Optimizing Row Cover Systems for Cucurbit Growers in Kentucky

Katie Fiske
Masters student in Dr. Gonthier’s Lab
UK Entomology
Pests and Diseases of Cucurbits

- **Cucumber beetles**
- **Squash bug**
- **Squash vine borer**
- **Bacterial wilt**
- **Cucurbit yellow vine disease**
- **Powdery mildew**
- **Downy mildew**
## Traditional Methods of Control: chemicals

<table>
<thead>
<tr>
<th>Conventional Insecticide</th>
<th>Cucumber Beetles</th>
<th>Squash bug</th>
<th>Squash vine borer</th>
<th>Conventional Fungicide</th>
<th>powdery mildew</th>
<th>downy mildew</th>
<th>Organic Pesticides</th>
<th>Cucumber Beetles</th>
<th>Squash bug</th>
<th>Squash vine borer</th>
<th>powdery mildew</th>
<th>downy mildew</th>
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</thead>
<tbody>
<tr>
<td>Asana XL</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Actigard</td>
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<td>X</td>
<td>Surround WP (kaolin clay)</td>
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<tr>
<td>Assail 30 SG</td>
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<td>Aftershock</td>
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<td>Pyganic Crop Spray 5.0 EC (pyrethrins)</td>
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<td>Belay 2.13 SC</td>
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<td>Ariston</td>
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<td>Entrust (spinosad)</td>
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<tr>
<td>Brigade 2 EC</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Cabrio</td>
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<td></td>
<td>Neem</td>
<td>X</td>
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<tr>
<td>Danitold 2.4 EC</td>
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<td>Chlorothalonil</td>
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<td>Javelin WG (Bt)</td>
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<tr>
<td>Harvanta 50 SL</td>
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<td></td>
<td></td>
<td>Curzate 60 DF</td>
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<td>Azera (azadirachtin)</td>
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<tr>
<td>Mustang Maxx</td>
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<td>X</td>
<td></td>
<td>Dexter Max</td>
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<td></td>
<td></td>
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<td>Permethrin 3.2 EC</td>
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<td>X</td>
<td>X</td>
<td>Dexter XCEL</td>
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<tr>
<td>Scorpion 35 SL</td>
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<td></td>
<td></td>
<td>Elumin</td>
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<tr>
<td>Sevin XLR</td>
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<td>Fixed Coppers</td>
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<td>Flint Extra</td>
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<td>Venom 70 SG</td>
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<td>Fluazinam</td>
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<tr>
<td>Warrior II</td>
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<td>X</td>
<td>X</td>
<td>Fluoxastrobin</td>
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<td></td>
<td>X</td>
<td>X</td>
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<tr>
<td>Rimon 0.83 EC</td>
<td>X</td>
<td></td>
<td></td>
<td>Gavel 75 DF2</td>
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<td>X</td>
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<tr>
<td>Sivanto 1.67 SL</td>
<td>X</td>
<td></td>
<td></td>
<td>Luna Experience</td>
<td>X</td>
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</tr>
</tbody>
</table>

**Resource Guide for Organic Insect and Disease Management**

**UK’s ID-36: Vegetable Production Guide for Commercial Growers**
Row Cover for Insect Exclusion

Photos: Dave Gonthier
4 Big Challenges to Using Row Covers

• Challenge 1: Cost
• Challenge 2: Non-insect vectored Disease Management
• Challenge 3: Weed Management
• Challenge 4: Pollination
# Row covers

![Photo: Robby Brockman](image)

<table>
<thead>
<tr>
<th>Product</th>
<th>Price</th>
<th>Weight</th>
<th>Size</th>
<th>~ Duration</th>
<th>Pieces for 1 50'x300' field</th>
<th>Cost for 1 50'x300' field</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agribon AG-19</td>
<td>$592</td>
<td>0.55 oz. (lightweight)</td>
<td>30'x1000'</td>
<td>1-3 seasons</td>
<td>1</td>
<td>$592</td>
<td>Arbico-Organics</td>
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<tr>
<td>ProtekNet</td>
<td>$1,256.80</td>
<td>60 gram</td>
<td>26'x328'</td>
<td>5 years</td>
<td>2</td>
<td>$2,512</td>
<td>Dubois Agrinovation</td>
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<tr>
<td>ExcludeNet</td>
<td>$752 (2020 pricing)</td>
<td>60 gram</td>
<td>26'x328'</td>
<td>5 years</td>
<td>2</td>
<td>$1,504</td>
<td>Berry Protection Solutions</td>
</tr>
</tbody>
</table>
Other Supplies you will need:

• Hoops (10’ EMT conduit pipe)
Other Supplies you will need:

- Something to weigh the net down:
  - Pavers
  - Rock bags
  - Sand bags
  - Old layflat with gravel (Maggie Dungan’s of Salad Days Farm “sand snakes”)
  - Layflat with water
  - PVC pipe filled with water or gravel
  - etc
Other Supplies you will need:

• Field sewing machine
• Needle, UV resistant thread
Further considerations:

- Table Ace acorn squash
- Athena muskmelon
- White raised plastic beds on 7’ centers
- 3 beds per plot
Challenge 2: non-insect vectored disease management

Powdery Mildew Incidence

- Control: 50%
- Row Cover: 20%

Avg. # of cucumber beetles/plant

- Control: 10
- Row cover: 1

Avg. total marketable weight, acorn squash

- Control: 15 lbs.
- Row Cover: 20 lbs.
Challenge 3: weed management

Use living mulch as a cover crop in between beds

Options:
• Teff
• Buckwheat
• Annual rye and clover?
Challenge 3: weed management

Early season teff

At muskmelon flowering - teff

Photos: Robby Brockman
Challenge 3: weed management

End of season teff

End of season buckwheat
Challenge 3: weed management

Some things to consider:
• Could mow the cover crop
• Use landscape fabric
Challenge 4: Pollination

• Most squash are pollinator dependent
• Nets will exclude both pests and pollinators
• Need to make sure bees have access to flowers at the flowering stage
## Challenge 4: Pollination

<table>
<thead>
<tr>
<th>On off</th>
<th>On off on</th>
<th>Open ends</th>
<th>Full season</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nets on</td>
<td>Nets on</td>
<td>Nets on, ends closed</td>
<td>Nets on, stocked bumble bees</td>
</tr>
<tr>
<td>Nets off</td>
<td>Nets off</td>
<td>Nets on, ends open</td>
<td></td>
</tr>
<tr>
<td>Nets on</td>
<td>Nets on</td>
<td>Nets on, ends closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nets off</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Early transplant**
- **Flowering**
- **Fruit development**
Yr 1 – Acorn Squash - yield (120 ft plots)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Marketable yield (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full season</td>
<td>A</td>
</tr>
<tr>
<td>on-off</td>
<td>A</td>
</tr>
<tr>
<td>on-off-on</td>
<td>A</td>
</tr>
<tr>
<td>open ends</td>
<td>B</td>
</tr>
</tbody>
</table>
Welcome to the Current Cucurbit website!

The Current Cucurbit

IPM strategies for cucurbit organic growers for wilt disease and weeds management.
Questions?

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Ric Bessin: Ric.bessin@uky.edu

Mark Williams: Mark.Williams@uky.edu

The Current Cucurbit: https://www.cucurbit.plantpath.iastate.edu/
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