Recent changes in the Phytophthora infestans population in Northern Ireland and first results from a new all-Ireland late blight project

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Phytophthora infestans in Ireland

- A2 first identified in Northern Ireland in 1987 and in the Republic of Ireland in 1988

* number of isolates tested

- 542
- 104
- 54
- 42
- 5
- 5
- 61
- 30
- 39
- 69
- 32
- 139
- 71
- 13
- 26
- 0
- 0

% A2 isolates

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<th>Year</th>
<th>NI</th>
<th>RoI</th>
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Phytophthora infestans in Northern Ireland

- A2 occurred at low frequency 1987-1995 in Northern Ireland
- one A2 isolate in 1995, then all A1 until...

2005: 3 A2 isolates in Co. Down; no A2 in 2006
Phytophthora infestans in Northern Ireland

- Of the A2 isolates from 2005, 2 were from different cultivars in the same south Down field, 1 was from a crop a few miles away.
Phytophthora infestans in Northern Ireland

- Of the A2 isolates from 2005, 2 were from different cultivars in the same south Down field, 1 was from a crop a few miles away.
- These 3 isolates shared a common RG57 fingerprint, but they were not blue 13.
- They were not identical to any of the 2005 GB A2s, but both surveys were based on small sample numbers.
**Phytophthora infestans** in Northern Ireland

- The incidence of A2 isolates increased in **2007**

- 8 A2 isolates found in 2007 in extensive survey, all in Co. Down
Locations of potato crops sampled in extensive survey, 2007
Locations of potato crops sampled in extensive survey, 2007

- Phenylamide-sensitive
- Phenylamide-resistant
- A2 (sensitive)
- A2 (resistant)
Phytophthora infestans in Northern Ireland

- The 8 A2 isolates identified in the 2007 extensive survey are from:
  - Désirée
  - Lady Claire
  - Kerr’s Pink
  - Marfona
  - Maris Piper (2)
  - Milagro
  - Saxon

- Seed was either from N. Ireland or Scotland
Phytophthora infestans in Northern Ireland

- The incidence of phenylamide-resistant strains increased from 25% in 2006 to 40% in 2007.
- The increase appeared unrelated to the increased A2 incidence.
Phytophthora infestans in Northern Ireland

- 5 crops were selected for intensive sampling
  - Clough, Kerr’s Pink (10 July)
  - Ardglass, Saxon (23 July)
  - Magheralin, Maris Piper (26 July)
  - Ballyhornan, Santé (7 August)
  - Bushmills, Kerr’s Pink (22 August)
- 120 single lesions collected from each were isolated
Locations of potato crops sampled in extensive and intensive surveys, 2007
Phytophthora infestans in Northern Ireland

- 5 crops were selected for intensive sampling
- 120 single lesions collected from each were isolated
  - Magheralin, Maris Piper: 113 isolates, 1 A2 (1%)
  - Clough, Kerr’s Pink: 82 isolates, 15 A2 (18%)
  - Ardglass, Saxon: 119 isolates, 21 A2 (18%)
  - Bushmills, Kerr’s Pink: 119 isolates, 21 A2 (18%)
  - Ballyhornan, Santé: 98 isolates, 92 A2 (94%)
Locations of potato crops sampled in intensive surveys, 2007
Phytophthora infestans in Northern Ireland

- **RG57 fingerprinting**
  - 23 isolates: all 8 from extensive survey, 15 representative of the 5 intensive sites
  - 3 were the same A2 genotype as found in 2005
  - 20 (7/8 extensive survey, 13/15 intensive survey isolates) all had the same fingerprint
  - These 20 were all *Blue 13*
  - Further characterisation will be carried out (mtDNA, SSRs)
Phytophthora infestans in Northern Ireland

- How did Blue 13 get to Northern Ireland?
- What are the implications for potato blight control in Ireland as a whole?
- This is being investigated as part of a new all-Ireland potato late blight project
An Integrated Biosciences Platform for the Future Control of Potato Late Blight on the Island of Ireland

2007 – 2011

Funded by the Department of Agriculture, Fisheries and Food under the National Development Plan 2007-2013 through the Research Stimulus Fund

Teagasc, Oak Park
AFBI, Belfast
University of Wales, Bangor

Co-ordinated by Denis Griffin
Sub-Project 1:
The current population structure, evolution and response to cultivar of Phytophthora infestans in Ireland

- **Extensive sampling:** collect 8 lesions/site, c. 50 sites (c. 35 in the south, 15 in the north of Ireland), aiming for 5 single-lesion isolates per site (250 isolates)

- **Intensive sampling:** collect 80 lesions/site from 10 selected crops (c. 6 in the south, 4 in the north of Ireland), aiming for 50 single-lesion isolates per site (500 isolates)
Sub-Project 1:
The current population structure, evolution and response to cultivar of Phytophthora infestans in Ireland

- **Phenotypic characterisation:**
  - mating type
  - metalaxyl resistance
  - race (sub-set)

- **Genotypic characterisation:**
  - mtDNA
  - SSR
  - RG57 (sub-set)
  - Gpi/Pep allozymes (sub-set)
Sub-Project 1: The current population structure, evolution and response to cultivar of Phytophthora infestans in Ireland

Northern Ireland

- Unusually few infected crops for most of the season
- Extensive sampling: 12 sites sampled, 30 isolates established (1-7 per site)
- Intensive sampling: 4 sites sampled, 25-50+ isolates per site currently being established
  - Co. Down: King Edward, Bishopscourt
  - Co. Down: Kerr’s Pink, Kilkeel
  - Co. L’derry: Kerr’s Pink, Castledawson
  - Co. Down: various cultivars, AFBI Crossnacreevy
Sub-Project 1:
The current population structure, evolution and response to cultivar of Phytophthora infestans in Ireland

Northern Ireland

- **Extensive sampling:**
  - 28 isolates tested for metalaxyl resistance: 54% resistant
  - 14 isolates with results for mating type: 8 A1, 6 A2

- **Intensive sampling:**
  - King Edward, Bishopscourt, Co. Down: 25 isolates, all A1
  - Kerr’s Pink, Kilkeel, Co. Down: 48 isolates, 16 results for mating type: 10 A1, 6 A2
  - other sites not yet tested
Sub-Project 1:
The current population structure, evolution and response to cultivar of Phytophthora infestans in Ireland

Republic of Ireland

- **Extensive sampling:** 42 sites sampled, 224 isolates established (1-18 per site)
- **Intensive sampling:** 6 sites sampled, 327 isolates established (30-82 per site)
  - Carlow: 3 trials, various cultivars
  - Cork: Kerr’s Pink
  - Donegal: Kerr’s Pink, Rooster
  - Louth: Kerr’s Pink
  - Meath: Rooster
  - Wexford: Golden Wonder
Carlow: organic trial, 8 August 2008
Setanta (left), Orla (right), Santé (far right)
Carlow: organic trial, 8 August 2008
Setanta (left), Sárpo Mira (centre) with Orla (right)
Sub-Project 1: The current population structure, evolution and response to cultivar of Phytophthora infestans in Ireland

Republic of Ireland

- **Extensive sampling:**
  - metalaxyl resistance: only a few isolates tested (some resistant)
  - 177 isolates with results for mating type: 129 A1, 48 A2

- **Intensive sampling:**
  - testing in progress
Sub-Project 1: The current population structure, evolution and response to cultivar of Phytophthora infestans in Ireland

Preliminary comments:

- All-Ireland collection of isolates established
- Characterisation started
- Both A1 and A2 mating types again found in Northern Ireland
- Both A1 and A2 isolates found in Republic of Ireland (the first finding of A2 for some years)

Is the population in Ireland changing as a result of the introduction of new genotypes such as Blue 13?

Yes!!
Many thanks to:

Northern Ireland

- Inspectors of Quality Assurance Branch, DARD
- Mark Wilson, AFBI
- Students of Queen’s University, Belfast

Republic of Ireland

- Teagasc Potato Advisory & Research staff
- Potato Seed Inspectors, DAFF
- Fiona Hutton, Teagasc, Oak Park
The project:

An Integrated Biosciences Platform for the Future Control of Potato Late Blight on the Island of Ireland, 2007-2011

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