

UC Ag Experts webinar series

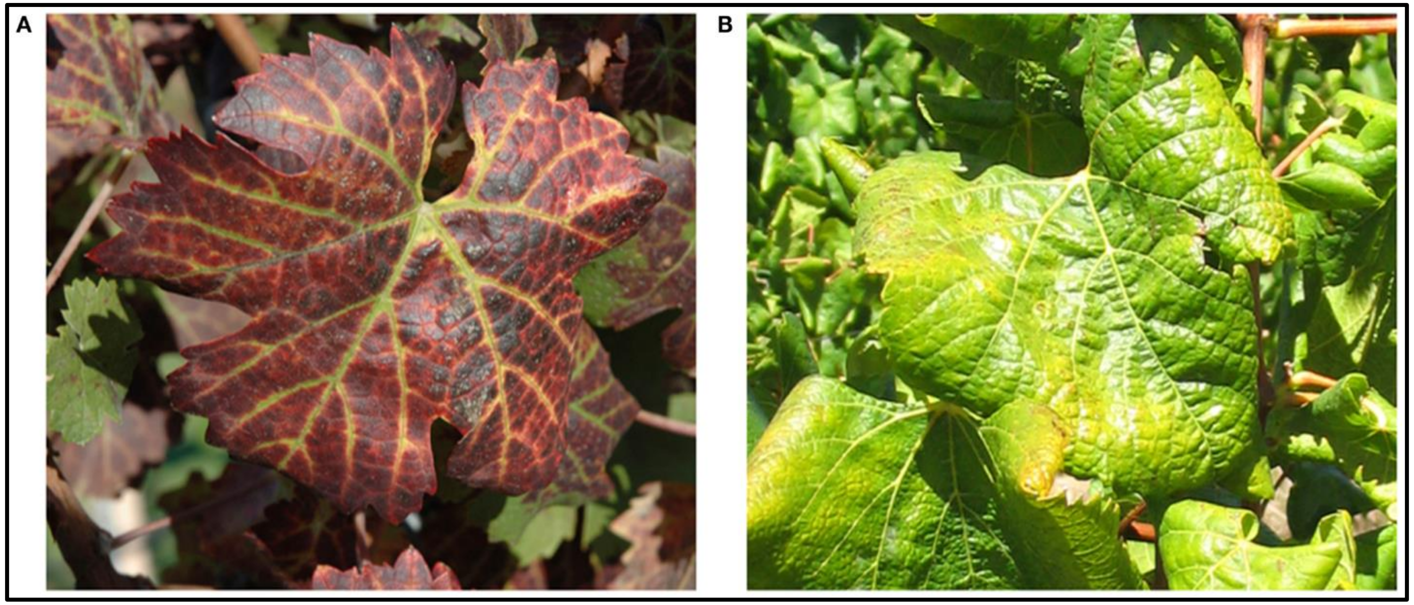
Vine Mealybug Controls in California Vineyards

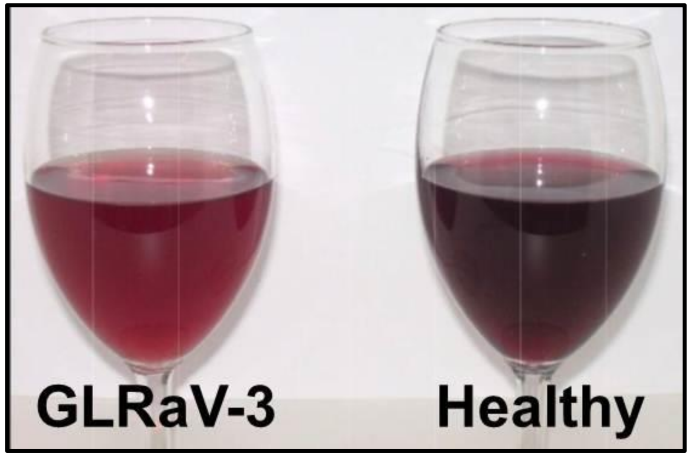
Kent Daane, Glenn Yokota, Monica Cooper, Vaughn Walton, Rodrigo Almeida, Kai Blaisdell, Luca Brilliante, Raksha Malakar-Kuenen, Thomas Martin, Nathan Mercer, Maher Al Rwahnih, Vicki Klaassen, Chris Geiger, Valeria Hochman, Brian Hogg, Michael Lopez, James Brown, Chi-Wei Tsai, Christina Wistrom, Ash Sial, Betsy Boyd,

Outline:

1) Leafroll and Vectors
2) Mealybug species, biology & monitoring
3) Biological & Chemical mealybug controls
4) Mating disruption for “vine” mealybug
5) Areawide Programs and Roguing
6) Discussion

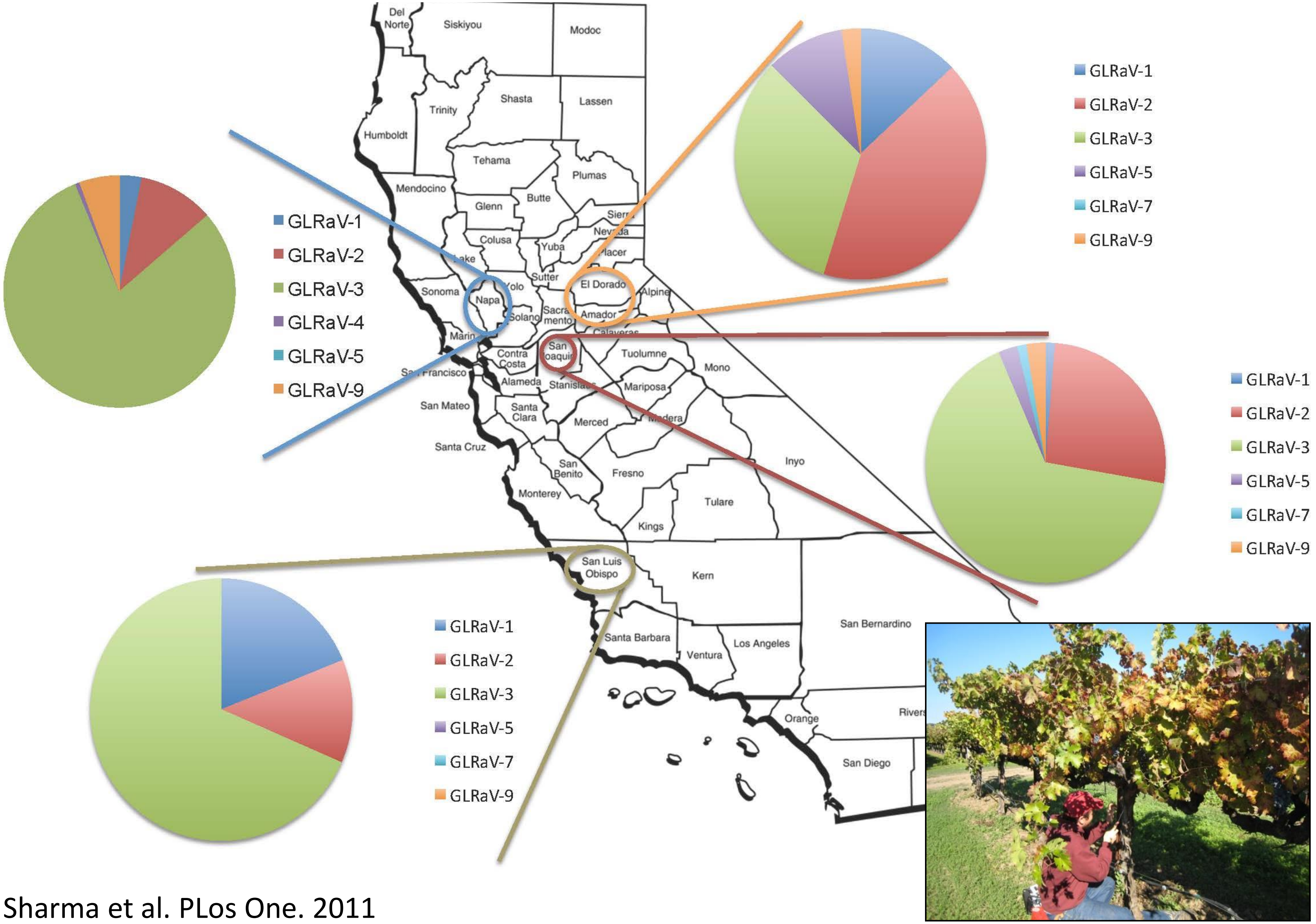
Grape leafroll associated viruses





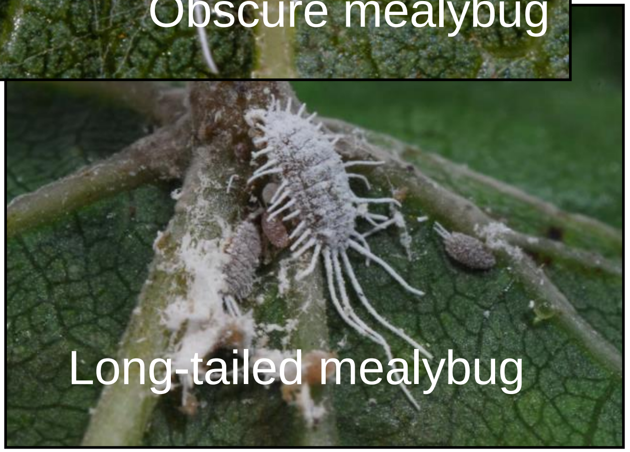
Delaying budbreak, flowering, and berry maturation; including changes in color, reduced sugar content, and increased acidity in juice

Different leafroll species/groups and strains within species/groups

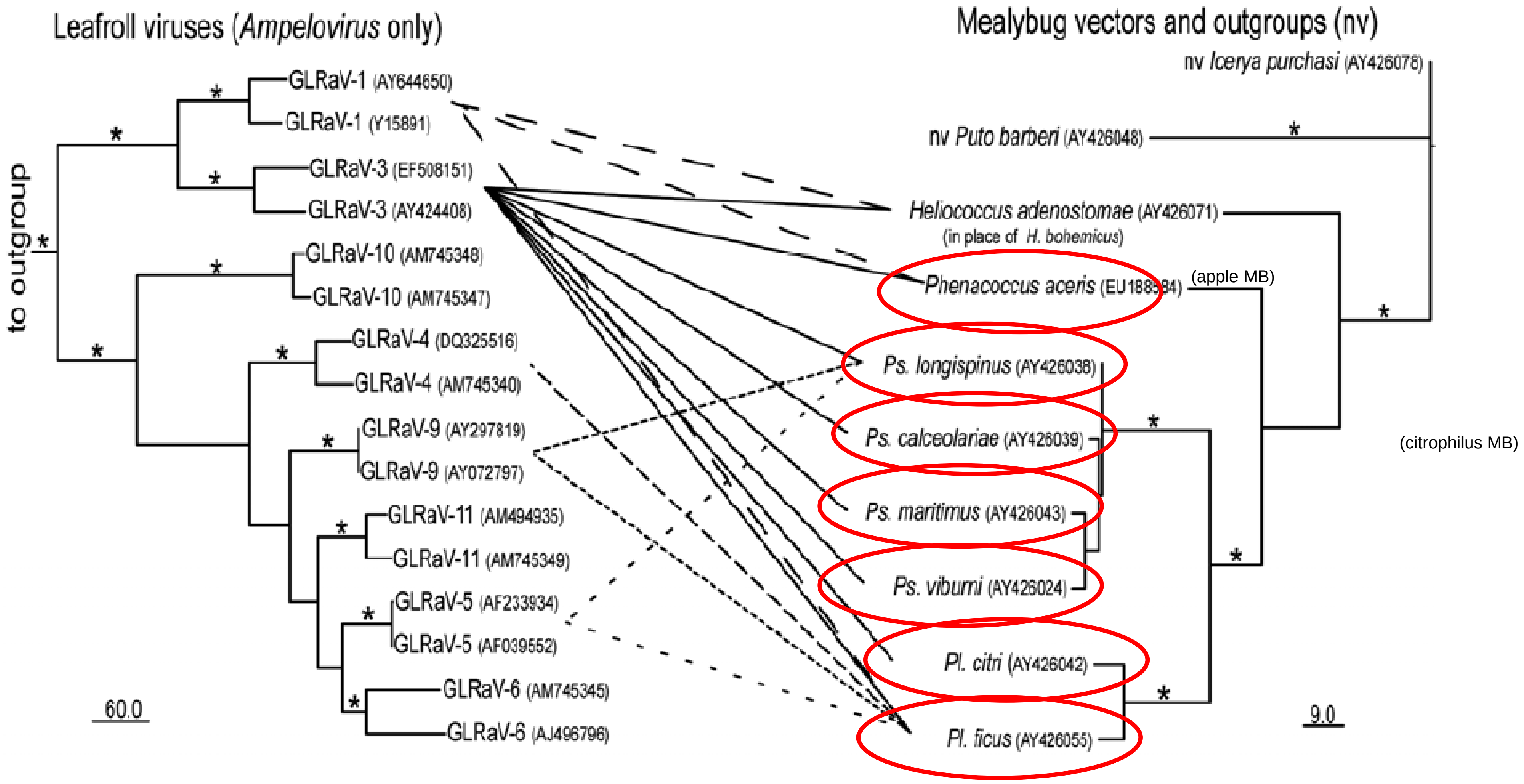


Sharma et al. PLos One. 2011

Mealybugs as leafroll vectors is the concern for wine growers

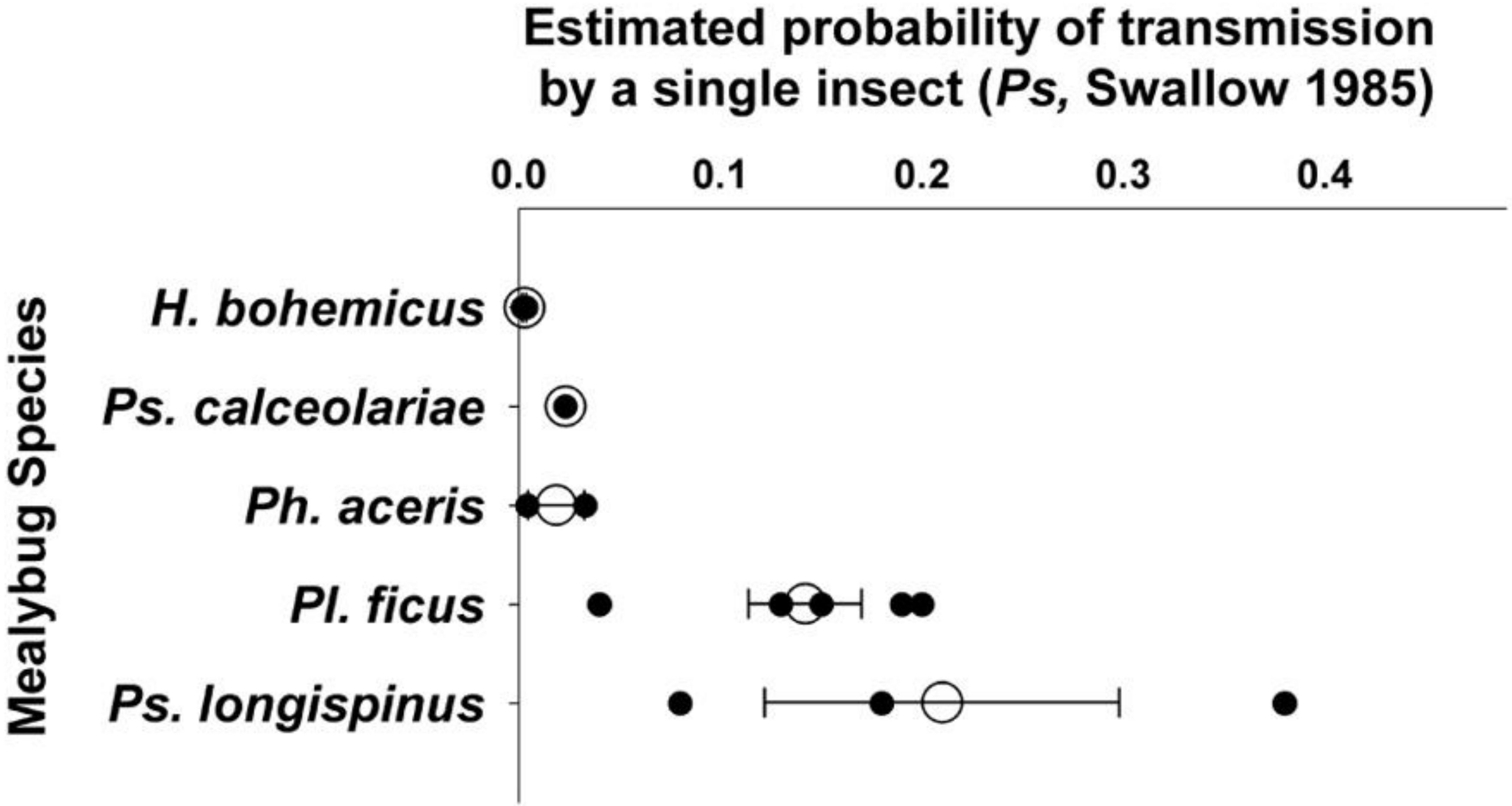


There is no vector-pathogen specificity or fidelity



Tsai et al. 2010, J Econ Entomol

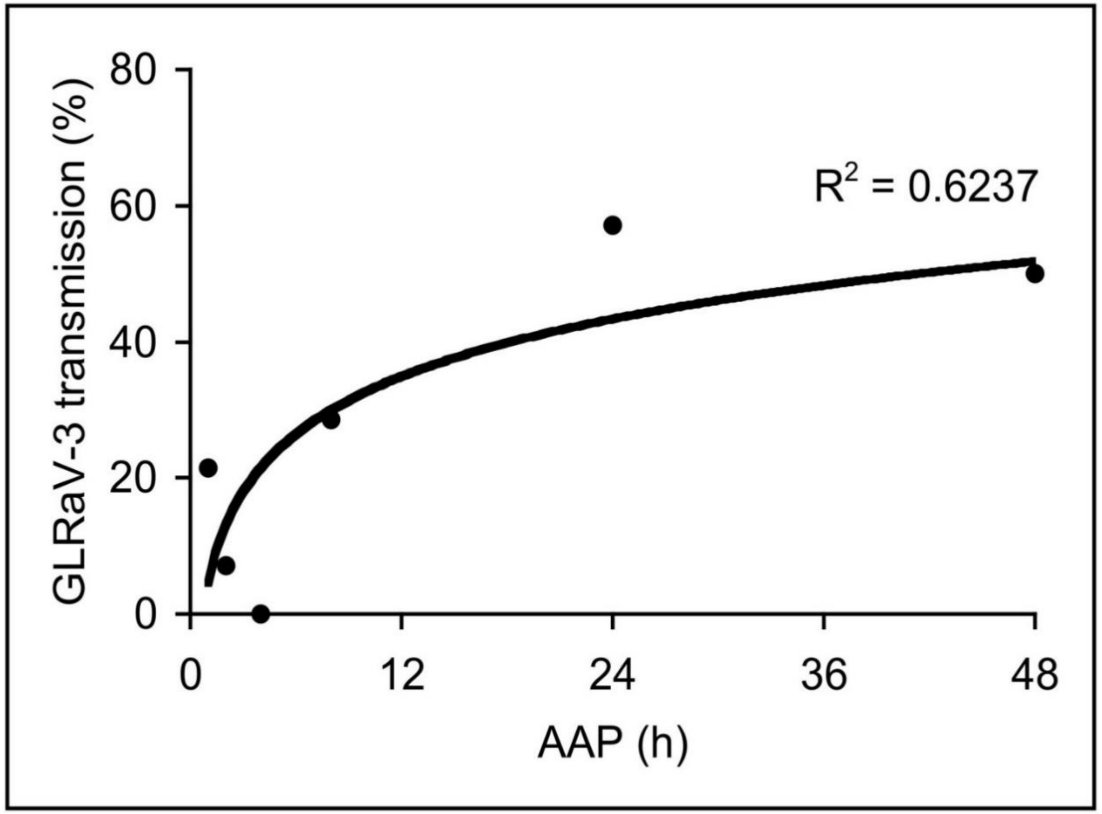
Vectors of Leafroll 3: mealybug spp. efficiency may vary



Almeida et al. 2013

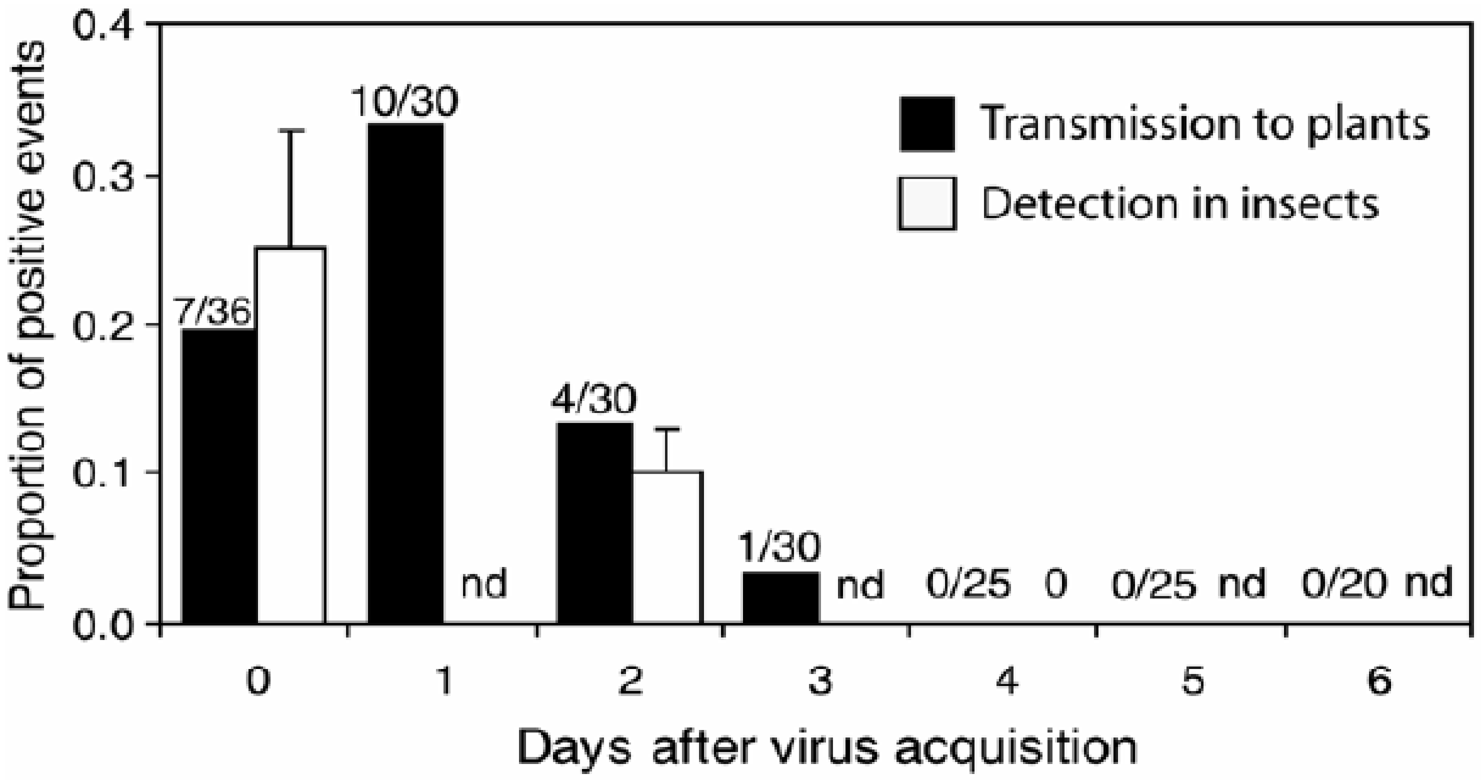
Key Transmission Facts – Acquisition & Transmission

- Crawlers **acquired** virus w/in 1 hr, and could **transmit** the virus w/in 1 hr
- Peak at 24 hr, all stages could acquire and transmit the pathogen for GLRaV



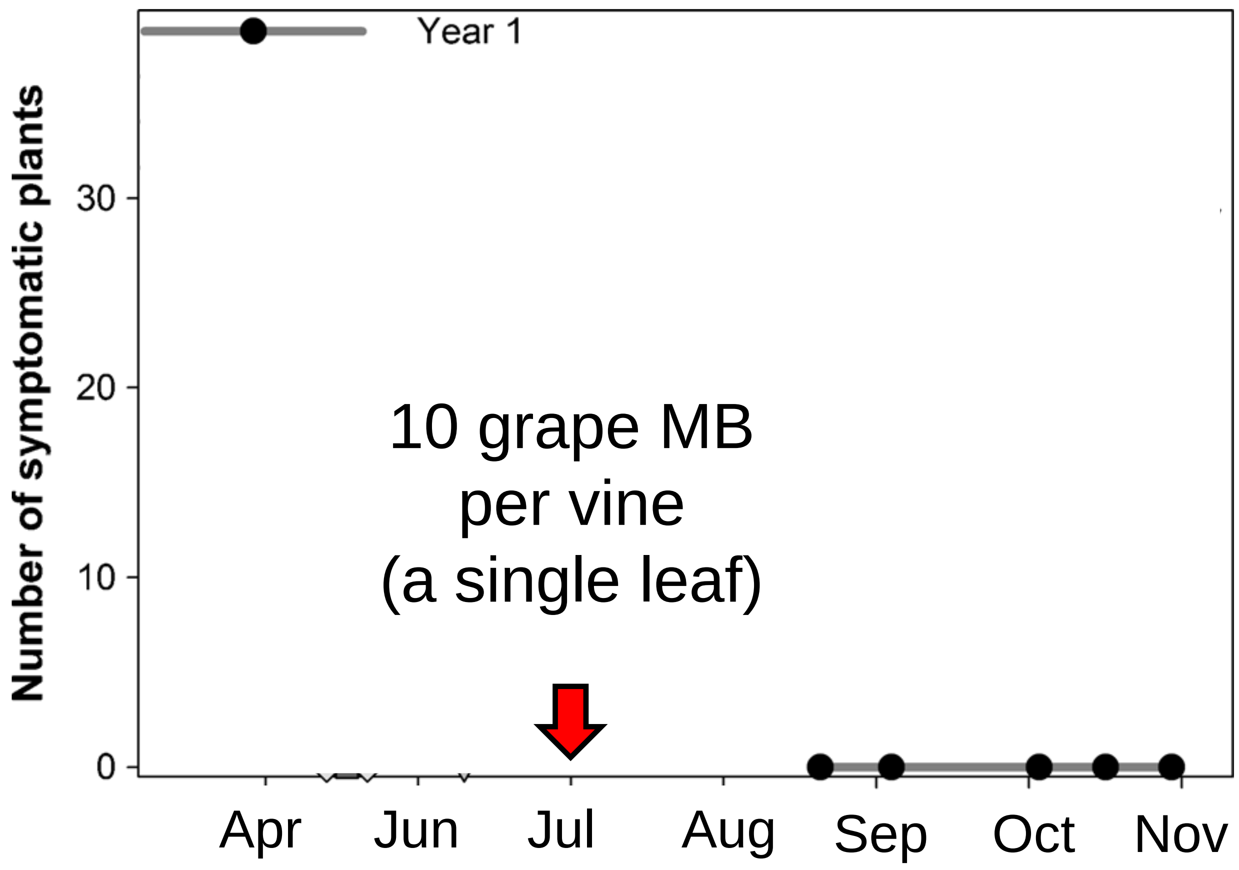
Tsai et al. 2008 *Phytopath*.

Semi-persistent transmission
(lost after four days, or each molt)



Tsai et al 2008 *Phytopathology*

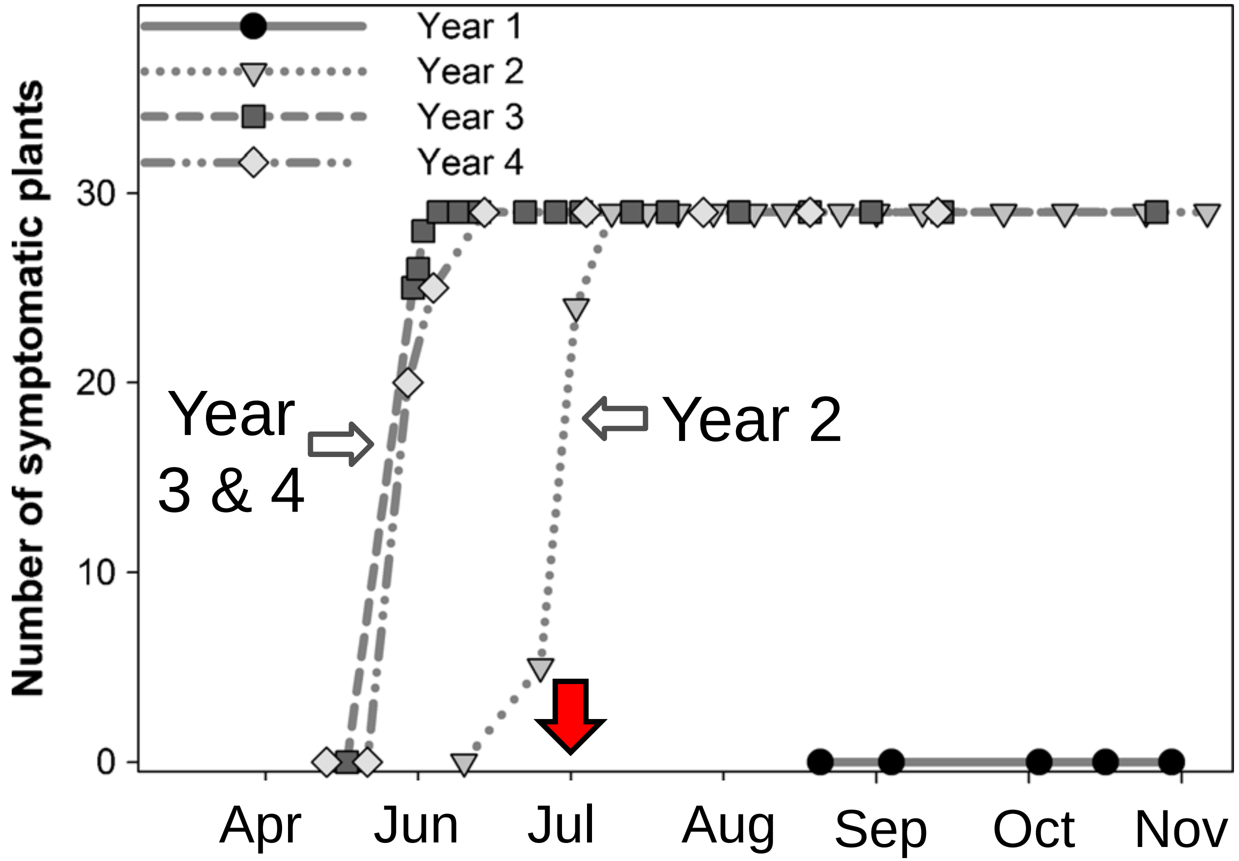
How long before GLRaV Symptoms occur?



10 grape MB per plant (on a single leaf);
48 h acquisition (in lab), 48 h inoculation (in field 19 July, Movento)

Blaisdell et al. 2016 *European J Plant Pathology*

How long before GLRaV Symptoms occur?

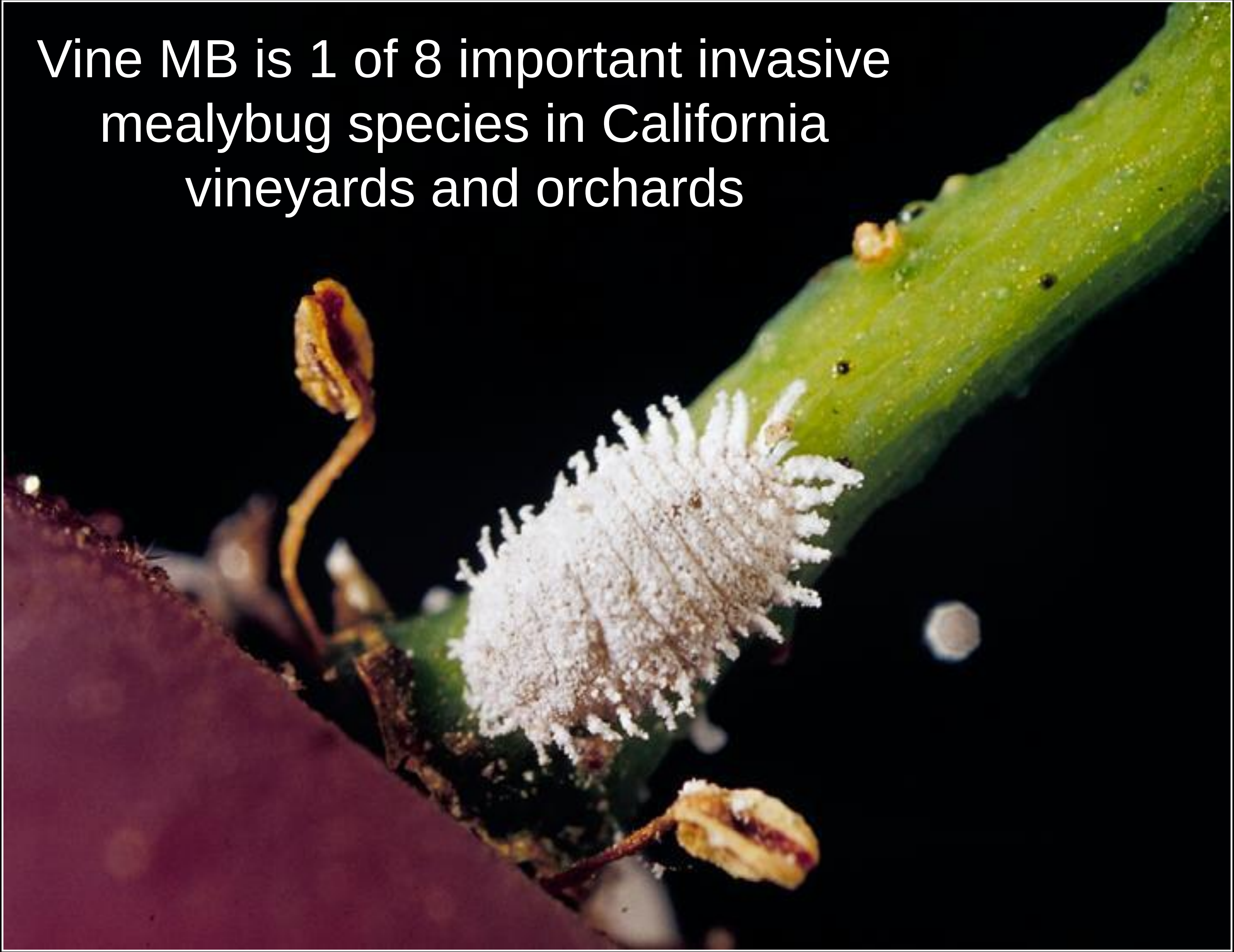


10 grape MB per plant (on a single leaf);
48 h acquisition (in lab), 48 h inoculation (in field 19 July, Movento)

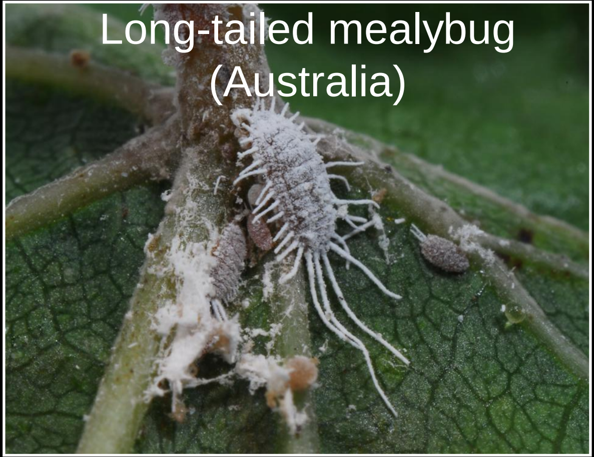
Blaisdell et al. 2016 *European J Plant Pathology*

Outline (California-based presentation):

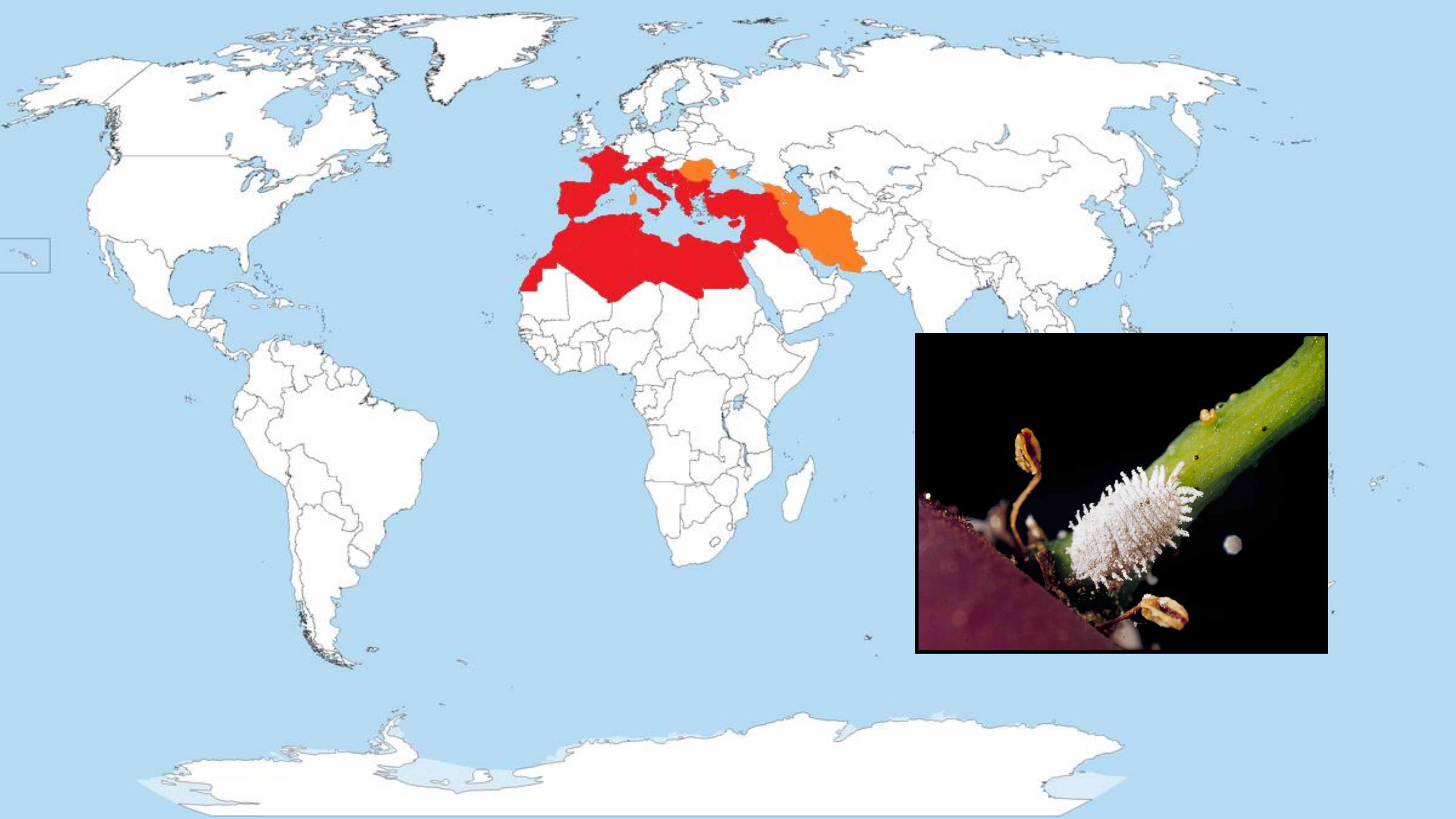
1) Leafroll and Vectors
2) Mealybug species, biology & monitoring
3) Biological & Chemical mealybug controls
4) Mating disruption for “vine” mealybug
5) Areawide Programs and Roguing
6) Discussion

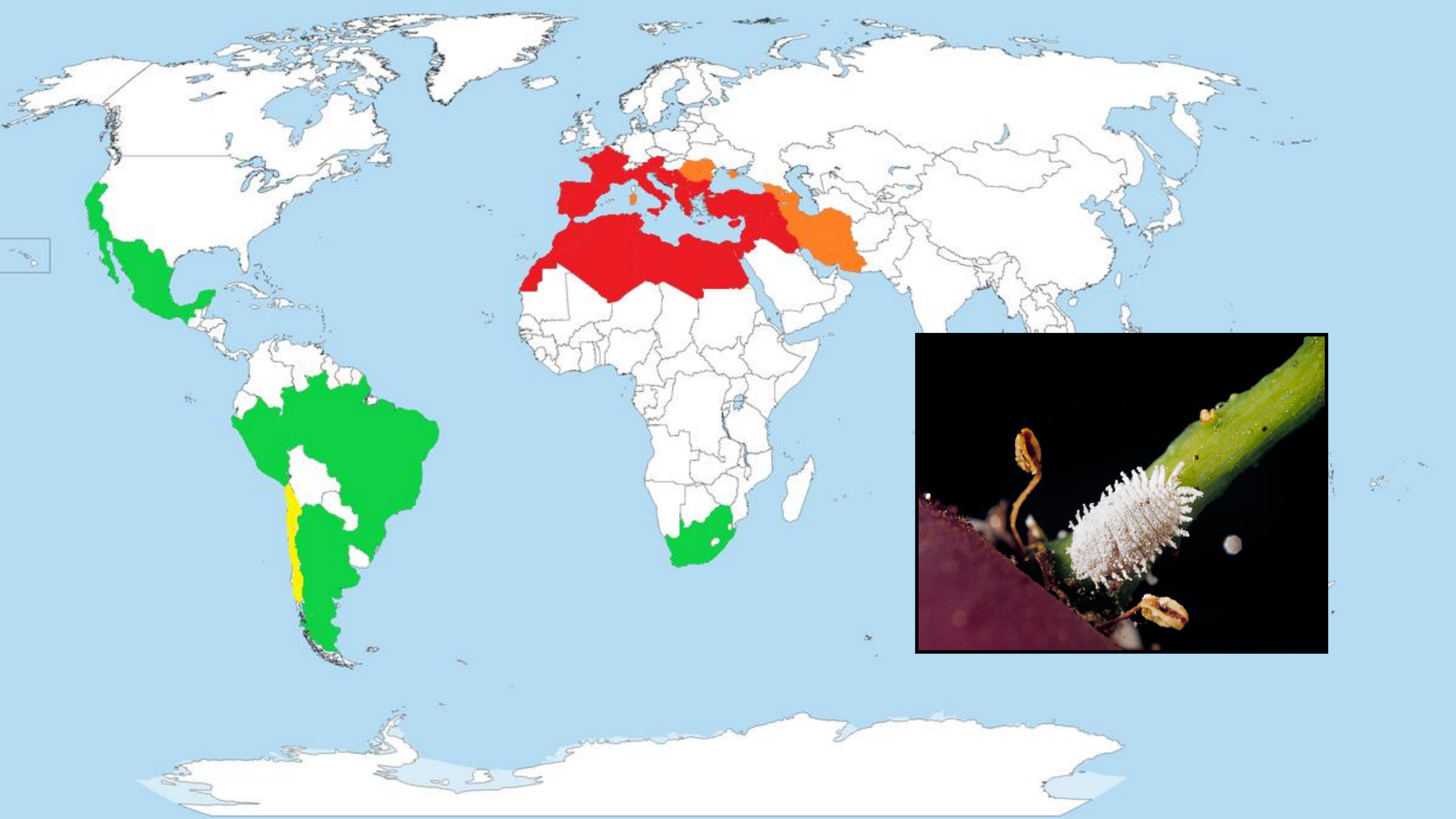

Vine MB is 1 of 8 important invasive mealybug species in California vineyards and orchards


Obscure mealybug
(South America)


Long-tailed mealybug
(Australia)

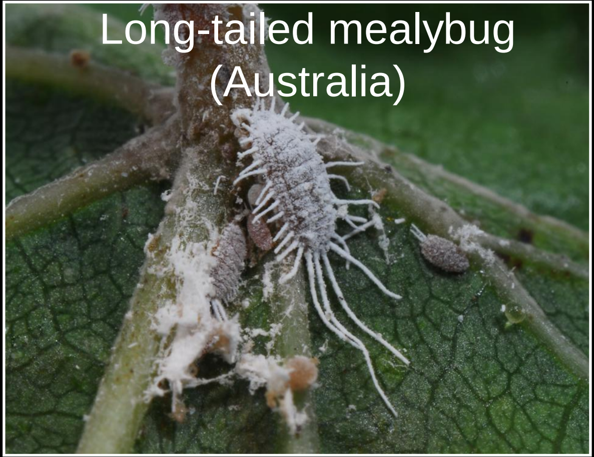

Gill’s mealybug
(native – southeastern US)






Vine mealybug
(Mediterranean)
Vine MB causes more damage
1) has more eggs,
2) on leaves leading to leaf drop
3) more honeydew excretion

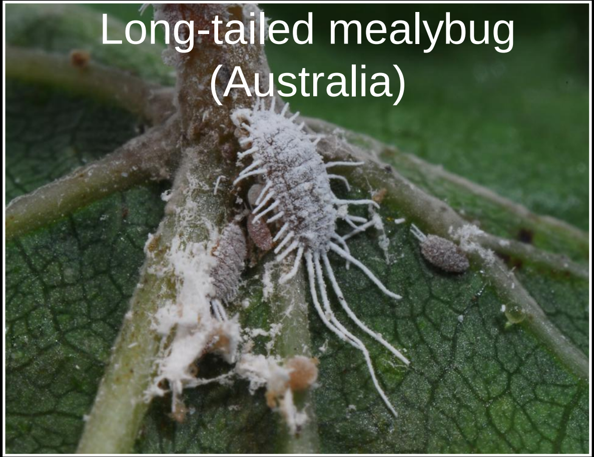

Obscure mealybug
(South America)


Long-tailed mealybug
(Australia)


Gill's mealybug
(native – southeastern US)

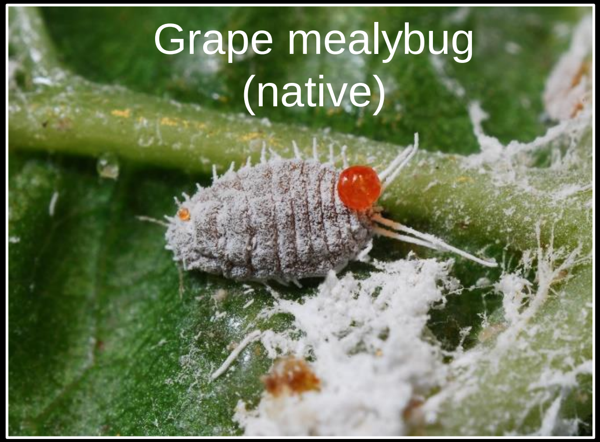

Pseudococcus maritimus (Grape MB)
North America

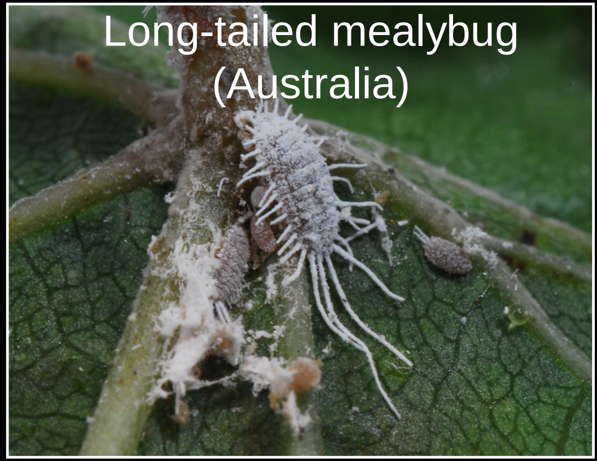

Obscure mealybug
(South America)


Long-tailed mealybug
(Australia)

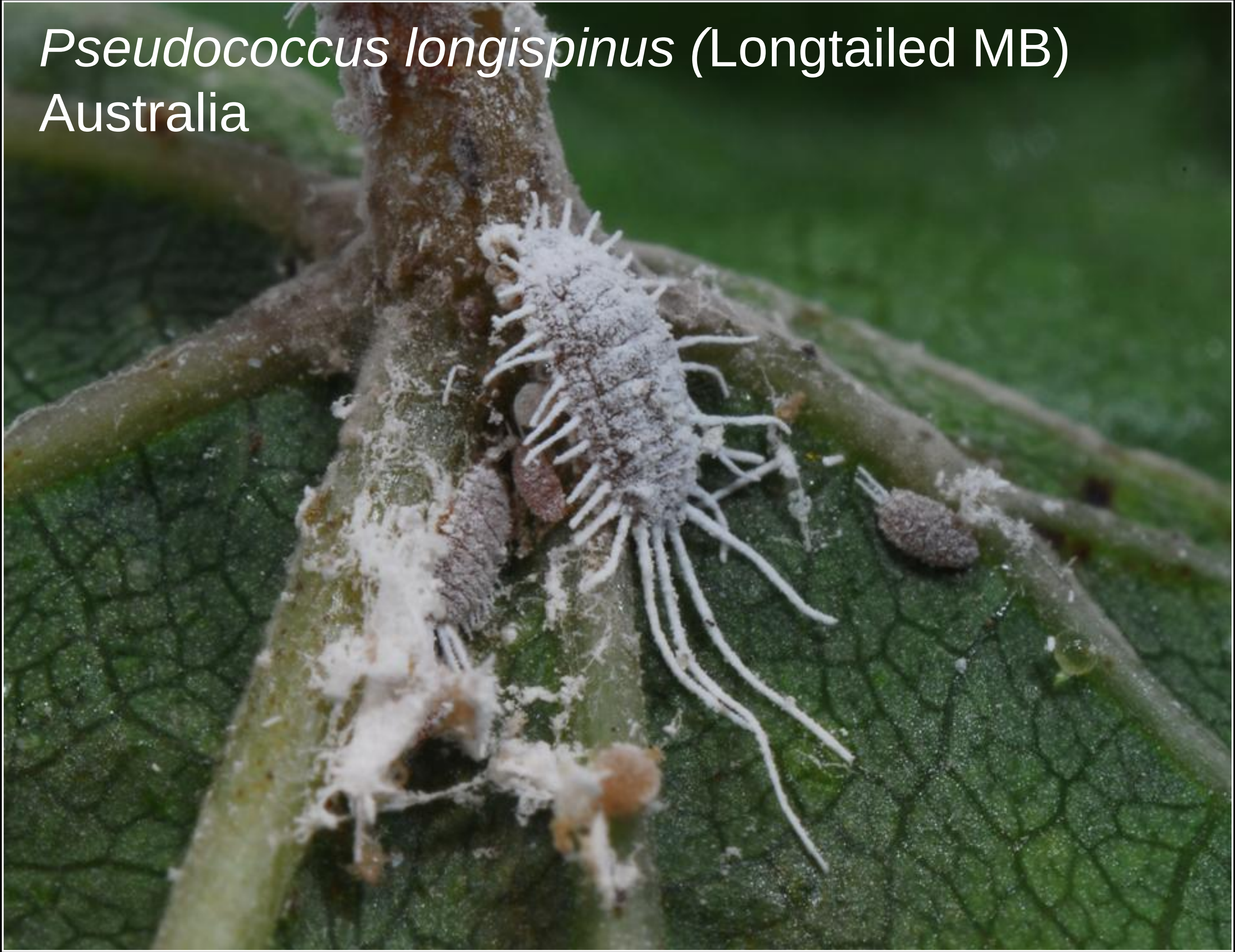

Gill's mealybug
(native – southeastern US)


Pseudococcus viburni (P. affinis) Obscure MB
South America


Grape mealybug
(native)


Long-tailed mealybug
(Australia)


Gill's mealybug
(native – southeastern US)


Pseudococcus longispinus (Longtailed MB)
Australia


Comstock mealybug
(Japan/China)
UC Statewide IPM Project
© 2000 Regents, University of California


Citrophilus mealybug
(Australia)


Gill's mealybug
(native – southeastern US)


During molts, MB lose wax – including “tails”
just molted
cast “skin”
Mature adult


Pseudococcus calceolariae (Citrophilus or Scarlet)
Australia


Citrus mealybug
(Asia)

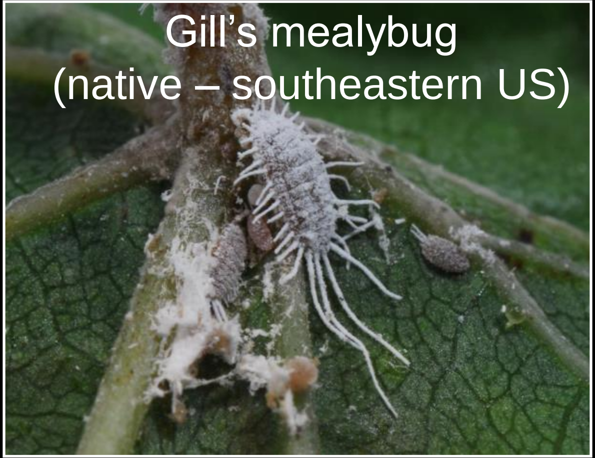

Comstock mealybug
(Japan/China)
UC Statewide IPM Project
© 2000 Regents, University of California

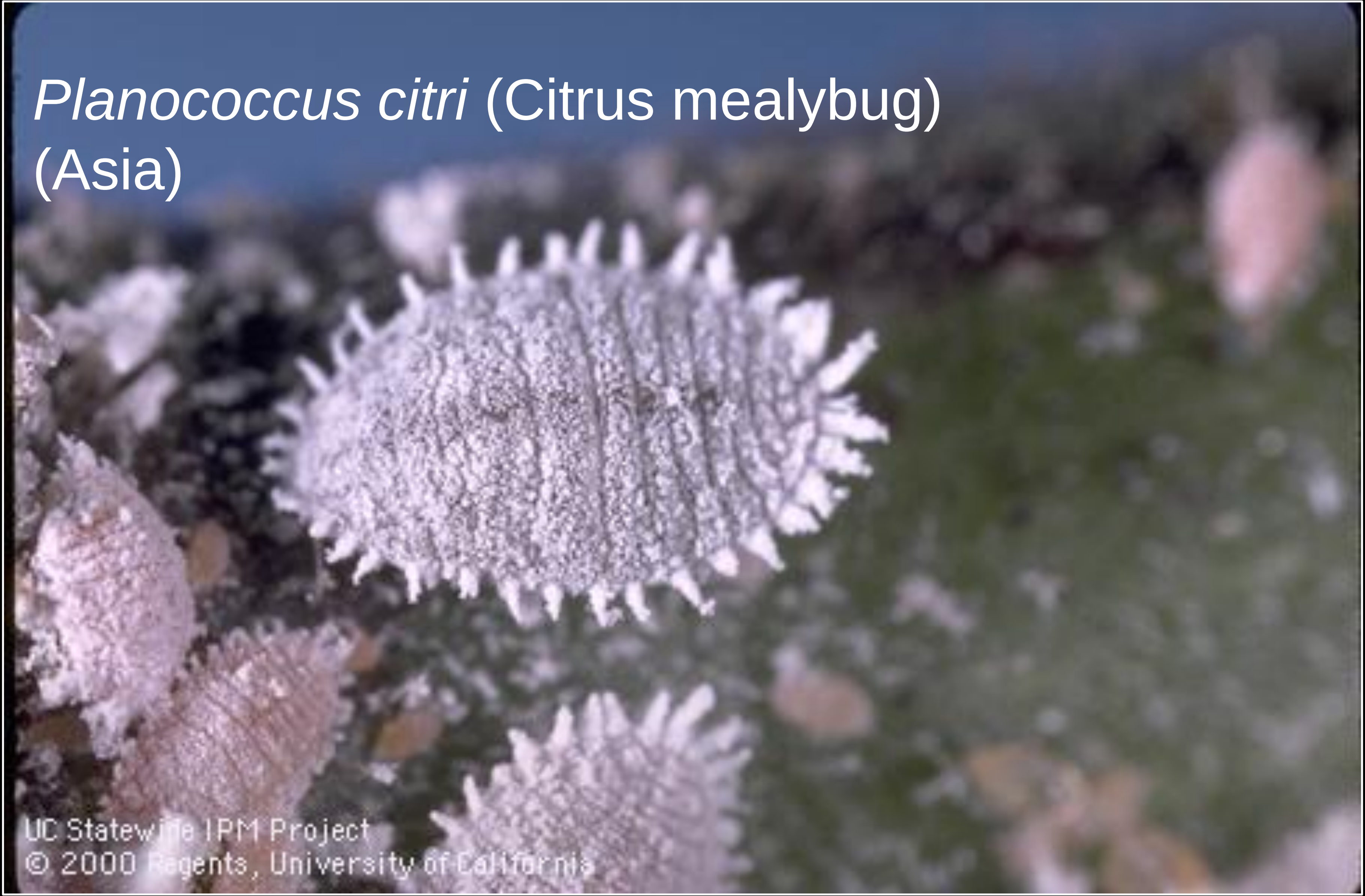

Gill’s mealybug
(native – southeastern US)


Ferrisia gilli (Gill's MB)
(southeastern US… maybe, related to *F. virigata*… Jamaica)

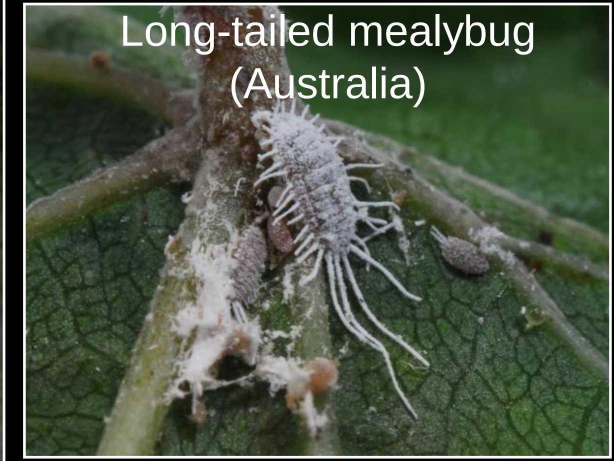

Comstock mealybug
(Japan/China)
UC Statewide IPM Project
© 2000 Regents, University of California


Citrophilus mealybug
(Australia)

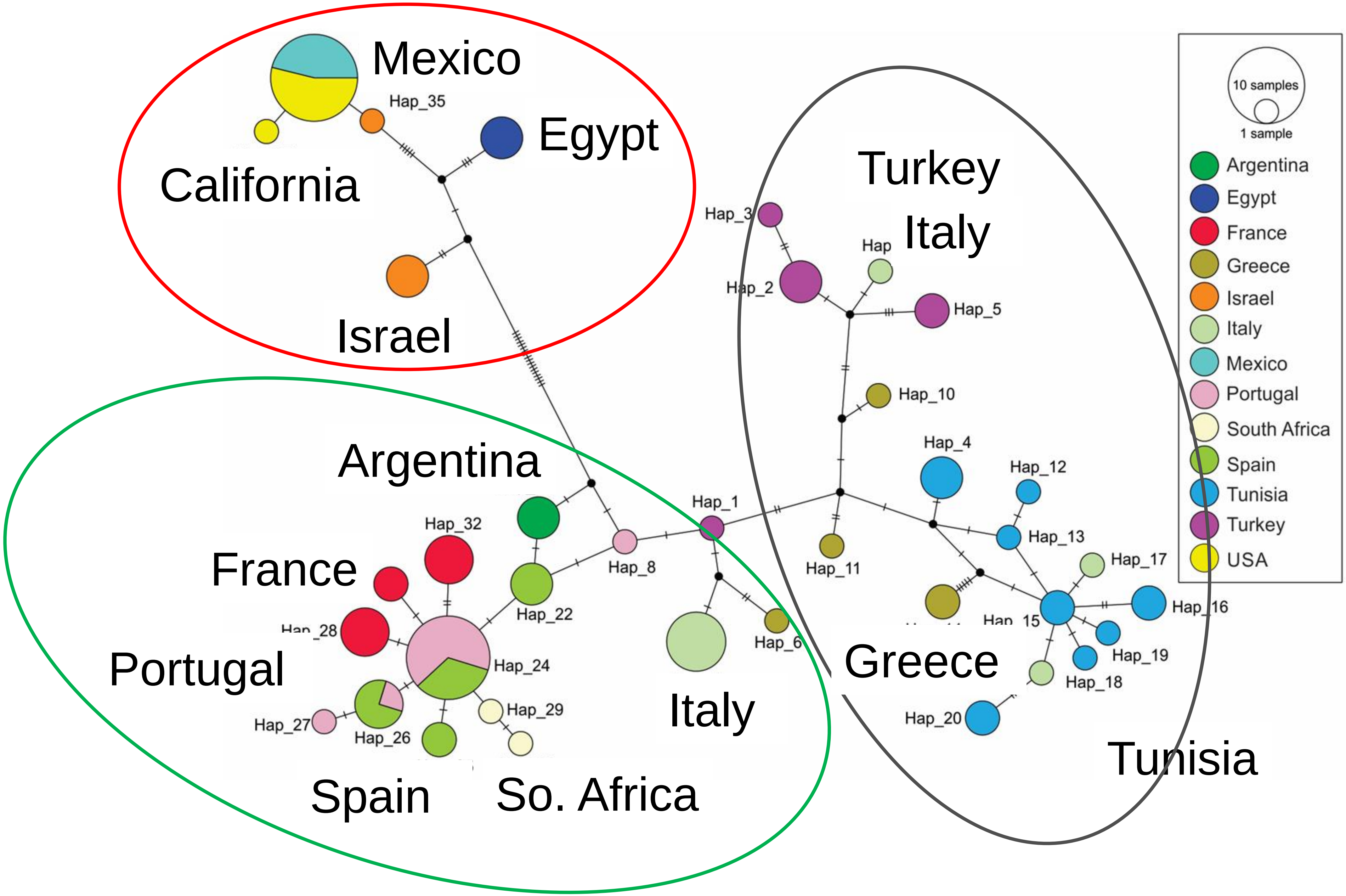

Gill's mealybug
(native – southeastern US)


Planococcus citri (Citrus mealybug)
(Asia)
UC Statewide IPM Project
© 2000 Regents, University of California

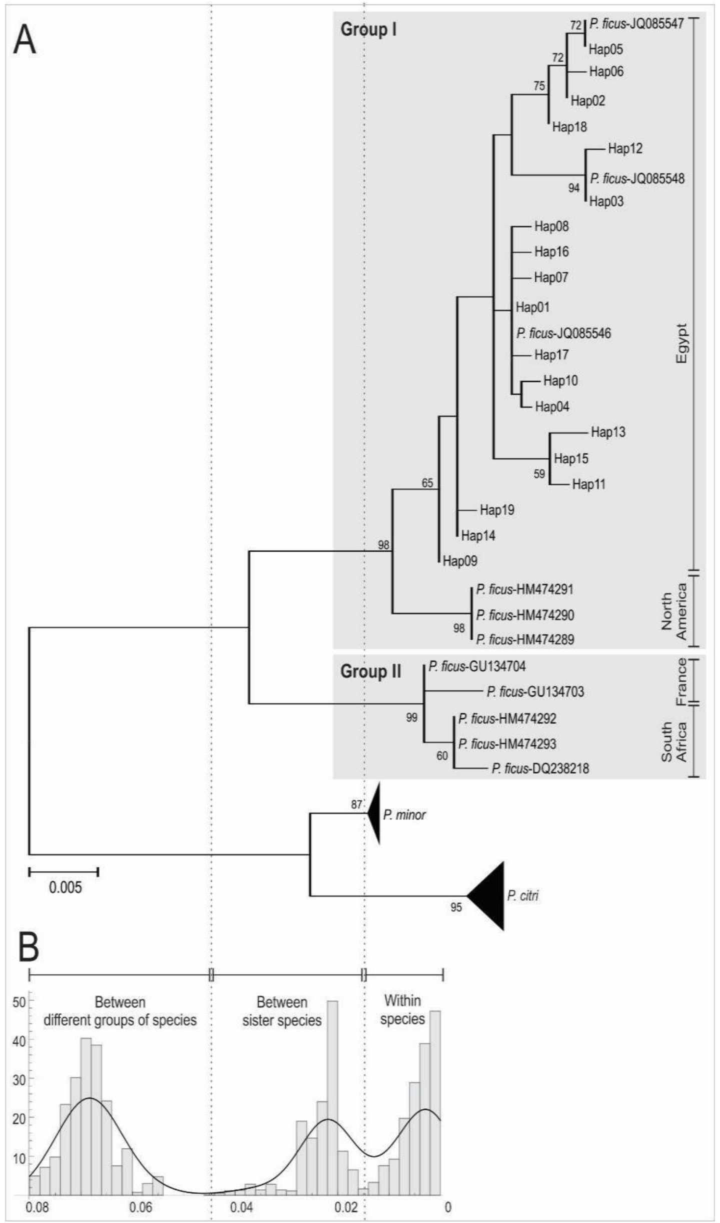

Vine mealybug
(Mediterranean)


Long-tailed mealybug
(Australia)


Gill's mealybug
(native – southeastern US)



Mexico
Hap_35
Egypt
California
Israel
Turkey
Italy
Hap_3
Hap
Hap_2
Hap_5
Hap_10
Hap_4
Hap_12
Hap_13
Hap_11
Hap_17
Hap_16
Hap_15
Hap_19
Hap_18
Hap_20
Greece
Tunisia
Argentina
Hap_1
Hap_8
Hap_32
France
Hap_22
Hap_28
Hap_24
Hap_6
Portugal
Hap_29
Hap_27
Hap_26
Italy
Spain
So. Africa
10 samples
1 sample
Argentina
Egypt
France
Greece
Israel
Italy
Mexico
Portugal
South Africa
Spain
Tunisia
Turkey
USA



Journal of Pest Science
https://doi.org/10.1007/s10340-022-01532-1

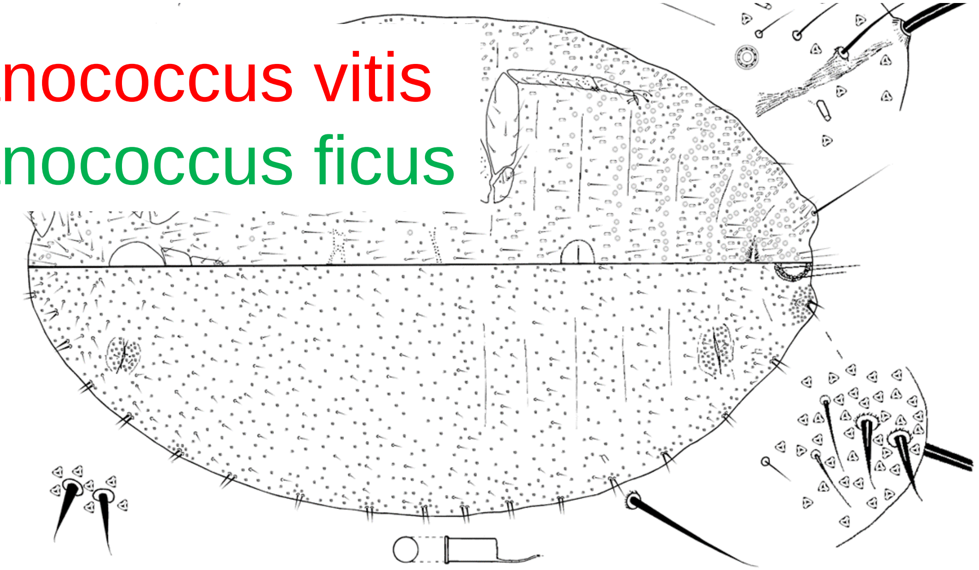
ORIGINAL PAPER

Identifying cryptic species of *Planococcus* infesting vineyards to improve control efforts

Margarita C. G. Correa[1] · Ferran Palero[2,3] · Vitor C. Pacheco da Silva[4] · M. Bora Kaydan[5,6] · Jean-Francois Germain[7] · Shaaban Abd-Rabou[8] · Kent M. Daane[9] · Arturo Cocco[10] · Elie Poulin[11] · Thibaut Malausa[2]

Planococcus vitis

Planococcus ficus



P. ficus pherotypes distribution

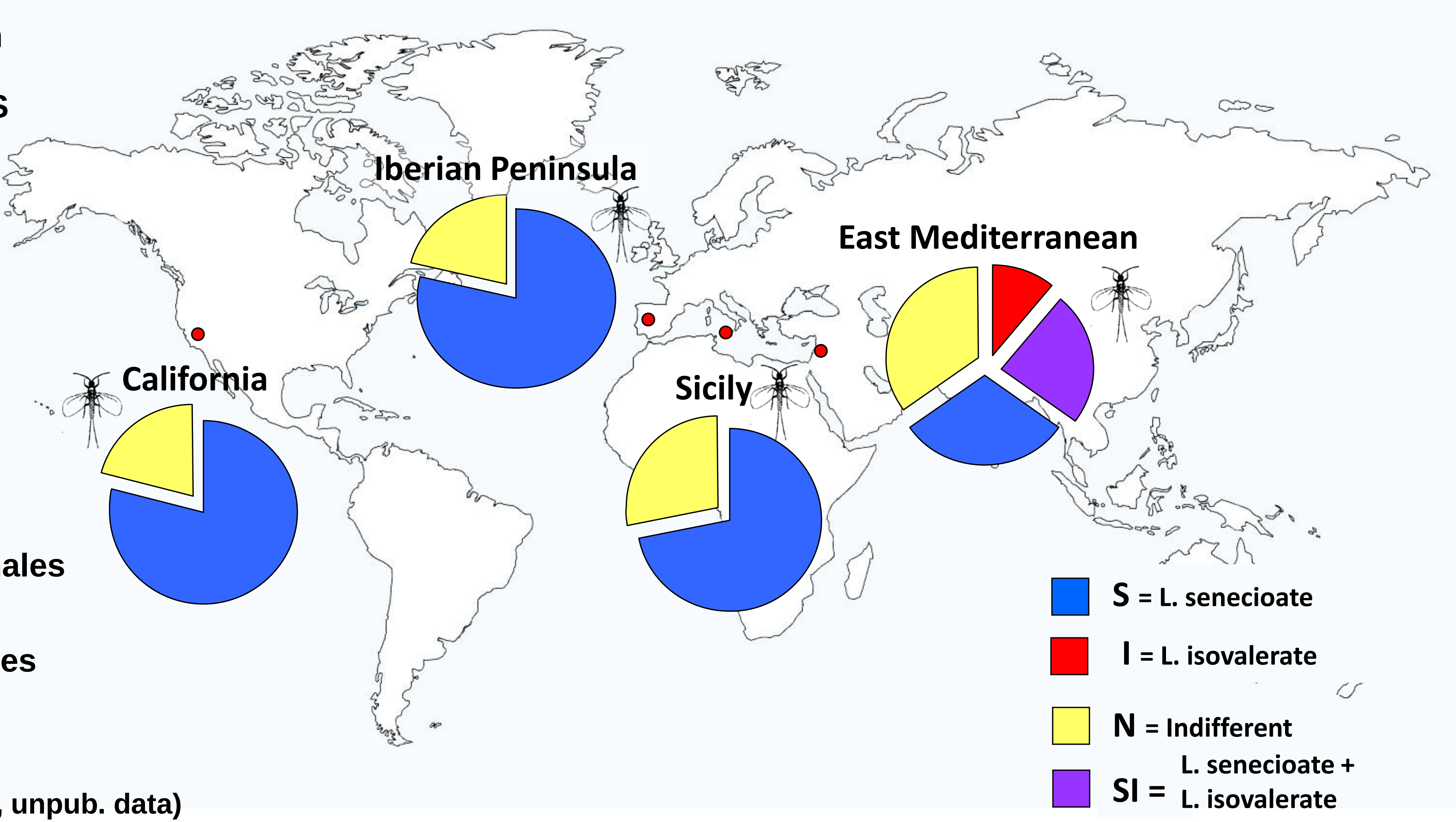
XVI ICS - Tbilisi

All 9 pherotypes were found in Israeli populations

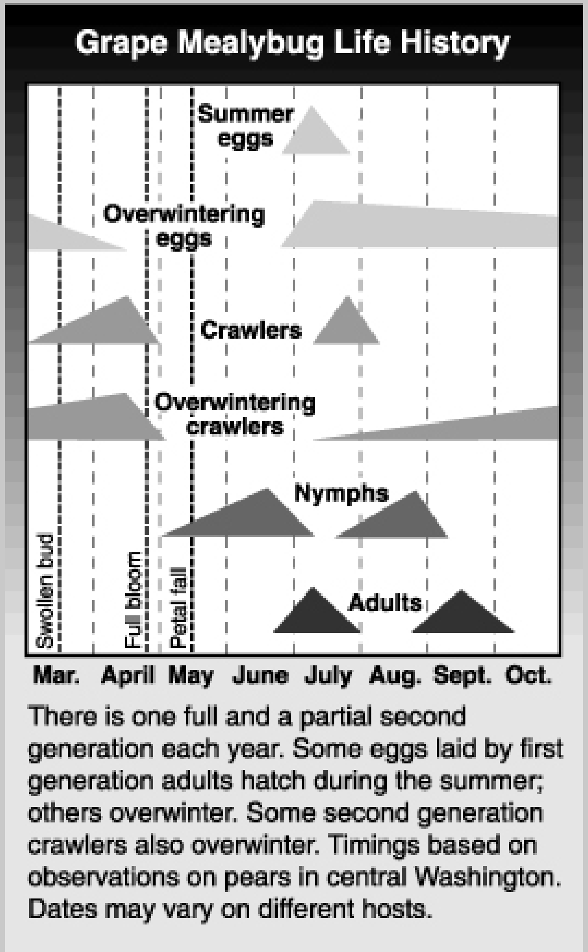
Pherotypes observed in Sicily, Portugal and California belonged to S and N groups

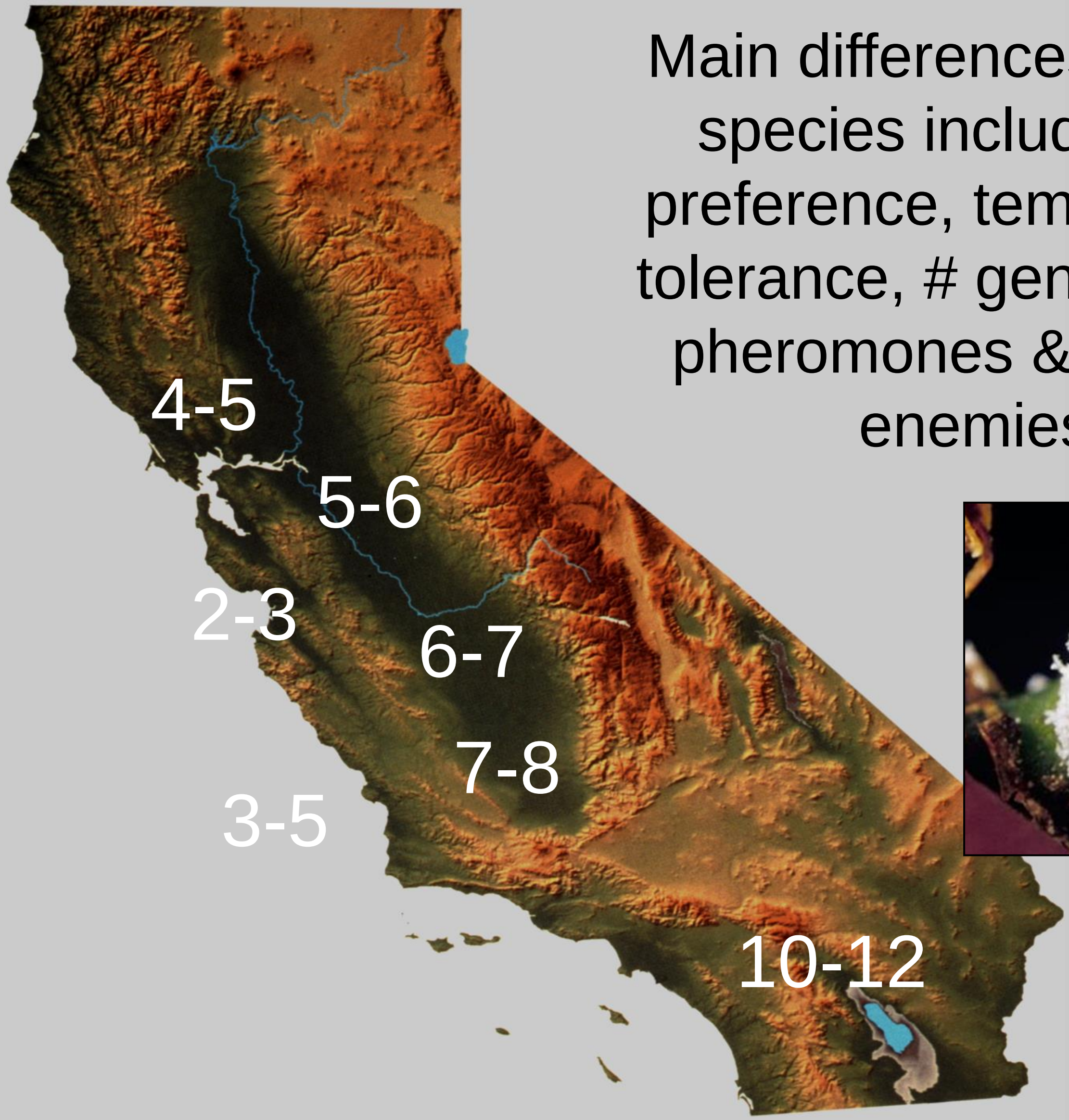
In California:

- **no production of L. isovalerate by females**
- **no attraction to L. isovalerate by males**



(Kol Maimon et a., 2010; Mendel, unpub. data)





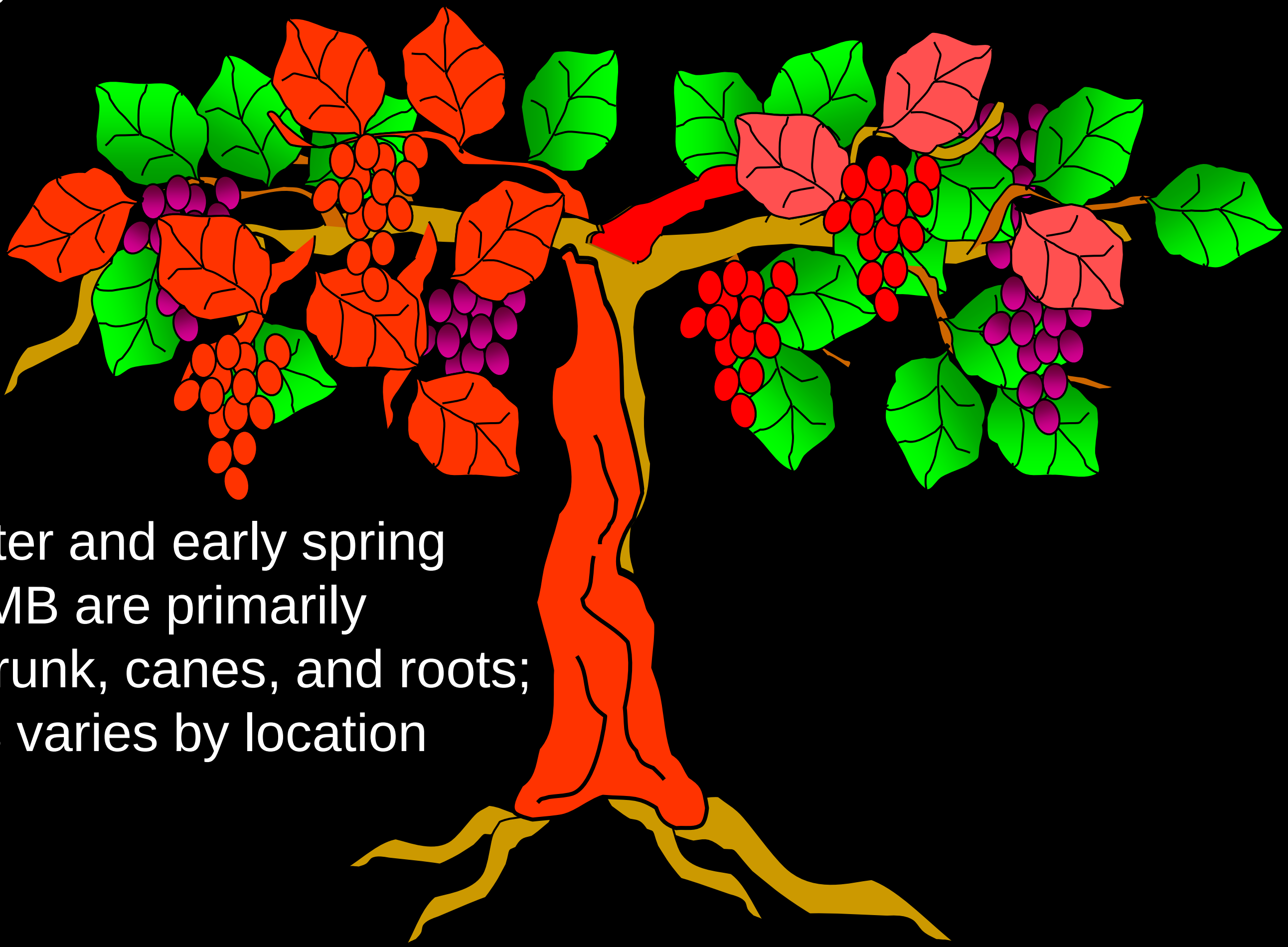
Main differences among species include host preference, temperature tolerance, # generations, pheromones & natural enemies

General seasonal changes in mealybug location

Summer and fall onto
leaves and into fruit

Early summer onto leaves

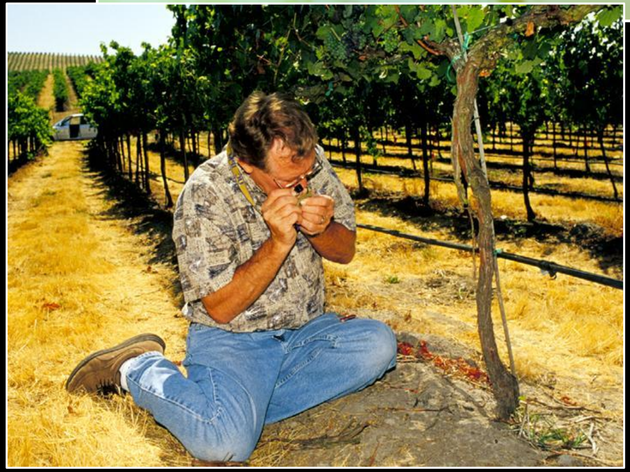
Spring onto canes



Winter and early spring
MB are primarily
on the trunk, canes, and roots;
this varies by location

VMB underground on roots, or under bark on the trunk, cordon, and canes remains a problem. This creates a ‘refuge’ from controls.



Sniffer Dog Trial

Summary by Neil McRoberts (UCD):

- dogs were on scent for VMB and Leafroll in indoor and some limited outdoor trials with potted plants
- the LR virus dogs were tested outdoors at Russel Ranch, needed to get use to working on trellised vines
- probably 1-4 months of work to see field effectiveness.

How long does it take for mealybugs to ‘Acquire’ and ‘Transmit’ the GLRaV pathogen?

A) Days
B) Hours
C) Weeks
D) Never

Outline:

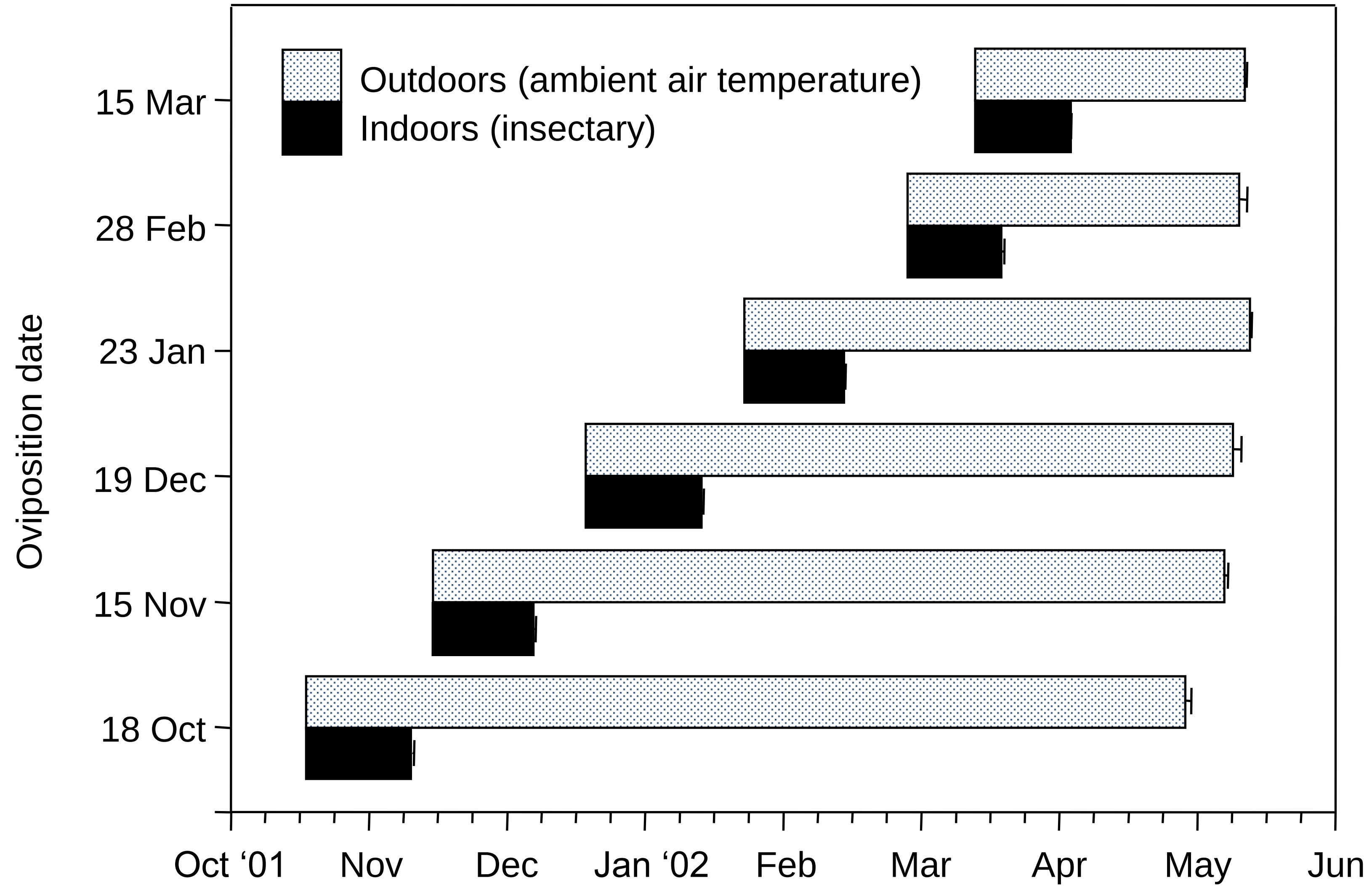
1) Leafroll and Vectors
2) Mealybug species, biology & monitoring
3) **Biological & Chemical mealybug controls**
4) Mating disruption for “vine” mealybug
5) Areawide Programs and Roguing
6) Discussion

There are a number of predators that attack VMB

Lacewings
Midges
Lady beetles

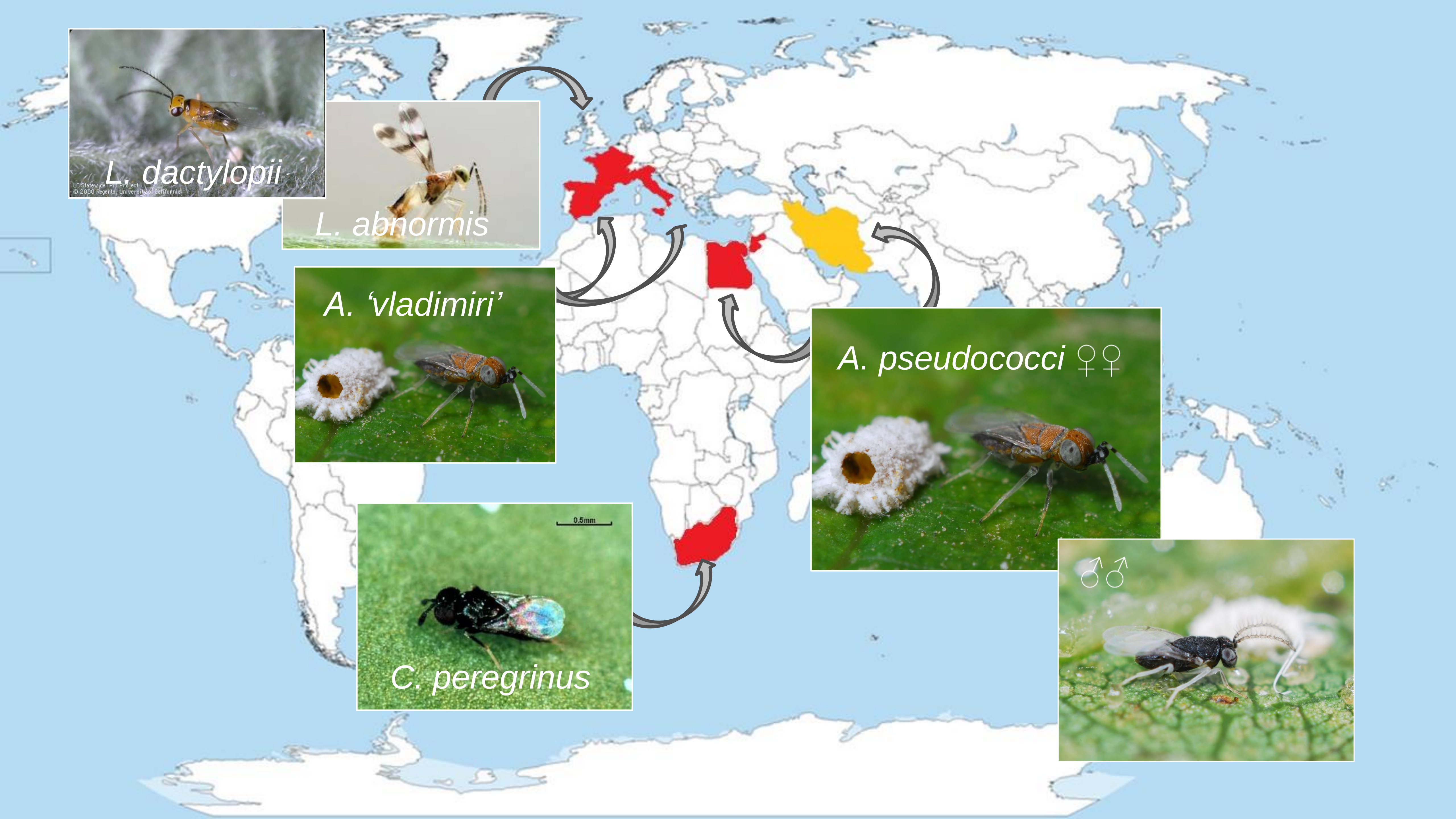
They tend to more common when VMB densities are high



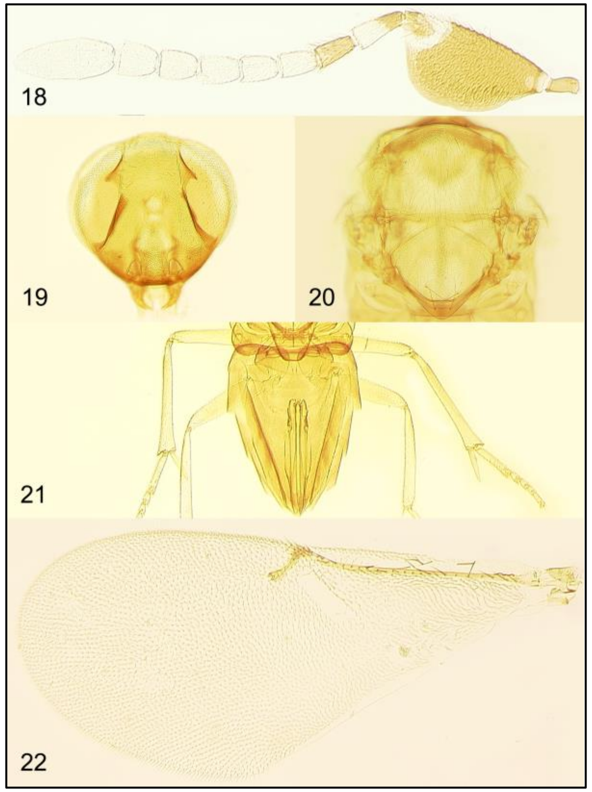


Anagyrus pseudococci oviposition and adult emergence dates


UAV-IQ Drone
releases of NE


L. dactylopii
UC Statewide IPM Project
© 2000 Regents, University of California
L. abnormis
A. 'vladimiri'
A. pseudococci ♀♀
0.5mm
C. peregrinus
♂♂

Anagyrus pseudococci vs *Anagyrus vladimiri*



Figs 18-22 *A. vladimiri*

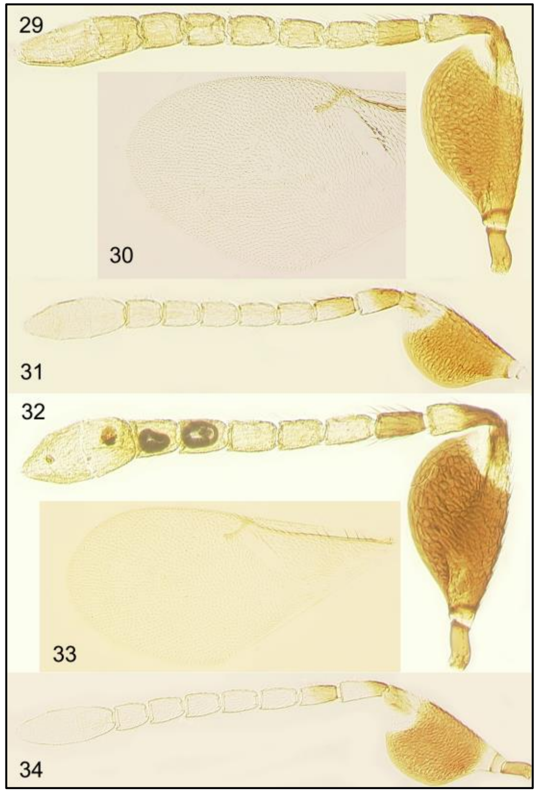
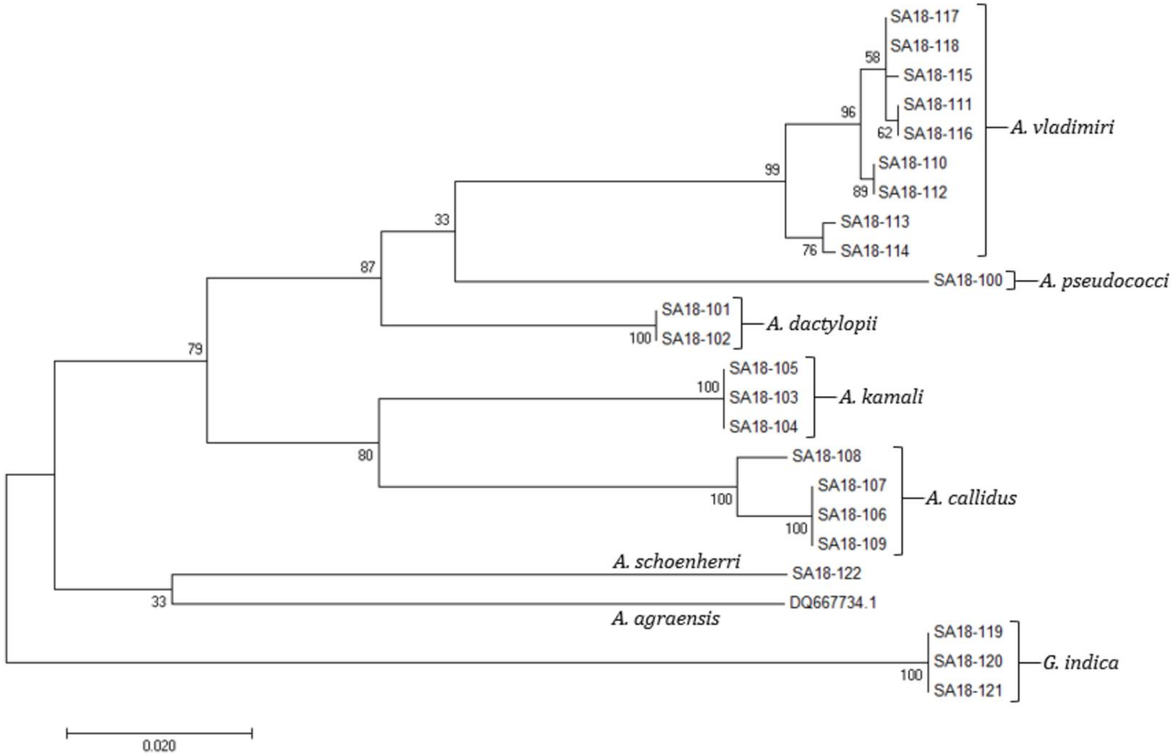
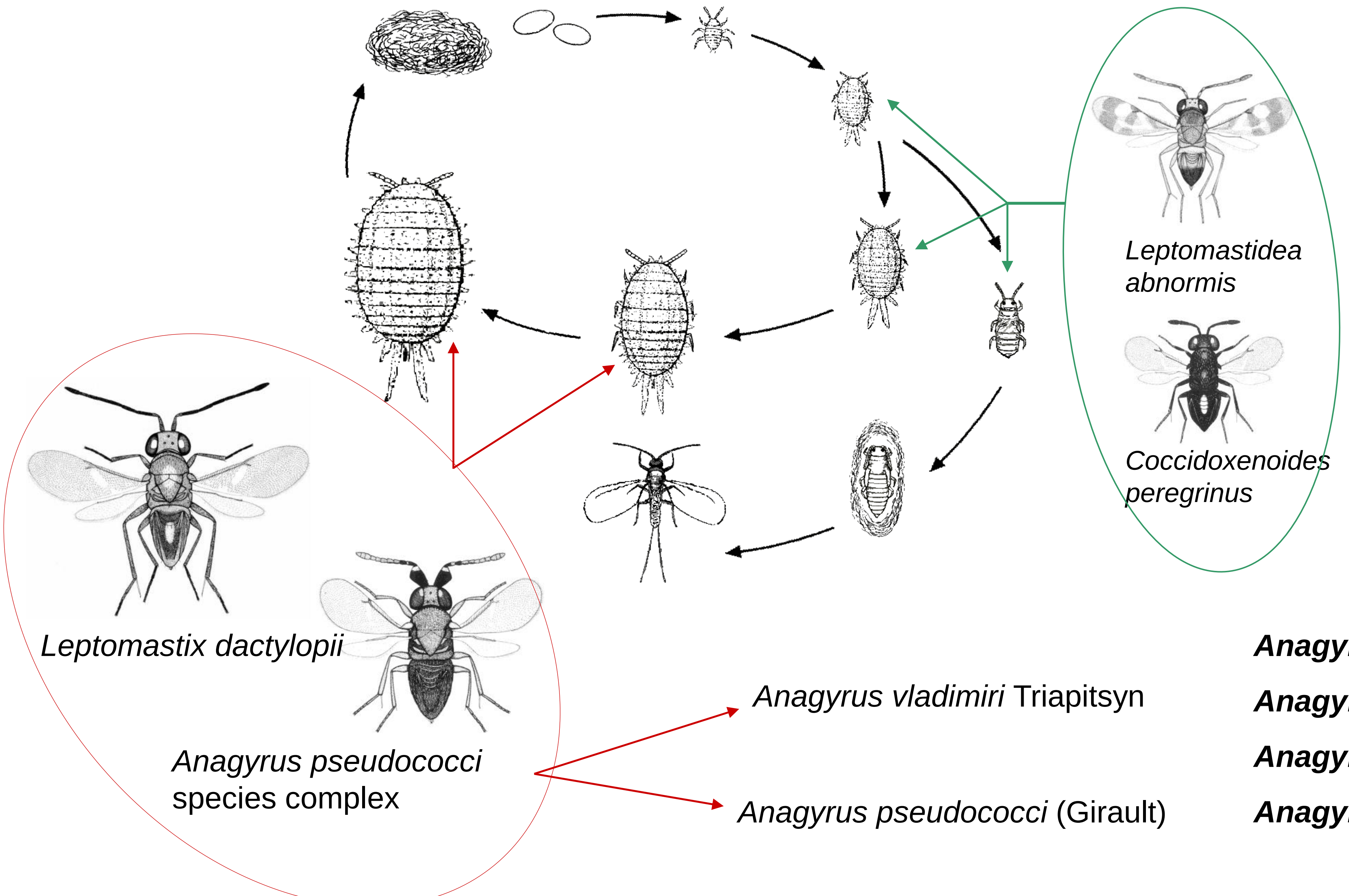


Fig 29 *A. dactylopii*
Figs 30-31 *A. kamali*
Fig 32-33 *A. kivuensis*
Fig 34 *A. pseudococci*



P. ficus and 'P. vitis' parasitoid complex

XVI ICS - Tbilisi



Anagyrus agraensis

Anagyrus planococci

Anagyrus dactylopii

Anagyrus mirzai

Biocontrol Science and Technology,
Vol. 21, No. 4, 2011, 427–433

Taylor & Francis
Taylor & Francis Group

RESEARCH ARTICLE

Natural enemies of *Planococcus ficus* (Hemiptera: Pseudococcidae) in Fars Province vineyards, Iran

Majid Fallahzadeh[a]*, George Japoshvili[b], Nazila Saghaei[c] and Kent M. Daane[d]

Order: Family	Species	Host association	Number
Hym.: Encyrtidae	*Anagyrus agraensis* Saraswat	Primary parasitoid – *P. ficus*	846
	Anagyrus dactylopii (Howard)	Primary parasitoid – *P. ficus*	415
	Anagyrus mirzai Agarwal & Alam	Primary parasitoid – *P. ficus*	631
	Anagyrus pseudococci (Girault)	Primary parasitoid – *P. ficus*	9120
	Leptomastix dactylopii Howard	Primary parasitoid – *P. ficus*	5923
	Leptomastix flava Mercet	Primary parasitoid – *P. ficus*	714
	Prochiloneurus bolivari Mercet	Primary/Secondary parasitoid	1202
	Homalotylus turkmenicus Myartseva	Primary parasitoid – coccinellids	259
	Homalotylus vicinus Silvestri	Primary parasitoid – coccinellids	438

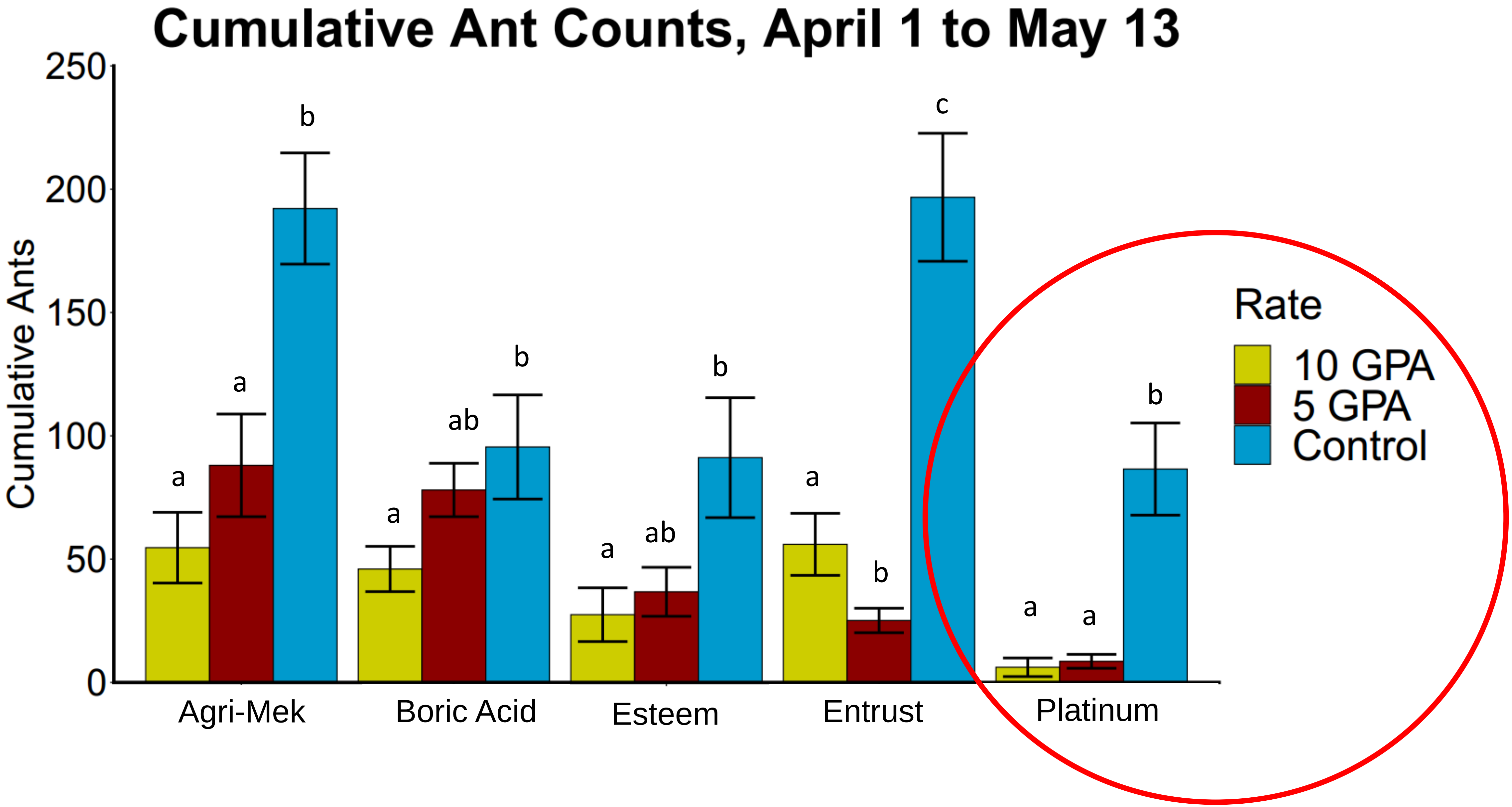



Hydrogel Ant Management

Hydrogel Trial (Lodi, Pavement ant)

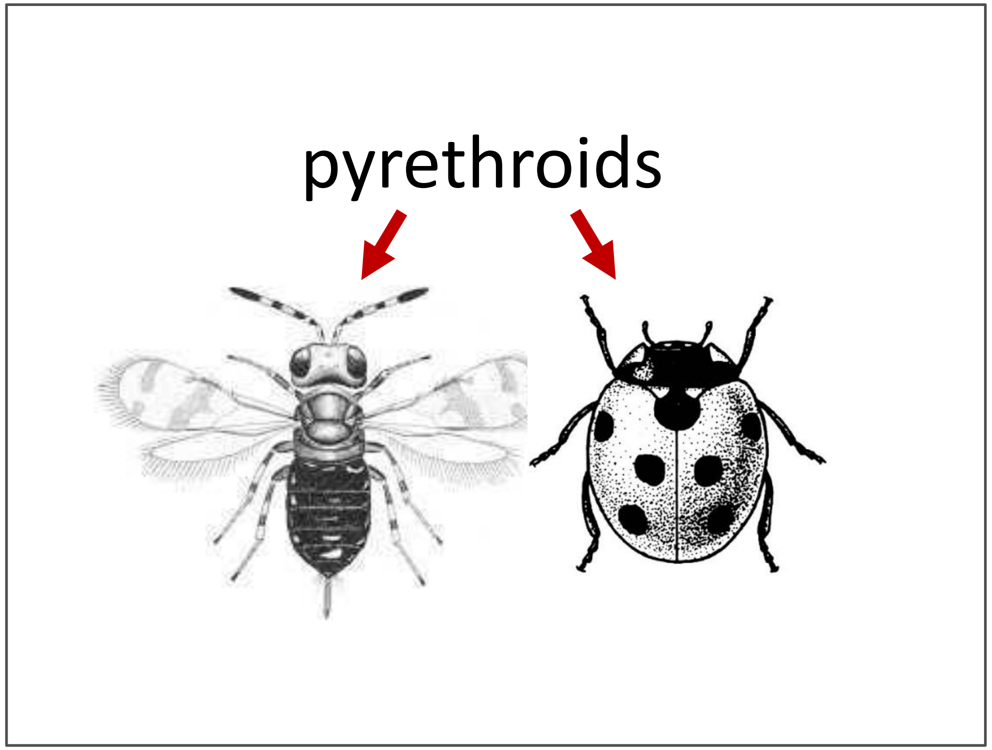
5 insecticides at 5 and 10 GPA
Crystals w/ 25% sucrose water
1 or 2 applications (1/100 or 1/200 label rate)

Insecticide	Label Rate	10 GPA	5 GPA
Agri-Mek	4.25 fl oz	0.042 fl oz	0.021 fl oz
Boric Acid	5%	6.7 dry oz	3.3 dry oz
Esteem	16 fl oz	0.16 fl oz	0.08 fl oz
Entrust	6 fl oz	0.06 fl oz	0.03 fl oz
Platinum	2.67 dry oz	0.026 dry oz	0.013 dry oz



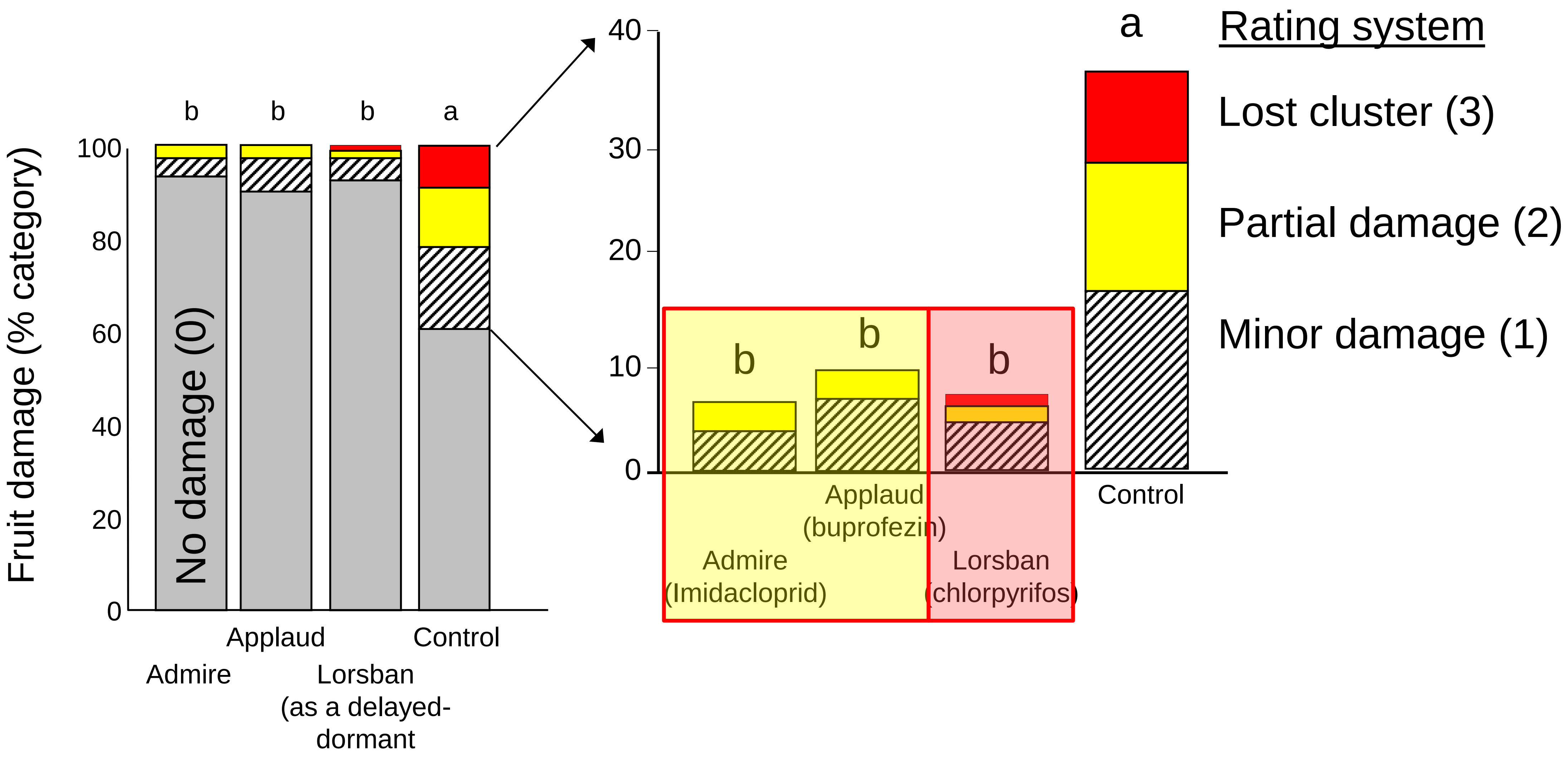
Cumulative Ant Counts, April 1 to May 13
Cumulative Ants
250
200
150
100
50
0
b
a
a
b
ab
a
b
ab
a
c
a
b
b
a
a
Agri-Mek
Boric Acid
Esteem
Entrust
Platinum
Rate
10 GPA
5 GPA
Control

Insecticides for Mealybugs and Natural Enemies

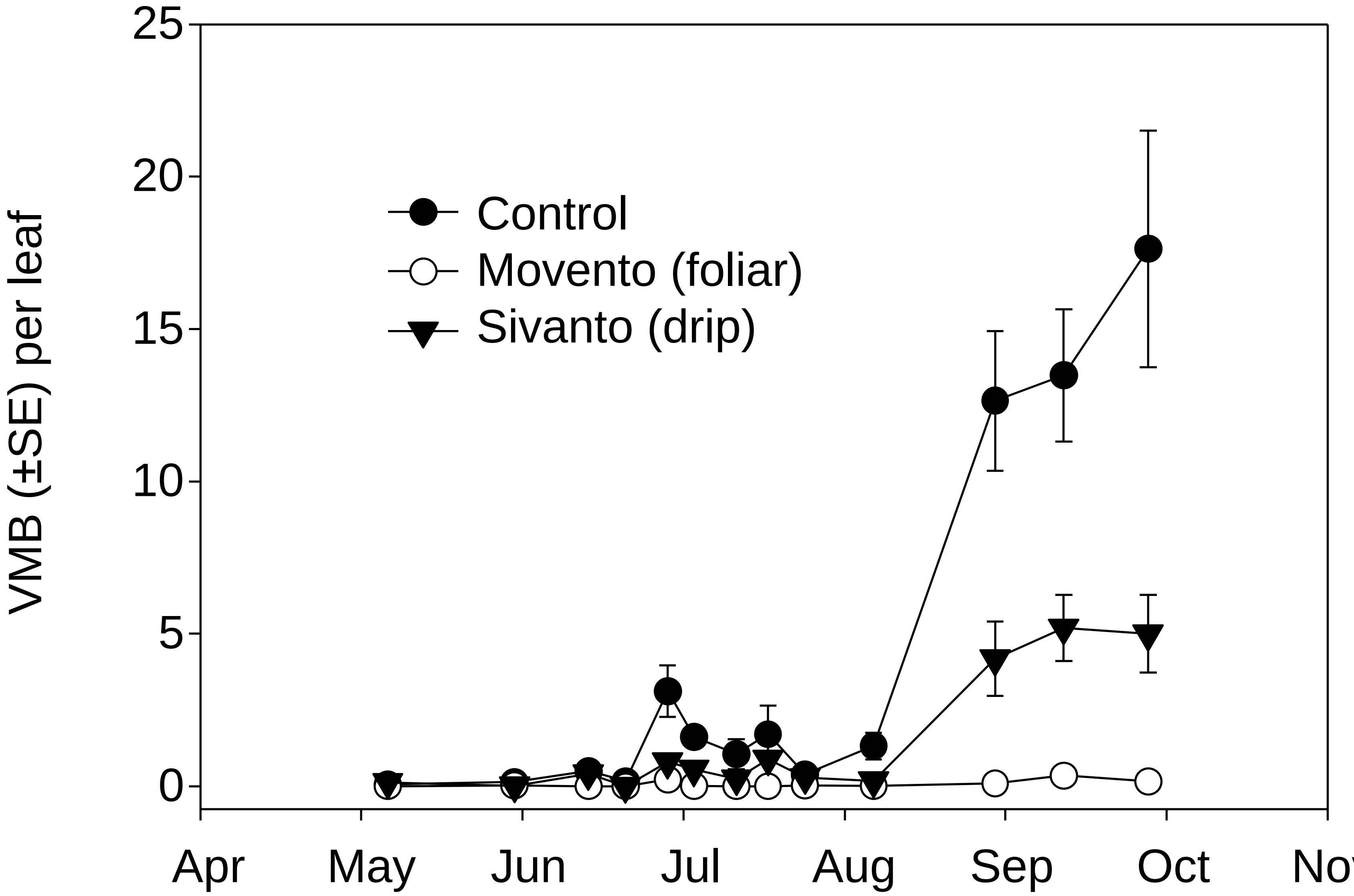


For most crops, selection of pesticides is the primary method to conserve natural enemies – even more important the cover crops

In the 1990s, Chemical Industry and UC sought alternates to in-season OPs and Carbamates

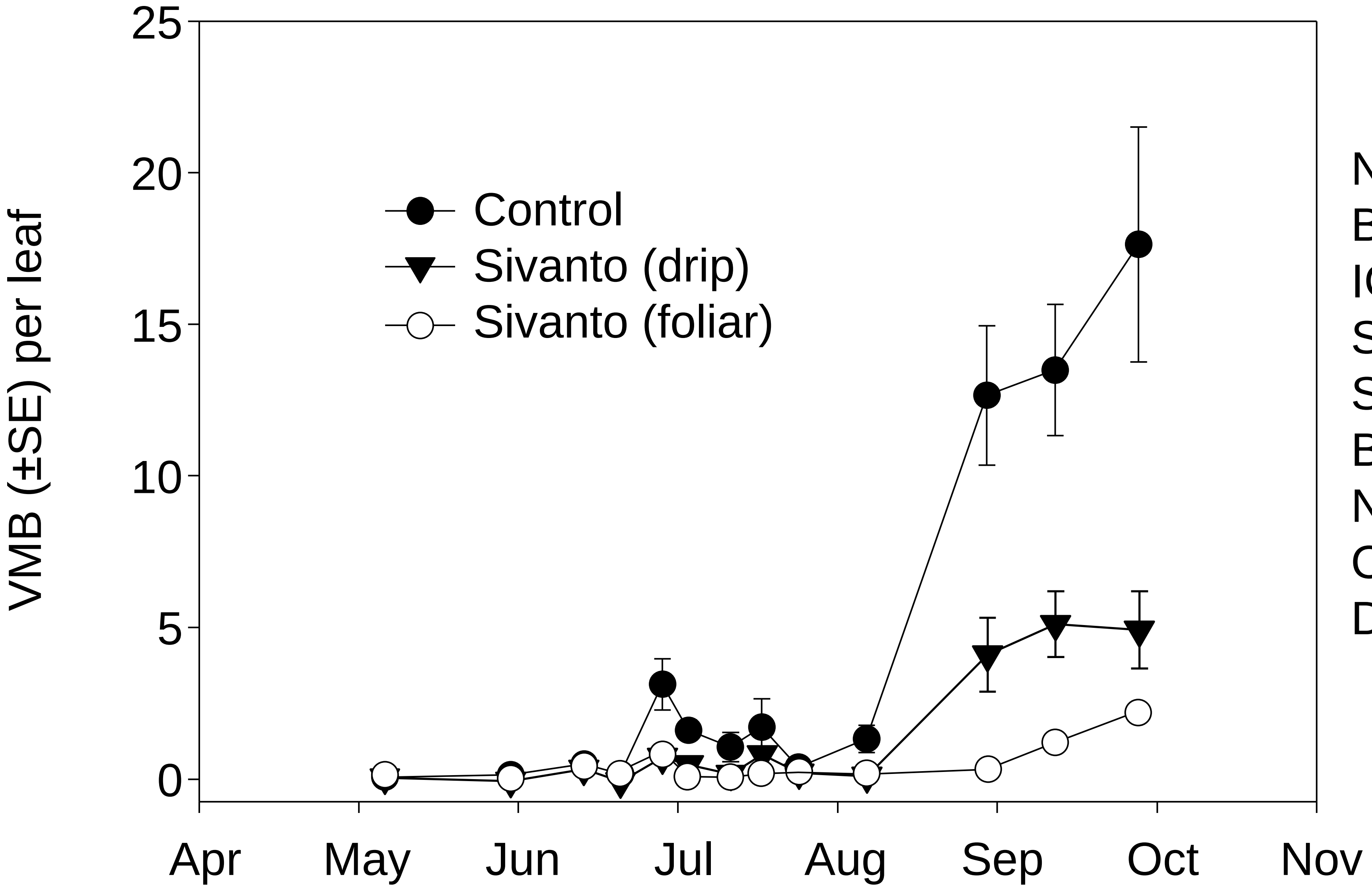


Spray Volume: 100 GPA; Air-blast Sprayer; label rate.
Details in Daane et al. 2006. *Calif. Agricul.* 60(1): 31-38.
Vine mealybug (*P. ficus*) was the target pest; Del Rey, CA.



Neonicotenoids
Butenolides
Sulfoximines
IGRs
Spirotetramat
Soaps
Botanicals
Neem
Oils
Diatomaceous earth

2019, Fresno Co. (westside)
material applied with backpack sprayer



Neonicotenoids
Butenolides
IGRs
Spirotetramat
Soaps
Botanicals
Neem
Oils
Diatomaceous earth

2019, Fresno Co. (westside)
material applied with backpack sprayer

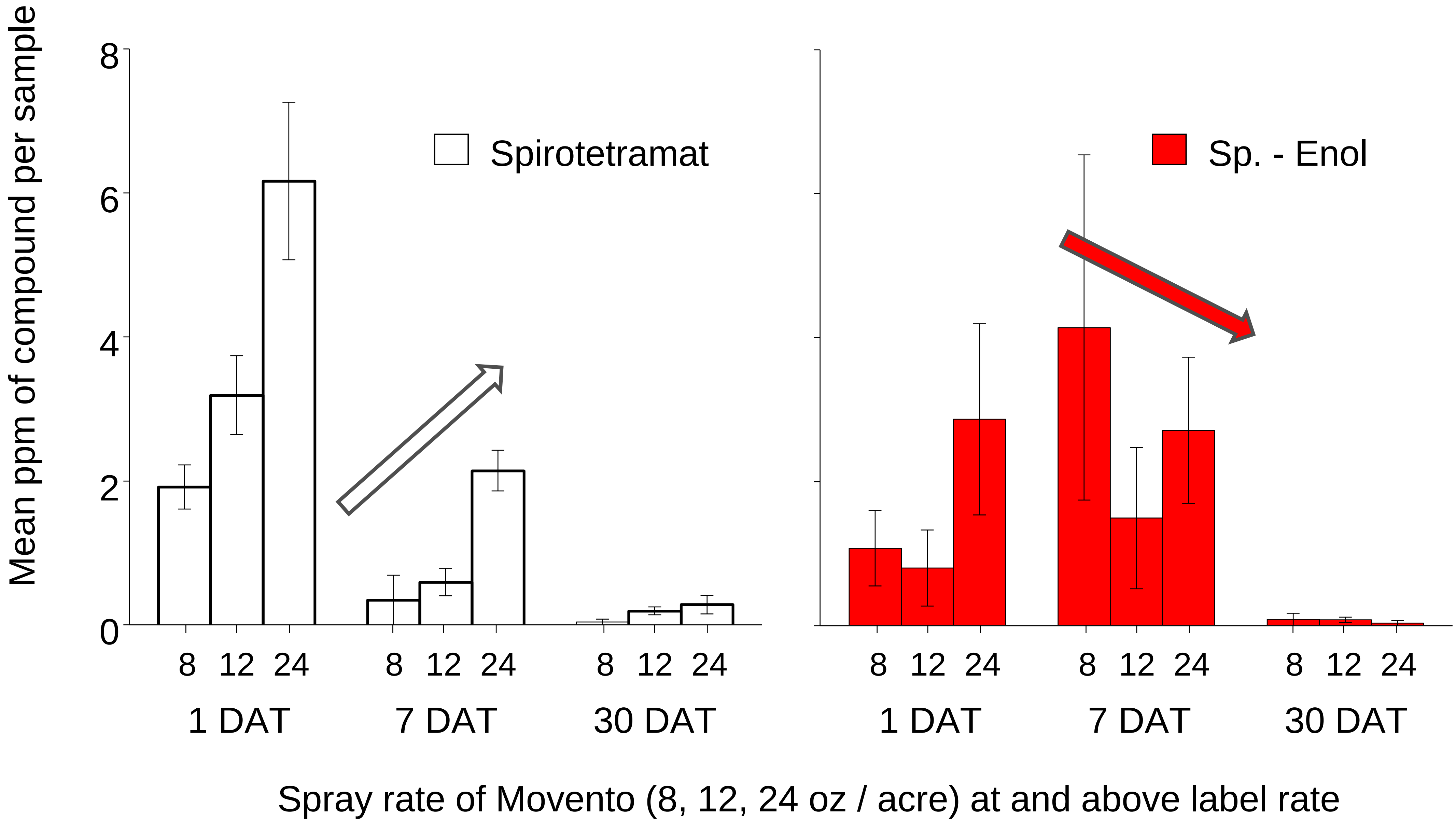
neem

pyrethrin
(botanical)

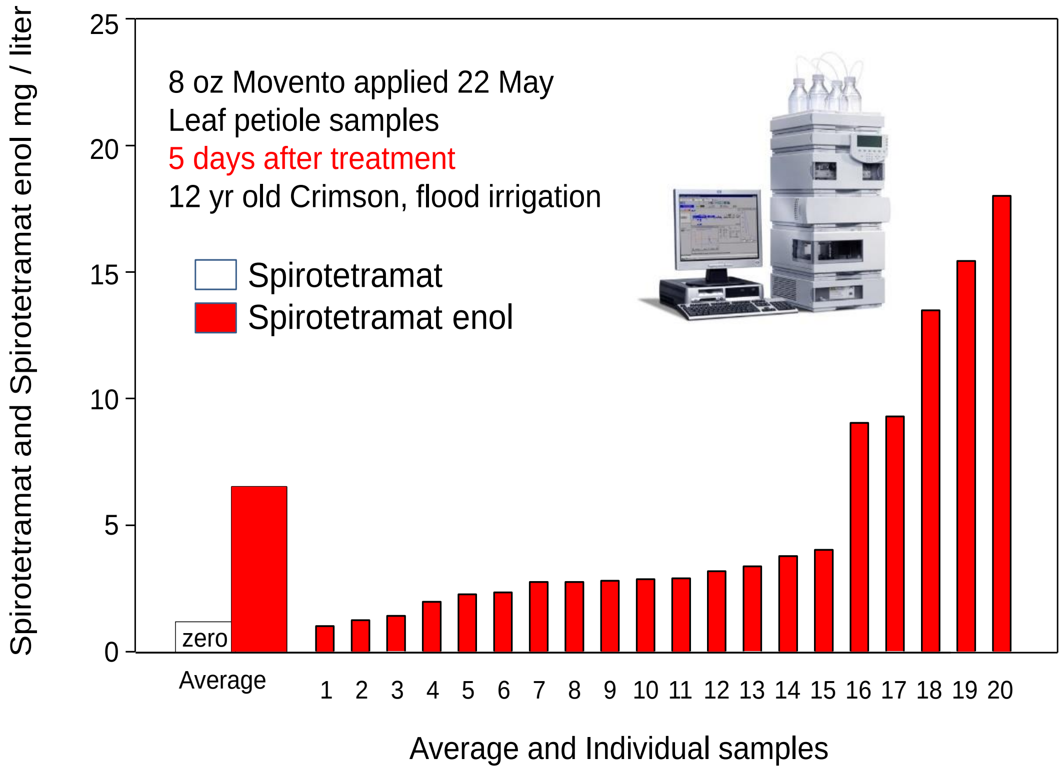
soaps

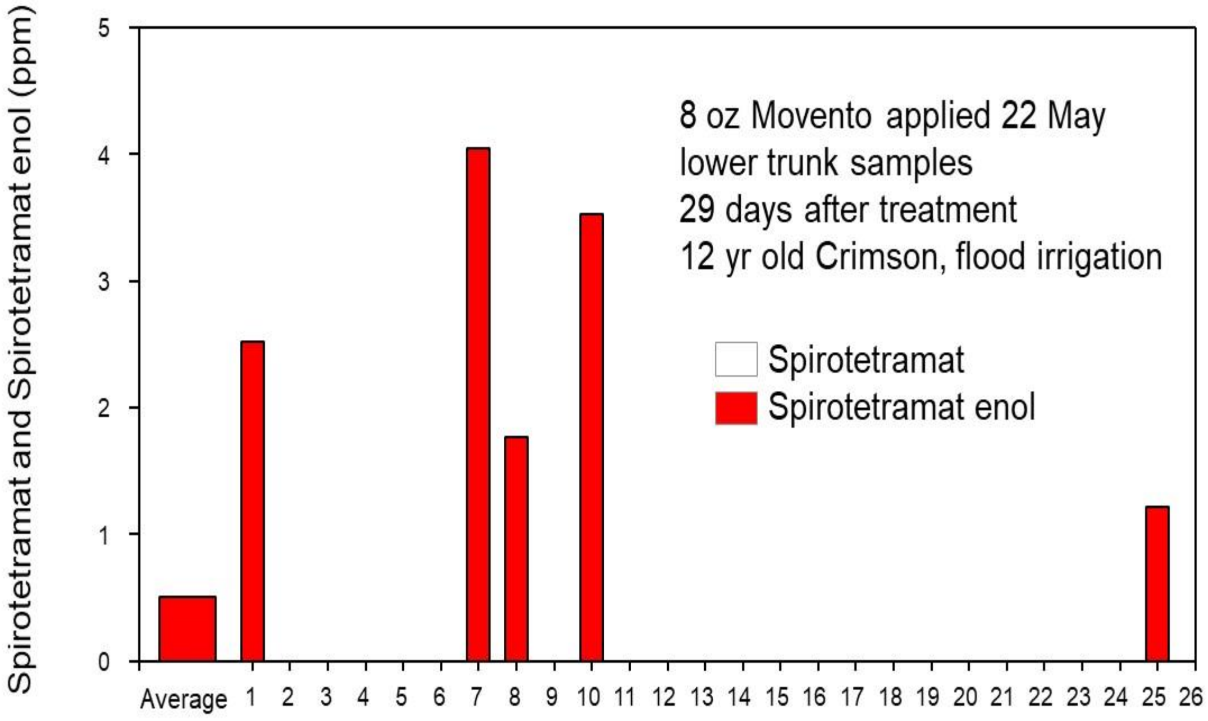
oils

Diatomaceous earth

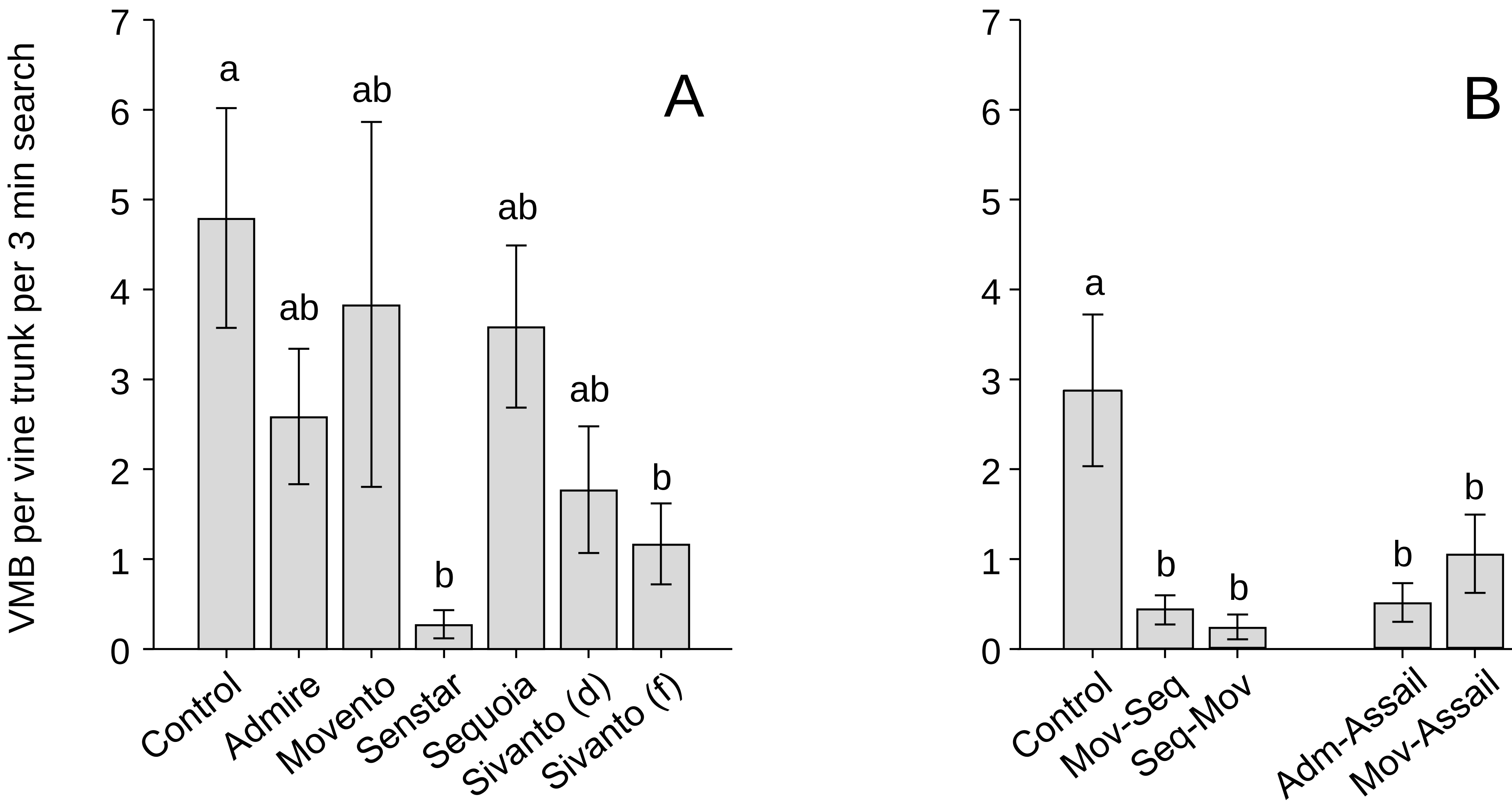


Mean ppm of compound per sample
8
6
4
2
0
Spirotetramat
Sp. - Enol
8
12
24
8
12
24
8
12
24
8
12
24
8
12
24
8
12
24
1 DAT
7 DAT
30 DAT
1 DAT
7 DAT
30 DAT
Spray rate of Movento (8, 12, 24 oz / acre) at and above label rate





Different vines, same row



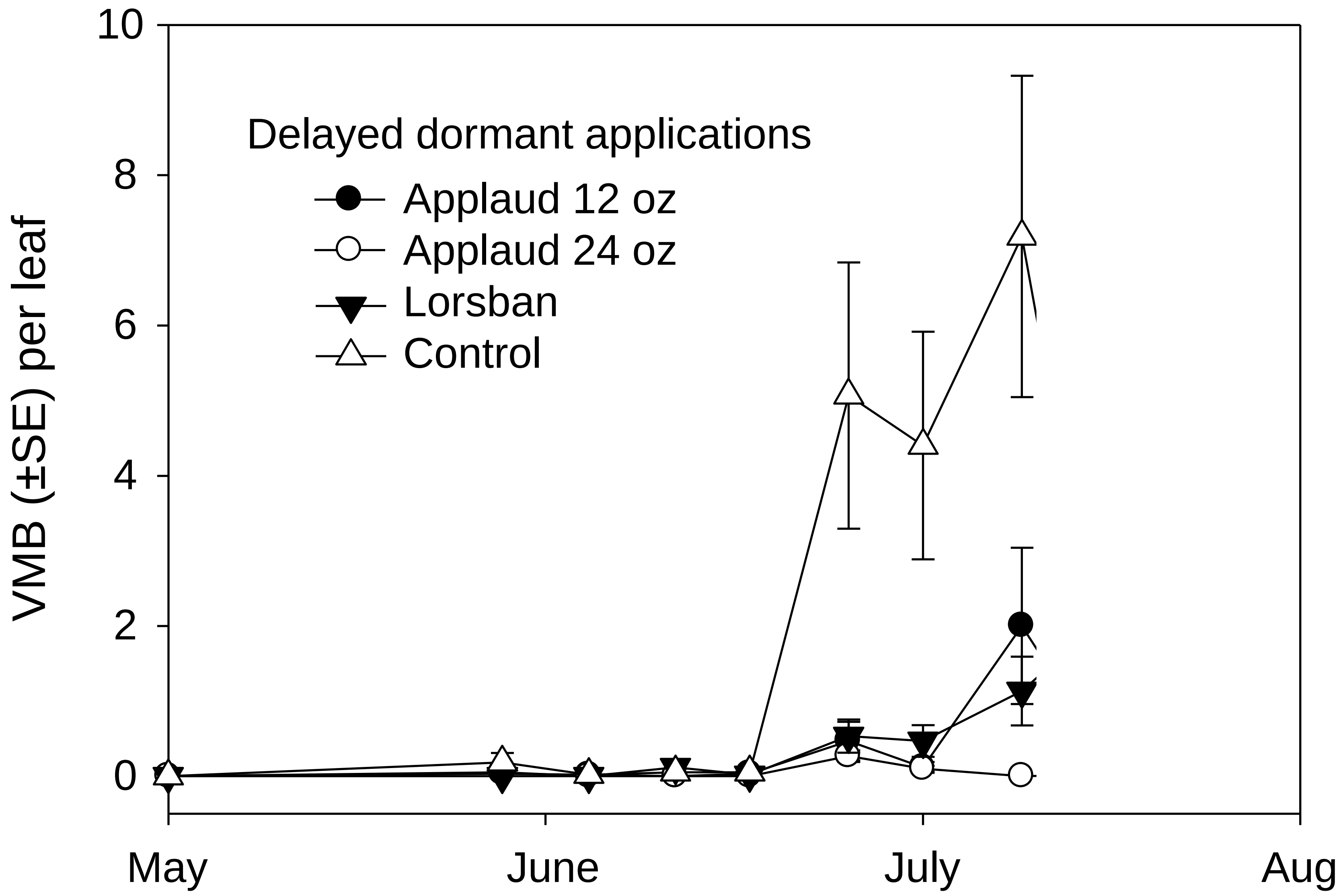
Admire (14 oz) & Sivanto (28 oz) (Drip) - applied at shoot elongation (30 Apr)
Movento (8 oz) & Senstar (16 oz) - applied at bloom (12 May)
Sequoia (5.75 oz) & Sivanto (14 oz) Foliar – timed to crawlers (1 Jul)

Movento (17 Jun)-Sequoia (1 Jul) & Sequoia (17 Jun)-Movento (1 Jul)
Admire (12 May)- Assail (5.3 oz, 1 Jul)
Movento (17 Jun) – Assail (5.3 oz, 1 Jul)

Sivanto as flupyradifurone
Vexter as methoxyfenozide
(IGR, similar to Intrepid)

2023, Fresno Co. (eastside)
applied with backpack sprayer

Treatment formulation [a]	Rate of product per acre [b]	Mean (±SE) pest per 3 minute trunk count	
		mealybug	carpenter moth
No-spray control	-	32.1 ± 6.9 a	5.00 ± 0.76 a
Sivanto	18.6	10.4 ± 2.4 b	2.17 ± 0.65 b
Sivanto + Pentrabark	18.6	15.6 ± 3.5 b	3.25 ± 0.71 ab
Vexer	16	11.2 ± 3.7 b	2.83 ± 0.56 b
Vexer + Pentrabark	16	14.4 ± 3.5 b	3.00 ±0.71 b
		$F_{4,55} = 4.226$, $P = 0.005$	$F_{4,55} = 2.559$, $P = 0.049$ [c]



Neonicotenoids
Butenolides
IGRs
Spirotetramat
Soaps
Botanicals
Neem
Oils
Diatomaceous earth

2018, Fresno Co. (eastside)
material applied with backpack sprayer

Outline:

1) Leafroll and Vectors
2) Mealybug species, biology & monitoring
3) Biological & Chemical mealybug controls
4) Mating disruption for “vine” mealybug
5) Areawide Programs and Roguing
6) Discussion

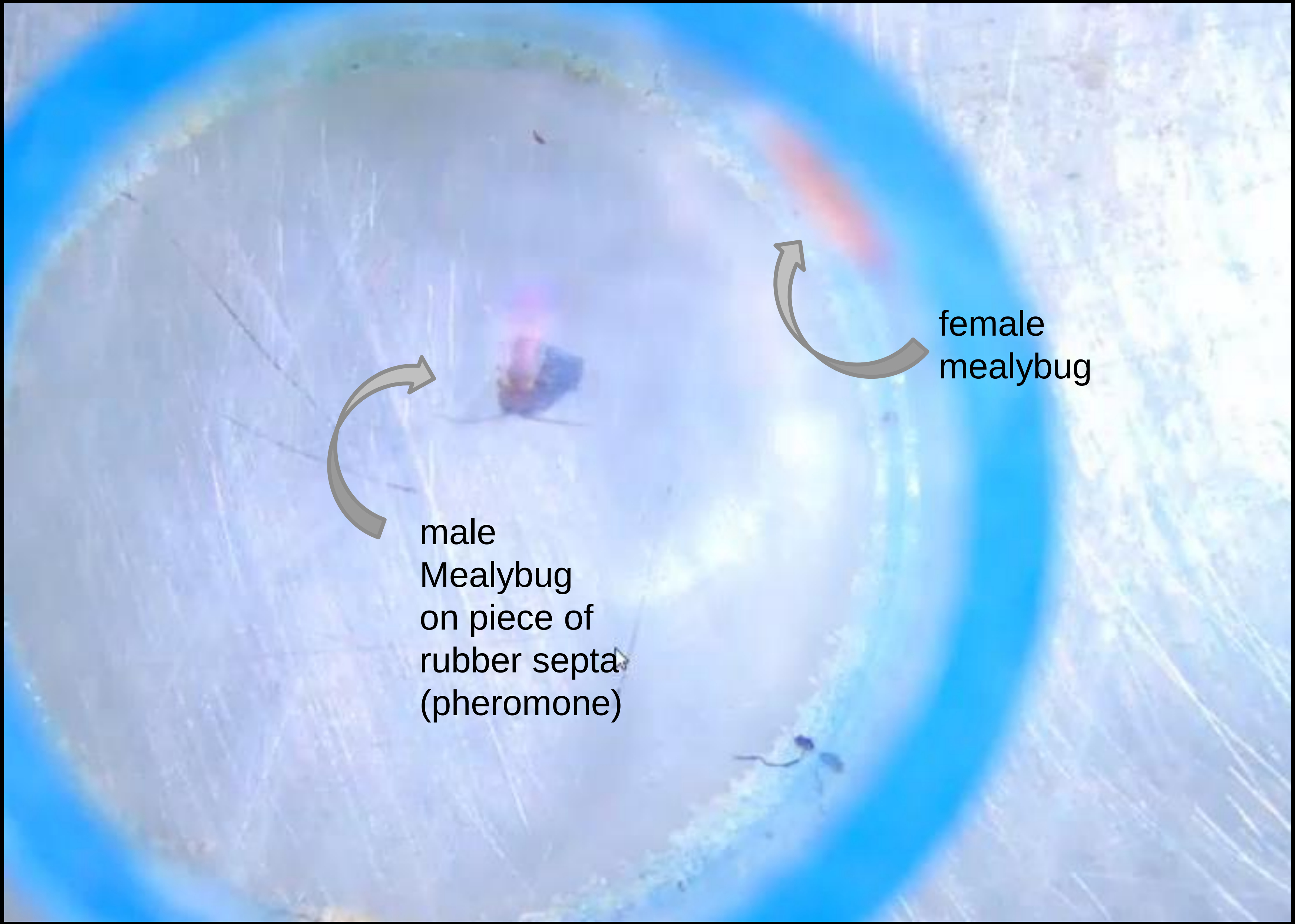
- Saturate a field with sex pheromones to reduce and delay mating

- Plastic dispensers, aerosol devices, sprayable and isomate dispensers

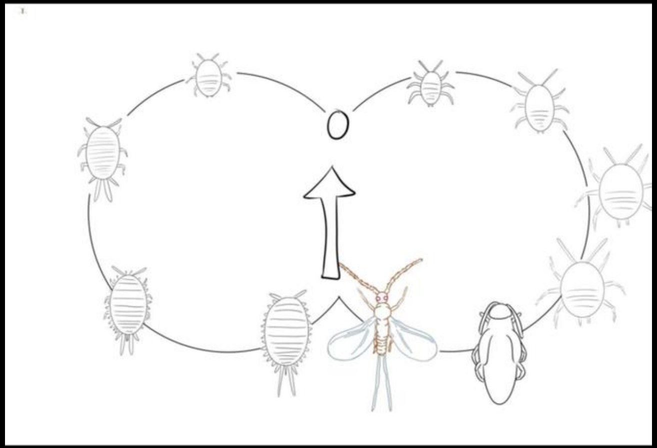
- Works best when pest population is low, and when used over a larger area (multiple vineyards)

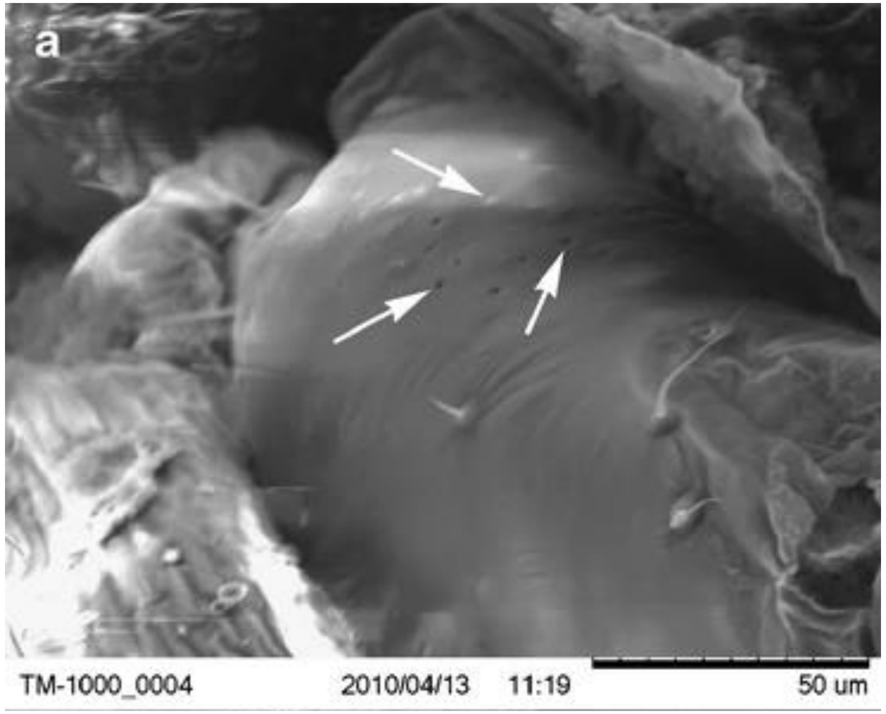
Suterra

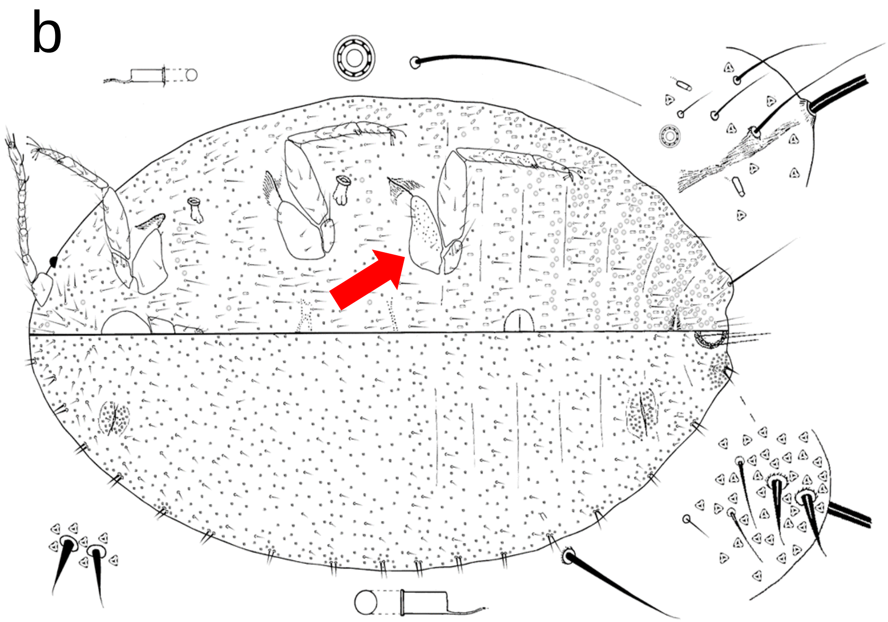
Damage still occurs with insecticides applied and/or natural enemies released; for this reason we explored the use of sex pheromones



Video of adult male VMB attempting to mate with a tiny slice of a pheromone lure.
A live female mealybug in the same container will be ignored.







Reproductive Biology of Three Cosmopolitan Mealybug (Hemiptera: Pseudococcidae) Species, *Pseudococcus longispinus*, *Pseudococcus viburni*, and *Planococcus ficus*

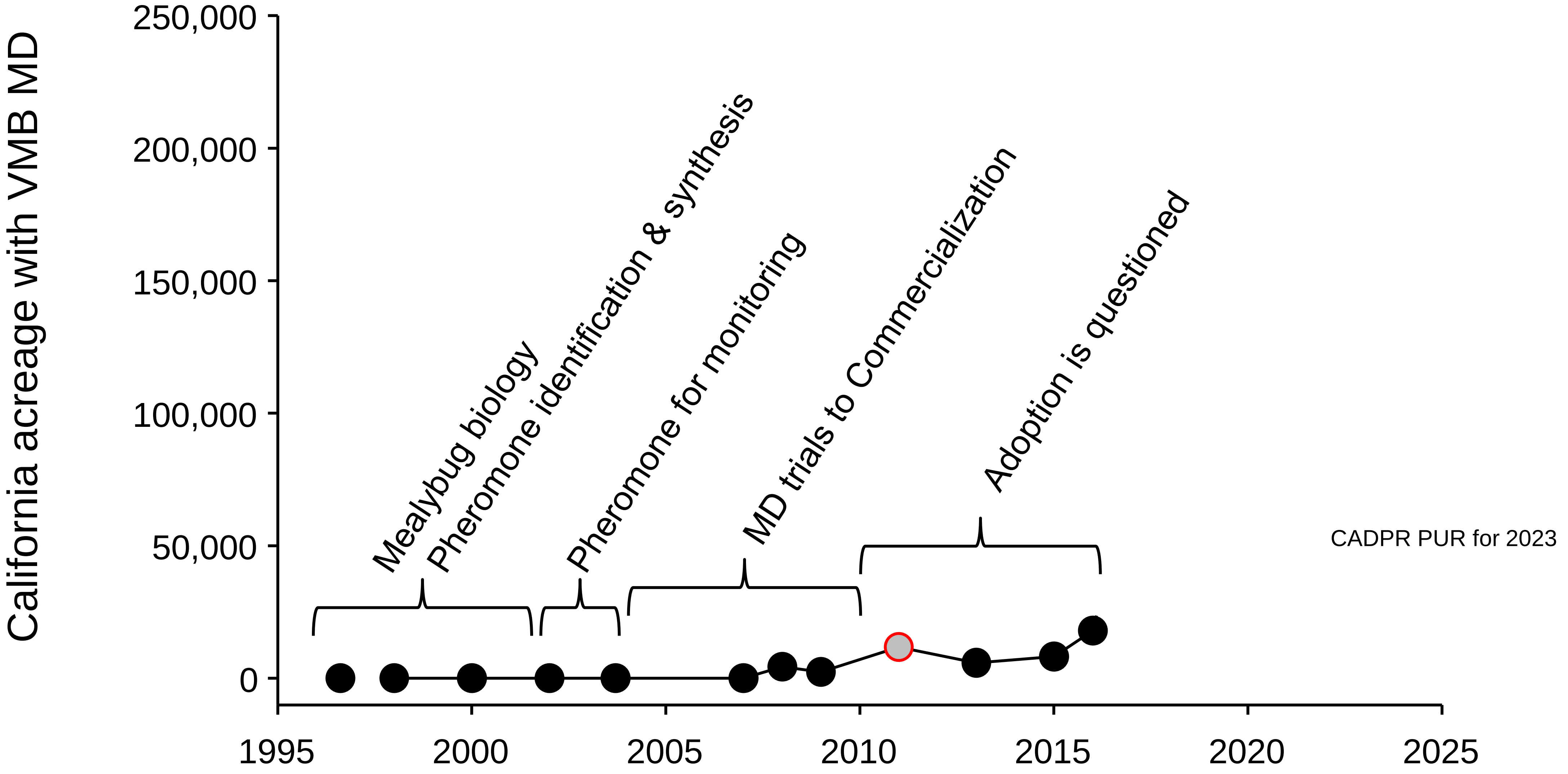
REBECCAH A. WATERWORTH,[1] IAN M. WRIGHT, AND JOCELYN G. MILLAR

Department of Entomology, University of California, Riverside, CA 92521

Ann. Entomol. Soc. Am. 104(2): 249–260 (2011); DOI: 10.1603/AN10139

(a) Electron micrograph of the [hind leg] coxa of an adult female [vine mealybug] at 1200x. Translucent pores are apparent as small openings on the surface.

(b) Top and bottom view of mealybug, showing location of the ‘coxa’ segment of the hind leg.



USDA ARS

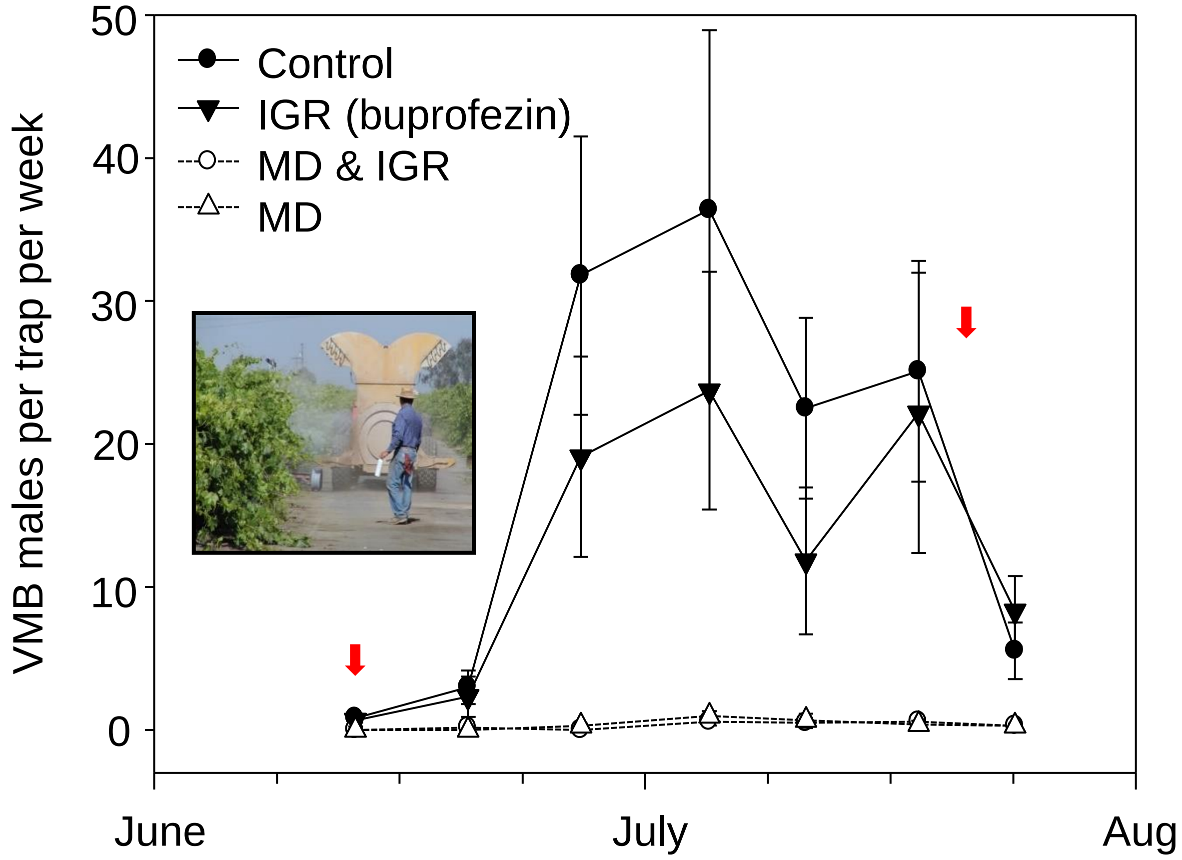
USDA NIFA
United States Department of Agriculture
National Institute of Food and Agriculture

OREGON WINE

OREGON WINE RESEARCH INSTITUTE

Oregon State University

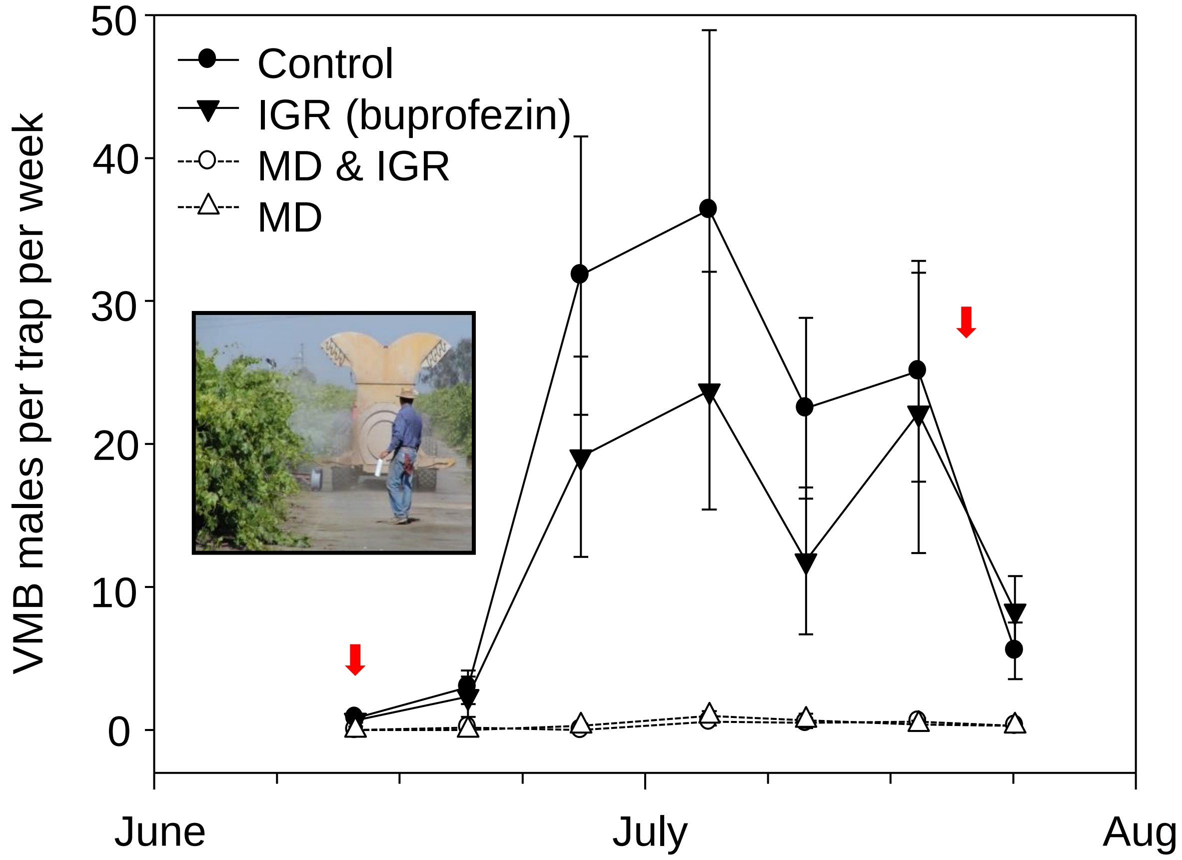
2015-present, change in attitude & use, and products

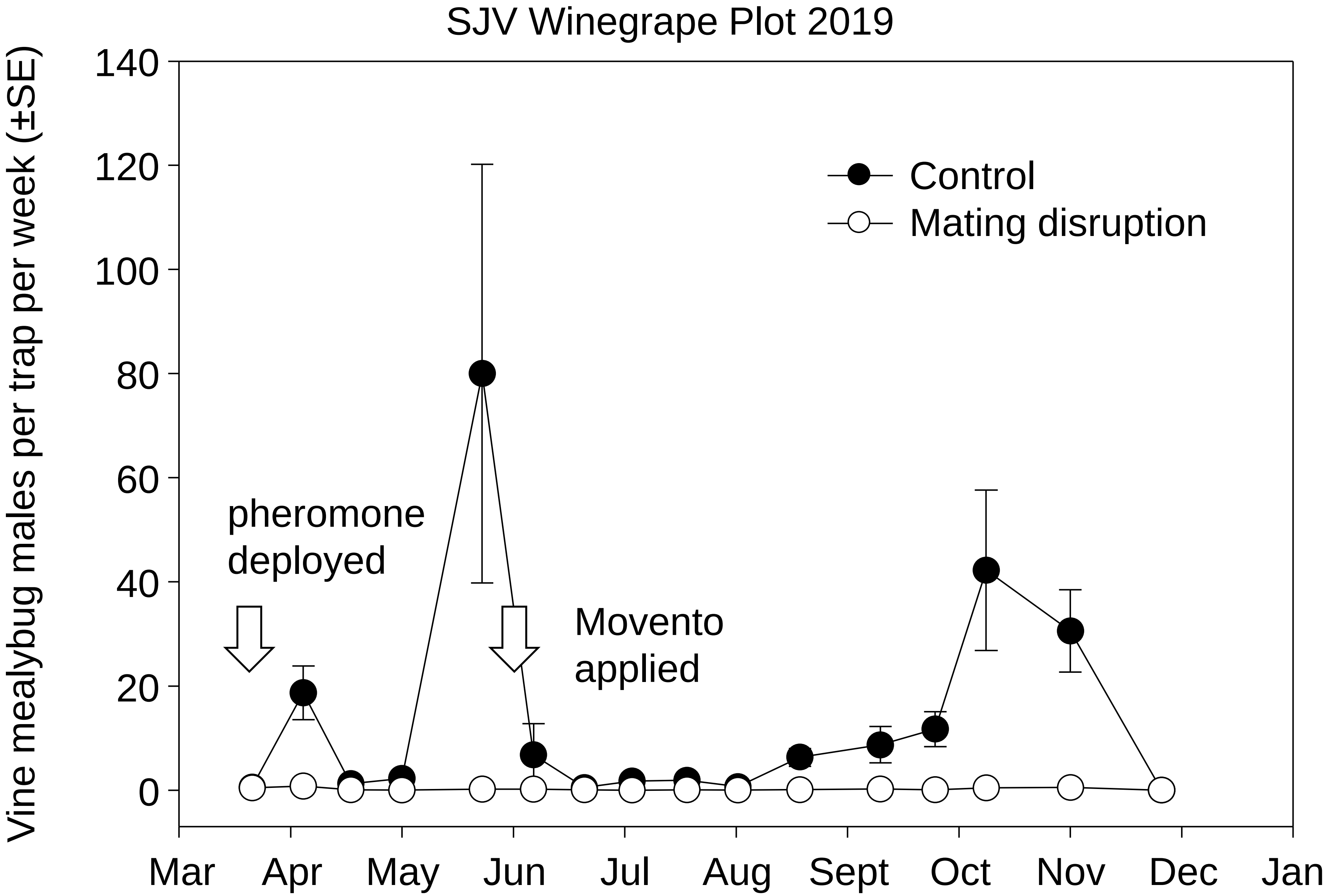


David Haviland (UCCE) conducted large scale <u>efficacy & cost</u> studies – using Suterra's flowable (sprayable) material

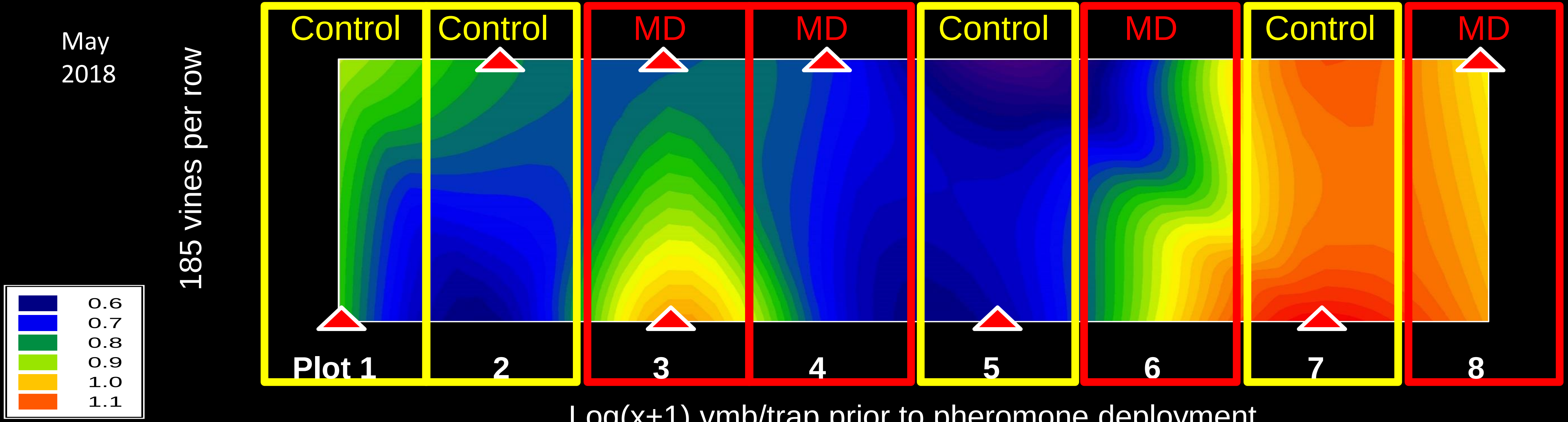
Monica Cooper (UCCE), Brian Hogg (USDA) conducted larger 'areawide' trials using passive dispensers

2015-present, change in attitude & use, and products

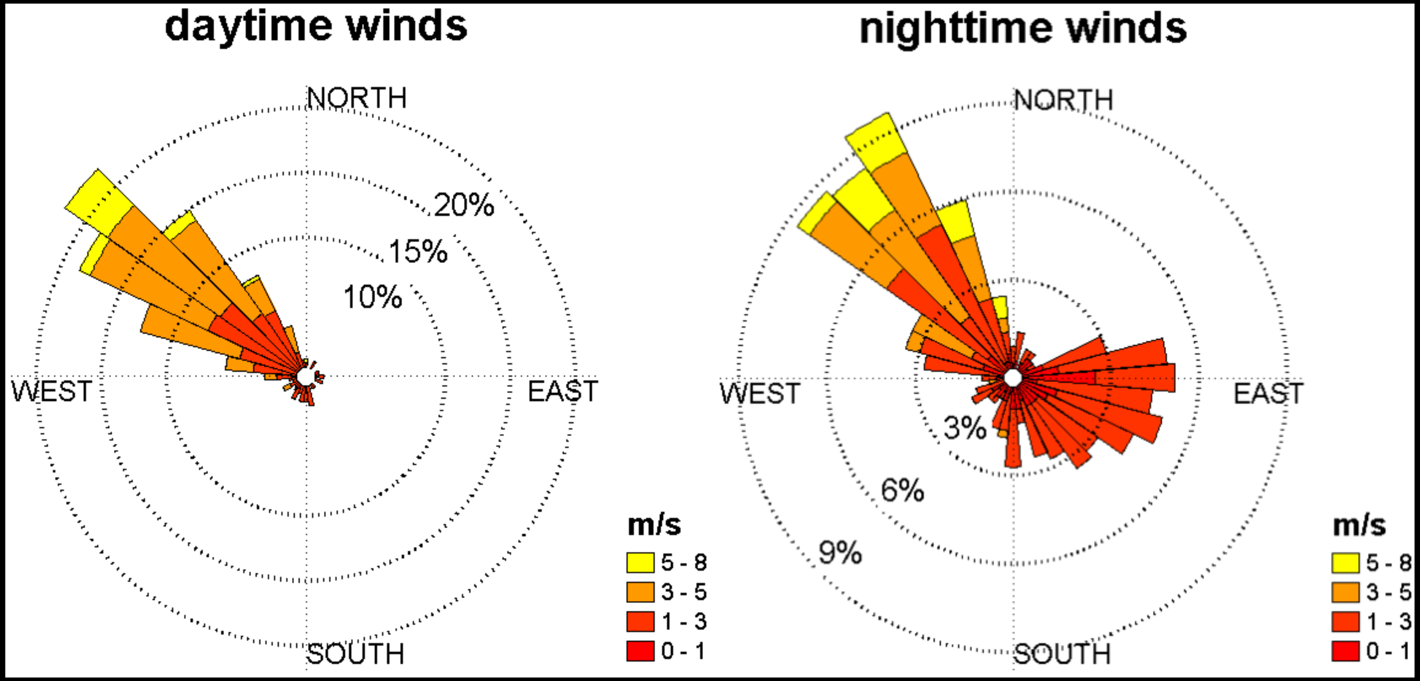


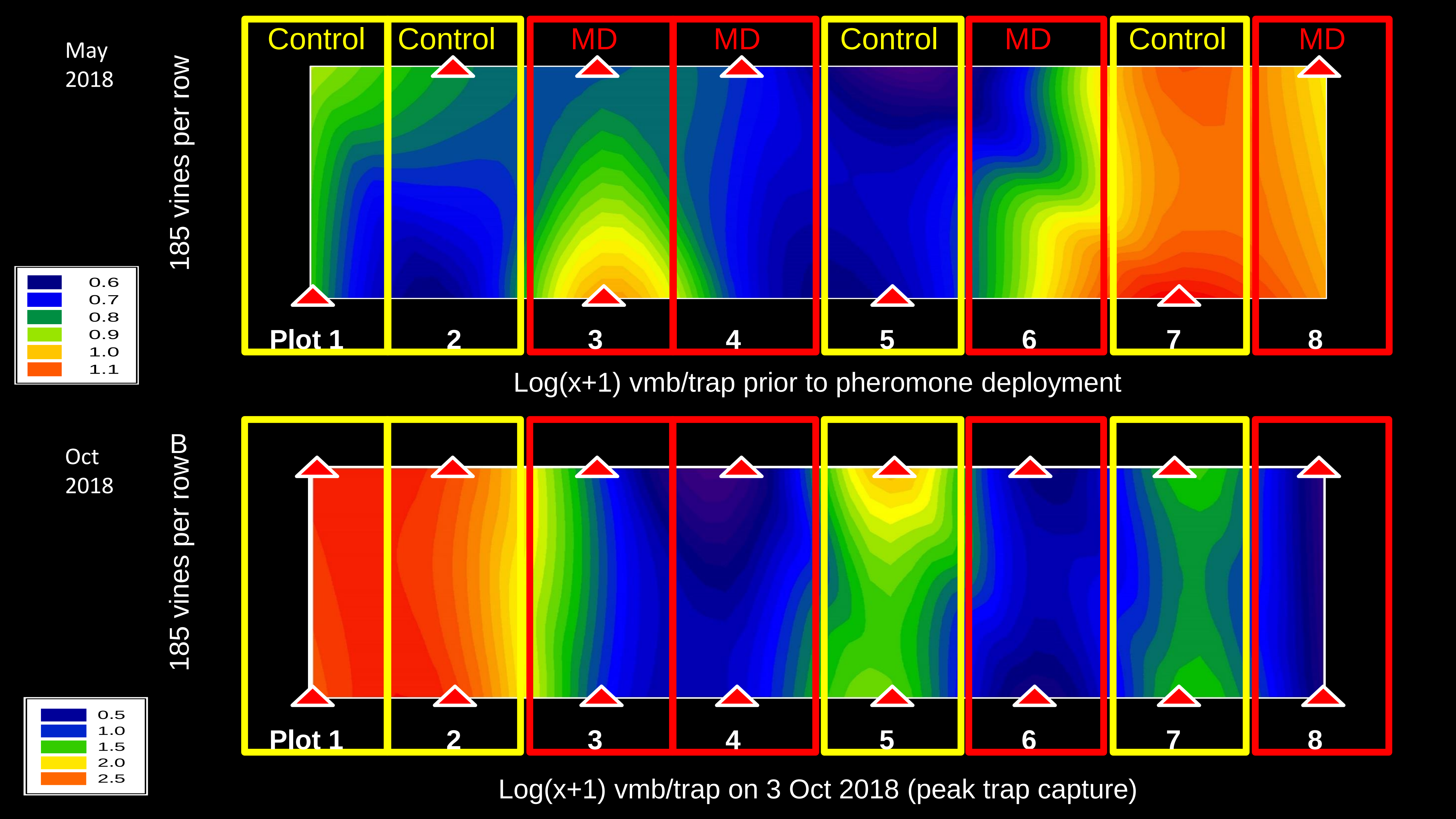

SJV Winegrape Plot 2019
Vine mealybug males per trap per week (±SE)
140
120
100
80
60
40
20
0
Control
Mating disruption
pheromone deployed
Movento applied
Mar
Apr
May
Jun
Jul
Aug
Sept
Oct
Nov
Dec
Jan

May
2018

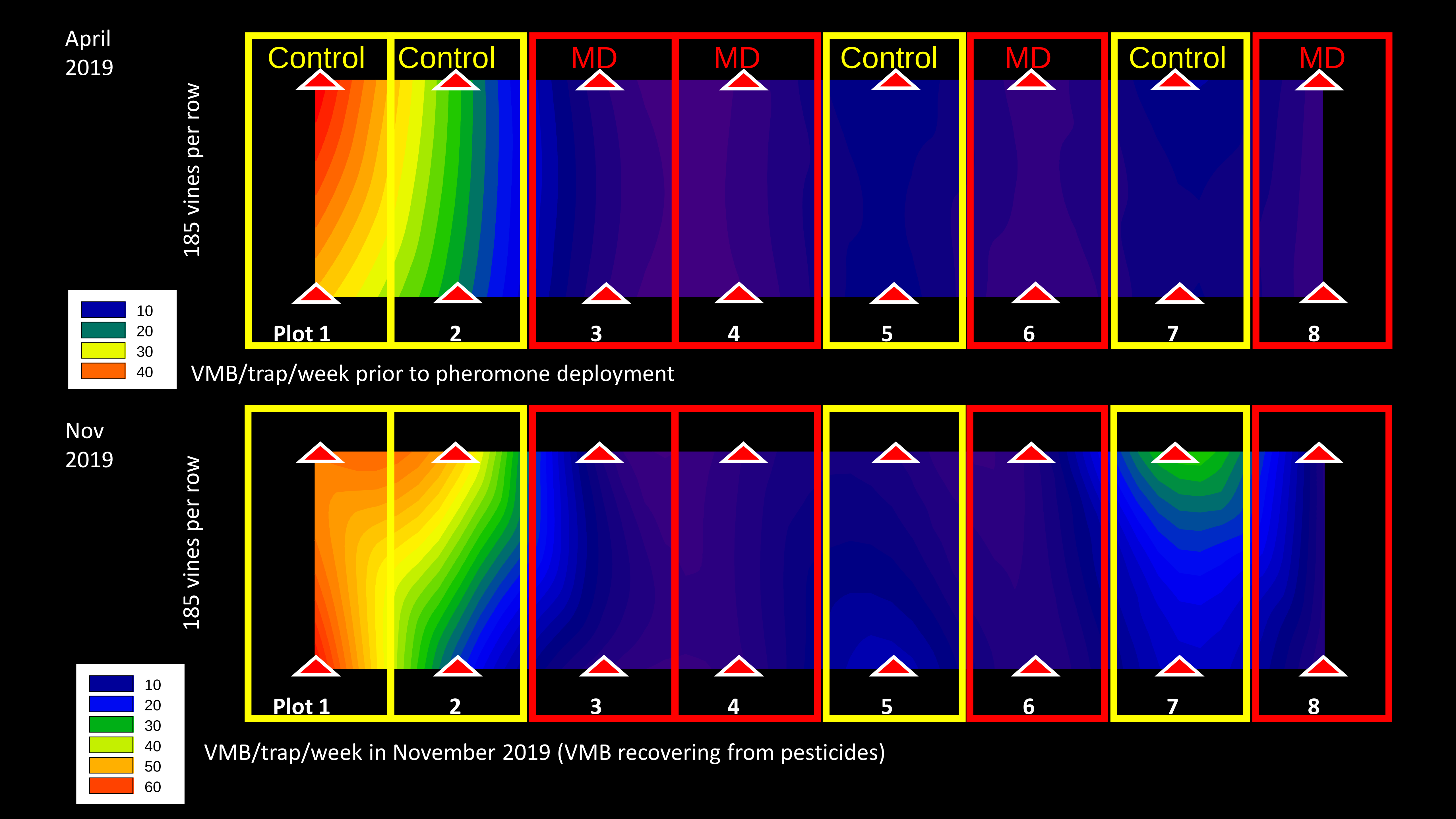


Log(x+1) vmb/trap prior to pheromone deployment

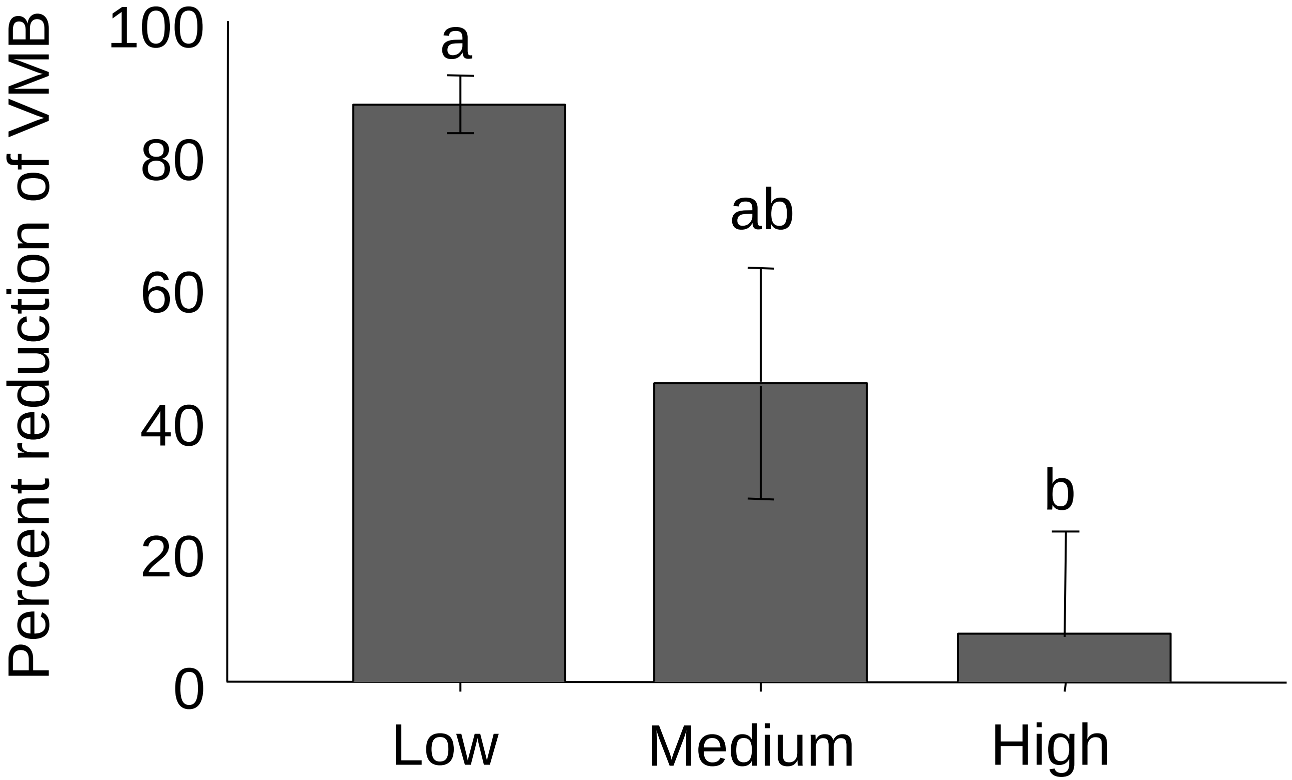




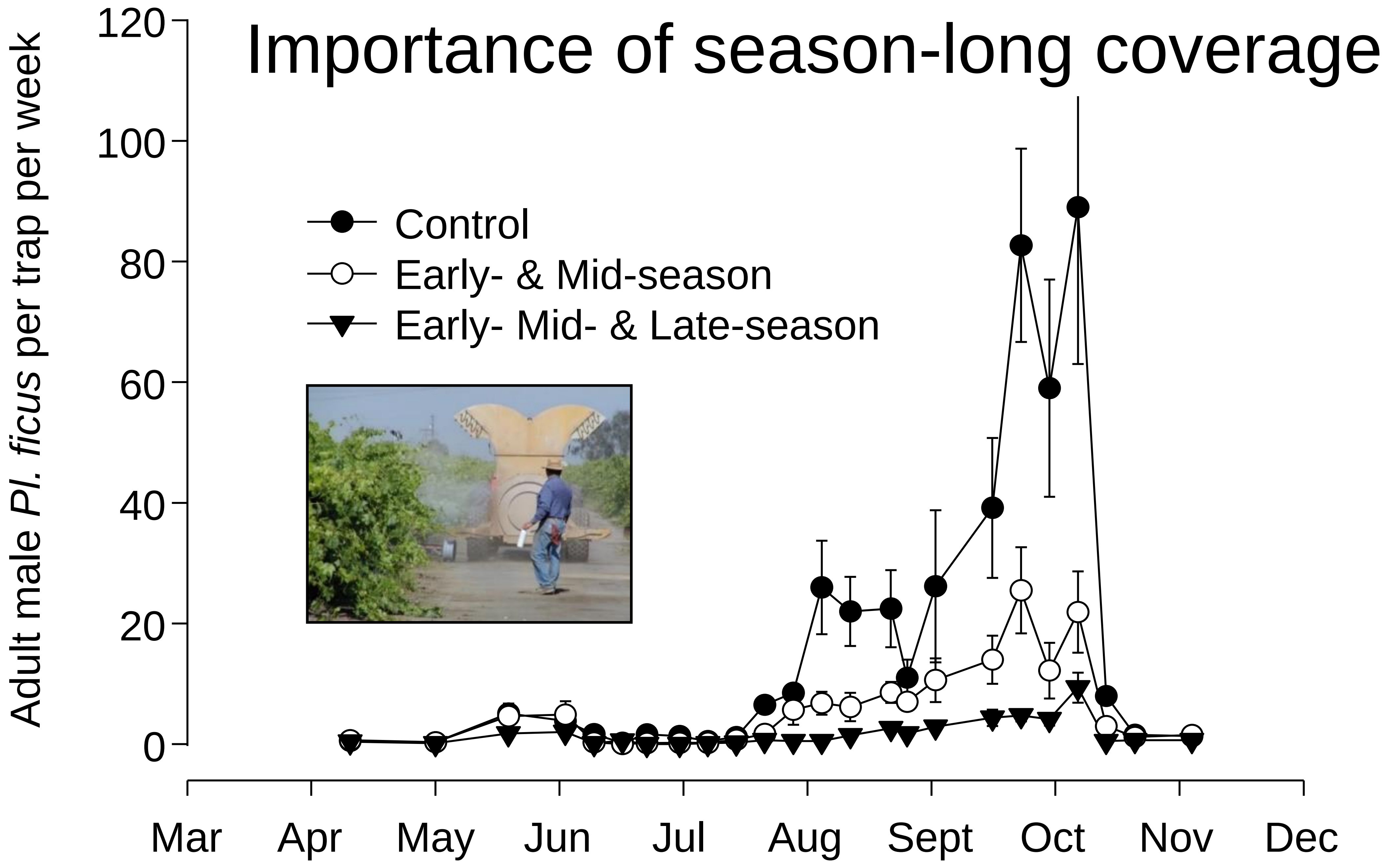
May
2018
185 vines per row
Control
Control
MD
MD
Control
MD
Control
MD
Plot 1
2
3
4
5
6
7
8
0.6
0.7
0.8
0.9
1.0
1.1
Log(x+1) vmb/trap prior to pheromone deployment
Oct
2018
185 vines per rowB
Plot 1
2
3
4
5
6
7
8
0.5
1.0
1.5
2.0
2.5
Log(x+1) vmb/trap on 3 Oct 2018 (peak trap capture)


April
2019
Control
Control
MD
MD
Control
MD
Control
MD
185 vines per row
Plot 1
2
3
4
5
6
7
8
10
20
30
40
VMB/trap/week prior to pheromone deployment
Nov
2019
185 vines per row
Plot 1
2
3
4
5
6
7
8
10
20
30
40
50
60
VMB/trap/week in November 2019 (VMB recovering from pesticides)

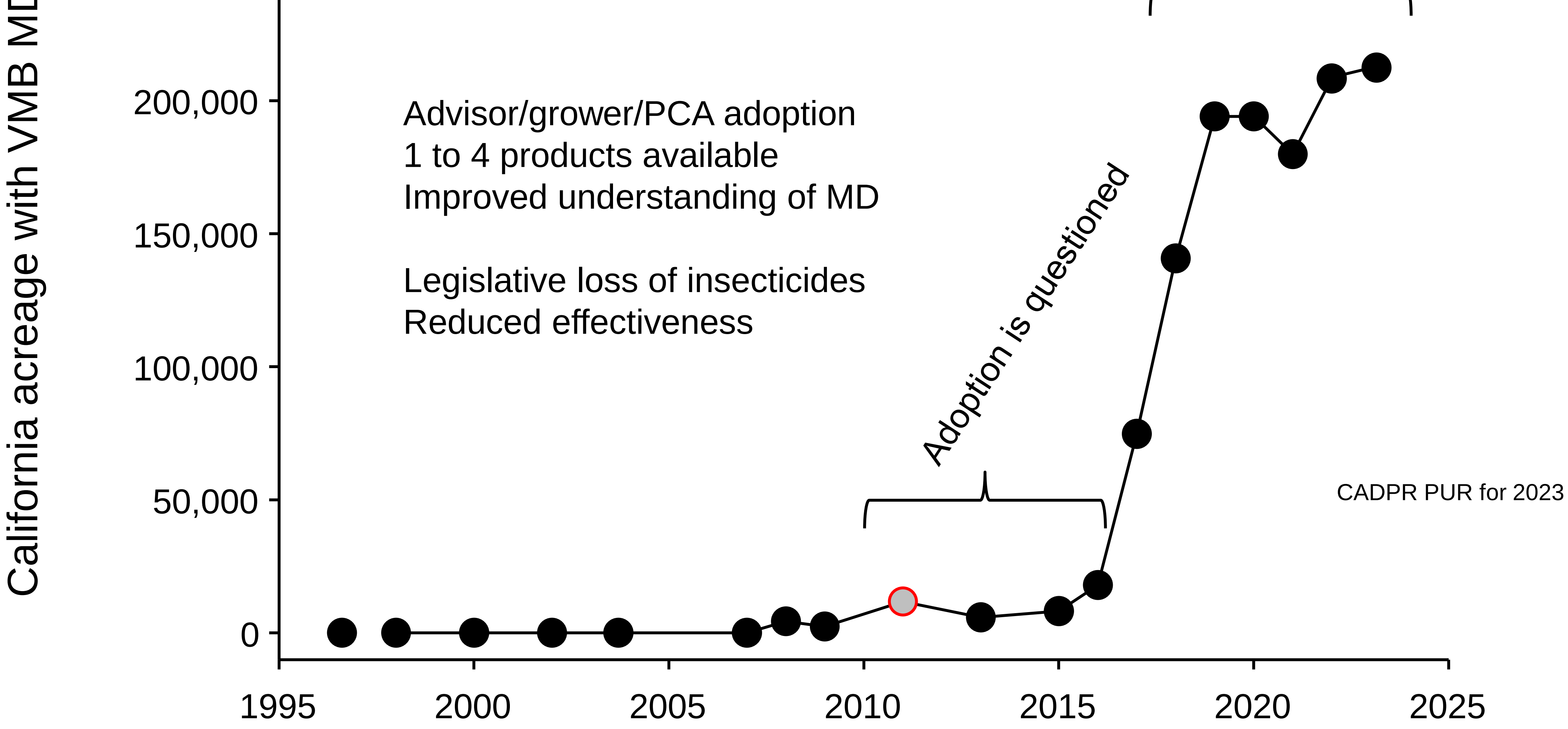
Impact of mealybug density – like other MD programs



This is why MD and insecticides are best used in combination


Importance of season-long coverage
Adult male Pl. ficus per trap per week
120
100
80
60
40
20
0
Control
Early- & Mid-season
Early- Mid- & Late-season
Mar
Apr
May
Jun
Jul
Aug
Sept
Oct
Nov
Dec

Summary



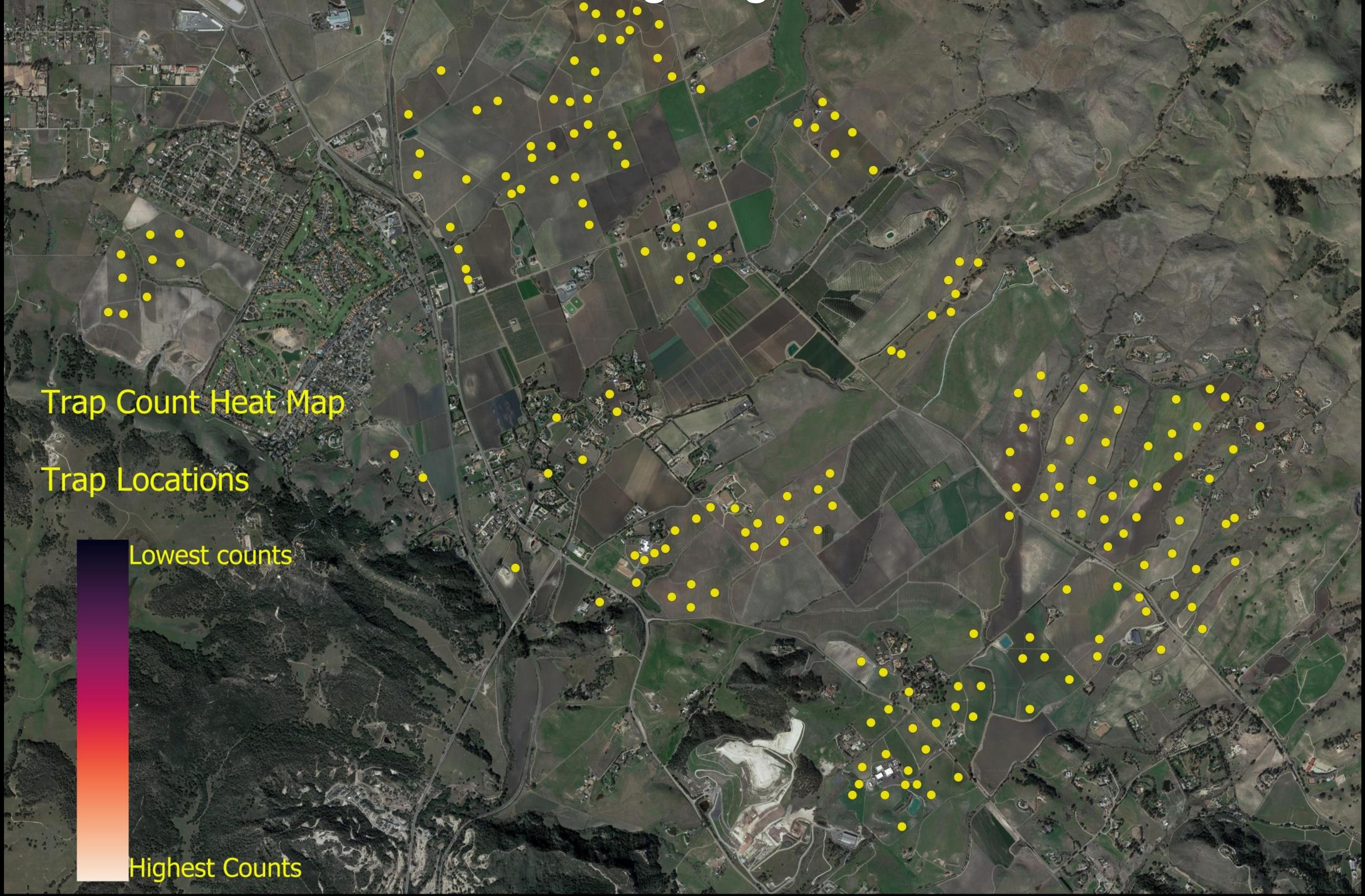
California acreage with VMB MD
250,000
200,000
150,000
100,000
50,000
0
1995
2000
2005
2010
2015
2020
2025
Advisor/grower/PCA adoption
1 to 4 products available
Improved understanding of MD
Legislative loss of insecticides
Reduced effectiveness
Adoption is questioned
CADPR PUR for 2023

Currently
VMB mating disruption used/tested in South Africa, Italy, France, Spain, Argentina, Peru, Brazil, Israel, Egypt, Turkey

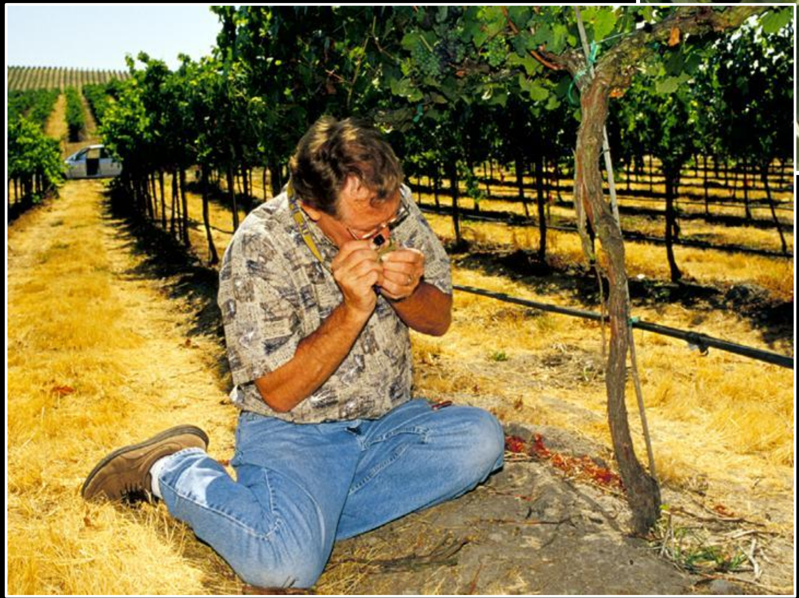
The female sex pheromone is emitted from:

A) Female hind coxae
B) Male antennae
C) Female spiracles

Areawide Control and Roguing GLRaV Infected Vines



Monitoring: Pheromone-baited traps establish the presence of MB & quantify abundance



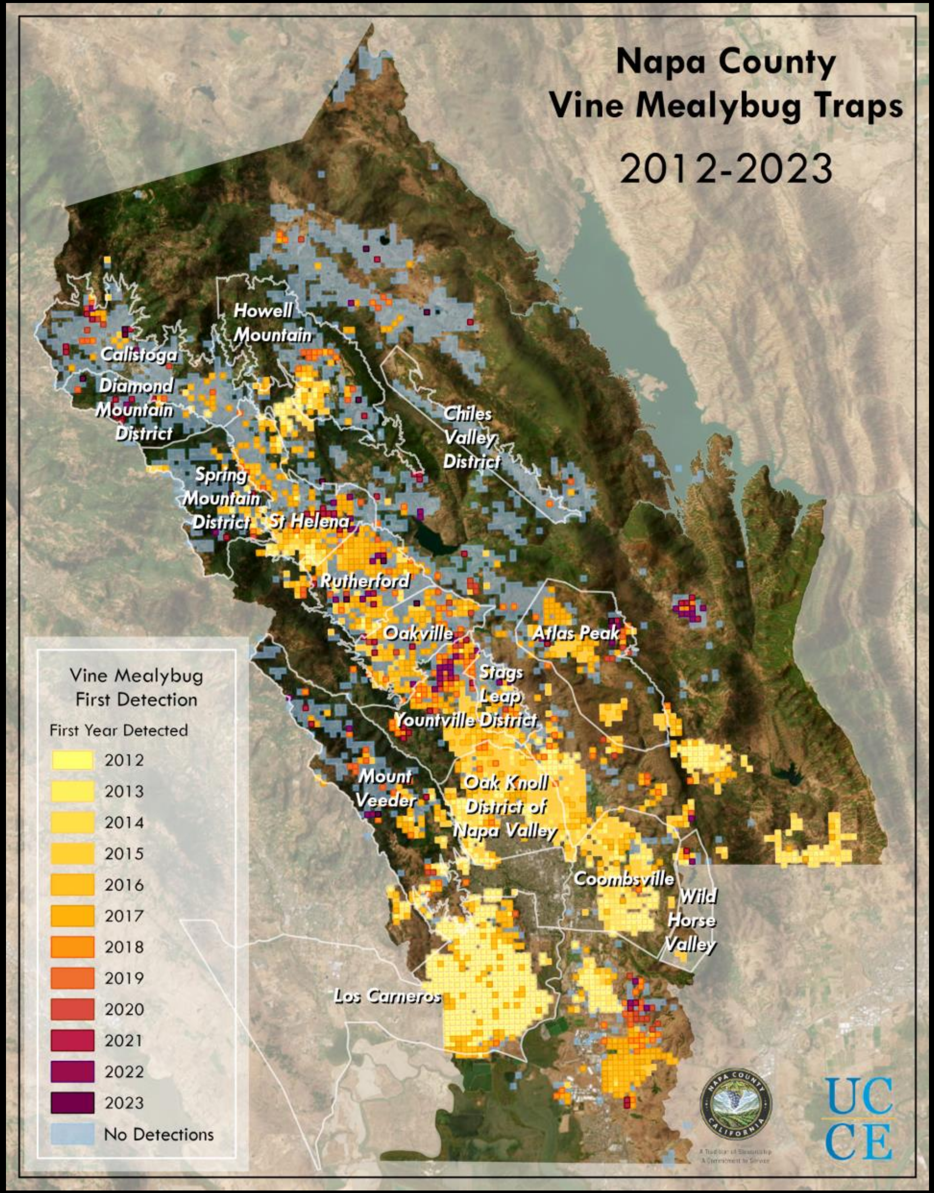
courtesy ML Cooper

Regional trapping: public-private partnerships

Napa County Pest & Disease Control District

Public-private partnership
Grower self-assessment

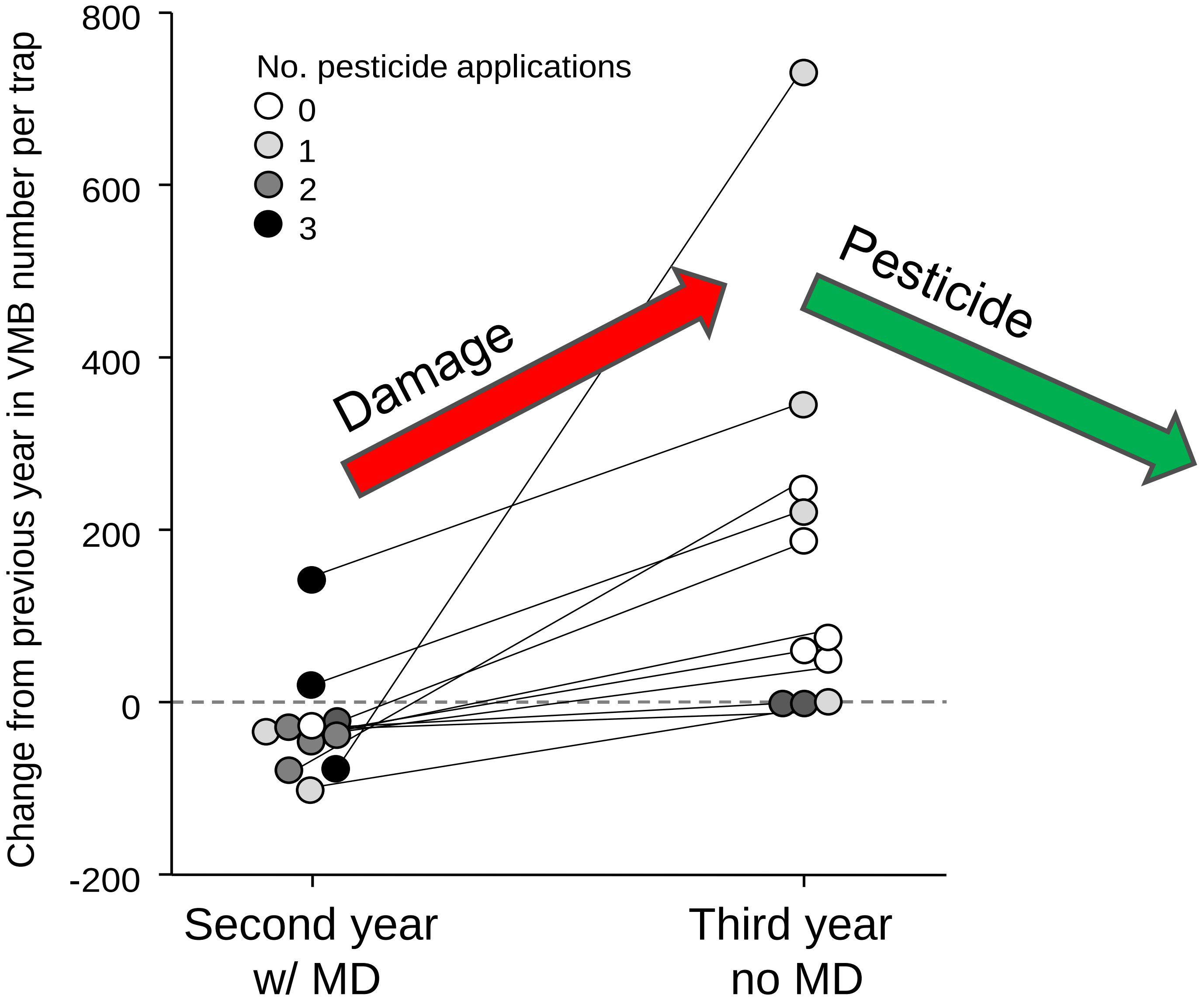
VMB detection trapping since 2012



courtesy ML Cooper

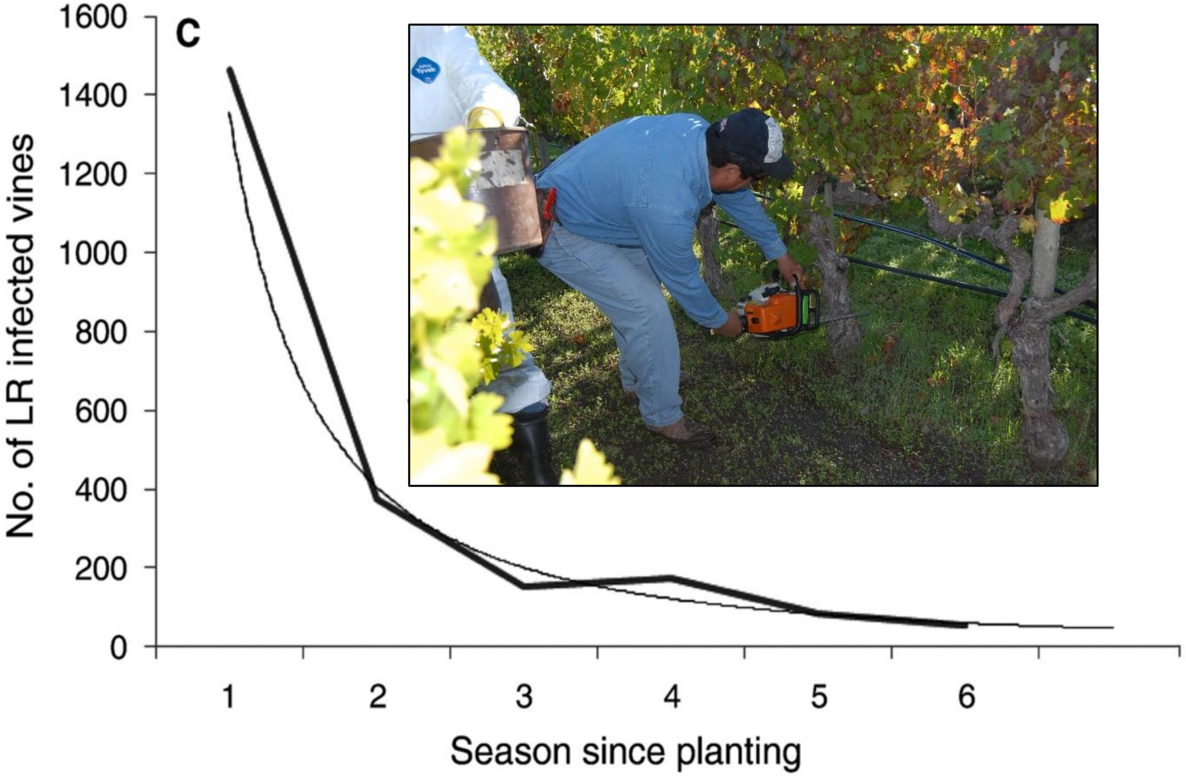
VMB Density Change - Areawide Monitoring & Decision Program (Napa)

Mealybug density increased in third year, after MD areawide program stopped, and note that growers no longer notified about hotspots & used less insecticides



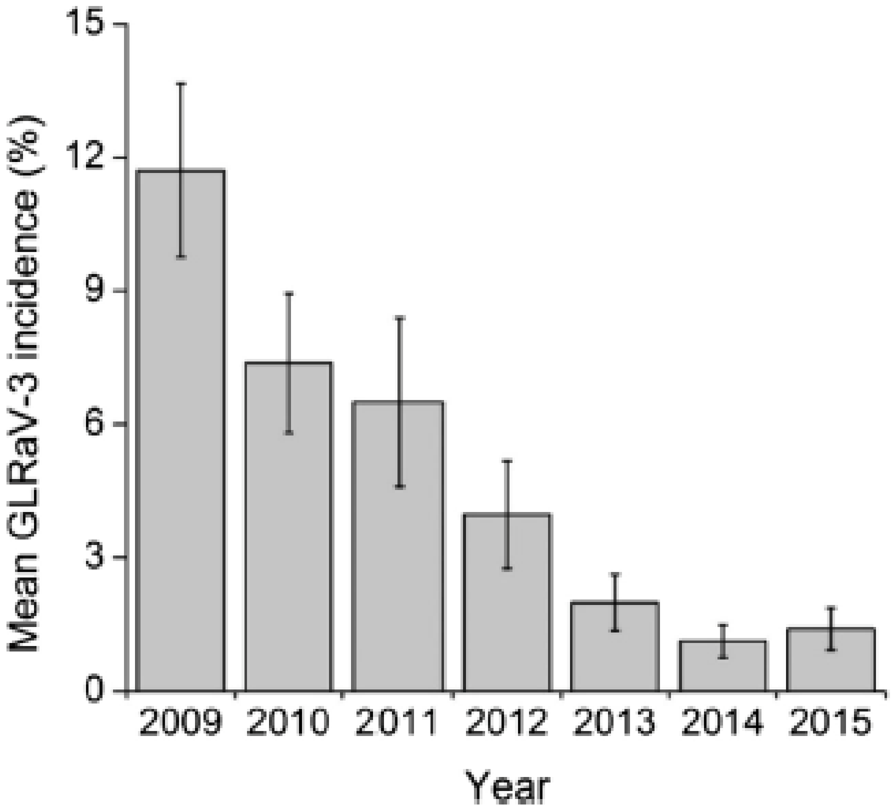
Roguing: The key to Leafroll control

I. South Africa



GLD-infected vines observed in different seasons following roguing of infected plants. Analysis is for vineyards on virgin soil w/ an initial infection of >1%. Pietersen et al. 2013. *Am. J. Enol. Vitic. 64:2*.

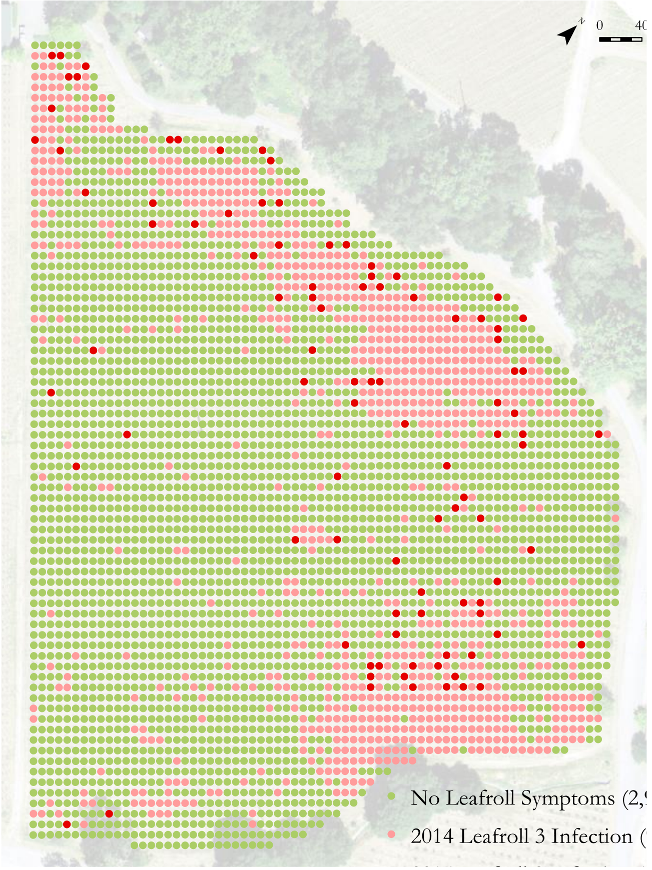
II. New Zealand



GLRaV-3 incidence 2009 to 2015 (9-11 vineyards) after roguing and replacement of infected vines. Bell et al. 2018. *J. Plant Path.* 100: 399-408.

Roguing: The key to Leafroll control

III. Napa



GLRaV vines removed annually

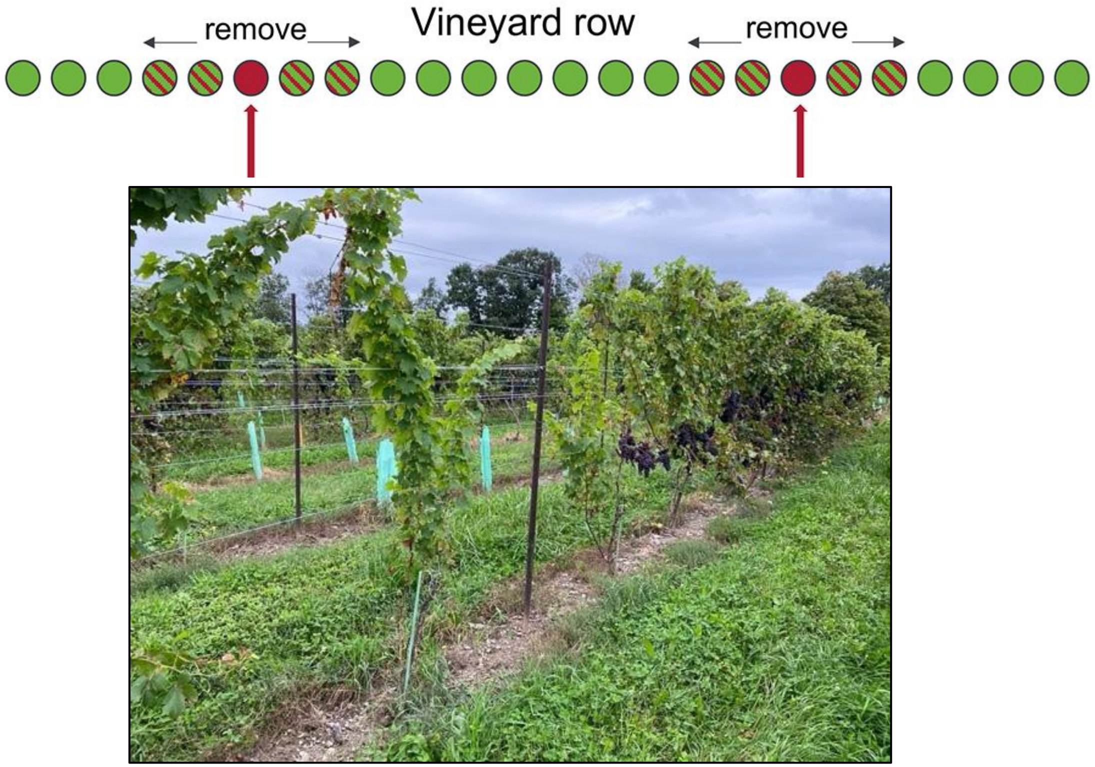
<u>2014-15:</u>
936 vines

<u>2015-16:</u>
96 vines

<u>2016-17:</u>
33 vines

GLRaV-3 incidence 2014 to 2017 after roguing and replacement of infected vines. MacDonald et al. 2021. *J. Econ. Entomol.* 114: 1452-1461.

IV. New York



GLD detection in a Cabernet franc vineyard. Treatments are colored in roguing only, roguing+insecticides, insecticides only, and control. Hesler et al. 2021. Research Focus (New York) Hesler et al. 2022. *Am J Enol Vitic 73:4*.

Roguing Impediments: Surveying MB & Leafroll

Distinguish visual symptoms (Napa)

Asymptomatic
but infected

courtesy ML Cooper

Roguing Impediments: MB & GLD Density

New Zealand (2009/2015)

(1) Initial disease incidence

0.4%
5%
10%
15%
20%
>20%

(2) Vector abundance *P. calceolariae* (citrophilus mealybug)

Low abundance:
6 MB per 100 leaves
2% leaf infestation

Moderate abundance:
26 MB per 100 leaves
7% leaf infestation

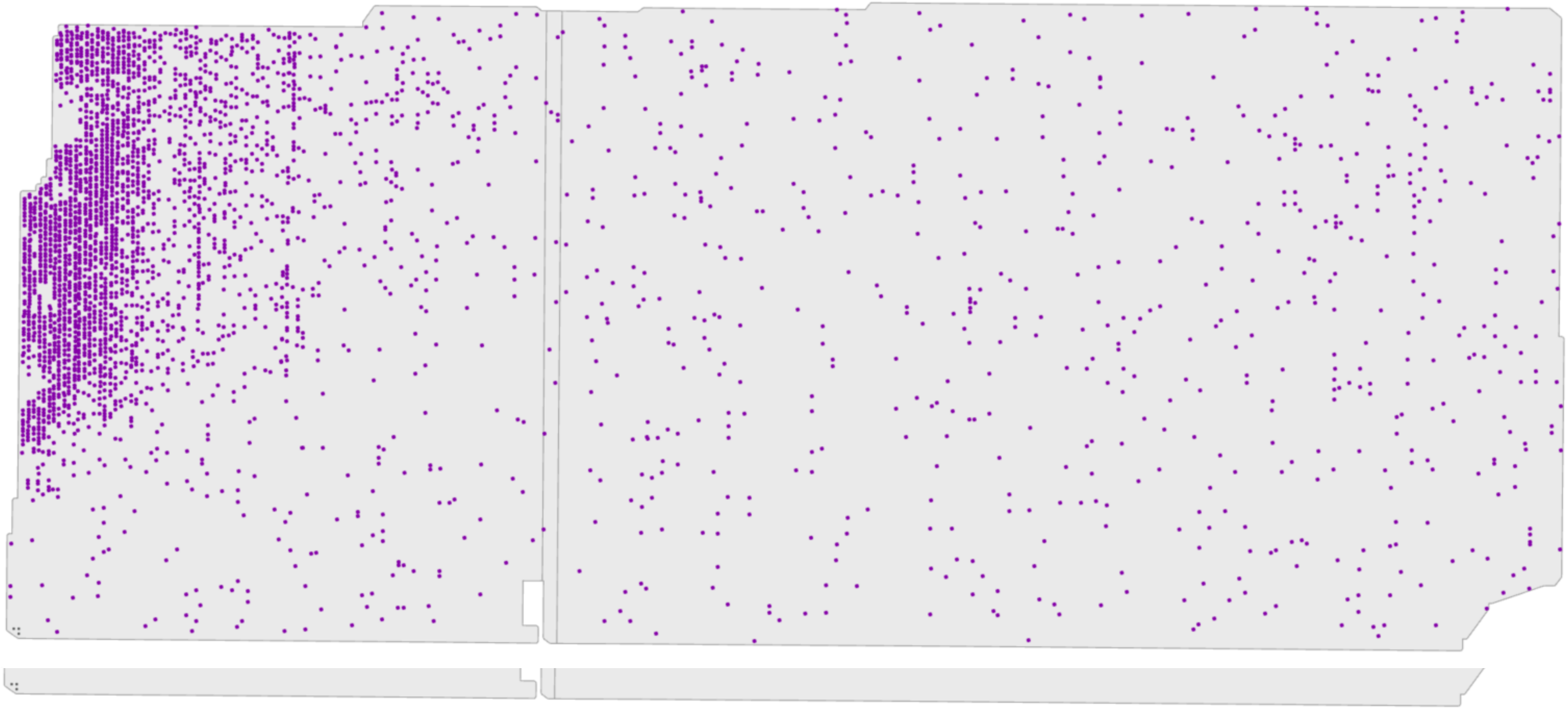
High abundance:
75 MB per 100 leaves
21% leaf infestation

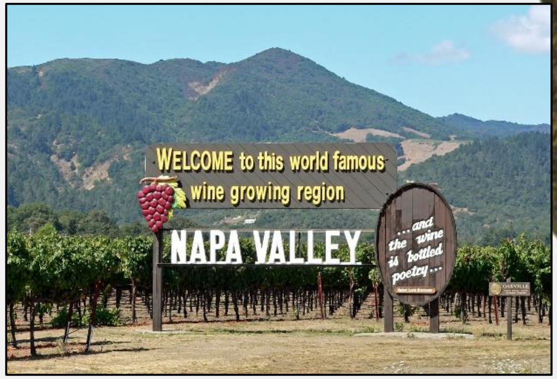
Roguing is optimal response, but… **with moderate MB & high GLD incidence…** roguing is more expensive + less effective.

Bell et al. 2018. J. Plant Pathol. 10.1007/s42161-018-0085-z
Bell et al. 2021. J Plant Pathol. 10.1007/s42161-020-00736-7

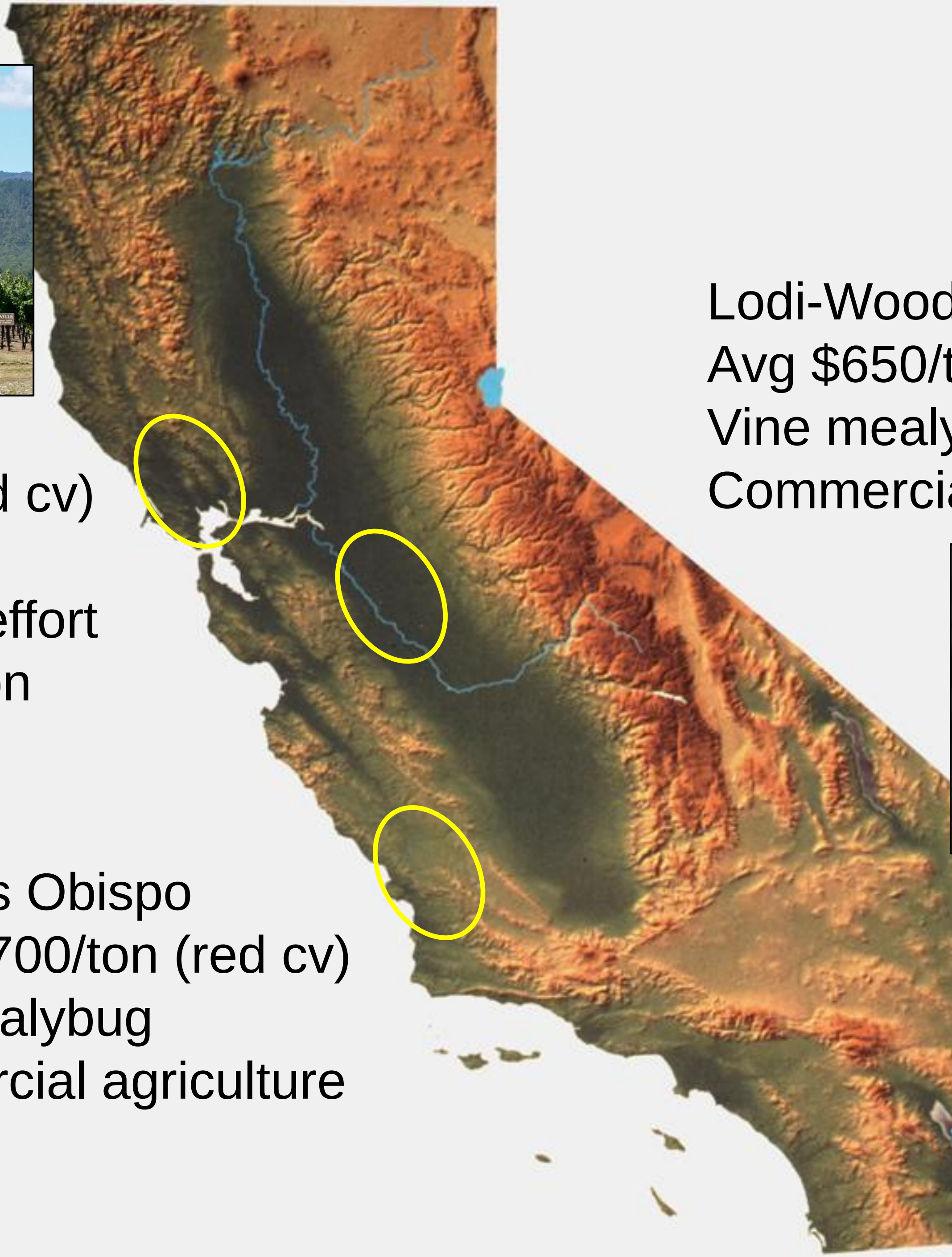
80-acre Pinot Noir vineyard, planted in 2015. Initially with an eastern-cluster that shifted to a randomly dispersal. Rouging all symptomatic vines in 2019 to 2022, but large jump in 2023.

Year	Virus Incidence (%)	Rogued?
2019	2.4	Yes
2020	1.5	Yes
2021	1.6	Yes
2022	1.6	No
2023	6.4	Yes





Napa
Avg $8,000/ton (red cv)
Grape mealybug
LBAM – areawide effort
Heritage wine region



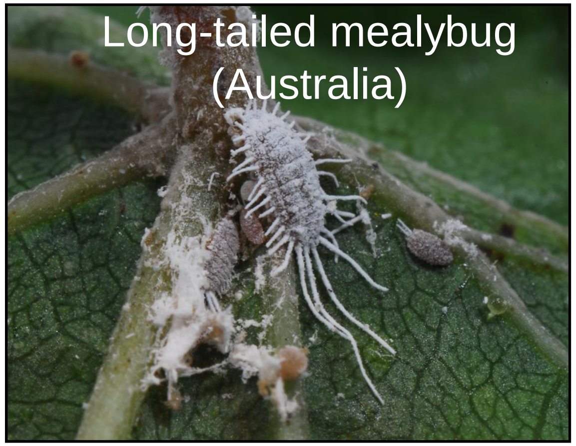
Lodi-Woodbridge
Avg $650/ton (red cv)
Vine mealybug
Commercial agriculture

San Luis Obispo
Avg $1,700/ton (red cv)
Vine mealybug
Commercial agriculture

Are different regional studies comparable?

New York and Napa Studies

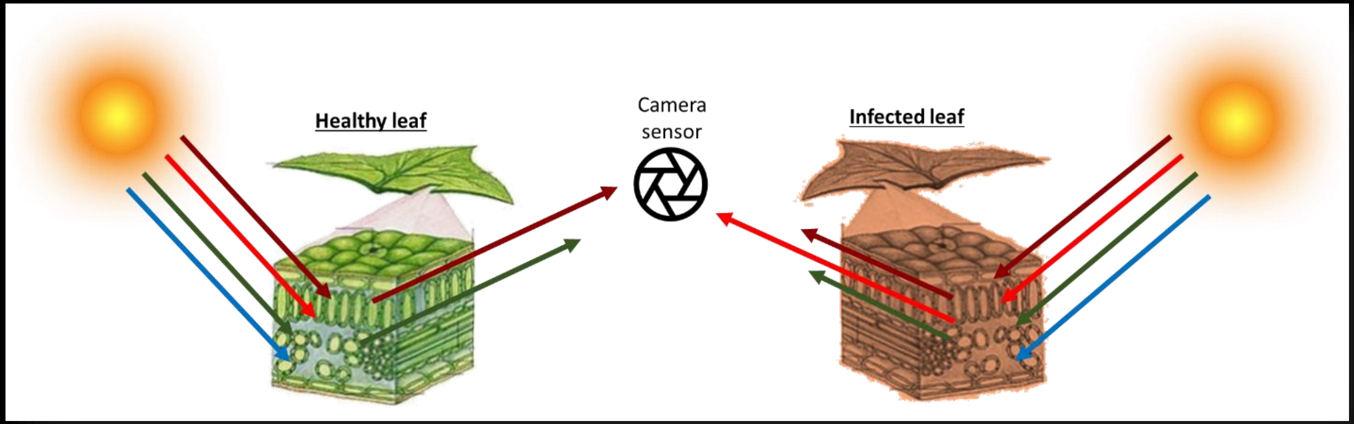
New Zealand Studies

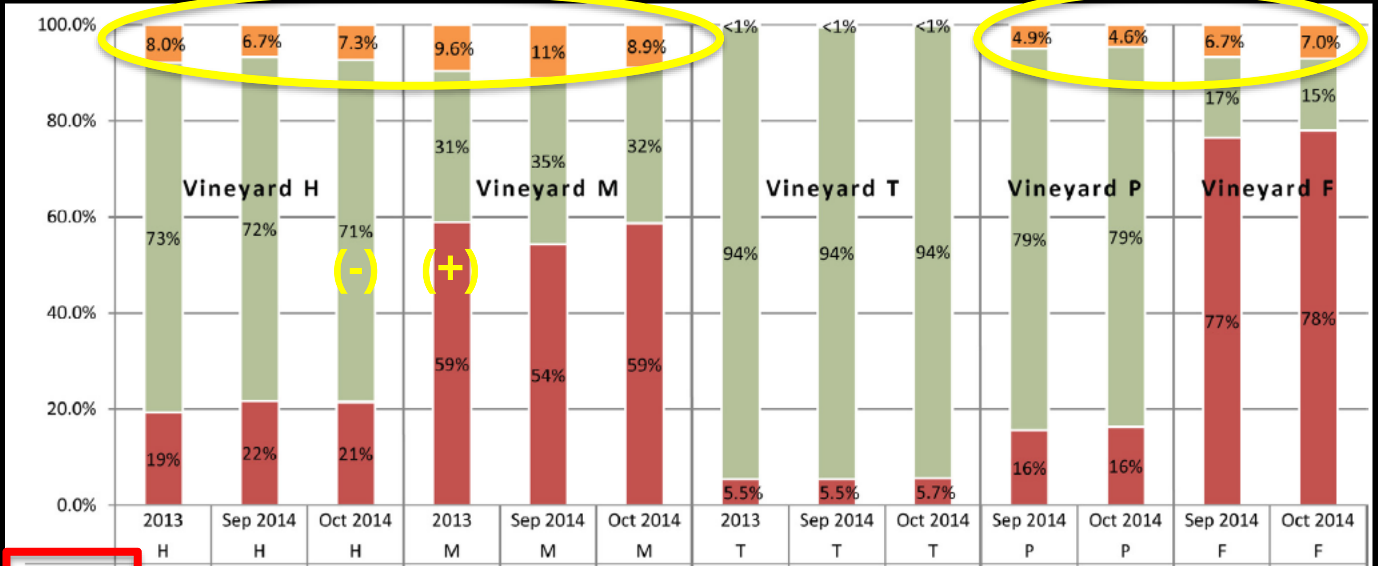


Israel and South Africa studies based on “*Planococcus ficus*” and this is the primary concern for most California and now Oregon growers

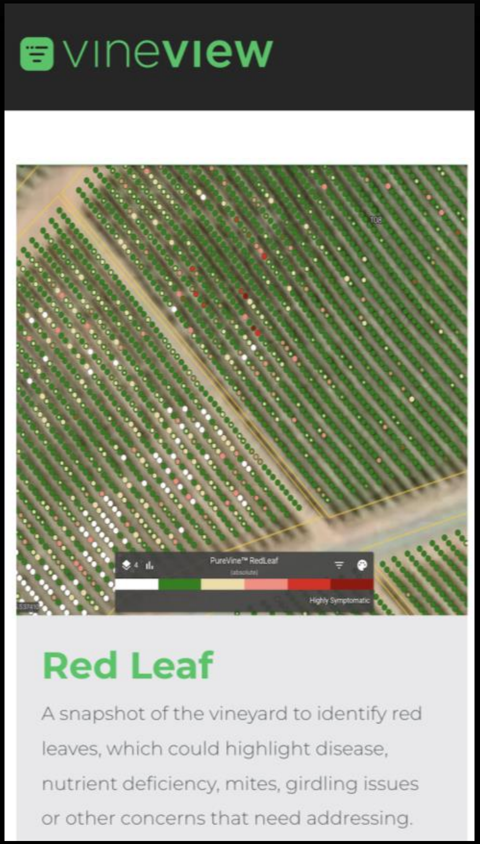
Decision-support tools

Airborne hyperspectral imaging for LR-3





	2013 H	Sep 2014 H	Oct 2014 H	2013 M	Sep 2014 M	Oct 2014 M	2013 T	Sep 2014 T	Oct 2014 T	Sep 2014 P	Oct 2014 P	Sep 2014 F	Oct 2014 F
Image/ Ground Conflict	8.0% 304	6.7% 256	7.3% 279	9.6% 213	11.1% 247	8.9% 197	0.5% 28	0.5% 32	0.2% 12	4.9% 314	4.6% 297	6.7% 198	7.0% 208
Agree - Non GLRaV-3	72.7% 2778	71.6% 2736	71.2% 2721	31.5% 698	34.5% 766	32.5% 720	94.1% 5758	94.0% 5751	94.1% 5761	79.4% 5075	79.0% 5050	16.7% 494	15.0% 442
Agree - GLRaV-3	19.3% 739	21.7% 829	21.5% 821	58.9% 1307	54.3% 1205	58.7% 1301	5.5% 334	5.5% 337	5.7% 347	15.7% 1001	16.3% 1043	76.6% 2260	78.0% 2302



MacDonald et al. 2016. http://dx.doi.org/10.1016/j.compag.2016.10.003

Grapevine leafroll disease management: challenges & opportunities

Monica Cooper, Farm Advisor, UC Cooperative Extension, Napa County

UCCE-Napa Viticulture Team:
Malcolm Hobbs, Selena Vengco, Jennifer Rohrs, Hannah Fendell-Hummel, Sarah MacDonald

Funding:
CDFA PD/GWSS Program
American Vineyard Foundation
Napa County Wine Grape Pest & Disease Control District





courtesy ML Cooper

Summary

1) There are no vine mealybug controls that provide 100% removal of the pest.
2) Biological controls are present, but on their own not enough for ‘vector control.’
3) No single pesticide application provides 100% control. Trial results can vary (David has mentioned ‘consistency’). OMRI materials have not worked as well as conventional materials (data not shown).
4) Mating disruption can be a part of VMB management; MD works best at low pest densities, and with multiple years of application and larger areas under MD (areawide controls).
5) Areawide management can increase grower communication, selection of the best materials, and a reduction of reinvasion from nearby mealybug sources.
6) Leafroll control is harder. Roguing is a difficult decision and, I get it, not always economical. Still, roguing on an areawide basis has been shown to work elsewhere and selective roguing can be a part of the Central Coast plan.

Thank you

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