EuroBlight
A potato late blight network for Europe

Phytophthora infestans tracking on a European scale

David Cooke, **Geert Kessel**, Jens G Hansen, Poul Lassen, Sanmohan Baby, Didier Andrivon, Roselyne Corbière
+ industrial sponsors

Euroblight aims/themes

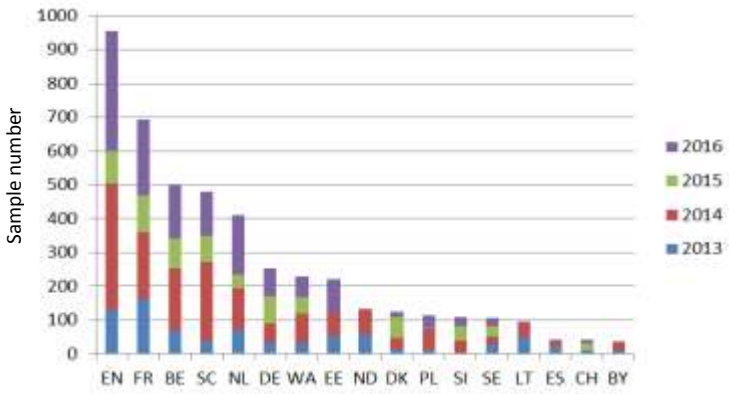
- **Tracking (global) population dynamics of potato blight pathogens:**
  Change = Trouble
- **Stewardship of host resistance genes and active ingredients -** develop and adopt innovative and sustainable control strategies on regional scales
- **Education, advocacy and communication** - taking into account different scales and stakeholders

EuroBlight
A potato late blight network for Europe

Sample statistics

- 2013-2016 - 5250 samples from 34 countries genotyped
- Northwestern Europe most frequently sampled

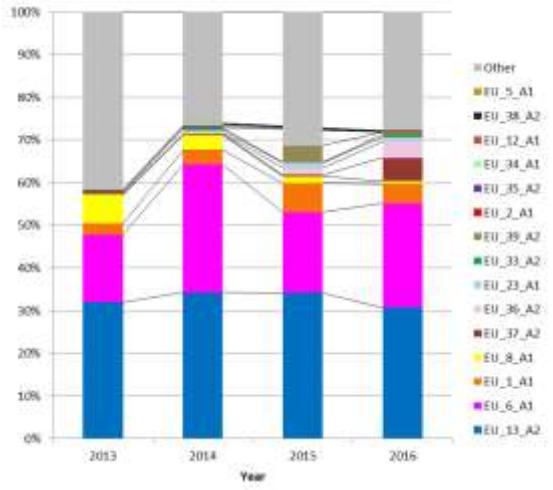
EN – England
FR – France
SC – Scotland
BE – Belgium
NL – the Netherlands
DE – Germany
WA – Wales
ND – Northern Ireland
SE – Sweden
PL – Poland
DK – Denmark
ES – Spain
SI – Slovenia
BY – Belarus
CH – Switzerland
EE – Estonia
LT – Latvia



EuroBlight
A potato late blight network for Europe

Countries with >30 samples shown

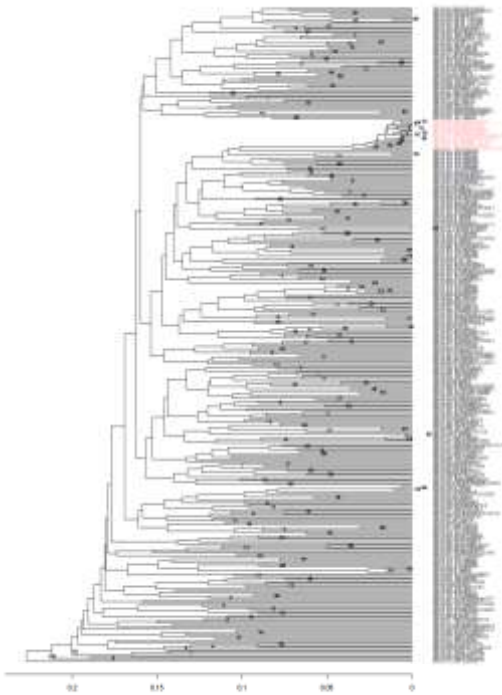
EU *P. infestans* genotype change

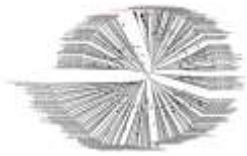


- Around 70% of EU population clonal
- EU_13_A2 & EU_6_A1 dominant
- EU_33_A2 'green 33' very low frequency
- **EU_36_A2 & EU_37_A2 novel clones increased in 2016**
- 20-30% of population each year genetically diverse 'Other' group probably from oospores. The *P. infestans* "gene pool"

EuroBlight
A potato late blight network for Europe

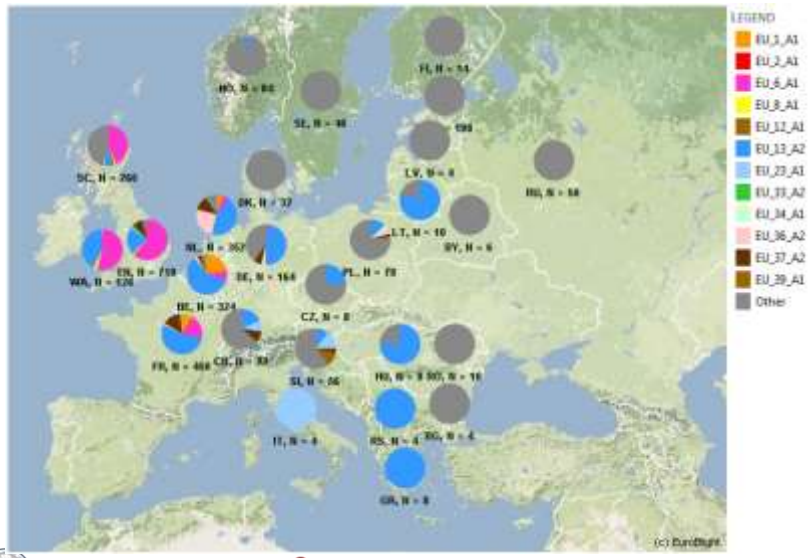
2016 – 'Others'





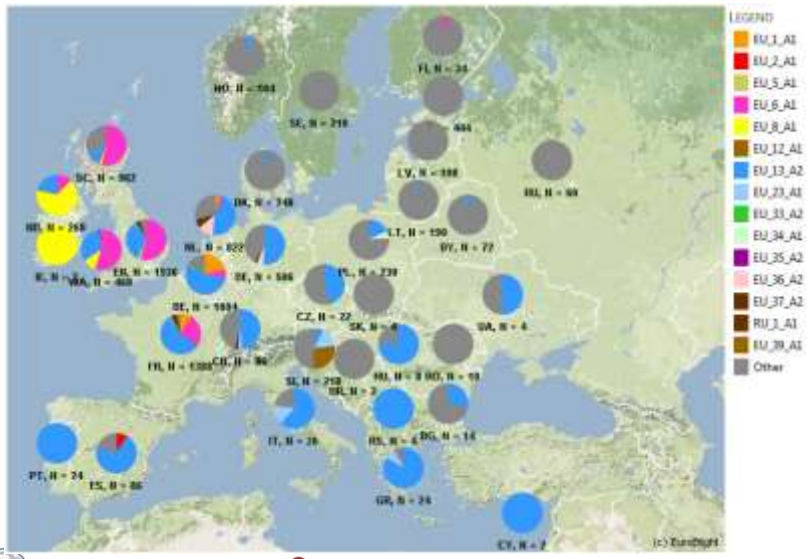
- Considerable genetic diversity in the sexual 'Other' population
- Minor genetic variation within asexual clones.

2016 data



EuroBlight
A potato late blight network for Europe

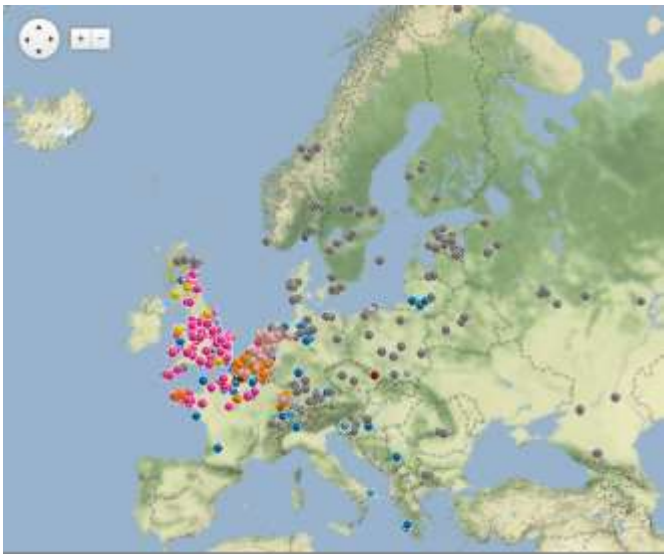
2013-2016 summary



EuroBlight
A potato late blight network for Europe

- 5251 samples from 34 countries

2016 samples



EuroBlight
A potato late blight network for Europe

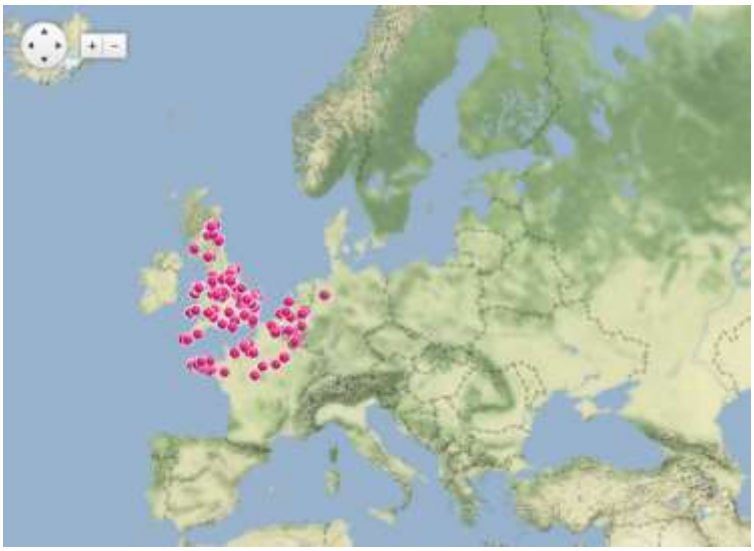
- 1595 samples from 26 countries

2016 samples – EU_13_A2

EuroBlight
A potato late blight network for Europe

Live map at
http://euroblight.net/pathogen-characteristics-and-host-resistance/sampling-sites-and-genotype-maps/

2016 samples – EU_6_A1

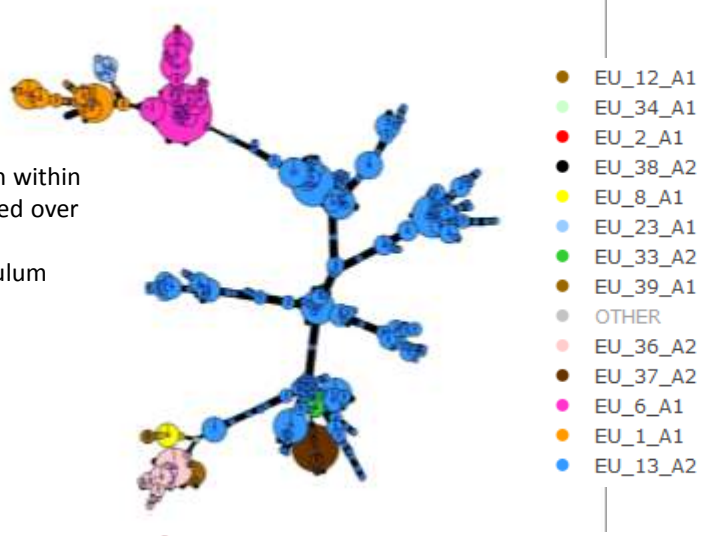


EuroBlight
A potato late blight network for Europe

Live map at
http://euroblight.net/pathogen-characteristics-and-host-resistance/sampling-sites-and-genotype-maps/

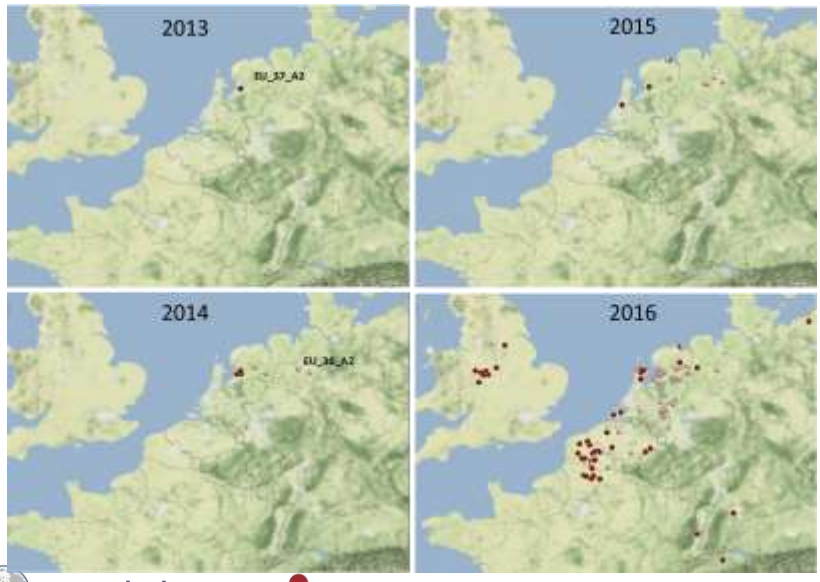
Genetic diversity 2016 – MSN clones only

- Minor variation within clones generated over time
- Can track inoculum spread



EuroBlight
A potato late blight network for Europe

EU_36_A2 & EU_37_A2 timeline



EuroBlight
A potato late blight network for Europe

Live maps at
http://euroblight.net/pathogen-characteristics-and-host-resistance/sampling-sites-and-genotype-maps/

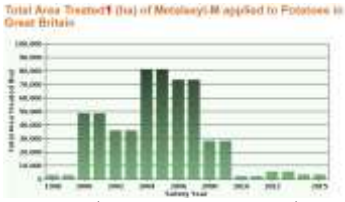
Population change and blight management

- **13 different fungicide groups on market for blight management**
- **Careful use required to reduce selection pressure**

- **EU_13_A2** emerged 2004, resistant to metalaxyl. Usage has fallen dramatically in Europe but it is still a good product where resistance is not dominant

- **33_A2** insensitivity to fluazinam

- **37_A2** insensitivity to fluazinam



UK Pesticide Usage Surveys – Fera Science Ltd, UK

EuroBlight
A potato late blight network for Europe

Live maps at
http://euroblight.net/pathogen-characteristics-and-host-resistance/sampling-sites-and-genotype-maps/

Green33 in the Netherlands 2008 - 2012

- Green33
  - NL2010: 20%
  - NL2011: 22%
  - NL2012: 6%

EuroBlight
A potato late blight network for Europe

Green33 in recent years

EuroBlight
A potato late blight network for Europe

Press release on EU-37-A2

EuroBlight
A potato late blight network for Europe

Clones – key questions

- **Origin – where and how?**
  - Several first reported in NL and DE
  - Presumed recombinant – commonly triploid

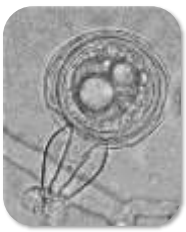
    (36_A2 triploid, 37_A2 diploid) - (see Li et al., 2017 MPMI)

- **Drivers of spread?**
  - Adaptation: Mutation – Selection: host, fungicide, survival, aggressiveness
  - Chance – bottleneck, right place at right time

EuroBlight
A potato late blight network for Europe

Conclusions

- New insights on pathogen diversity
- **Dominance of a few clones** across large areas of European crops shows that EU growers/industry **share management challenges**
- Surveys needed to inform fungicide use strategies to minimise the risks of product failure – **13_A2**, **EU_37_A2** and **EU_33_A2**
- Much **primary inoculum is locally generated** and spread. Better management of inoculum sources would aid management
- A highly diverse gene pool of novel types is present as a result of **sexual oospore formation and derived infections**
- **High genetic diversity increases the risk** of blight management problems - evolving virulence against novel host resistance genes and reduced sensitivity to specific fungicide active ingredients
- Phenotypic traits of existing and novel genotypes being examined in ERA-NET project (IPMBlight2.0)



- Live data mapped on www.euroblight.net

EuroBlight
A potato late blight network for Europe

Europe sponsors/contributors/collaborators

ADAMA
Agrifirm
Agriphar
BASF SE
Bayer CropScience AG
Belchim Crop Protection
Certis
Cheminova
CropSolutions
Dupont de Nemours
Emsland Group
Germicopa SAS
HZPC Holland B.V.
Neiker
Nordisk Alkali
PCA
Profytodsd
Syngenta Agro GmbH
UPL

AFBI
Agricultural Institute of Slovenia
AHDB Potatoes
Aarhus University*
ARVALIS-Institut du Végétal
Bayerische Landesanstalt für Landwirtschaft
Centre Wallon de Recherches Agronomiques
Estonian University of Life Sciences*
INRA*
The James Hutton Institute*
NIBIO, Norway*
PRI/WUR
Plant Breeding & Acclimatization Inst. (IHAR)
Swedish University of Agricultural Sciences
TEAGASC

* Partners in the IPMBlight2.0 project

EuroBlight
A potato late blight network for Europe