Does soil organic matter affect severity of disease on potato caused by *Rhizoctonia solani*?

Jennie Brierley & Alison Lees
Rhizoctonia solani AG3
Evaluating disease risk

1. Soil sample (pre-planting)

2. Quantification of target inoculum

3. Relating inoculum to disease risk

www.euroblight.net
**R. solani**: black scurf

![Graph showing disease incidence](image)

**Soil inoculum treatment**

- Minitubers
- <1%
- 1-10%
- >10%

**Disease incidence (%)**

0 1:100 1:50 1:10 undiluted

Lsd

Brierley *et al.* (2016) Potato Research

**Crops with >10% disease**

- No
- Yes

**Seed inoculum**

- No
- Yes

Brierley *et al.* (2016) Potato Research
Farm scale monitoring:
Centre for sustainable cropping platform

6 field rotation
Rotation & field layout

- Potato
- Winter Barley
- Winter OSR
- Winter wheat
- Field Beans
- Spring Barley
- Road field
- Mid East
- Den South
- Estate
- Kennels
- Pylon
- Mixed Bottom Land
Crop cultivars and treatments

Sustainable treatments:
- Addition of compost
- Reduced inorganic fertilizer
- Reduced herbicide application
- Reduced fungicide/pesticide application

1. Lady Balfour
2. Mayan Gold
3. Vales Sovereign
4. Cabaret
5. Maris Piper
Soil organic matter (2015)
Black scurf on seed and progeny tubers

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Agronomy</th>
<th>2011 seed</th>
<th>2012 seed</th>
<th>2013 seed</th>
<th>2014 seed</th>
<th>2015 seed</th>
<th>2016 seed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>progeny</td>
<td>progeny</td>
<td>progeny</td>
<td>progeny</td>
<td>progeny</td>
<td>progeny</td>
</tr>
<tr>
<td>Cabaret</td>
<td>Conv.</td>
<td>28</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Sust.</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Lady Balfour</td>
<td>Conv.</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>9</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Sust.</td>
<td>9</td>
<td>2</td>
<td>0</td>
<td>23</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Maris Piper</td>
<td>Conv.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Sust.</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Mayan Gold</td>
<td>Conv.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Sust.</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td>22</td>
<td>2</td>
</tr>
<tr>
<td>Vales sovereign</td>
<td>Conv.</td>
<td>7</td>
<td>0</td>
<td>13</td>
<td>11</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Sust.</td>
<td>5</td>
<td></td>
<td>11</td>
<td></td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Effect of increased soil organic matter: field trial

- Plant emergence was delayed
- Stolon pruning increased
- Yield decreased
- Black scurf on progeny tubers increased
Potting mixes comprised of varying ratios of field soil and either manure or municipal compost were inoculated with *R. solani* AG3 and planted with a single Maris Piper mini-tuber.

<table>
<thead>
<tr>
<th>Environment?</th>
<th>Variety?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field soil 100%</td>
<td>Field soil 75% - Compost 25%</td>
</tr>
<tr>
<td>Field soil 75% - Manure 25%</td>
<td>Field soil 50% - Compost 50%</td>
</tr>
<tr>
<td>Field soil 50% - Manure 50%</td>
<td>Field soil 25% - Compost 75%</td>
</tr>
<tr>
<td>Field soil 25% - Manure 75%</td>
<td>Field soil 75% - Compost 25%</td>
</tr>
<tr>
<td>Field soil 50% - Compost 50%</td>
<td>Field soil 25% - Compost 75%</td>
</tr>
</tbody>
</table>
Effect of increased soil organic matter: Comparing field soils

- 0 sclerotia added
- 0.01g sclerotia added per tuber
- 0.03g sclerotia added per tuber
- 0.06g sclerotia added per tuber
Acknowledgements
Decision making

Site selection

Varietal selection

Crop management

Chemical control
IPM@Hutton

http://ipm.hutton.ac.uk/

Crop protectants & Biopesticides

Biocontrol

Biodiversity

Landscape Management

Pest & Disease Resistance

Detection & Monitoring

Pollinators

Rotations & Crop Diversity

Weed Management