Fire Blight Control:

Antibiotics, Copper, Biologicals, and Others

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Outline

- **Seasonal fire blight concerns & considerations for using models**

- 2015 Fire blight trials in Geneva
  - Blossom blight
  - Shoot blight

Seasonal fire blight concerns

- Fire blight epidemics avoided in eastern NY & western NY hit hard
- Heavy June rains in western and northern NY & higher historical inoculum
- ENY growers felt models failed > wasted money

Managing fire blight: Using models

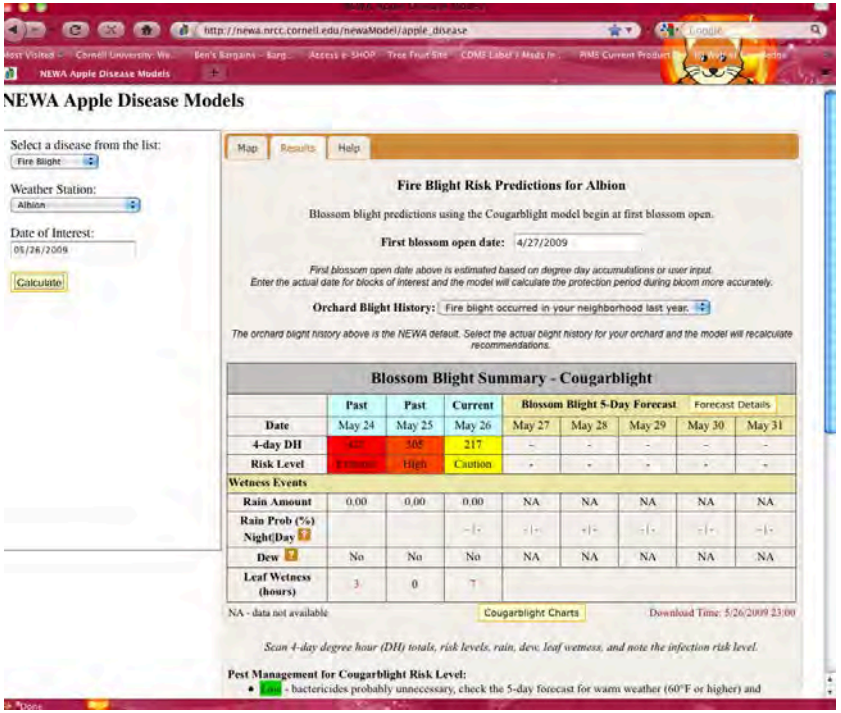
- Web-based intuitive pest/disease forecasting systems
  - Web versions of time-tested relationships with integrated weather data
- Promoted and used for apples in WA, Canada, China, & Europe:
- Prevents unnecessary pesticide applications, promotes pesticide stewardship, improves cost-effectiveness of pesticides, prevents losses due to disease

Managing fire blight: Using models

- Fire blight forecasting:
  - Predicts blossom blight infection risk periods
  - Helps track development of shoot blight (not infection)
  - Best practice for avoiding antibiotic resistance
  - NEWA system & Marybylt 7.1: heat units & presence of moisture

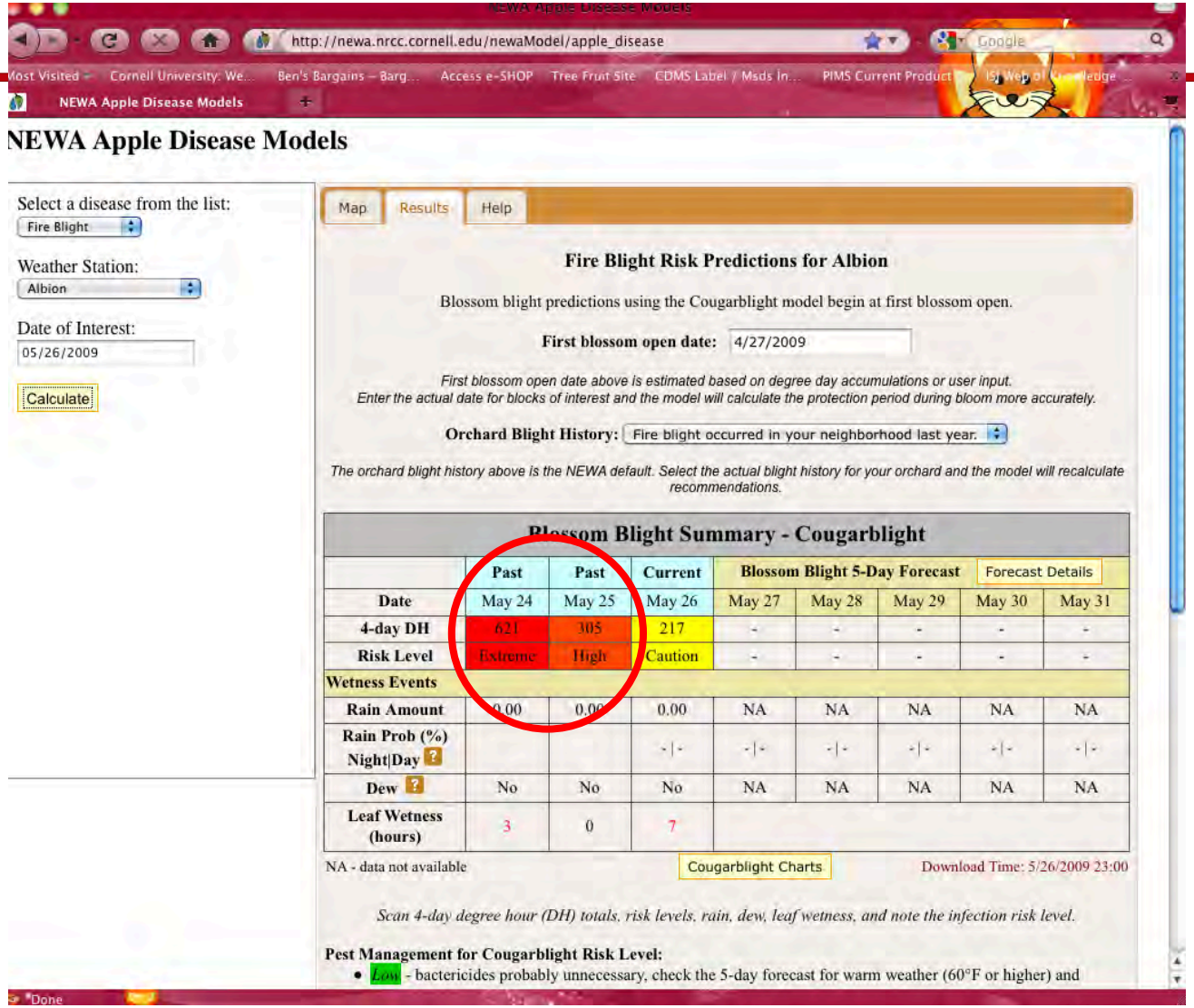
Managing fire blight: Using models

- NEWA system:
  - Based on CougarBlight logic (WSU)
    - Model works well on east coast apples
  - Integrated with NEWA/NRCC data
  - Updated regularly (EIP Logic)
  - Fully Automated: w/ limited user input



http://newa.cornell.edu/index.php?page=apple-diseases

Managing fire blight: Using models

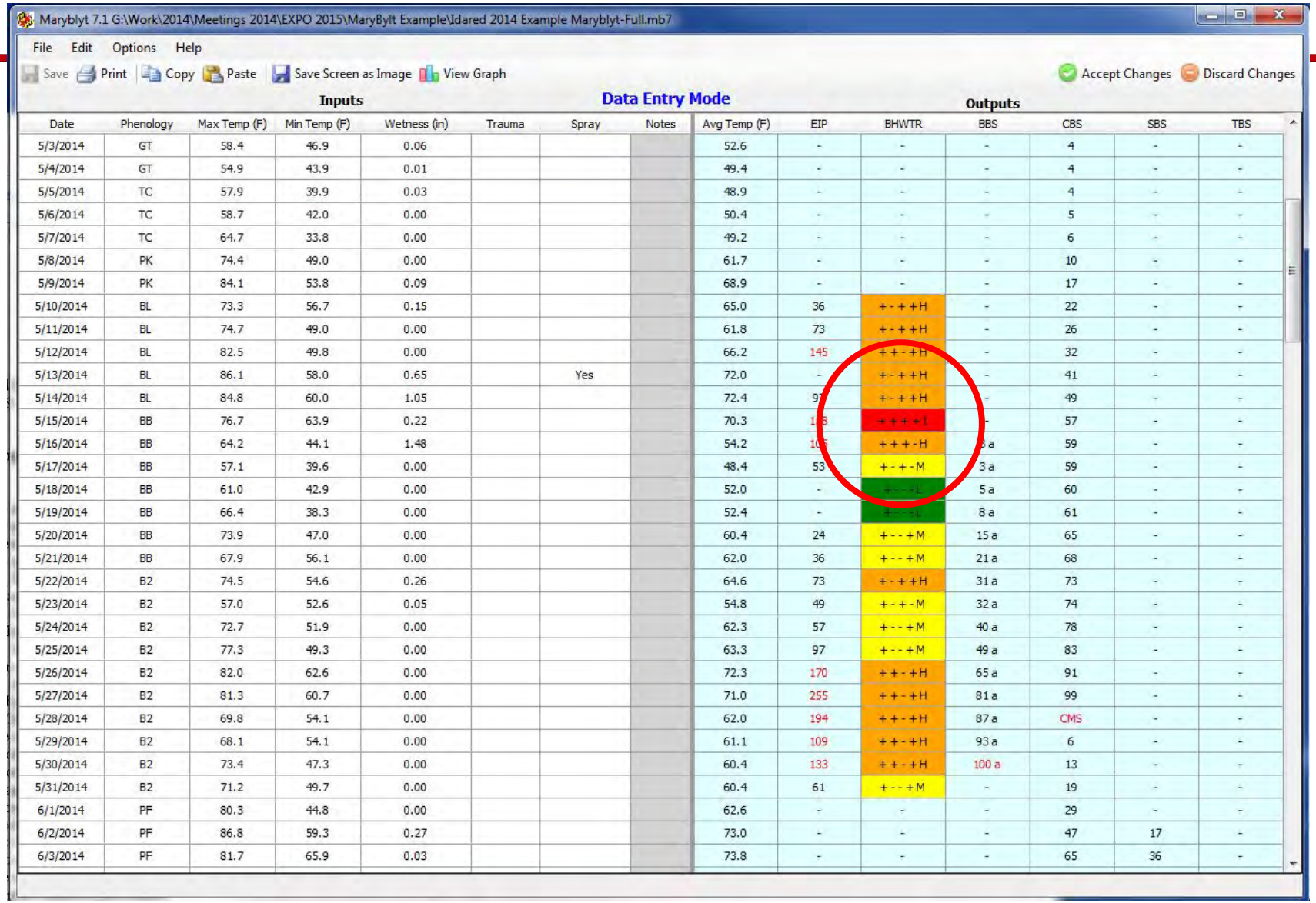


http://newa.nrcc.cornell.edu/newaModel/apple_disease

Managing fire blight: Using models

- MaryBlyt 7.1:
  - Based on east coast research and validation
  - Standalone program
  - Requires more user input/data, but higher level of specificity
  - Season long predictions
  - Can import NEWA data (NEWA will incorporate logic) http://www.caf.wvu.edu/kearneysville/Maryblyt/

Managing fire blight: Using models



Maryblyt 7.1 G:\Work\2014\Meetings 2014\EXPO 2015\MaryBylt Example\Idared 2014 Example Maryblyt-Full.mb7

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Data Entry Mode

	Inputs							Outputs						
Date	Phenology	Max Temp (F)	Min Temp (F)	Wetness (in)	Trauma	Spray	Notes	Avg Temp (F)	EIP	BHWTR	BBS	CBS	SBS	TBS
5/3/2014	GT	58.4	46.9	0.06				52.6	-	-	-	4	-	-
5/4/2014	GT	54.9	43.9	0.01				49.4	-	-	-	4	-	-
5/5/2014	TC	57.9	39.9	0.03				48.9	-	-	-	4	-	-
5/6/2014	TC	58.7	42.0	0.00				50.4	-	-	-	5	-	-
5/7/2014	TC	64.7	33.8	0.00				49.2	-	-	-	6	-	-
5/8/2014	PK	74.4	49.0	0.00				61.7	-	-	-	10	-	-
5/9/2014	PK	84.1	53.8	0.09				68.9	-	-	-	17	-	-
5/10/2014	BL	73.3	56.7	0.15				65.0	36	+ - + + H	-	22	-	-
5/11/2014	BL	74.7	49.0	0.00				61.8	73	+ - + + H	-	26	-	-
5/12/2014	BL	82.5	49.8	0.00				66.2	145	+ + - + H	-	32	-	-
5/13/2014	BL	86.1	58.0	0.65		Yes		72.0	-	+ - + + H	-	41	-	-
5/14/2014	BL	84.8	60.0	1.05				72.4	97	+ - + + H	-	49	-	-
5/15/2014	BB	76.7	63.9	0.22				70.3	1[illegible]	+ + + + L	-	57	-	-
5/16/2014	BB	64.2	44.1	1.48				54.2	10[illegible]	+ + + - H	[illegible] a	59	-	-
5/17/2014	BB	57.1	39.6	0.00				48.4	53	+ - + - M	3 a	59	-	-
5/18/2014	BB	61.0	42.9	0.00				52.0	-	+ - - L	5 a	60	-	-
5/19/2014	BB	66.4	38.3	0.00				52.4	-	+ - - L	8 a	61	-	-
5/20/2014	BB	73.9	47.0	0.00				60.4	24	+ - - + M	15 a	65	-	-
5/21/2014	BB	67.9	56.1	0.00				62.0	36	+ - - + M	21 a	68	-	-
5/22/2014	B2	74.5	54.6	0.26				64.6	73	+ - + + H	31 a	73	-	-
5/23/2014	B2	57.0	52.6	0.05				54.8	49	+ - + - M	32 a	74	-	-
5/24/2014	B2	72.7	51.9	0.00				62.3	57	+ - - + M	40 a	78	-	-
5/25/2014	B2	77.3	49.3	0.00				63.3	97	+ - - + M	49 a	83	-	-
5/26/2014	B2	82.0	62.6	0.00				72.3	170	+ + - + H	65 a	91	-	-
5/27/2014	B2	81.3	60.7	0.00				71.0	255	+ + - + H	81 a	99	-	-
5/28/2014	B2	69.8	54.1	0.00				62.0	194	+ + - + H	87 a	CMS	-	-
5/29/2014	B2	68.1	54.1	0.00				61.1	109	+ + - + H	93 a	6	-	-
5/30/2014	B2	73.4	47.3	0.00				60.4	133	+ + - + H	100 a	13	-	-
5/31/2014	B2	71.2	49.7	0.00				60.4	61	+ - - + M	-	19	-	-
6/1/2014	PF	80.3	44.8	0.00				62.6	-	-	-	29	-	-
6/2/2014	PF	86.8	59.3	0.27				73.0	-	-	-	47	17	-
6/3/2014	PF	81.7	65.9	0.03				73.8	-	-	-	65	36	-

Managing fire blight: Using models

- Considerations for models:
  - Tells: **When** and **How** favorable environmental conditions are for blossom blight infection
  - Doesn't predict control failures or future disease
  - Shoot blight > **internal** movement of bacteria to growing shoot tips or **external** following a warm windy storm
  - It's more cost-effective to spray for fire blight when environment conditions are favorable
  - If you are going to spray, use the models to guide you application timing

Managing fire blight: Using models

- Considerations for models:
  - Fire Trials without inoculation during favorable conditions
    - No infection - Barely noticeable infection
    - Not enough blight to see differences
    - Shoot blight only if hot summer storms during periods of vigorous growth
  - Fire blight trial blocks don’t get fire blight every year
  - Do you need to spray for fire blight?

Managing fire blight: Using models

- Considerations for models:
  - The consequences are too severe if fire blight develops or gets established (esp. New Plantings)

Outline

- Seasonal fire blight concerns & considerations for using models

- **2015 Fire blight trials in Geneva**
  - **Blossom blight**
  - **Shoot blight**

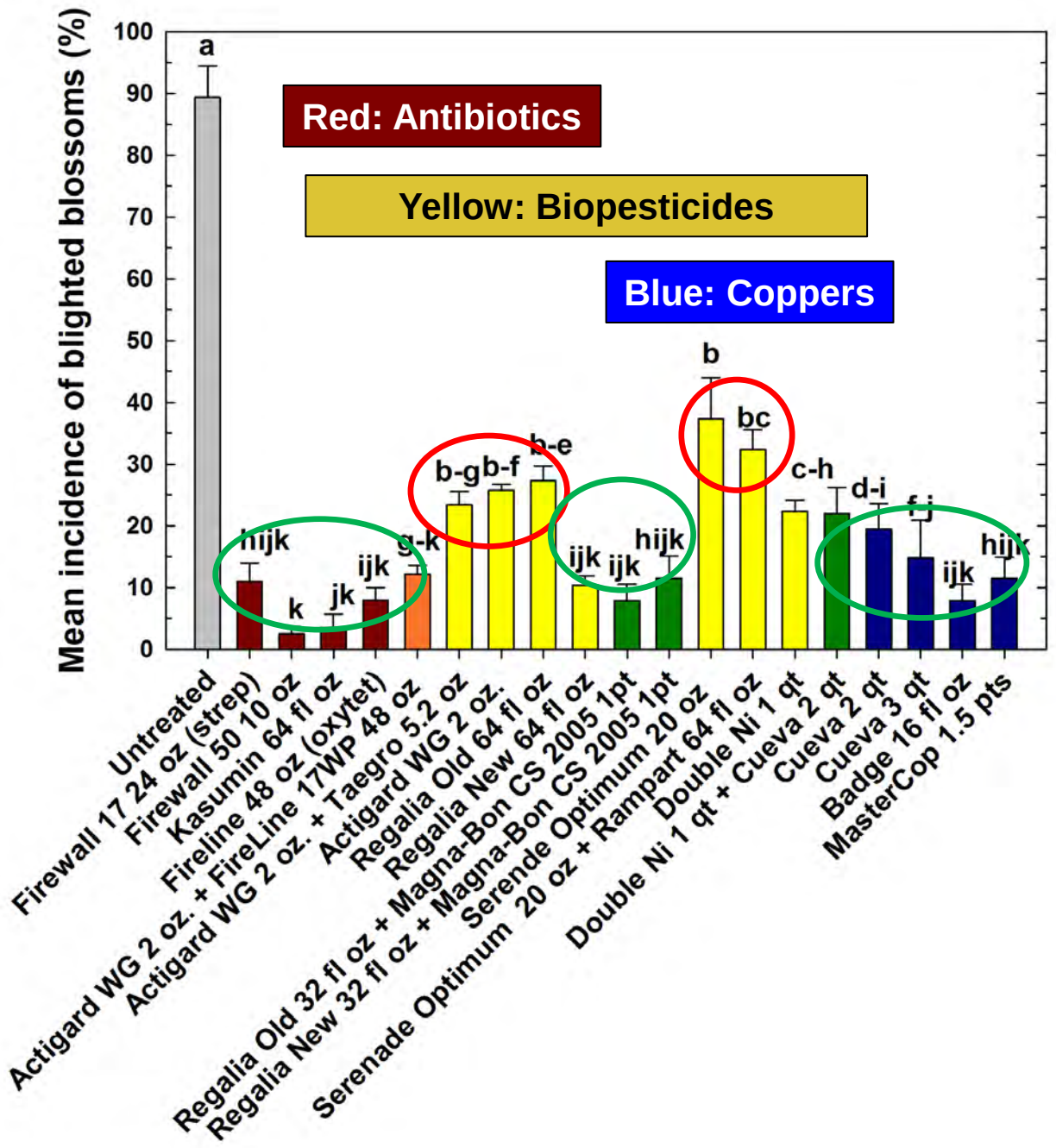
2015 Fire Blight Trials - Geneva

- Orchard site
  - 12-year-old ‘Idared’ trees on B.9

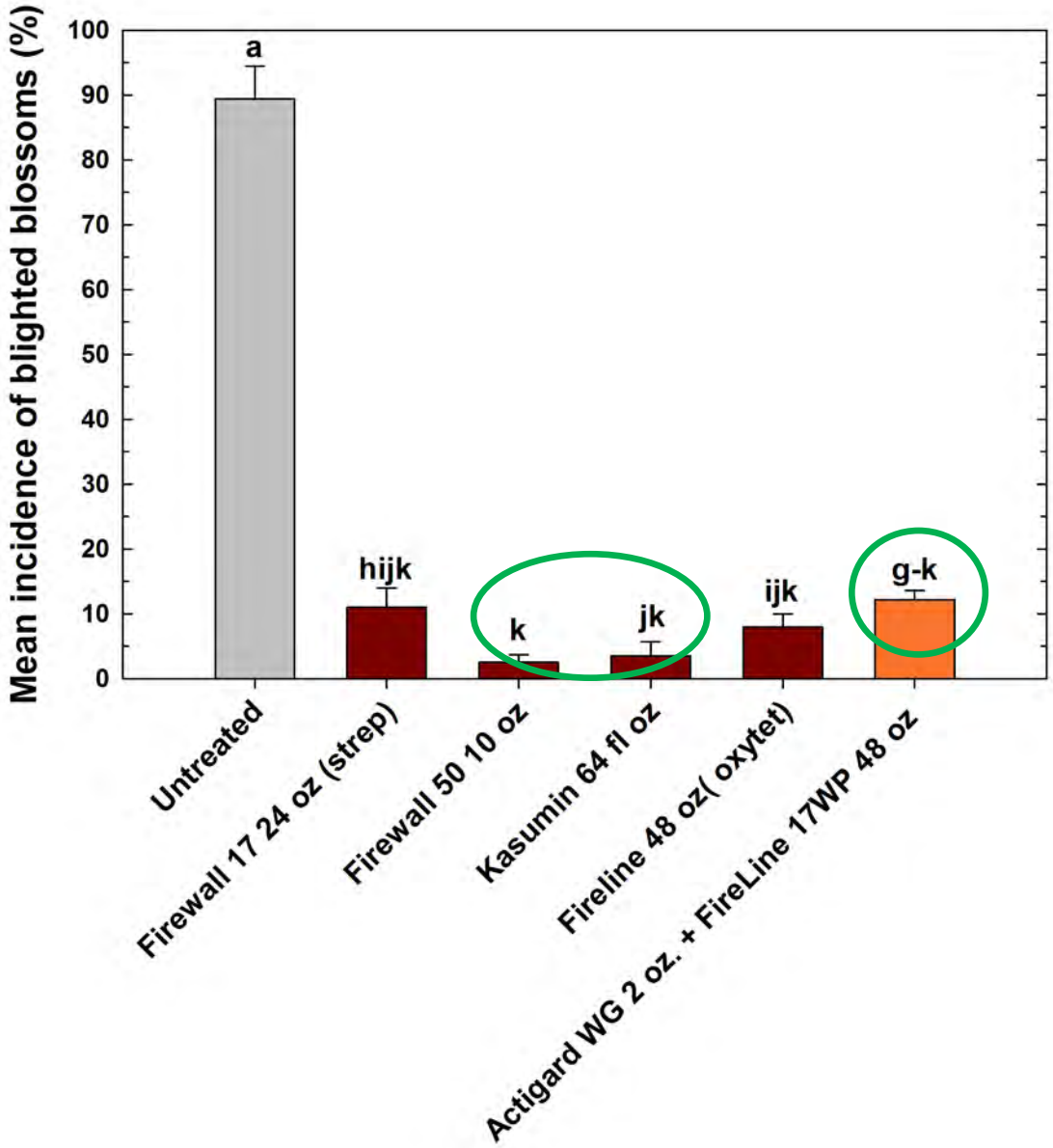
- Artificial inoculum: hand-pump sprayer for blossom blight & scissor dip for SB

2015 Fire Blight Trials - Geneva

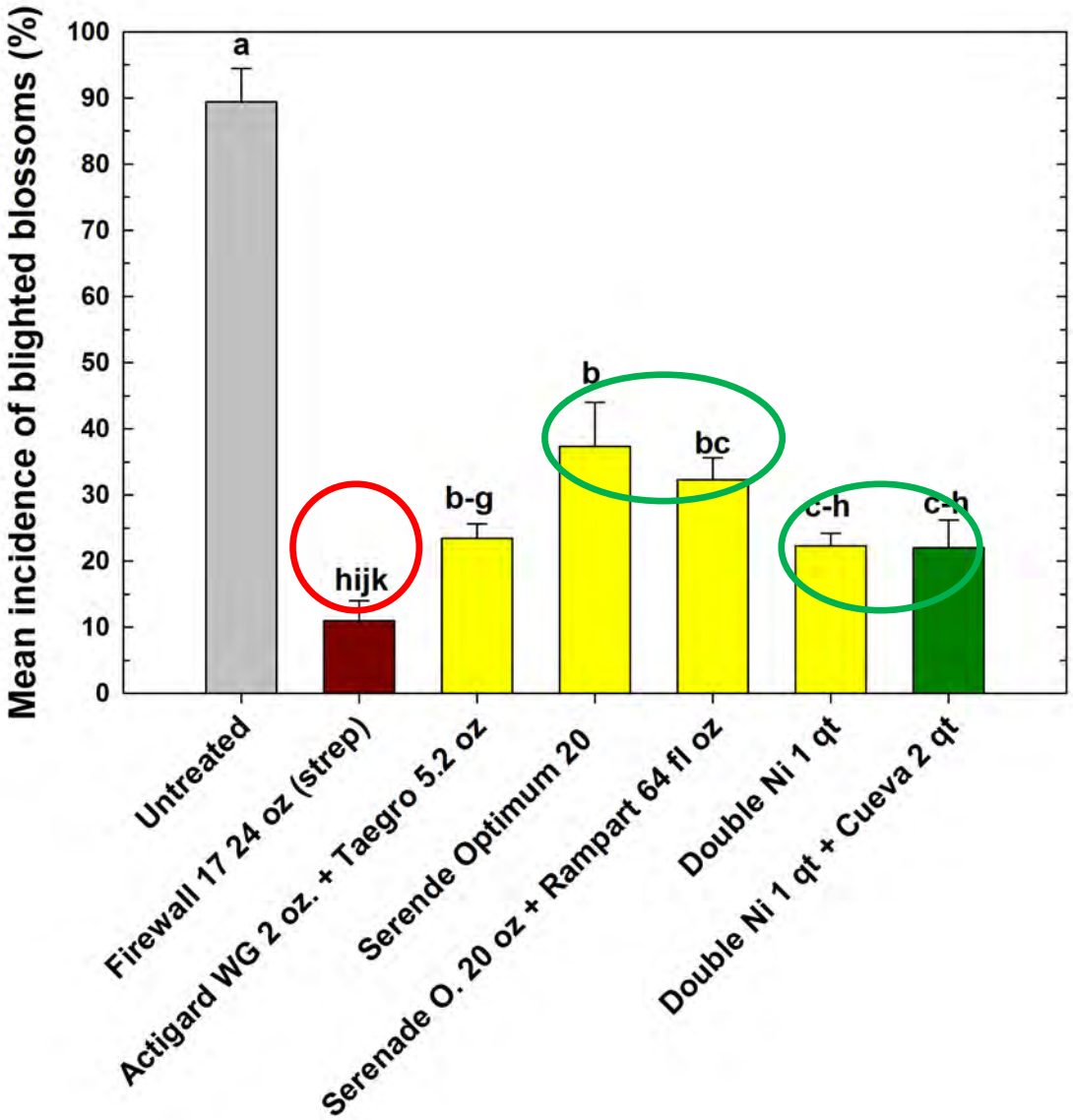
- Blossom blight application timing
  - Pre-bloom timings for biopesticides
  - All antibiotics & biopesticides @ 80% bloom
  - 10% (9 May) to 80% (10 may) 80ºF
  - (Ea 273 at $1x10^5$ $CFUml^{-1}$)
- Blossom blight incidence: percentage of blighted blossoms (5 reps)


Red: Antibiotics
Yellow: Biopesticides
Blue: Coppers
Mean incidence of blighted blossoms (%)
100
90
80
70
60
50
40
30
20
10
0
a
hijk
k
jk
ijk
g-k
b-g
b-f
b-e
ijk
ijk
hijk
b
bc
c-h
d-i
f-j
ijk
hijk
Untreated
Firewall 17 24 oz (strep)
Firewall 50 10 oz
Kasumin 64 fl oz
Fireline 48 oz (oxytet)
Actigard WG 2 oz. + FireLine 17WP 48 oz
Actigard WG 2 oz. + Taegro 5.2 oz
Actigard WG 2 oz.
Regalia Old 64 fl oz
Regalia New 64 fl oz
Magna-Bon CS 2005 1pt
Regalia Old 32 fl oz + Magna-Bon CS 2005 1pt
Regalia New 32 fl oz + Magna-Bon CS 2005 1pt
Serende Optimum 20 oz
Serenade Optimum 20 oz + Rampart 64 fl oz
Double Ni 1 qt
Double Ni 1 qt + Cueva 2 qt
Cueva 2 qt
Cueva 3 qt
Badge 16 fl oz
MasterCop 1.5 pts

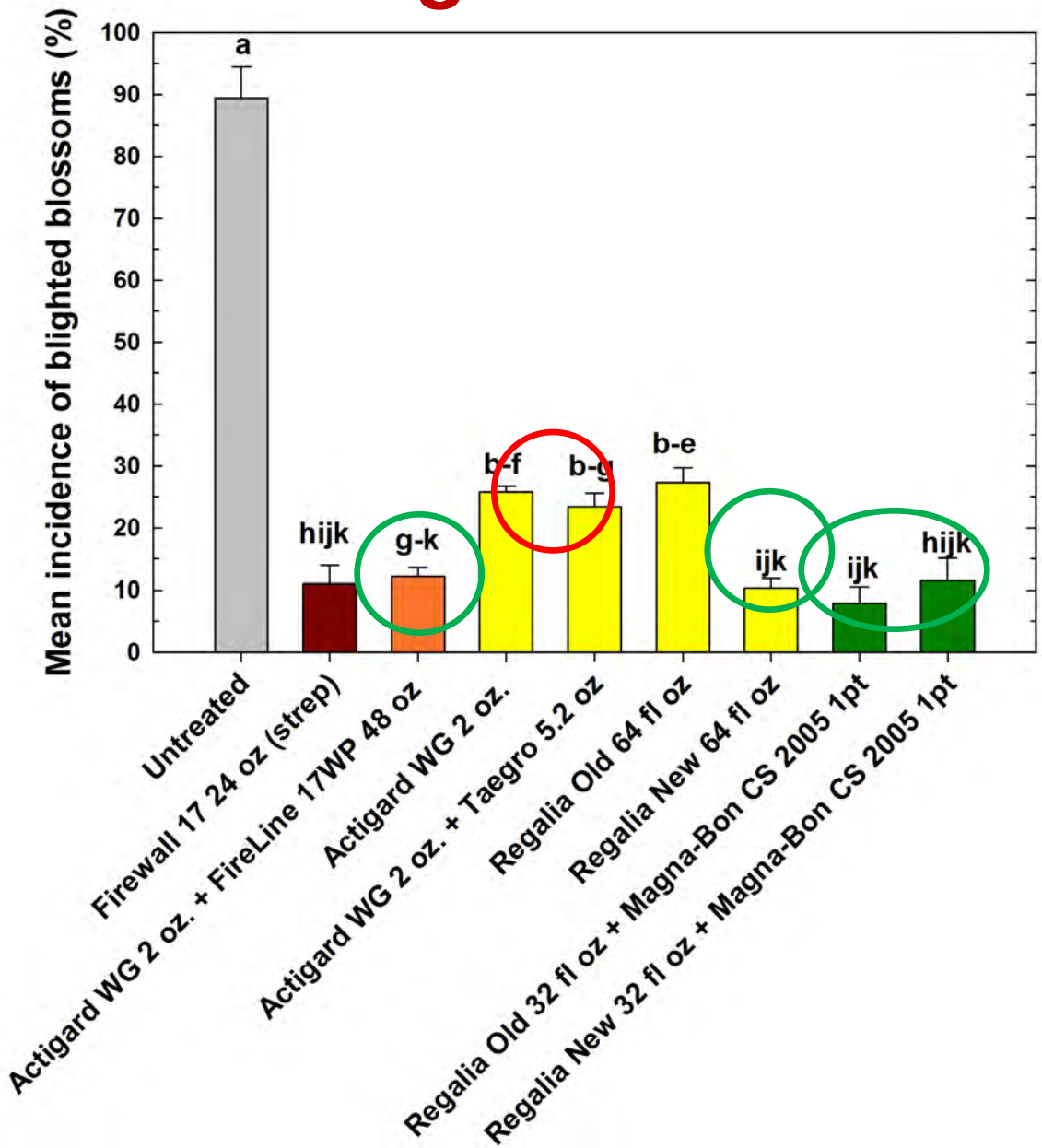
2015 Fire Blight Trials: Anti BB



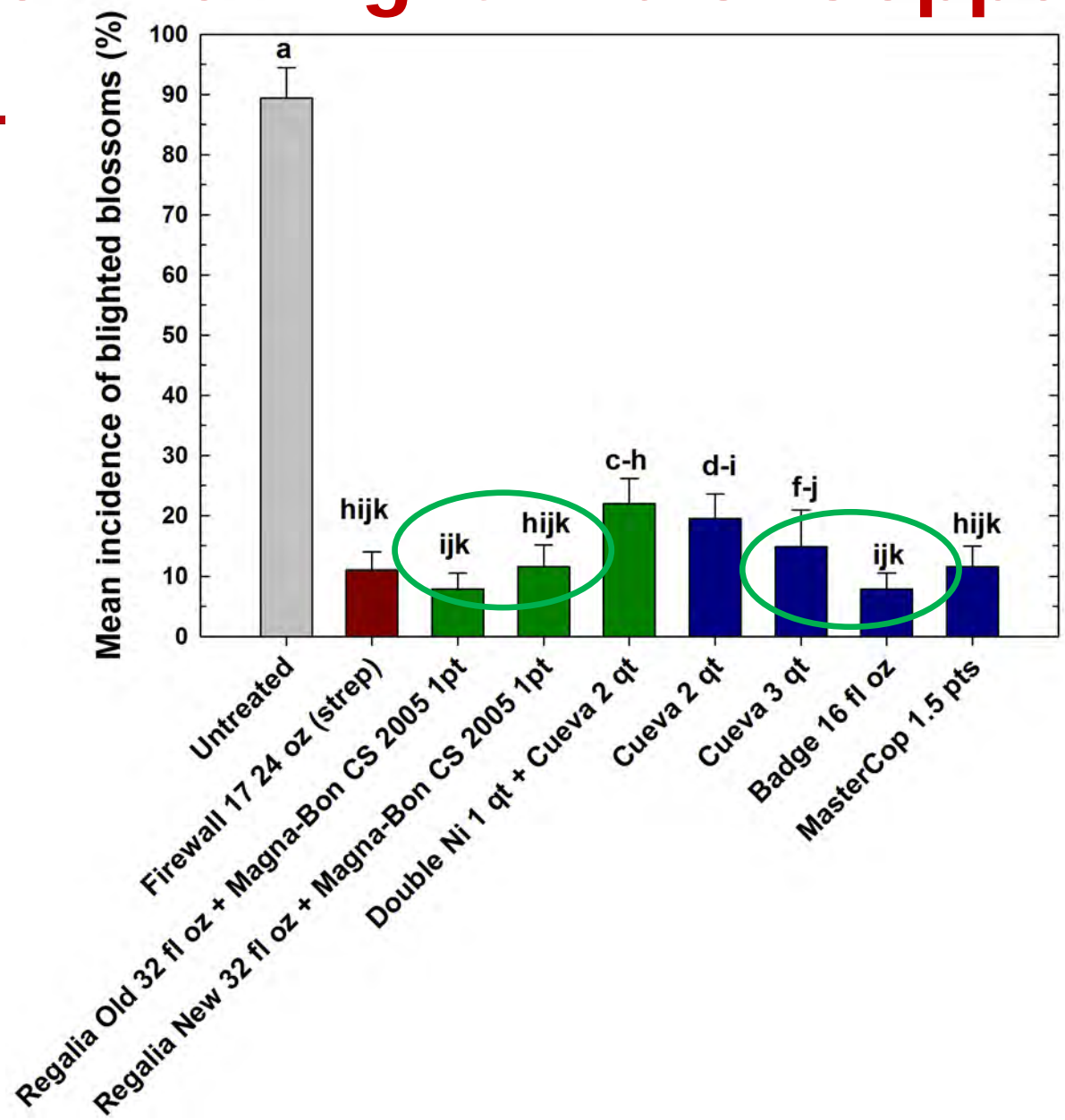
2015 Fire Blight Trials: Bio BB



2015 Fire Blight Trials: SARS BB

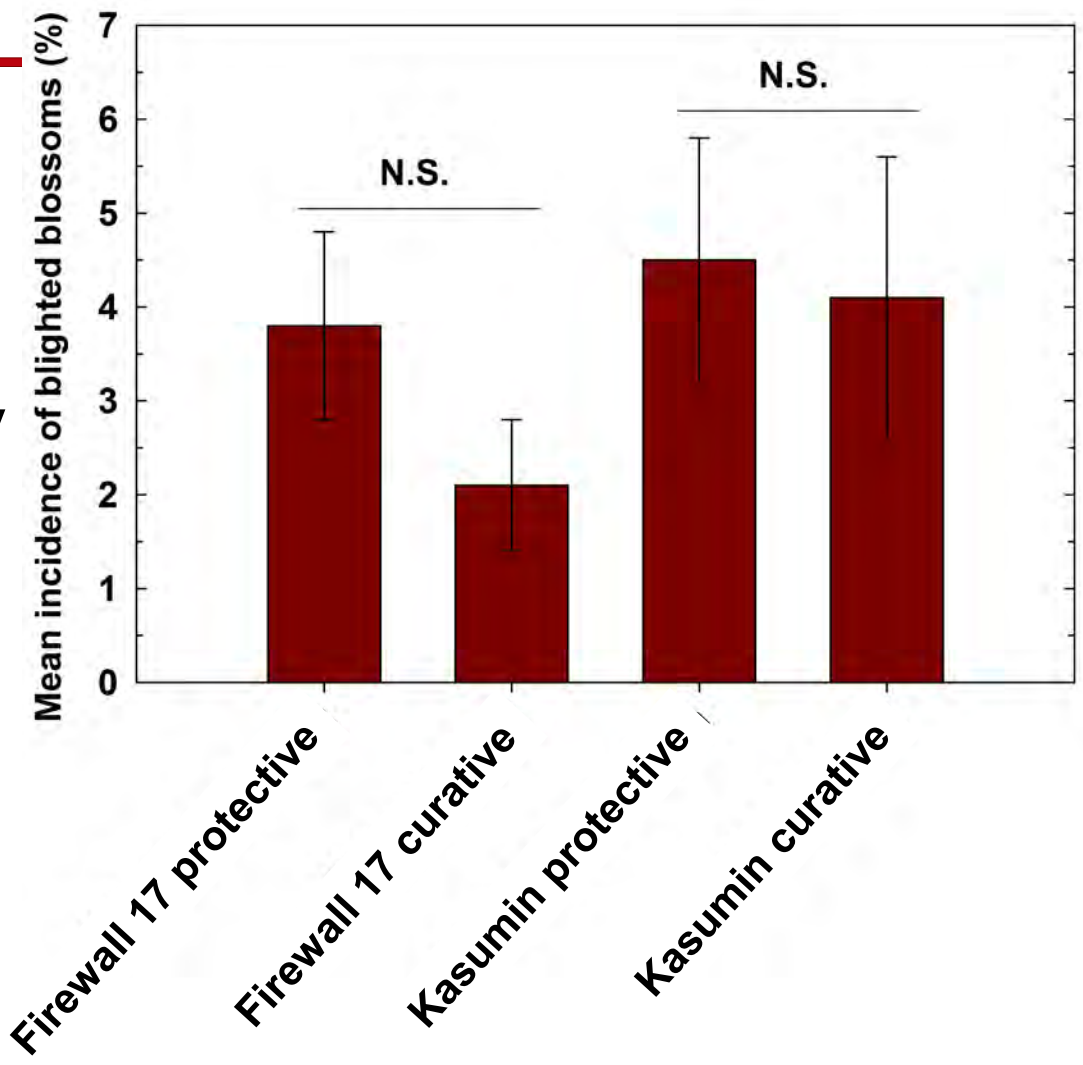


2015 Fire Blight Trials: Coppers – BB



2015 Fire Blight Trials: Post-infection

- Curative applications applied 24 h following inoculation
- Streptomycin: partially systemic 12-24 h post infection
- Kasumin: no systemic activity > still effective 24 h post infection
- May 10-12: 60-80 ºF, 0.13-0.50”



2015 Fire Blight Trials: Blossom Blight

Trends & Considerations

- Antibiotics:
  - Firewall 50WP most effective antibiotic (Section 18 for citrus canker)
  - Kasumin 2L: most effective of registered antibiotics for fire blight
  - Fireline 17WP: worked well this year (protectant – static)

- Coppers: Badge, MasterCop, & Cueva (3qt rate) on par with weaker antibiotics **No phyto!**

2015 Fire Blight Trials: Blossom Blight

Trends & Considerations

- Biologicals: Double Nickel LC > Serenade
  - Work fairly well – good in light pressure situations and organic
- SARS: Regalia worked well enough to look like antibiosis
  - New formulation of Regalia even better
  - Adding Magna-Bon CS improved lower rate applications

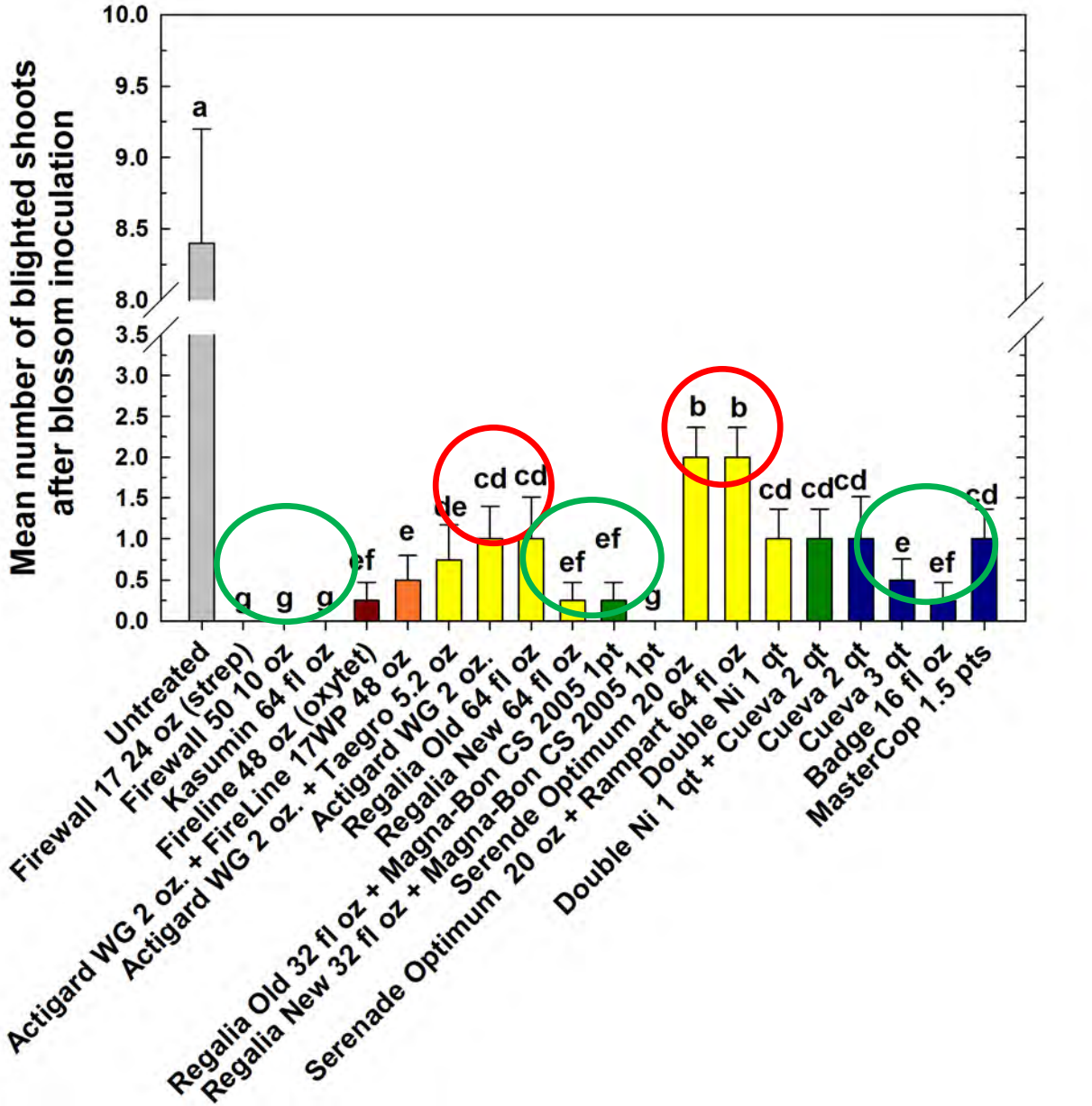
2015 Fire Blight Trials: Shoot blight

- Shoot blight application timing
  - Active terminal growth (5-7”): 24 hours after inoculation (trauma)
  - Apogee (PF/1-2”) & Actigard (5-days prior)
  - June ~64ºF 7.28”
- Shoot blight: progression of canker of 20 shoots (5 reps)

2015 Fire Blight Trials: Shoot blight

- Severe shoot blight > June ~64ºF 7.28”
- Kasumin 2L, FireWall 17WP, Apogee > ~ 60% control
- Actigard 2 oz = Untreated
- Orchard mostly dead in August –except apogee

2015 Fire Blight Trials: BI-SB



2015 Fire Blight Trials: Shoot blight

Trends & Considerations

- Trauma based inoculation – Apogee or antibiotics are the only viable options
  - Apogee 3-6 oz/100 gal @ 1-3” growth & again 14-21 days later
  - Apogee 2 (oz/100 gal) 1-3” growth > 3 oz > 2oz @ 21 days
- Late season antibiotic use (No Kasumin) > trauma events

2015 Fire Blight Trials: Shoot blight

Trends & Considerations

- Blossom inoculated shoot blight (small trees)
  - Trends mirror the blossom blight trends with antibiotics and coppers > best
  - Inoculum reduction > secondary shoot blight
  - Regalia + Magna-Bon comparable to other copper alternatives & even strep
  - Adding to Regalia to Apogee may be beneficial

Additional Questions