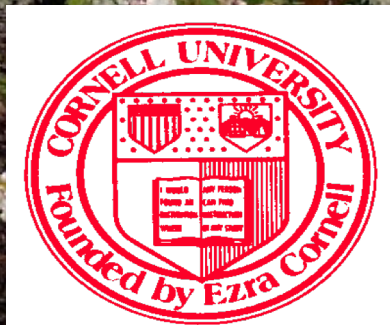
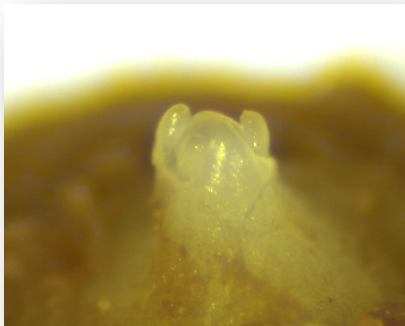


Use of Plant Growth Regulators Improve Return Bloom and Fruit Set

Terence Robinson and Poliana Francescato
Dept. of Horticulture
Cornell University
Geneva, NY 14456

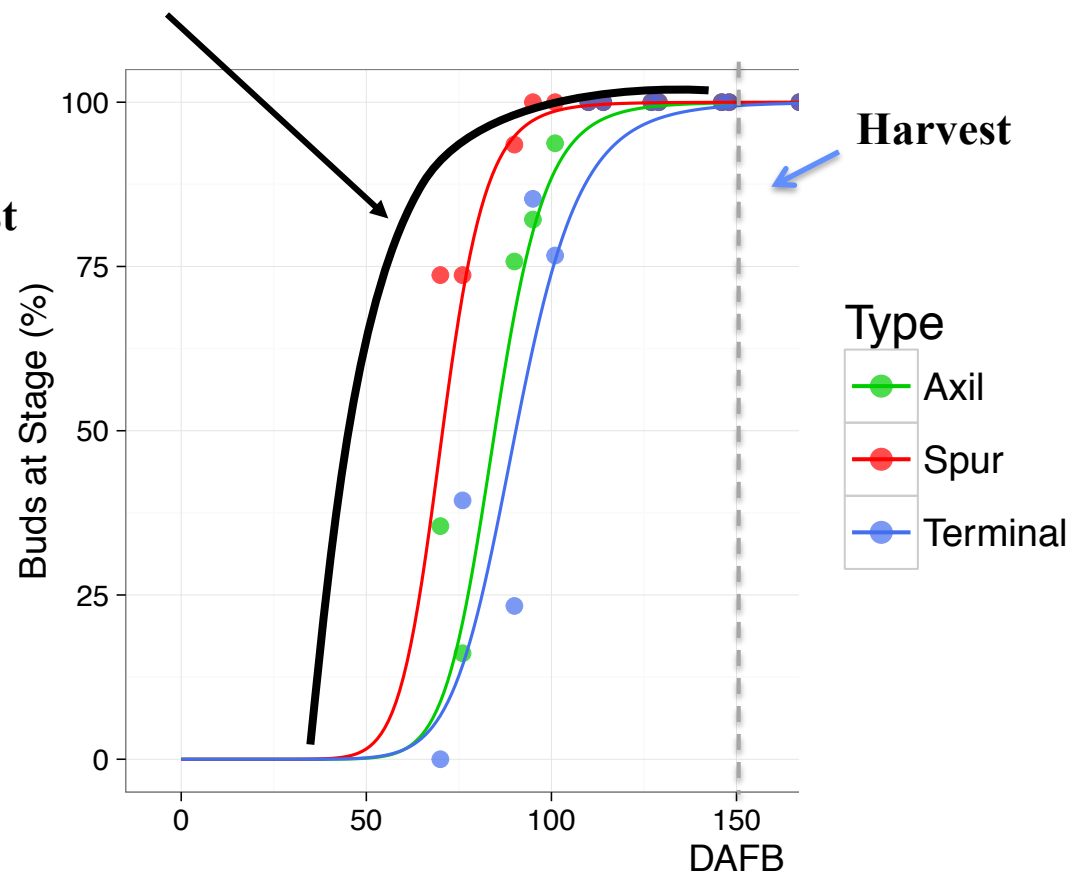
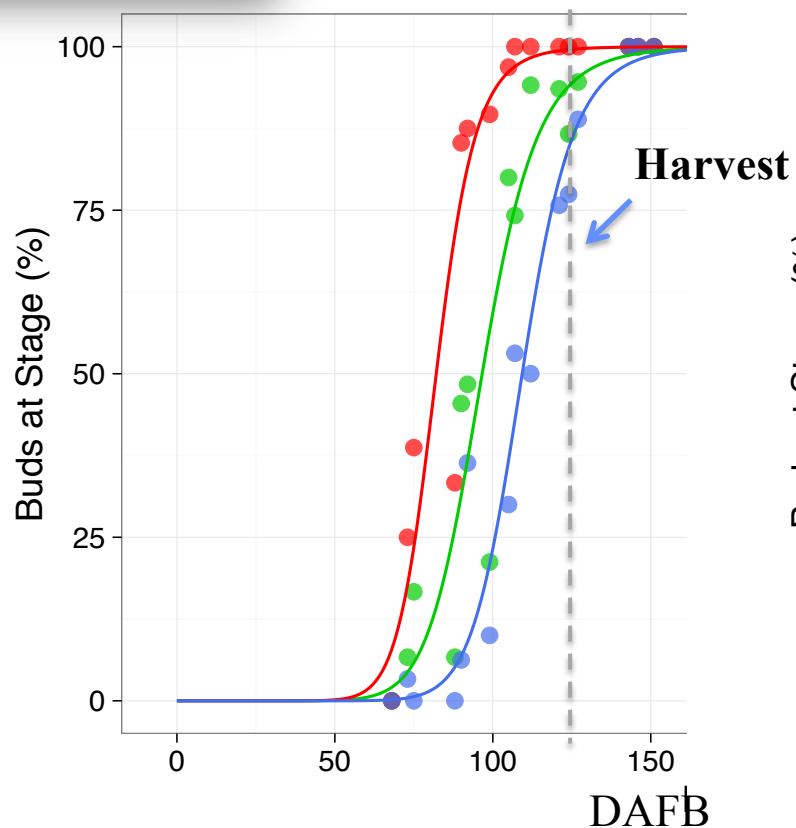




Flower Initiation in Apple Spur Buds

Honeycrisp

Peak at 45-55 DAFB
(NY - end June/early July)



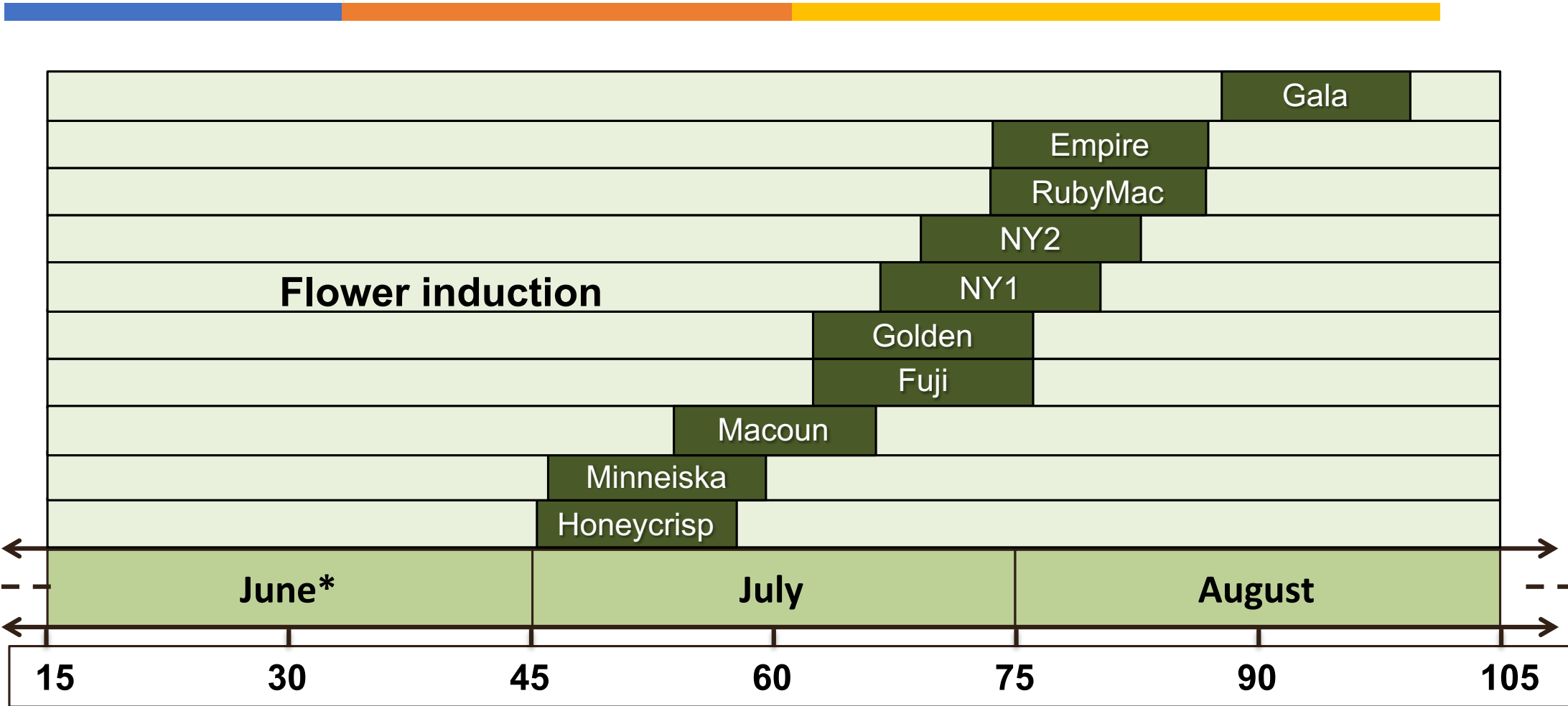
Gala

peak at 85-95 DAFB
(NY - middle August)

Fuji

peak at 65-75 DAFB
(NY - middle July)

Timing of Flower Initiation in Apples



Days after full bloom

Months for NY state

Varieties differ widely in the time of flower induction/initiation.

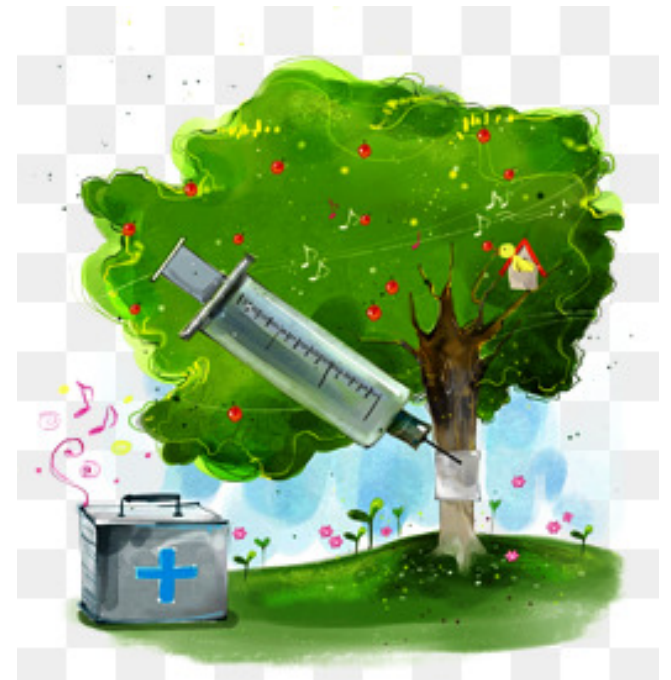


There is a trend of varieties that are prone to biennial bearing (such as Honeycrisp, Fuji, etc) to initiate flower earlier than the annual cropping varieties (Gala).

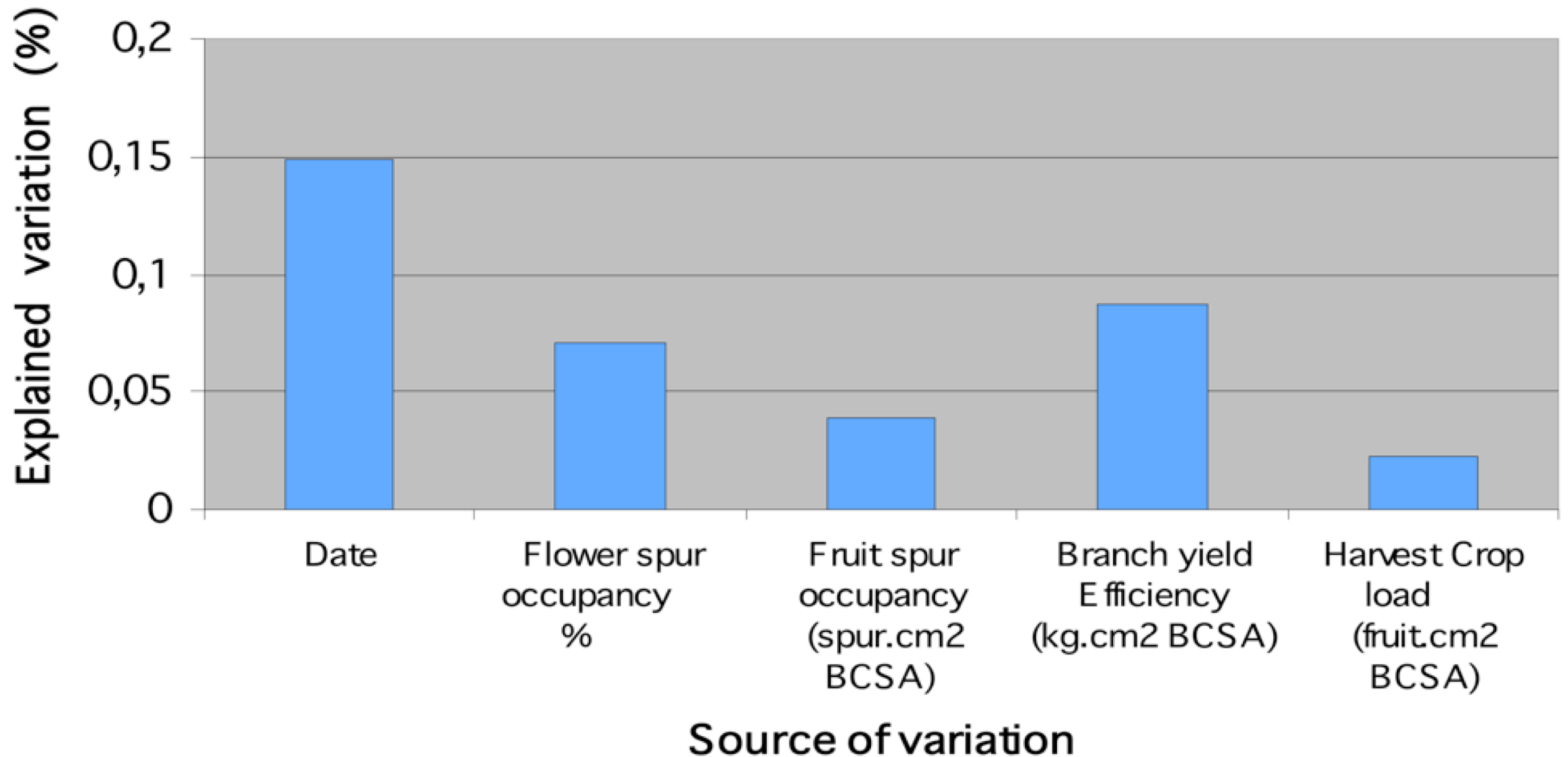


Factors that could help promote or inhibit flower formation

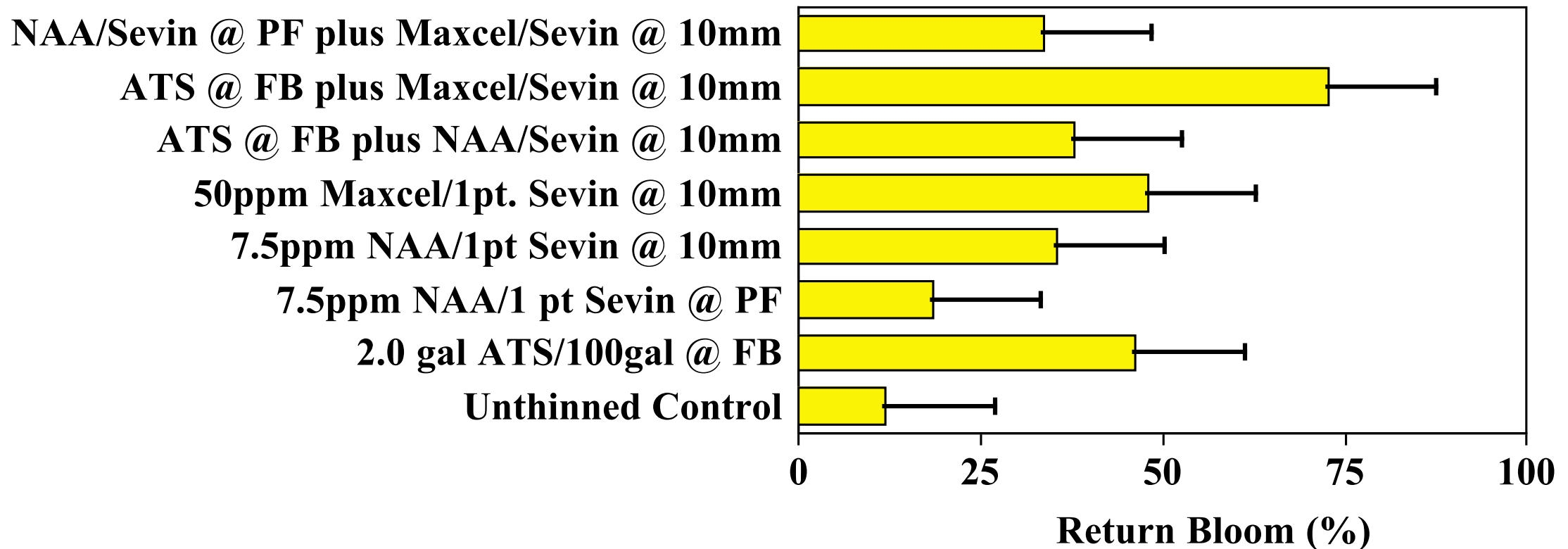
1. Early Thinning (seed produced GA)
2. Variety
3. Rootstock
4. Tree training and pruning (light)
5. Irrigation and fertilization
6. Girdling
7. Climate conditions
8. Use of plant growth regulators



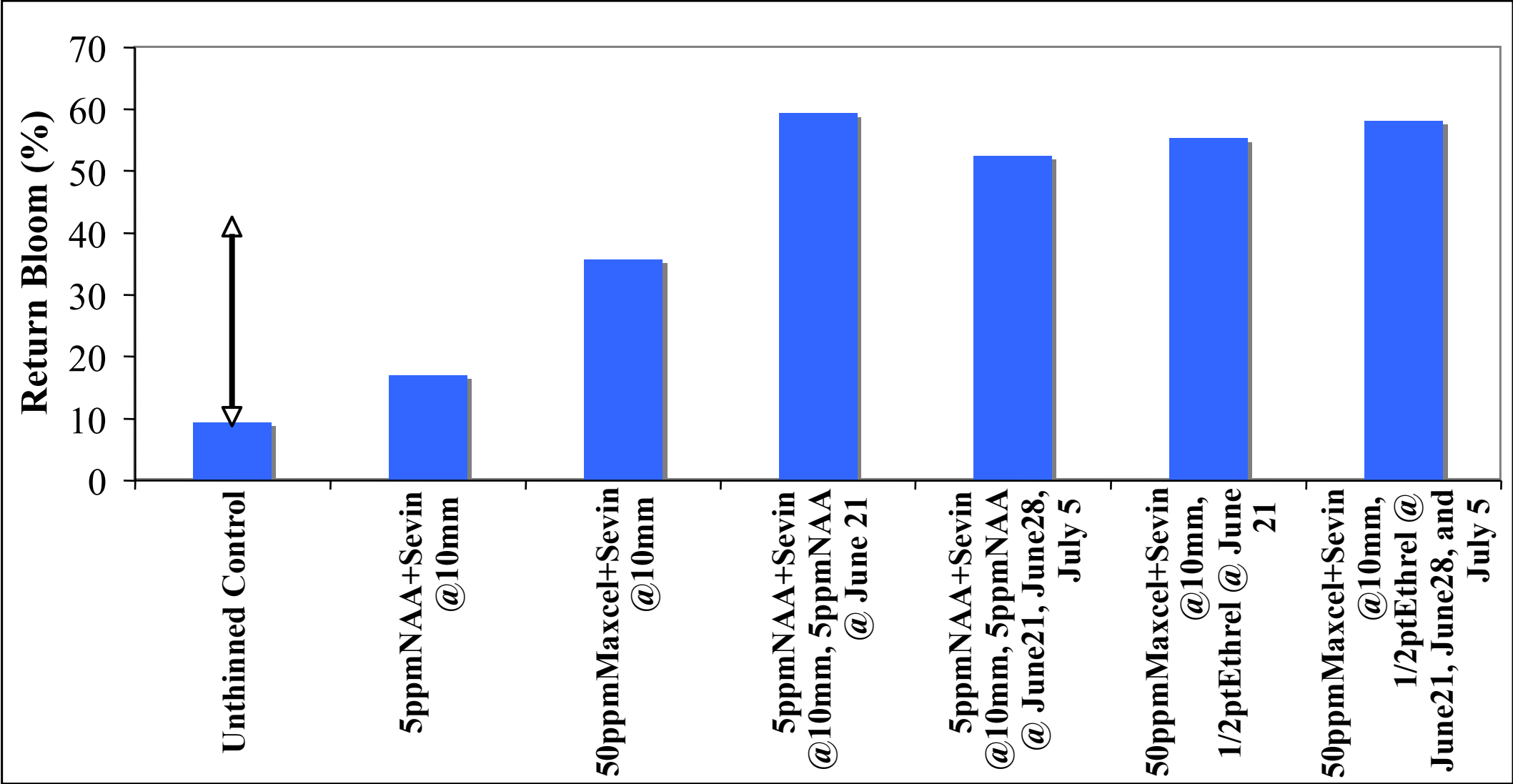
Honeycrisp Return Bloom was Most Affected by Date of Hand Thinned and then by Spur Occupancy



Honeycrisp Return Bloom in 2004 was Improved with ATS at Bloom or ATS at Bloom plus Maxcel/Sevin at 10mm stage.



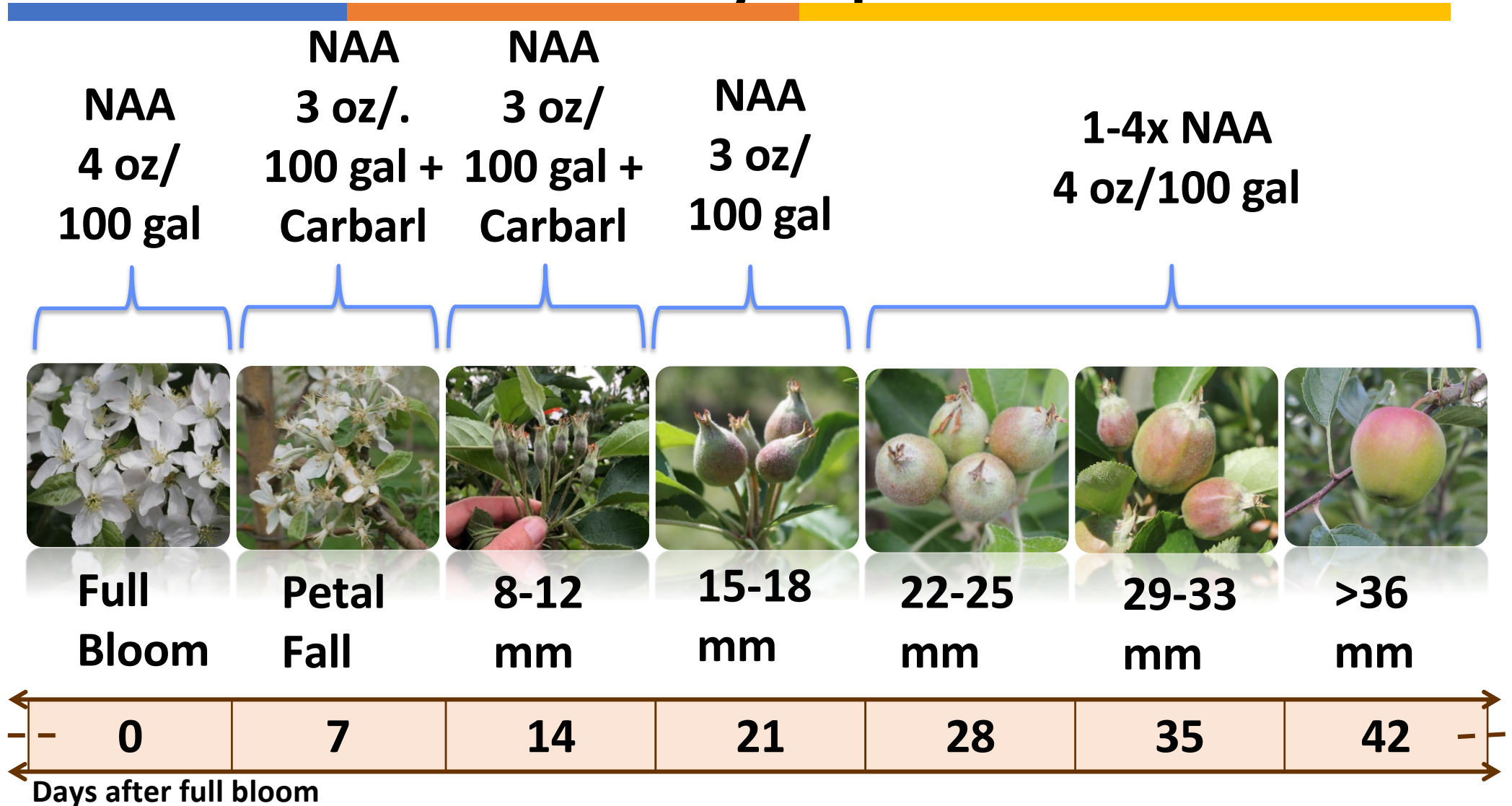
Honeycrisp Return Bloom was Improved with NAA/Sevin at PF plus Maxcel/Sevin at 10mm stage plus Summer NAA or Summer Ethrel in 2004.



Key points for managing return bloom:

- Know the timing of flower induction/initiation of each variety
- Reduce the total number of seeds per tree before flower initiation time (early thinning)
- For early flower initiating varieties (Honeycrisp) this requires bloom thinning
 - ATS (2%) at bloom has worked well in NY for Honeycrisp (The PTGM will make this treatment more effective)
 - NAA (4 oz/100) at bloom has worked well in NY for Honeycrisp PGRs summer sprays will not work on heavy loaded trees.
- Where cropload is reduced early then summer PGR sprays help
 - 4 weekly sprays of NAA (4 oz/100) after fruits reach 22mm size will improve return bloom
 - 4 weekly sprays of Ethrel (150ppm=half normal dose) after fruits reach 22mm will improve return bloom (Note: If the last Ethrel spray is within 6 weeks of harvest it will increase preharvest drop and cause early ripening)
- **PGRs summer sprays will not work on heavy loaded trees.**

NAA spray program to enhance flower formation in Honeycrisp



Rates = 100 gallon dilute basis

Ethephon?

Return bloom with Pear:

- Like apple, pear varieties show variation in when flower buds initiate
- 3-6 weekly summer sprays Ethrel (300ppm=normal dose) at 30-65 days after full bloom improved fruit set of Bosc in NY and Rocha pear in Brazil
- NAA did not consistently improve return bloom of pear and reduced fruit size.

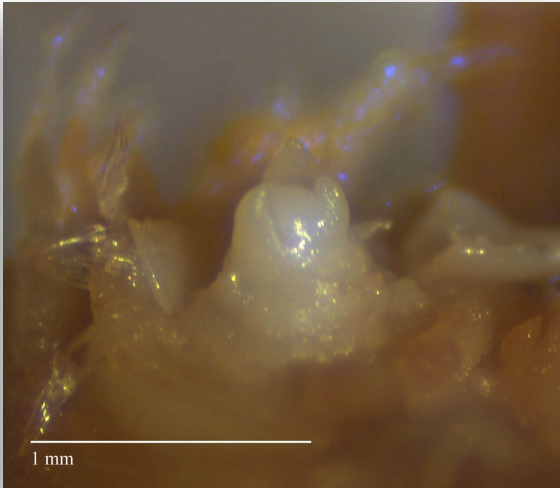
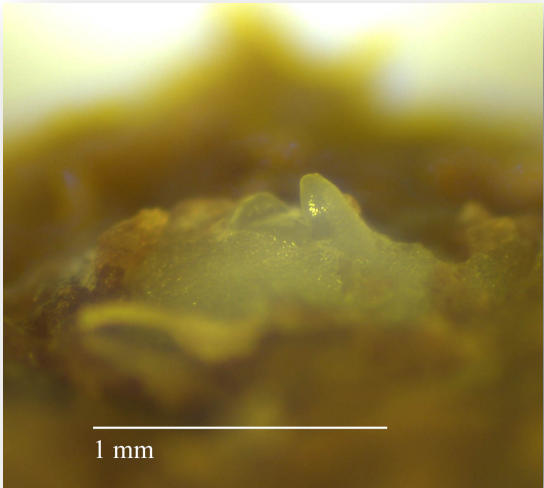


Flower Initiation on Pears

Spur buds – NY, USA

Pear Variety	
Kosui	early
Nitaka	
Shinseiki	
Isiwasse	
Olympic	
Atago	late
Hosui	
Ya Li	
Yoinashi	

Doming of the bud apex



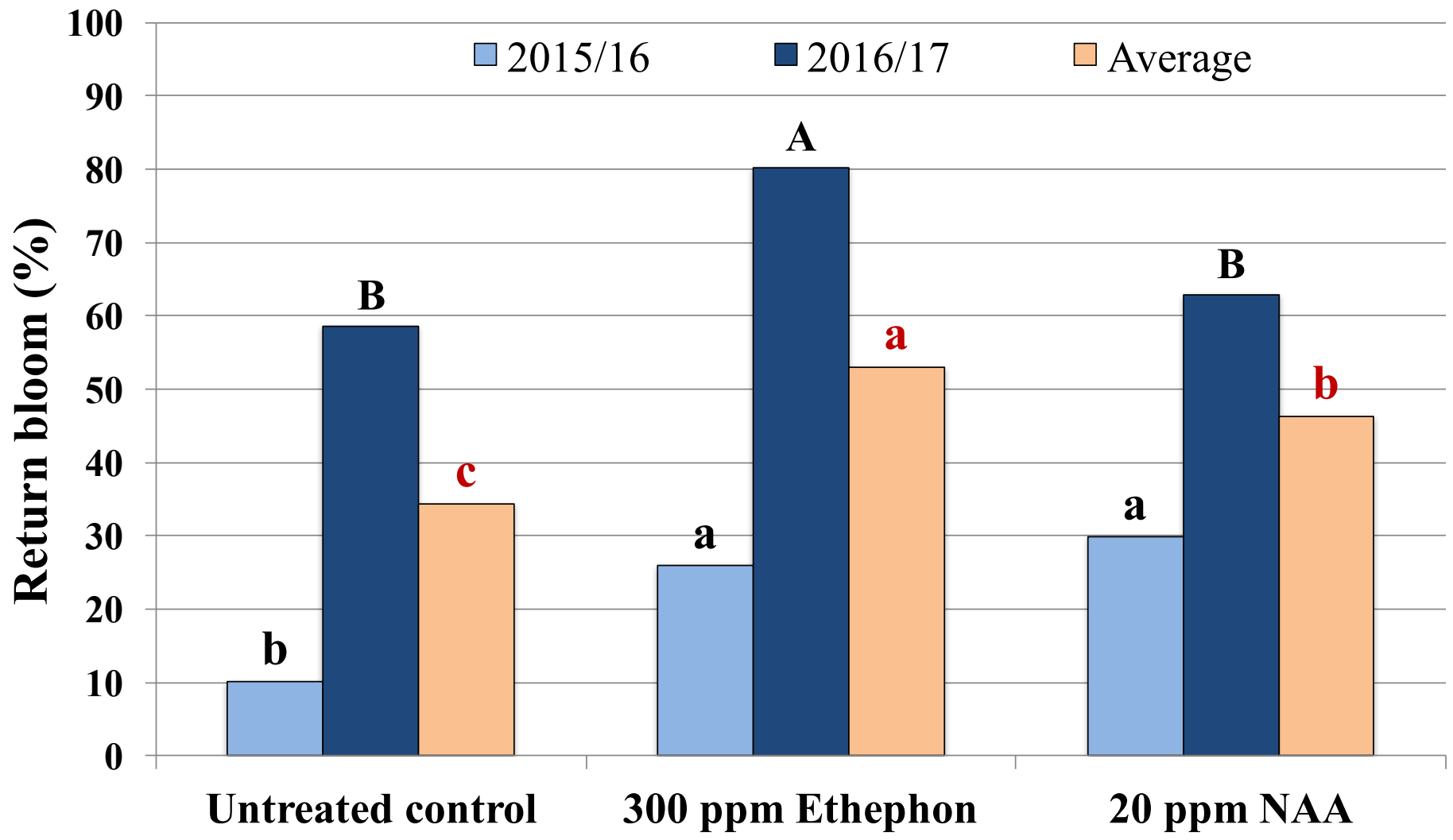
Abate Fetel = 45 DAFB

Bartlett = 60 – 85 DAFB
55 – 80 DAFB

Comice = 60 – 85 DAFB

Bosc = 75 – 95 DAFB

Effect of Ethephon and NAA on return bloom



The Use of Retain to Improve Fruit Set of Cherry

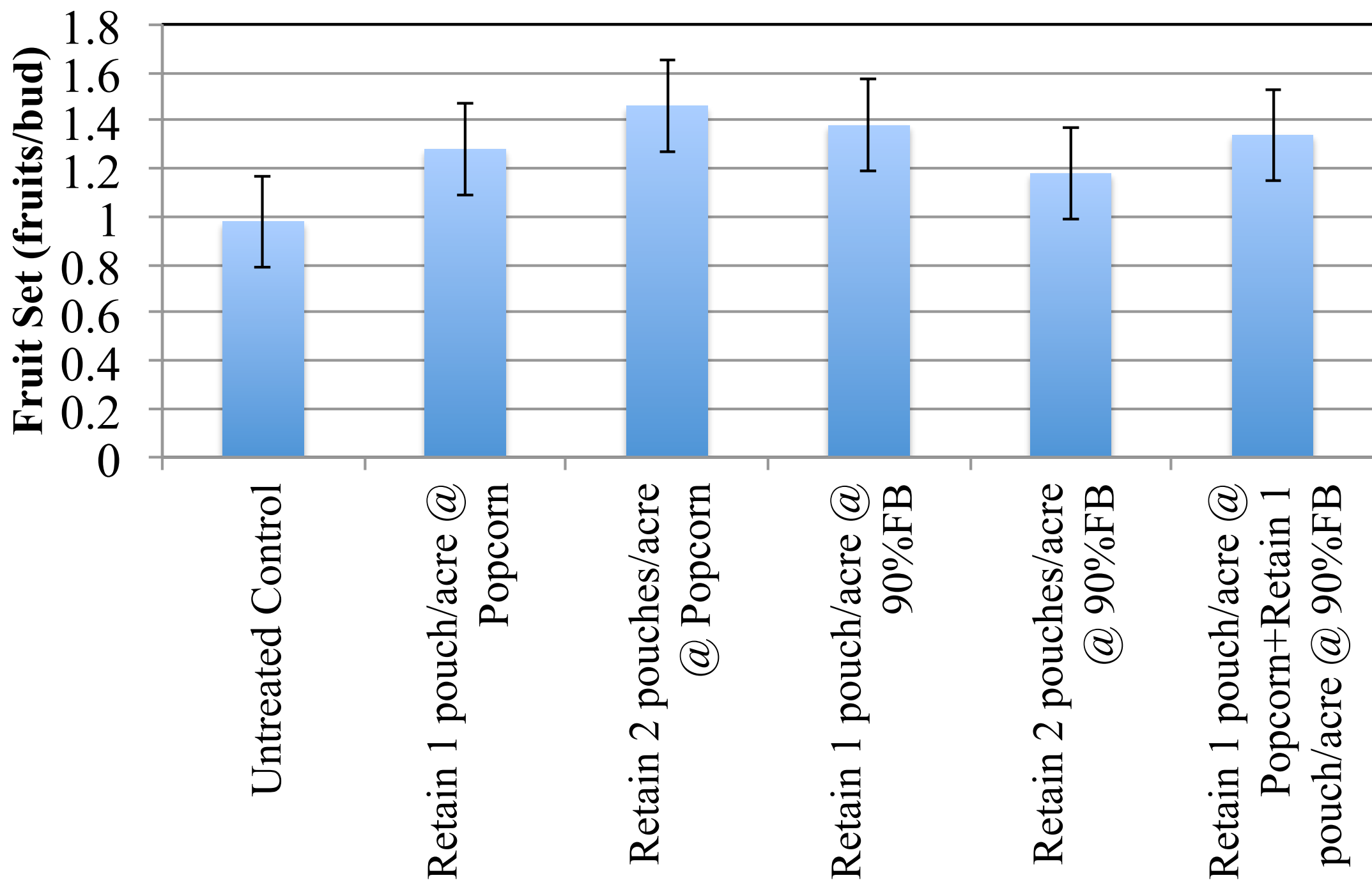
- Retain applied at the beginning of flowering can improve fruit set of varieties with low fruit set such as Regina.
- Regina has low fruit set because of a short life of ovules which often die before the pollen tube reaches the ovule.
- Retain is used at high rate (2 times the normal rate= 2 pouches per acre)
- It should be applied at late popcorn stage when the first flowers open (5% open)
- Do not add surfactants since these have a negative effect on pollinization and pollen tube growth

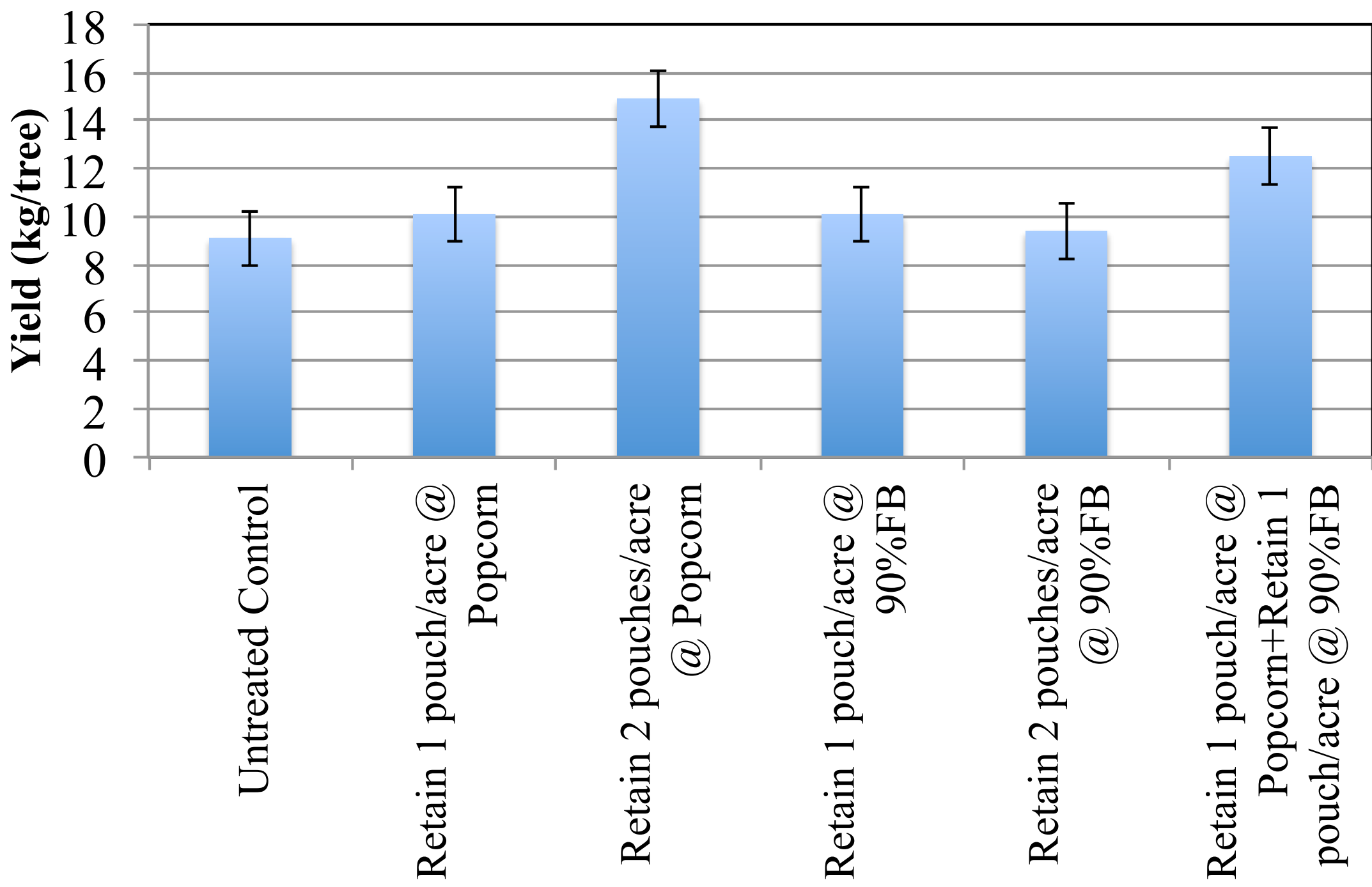


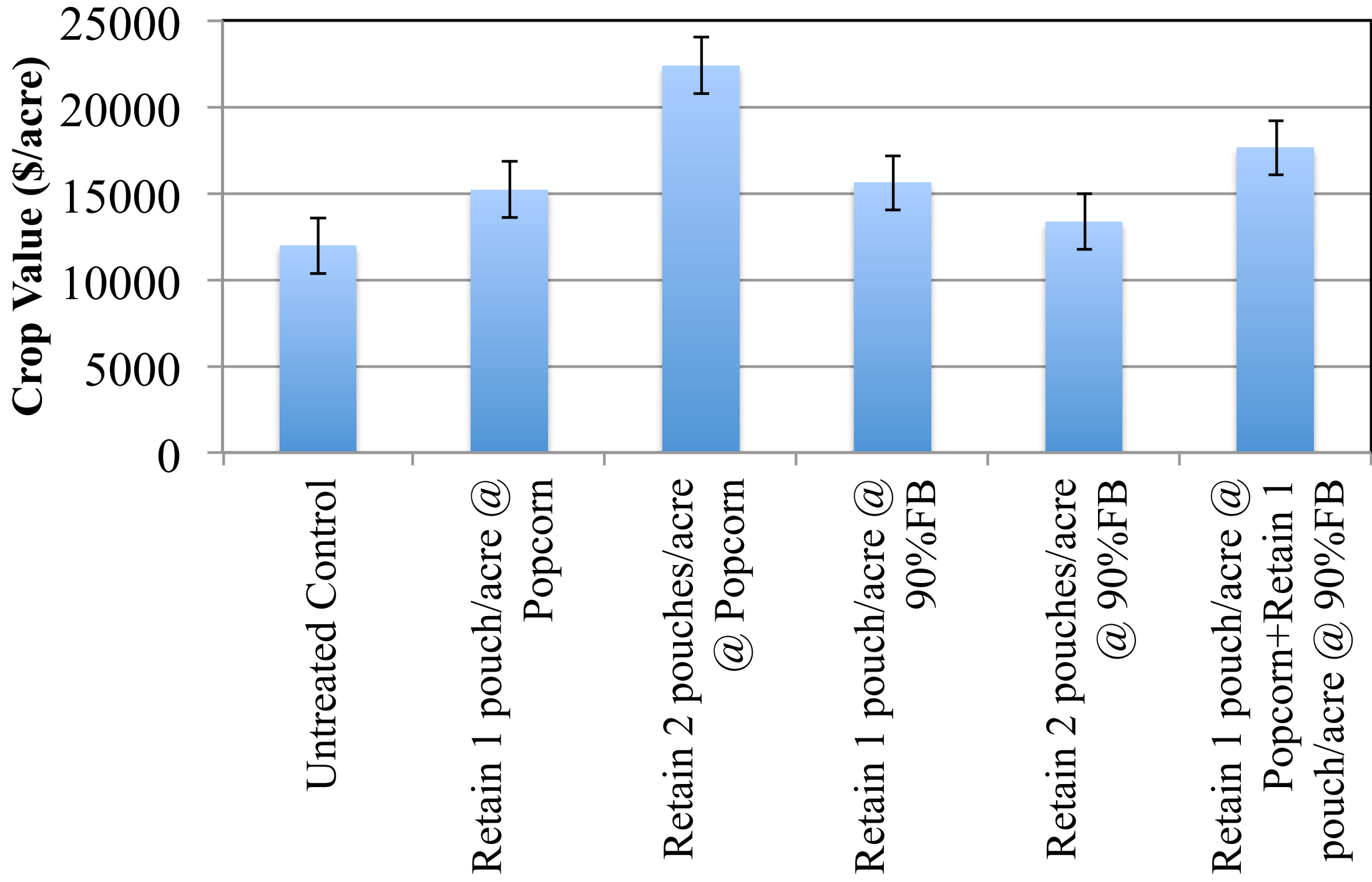
Improving Fruit Set

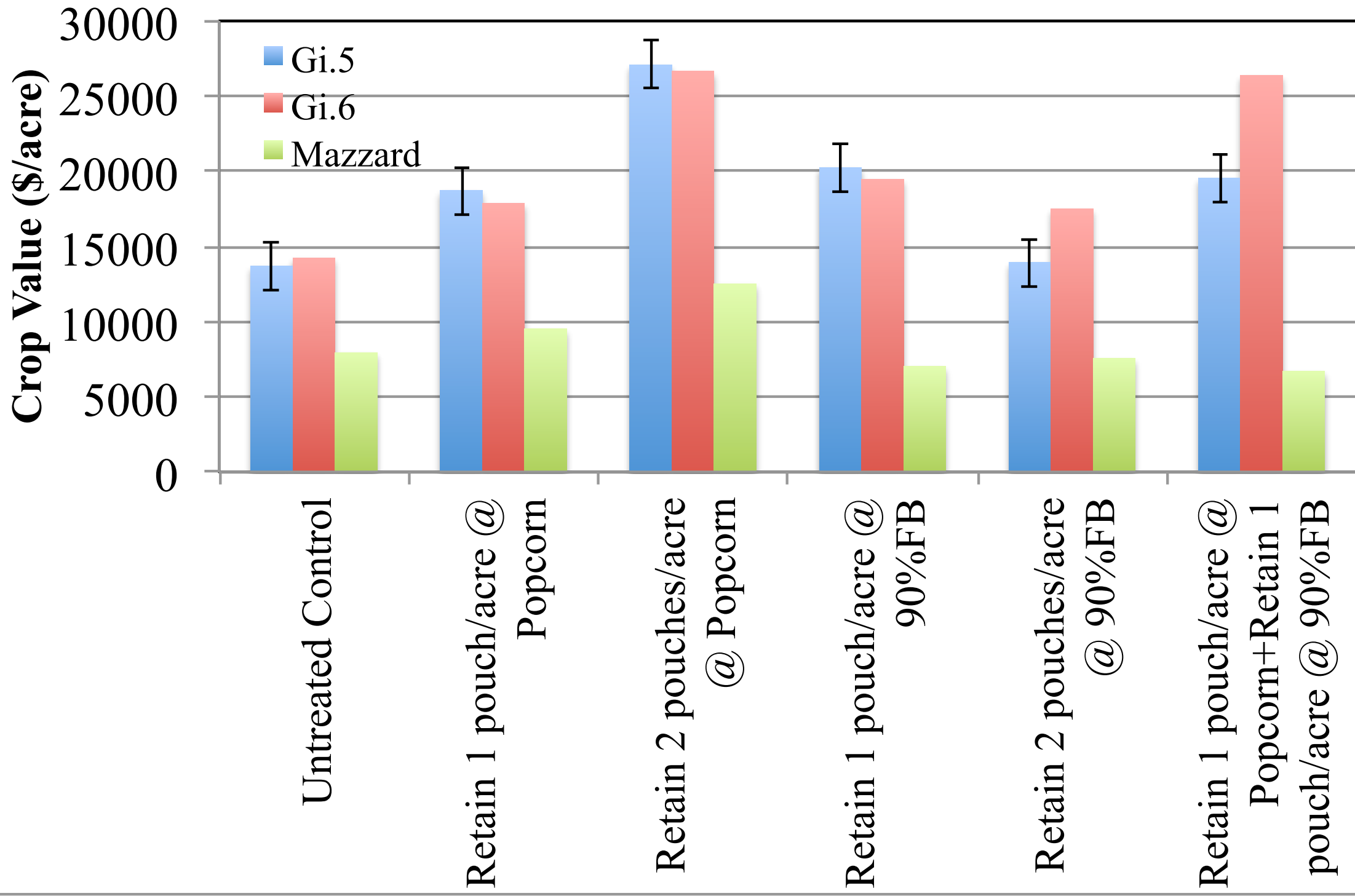
- With some varieties like Regina the flower ovule dies before pollen tube reaches it. Thus fruit set is often low.
- Retain applied at popcorn stage improves ovule longevity and improves fruit set
- Apply 1-2 pouches per acre when first flower opens but 98% of flowers are at popcorn stage











The Use of Retain to Improve Fruit Set of Pear

- With pear the problem is not a short ovule life but it is early fruit abscission after pollination. (Probably due to ethylene)
- A combination of Promalin at Full Bloom and Retain at 15 days after full bloom has given the best improvement in fruit set of Bosc and Comice
- Retain at FB had little effect on set but when applied 15 days after full bloom significantly improved fruit set.
- Use rate of Retain is the normal apple rate of 1 pouch per acre
- A surfactant is recommended with post bloom applications of Retain (1pt. Silwet/100 gal)



The Use of Harvista to Improve Fruit Set of Cherry

- Harvista recently received a label for application at bloom to improve fruit set of cherry.
- Harvista can be applied twice during bloom
 - At 10% bloom
 - At 50% bloom

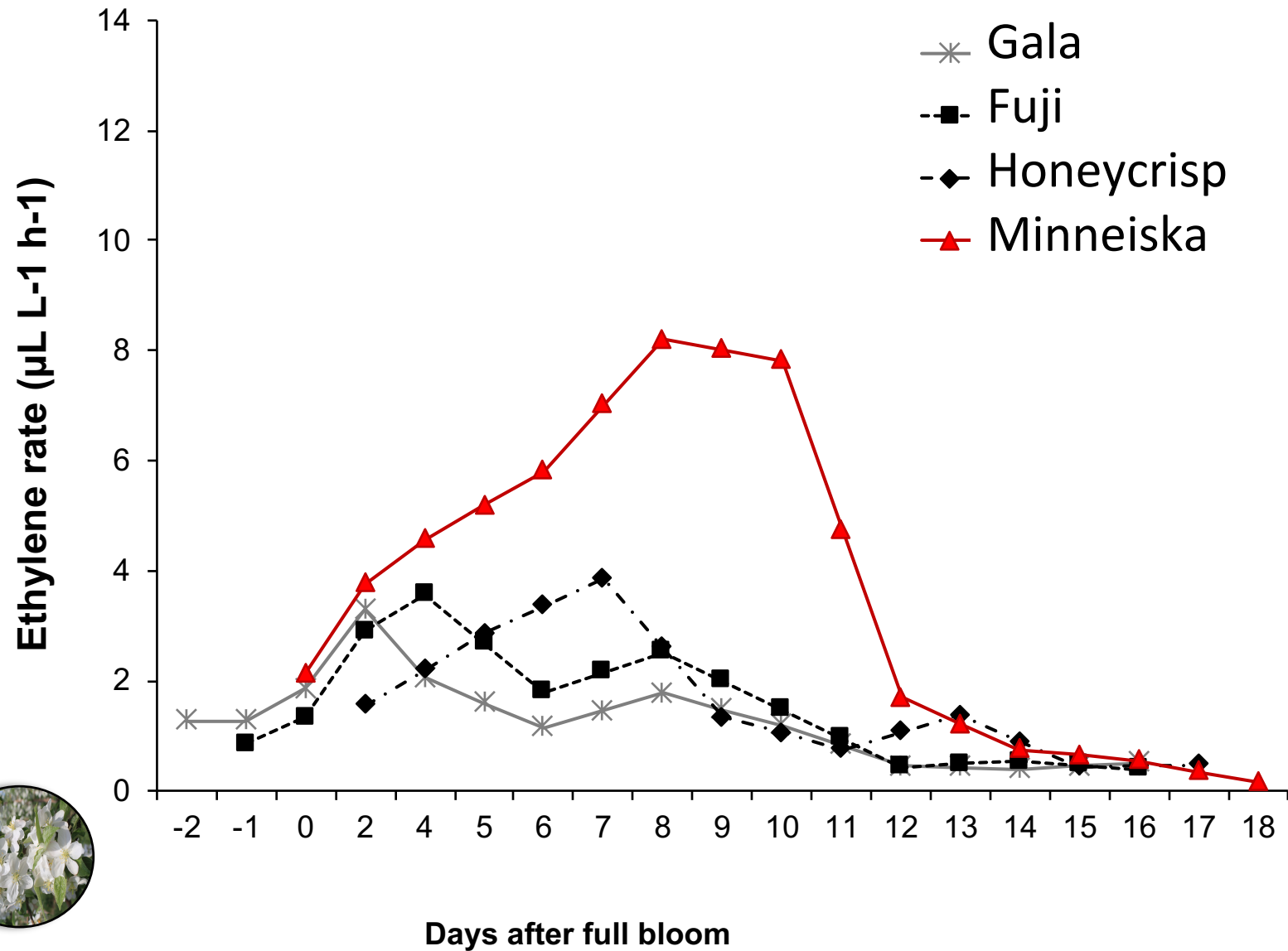


The Use of Retain to Improve Fruit Set of Apple

- Most apples have excessive fruit set but Sweetango in many cases has excessive early fruit drop and too little fruit set
- This problem is likely due to high ethylene production of the flowers and the use of GA4+7 to control russetting.
- Retain should be applied at full bloom and at petal fall
- Use rate is the normal apple rate of 1 pouch per acre
- A surfactant is recommended in the second spray (1pt. Silwet/100 gal)

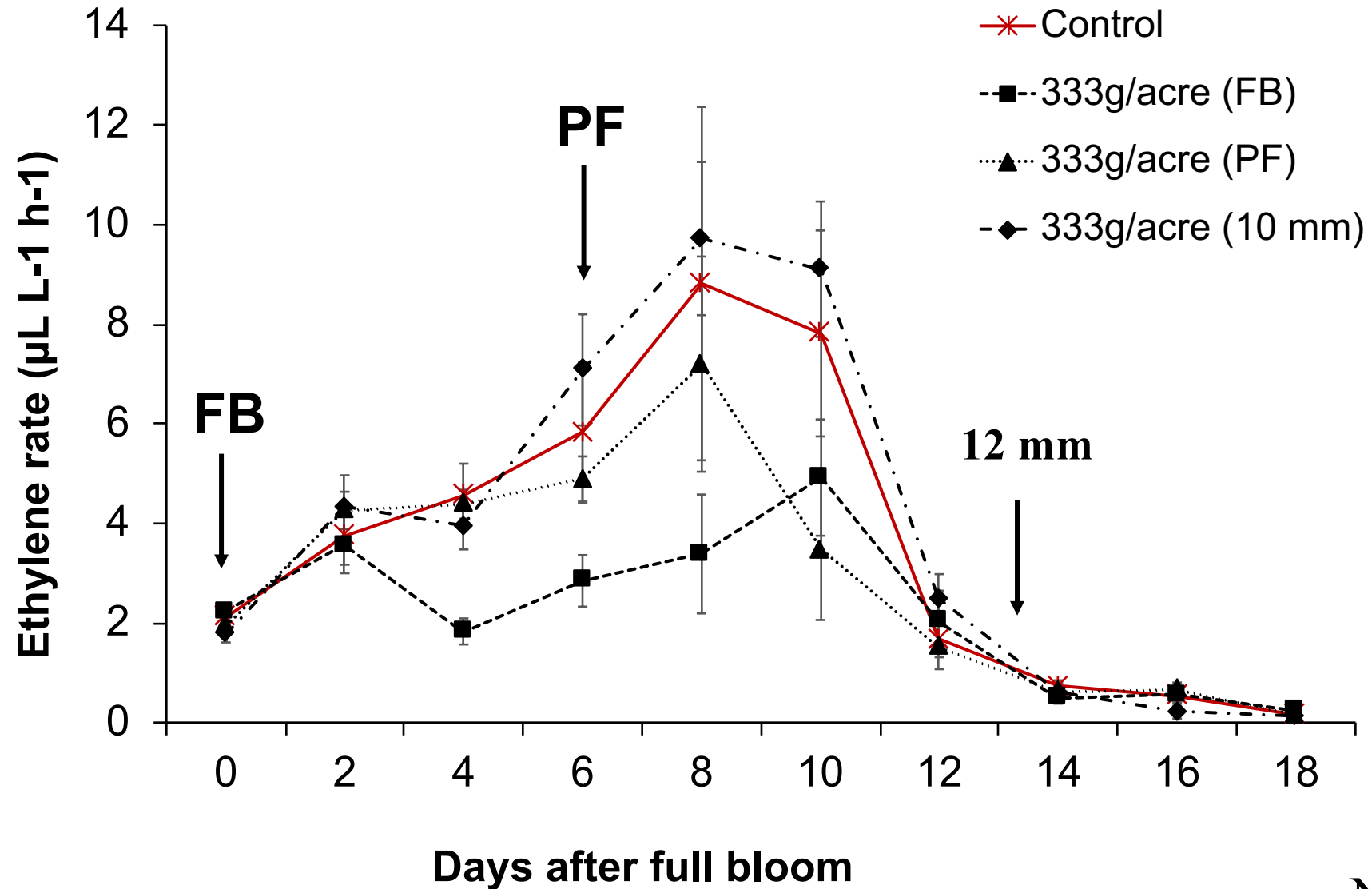


Ethylene evolution in apple flower/fruitlet



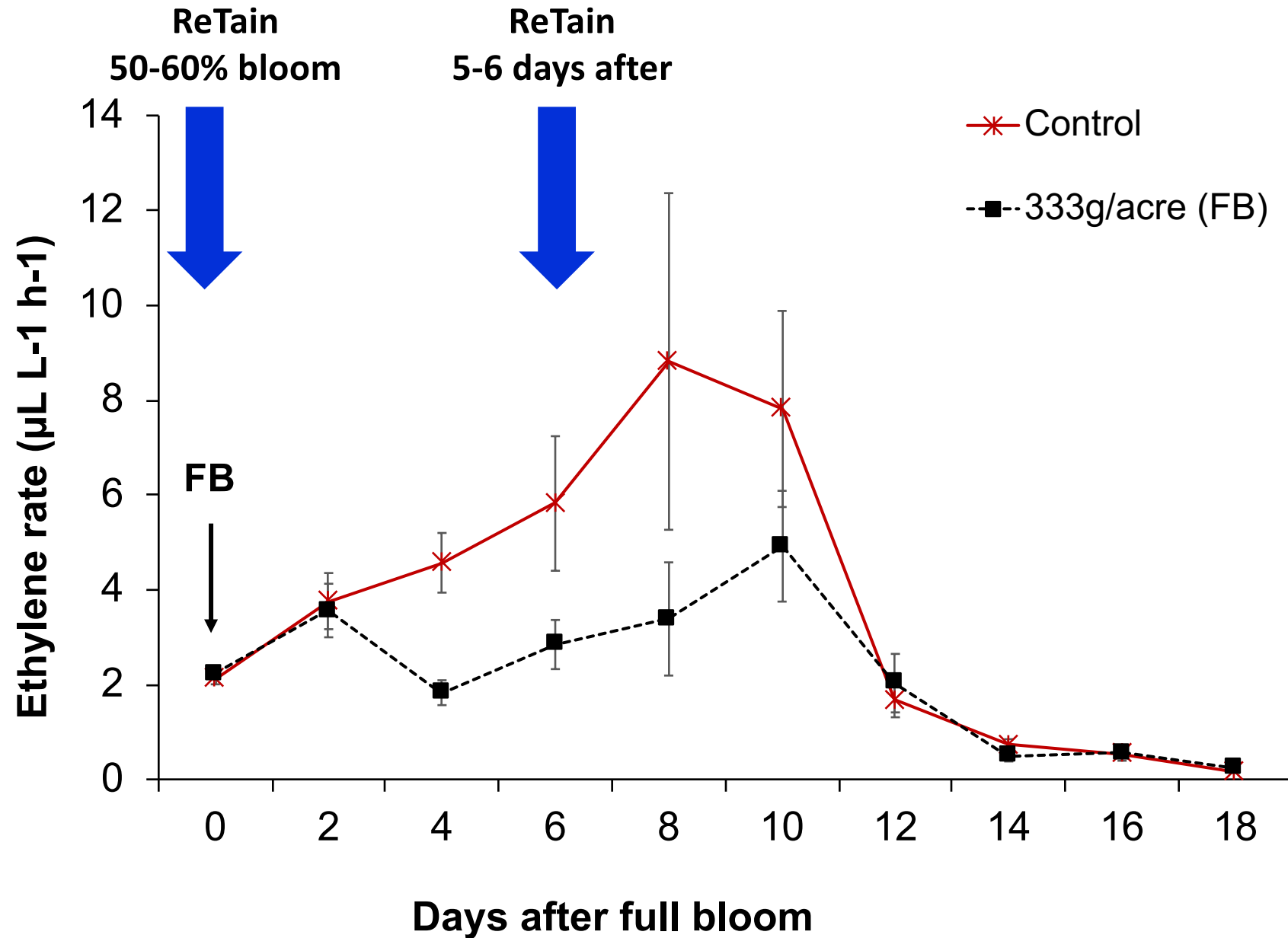
Using AVG (ReTain) to Inhibit Ethylene Production

Minneiska flowers/fruitlets (2018)



Using AVG (ReTain) to Inhibit Ethylene Production

Minneiska flowers/fruitlets (2018)





Questions?