Growing Pumpkins: Disease Management

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Cucurbit Downy Mildew

Destructive disease of vine crops

All vine crops are susceptible
  • But susceptibility varies

Pathogen does not survive the winter outdoors in Great Lakes Region—requires living green tissue
Migrations of Downy Mildew Spores

Two separate migrations:

- Great Lakes Region -
  - Group II

- Southeastern US to MW and NE
  - Group I

[Map of Total Acres Harvested: Pumpkins showing migration routes]
Managing Downy Mildew

• Downy mildew-resistant varieties not available for pumpkin

• Monitoring
  • Sentinel plots
    • Wooster
    • NCARS (Fremont)
    • Muck Crops
    • (Columbus)
  • Samples submitted to OSU Vegetable Pathology Lab or PPDC
  • Cucurbit Downy Mildew forecasting site: cdm.ipmpipe.org (new version!)
Cucurbit Downy Mildew Monitoring & Alerts

• We need your help! Send (any) cucurbit suspected downy mildew samples to
  • OSU Vegetable Pathology Lab (commercial samples) https://u.osu.edu/vegetablepathologylab/diagnostic-submission/
  • OSU C. Wayne Ellett Plant and Pest Diagnostic Clinic (home garden samples) https://ppdc.osu.edu/
  • Text or email photos first

• Twitter @OhioVeggieDoc
• Ohio Veggie Disease News http://u.osu.edu/miller.769/
• Ohio VegNet Newsletter http://u.osu.edu/vegnetnews/
Management: Well-timed Fungicide Applications

- Fungicides are necessary to manage downy mildew
- Fungicide resistance management is critical
  - Fungicide insensitivity development is common in downy mildew pathogen
- Important to test fungicides for efficacy
Cucumber Downy Mildew Seedling Bioassay

Cucumber seedlings sprayed with fungicide at label rate in greenhouse

Plants moved to cucumber field with active downy mildew for 48 hrs

Plants returned to greenhouse for 7 days
# Recommended Downy Mildew Fungicides

<table>
<thead>
<tr>
<th>Product</th>
<th>PHI (days)</th>
<th>FRAC Code</th>
<th>Rel. Eff.</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orondis Opti</td>
<td>3</td>
<td>U15 + M</td>
<td>++++</td>
<td>After downy mildew has been reported:</td>
</tr>
<tr>
<td>Ranman 400SC</td>
<td>0</td>
<td>21</td>
<td>++++</td>
<td>Apply more selective fungicides in a program that alternates modes of action</td>
</tr>
<tr>
<td>Elumin</td>
<td>2</td>
<td>22</td>
<td>++++</td>
<td>Tank mix with protectant fungicide unless applying Orondis Opti, Gavel or Zing!</td>
</tr>
<tr>
<td>Zampro</td>
<td>0</td>
<td>40 + 45</td>
<td>++++</td>
<td></td>
</tr>
<tr>
<td>Omega 500F</td>
<td>30</td>
<td>29</td>
<td>++++</td>
<td></td>
</tr>
<tr>
<td>Gavel 75DF</td>
<td>5</td>
<td>22 + M</td>
<td>+++</td>
<td></td>
</tr>
<tr>
<td>Zing!</td>
<td>0</td>
<td>22 + M</td>
<td>+++</td>
<td></td>
</tr>
<tr>
<td>Manzate ProStick 75DG</td>
<td>5</td>
<td>M</td>
<td>+++</td>
<td>Apply protectant fungicides until downy mildew appears “locally”</td>
</tr>
<tr>
<td>Bravo WeatherStik</td>
<td>0</td>
<td>M</td>
<td>+++</td>
<td></td>
</tr>
</tbody>
</table>
Downy Mildew – Take Home Messages

• Can’t predict when downy mildew will appear in 2020
  • Keep tabs on monitoring sites
  • Scout pumpkins

• Maintain a protectant fungicide program (mancozeb, chlorothalonil) until downy mildew appears locally

• Rotate effective fungicides with different mode of action/FRAC code to help reduce risk of fungicide resistance
Plectosporium Blight

Symptoms – typical diamond- or spindle-shaped lesions on stems, petioles, handles, leaf veins
• Fruit symptoms – small white circular lesions
Management of Plectosporium Blight

- Sanitation
- Crop Rotation
- Resistance/Partial Resistance
- Fungicides
Resistance of Pumpkin Varieties to Plectosporium Blight, OSU South Centers 2018

1=1-19%; 2=20-39%; 3=40-59%; 4=60-79%; 5=80-100%
Plectosporium blight severity on stems
Fungicide Efficacy – Plectosporium Blight, Pumpkins, 2019

- Study carried out to identify effective fungicides
- Funded by OVSFRDP
<table>
<thead>
<tr>
<th>Treatment, rate (application timing)</th>
<th>Disease incidence %</th>
<th>Marketable %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aprovia Top, 13.5 fl oz (1-12)</td>
<td>60.2 ab</td>
<td>38.0 dc</td>
</tr>
<tr>
<td>Dexter MAX, 3.2 lb/A (1-12)</td>
<td>49.5 bcd</td>
<td>48.7 abc</td>
</tr>
<tr>
<td>Dexter XCEL ,72 fl oz (1-12)</td>
<td>47.3 bcd</td>
<td>49.7 abc</td>
</tr>
<tr>
<td>Flint Extra, 3.8 fl oz/A (1-12)</td>
<td>52.0 abc</td>
<td>45.8 a-d</td>
</tr>
<tr>
<td>Inspire Super, 20 fl oz (1-12)</td>
<td>69.6 a</td>
<td>28.5 d</td>
</tr>
<tr>
<td>Mural, 6.96 oz (1-12)</td>
<td>53.8 abc</td>
<td>43.5 bcd</td>
</tr>
<tr>
<td>Quadris Top, 14 fl oz (1-12)</td>
<td>33.1 d</td>
<td>63.9 a</td>
</tr>
<tr>
<td>Quadris Flowable, 15.5 fl oz (1-12)</td>
<td>42.0 bcd</td>
<td>55.2 abc</td>
</tr>
<tr>
<td>Tepera, 12.6 fl oz (1-12)</td>
<td>40.7 cd</td>
<td>57.5 ab</td>
</tr>
<tr>
<td>Tepera Plus, 15.4 fl oz (1-12)</td>
<td>46.8 bcd</td>
<td>53.1 abc</td>
</tr>
<tr>
<td>TopGuard EQ 8 fl oz (1-12)</td>
<td>54.4 abc</td>
<td>41.8 bcd</td>
</tr>
<tr>
<td>Microthiol Disperss, 4 lb/A (1,3,5,7,9,11)</td>
<td>36.2 cd</td>
<td>63.8 a</td>
</tr>
<tr>
<td>Topsin M WSB, 3.2 oz/A (1,3,5,7,9,11)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trionic 4 SC, 8 fl oz/A (2,4,6,8,10,12)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manzate Pro-Stick, 3 lb/A (2,4,6,8,10,12)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-treated</td>
<td>54.3 abc</td>
<td>44.0 bcd</td>
</tr>
</tbody>
</table>
Take-home Messages

• None of the fungicides fully controlled Plectosporium blight on pumpkins (handles)
• However Quadris Top and a program including Topsin M (Group 1) and Manzate should be considered as options
• Others to consider:
  • Tepera (fluoxastrobin)
  • Quadris (azoxystrobin)
  • Dexter XCEL (azoxystrobin + mancozeb + tebuconazole)
  • Dexter MAX (azoxystrobin + mancozeb)
Phytophthora Blight – Pumpkins

- *Phytophthora capsici*
- Favored by warm, rainy conditions – usually start seeing it in July
- Most often observed in low spots or other areas with poor drainage
- Affects roots, stems, leaves and fruit
- Pathogen survives at least 5 years in soil
Management

• Rotate away from susceptible crops at least 3 years
• Avoid surface water (ponds, streams, etc.) for irrigation
• Choose appropriate site
  • Well-drained soil
  • Avoid low areas
  • Improve soil - increase organic matter content
    • Cover crops, compost
Management

• Scout for and remove crown rot-diseased plants and fruits, and plants and fruits 5 ft into healthy area

• Do not maintain cull piles; bury diseased plants, fruits

• Apply fungicides
### Phytophthora Blight Fungicides

**Midwest Vegetable Production Guide Ratings**

- **G** = Good
- **F** = Fair
- **S** = Suppression only

<table>
<thead>
<tr>
<th>Product</th>
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<th>FRAC Code</th>
<th>Rel. Eff.</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orondis Gold</td>
<td>0</td>
<td>U15 + 4</td>
<td>G+</td>
<td>See label for restrictions</td>
</tr>
<tr>
<td>Orondis Ultra</td>
<td>0</td>
<td>U15 + 40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orondis Opti</td>
<td>0</td>
<td>U15 + M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ranman 400SC</td>
<td>0</td>
<td>21</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Elumin</td>
<td>2</td>
<td>22</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Forum 4.18SC</td>
<td>0</td>
<td>40</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Tanos 50WG</td>
<td>3</td>
<td>11 + 27</td>
<td>S</td>
<td>Foliar/fruit phase only</td>
</tr>
<tr>
<td>Tanos 50WG</td>
<td>3</td>
<td>11 + 27</td>
<td>S</td>
<td>Foliar/fruit phase only</td>
</tr>
<tr>
<td>Gavel 75DF</td>
<td>5</td>
<td>22 + M3</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Zing!</td>
<td>0</td>
<td>22 + M5</td>
<td></td>
<td>No rating</td>
</tr>
<tr>
<td>Presidio 4SC</td>
<td>2</td>
<td>43</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Revus</td>
<td>1</td>
<td>40</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Ridomil Gold SL</td>
<td>7</td>
<td>4</td>
<td>(G)</td>
<td>Insensitivity to Ridomil occurs in some locations</td>
</tr>
<tr>
<td>Zampro</td>
<td>0</td>
<td>40 + 45</td>
<td>G</td>
<td></td>
</tr>
</tbody>
</table>
Phytophthora blight control

Foliar Fungicides Only

% Healthy plants

- Non-treated
- Orondis Ultra + Kocide
- Orondis Ultra alt Tanos + Kocide
- Orondis Ultra alt Ranman
- Orondis Ultra alt Tanos + Kocide
- Orondis Ultra alt Ranman + Kocide
- Orondis Ultra + Kocide
- Orondis Ultra alt Ranman + Kocide
- Orondis Ultra + Kocide
- Orondis Ultra alt Presidio + Kocide
- Orondis Ultra alt Presidio

Letters indicate significant differences in effectiveness.
Take-home Messages

• Cultural practices – rotation, sanitation, water management – are critical
• No Phytophthora-resistant pumpkin varieties
• Fungicides are helpful under low-moderate disease pressure
  • Orondis Ultra (U15 + 40)
  • Elumin (22)
  • Ranman (21)
  • Presidio (43)
  • Revus (40)
  • Zampro (40 + 45)
Bacterial Leaf Spot – *Xanthomonas cucurbitae*

- Seedborne disease
- Does not overwinter in cold climates
- Varieties may vary in susceptibility

**Management:**
- Dilute bleach seed treatment
- Copper bactericide applications early
Seed Treatment with Bleach

Step 1: Agitate seed in a solution of 25 oz Clorox plus 100 oz water with one teaspoon surfactant for 1 minute. Use 1 gallon of disinfectant solution per pound of seed (conversions provided below) and prepare a fresh solution for each batch.

Step 2: Rinse seed thoroughly in cold running tap water for 5 minutes.

Plant within 2 weeks

https://u.osu.edu/vegetablediseasefacts/management/chlorine-seed-treatment/
Follow OSU Vegetable Pathology at:
Ohio Veggie Disease News
  • u.osu.edu/miller.769/
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  • u.osu.edu/vegetablediseaefacts/
High Tunnel Disease Facts
  • u.osu.edu/hightunneldiseasefacts/
Twitter
  • @ohioveggiedoc

Midwest Vegetable Production Guide
https://ag.purdue.edu/btny/midwest-vegetable-guide/Pages/default.aspx
https://mwveguide.org