MANAGEMENT OF DOWNY MILDEW ON SLICING CUCUMBER AND UPDATES ON NEW FUNGICIDES FOR VEGETABLES

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Does trellising slicing cucumbers help manage downy mildew?

Does trellising improve performance of resistant cultivars or fungicides?
Integrated Management of Downy Mildew on Slicing Cucumber

### Treatments
- **Fungicides**
  - chlorothalonil (Bravo) alternated with Ranman, weekly
  - Water (control)
- **Varieties (Bayer)**
  - **Bristol**, new partially resistant cultivar
  - **Speedway**, older susceptible with similar parentage
- **Trellising**
  - Trellised as for tomatoes
  - Raised bed culture

### Methods
- **Spring and Fall**
  - Direct seeded May 10 and Aug. 8
  - 3 and 4 reps in spring, fall
  - Sprayed 7 times
  - Disease rated 7 and 6 times in spring, fall
  - Fruit harvested and graded 7 and 6 times (2x/week) in spring, fall
Plots were Arranged in a Split-Split Design: Fungicide-Trellis-Cultivar
Downy Mildew Appeared in Mid-June
Slicing Cucumber Harvest, 3 Jul 17

Bristol-partially resistant

Speedway-susceptible
# Slicing Cucumbers Sorted into Grades

<table>
<thead>
<tr>
<th>Grade</th>
<th>Diameter</th>
<th>Length</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Extra No. 1</td>
<td>2 3/8 in. max</td>
<td>6 in. min</td>
<td>fairly well formed &amp; colored</td>
</tr>
<tr>
<td>US No. 1 Large</td>
<td>&gt; 2 3/8 in.</td>
<td>6 in. min</td>
<td>fairly well formed &amp; colored</td>
</tr>
<tr>
<td>US No. 1 Small</td>
<td>1.5 to 2 in.</td>
<td>6 in.</td>
<td>fairly well formed &amp; colored</td>
</tr>
<tr>
<td>Cull</td>
<td>any</td>
<td>any</td>
<td>misshapen on blossom end</td>
</tr>
</tbody>
</table>

USDA, AMS, United States standards for grades of cucumbers, 2018
Sprayed Yielded More than Water in Both Seasons

Bristol Yielded More Than Speedway in Spring, Not Fall
Fungicides Reduced % Culls by Weight

$P = 0.02$
## Input Costs ($/A) in Spring and Fall

<table>
<thead>
<tr>
<th>Factor</th>
<th>Bristol</th>
<th>Speedway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed</td>
<td>$96</td>
<td>$70</td>
</tr>
<tr>
<td>Fungicide (Bravo/Ranman)</td>
<td>$79 (37+42)</td>
<td></td>
</tr>
<tr>
<td>Trellising</td>
<td></td>
<td>$404</td>
</tr>
<tr>
<td>Total Not Sprayed, Flat Bed</td>
<td>$96</td>
<td>$70</td>
</tr>
<tr>
<td>Total Sprayed, Flat Bed</td>
<td>$176</td>
<td>$149</td>
</tr>
<tr>
<td>Total Not Sprayed, Trellised</td>
<td>$501</td>
<td>$474</td>
</tr>
<tr>
<td>Total Sprayed, Trellised</td>
<td>$580</td>
<td>$553</td>
</tr>
<tr>
<td>Other Inputs</td>
<td></td>
<td>$3,018</td>
</tr>
<tr>
<td>Fixed Costs</td>
<td></td>
<td>$233</td>
</tr>
<tr>
<td>Other Costs</td>
<td></td>
<td>$210</td>
</tr>
</tbody>
</table>
Prices for Slicing Cucumbers, 2017
Columbia, SC (USDA, AMS)

Price/Carton (1 1/9 Bushel, 53 lb)

- Price Sm
- Price Med+Jumbo

Graph showing the price per carton for slicing cucumbers from June 20 to October 17, 2017.
Return/Acre Similar to Yields
Return = (Yield * Price) - Input Costs

\[ P = 0.03 \]
Summary of Downy Mildew Yields

- **Season**
  - Higher yield in spring than in fall
- **Fungicides**
  - Increased yield of both cultivars both seasons
- **Cultivars**
  - Bristol yielded better than Speedway in spring
- **Trellising**
  - No effect on marketable yield
‘Bristol’ was More Vigorous Than ‘Speedway’ with Longer Vines

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Speedway</td>
<td>51 in.</td>
<td><em>P</em> = 0.0002</td>
</tr>
<tr>
<td>Bristol</td>
<td>65 in.</td>
<td>6-7 wk old</td>
</tr>
</tbody>
</table>
‘Bristol’ Often had Less Disease Than ‘Speedway’ Mid-Season
Downy Mildew Progress in Spring

Leaf Area Diseased (%)

Days after Seeding

Speedway, Water
Bristol, Water

Speedway, Fungicide
Bristol, Fungicide

BR-T-B
BR-T-S
BR-U-B
BR-U-S
W-T-B
W-T-S
W-U-B
W-U-S
Speedway Vs. Bristol

Speedway

Bristol
Fungicides and ‘Bristol’ Controlled Downy Mildew in Spring and Fall

<table>
<thead>
<tr>
<th></th>
<th>Final Leaf Area Diseased (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spring</strong></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>80</td>
</tr>
<tr>
<td>Bravo/Ranman</td>
<td>20</td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>50</td>
</tr>
<tr>
<td>Bravo/Ranman</td>
<td>20</td>
</tr>
</tbody>
</table>

- **Bristol**
- **Speedway**
To Manage Downy Mildew on Slicing Cucumber

- Trellising does not help
- Grow resistant cultivars, e.g. Bristol (Bayer)
  - Bristol performed better with fungicides
- Spray weekly with fungicides
  - Do not need expensive fungicides with resistant cultivar
FRAC Group U13
- New active ingredient

Registered on
- Cantaloupe
- Cucumber
- Squash
- NOT WATERMELON

Controls
- Cucurbit powdery mildew

Max. 5 applications per crop

Rotate with another PM fungicide (Quintec or Vivando)

REI 12 hours

PHI 0 days

No plant-back restrictions

DO NOT USE in greenhouses
- Registered on
  - All cucurbits
  - Pepper
  - Eggplant
- Controls
  - Cucurbit downy mildew
  - Phytophthora blight
- DO NOT USE in greenhouses

- FRAC Group 22
  - Same as Gavel
  - Don’t rotate Elumin and Gavel
- 2 applications per crop
- Must rotate between applications
- REI of 12 hours
- PHI of 2 days
- Plant back 30 days
- Certis USA
- Copper Hydroxide 46.1% (30% metallic copper equivalent)
- NOP listed and OMRI approved
- REI 48 hours
- PHI 0 days
- May be applied in greenhouses
Rhyme (FMC) 22.7% flutriafol
Topguard (Cheminova) 11.8% flutriafol

- FRAC 3
- REI 12 hours
- PHI 0 days
  - Shorter than other FRAC 3 fungicides, e.g. Folicur
- DO NOT USE in greenhouses

- Rhyme registered on
  - Brassicas, head/stem and leafy
  - All fruiting vegetables
  - Cucurbits but NOT WATERMELON

- Topguard registered only on
  - Pepper, eggplant, okra but NOT TOMATO
  - Cucurbits but NOT CANTALOUPE
  - Watermelon
- 25.3% azoxystrobin + 18.6% flutriafol
- FRAC Groups 11 + 3
- REI 12 hours
- PHI 1 to 7 days (check label)
- Plant back of 0 days for labeled crops
- DO NOT USE in greenhouses

- Crops include
  - Leafy brassicas
  - Leafy vegetables
  - All fruiting vegetables
  - Cucurbits but NOT WATERMELON
- NCSU: “Good on Septoria and Alternaria on tomato”
- ALWAYS USE HIGH RATE
  - Low rate does not have enough azoxystrobin
- 70% mancozeb + 5% azoxystrobin
- FRAC M03 + 11
- ALWAYS USE HIGH RATE
  - Low rate does not have enough azoxystrobin
- Registered on same crops as mancozeb
  - Should be very good against anthracnose
- REI 24 hours
- PHI Same as mancozeb
- DO NOT USE in greenhouses
Gummy Stem Blight
Recommendations for 2019

- Same systemic fungicides
  - Switch
  - Inspire Super
  - Luna Experience
    - Resistance to Luna observed in Georgia in 2018
  - Rotate with chlorothalonil or mancozeb
Acknowledgements

- SC Specialty Crop Block Grant Program
- Syngenta Crop Protection
- Luxembourg - Pamol