Alternative Effects of Shade Netting Over Apple Orchards

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History of Nets in Orchards

- Hail nets
- Shade nets
Types of Net Structures

- Drive-in enclosure
- Tree wrap
- Top-cover only
Multiple Functions

- Minimize heat stress
- Eliminate overhead cooling
- Improve fruit size, skin color
- Reduces worker exposure to UV and heat stress
- Excludes vertebrate (birds/deer)
- Exclude insects
Cage Construction

4- 40’x50’x15’ Cages
48 trees/cage

12- 10’x10’x5’ Cages
3 trees/cage
Ability to exclude direct pests

codling moth

leafrollers

Photo: Jay Brunner

Photo: Doug Wilson

Photo: H. Reidl
Moth Exclusion

- Large resident population
- Remove populations within cages
- Traps deployed in netted and non-netted areas
Effects on indirect pests and natural enemies

• Do cages affect predator/prey population dynamics?

• Indirect Pests: Woolly apple aphid

• Natural Enemies: Lacewings, Syrphids, *Aphelinus mali*
Density Tracking

- Deploy traps to monitor densities throughout growing season
- Determine treatment effects on seasonal abundance of pests and natural enemies
2016 Results

**Small Cage Earwig**

- Avg. Earwig CID / Plot
- 1. Caged: a
- 2. Airblast: b
- 3. Control: ab

**Large Cage Earwigs**

- Avg. Earwig CID / Plot
- 1. Caged: a
- 2. Airblast: a
- 3. Control: a

Photos:
- Photo: E. Beers
- Photo: J. Brunner
A. mali CID

Avg. A. mali CID / Plot

1. Caged
2. Airblast
3. Control

Photo: E. Beers
Woolly Apple Aphid CID

Avg. WAA CID / Plot

1. Caged
2. Airblast
3. Control

Photo: A. Marshall
**Codling Moth CID**

- **1. Caged**
  - Avg. CM CID/Plot: 20

- **2. Airblast**
  - Avg. CM CID/Plot: 120

- **3. Control**
  - Avg. CM CID/Plot: 160

*Photo: W. Cranshaw*
Codling Moth Damage

Percent CM Damage


Photo: E. Beers
What about other applications?

• Full enclosure requires a significant upfront investment

• Other direct pests?
Efficacy of a barrier at orchard border

- Will a barrier reduce migration into the orchard?
- Will insecticide infused netting be more effective?
Making Dreams a Reality

Photo: A. Marshall
Success!!!
Acknowledgements

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