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Vine Mealybug Chemical Control: A Review

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Wilbur Ellis Company

Feb 21, 2017

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VINE MEALYBUG

Formidable pest spreading through California vineyards

BY Kent Daane, Associate Specialist, University of California Extension, UC Berkeley;
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Lake County Fears Mealybug Find

Five males found in Big Valley region but females sought for positive ID. Compiled by staff

Published on: **Oct 14, 2004**

Farmprogress.com

Major grape pest found in Big Valley

TUESDAY, 03 APRIL 2007 17:58 | CHUCK MORSE

Lakeconews.com

BIG VALLEY – The Lake County Department of Agriculture is reporting the detection of a serious grape pest, the Vine Mealybug (VMB), in the Big Valley area.

In late December 2006, the California Department of Food and Agriculture diagnostic laboratory sent confirmation to the county's Agriculture Department that six male VMBs had been caught in special traps baited with a chemical attractant specific for mealybug males.

VMB – A fast-moving pest

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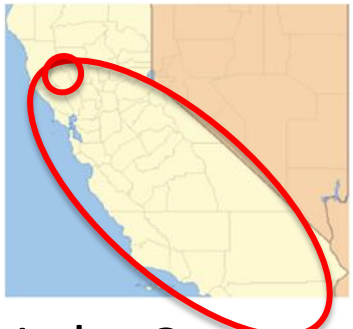
1990s	2000-2001	2002-2003	2004
			
Riverside, Kern and Fresno Co.	San Luis Obispo, Santa Barbera	Monterey, Napa, Sonoma, Solano, *others*	Lake County, Tulare, Merced, San Benito

In 2004 – Control suggested

- Delayed dormant application of Lorsban (February or March)
- Spring application of Applaud or Sevin (*Sevin may cause mite outbreaks*)
- Systemic application of Admire in spring
- Summer to fall foliar treatments (Applaud, Dimethoate, Imidan, Malathion)
- Post-harvest application of Lorsban.

MAY/JUNE 2004

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PRACTICAL WINERY & VINEYARD
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In 2004 – Control suggested Tools disappearing

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- Delayed dormant application of Lorsban (February or March) *(24c by Permit only)*
- Spring application of Applaud or Sevin (Sevin may cause mite outbreaks)
- Systemic application of Admire in spring
- Summer to fall foliar treatments (Applaud, Dimethoate *(no longer CA grape registration!),* Imidan (*WA only?*), Malathion)
- Post-harvest application of Lorsban?

MAY/JUNE 2004 PW

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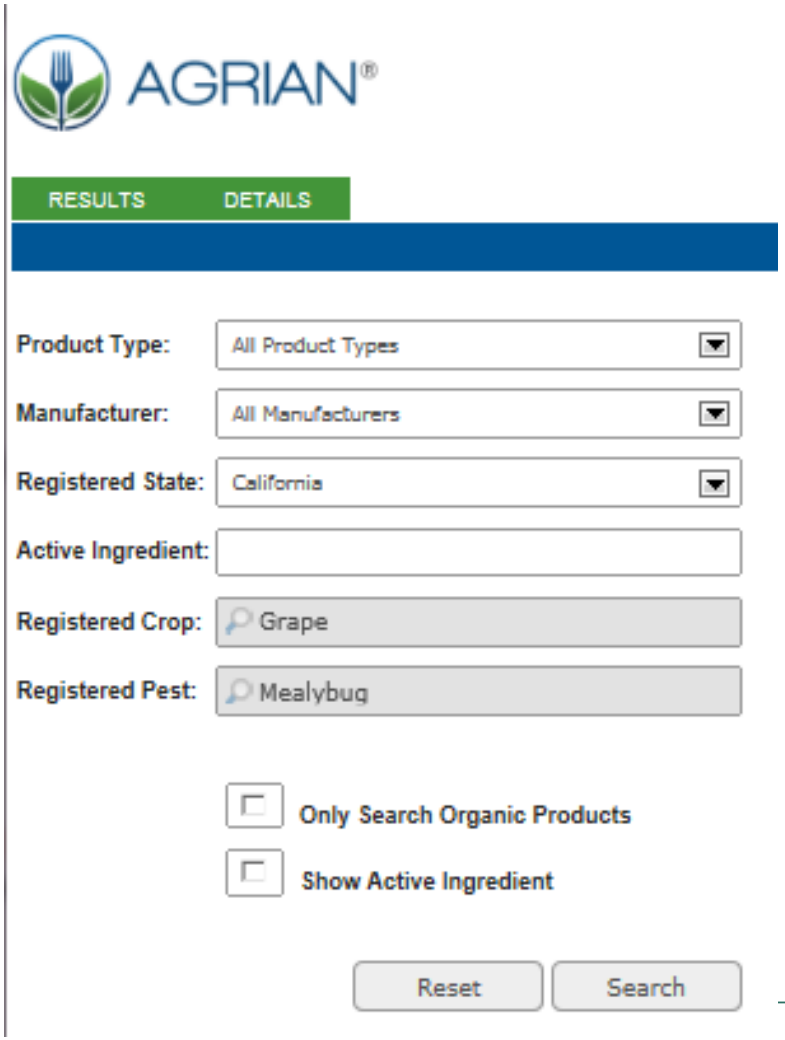
AGRIBUSINESS DIVISION

Today's Chemical 'Tools'



California –registered, mealy bug crop protection products in grapes…

167 different products

However… Many have similar chemistry …

> 167 products registered!! Where do I start??

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Soft chemistries

34 Organic options:

Bacterial strains, selected oils, pyrethrins, lime sulfur

Spray oils

(~20 options)

Mineral oils, hort oils (415, 440), petroleum – based oils, even Garlic oil, others

Largest bucket yet; conventional chemistry:

Just as many companies as products!

Conventional chemistry review

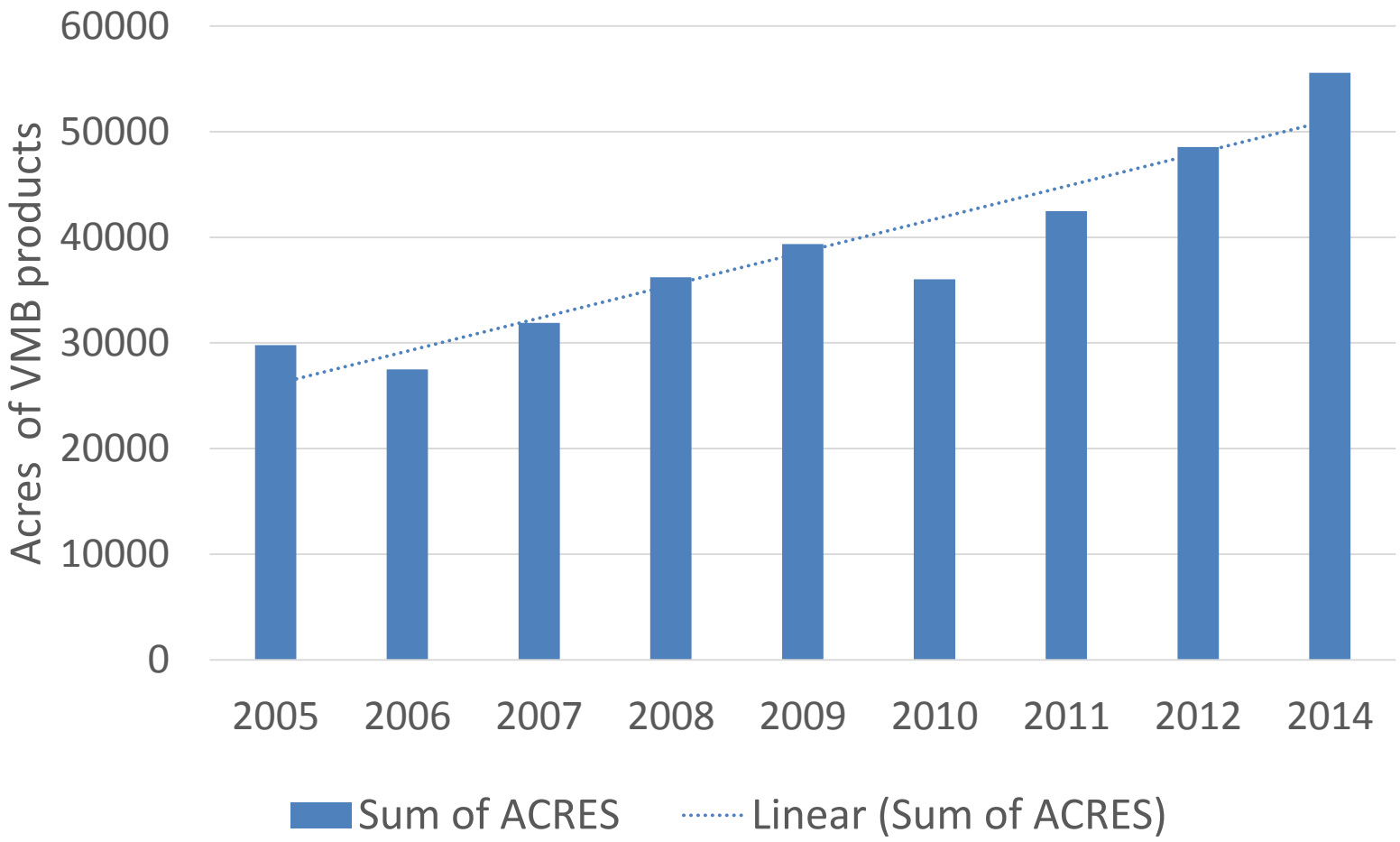
Few active ingredients:

1) acetamiprid (Assail), 2) buprofezin (Applaud), 3) chlorpyrifos (Lorsban, 4) clothianidin (Belay), 5) dinotefuran (Venom), 6) fenpyroximate (FujiMite), 7) Flupyradifurone (Sivanto), 8) imidacloprid (Admire), 9) malathion, 10) phosmet, 11) spirotetramat (Movento), 12) thiamethoxam (Platinum/Actara)

http://calpip.cdpr.ca.gov/main.cfm: Accessed Feb. 2015

Top 8 VMB Products – Trends

Napa, Sonoma, plus Lake Counties



http://calpip.cdpr.ca.gov/main.cfm: Accessed Feb. 2017

Top 8 VMB Products

Acres by Year (SUM 3 counties)

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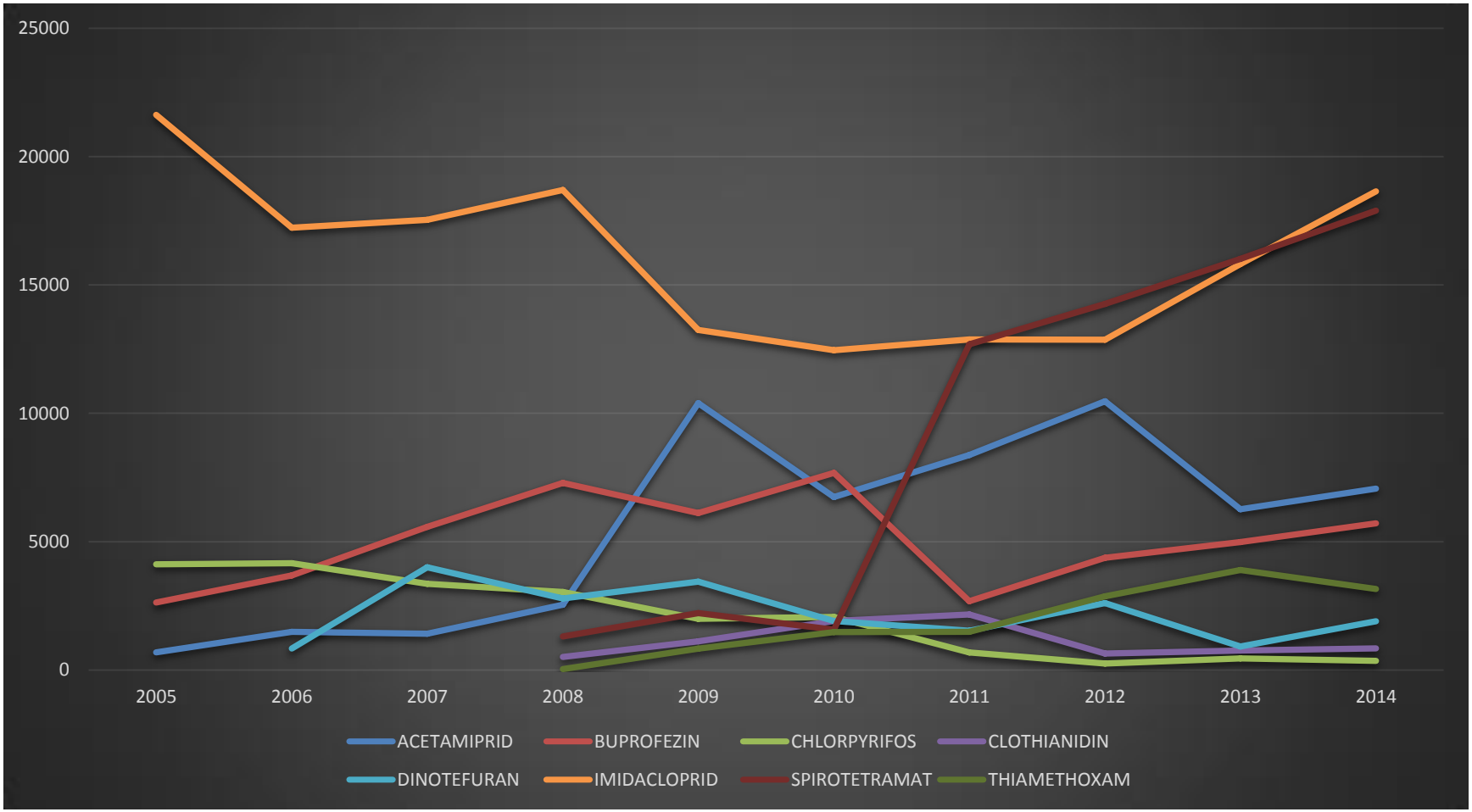

http://calpip.cdpr.ca.gov/main.cfm: Accessed Feb. 2017

Individual profiles

Technical information & keys for activity

Remember, for all materials:

ENSURE YOU FOLLOW LABELED GUIDELINES

- Product use recommendations, restrictions, PHI, # max applications, etc.

acetamiprid (Assail®)

IRAC Group: 4A Signal Word: CAUTION

Chemical group: Neonicotinoid

Mode of action: Nicotinic acetylcholine receptor agonist

Application method: Foliar

Application timing: Beginning of crawler/nymph activity, March or April if label allows

Notes & Keys for Effective Activity:

No adjuvants allowed on grapes; oils allowed; coverage (targeted at pest) is key

buprofezin (Applaud®)

IRAC Group: 16 Signal Word: CAUTION

Chemical group: Buprofezin

Mode of action: Chitin biosynthesis inhibitor, Type 1

Application method: Foliar

Application timing: Early crawler emergence, March or April

Notes & Keys for Effective Activity:

No adult activity, 3 to 7 day lag to death, soft on beneficial insects, spray coverage on pest is vital

chlorpyrifos ** (Lorsban Advanced®)

IRAC Group: 1B Signal Word: Danger

Chemical group: Organophosphate

Mode of action: Acetylcholinesterase inhibitor

Application method: Foliar

Application timing: Dormant & Delayed Dormant

Notes & Keys for Effective Activity:

150 GPA min (per label); no more than 2 quarts/yr

Controls argentine ants

**Use allowed under a 24c Special Local Needs Label in California; Lorsban Advanced® is a Restricted Use Pesticide

clothianidin (Belay®)

IRAC Group: 4A Signal Word: CAUTION

Chemical group: Neonicotinoid

Mode of action: Nicotinic acetylcholine receptor agonist

Application method: Foliar or Soil**

Application timing: Early population development

Notes & Keys for Effective Activity:

Apply with lower populations; ensure good coverage (foliar); follow label for soil applications

** Monitor Max AI per year

dinotefuran (Venom®)

IRAC Group: 4A Signal Word: CAUTION

Chemical group: Neonicotinoid

Mode of action: Nicotinic acetylcholine receptor agonist

Application method: Foliar or Soil**

Application timing: Bud break to pea-sized berry

Notes & Keys for Effective Activity:

Apply before populations are established; ensure good coverage; best placed in heavier soils

**Monitor MAX AI per Year

imidacloprid (Admire Pro®)

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IRAC Group: 4A Signal Word: CAUTION

Chemical group: Neonicotinoid

Mode of action: Nicotinic acetylcholine receptor agonist

Application method: Foliar or Soil**

Application timing: Bud break to pea-sized berry.

Notes & Keys for Effective Activity: Bee Restrictions

Apply before populations are established; ensure good coverage; allow time to enter vine

** Monitor MAX AI per Year

flupyradifurone (Sivanto®)

IRAC Group: 4D Signal Word: Caution

Chemical group: butenolides

Mode of action: Nicotinic acetylcholine receptor agonists

Application method: Foliar, Soil (different rates)

Application timing: When pest present in canopy since contact activity. Use In between longer acting products like Neonics, Movento

Notes: No cross resistance to 4A group known.

Check if export MRLs in place for your market

spirotetramat (Movento®)

IRAC Group: 23 Signal Word: CAUTION

Chemical group: Tetronic/Tetramic Acid Derivative

Mode of action: Acetyl CoA Carboxylase Inhibitor

Application method: Foliar

Application timing: Enough foliage for uptake

Notes & Keys for Effective Activity:

Xylem & Phloem Mobile; <u>Adjuvant required</u>; up to 30 days until full activation

thiamethoxam (Platinum / Actara®)

IRAC Group: 4A Signal Word: CAUTION

Chemical group: Neonicotinoid

Mode of action: Nicotinic acetylcholine receptor agonist

Application method: Foliar or Soil

Application timing: (Soil) Early spring, prior to crawlers/adults movement on outside of bark; (Foliar) lower populations

Notes & Keys for Effective Activity:

Early application; Flexible soil parameters, but very good in heavier soils

Active ingredient	Common Trade Name	Mode of Action / IRAC	Application Method	Application Timing	Notes
acetamiprid	Assail	4A	Foliar	Crawler / Nymph	Use with Oil
buprofezin	Applaud	16	Foliar	Crawler	No adult activity
chlorpyrifos	Lorsban Advanced	1B	Foliar	Dormant or Delayed Dormant	Kills ants, delayed dormant = best
clothianidin	Belay	4A	Foliar / Soil	Early population	Coverage = key
dinotefuran	Venom	4A	Foliar / Soil	Early population	Very soluble
imidacloprid	Admire, others	4A	Foliar / Soil	Early population	Lower solubility
flupyradifurone	Sivanto	4D	Foliar / Soil	In season	No known cross resistance
spirotetramat	Movento	23	Foliar	Flexible	Needs leaf penetration
thiamethoxam	Platinum / Actara	4A	Foliar / Soil	Early population	Medium-high solubility

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flupyradifurone	Sivanto	4D	Foliar / Soil	In Season	No known cross resistance
spirotetramat	Movento	23	Foliar	Flexible	Needs leaf penetration
thiamethoxam	Platinum / Actara	4A	Foliar / Soil	Early population	Medium –high solubility

New AIs to watch

- **sulfoxaflor (Sequoia®)**

IRAC Group: 4C

Chemical group: Sulfoximines

Mode of action: Nicotinic acetylcholine receptor agonists

Application method: Foliar

Application timing: Best timing, *TBD*

Notes: No cross resistance to 4A group known

Waiting on CA re-registration with restrictions for minimizing bee exposer

Soil applied materials

Considerations:

– Soil type

– Relative Solubility & soil adsorption of chemistry

- UC IPM Guidelines

"IMIDACLOPRID
(Admire Pro - Soil)
MODE-OF-ACTION GROUP NUMBER1: 4A

COMMENTS: Efficacy of soil-applied neonicotinoids depends on soil texture. Imidacloprid binds readily to certain soil particles, has low water solubility, and long persistence (months). These characteristics allow it to be very effective in light soils, but ineffective in heavy soils."

http://www.ipm.ucdavis.edu/PMG/r302301911.html

Foliar applied materials

- Coverage – Most require great coverage, targeted at pest; depends on Active Ingredient
- Adjuvants – follow labeled guidelines
  - Crop Safety & Efficacy
- Water conditions

Program approaches

- Considerations in designing a program
  - What is the population level?
  - Which products have site-specific restrictions?
  - Equipment / vineyard constraints?
  - What life stages are current?
  - Where product acts, when?
  - How quickly the product works?

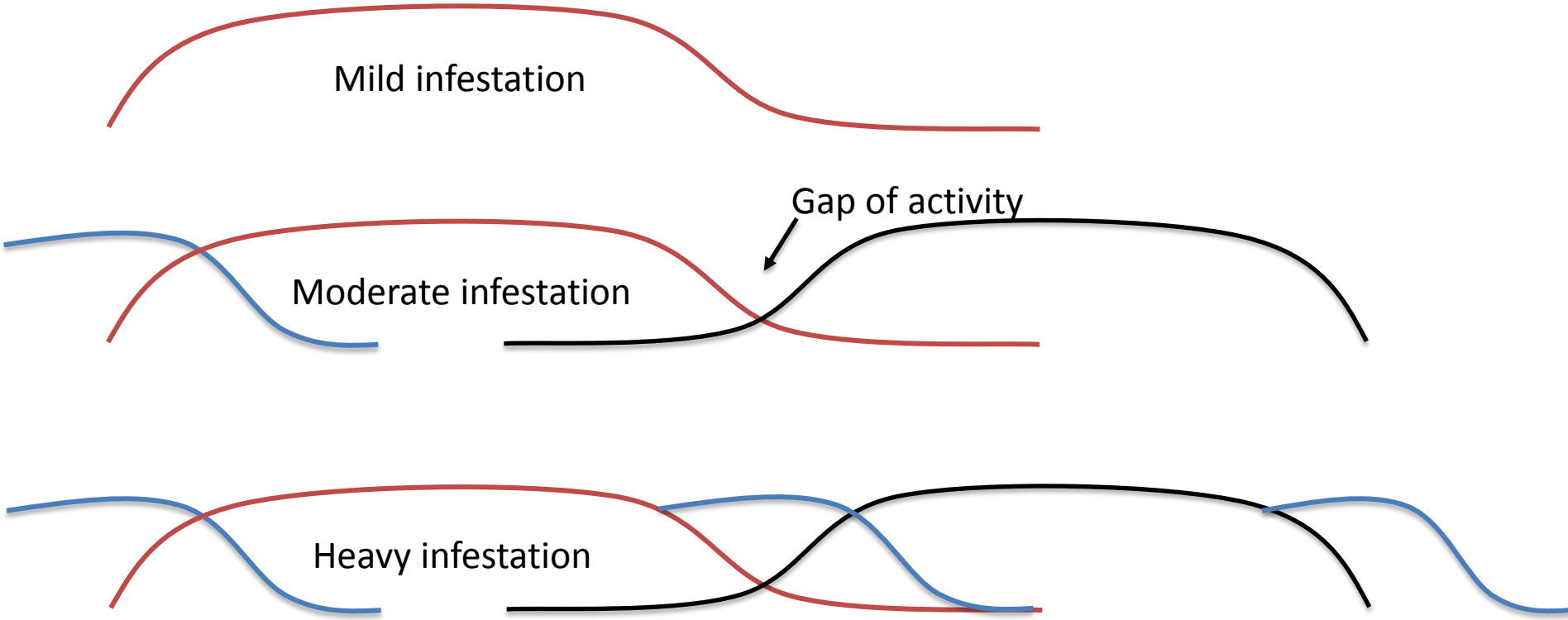
Program approaches

- Considerations in designing a program
  - Compatibility of program with resistance management?
  - Will the product control other pests?
    - Sharpshooter, phylloxera, leafhoppers, Ants, etc.
  - IPM; overlay other tools for full-season control
    - Mating disruption, soft chemistries, oils
    - Cleanliness, Equipment, Crew Movement
    - Bark Stripping
    - Cleaning Grapes
    - Replanting

Seasonal Control Calendar

Draw out your plans: Examples below

Delayed Dormant	Bud Break	Early Shoot Growth	Bloom	Berry Touch	Veraison	Harvest	Post Harvest	Dormant



Seasonal Control Calendar

Design YOUR plan below

Delayed Dormant	Bud Break	Early Shoot Growth	Bloom	Berry Touch	Veraison	Harvest	Post Harvest	Dormant
		Mild infestation						
		Moderate infestation						
		Heavy infestation						