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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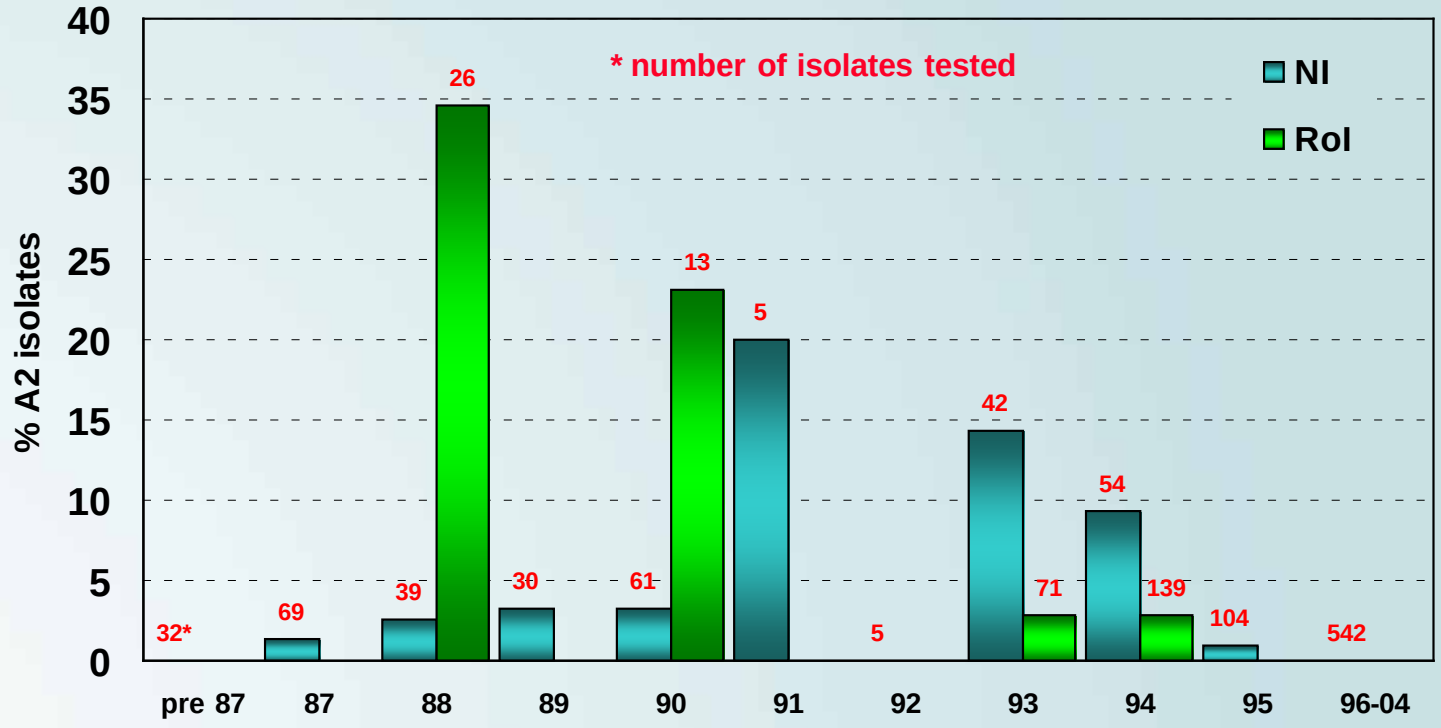
An Roinn Talmhaíochta, Iascaigh agus Bia
Queen's University Belfast
NDP National Development Plan 2007 - 2013

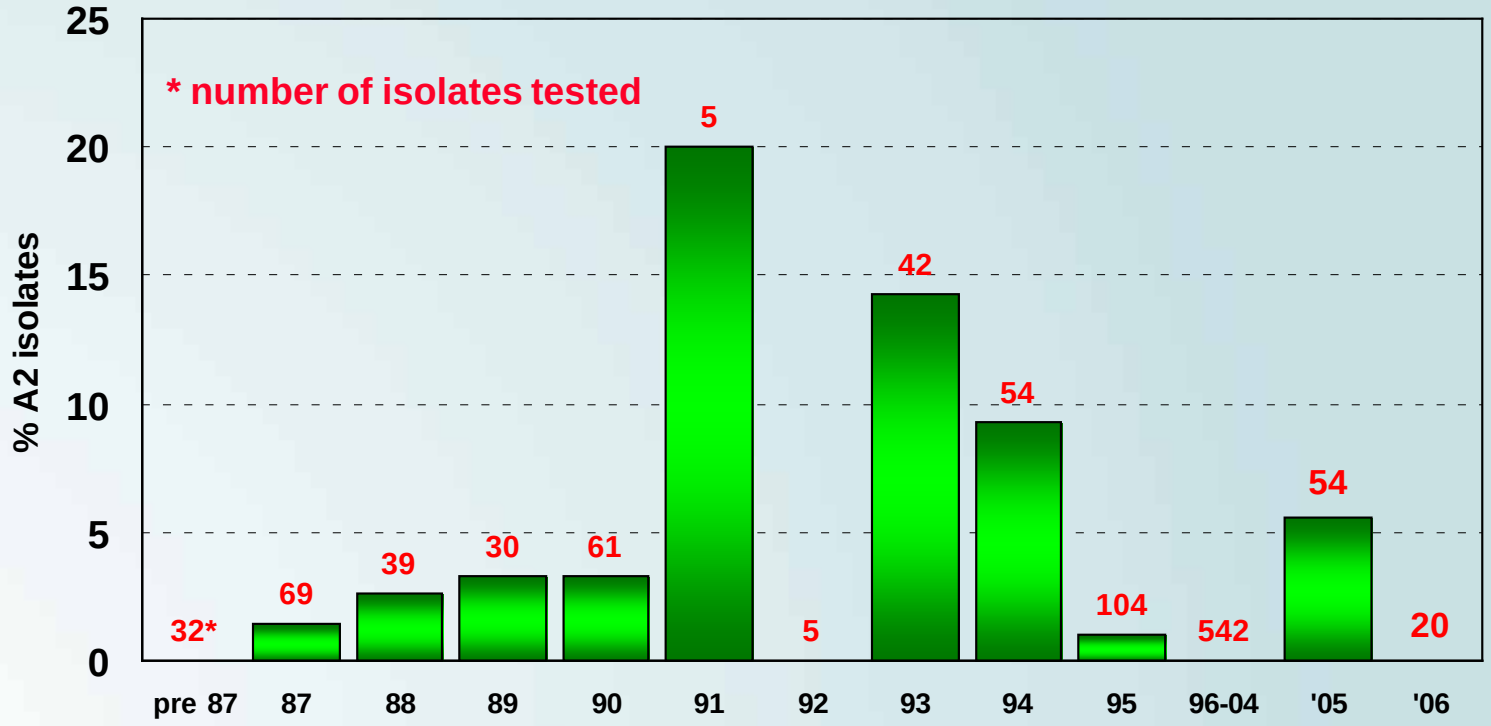
Phytophthora infestans in Ireland

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



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

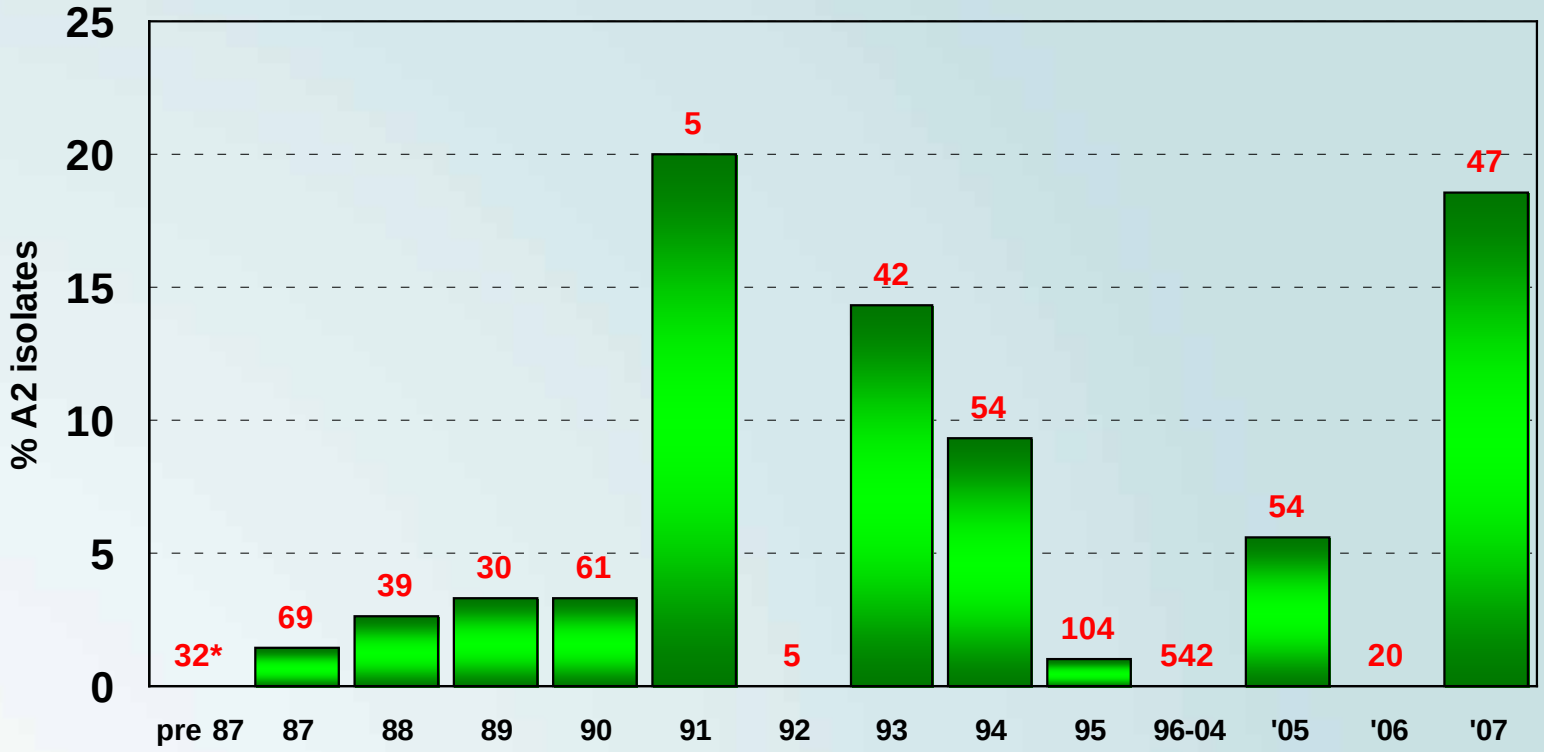
- *Of the A2 isolates from 2005, 2 were from different cultivars in the same south Down field,*
  1 was from a crop a few miles away

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*

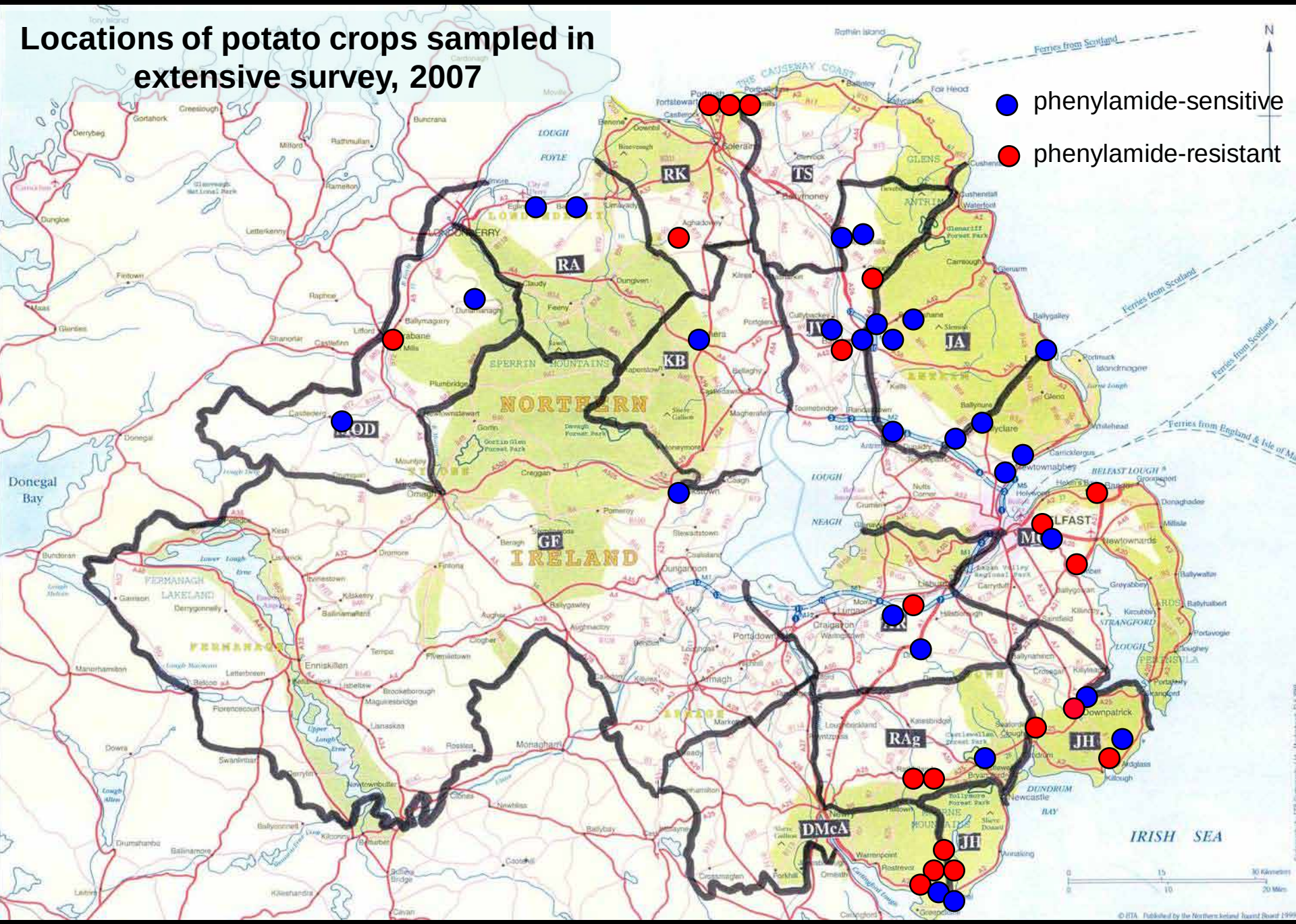
Phytophthora infestans in Northern Ireland

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

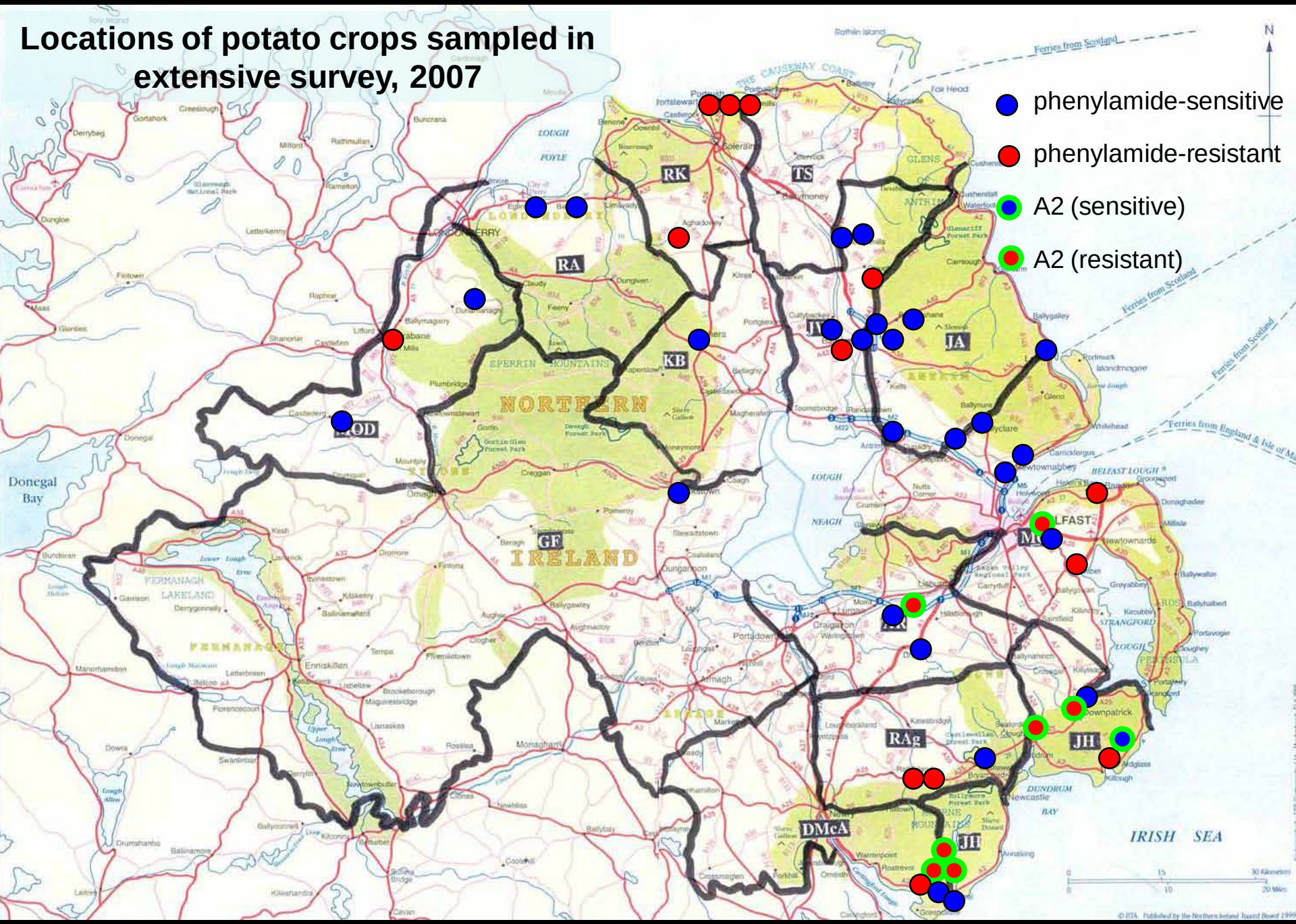


- *8 A2 isolates found in 2007 in extensive survey, all in Co. Down*

Locations of potato crops sampled in extensive survey, 2007



Locations of potato crops sampled in extensive survey, 2007

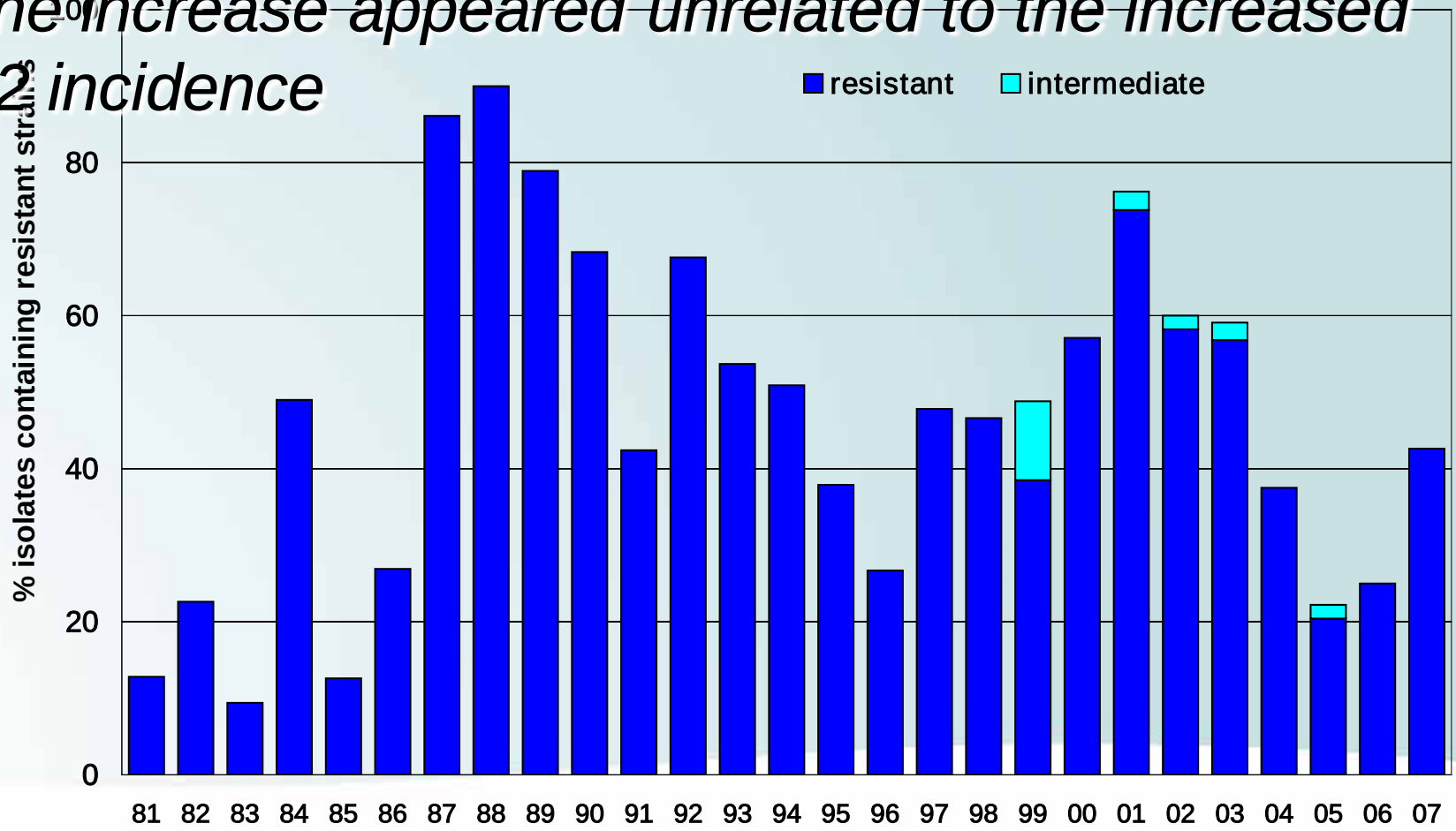


Phytophthora infestans in Northern Ireland

- *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

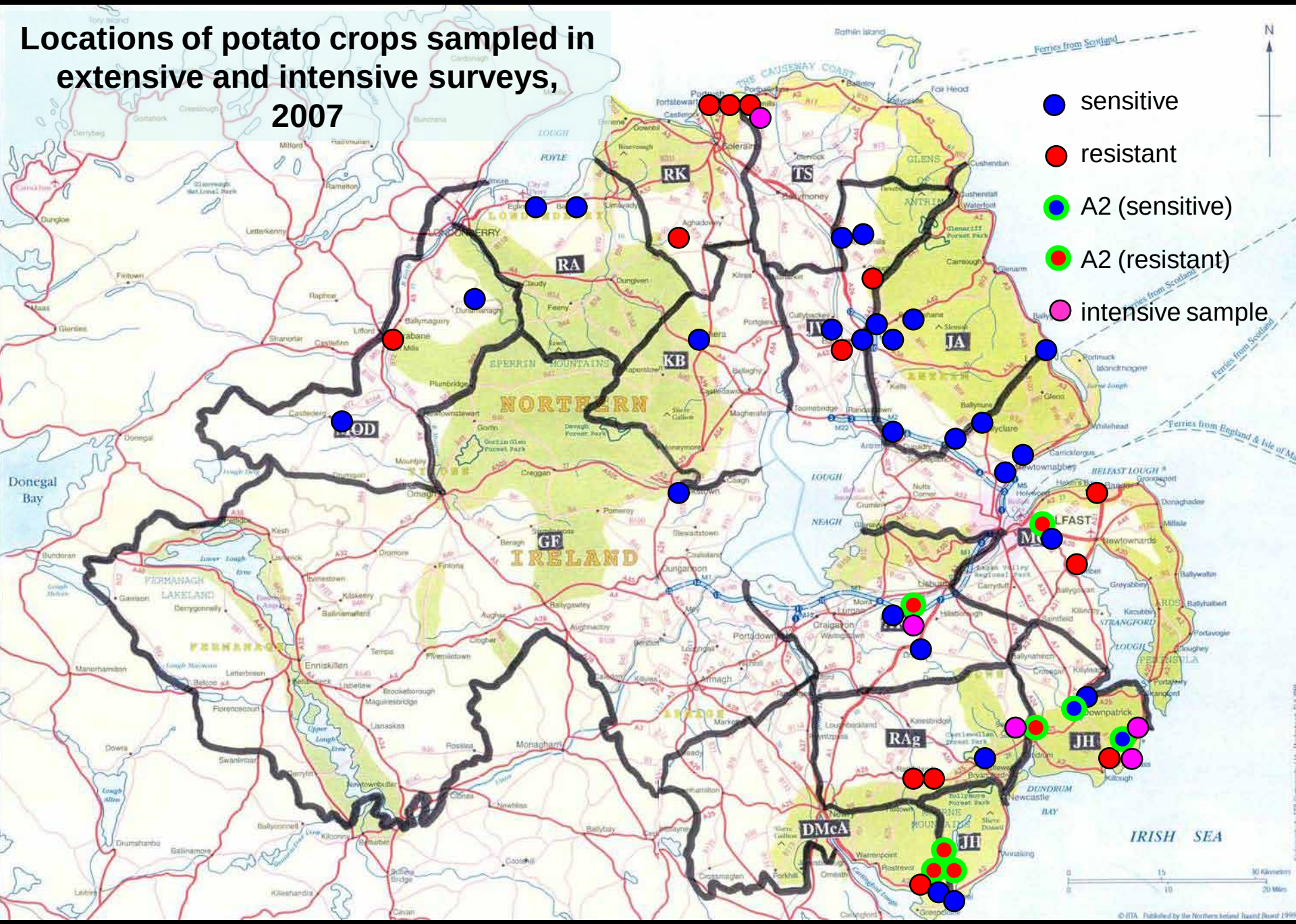
- *The incidence of phenylamide-resistant strains increased from 25% in 2006 to 40% in 2007*
- *The increase appeared unrelated to the increased A2 incidence*



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

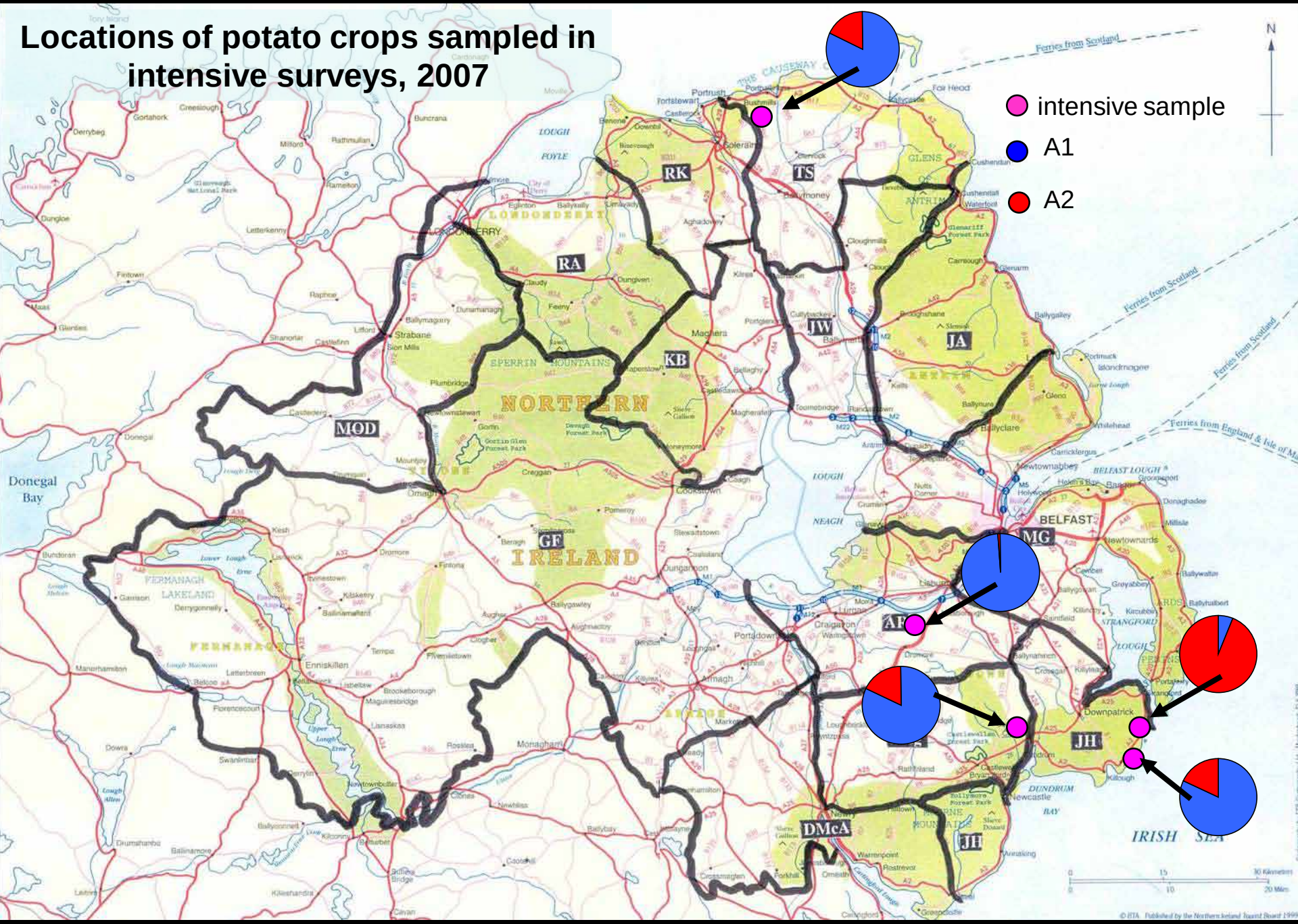



Ardglass, Saxon, 23 July 2007

Phytophthora infestans in Northern Ireland

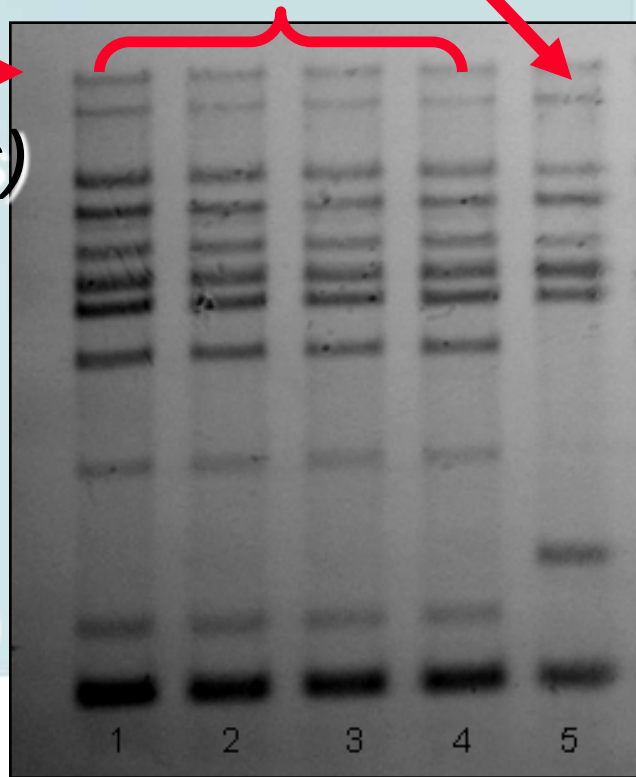
- *5 crops were selected for intensive sampling*
- *120 single lesions collected from each were isolated*
  - *Magheralin, Maris Piper: 113 isolates, **1 A2** (**1%**)*
  - *Clough, Kerr's Pink: 82 isolates, **15 A2** (**18%**)*
  - *Ardglass, Saxon: 119 isolates, **21 A2** (**18%**)*
  - *Bushmills, 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:

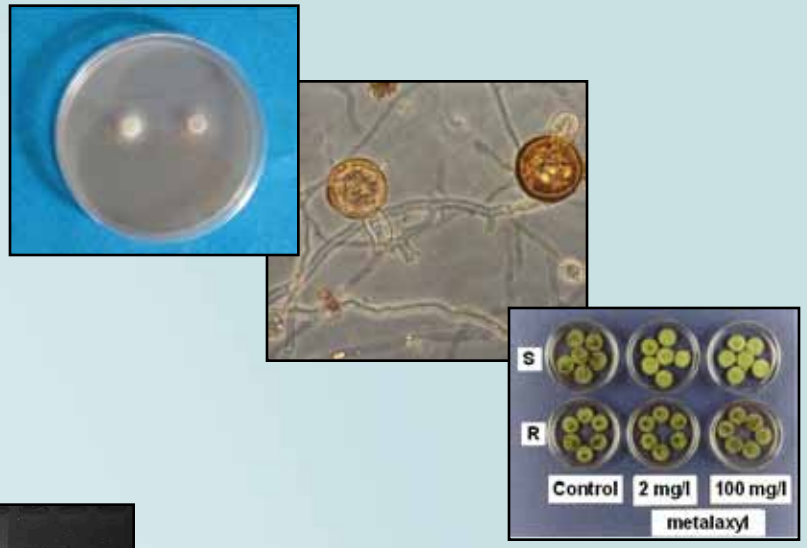
The current population structure, evolution and response to cultivar of Phytophthora infestans in Ireland

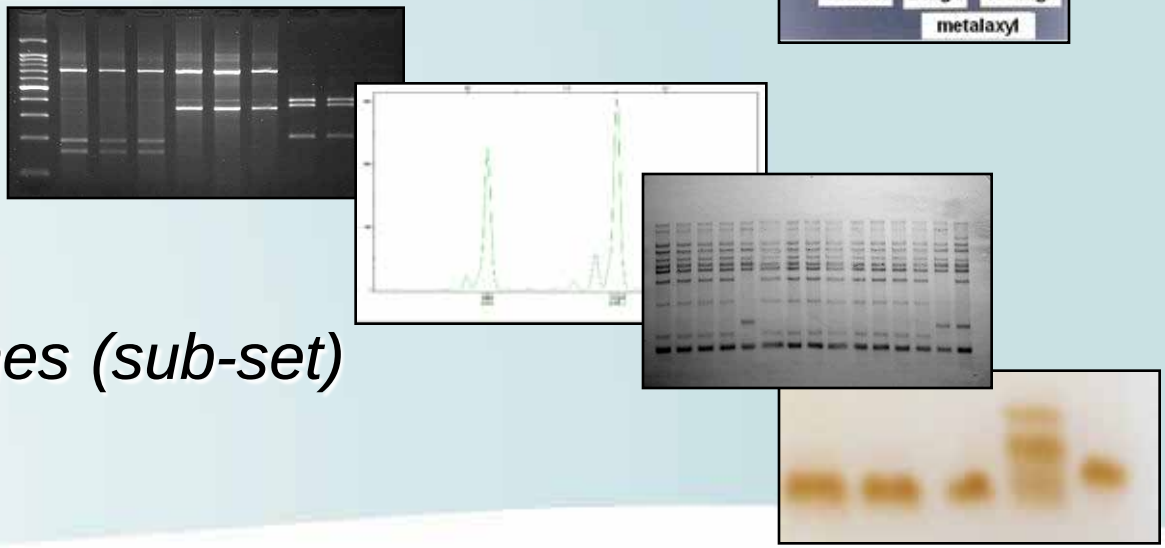
- *Extensive sampling: collect 8 lesions/site, c. 50 sites (c. 35 in the south, 15 in the north of Ireland), aiming for 5 single-lesion isolates per site (250 isolates)*
- *Intensive sampling: collect 80 lesions/site from 10 selected crops (c. 6 in the south, 4 in the north of Ireland), aiming for 50 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*

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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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National Development Plan 2007 - 2013