Novel control of lettuce downy mildew and anthracnose

Belinda Rawnsley
Lee Bartlett and Barbara Hall

South Australian Research and Development Institute (SARDI)
Waite Research Precinct
Adelaide, South Australia

belinda.rawnsley@sa.gov.au
Downy mildew of lettuce

- *Bremia lactucae*
- Obligate pathogen
- Routine fungicide use
- Resistant varieties
- Yield loss and poor marketability
Anthracnose

- Fungi *Microdochium panattonianum*
- Survives on debris in soil
- Causes circular leaf lesions
- Economic losses
Aim

- Evaluate different products (inc. biologicals, soft options and plant growth) to control downy mildew and anthracnose on lettuce to reduce reliance on chemical fungicides
  - safer products
  - residue issues
  - market access
  - environmental concerns
Varietal susceptibility

- Tested 21 varieties with known and unknown resistance to DM and Anthracnose
- Inoculated plants in controlled environment growth room (14°C)
- Downy mildew – 2 susceptible varieties
- Anthracnose – all varieties with varying degrees of susceptibility

Selected six varieties susceptible to anthracnose
<table>
<thead>
<tr>
<th>Anti-fungal compound</th>
<th>Plant Growth</th>
<th>Biological</th>
<th>Fungicide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agri Fos (Phosphonic acid)</td>
<td>Acadian (Seaweed extract)</td>
<td>MicroPlus (Streptomyces)</td>
<td>BAS 651</td>
</tr>
<tr>
<td>Phostrol (Phosphorus acid)</td>
<td>Aminogro (Amino acid)</td>
<td>Sentinel (Trichoderma)</td>
<td>Cabrio</td>
</tr>
<tr>
<td>Silmatrix (Potassium silicate)</td>
<td>FoliCal 19 Plus (Calcium)</td>
<td>Serenade (Bacillus)</td>
<td>Tri-base Blue</td>
</tr>
<tr>
<td>Ecocarb (Potassium bicarbonate)</td>
<td>Agri 50 (Polysaccharide)</td>
<td>Trichoderma</td>
<td>Curex 3</td>
</tr>
<tr>
<td>Ecoprotector (Potassium sulphate)</td>
<td>Rezist (Polyamines)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bion (Acibenzolar-R-S-methyl)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Products tested**
Greenhouse trials

- Downy mildew (cv. Constanza), Anthracnose (cv. Explore)
- 22 tested - 5 experiments
- Applied 3 days before or after inoculation
- Assessment:
  - Downy 14 days after inoculation
  - Anthracnose 8 days after
Downy mildew severity

Pre-inoculation – example of trial results

Incidence (<20% for copper-based fungicides)
Anthracnose severity

Pre-inoculation application
Almost all treatments 100% disease incidence
Anthracnose

AgriFos

Sentinel
2010 Field trials – downy mildew

• 2 varieties cv. Marksman and Barcelona
• Planted Aug – harvested 9 weeks later
• 8 products tested
• Six sprays (7-14 days)
Field trials – never go as planned
(Sclerotinia and no anthracnose)
Field trials

Assessed 4 fully mature leaves disease rating scale 1-6
Severity cv. Marksman

Mean severity (% leaf area affected)

- Phostrol
- Folical19
- Rezist
- Kocide
- Aminogro
- Trichoderma
- Water
- Microplus
- Ecocarb

Treatment
Severity cv. Barcelona

![Graph showing mean severity (% leaf area affected) for different treatments. The graph includes bars labeled Rezist, Kocide, Folical19, Ecocarb, Aminogro, Phostrol, Trichoderma, Microplus, and Water. The treatments are arranged on the x-axis, and the y-axis represents the mean severity (% leaf area affected). The bars are labeled with letters indicating statistical comparisons.]
Conclusion

• Variable control by alternatives

• Downy - alternatives:
  ➢ Rezist (plant growth)
  ➢ Folical 19® (Calcium)

• Anthracnose - limited products
  ➢ AgriFos®, Cabrio®, Kocide® best

• Commercially unacceptable disease levels
Acknowledgements

• Funding provided by the Vegetable levy through HAL (project VG07127)
• Angela Lush & Ian Bogish (SARDI)
• Seed companies
• Growers for providing diseased plants
• Project team from DPIVic and University of Queensland
# 65 Nitrogen affects lettuce susceptibility to downy mildew (*Bremia lactucae*)

# 66 Anthracnose disease on lettuce affected by variety and nitrogen