

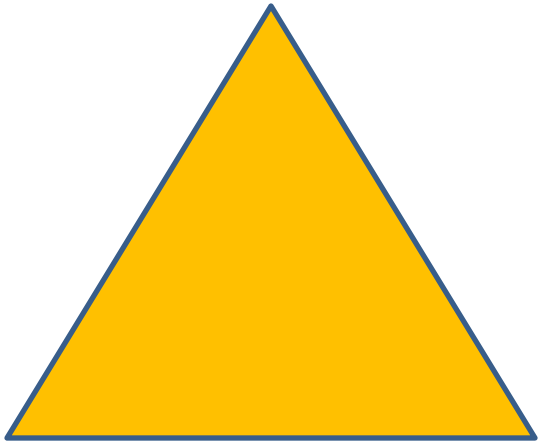
Update on fruit tree diseases: Scab, Blast and Blight

Lynn Wunderlich, Farm Advisor
University of California Cooperative Extension-Central Sierra
Foothill Tree Fruit Meeting 2/15/12




What makes a bad disease year?

Host-*susceptible tissue present*

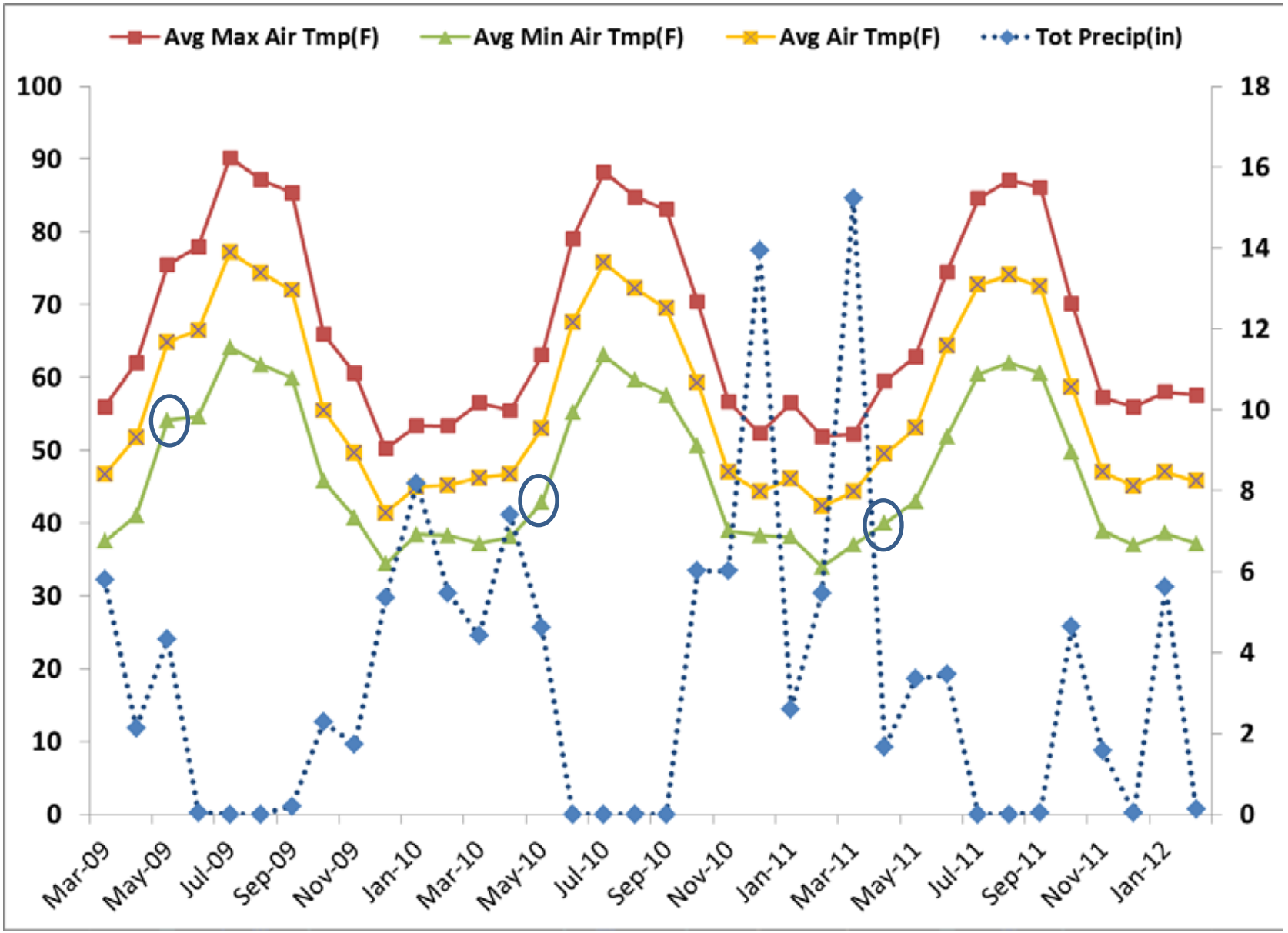


Pathogen-*sources of inoculum, strain, etc.*

Environmental *conditions-that are right for the pathogen to develop*

Monthly average max air temp, average min air temp, average air temp (all ˚F) and precipitation (in.) for March 2009 to February 7, 2012.

Camino CIMIS station data.



Bacterial blast

Pathogen: *Pseudomonas syringae*

Host: Most *Prunus*, some *Pyrus* and *Malus*

Environmental conditions: Cold, wet weather from bud break to bloom.

Most severe in the lowest parts of the tree and usually in the coldest part of the orchard.

May need freezing of tissue for blast to occur.

Bacteria present on all parts of the tree during the year-though populations build with cool, wet conditions.

This picture taken on May 12, 2010. On May 11, temperatures reached 32.8F at 9 p.m. (Camino CIMIS).


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Fig. 3. Fruit infection caused by the blast organism.

Can you spray for blast?

1977 Bethell et.al. did work in pears:
Treated with
50% Copper at green tip @ 20 lb./ac (5 lb. per 100gal, 400 gal/ac)

17.5% streptomycin @ 32 oz./ac in 400 gal. @ 1% bloom

Got 1% blossom blast compared to 10%.

2 coppers not recommended due to phytotox.

Most agree that Copper/antibiotic sprays are NOT effective-most research hasn't shown positive effect.

Have recolonization with Pseudomonas.

Frost protection may be helpful.

Fig. 1. Blast of pear blossoms caused by the blast organism.

Copper-streptomycin sprays control pear blossom blast

Richard S. Bethell ■ Joseph M. Ogawa ■ W. Harley English
Robert R. Hansen ■ Billy T. Manji ■ Frank J. Schick

Blasting of flowers is an occasional problem in California pear orchards. Three common causes of blasted blossoms are boron deficiency, lack of winter chilling, and bacterial infection caused by

by streptomycin sprays during early bloom with the belief that these sprays do reduce the incidence of blast.

Critical field observations on disease development with reference to chill-

Fireblight

Pathogen: *Erwinia amylovora*

Hosts: Pear, esp. Bartlett, and Asian pear. Some apple cultivars, esp. Jonathan, Rome, Fuji.

Flowers susceptible-esp. when sugar in nectar is low (rainy weather or humidity). Rat-tail bloom.
New shoots, leaves, branches.

Spread by rain, insects, man (pruning tools).

Environment: Warm temperatures and humidity. Mean 62 in March, 60 in April and 58 in May. Treat prior to rain.


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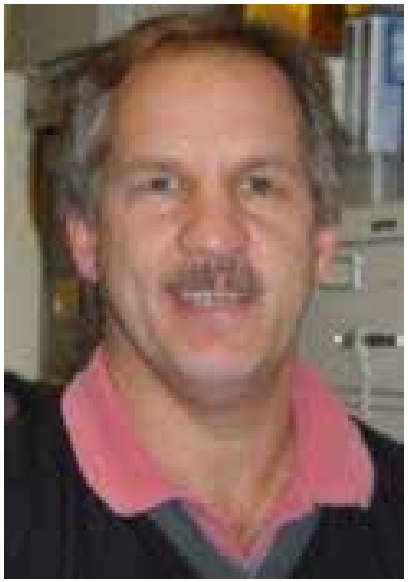
Credit for the fireblight research results presented today

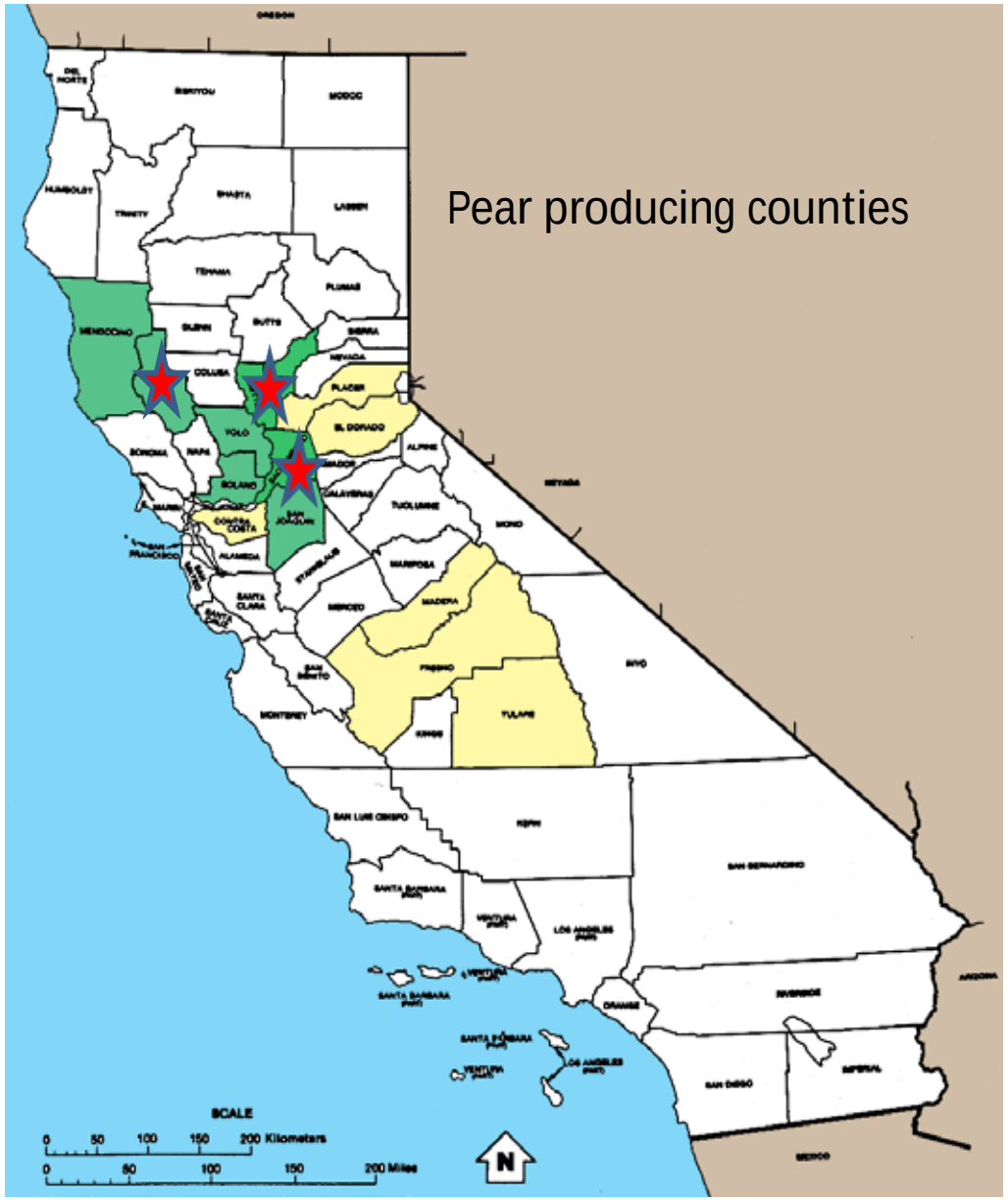


James E Adaskaveg
Plant Pathologist
at UC Riverside

Currently registered treatments for Fireblight

Compound	Notes	Efficacy
Copper	Used only during dormant/bloom-russetting. New formulations eval.	+++
Dithane	Mancozeb-a dithiocarbamate.	++
Streptomycin	(1950s) Resistance issues	++++/+
Oxytetracylcine	(1970s) Less effective, some resistance	+++
Bloomtime Biological	Pantoea agglomerans strain E325-Efficacy variable	+/+++
BlightBan	Pseudomonas syringae strain A506-Efficacy variable	+/++
Actinovate	Strep. Lydicus-currently evaluated	+/++

Surveys of antibiotic resistance (J. Adaskaveg)



Collection of isolates from major pear growing regions in CA (2006 - 2011)
•Sacramento valley – Sacramento, Sutter/ Yuba Co.
•Lake Co.

Evaluate sensitivity
•Streptomycin
•Oxytetracycline
•Kasugamycin

Rated resistance on basis of concentration required to inhibit 95% growth.

Results of antibiotic resistance survey

- No resistance to kasugamycin or oxytetracylcine found.
- Resistance to streptomycin was rated “moderate”.
- Resistance varies year to year and by location.
- Variation correlates with fireblight incidence and amount of spraying (we select for resistance in high pressure years). But those resistant bacteria are less fit.

So, if we rotate with new bactericides, high populations of streptomycin resistant bacteria can be avoided.

Treatment (@ bloom, full bloom, petal fall) ***J. Adaskaveg research results*	A.I.	Incidence
Control		a (~35%)
Actinovate 12 oz + Tactic 8 fl oz	Metabolite of *Strep. lydicus*	bcd (~18%)
Kasumin 8L 100 ppm + Actinovate 12 oz	Metabolite of *Strep. kasugaensis*	bcd (~7%)
Cerebrocide 64 fl oz + Ph-D 6.2 oz	Mushroom extract/ Polyoxin-D zinc	bcd
Kasumin 8L 100 ppm + Streptomycin 100 ppm		bcd
Fireline 200 ppm	Oxytetracycline hydrochloride	cd (~5%)
Badge X2 8 oz.	Copper hydroxide+ Copper oxychloride	cd
Firewall 100 ppm	Strep. sulfate	cd
Kasumin 8L 100 ppm		cd
Kasumin 2L 100 ppm		cd
Kasumin 8L 100 ppm + Quintec 6 fl oz		cd
Kasumin 8L 100 ppm + Prophyt 4 pt + Tactic	Potassium phosphite	d (~2%)

What about organic or “natural” options?

Treat. 4 airblast app. Starting at 80% bloom in 100gal/ac	A.I.	incidence after inoculation
Control		a (~35%)
Firewall 100 ppm	Strep. sulfate	d (< 5%)
*Badge X2 8 oz	Copper hydroxide+ Copper oxychloride	d (<5%)
Cerebrocide 64 fl oz	Mushroom extract	c (< 10%)
Cerebrocide 64 fl oz + Ph-D org. 6.2 oz	Mushroom extract/Polyoxin-D zinc	c (< 10%)
Blossom Protect 21.5 oz + Buffer 9.35 lb	Biological-microbial mix	b (~ 12%)
*Actinovate 12 oz + Tactic 8 fl oz	Strep. lydicus metabolites	c (< 10%)
Citrox BC 133 ml + Proalexin 133 ml rotated w/Biozyme	Fruit acids and flavinoids/activate plant defense	b (~ 17%)
Blossom Protect rotated w/Citrox/Proalexin		c (< 10%)

J. Adaskaveg research results. * OMRI labeled. Check CA. registration.

Fireblight-new chemical options coming

- Kasugamycin-Kasumin
  - Metabolite of *Strep. kasugaensis*.
  - Efficacy = or greater than Strep. or Oxytetracyline
  - Effective against resistant bacteria
  - No phytotox. observed after 3 applications
  - Different mode of action than other antibitoics
  - Jim Adaskaveg “favorite”
  - Registration in 2012?

Fireblight-new biological/natural options coming

- Range of new products with promise
- New copper compounds (i.e. Badge) no phytox after 3 applications
- Adaskaveg has seen variable efficacy in years of testing
- Advised to use when disease pressure is lower and in rotation.

Apple scab

Pathogen: Venturia inequalis

Host: Apple varieties show some difference in susceptibility: Ashmead's Kernel, Crimson Crisp, 'Sir Prize' resistant.
Pink Lady, Fuji, Jonagold, Granny Smith, Golden Delicious all susceptible or very susceptible.

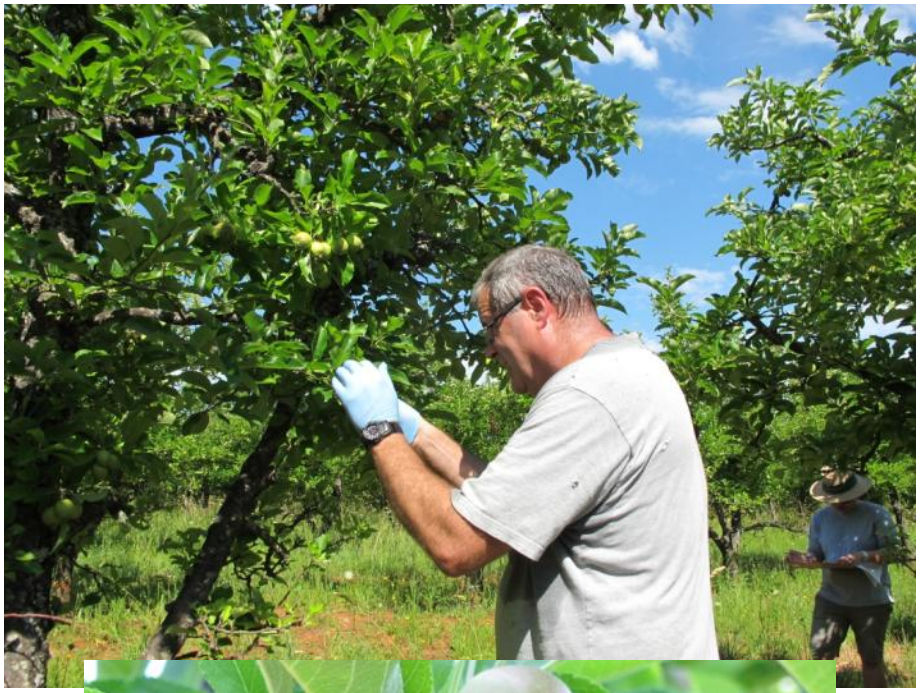
Susceptible starting at green tip and continuing through apple development IF rainy conditions present. Spores overwinter in leaf litter.

Environment: Moisture and temperature dependent- "Mills and LaPlante" table.

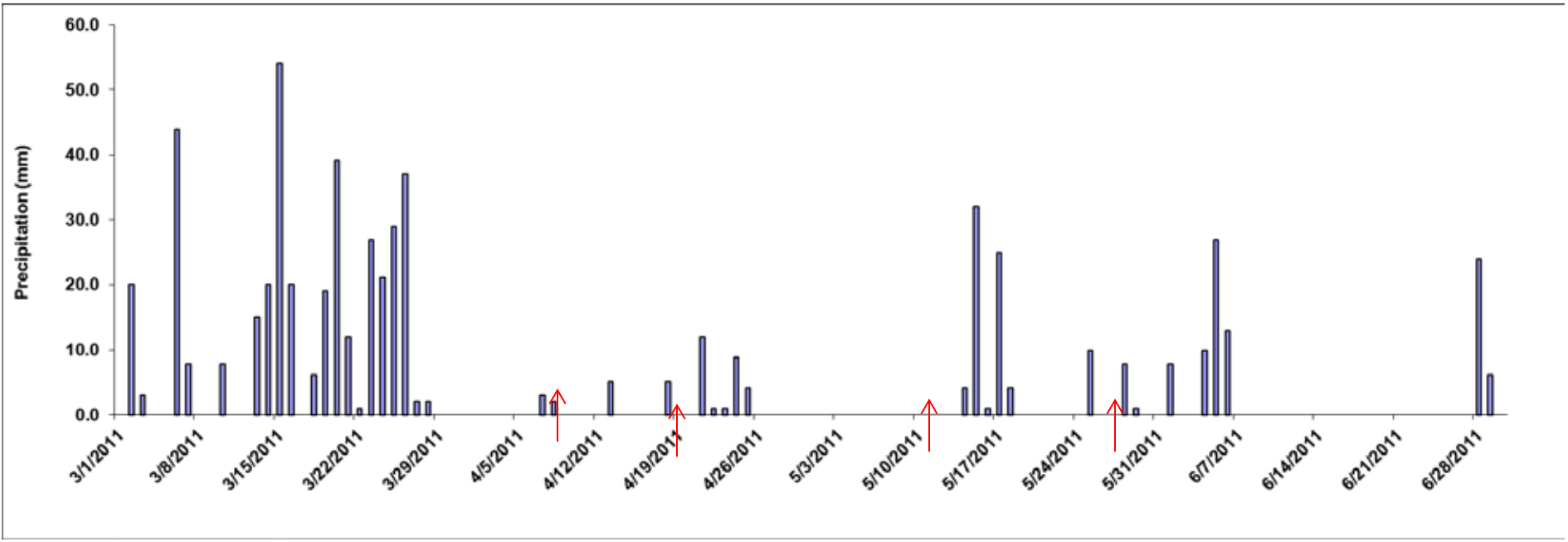
Ave. temperature from approx. 42F (30 hours wetting) to 78F (13 hours wetting).

Apple scab trials with Ian Bay, Doug Gubler lab

- Golden delicious block-untreated
- 4 trees per rep, 17 treatments,
- 4 application dates based on predicted rainfall and growth stage
- Applied by hand-gun in equiv. 100gal/ac-150gal/ac
- Evaluated on July 6-small fruits. 40 leaves and 40 fruits randomly from each tree.
- Scored number of lesions: percent of disease incidence and mean disease severity.



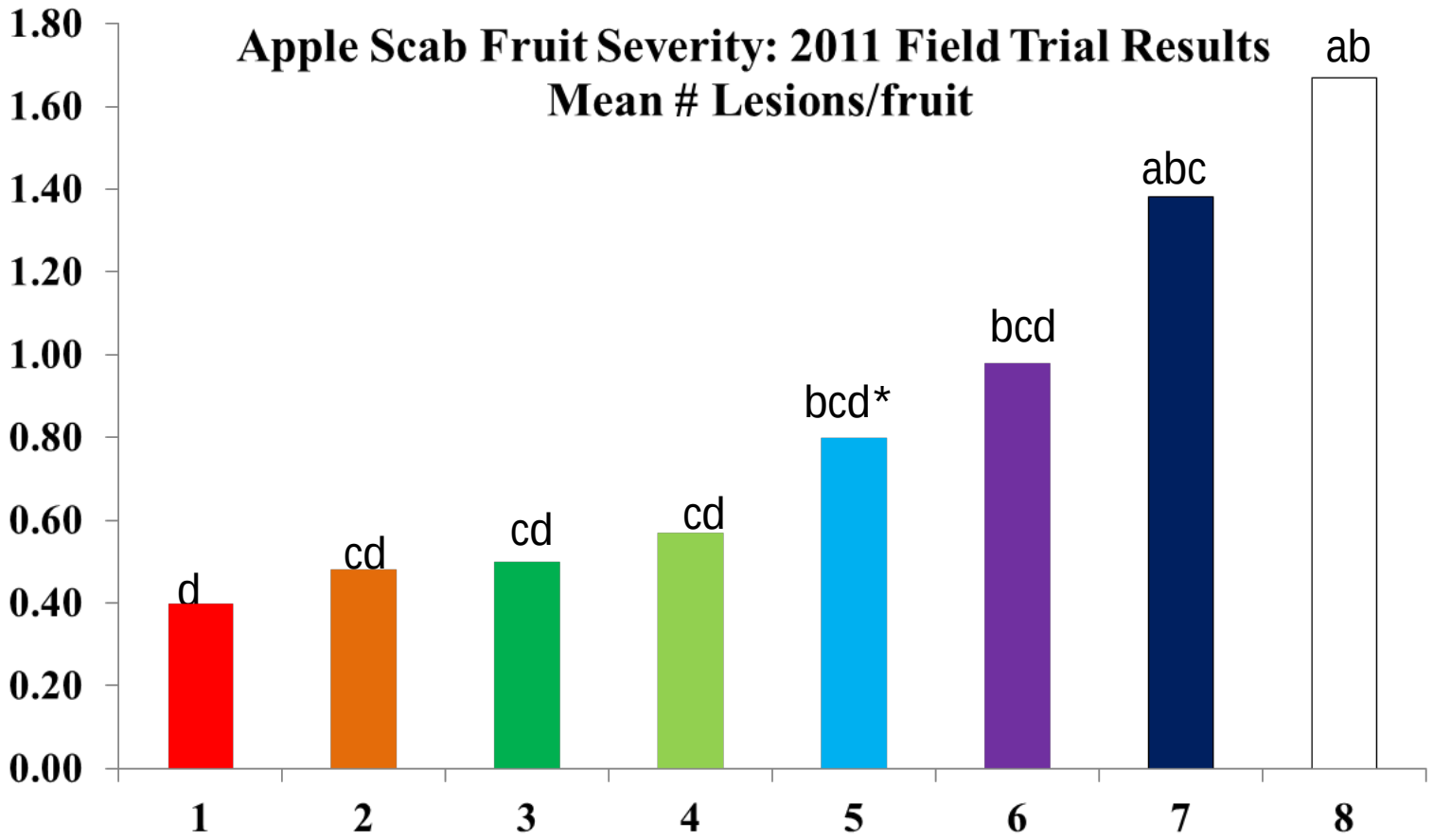
Rain events in 2011
Camino CIMIS data: Precip. in mm.



Applications for apple scab trial in 2011:
April 6 @ Green tip
April 19 @ Red bud
May 12 @ full bloom
May 27 @ petal fall

Apple Scab materials tested in 2011 trial

Product	Active ingredient(s) and concentration	Class	Manufacturer
Antica	Lactic acid (10%)	?	Ahcil Laboratories
Companion	Bacillus subtilus QB03 (0.03%)	biological	Growth Products, Ltd
Flint	trifloxystrobin (50%)	QoI	Bayer
Fontelis	penthiopyrad (20%)	carboxamide	Dupont
Koverall	mancozeb (75%)	carbamate	Cheminova
Manzate	mancozeb (75%)	carbamate	Dupont
MAR - YS	Yucca schidigera (100%)	plant extract	Monterey Ag Resources
Recover RX	nitrogen (3%)/phosphoric acid (18%)/potash (18%)	fertilizer	Growth Products, Ltd.
Sovran	kresoxim-methyl (50%)	QoI	BASF
Topguard 1.04 SC	flutriafol (12%)	dimethylase inhibitor	Dow AgroSciences
Vangard	cyprodinil (75%)	anilinopyrimidine	Syngenta Crop Protection, Inc.

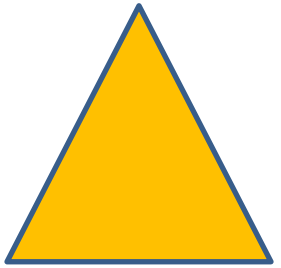


1= 4 lb.Manzate + 4 oz.Vangard (2x); 2 oz. Fontelis (2x)
2= 2.5 oz.Flint + 48 oz.Koverall, alt 13 oz.Topguard + 48 oz. Koverall
3= 5% v/v MAR-YS (Yucca Ag Aide)
4= 1 gal.Companion
5= 4 oz.Sovran-*Chemical Standard
6= Antica, 3.0%(v/v)
7=1 gal. Companion;2 gal. Recover RX; 0.5 gal Sil-Phite
8= Untreated control

What determines successful disease (scab) control?

- TIMING-***prior to rain*** and infection period when susceptible host present
- Adequate coverage
- Fungicide choice-rotation of products to fight resistance
  - Look for FRAC number on label

Host-*susceptible tissue present*



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Questions?