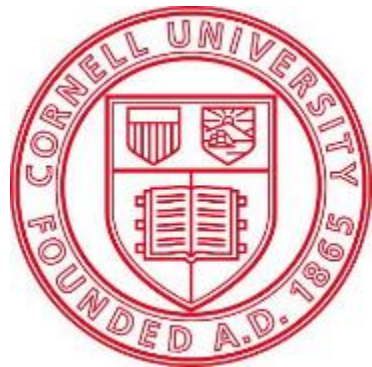


# Updates on Prohexadione Research and Tools for Managing Blossom and Shoot Blight

*Anna Wallis &  
Kerik D. Cox Cornell AgriTech*

*Plant Pathology and Plant-Microbe Biology Section  
School of Integrative Plant Science  
Cornell University*



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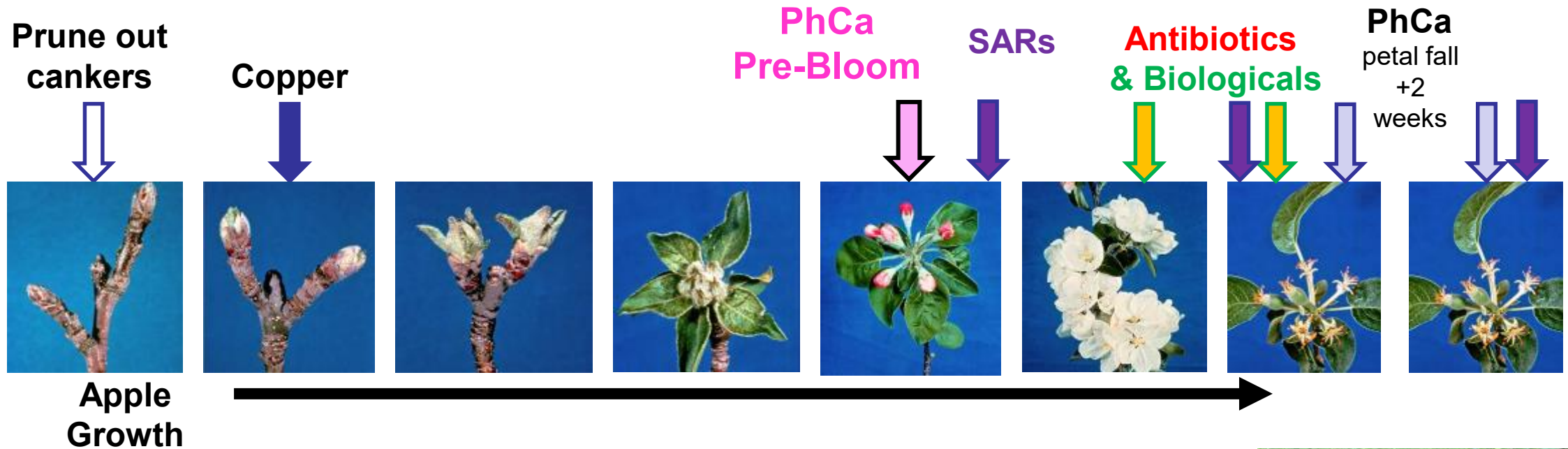


# Shoot blight is devastating, unpredictable, and difficult to manage

- An unnoticeable amount of blossom blight can lead to shoot blight
- Host susceptibility & vigor influence level of devastation
- Prohexadione calcium (PhCa): **highly effective** > works internally > **slows vigor & establishment of young trees**
- Optimize timing & rate of PhCa to help manage blossom blight & reduce shoot blight in advance?



# Fire blight Management Overview: PhCa



PhCa: reduce blossom and shoot blight without affecting tree vigor?

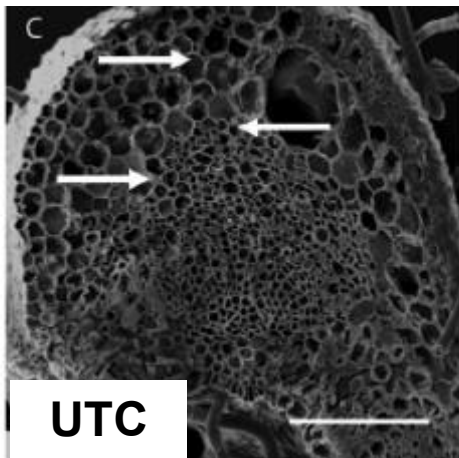
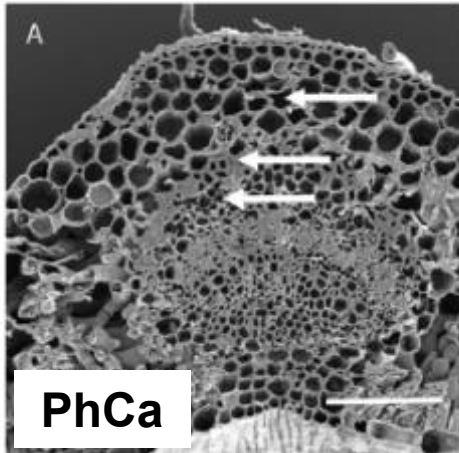




# PhCa Mechanism

## physical barrier to pathogen invasion of tissues

Shoot tissue



True for blossoms  
pedicels?

Prevent invasion of  
shoot tissues





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# Commercial Orchards

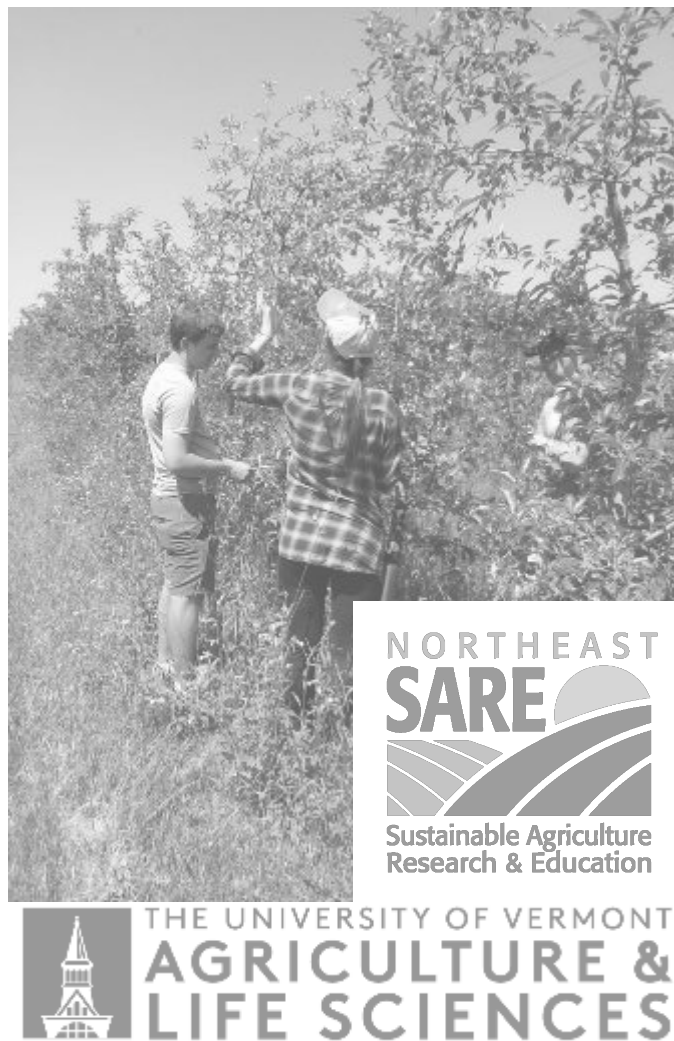




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# University of Vermont

# Commercial Orchards





# Fire Blight & Vigor Assessments

- Blossom and Shoot blight
- Crop load, fruit size, TCSA, & shoot length: late June – early Oct



# Trials at AgriTech - Bearing

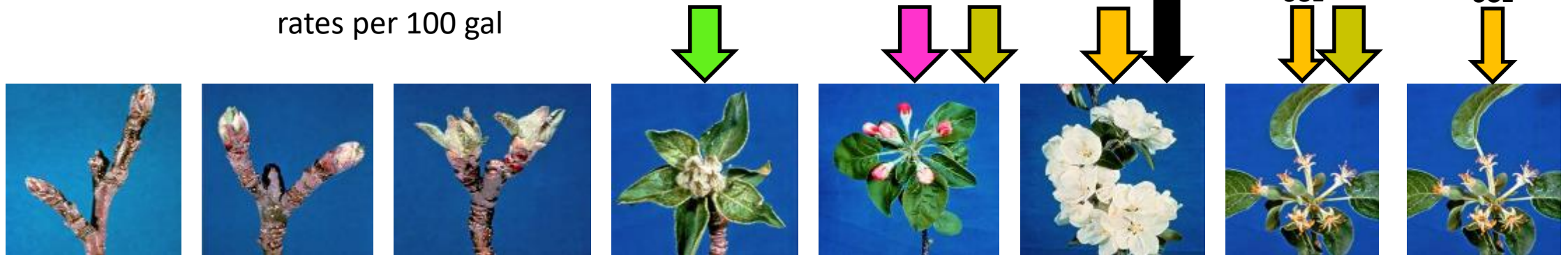
Untreated
Streptomycin
Streptomycin + PhCa 6oz Postbloom
PhCa 3oz @Pink
PhCa 6oz @Pink
PhCa 3oz @Tight Cluster*
PhCa 6oz @Tight Cluster*
PhCa 2oz + Actigard 1oz*

rates per 100 gal

**Bearing block**  
**2016, 2017, 2018, 2019\***

- Gala
- B.9
- Planted 2000

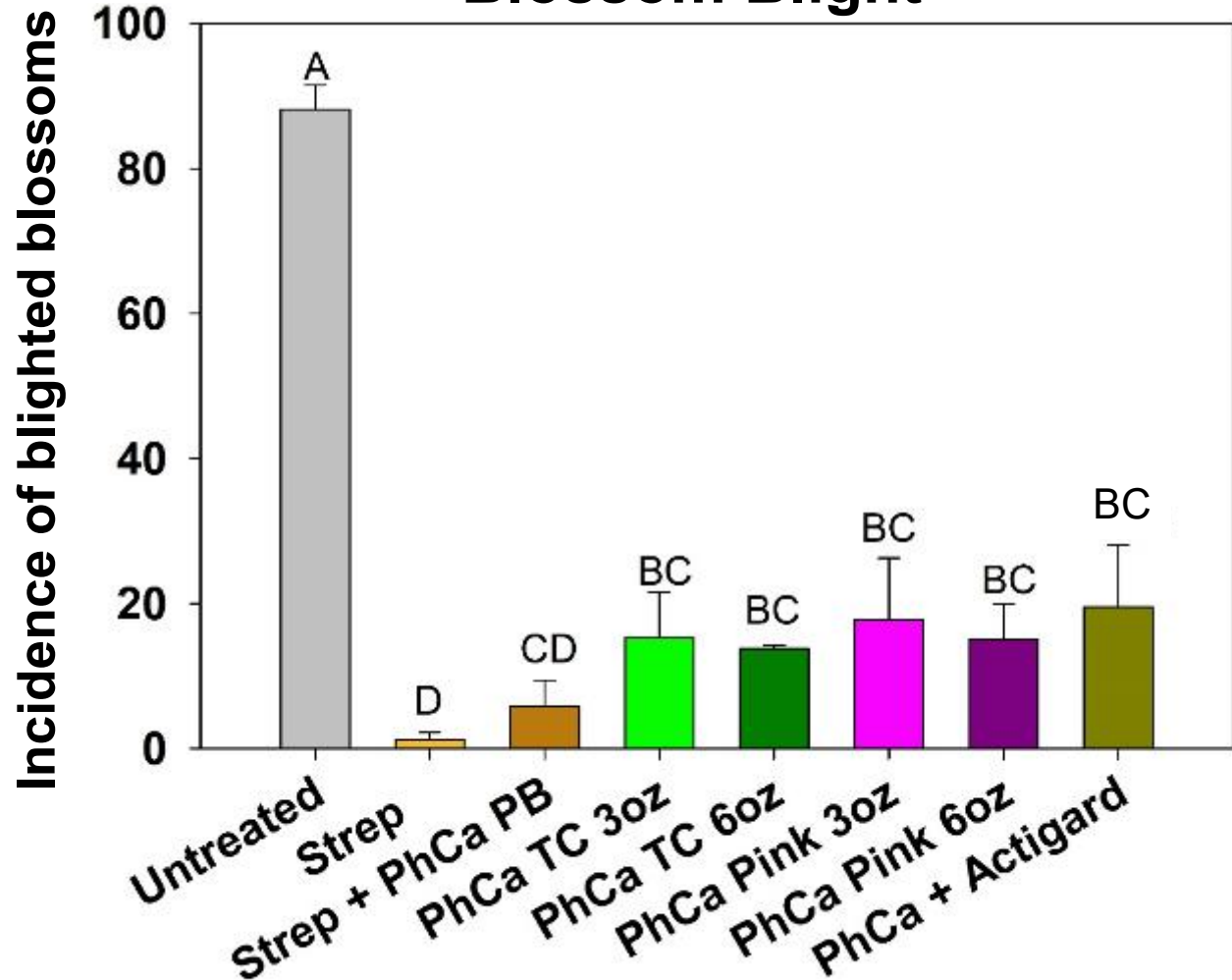
Inoculation  
Within 24 hrs  
Ea273  $10^6$  CFU/ml



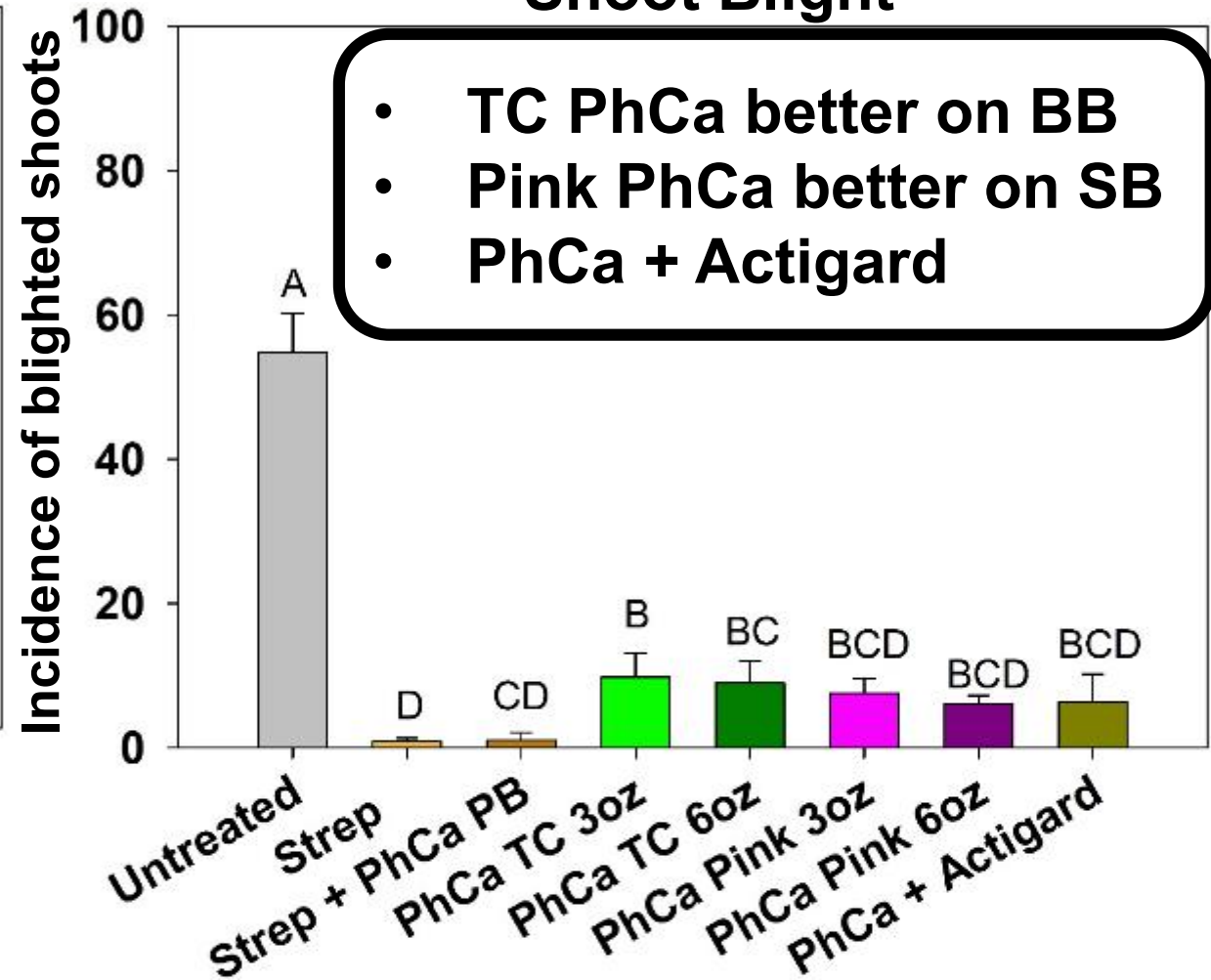


# Trials at AgriTech - Bearing

## Blossom Blight

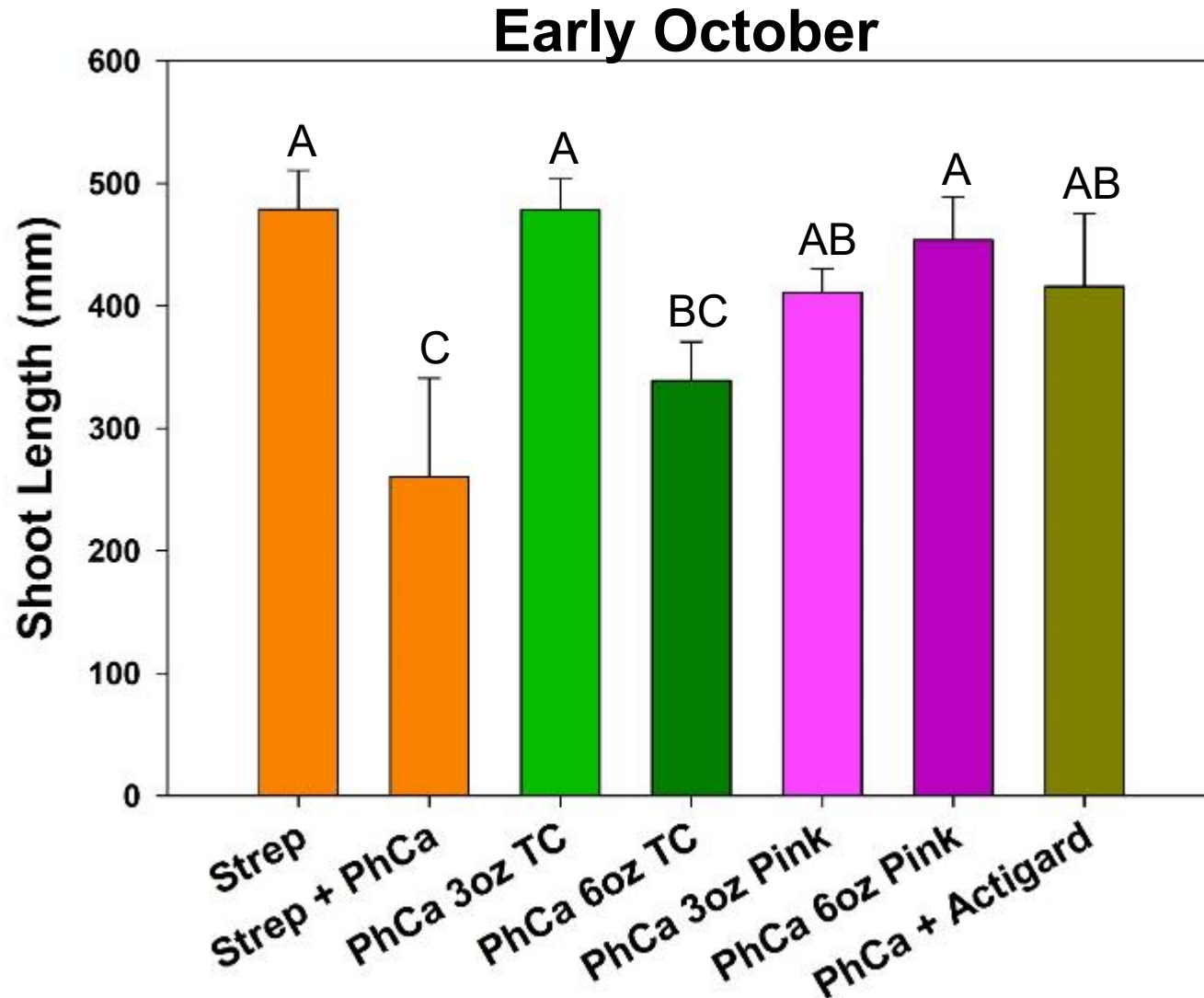


## Shoot Blight





# Trials at AgriTech – Bearing (2019)



- **Strep + PhCa post-bloom: reduced vigor**
- **PhCa Pink/TC: minimum impact on vigor**

**No significant differences between treatments for fruit size, fruit number, and TCSA**



# Trials at AgriTech - Young

Untreated
PhCa 3oz @Pink
PhCa 3oz @Pink + Serenade Opti
PhCa 6oz @Pink
PhCa 6oz @Pink + Serenade Opti
PhCa 'Trickle'
Regalia 32 fl oz + Magna Bon 64 fl oz

rates per 100 gal

## Young block 2018 & 2019

- Planted 2016
- NY-1 (Snapdragon)G.935
- Cumulative impacts



Not Inoculated

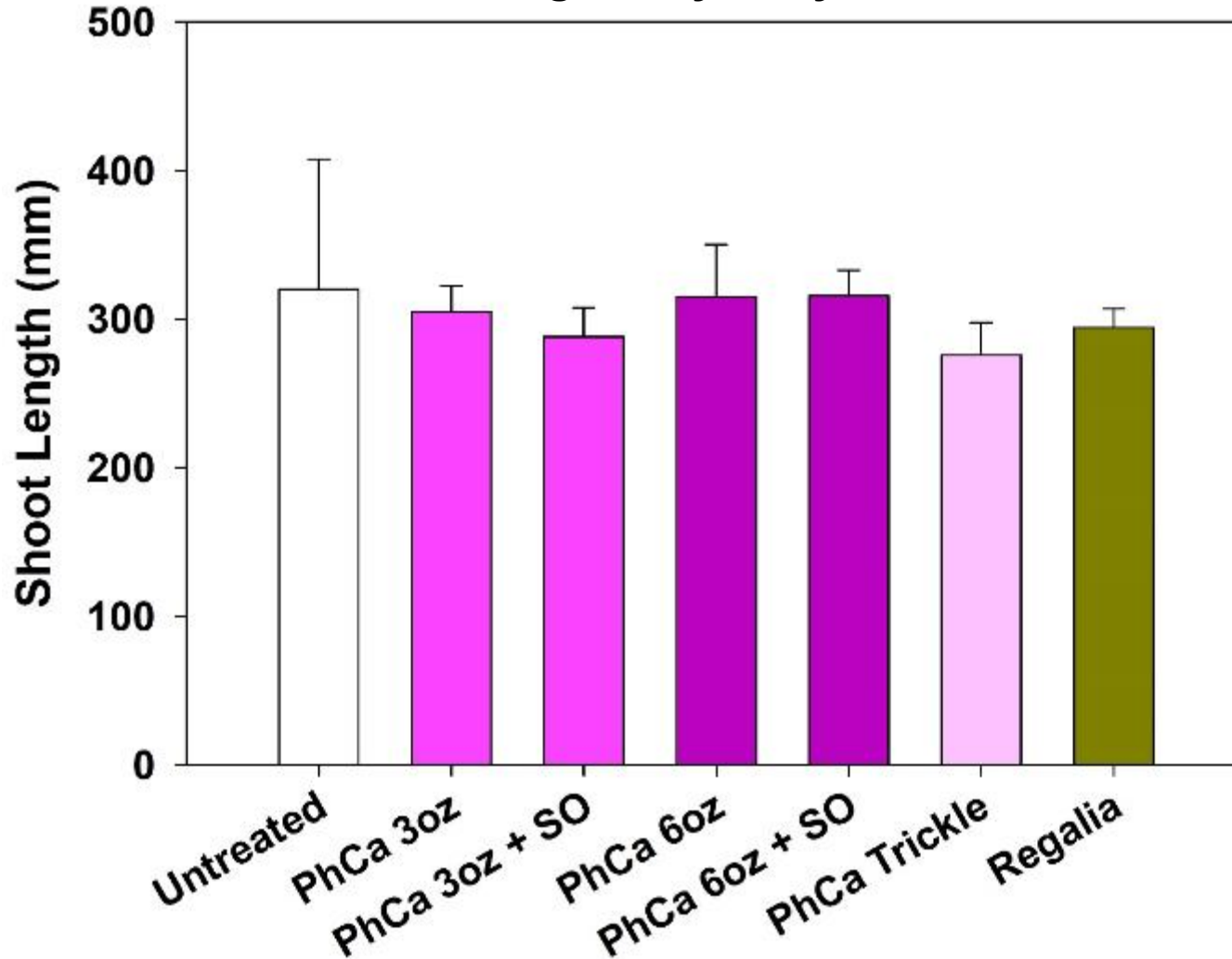
PhCa      PhCa      PhCa      PhCa      PhCa  
PhCa      3oz      S.O.      2oz      2oz      2oz  
↓      ↓      ↓      ↓      ↓      ↓      ↓      ↓





# Trials at AgriTech - Young

Shoot grow by Early October



**No significant differences between treatments for fruit size, fruit number, and TCSA**

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# Trials at UVM

Untreated

Streptomycin + PhCa Postbloom

PhCa 3oz @Pink

PhCa 6oz @Pink

PhCa 2oz + Actigard 1oz

PhCa 3oz + Rampart (phosphite) 62 fl oz

Regalia 32 fl oz + Magna Bon 64 fl oz

rates per 100 gal

## Bearing block

- Crimson Crisp, Topaz on M.26
- Planted 2011



## Young block

- Macoun on G.30
- Planted 2017



Inoculation  
Within 24 hrs  
Ea273  $10^6$   
CFU/ml

Strep

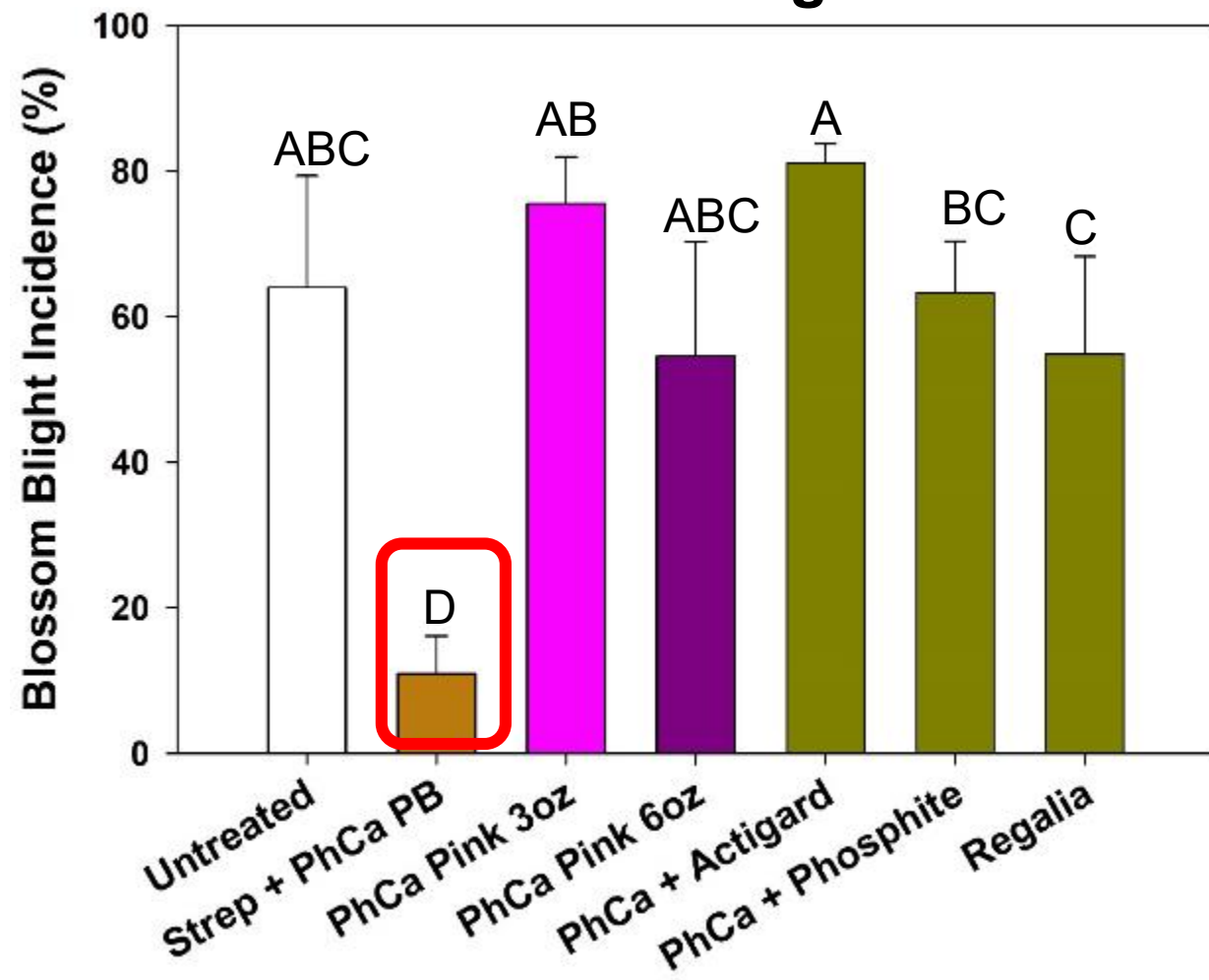
PhCa  
6oz

PhCa  
6oz

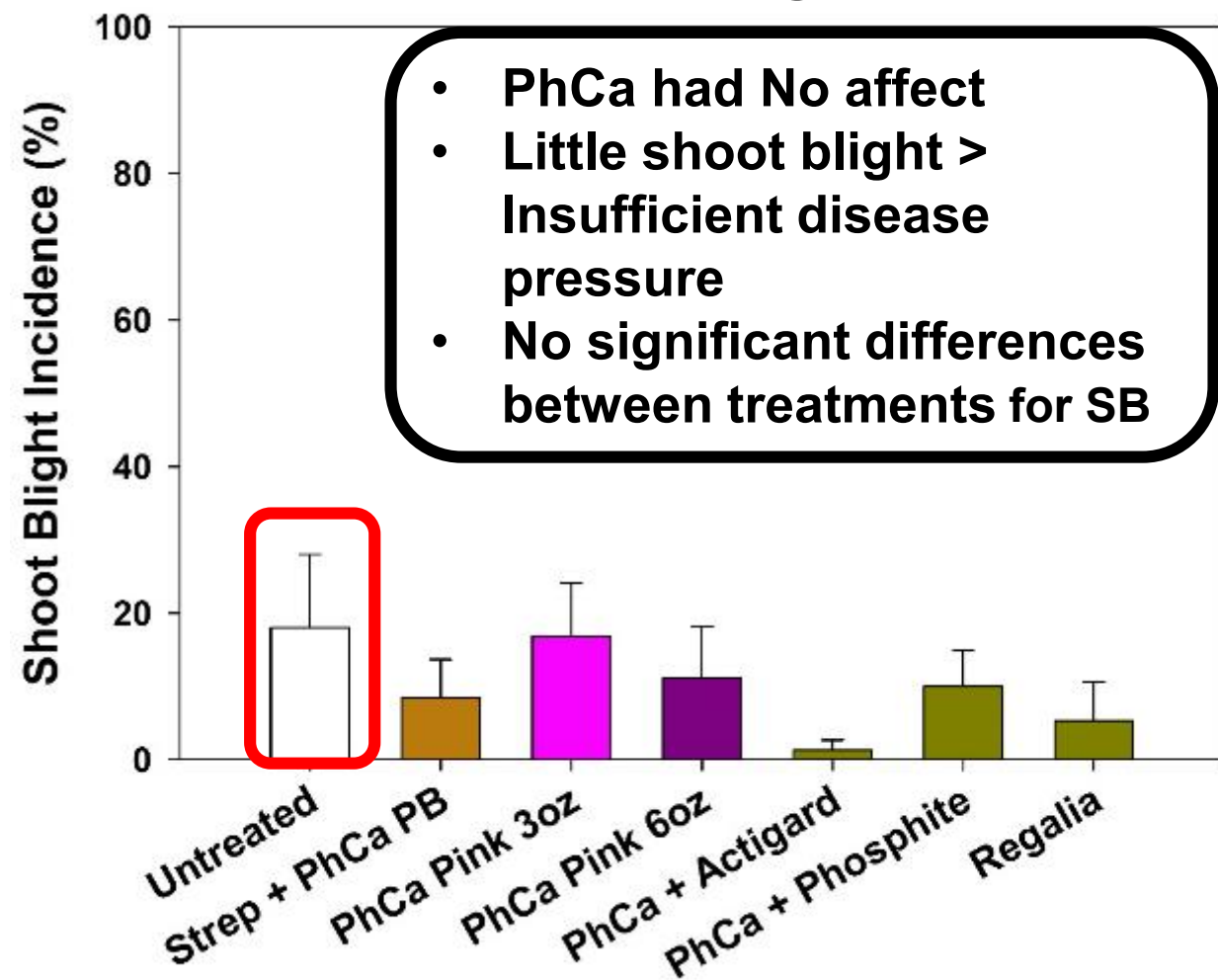


# Trials at UVM – Bearing ‘Crimson Crisp’

## Blossom Blight



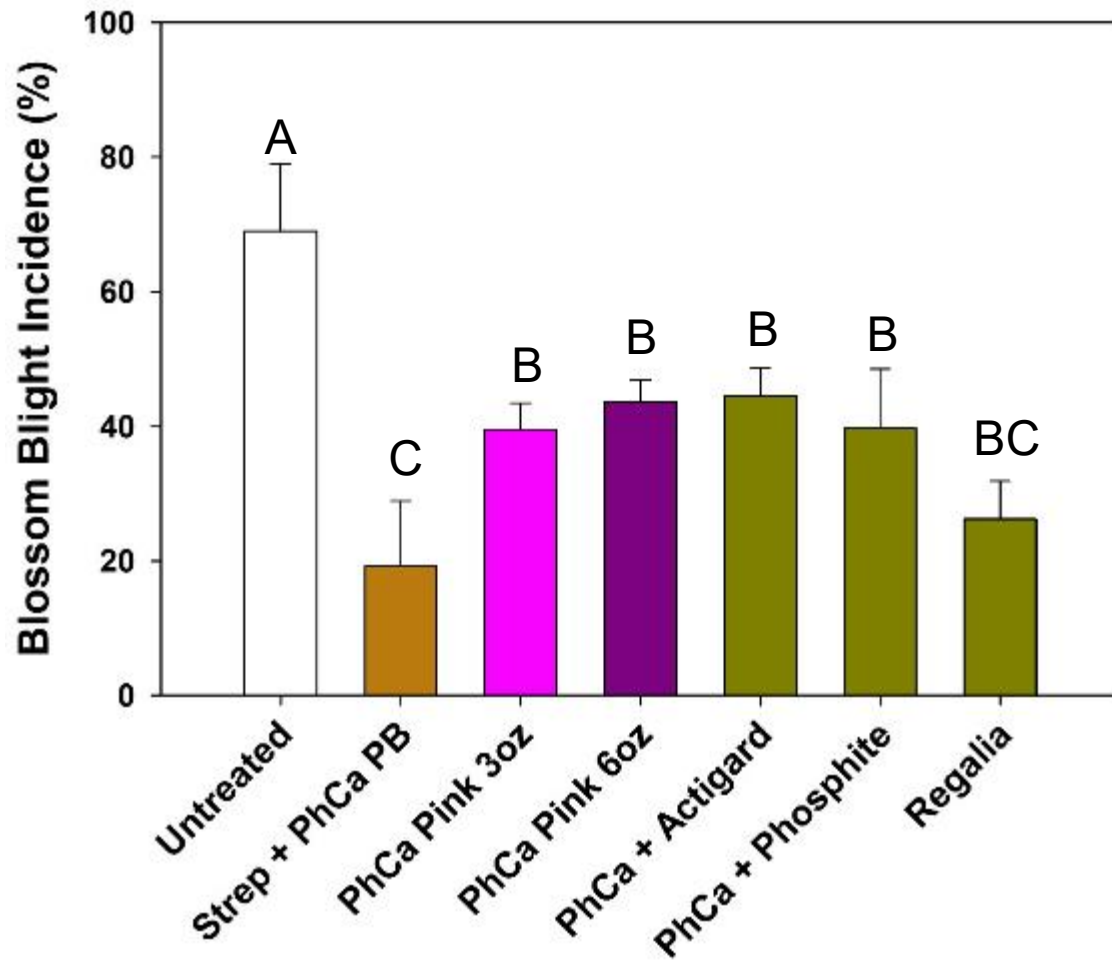
## Shoot Blight



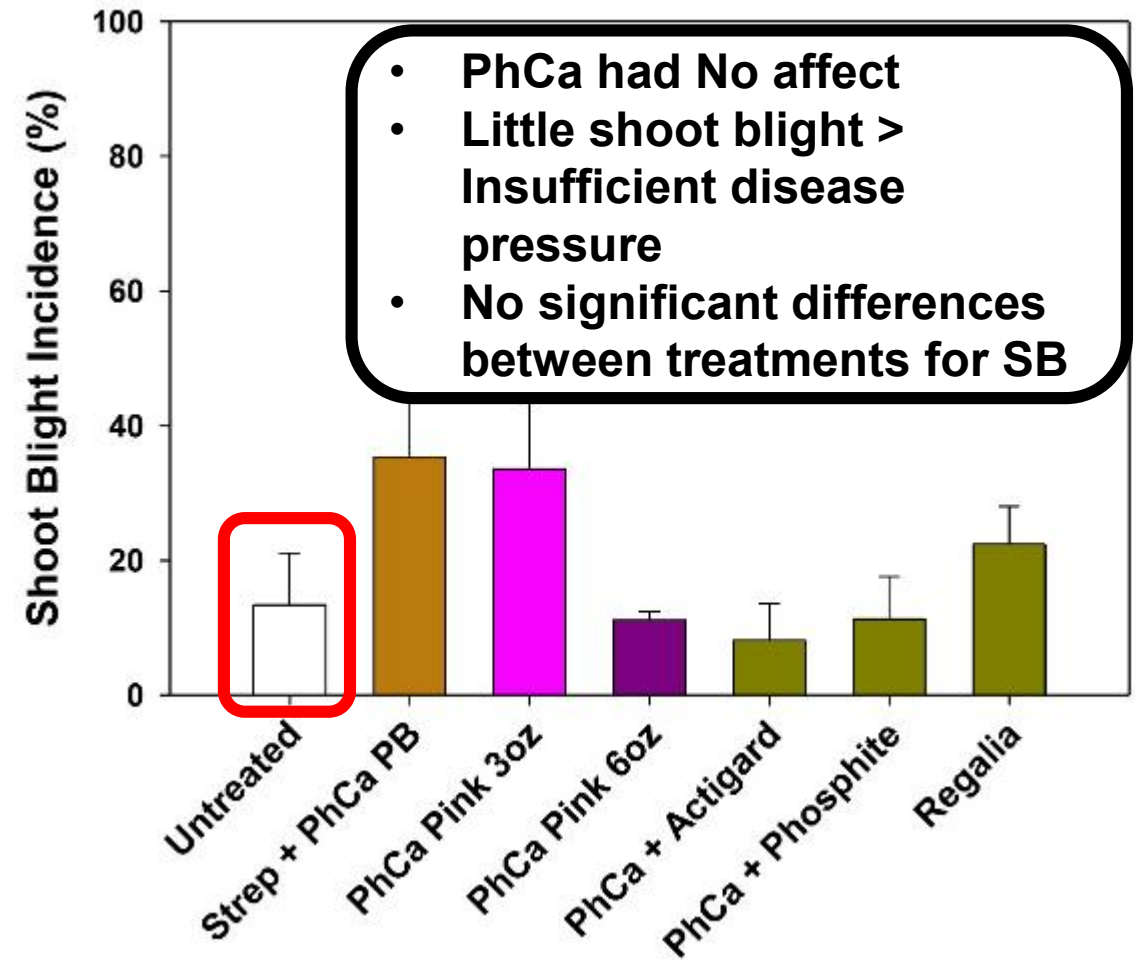


# Trials at UVM – Bearing ‘Topaz’

## Blossom Blight

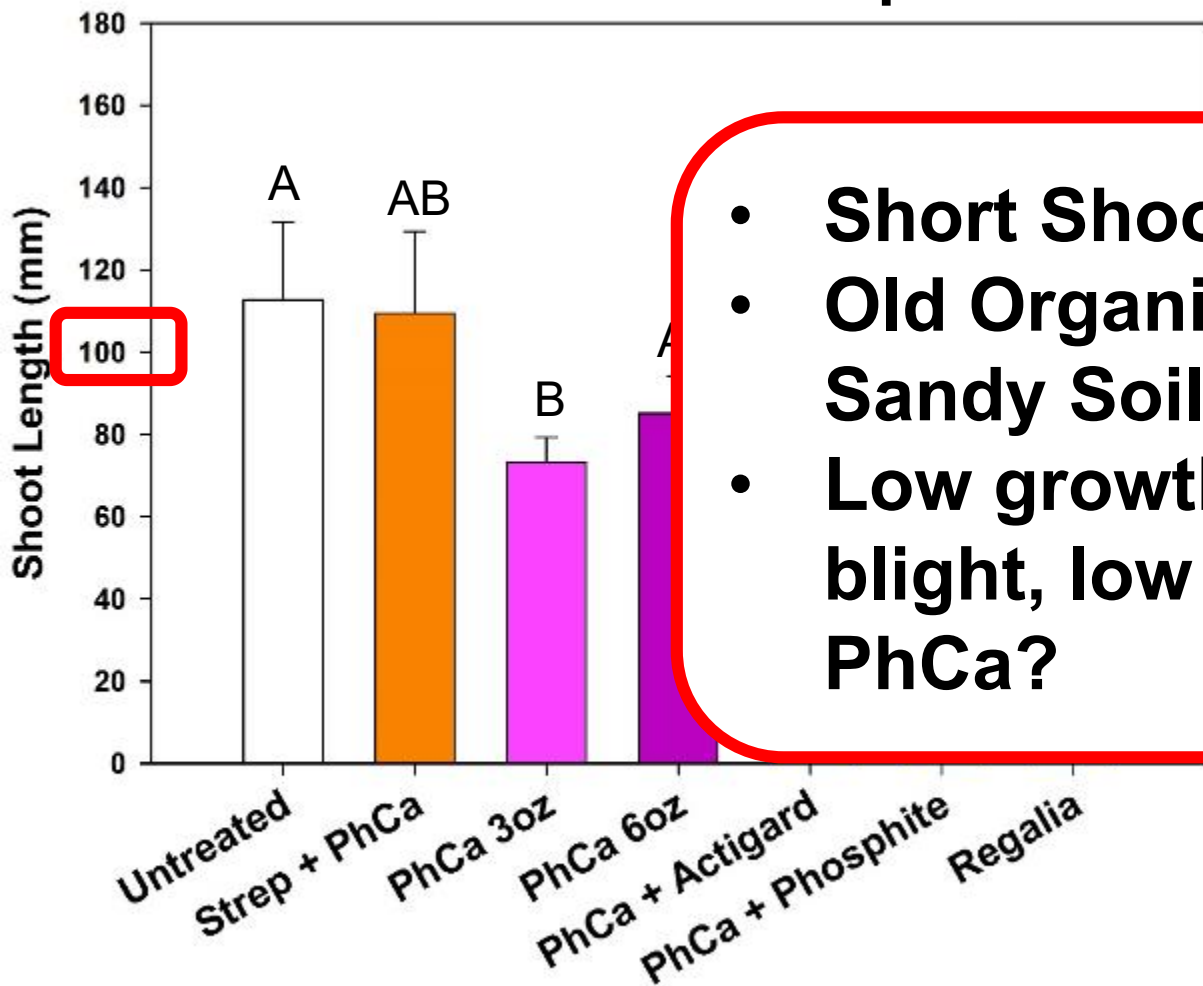


## Shoot Blight

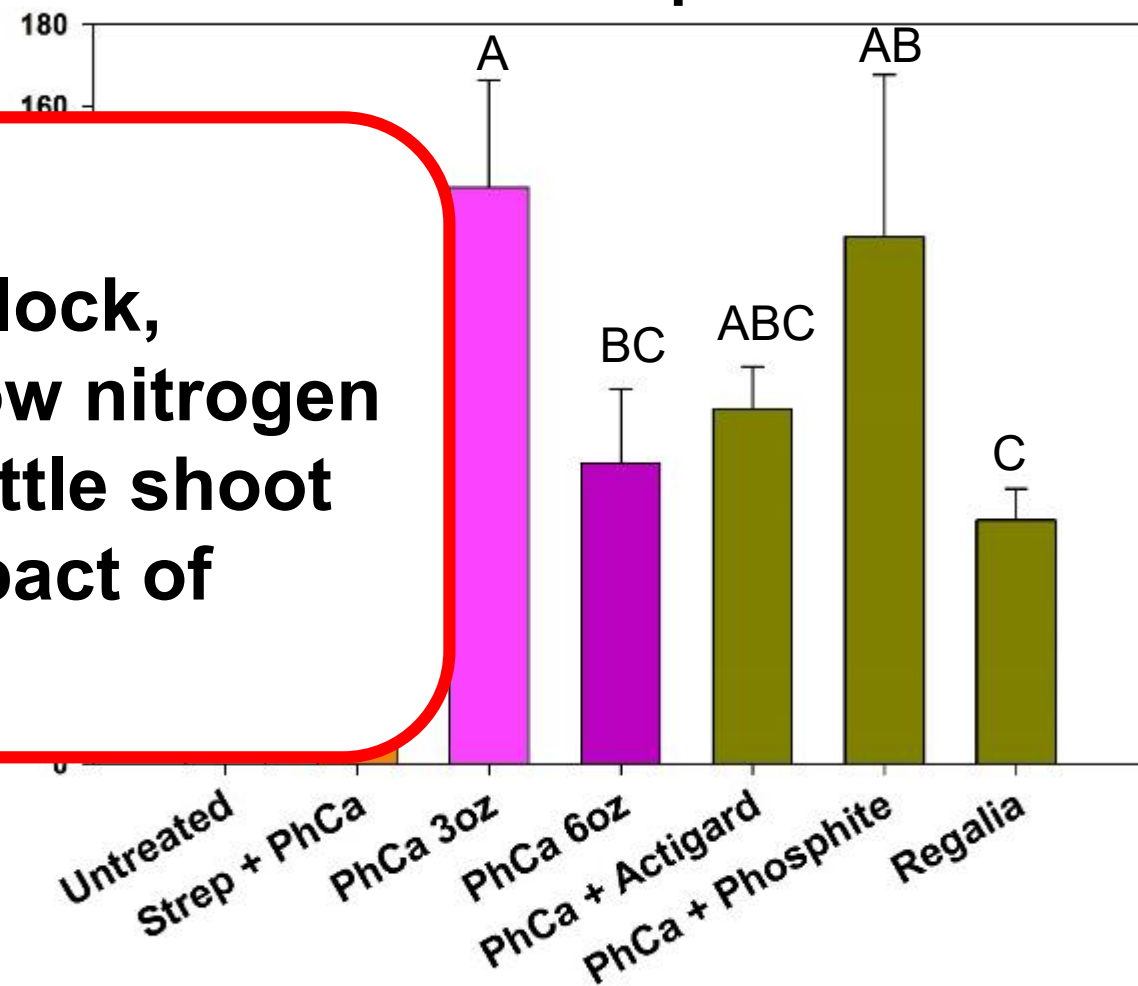


# Trials at UVM – Bearing: Shoot Length

‘Crimson Crisp’



‘Topaz’



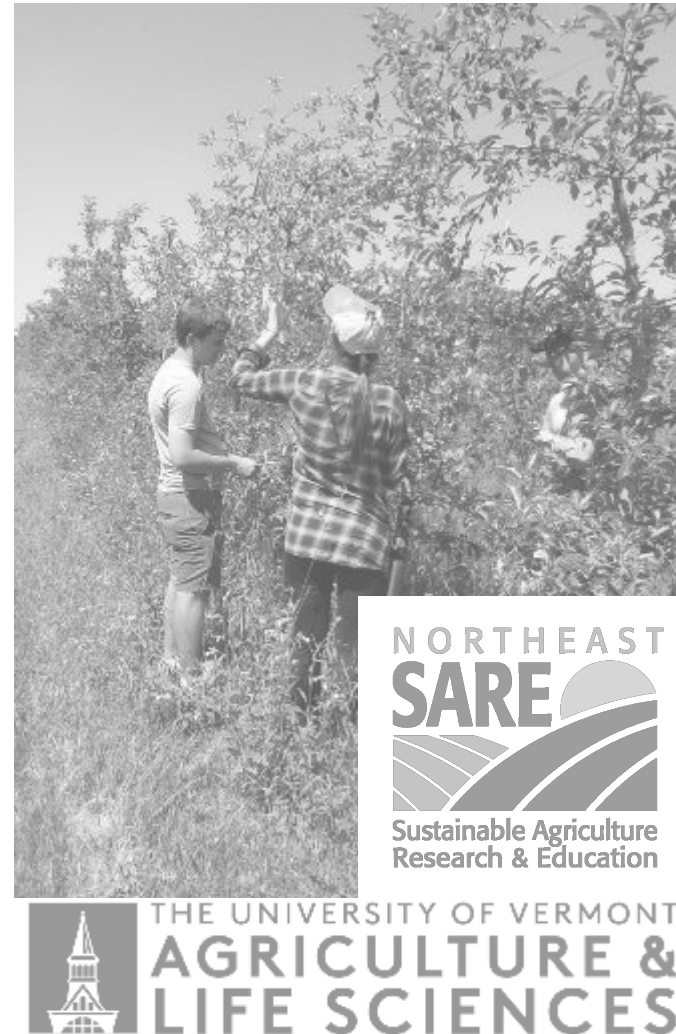
- Short Shoots!
- Old Organic Block, Sandy Soil, Low nitrogen
- Low growth: little shoot blight, low impact of PhCa?



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# Commercial Orchards



# Trials at Commercial Orchards

Untreated
Streptomycin + PhCa Postbloom
PhCa 3oz @Pink + Double Nickel @Bloom
PhCa 6oz @Pink + Double Nickel @Bloom
Regalia 32 fl oz + Magna Bon 64 fl oz

rates per 100 gal



**Orchard 1**  
WNY  
Gala/G.41  
Planted 2015



**Orchard 2**  
WNY  
Gala/Pajam2  
Planted 2015



**Orchard 3**  
ENY  
Gala/G.935  
Planted 2016



**Orchard 4**  
ENY  
AceyMac/G.935  
Planted 2018

Not Inoculated



PhCa

Strep

D.N.

PhCa

6oz

PhCa

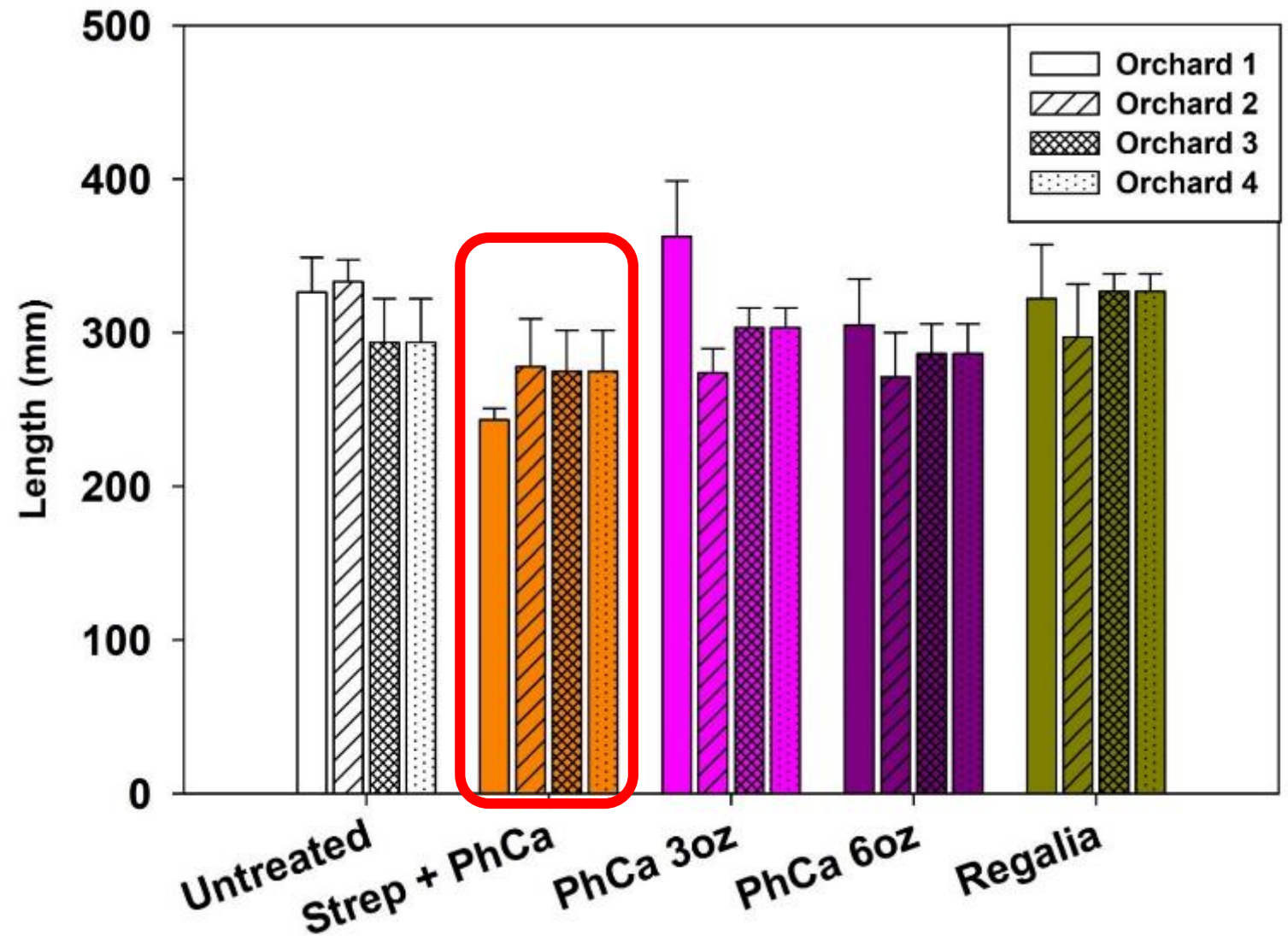
6oz





# Trials at Commercial Orchards

- Impact of treatments varied between sites
- Strep + PhCa post-bloom: consistently reduced vigor
- PhCa pink treatments: all had minimal impact



# PhCa: Takeaways and Conclusions

- **Pre-bloom PhCa reduced blossom & shoot blight**
  - 6 oz rate improved effect on BB
  - Pairing with Actigard is also viable
- **Tree vigor important factor**
  - PhCa does not kill Ea
  - No affect in low vigor block, but less shoot blight in a low vigor block
- **No Impact on shoot growth from pink applications**





# Cornell AgriTech – Other Tools

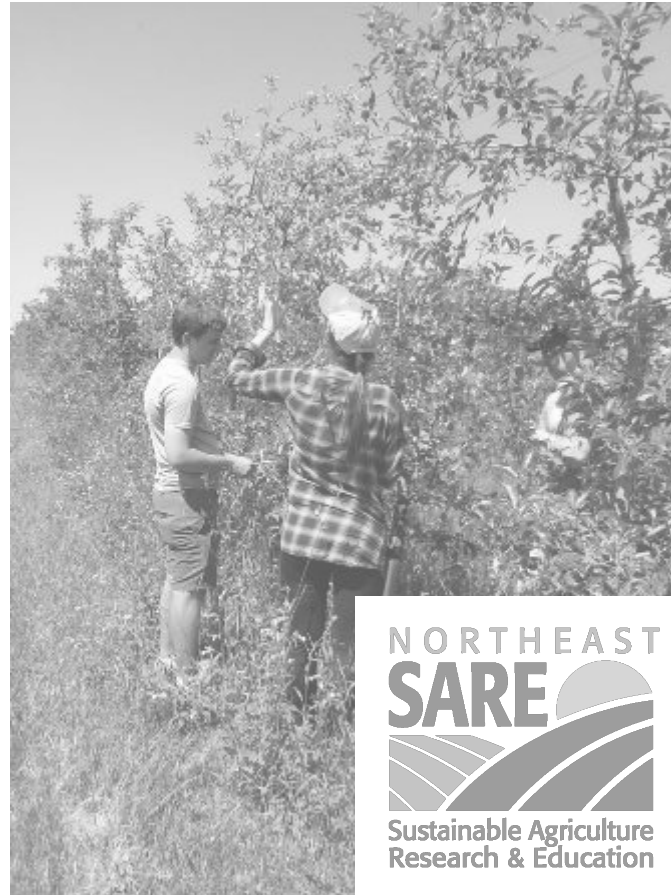
# University of Vermont

# Commercial Orchards



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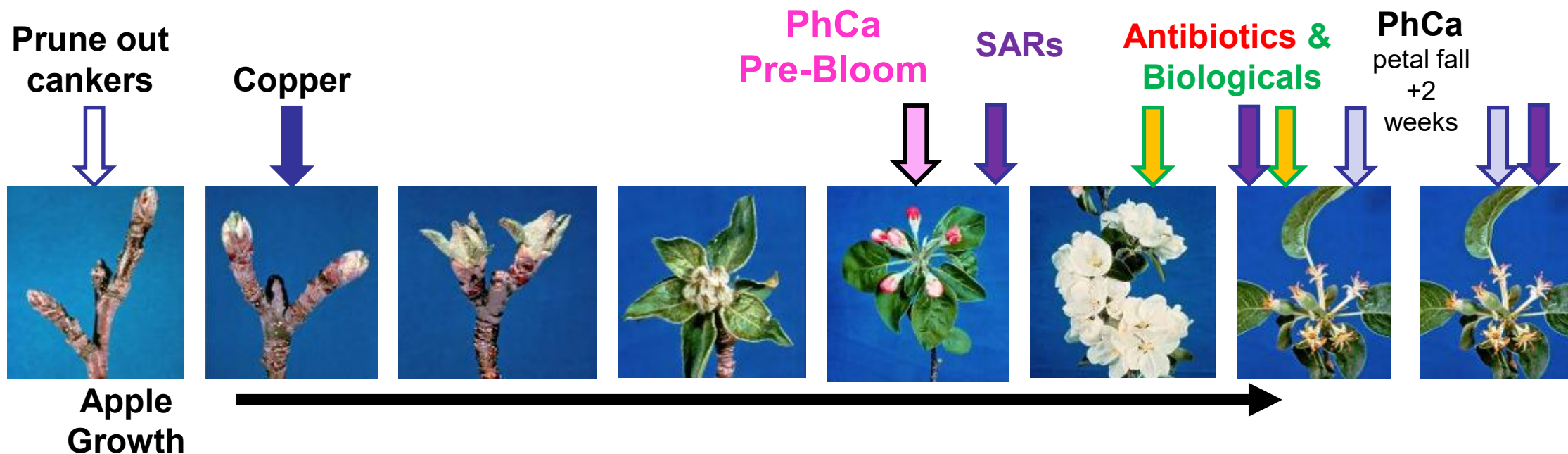
**NORTHEAST  
SARE**  
Sustainable Agriculture  
Research & Education

 **THE UNIVERSITY OF VERMONT  
AGRICULTURE &  
LIFE SCIENCES**



 **NY farm viability  
INSTITUTE**

# Fire blight Management Overview



Biologicals, SARs, and other alternatives to antibiotics





# Trials at AgriTech - Biologicals

Untreated
FireWall 17 wp 24 oz
Alum 8 lbs
Blossom Protect 1.5lbs + Buffer
Serenade Opti 20 oz
Serenade Opti 20 oz + Actigard
Double Nickel 1 qt + Cueva 2 qt
Stargus 64 fl oz + Regulaid 48 fl oz
Agriphage 1qts x3 & 2 qts x1

## Bearing block 2019

- Gala on B.9
- Planted 2000



Inoculation  
Within 24 hrs  
Ea273  $10^6$  CFU/ml

PhCa  
Pre-Bloom

SARs

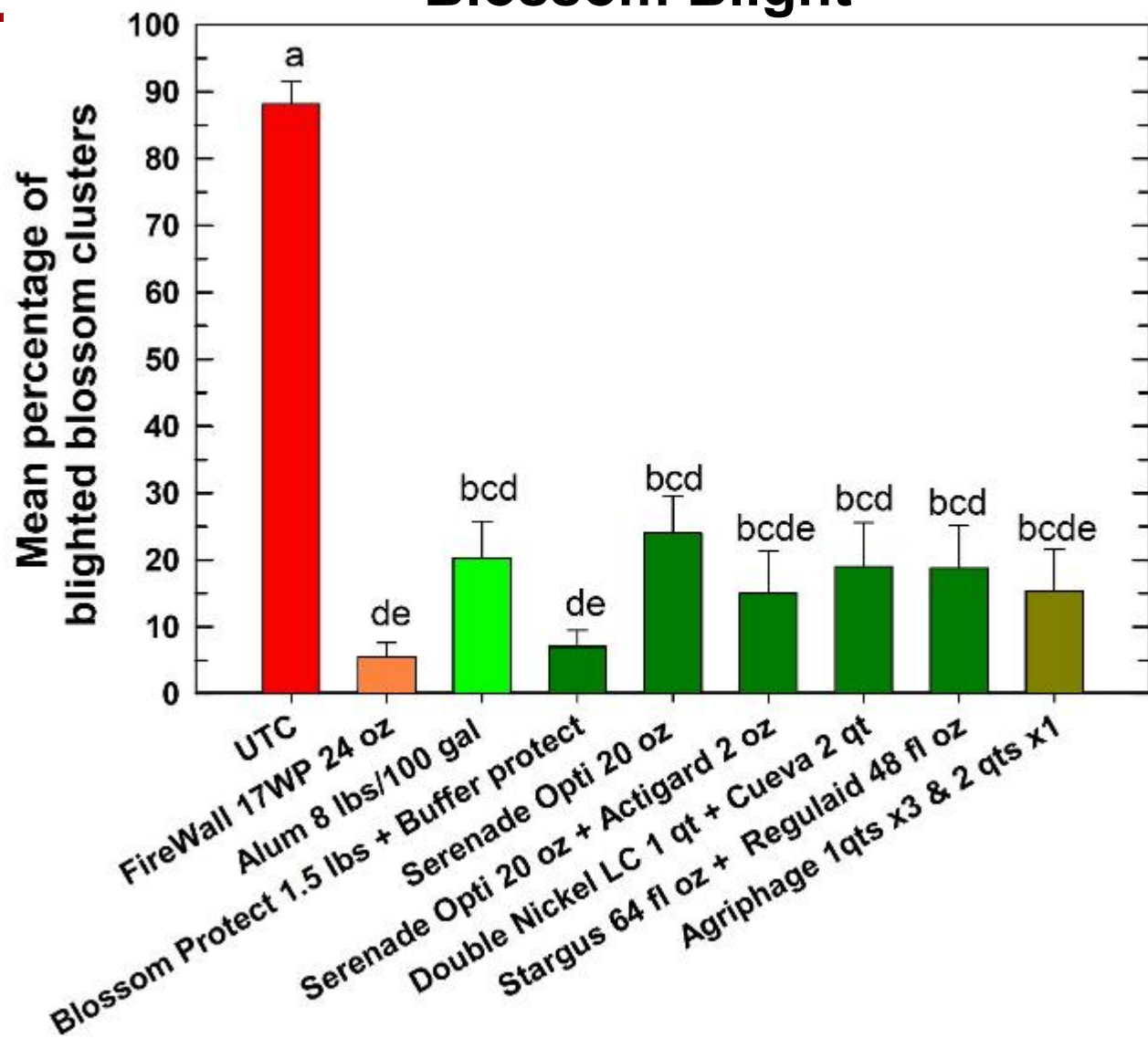
Biologicals

PhCa  
petal fall  
+2  
weeks

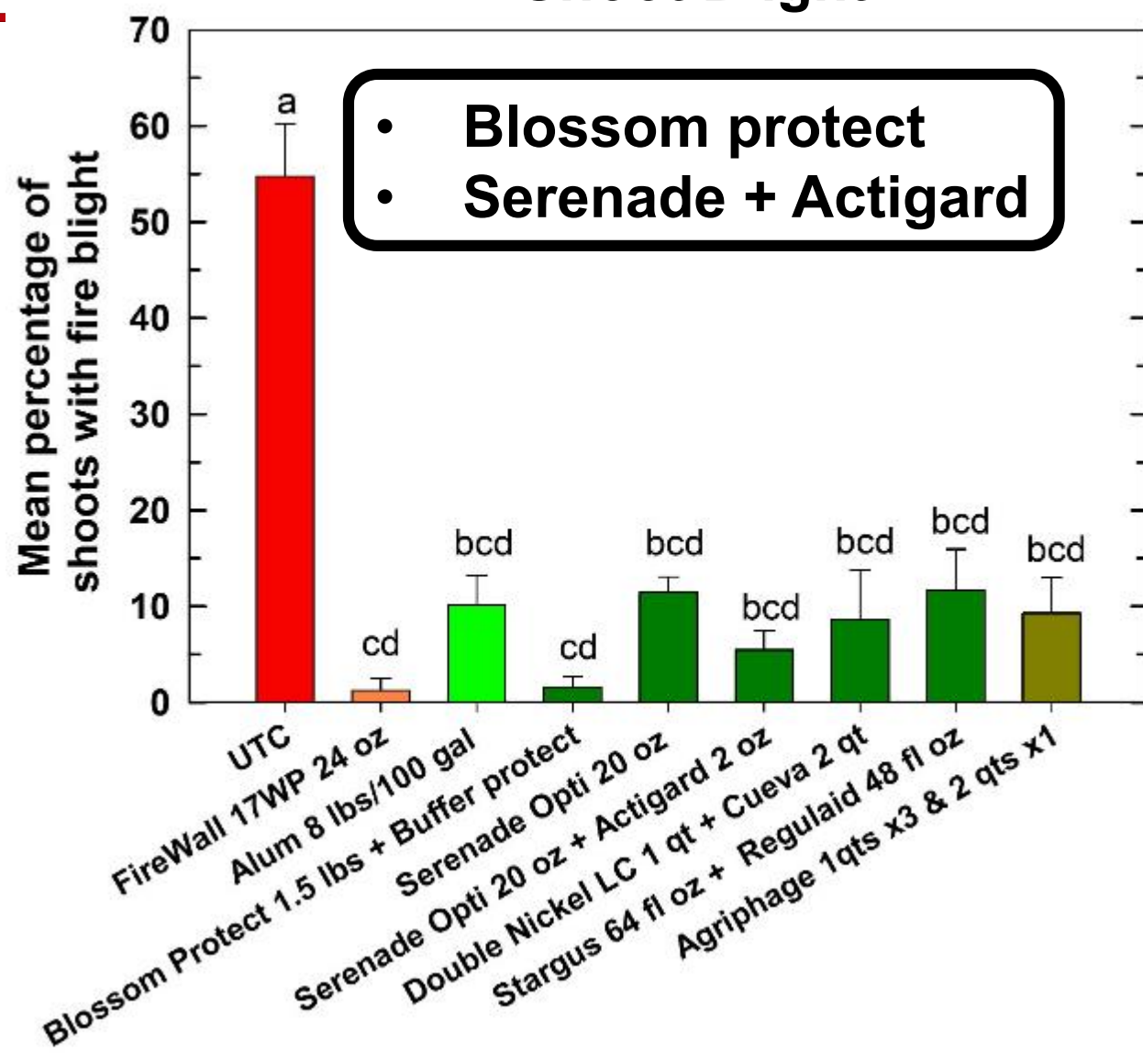


# Trials at AgriTech - Biologicals

## Blossom Blight



## Shoot Blight





# Trials at AgriTech - SARS

Untreated

FireWall 17 wp 24 oz

LifeGard WG 13.5

LifeGard WG 13.5 + Cueva 2 qt

Regalia 16 fl oz + Regulaid 48 fl oz

Regalia 16 fl oz + Regulaid 48 fl oz +  
Apogee 2 oz

Bearing block 2019

- Gala on B.9
- Planted 2000



Inoculation  
Within 24 hrs  
Ea273  $10^6$  CFU/ml

Prune out  
cankers



Copper



PhCa  
Pre-Bloom



SARs



Antibiotics &  
Biologicals

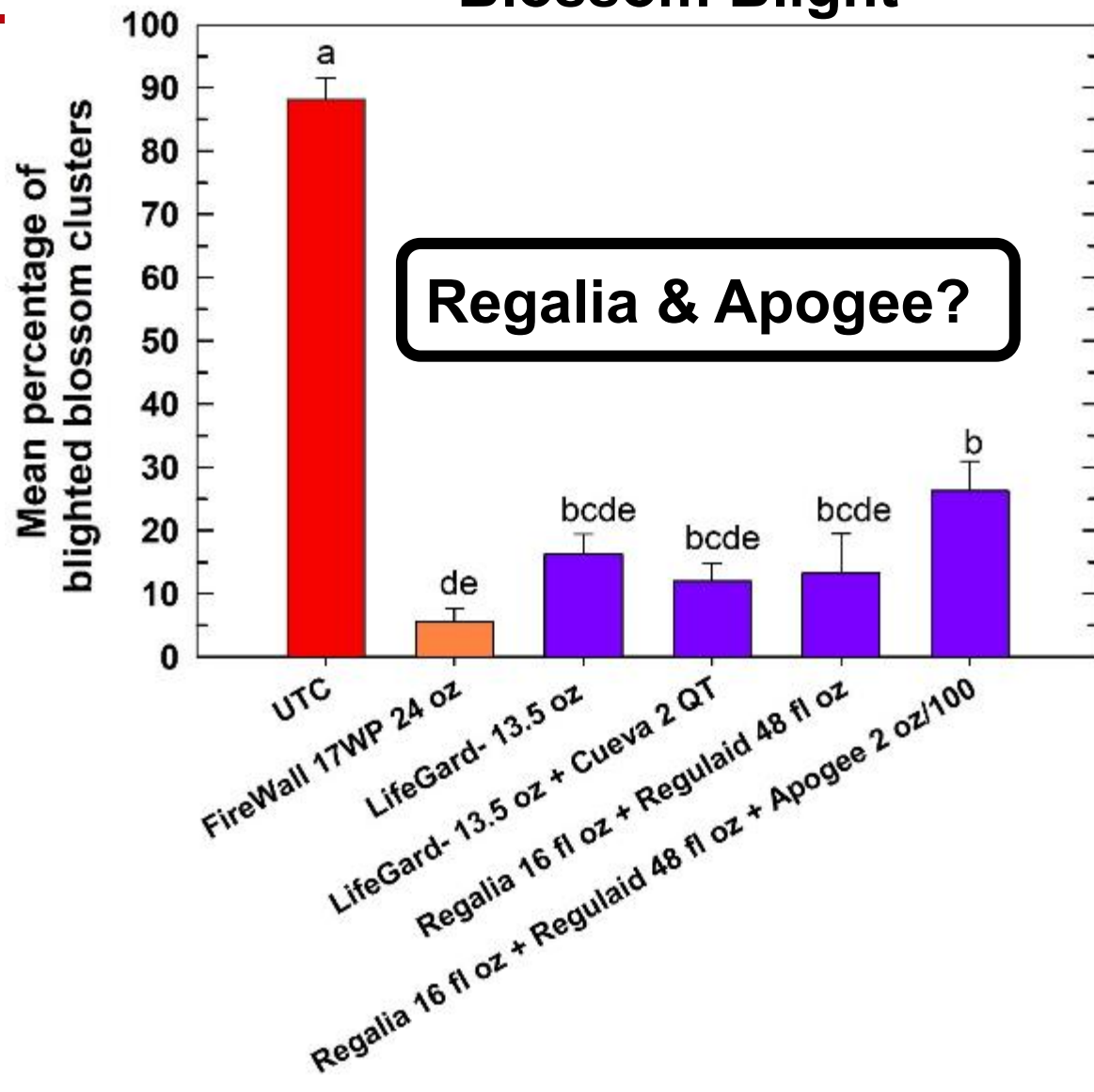


PhCa  
petal fall  
+2  
weeks

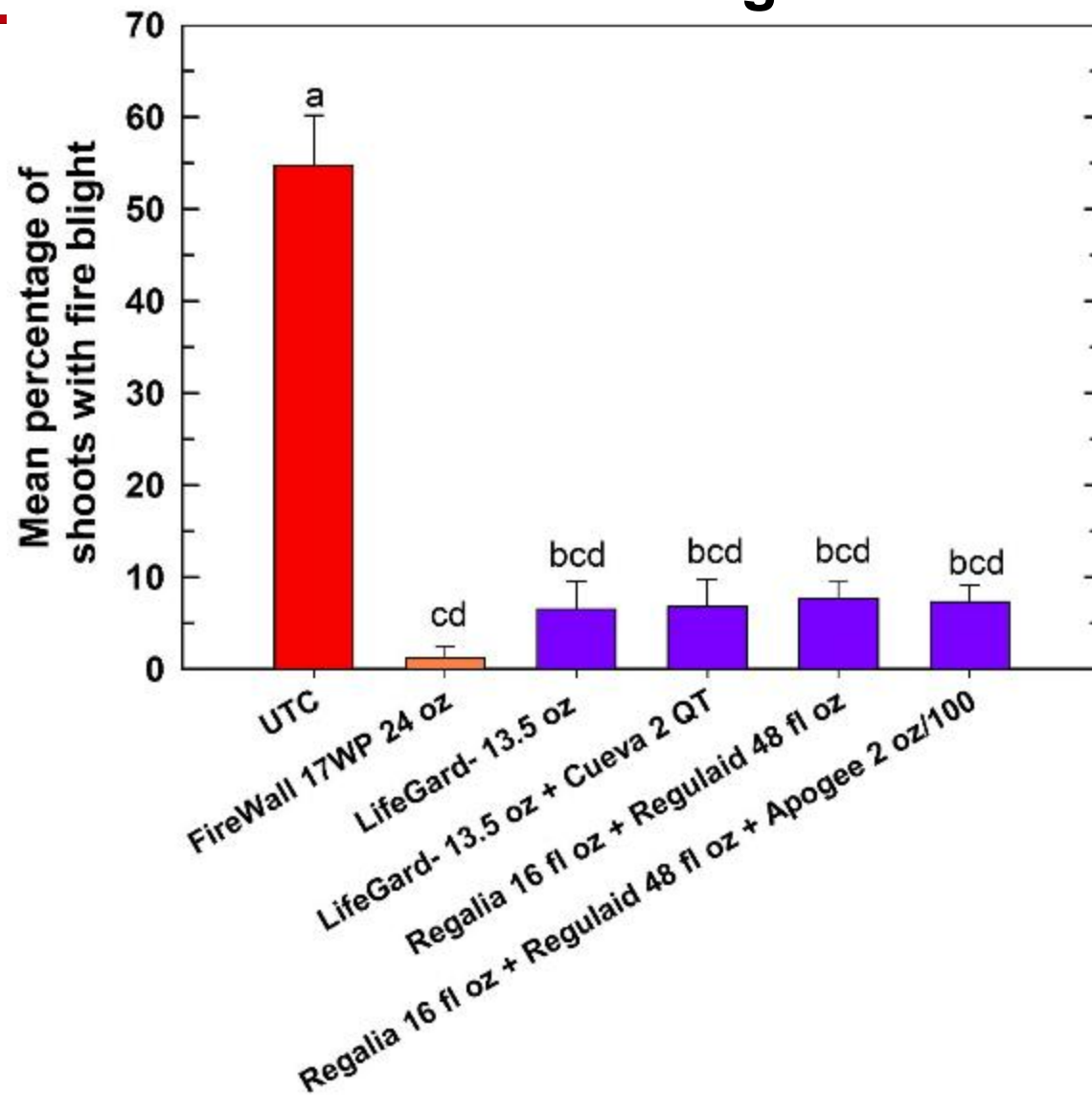


# Trials at AgriTech - SARS

## Blossom Blight



## Shoot Blight





# Trials at AgriTech - Copper

Untreated
FireWall 17 wp 24 oz
Previsto 2 qts
Previsto 3 qts
Cueva 2 qts
Badge x2 1.5 lbs

## Devastated block 2019

- Idared on B.9
- Planted 2000



Inoculation  
Within 24 hrs  
Ea273  $10^6$  CFU/ml

Prune out  
cankers



Copper



PhCa  
Pre-Bloom



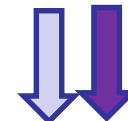
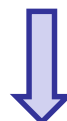
SARs



Coppers &  
Biologicals

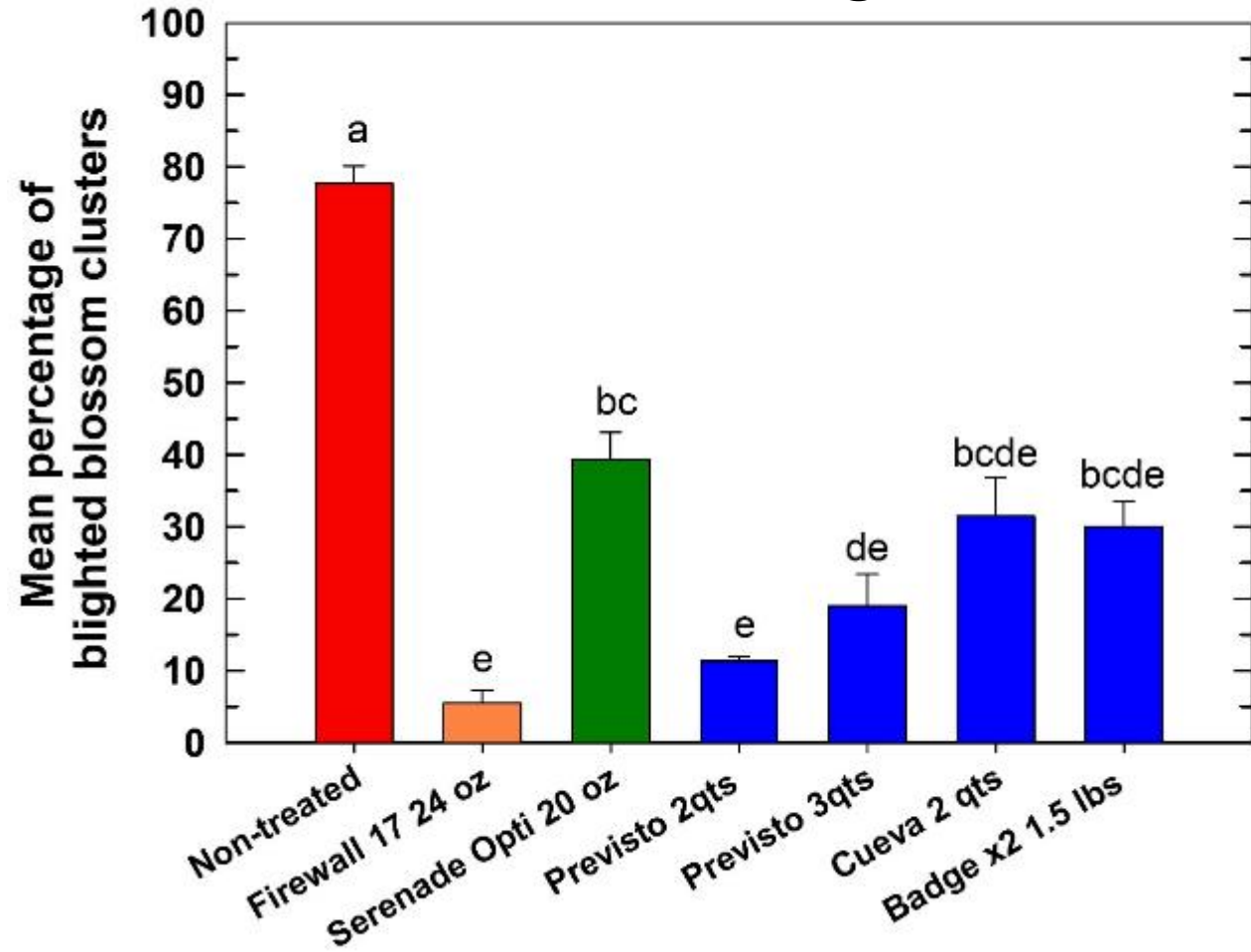


PhCa  
petal fall  
+2  
weeks

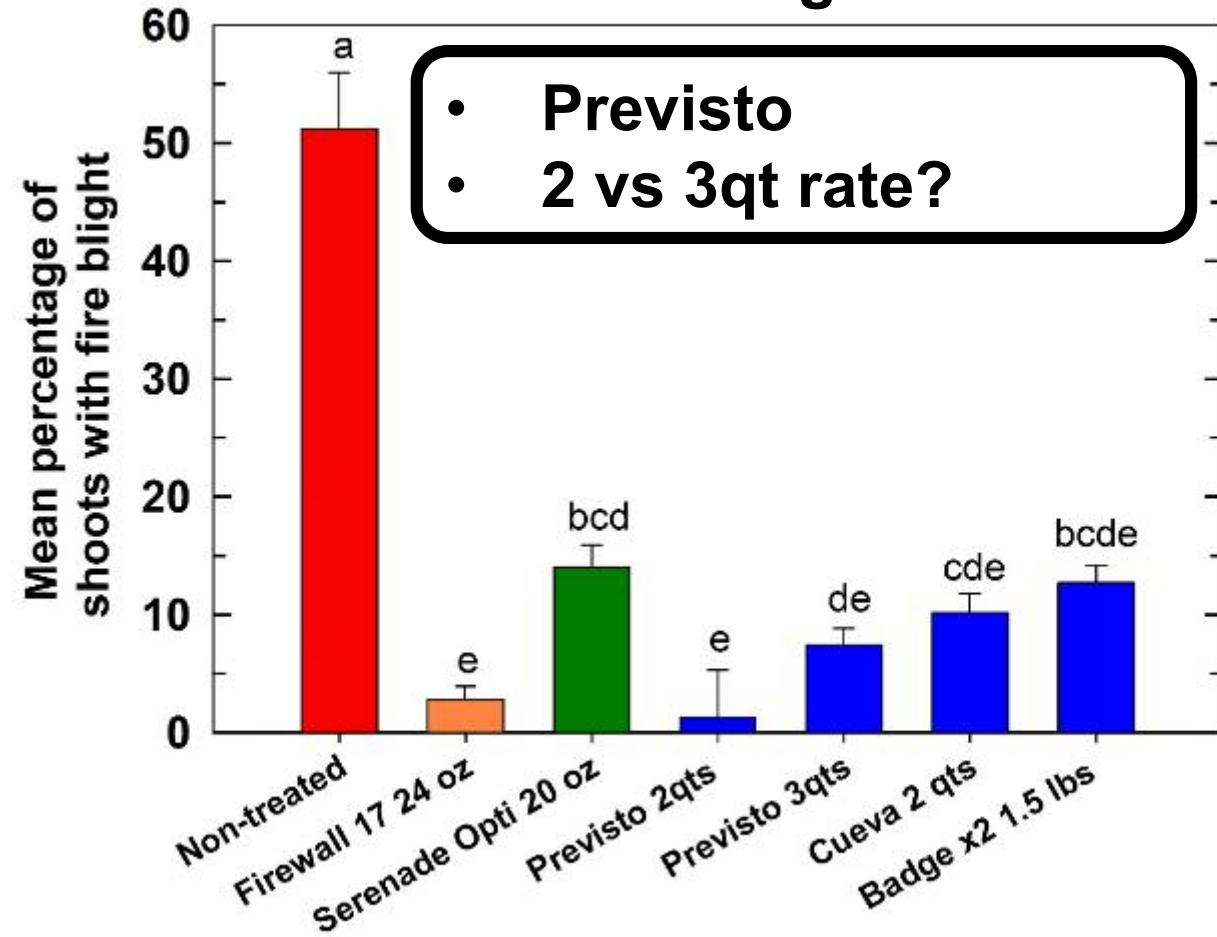


# Trials at AgriTech - Copper

## Blossom Blight



## Shoot Blight





# Biologicals, SARs, and Copper Takeaways and Conclusions

- **Biologicals**
  - Blossom Protect effective – never seen russeting
  - Serenade w/Actigard enhanced
- **SARs**
  - Similar performance from LifeGard and Regalia
- **Coppers**
  - Previsto was highly effective – never seen russeting



# Acknowledgements

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Jessica Foster

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