Updates on Important Cucurbit Diseases in Illinois and Indiana and Their Management

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Important Cucurbit Diseases in 2018

- **Abiotic diseases**
  - Edema
  - Sunburn of fruit
  - Cracking of fruit

- **Biotic Diseases**
  - Powdery mildew
  - Downy mildew
  - Phytophthora blight
  - Bacterial spot
Edema (Oedema)

Management: Grow less sensitive cultivars
Sunburn of Pumpkin Fruits

Management: Do not cut fruits early and leave them under sun
Cracking of Melon Fruit

Management: Do not plant sensitive cultivars (Aphrodite?)
Important Cucurbit Diseases

- Powdery mildew
Powdery Mildew on Cucurbits

Crop susceptibility

- JOL pumpkins – susceptible
- Processing pumpkins – less susceptible
- Squash (summer & winter) - susceptible
- Melons – susceptible
- Watermelon – less susceptible
- Cucumber - most commercial varieties are resistant
Powdery Mildew: Infected Plant Parts

- Infected tissues
  - Vines
  - Leaf petioles
  - Upper and lower leaf surfaces
  - Fruit stems
Powdery Mildew of pumpkin: vine infection
Powdery mildew of pumpkin: lower surface of a leaf
Powdery mildew of pumpkin: upper surfaces of leaves
Powdery mildew of pumpkin: fruit stems
Our Powdery Mildew Project
Hierarchical clustering for 160 isolates
Cucurbit Powdery Mildew Pathogen in the USA

Fungus *Podosphaera xanthii*
## Fungicides for Powdery Mildew: 2018

<table>
<thead>
<tr>
<th>Fungicide</th>
<th>PM Severity (%)</th>
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</thead>
<tbody>
<tr>
<td>Control</td>
<td>50.00</td>
</tr>
<tr>
<td>Quintec/ Procure</td>
<td>1.81</td>
</tr>
<tr>
<td>Quintec</td>
<td>6.51</td>
</tr>
<tr>
<td>Procure</td>
<td>1.13</td>
</tr>
<tr>
<td>Fontelis</td>
<td>11.56</td>
</tr>
<tr>
<td>Pristine</td>
<td>18.71</td>
</tr>
<tr>
<td>Quadris</td>
<td>15.63</td>
</tr>
<tr>
<td>Torino</td>
<td>18.13</td>
</tr>
<tr>
<td>Aprovia Top</td>
<td>11.21</td>
</tr>
<tr>
<td>Bravo W.S./ Quintec/ Inspire Super</td>
<td>8.50</td>
</tr>
</tbody>
</table>
Cucurbit Powdery Mildew

- Scott your field at weekly schedule (mainly after 15 July)
- Spray-apply Procure alternated with Quintec at 7-day intervals
- Use medium to high rates of the fungicides
Important Cucurbit Diseases

- Downy mildew
Downy mildew on cucumber
A pumpkin filed with downy mildew-infected plants
Cucurbit Downy Mildew

- Downy mildew: a fungal disease
- Pathogen: *Pseudoperonospora cubensis*
- Occurrence: may or may not occur in IL/IN
- Importance: devastating disease
- Management: effective fungicides
Management of Downy Mildew

- Field scouting is very important
- Accurate disease diagnosis is essential
- Fungicide applications is essential
<table>
<thead>
<tr>
<th>Fungicide</th>
<th>Leaf infection (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>19.14 a</td>
</tr>
<tr>
<td>Revus</td>
<td>0.14 cd</td>
</tr>
<tr>
<td>Forum</td>
<td>1.30 b-d</td>
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<tr>
<td>Gavel</td>
<td>0.25 cd</td>
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<tr>
<td>Omega</td>
<td>0.00 d</td>
</tr>
<tr>
<td>Presidio</td>
<td>0.15 cd</td>
</tr>
<tr>
<td>ProPhyt</td>
<td>0.18 cd</td>
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<tr>
<td>Ranman</td>
<td>1.23 bcd</td>
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<tr>
<td>Ridomil Gold Copper</td>
<td>0.85 bcd</td>
</tr>
<tr>
<td>Tanos</td>
<td>1.80 bc</td>
</tr>
<tr>
<td>Zampro</td>
<td>0.15 cd</td>
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<tr>
<td>Zing</td>
<td>0.59 bcd</td>
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</tbody>
</table>
Effective Management of Downy Mildew of Cucurbits

- Fungicides for downy mildew
  - Revus + Bravo Weather Stik
  - Omega + Bravo Weather
  - Orondis Ultra + Bravo Weather Stik
  - Orondis Opti (high rate)
  - Weekly application of fungicides
Important Cucurbit Diseases

- Phytophthora blight
Seedling death of pumpkins by *P. capsici*
Pumpkin vine infection by *P. capsici*
Pumpkin fruit infection by *P. capsici*
Squash fruit infection by *P. capsici*
Fungicide Trials in 2018 in Illinois

- Pumpkin trial in a commercial field with pivot irrigation
- Summer yellow squash trial in raised beds with drip irrigation
Drip-Delivery
Fungicide for Pumpkin Phytophthora

- Infested soil with *P. capsici*
- Seed sown on 6 June
- 17 Fungicide treatments + 1 control
- Fungicide applications
  - 5 Weeks after sowing seeds (8 sprays)
  - At first sign of the disease (4 sprays)
- Plant were inoculated on 9 August

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Treatments

<table>
<thead>
<tr>
<th>Treatment</th>
<th>% Infected Fruits</th>
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</thead>
<tbody>
<tr>
<td>Control</td>
<td>53</td>
</tr>
<tr>
<td>Revus (8)</td>
<td>7</td>
</tr>
<tr>
<td>Revus + Kocide (8)</td>
<td>17</td>
</tr>
<tr>
<td>Ranman (4)</td>
<td>10</td>
</tr>
<tr>
<td>Ranman + Kocide (8)</td>
<td>21</td>
</tr>
<tr>
<td>Orondis Opti (8)</td>
<td>21</td>
</tr>
<tr>
<td>Orondis Ultra (8)</td>
<td>12</td>
</tr>
<tr>
<td>Orondis Ultra (8)</td>
<td>21</td>
</tr>
<tr>
<td>Orondis Gold 200 (8)</td>
<td>8</td>
</tr>
<tr>
<td>Omega, 1 pt (8)</td>
<td>14</td>
</tr>
<tr>
<td>Omega, 1.5 pt (8)</td>
<td>14</td>
</tr>
<tr>
<td>Orondis Ultra/Revus (8)</td>
<td>10</td>
</tr>
<tr>
<td>Elumin (8)</td>
<td>8</td>
</tr>
<tr>
<td>Orondis Ultra/Revus (8)</td>
<td>10</td>
</tr>
<tr>
<td>Revus + Kocide/Ranman</td>
<td>8</td>
</tr>
<tr>
<td>Orondis Ultra/Ranman/Revus</td>
<td>8</td>
</tr>
<tr>
<td>Revus + Kocide/Ranman</td>
<td>8</td>
</tr>
</tbody>
</table>
Fungicide Treatments – Pumpkin
(Conclusions)

- Fungicides used in this trial were effective in reducing incidence of vine and fruit infection
- Application of fungicides at first sign of the disease provides satisfactory protection against *P. capsici*
Fungicide for Squash Phytophthora

- Yellow summer squash ‘Ferry-Morse’
- Raised beds with drip irrigation
- 7 Fungicide treatments + 2 controls
- Transplant: 2-week-old seedling, 31 May
- Inoculation: 15 ml inoculum/each plant
- Drench, Sprnch, and drip-delivery at transplanting
- Fungicide applications (6): 7 Jun – 12 Jul
Fungicide Treatments – Squash

(Conclusions)

- Drip-delivery of fungicides was not effective
- Drenching fungicides at transplanting was the most effective
Managing Phytophthora Blight

Recommended practices

- ≥3 years of crop rotations/weed control
- Seed treatment with Apron XL LS (0.64 fl oz/100 lb seed)
- Avoid using contaminated water
- Disk localized infected plants (spot)
- Fungicide applications (spray)
- Sanitation during harvest
Managing Cucurbit Phytophthora Blight

- Recommended fungicides sprays
  - Orondis Ultra (FRACs: U15, 40)
  - Revus: (FRAC: 40)
  - Ranman (FRAC: 21)
  - Elumin (FRAC: 22)

Spray at weekly schedule

Follow label directions
Pumpkin fruit rot in bins in storage, caused by Phytophthora capsici
Pumpkin fruit rot in the field, caused by *Phytophthora capsici*
Important Cucurbit Diseases

- Bacterial spot
Bacterial spot of pumpkin
Bacterial spot on squash
Collapse of pumpkin fruit infected by *Xanthomonas cucurbitae*
Bacterial Spot of Cucurbits

- A disease of pumpkins & winter squash
- Pathogen survives more than 24 months in the field
- Pathogen survives more than 20 months in seeds
- Seed-borne inoculum is eradicated by hot-water or HCl treatments
- No resistant cultivar is available

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List of compounds tested

Chemicals:
1. ActiGard 50 WG
2. Agion E
3. Agrimycin 17 WP
4. Badge X2 DF
5. Cuprofix Ultra 40 DF
6. Cueva FL
7. Manzate PRO Stik
8. Kasumin 2L
9. Kocide-3000 46.1 DF
10. Mil-Stop SP
11. Mycoshield 17 WP
12. Nordox 75 DF
13. Phyton-016B

Biocontrol agents
14. SciEx83-3S
15. SciEx83-4S
16. Tanos 50 DWG
17. Quintec 2.08 SC
18. Actinovate AG
19. Cx-9030
20. Regalia
21. Serenade ASO
22. Sonata ASO
Conclusions

- We are conducting research to develop strategies for disease management.
- We have not been able to document the importance of seed-borne inoculum.
- Crop rotation with non-cucurbits for at least 2 year.
- Most effective chemical have been: Manzate PRO Stick, Kocide-3000, Cueva, and Regalia.