Ag Madness
Pumpkin Production
April 16, 2020

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Topics

• Mustard Cover Crop / Biofumigation
• Powdery Mildew fungicide efficacy
• Pumpkin / Squash hybrids
• Insect Management
Biofumigation using Mustard cover crops

• Research 2018/19/20
• Reduce soil borne diseases (Filthy Four)
Biofumigation - the incorporation of fresh and finely ground plant biomass into the soil, releasing several substances able to suppress soil-borne pests (bacteria, fungi, nematodes, weed seeds)
What is biofumigation

- 20+ year old practice
- Mustard plants produce Glucosinolates (GSL)
- *Brassica juncea* - highest GSL
- GSL peak during flowering
- Suppresses diseases and nematodes
- Variable efficacy
- Treat MCC like cash crop
  - Biomass
  - 50-100 lb N / A
  - N:S (6N:1S) / A
Our Study – Trial Design

Pacific Gold
6.5 lb/A
$6.5 / lb

Caliente 199
11 lb / A
$6.5 / lb

½ rate PG + C199

Rep-TRT
Our Study - Operations

• Seeded April 10, 2019 - emerged April 23
• Processed MCC June 4 (Trt 2 only); June 12 (Trts 3 & 4)
Our Study – Equipment Recap

- Process MCC at peak flowering
- All operations in 10-15 minutes
- Wait 10-14 days to DS or transplant
Plectosporium Blight on Foliage

- Plecto is a fungal blight on petioles, leaves, vines, fruit and handles
- Soil borne & overwinters as a spore; thrives in 77F, humid, wet weather
- Disease on the upswing in Ohio
Plectosporium Blight on Fruit
Our Study – Conclusions

- Weather in 2019 (at station) not conducive to Plectosporium
- Very little disease detected on foliage (NS, <3%), none on fruit
- Possible effect on fruit wt. (Caliente 199)
- Strobilurons do NOT control PM, need other fungicides
- Establishment of MCC early in spring is challenging (weather)
- Processing MCC requires bush hog, roto-tiller, and packer; can be sprayed with water, all within minutes
- Repeat study 2020 - Focus on measuring biomass produced
Our Study – Additional Benefits

- Pollinators / Beneficial insects
- 1-7,000* lbs / A organic matter back into soil
- Increased soil health
Biofumigation – Final Thoughts

• Researchers now understand the beneficial effects observed may not always be related to the activity of GSL-based hydrolysis compounds

• Other mechanisms may play a complimentary or more dominant role in disease suppression

• Incorporating large amounts of organic matter into the soil
  • Potentially improving soil structure
  • Increased nutrient availability
  • Increased water holding capacity
  • Stimulation of beneficial / pathogen-suppressive microbial communities
• Biofumigation video
• OSU IPM YouTube Channel
Powdery Mildew

- Occurs every year in OH, does **not** overwinter in OH
- Scout mid-July, top & bottom leaf surface, begin trt when first detected
- Trt 7-14 day schedule, 35-50 GPA, 60+PSI, rotate FRAC numbers
- Ex. Quintec (13) alt. w/ Procure (3)
- Ex. Luna Experience (3,7) alt. w/ Vivando (U8)
- Can use M fungicides (Chlorothalonil, Manzate) every spray
Powdery Mildew Demo Trial

- Efficacy of fungicide combinations
- Each TRT non-replicated, 80ft row
- Use PM susceptible hybrids
- Begin rating/spraying end of July
- Trt 7-14 days until mid Sept
- 6 random leaves per TRT
- % PM upper & lower leaf surface
- Part of pumpkin field day
- Compile report
- u.osu.edu/jasinski.4/pumpkin
### Powdery Mildew Demo Trial

<table>
<thead>
<tr>
<th>TRT</th>
<th>Product, Rate, FRAC Sprays 1, 3, and 5</th>
<th>Product, Rate, FRAC Sprays 2, 4, and 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Luna Experience</strong> (6 fl oz) + NIS (0.125 v/v) [FRAC 7,3] (Bayer)</td>
<td><strong>Vivando</strong> (15.4 fl oz) + Manzate (2.5 lb) + NIS (0.125 v/v) FRAC [U8 + M] (BASF and UPL)</td>
</tr>
<tr>
<td>2</td>
<td><strong>Luna Sensation</strong> (6 fl oz) + NIS (0.125 v/v) (FRAC 7,11) (Bayer)</td>
<td><strong>Vivando</strong> (15.4 fl oz) + Manzate (2.5 lb) + NIS (0.125 v/v) FRAC [U8 + M] (BASF and UPL)</td>
</tr>
<tr>
<td>3</td>
<td><strong>Microthiol</strong> (4 lb) + <strong>Topsin</strong> M (8 oz) (FRAC M + 1) (UPL)</td>
<td><strong>Trionic</strong> (8 oz) + Manzate (2.5 lb) (FRAC 3 + M) (UPL)</td>
</tr>
<tr>
<td>4</td>
<td><strong>Microthiol</strong> (4 lb) + <strong>Topsin</strong> M (8 oz) (FRAC M + 1) (UPL)</td>
<td><strong>Procure</strong> (8 oz) + Manzate (2.5 lb) (FRAC 3 + M) (UPL/Arysta)</td>
</tr>
<tr>
<td>5</td>
<td><strong>Miravis Prime</strong> (11.4 oz, FRAC 7 + 12) + NIS (0.125 v/v) (Syngenta)</td>
<td><strong>Procure</strong> (8 oz) + Manzate (2.5 lb) + NIS (0.125 v/v) [FRAC 3 + M] (UPL / Arysta)</td>
</tr>
<tr>
<td>6</td>
<td><strong>Inspire Super</strong> (20 oz, FRAC 9 + 3) + NIS (0.125 v/v) (Syngenta)</td>
<td><strong>Vivando</strong> (15.4 fl oz) + Manzate (2.5 lb) + NIS (0.125 v/v) FRAC [U8 + M] (BASF and UPL)</td>
</tr>
<tr>
<td>7</td>
<td><strong>Miravis Prime</strong> (11.4 oz, FRAC 7 + 12) + NIS (0.125 v/v) (Syngenta)</td>
<td><strong>Inspire Super</strong> (20 oz) + Manzate (2.5 lb) + NIS (0.125 v/v) (FRAC 9 + 3, M) (Syngenta)</td>
</tr>
</tbody>
</table>
Powdery Mildew Demo Trial
Fungicide Ratings Last Few Years
South Charleston (WARS)

**Good to Great Products**
- Miravis Prime, Inspire Super (new)
- Luna Experience, Luna Sensation
- Merivon, Vivando, Fontelis, Torino
- Quintec – decreasing performance

**Rotational Partners**
- Procure, Rally, Pristine (Good)

**Cover Sprays**
- Bravo or Manzate (Good/OK)
Powdery Mildew – Fungicide Efficacy

- Merivon and Torino also tested, results not consistent with other researchers/locations
- Several good to great options for PM control
2019 Pumpkin & Squash Hybrid Demo Trial
Small Fruit

- Single plots, 45’ long, non-replicated
- Focus of trial is PMT/R Hybrids
- Even PMT/R Hybrids need to be protected with fungicides

<table>
<thead>
<tr>
<th>Hybrid</th>
<th>Company</th>
<th>PMT/PMR</th>
<th>Maturity (days)</th>
<th># Mature Fruit / 45' row</th>
<th>AVG fruit wt. (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Half Pint</td>
<td>Siegers</td>
<td>PMT</td>
<td>80</td>
<td>74</td>
<td>1.2</td>
</tr>
<tr>
<td>Mini Warts</td>
<td>Harris</td>
<td>PMT</td>
<td>110</td>
<td>&gt;44</td>
<td>1.8</td>
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<tr>
<td>Snowball</td>
<td>Siegers</td>
<td>PMT</td>
<td>100</td>
<td>&gt;60</td>
<td>1.8</td>
</tr>
<tr>
<td>Cinnamon Girl</td>
<td>Johnnys</td>
<td>PMT</td>
<td>85</td>
<td>34</td>
<td>2.5</td>
</tr>
<tr>
<td>Sanchez</td>
<td>Harris</td>
<td>NA</td>
<td>95</td>
<td>28</td>
<td>3.2</td>
</tr>
<tr>
<td>Warty Gnome</td>
<td>Harris</td>
<td>PMT</td>
<td>95</td>
<td>33</td>
<td>3.3</td>
</tr>
<tr>
<td>Hybrid Pam</td>
<td>Harris</td>
<td>NA</td>
<td>100</td>
<td>26</td>
<td>4.1</td>
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</table>
## 2019 Pumpkin & Squash Hybrid Demo Trial
### Medium Fruit

<table>
<thead>
<tr>
<th>Hybrid</th>
<th>Company</th>
<th>PMT/PMR</th>
<th>Maturity (days)</th>
<th># Mature Fruit / 45' row</th>
<th>AVG fruit wt. (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blanco</td>
<td>Harris</td>
<td>NA</td>
<td>105</td>
<td>31</td>
<td>5.7</td>
</tr>
<tr>
<td>Gum Drop</td>
<td>Johnnys</td>
<td>NA</td>
<td>100</td>
<td>16</td>
<td>6.4</td>
</tr>
<tr>
<td>Moonshine</td>
<td>Harris</td>
<td>NA</td>
<td>100</td>
<td>16</td>
<td>6.7</td>
</tr>
<tr>
<td>Galeaux</td>
<td>Harris</td>
<td>NA</td>
<td>95</td>
<td>12</td>
<td>10.0</td>
</tr>
<tr>
<td>Fairytale</td>
<td>Harris</td>
<td>NA</td>
<td>110</td>
<td>11</td>
<td>10.7</td>
</tr>
<tr>
<td>Thor</td>
<td>Siegers</td>
<td>NA</td>
<td>105</td>
<td>10</td>
<td>11.1</td>
</tr>
<tr>
<td>Knucklehead</td>
<td>Johnnys</td>
<td>NA</td>
<td>105</td>
<td>11</td>
<td>12.4</td>
</tr>
<tr>
<td>One too Many</td>
<td>Harris</td>
<td>PMT</td>
<td>110</td>
<td>12</td>
<td>12.4</td>
</tr>
<tr>
<td>Red Warty Thing</td>
<td>Harris</td>
<td>NA</td>
<td>110</td>
<td>12</td>
<td>12.5</td>
</tr>
<tr>
<td>Warty Goblin</td>
<td>Harris</td>
<td>PMT</td>
<td>105</td>
<td>17</td>
<td>12.7</td>
</tr>
<tr>
<td>Blue Doll</td>
<td>Harris</td>
<td>PMT</td>
<td>100</td>
<td>14</td>
<td>12.9</td>
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</tbody>
</table>
## 2019 Pumpkin & Squash Hybrid Demo Trial

### Large Fruit

<table>
<thead>
<tr>
<th>Hybrid</th>
<th>Company</th>
<th>PMT/PMR</th>
<th>Maturity (days)</th>
<th># Mature Fruit / 45' row</th>
<th>AVG fruit wt. (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbonado Gold</td>
<td>Rupp</td>
<td>PMT</td>
<td>100</td>
<td>13</td>
<td>13.1</td>
</tr>
<tr>
<td>Hermes</td>
<td>Harris</td>
<td>PMT</td>
<td>90-95</td>
<td>16</td>
<td>13.2</td>
</tr>
<tr>
<td>Zues</td>
<td>Harris</td>
<td>PMT</td>
<td>110</td>
<td>14</td>
<td>13.8</td>
</tr>
<tr>
<td>Renegade</td>
<td>Johnnys</td>
<td>PMT</td>
<td>95</td>
<td>13</td>
<td>14.2</td>
</tr>
<tr>
<td>20 Kt Gold</td>
<td>Rupp</td>
<td>PMT</td>
<td>100</td>
<td>13</td>
<td>14.4</td>
</tr>
<tr>
<td>Indian Doll</td>
<td>Harris</td>
<td>PMT</td>
<td>100</td>
<td>18</td>
<td>14.5</td>
</tr>
<tr>
<td>Valenciano</td>
<td>Johnnys</td>
<td>NA</td>
<td>110</td>
<td>2 (only 8 set)</td>
<td>16.2</td>
</tr>
<tr>
<td>Orange Sunrise</td>
<td>Harris</td>
<td>PMT</td>
<td>100</td>
<td>19</td>
<td>16.4</td>
</tr>
<tr>
<td>Bayhorse Gold</td>
<td>Rupp</td>
<td>PMT</td>
<td>100</td>
<td>15</td>
<td>21.3</td>
</tr>
</tbody>
</table>
2019 Pumpkin & Squash Hybrid Demo Trial

Back (L to R) – Knucklehead, Bayhorse Gold, Orange Sunrise, Hermes, 20 Kt, Warty Goblin, Red Warty Thing

Back Middle (L to R) – Thor, Zues, Carbonado Gold, Renegade, Gumdrop, Blanco, Moonshine

Front Middle (L to R) – One Too Many, Valencia, Blue Doll, Galeaux, Indian Doll, Fairytale

Front (L to R) – Hybrid Pam, Cinnamon Girl, Warty Gnome, Sanchez, Snowball, Mini Warts, Half Pint
Spectrum of Pumpkin/Squash Pests

- **Key Diseases:**
  - Powdery mildew
  - Bacterial wilt
  - Phytophthora
  - Fusarium
  - Plectosporium
  - Angular leaf spot
  - Bacterial leaf spot
  - Anthracnose
  - Downy mildew
  - Yellow vine decline
  - Virus (WMV), others

- **Key Insects:**
  - Striped cucumber beetles/larvae
  - Corn rootworm beetles/larvae
  - Squash bug
  - Squash vine borer
  - Aphids

- **Key Weeds:**
  - Pigweed
  - Marestail
  - Cocklebur
  - Lambsquarters
  - Black nightshade
  - G./C. Ragweed
  - Velvetleaf
  - Grasses (foxtail, barnyard, etc.)
Striped Cucumber Beetle

- **THE** key early season pest
- Protect seedlings cotyledon – 4\textsuperscript{th} leaf from feeding
Bacterial Wilt
Vectored by Striped and Spotted Cucumber Beetles
Cucumber Beetles & Bacterial Wilt

- **Must protect seedling from cotyledon through 3\textsuperscript{rd} - 4\textsuperscript{th} leaf**
- Shift seeding or transplanting later to avoid beetles (mid June)
- Scout and use foliar products when threshold is reached
  - 0.5 btl / plant (cotyl-1st), 1 btl / plant (2-3 leaf), 2 btl / plant >4 leaf
- Use systemic seed treatments (2-3 weeks protection)
- Use systemic materials as transplant drenches (2-3 weeks protection)
- Use in-furrow materials during seeding (4-6 weeks control, least desirable)
- Use row covers over small plantings (remove at flowering)
- Protect fruit rind later in the season
Systemic Insecticide Efficacy

Cotyledon
Squash Bugs / Yellow Vine Decline

SB overwinter as adults
Attach seedlings in spring/summer
Plants turn yellow, stunt
Brown ring around stem
Squash Bugs / Yellow Vine Decline

- Squash bugs can vector bacteria to plants early to mid season

- **Symptoms** – yellow plants appear ca. 30+ days after infection

- **Crop rotation** – plant fields far apart

- **Row covers** for small acreages

- **Scout** seedlings early, treat **nymphs** with foliar insecticides if > 1 egg mass / plant found
Take Home Messages

• Biofumigation *may* control some soil borne diseases; jury is still out in OH

• Mustard beneficial to pollinators and soil health

• Diseases susceptibility changes over time; explore new fungicides if needed

• Wide variety of hybrids on market, choose PMT/R and fit those to your market needs

• Scout for pests, seed trts OK to use, minimize pollinator harm

• Do small scale research / demo on your farm, start small, take notes, see what works, iterate
Pumpkin IPM Publications

- Identifying and Managing Cucurbit Pests (IL) $11
- Pumpkin Production Guide (NRAES-123) $39
- IPM Scouting Guide for Common Problems of Cucurbit Crops in Kentucky -pdf (free)
Current Sources of IPM Information

• VegNet Newsletter/Blog
  • Updated daily/weekly through the season

• OSU IPM YouTube
  • Research, DIY, Hybrids

• Midwest Vegetable Production Guide
  • Updated annually by OSU & 7 other States vegetable specialists
Contact Information

Questions?

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