

The Nursery Perspective of the Glassy-winged Sharpshooter: Why you should care and what you can and must do about it

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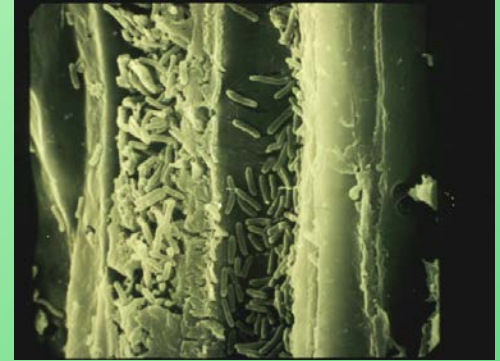
**Riverside & ²California Department of
Food and Agriculture**

Xylella fastidiosa biology

Xylem-limited bacterium

Wide host range

- crops, native, ornamental, weedy plants
- disease severity differs among hosts



Substantial genetic variation

- host-specific strains
- pathogenicity varies among strains

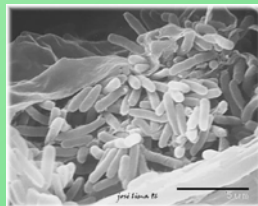
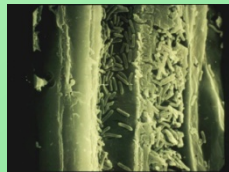
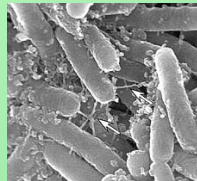
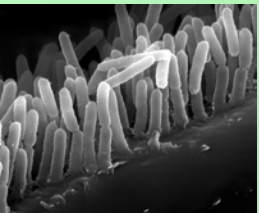
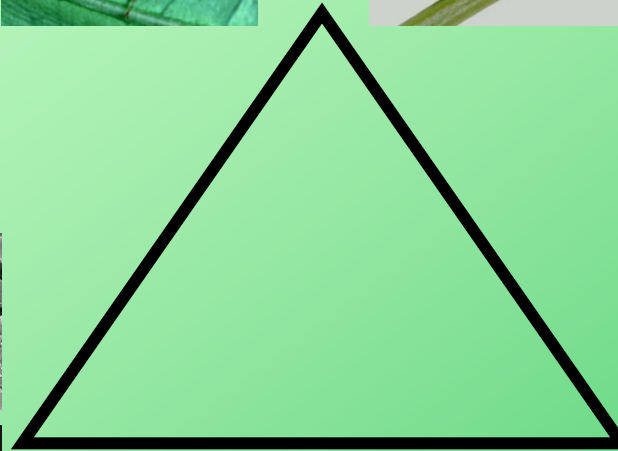
Transmitted by xylem-sap feeders

- leafhopper, esp. sharpshooters, are the most important vectors
- many sources of variation



No cure

Xylella leafhopper vectors



Xylella
strains

Xylella
host species
or varieties

Xylella fastidiosa transmission

No latent period

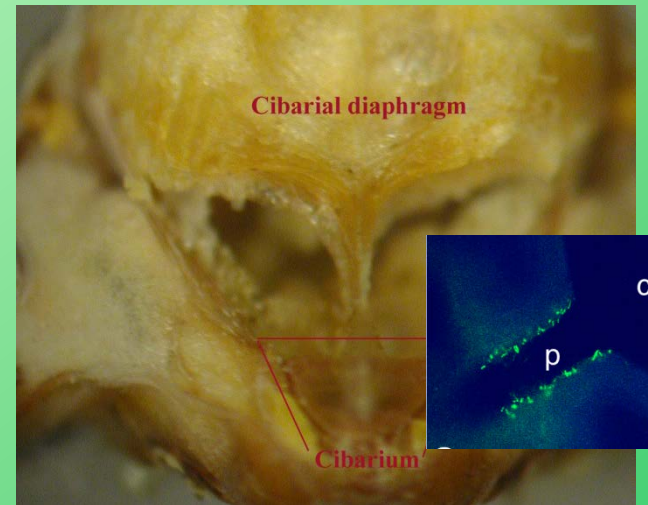
Nymphs & adults can transmit

-no transmission after molting

-persistent in adults

Insect species differ in efficiency of transmission

Efficiency tied to plant infection level
> 10,000 cells/g plant





almond



pecan



oleander



olive



oak



coffee



plum



elm



sweet gum

phony peach



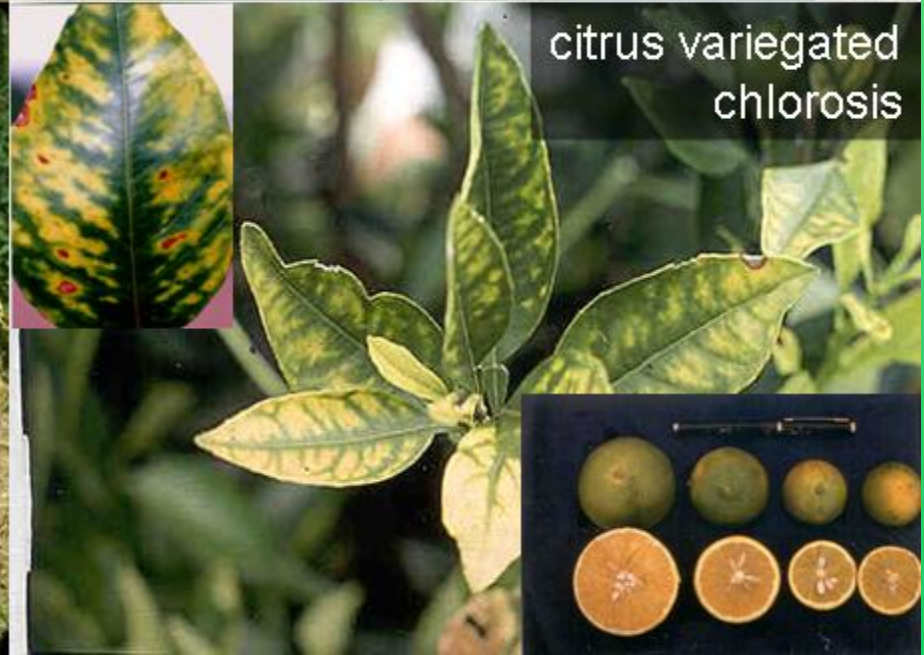
periwinkle wilt



alfalfa dwarf



citrus variegated chlorosis



Disease management

Landscape management

- remove alternative hosts**
- remove diseased plants (roguing)**

Develop resistant host varieties

- back-crossing with resistant varieties**
- GMO approach**

Avirulent/symbiotic strains

- outcompete *X. fastidiosa***

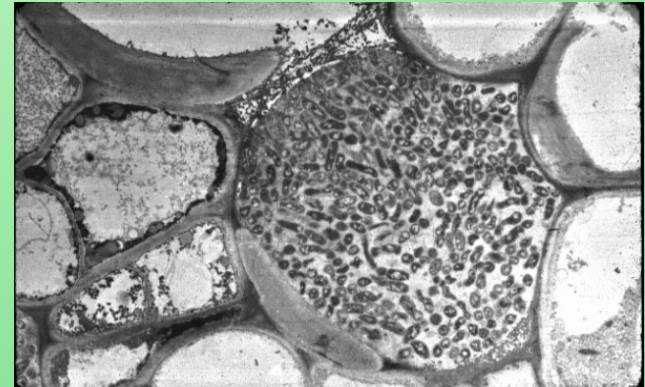
Vector (insect) management

Currently, the greatest threat is to grapes

Pierce's Disease



Xylella in hundreds of plants



GWSS feeds on hundreds of plants

Currently, the threat is to grapes



CDFA Program Elements

- **Contain the Spread:** Prevent the spread of the GWSS to new areas of the state by regulating shipments of host plants and plant materials.
- **Statewide Survey and Detection:** Find and monitor GWSS infestations and populations through trapping and visual survey.
- **Rapid Response:** Respond quickly to detections of GWSS in new areas by intensively surveying the area and applying treatments if necessary.
- **Outreach:** Raise awareness about Pierce's disease and its vectors while responding to the concerns of growers and the general public.
- **Research:** Develop solutions to Pierce's disease and its vectors.

Areawide Treatment Programs:

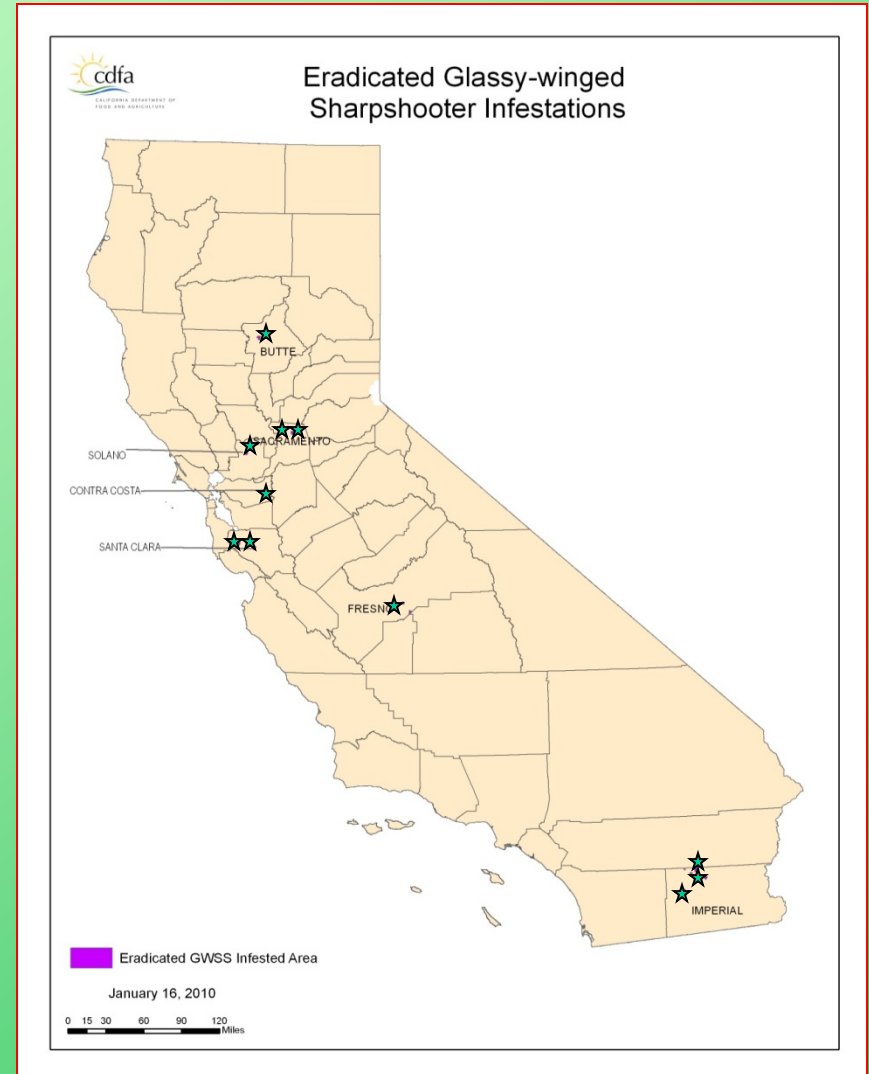
The coordination of chemical treatments in commercial citrus blocks and urban areas along with releases of biological control agents in the following counties:

Fresno, Kern, Madera, Riverside (Coachella and Temecula Valleys), Tulare

Eradication Programs:

New and emerging populations of GWSS outside of Southern California are quickly detected and eradicated.

To date: 14 areas statewide



Why Care about Sharpshooters in Ornamental Nurseries?

- Not really a severe nursery pest
- High potential of movement of insect to areas without GWSS populations and triggering a PD outbreak.



Contain the Spread: Nursery Quarantine



Nursery Quarantine

Issues are not biological

- **No other approach besides insecticides is suitable:**
Quarantine requires 100% control of all life stages.
- **Effective monitoring at origin and destination:**
Expensive and time consuming inspections
- **Effective application:** Growers must apply material correctly.
- **Comfort levels:** Growers (of grapes/almonds) in uninfested counties must rely on others for control.
- **Contradictory demands** by the State: CDPR vs. CDFA

Contain the Spread

State Regulations related to movement

Regulate shipments of Nursery Stock



Nursery Quarantine

CDFA Pierce's Disease Control Program and County Restrictions on the Glassy-winged Sharp Shooter Nursery Compliance Requirements

- Intensive surveys
- Establish **GWSS-free** staging area for shipments
- Ship plants **free from** all viable life stages of GWSS (= *inspections*)
- Ensure blue-tag system.



**Yellow
Sticky Traps**



**Visual
Inspections**

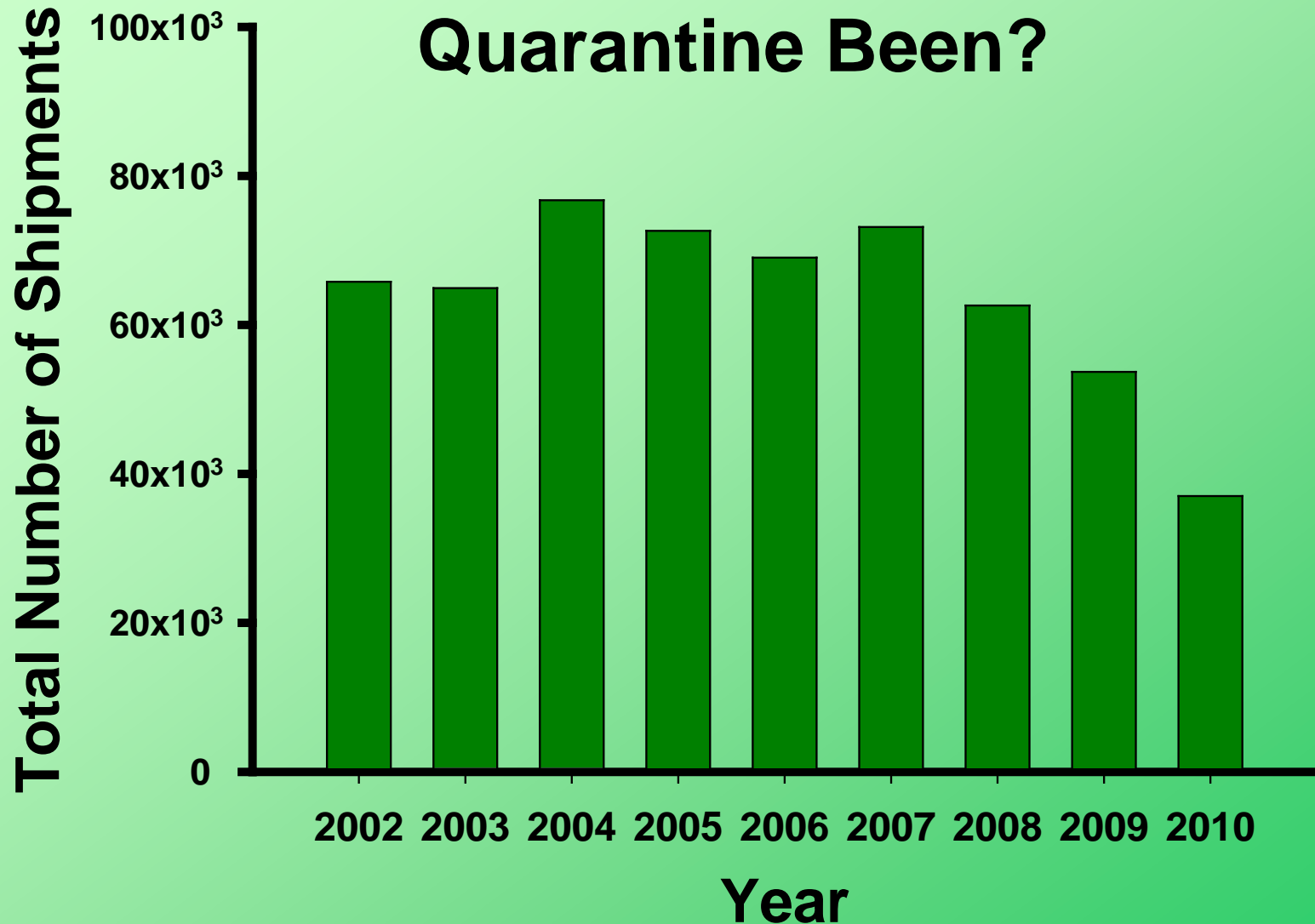
Contain the Spread

Chemical treatments used to eradicate infestations

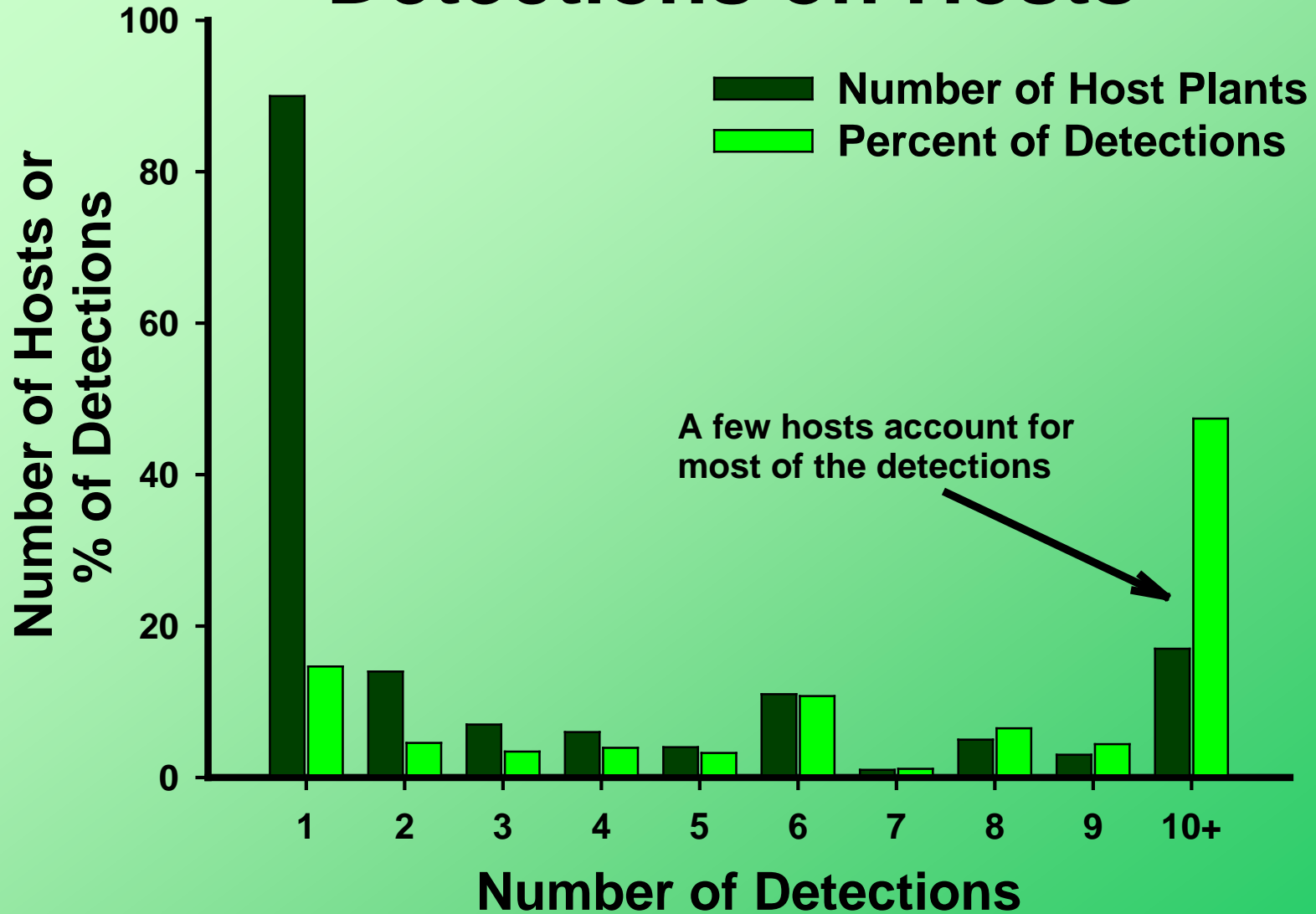
- **Carbaryl**
 - **Cyfluthrin**
 - **Imidacloprid**
-
- **1-2 applications per property/year**
 - **Methods: foliar, soil drench, soil injection**



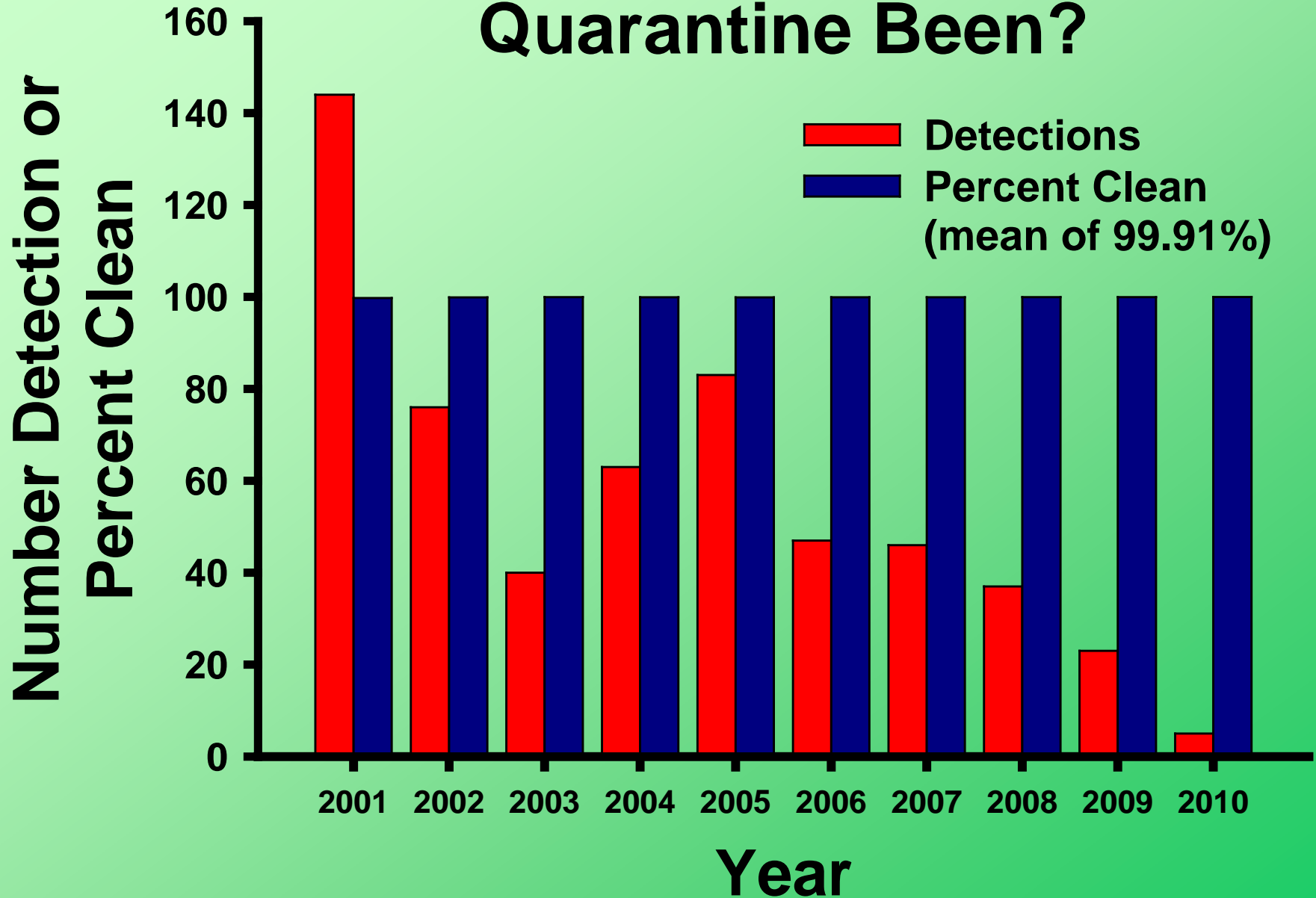
How Effective Has Quarantine Been?



Detections on Hosts



How Effective has Quarantine Been?



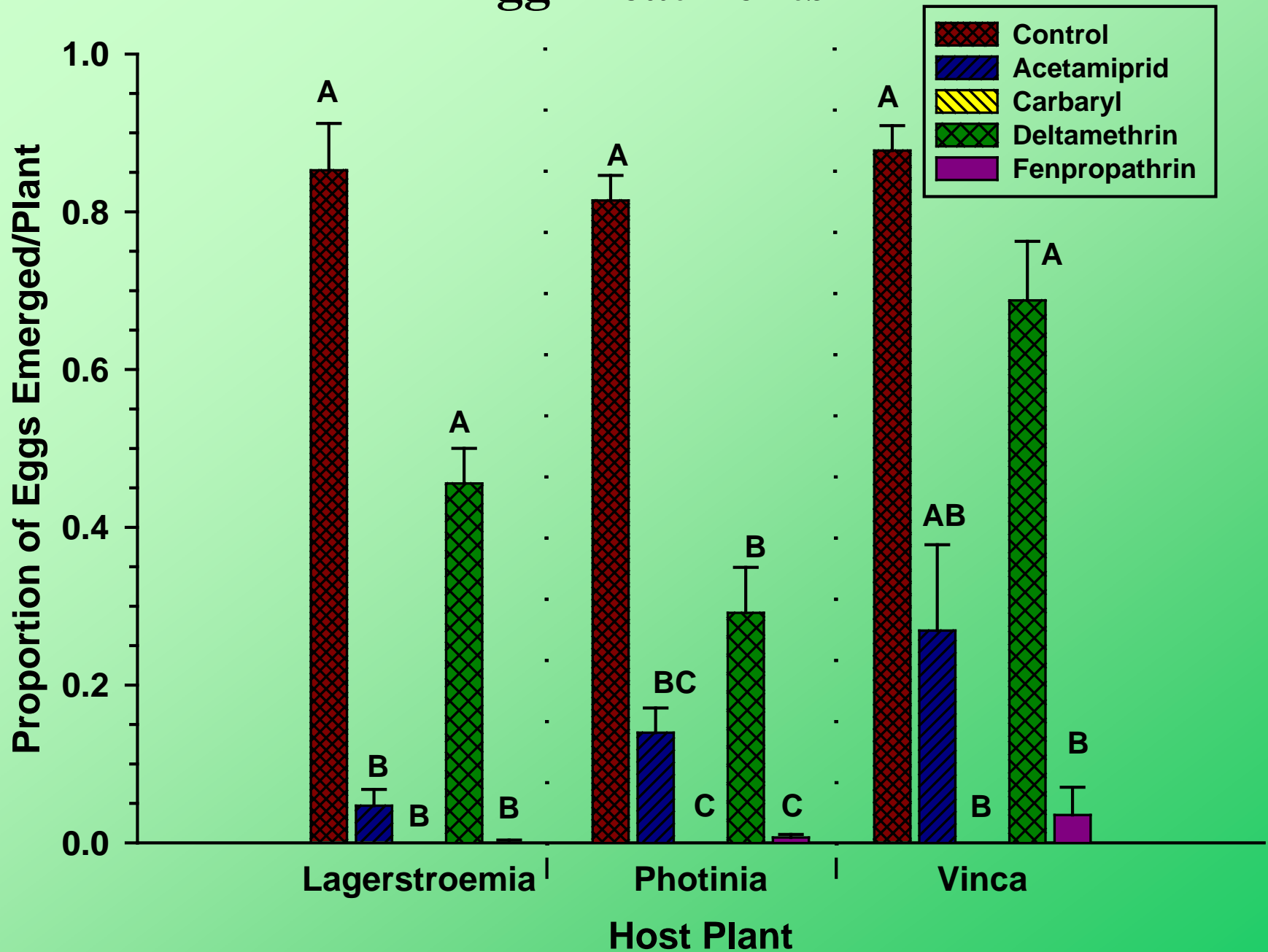
Costs of Quarantine

- CDFA estimates of direct costs to the California nursery industry to be ~\$10 million/year (in excess of \$100 million since 2001). **Value is low**
- The Nursery Industry estimates the costs to be ~\$0.30-\$25.00+ per container of product.
- This includes trapping, treatment, monitoring, safeguarding, and inspection.
- It does not include costs of rejections, lost sales, lost markets
- Without controlling for eggs, there is a small but detectable number of egg masses moving through quarantine.

Until 2009 there was a need for...

- **A state-approved, standardized, disinfestation protocol for the prevention and elimination of glassy-winged sharpshooters within nursery crops.**
- **The goal is to reduce costs of quarantine by implementing a standard prophylactic disinfestation procedure and eliminating inspections.**
- **The sticking point with quarantine has always been the elimination of viable egg masses.**

Egg Treatments



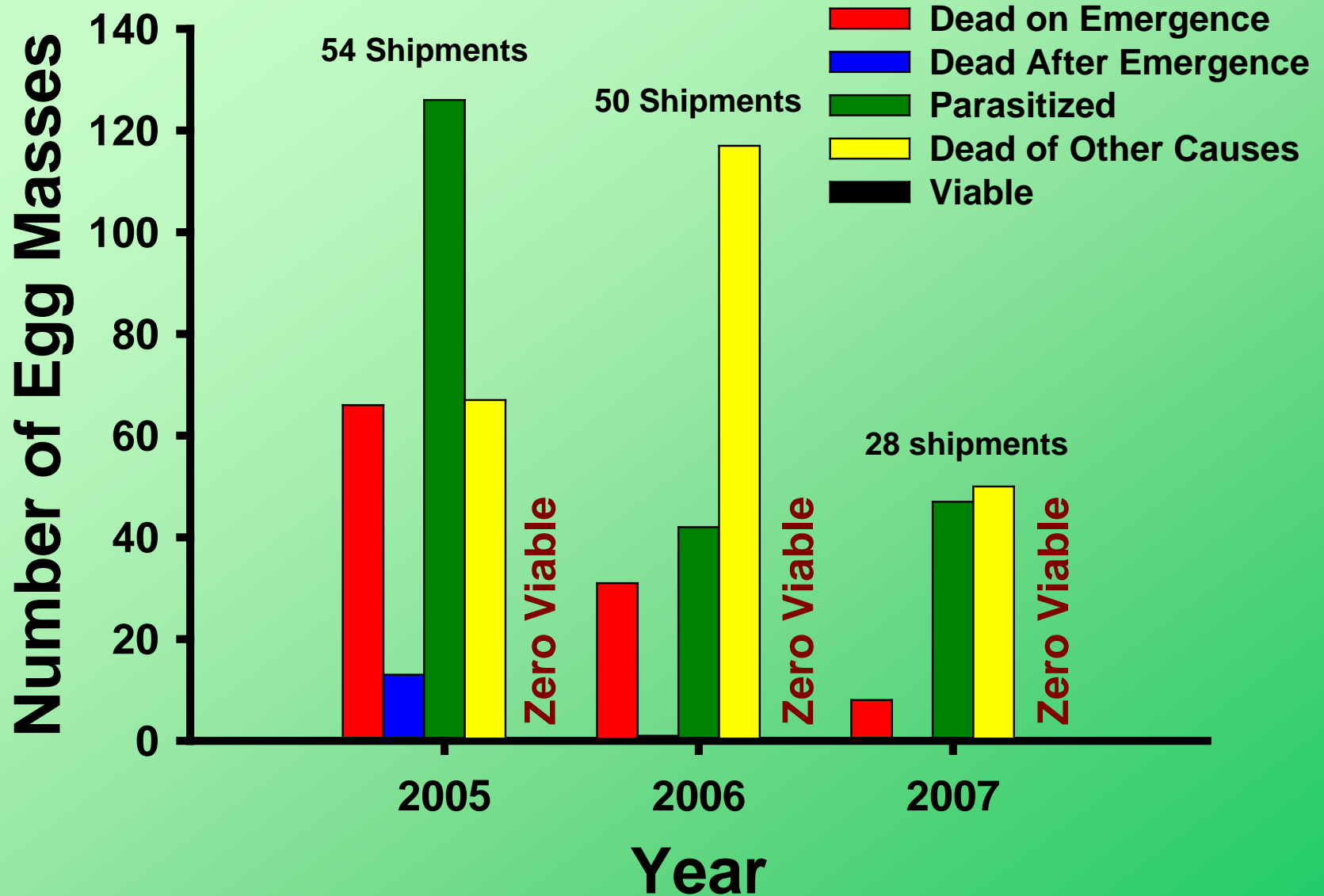
Egg Treatments



2005-2007: CDFA GWSS Pilot Program

- The quarantine and inspection protocols *could not be sustained economically.*
- Three nurseries volunteered to follow GWSS Control Program *plus* treat plant material with either carbaryl or fenpropathrin immediately before shipment. **NO INSPECTIONS!**
- Shipped north, held and inspected for GWSS.

Pilot Program: Fate of Egg Masses



At the end of 2007

- 1. On-going quarantine practices resulted in shipment of material that is 99.91% free from GWSS.**
- 2. The dominant stage slipping through quarantine was still the egg.**
- 3. Prophylactic treatment protocols evaluated in Pilot Program were 100% effective, without inspections at origins.**
- 4. 2009: Established the **Approved Treatment Program.****

Approved Treatment Program

- Participating nurseries are under a special compliance agreement and must implement and maintain BMPs
- Trapping at 4 traps per acre
- Threshold: 10 GWSS trapped in a single yellow panel trap within a two-week period
- Treatments of Sevin SL or Tame witnessed by licensed inspector
- Treatment (Certificate of Quarantine Compliance) expires in five days

Approved Treatment Program

Participating nurseries are not required to conduct an outgoing inspection of plant material. Therefore, an acceptable level of GWSS egg masses may be present on plant material under the ATP.

Approved Treatment Program

**Destination
counties may
sleeve egg
masses**



Approved Treatment Program

- Any shipment found at destination to have *live nymph or adult GWSS* will be destroyed on-site or returned to origin, as ordered by the receiving CAC
- The shipping CAC and CDFA shall suspend the approved treatment protocol compliance agreement of any shipping nursery with a nymph or adult life stage rejection until the problem has been mitigated to satisfaction of the shipping CAC and CDFA

Approved Treatment Protocol

Year	# Rejections	#Shipments	#Plants
2009	1*	7,939	2,336,127
2010	0	11,499	3,915,453
2011 (through July)	0	5,901	1,870,861

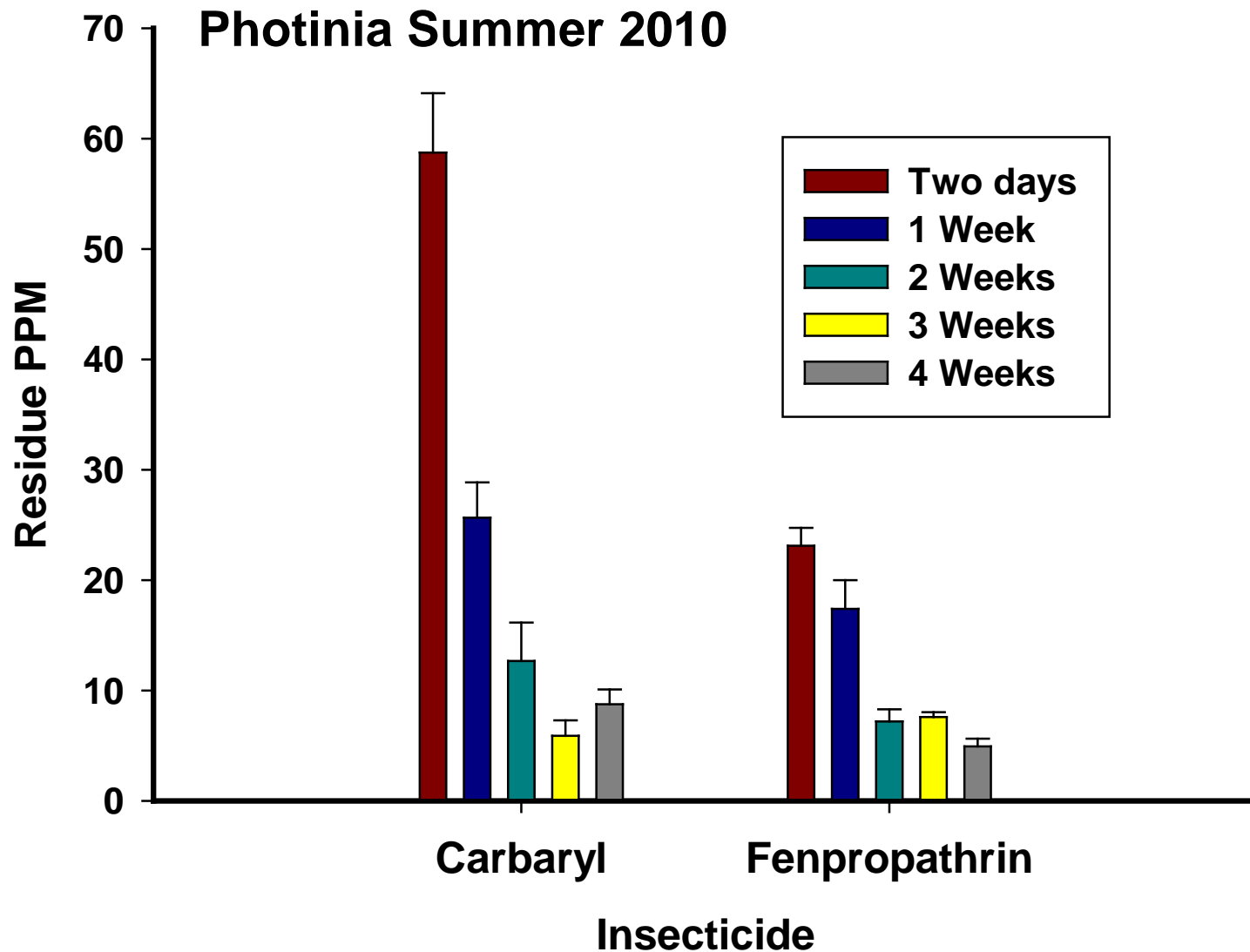
*violation by grower

But.....

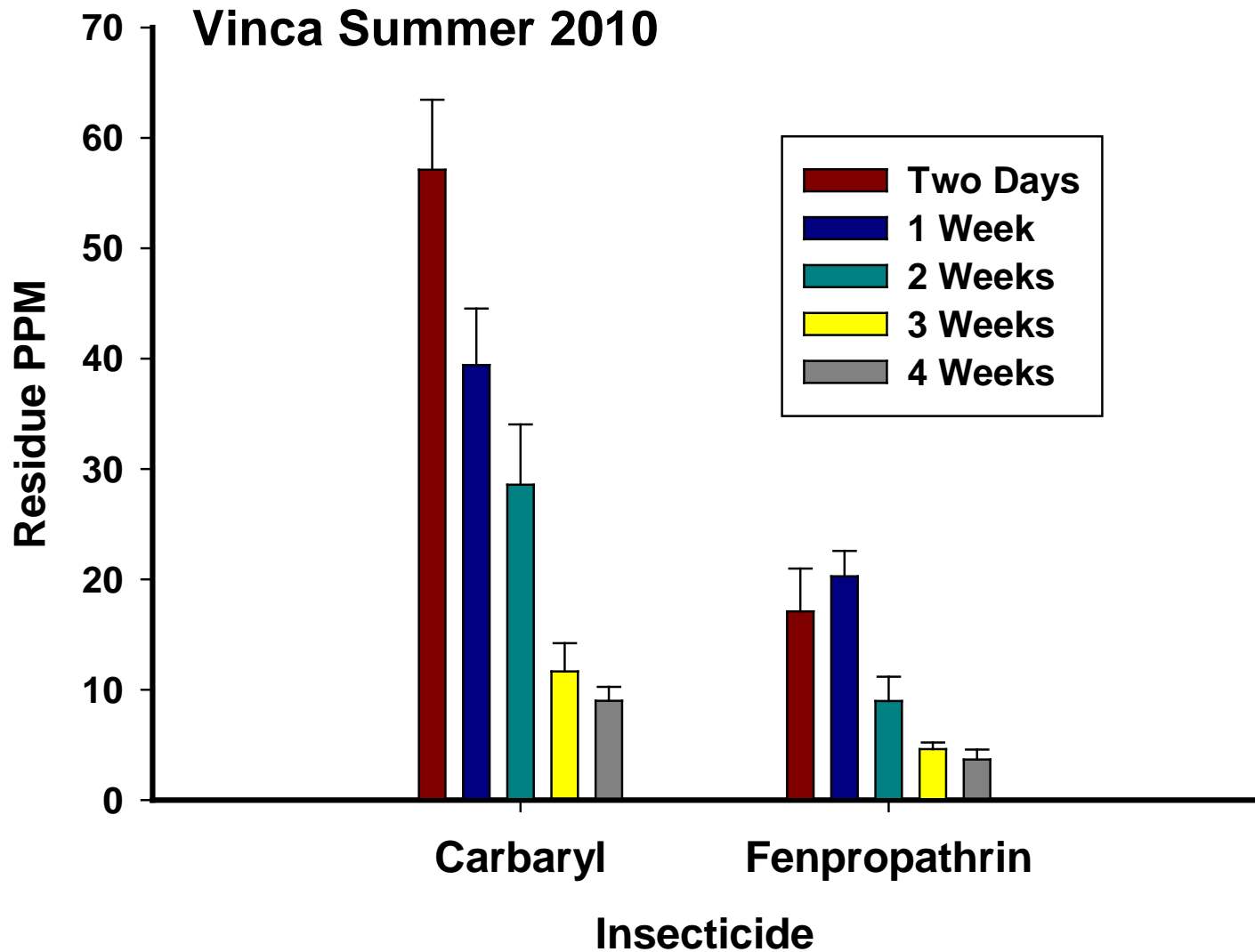
How does one *really know* the
plants have been treated
adequately?

Answer: Insecticide residue values

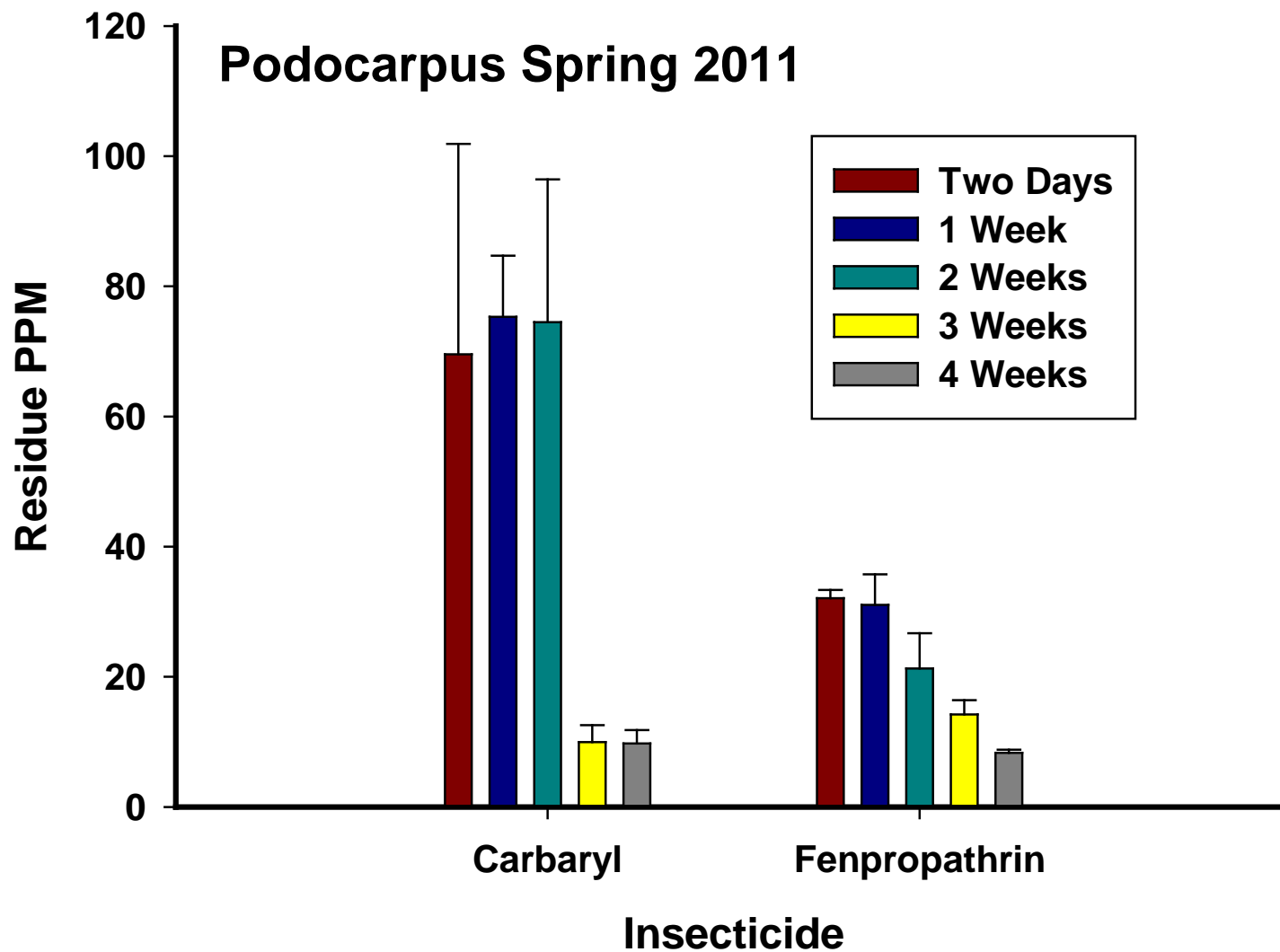
Residue Results: Shrubs



Residue Results: Bedding Plants



Residue Results: Trees



Residue Suggestions

- The following values are recommended as initial *minimum* values of use for determining whether or not foliage has been treated.
 - For Shrubs (e.g. Photinia): 50 ppm of carbaryl, 25 ppm fenpropathrin.
 - For Trees (e.g. Lagerstromia, Podocarpus): 65 ppm carbaryl, 25 ppm fenpropathrin
 - For Bedding plants (e.g. Vinca): 50 ppm carbaryl, 20 ppm fenpropathrin.
- In most cases adequately treated plants will have larger values than above, but due to a variety of factors (time since treatment, thickness of leaves, adequacy of coverage, quantity of non-treated material in a sample, etc) it would not be unreasonable to detect somewhat lower concentrations on adequately treated foliage.

What's in Store for the Future

- **Upon consultation with CDFA, nurseries may begin using the approved treatment protocol.**
- **Continue to develop residue data base to determine if and when materials were treated. Allows rapid determination of adequacy of treatment.**

Please visit our website

<http://www.cdfa.ca.gov/pdcp/>



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PIERCE'S DISEASE CONTROL PROGRAM

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The mission of the Pierce's Disease Control Program (PDCP) is to minimize the statewide impact of Pierce's disease and its vectors in California.

GENERAL INFO

[E-mail PDCP](#)

[E-mail CDFA](#)

[Plant Health Division](#)

[County Ag Contacts](#)

ACKNOWLEDGEMENTS

- **Altman's Plants**
- **Bordier's Nursery**
- **Hines Nursery**
- **Monrovia Nursery**
- **Norman's Nursery**
- **Pardees Nursery**
- **Valley Crest Nursery**
- **Village Nursery**
- **Weidner's Gardens**
- **Staff of CDFA**
- **Funding from CDFA**
- **Funding from CANGC**