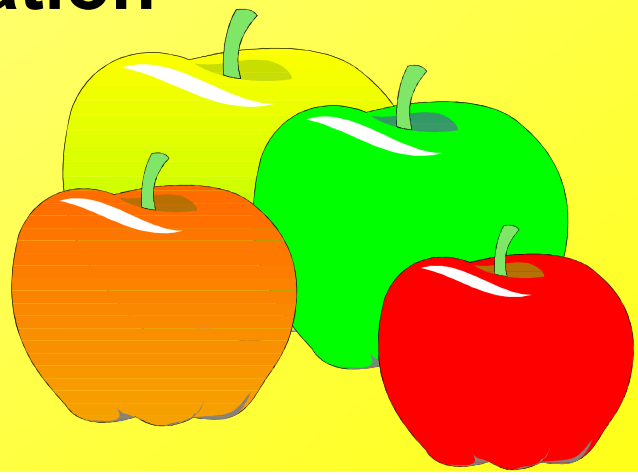
Successful Use of Apogee and ReTain in Apple

Philip Schwallier

District Horticulture Agent

Clarksville Horticultural

Experiment Station



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
- Fewer insect/disease problems

Apogee

Effect

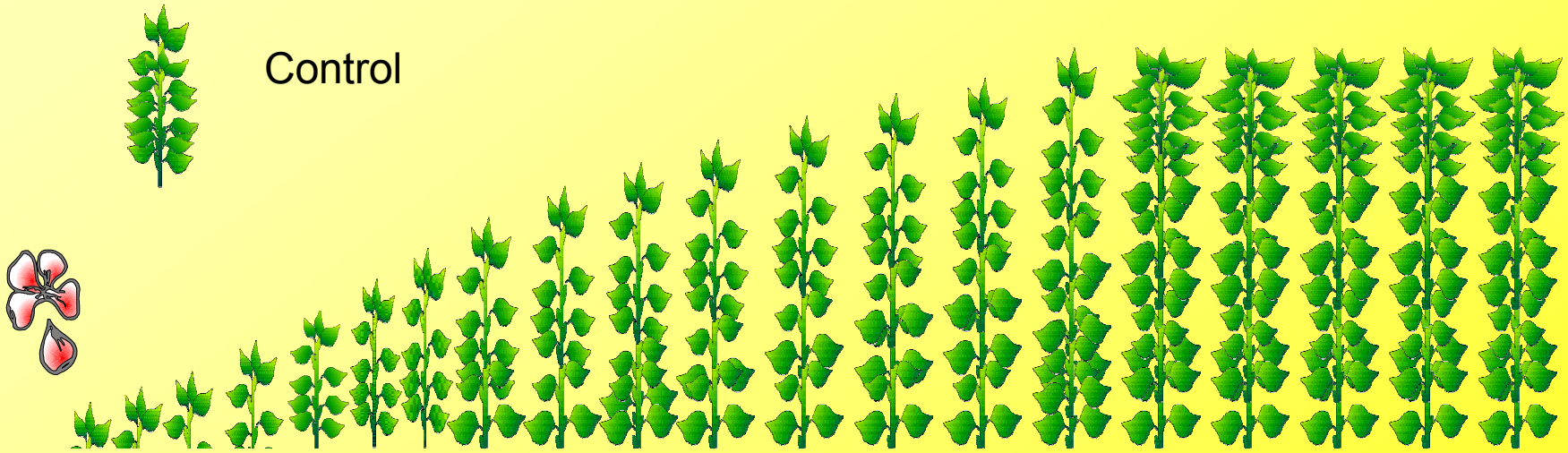
- Effects on shoot growth
  - Pruning
  - Return Bloom
- Suppresses Fireblight
  - Tree Productivity & Survival
- Other considerations
  - Red Color Improvement???
  - Thinning

Apogee Rates & Timing

Full Seasonal Rate	12 oz/100	48 oz/acre	250 ppm
Must have buffer	Equal amounts of AMS		
Must include surfactant	Silwet or Sylgard		
1st Application:	King Bloom Petal Fall		
Not compatible with hard water, Ca, B.			

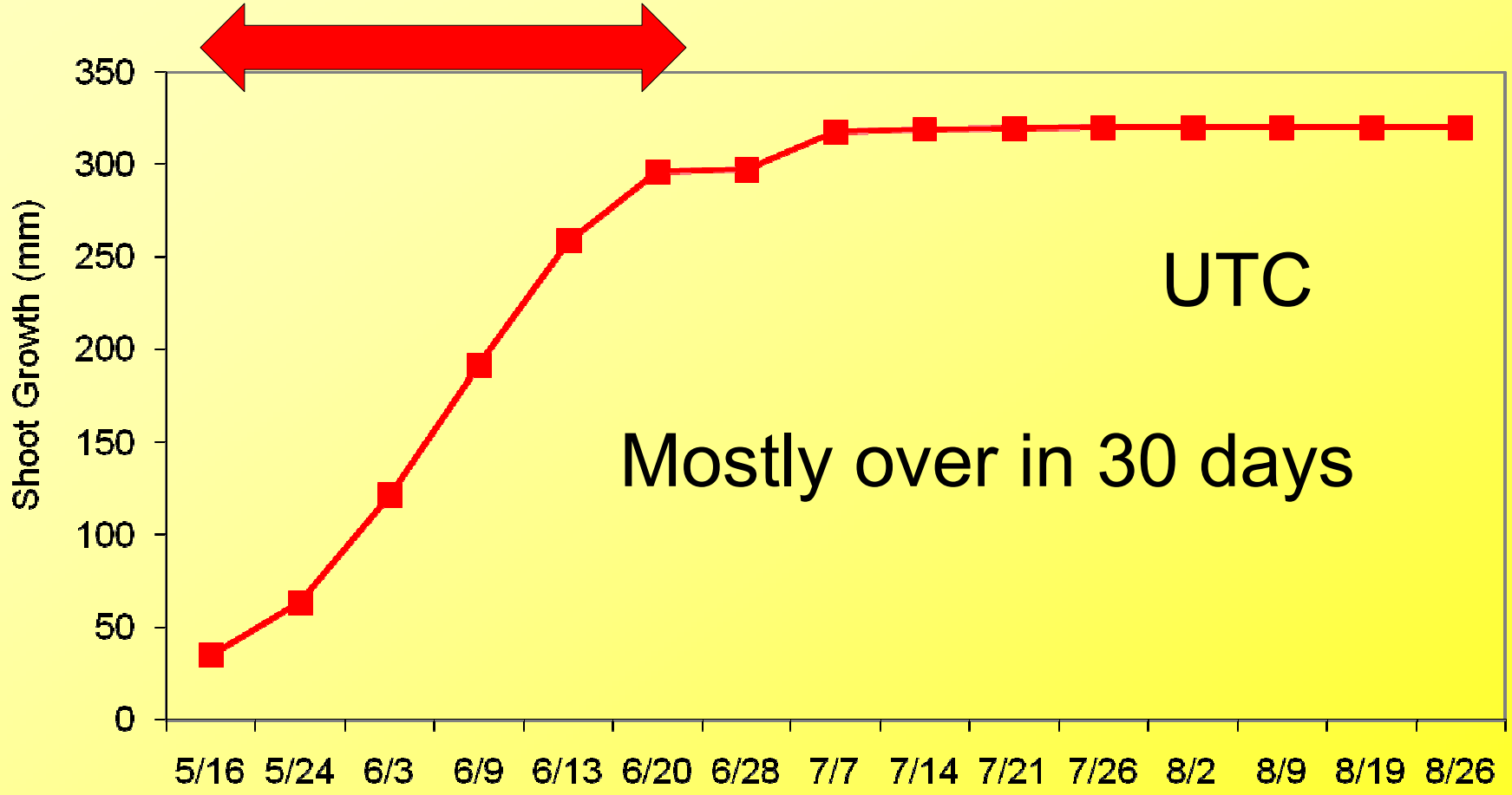
Apogee Trial
Shoot Growth

Northern States



Full Bloom	June	July

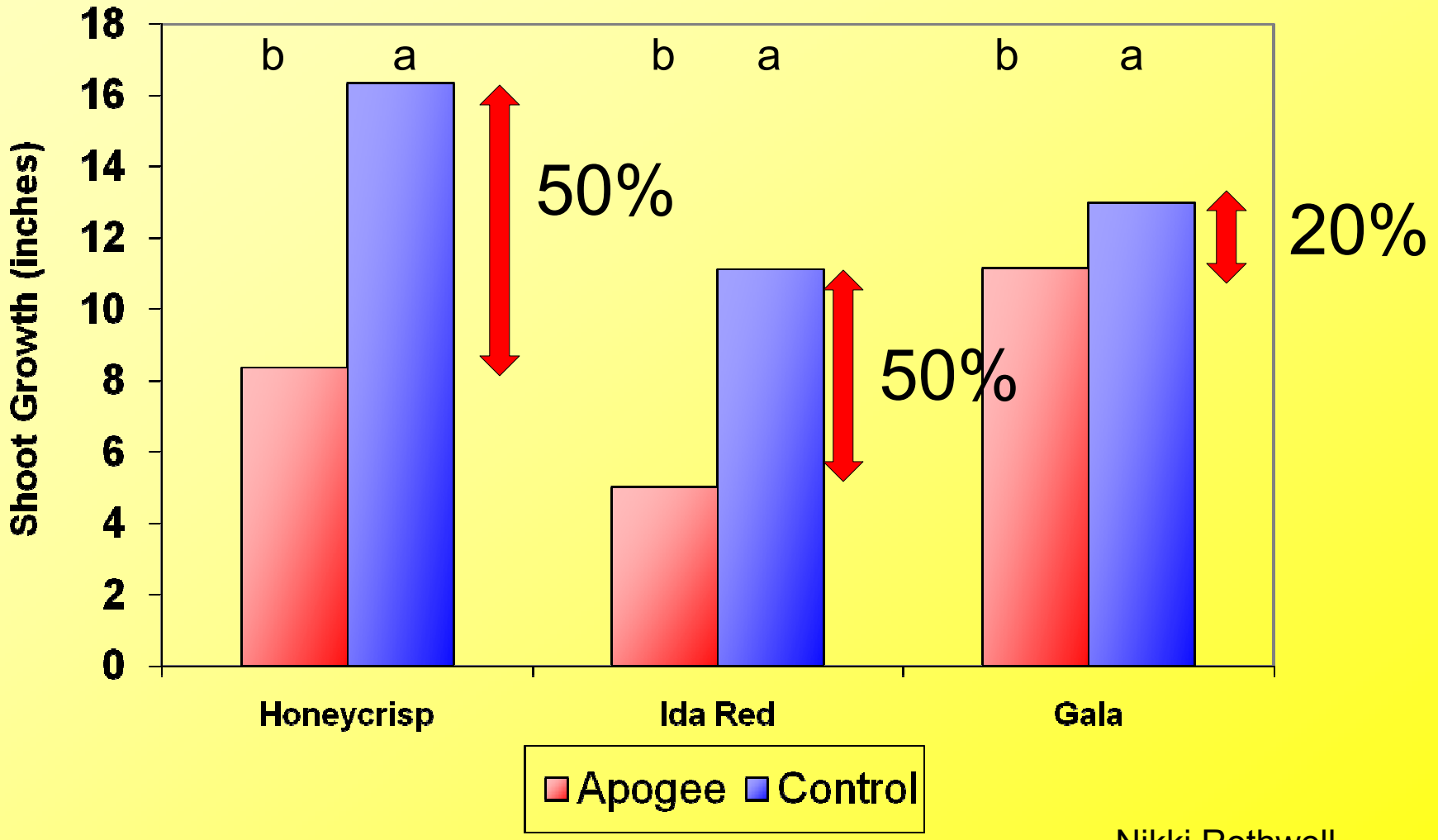
McIntosh Apogee Trial, CHES



Trial 14


NW Mich. Apogee Trial 2008
Nikki Rothwell

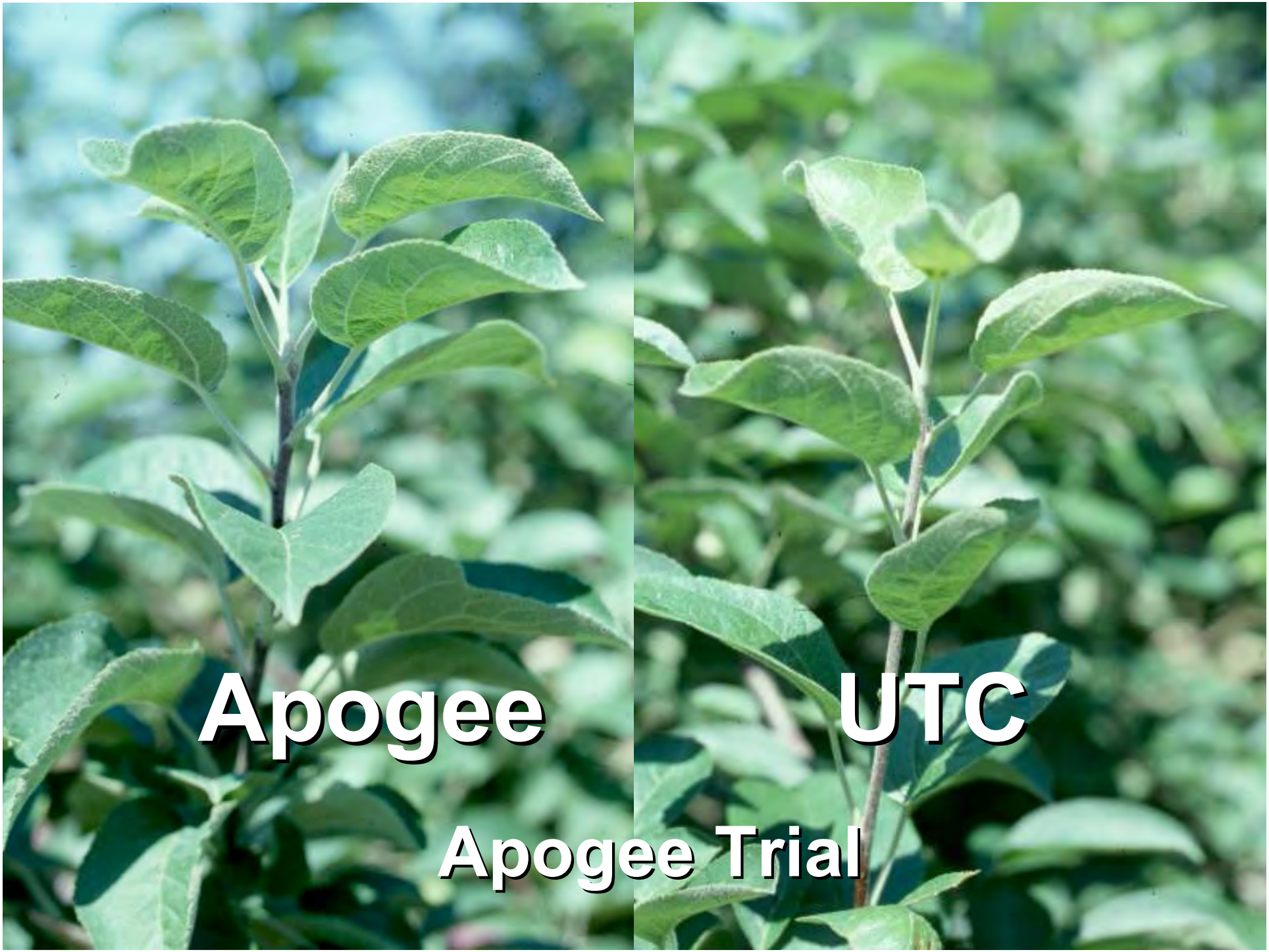
NW Mich. Apogee Trial 2008



Nikki Rothwell

Apogee Trial


Apogee Trial
Apogee


Apogee
UTC
Apogee Trial

Apogee Trial
Shoot Growth

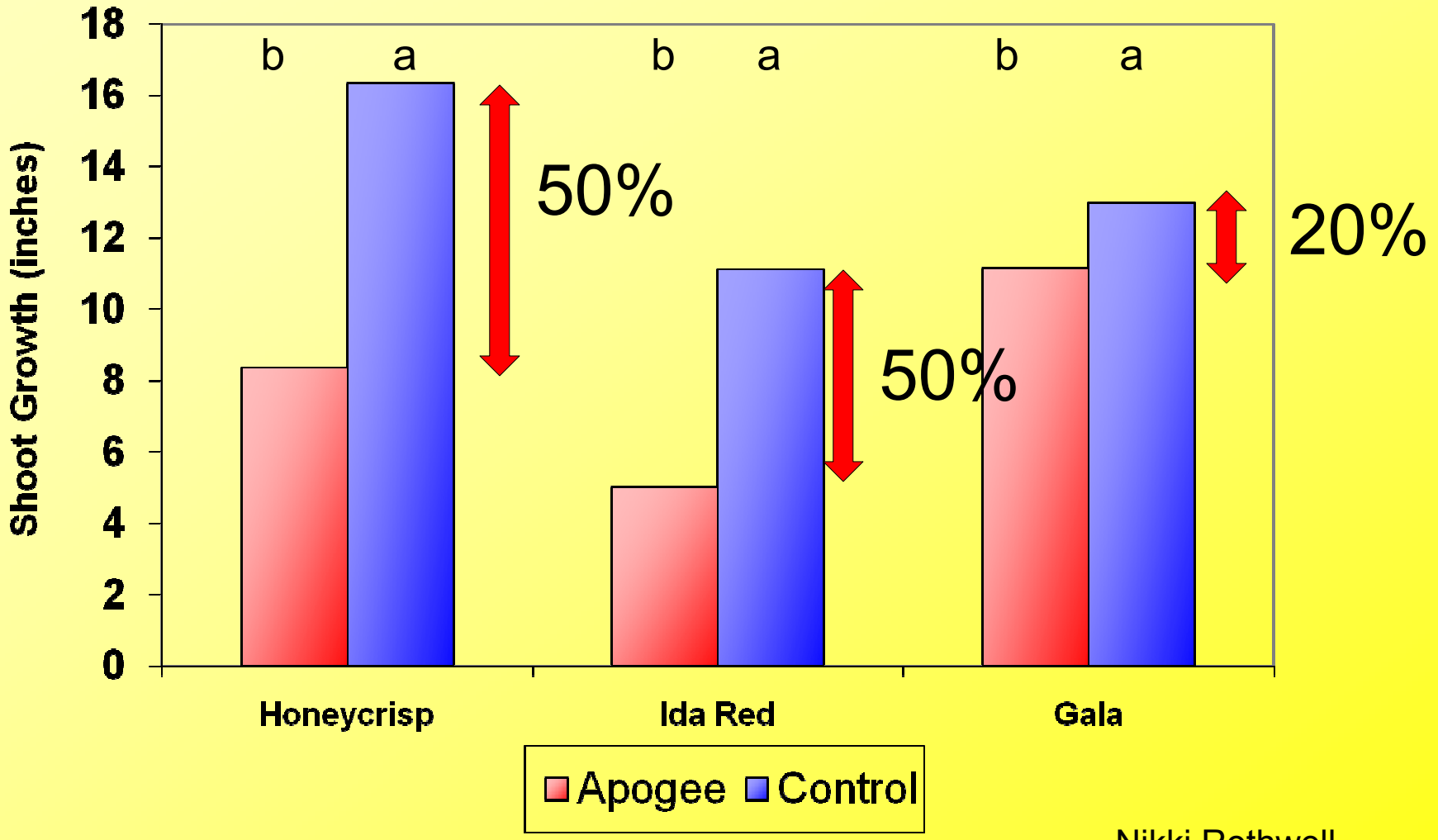
Apogee

Control

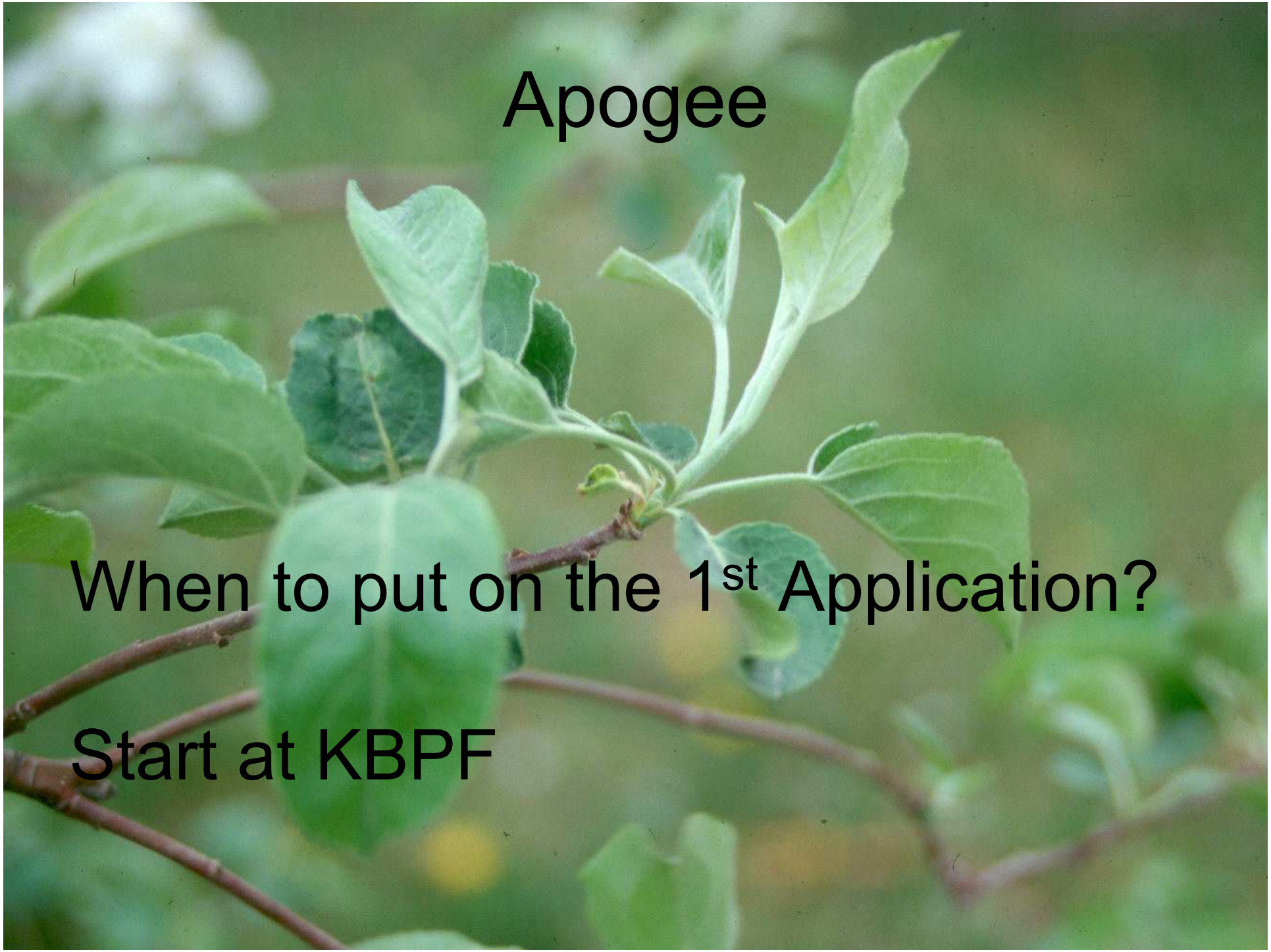
Typical Growth Control 40%

Full Bloom	June	July

NW Mich. Apogee Trial 2008



Nikki Rothwell


Apogee
When to put on the 1st Application?
Start at KBPF


Apogee Trial
1” to 3” growth

Apogee

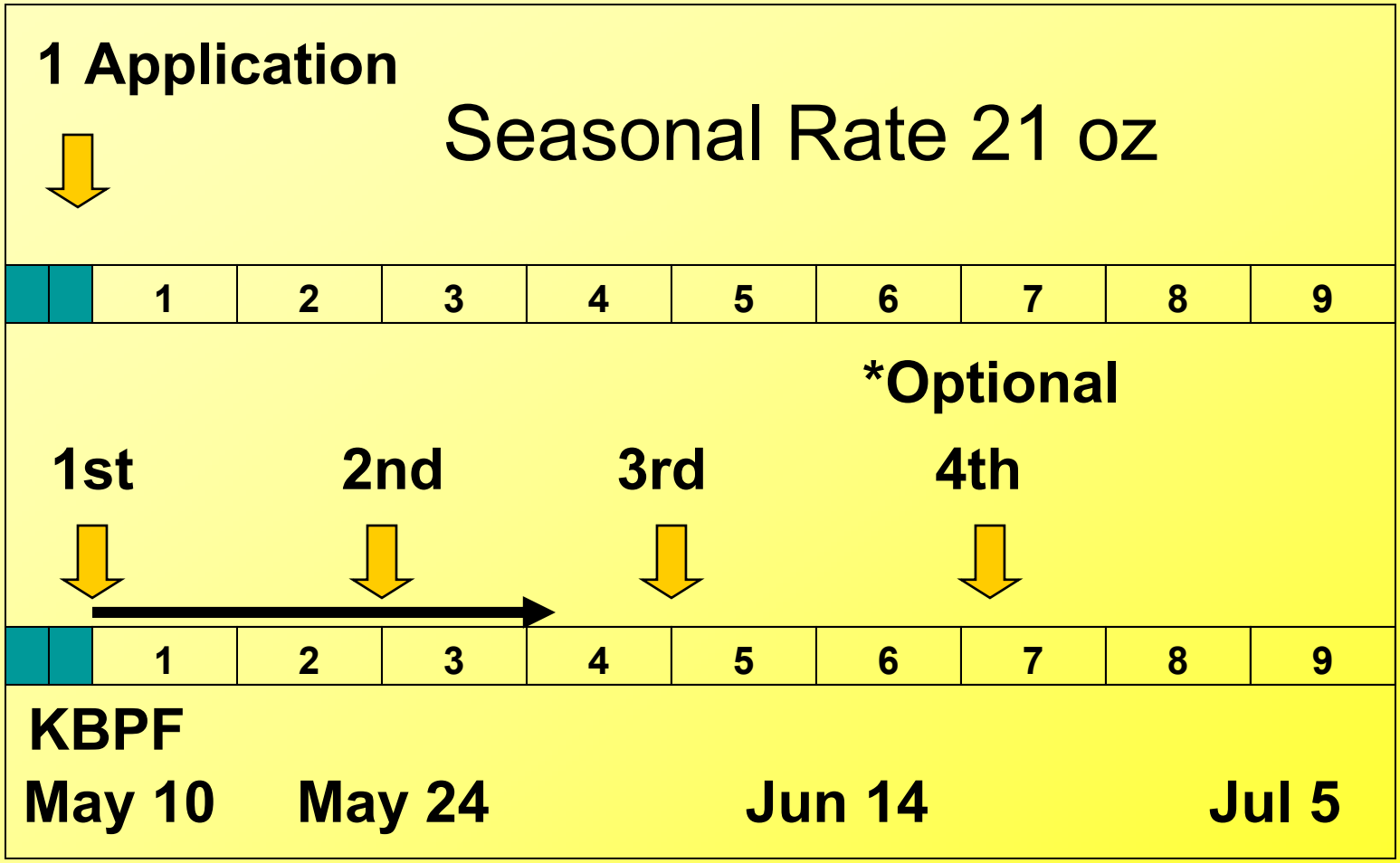
Apogee

Seasonal Rate

- 48 oz/acre is full rate.
  - Start by reducing to 2/3 rate = 32 oz/acre
  - Reduce to TRV
    - Example 67% TRV = 21 oz/acre

Need to find your own rate.
Year after year use reduce rates.

Apogee Split Applications

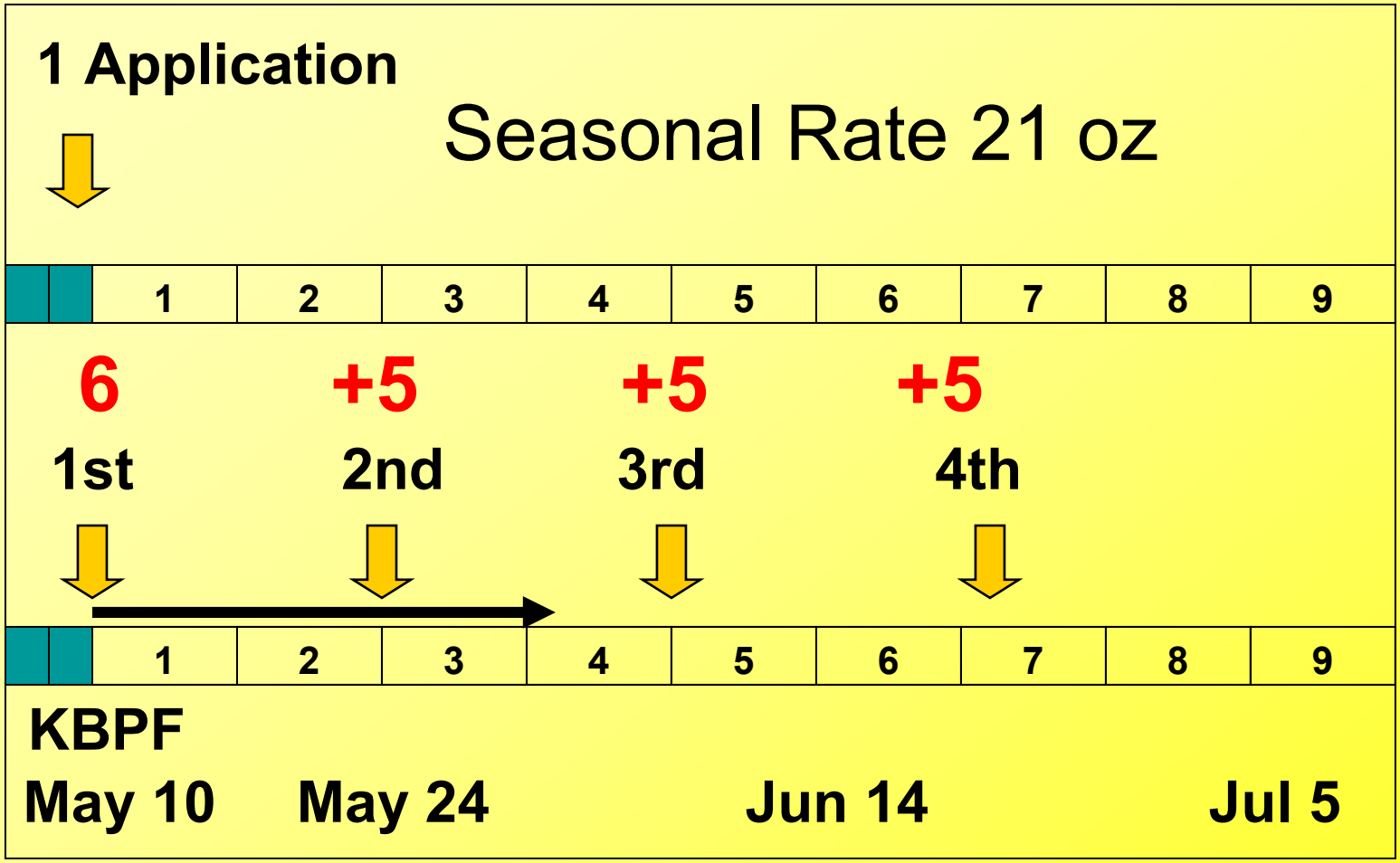


Apogee Rates & Timing

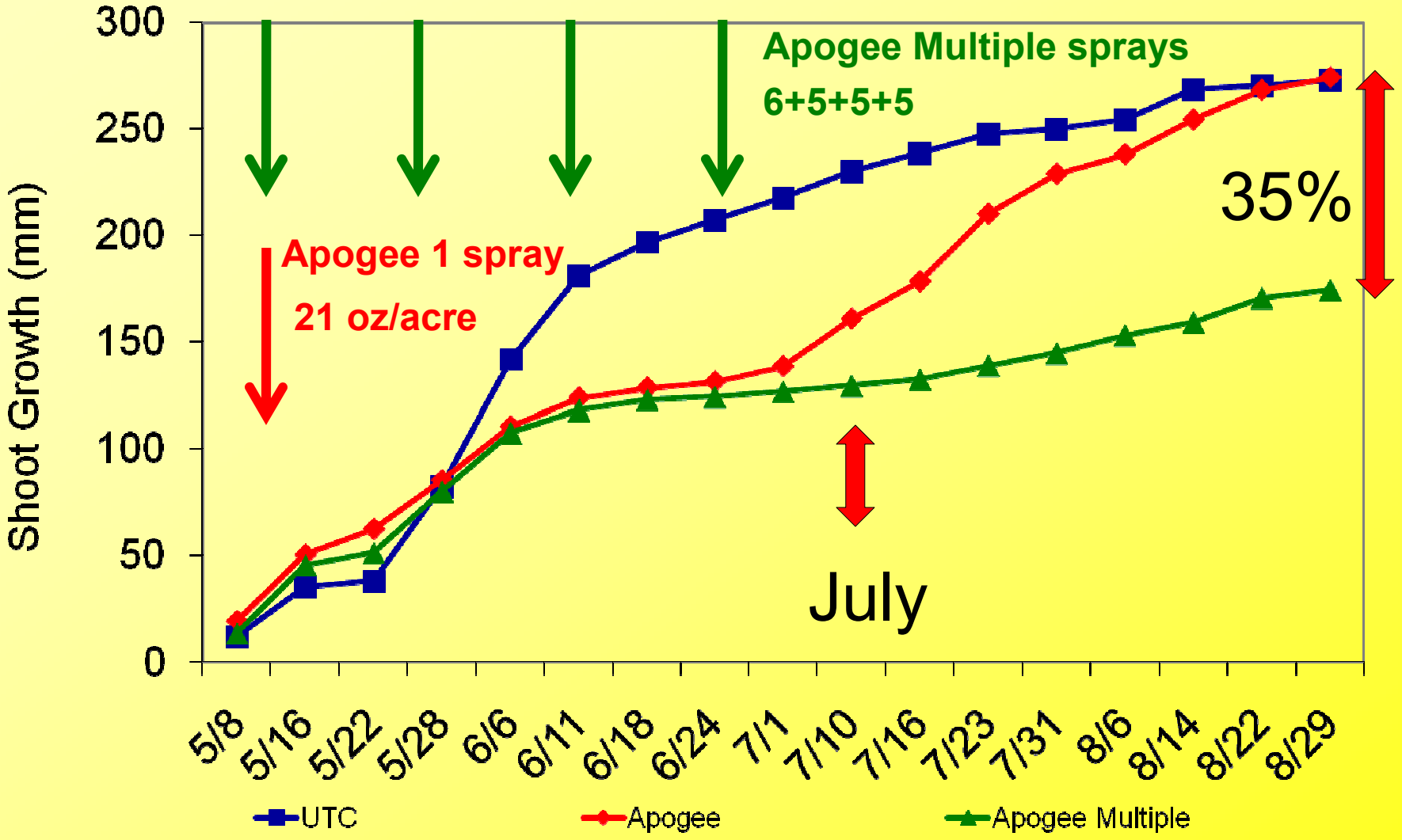
oz/Acre

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	2-3 weeks later	

Apogee Split Applications



Gala Apogee Trial, CHES



Trial 14


Apogee Trial
Regrowth Fuji

Apogee Rates & Timing

oz/Acre

Tree Size	1st	2nd	3rd	4th *Optional	Seasonal Total
Medium <200 to 300 TRV	**6**	**5**	**5**	**5***	**21 oz**
Timing	King Bloom PF	2 weeks after KB PF	2 weeks later	3 weeks later	
Medium <200 to 300 TRV	**12**		**9**		**21 oz**
Timing	King Bloom PF		3 weeks later		

Apogee

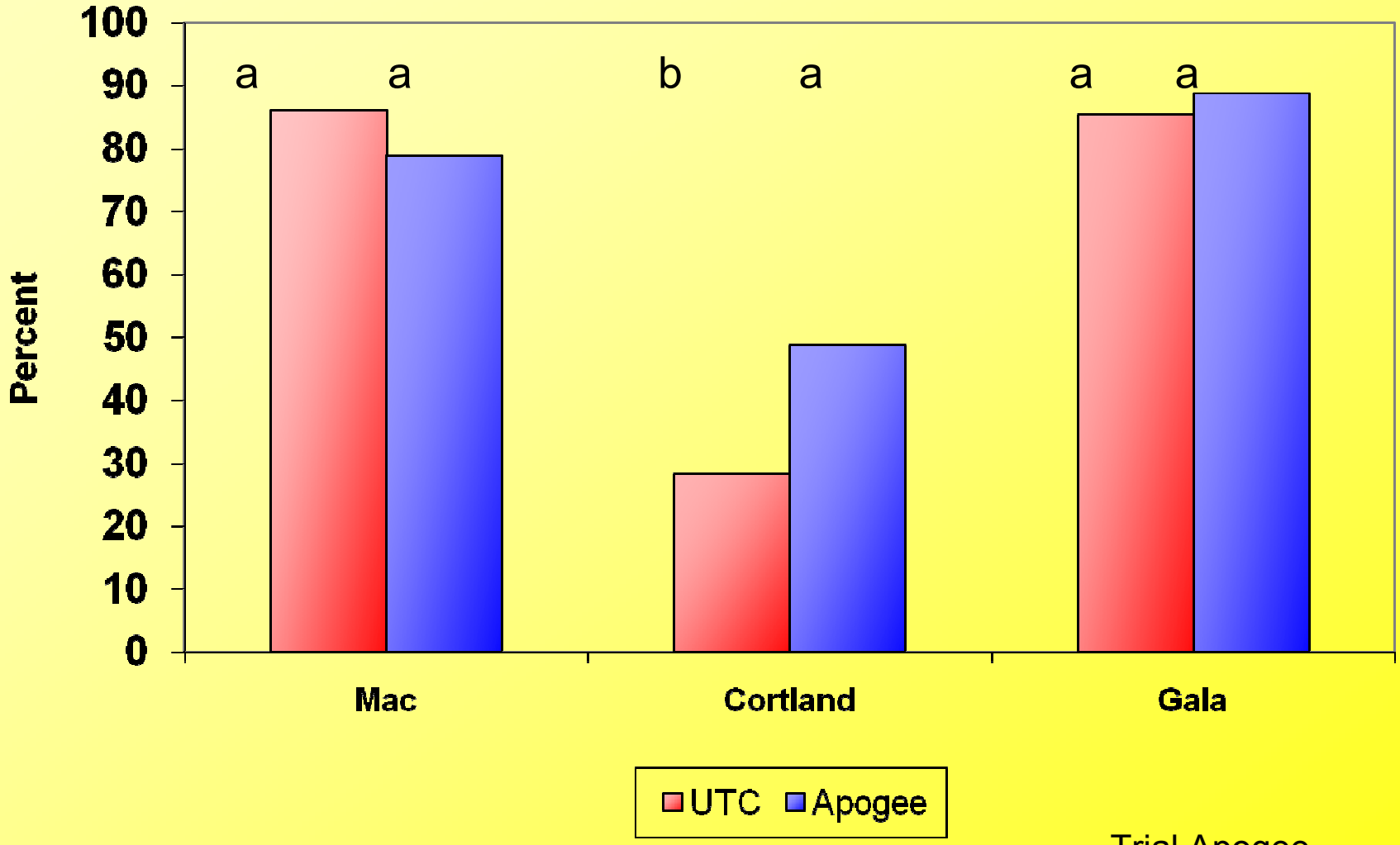
- Apogee increases fruitset but not consistently
- Because of higher cropload, fruit size may be smaller
- Increase thinning.
- Cropload vs rate needed

Super Spindle

Super Spindle

Apogee Super Spindle 2004

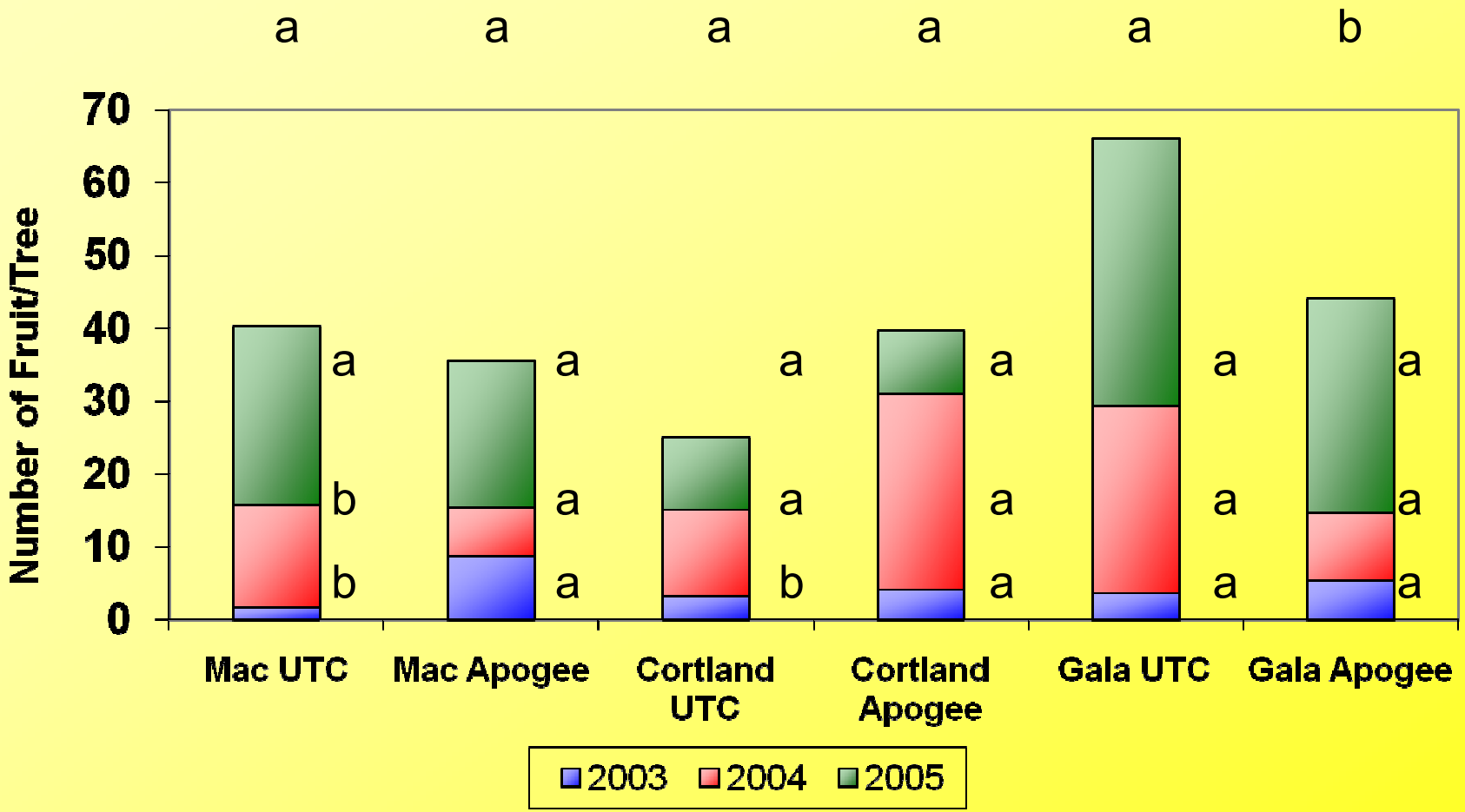
Percent Fruit Set / Cluster



Trial Apogee

Apogee Super Spindle Fruit #'s

2003-2005



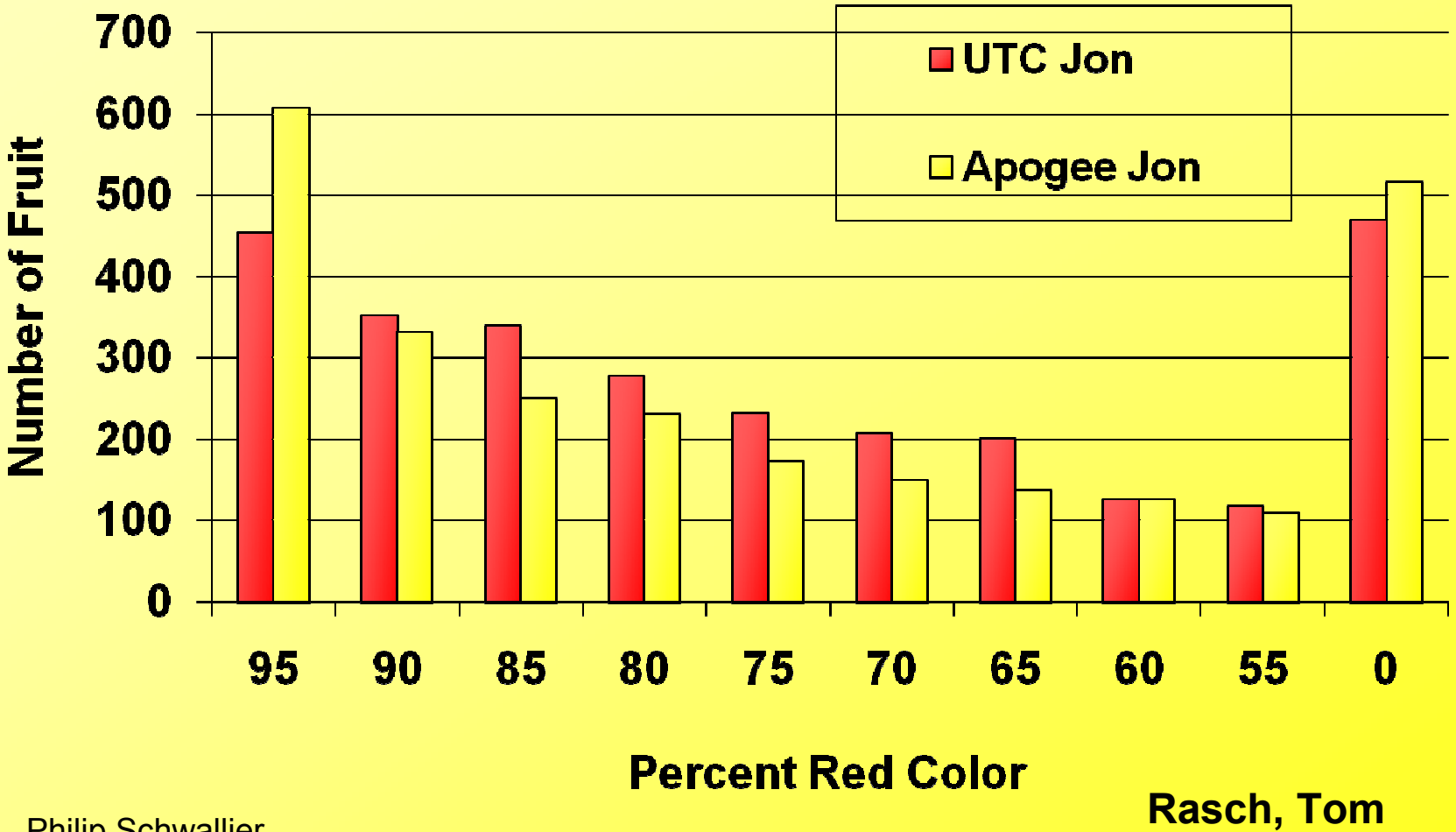
Trial Apogee

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 Trial



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Rasch, Tom


Honeycrisp Trial 2003
Harvest
Apogee
UTC

Apogee

Conclusions

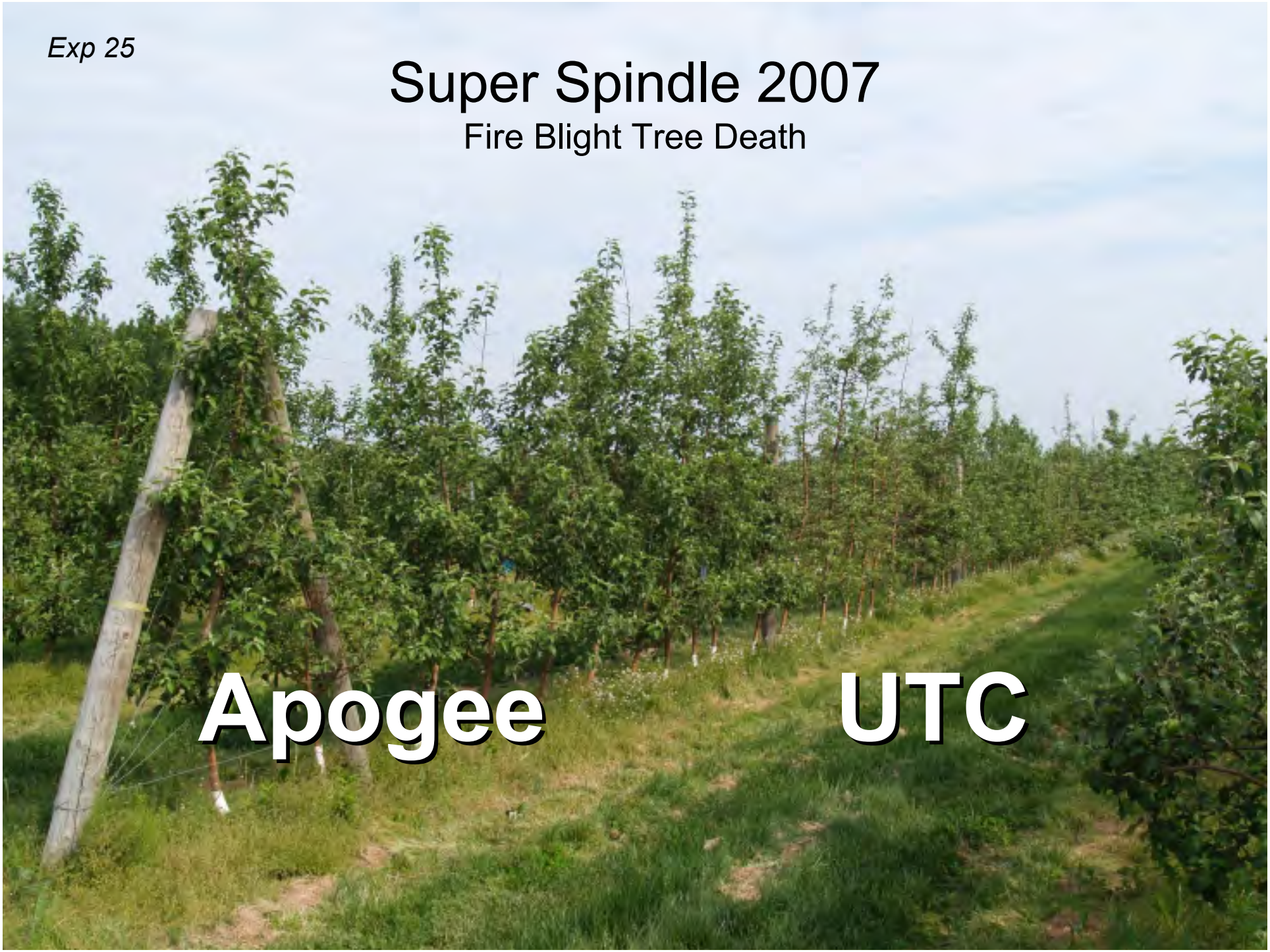
- Fireblight Suppression
- Will suppress FB canker growth and FB infections on shoots
- Key factor is apply early and high rates (get the shoots under control early)

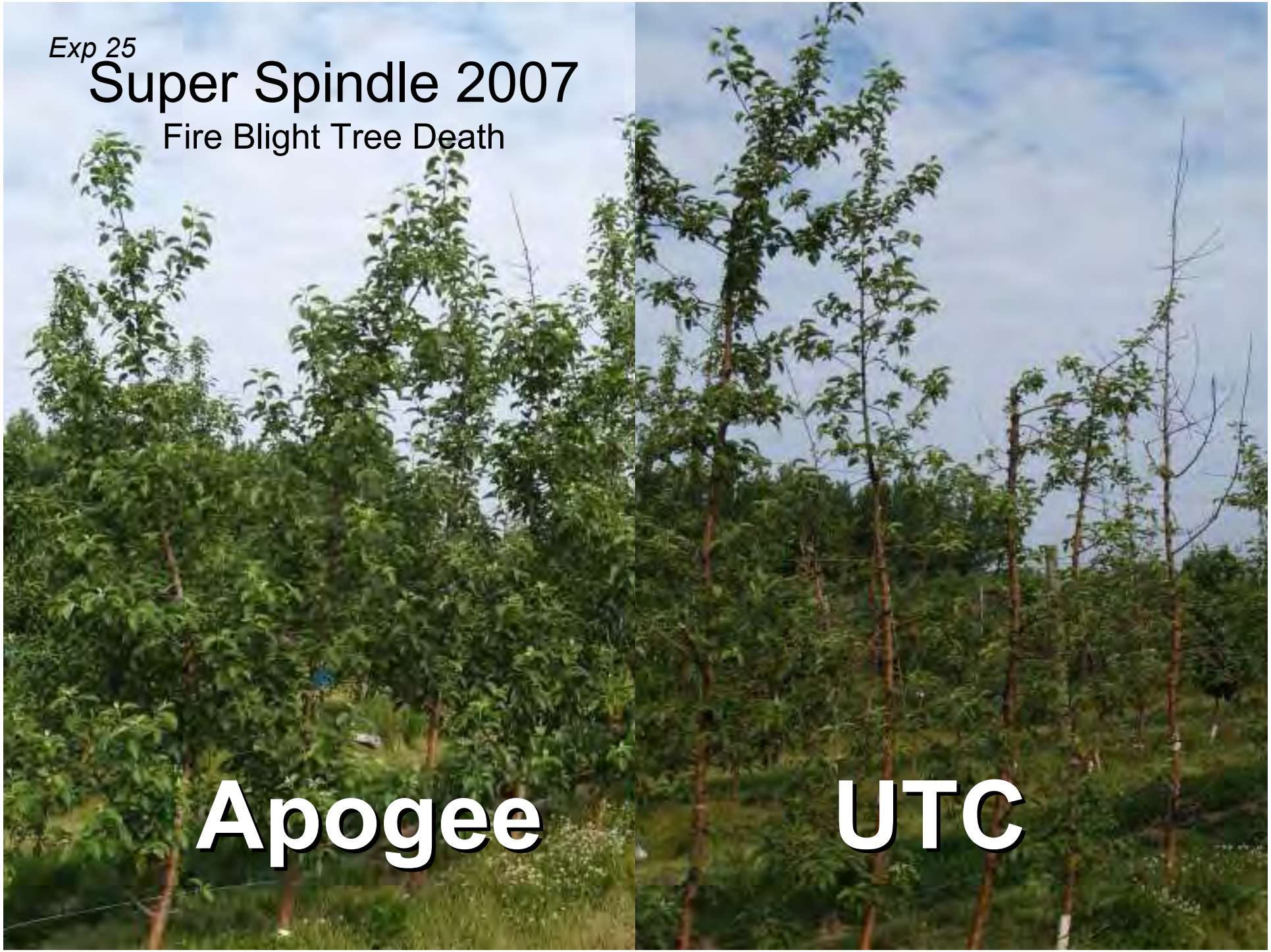
Fireblight Shoot Blight

Exp 25

Super Spindle 2007

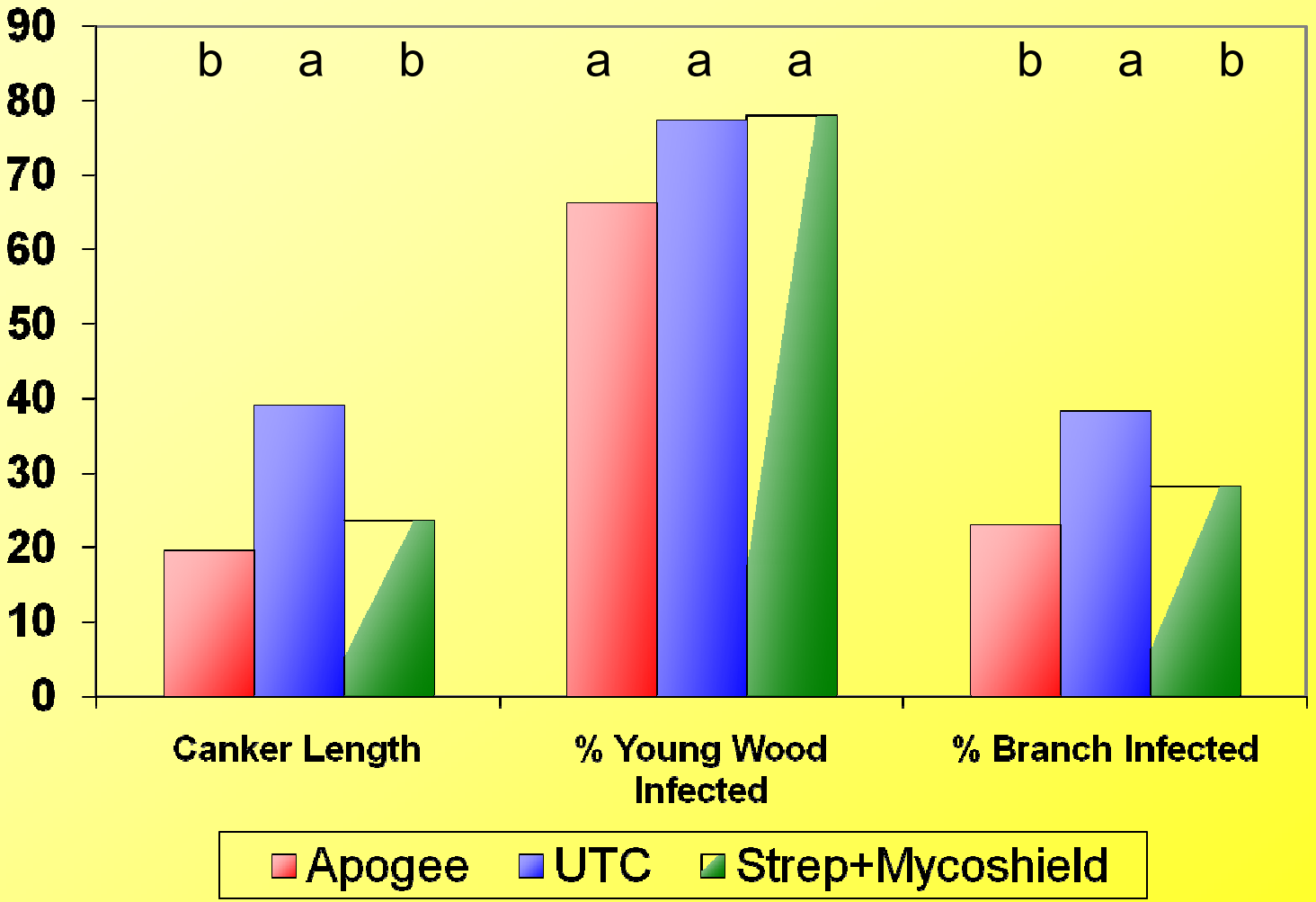
Fire Blight Tree Death




Exp 25
Super Spindle 2007
Fire Blight Tree Death
Apogee
UTC

Fireblight & Apogee Trial 2008

Canker Growth



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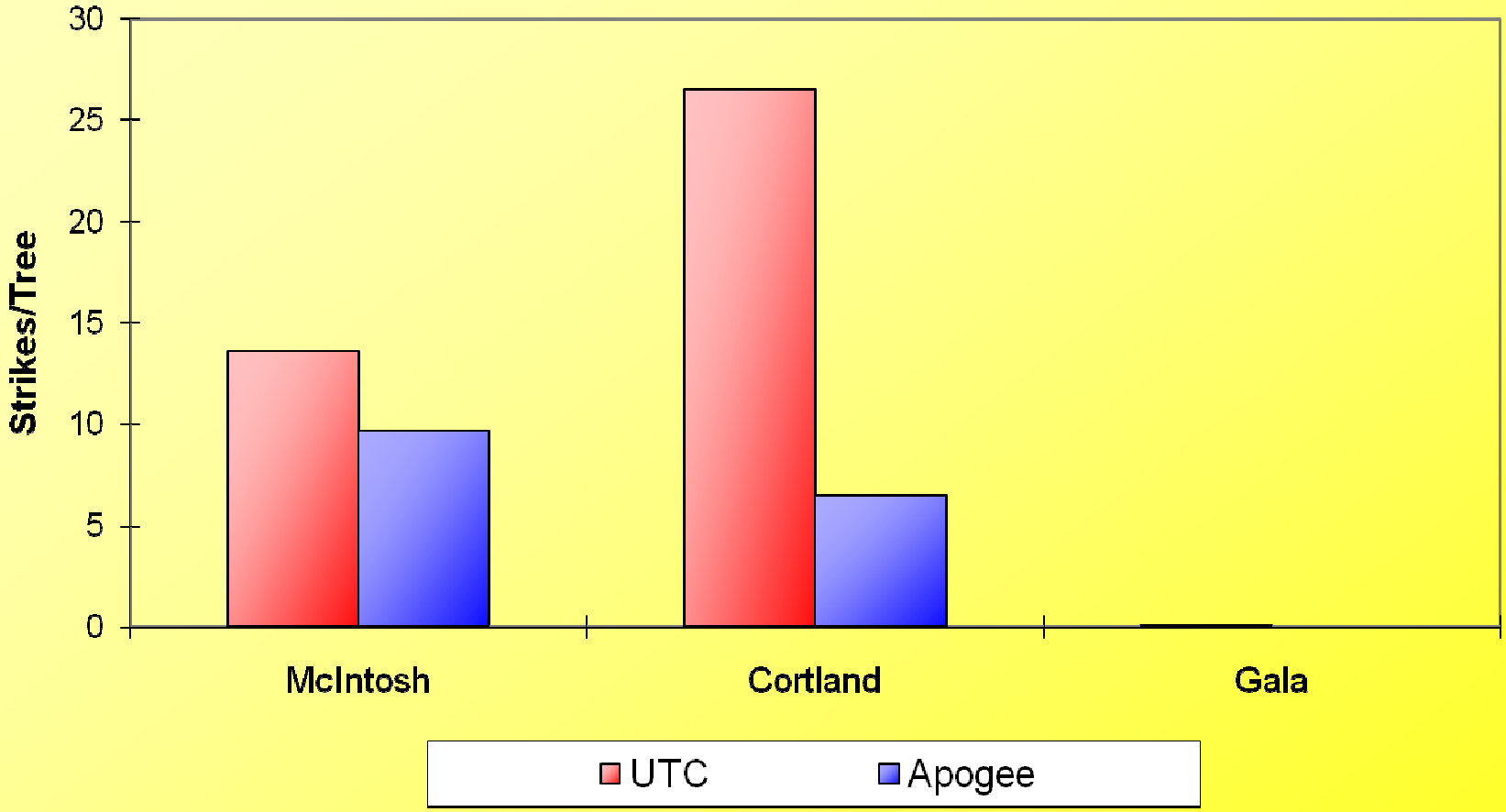
Super Spindle 2004
Cortland With Fireblight

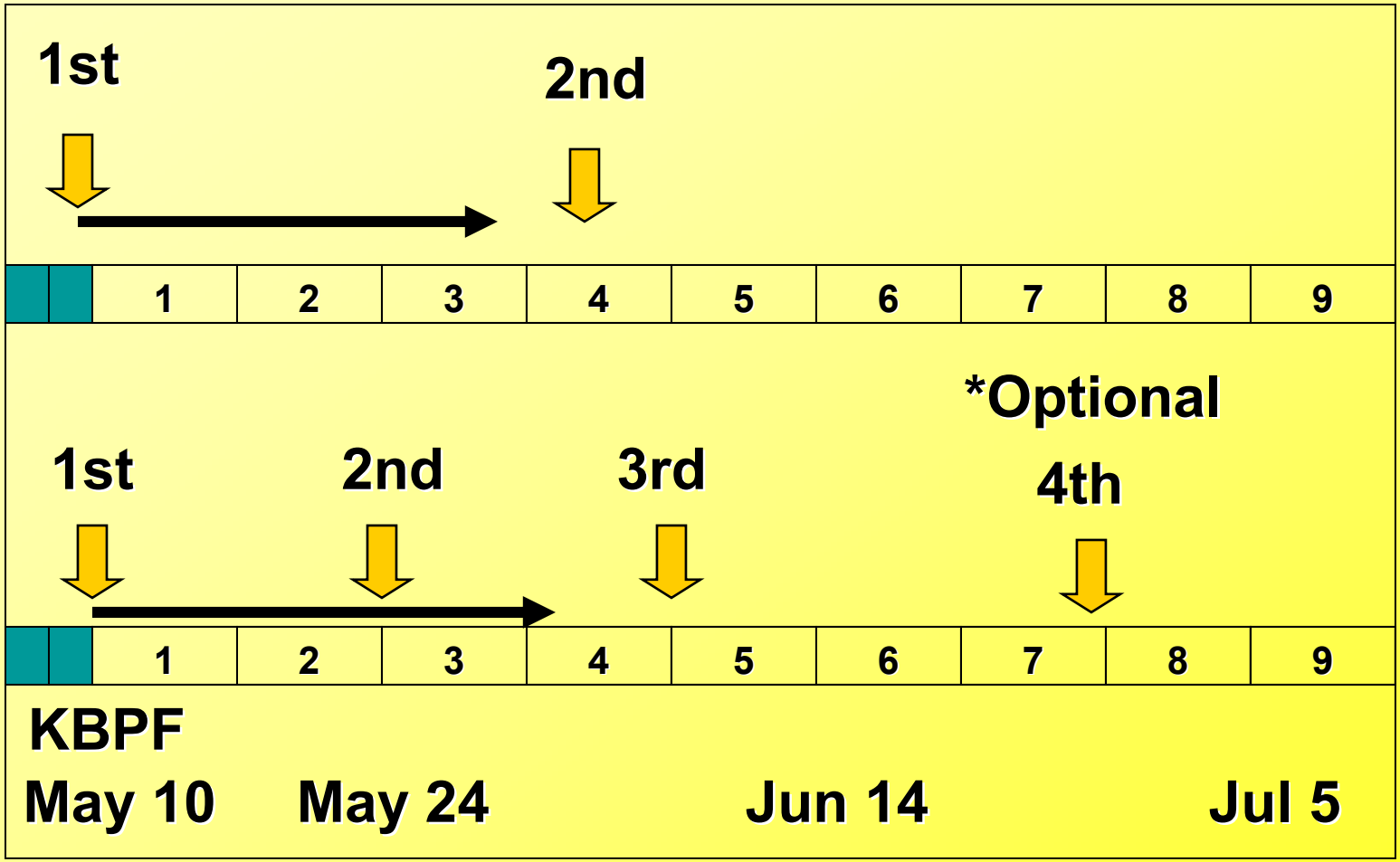
Exp 25

Fire Blight Strikes

Super Spindle



Apogee & Fireblight

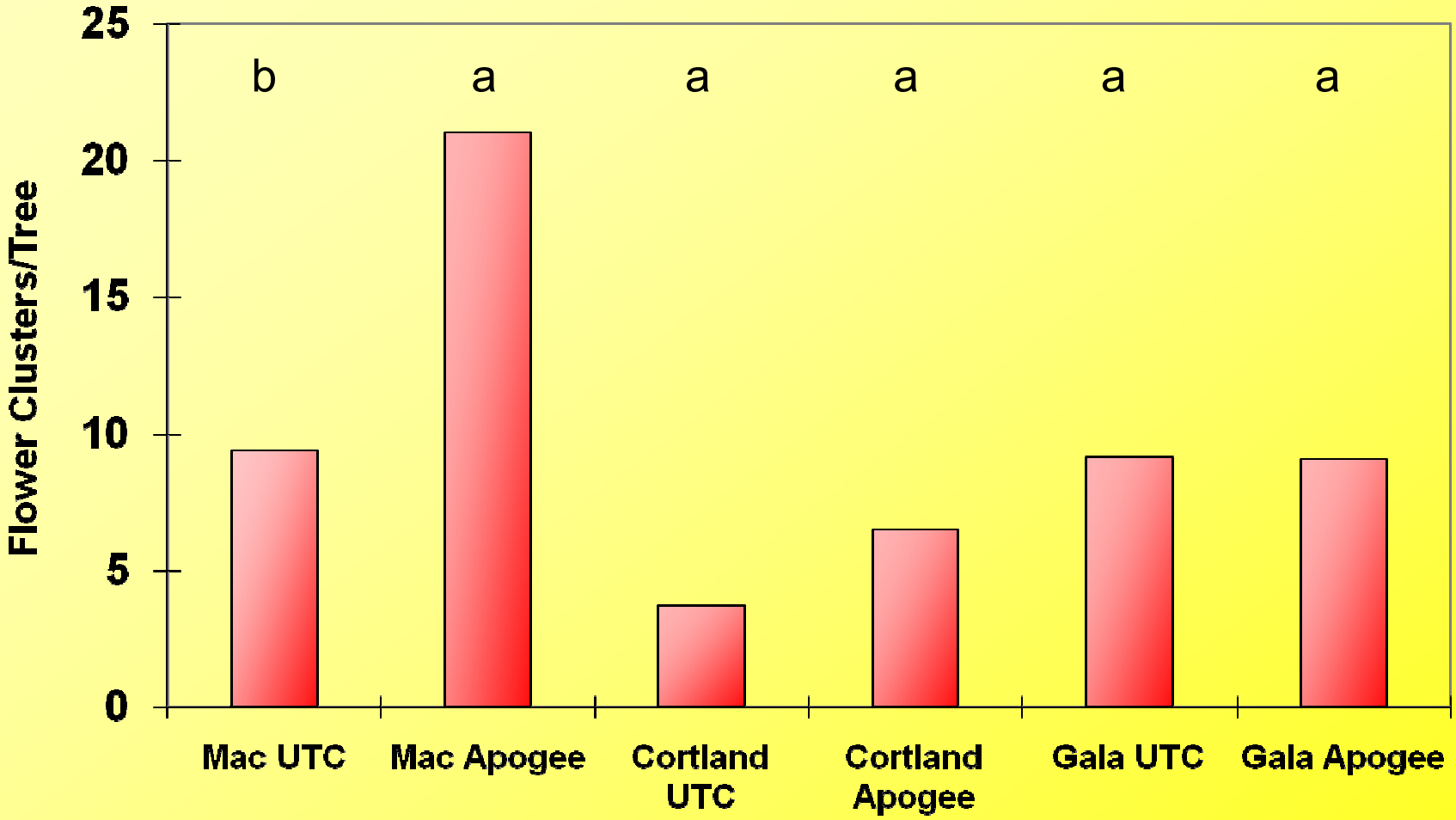


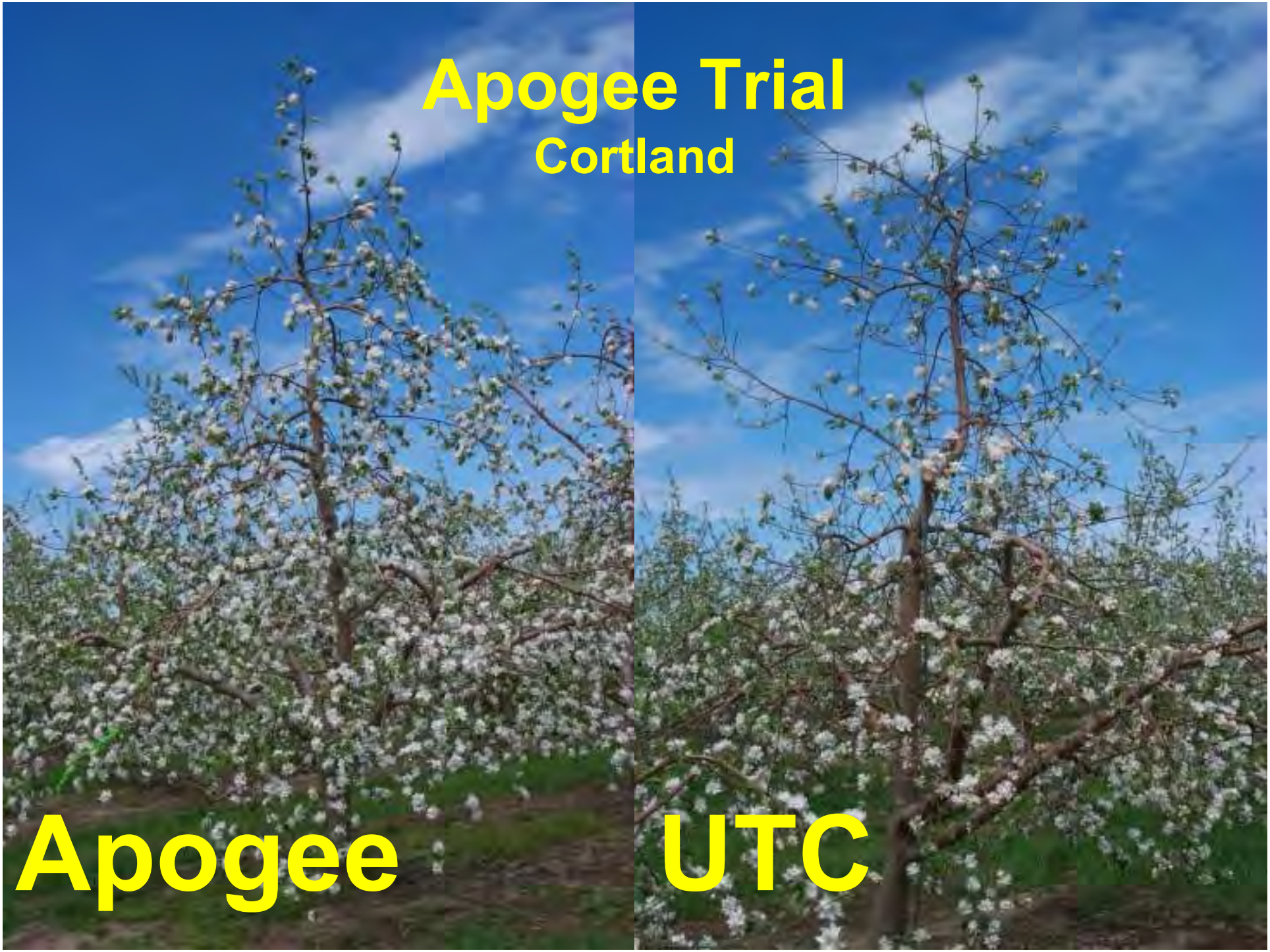
3 weeks to measure effect

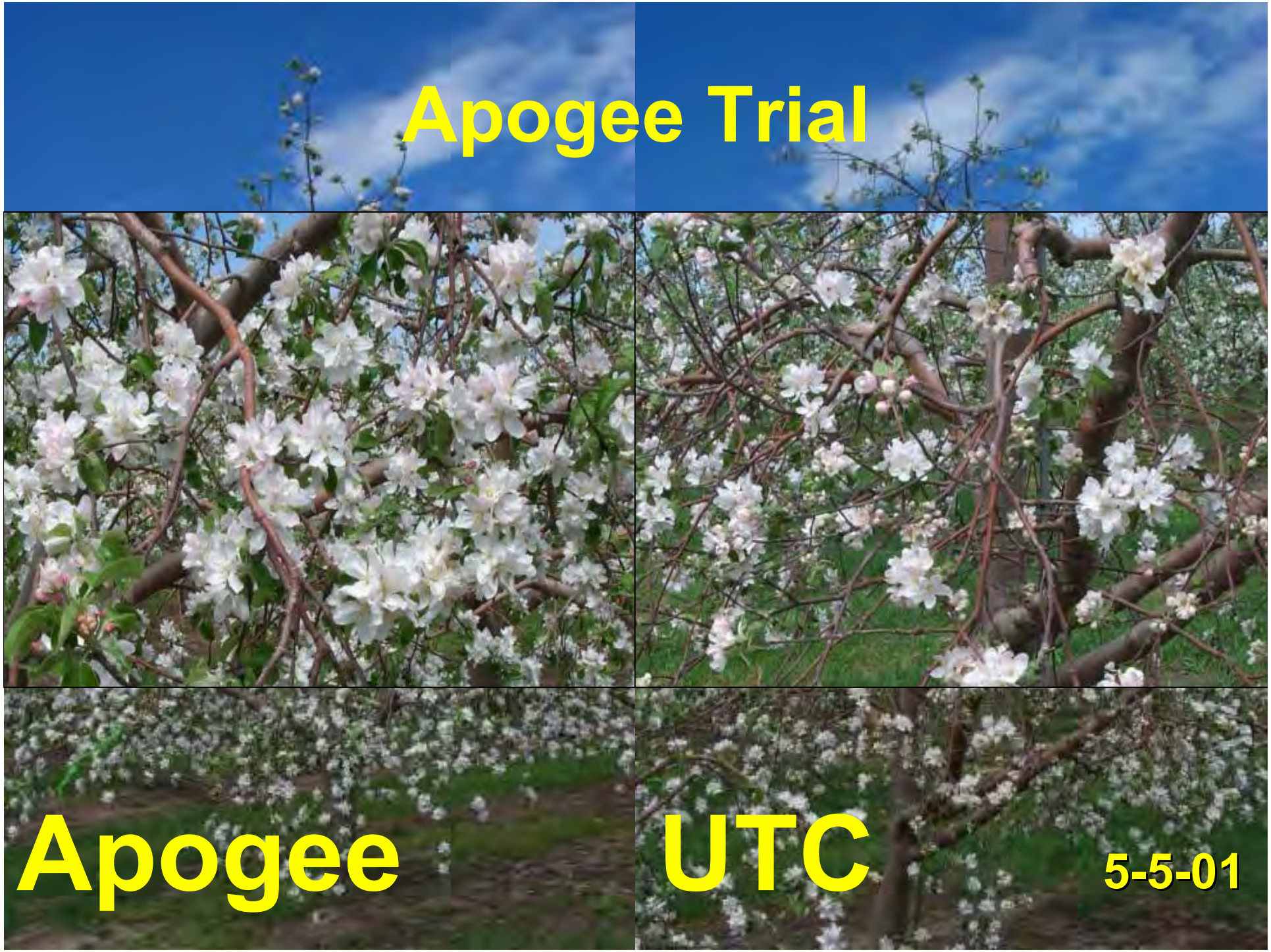
Apogee and Return Bloom

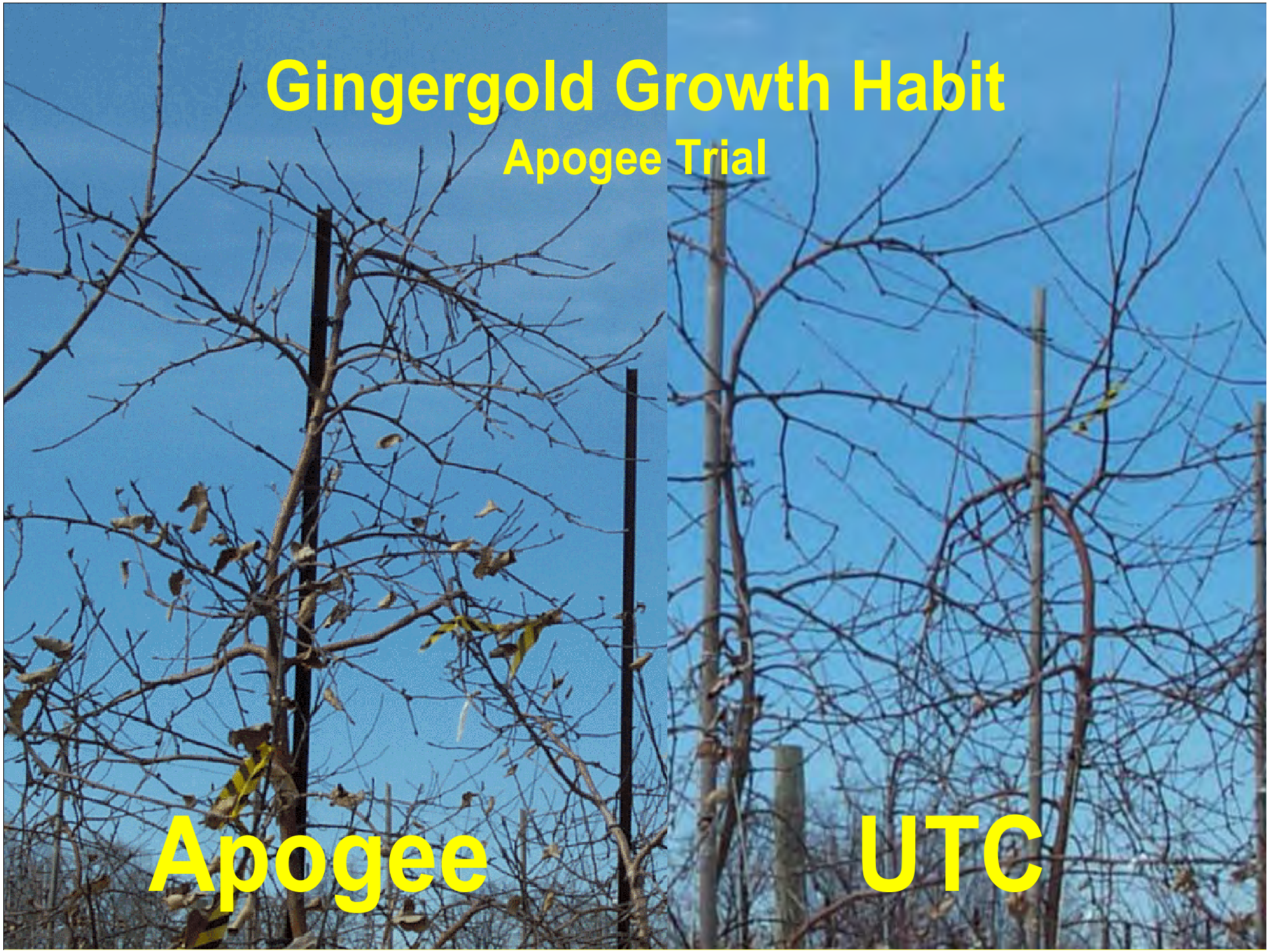
Apogee Super Spindle 2003

Return Bloom

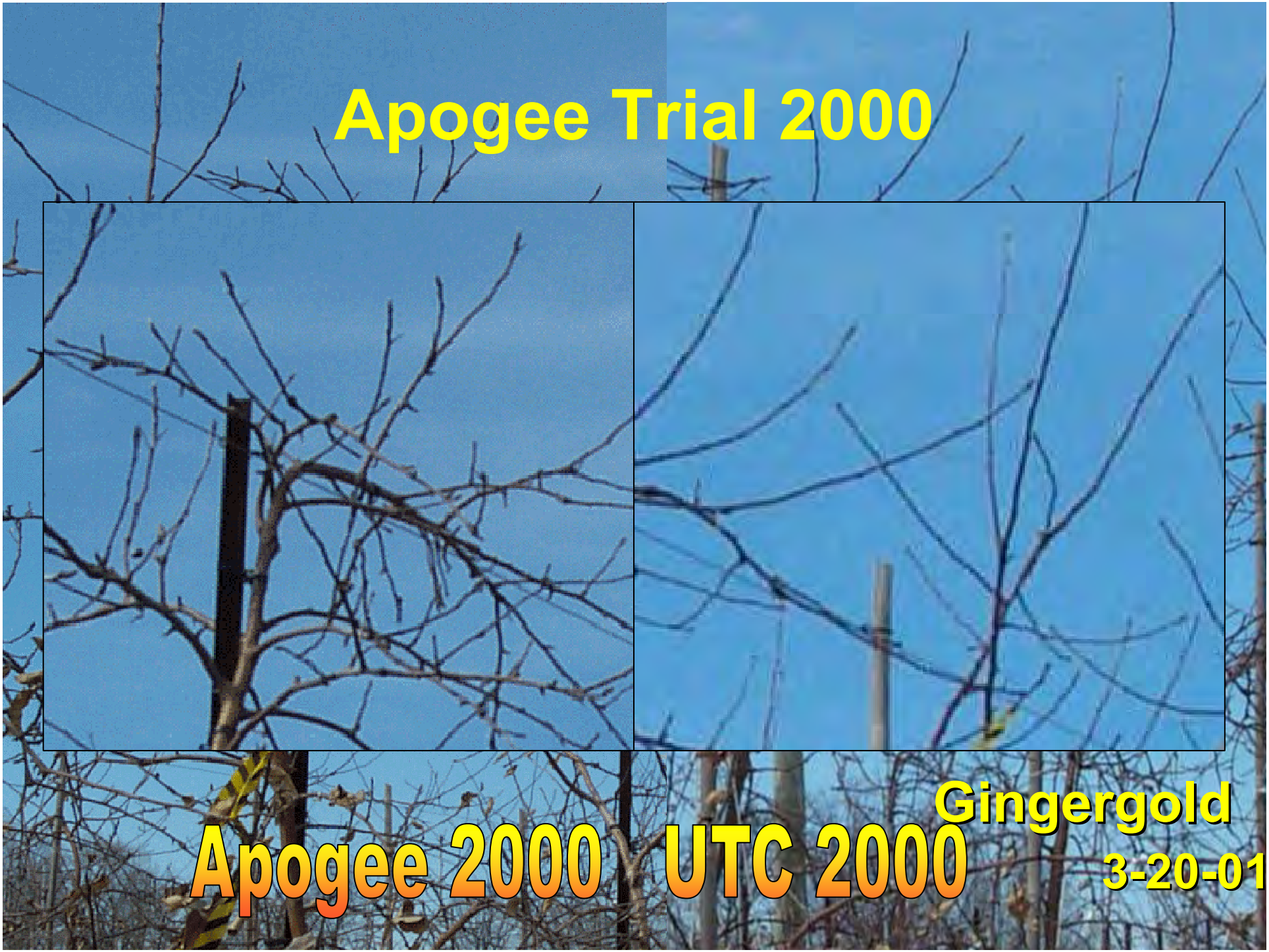



Apogee Trial
Cortland
Apogee
UTC


Apogee Trial
Apogee
UTC
5-5-01

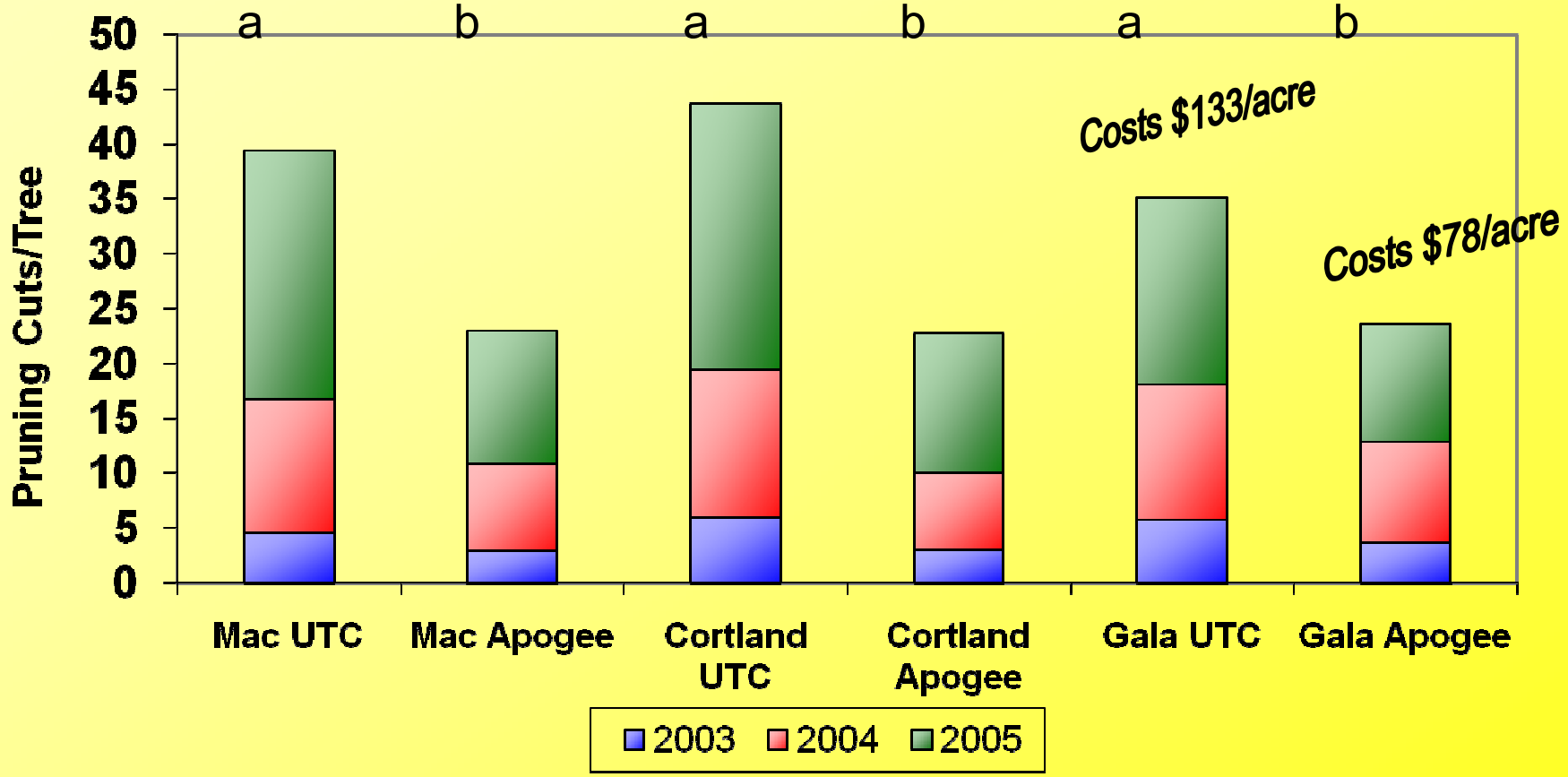

Gingergold Growth Habit
Apogee Trial
Apogee
UTC

Apogee Trial 2000



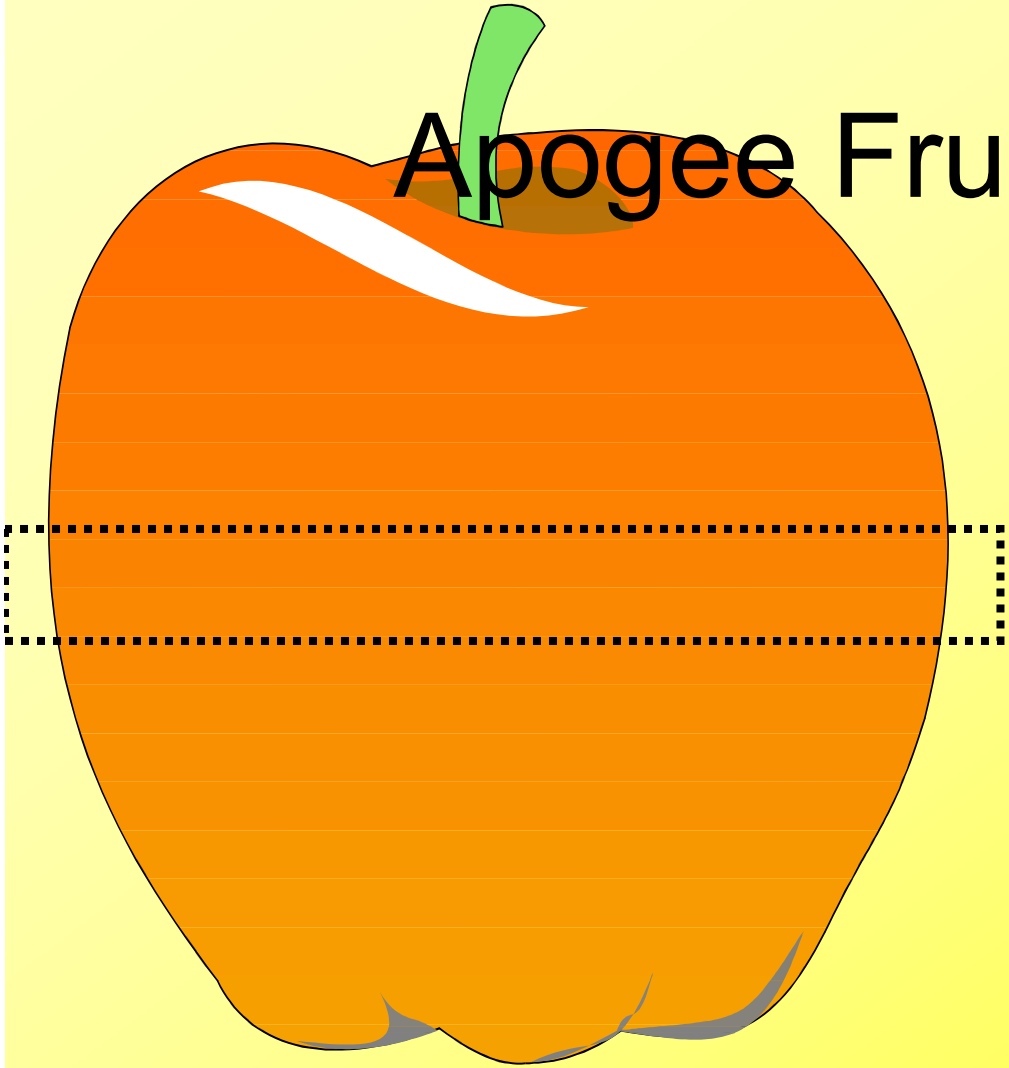
Apogee Super Spindle 03-05

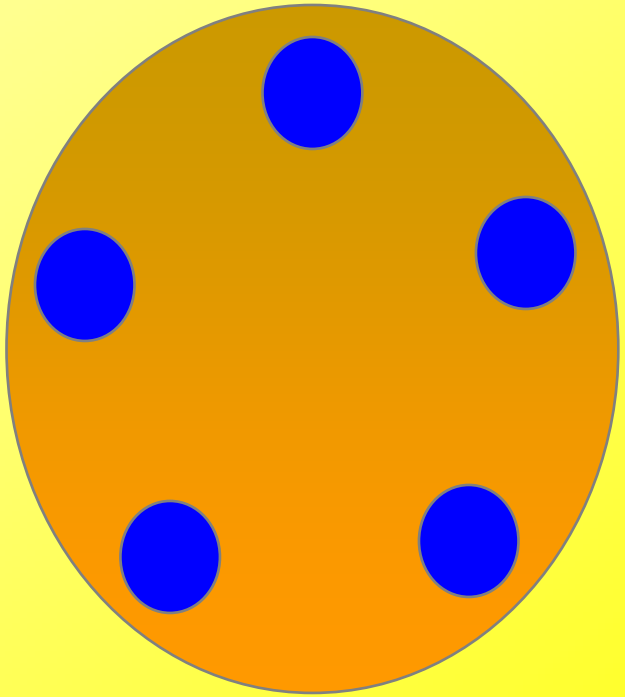
Pruning Cuts



Trial Apogee

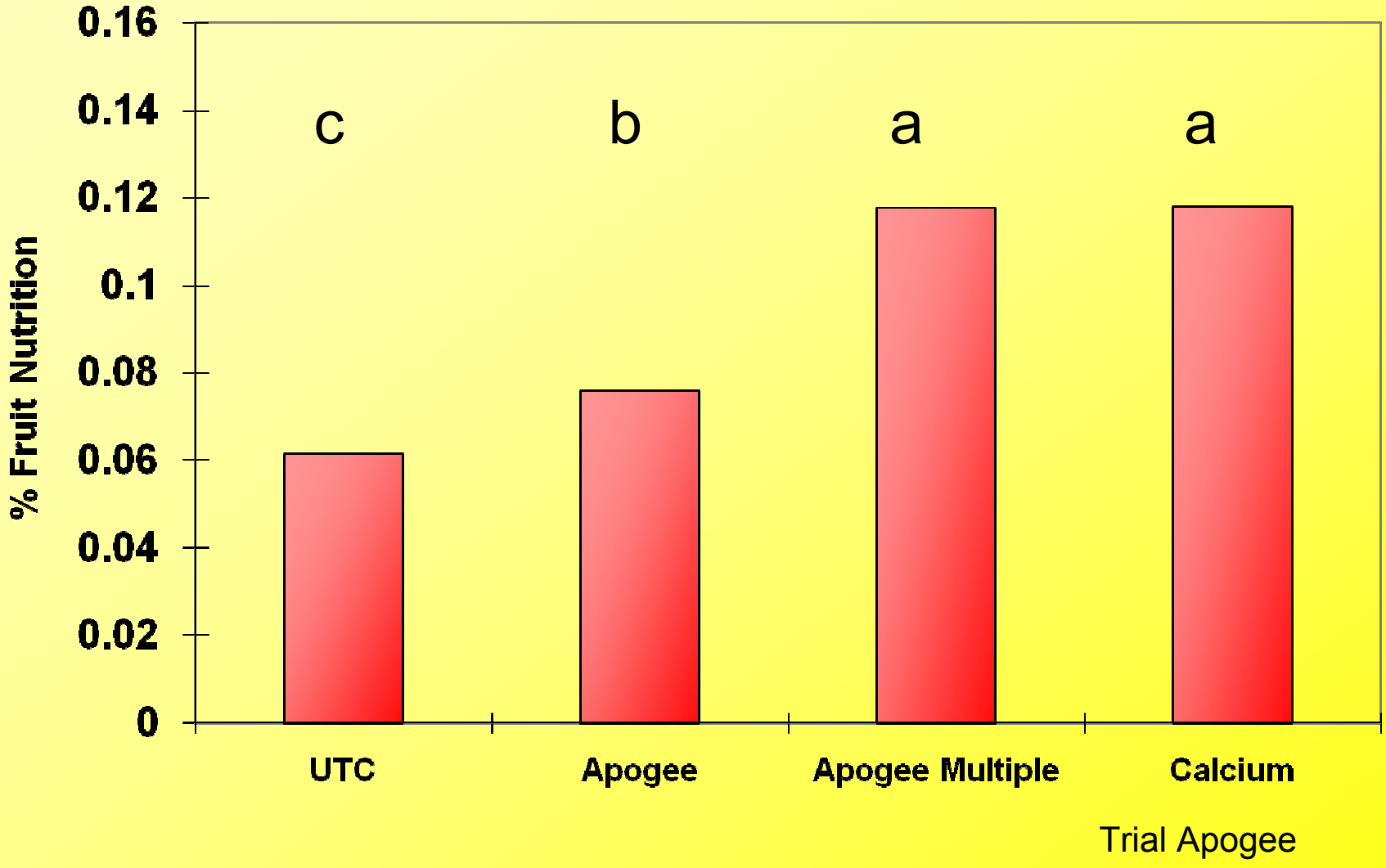
Apogee Fruit Nutrition





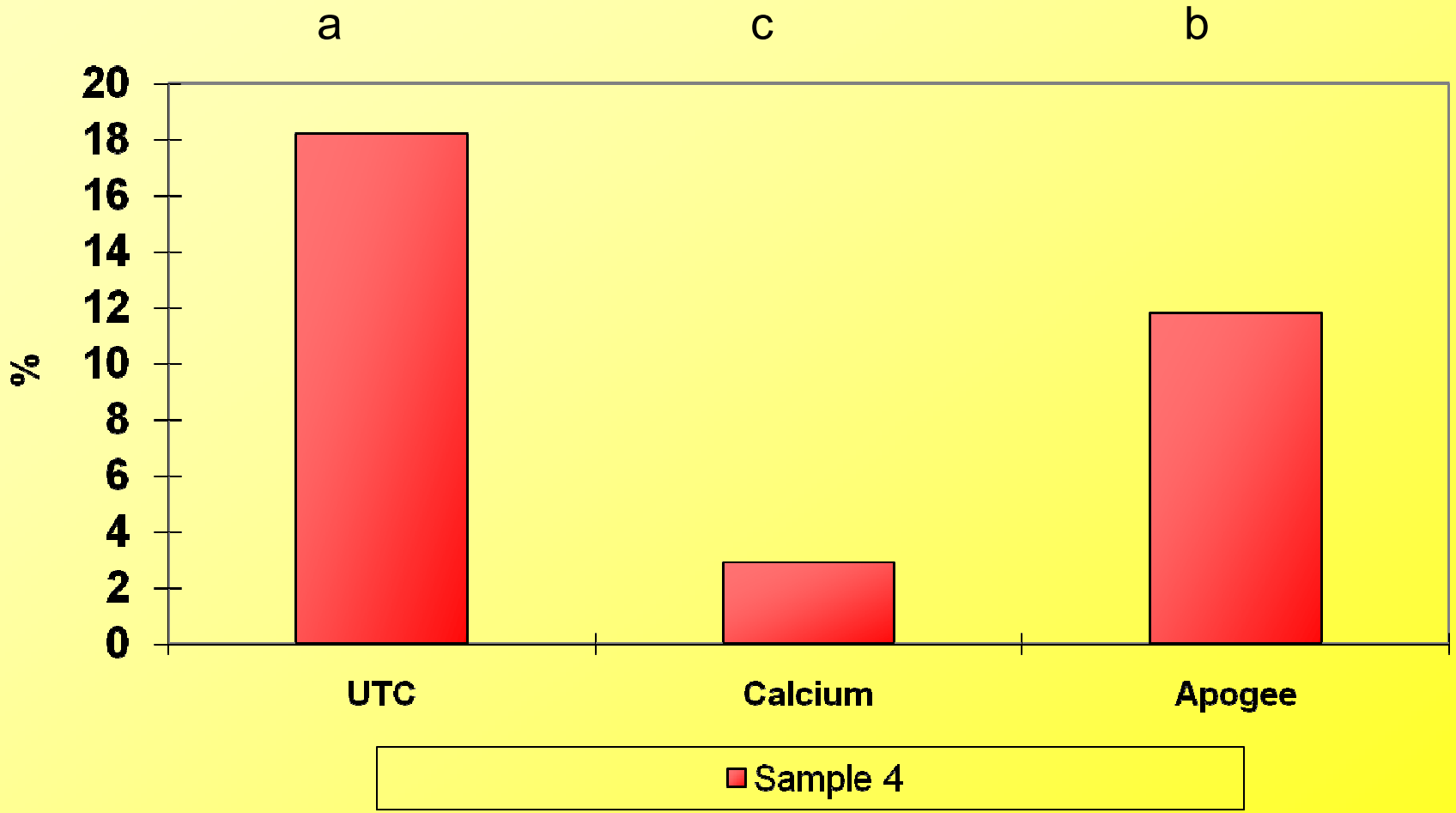
2002 Gala Apogee Trial

Fruit Calcium



Honeycrisp Calcium Trial 2005

Bitterpit



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

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.**

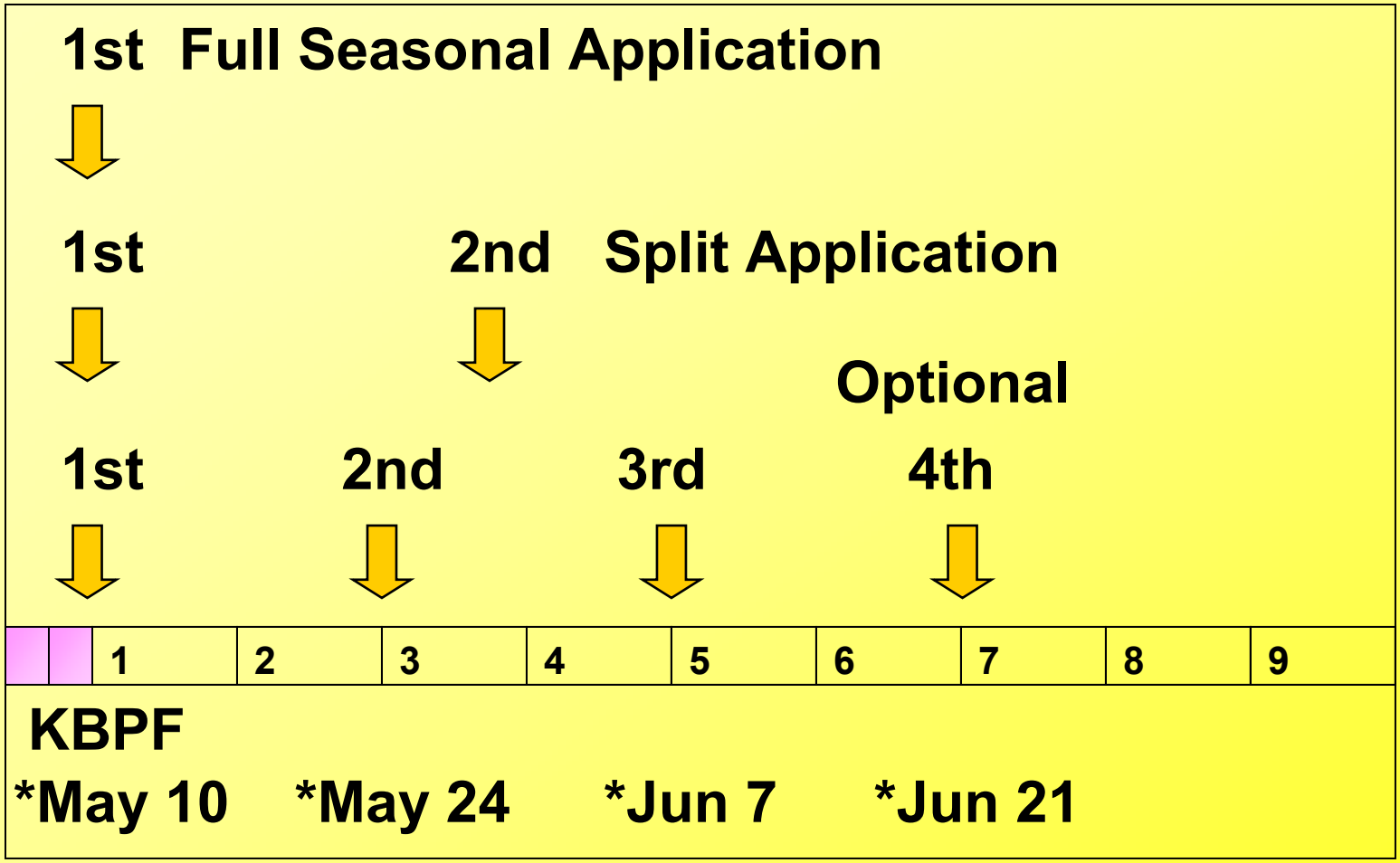

Apogee Trial 2000

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

Timing Apogee Applications



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

ReTain

- **Delays harvest**
- **Stops Drop**
- **Improves Shelf Life**

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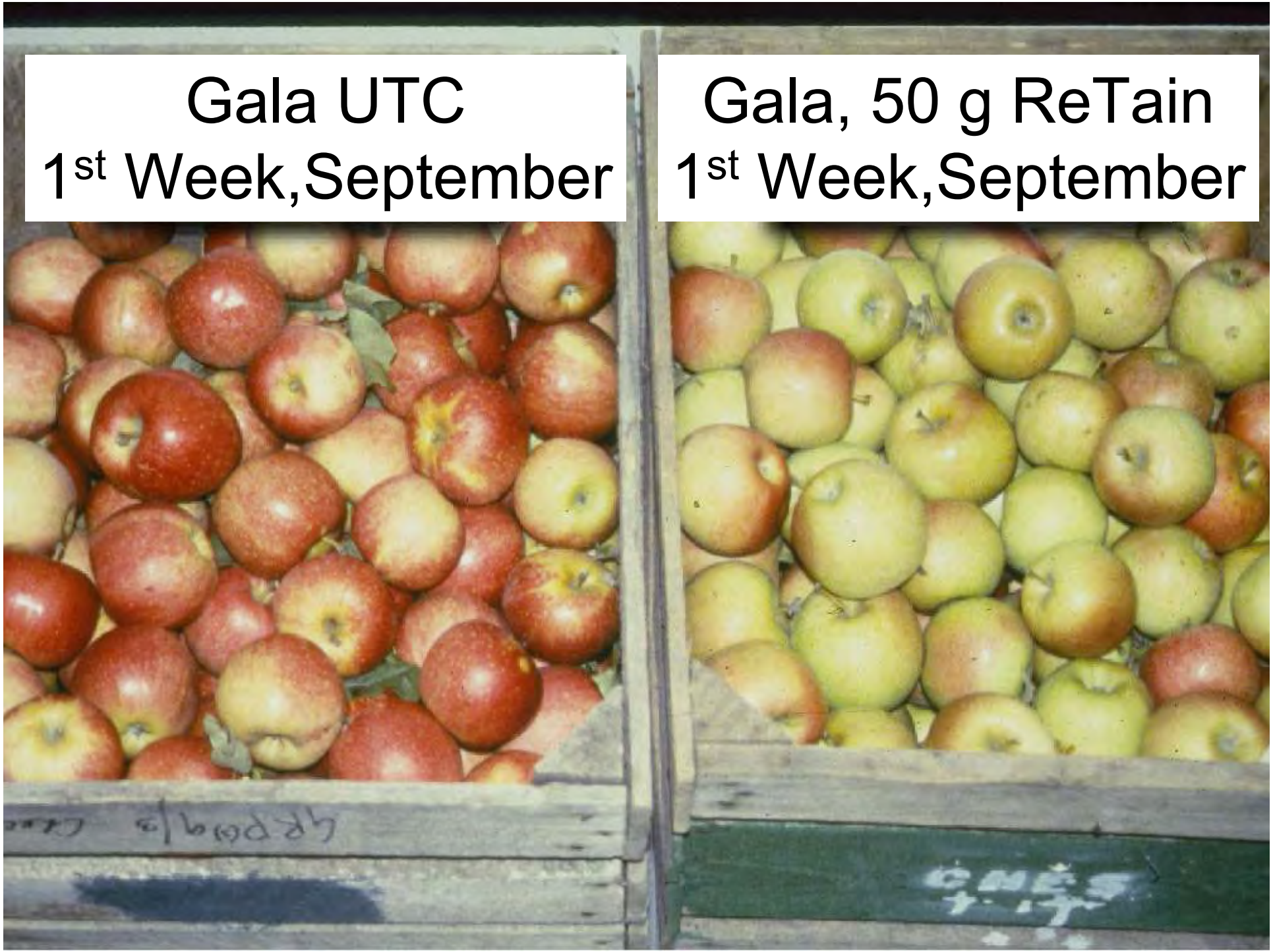
ReTain

- Maturity and Harvest Management
- Impact on Fruit Size
- Impact on Color
- Reduces Watercore, Greasiness, Cracking
- May Increase Fruit Size?
- Gala, Jonagold, Very Sensitive
- Honeycrisp, Moderately Sensitive

ReTain

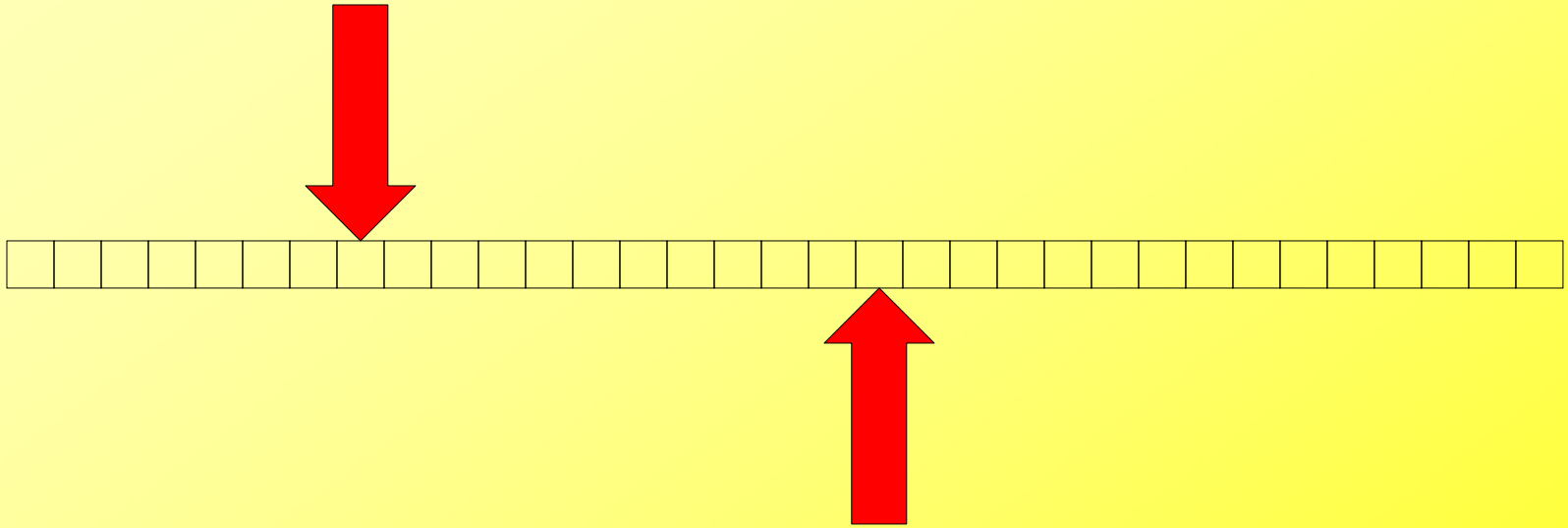
- Apply 4 weeks before anticipated harvest.
- Gala delayed 14 to 21 days
- Jonagold delayed 10 to14 days
- Honeycrisp delayed 7 to 10 days
- Most other varieties delayed 7 days


Gala UTC
1st Week,September
Gala, 50 g ReTain
1st Week,September


Gala 50 g ReTain
3rd Week,September

ReTain Harvest

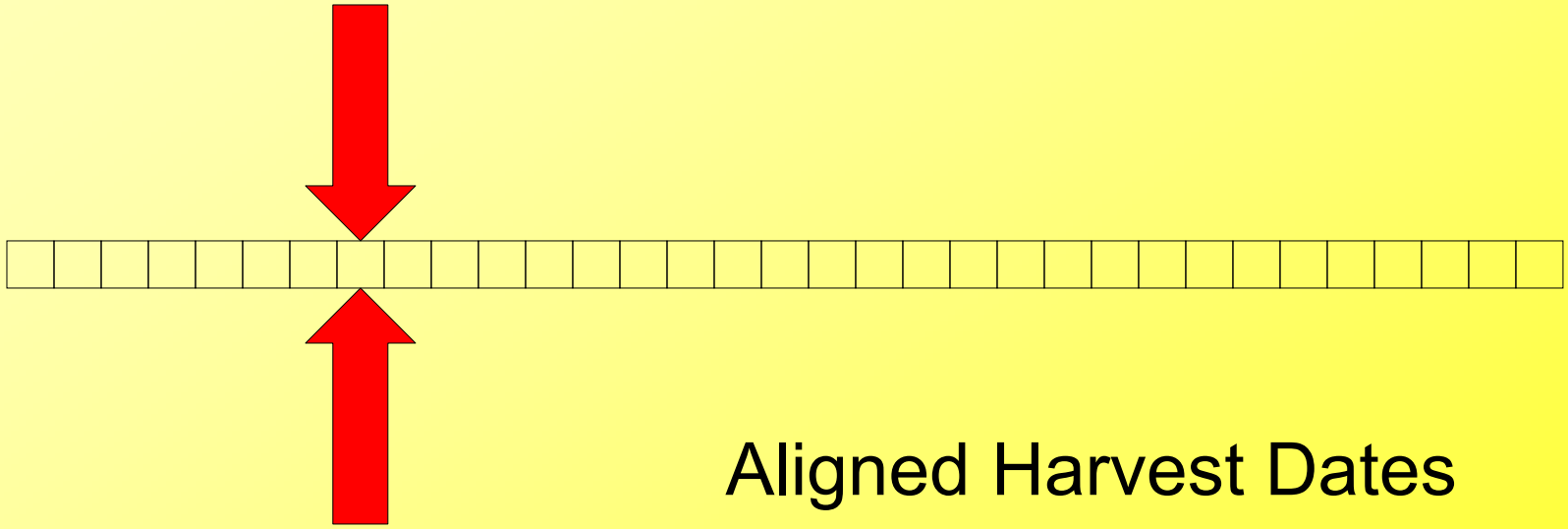
Normal Harvest



ReTain Treated

ReTain Harvest

Normal Harvest

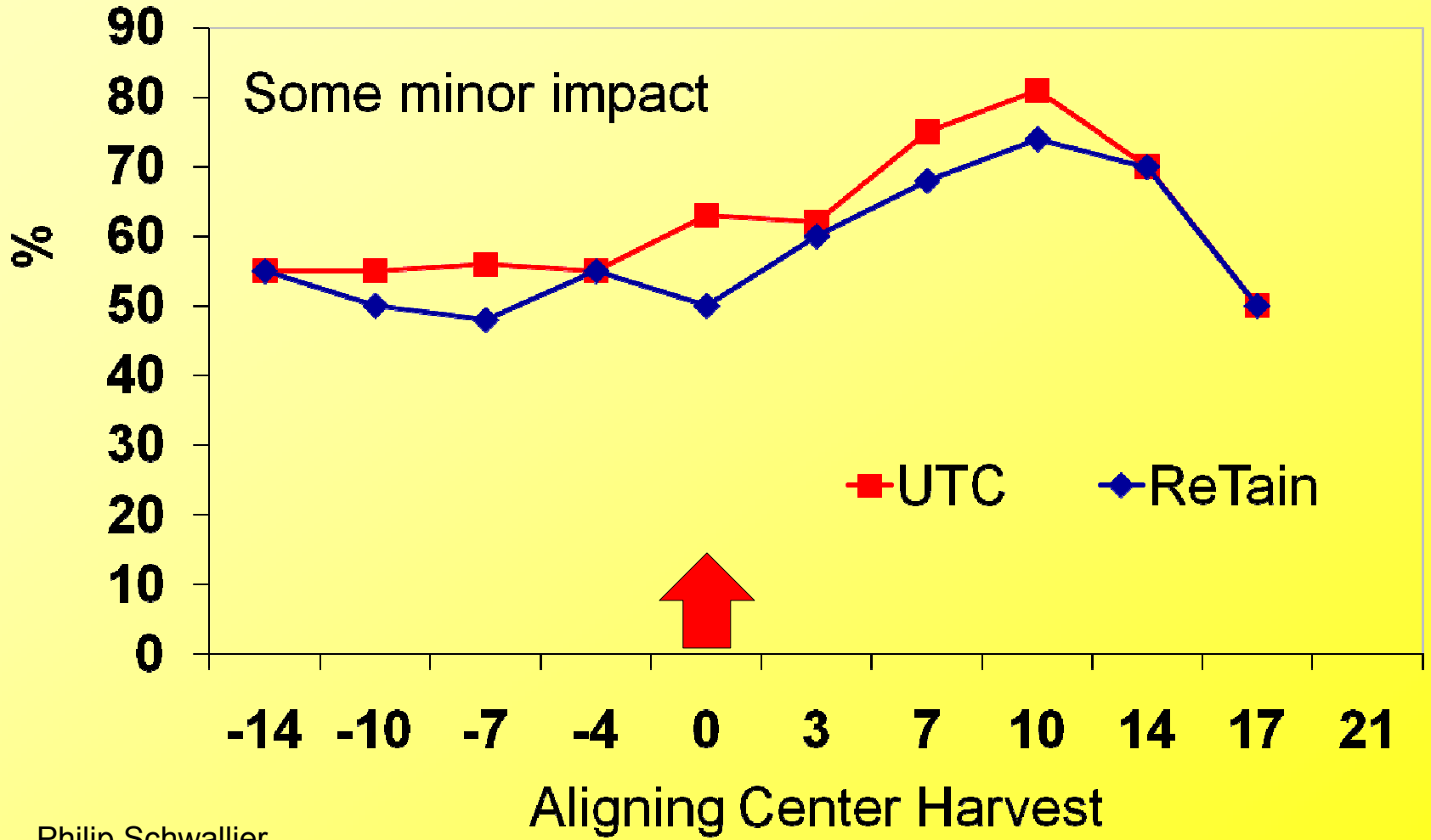


Aligned Harvest Dates

ReTain Treated

Jonagold ReTain Trials

% Red Color



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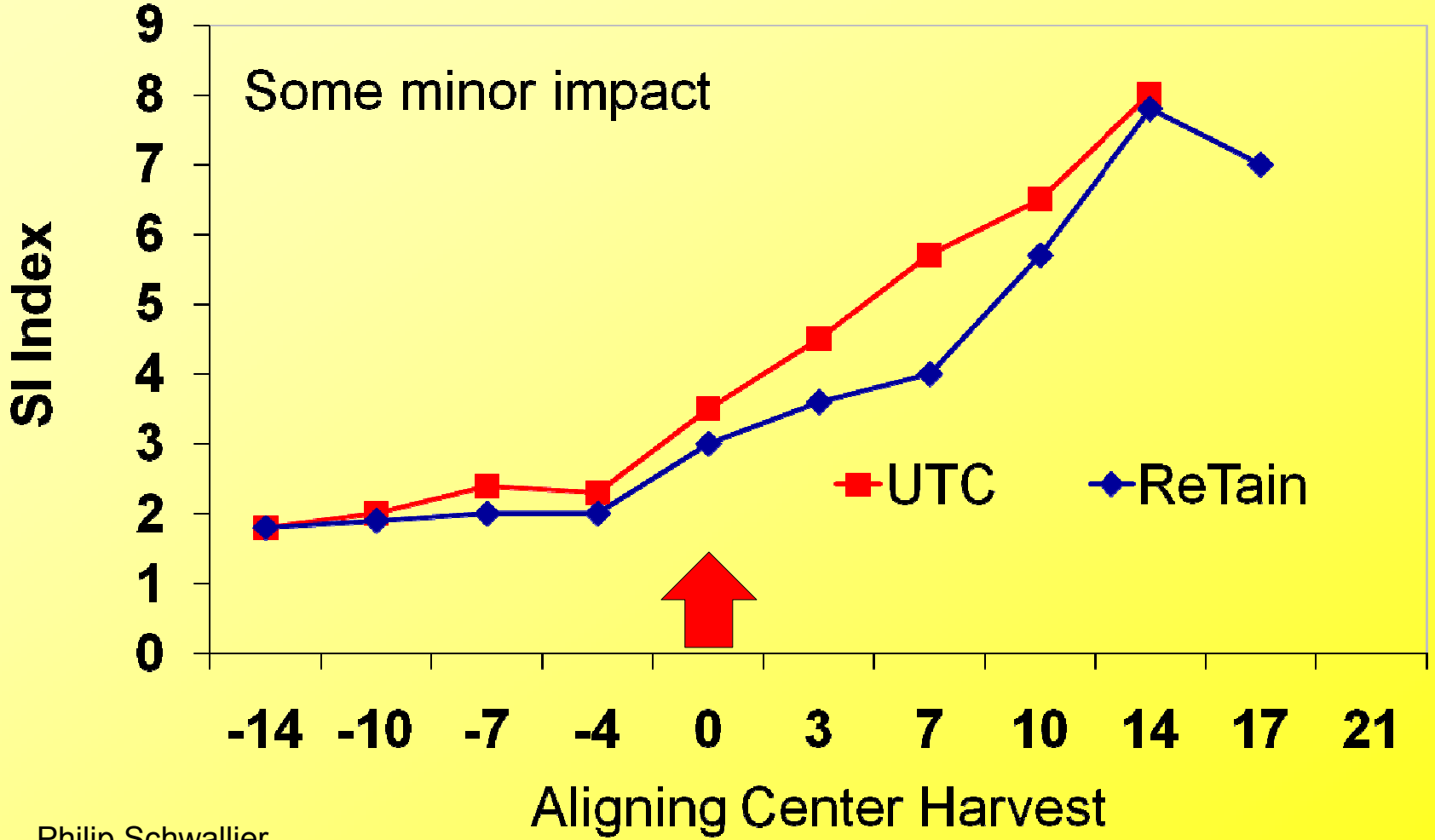
Jonagold ReTain Trials

Starch Index



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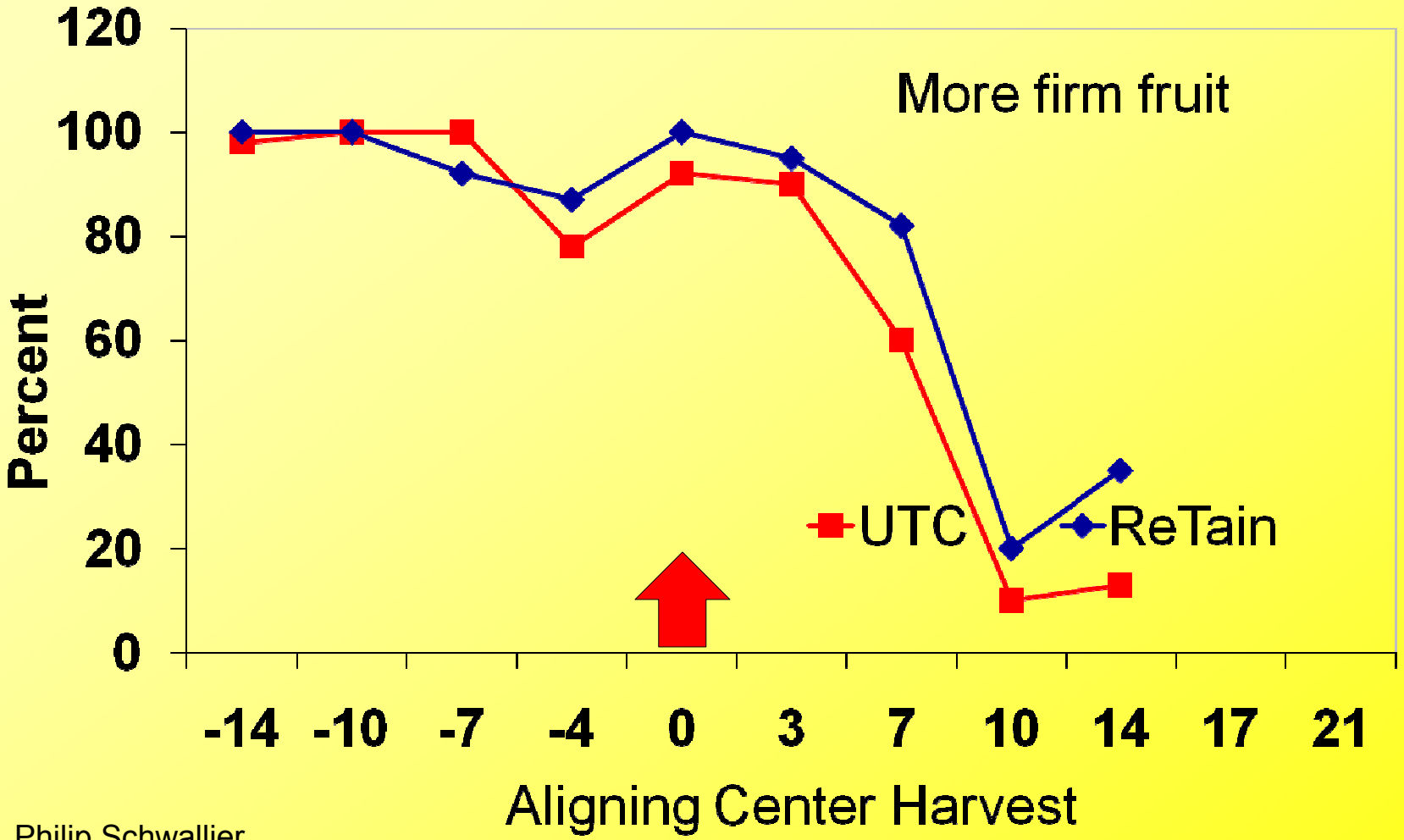
Jonagold ReTain Trials

Firmness



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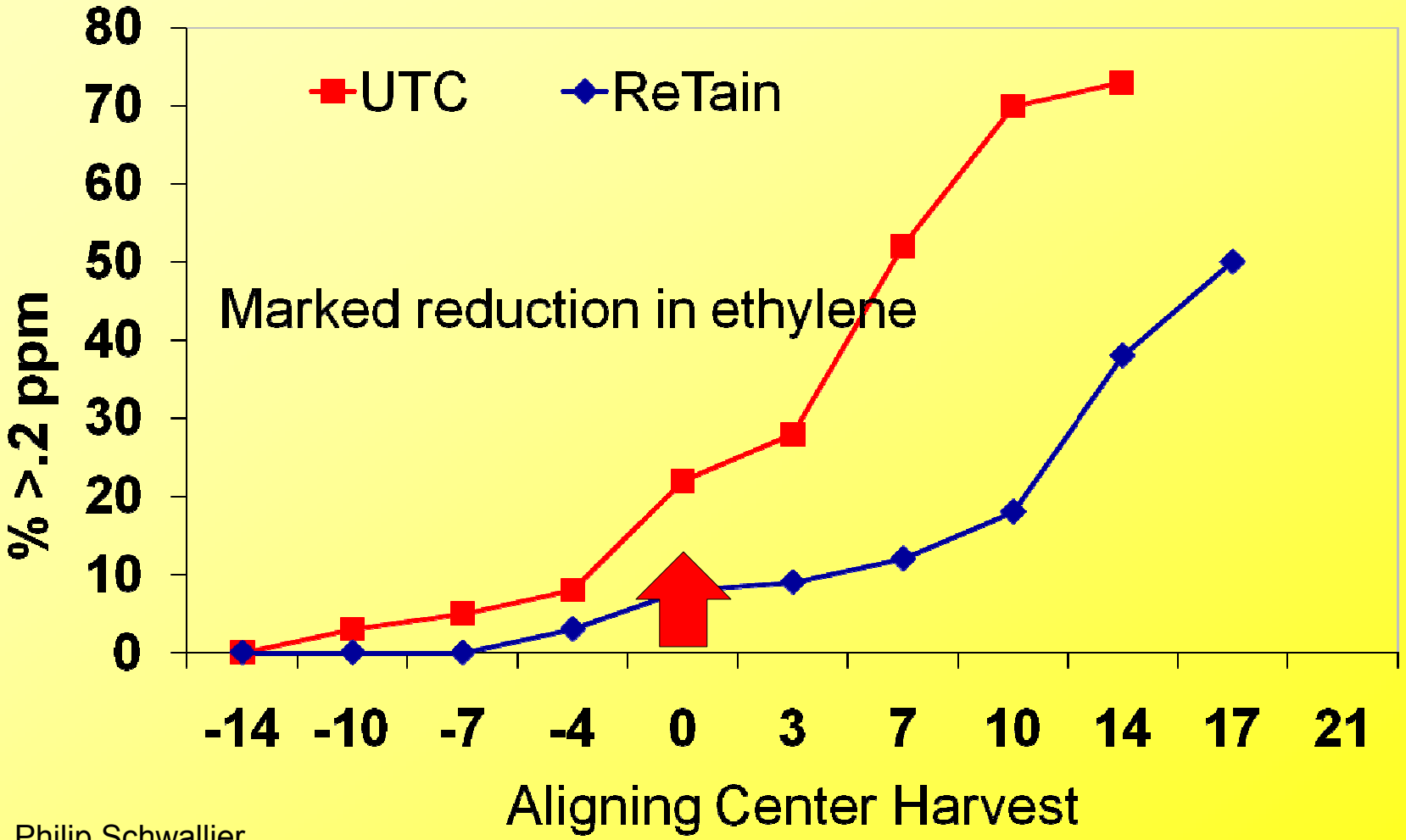
Jonagold ReTain Trials

Internal Ethylene



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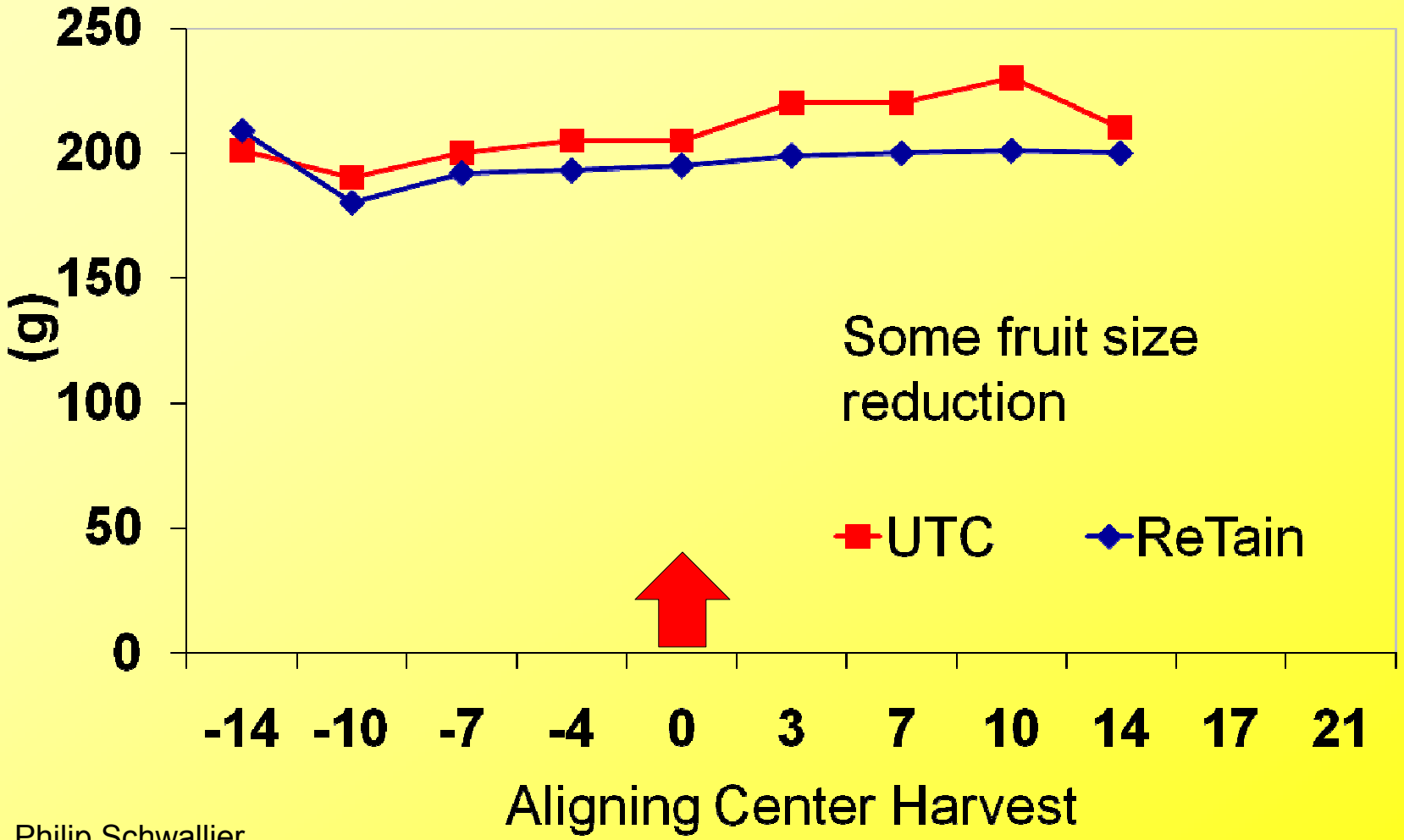
Jonagold ReTain Trials

Fruit Weight



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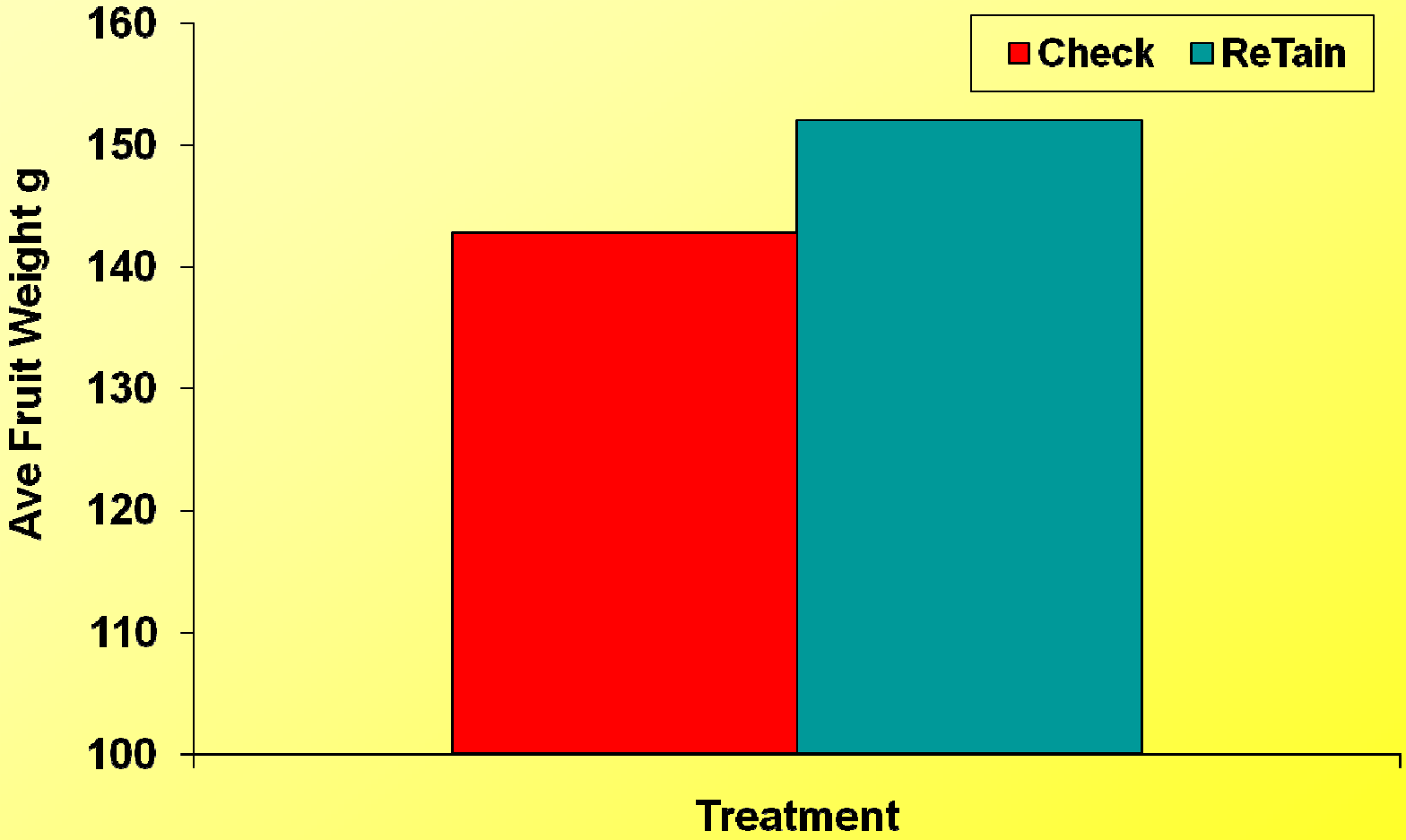
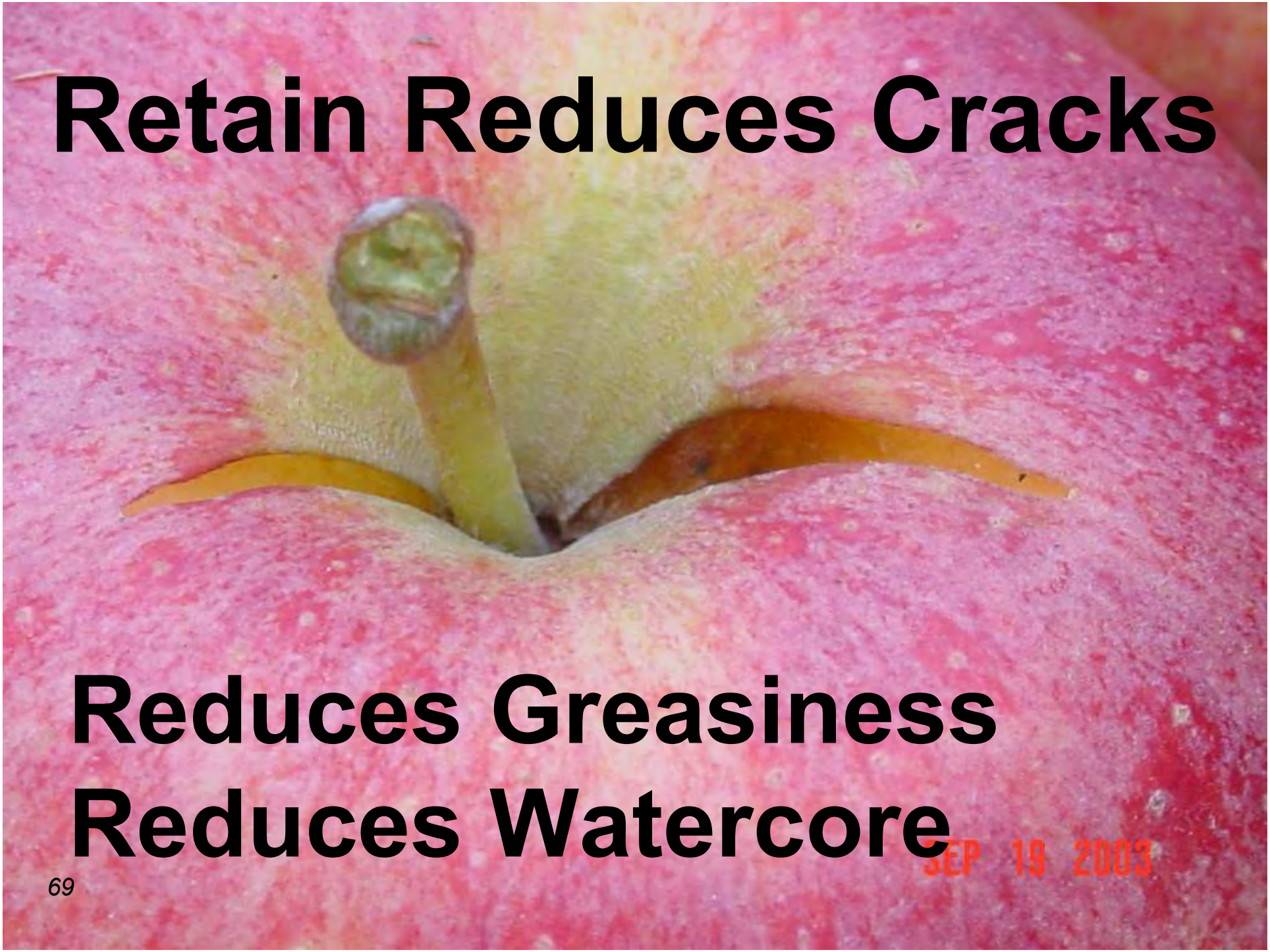
Gala ReTain Trial
Average Fruit Weight

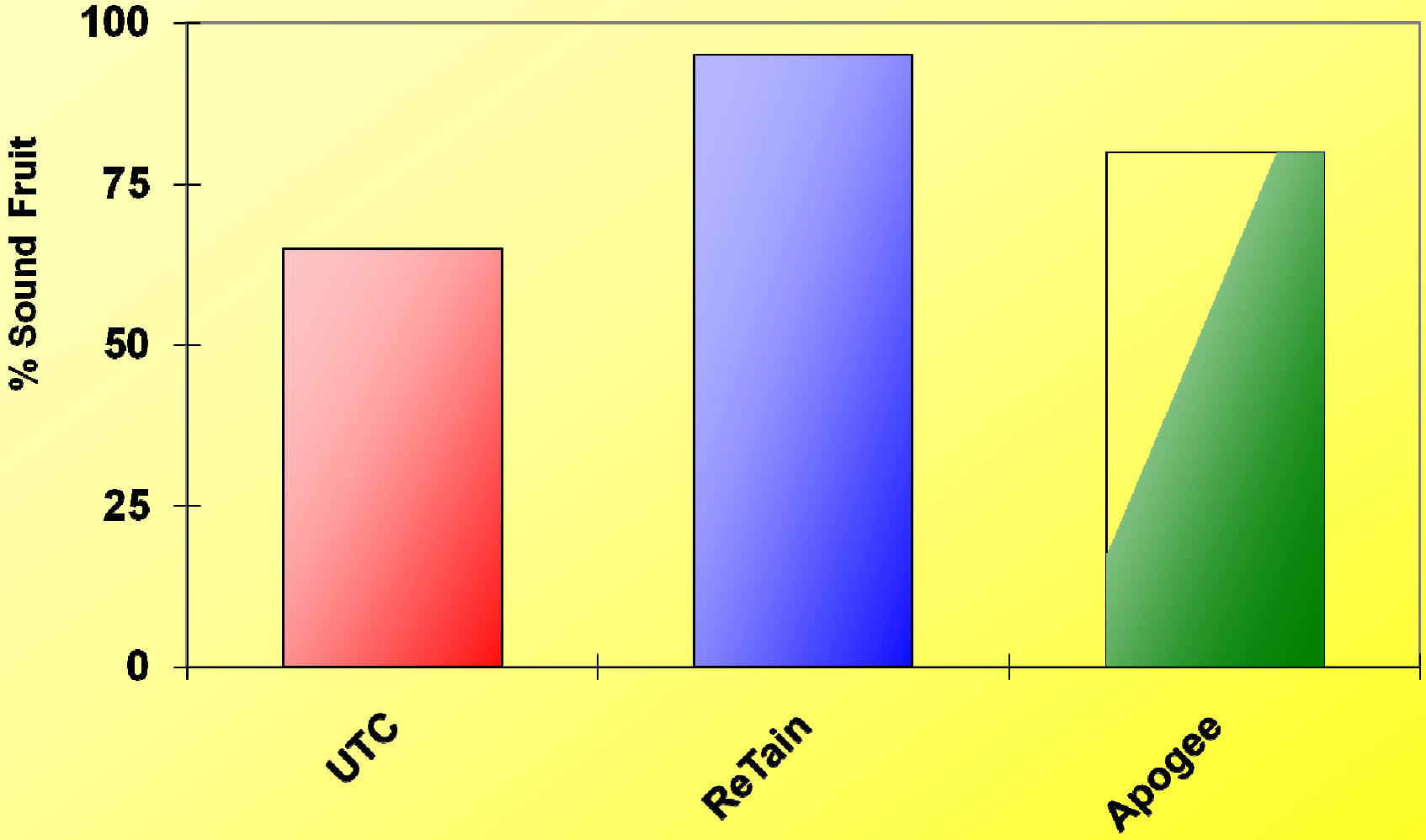


ReTain Stops Drop


Retain Reduces Cracks
Reduces Greasiness
Reduces Watercore
SEP 19 2003

Honeycrisp Trial 2003 @ CHES

Sound Fruit



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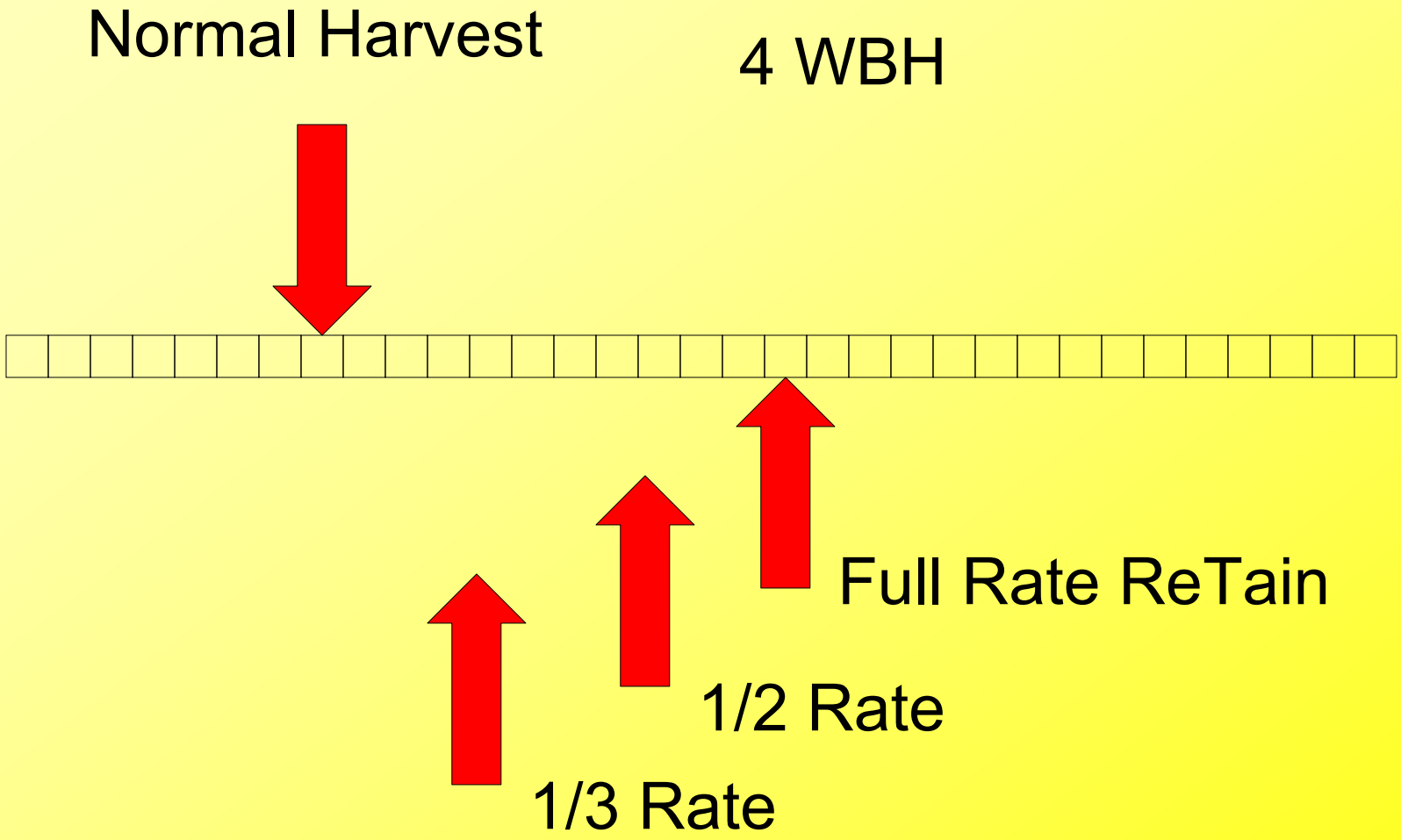
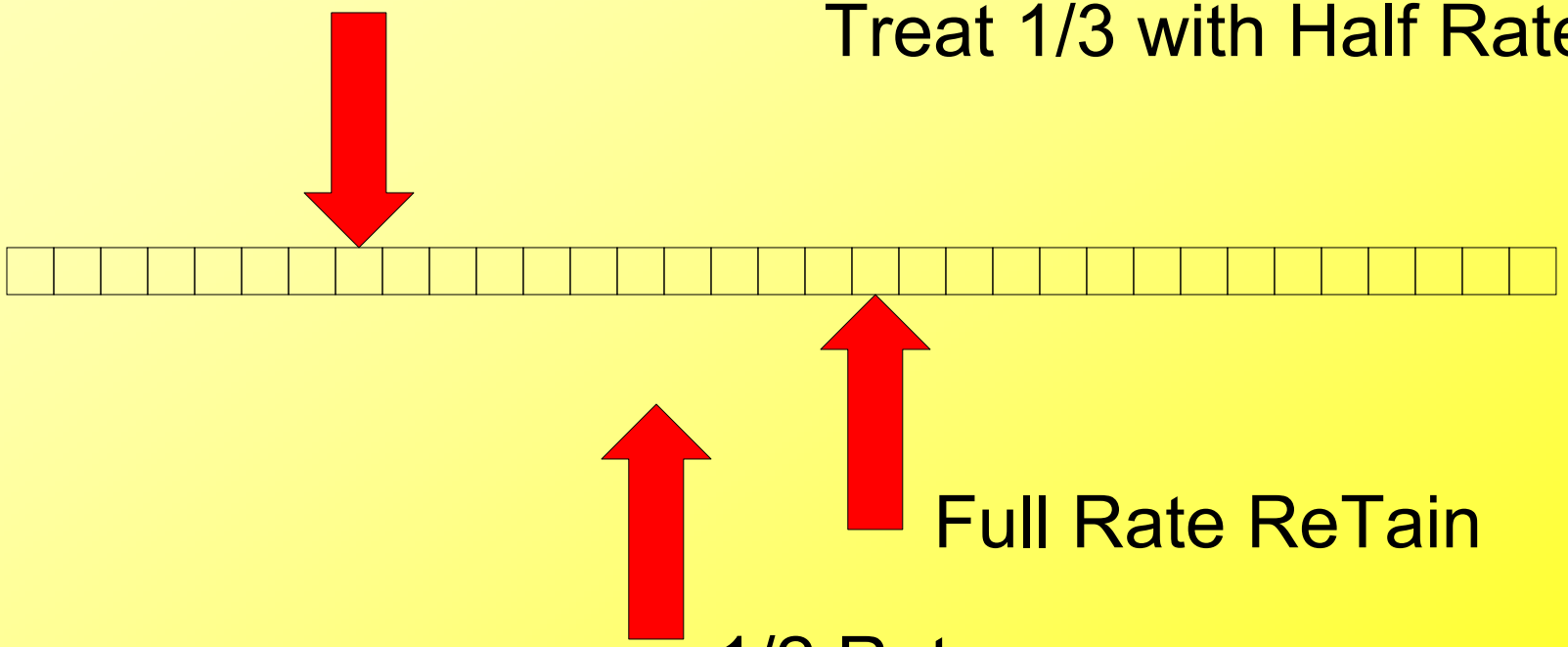
ReTain Harvest



Red Del Example

Normal Harvest

Treat 1/3 with Full Rate
Treat 1/3 with Half Rate



Full Rate ReTain

1/2 Rate

ReTain

- Harvest management tool
- Quality improvement

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ReTain

- Delays harvest
- Stops Drop
- Reduces Watercore, Greasiness, Cracks
- Improves Shelf Life
- May Increase Fruit Size??
- Color Development??
- Gala, Jonagold, Very Sensitive
- Honeycrisp, Moderately Sensitive

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Thanks to:
CHES staff
Michigan Apple Research Committee
Michigan State Horticulture Society
Valent BioSciences
AmVac
BASF
Grower Cooperators