Potato Late Blight: Tools for Integrated Pest Management

Alison Lees

@IPMHutton

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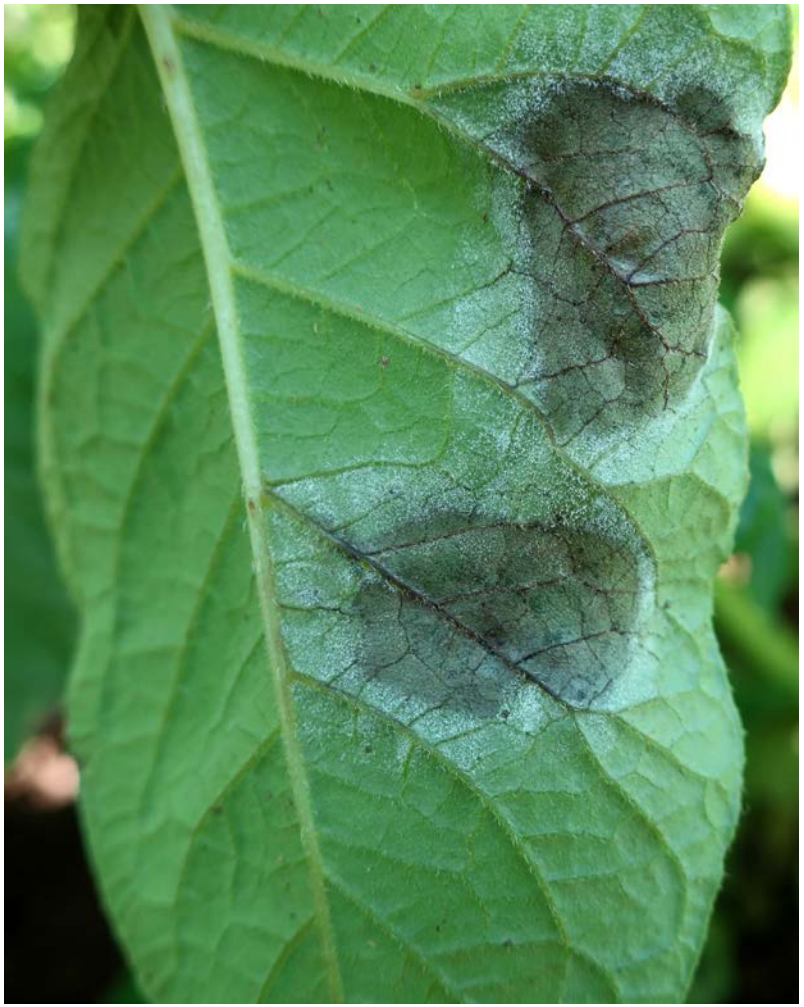
Steps towards implementing IPM – in theory

- Recognise problem
- Recognise solution
- Ability and willingness
- Trial and assess
- Adopt



Late Blight control
– is there a problem to recognise?

- Fungicides are effective if applied correctly
- Routine applications are convenient
- Fungicide insensitivity is relatively rare
- Anti-resistance strategies are in place - FRAG
- Active ingredients are available
- Costs are high, **but risk is higher**

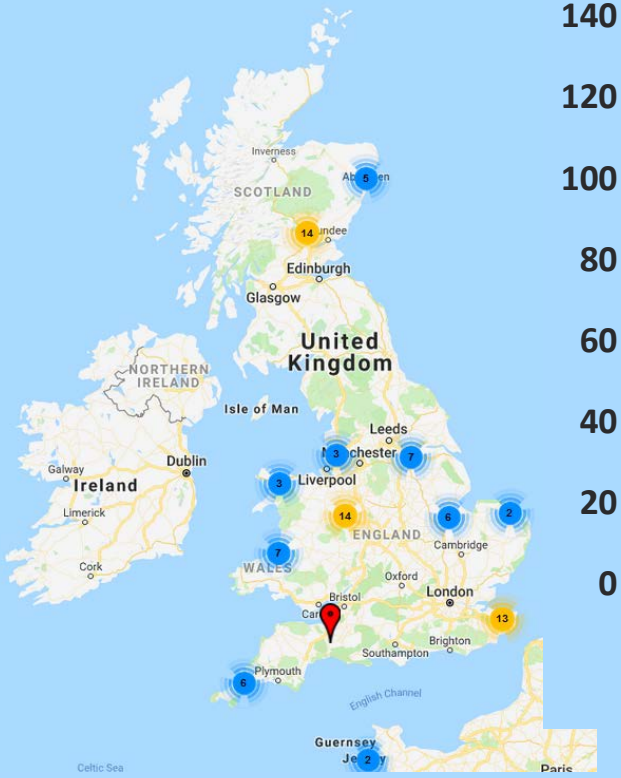
Drivers…

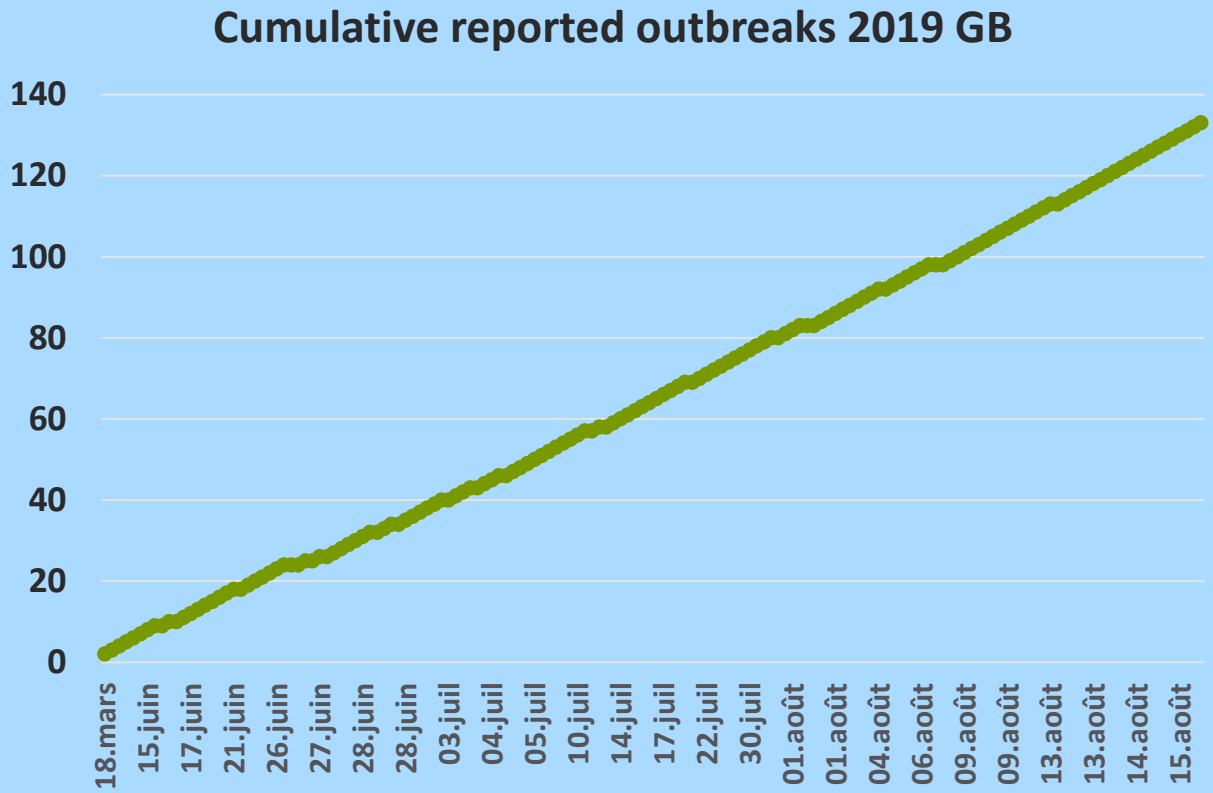
- Increasingly aggressive genotypes of *P. infestans*
- New fungicide insensitive genotypes
- Fewer actives approved/loss of current actives
- More blight conducive weather

- Meeting IPM targets
- Economic and environmental costs
- Reducing reliance on pesticides

GB Fight Against Blight Campaign

Outbreak data informs local and national disease risk

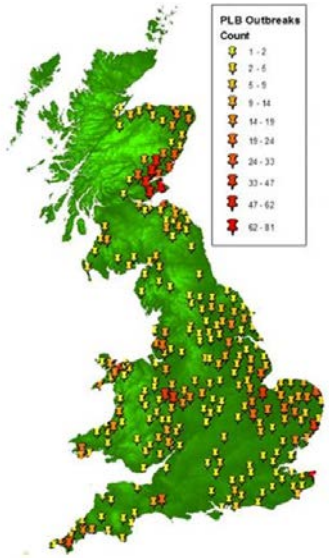




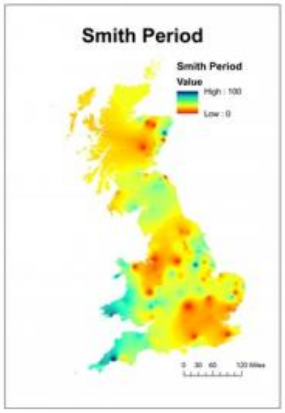
Hutton Criteria

Implemented from 2017 in Blightwatch

In conjunction with outbreak data = better resolution of disease risk based on environmental conditions



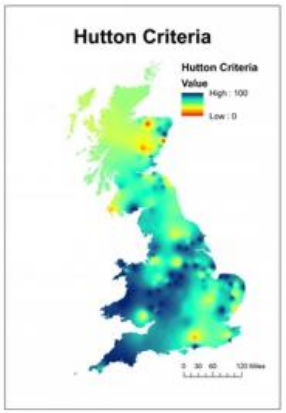
Historical outbreak data → analysis of existing models → improvement



Previously: Smith Periods

Two consecutive days:

1. Each day minimum temperature 10°C
2. Each day at least 11 hours with RH ≥ 90%



Now: Hutton Criteria

Two consecutive days:

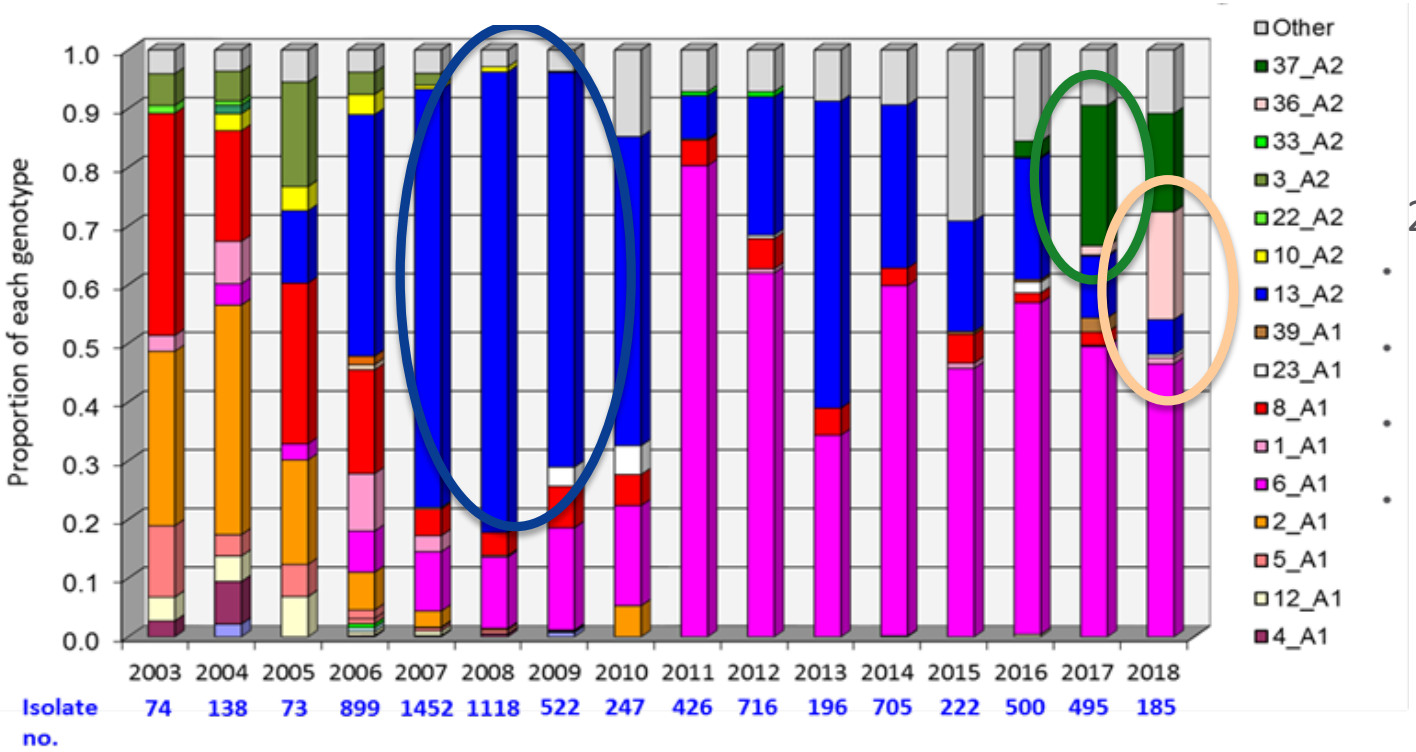
1. Each day minimum temperature 10°C
2. Each day at least 6 hours with RH ≥ 90%

Changing *P. infestans* population over time

13_A2 associated with Metalaxyl resistance, overcame host resistance, aggressive

37_A2 associated with Fluazinam resistance – change in practice

36_A2 increasing in 2018



2018

- 6_A1 from 50 to 46%
- 36_A2 from 2 to 18%
- 37_A2 from 24 to 17%
- 13_A2 from 11 to 6%

Industry awareness EU_37_A2

Dark Green 37: Coming to a field near you

BY JOHN SWIRE ON OCTOBER 26, 2017 CROPS, NEWS, POTATOES

The emergence of a new strain of potato late blight (Phytophthora infestans) with resistance to fluazinam, one of the most commonly used blight fungicides, is raining concern among agronomists.

Fungicide resistance warning for new potato blight strain

Friday 30 June 2017 14:58 Richard Allison

A reduced sensitivity to a key blight fungicide is being partly blamed for the spread of a new strain of the potato disease across Europe, with UK farmers urged to alternate their fungicide actives this season. The Dark Green 37 (EU-37) strain of blight was first detected in the Netherlands in 2013 and it has now spread to England, German, Belgium and north-west France. See also: How spud growers will benefit from blight forecasts Worryingly, this strain of the most important […]

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Blight actives feel the strain

Late blight pressure and a flurry of activity from blight scouts gives an early indication that new blight strain 37_A2 is on the rise. *CPM* reports.

typing has been carried out in 'real time' this season by David Cooke at The monitoring has been carried out following the spread of the blight he Netherlands (where it was first found in 2013), Germany, Belgium, es of have shown a reduced sensitivity to fluazinam.

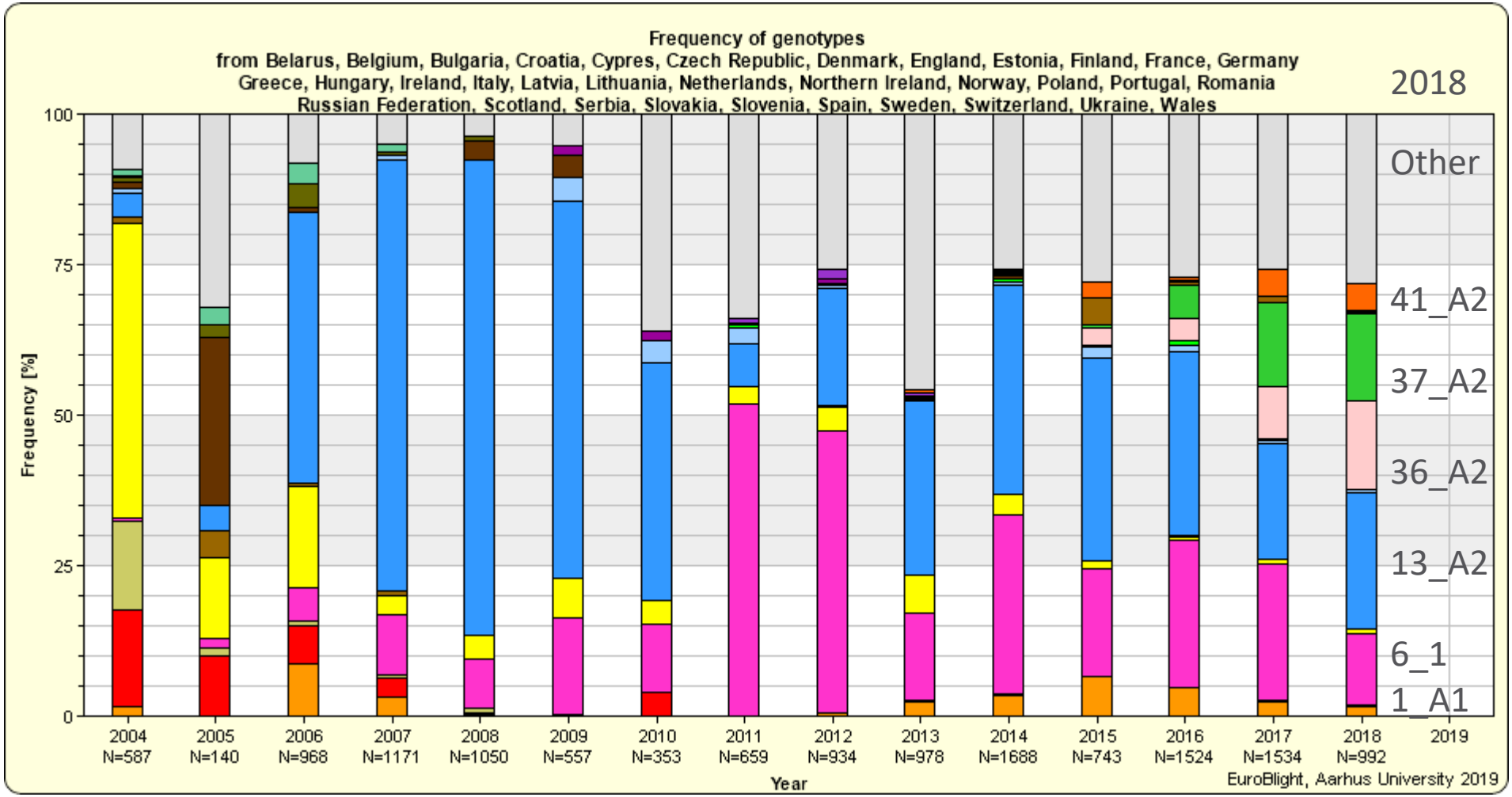
een 15 findings (up to 25 Sept) of the new blight strain, reported for the a very small number of samples.

Eurofins trial Derbyshire 2017

Shirlan Revus

Syngenta press release online 17 Sept 2017

EU *P. infestans* genotype change

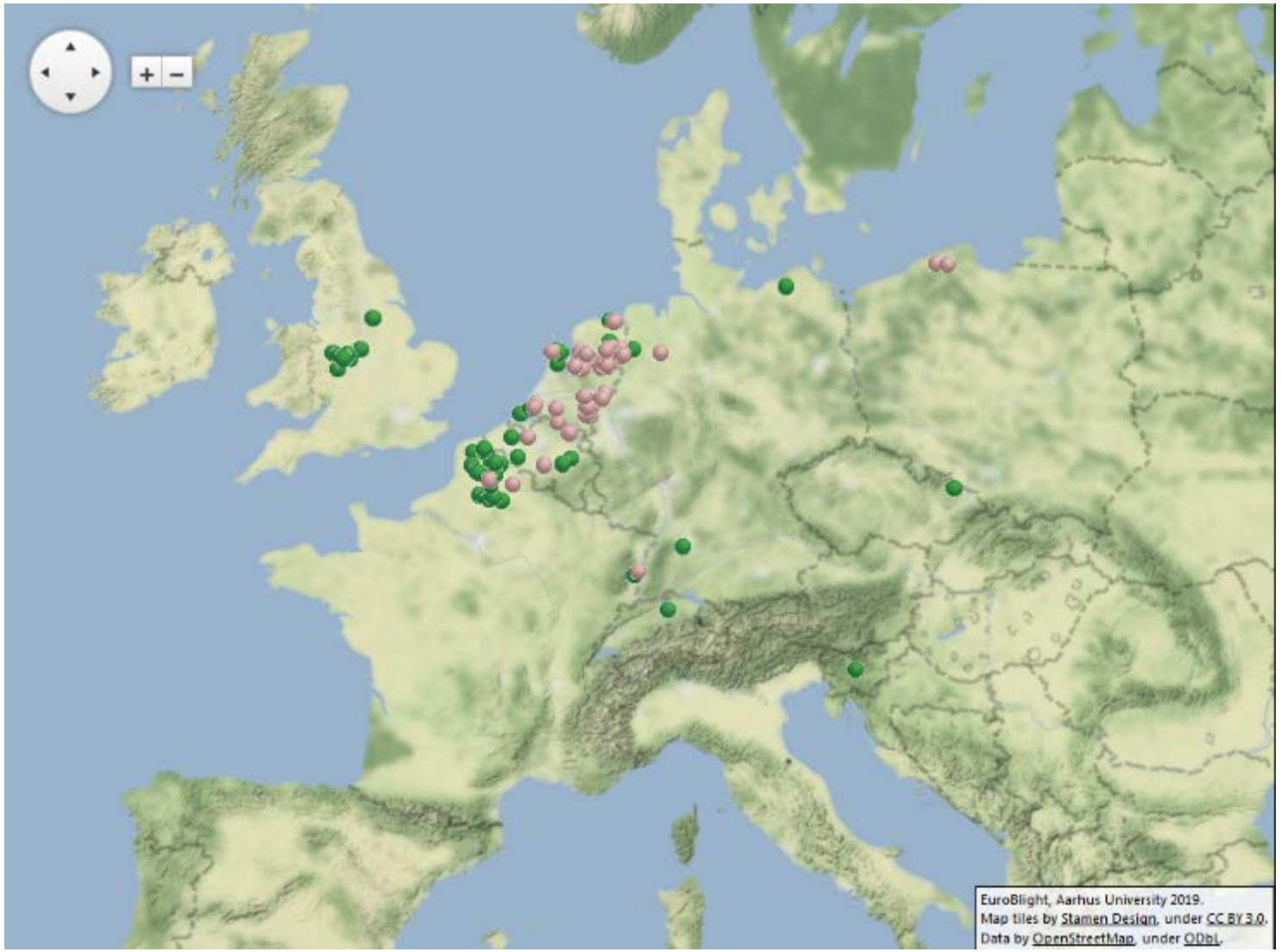


EuroBlight
A potato late blight network for Europe

2015 36_A2 & 37_A2

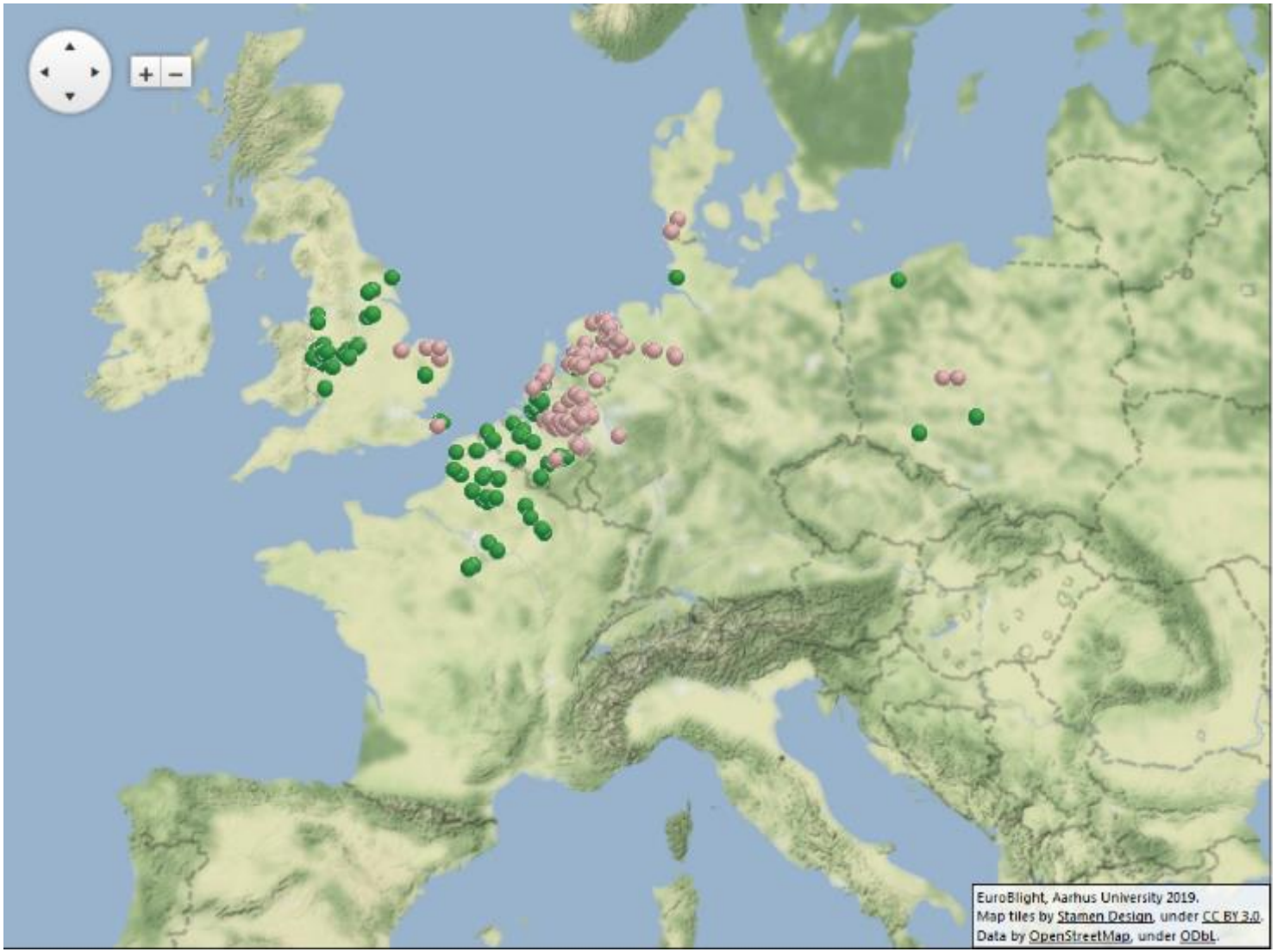
EuroBlight
A potato late blight network for Europe

2016 36_A2 & 37_A2



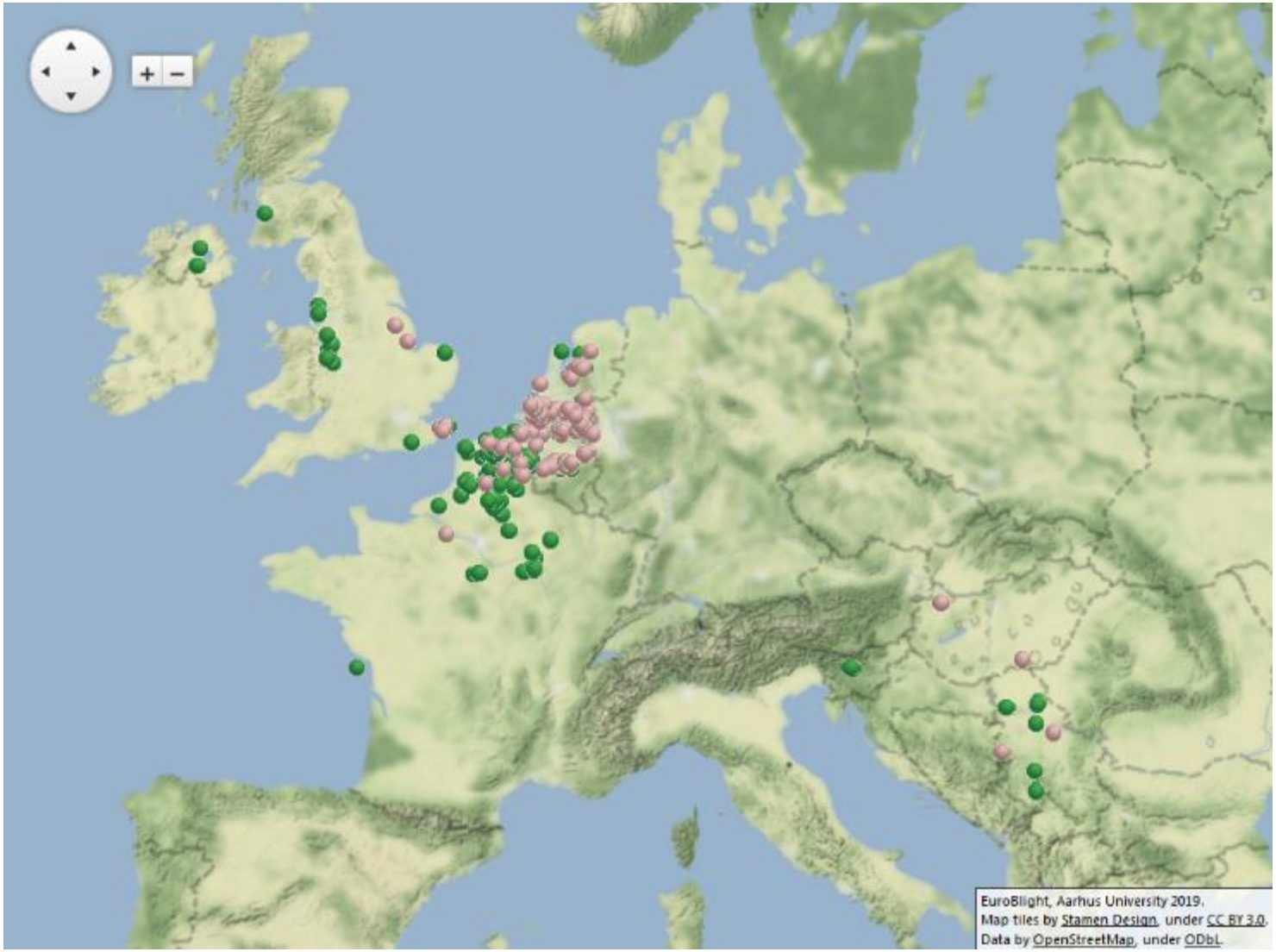
EuroBlight
A potato late blight network for Europe

2017 36_A2 & 37_A2



EuroBlight
A potato late blight network for Europe

2018 36_A2 & 37_A2



EuroBlight
A potato late blight network for Europe

Increasing incidence of 36_A2
Fungicide testing in GB lineages of *P. infestans*

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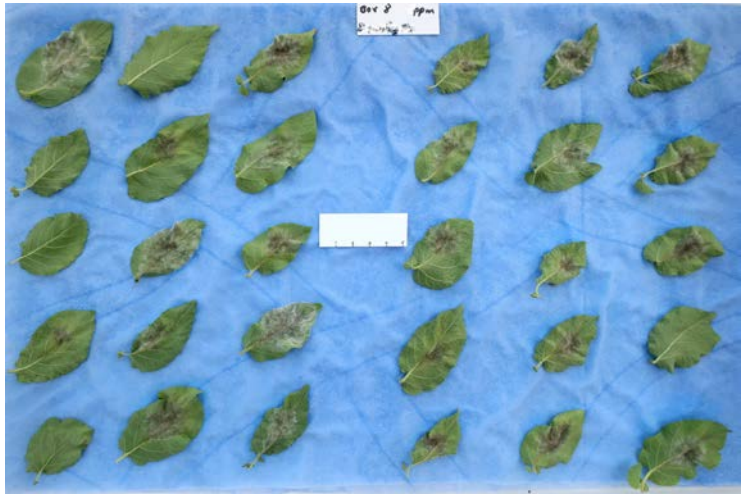
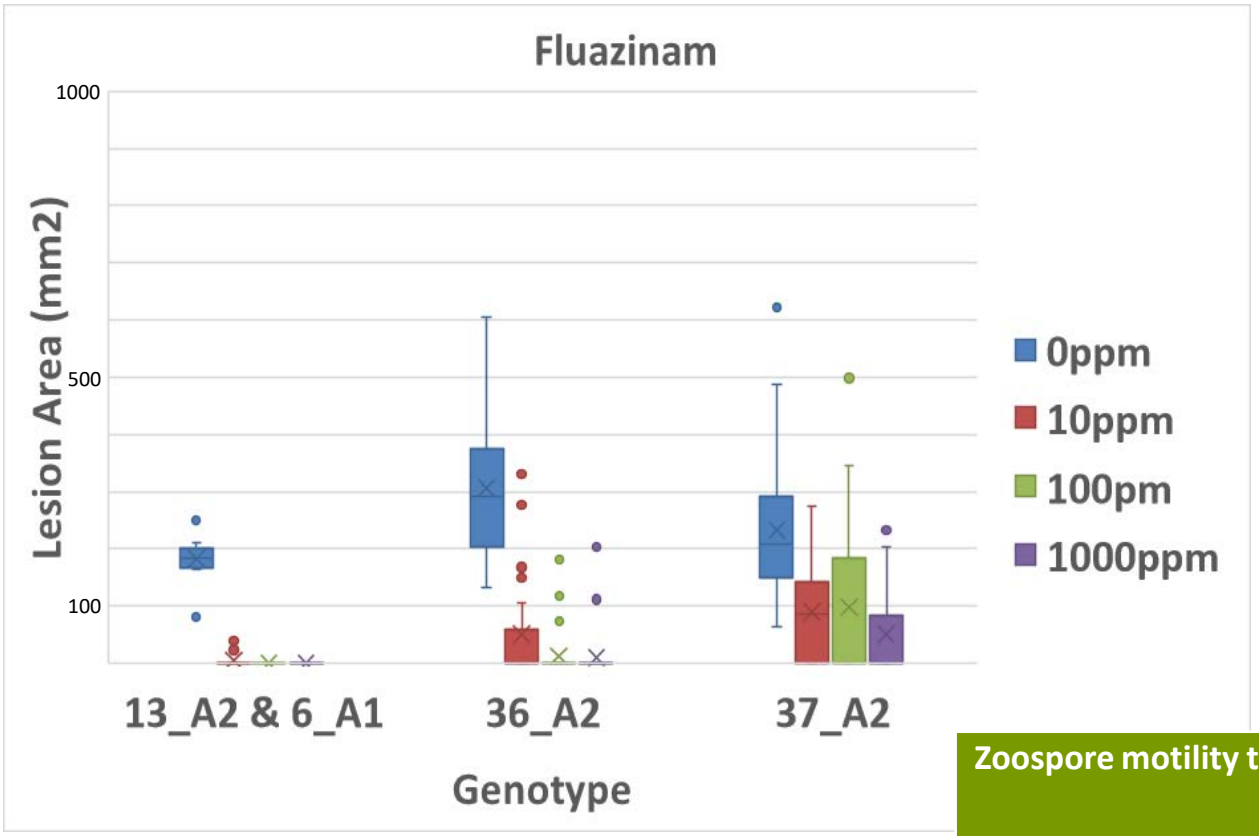
- Test fungicides for their ability to inhibit late blight in the laboratory
- Isolates belonging to established (13_A2, 6_A2), or relatively new lineages (36_A2, 37_A2) tested
- Tests conducted according to FRAC protocols and concentrations

Fungicide Group (FRAC Code)	Active Ingredient
Benzamides (43)	fluopicolide
CAA (40)	mandipropamid
Carbamates (28)	propamocarb hydrochloride
Qil (21)	cyazofamid
Uncouplers of oxidative phosphorylation (29)	fluazinam



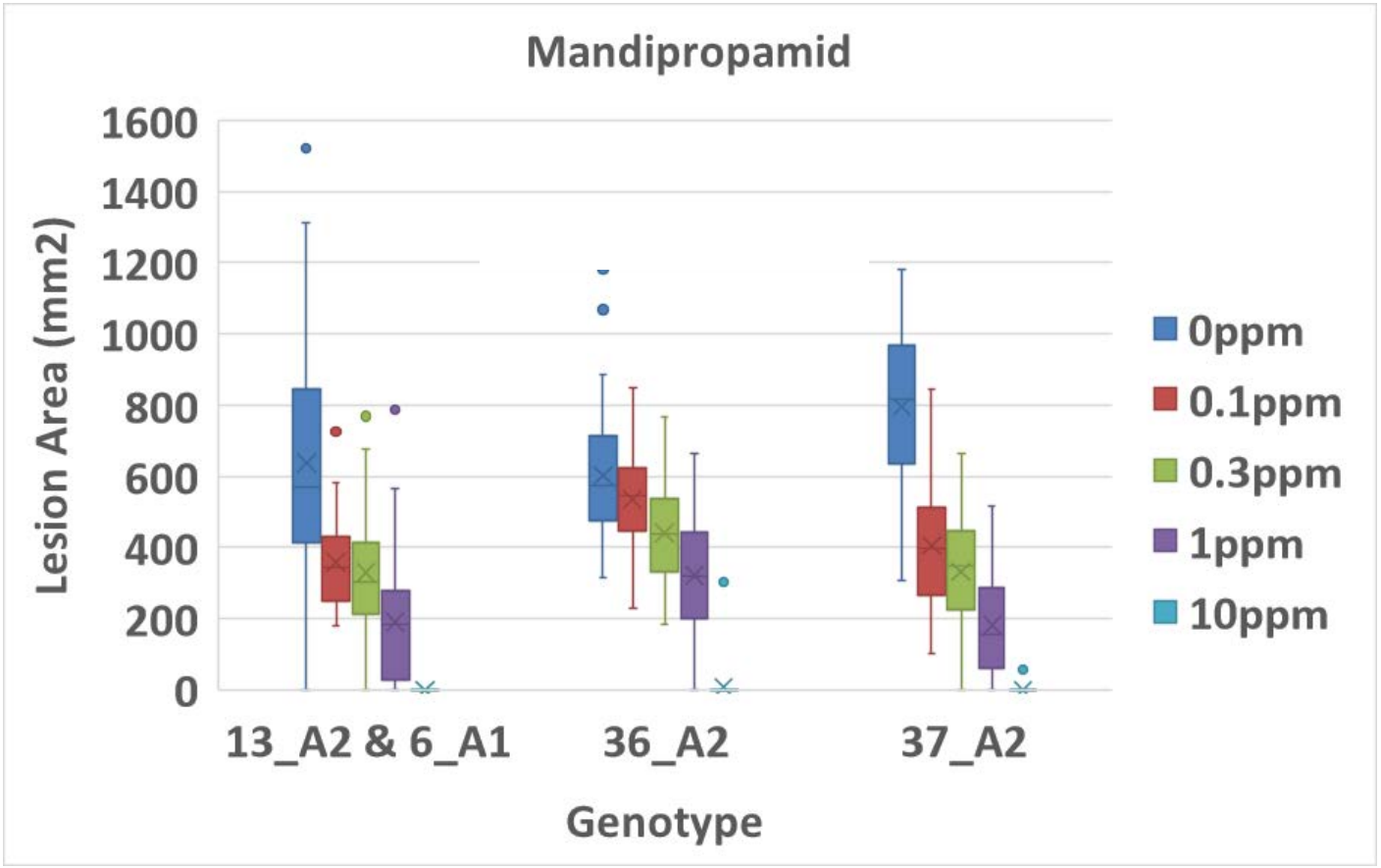
Fluazinam



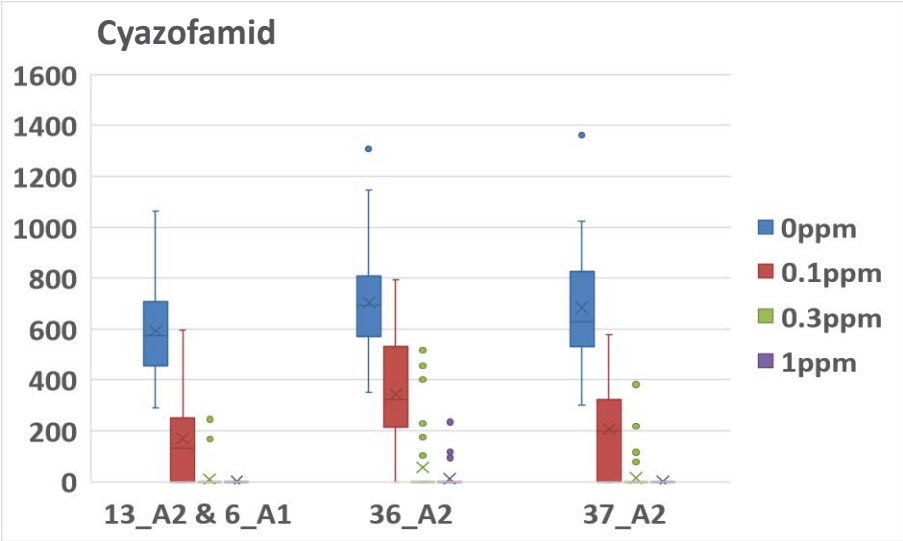
- Uncoupler of oxidative phosphorylation (11)
- Isolates of 37_A2 able to form lesions at max. field rate of fluazinam
- Confirms zoospore motility results

Zoospore motility test	Minimum Inhibitory concentration (µg/ml)
Clonal lineage	
EU_13_A2 EU_6_A1	0.088a
EU_36_A2	0.166a
EU_37_A2	3.675b

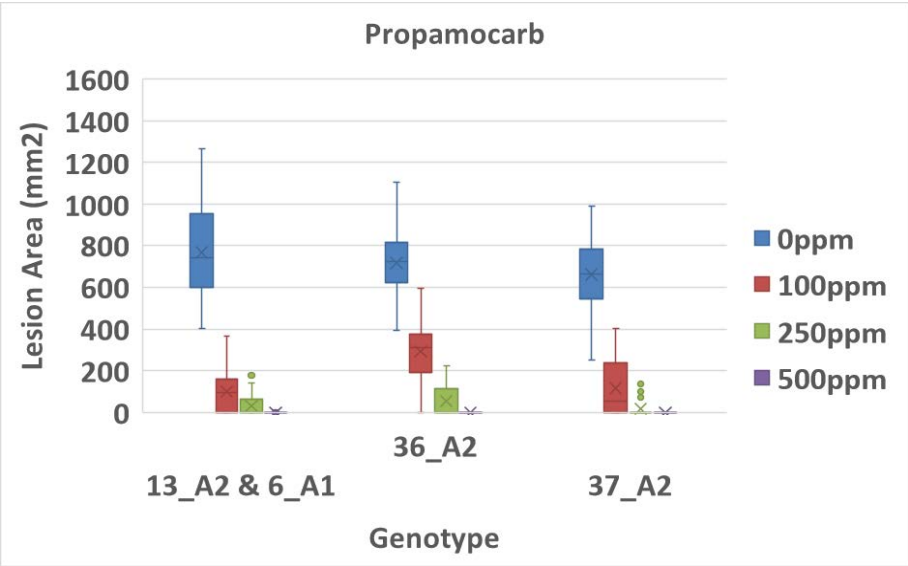
Mandipropamid

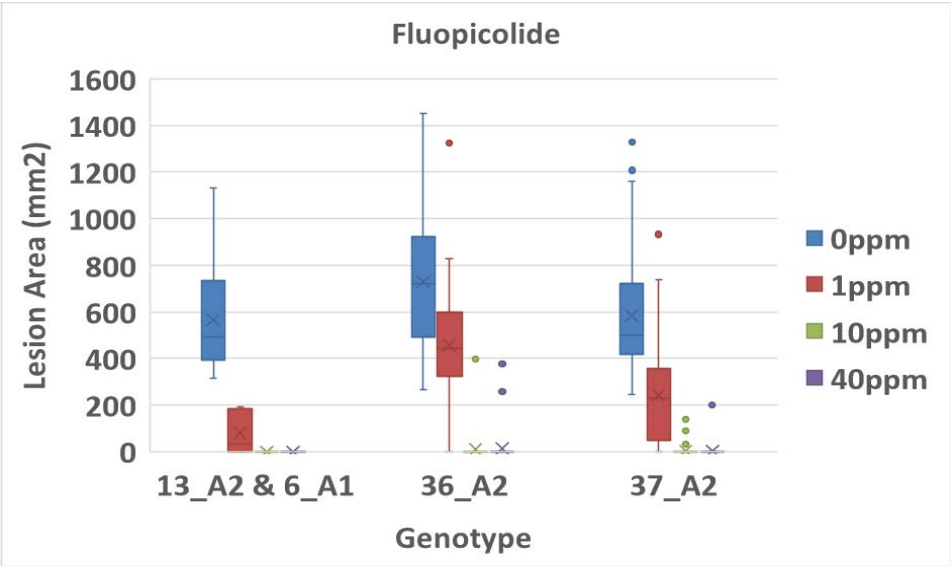


- CAA group (40)
- Mandipropamid max. field rate 750ppm



- QiI group (21)
- Cyazofamid max. field rate 400ppm
- Dose ranges are low to allow EC50 values to be generated





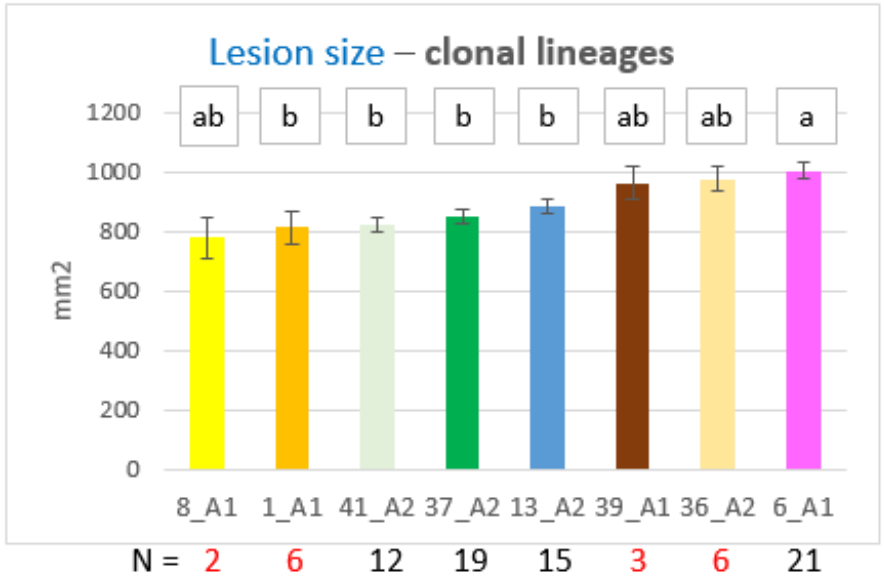
- Carbamate (28)
- Propamocarb max. field rate 5000ppm

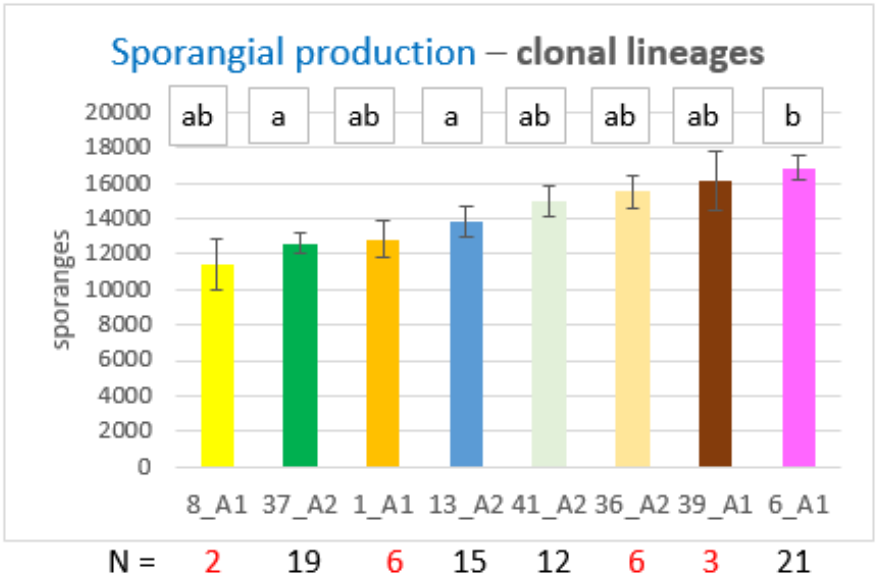
- Benzamide (43)
- Fluopicolide max. field rate 500ppm
- Results confirmed in zoospore motility test

Fungicide testing take-home messages 2018

- Evidence for insensitivity to fluazinam in genotype 37_A2
- No evidence of resistance to any active ingredient tested in genotype 36_A2 (or other lineages)
- Genotype 36_A2 isolates formed slightly larger lesions than other genotypes across low doses of all active ingredients tested
- No change to Best Practice - Follow FRAC guidelines
- Important to monitor emergence of 36_A2 and other genotypes in the context of their aggressiveness, to test further isolates and to monitor field performance

Aggressiveness testing in IPMBlight2.0 project





- Isolates of 36_A2 and other lineages collected across Europe tested at INRA, France
- On average, 36_A2 isolates formed amongst largest mean lesions and abundant sporangia
- Supports evidence from outbreak sampling

Roselyne Corbieres
Didier Andrivon

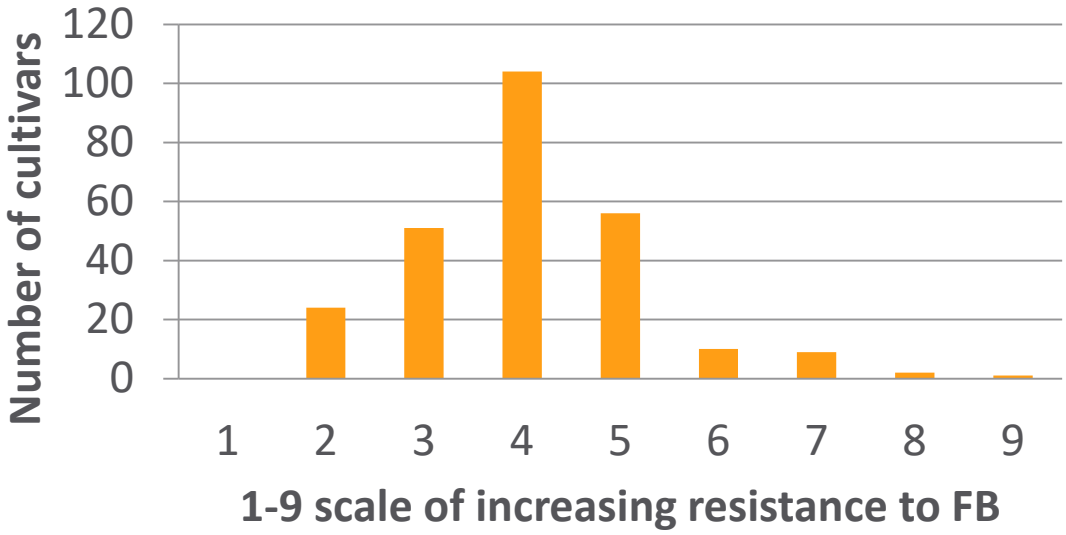
New genotypes (36-37-41) are more aggressive than the EU13_A2 genotype

- Latent period is shorter and they produce more spores

EU36_A2 needs a close follow up for almost all products
EU37_A2 is less sensitive to one active ingredient, others to follow up

Host resistance

- Host resistance in varieties is known – informed by population
- Use of host resistance reduces inoculum levels overall
- Stewardship – host resistance slows epidemics and also the rate of development of fungicide insensitivity
  - and *vice versa* fungicides in combination with partial resistance slow evolution of virulence



Improving on weather based forecasting

Are *P. infestans* sporangia present?

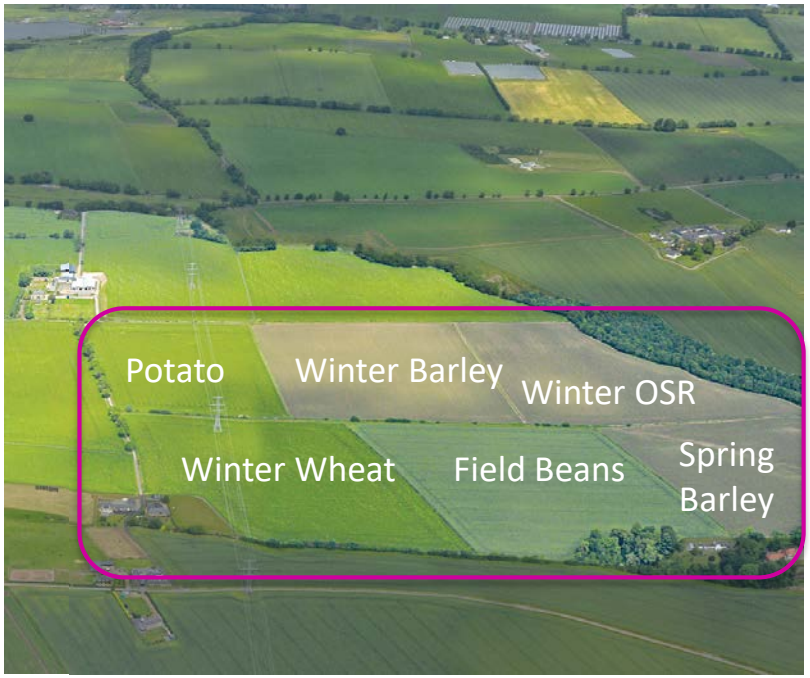
Theory: no sporangia = no risk of infection

Detection of spores in conjunction with Hutton criteria to improve blight risk predictions

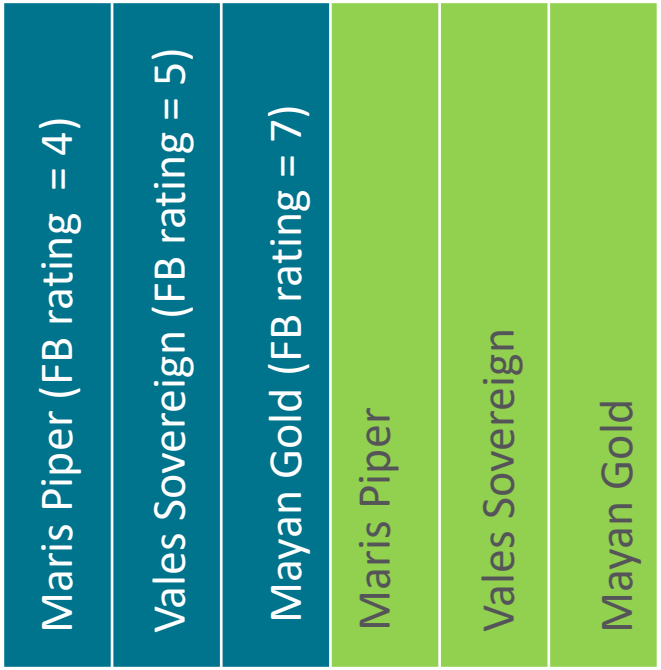
Trial and Assess

- Host Resistance/Hutton Criteria/spore detection
- Hutton criteria used to inform ‘sustainable’ fungicide strategy 2017/2018/2019

Hutton CSC long-term rotation

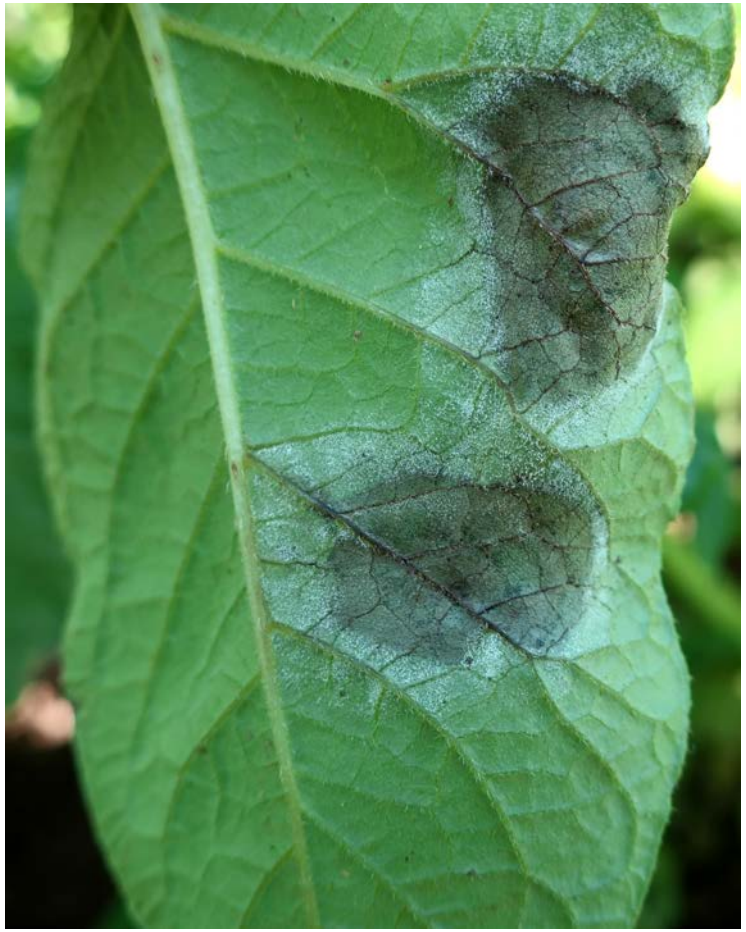


‘Conventional’ ‘Sustainable ’



Conventional = robust 7 day fungicide programme starting on a set date
Sustainable = robust programme triggered only by Blightwatch (Hutton period)

- **Recognise problem**
  - Changing population
  - Aggressiveness
  - Fungicide insensitivity
- **Recognise solutions**
  - Host resistance
  - Outbreak info/genotypes/phenotypes
  - Risk assessment
  - Appropriate fungicide use
  - Alternatives?
- **Ability and willingness**
  - High risk strategy in Europe
- **Trial and assess**
  - Under assessment
- **Adopt**
  - Barriers to uptake



Acknowledgments

David Cooke
James Lynott
Siobhan Dancey
Peter Skelsey

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Fight Against Blight Scouts for collecting samples