Best Management Practices for Onion Pests

Christy Hoepting
Cornell Cooperative Extension Vegetable Program

Allium Schools: (abridged version)
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Plattsburgh, NY, October 22, 2013
Onion Thrips

Nymph (0.5 – 1.2 mm)
No wings

Nymphs feeding in leaf axils

Adult
≤ 2 mm
Wings
*Thrips produce 3 to 4 generations in a field, requiring 6 to 8 weeks of protection.
Organic Options

• **Entrust** is the most effective OMRI-approved insecticide
  – Apply at 1 OT per leaf

• Kaolin clay (Surround) provides mediocre control
  – Washes off with rain and needs to be reapplied

• Natural pyrethrins
  – ?
Insecticide Efficacy Trials: Results 2009 (Botanicals)

Botanical Insecticides: Potter, 2009

Neemazad, Neemix, Trilogy, Requiem did not provide effective control
## Registered Insecticides

<table>
<thead>
<tr>
<th>Products</th>
<th>Chemical Class</th>
<th>Active Ingredient</th>
<th>Relative Efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lannate LV</strong></td>
<td>carbamate</td>
<td>methomyl</td>
<td>+</td>
</tr>
<tr>
<td><strong>Radiant</strong></td>
<td>spinosyn</td>
<td>spinetoram</td>
<td>+++</td>
</tr>
<tr>
<td><strong>Movento 240SC</strong></td>
<td>Tetramic acid</td>
<td>Spirotetramat</td>
<td>+++</td>
</tr>
<tr>
<td><strong>Section 18</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Agri-Mek 0.15EC</strong></td>
<td>avermectin</td>
<td>abamectin</td>
<td>++</td>
</tr>
<tr>
<td><strong>Agri-Mek 0.7 SC</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Assail 30SG</strong></td>
<td>neonicotinoid</td>
<td>acetamiprid</td>
<td>-</td>
</tr>
<tr>
<td><strong>Warrior II with Zeon Technology</strong></td>
<td>pyrethroid</td>
<td>lambda-cyhalothrin</td>
<td>+ to ++</td>
</tr>
</tbody>
</table>

**BEST!** Does not work!
Scouting for Onion Thrips

• Start looking for onion thrips in early to mid June
  – Bare root transplants imported from the south may be infested with onion thrips

• Look deep into the leaf axils to find the first thrips of the season
Scouting for Onion Thrips

Thrips should be controlled before you see this much damage
Scouting for Onion Thrips
Management of Onion Thrips

• First line of defense is insecticides

Cultural Practices:

• Mulches (reflective silver plastic, straw)
  – May delay colonization of thrips into onion
    • Delay first insecticide spray
  – May slow development of onion thrips
    • Decrease frequency of sprays
Reflective Silver Mulch
Straw Mulch Reduces Onion Thrips
Botrytis Leaf Blight

Classic BLB lesions:
Look for tiny straw-colored center surrounded by a silvery halo
When BLB lesions get old:
• center becomes sunken, often splits, yellowish in color
• remnants of the silvery halo can usually still be seen
Botrytis Leaf Blight

BLB lesions may be confused with:

- Chemical injury
- Pelting rain injury
- Iris Yellow Spot Virus

Overwinter as sclerotia in soil, cull piles, onion debris.
Optimum conditions: 59 – 65 °F + 12 hours leaf wetness; greatly reduced above 81 °F
Alternaria Purple Blotch

Look for purple or tan boat-shaped lesions on otherwise green leaf tissue.
Alternaria Purple Blotch

- Over-winters in crop residue and cull piles
- Optimum conditions:
  - 77 °F, min: 55 °F, max: 97 °F
  - 90+ % RH
  - Long periods of leaf wetness
- Shows up in late-June, early August
Downy Mildew
Downy mildew is invaded by secondary pathogens including Purple Blotch & SLB.
Downy Mildew

- Optimum Conditions:
  - 50-54 °F plus long dew periods
  - Day time temps > 74 °F can prevent sporulation

- VERY challenging to control

Onions die standing up from downy mildew
# Fungicide Recommendations

**Hoepting et al.**

<table>
<thead>
<tr>
<th></th>
<th>Purple Blotch</th>
<th>Botrytis Leaf Blight</th>
<th>Downy Mildew</th>
<th>Stemphylium Leaf Blight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scala</td>
<td>Bravo</td>
<td>Ridomil Gold</td>
<td></td>
<td>Pristine</td>
</tr>
<tr>
<td>Quadris Top</td>
<td>Scala</td>
<td>a.i. mancozeb*</td>
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<td></td>
</tr>
<tr>
<td>Rovral</td>
<td>Rovral</td>
<td>Quadris Top</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>a.i. phosphorus acid**</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bravo 1.5 pt + Scala 9 fl oz + 3 lb Penncozeb</strong></td>
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</table>

*Penncozeb, Manzate, Dithane

**Phostrol, Prophyte, Ramphart, etc.**
Organic Pesticide Recommendations?

• We do not have a lot of experience with management of fungal leaf diseases (SLB, downy mildew, etc.) or onion thrips with organic pesticides

• Do you have any experience?

• Any success stories?

• Is this an area of research that you are interested in?
  – Which pests and diseases
  – We are thinking that thrips management may be worthwhile?
Bacterial Diseases of Onions
Bacterial Diseases of Onions
Planting Configurations

• 3-foot wide beds (Standard)
• 2-4 rows per bed (6 to 12+ inch row spacing)
• 4 to 12+ inch plant spacing
• Plant population range:
  – ~200 to 1600 plants per 100 feet of plastic bed
Plastic Mulch

- Onion growth is favored by:
  - moderate temperatures:
    - no growth below 43°F
    - no growth above 81°F

- Black plastic absorbs sunlight
  - Increase soil temperature
  - Promotes early crop growth in April & May
Black plastic promotes early season seedling growth
Metallic silver mulch had significantly 1.5 times higher yield than black.
WIDE plant spacing is favorable for bacterial decay:

- **Large plants, bushy leaves:** hold water in leaf axils and whorls  
  - Favor bacteria to entry into plant
- **Thick necks:** take longer to dry down, remain green and succulent  
  - Bacteria spread from leaves into bulb
- **Delayed maturity:** interferes with proper lodging & curing of necks and bulbs  
  - Bacteria spread from leaves into bulb

Narrow plant spacing is less favorable for bacterial rots
Narrowing plant spacing by 2 inches compared to the growers’ standard:

• Significantly provided 44 to 66% control of bacterial bulb decay at harvest.
• Increased marketable yield by 120 to 220%.
• The economic return increased 1.1 to 5.5 times representing $45 to $258 more income per 100 feet of bed.
Be Aware of Nutrient Interactions with Spacing & Mulch Type

In cold spring, nutrients are less available under silver than black plastic

Panama, NY 2011
Be Aware of Nutrient Interactions with Spacing & Mulch Type

- 48 inch², 13” row x 4” plant
- 24 inch², 6” row x 4” plant
- 20 inch², 5” row x 4” plant

As plant population increases, amount of nutrients per plant decreases.
Plant Spacing & Mulch Considerations

• Who says all your onions have to have the exact mulch type and planting configuration?

• Diversify mulch type & plant spacing
  – Unpredictable weather (cool vs. hot)
  – Different markets/bulb size (narrower spacing for medium bulb markets, wider spacing for jumbo markets)
  – Early harvest vs. stored onions (wide spacing on black for early harvest, narrow spacing on silver for storage onions)
Harvest Tips for Best Quality

• In general, bulb quality is best during hot and dry growing seasons (although size is down)

• Cool and wet growing seasons are most favorable for disease development and can result in poor bulb quality

Botrytis neck rot (fungal)  Bacterial bulb rot
Harvest Tips for Best Quality

Pulling and Windrowing:

- Pull when at least 50% lodged
- After lodging, bulbs increase 25 to 33%
- Pull when onion plants pull readily out of the ground (indicates bulbing is complete)
Harvest Tips for Best Quality

Pulling and Windrowing: Avoid Sunscald

- Do not pull onions or leave freshly pulled bulbs in hot intense direct sunlight
- Orient pulled plants so that leaves lay over top of the bulbs
- Remove onions from field and dry down inside or out of direct sunlight with lot’s of air circulation

Onions with sunscald
Harvest Tips for Best Quality

Topping and Harvesting:

• Conduct harvest practices when weather is dry
• Avoid bruising during harvest procedures

**Brown stain**, caused by a soil-borne fungal pathogen that causes the onion skin to stain
Harvest Tips for Best Quality

Curing:

• Optimum conditions:
  – 68-86 °F (best skin develops at 75-90 °F)
    • 3-5 °F above ambient air temperature
    • Avoid greater than 90 °F for bacterial diseases and > 82 °F for black mold
  – 70% relative humidity
    • RH going into boxes should be 50% and 100% coming out
  – 12 to 24 hour

• Shallow stacking is better
Harvest Tips for Best Quality

Storage:

• Optimum conditions:
  – 32 °F with 65-70% RH
• Store out of direct sunlight; will induce greening of outer scales
• Avoid condensation by not circulating air onto onions that is a warmer temperature than the onions
Christy Hoepting

• 585-721-6953
• cah59@cornell.edu
• Cornell Vegetable Program website:
  http://cvp.cce.cornell.edu/
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