

Apple PGR's for Michigan 2019

Philip Schwallier
District Hort Agent
Clarksville Research Center

Thanks to:

Michigan Apple Research Committee
Michigan State Horticulture Society
Tree Fruit Commission
Valent BioSciences, Valent USA
AmVac
BASF

MICHIGAN STATE
UNIVERSITY
EXTENSION

MICHIGAN STATE UNIVERSITY
AgBioResearch

Apogee and Actigard

Philip Schwallier
District Hort Agent
Clarksville Research Center

Thanks to:

Michigan Apple Research Committee
Michigan State Horticulture Society
Tree Fruit Commission
Valent BioSciences, Valent USA
AmVac
BASF

MICHIGAN STATE
UNIVERSITY
EXTENSION

MICHIGAN STATE UNIVERSITY
AgBioResearch

Tall Spindle
Spy 2009
4th leaf



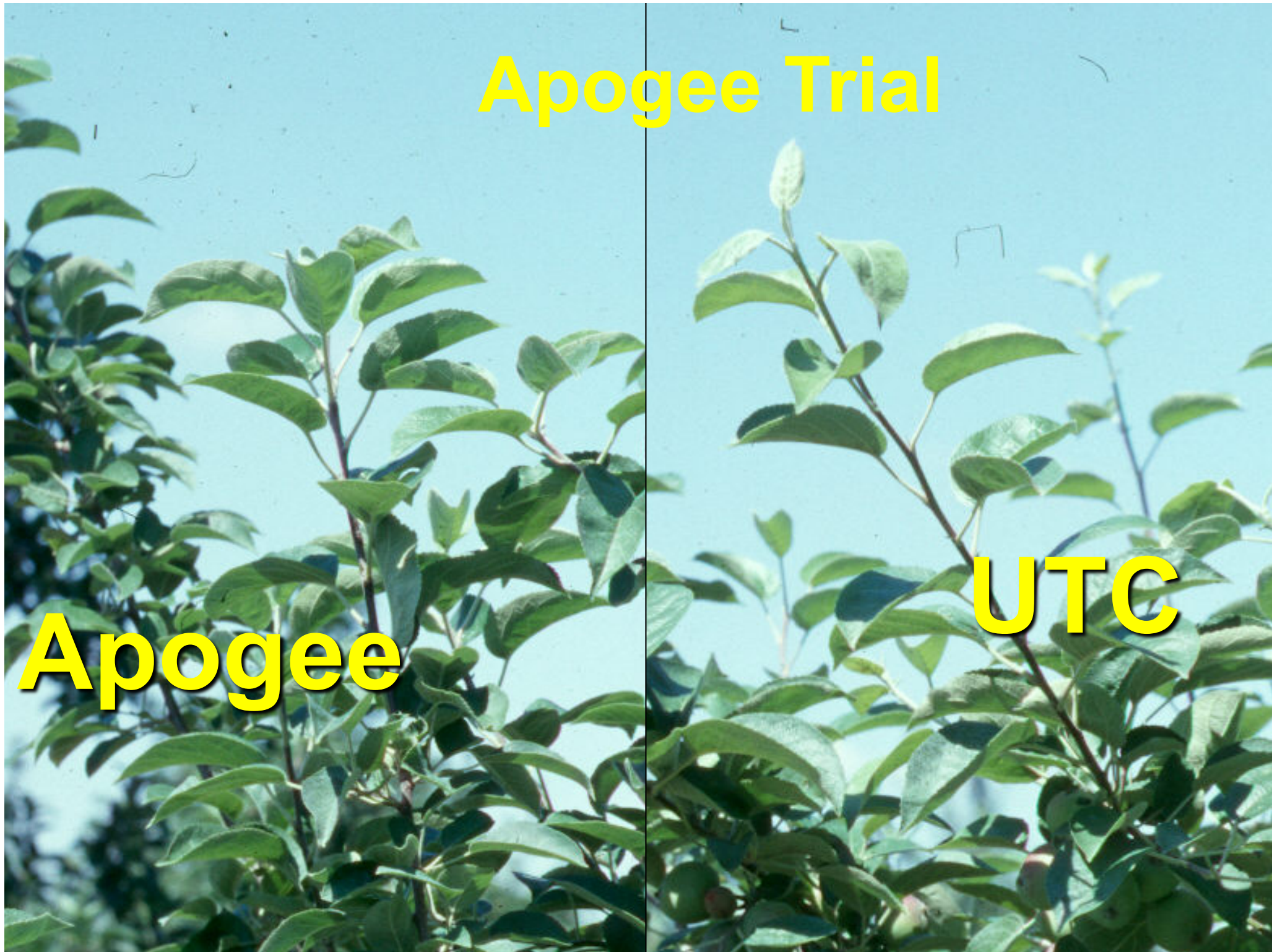
Apogee

- Vegetative Growth Control
- Apogee (Prohexadione-calcium)
 - Inhibits production of gibberellic acid (GA).
 - Locally systemic.
 - Apply early (King Bloom Petal Fall)
 - Not compatible with hard water, Ca, B.
 - Better spray coverage, reduce pruning
 - Fewer insect/disease problems
- Fire Blight Suppression
- Reduces Pruning
- Enhances Red Color???
- Return Bloom??

Apogee Trial

Apogee

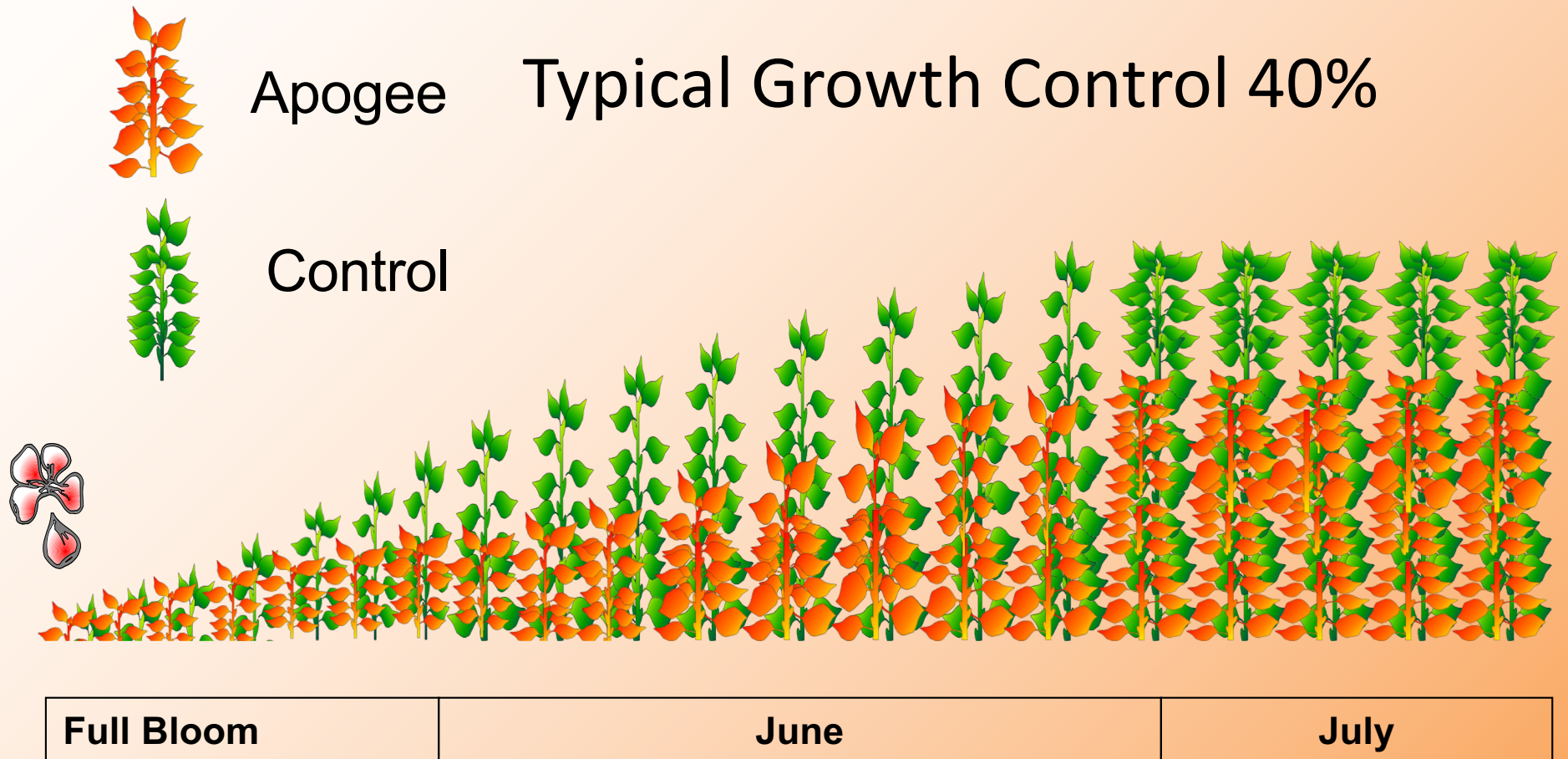
UTC



Apogee



Apogee Trial Shoot Growth

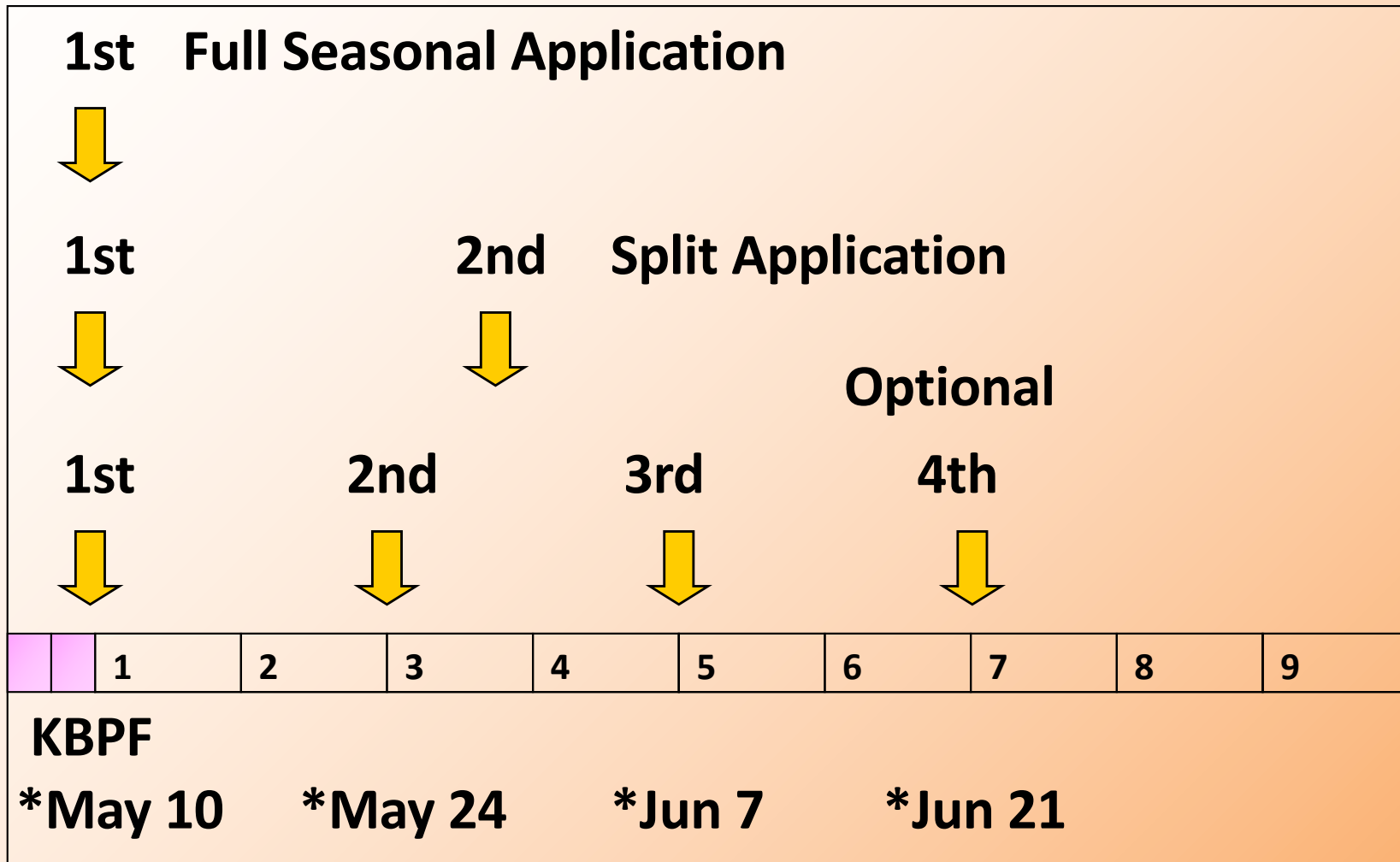


NW Mich. Apogee Trial 2008



Nikki Rothwell

Timing Apogee Applications



*These dates are typical timing dates for the Grand Rapids, Michigan area.

Apogee

Fireblight

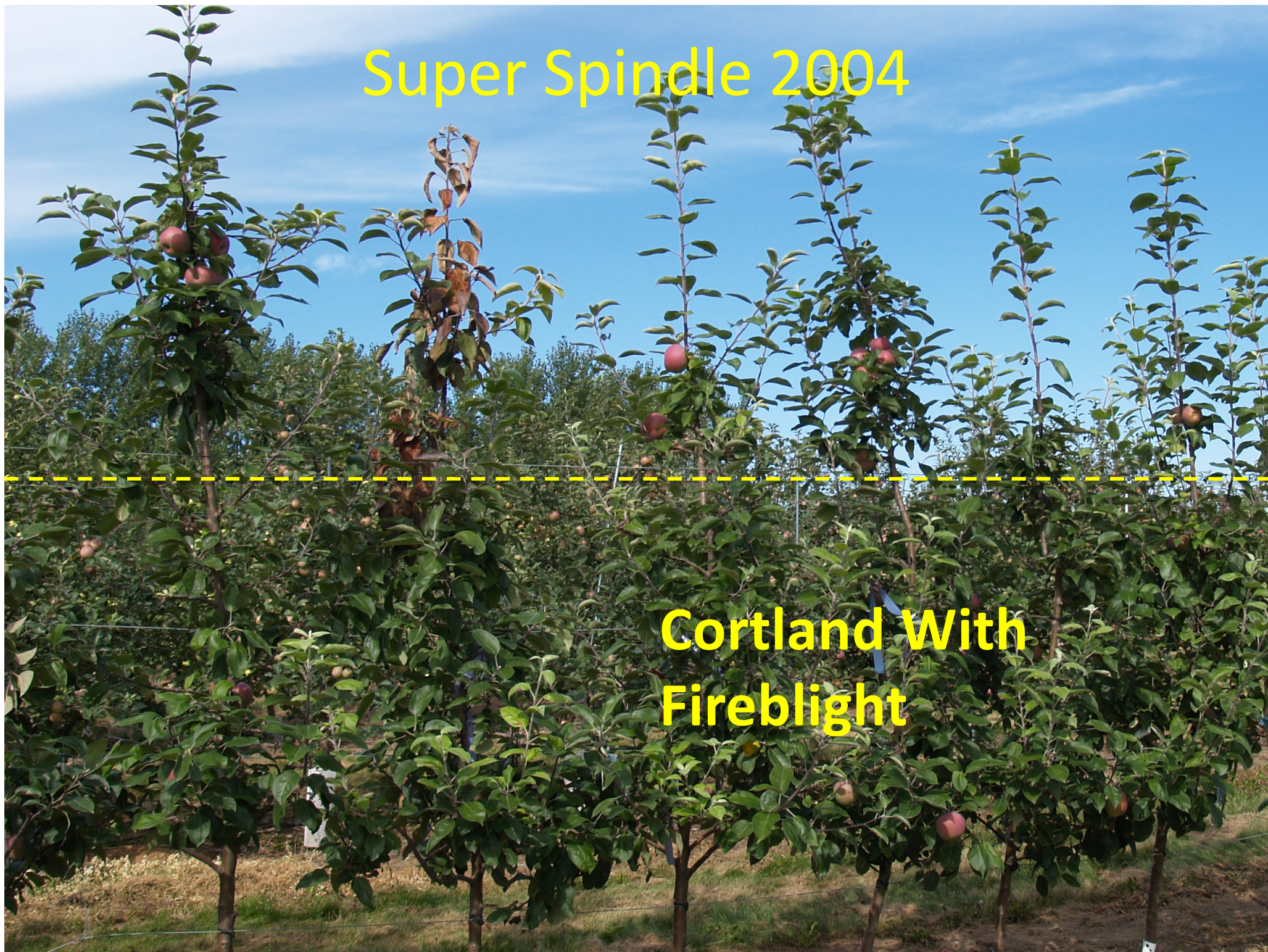
- Fireblight Suppression
- Will suppress FB canker growth and FB infections on shoots
- Key factor is apply early and high rates (get the shoots under control early)

Fireblight Shoot Blight



Super Spindle 2004

**Cortland With
Fireblight**



Exp 25

Super Spindle 2007

Fire Blight Tree Death

Apogee

UTC





Untreated



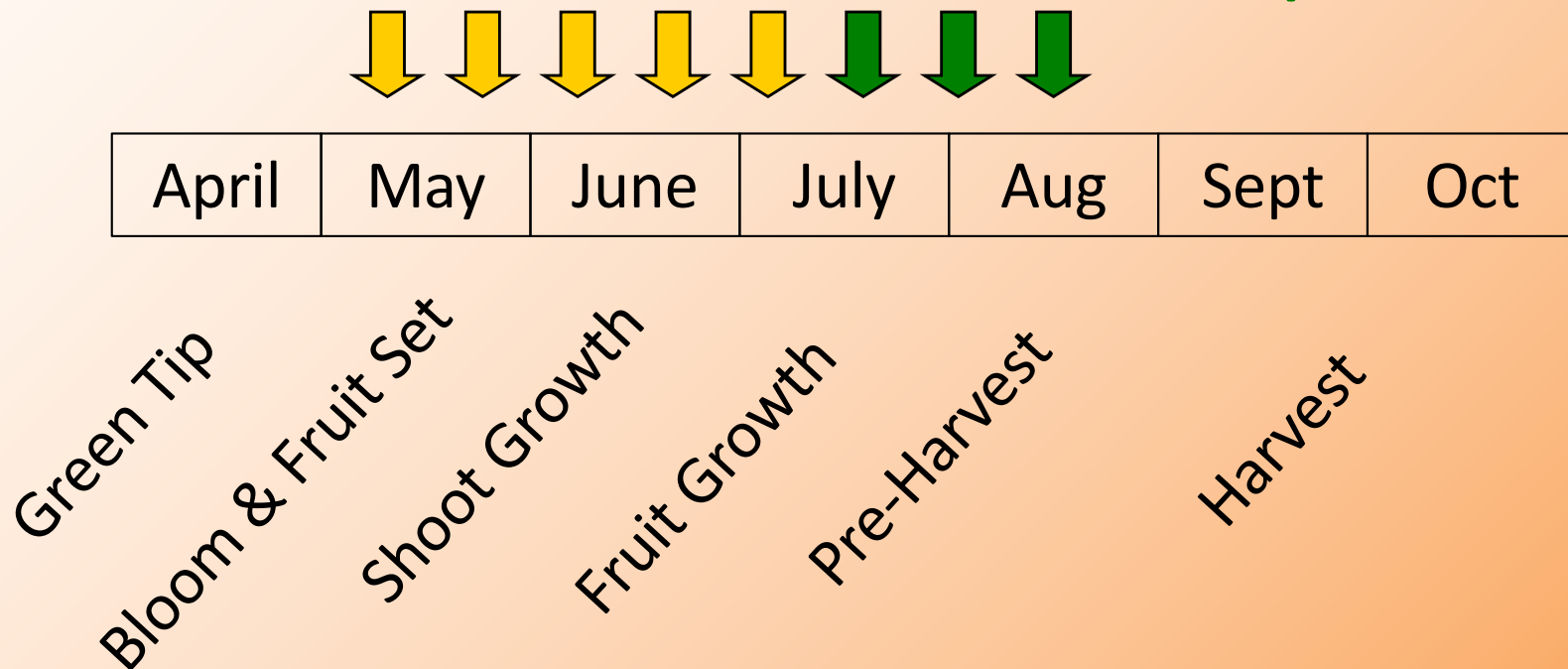
Apogee

From Dr. George Sundin, Michigan State University

Apogee for High Densities

- To control vegetative areas of trees
- Apogee is locally systemic
- 3-4 oz/acre every 2 weeks

Optional



Gingergold Growth Habit

Apogee Trial

Apogee

UTC



Gingergold Growth Habit

Apogee Trial



Apogee

UTC

Honeycrisp Trial 2003

Harvest

Apogee

UTC



Apogee

- Nit vs rate needed
- Vigor vs rate needed
- Vigor or low cropload or high N will need additional Apogee

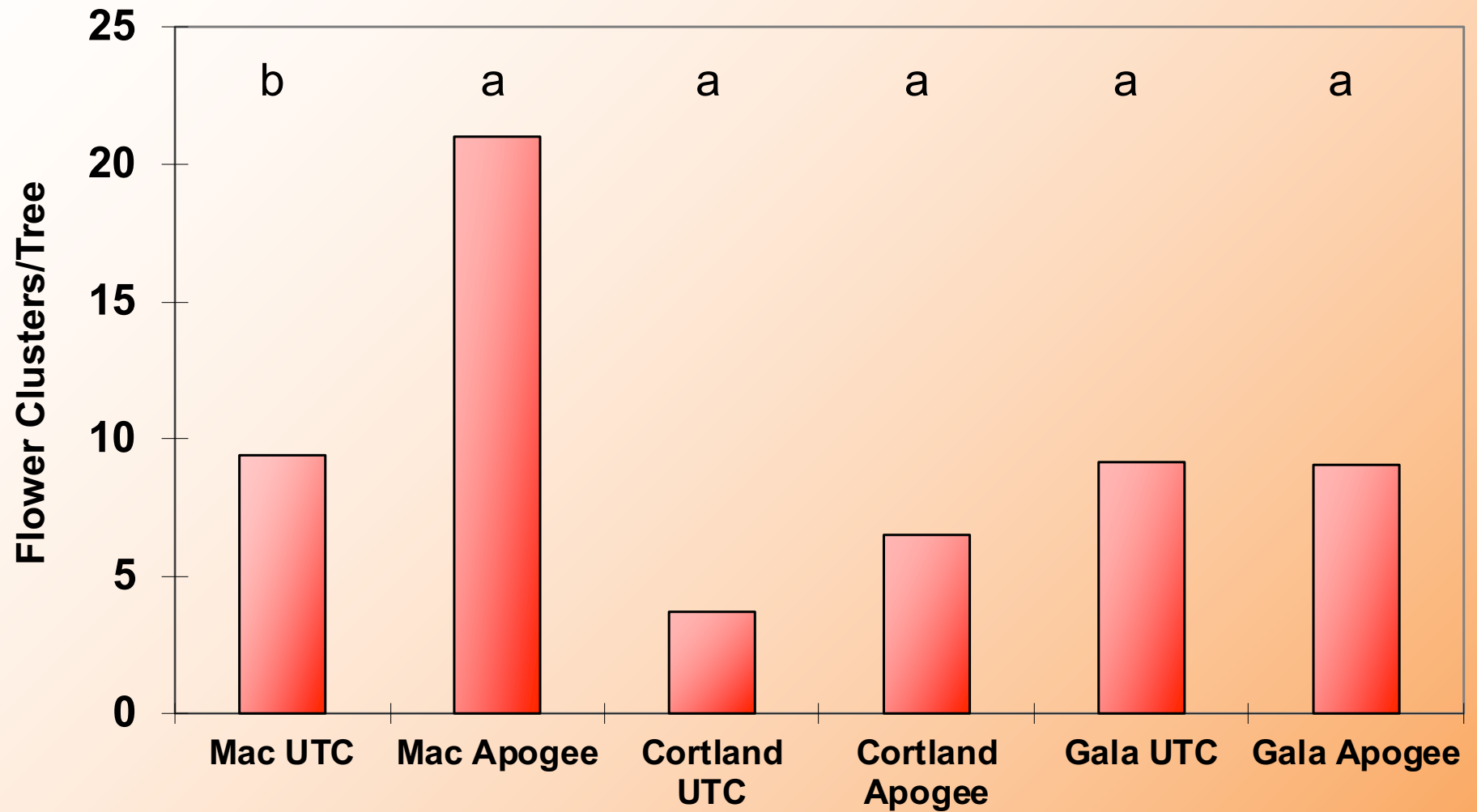
- Effect on Red Color
 - Inconsistent, no effect.

Apogee and Return Bloom

MAY 3

Apogee Super Spindle 2003

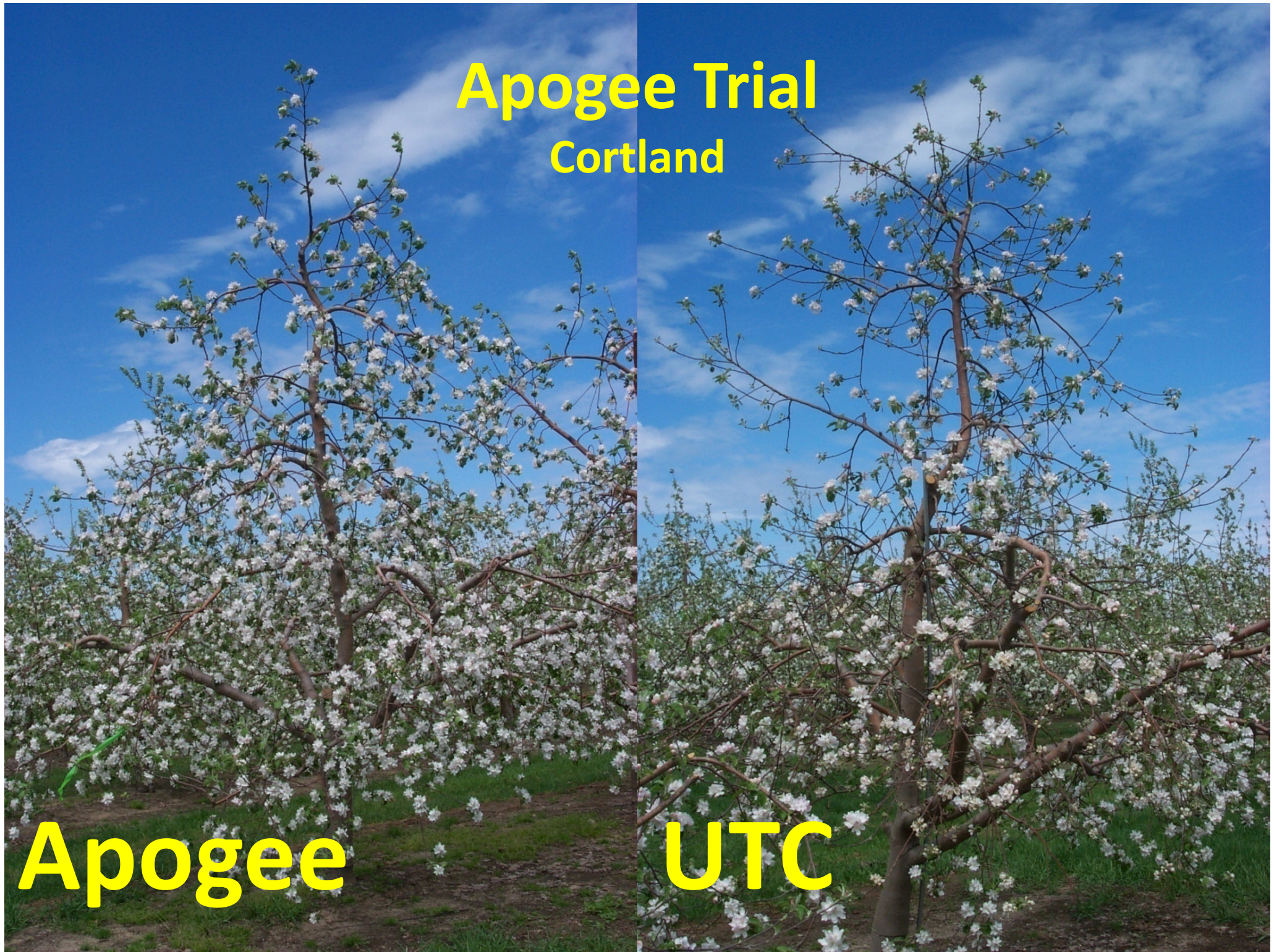
Return Bloom



Apogee Trial Cortland

Apogee

UTC



Apogee Trial



Apogee



UTC

5-5-01

Orchard Factors to Adjust Program

Factors	Recommended Apogee Rate Change
Heavy Pruning (Vigor)	Add 1 oz/acre/spray
Nitrogen Fertilizer	Move Apogee Season Program to the Next Higher Level
Low Cropload	
Questionable Coverage	
Fireblight Concerns	
Varieties	See Variety Guide

Apogee Rates & Timing

oz/Acre

Tree Size	1st	2nd	3rd	4th *Optional	Seasonal Total
Small <200 TRV	5	4	4	4*	17 oz
Medium <200 to 300 TRV	6	5	5	5*	21 oz
Large >300 TRV	7	6	6	6*	25 oz
Timing	King Bloom PF	2 weeks after KB PF	2 weeks later	3 weeks later	

Variety Consideration

Sensitivity to Apogee	Variety	Recommendation
Very Sensitive	Gingergold, Gala, Cortland, Rome, Paulared	Consider reducing rates of later sprays (spray 3 and 4).
Sensitive	Golden Delicious, Fuji, Spartan, N. Spy, Jonamac	
Less Sensitive	Jonathan, Idared, McIntosh, Empire*, Golden Supreme, Jonagold	Consider using additional 1 oz/acre/spray.
Special	Red Delicious, Spur Mac	Spur type, Use 4+3+2 for medium size trees.

*** Not recommended on Empire, Stayman.**

Apogee Trial 2000

Empire

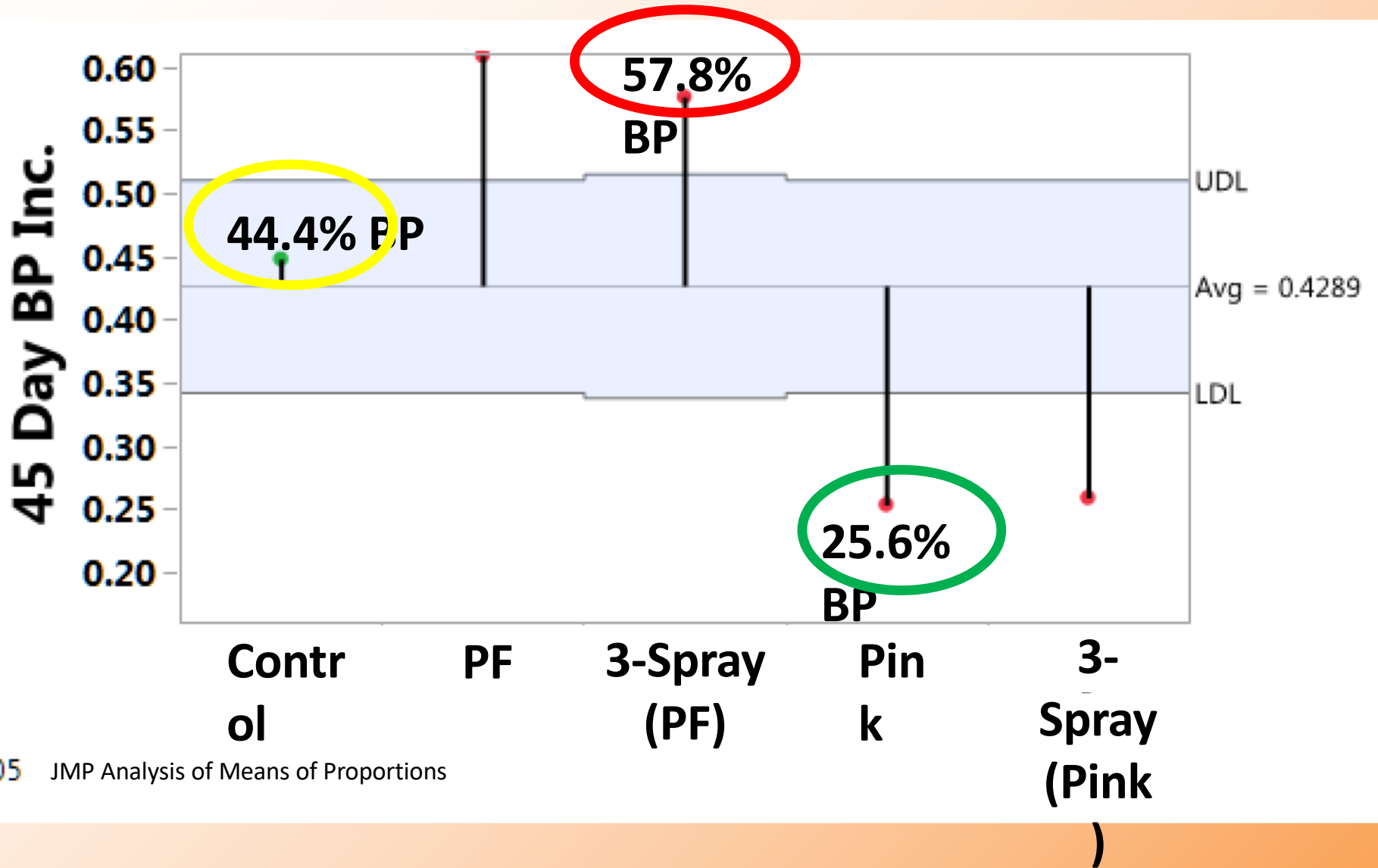


Apogee

Conclusions

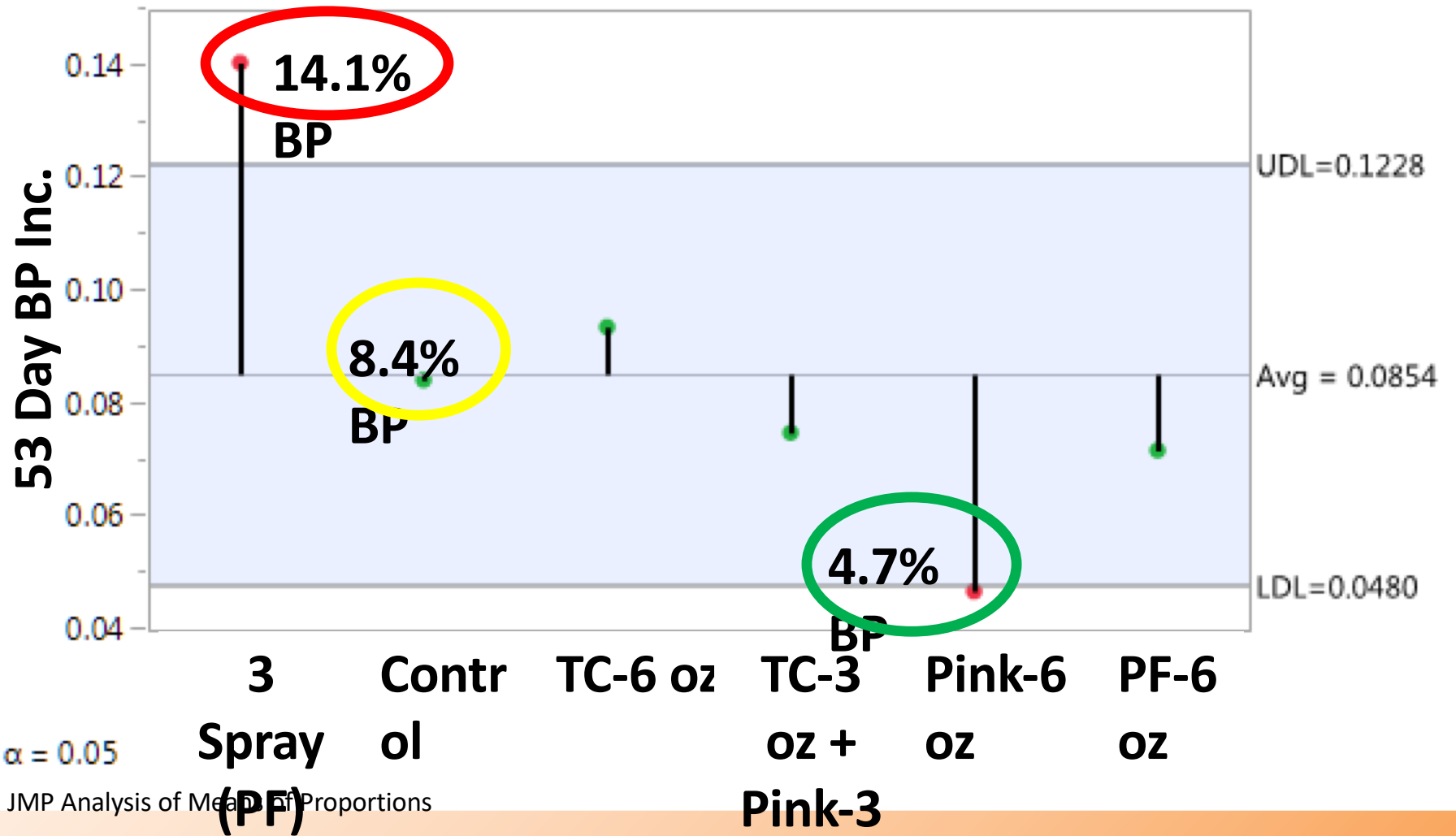
- Reduces shoot growth
- Significantly reduces pruning
- Suppresses FB.
- Apogee increases return bloom and fruit set (some varieties).
- Varieties differences
- Some fruit Ca benefits
- Increase thinning

Prohexadione-Ca and Bitter Pit



$\alpha = 0.05$ JMP Analysis of Means of Proportions

Prohexadione-Ca and Bitter Pit



Investigate strategies that might favor the movement of calcium into fruits.

2016 & 2017 PGR Detail Trial Results

1. Prohex 6 oz/A at pink significantly reduces bitter pit incidence.
2. Prohex when used at the conventional timing significantly increases bitter pit incidence.



Thanks to:

Michigan Apple Research Committee

Michigan State Hort Society

Valent USA

Valent BioSciences

International Fruit Tree Association

Supporting Growers

BASF

Amvac

Fine Ag Chemical

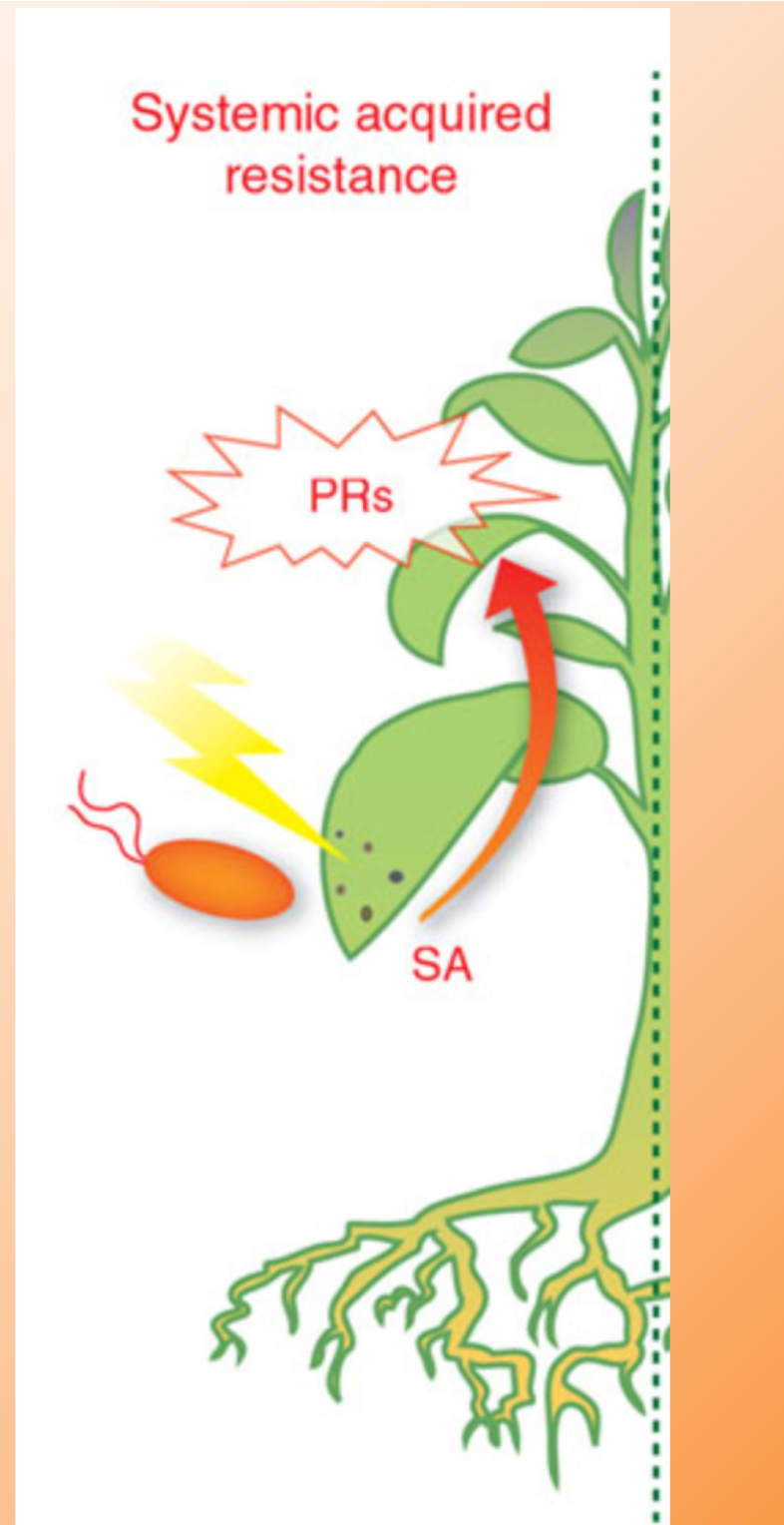
MICHIGAN STATE
UNIVERSITY
EXTENSION

MICHIGAN STATE UNIVERSITY
AgBioResearch

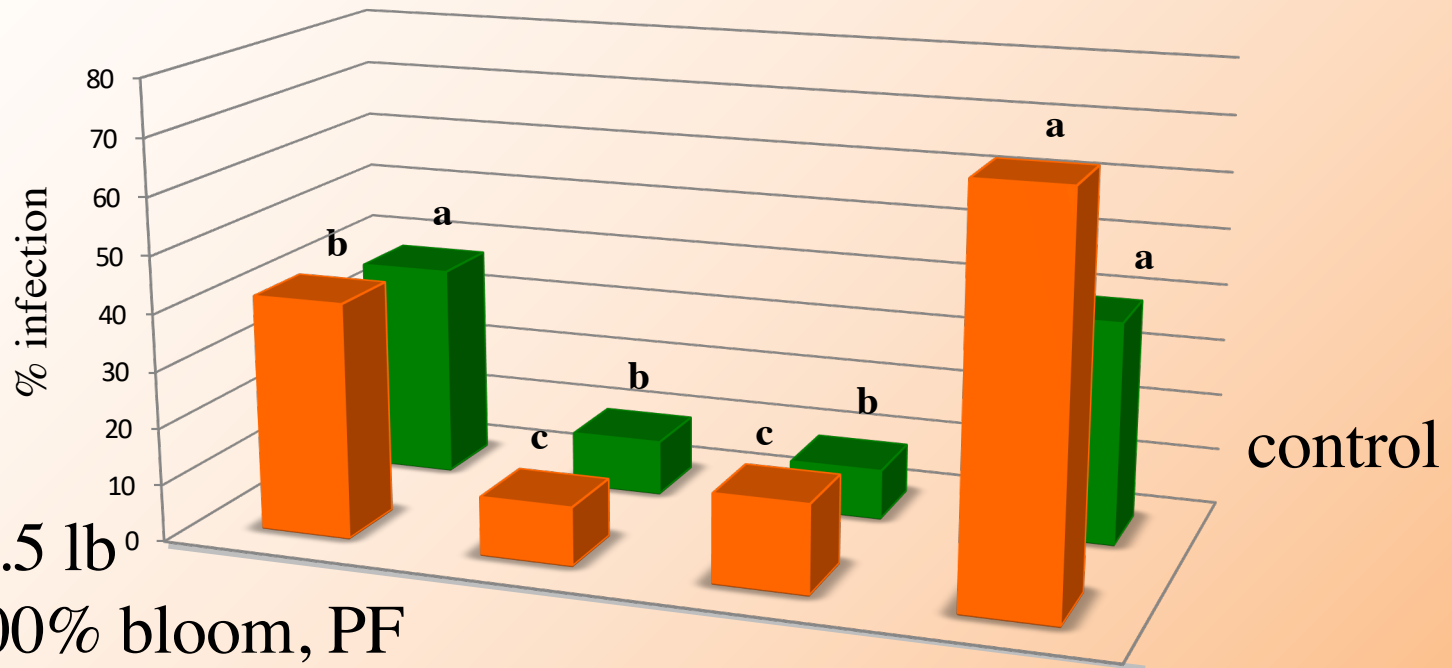
Actigard and SAR

- Acibenzolar-S-methyl
- Activates **systemic acquired resistance (SAR)** in the plant
- 1. pathogen attack
- 2. pathogen recognition
- 3. plant response at site of attack
- 4. **SAR signaling through plant**
- 5. **defense activated in plant for future attack**

From Sundin Lab



2014 Actigard test on 'McIntosh'

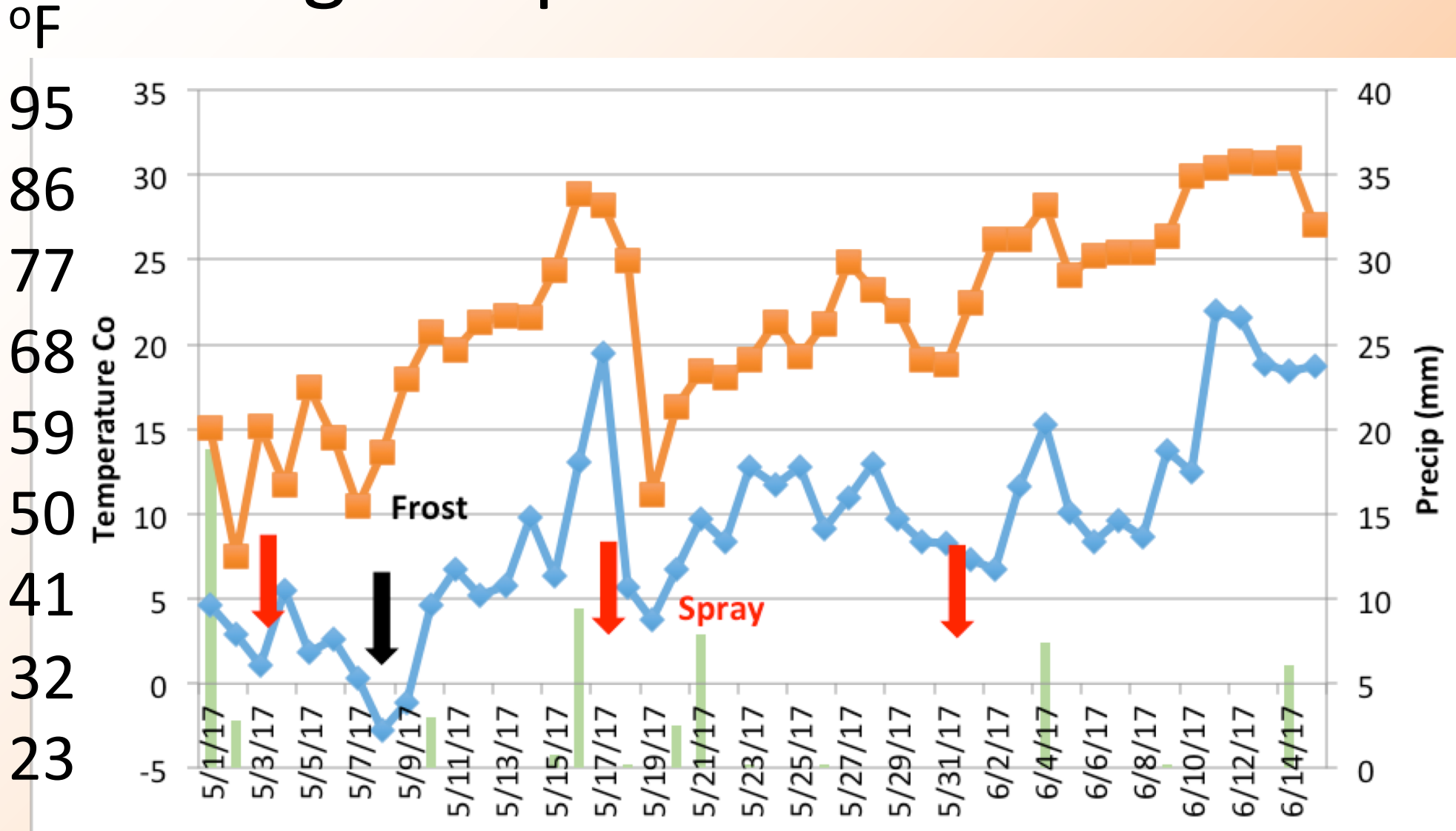


FireLine, 1.5 lb⁰
20-50%, 100% bloom, PF

Actigard, 2 oz + FireLine, 1.5 lb
20-50%, 100% bloom

Actigard, 2 oz, 20-50% bloom
FireLine, 1.5 lb, 100% bloom
Actigard, 2 oz, PF

Actigard Sparta Weather 2017



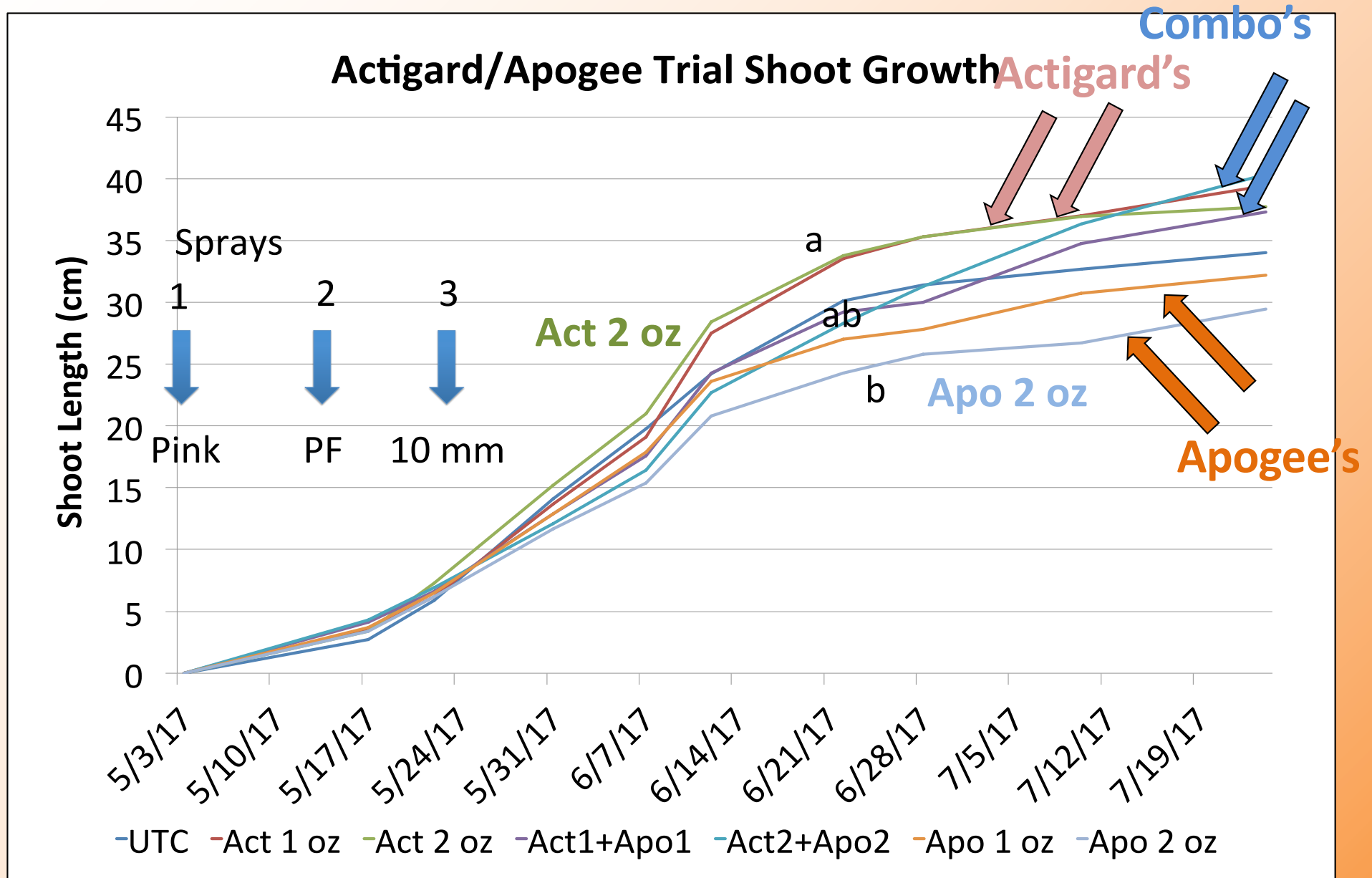
Actigard/Apogee Trial 2017

Table 1. Actigard and Apogee Treatments, Rates and Dates.

#	Treatment	Apps	Rate (ppm)	Total Seasonal Rate	5/3 Pink	5/17 Petal Fall	5/31 10 mm
1	UTC						
2	Actigard 1 oz 3x	3	1 oz	3 oz	✓	✓	✓
3	Actigard 2 oz 2x	2	2 oz	4 oz	✓	✓	
4	Actigard 1 +Apogee 1 3x	3	1+1	3 oz + 3 oz	✓	✓	✓
5	Actigard 2 + Apogee 2 2x	2	2+2	4 oz + 4 oz	✓	✓	
6	Apogee 1 oz 3x	3	1 oz	3 oz	✓	✓	✓
7	Apogee 2 oz 2x	2	2 oz	4 oz	✓	✓	

All Apogee treatments included Choice and LI700 as additives.

Actigard/Apogee Trial 2017





MSU Fruit School 2019

Philip Schwallier

Clarksville Research Center
Michigan State University

Thank you!

MICHIGAN STATE
UNIVERSITY
EXTENSION

MICHIGAN STATE UNIVERSITY
AgBioResearch