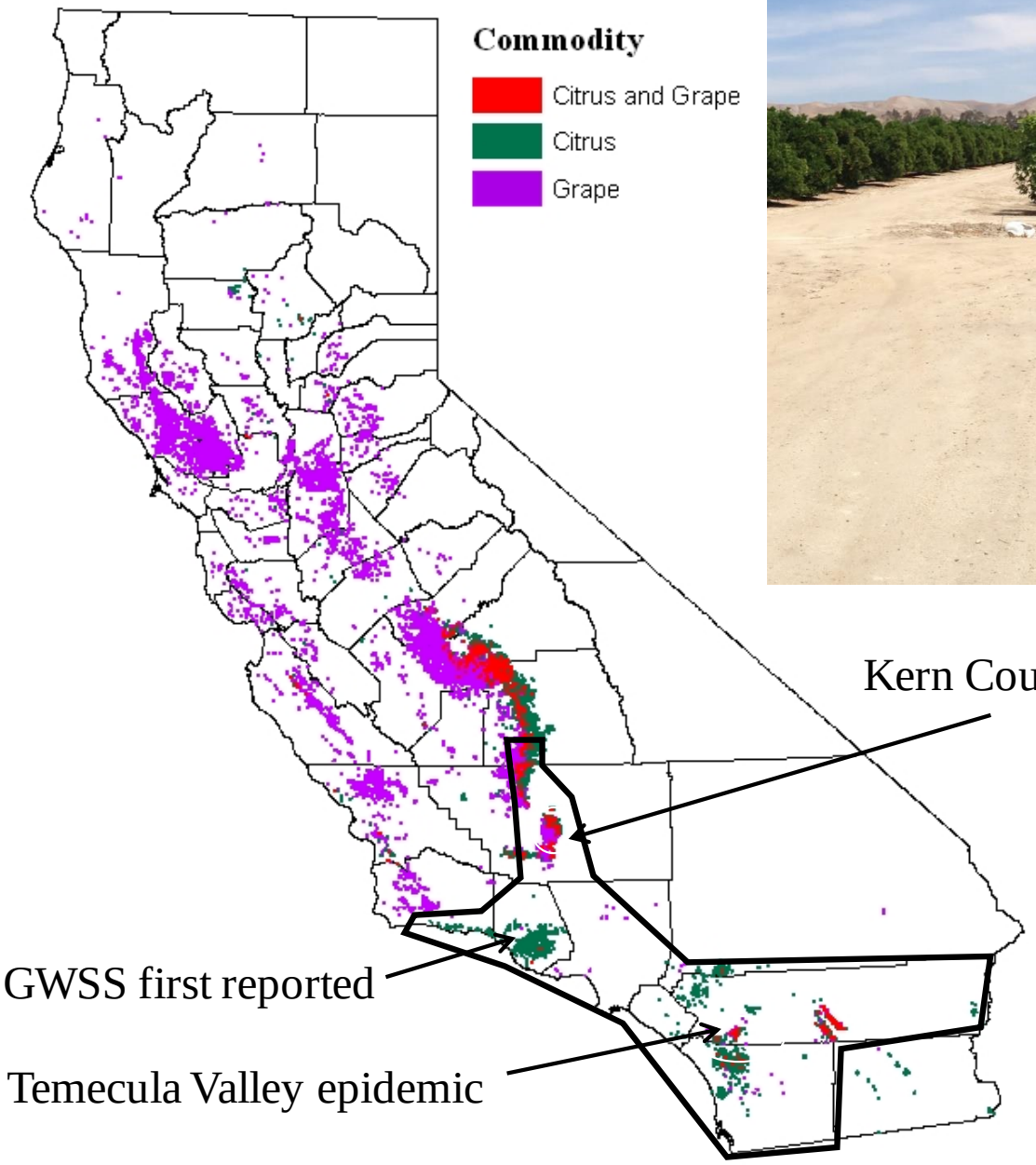
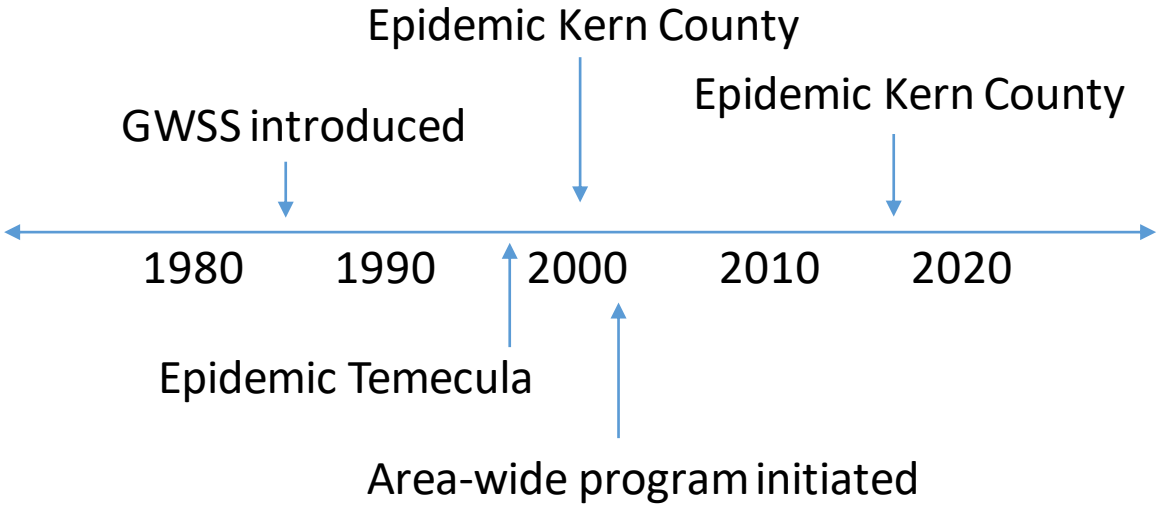
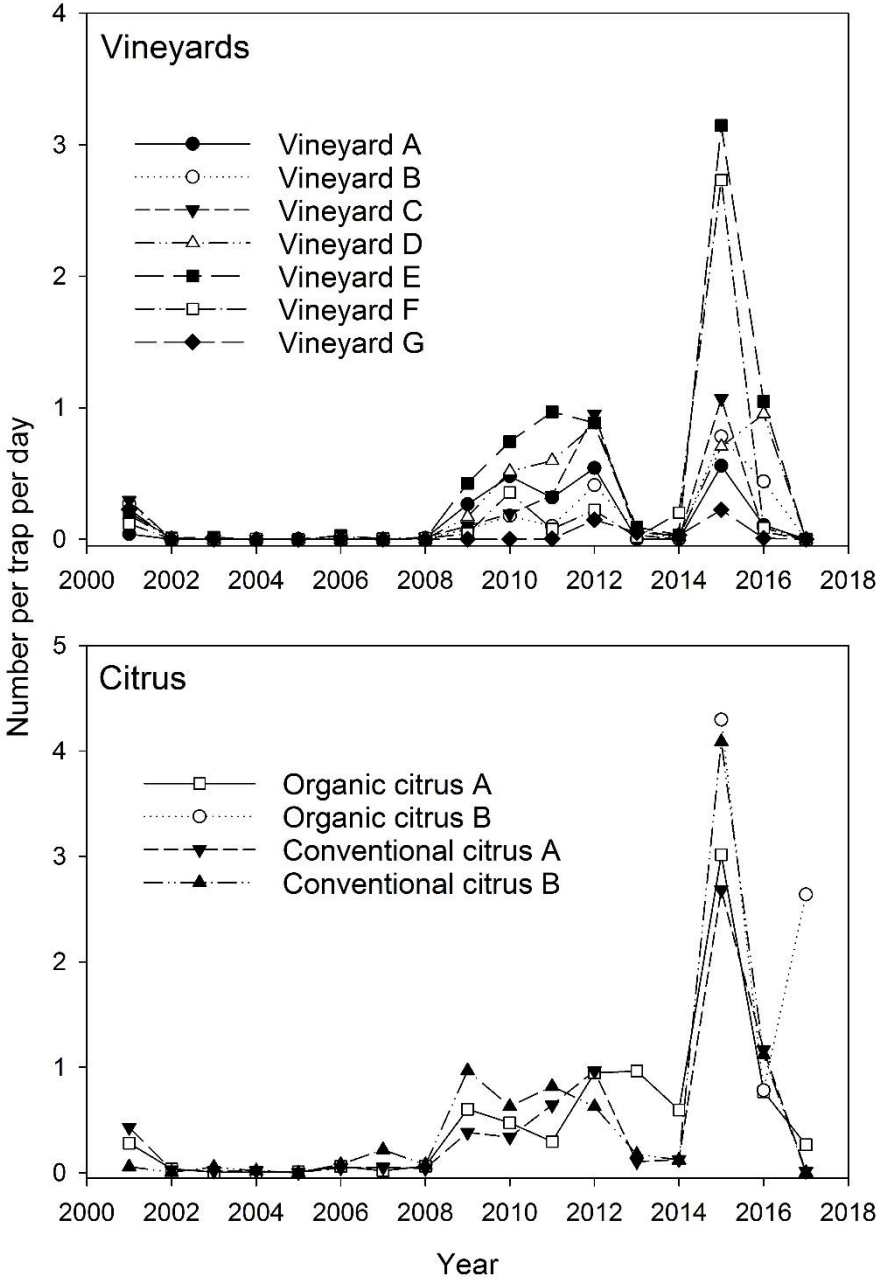
Pierce's disease of grapevine and glassy-winged sharpshooter

Overwintering host for GWSS

Citrus strains of *X. fastidiosa* not present in California


Commodity
Citrus and Grape
Citrus
Grape
Kern County epidemic
GWSS first reported
Temecula Valley epidemic


Epidemic Kern County
Epidemic Kern County
GWSS introduced
1980
1990
2000
2010
2020
Epidemic Temecula
Area-wide program initiated


Vineyards
Vineyard A
Vineyard B
Vineyard C
Vineyard D
Vineyard E
Vineyard F
Vineyard G
Citrus
Organic citrus A
Organic citrus B
Conventional citrus A
Conventional citrus B
Number per trap per day
Year
0
1
2
3
4
5
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018

When does vine-to-vine spread occur?
or
When should sharpshooters be controlled?

- When are chronically infected vines likely to be acquisition sources?
- When are vectors abundant in vineyards?
- When are vectors inoculative?

When are chronically infected vines likely to be acquisition sources?

- Collected vine samples every 3 weeks from:
  - Vines confirmed as infected in August/September of previous year
  - Vines identified based on early season symptoms
    - Delayed growth
  - Heavily pruned vines (stumps)
  - Conducted qPCR on collected samples
    - Combined 4-5 leaf petioles


Vines confirmed as infected in previous year
June 2017


Vines confirmed as infected in previous year
July 2017


Vines confirmed as infected in previous year
October 2017

Vines confirmed as infected in previous year

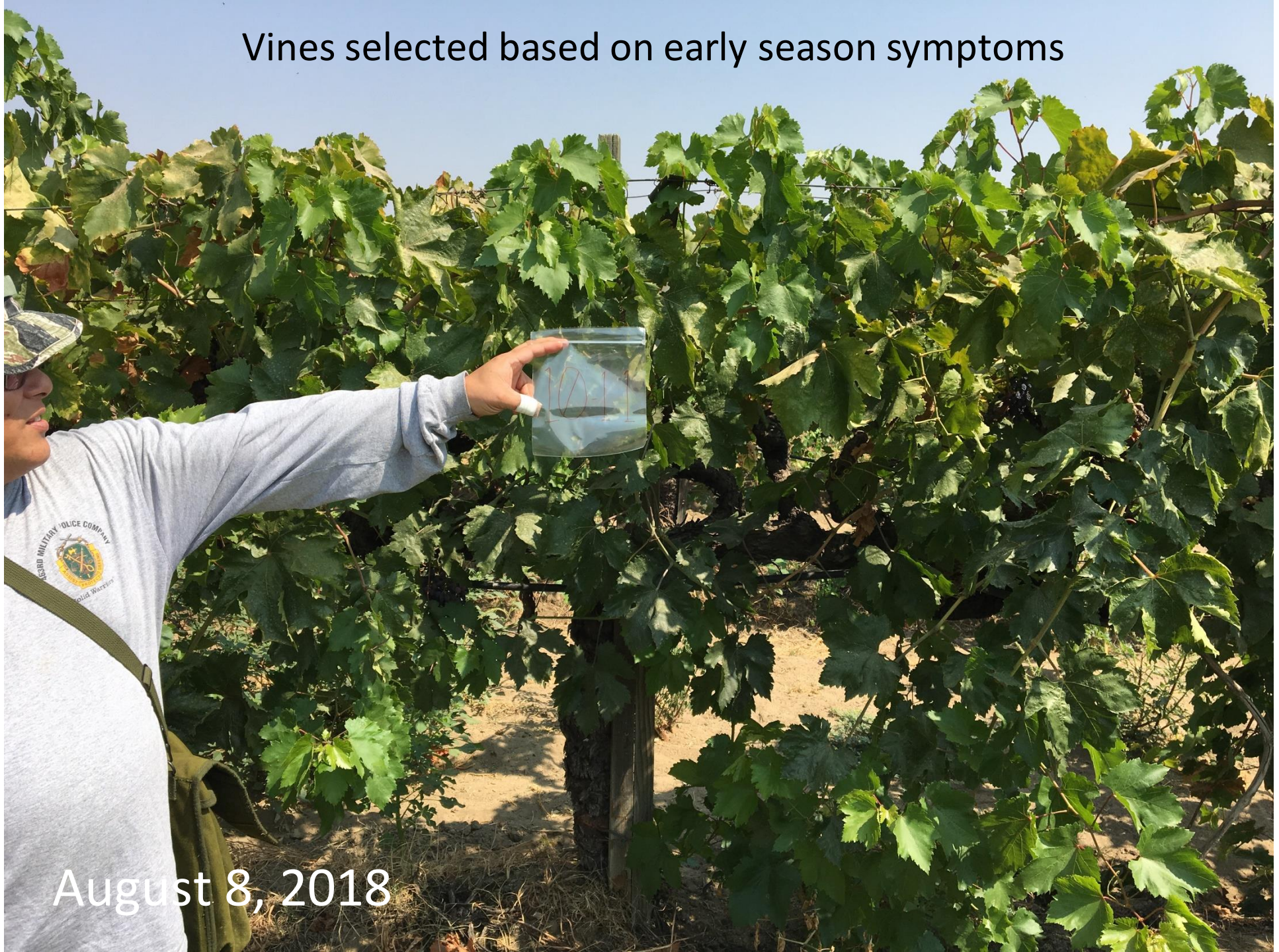
April 6, 2018


Vines selected based on early season symptoms
Normal growth
Delayed growth
April 6, 2018

Vines selected based on early season symptoms


July 18, 2018

Vines selected based on early season symptoms



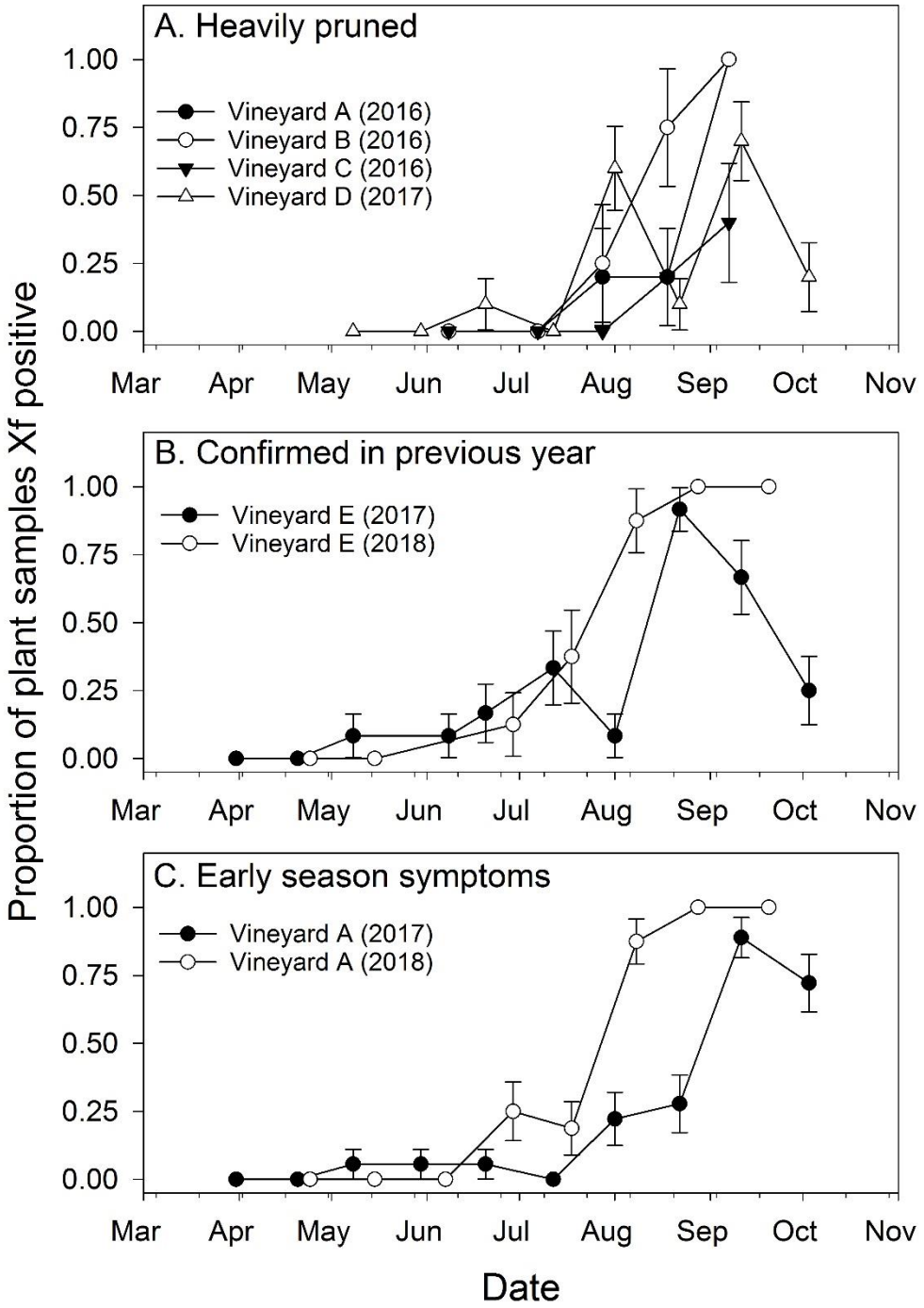
August 8, 2018


Vines selected based on early season symptoms
August 28, 2018

Vines selected based on early season symptoms

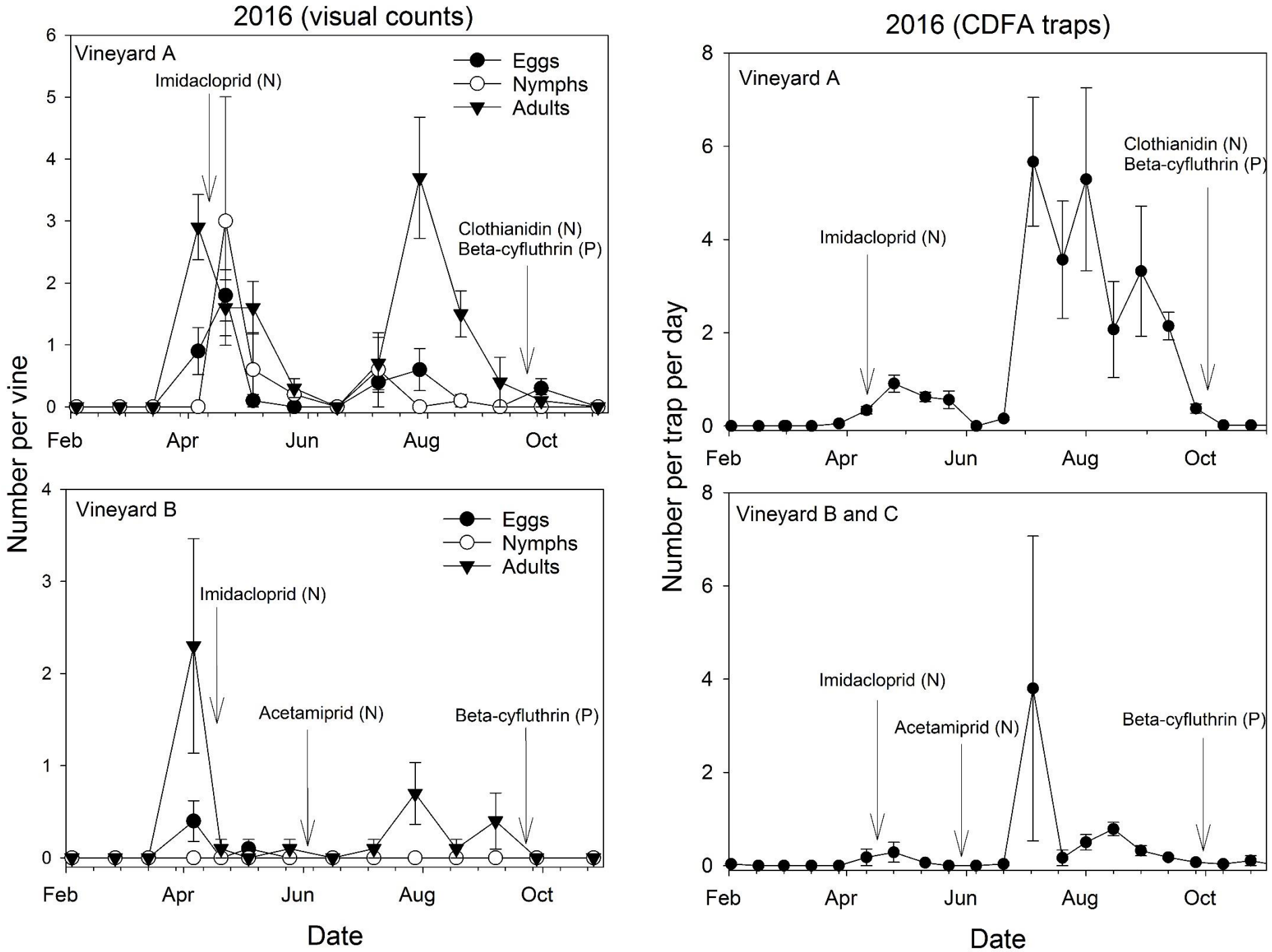
Unaffected vines

September 20, 2018


A. Heavily pruned
Vineyard A (2016)
Vineyard B (2016)
Vineyard C (2016)
Vineyard D (2017)
B. Confirmed in previous year
Vineyard E (2017)
Vineyard E (2018)
C. Early season symptoms
Vineyard A (2017)
Vineyard A (2018)
Proportion of plant samples Xf positive
1.00
0.75
0.50
0.25
0.00
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Date

When are sharpshooters abundant in vineyards?

- Analyzed CDFA trapping data available for vineyard sites
- Conducted timed searches for sharpshooters on individual grapevines
  - 10 vines per site
  - Each vine searched for 2 minutes
  - Counted number of egg masses, nymphs, and adults
  - Completed every three weeks

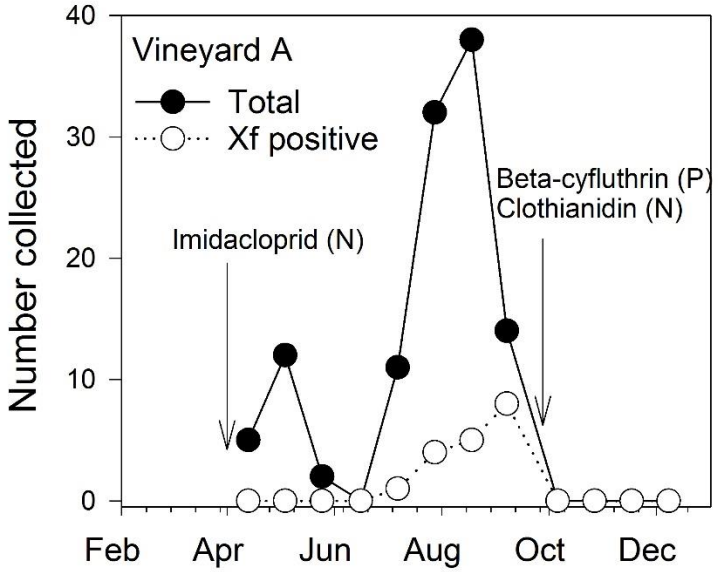


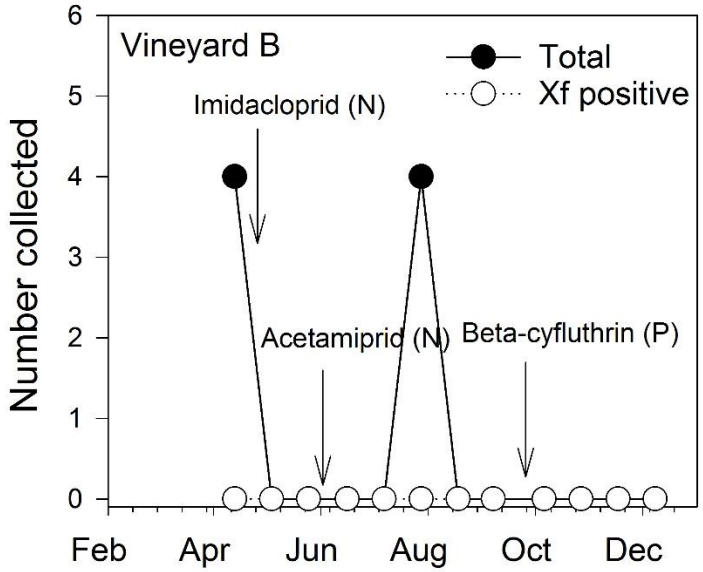
No sharpshooters were observed at vineyard sites In 2017 or 2018

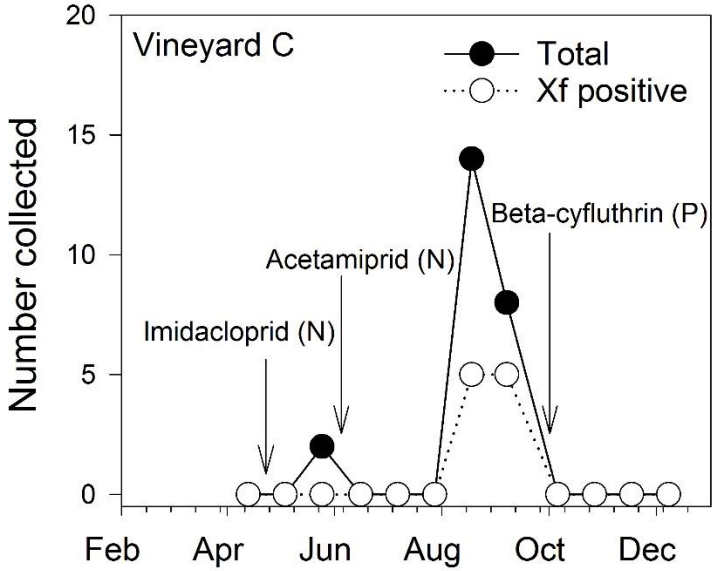
When are inoculative sharpshooters present in vineyards?

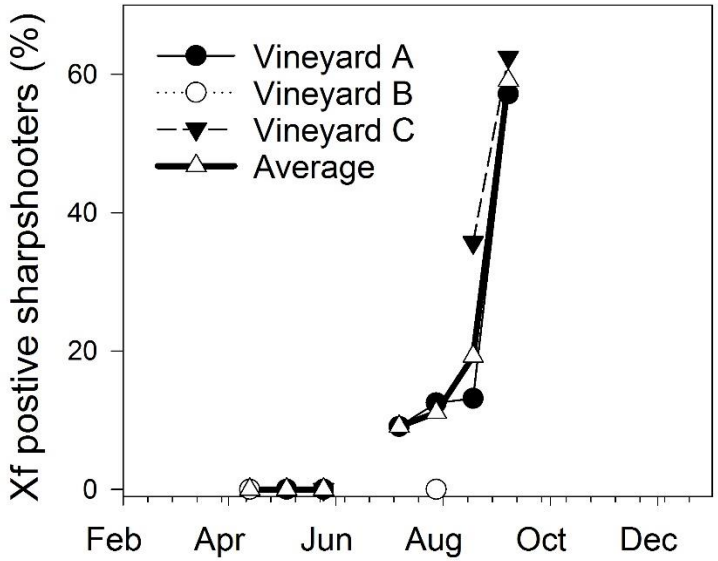
- Conducted 20 minute searches for sharpshooter adults
  - Completed every 3 weeks
- Conducted qPCR on sharpshooter heads

2016



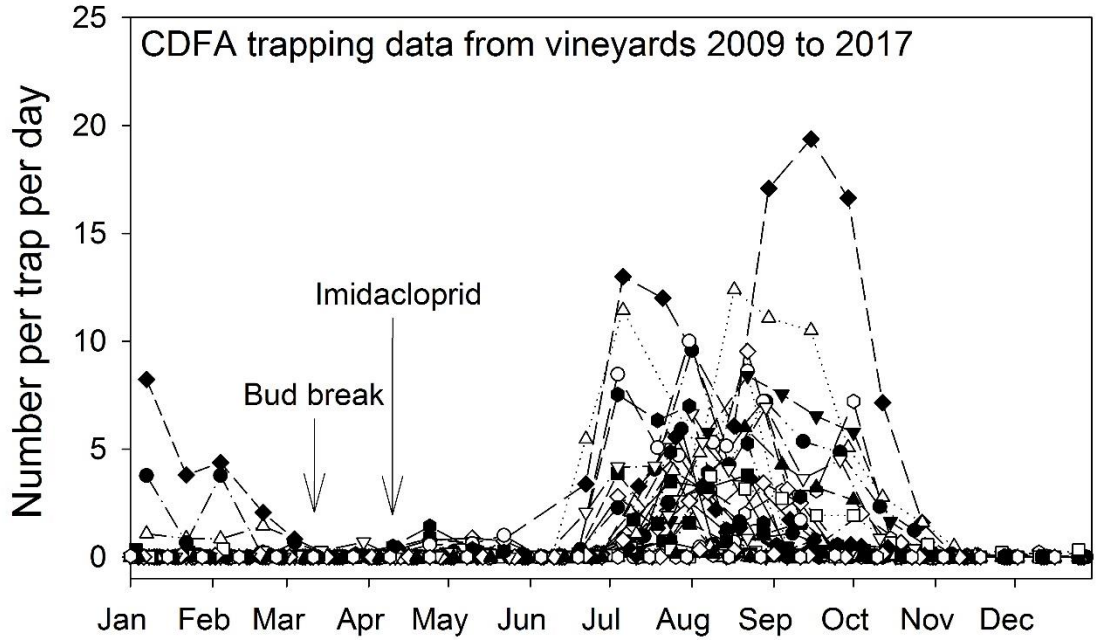


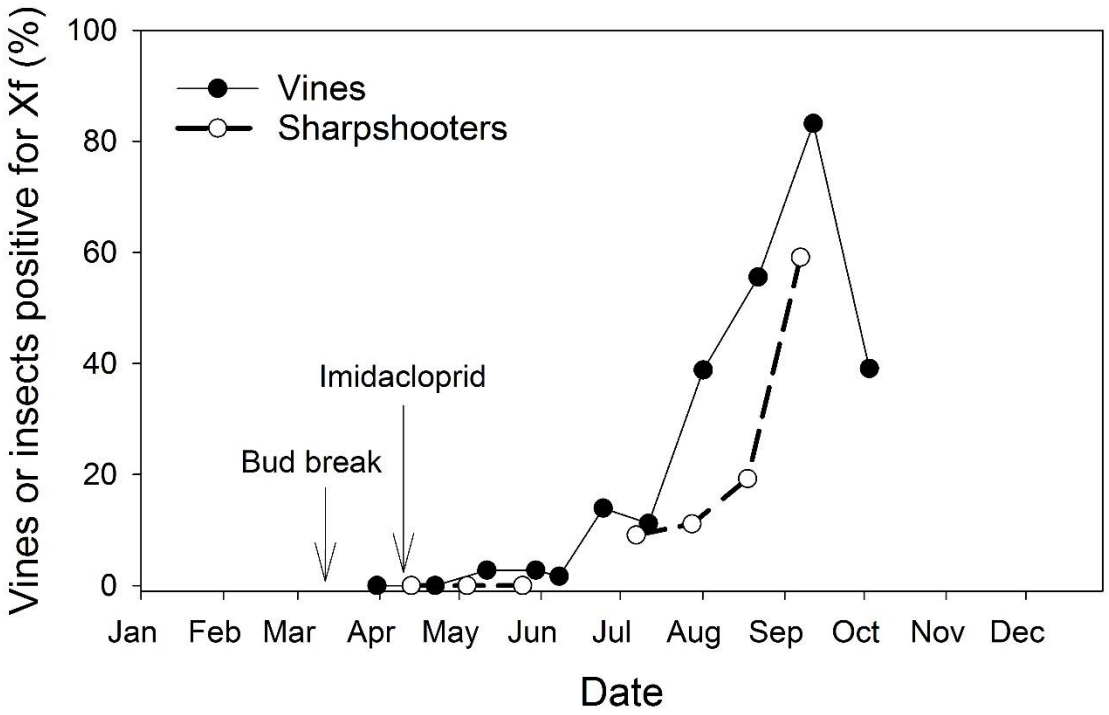




Date

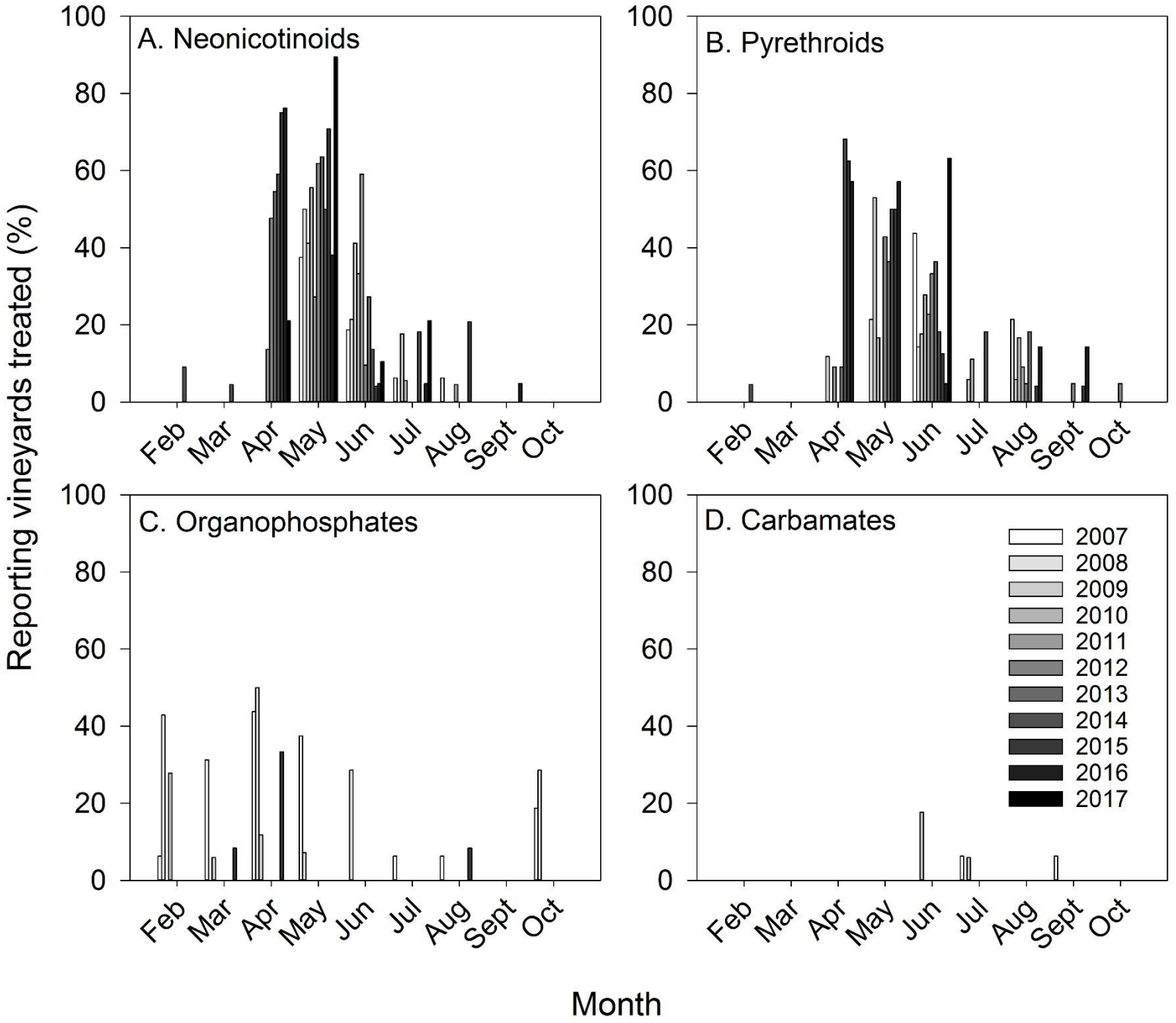
In 2017 and 2018, no sharpshooters were observed at vineyard sites.





When does vine-to-vine spread occur?

Most likely July thru September



Vineyards are not typically treated with insecticides that are active against GWSS in July and August

Conclusions

- Primary spread may occur after bud break and before vines are protected by insecticides
  - GWSS overwinter as adults
  - Inoculative vectors that move into vineyards during spring may have acquired *X. fastidiosa* from grapes the previous fall.
- Secondary spread occurs in late summer (July thru September)
  - Insecticides not typically applied in July and August
  - Post-harvest interval
  - Rates of winter curing appears to be much lower than anticipated
- Effective control is hampered by:
  - Inability to quickly and accurately identify infected vines for roguing
  - Insecticide resistance
  - Alternative methods for suppressing vector populations are needed

Thanks to:

- Consolidated Central Valley Table Grape Pest and Disease Control District for funding.
- Technical support:
  - Sean Uchima, Brandon Ortega, Robert Leija, Sandra Navarro, Nathaniel Luna, and Minerva Gonzalez.