Pollen Tube Growth Model For Michigan 2019

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Thanks to:

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

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Fruit Quality

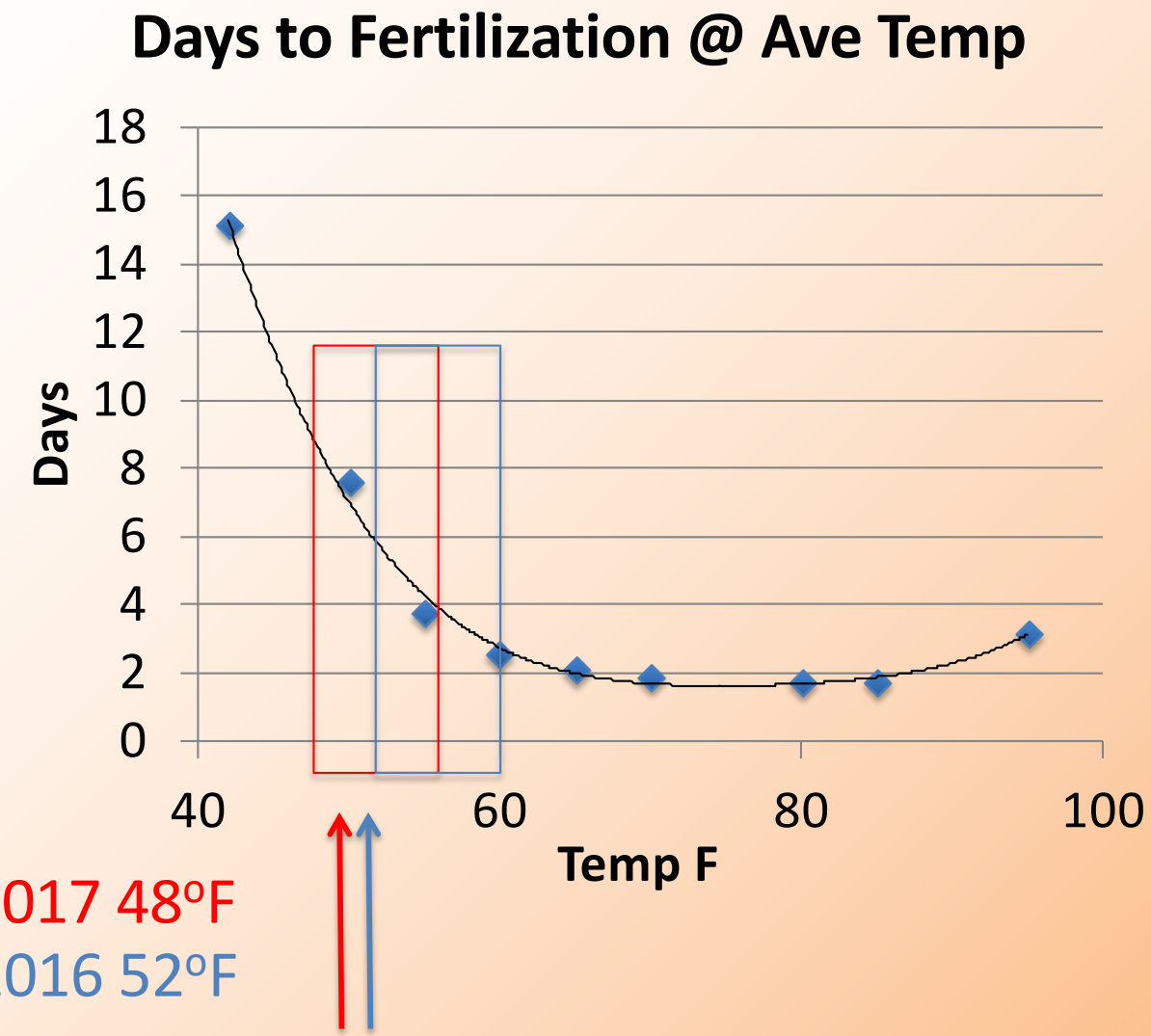
- Maximum quality starts with dormant pruning.
- Next timing is at bloom.
- Chemical thinning.

Fertilization of Apple Flowers

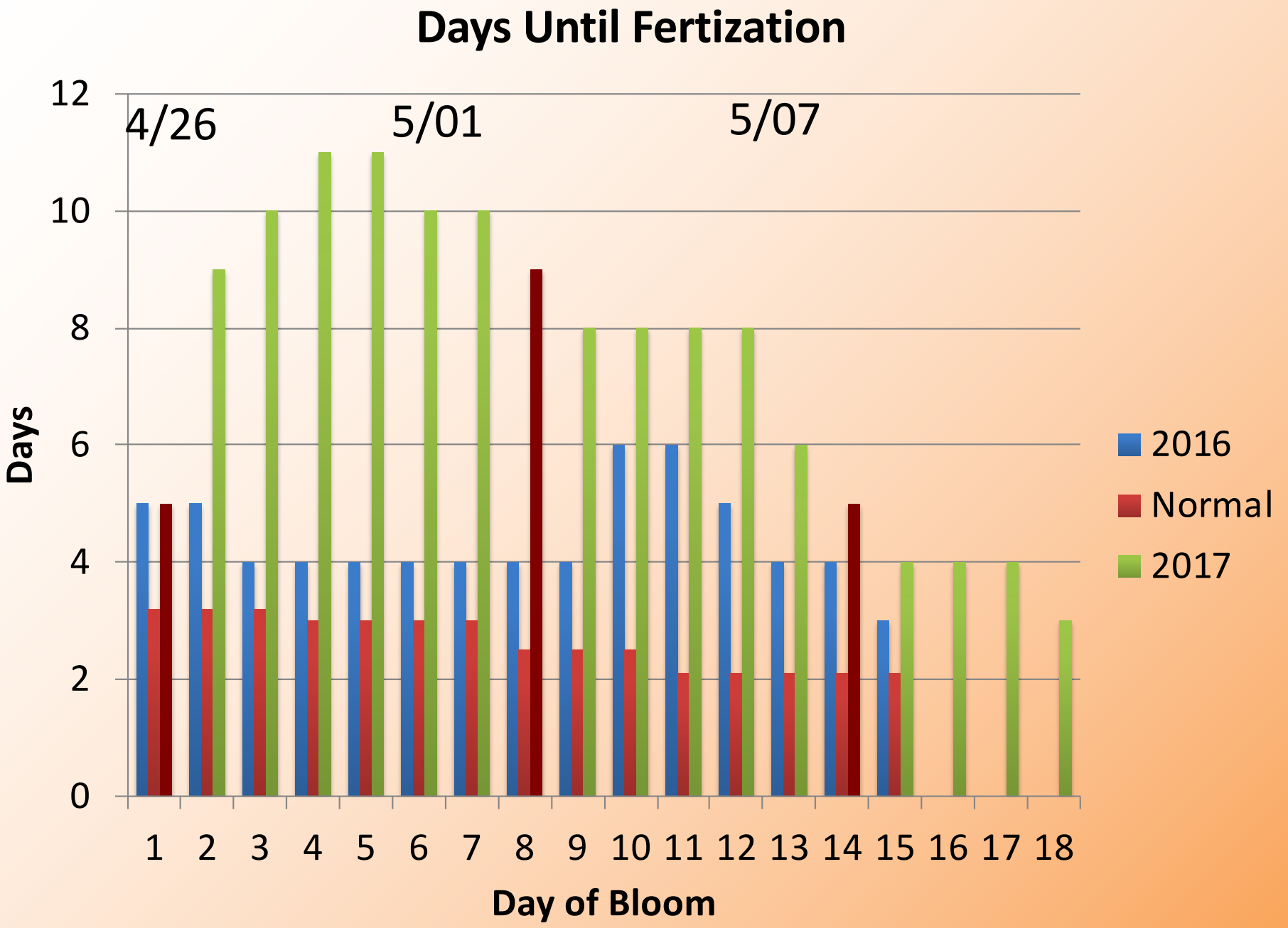
- It takes about 2.5 days for flowers to be fertilized.

- Use model to time blossom thinners.
- Lime Sulfur Oil
- ATS

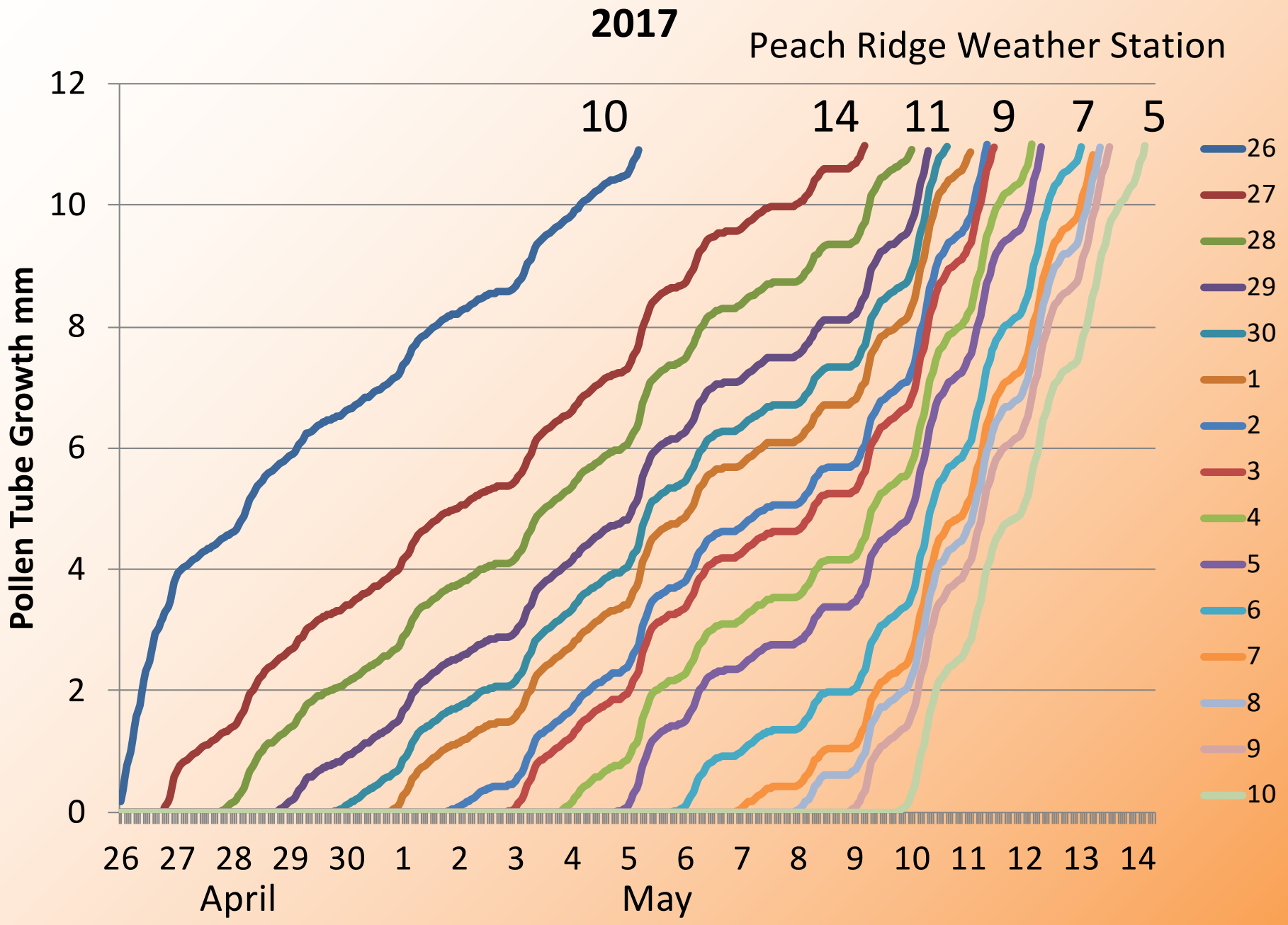
Apple



Temp	Days	Hours
42	15.2	364
50	7.6	182
55	3.8	91
60	2.5	61
65	2.1	51
70	1.9	46
80	1.7	41
85	1.7	41
95	3.2	76


Days Until Fertization
12
10
8
6
4
2
0
Days
4/26
5/01
5/07
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
Day of Bloom
2016
Normal
2017

Pollen Tube Growth Model 2017



PTGM Steps

- Selection variety and block.
- Measure 25 to 50 pistils.
- Get the average length and enter into model.

PTGM Steps

- Set model start clock when 5 to 10% bloom open.
  - **OR** If you want 100 apples/tree, then when 100 flowers are open
- For Example:
  - Day 0 a few blossoms open
  - Day 1 10% bloom opened overnight
  - Set start at: 8 am day 1

PTGM Steps

- When model predicts 100% fertilization, spray 1st blossom thinner.

- For Example:
  - Day 3 @ 2pm = 100% fertilization.
  - Spray between 2 and 3 pm.

PTGM Steps

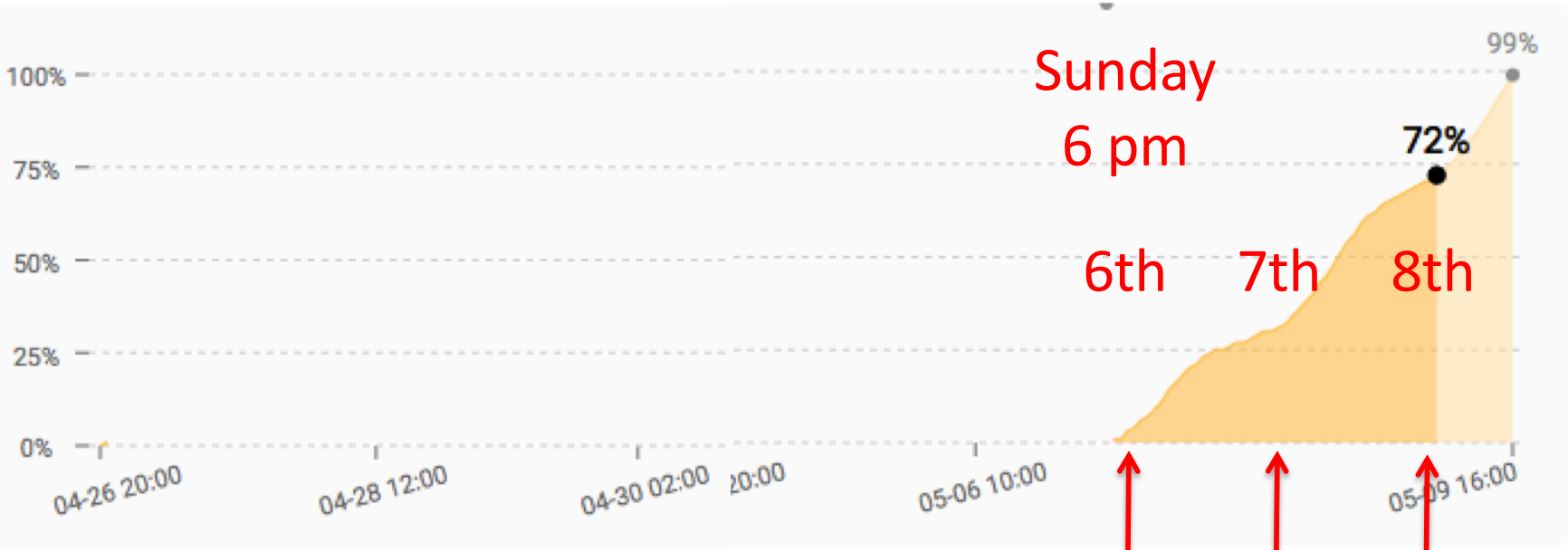
- Restart clock by entering spray info.
- Spray again when you get more than 50% but before you get 100%.

- Repeat again if necessary.

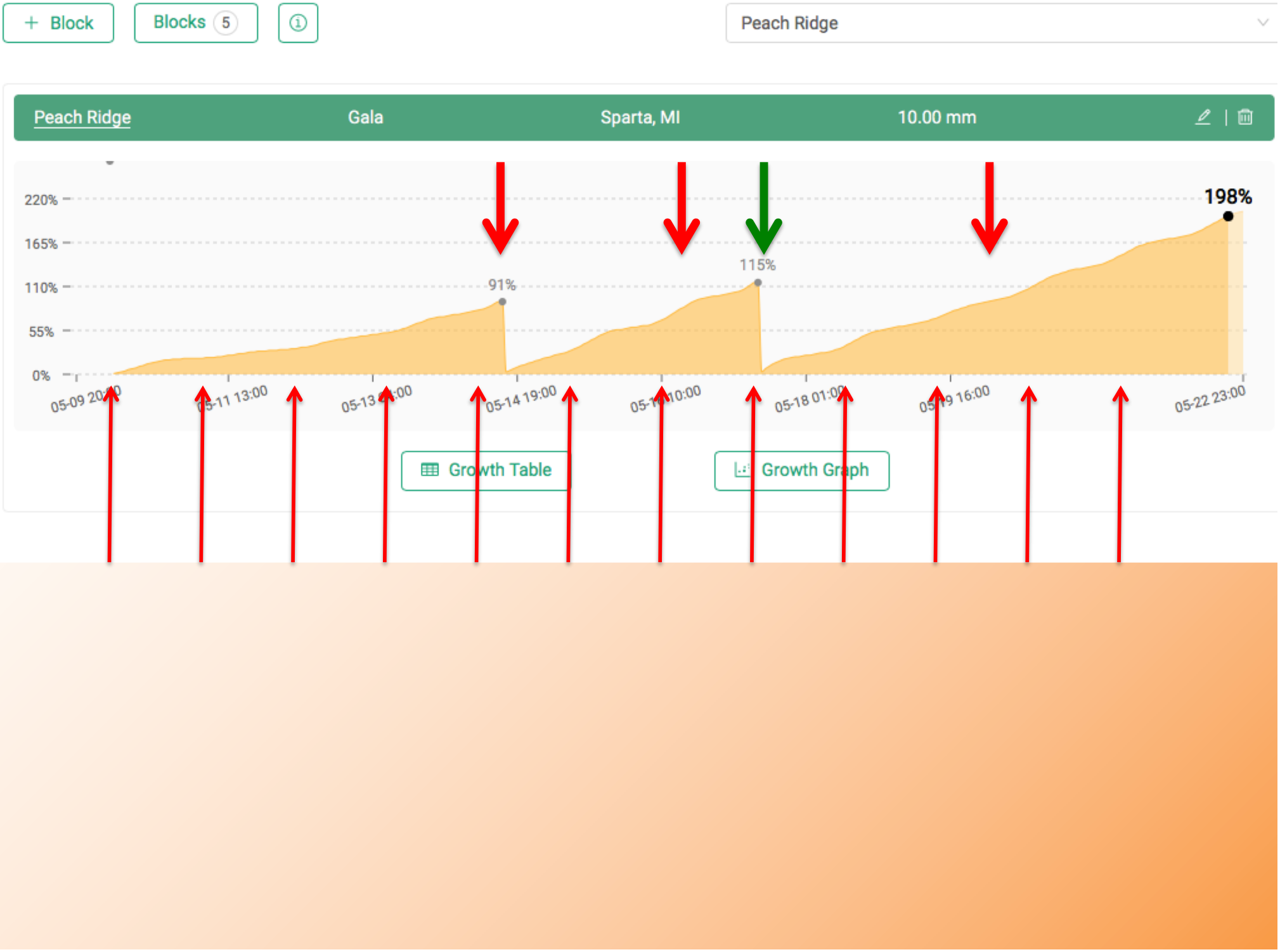
+ Block | Blocks 3 | ⓘ | dge

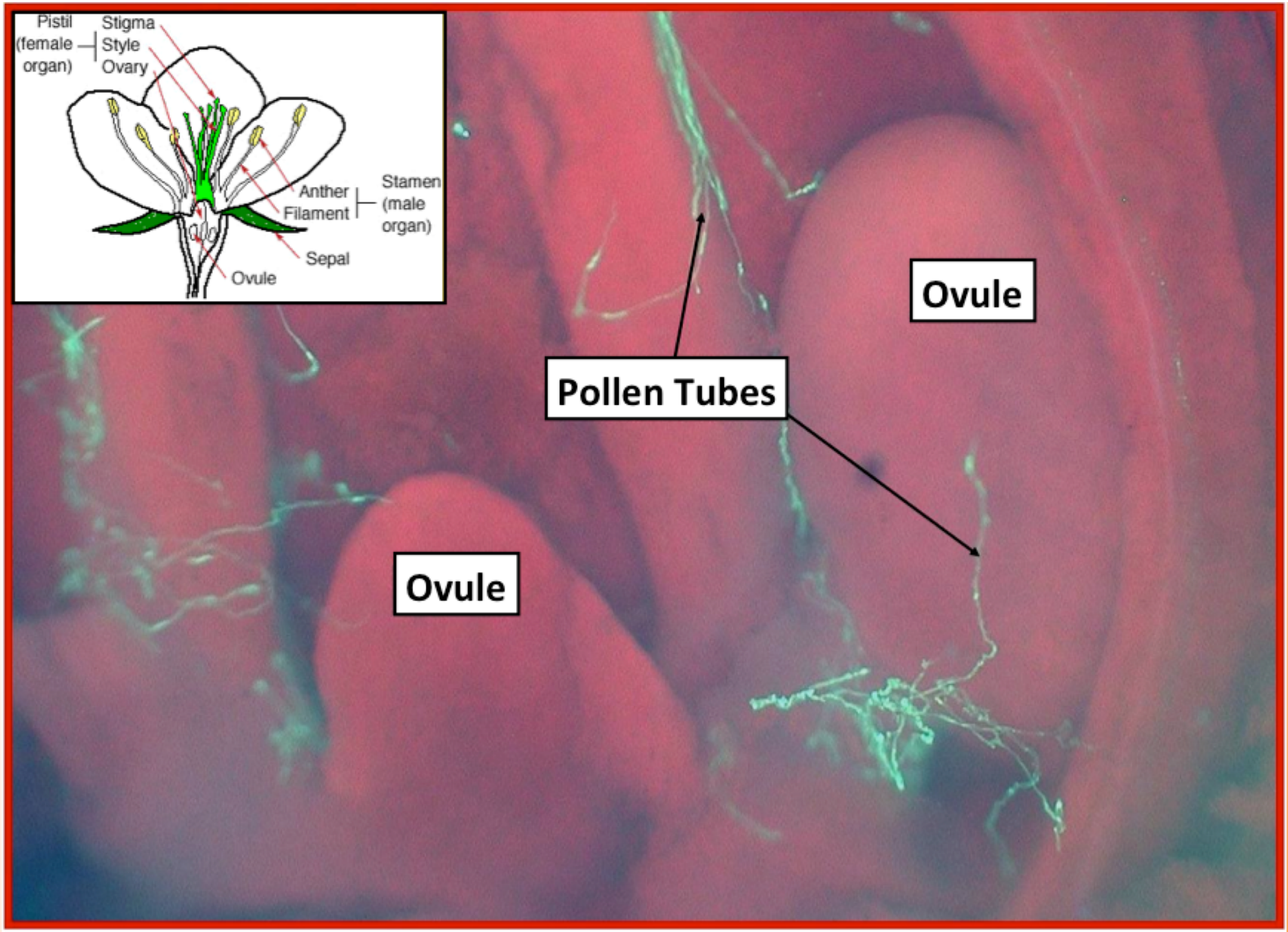
Peach Ridge | Gala | 10.00 mm | 1 | ✎ | 🗑

The second blossom thinning spray in the Block should bnd 60% of the style length. Entering this spray date resets the model to 0%. If a frost killed the king bloom, the later bloc the crop. Therefore, it may warrant waiting until reaching the 100% fertilization threshold before applying the subsequ

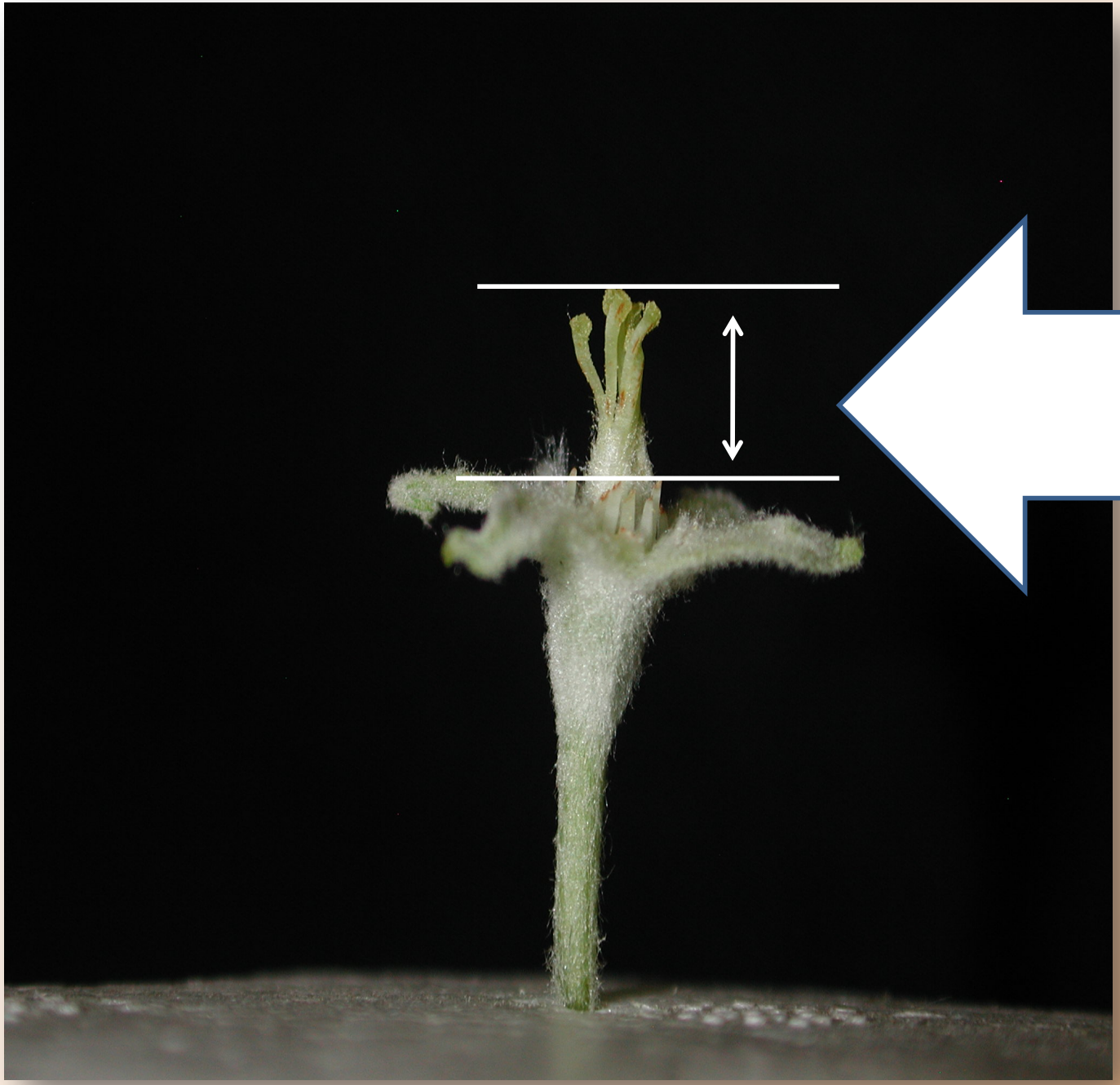


Set 2nd Spray | Growth Graph


+ Block
Blocks 5
Peach Ridge
Peach Ridge
Gala
Sparta, MI
10.00 mm
220%
165%
110%
55%
0%
91%
115%
198%
05-09 20:00
05-11 13:00
05-13 07:00
05-14 19:00
05-16 10:00
05-18 01:00
05-19 16:00
05-22 23:00
Growth Table
Growth Graph



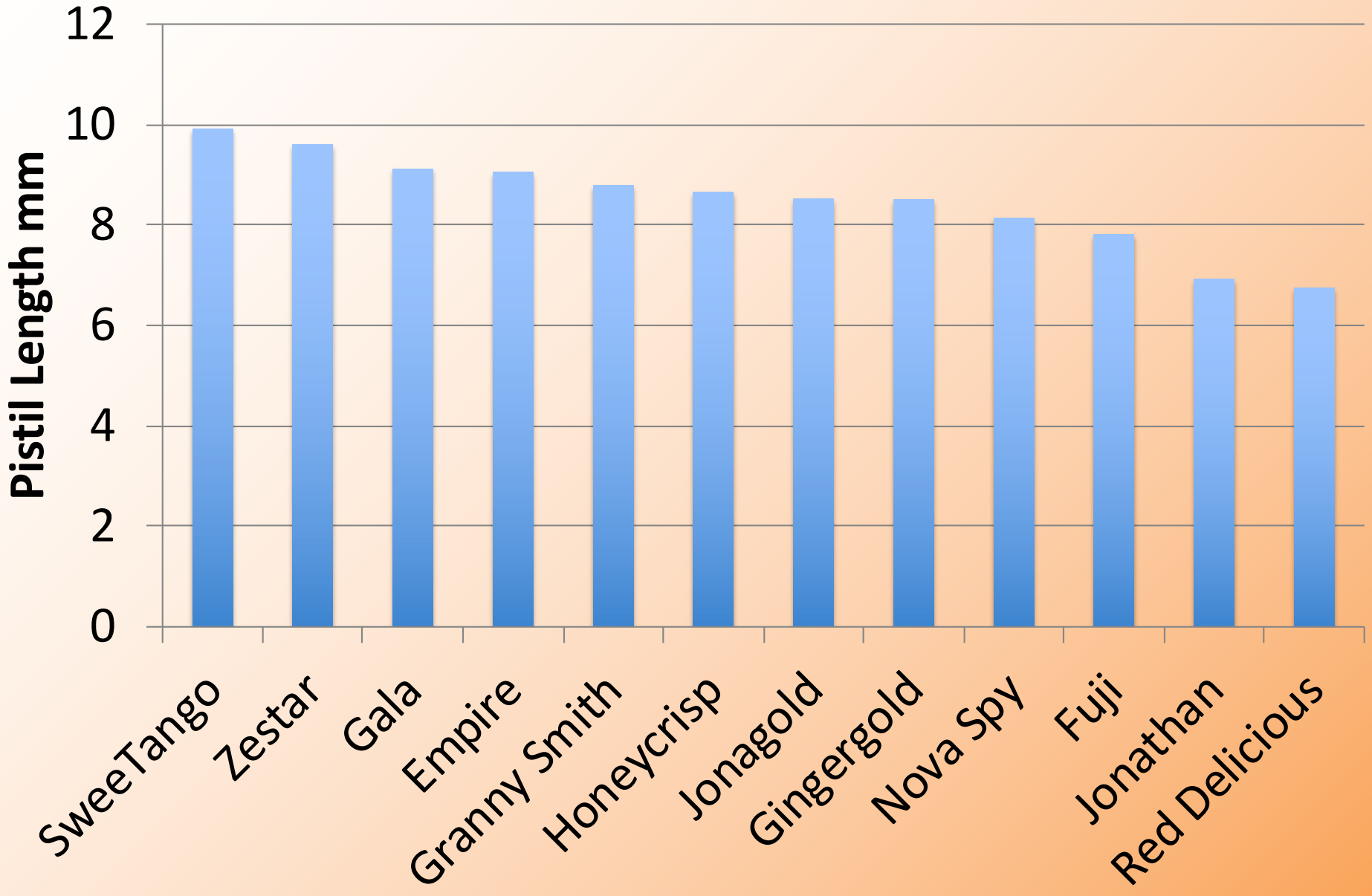
Fertilization is determined by evaluating stained pollen tubes using fluorescence microscopy.



MEASURE STYLES AS SHOWN FOR FLOWER STYLES MEASURED WITHOUT REMOVING FROM TREE

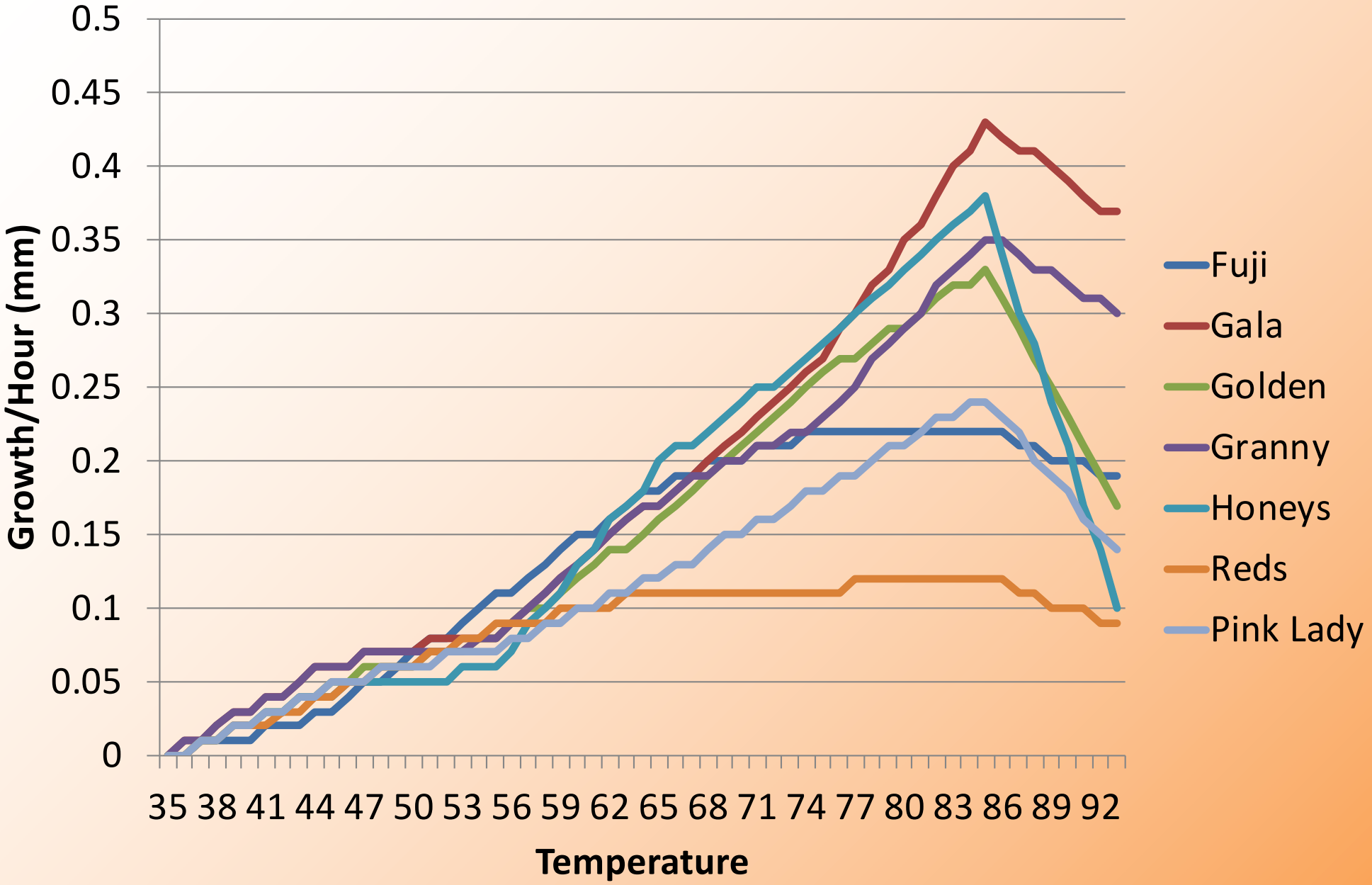
Average Style Length 2018	
SweeTango	9.92
Zestar	9.61
Gala	9.12
Empire	9.05
Granny Smith	8.79
Honeycrisp	8.66
Jonagold	8.52
Gingergold	8.51
Nova Spy	8.14
Fuji	7.81
Jonathan	6.92
Red Delicious	6.75

Average Style Length 2018



Macintosh HD:Users:philipschwallier:Desktop:Destop Cleanup:MSU Ridge Apple Lab:[2018 Style Length Measurments.xlsx]Style

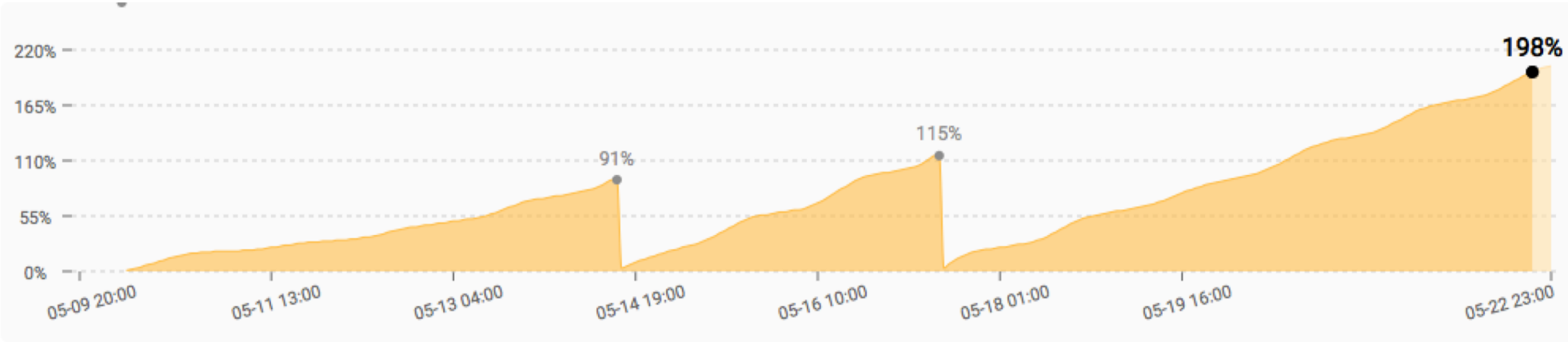
Pollen Tube Growth Model



Macintosh HD:Users:philipschwallier:Desktop:Destop Cleanup:MSU Ridge Apple Lab:[2017 Bloom Set Pollen Fertilization (version 1).xlsx]Sheet5

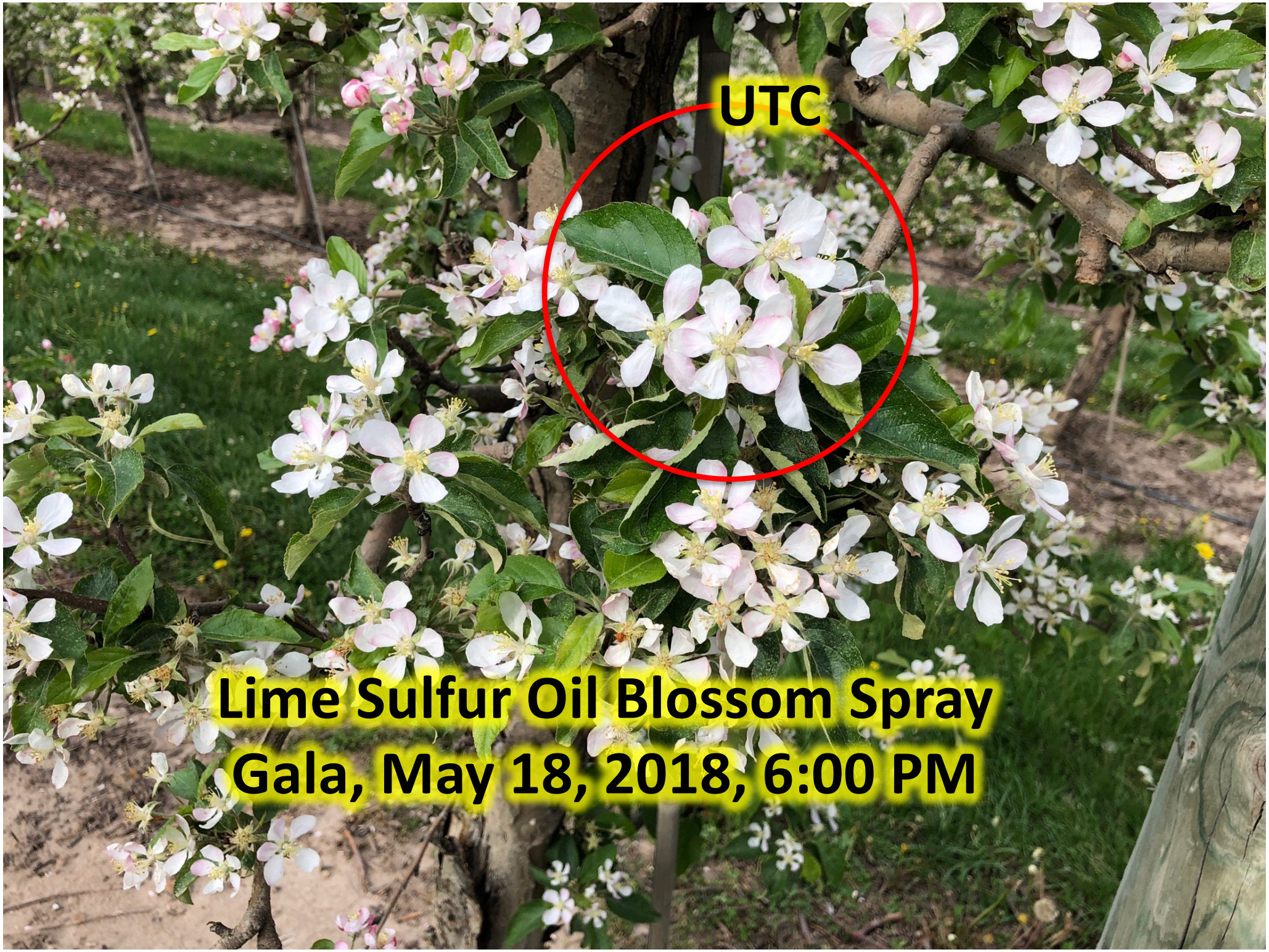
+ Block | Blocks 5 | ⓘ | Peach Ridge

Peach Ridge	Gala	Sparta, MI	10.00 mm

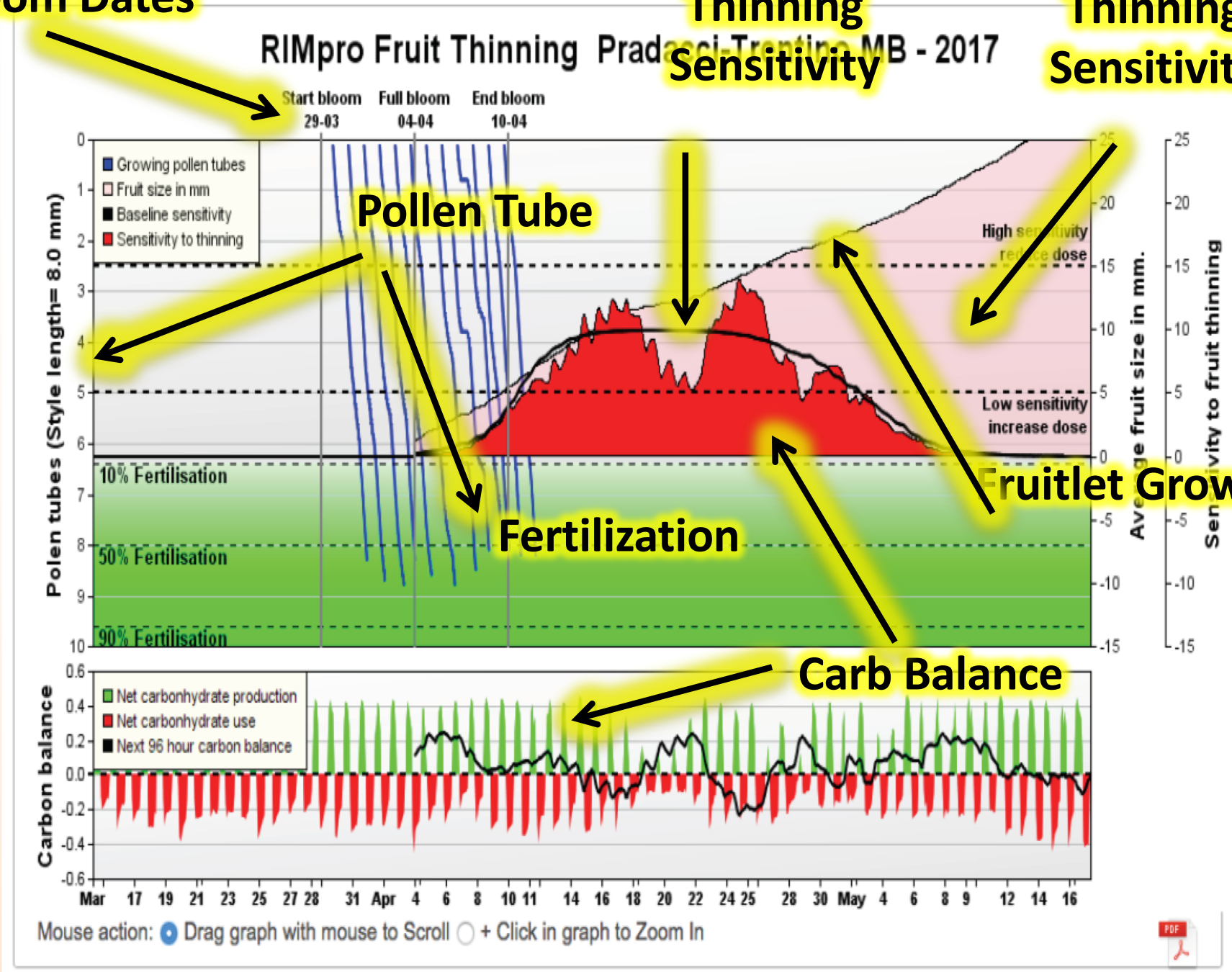


Growth Table | Growth Graph

Blossom Spray
Gala, May 16th, 2018, 7:30 pm

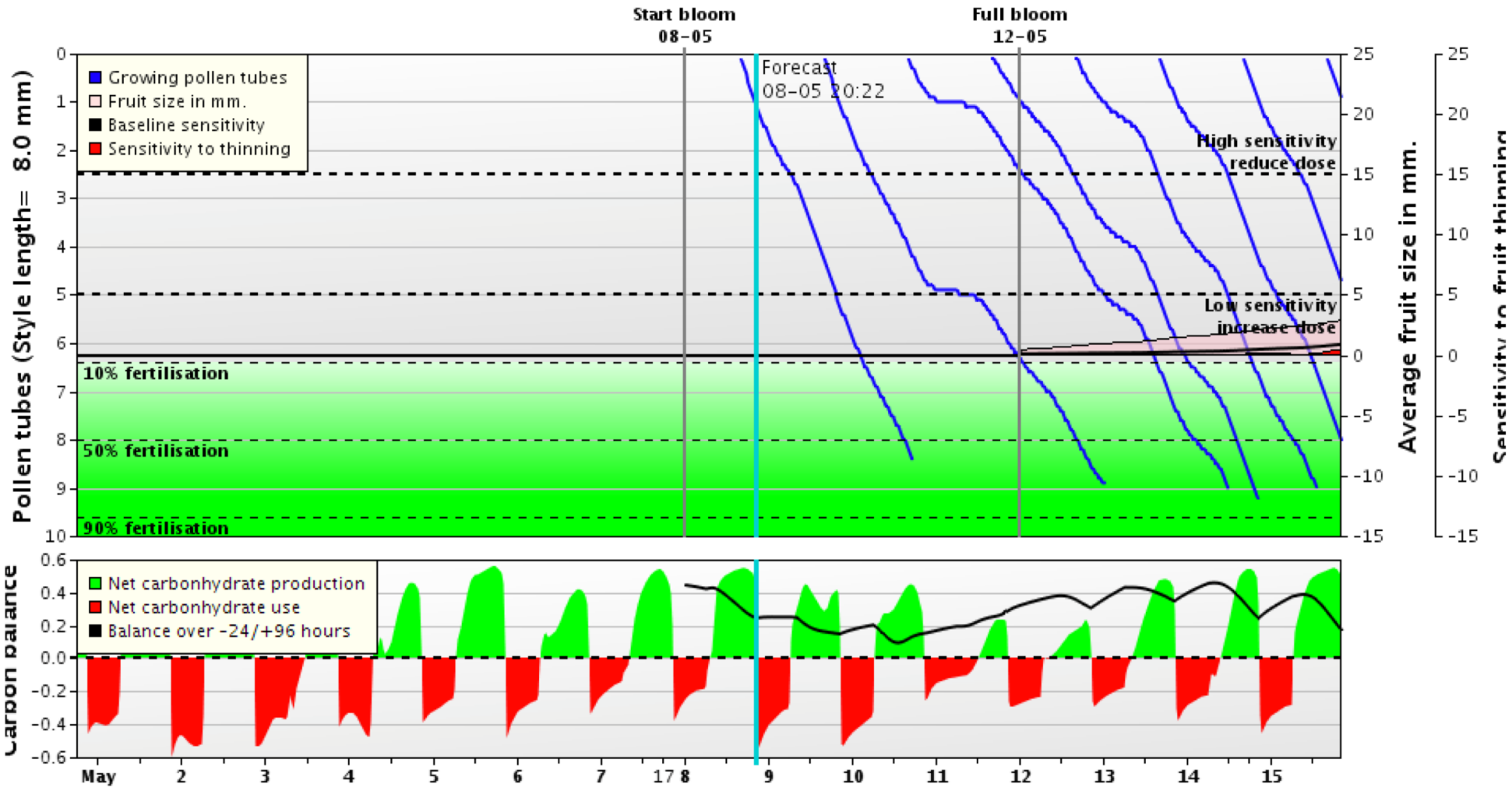

UTC
Lime Sulfur Oil Blossom Spray
Gala, May 18, 2018, 6:00 PM

Example 1: Pradacci, Trentino, Italy.



Apple | Pear (Conference) | My Flowering Dates

RIMpro Apple Thinning (Experimental) Sparta - 2018



Mouse action: ○ Drag graph with mouse to Scroll ◉ + Click in graph to Zoom In

Bloom PGR's+

- MaxCel — Mild, Cell Division
- NAA, NAD — Mild Thinning
- Promalin — Cell Division, +/- Thinning
- **Lime Sulfur Oil — Photosynthesis, Caustic**
- **ATS — Caustic**
- ReTain, Apogee — Increases Fruit Set
- Ethrel — Thinning, Unreliable

Blossom Thinning

Fruits drop early.

Thinning early maximizes fruit size.

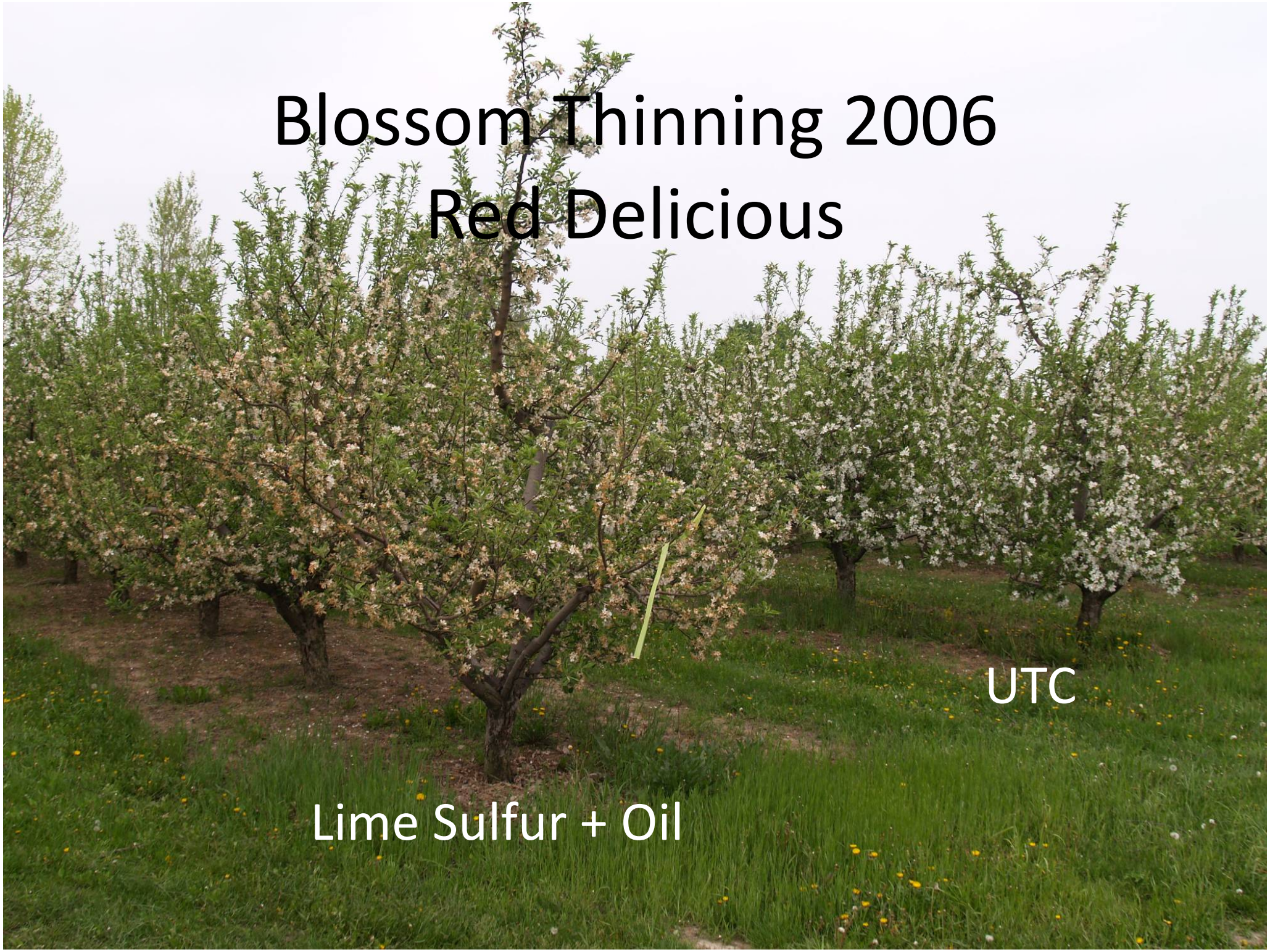
Thinning early maximizes return bloom.

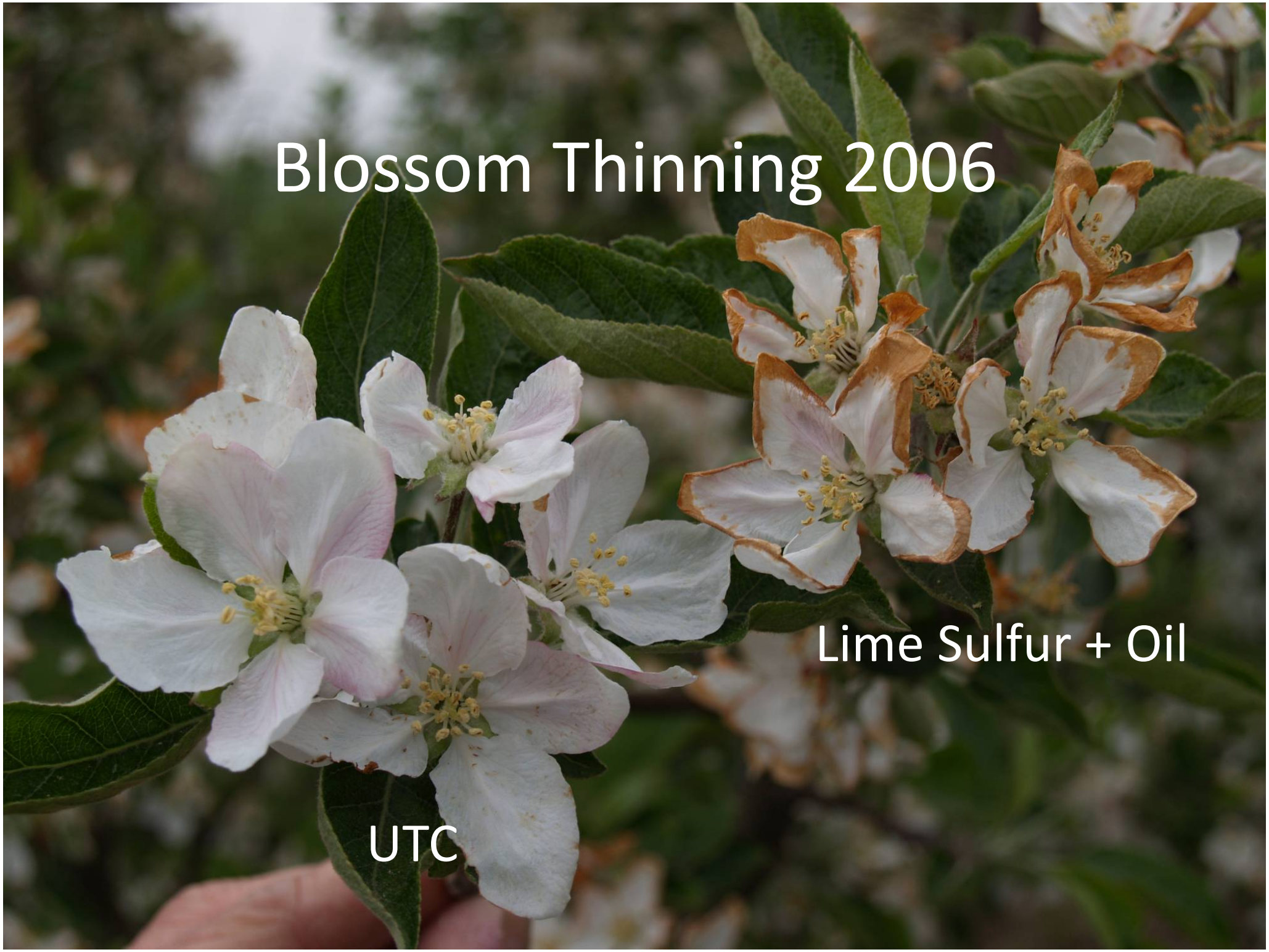
Can be beneficial on difficult to thin varieties.

Allows additional step in reducing a heavy crop.

Blossom Thinning Action

- Depresses Photosynthesis.
- Burns Pistils
- Prevention of Fertilization and Pollen Germination


Blossom Thinning 2006
Red Delicious
UTC
Lime Sulfur + Oil


Blossom Thinning 2006
Lime Sulfur + Oil
UTC

Blossom Thinning

Use Liquid Lime Sulfur and Oil (1 to 5%)

LS @ 2.5 gal/100

Oil @ 2 gal/100

Apply @ 100/acre

Target 80% FB (just after KB)

Follow every 3 to 4 days

ATS (Ammonium Thiosulfate)

Burns Pistils

Use ATS @ 1.5 to 2 gal/100

Apply @ 100/acre

Target 80% FB (just after KB)

Follow 2 days later

Regalia

- Organic bio fungicide.
- Shown to thin when applied during bloom.
- Mild thinner.

Risks

- Phytotoxicity
- Russet
- Bee injury

Idared blossom injury by airblast application

Non-treated flower

Regalia 2 pt/A
No russet

Flower and Leaf Damage

Full Bloom Percent Thinning

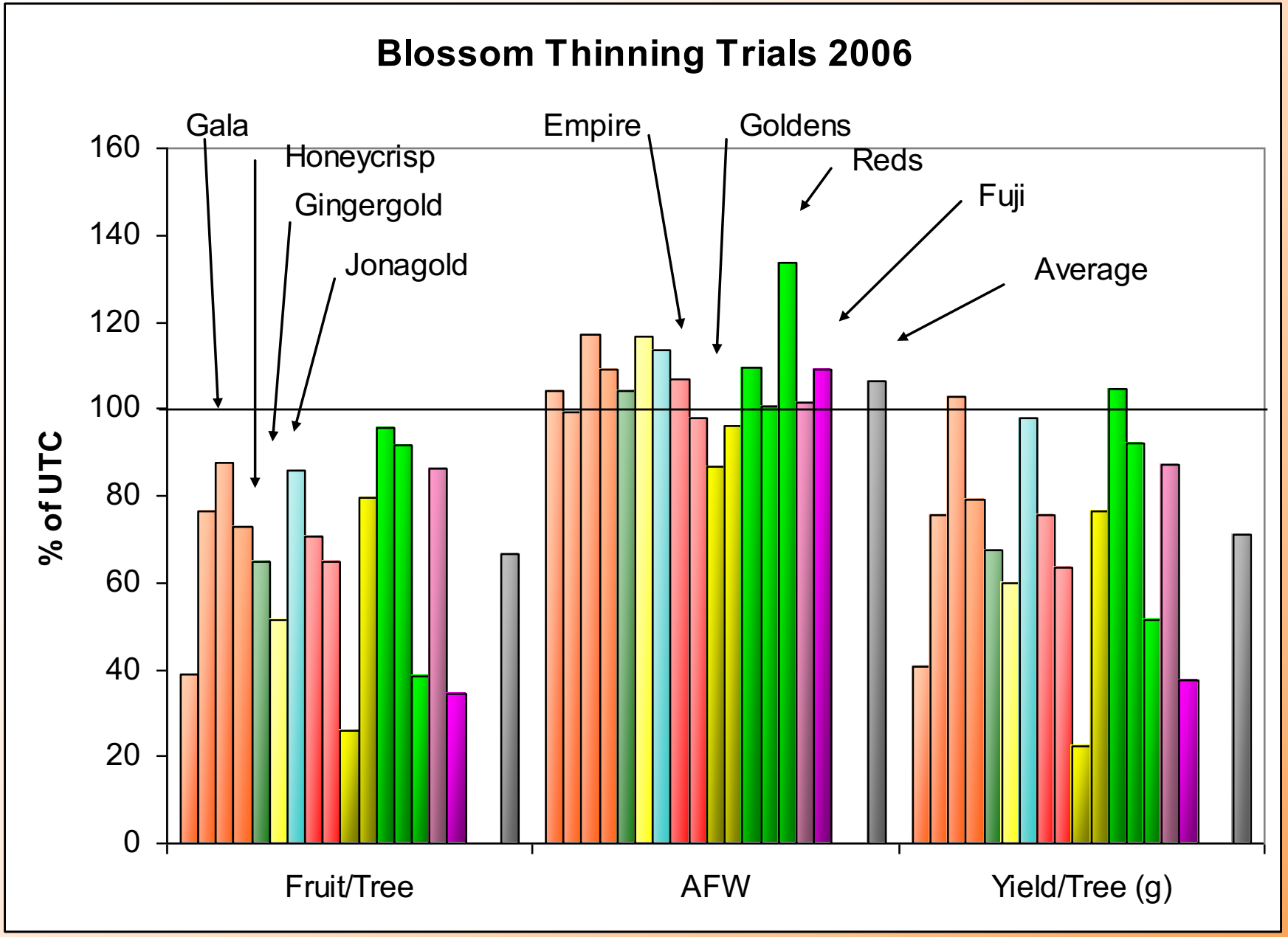
	Difficult to Thin		Easy to Thin	
Thinner Choice	Normal Weather	Moderate Carb Stress	Normal Weather	Moderate Carb Stress
NAA 5 ppm NAA 15 ppm	0-5 0-10	0-15 0-20	0-20 0-30	0-30 0-40
6-BA 100 ppm	0-3	0-5	0-5	0-6
NAD	0-5	0-10	0-8	0-10
Promalin				

Blossom Thinning

Measurement	Average Blossom Thinning Response
Fruit / Tree	24% Decrease Fruit / Tree
Yield / Tree	18% Decrease Yield / Tree
AFW (Average Fruit Weight)	4% Increase AFW
Fruit Set / Cluster	1% Decrease Fruit Set / Cluster
FTCA (Fruit / Trunk Cross-Sectional Area)	46 % Decrease FTCA
Pygmy / Tree (Fruit < 2”)	34% Decrease Pygmy / Tree

Blossom Thinning 2006

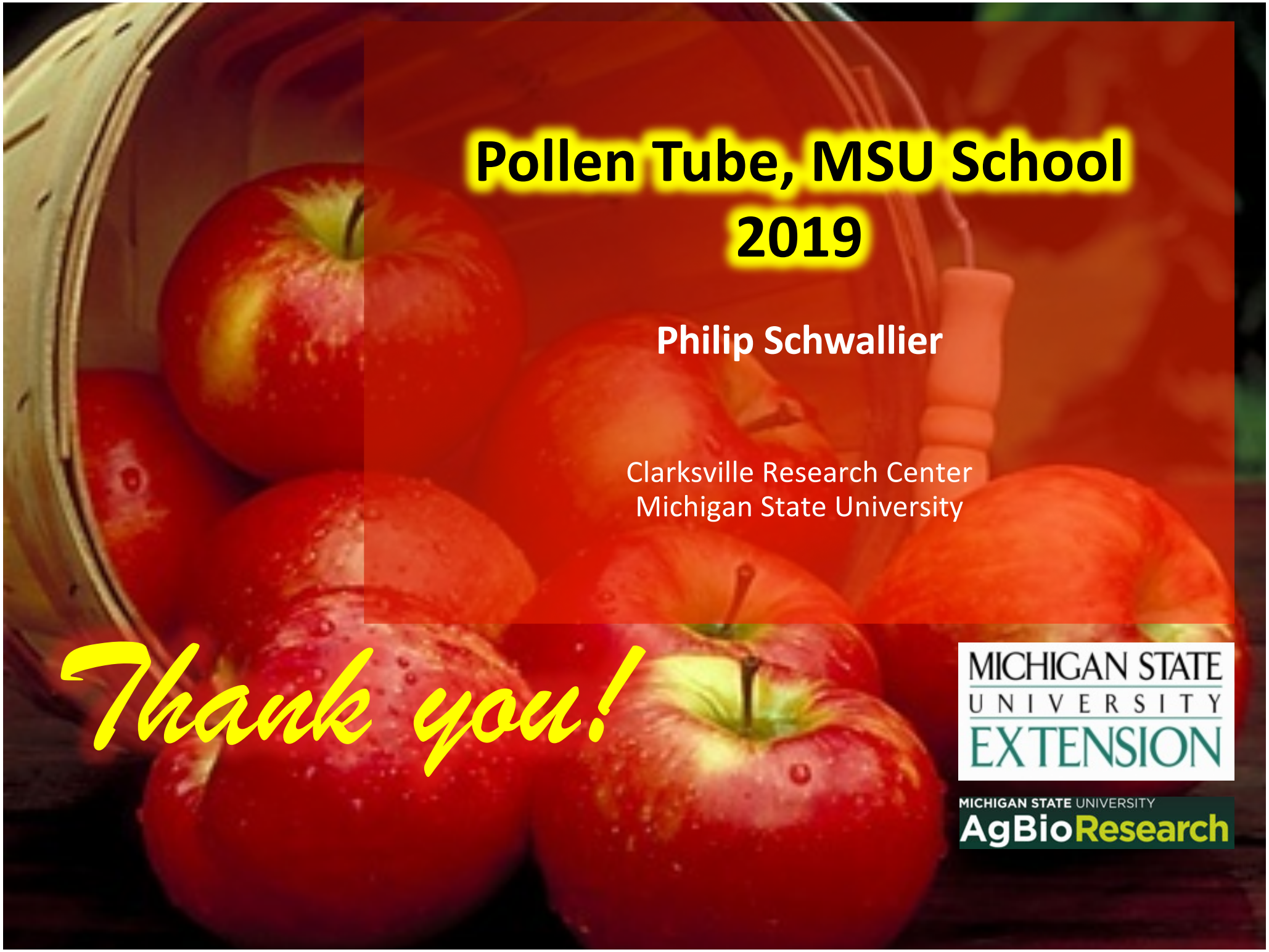
Yield/Tree & AFW/Tree



PTGM Site

- Link to PTGM for 2019:

- http://ptgm.newa.cornell.edu


Pollen Tube, MSU School 2019
Philip Schwallier
Clarksville Research Center
Michigan State University
Thank you!
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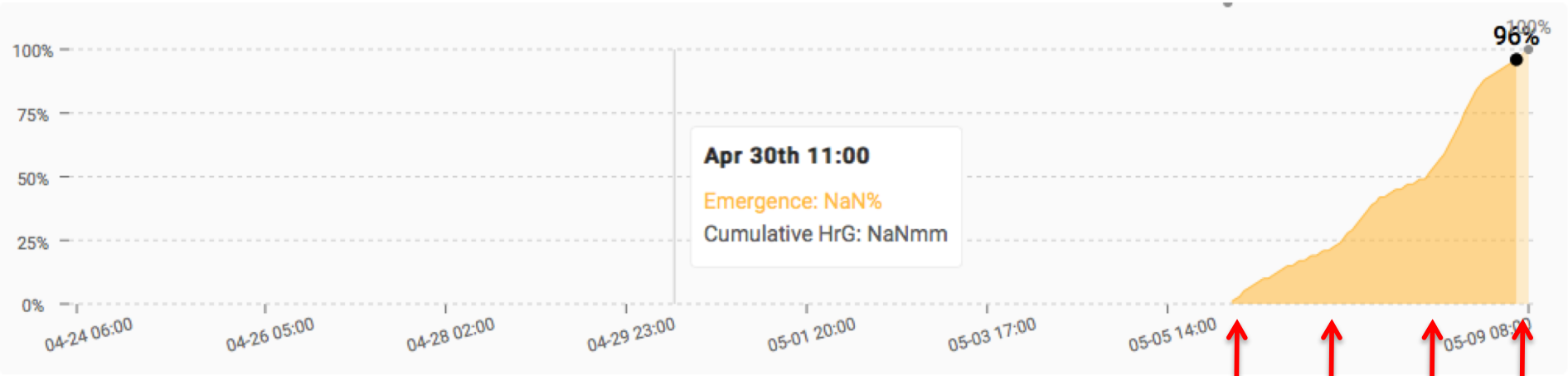
MICHIGAN STATE UNIVERSITY AgBioResearch

+ Block | Blocks 3 | ⓘ | SWMREC

SWMREC	Gala	Benton Harbor (SWMREC), MI	10.00 mm

The second blossom thinning spray in the Block should be applied when the pollen tube length is between 50 and 60% of the style length. Entering this spray date resets the model to 0%. If a frost killed the king bloom, the later blooming flowers may be the ones you want to keep to set the crop. Therefore, it may warrant waiting until reaching the 100% fertilization threshold before applying the subsequent bloom thinning spray.

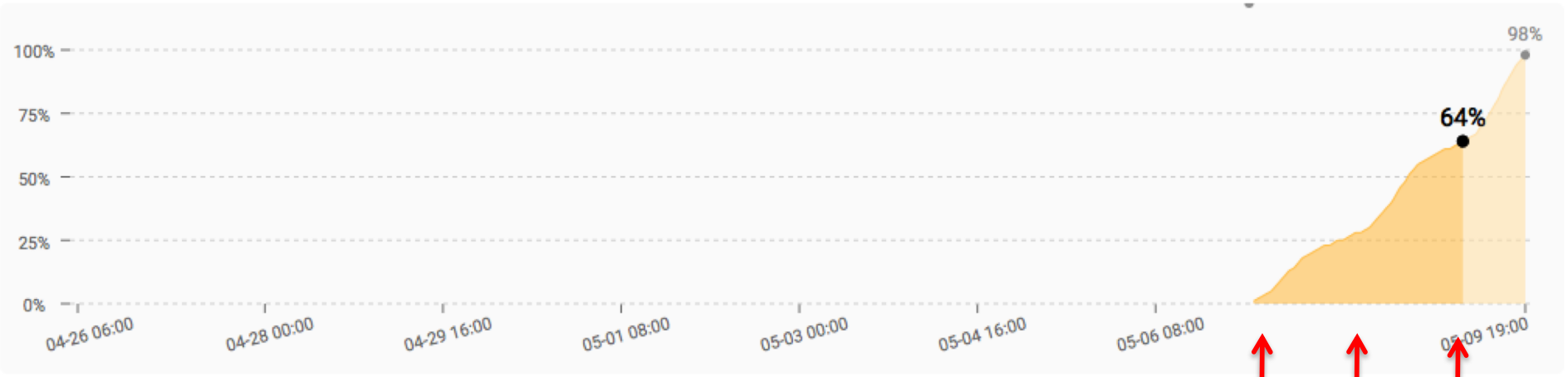


Set 2nd Spray | Growth Table | Growth Graph

+ Block | Blocks 3 | ⓘ | AppleWood

AppleWood	Gala	Deerfield/Blissfield, MI	10.00 mm

The second blossom thinning spray in the Block should be applied when the pollen tube length is between 50 and 60% of the style length. Entering this spray date resets the model to 0%. If a frost killed the king bloom, the later blooming flowers may be the ones you want to keep to set the crop. Therefore, it may warrant waiting until reaching the 100% fertilization threshold before applying the subsequent bloom thinning spray.



Set 2nd Spray | Growth Table | Growth Graph