

# Fruit Product Update



**fine**

# Quality PGRs For Fruit Crops:

- **Exilis Plus (2% benzyladenine)**
  - Post bloom thinner for apples & pears
- **Perlan (1.8% BA + 1.8% GA<sub>4/7</sub>)**
  - Increased fruit size & improved fruit shape
- **Novagib (0.95% GA<sub>4/7</sub>)**
  - Reduces russet by increases the elasticity and production rate of the outer epidermal cells of the expanding fruit.
- **Falgro (GA<sub>3</sub>)**
  - Slows down the maturity process in sweet cherries, resulting in larger, firmer, sweeter and better colored fruit.





exilis plus

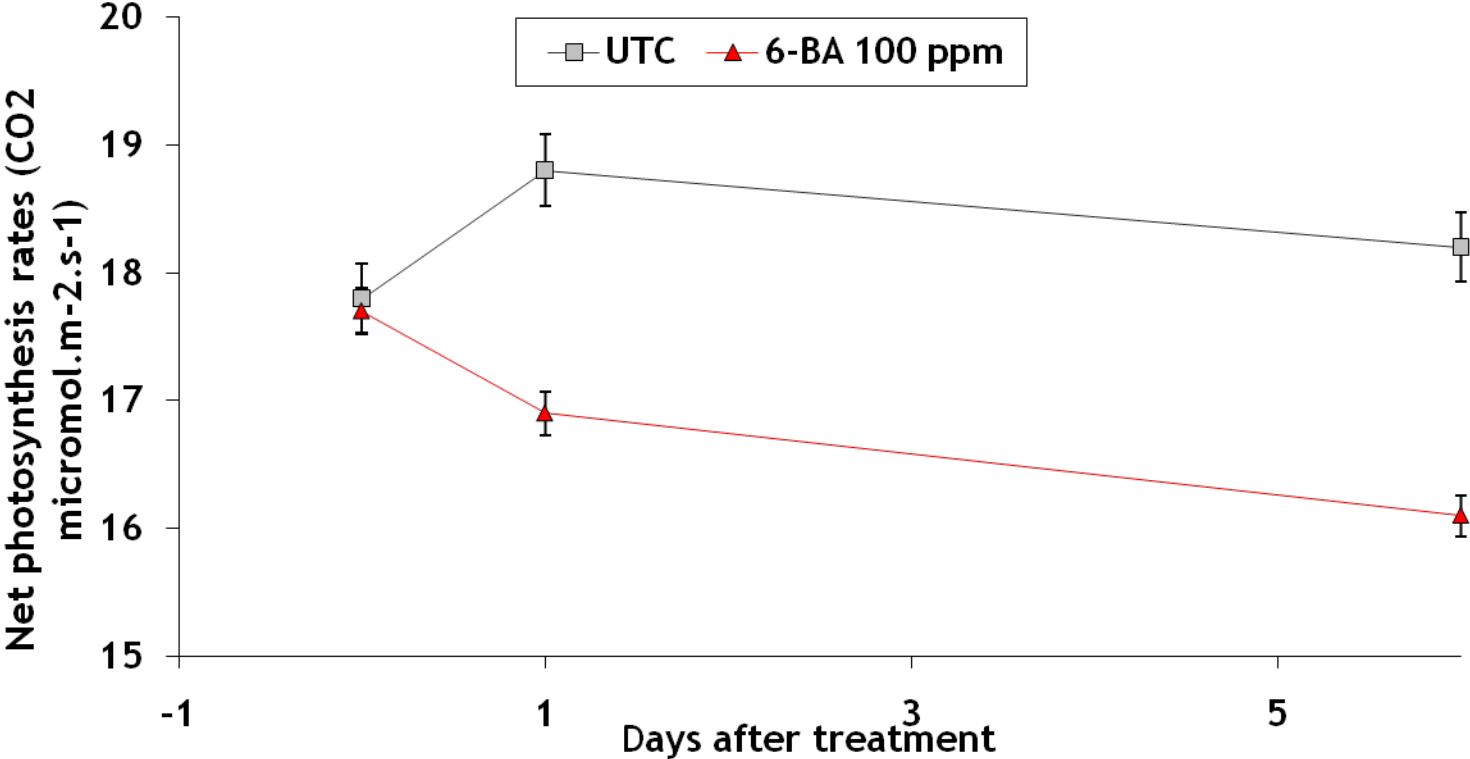
## How Does Exilis Plus Work:

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- Post-Bloom Thinner:
  - Active ingredient: Benzyladenine (BA)
  - Decrease in photosynthesis
  - Increased fruitlet cell respiration (temperature dependent)
  - Net reduction in carbohydrates (sugars) lead to accelerated abscission and fruit drop of 'weaker' side fruit
- Increases Fruit Size:
  - BA increases fruit size beyond the effect attributable to thinning alone by increasing cortical cell division; thus increasing the number of cells in the fruit cortex.

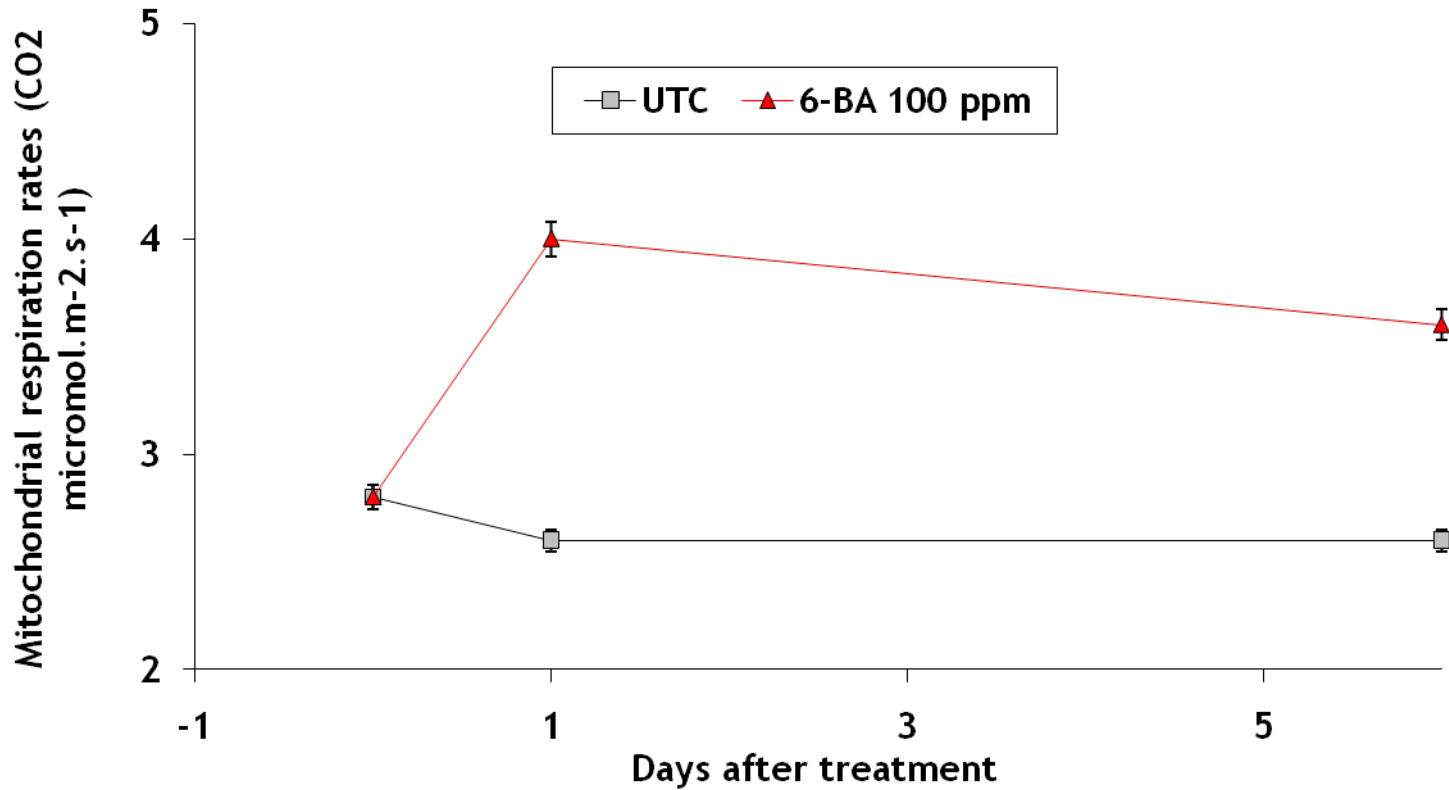
# Exilis Plus: Effect on photosynthesis

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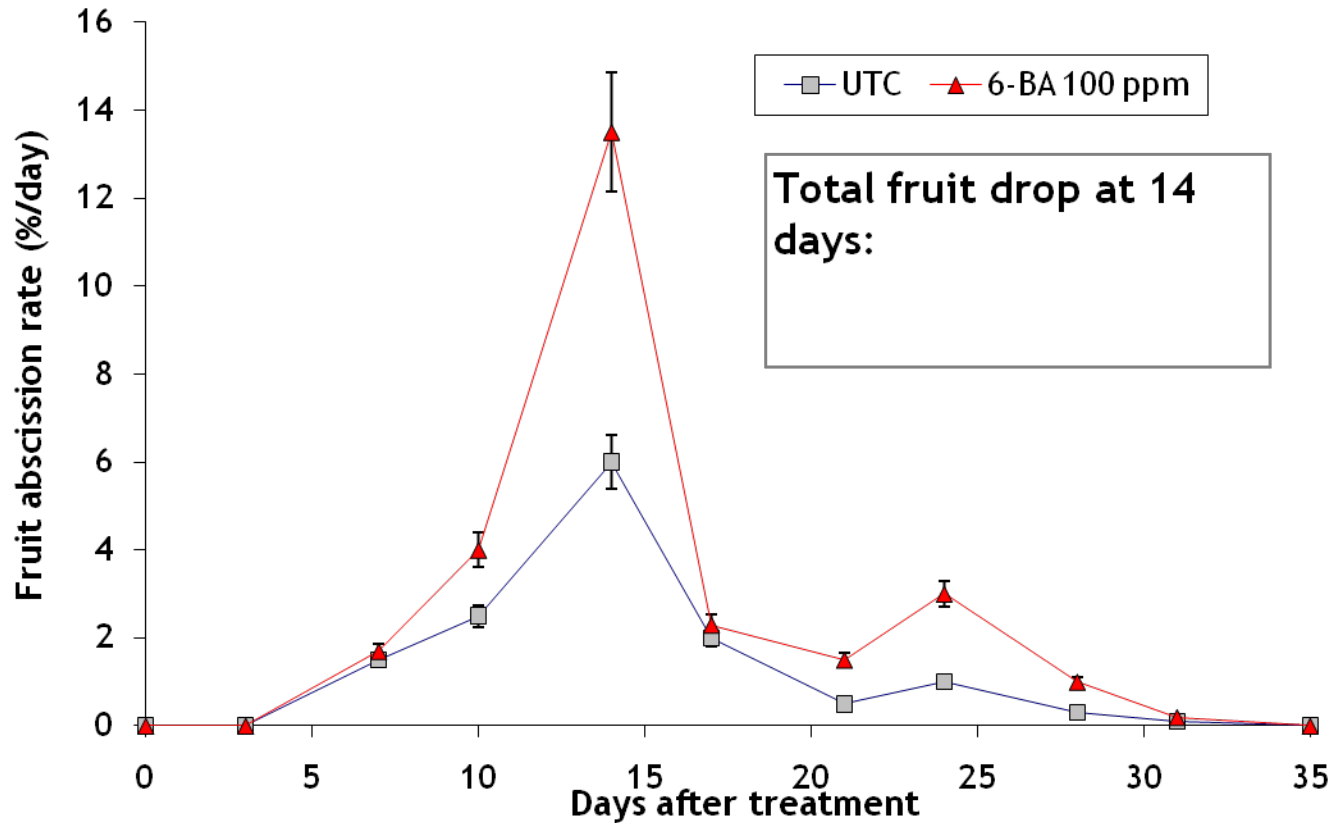
# Exilis Plus: Effect on respiration

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# Exilis Plus: Fruit Thinning

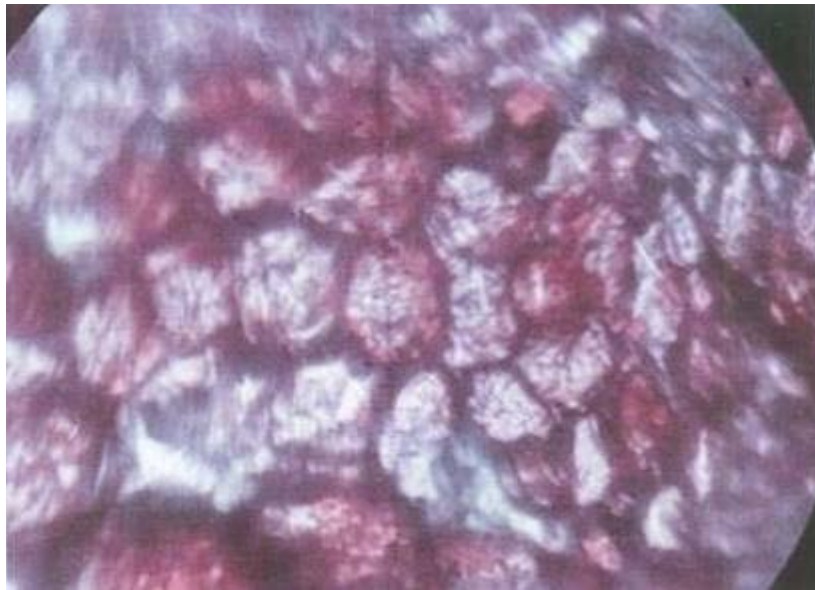
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# Exilis Plus : Increased Fruit Size

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BA increases fruit size beyond the effect attributable to thinning alone by increasing cortical cell division; thus increasing the number of cells in the fruit cortex.

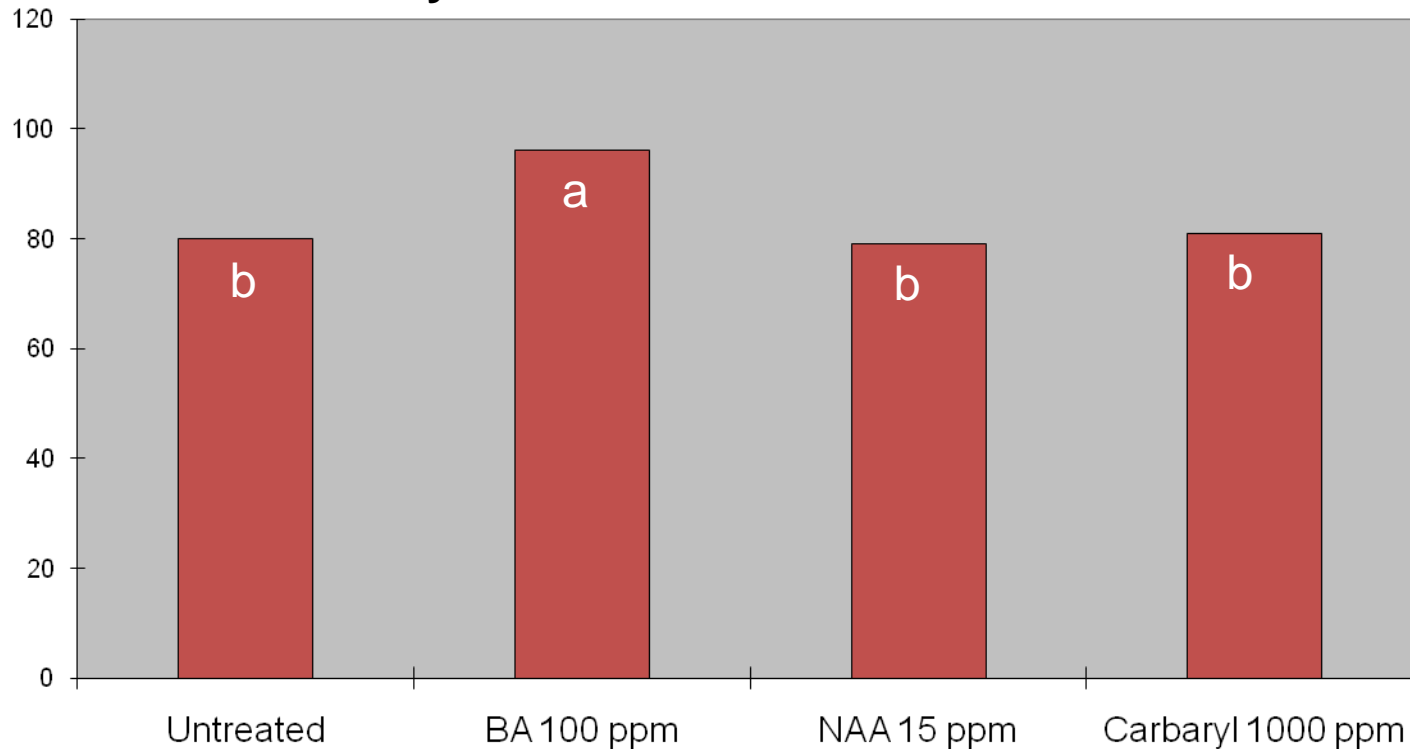




# Effects of Benzyladenine on Apple Fruit Size

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## No. of Cell Layers in Fruit Cortex



**Variety: Empire/ M.7**

**Application Timing: 13 mm**

# Factors Affecting Chemical Thinning: Temperature

- Temperatures after application:
  - 70 – 80 °F for 3 to 4 days following application is optimal.
  - Temperatures > 85 °F can result in over thinning.
- Temperatures before application:
  - Plant tissues that have developed during cool cloudy conditions are more easily penetrated by thinning chemicals.
  - Warm sunny conditions favor the development of a waxy surface that restricts the penetration of thinning chemicals.
- Temperatures during application:
  - Warm temperatures (>70°F) and humid conditions will result in greater thinner uptake.

# Influence of Climactic Conditions on BA Thinning Effect

<b>Thinning Effect</b>	<b>Nighttime Temperatures</b>	<b>Daytime Cloudiness</b>
<b>High</b> ↑ <b>Low</b>	High (>60° F)	High (>40%)
	High (>60° F)	Low (<20%)
	Low (<50° F)	High (>40%)
	Low (<50° F)	Low (<20%)

# Factors Affecting Chemical Thinning: Tree Growth & Vigor

- Young trees are more easily thinned than older trees.
  - More rapid vegetative growth & subsequent reduction in carbohydrate reserves.
- Low vigor trees are generally easier to thin (over thin).
  - Low vigor is often due to inadequate nutrient and/or moisture supply.
  - Adequate thinning of low vigor trees does not necessarily result in adequate fruit size.
- In healthy trees, well exposed tops are more difficult to thin than the shaded lower canopy.
  - Direct 80% of spray to top 2/3 of canopy.

# Exilis Plus Apple Recommendations

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- Make 1-2 applications of 75-200 ppm when king fruit are 5 to 10 mm in diameter ( $\approx$  7-21 days after full bloom).
  - Under cool conditions ( $< 60$  °F), wait for warmer temperatures before applying Exilis Plus.
- Use a properly calibrated sprayer to ensure thorough coverage.
  - Direct 80% of the spray into the top 2/3 of the canopy (higher vigor = more difficult to thin).
  - Best results are obtained with airblast sprayers that deliver a fine mist (around 100-micron droplet size).
  - Water volumes should range between 75 and 200 GPA
- Adjust spray solution to a pH of 7 or less if needed.
- For more aggressive thinning:
  - Combine Exilis Plus with Sevin 4L/ XLR
  - Apply Exilis Plus during the beginning of a warming trend
  - Temperatures  $>80$ °F can result in excessive thinning

# **Exilis Plus: Thinning Rate Recommendations**

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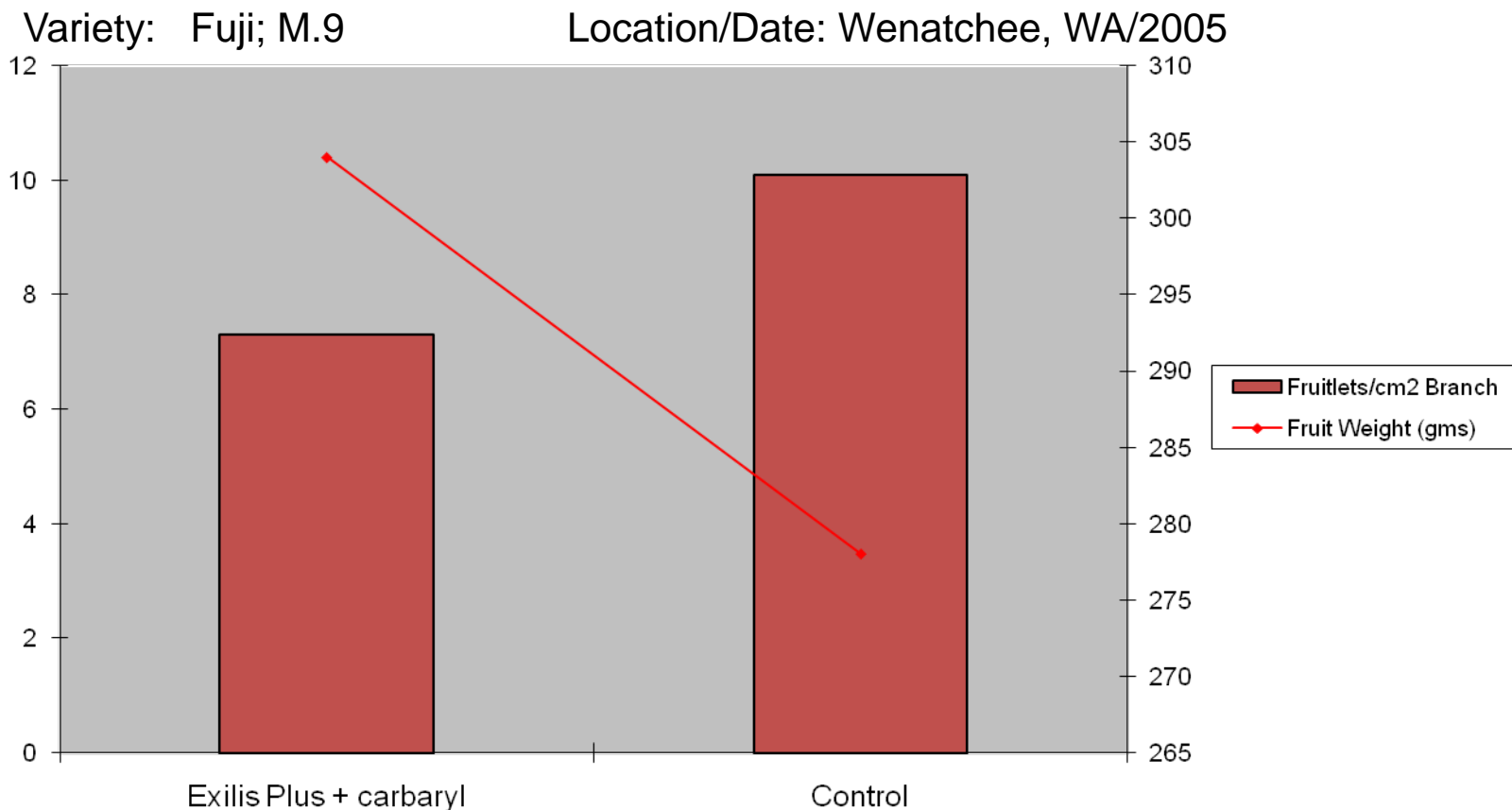
Apply at 5 – 10 mm king fruit diameter:

<b>Level of Thinning</b>	<b>Treatment</b>	<b>Rates</b>
<b>Aggressive</b>	Exilis + Sevin XLR	100-200 ppm + 1-2 qt/A
<b>Moderate</b>	Exilis + Sevin XLR	50-75 ppm + 0.5-1 qt/A
<b>Mild</b>	Exilis	50-75 ppm

# Compatibility of Exilis Plus with Other Post-Bloom Thinners

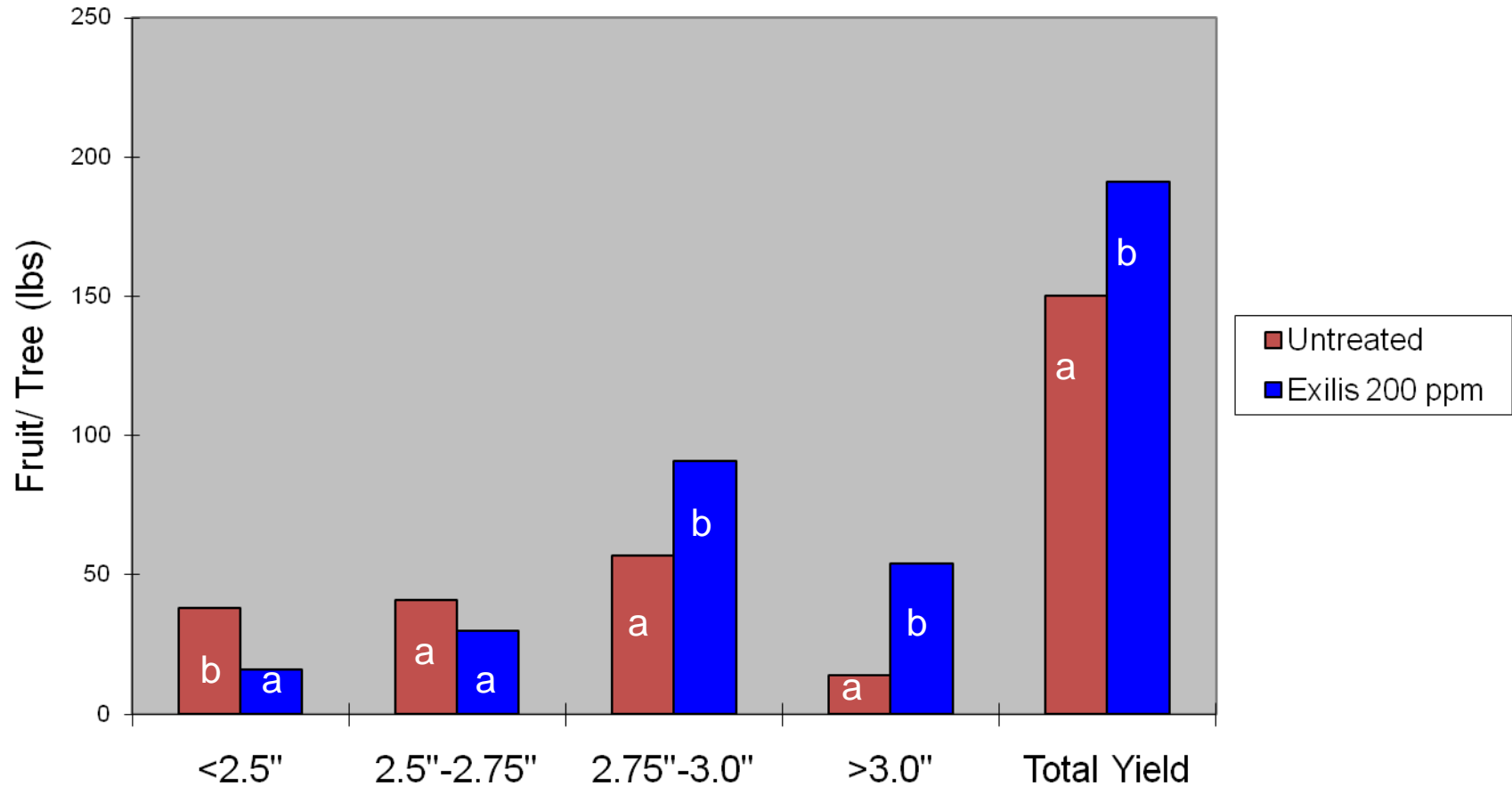
- When used alone, Exilis is a mild thinner with little risk of over-thinning.
- Most varieties can be thinned by BA alone only under favorable conditions.
- One of the key benefits of Exilis is that it can be used in a wide range of thinning strategies in combination with the majority of other bloom & post-bloom thinners.
- Carbaryl (Sevin):
  - The ideal application timing of Exilis is similar to carbaryl.
  - Synergies between Exilis Plus & carbaryl have been widely demonstrated.
- NAA (Fruitone/Fruitfix):
  - Tank-mix combination BA + NAA provides strong thinning effect and excellent return bloom.
  - Post-bloom applications of NAA may increase pygmy fruit on Red Delicious & Fuji.

# The Effects of EXILIS® PLUS on Fruit Thinning & Fruit Size





# Exilis Plus: Fruit Yield & Size Distribution

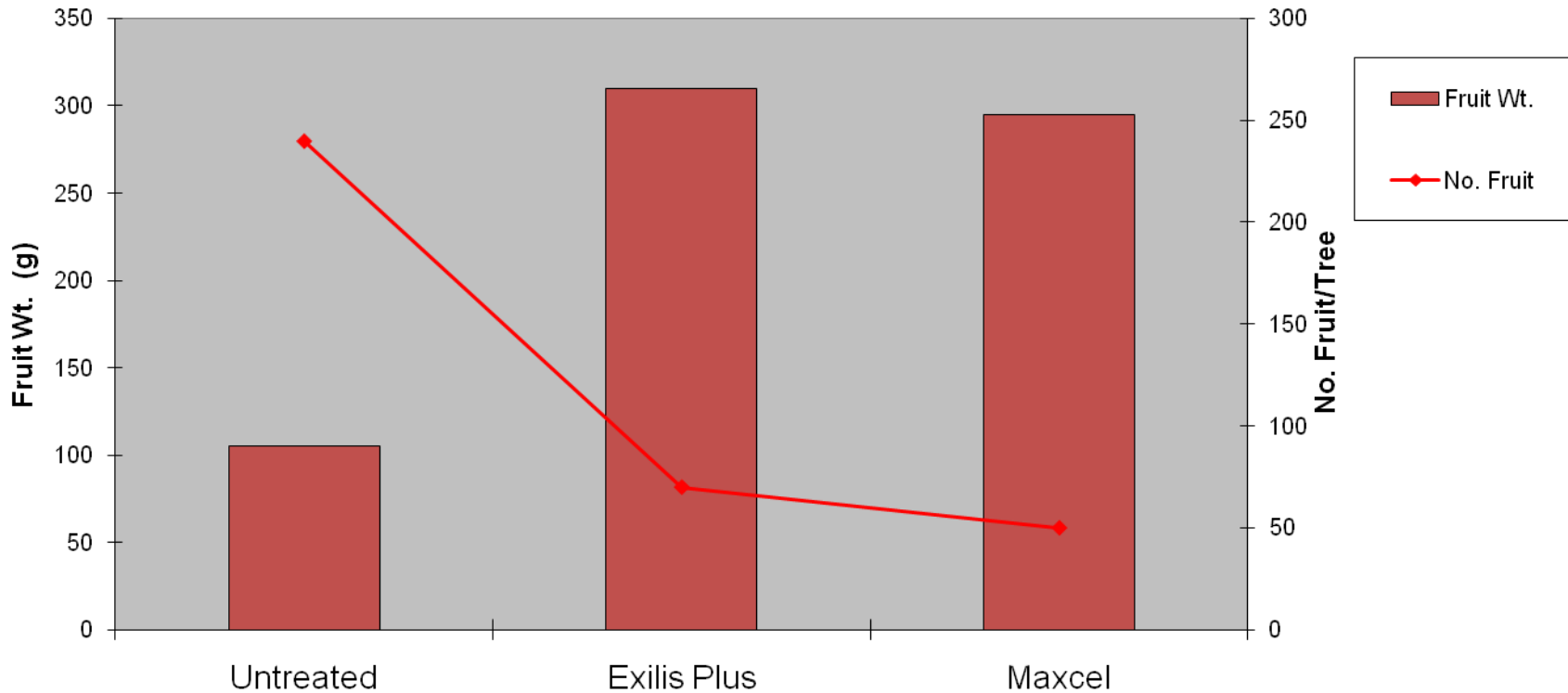


**Variety: Golden Delicious**  
**Location: Sodus, NY**

**Application Date: 2005**  
**App. Timing: 8-10 mm fruit**

Means followed by same letter do not significantly differ (LSD P<0.10)

# The Effects of BA on Fruit Thinning & Fruit Size

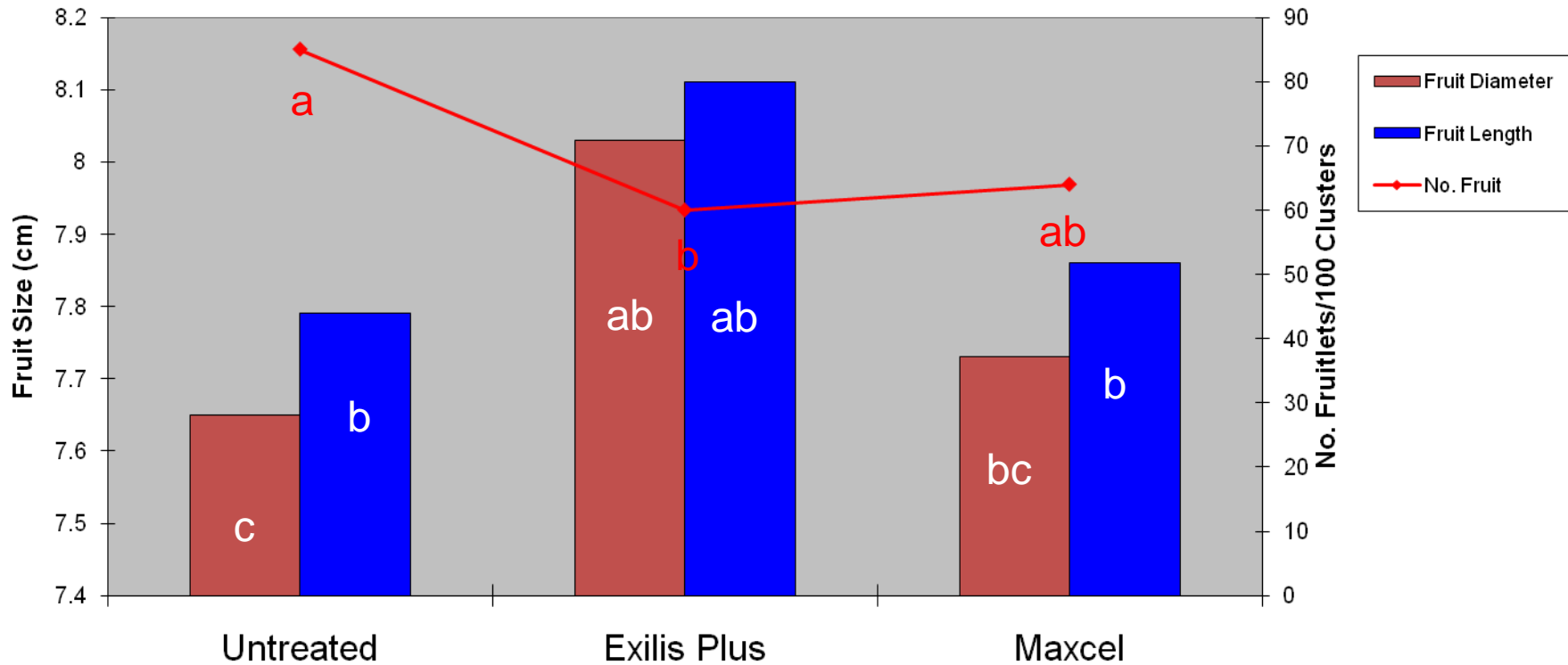


Variety: Golden Delicious  
Location: Clarksville, MI

Application Date: 06/06/02  
Crop Stage: 2 WAPF

Both Exilis Plus & Maxcel were applied at 100 ppm in combination with carbaryl

# Effects of Exilis and Maxcel on Fruit Thinning and Fruit Size



Variety: Pink Lady; M.7  
Location: Mattawa, WA

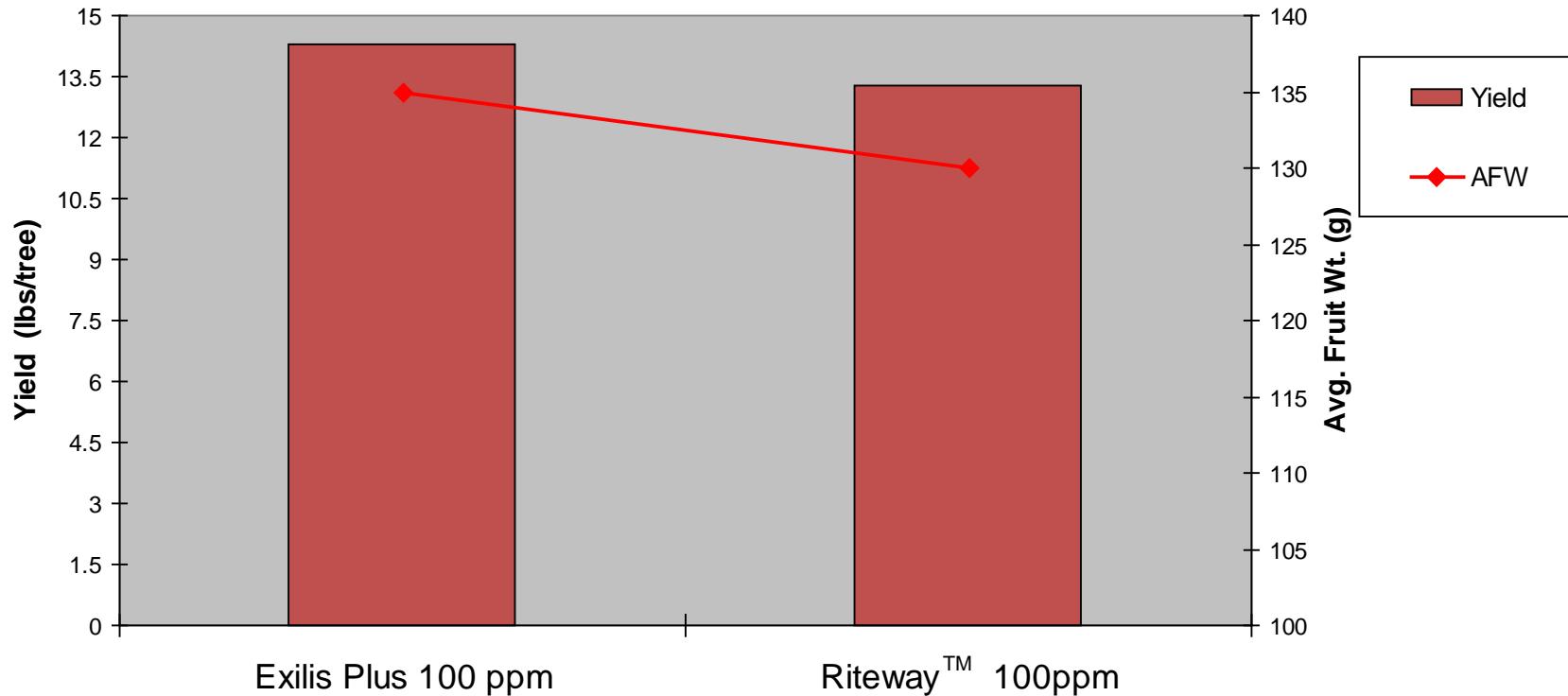
Date: 2004  
App. Timing: Petal Fall- 10 mm<sup>1</sup>

<sup>1</sup>Treatments were applied 3 times @ 50 ppm at 7-day spray intervals, beginning at petal fall. Means followed by same letter do not significantly differ (Tukey's Test P<0.10).

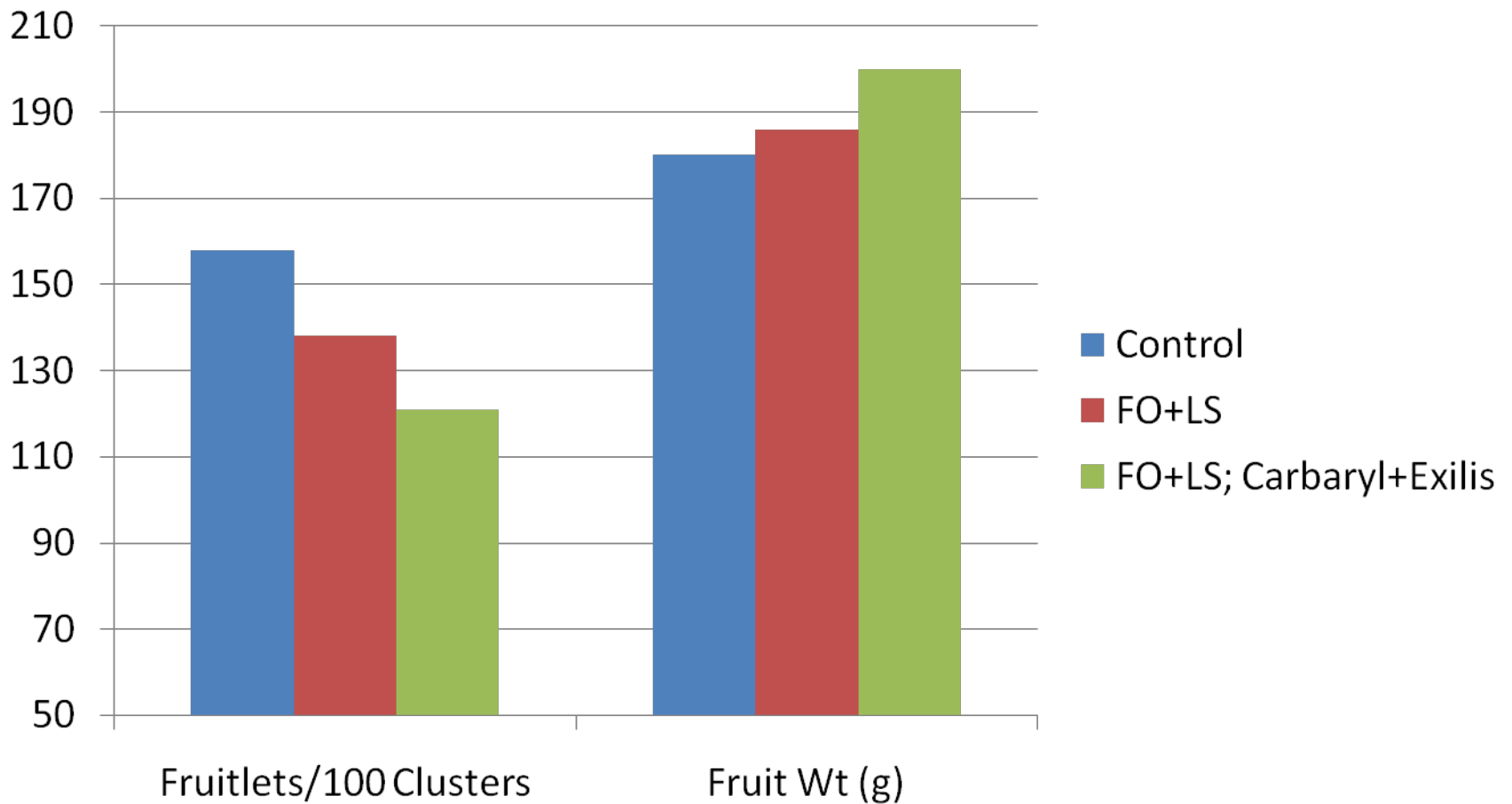
# The Effects of Exilis Plus on Yield & Fruit Size

Variety: Jonathan

Location/Date: MI State; Clarksville, 2005



# Evaluation of Bloom +/- Post Bloom Thinning Treatments



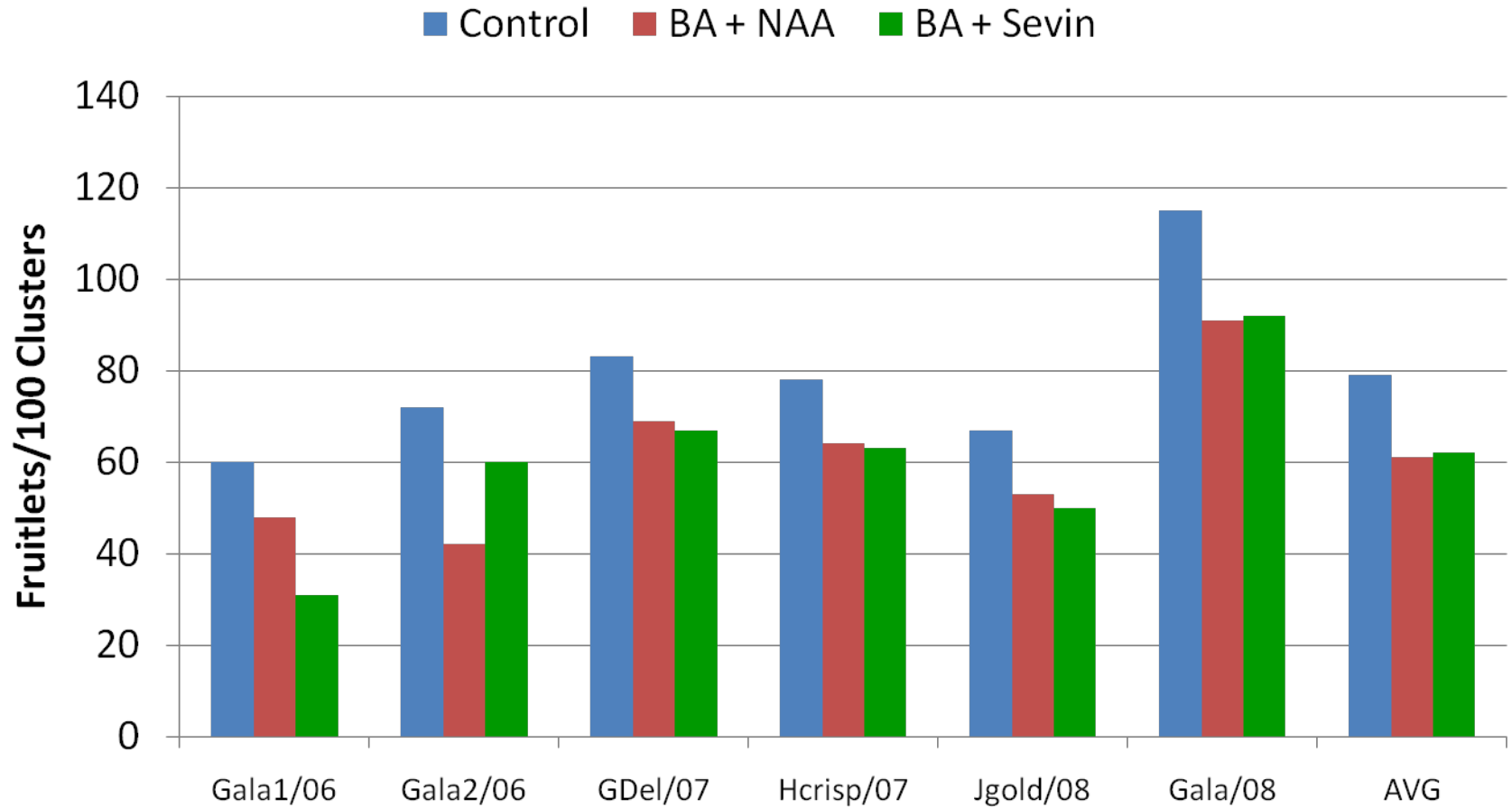
## Treatment Rates:

Fish Oil (FO)=2%; Lime Sulfur (LS)=3%; Carbaryl=3 pt/A; Exilis=6 pt/A

App Timings: 20% & 80% Bloom; 5 mm & 10 mm fruit diameter

# Washington Apple Postbloom Thinning Trials 2006-2008

## BA + Carbaryl vs. BA + NAA



# Exilis Plus Use on Pears



# EXILIS PLUS

## Pear Recommendations

Bartlett: 100 – 200 ppm

Bosc: 75 – 150 ppm

For fruit thinning, fruit sizing and enhancing return bloom, make 1 to 2 applications of 75-200 ppm when king fruit are 5 – 15 mm in diameter.

When making split applications allow 7-10 days after the first spray, applying the second treatment before the diameter of king bloom fruit exceeds 20mm.

Apply in sufficient volume to ensure thorough coverage; 100 GPA is generally recommended.

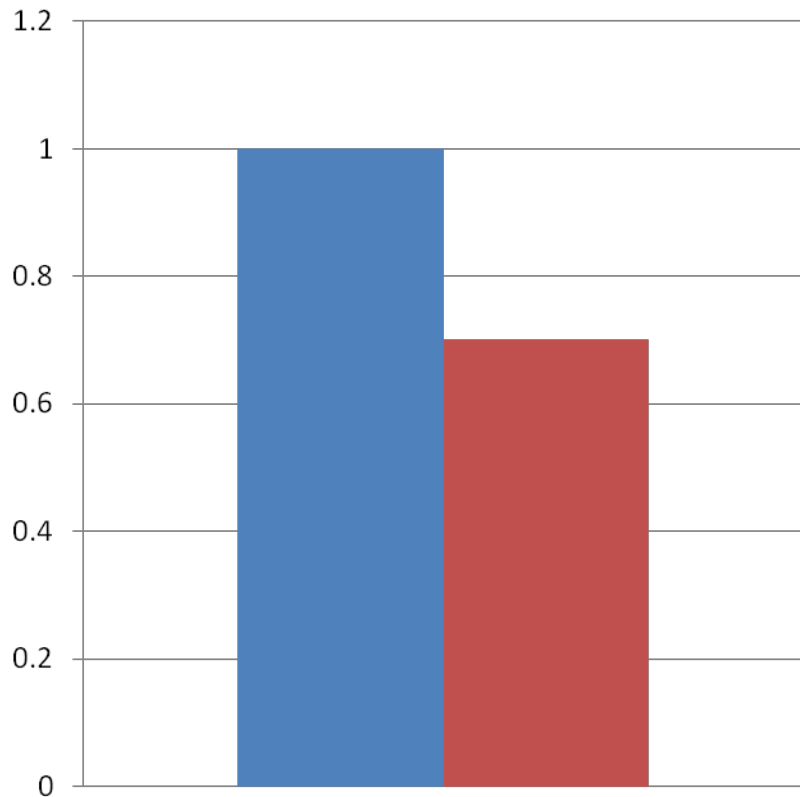
REI: 12 hours



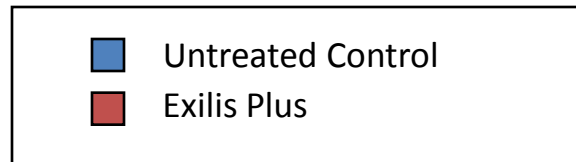
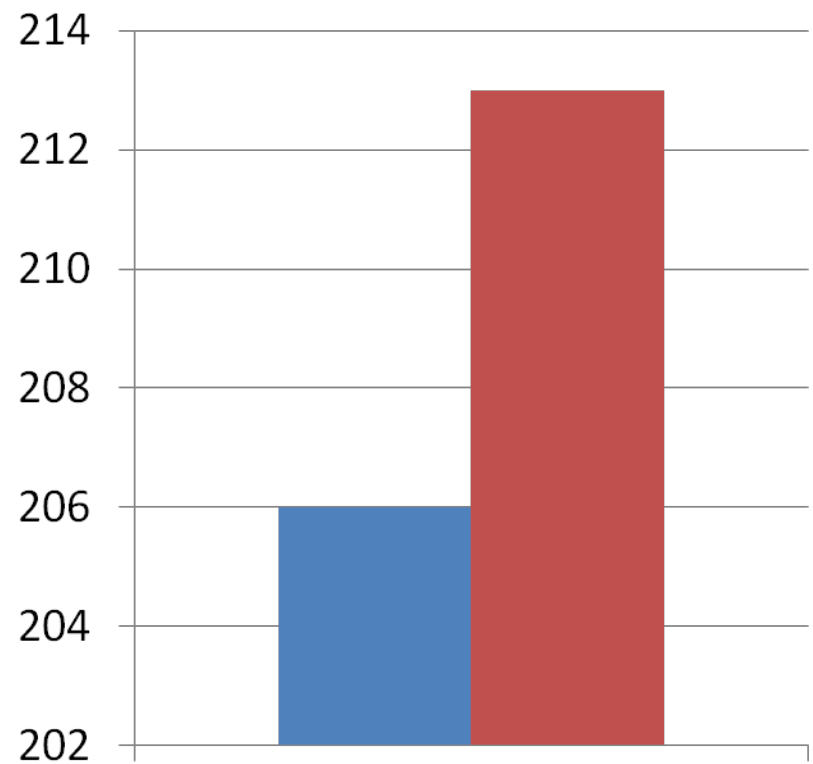
# Exilis Plus on Bartlett Pears - 2008

Exilis Plus Rate & Application Timing: 4 qt/A (200 ppm) @ 10 mm

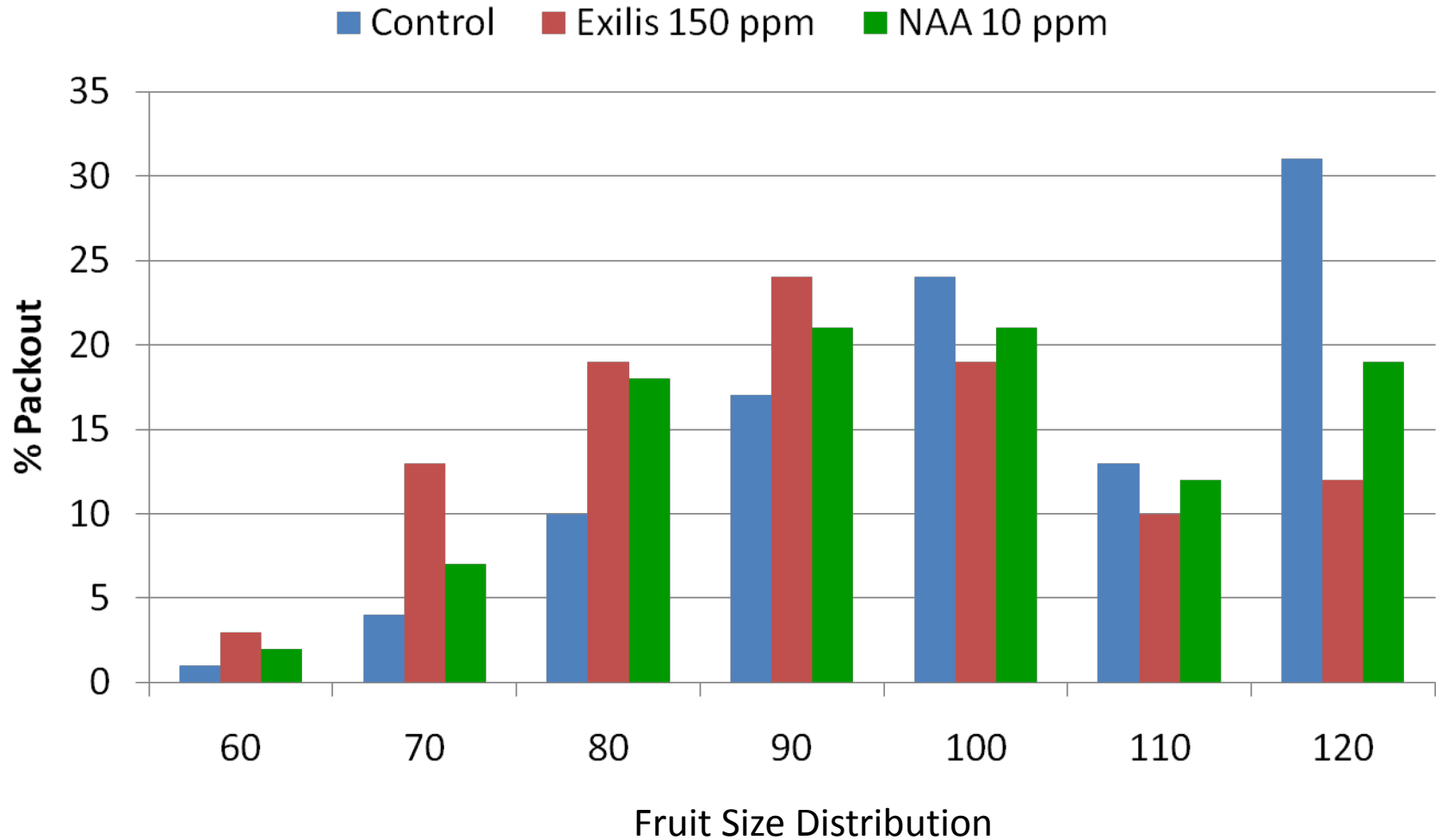
## Fruitlets/Branch cm<sup>2</sup>



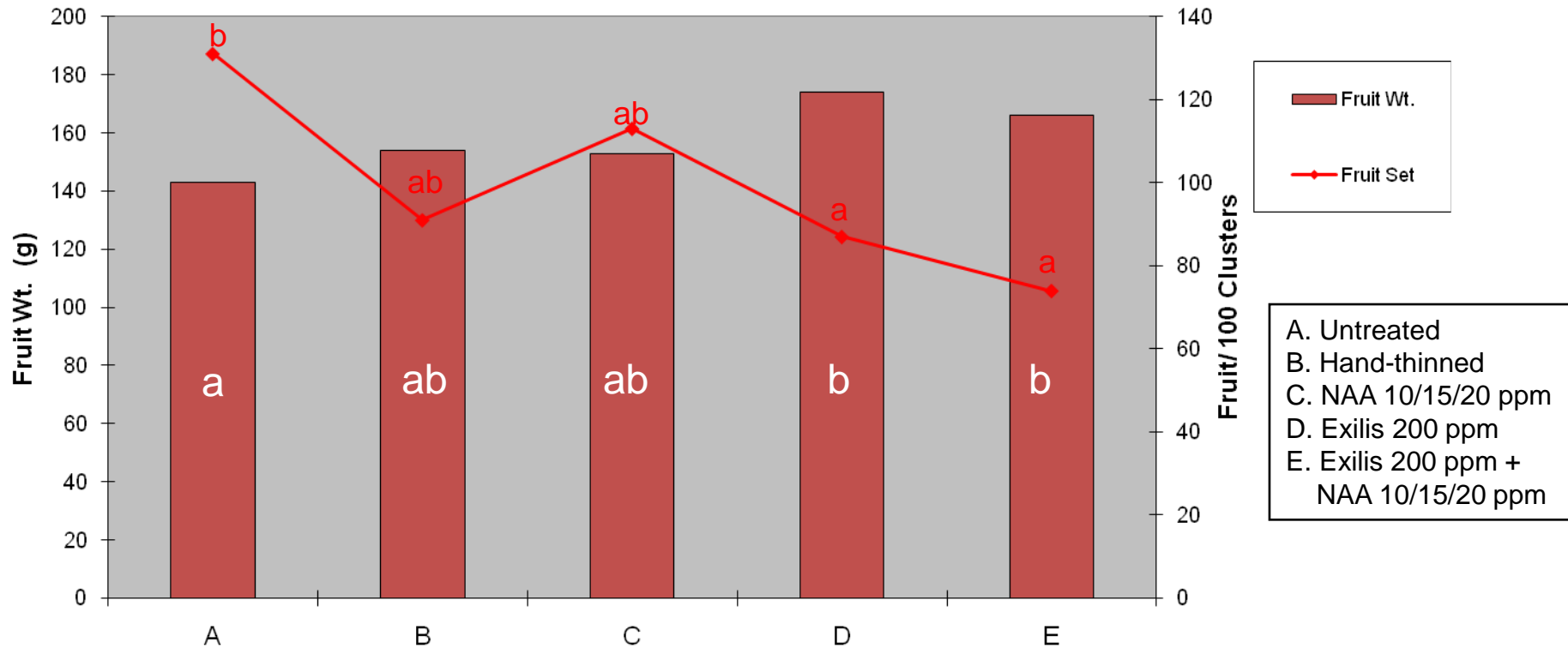
## Avg Fruit Wt (grams)



# Fruit Size Distribution on Bosc



# Effect of Exilis & NAA on Fruit Thinning and Sizing of Pear



Variety: Conference

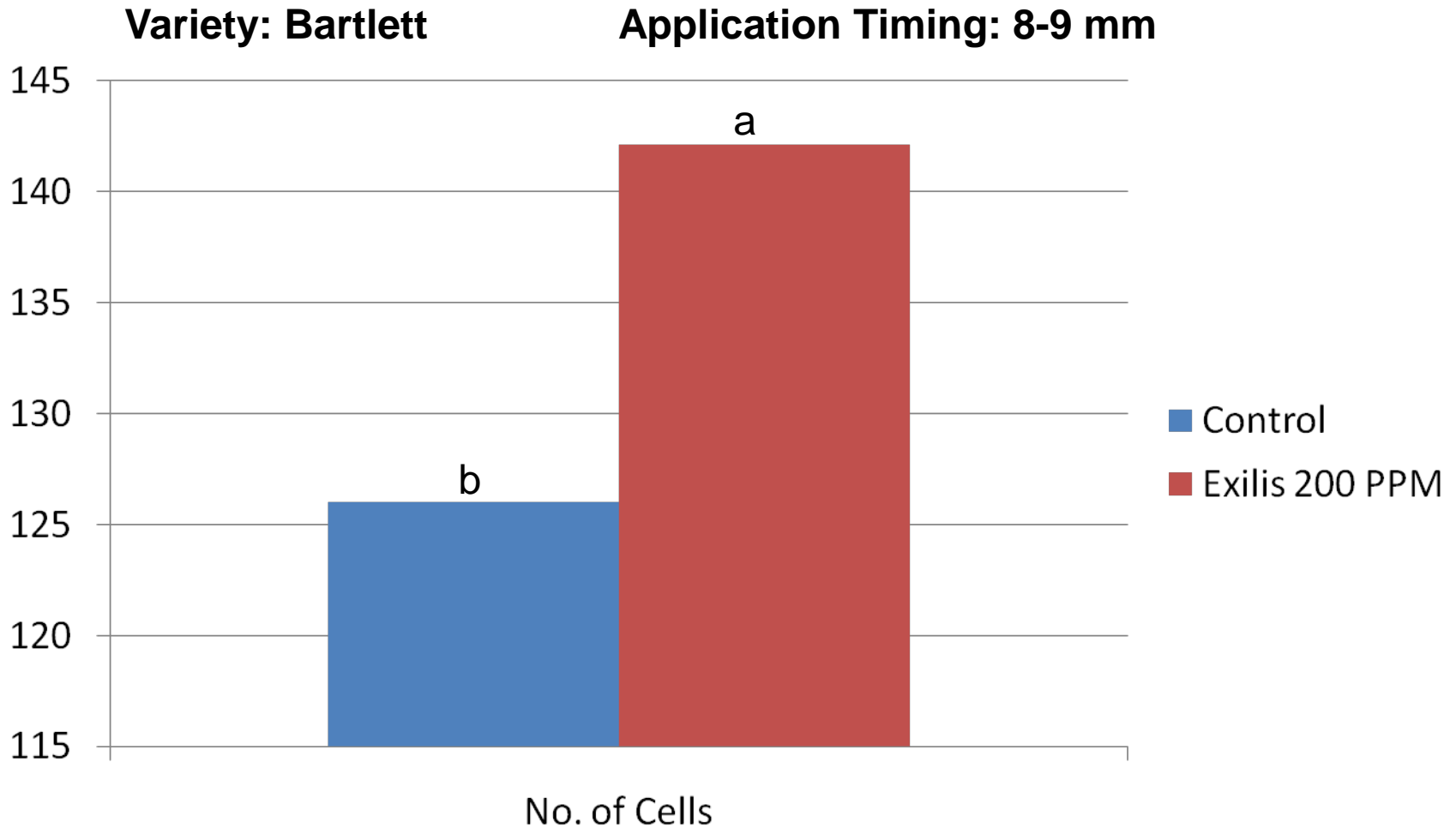
Trial Dates: 2000, 2002, 2003

Location: IRTA-EEA Mas Badia, Girona, Spain App. Timing: 8-10 mm

Means followed by same letter do not significantly differ (P<0.01)

# Effects of Exilis Plus on Pear Fruit Size

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INTA; Alto Valle, Argentina; 2007



## How Does Perlan Work:

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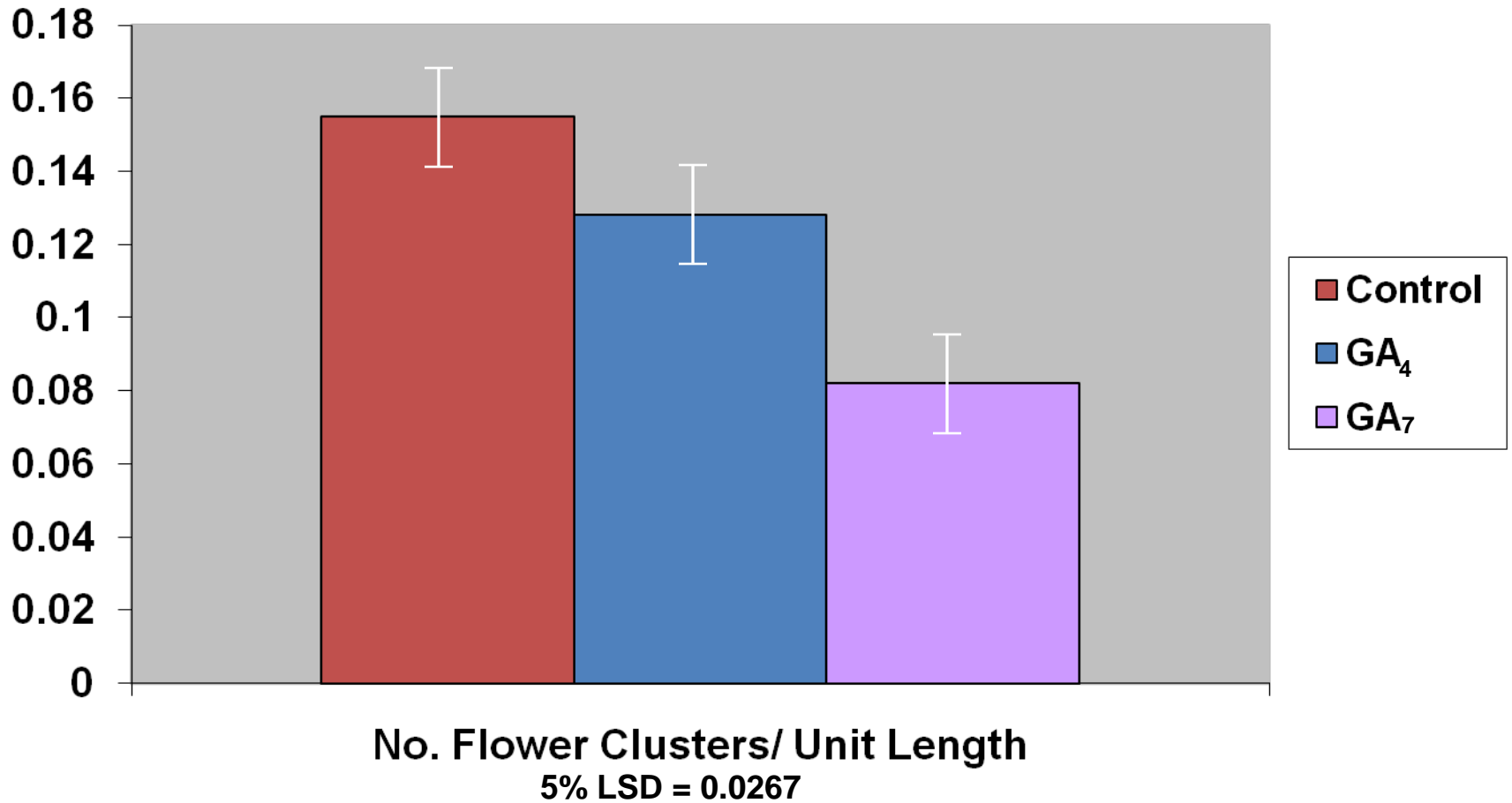
- 2 Active ingredients:  $GA_{4+7}$  + Benzyladenine
- Two ingredients in Perlan contribute to increase fruit size: 6-BA stimulates cell division, and  $GA_{4+7}$  causes cell expansion.
- The combination of  $GA_{4+7}$  and BA result is a larger fruit with more cells and larger cells.
- The unsurpassed quality of Perlan stems from a unique process used to manufacture highly pure  $GA_4$ , with only a minimal amount of  $GA_7$ .

# Perlan: GA<sub>4</sub> Purity

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- Perlan:
  - GA<sub>4</sub> 97%
  - GA<sub>7</sub> 3%
- Competitors GA<sub>4+7</sub>:
  - GA<sub>4</sub> 79%
  - GA<sub>7</sub> 21%

# Effects of GA<sub>4</sub> & GA<sub>7</sub> on Return Bloom



J. Palmer; New Zealand

Variety: Jazz / M.9

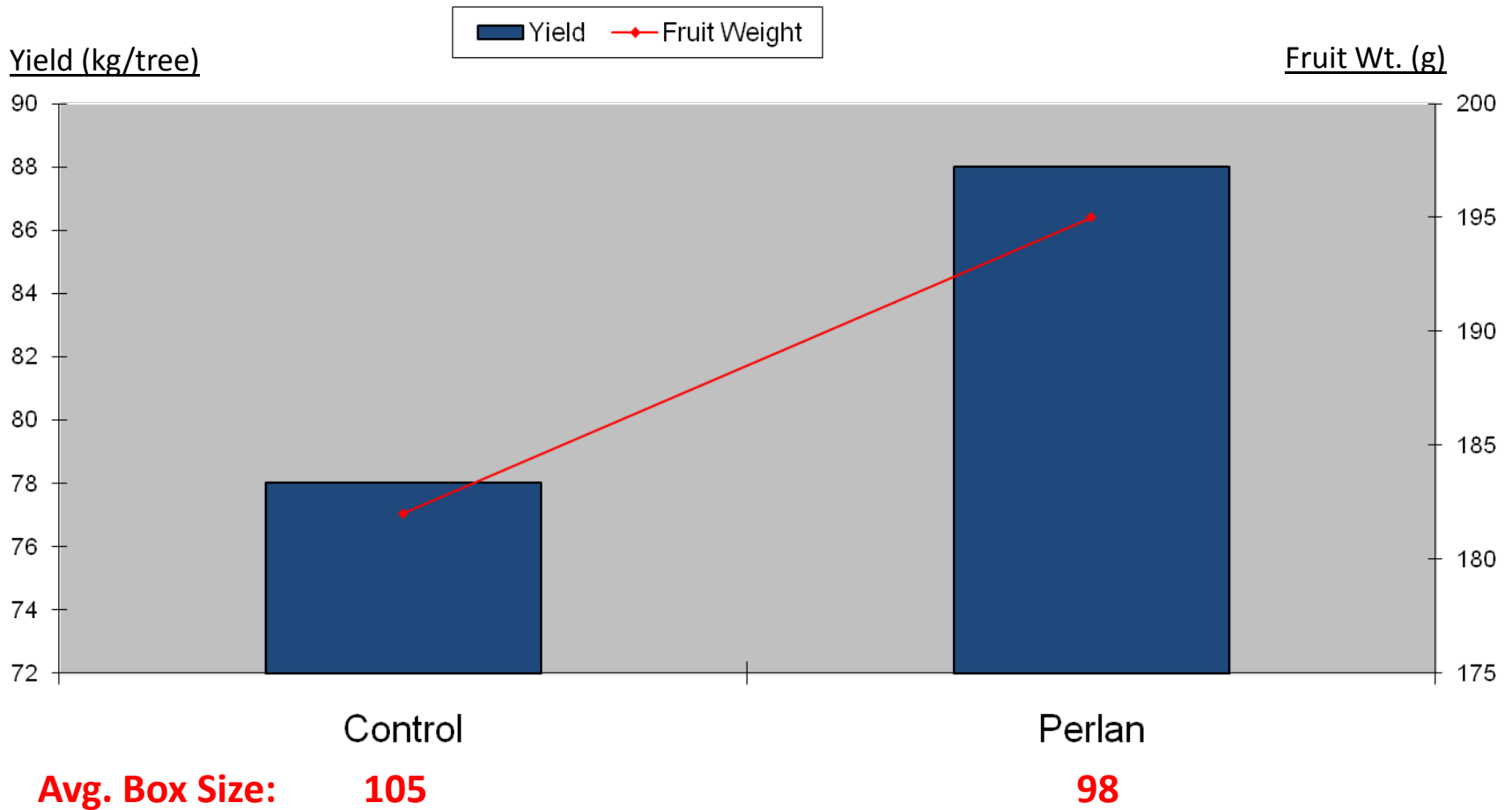


## Perlan Treatment Recommendations (improved typiness):

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- Make 1 application of 1 to 2 pints/acre between early king bloom and early petal fall.
- Best results are obtained with airblast sprayers that deliver a fine mist (around 100-micron droplet size).
- Water volumes should range between 50 and 200 GPA.
- Spray solution must not have a pH higher than 8; Use a buffering agent if necessary.

# Evaluation of Perlan on Red Delicious



Researcher/Year: WTFRC/ 2007    Perlan Rate: 2.3 L/ha  
Trial Location: Royal Slope, WA    Variety: Red Delicious/M.26



## How Does Novagib Work:

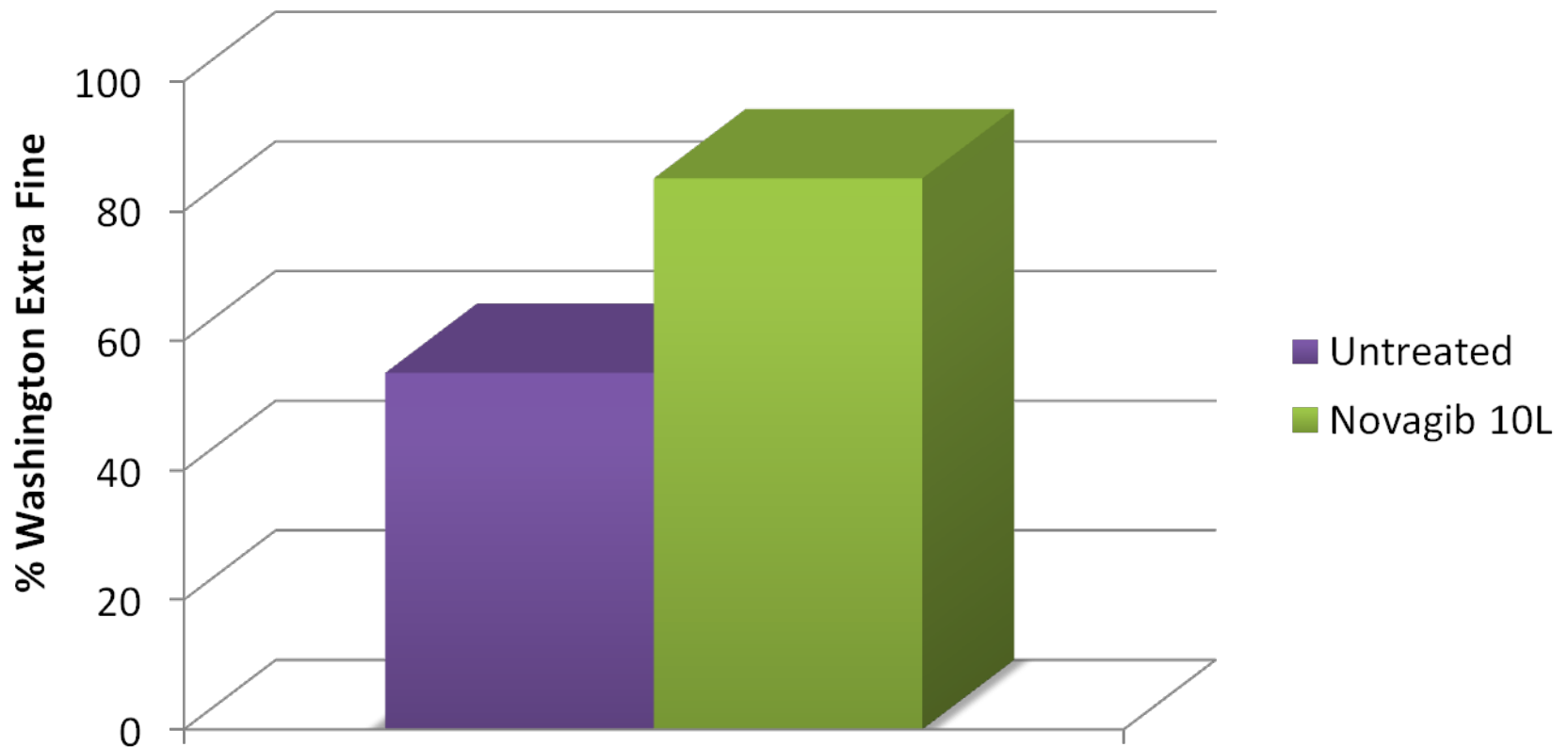
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- Fruit russeting can be caused by many factors i.e. weather, frost, disease.
- Cool/wet weather can cause russeting.
- Russet results from damage to epidermal cells. 'Corky' cells form and become exposed as fruit matures.
- Fruit are most susceptible during their early development (4-6 weeks after petal fall).
- Novagib prevents moisture-related russeting by increasing the plasticity of fruit skin, making it less susceptible to cracking.
- In addition, Novagib has been shown to improve overall fruit finish, resulting in more marketable fruit.

## Novagib Treatment Recommendations (russet reduction):

- Novagib should be applied in 3 to 4 consecutive applications.
- Make the first application of 20-26 fl oz in 100 gallons of water. Repeat treatments at 7-10 day intervals.
- Rate and frequency of application should be determined by varietal susceptibility, crop history, and weather conditions.
- Excessive spray volumes that result in runoff may reduce product performance. Do not apply in spray volumes greater than 100 GPA.
- Maintain a pH of 5 to 8 in the spray tank.
- Apply in conditions conducive of slow drying i.e. morning or evening.

# Evaluation of Novagib on Golden Delicious



Source: WTFRC; 2007  
Location: Wapato, WA

Treatment Timing: PF, +7, +14, +21, +28  
Novagib Rate: 0.2 liters/100 liters



# Falgro GA<sub>3</sub>

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- Made by Fine Agrochemicals, the second largest gibberellin producer in the world.
  - Using *Gibberella moniliforme*
  - Fine Agrochemicals proprietary strain
- 26 years of experience in PGR's
- Quality assured production to ISO 9002 standards
- Formulated in the US as a 4% Liquid and a 20% Soluble Powder
- Approved for organic use by the Organic Materials Review Institute (OMRI)



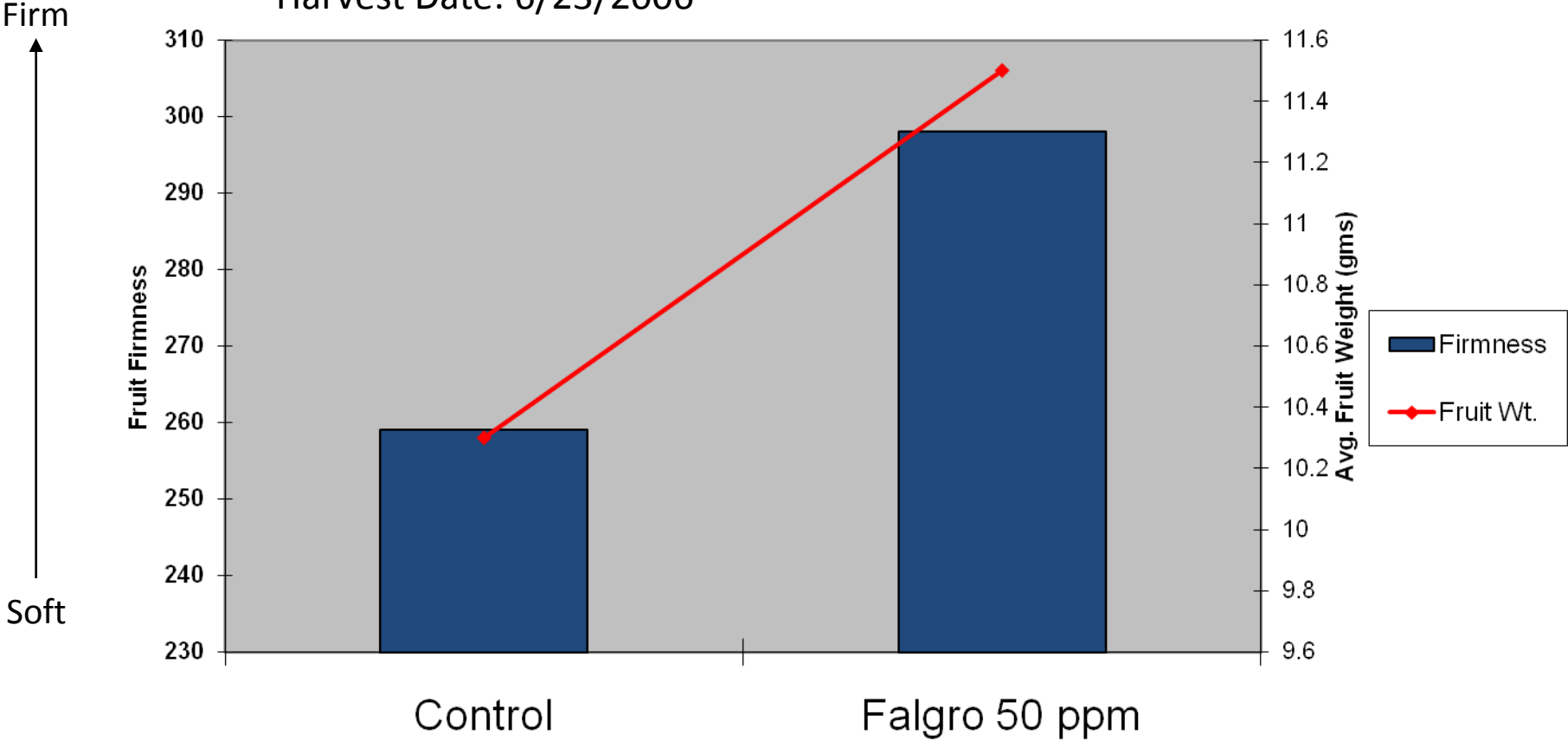
# Falgro Sweet Cherry Recommendations

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- Falgro delays fruit maturation and senescence 4 to 5 days, allowing for additional fruit growth while maintaining fruit firmness and stem condition for better shipping and additional shelf life.
- Sweet cherries treated about 3 weeks before harvest with Falgro will be firmer, sweeter, larger & less susceptible to surface pitting.
- **Single Application:** Make one application of 16 to 48 g ai/acre (do not exceed a total of 48 g ai/acre) as a dilute spray on large mature trees when the fruit is light green to straw colored in sufficient water to ensure thorough wetting.
- **Split Applications:** Make the first application of 8 to 24 g ai/acre when fruit is light green to straw colored. Make the second application of 8 to 24 g ai/acre 7 to 14 days later. Do not exceed a total of 48 g ai/acre.

# Effect of Falgro 20SP on Sweet Cherry Size and Firmness

Harvest Date: 6/23/2006



Variety: 'Rainier'

Trial Location: Buena, WA

Researcher/Yr: WSU; 2006

**THANK YOU!**



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