P. infestans Population Changes: implications

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Isolates characterised for: mating type genotype
• Major changes in population

• Increasing proportion of A2

• This increase mainly attributed to an increase in a particular clonal lineage

This genotype is known as 13_A2 (‘blue A2’)

Why is 13_A2 dominating and does this matter in terms of controlling late blight?

Not because it is A2 but because it exhibits other characteristics:
Blight bruises potato growers’ confidence

The challenges of accelerating changes in climate and diseases to which Professor Peter Gregory, chief executive of SCRI, is only too well aware.

"Blight pathogens are an example. Much of the effort in the last decade has been put into pest and disease work. We have understood how to combat pests and diseases, but we now need to understand the variables of temperature, rainfall and humidity," said Professor Gregory.

"We have to be able to look ahead and map the work. We have to be able to do research into new varietal improvement to help in disease resistance."

The information we need is important to potato breeders, for example, who are working hard to breed in disease resistance." Some of the new varieties will be targeted for export markets. A group of Egyptian growers and potato specialists were in Gourdie yesterday on a visit organised by fertiliser company Yara and potato specialists Greenleaf.

"Dr. Osmaha, of Yara Egypt, says, "We have big expectations of the variety, with the disease problems that are facing the potato industry in Egypt."

"But no luxury is in it. The new growing season only started at the end of last year, and the area over the last 10 years has increased from 30,000 hectares." The area is expected to increase to 300,000 hectares and the white area is irrigated using centre pivot and spray irrigation of the crop."

He has been involved in a team looking at the increasing incidence of blight on potatoes, which is now much more prevalent. The type of blight which can reproduce with the more prevalent blight type is now much more prevalent.

"We are in the middle of a three-year project but it seems we have a blight which is harder to control and more aggressive," he said.

ROTATIONS

SAC head of crop services Stuart Wale said: "There are problems with

Nelson, of potato packers Braisdon, pointed out that 69% of the chemicals approved for use on potatoes in 1993 are no longer on the approved list.

There are also pressures from retailers and other agencies such as Sopp to grow potatoes with less risk to the environment, including safeguarding water quality and preventing soil erosion. There are also questions raised about the carbon footprint of the crop.

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A recent Potatoes in Practice event attracted 600 visitors.
Characteristics of 13_A2 and implications

2007 all GB samples ~ 1400

13_A2 present/dominating throughout the growing season
- Survives overwinter
- Infects early
Characteristics of 13_A2 and implications  - Aggressiveness

- **Aggressiveness** – amount of damage caused to leaves, stems and tubers
- **Fitness** – disease spread within (sporangia and zoospores) and between (tubers or oospores) seasons
- Compared the aggressiveness of a range of GB and foreign *P. infestans* genotypes against foliage and tubers of a range of potato varieties under different conditions.
  - 17 GB 2006 isolates
  - 9 other isolates: 6 foreign (2 NL (04&06), 2 PL(05), 2 SE(03) 2 SCRI controls (1995 &1997),1 Irish isolate LD151
  - 5 cultivars
Characteristics of 13_A2 and implications - Aggressiveness

• Field foliar

5 isolates released into field trial and tracked over epidemic

• Foliar

26 isolates: detached leaves of glasshouse grown plants at two different temperatures in growth chambers

• Tuber

4 isolates: field-grown whole tuber test

<table>
<thead>
<tr>
<th>Resistance rating</th>
<th>Foliar</th>
<th>Tuber</th>
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<tbody>
<tr>
<td>King Edward</td>
<td>3</td>
<td>4</td>
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<tr>
<td>Maris Piper</td>
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<td>Cara</td>
<td>7</td>
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<tr>
<td>Lady Balfour</td>
<td>8</td>
<td>7</td>
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Characteristics of 13_A2 and implications - Aggressiveness (Field Foliar)

- All isolates were pathogenic in lab test at D0
- Domination of genotype 13_A2
- Four other genotypes (1 alien) rare
Characteristics of 13_A2 and implications - Aggressiveness (Foliar)

- 26 isolates
- 5 varieties
- 2 temperatures 13°C & 18°C
- 6 replicates in RCB design
  1560 detached leaves in 60 boxes
- Inoculation
  Isolates maintained on Craig’s Royal
  420 sporangia per droplet
- Factors recorded
  IP – incubation period – time to 1st symptoms
  LP – latent period – time to sporulation
  Lesion size (2 measurements) at 6 d.a.i.
  (Strongly correlated with other traits such as sporulation)
Characteristics of 13_A2 and implications - Aggressiveness (Foliar)

Lesion area (mean of all varieties)
- On average, genotype 13_A2 isolates sporulate sooner than other genotypes at 13°C
• genotype 13_A2 resulted in significantly more disease that isolates of other common genotypes after 12 weeks at 4C
Characteristics of 13_A2 and implications - Virulence

Virulence of genotype 8- A1

Virulence of genotype 13- A2

Race: 1,2,3,4,5,6,7,10,11
2006/7 Anecdotal reports that historic resistance ratings are no longer valid for some cultivars.
2008 SCRI & SASA – Foliage Blight tests

- re-screened cultivars, parental breeding material and wild species from CPC with isolate of 13_A2
- 10 most popular commercial cultivars according to Potato Council figures on planted area 2007
- & other cultivars, as appropriate, for which there is circumstantial evidence for decreased host resistance e.g. Stirling, Setanta and Orla.
Resistance of 10 most widely grown cultivars in GB 2007 (x 1000 Ha) to 13_A2 represents 61% of total planted area (131,000 Ha)
SCRI and SASA field results 2008 –
cultivars with anecdotal evidence of breakdown in resistance
Sarpo Mira

Eucablight data

Scottish data
Conclusions

• Proportion of 13_A2 in GB population is high: remains 70-80% in 2008

Characteristics that make it dominant compared to other isolates and may have implications for management:

- Survives overwinter and infects early - vigilance
- Aggressive at 13°C
- (and also at much lower temperatures? Smith periods?)
- Shorter latent period – cycling more quickly
- Able to overcome previously resistant cultivars
- Metalaxyl insensitivity

• Ensure breeding material resistant
• Watch for increased variation in population
• Ensure fungicide sensitivity