

Invasive Agricultural Pests in California that Impact Winegrapes

Lucia G. Varela

North Coast Extension Advisor

Highlight of three invasive species:

- Glassy-winged sharpshooter / Pierce's disease
- Vine mealybug / grapevine leafroll disease
- European grapevine moth



Photos: Jack K. Clark

Pierce's disease: climate influence

Complex interactions:

- Pathogen in vine vascular tissue:
 - *Xylella fastidiosa* (bacteria)
- Transmitted by sharpshooters
- Host plants harbor the bacteria
- Grapevines are susceptible
- Climate influence

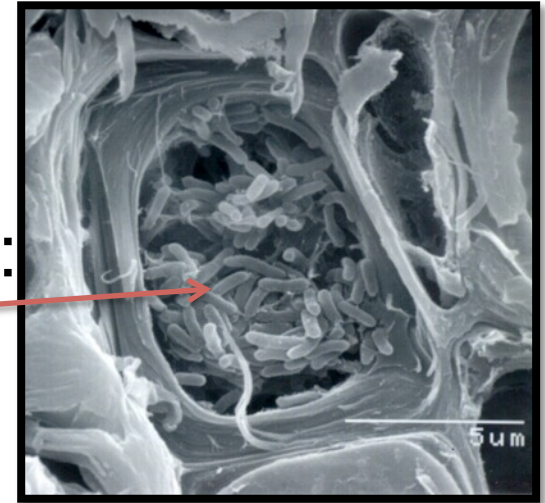
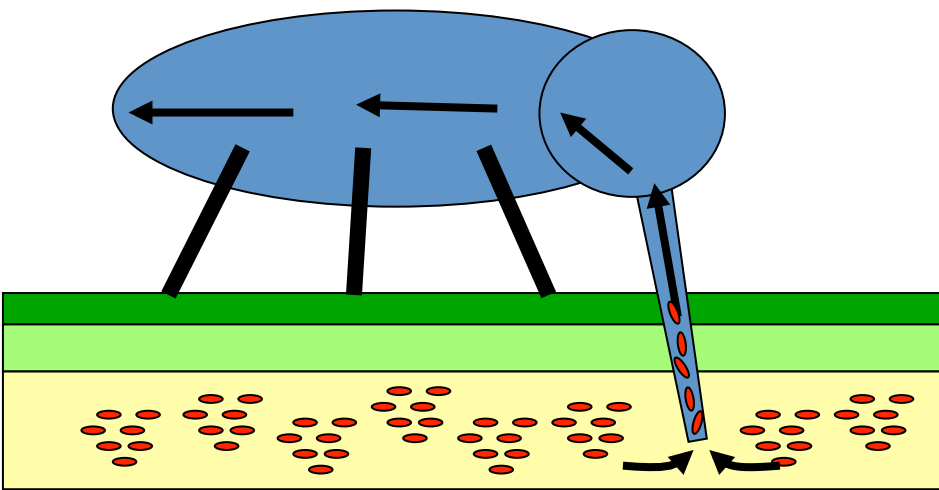


Photo: Jack K. Clark

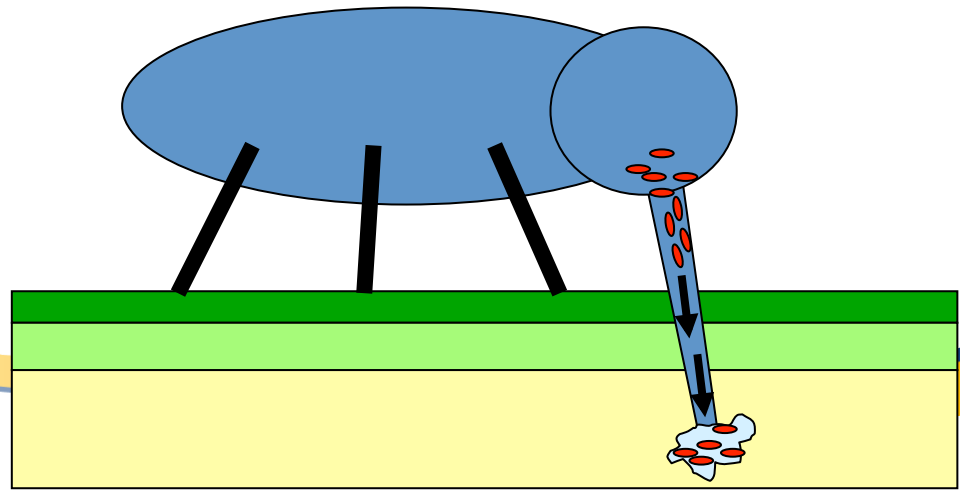
Glassy-winged sharpshooter

*Sharpshooters vector the bacteria
that causes Pierce's disease*

Feeding and acquisition
of bacteria

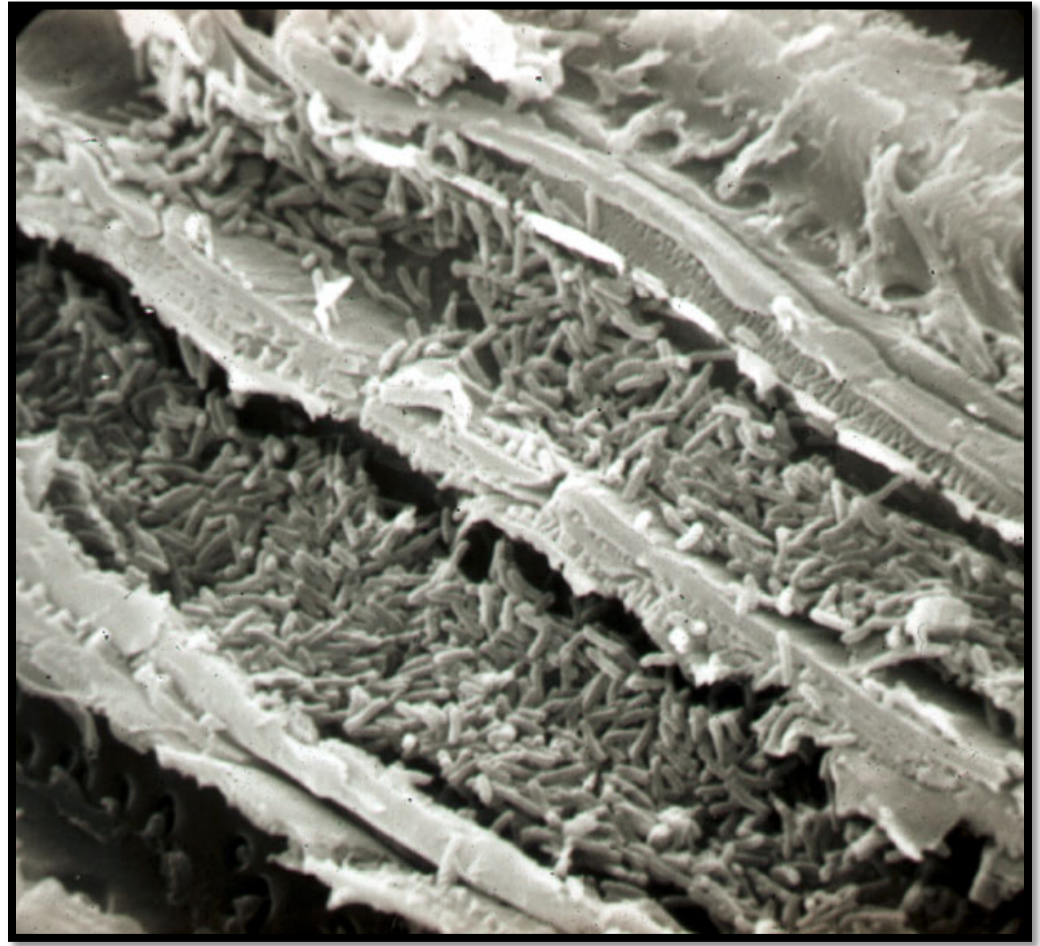


Transmission into
grapevine in spring



Pierce's disease pathogen

- Bacterium multiplies and produces a gel-like material that blocks the water-conducting system (xylem)



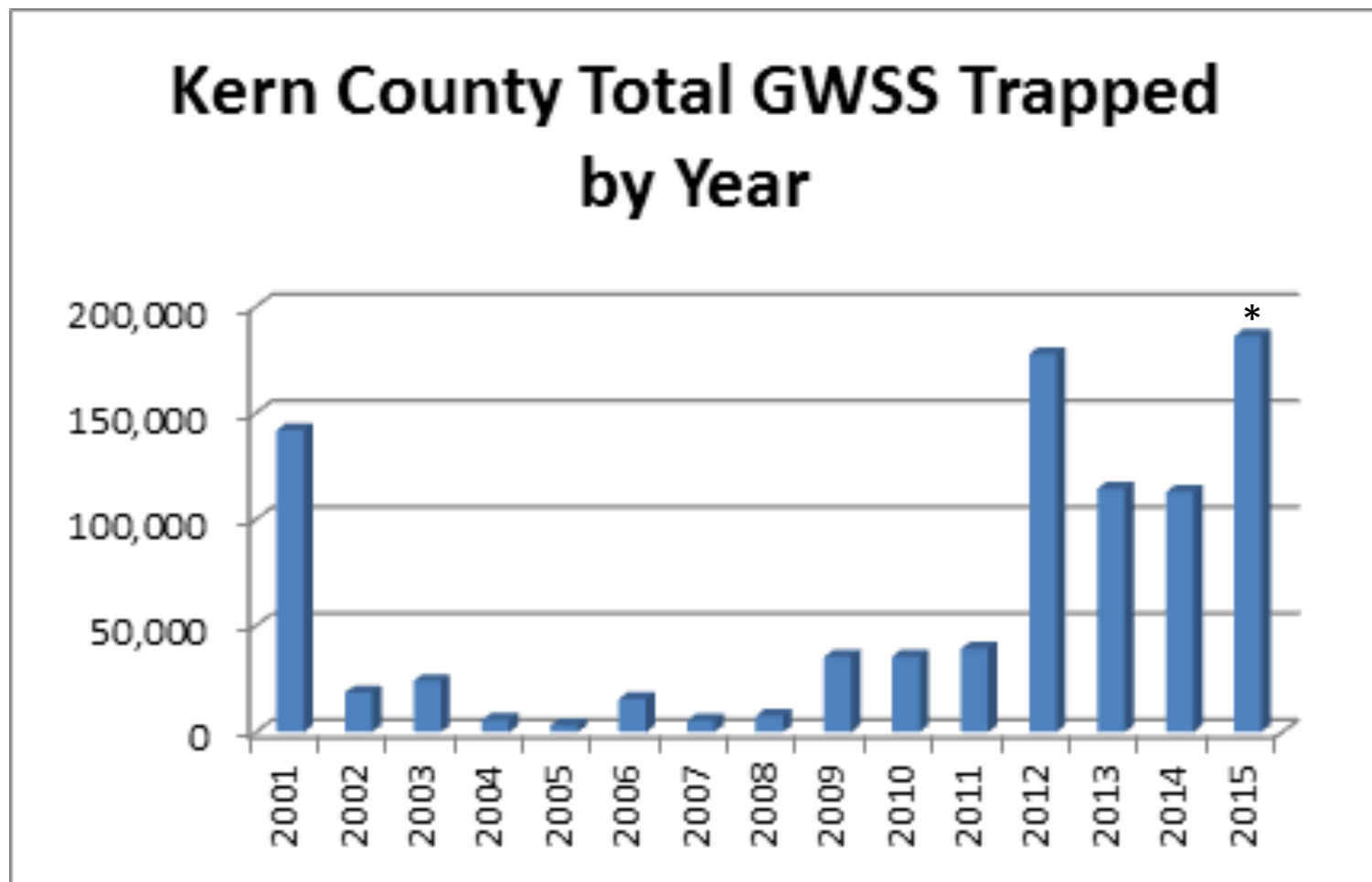
Pierce's disease

- Decreased water movement in vine causes summer **symptoms** that often look like water stress:
 - Leaf Scorch
 - Grapes turn to raisins
 - Vine decline
- **Vine death**



Photos: Jack K. Clark

Sharpshooter population increase



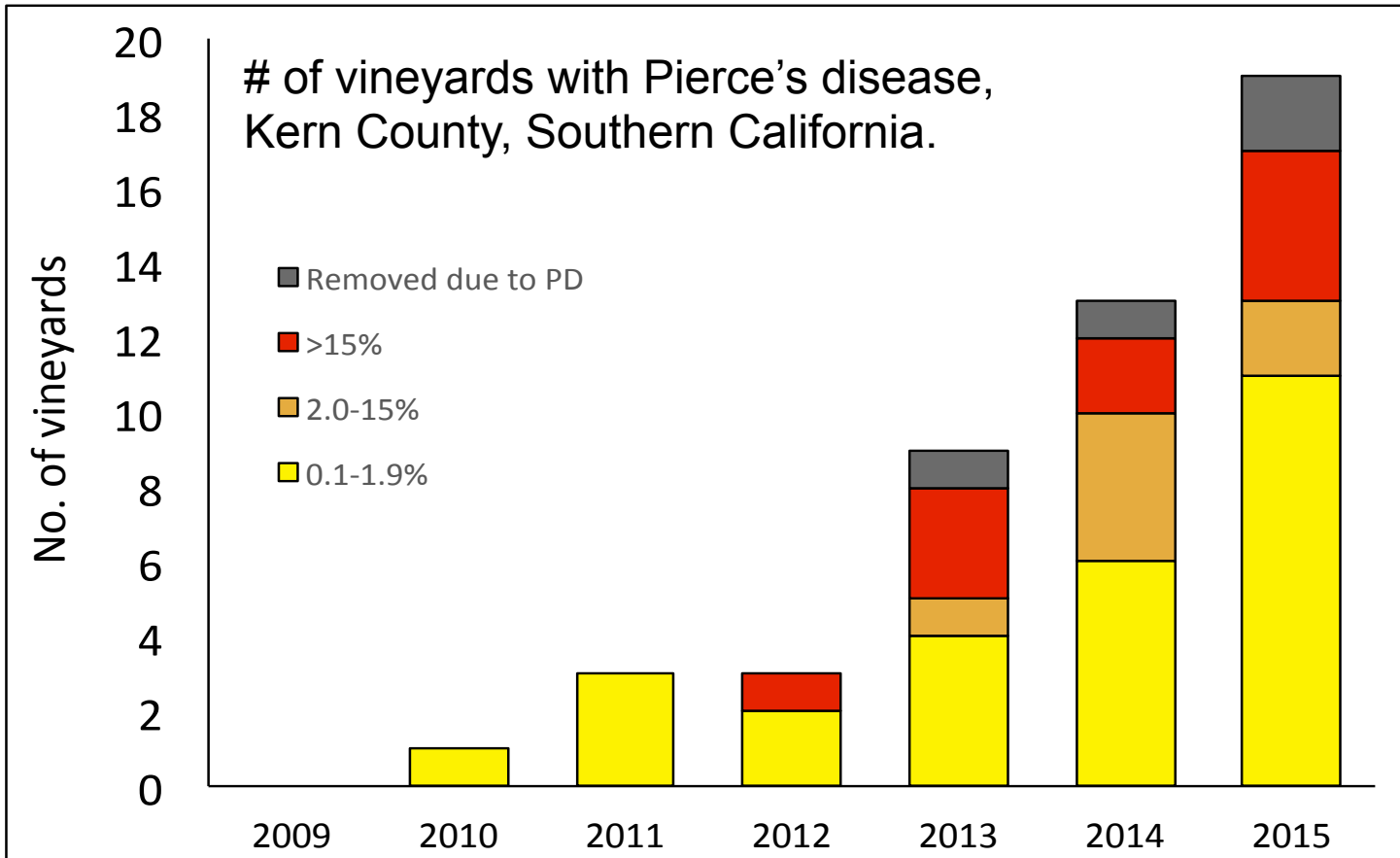
CDFA trapping program

* 2015 data through October 10

Sharpshooter population increase

- Through effective CDFA Glassy-winged sharpshooter (GWSS) program: GWSS is not present in northern California winegrape growing regions.
- However, populations of native sharpshooters have also increased in the North Coast of California.

Increase incidence of Pierce's disease



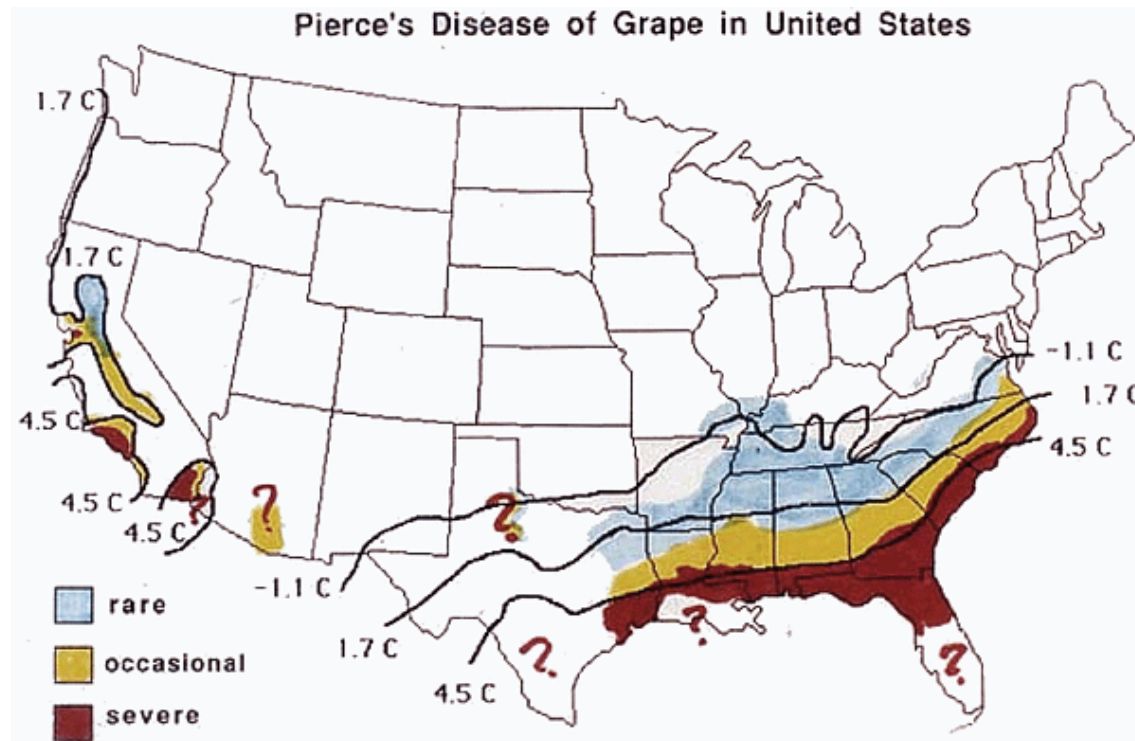
UC surveys - David Haviland, 2009-2015, General Beale Region, Kern County.

Lack of winter recovery



- Bacteria die during cold winters (winter recovery); mild winters lead to a decrease in winter recovery in grapevines.
- A shift in winter temperatures may contribute to a change in the epidemiology of the disease.

Historical distribution of Pierce's disease



In some areas with severe incidence grapevines cannot be grown due to Pierce's disease.

Pierce's disease: climate influence

- Meteorologist forecast mild winters in California for the foreseeable future.
- A shift in winter temperatures warrants continued investment on research.

Vine mealybug and spread of grapevine leafroll virus

- Vine mealybug
- Grapevine leafroll disease



Photo: Jack K. Clark



Transmission: Grapevine leafroll virus with Vine mealybug

Nymphs are highly efficient at virus transmission:

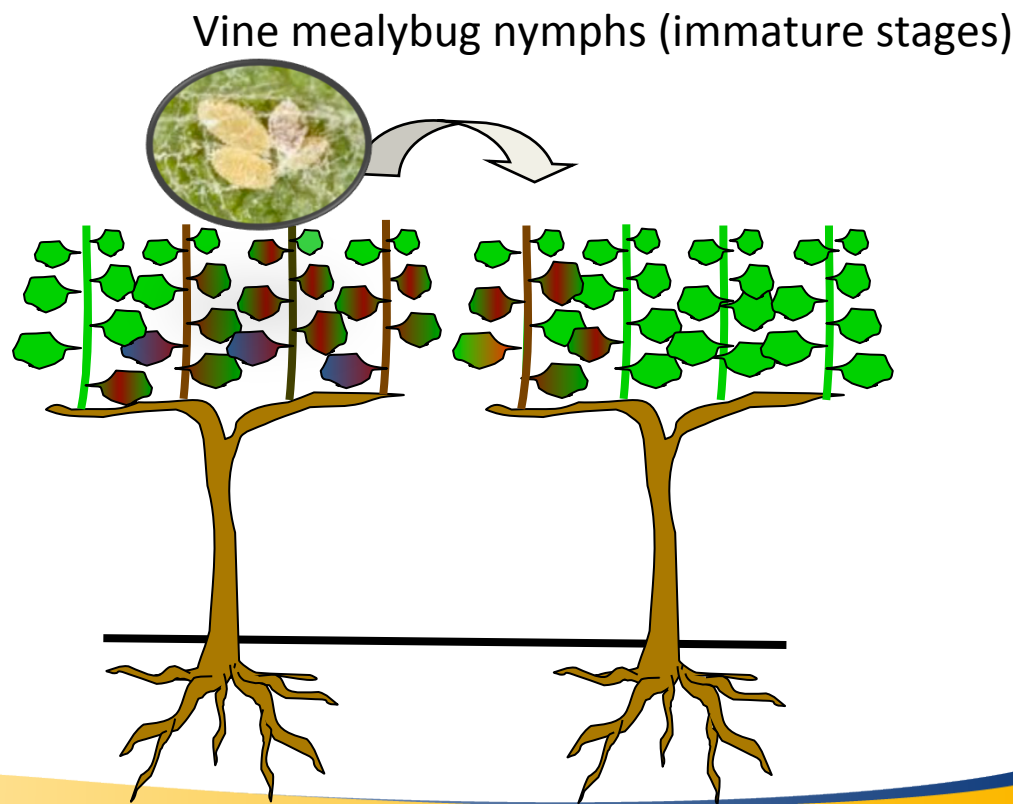
Acquisition: 1 hr



Inoculation: 1 hr



Tsai et al. 2008 *Phytopathology* 98: 1093-1098



Grapevine leafroll disease

- Yield reduction
- Delayed fruit ripening
- Lower sugar accumulation
- Diseased vines cannot be cured



Vine mealybug was moved to winegrape regions on nursery stock



Preventing vine mealybug on nursery stock

Use of hot water immersion for nursery cuttings

Haviland et al. 2005, *J. of Econ. Entomol.* 98(4):1109-1115



European grapevine moth program

- Detected in 2009 in Napa Valley.
- Most damaging insect pest of grapevines in Europe.
- Larvae feed on berries which may lead to bunch rot.



Photo: Jack K. Clark

European grapevine moth program

- Surveillance with detection traps
- Two pronged approach for control:
 - Use of mating disruption
 - Well-timed reduced-risk insecticide applications
- Strong collaboration among agencies, institutions and industry



Reduction in European grapevine moth detections (2010-2015)

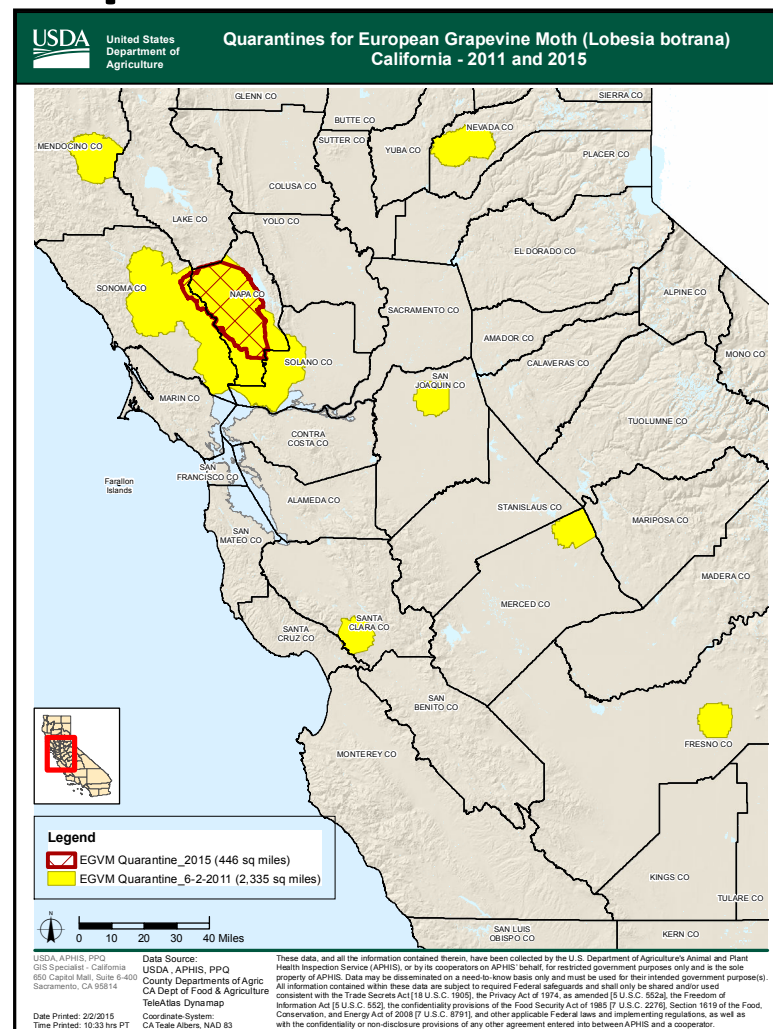


Year	# of moth caught on traps in California
2010	100,959
2011	146
2012	77
2013	40
2014	1
2015	0

Reduction of EGVM quarantine area

Quarantine Area

- 2011 – 2,335 square miles
- 2015 – 446 square miles



European grapevine moth



Photo: Jack K. Clark

- Movement in California primarily associated with:
 - Movement of infested winegrapes.
 - Movement of infested machinery.
- **We do not know** the pathway of introduction into California
- **CRITICAL TO CONTINUE SURVEILLANCE**
 - Post eradication monitoring in California
 - Through Cooperative Agricultural Pest Survey (CAPS) nationwide

Conclusions

- Climate change may impact disease incidence **requiring continued investment in research.**
- **Enforcement of clean nursery stock** is key to preventing grapevine viruses; both clean of viruses and insect free.
- **Surveillance** is a keystone for early detection of invasive species.

Thank you

