

IPM considerations for organic fruit production: managing insect pests



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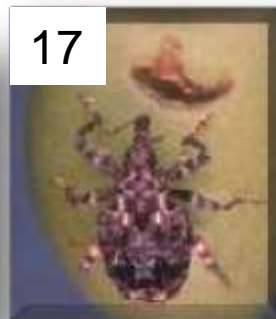
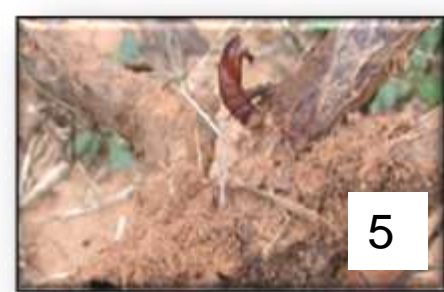
[Raspberry Crown Borer](#)

Outline

- Organic tactics against:
 - Codling moth or Oriental fruit moth
 - San Jose scale
 - Plum curculio
 - Japanese beetle
 - Grape root borer
- Screen exclusion
- Summary

Integrated Pest Management (IPM)

- USDA IPM Roadmap (2003) definition of IPM:
 - ❖ Science-based, decision-making process that identifies and reduces risks from pests and pest management related strategies.
 - ❖ It coordinates pest biology, environmental information and available technology to prevent unacceptable levels of pest damage by the most economical means, while posing the least possible risk to people, property, resources, and the environment.



Organic Apple Project

09/2008 - 08/2013 **Best management practices for organic orchard nutrition.** USDA-CSREES Integrated Organic Program (IOP). Co-PI: Rom, Garcia, Johnson, Popp, Savin.

Objectives:

Evaluate effects of ground cover and nutrient management practices on soil chemical, physical and biological characteristics, plant health

- Evaluate organic pest management practices
- Apprenticeship program mentored by a local grower
- Develop economic production and marketing budgets
- Develop organic apple teaching module

Organic Orchard Management

Developing Best Practices for Ground Cover, Nutrition and Pest Management in the South



'Enterprise'




Pest Management




Surround white wash



CM or OFM trapping



Isomate CM/OFM
TT dispensers
used between
early and late
season sprays of
Entrust, Cyd-X, Bt



Benzaldehyde +
plum essence
baited PC
pyramid traps set
around perimeter

Organic Apple PM Program



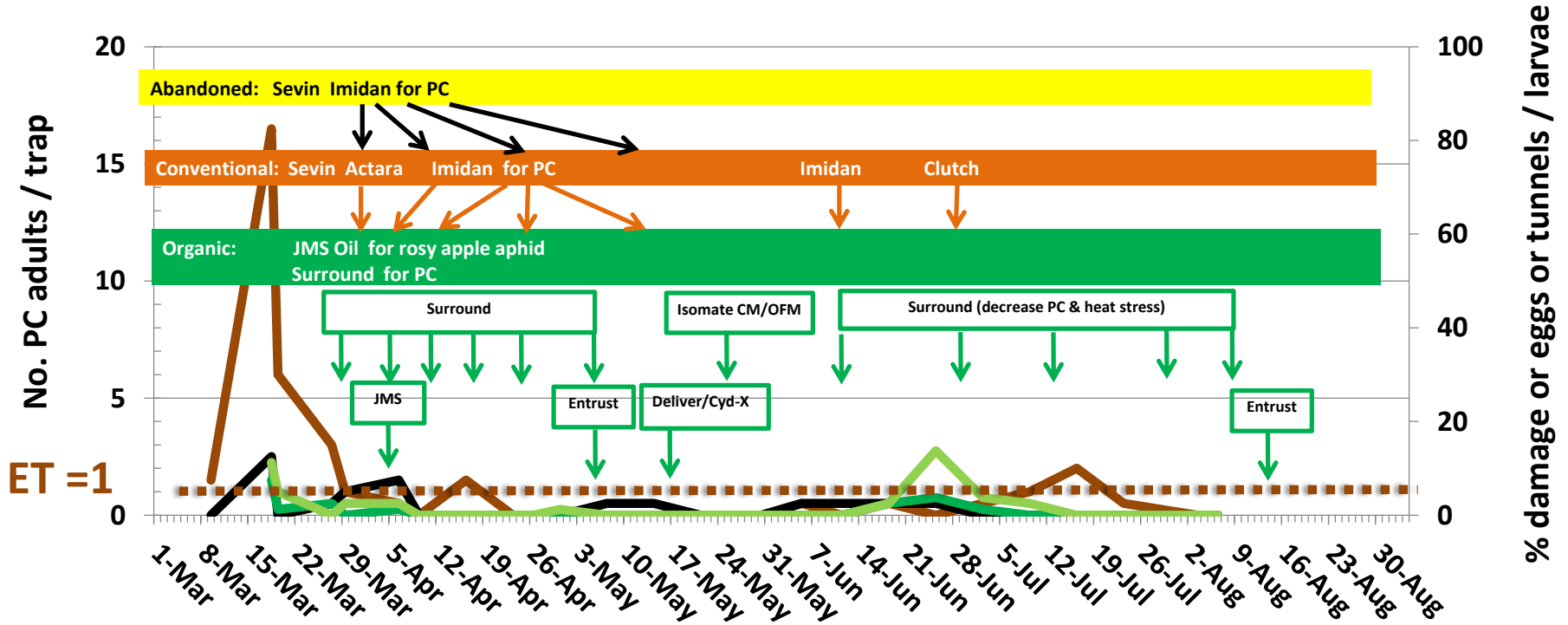
Fayetteville 2012



— PC per trap (abandoned)

— PC per trap (conv.)

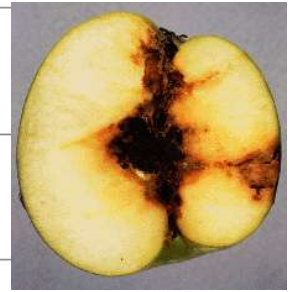
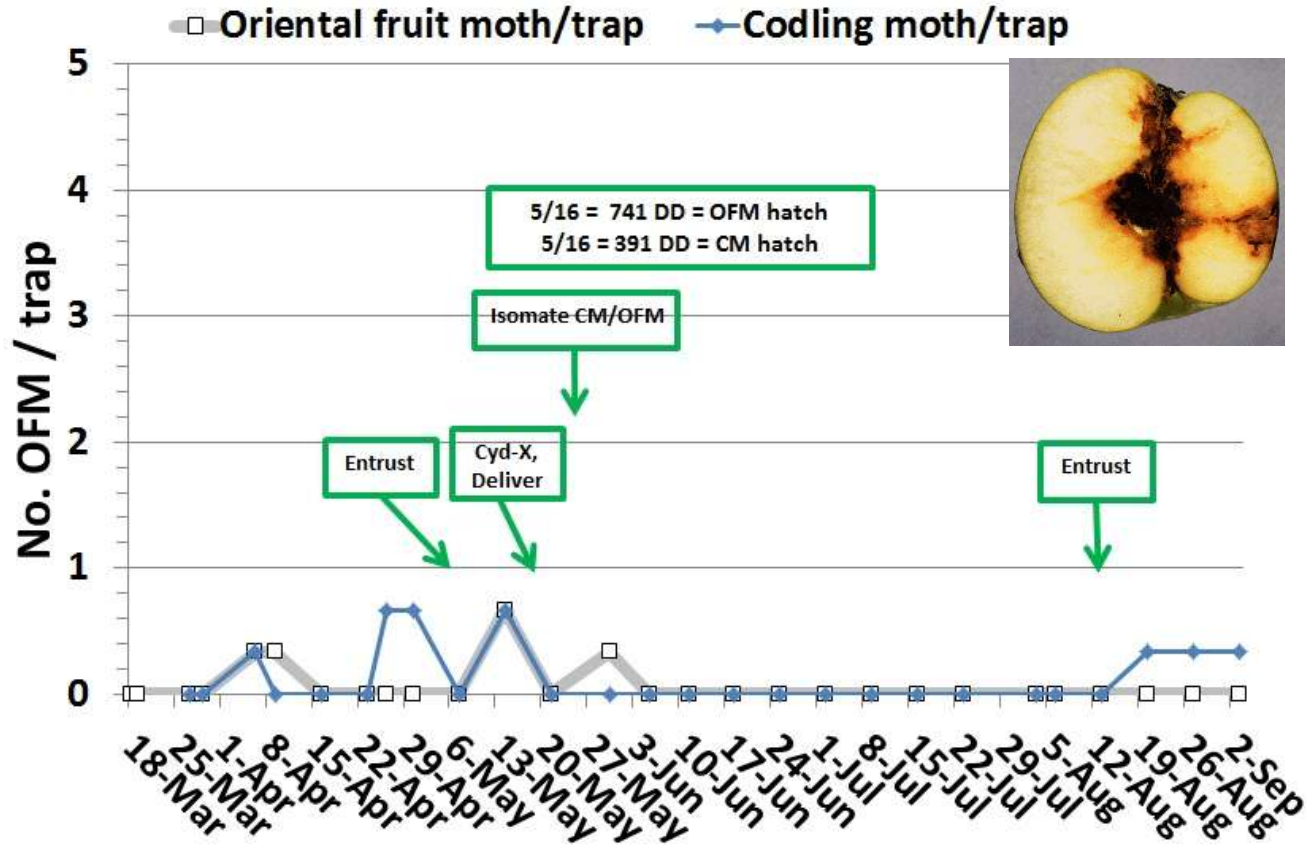
— PC per trap (Org. N)



Organic Apple PM Program

(overwintered density was low due to similar program in previous years)

Fayetteville 2012



Apple Pest/Disease Damage in Organic 'Enterprise' Apples

Year	% PC	% CM/OFM	% SJS
2008	3.7	1.1	1.5
2009	23.3	7.1	25
2010	25.8	0.2	23.3
2011	41.0	0	0
2012	38.7	0	9.5



- Damage by CM and OFM prevented by Entrust, Cyd-X, Bt and Isomate CM/OFM ties
- Damage by SJS prevented by 4 JMS Stylet Oil sprays in 2011
- Damage by plum curculio reduced by Surround whitewash compared to 100% damage in untreated orchards

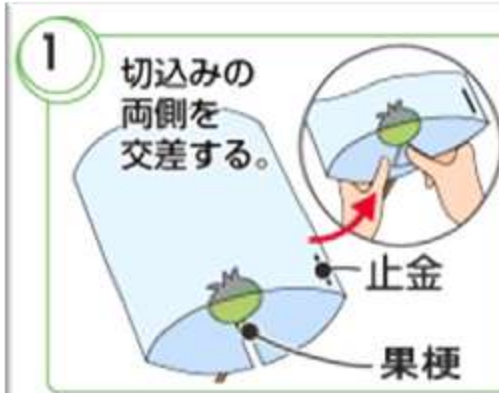
Can Japanese Fruit Bag Prevent Damage?

Undergraduate, Spencer Fiser, determined effect of date of fruit bag placement on percent fruit damage

- 25 fruit bag wrapped over fruit on several dates
- Aug. 28, assessed fruit damage at harvest



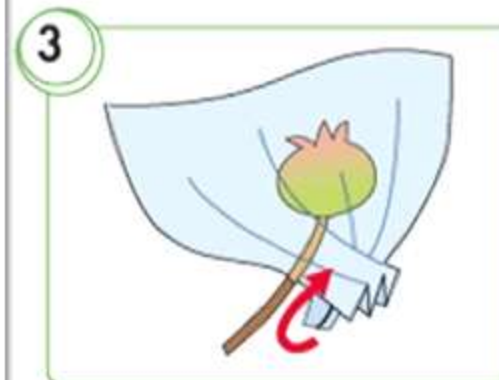
Placement of Fruit Bag



First, expand the sack. Next, the young fruit is positioned by slipping the stem into the center slot of the open sack.



Gather the left side of the open bag top and lay it over the embedded wire on the right side as you prepare to wrap and twist as shown in step 3.



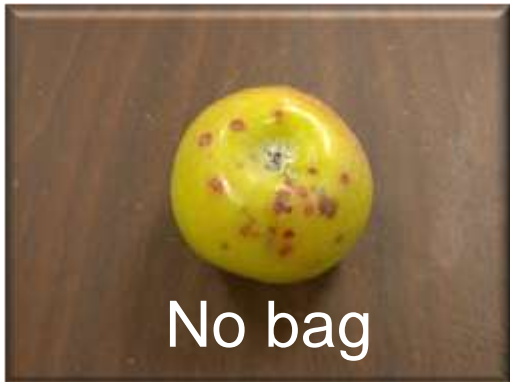
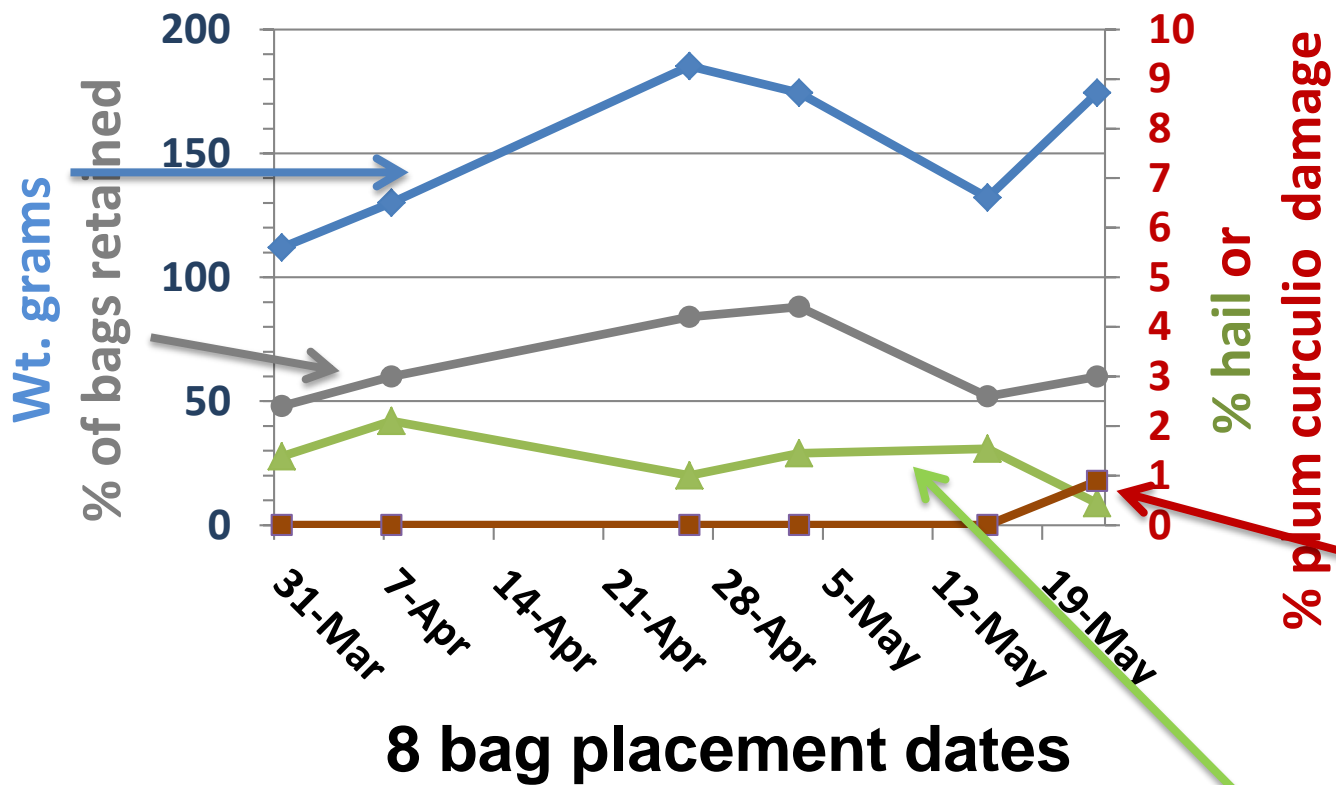
Use the wire embedded in the right side like a twist tie to wrap up and over the bunched left top until clasped securely. Try to keep the sack "inflated".



Gently tap the bottom of the expanded sack to appear dented or concave, this preserves the ballooned shape.

Source of Japanese Fruit Bags:
Wilson Irrigation & Orchard Supplies,
1902 S. 11th St., Union Gap, WA 98903;
(800) 232-1174 (\$0.14 ea. Or
\$140/1000 bags)

Results: < 2% damage



- % of bags retained
- ▲ % Hail
- % Plum curculio



8 bag placement dates



Surround Prevents Japanese Beetle Damage



Grape Root Borer



GRB pheromone trap to monitor flight or mass trap males



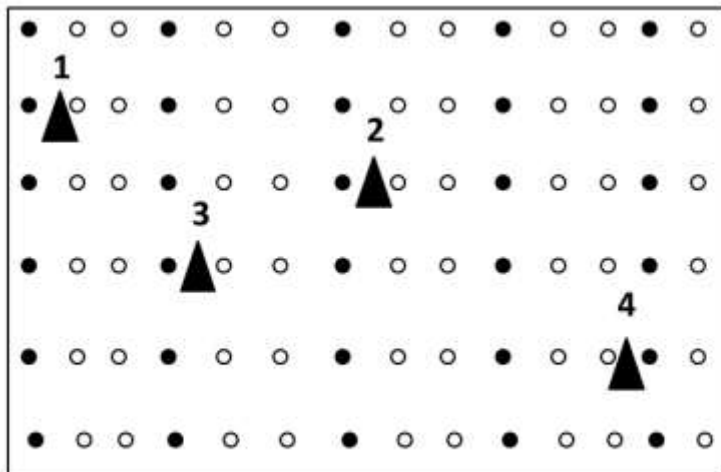
GRB male
(female lays eggs on leaves & larva enters soil to tunnel in roots)



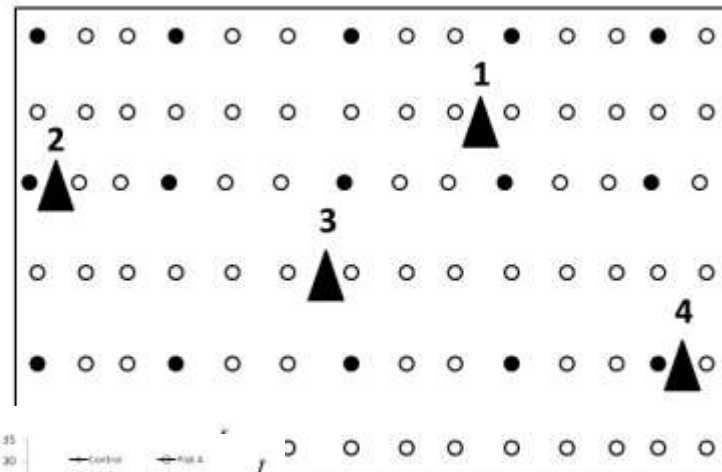
GRB larva tunneling in grape root

- Larva tunnels in grape & muscadine roots = slowly causes vine decline and death
- Apply soil application of Lorsban in mid-June to prevent larval entry to roots (35 day PHI)
- Mating disruption using Isonet-Z pheromone ties
- Mass trap GRB males in sex pheromone baited green bucket traps at density of 1 trap per acre

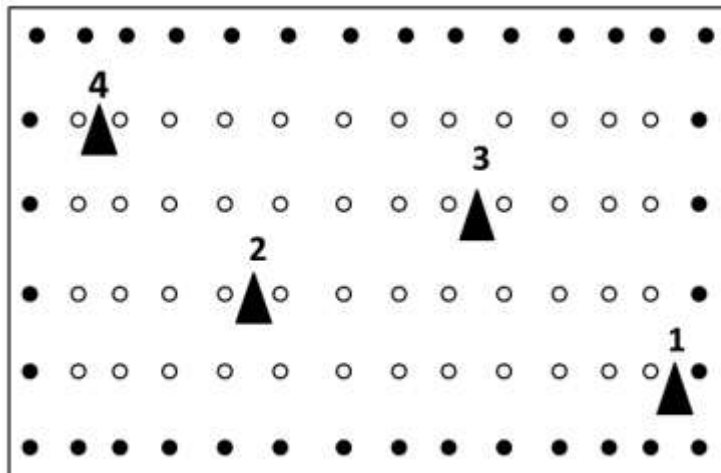
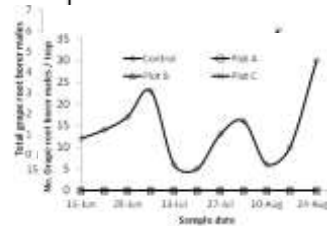
Mating Disruption



Plot A



Plot B



Plot C

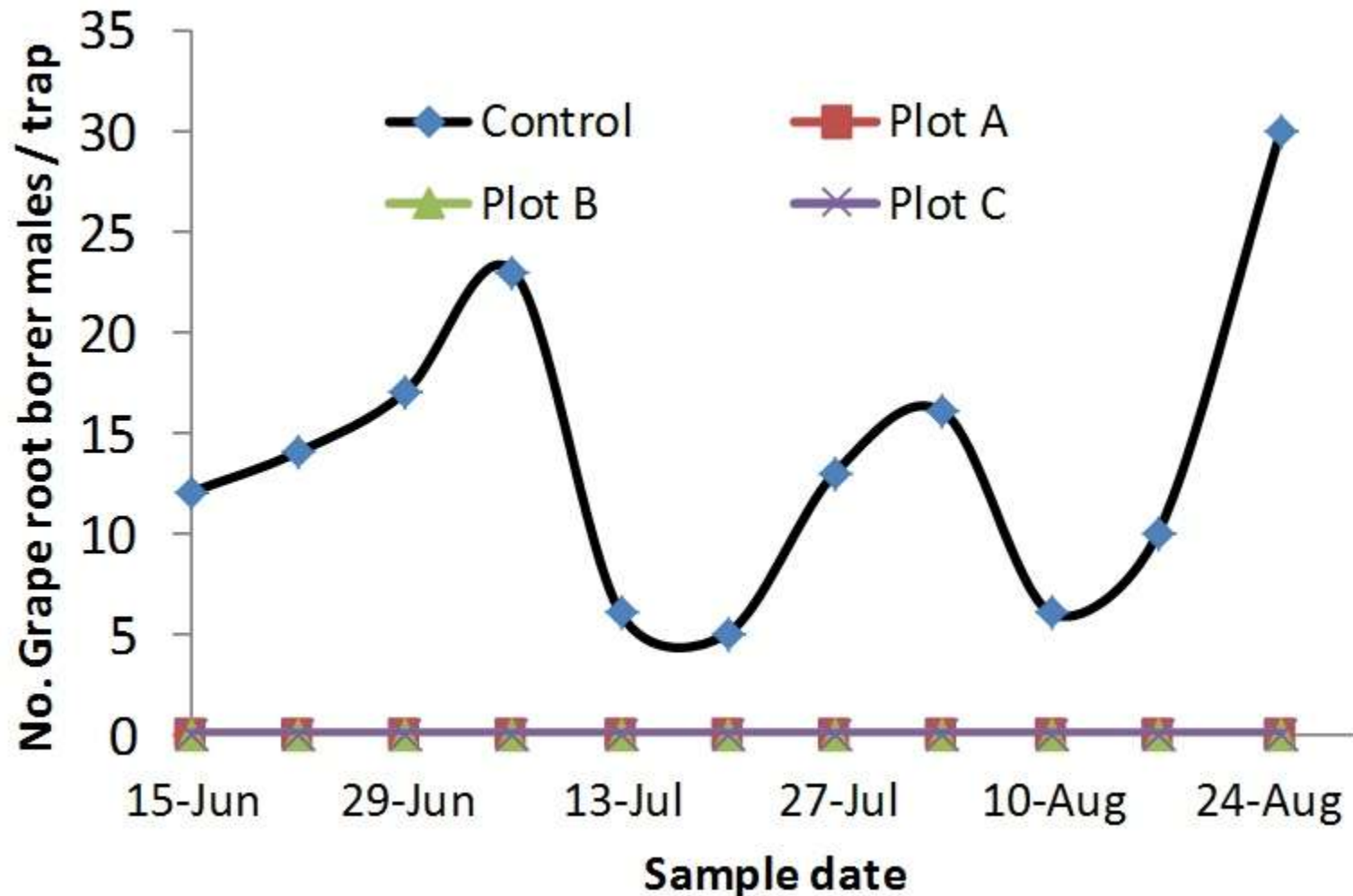
Muscadine vine *without* a twist-tie (○)

Muscadine vine *with* a twist-tie (●)

Baited monitoring wing trap = ▲

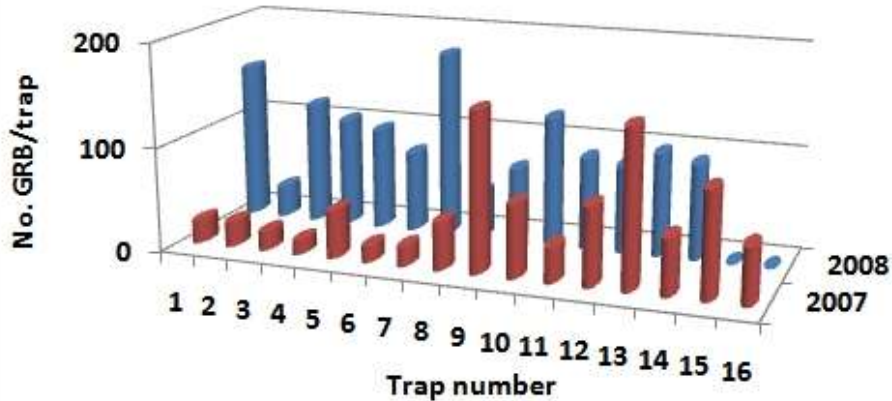


Results: Isonet-Z ties reduced trap catch to zero which implies no mating

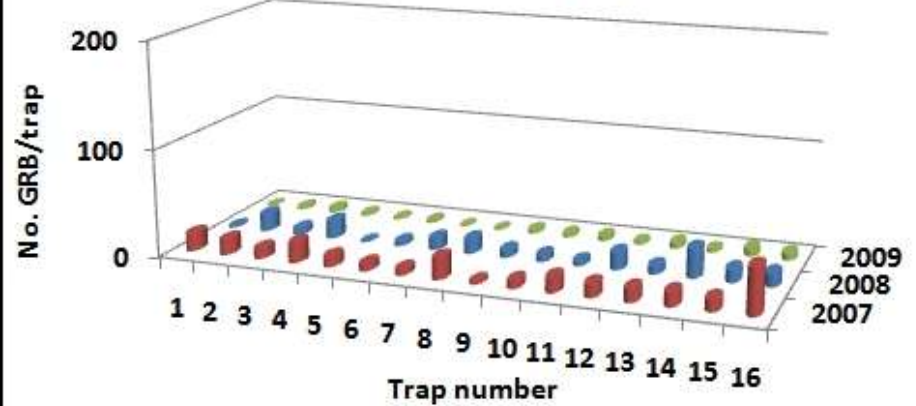


Mass Trapped GRB (2007-2009)

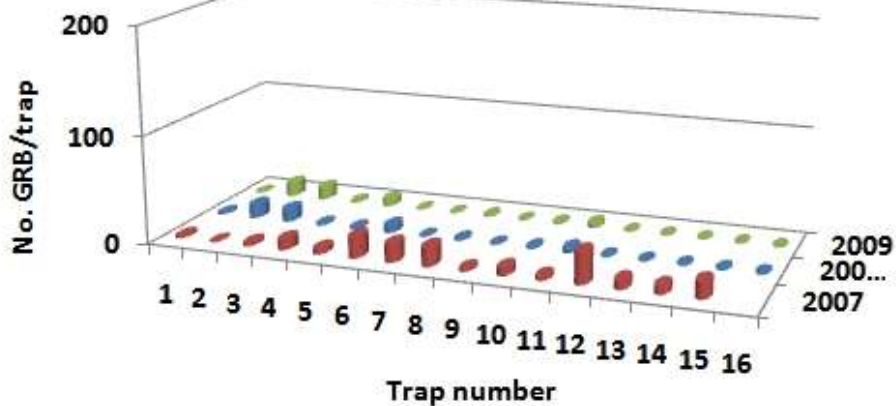
Farmington, Missouri ('Chardonel')



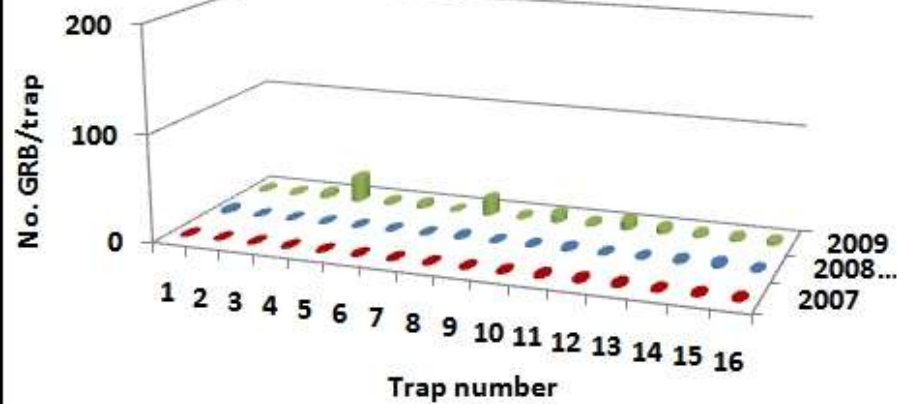
Hermann, Missouri ('Vidal')



Bethel Heights, Arkansas ('Concord')

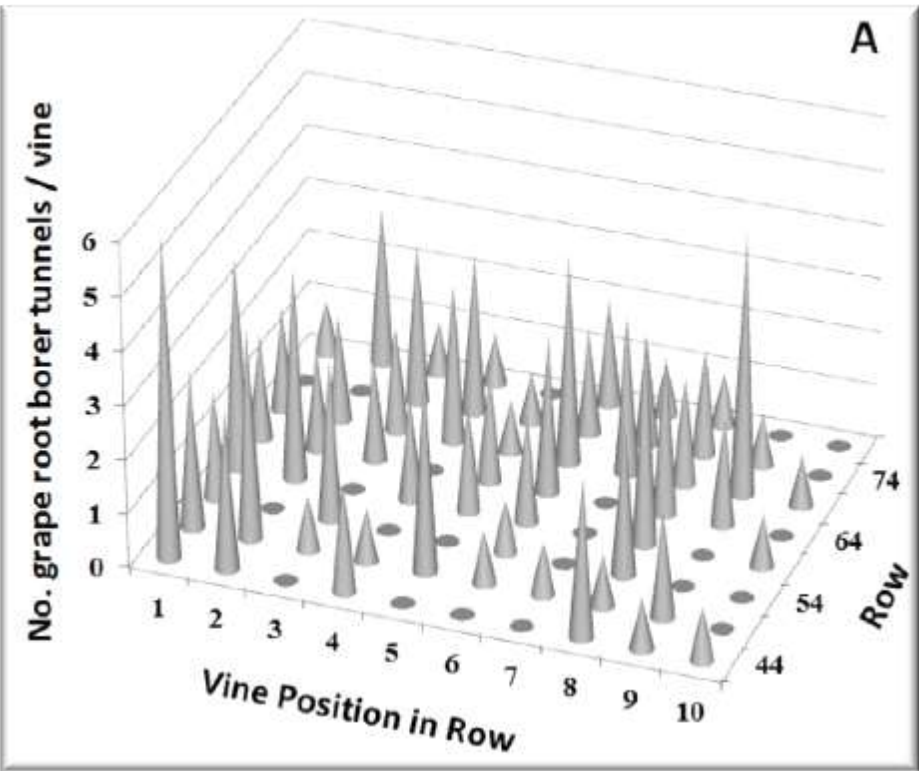


Hindsville, Arkansas ('Concord')

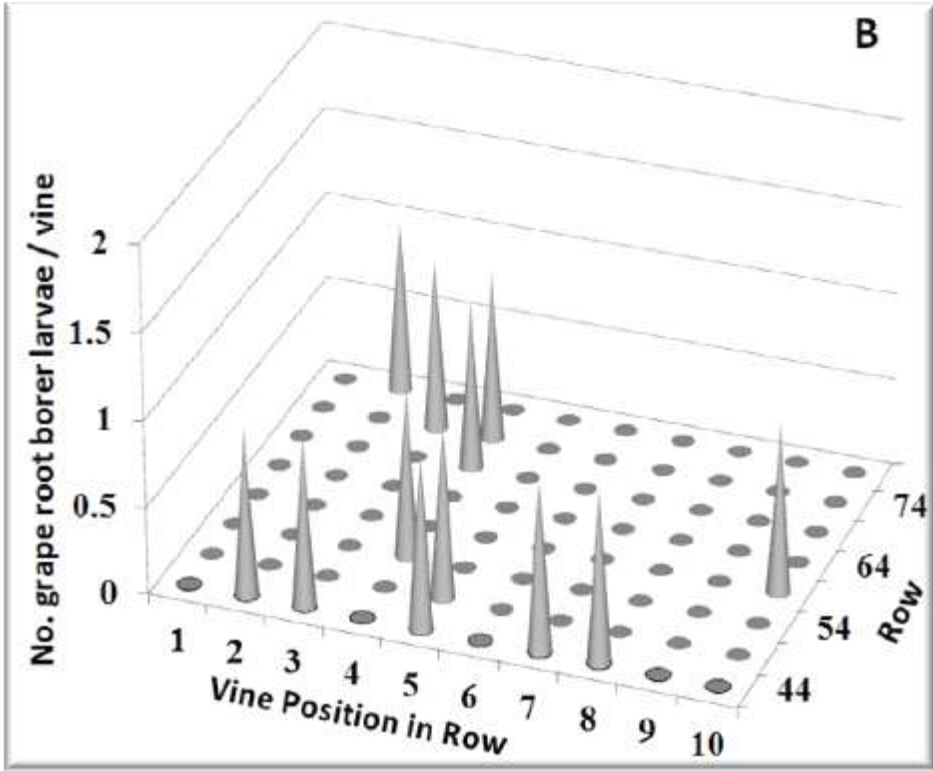


Result: mass trapping reduced larvae in roots (2009)

Roots with tunnels



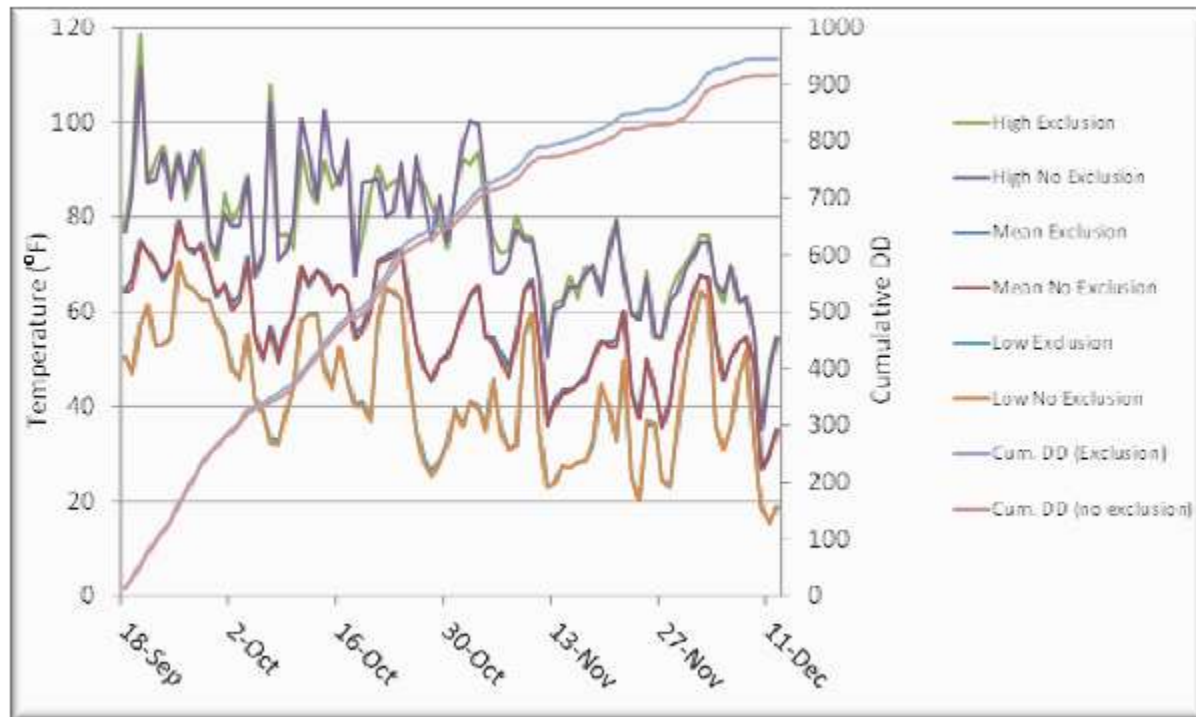
Roots with larvae



Future: exclude insects in high tunnel evaluating ProtekNet screen



Placement of ProtekNet screening



Very little difference in temperature in high tunnel with screen vs. no screen (Fayetteville, AR 2012)



Summary

- Japanese fruit bags prevented disease and insect damage
- 4 weekly sprays of JMS Stylet oil prevented SJS spots
- Mating disruption in combination with Entrust, Bt and/or codling moth virus (Cyd-X) prevented wormy fruit
- Japanese fruit bags produce 98% clean fruit
- Surround whitewash did not reduce damage by plum curculio but prevented Japanese beetle damage
- Mass trapping (1 trap/acre) and mating disruption both reduced grape root borer larval counts and mating
- ProtekNet screen on high tunnel may exclude many pests

Acknowledgements

- Funding sources and/or suppliers:
 - USDA-Integrated Organic Program: Best Management Practices for Organic Orchard Nutrition
- Materials / Sources:
 - Certis USA / Cyd-X (virus), Deliver (*Bt*)
 - Dow / Entrust (spinosad)
 - Engelhard Corporation / Surround
- Assistants:
 - Barb Lewis, Sam Kim, Brian Cowell, Kevin Durden, Clint Trammel



Questions?

