A PRIMER ON HIGH TUNNEL CUCUMBER PRODUCTION

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New England Vegetable and Fruit Conference— December 2022

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General production considerations

Warm Season Crop

- Transplant should be used. Spring and fall
- Cucumber plants are very sensitive to low temperatures
- Plant growth is suppressed when temperatures are above 95°F

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Cultivar Selection

Parthenocarpic cultivars should be u

Mini or Beit Alpha: labor intensive, a lot of fruit

- Katrina
- Socrates
- Manny
- Manar
- Jawell
- Picolino

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Cultivar Selection

Parthenocarpic cultivars should be us

Dutch greenhouse: misshapen fruit, expensive seed

- Camaro
- Kalunga
- Tyria
- Poniente

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Cultivar Selection

Parthenocarpic cultivars should be u

American slicer: thick skin,
similar to field varieties

- Corinto
- Lisboa
- Alcazar

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Cultivar Selection

Parthenocarpic cultivars should be us

Japanese/Asian cucumber:
later to produce fruit, male and
female flowers

- Taurus
- Tasty Jade
- Tasty Green
- China Long
- Itachi (white)

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Cultivar Selection

Parthenocarpic cultivars should be used

Pickling cucumbers

- Adam Gherkin
- Quirk
- Excelsior

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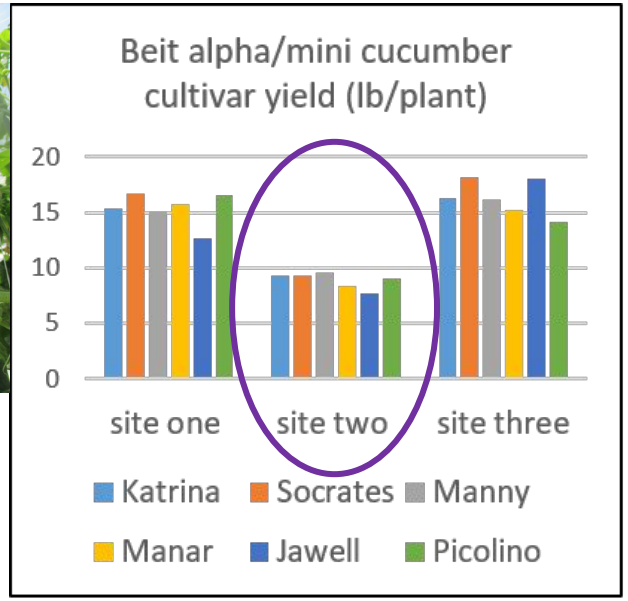
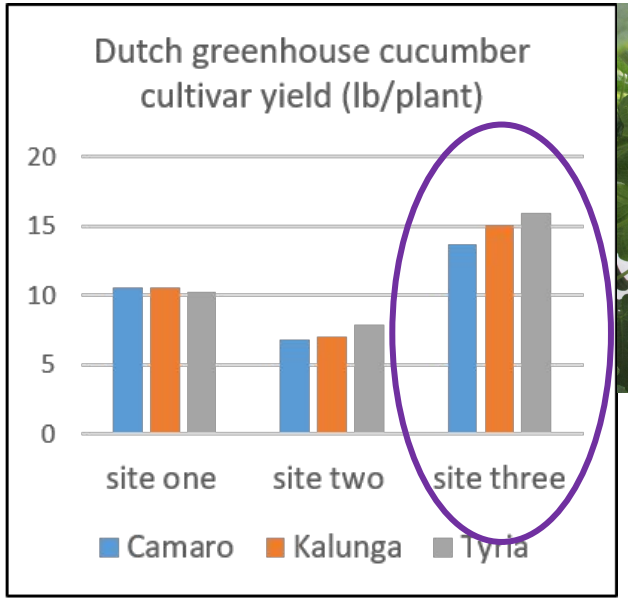
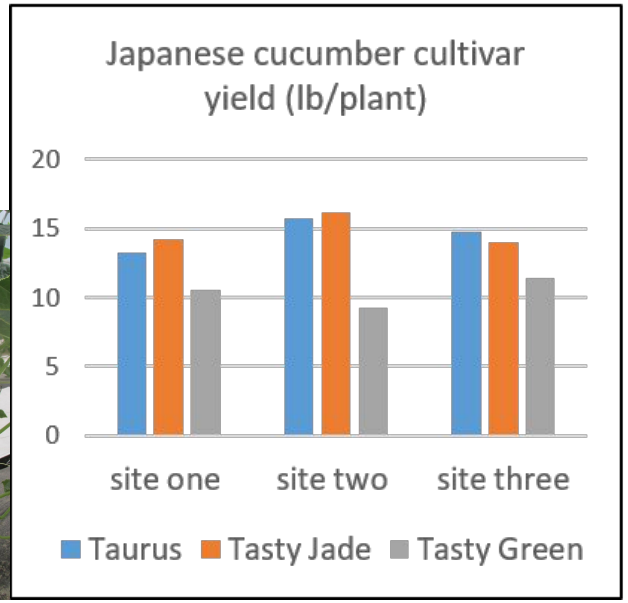
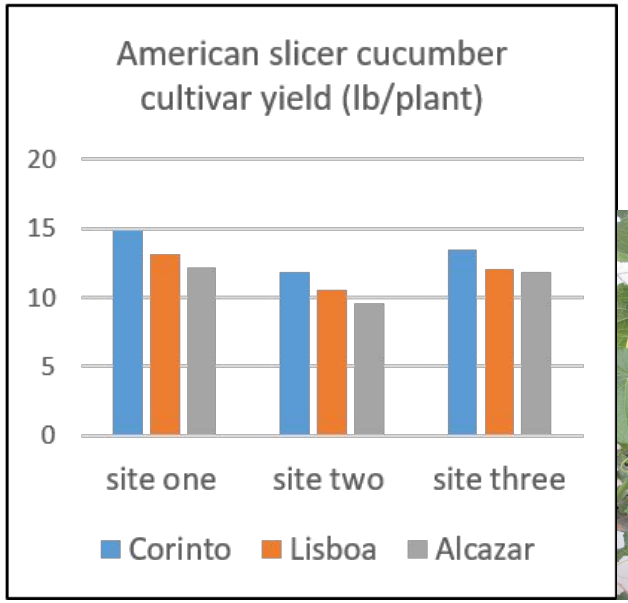
Cultivar selection





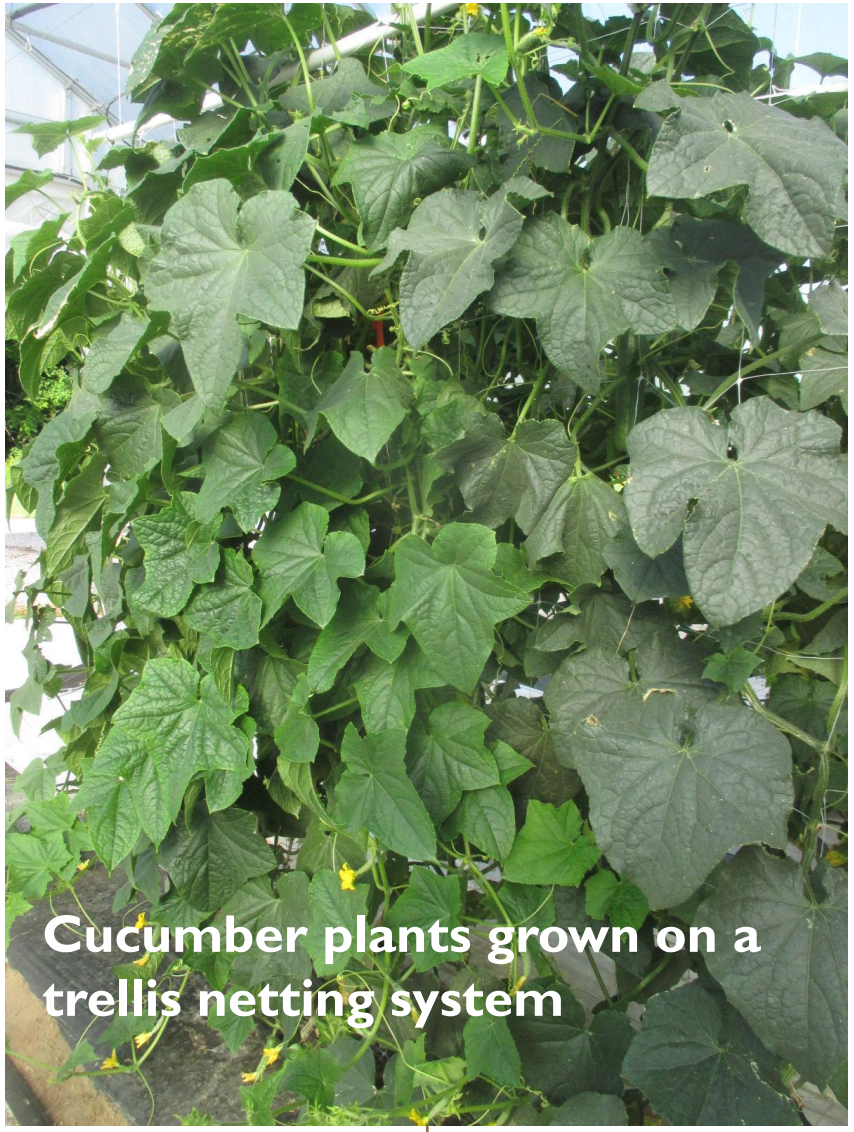




Liz Maynard
Pinney Purdue Ag Center
Bronwyn Aly
University of Illinois,
Dixon Springs Ag Center

Pruning and trellising systems

Cucumber plants grown with a one-leader system



Cucumber plants grown on a trellis netting system

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Grafting

Cucumbers are very sensitive to low temperatures

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Grafting

Cucumber is widely grown in solar greenhouses in winter in northern China

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Grafting

Grafting cucumbers onto cold tolerant rootstocks is key for winter production

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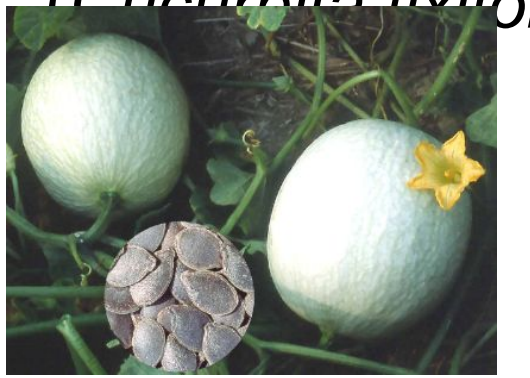
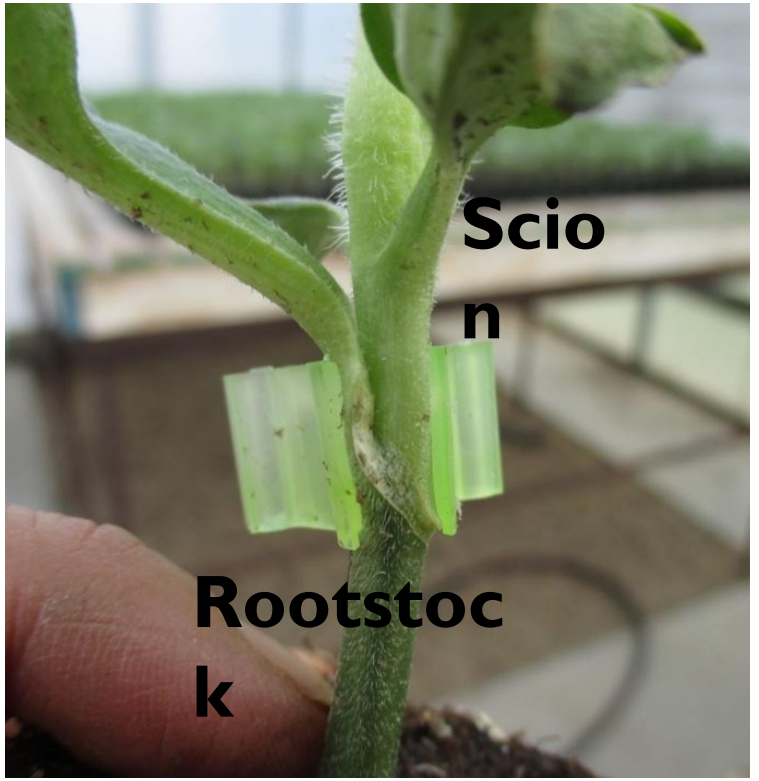
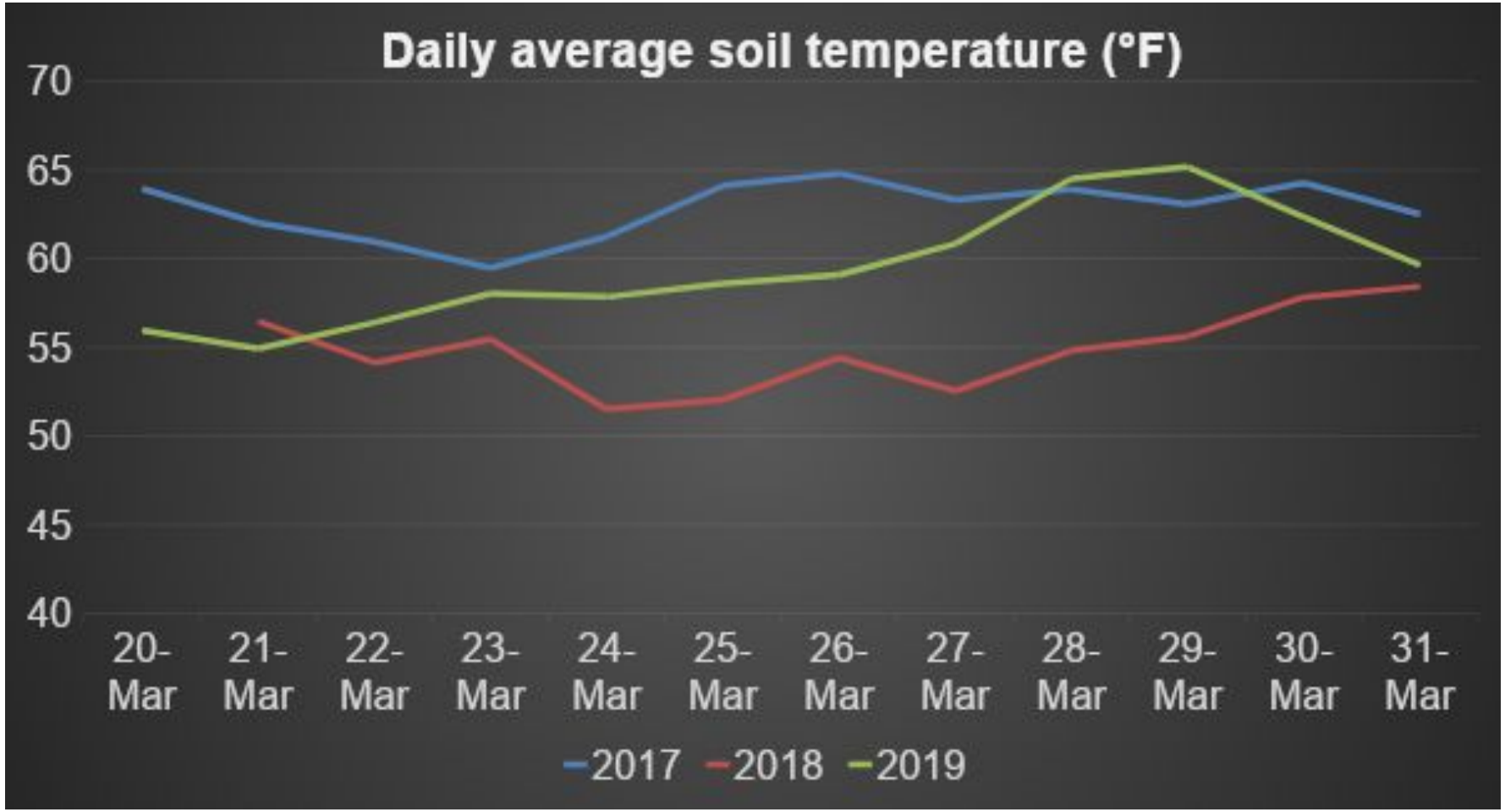
Grafting

- Cucumbers are typically grafted onto squash interspecific hybrid (*Cucurbita maxima* × *C. moschata*), squash (*C. moschata*) and figleaf gourd (*Cucurbita fixifolia*) rootstock





Grafting trials at SWPAC 2016-2019



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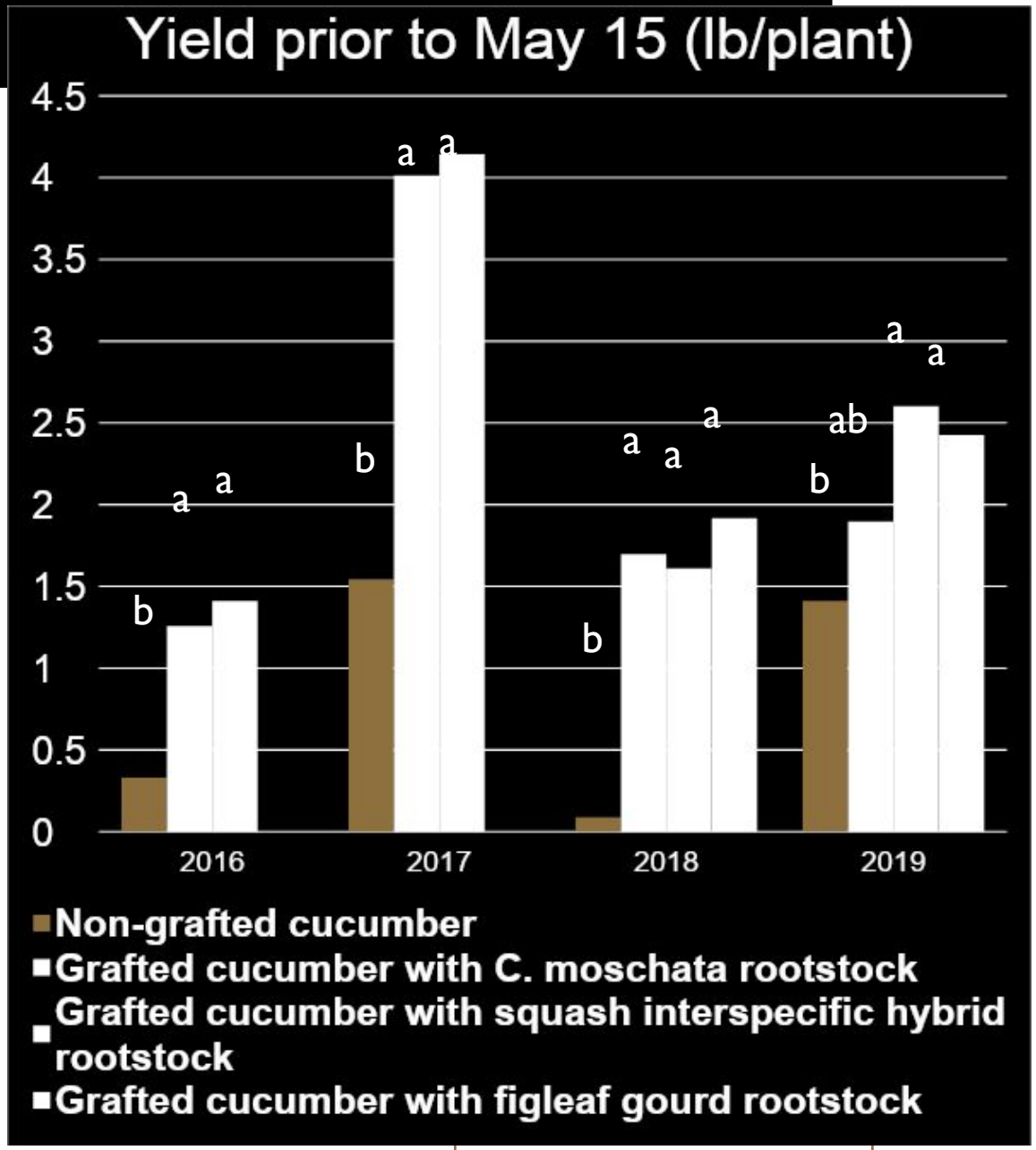
	2016	2017	2018	2019
Replant rate	44.4%	0	91.7%	77.7%

All the grafted plants survived, replant rate for non-grafted cucumbers is above.

Grafting

"We are first at market with cucumbers by three weeks. It makes a difference, sales wise. It gets us ahead of the game quickly. It paid off very well."



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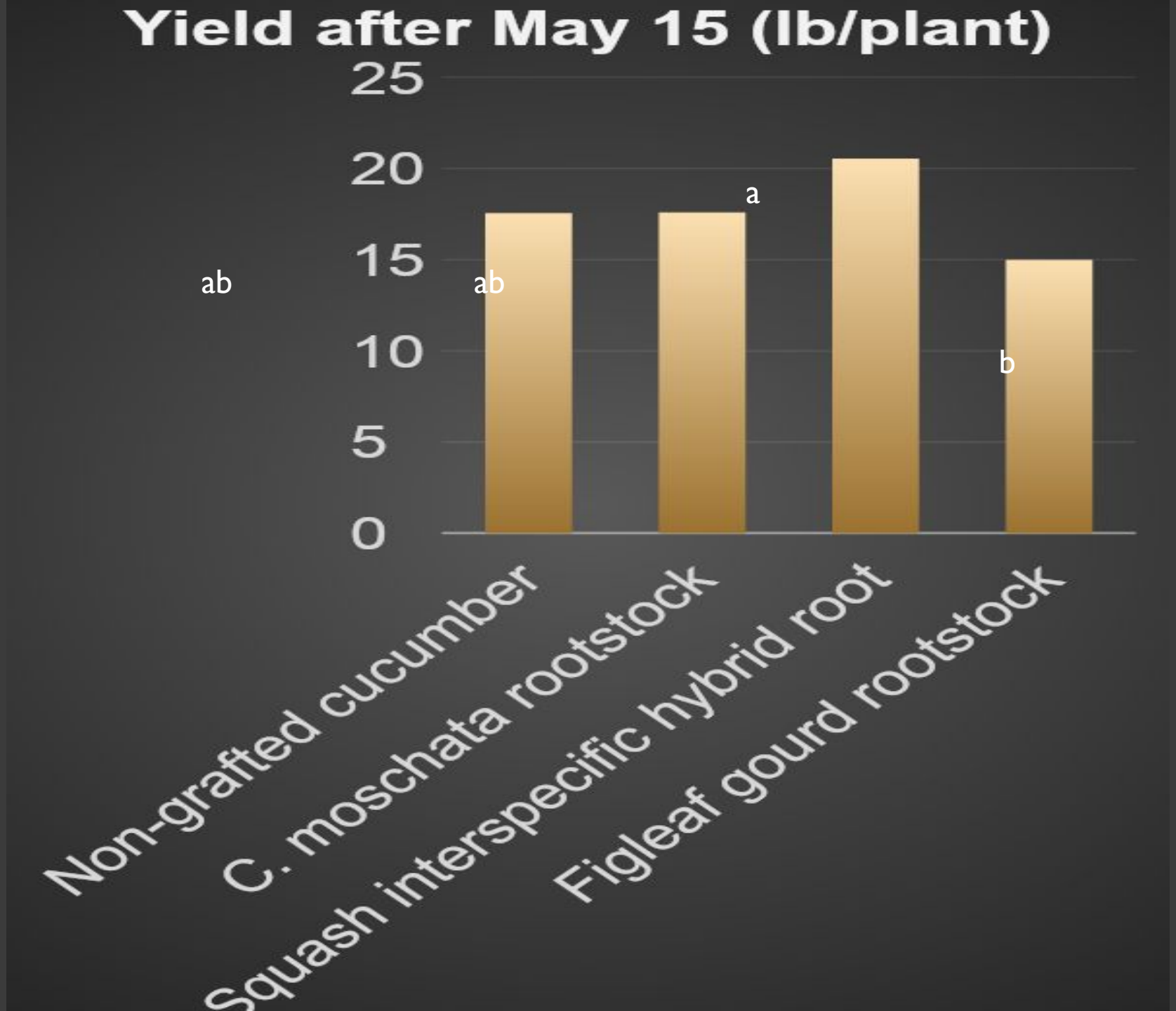
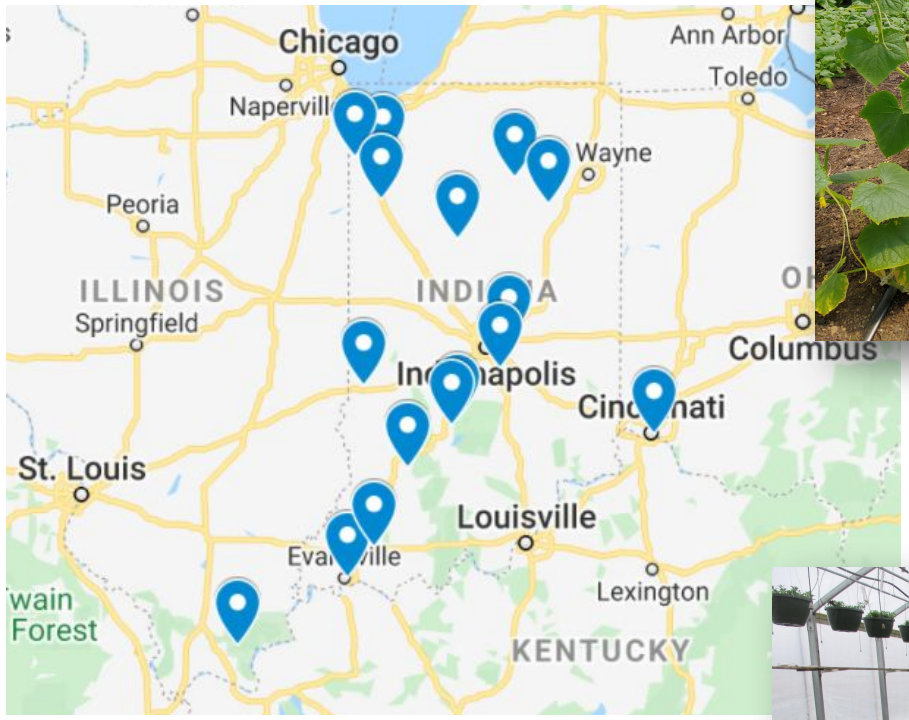

Yield after May 15 (lb/plant)
25
20
15
10
5
0
ab
ab
a
b
Non-grafted cucumber
C. moschata rootstock
Squash interspecific hybrid root
Figleaf gourd rootstock

Grafting on-farm trials



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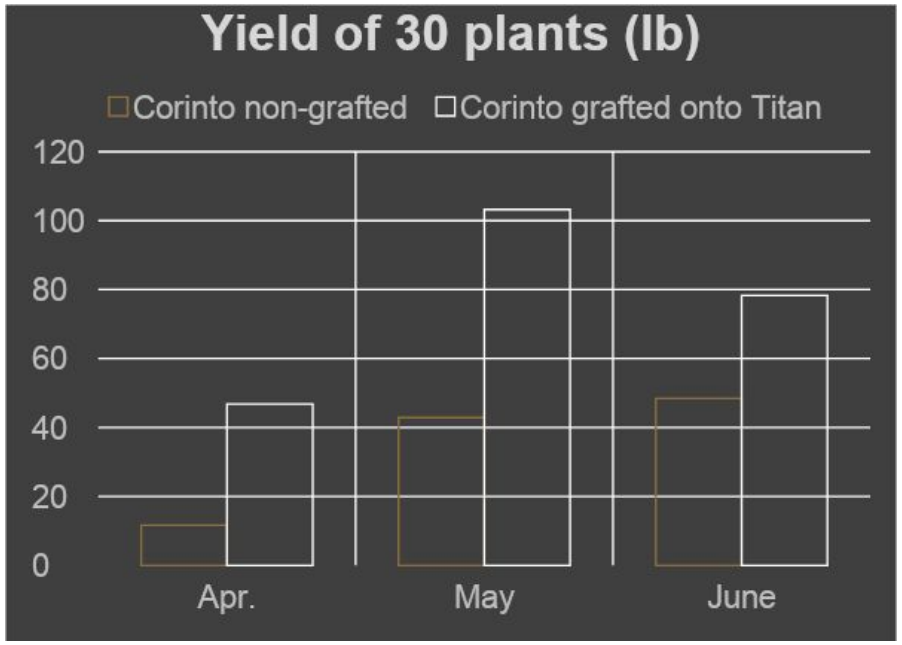
Grafting Case Study Lafayette, IN

- Planted on Feb. 22, 2018 in a heated tunnel.
- Harvested from Apr. 4 to June 30, 2018.
- Lost 6 out of 30 non-grafted plants early in the season due to stem split.
- No grafted plants lost in early season



Dead plants had damaged stem, likely caused by insects damage

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Disease

Dan Egel, degel@purdue.edu

Disease Management

Powdery mildew

Downy mildew

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Disease Management

White mold

Charcoal rot

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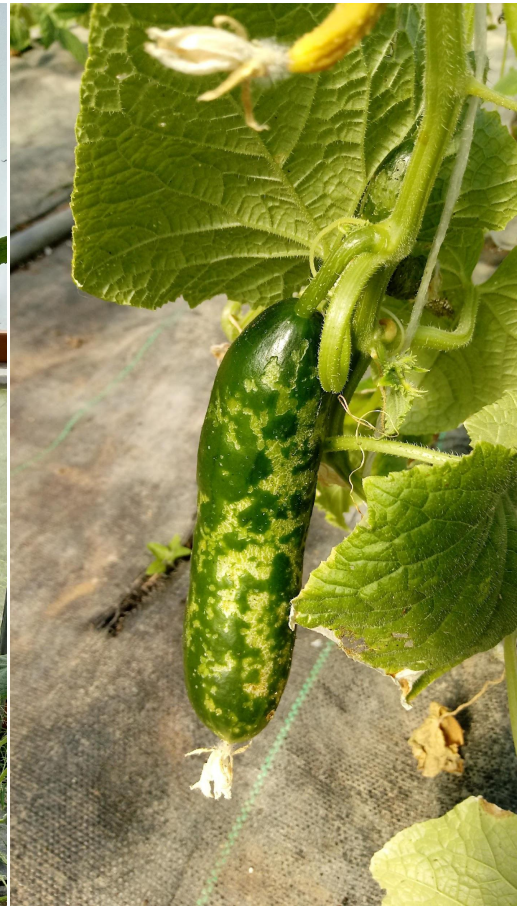
Insects & Mites

[redacted]

Insect Management

Cucumber beetles and bacterial wilt



Squash bugs

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Insect Management

Two-spotted spider mites

Aphids

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Photos by John Obermeyer








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Augmentation BioControl

- Successful in greenhouse
- Commercially-available predatory insects
- Feed on pests, pollen and nectar; attracted to HIPVs
- Need to consider dispersal during periods of low pest availability

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Green Lacewing

Convergent Ladybug

Minute Pirate Bug

Spined Soldier Bug

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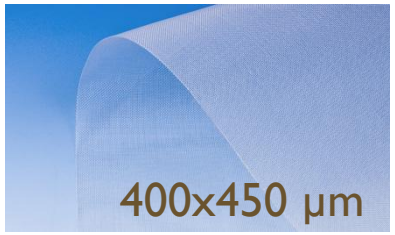
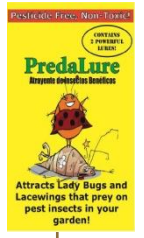
Conventional


Screened



Volatile + Flowers

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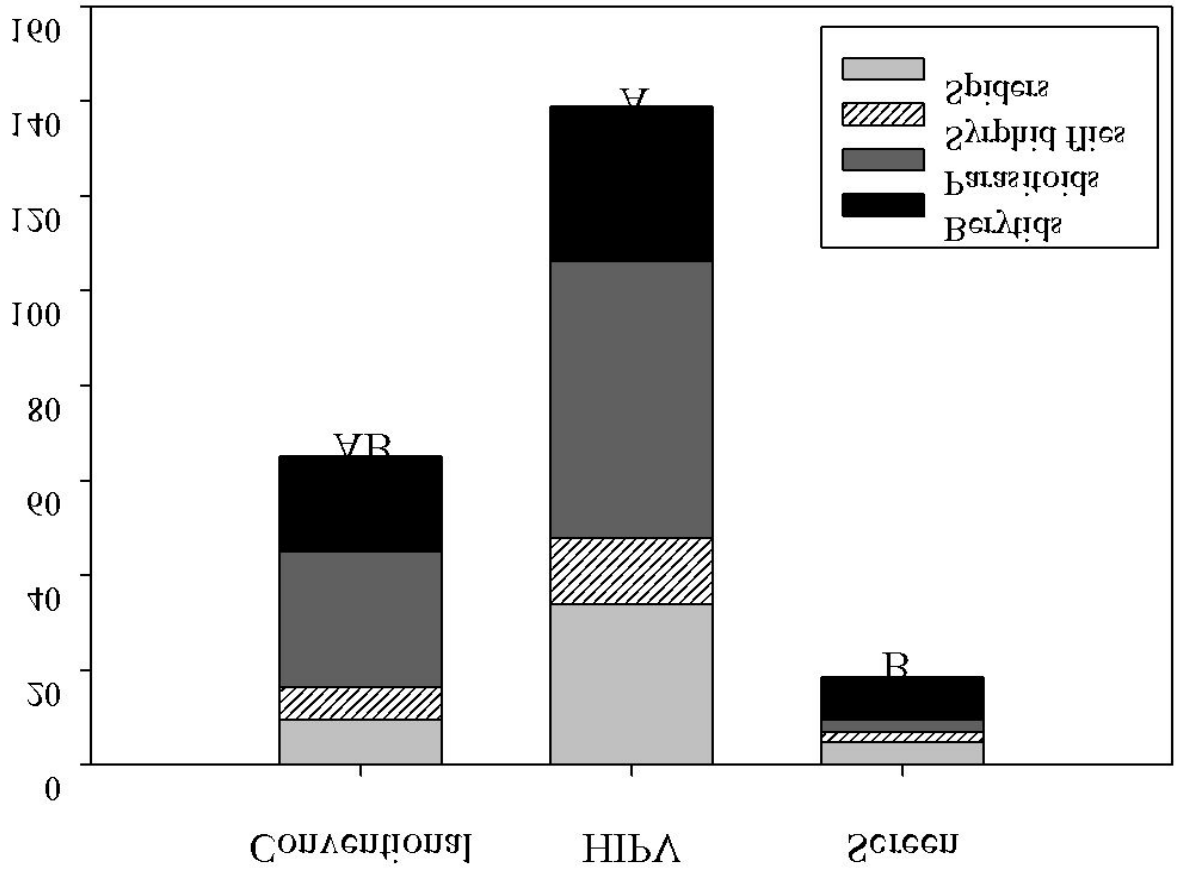
6 Days Post Release
Conventional
HIPV
Screen
0.0
0.3
0.5
0.7

BEYOND ORIUS, FLOWERS WERE GOOD!



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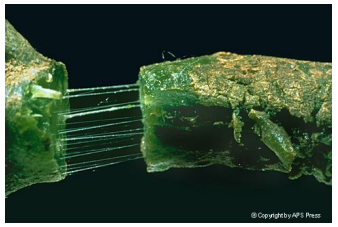
Lessons Learned

- Screening protects against cucumber beetles and bacterial wilt



- Screening can increase aphid outbreaks

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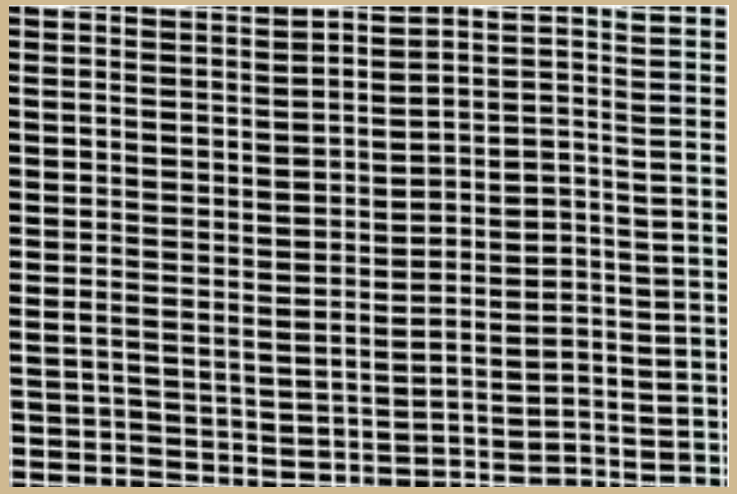
Open
Screened
130
120
110
100
90
80
70
60
Aug 2012
Jul 2012
Jun 2012
May 2012
Oct 2014
Sept 2014
Aug 2014
Jul 2014
Jun 2014
Overall mean

Insect Exclusion Screens

LS Econet 100400
- Hole 1.00 x 4.00 mm
- 90% PAR transmission
- 5% ventilation reduction



Anti-Insect Netting, 25 Mesh
- Hole 0.72 x 0.97 mm
- 78-82% PAR transmission
- 40% ventilation reduction

Eunis

Corinto

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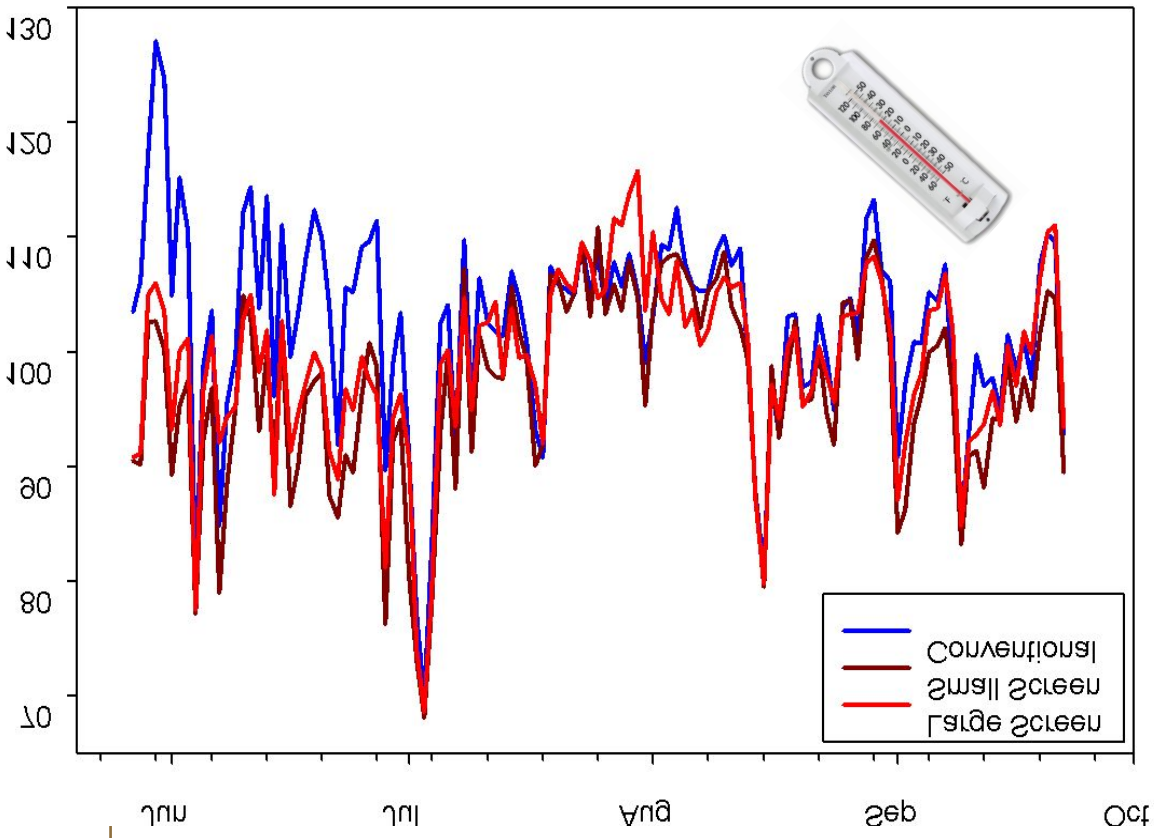
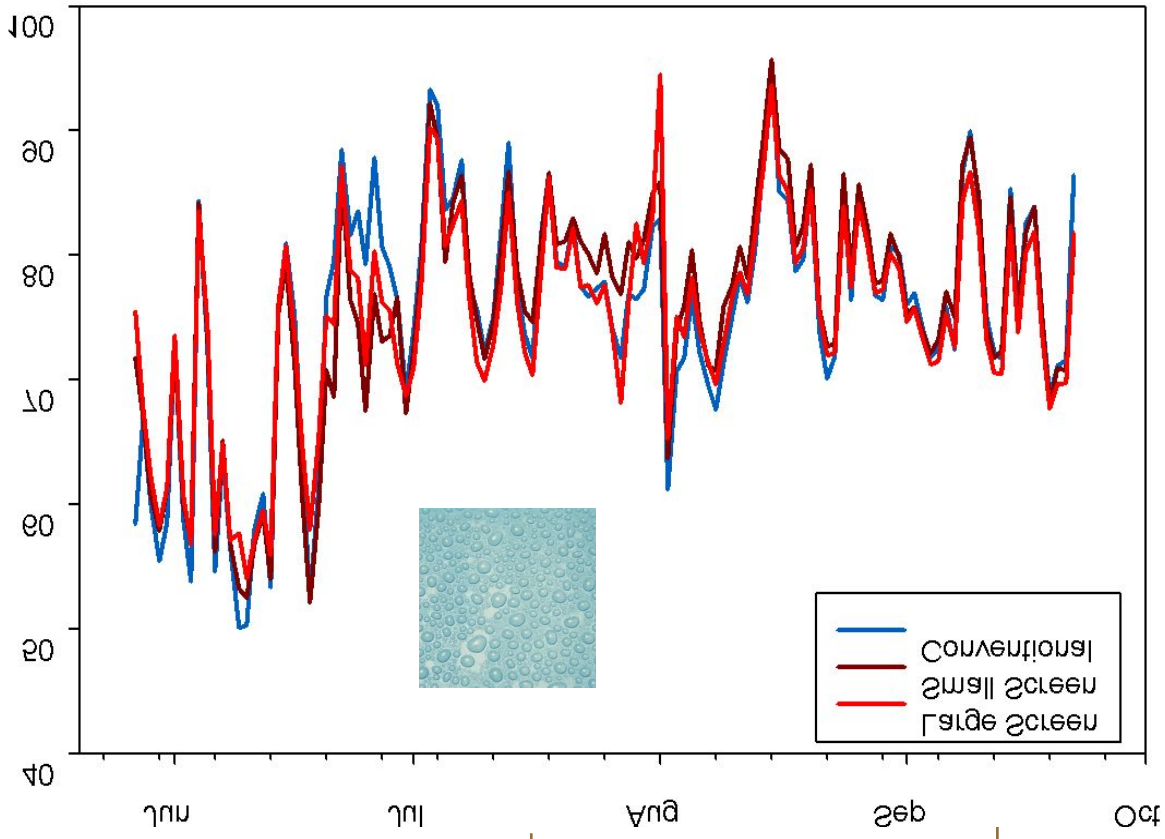
No difference in temperature or %RH





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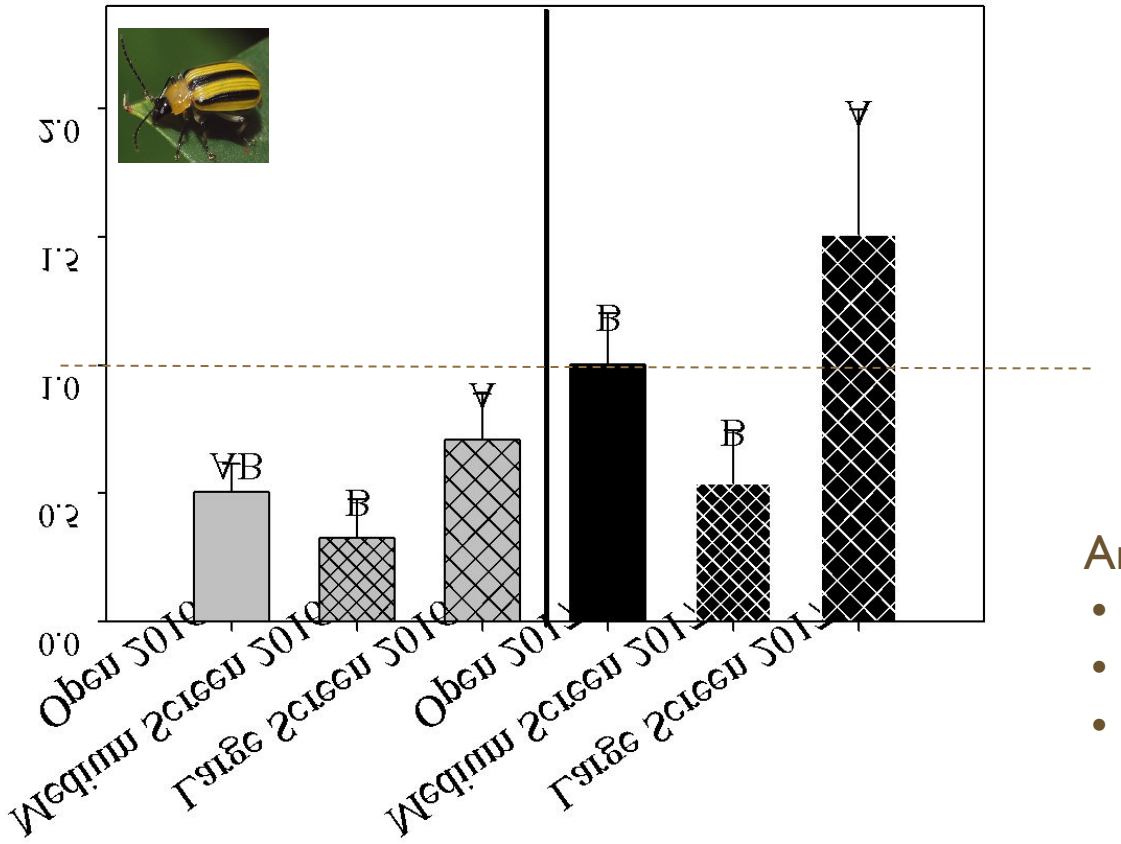
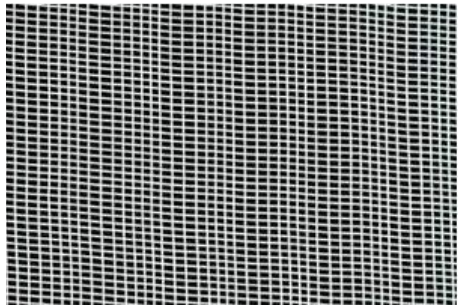
Utility of Screening





Anti-Insect Netting, 25 Mesh

- Hole 0.72 x 0.97 mm
- 78-82% PAR transmission
- 40% ventilation reduction

1.00 x 4.00 mm
too big!

0.40 x 0.45 mm
too small!

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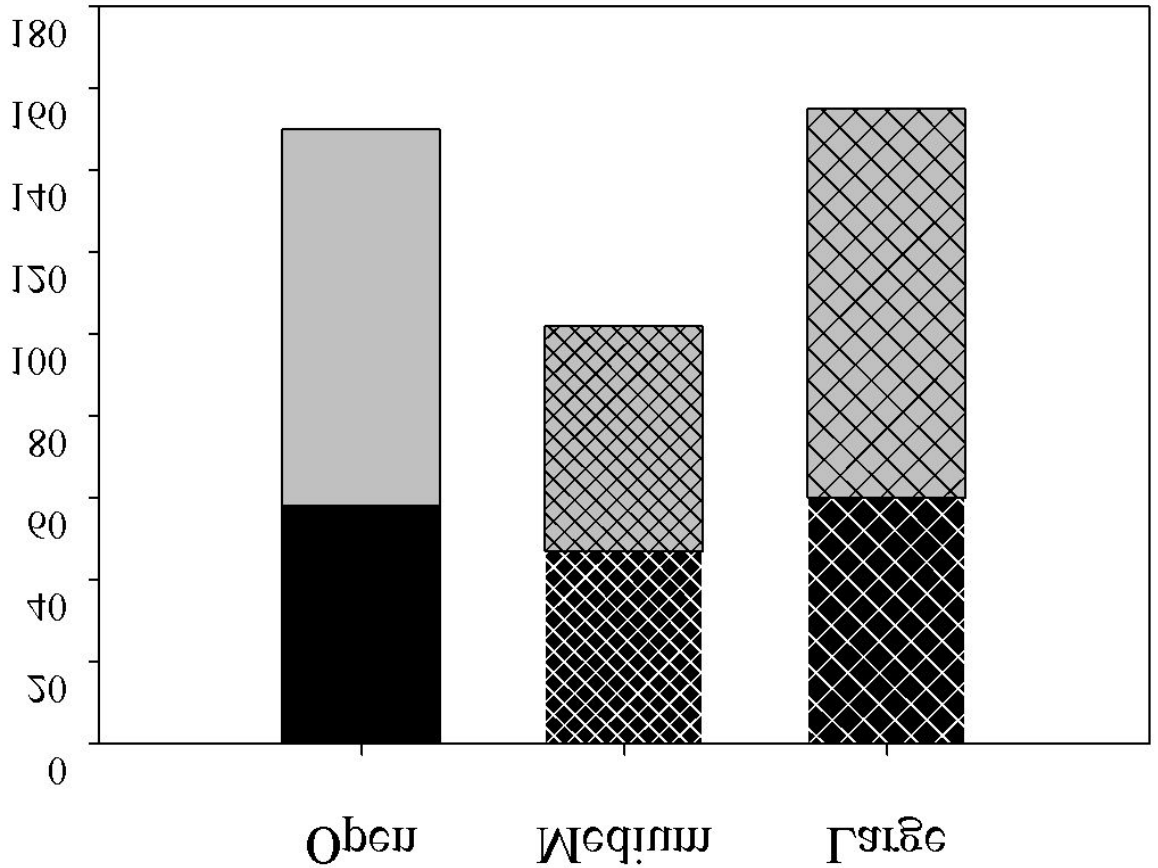
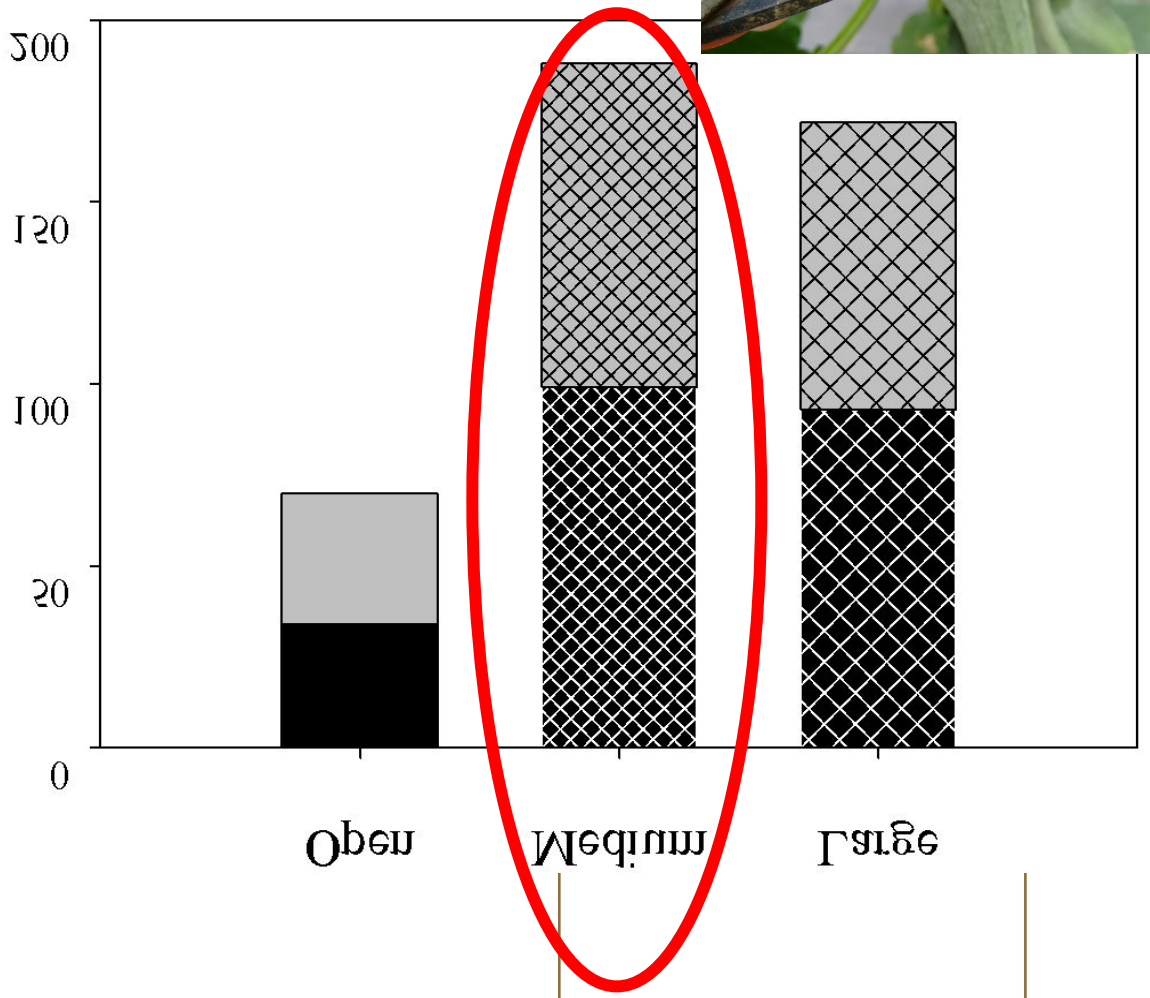
Best management practices are key!





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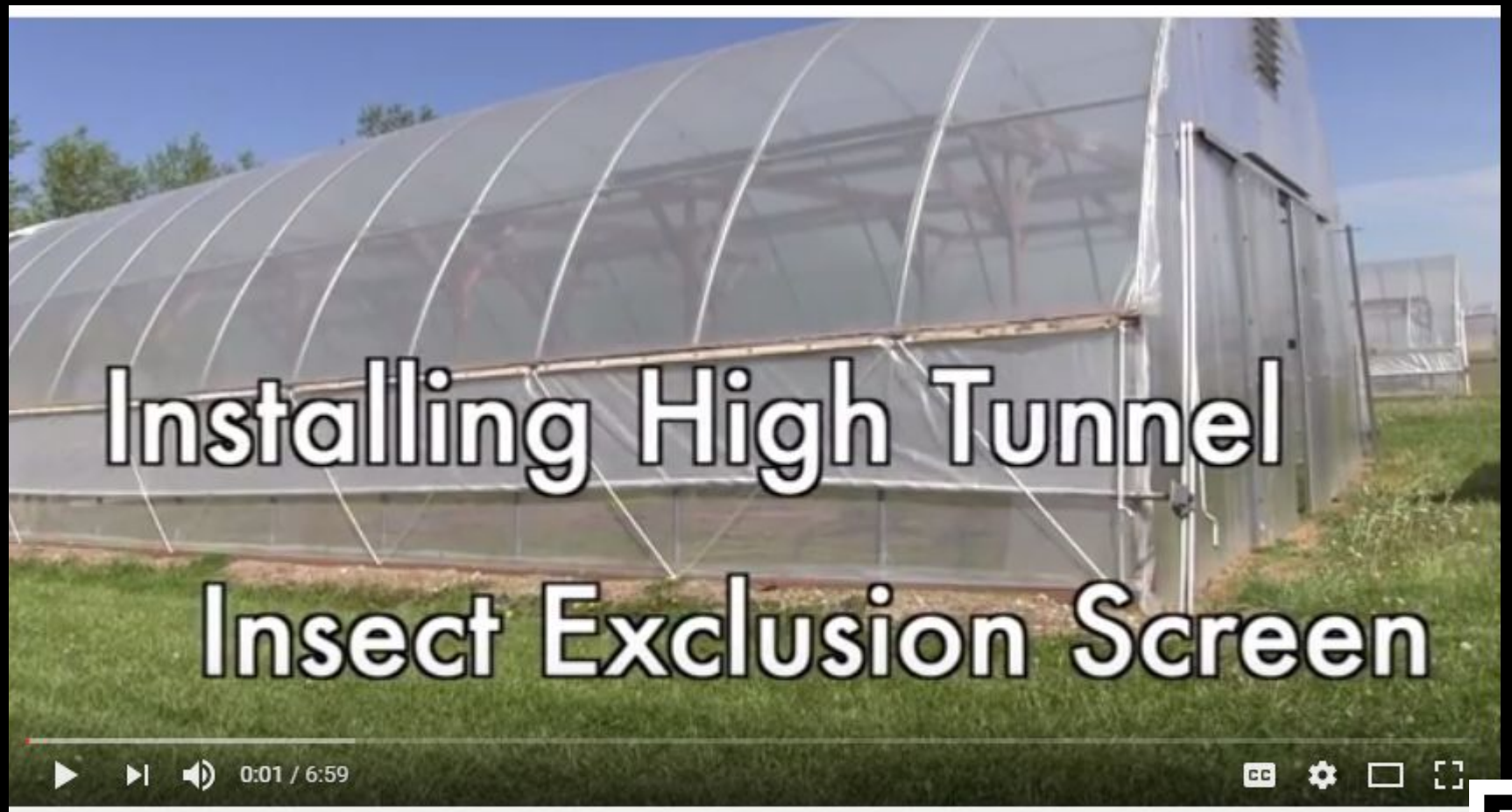

Installing High Tunnel Insect Exclusion Screen

P

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- General Production Considerations
- Cultivar Selection
- Pruning and Trellising Systems
- Insect and Mite Management
- Disease Management
- Physiological Disorders
- Grafting

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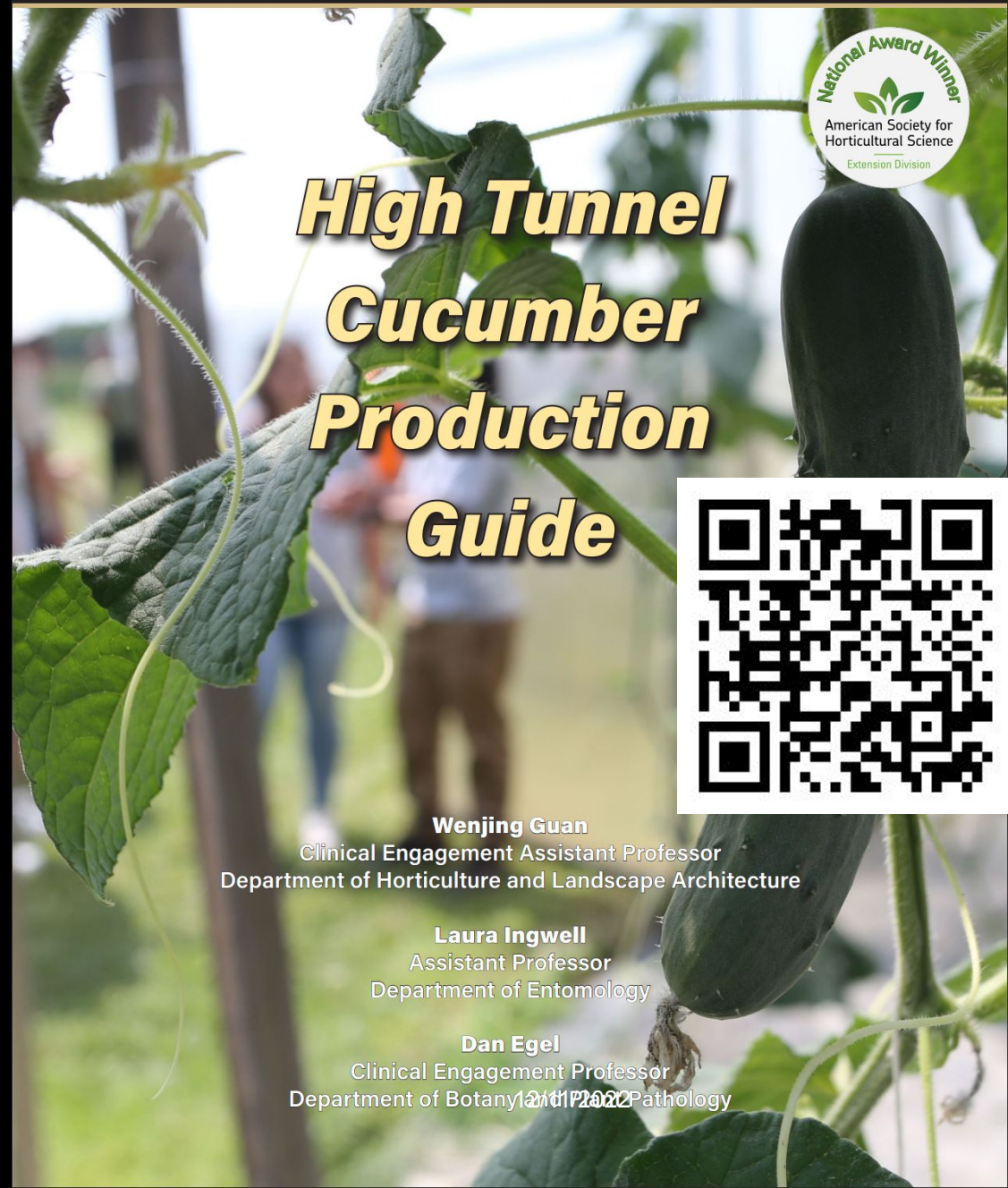

High Tunnel Cucumber Production Guide

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