Tuber blight
Effects of cv, spore density and isolate

A. Evenhuis, P.J. van Bekkum & G.J.T. Kessel
Outline

- Objective
- Susceptibility of cultivars in relation to Phytophthora strains
- Tuber blight incidence in the field in relation to spore density and isolate
- General discussion & conclusions

This research was funded by:
Ministry of Agriculture, Nature and Food quality
Objective

- To establish relationships between inoculum density in the soil and tuber blight
  - CV’s
  - Field conditions
- Improve decision rules to prevent tuber infection
  - Avoid tuber infection and tubers as primary inoculum source
  - Reduce environmental impact and possibly fungicides input
Requirements for tuber infection (above ground)

- **Foliar infection**
  - Variety
  - Weather conditions
  - Spray schedule

- **Sporulation**
  - Number of sporangia produced
  - Survival of sporangia

- **Wash down of sporangia to the ridge**
  - Rain duration
  - Rain intensity
Requirements for tuber infection (below ground)

- Spore density in the ridge
- Survival of spores
  - On the soil
  - In the ridge
- Infection of tubers
  - Cultivar resistance to tuber blight
  - Phytophthora strain
  - Inoculum density
  - Soil conditions
M & M Tuber blight incidence (laboratory)

- **Inoculated infection experiments on tubers:**
  - **During tuberization**
    - 7 Cultivars
    - Phytophthora strains
      - IPO98014
      - IPO428-2
      - Mixture of 15 recent strains
  - **During storage 2009**
    - IPO98014
    - IPO428-2
    - 2 Blue 13 isolates
Inoculation of the ridge:
- 3 cultivars
  - Varying in tuber blight resistance
- 2 isolates + mixture
- 2 spore densities
  - 100 % of ‘maximum’ spore density washed off’
  - 10 % of ‘maximum’ spore density washed off’
- 3 inoculation dates
Assessments soil infectivity field

- Survival of spores in the ridge
  - Weekly soil samples
  - Lacey method
- Tuber infection:
  - Infected Tubers:
    - At harvest
    - After 3 weeks incubation
Susceptibility of cv’s to *P. infestans* isolates

Tuberization; 3 yr average

<table>
<thead>
<tr>
<th>Variety</th>
<th>Tuber blight (%)</th>
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<tbody>
<tr>
<td>Monalisa (6)</td>
<td>40</td>
</tr>
<tr>
<td>Bintje (4.5)</td>
<td>45</td>
</tr>
<tr>
<td>Starga (4.5)</td>
<td>30</td>
</tr>
<tr>
<td>Agria (7,5)</td>
<td>25</td>
</tr>
<tr>
<td>Remarka (9)</td>
<td>20</td>
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<tr>
<td>Seresta (8)</td>
<td>15</td>
</tr>
<tr>
<td>Festien (9)</td>
<td>10</td>
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</tbody>
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I.P.O. 428-2

Mixture

I.P.O. 98014

l.s.d. = 8.0
Effect isolate on tuber blight (storage)

Storage 2009-2010

I.s.d. = 7.8 (n.s.)

CV Bintje
Survival as represented by octant infection

Average of three exp.

- Blue 13 10%
- Blue 13 100%
- IPO-428-2 10%
- IPO 428-2 100%
- mixture 10%
- mixture 100%

Infected octants (%) vs. days
Tuber blight incidence

l.s.d. = 1.2
Discussion & conclusions

- Overall: strong cultivar effect
- Also isolate effect but smaller
- IPO428-2 and mixture more aggressive than IPO98014, especially on susceptible cv’s
- Blue 13 was at least as aggressive as known aggressive strains on Bintje
Discussion & conclusions

- Overall, the mixture of 15 current isolates, including blue 13, was most aggressive towards tubers.
- Survival of sporangia in soil is density dependent: longer with higher inoculum densities.
- Inoculum density is related to tuber blight incidence:
  - Not 1:1
- Inoculum pressure is determined above soil:
  - These data help to establish the related tuber blight risk.
Thank you for your attention!

Acknowledgments: T. van den Bosch, M. Förch, M. Holdinga, M. Schilder, A. Clerkx, P. Kastelein & M. de Klein
Statement for discussion

- New (monogenic) resistances can be introduced without fungicide protection
- New (monogenic) resistances should be treated qs if they were susceptible