

Controlling Fire Blight in Landscape Settings

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NOT an EH EXPERT!

- No direct experience controlling fire blight in landscape trees, e.g. ornamental pear
- Experience is fire blight in pear orchards where *fruit finish* is a key parameter in evaluating materials, in addition to efficacy;
- Recent focus has been on organically-approved control since NOP eliminated antibiotics in October 2014.

Fire Blight Hosts

Rosaceae (Rose family): 200 species

➔ MAJOR: Apple, pear, quince



ORNAMENTALS



Cotoneaster



Hawthorn (*Crataegus*)



Stranvaesia



Pyracantha (firethorn)



Mountain ash (*Sorbus*)

Ornamental Pear (*P. calleryana*)



'Bradford'



'Chanticleer/Cleveland Select'

"This plant is invasive in Missouri. The species should not be planted in the Midwest. [Control and Alternatives](#)"; **THIS IS NATIONWIDE IN SCOPE!**

Pathogen overwinters here



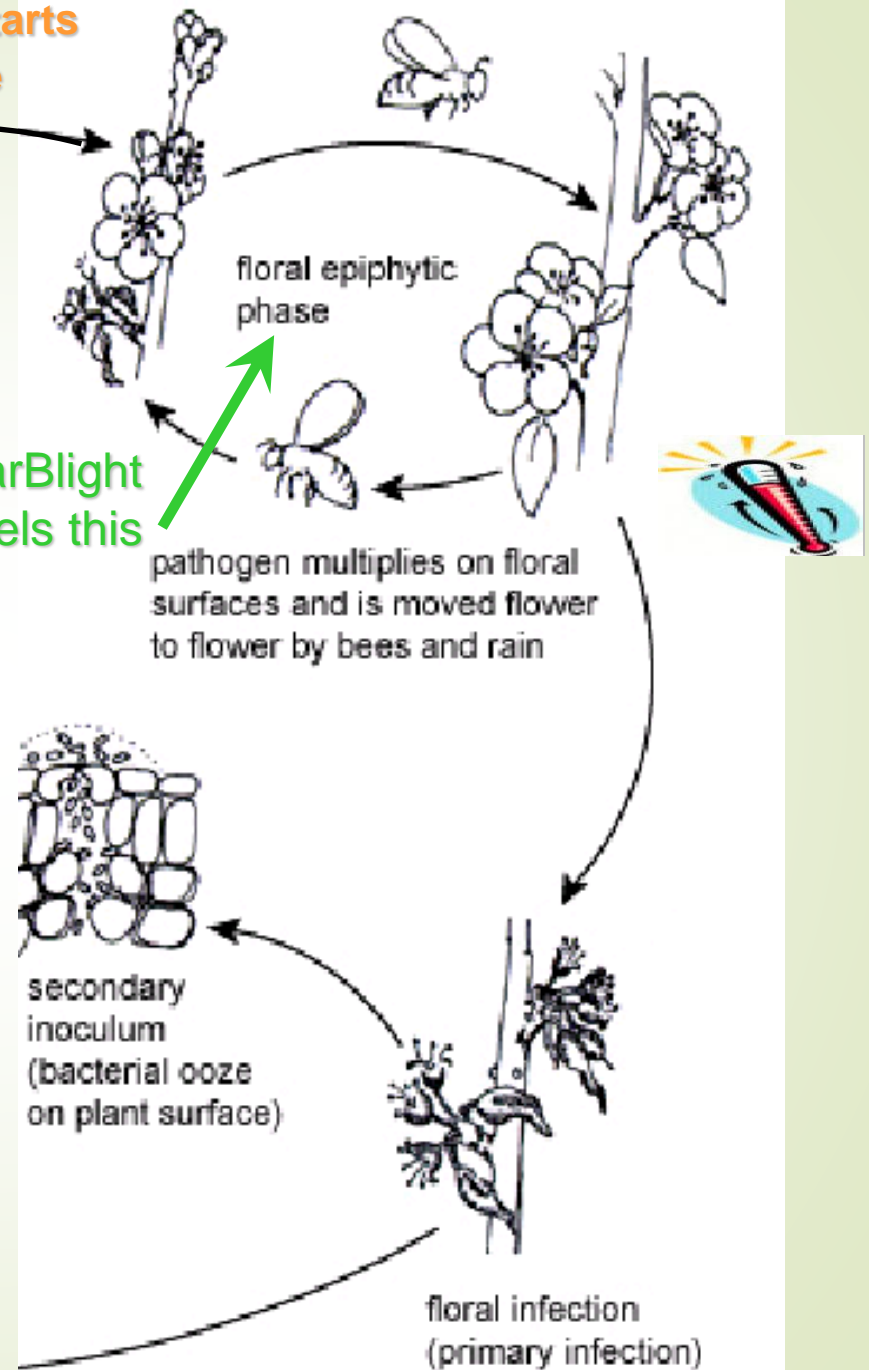
A. Jones, APSnet

This jump starts the cycle



CougarBlight models this

Not this



Significance of old cankers & bloom temperature

When is the fire blight pathogen active?

Is the fire blight pathogen
in this bag of flowers?



Answered by 'LAMP'
assay that detects
pathogen DNA:



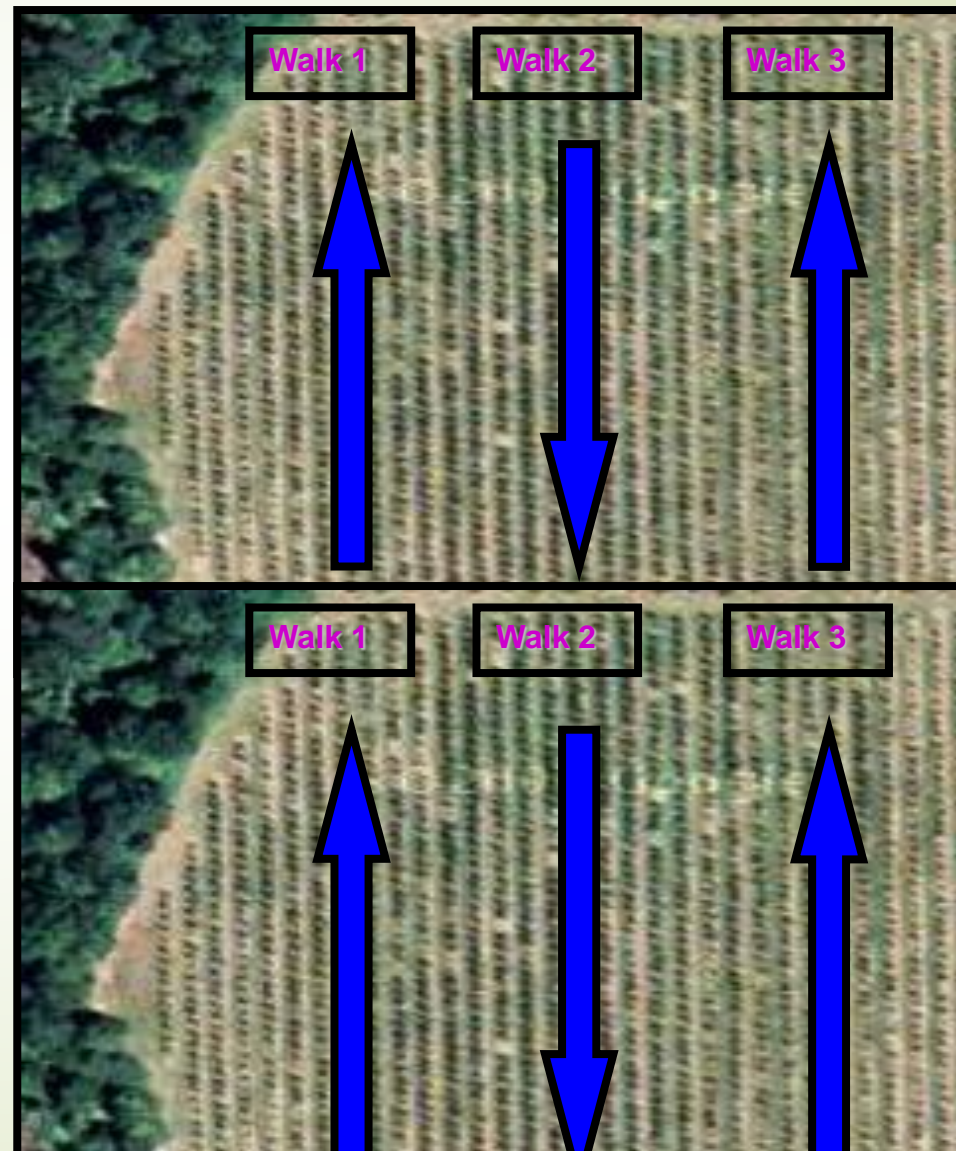
Showed using delayed dormant copper

LAMP Survey

➤ Delayed dormant oil plus
CuOH+CuOCl (6 lbs/A)

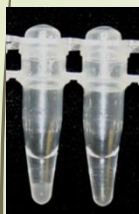
In 2010-2013 we split
fourteen ~10-acre blocks

➤ Delayed dormant oil



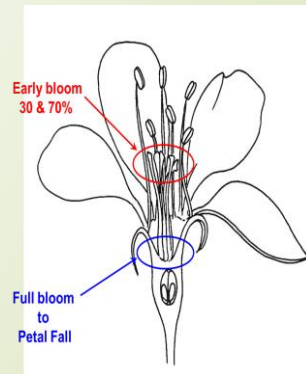
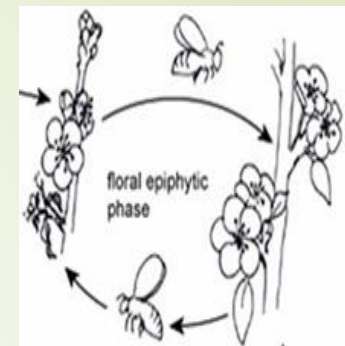
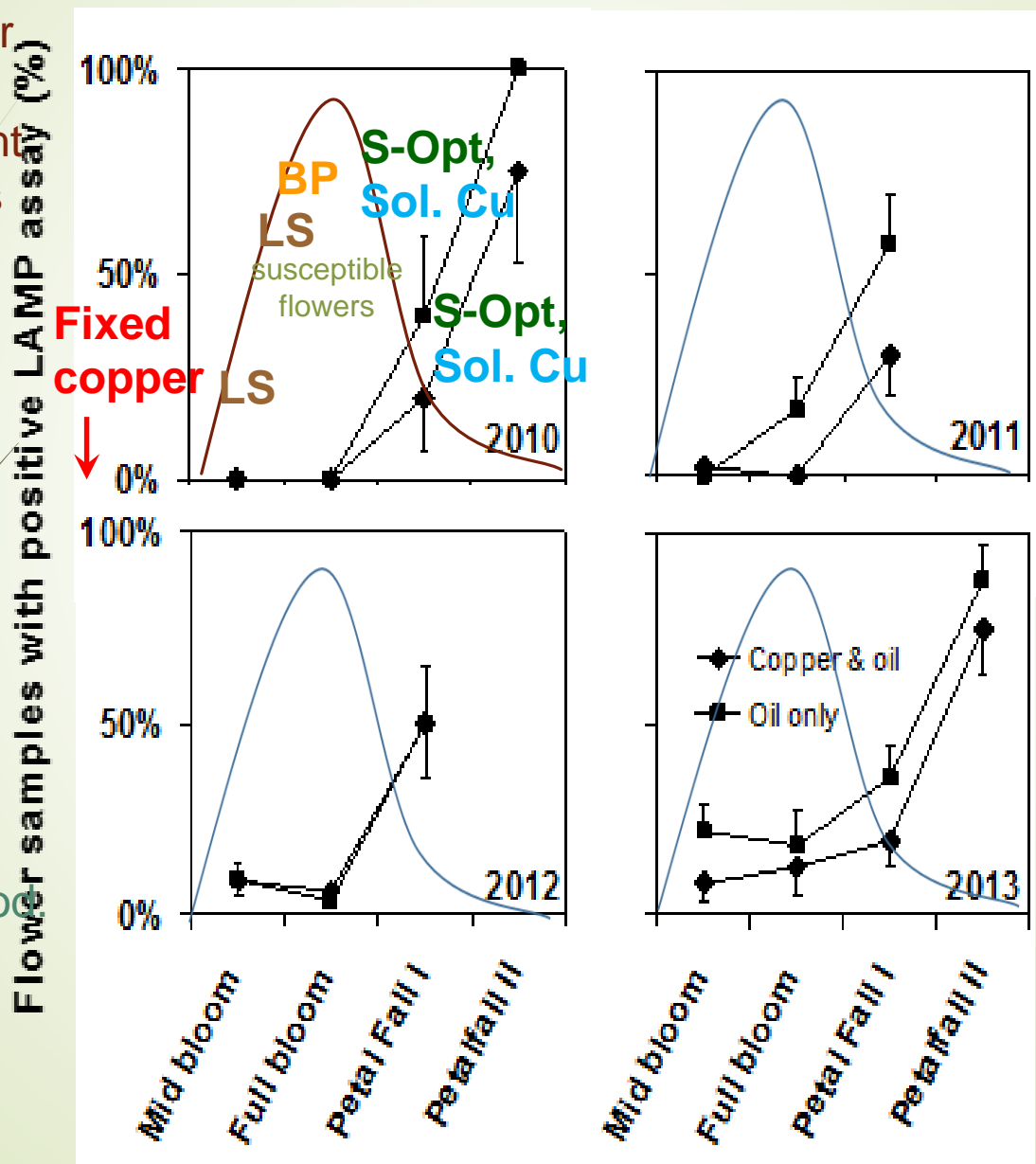
When do we find the fire blight pathogen in flowers?

LAMP is a molecular assay we employ to detect the fire blight pathogen in flowers



Each year, twelve commercial Bartlett pear orchards in northern California were surveyed during the bloom period

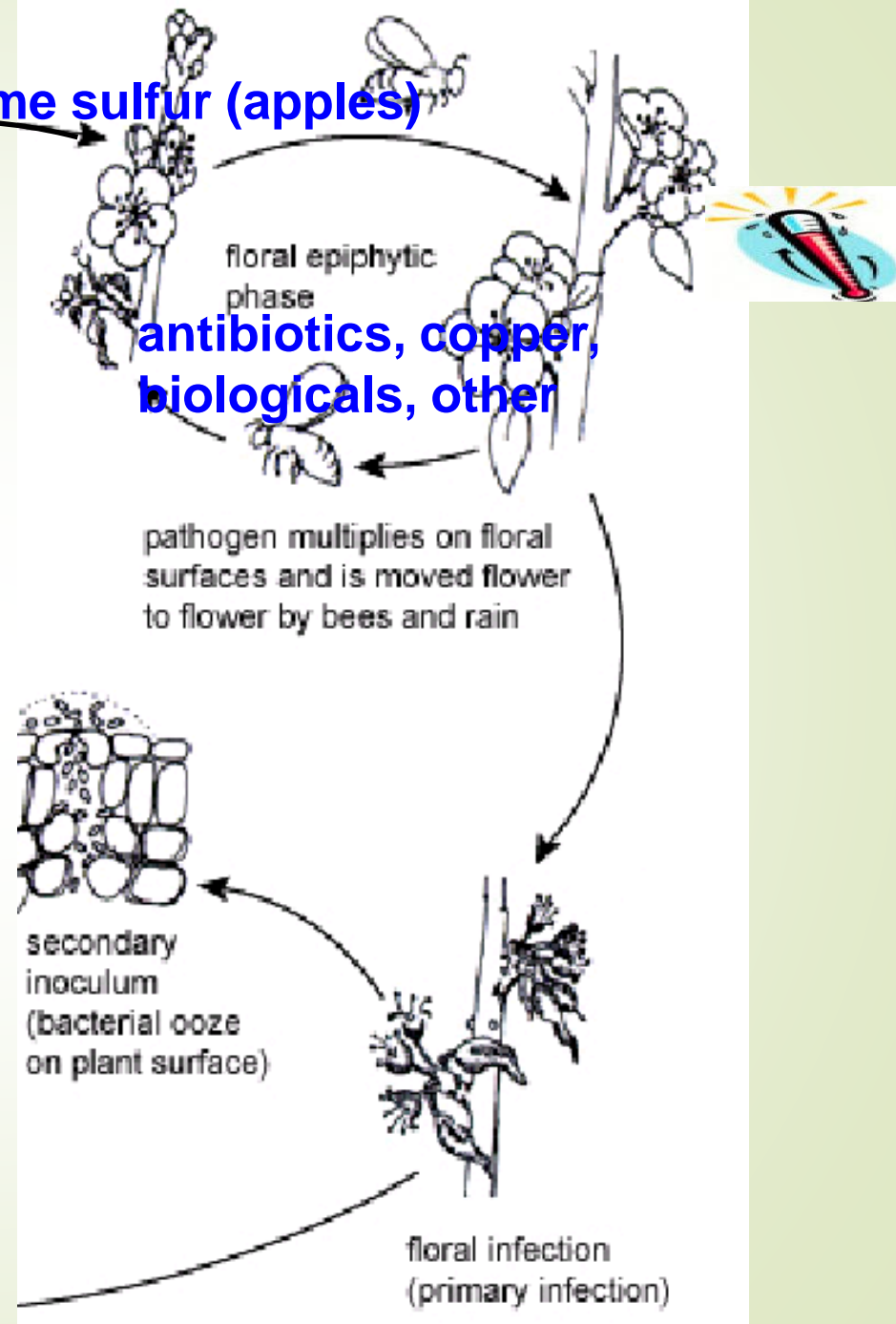
All orchards received multiple antibiotic sprays





**fixed
copper,
SARs**

lime sulfur (apples)





Ornamental Fire Blight Management Options (order of desirability)

- **PLANT SELECTION:** Resistant cultivars, remove alternative hosts (e.g. Pyranantha)
- **SANITATION:** Cut out infected wood if possible (impractical if too many); complete removal
- **TREATMENT:** Antibiotics (streptomycin terramycin, kasugamycin); copper (fixed, soluble); SARs (Actigard); nutrient-based (phosphorous acid); biologicals (A506, Blossom Protect):

CHEMICALS IMPRACTICAL FOR ORNAMENTALS IN MOST CASES! WATCH LABELLING!



2016 Pacific Northwest Plant Disease Management Handbook

Bradford, Capital, *Cleveland Select

*moderately susceptible; weak
branching*

Aristocrat, Autumn Blaze, Early Red, Redspire

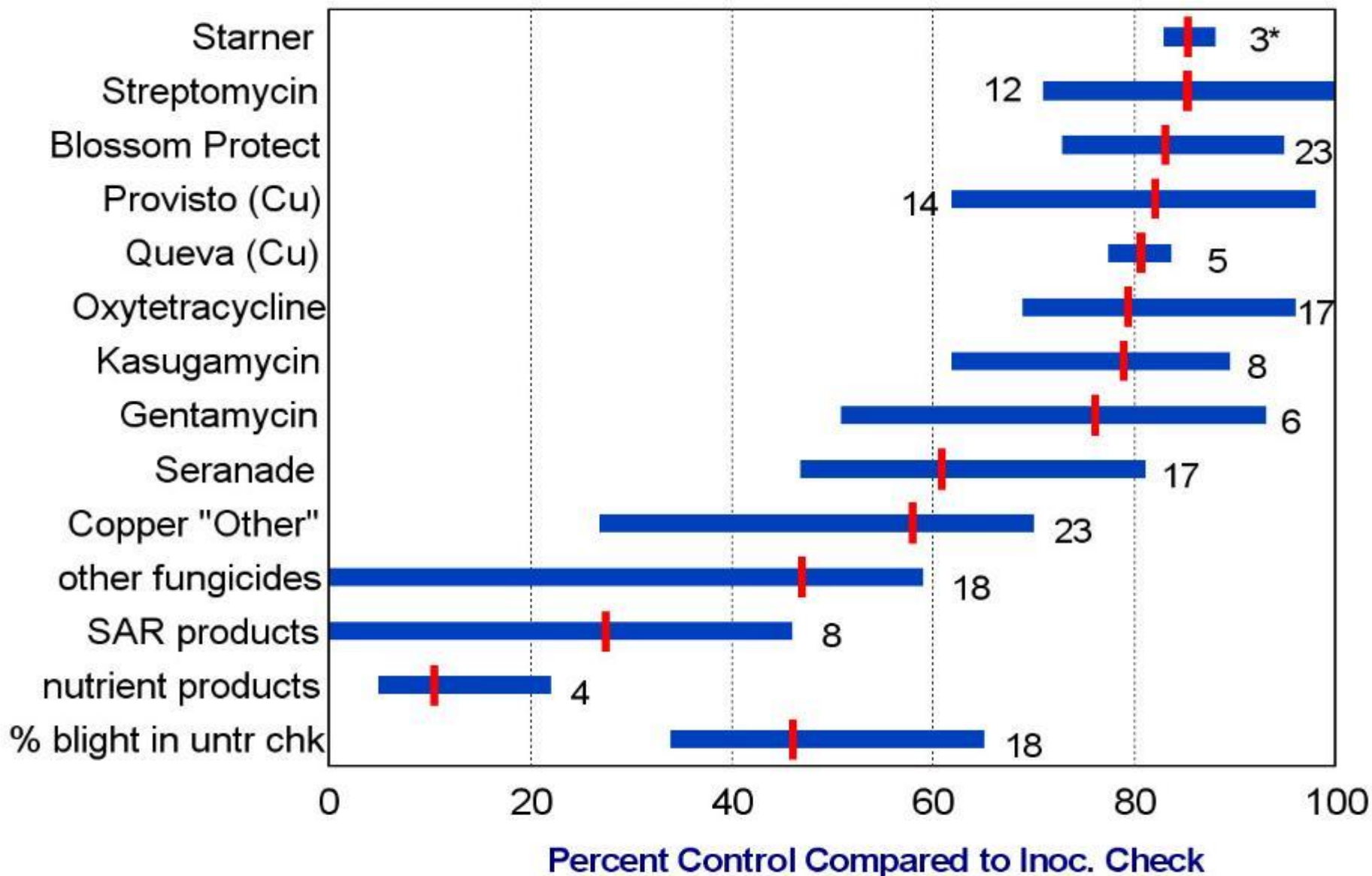
least resistant; stronger branching

***Chanticleer, Trinity, Whitehouse**

most resistant (contradicts C. Select)

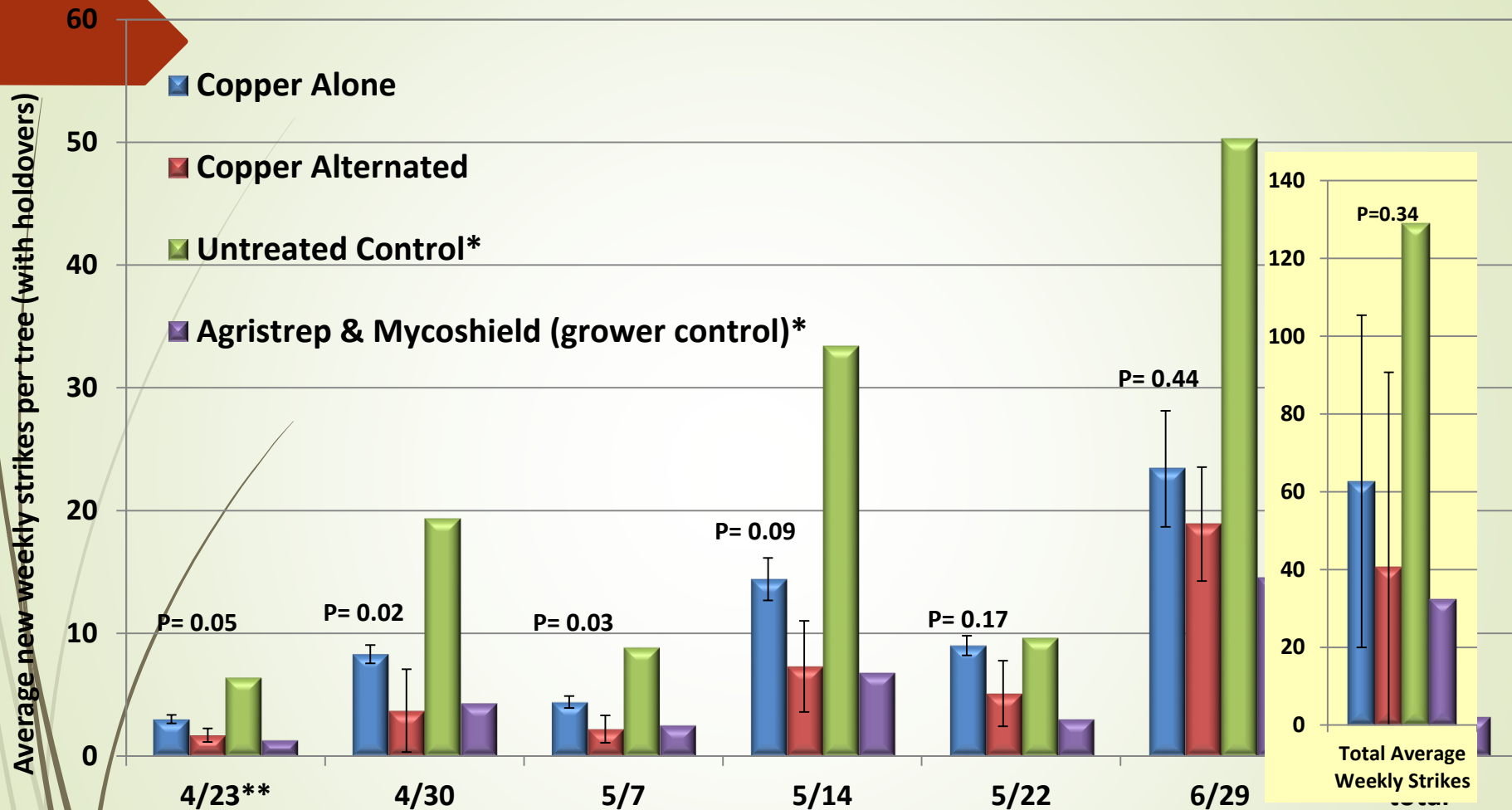
Summary of Efficacy - % Control Fire Blight

Innoculated Treated Flowers




* Number of Trials Product Tested

THIS APPLIES TO *MOST OTHER* NON-ANTIBIOTIC MATERIALS



* Control and antibiotics means for comparison only, not included in t-test. ** Date of last antibiotic and 'alone' applications. Error bars=standard error.

Average number of weekly fire blight strikes, copper alone versus alternated with antibiotics, 'Bartlett' pear trees, Scotts Valley (Lakeport), Lake County, California, 2015



New Research (UC, OSU, WSU, PSU, VA, Cornell, MI)

ANTAGONISM: Biological organisms (bacteria, yeast, other) (e.g. BlightBan A506, Blossom Protect; mainstay of organic programs)

ACQUIRED SYSTEMIC RESISTANCE (SAR)

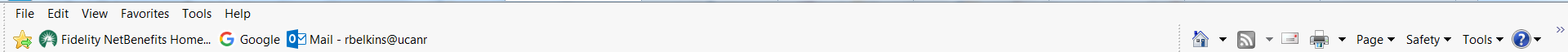
(e.g. Actigard): bark paints (ornamentals in future?), foliar sprays; new CA label

COPPER FORMULATIONS: soluble formulations to reduce russet and enhance coverage (e.g. Previsto, Cueva)

ADJUVANTS TO ENHANCE CONTROL: citric acid-type materials (MO of phosphorous acid product?)

BREEDING: resistance = MAIN AVENUE IN FUTURE (genetic markers)

http://ipm.ucdavis.edu



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Interactive Tools and Models: Fire Blight Risk Assessment

[Using the model](#) | [The research](#) |

This program presents assessments of the risk of *Erwinia amylovora* infection of apples and pears, based on two models and using calculations based on weather data stored in the UC IPM weather database.

The degree-hour fire blight model assesses actual conditions for *Erwinia amylovora* bacterial growth and infection. It also indicates when treatment is unnecessary. It takes into account early bloom and periods of continuous cool weather, allowing adjustments in treatment timings.

The mean air temperature model predicts colonization of blossoms by the bacterium, based on daily air temperatures.

Use the models in conjunction with weather data gathered and stored in the UC IPM weather database. If possible, start the season with a full soil water profile so you can avoid irrigation during bloom, which affects the local relative humidity.

Spray considerations

Model results suggest when you will need to treat for fire blight. For complete information, see the UC IPM Pest Management Guideline for [Fire Blight on Pear](#).

Existing orchards

None available.

Set up new orchard

Orchard name:

Weather data: UC IPM database [\(Check for availability\)](#)


Start date: mm/dd/yyyy [\(Selecting a start date\)](#)

End date: mm/dd/yyyy

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MAKE A GIFT

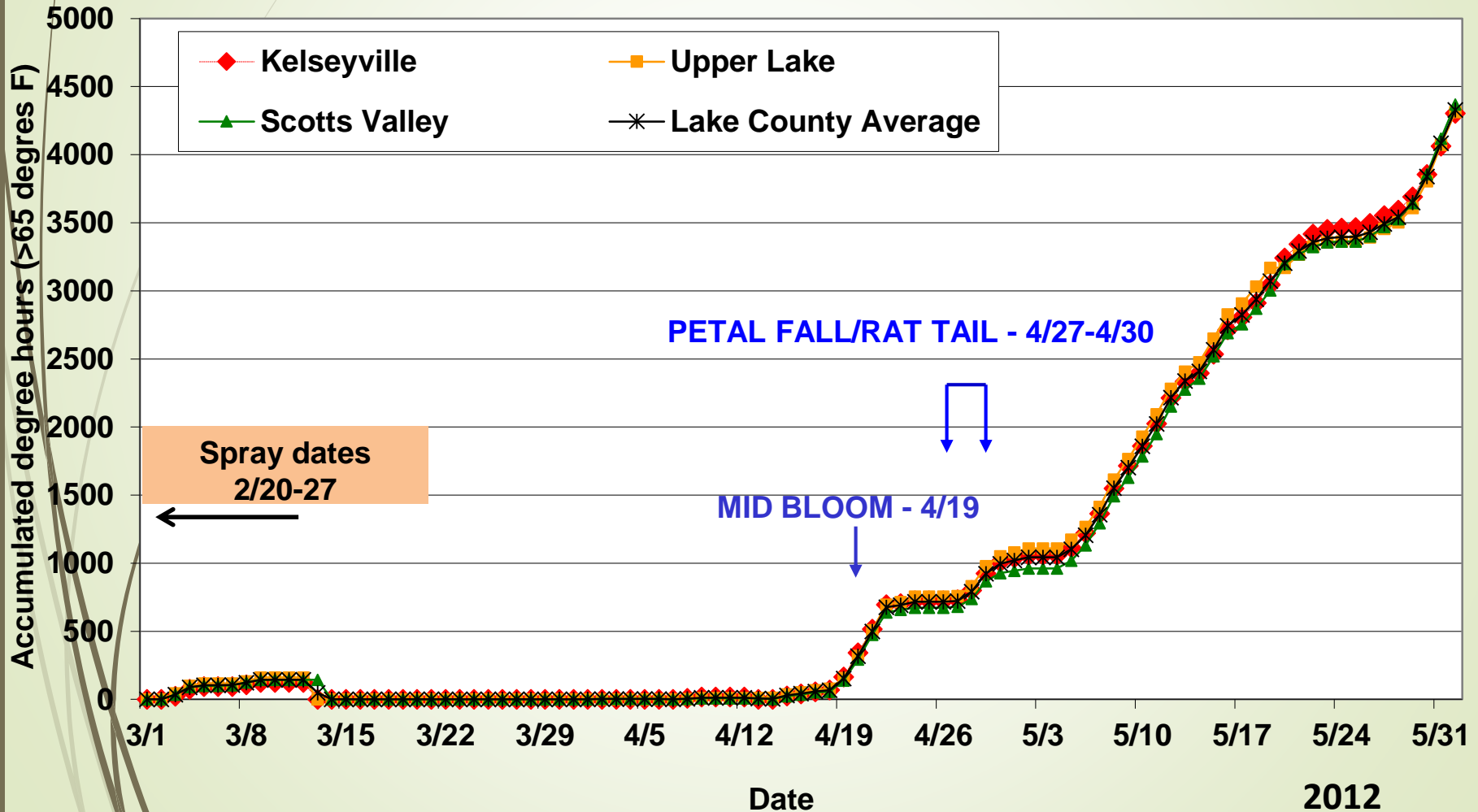




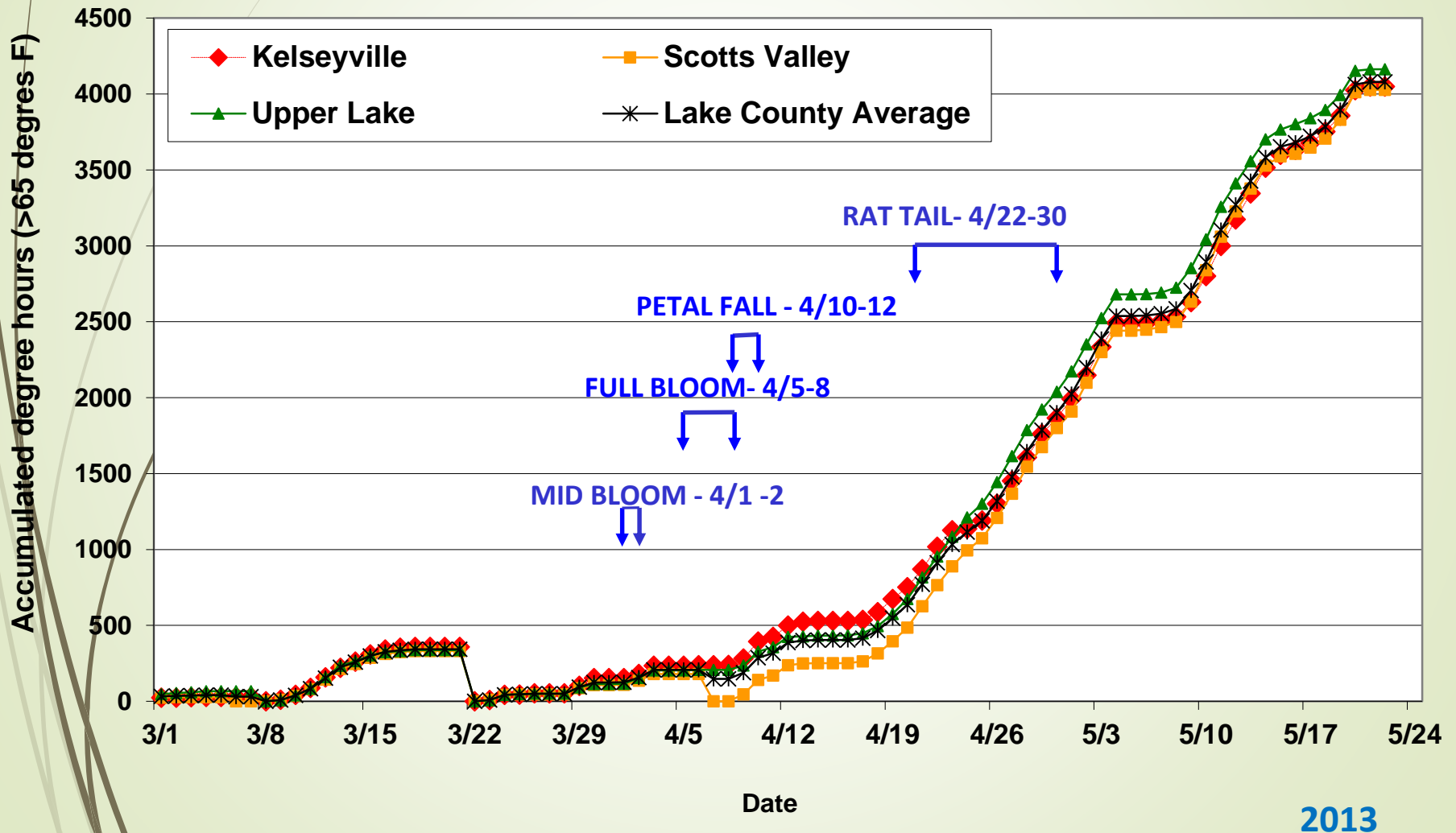
**Degree hour accumulation
differences 2012-2015: effect on
treatment timing and interval**

**(observe when the 1000 DH
threshold is crossed)**

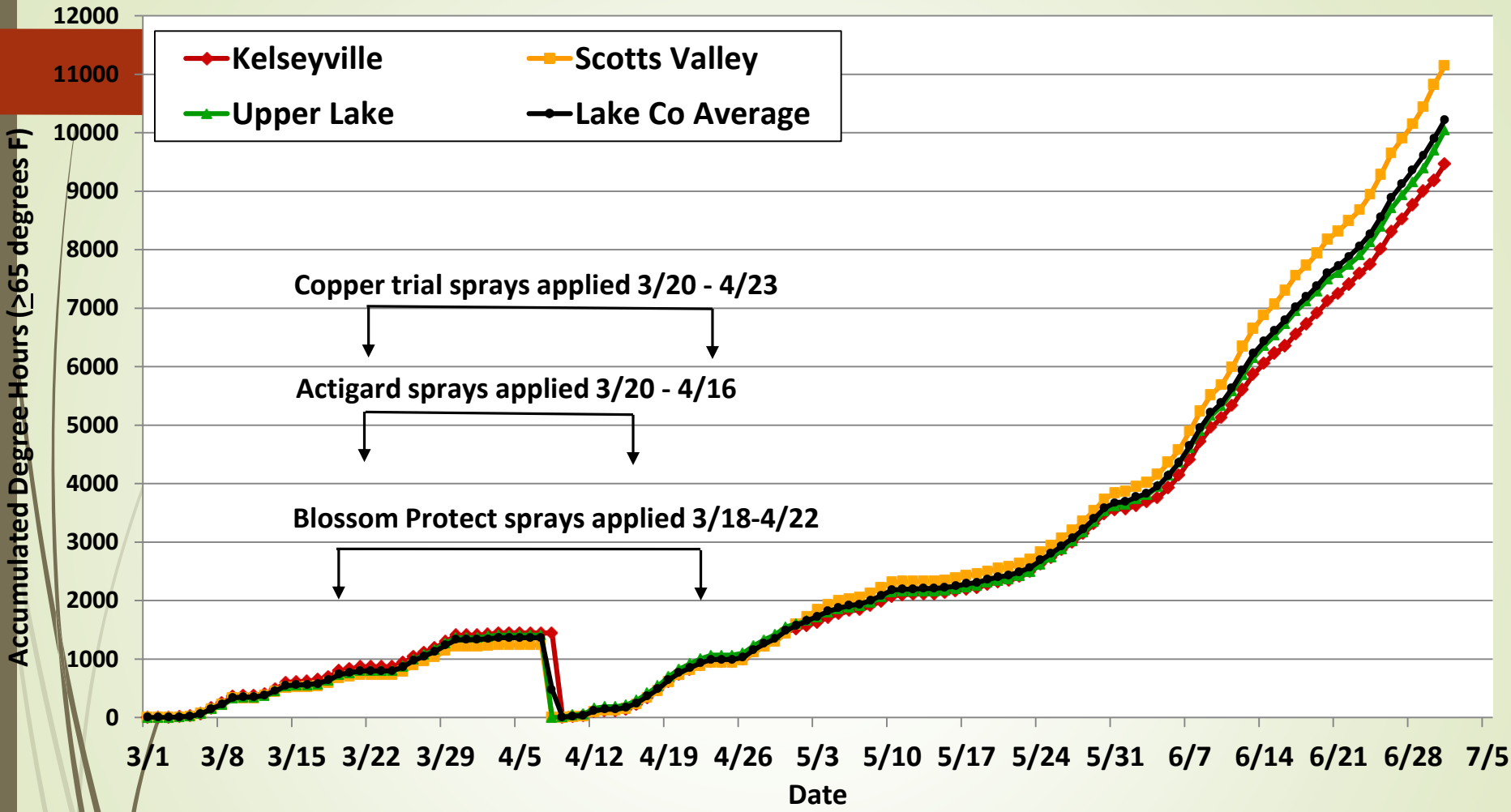
Relationship between accumulated degree hours (base >65°F) for Kelseyville, Scotts Valley (Lakeport) and Upper Lake, Lake County, California, March 1 to June 1, 2012 and positive LAMP samples (shown in blue).



Relationship between accumulated degree hours (base $\geq 65^{\circ}\text{F}$) for Kelseyville, Scotts Valley (Lakeport) and Upper Lake, Lake County, California, March 1 to May 23, 2013 and positive LAMP samples.



2013



Accumulated degree hours (base $\geq 65^{\circ}\text{F}$ with 4-day crash) for Kelseyville, Scotts Valley (Lakeport) and Upper Lake, Lake County, California, March 1 to July 1, 2015. Degree-hours calculated using data from Kelseyville-0.1P (Kel), Scotts_Valley-0.2 P (SVL), and Upper_Lake-0.1 P (UPL) (Source: UCIPM).

2015

Weather conditions relevant to fire blight infection and russet formation during early fruit development, Lake and Mendocino Counties, California, April and May 2014

Location	Air Temperature						Moisture							
	Minimum (°F)		No. days ≤ 32°F		No. Hours 70-85°F		Precipitation (Total inches)		Average Relative Humidity (%)		Maximum Relative Humidity (%)		Leaf Wetness (Total hours)	
	April	May	April	May	April	May	April	May	April	May	April	May	April	May
Kelseyville ¹	39.2	41.6	0	1	120.6	132.0	1.01	0.00	61	52	86	67	100.4	4.4
Scotts Valley ²	35.9	38.5	7	3	120.2	147.2	0.96	0.02	72	64	98	82	231.2	96.3
Upper Lake ³	39.6	42.5	0	0	115.1	148.5	1.36	0.01	72	63	98	80	204.0	59.6
Ukiah ⁴	41.3	43.3	0	0	97.8	107.6	0.25	0.01	63	54	87	73	169.4	53.7

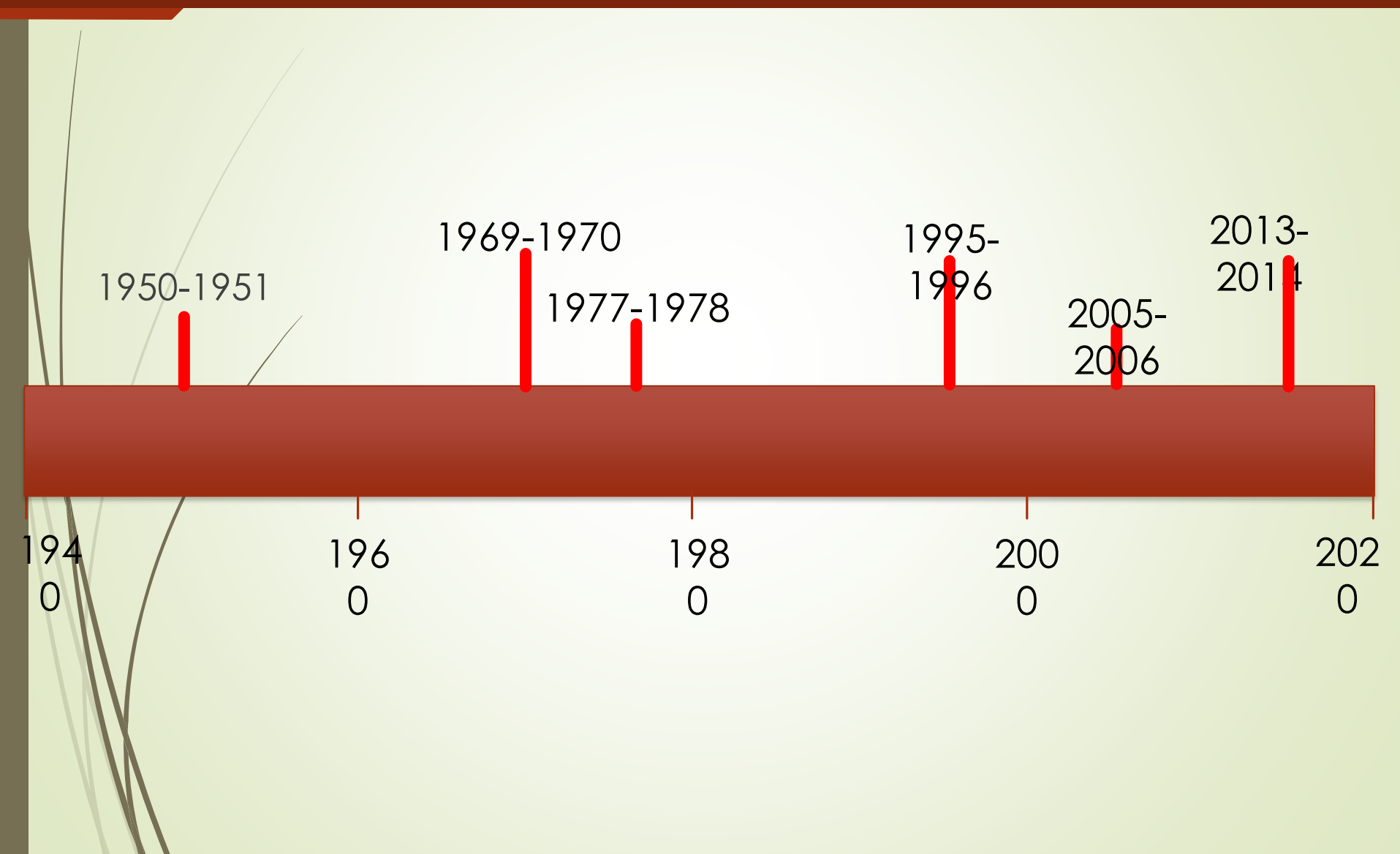
¹ Location of single-tree shared protocol trial, three grower-applied Blossom Protect and four grower-applied Actigard trials

² Location of single-tree GWN-10073 (Previsto® and Copper Count-N trial and one grower-applied Actigard trial

³ Location of (one each) grower-applied Blossom Protect and Actigard trials

⁴ No formal trial at this location; informational purposes only

Low chill winters come every few decades





QUESTIONS?



University of California
Agriculture and Natural Resources

THANK YOU!!

