The link between genotype, phenotype and IMP2.0

Geert Kessell, Bert Evenhuis, Trudy van den Bosch, Marieke Förch and Huub Schepers
Outline

- EU Monitoring versus the target group
- Current use of monitoring information
  - Short update on the NL population 2014
- Future use of monitoring information

- An IPM2.0 control strategy for PLB
  - Host resistance
  - Fungicides
  - *P. infestans* Population Monitoring
Phytophthora infestans monitoring
Data Analysis + Phenotyping
Current use of monitoring (information)

- Analysis of Control problems:
  - (Extreme) weather
  - High primary inoculum
  - Population Changes

- Rapid identification of the culprit when problems occur
  - Blue13
  - Green33
  - New, “Green33 related” clone in the NL

- Population dynamics under a.i. selection pressure

- Population Genetics:
  towards a better understanding P. infestans of population dynamics
P. infestans clonal lines in the Netherlands
Green33 in 2013
Green33 in 2014
The Dutch Population 2014

- Blue13: 44%
- EU1-A1: 1%
- “Others”: 55%
- 2 new clones, implications currently unknown
Future use of Monitoring information

- Early warning
- Geographical (mis)matching a.i.’s and R-genes with the local population for efficient PLB control
- ...

➢ Essential to know the Phenotype behind the genotype
  - Genotyping is “High Throughput” and Quick
  - Phenotyping is Low Throughput and Slow
    - Clonal lines make it easier
    - The “others” group complicates matters
### Genotype → Phenotype

#### Active Ingredients

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<tr>
<th></th>
<th>Fluazinam</th>
<th>Metalaxyl</th>
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#### Resistance Genes

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<tr>
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*Wageningen UR*  
*For quality of life*
Lelystad & Valthermond 2010 & 2011
Lesion counts monitoring plots

Valthermond

Lelystad

WAGENINGEN UR
For quality of life
Results

- Valthermond 2011

Fungicide input (full dose rate equivalents) / Infection (%)
Results

Valthermond 2010

Valthermond 2011

Lelystad 2010

Lelystad 2011

Full dose rate equivalents / Severity (%)

End of Season Severity (%)
AMIGA trials 2013 & 2014

- 3 potato cultivars:
  - Desiree (Conventional)
  - A15-031 (Desiree + Vnt1) (GM)
  - Sarpo mira (Conventional)

- 3 Control strategies:
  - No spraying (against PLB)
  - Weekly Spray application
  - IPM 2.0 (DSS + AVR Monitoring info)
AMIGA, Valthermond 2014
## Results 2013

### Fungicide applications under extreme disease pressure:

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<th>Variety</th>
<th>Strategy</th>
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### Planting date:
- Emergence: 29-6-2013
- Haulm Killing: 25-9-2013
- Length of season: 88 Days
## Results 2014

<table>
<thead>
<tr>
<th>Cultivar</th>
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Some Conclusions

- For practical application of monitoring information, we need to know the link between genotype and phenotype.
- Monitoring is an essential component of next level PLB control strategies.
- The full potential of IPM in PLB control is not yet realized, ... not even close!
- Ample room for improvement **IF** host resistance is introduced.
Thank you for your attention

7 August 2013