Managing Fruit Rots & other diseases of Honeycrisp




Anna Wallis & Kerik D. Cox

Plant Pathology and Plant-Microbe Biology Section

School of Integrative Plant Science

Cornell University

Cornell AgriTech

New York State Agricultural Experiment Station

Honeycrisp is Resistant to Apple Scab

Not resistant to many other diseases

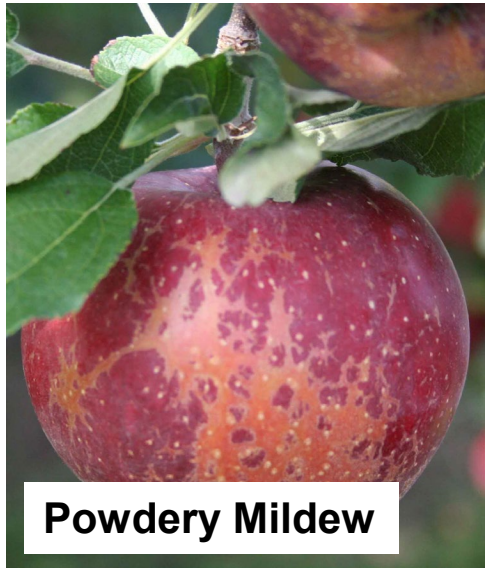
DISEASE SUSCEPTIBILITY OF COMMON APPLES

https://blogs.cornell.edu/applevarietydatabase/disease-susceptibility-of-common-apples/

Show 50 entries Search: Honey

Variety	Fire blight	Apple Scab	Cedar Apple Rust	Powdery Mildew
Honey Crisp	Moderately Resistant[3]; Resistant[7,8]	Moderately Resistant	Susceptible	Susceptible[1, 3]
Honey Gold	Moderately Resistant[4]; Highly Susceptible[7]; Susceptible[8]	Resistant	Susceptible	Resistant[1]

Showing 1 to 2 of 2 entries (filtered from 329 total entries) Previous Next



Sanitation is good for all ascomycetes
(not just for apple scab)

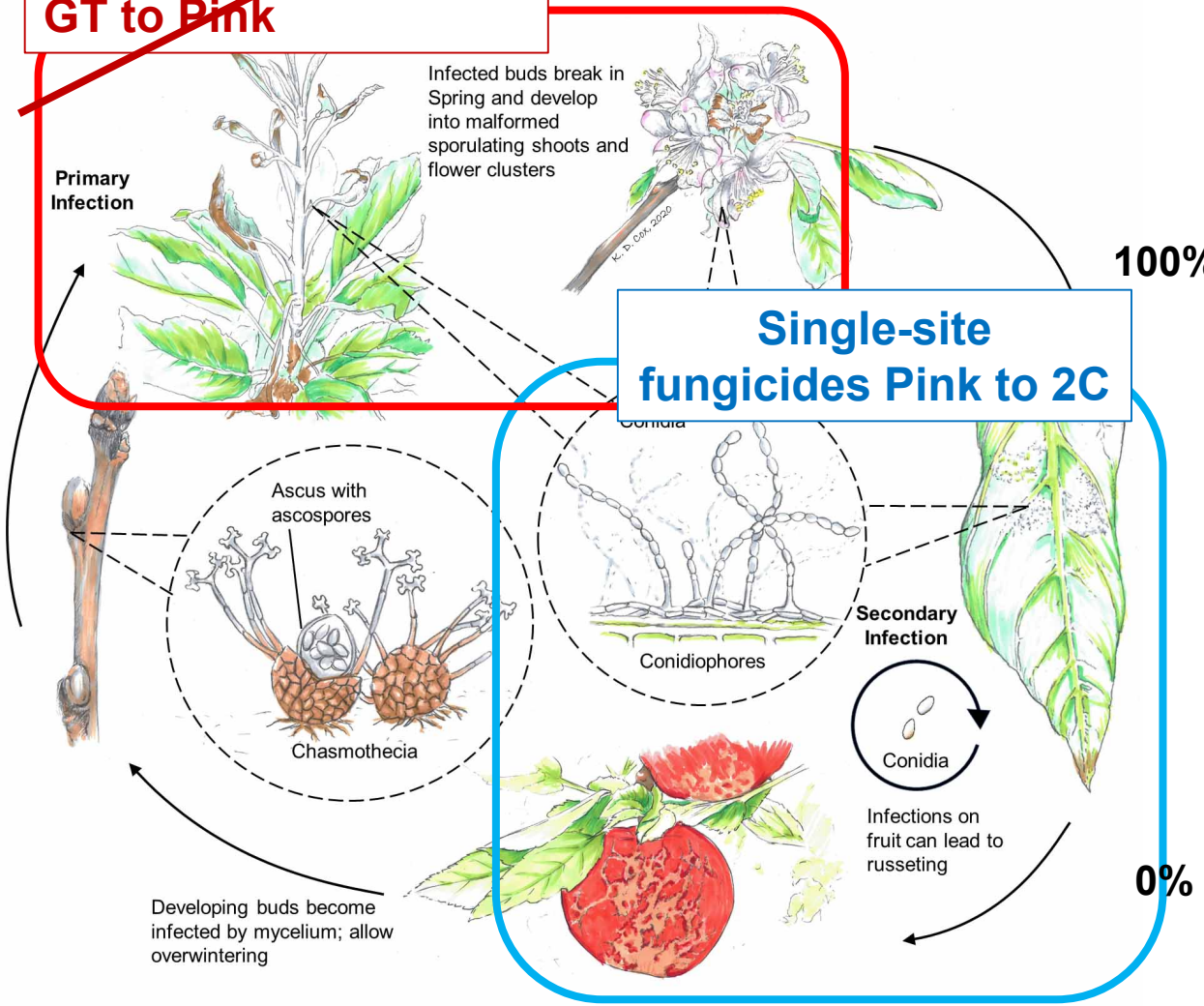
- **Sanitation**:
  remove & destroy fruit drops,
  leaf litter, prunings, or other
  dead plant material
  →***reduces accumulation of inoculum***
  - **Fall: (Scab)**
    Leaf Shredding (rake into middles, scalp the sod) or
    Urea application (40lbs/100) or
    Dolomitic lime (2.5 tons/Acre)
  - **Spring: (Perennial berries & Scab**)
    Delayed Dormant Copper
    application at silver tip (15% MCE)

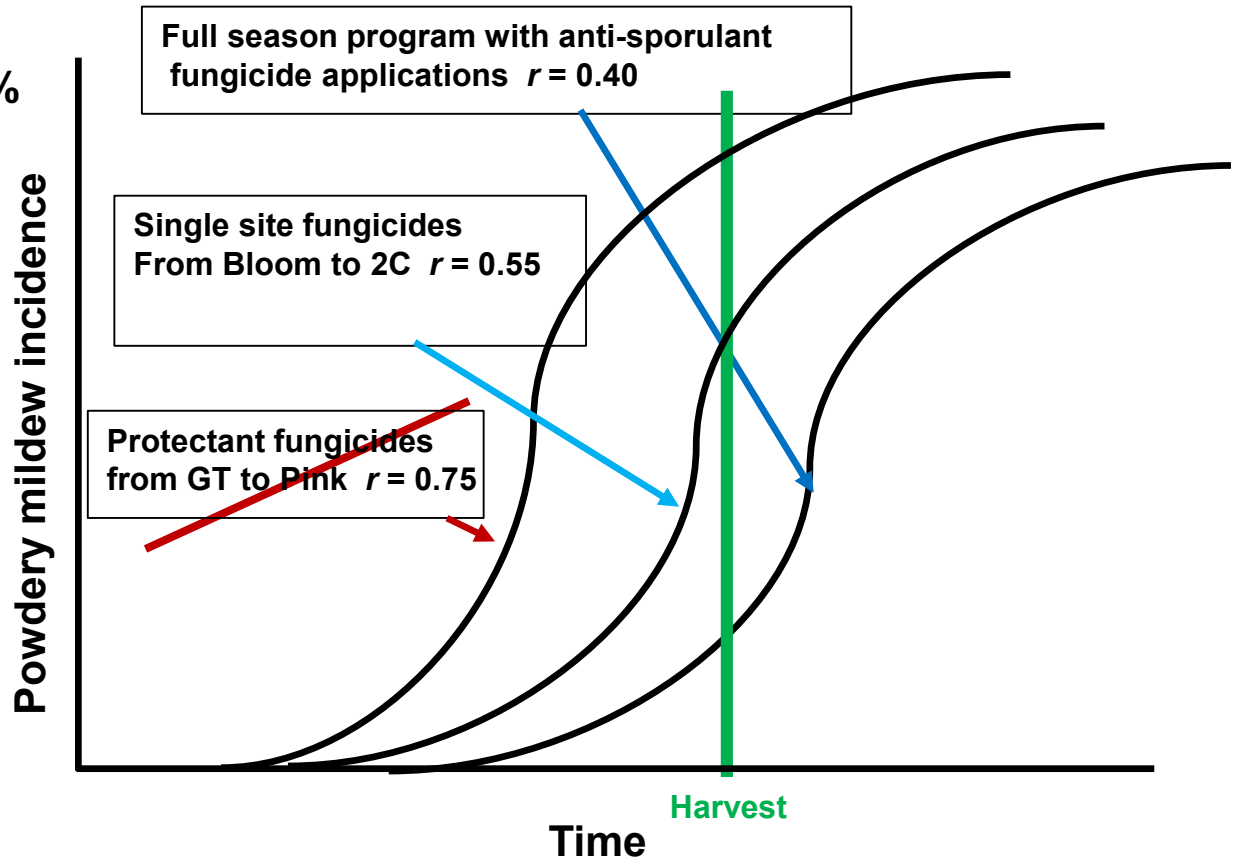
Powdery Mildew

- Cultivars favored by consumer and producers: susceptible
- Favored by warm dry periods in the spring and summer
- Continues unchecked towards harvest: fungicides not applied for in summer

Powdery Mildew

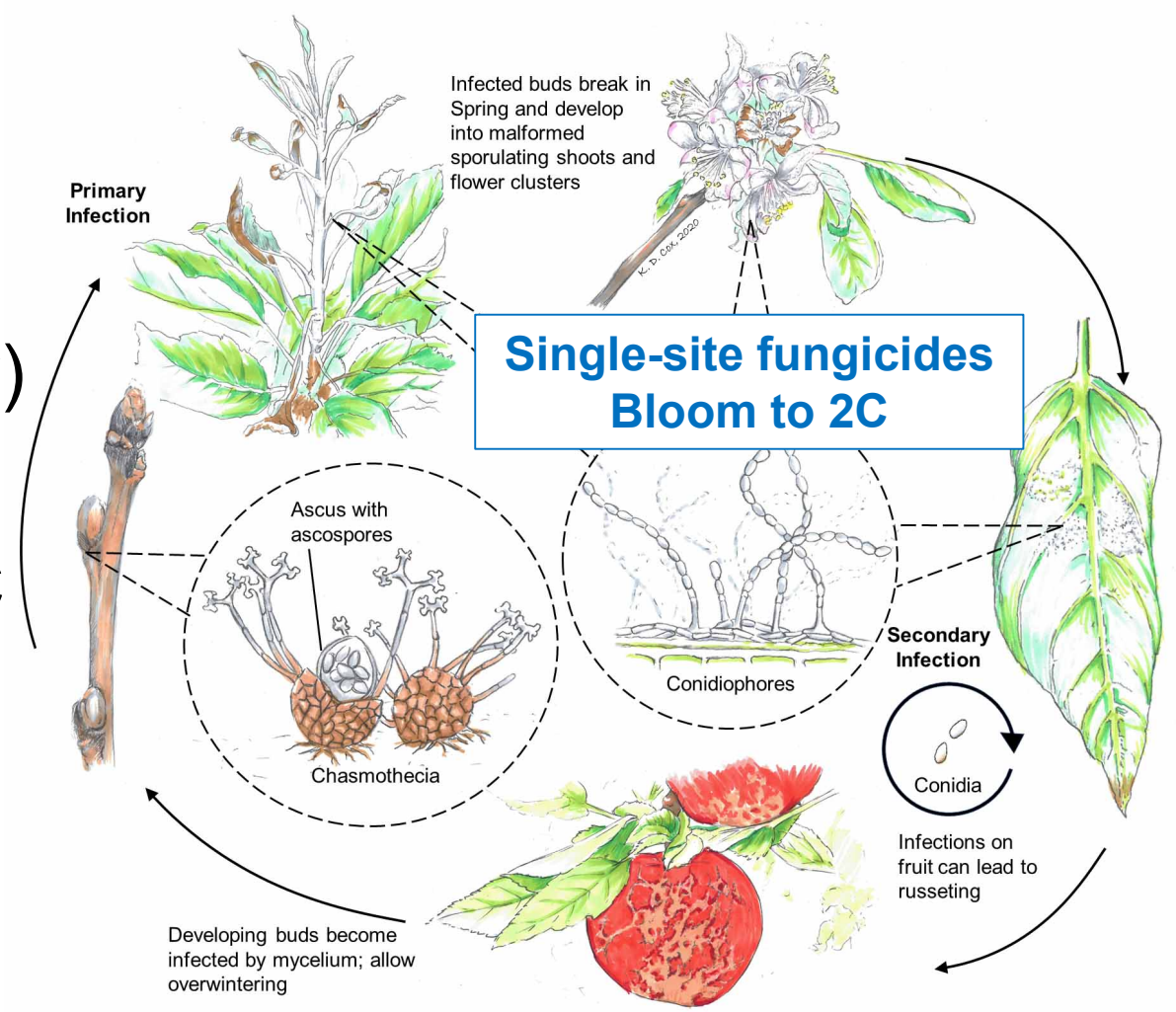
Protectant fungicides GT to Pink





Powdery Mildew

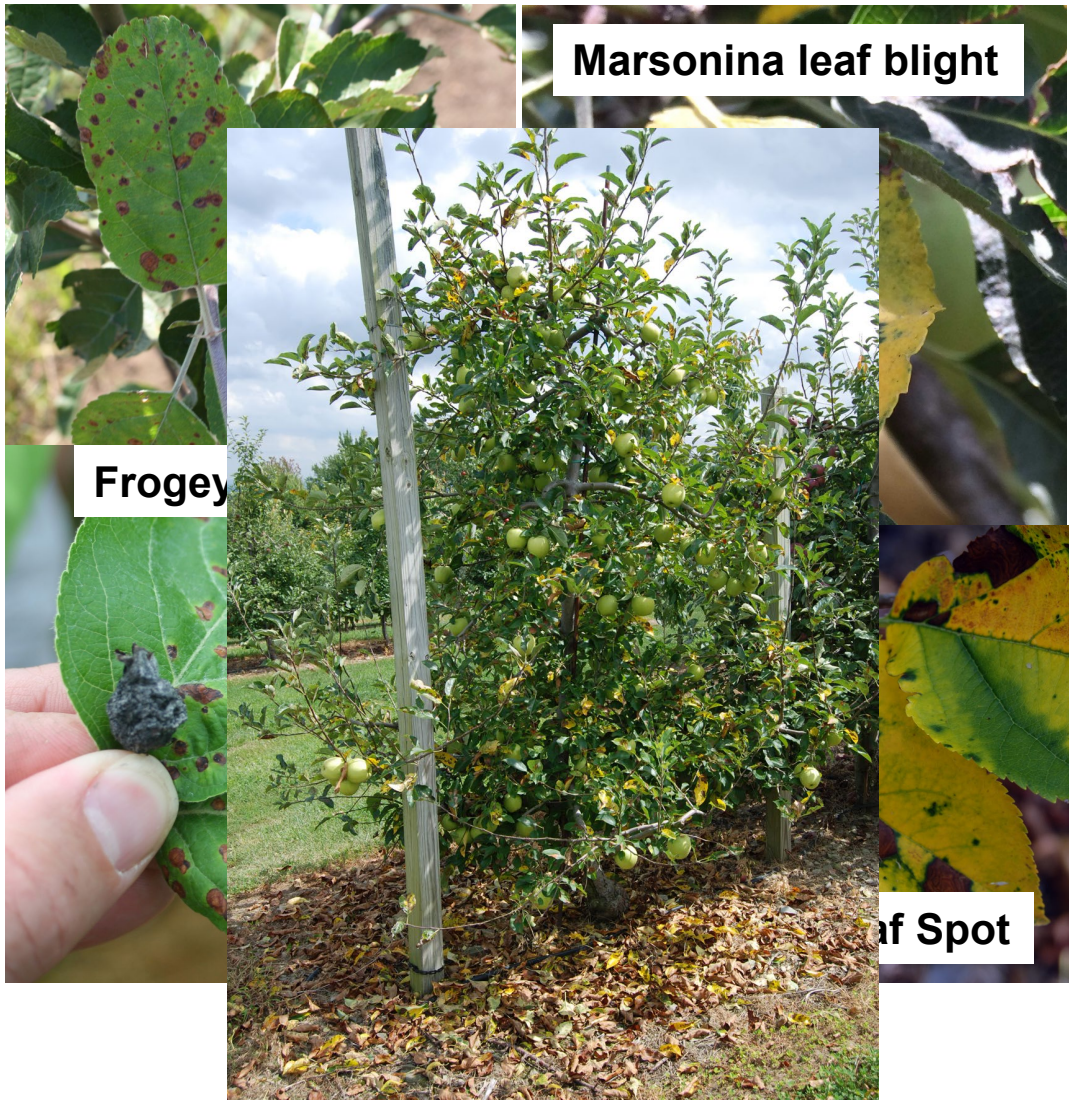
- **Chemical management**:
  - Multi-site fungicides
    - Captan & mancozeb not effective
    - Protectant fungicides (**sulfur only**)
  - Single site fungicides
    - 7-10 day interval, bloom to 2-3rd C
    - DMIs, QoIs, SDHIs
  - DMI Resistance???
    - 80-90's: "never see mildew";
    - 2000's: "doesn't solve the problem"



Summer Foliar Diseases

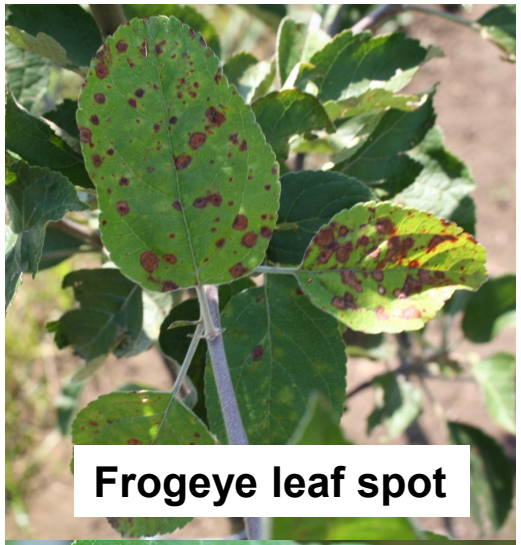
- Frogeye leaf spots
- Alternaria leaf spot
- Glomerella leaf spot
- Marsonina leaf blight

- Managed with apple scab & summer fungicide programs
- Problem in organic operations or those heavily reliant on multi-site protectant fungicides



Summer Foliar Diseases

- Single-site fungicides
  - QoIs, SDHIs, and DMI fungicides provide a high level of control
  - No fungicide resistance
- Summer cover applications
- Sanitation in fall or spring


Frogeye leaf spot


Marsonina leaf blight


Glomerella Leaf Spot

Summer fruit diseases

- Fly Speck Sooty Blotch
- Bitter rot (anthracnose)
- Black and white rot (Botryosphaeria)

- Problem in warmer sandy regions (e.g. Hudson Valley)
- Problem in organic operations or those heavily reliant on multi-site protectant fungicides

Summer fruit diseases

1. ***Latent infection***
   from bloom to early fruit development

2. ***Pre-harvest***:
   Fall rains or wounding of mature fruit

3. ***Post-harvest / in storage***:
   Lead to pack out rejections

Summer fruit diseases

Recommended Program:

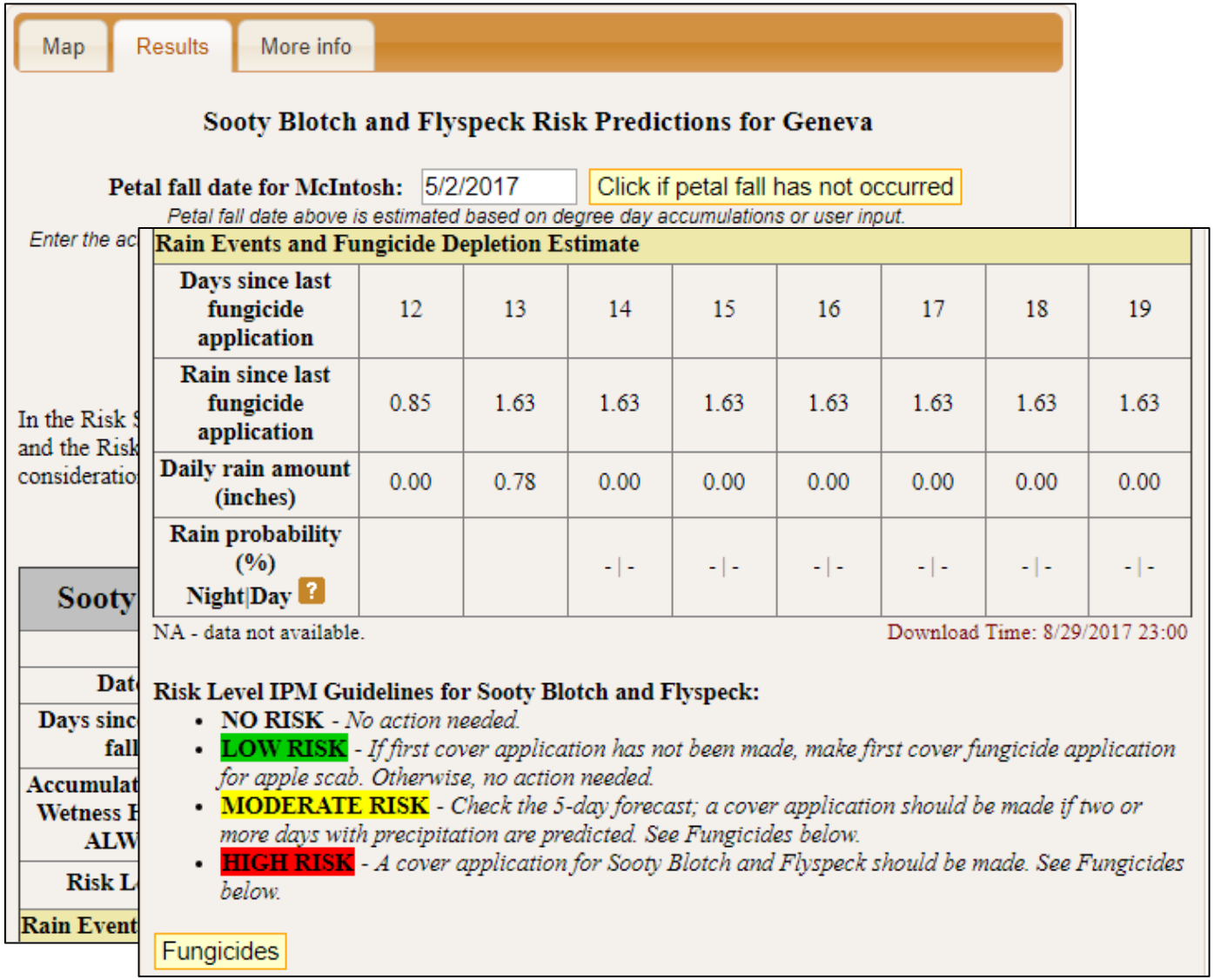
1. Single-site fungicides at petal fall to 1st cover
- SDHIs: Aprovia or Fontellis,
  DMIs: Inspire Super, Cevya,
  QoI/SDHIs: Pristine, Luna Sensation, Merivon
- Avoid captan during this period – complex tank mixes

2. Summer cover applications
- Maintain approaching harvest
- Heavy rains (> 1.5-2”)
  consider another fungicide application if > 5 days to harvest

3. Apply SDHI/QoI right at before harvest (low PHIs)

Sooty Blotch Flyspeck Model

- NEWA Disease forecasting for flyspeck sooty blotch
- http://newa.nrcc.cornell.edu/newaModel/apple_disease
- Predicts onset of epidemic: **Biofix:** 10 days after petal fall
- Assists with determining timing of summer disease fungicide applications (depletion)
- LW algorithms improve risk tracking in areas without wetness sensors



Summary & Takeaways

- **Honeycrisp:** resistant to apple scab and fire blight, but ***susceptible to many other diseases***
- **Start with sanitation:** fungi live on dead wood
  Remove prunings and drops & apply Urea
- **Single-site fungicides:** Bloom to 2nd / 3rd cover & pre-harvest good for PM and highly affective against leaf spots and rots
- **NEWA flyspeck sooty blotch model** to time summer covers: and reapply after depletion of fungicides (1.5 to 2” of rainfall)

Controlling fire blight with Prohexadione Ca in Honeycrisp

Anna Wallis &
Kerik D. Cox, Cornell AgriTech

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

LOF Winter Fruit Schools
February, 2020

Cornell AgriTech
New York State Agricultural Experiment Station

Fire Blight Survey 2020

Is streptomycin-resistant *E. amylovora* re-emerging in WNY?

SmR Ea identified at 2 new locations in 2019

Where is strep-resistant fire blight in New York & New England?

Submit fire blight infected trees and strikes for test

Contact one of the persons below to help you collect samples and take data:

Kerik Cox, 315-787-2401, kdc33@cornell.edu, NYSAES (Receiving lab)
Janet VanZoeren, 585-797-8368, jev67@cornell.edu CCE LOFT, Orleans O
Dan Donahue, 518-322-7812, djd13@cornell.edu, CCE ENYCHP, Hudson Vall
Mike Basedow, 518-410-6823, mrb254@cornell.edu, CCE ENYCHP, Champlai

Sample information

Date collected_____
Collector's name_____
Grower name _____
Farm name and block/location_____
Street address_____
City, State_____ Zip Code____
County_____

Blossom and shoot blight management applications in 2020

Date Material

_____
_____
_____
_____

GPS coordinates of the sample collected_____
Part of the tree infected is (circle) -

blossom cluster current shoot young wood trunk

Length of strike (ft. in.)_____
Variety_____
Rootstock_____
Age of tree/year planted_____
If a newly planted tree, from what nursery? _____

Instructions:

It is only possible to isolate the bacteria (*Erwinia amylovora*) from *fresh, active lesions*, where healthy tissue meets the diseased tissue i.e. the lesion margin.

It is impossible to isolate fire blight bacteria from dead, dried out tissue.
Treat your sample like a valentine rose for your sweetheart, don't let it dry out!

Sampling the Lesion Margin

Collect samples that include about 3 inches of healthy tissue beyond the infected tissue, and include about 3 inches of infected tissue. Do not submit all the dead branch of the strike, this is often too long and can be cut back, as described, to 3 inches of infected tissue above 3 inches of healthy tissue.

If possible, refrigerate infected trees and strikes.
Protect samples from drying out prior to submitting them.

Do not collect entire branches or trees unless symptoms are unusual.

Fire blight strike on current shoot (photo courtesy of J. Carroll).

Cornell University Cooperative Extension IPM

Strain patterns

Group 1	15.34.38
	44.34.38
Group 2	2.22.38
	4.56.38
	4.21.38
	4.57.38
Group 3	4.27.38
	4.58.38
	47.27.38
	50.27.38
	42.27.38
	5.27.38
	5.55.38
	51.27.38
	41.23.38
	40.27.38
	43.27.38
	53.27.38
	52.27.38

Tancos et al 2016

Honeycrisp is Resistant to Fire Blight

DISEASE SUSCEPTIBILITY OF COMMON APPLES

https://blogs.cornell.edu/applevarietydatabase/disease-susceptibility-of-common-apples/

Show 50 entries Search: Honey

Variety	Fire blight	Apple Scab	Cedar Apple Rust	Powdery Mildew
Honey Crisp	Moderately Resistant[3]; Resistant[7,8]	Moderately Resistant	Susceptible	Susceptible[1, 3]
Honey Gold	Moderately Resistant[4]; Highly Susceptible[7]; Susceptible[8]	Resistant	Susceptible	Resistant[1]

Showing 1 to 2 of 2 entries (filtered from 329 total entries) Previous Next

Honeycrisp samples w/shoot blight in survey →

Central Leader Blight (2016)

Shoot blight is devastating, unpredictable, and difficult to manage

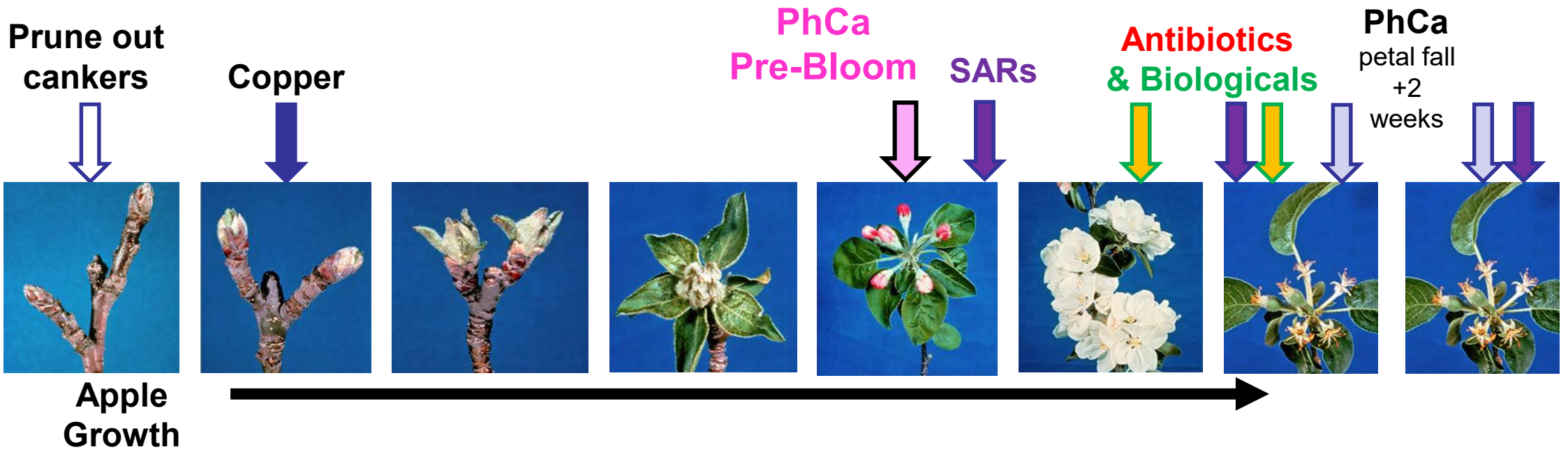
- An unnoticeable amount of blossom blight can lead to shoot blight
- Host susceptibility & vigor influence level of devastation
- Prohexadione calcium (PhCa)
  highly effective
  slows vigor & establishment of young trees

Can we optimize timing & rate of PhCa to help

Manage blossom blight

Reduce shoot blight in advance?

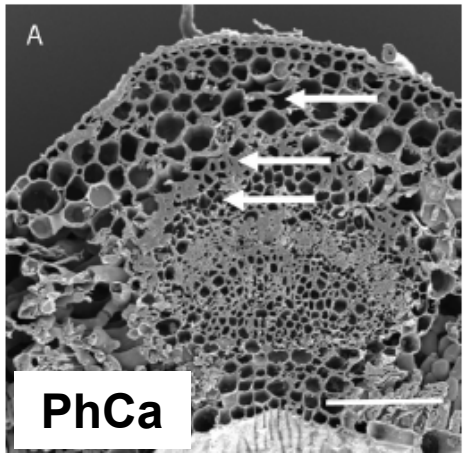
Fire blight Management Overview: Integrating PhCa

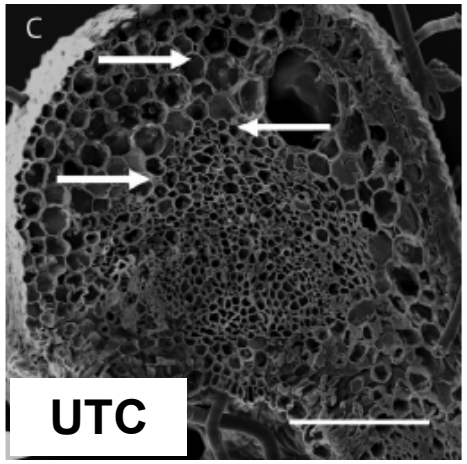


Can PhCa be applied at pink to reduce blossom and shoot blight without affecting tree vigor?

PhCa Mechanism
physical barrier to pathogen invasion of tissues

Shoot tissue





McGrath et. al 2009

True for blossom pedicels?

Prevent invasion of shoot tissues

Cornell AgriTech

University of Vermont

THE UNIVERSITY OF VERMONT
AGRICULTURE & LIFE SCIENCES

Commercial Orchards

NY farm viability INSTITUTE

Fire Blight & Vigor Assessments

Disease Incidence

Blossom / Shoot Blight

% incidence of 20 flower clusters / shoots

Horticultural Impact

Trunk diameter

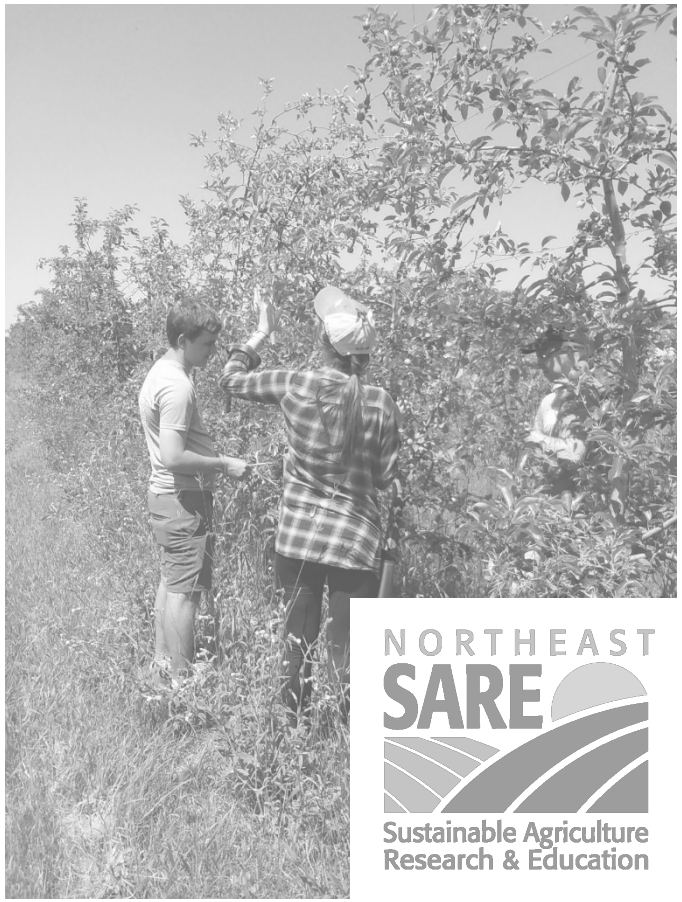
Shoot length

Fruit number & size

(taken at harvest)

Cornell AgriTech

University of Vermont



Commercial Orchards

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

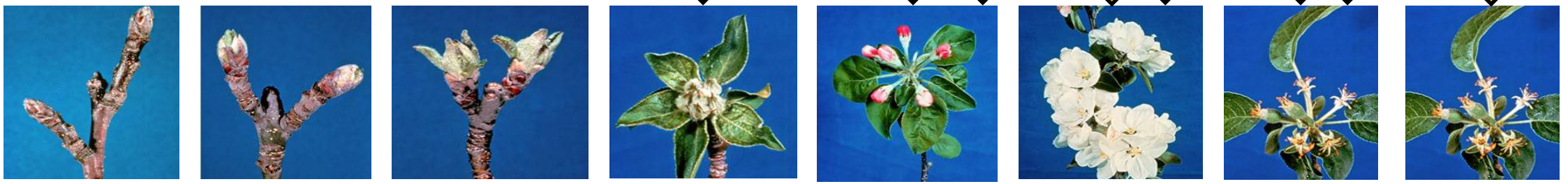
Bearing block
2016, 2017, 2018, 2019*
- Gala
- B.9
- Planted 2000

Inoculation
Within 24 hrs
Ea273 10^6 CFU/ml

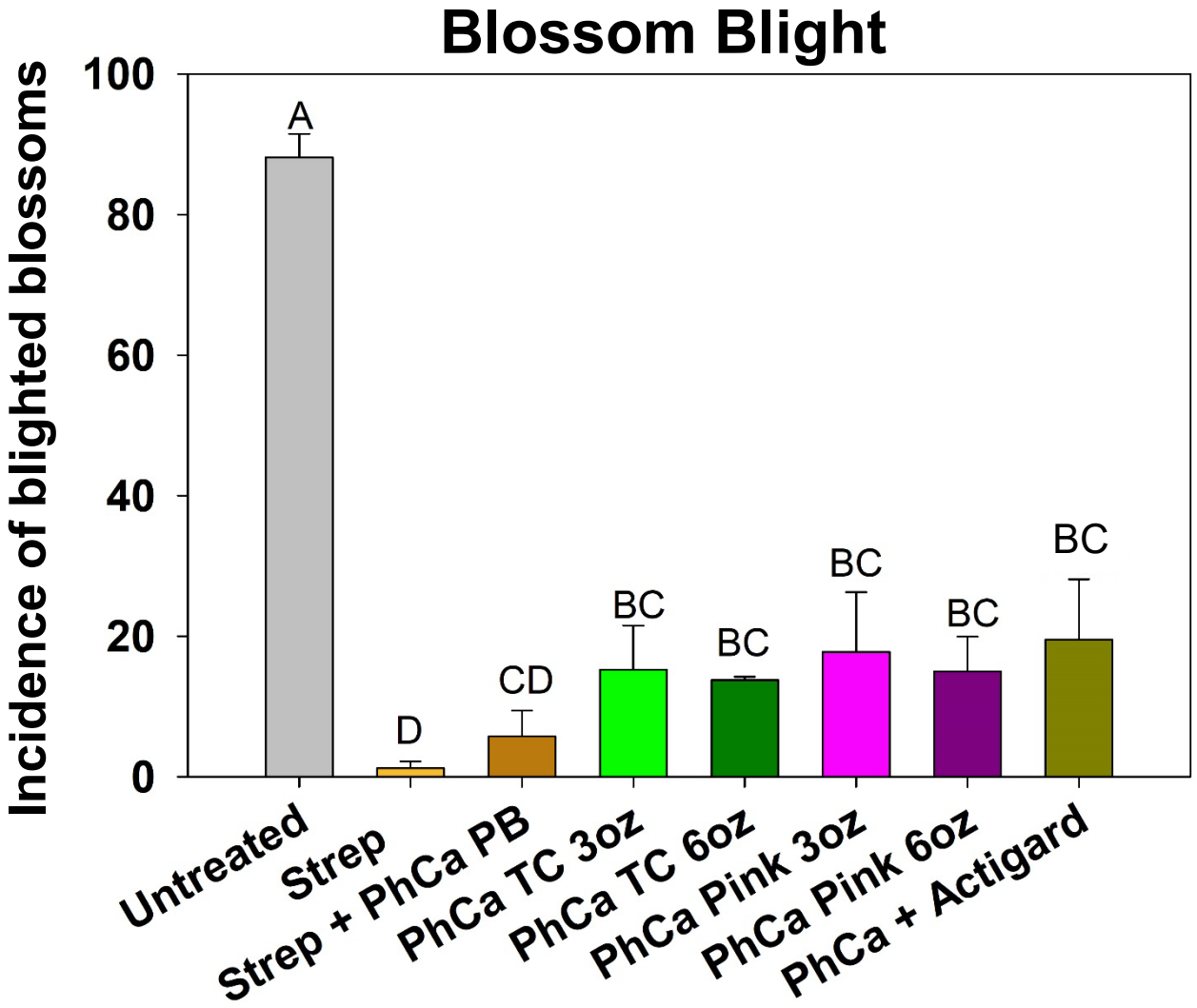
Strep

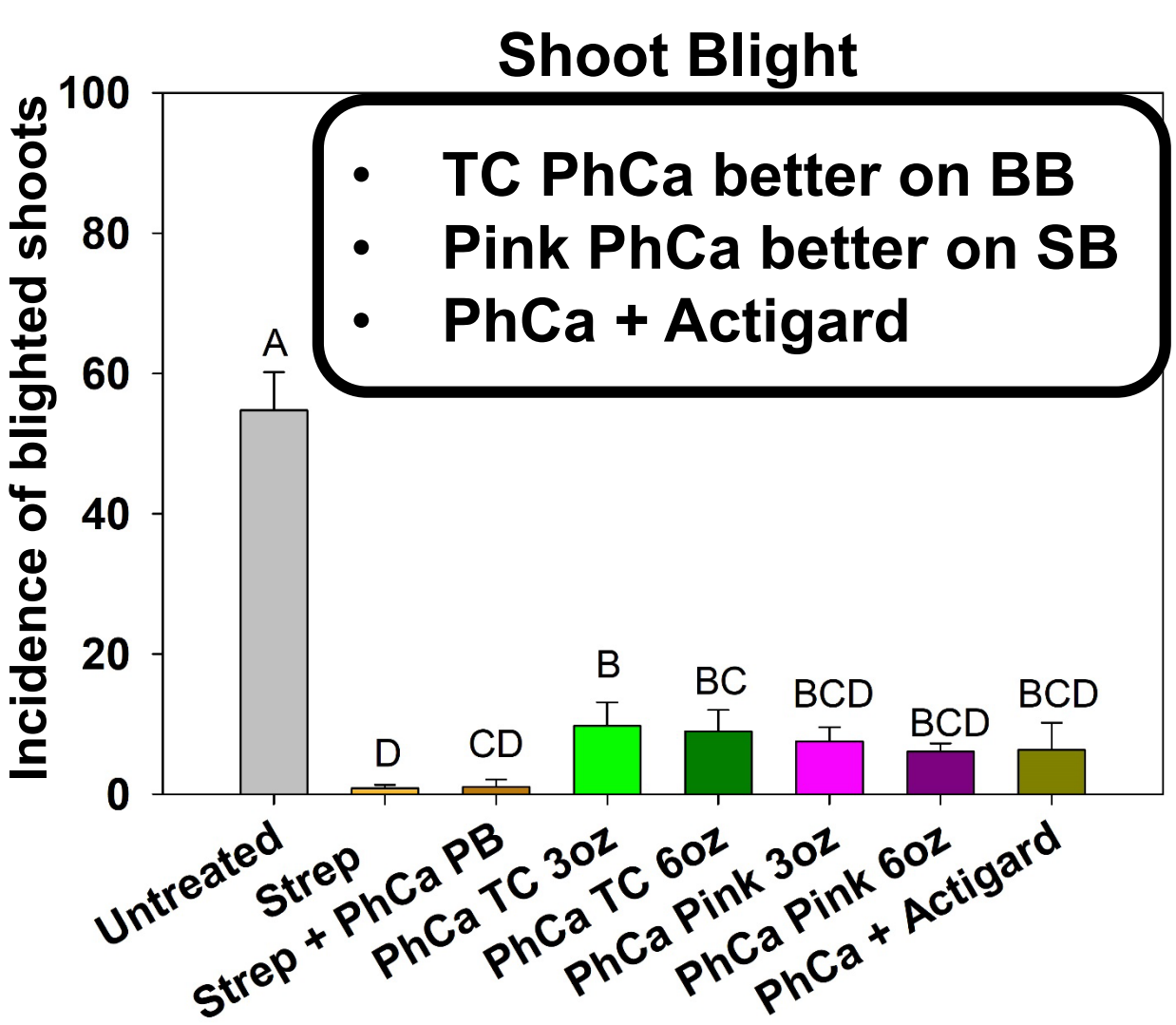
PhCa 6oz

PhCa 6oz

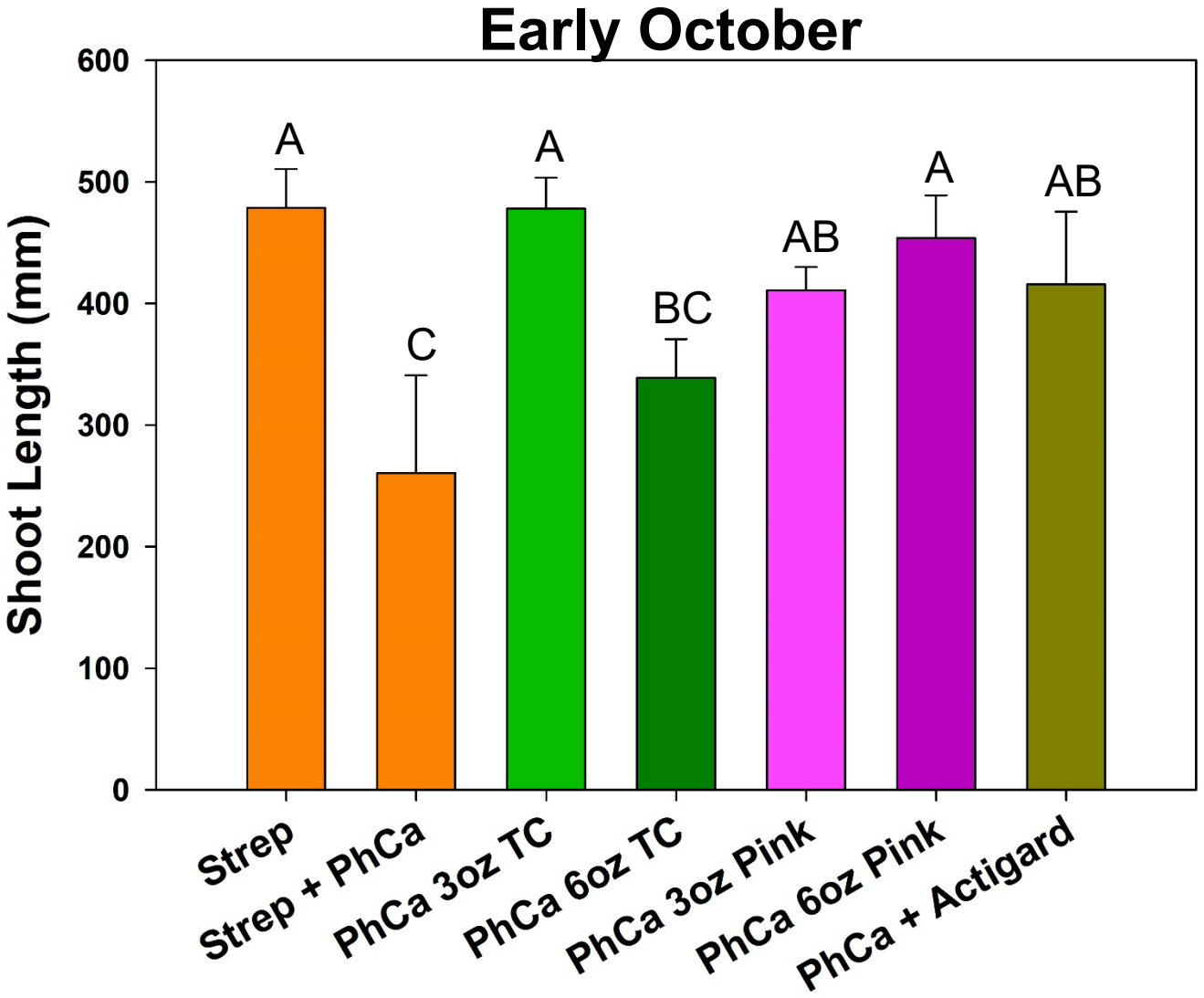


Trials at AgriTech - Bearing





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

Cornell AgriTech

University of Vermont

NORTHEAST SARE
Sustainable Agriculture
Research & Education

THE UNIVERSITY OF VERMONT
AGRICULTURE & LIFE SCIENCES

Commercial Orchards

NY farm viability INSTITUTE

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

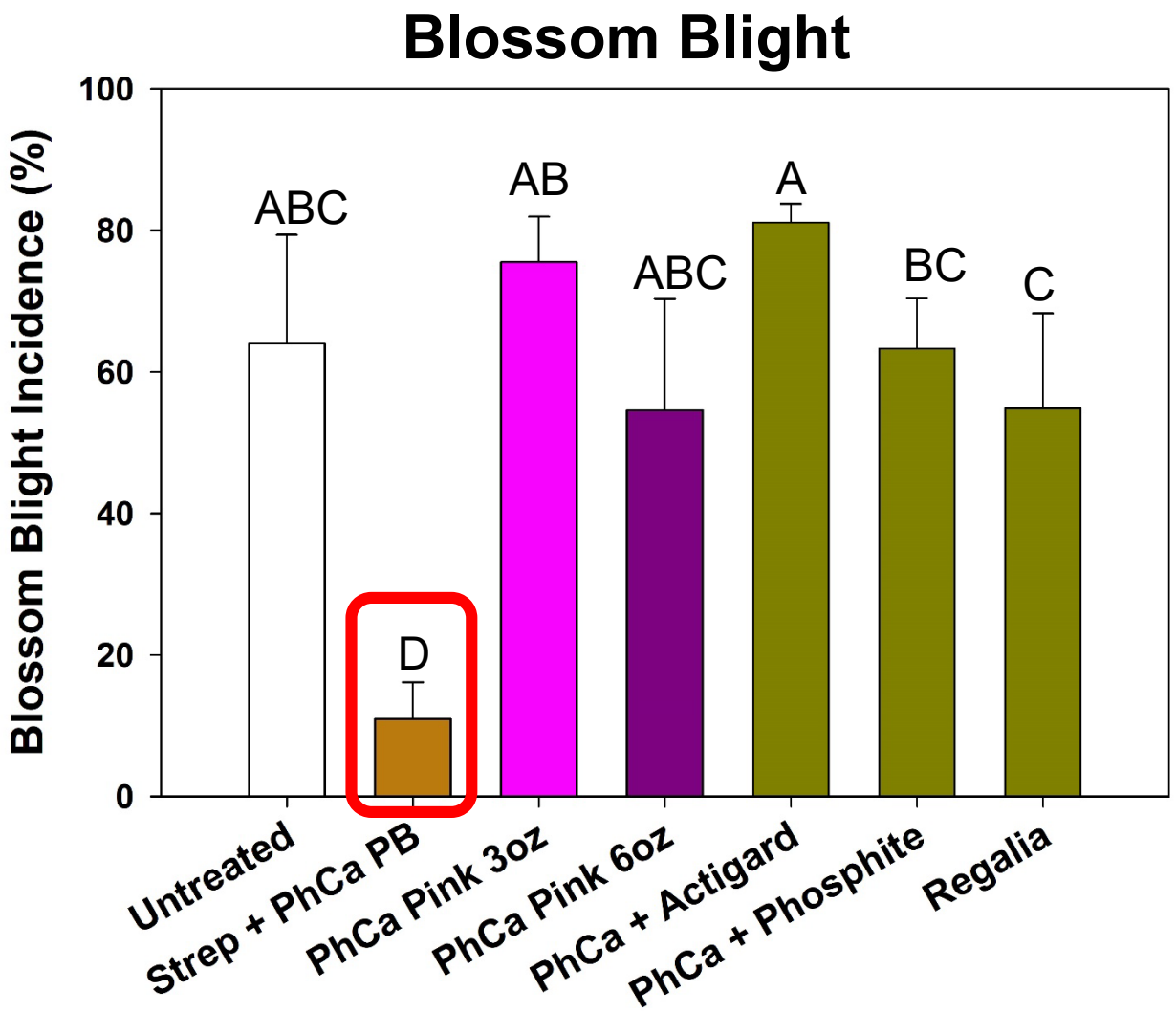
Inoculation
Within 24 hrs
Ea273 10^6
CFU/ml

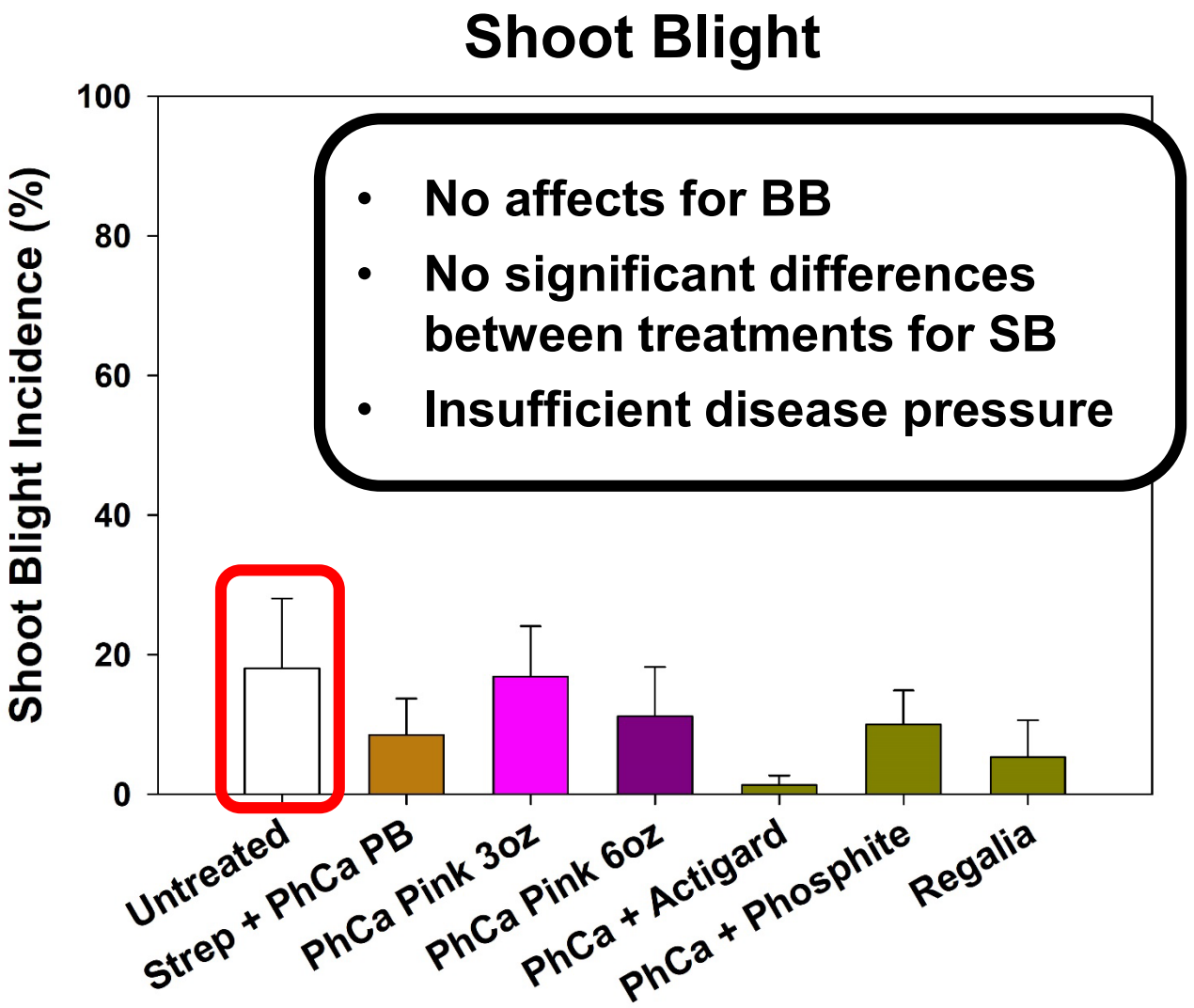
Strep

PhCa 6oz

PhCa 6oz

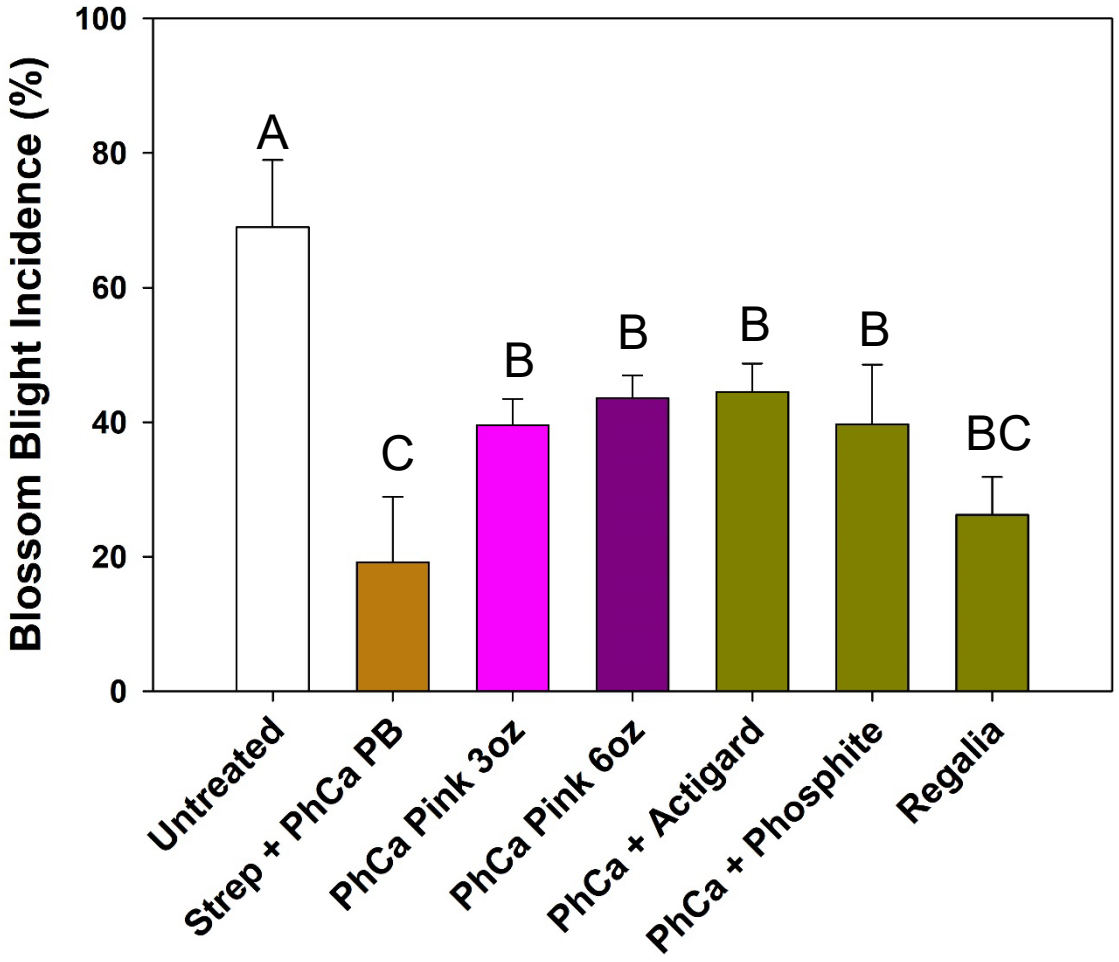
Trials at UVM – Bearing ‘Crimson Crisp’



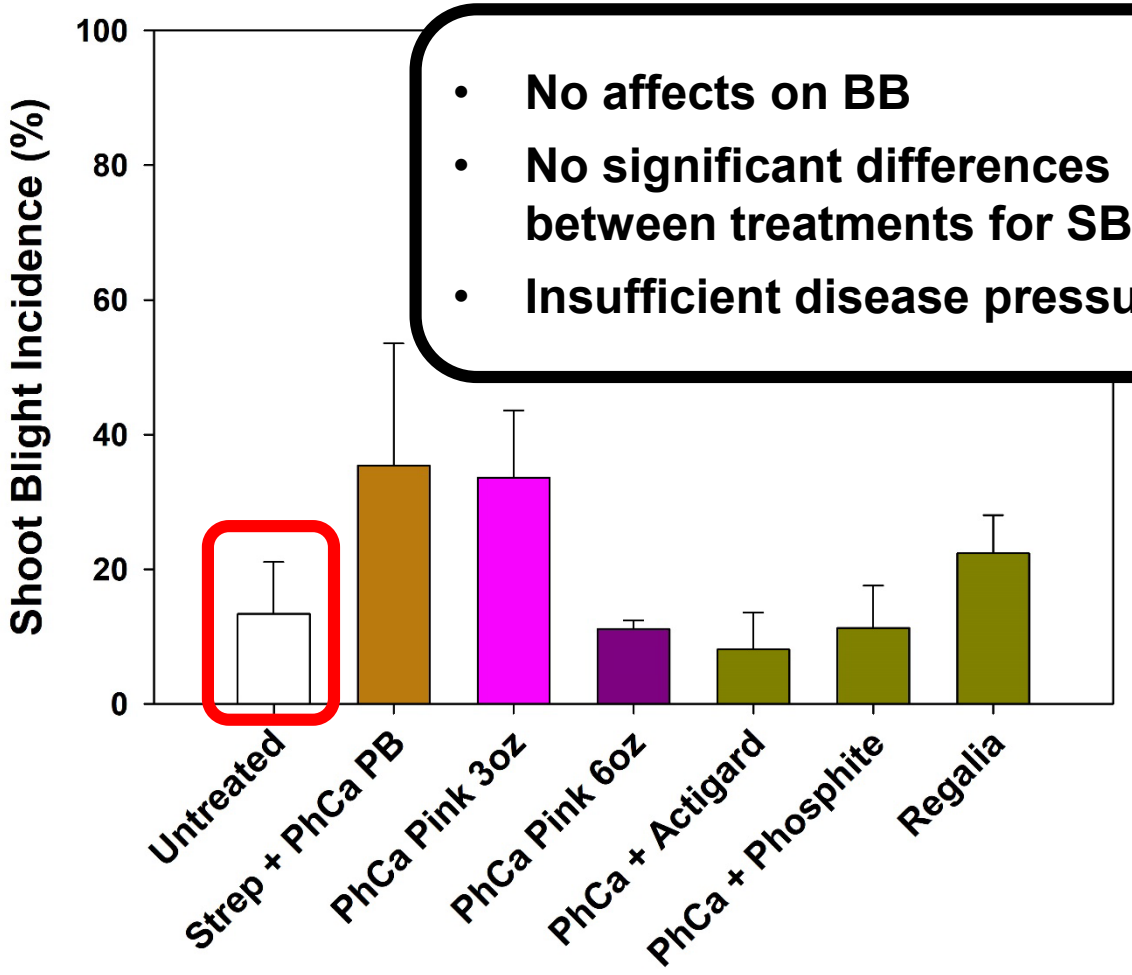


Trials at UVM – Bearing ‘Topaz’

Blossom Blight

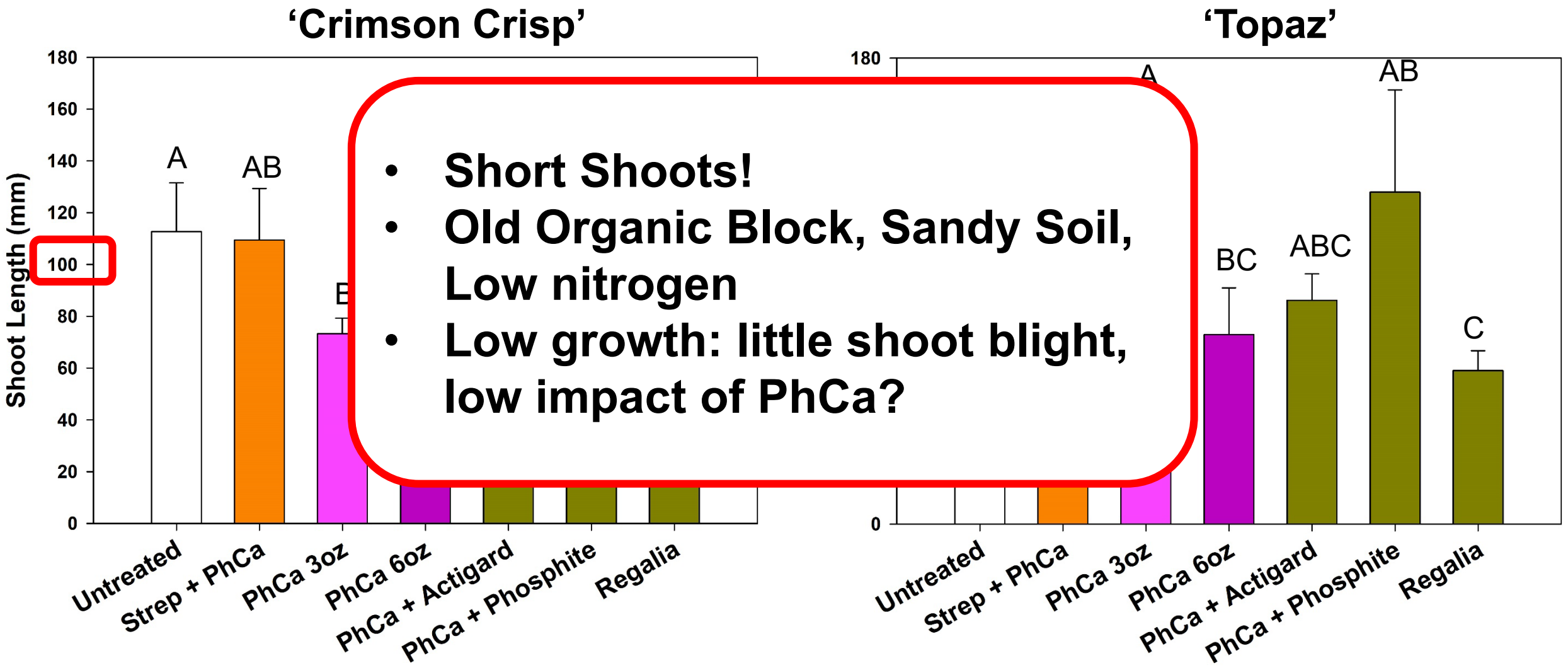


Shoot Blight



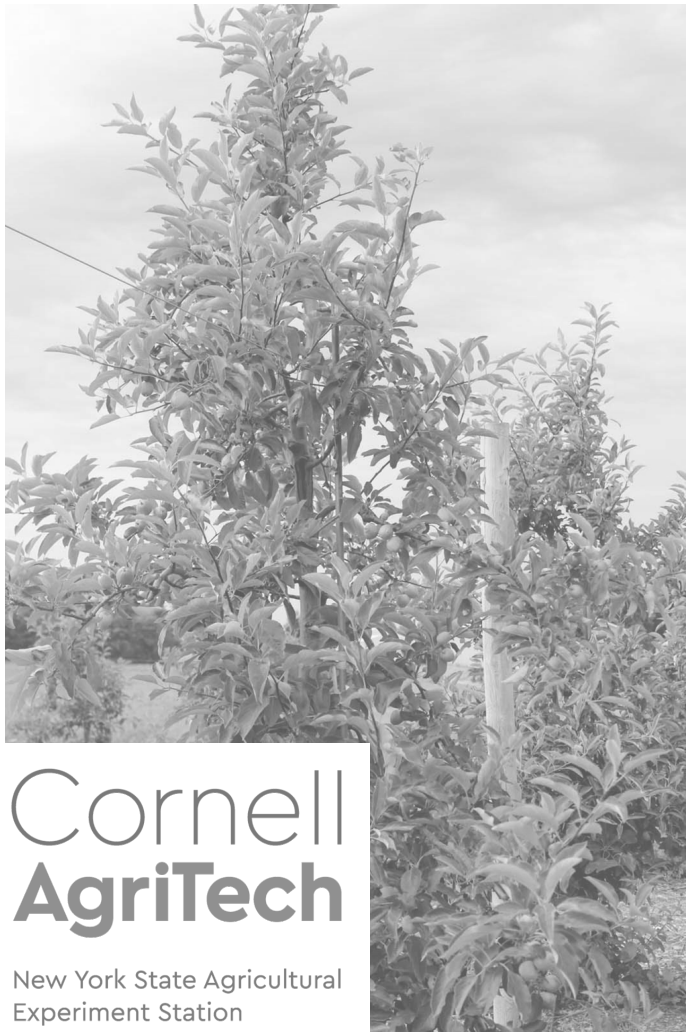
- No affects on BB
- No significant differences between treatments for SB
- Insufficient disease pressure

Trials at UVM – Bearing: Shoot Length

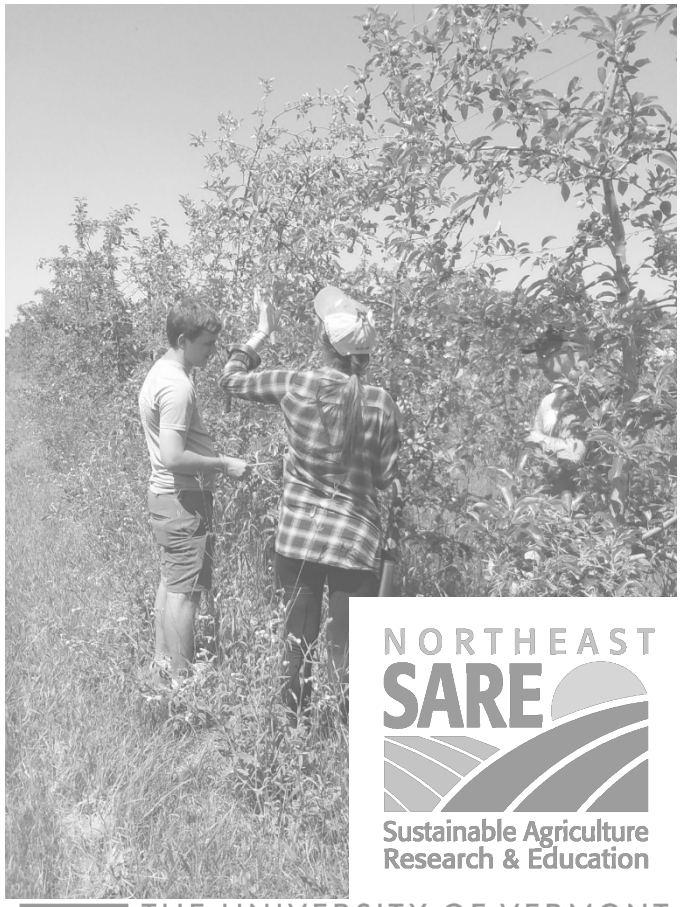


- **Short Shoots!**
- **Old Organic Block, Sandy Soil, Low nitrogen**
- **Low growth: little shoot blight, low impact of PhCa?**

Cornell AgriTech



University of Vermont



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

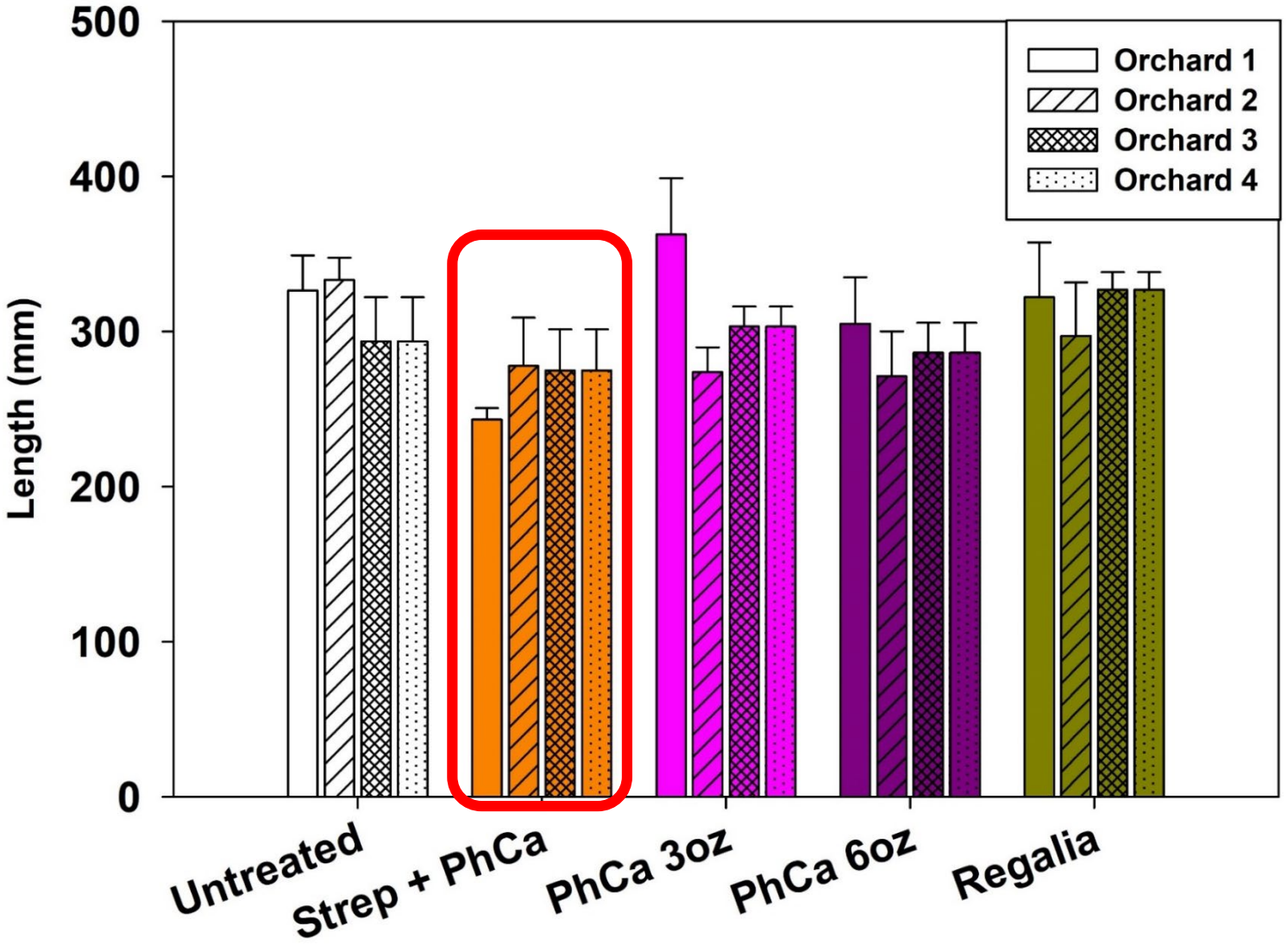
D.N. **Strep**

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
- Repeat trial in 2020 for cumulative effects



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, but no risk of shoot blight in a low vigor block
- **No Impact on shoot growth from pink applications**

Which best describes your current use practices for PhCa to manage fire blight

I use PhCa post-bloom only

I use PhCa pre-bloom only

I use PhCa pre- and post-bloom

After listening to this presentation, my understanding of PhCa for fire blight management has:

Increased greatly	**A**
Increased a moderate amount	**B**
Remained unchanged	**C**
I'm confused	**D**

How likely are you to change your fire blight management plan based on this presentation

Most likely

Somewhat likely

Unlikely, I'm do not plant to use PhCa

I already use PhCa to manage fire blight

Acknowledgements

Cox Lab Members
Katrin Ayer
David Strickland
Mei-Wah Choi

Undergraduate students
John Spafford
April Moffet
Jamie Spychalla

University of Vermont
Dr. Terence Bradshaw
Jessica Foster

Agrichemical Companies

Cornell AgriTech
New York State Agricultural Experiment Station

NY farm viability INSTITUTE

THE UNIVERSITY OF VERMONT AGRICULTURE & LIFE SCIENCES

NORTHEAST SARE
Sustainable Agriculture Research & Education