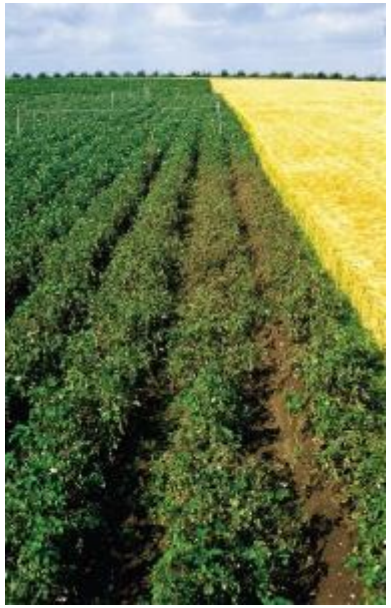
BlightManager



Prevention and control of late blight and early blight

Jens G. Hansen & Isaac K. Abuley
Aarhus University

AARHUS UNIVERSITET

AGRI NORD

AGROINTELLI

AKV

STØTTET AF
Kartoffelafgiftsfonden

FIELDSENSE

KMC
LET'S TAKE FOOD FORWARD

BJ-Agro

SEGES

Kartoffelworkshop
7 December 2021

BlightManager
January 2019 –
31 December 2021

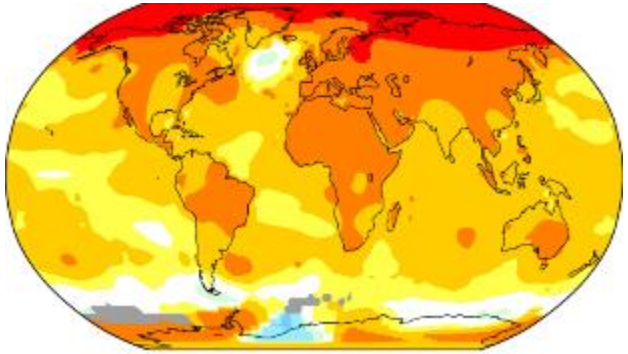
Outline:

- Selected achievements / Jens
- *P. infestans* genotypes in Denmark 2021 / Jens
- Lesion growth and latent period for EU41, EU43 compared with “Other” / Isaac
- Improved control strategies / Isaac
- Conclusions and recommendations / Jens

In the light of challenges:

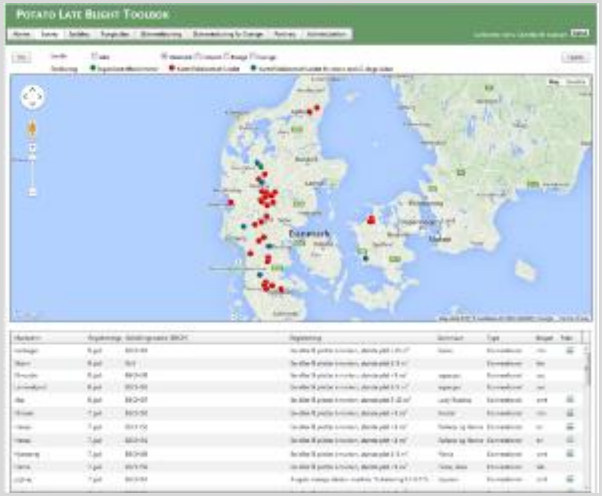
New *P.i.* population - Early infections from oospores

Milder winters – dumps and volunteers



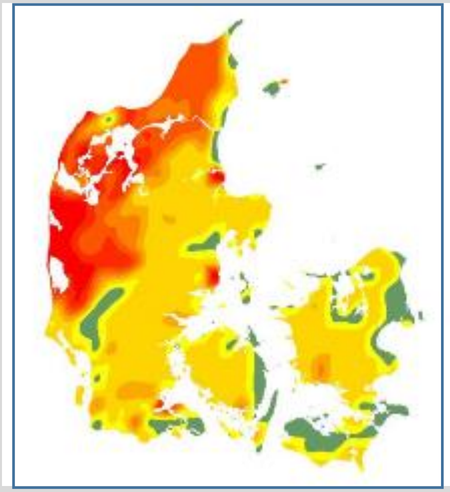
Demand on fungicide reductions

Before BlightManager

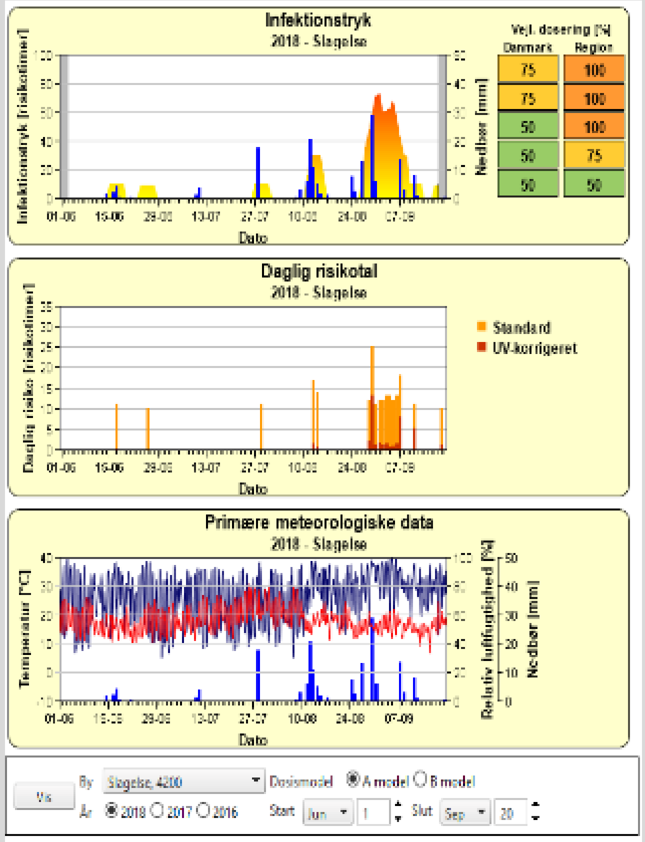


Surveillance network

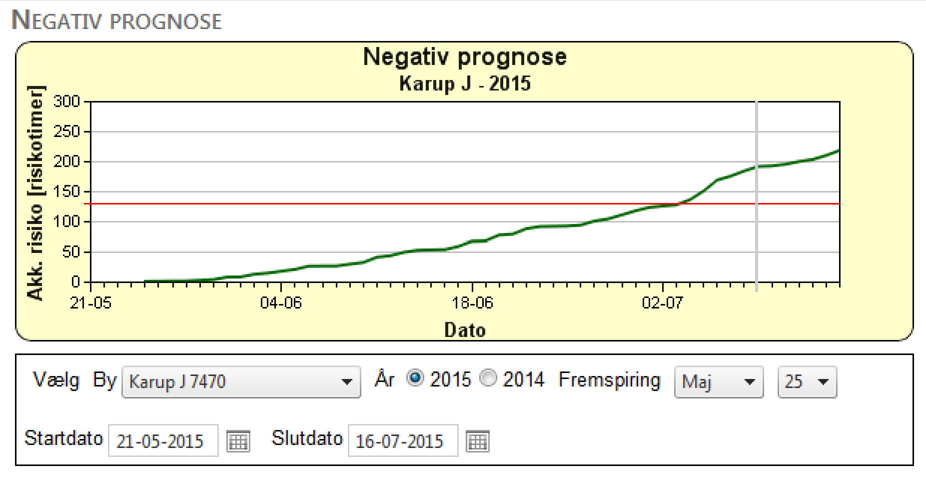
Rain during crop emergence



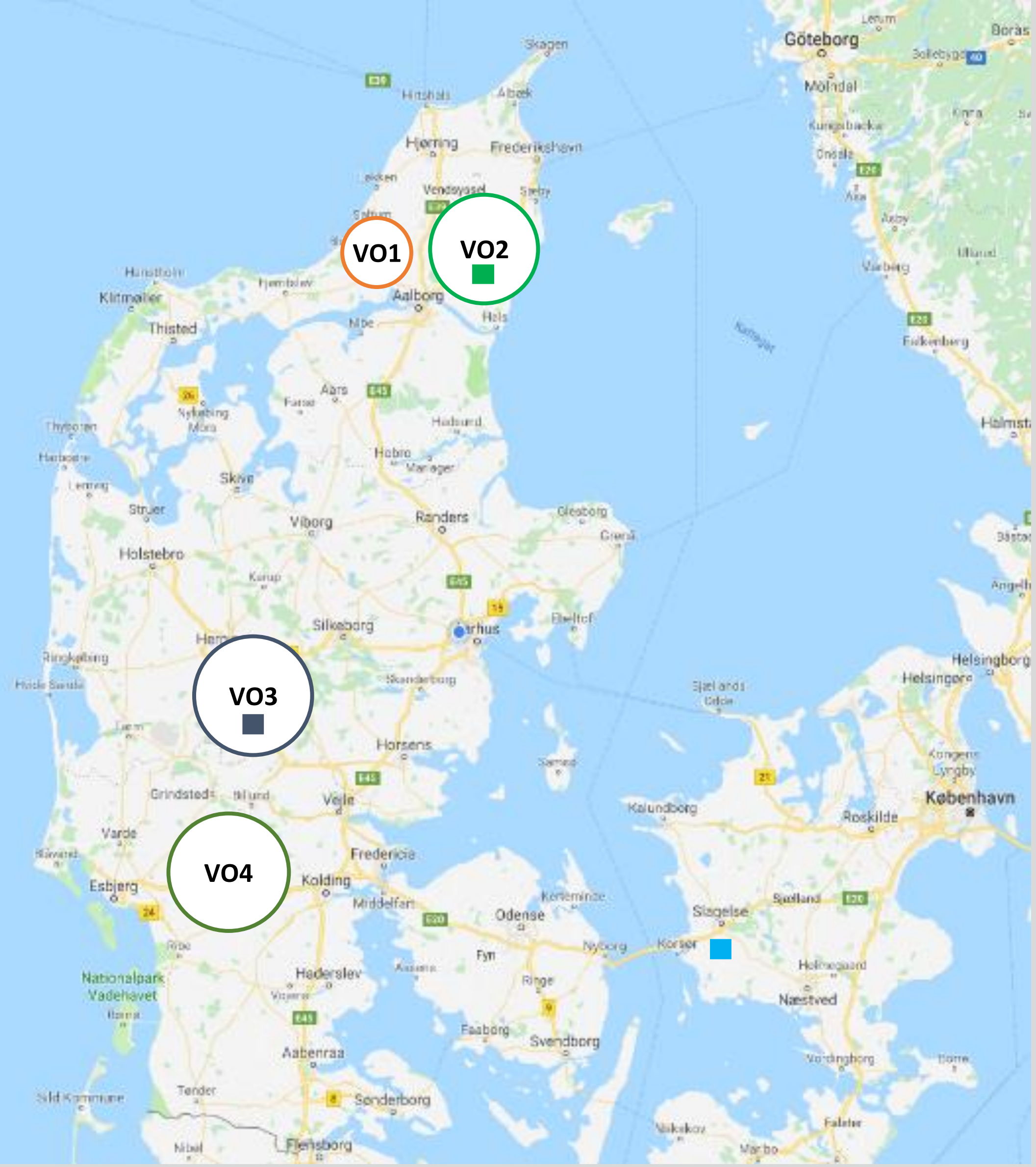
Regional infection pressure



Infection pressure + Rain (postal code)



Infection risk from infected tubers



Four Case study regions (VO1-VO4)

VO1 VO2 VO3 VO4

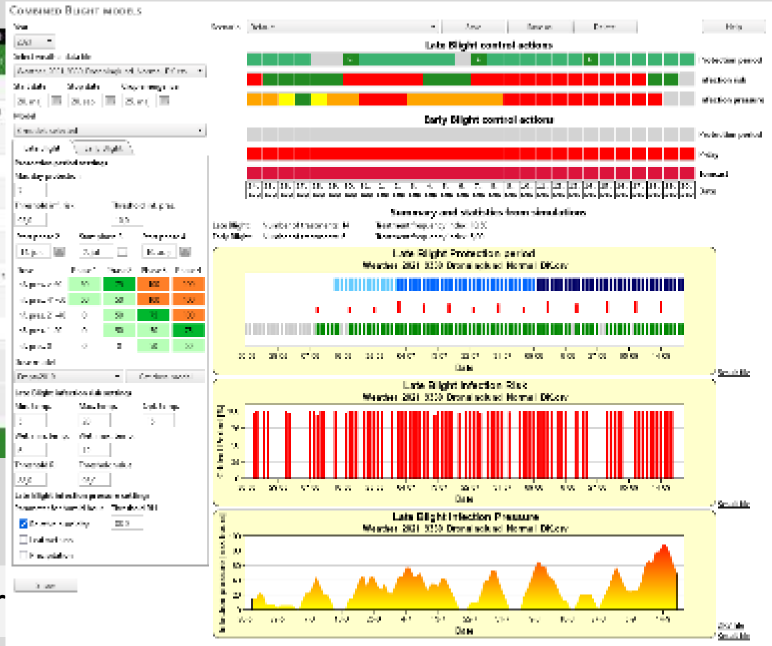
1. VO1: Store Vildmose (Jannie R. Sørensen)
2. VO2: AKV Dronninglund (Henrik Pedersen)
3. VO3: KMC Brande (Kristian Elkjær)
4. VO4: BJ-Agro (Benny Jensen)

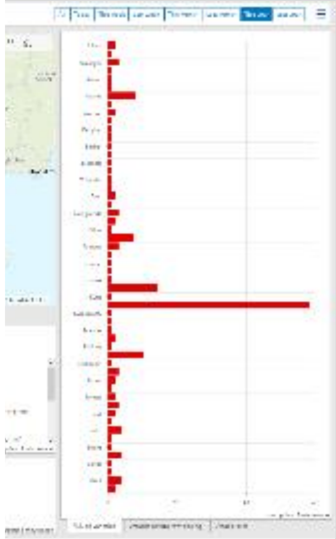
Three Trial sites:

- Dronninglund (VO2)
- Arnborg (VO3)
- Flakkebjerg (close to Slagelse)

Thanks to all industry partners for the work done in the Case study regions!

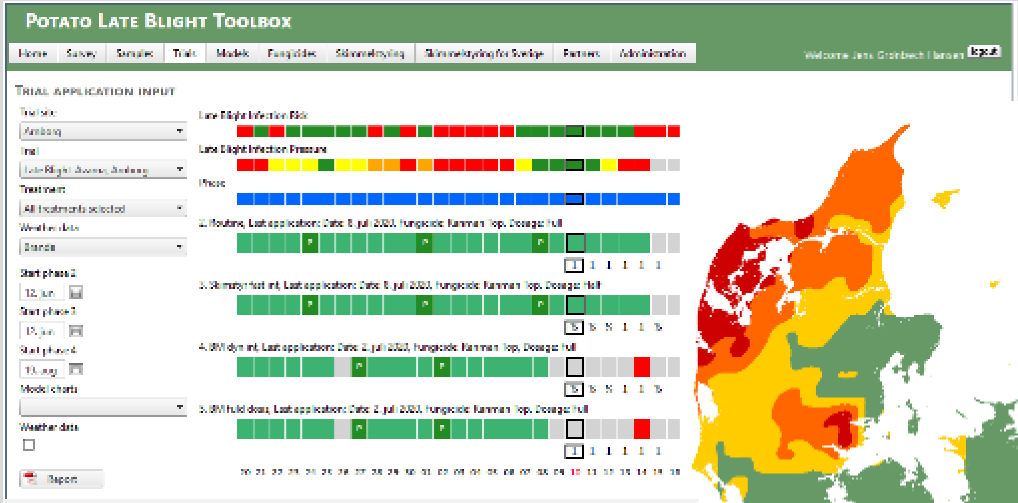
BlightTr





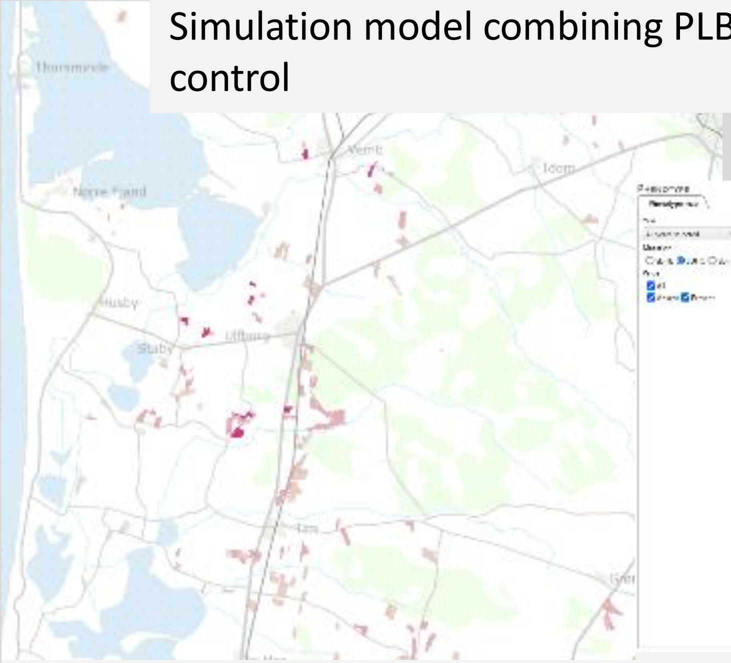
B and EB

Simulation model combining PLB and EB control



Improved models, Data management and mapping tools

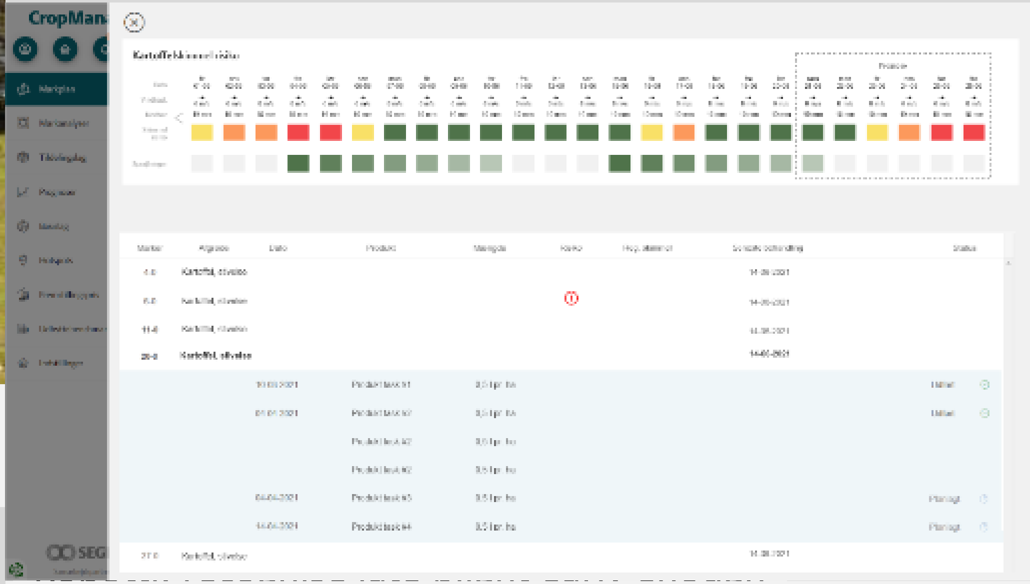
Genotyping of *P. infestans*



aled

GIS Risk model for oospores

Monitoring fungicide resistance, EB



BlightManager in CropManager

EuroBlight
A potato late blight network for Europe

EuroBlight > ... > News > News >

- Home
- About EuroBlight
- EuroBlight workshop 9-12 May, 2022
- EuroBlight Zoom meetings 2021 - presentations
- Pathogen monitoring
- Control strategies
- Alternaria
- Late blight Survey Mapper
- News
  - News
- Workshop proceedings 1996-2015
- Research projects
- Protocols

FACULTY OF TECHNICAL SCIENCES

Results of the EuroBlight potato late blight monitoring in 2020

Nyhedsarkiv
- 2021
  - maj 2021 (1 post)
  - april 2021 (1 post)
  - februar 2021 (1 post)
- 2020
  - september 2020 (1 post)
  - marts 2020 (1 post)

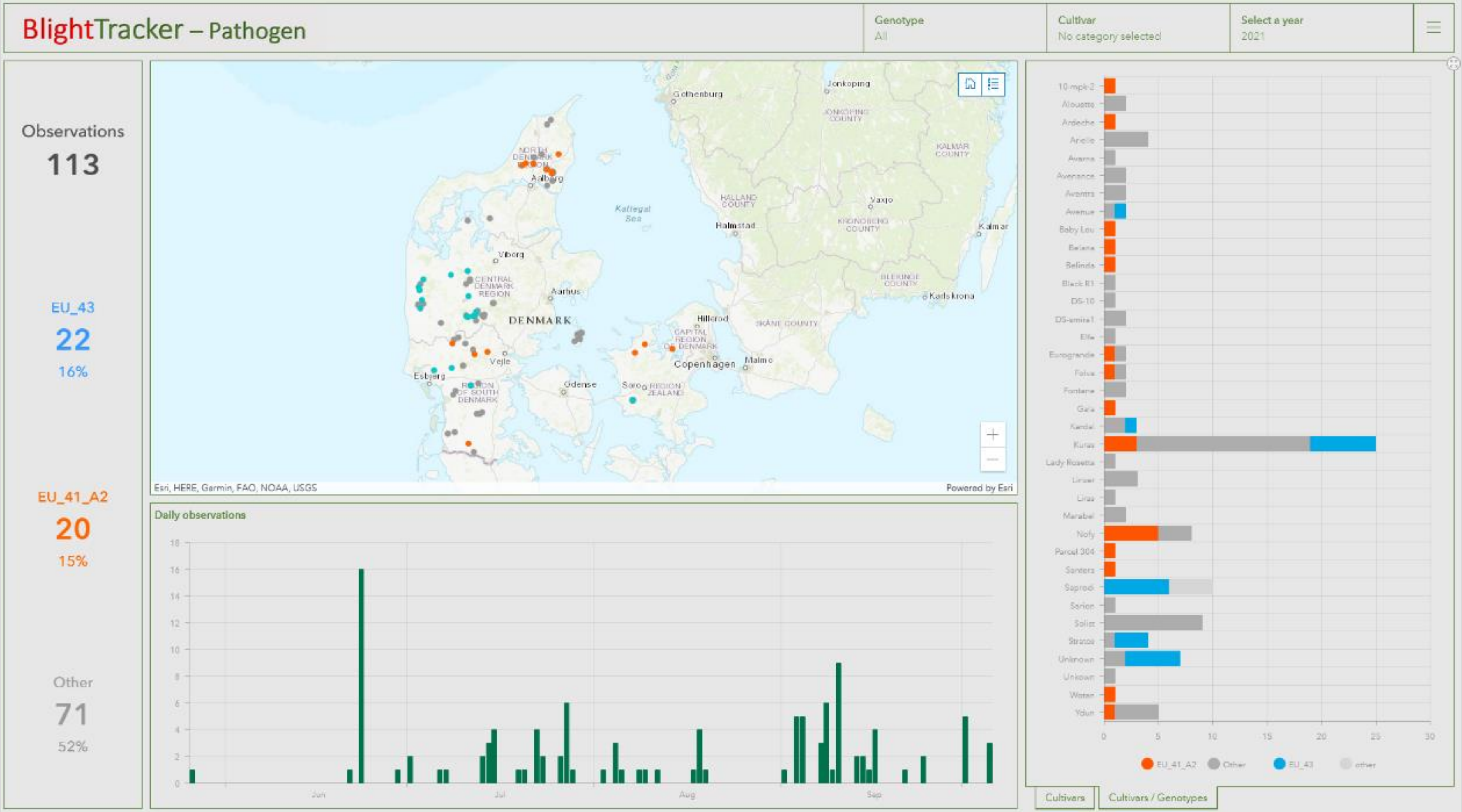
EuroBlight is continuously examining the ongoing evolution of the Euro... late blight pathogen ... results. Approximate... countries genotyped...

Blight lesion photo by James Lynott of The Jo...

9. april 2021 af Jens Grønbech Hansen

Key findings:

- EuroBlight continuously inve... population of the potato late... now reports on the 2020 resu...


BlightTracker – Pathogen
Genotype
All
Cultivar
No category selected
Select a year
2021
Observations
113
EU_43
22
16%
EU_41_A2
20
15%
Other
71
52%
Esri, HERE, Garmin, FAO, NOAA, USGS
Powered by Esri
DENMARK
Gothenburg
Jonkoping
Kattegat Sea
Halmstad
Vaxjo
Kalmar
Karlskrona
Aalborg
Viborg
Aarhus
Hillerod
Copenhagen
Malmo
Vejle
Esbjerg
Odense
Daily observations
Jun
Jul
Aug
Sep
EU_41_A2
Other
EU_43
other
Cultivars
Cultivars / Genotypes

Phenotypic traits of some known genotypes

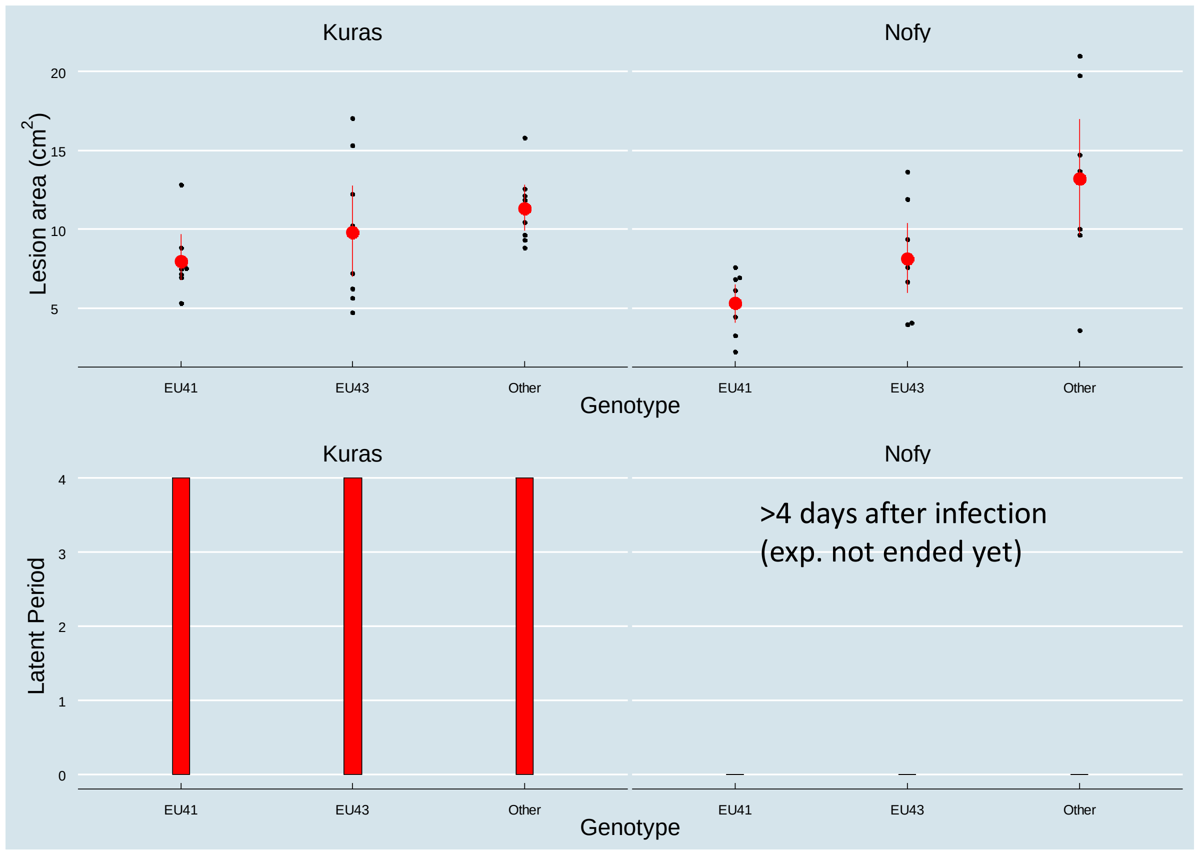
Genotype	Country and year first identified	Phenotypic traits
EU13	NL in 2004	Aggressive and less sensitive to matalaxyl
EU33	UK in 2011	Less sensitive to fluazinam
EU36	NL and DE in 2014	Aggressive – indications that it can infect at very low dosages
EU37	NL in 2013	Aggressive and less sensitive to fluazinam products
EU41	DK in 2013	Multi-virulent and relatively aggressive (high sporulation capacity)
EU42	UK in 2020	Unknown
EU43	DK in 2018 (2020)	Unknown

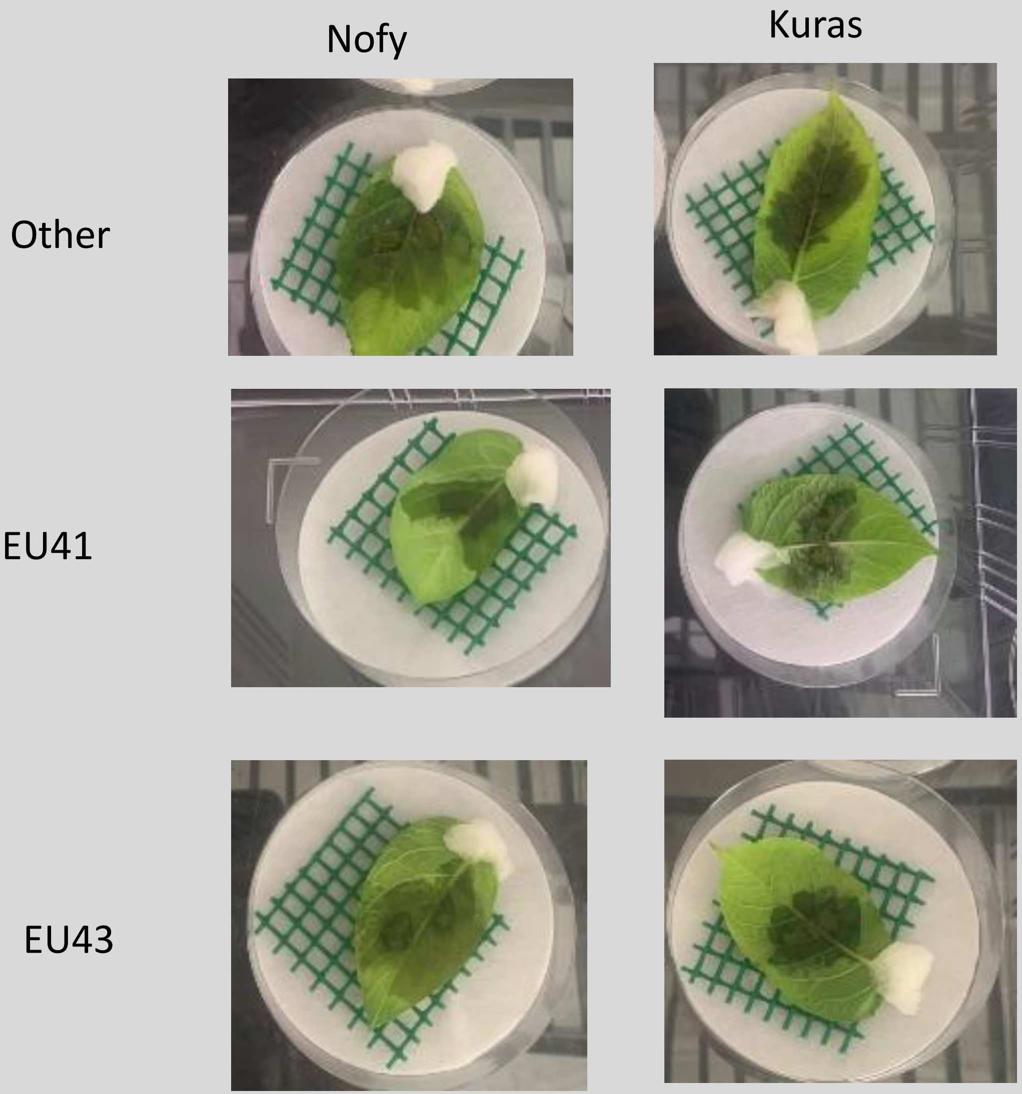
Conclusions genotypes

EuroBlight
A potato late blight network for Europe

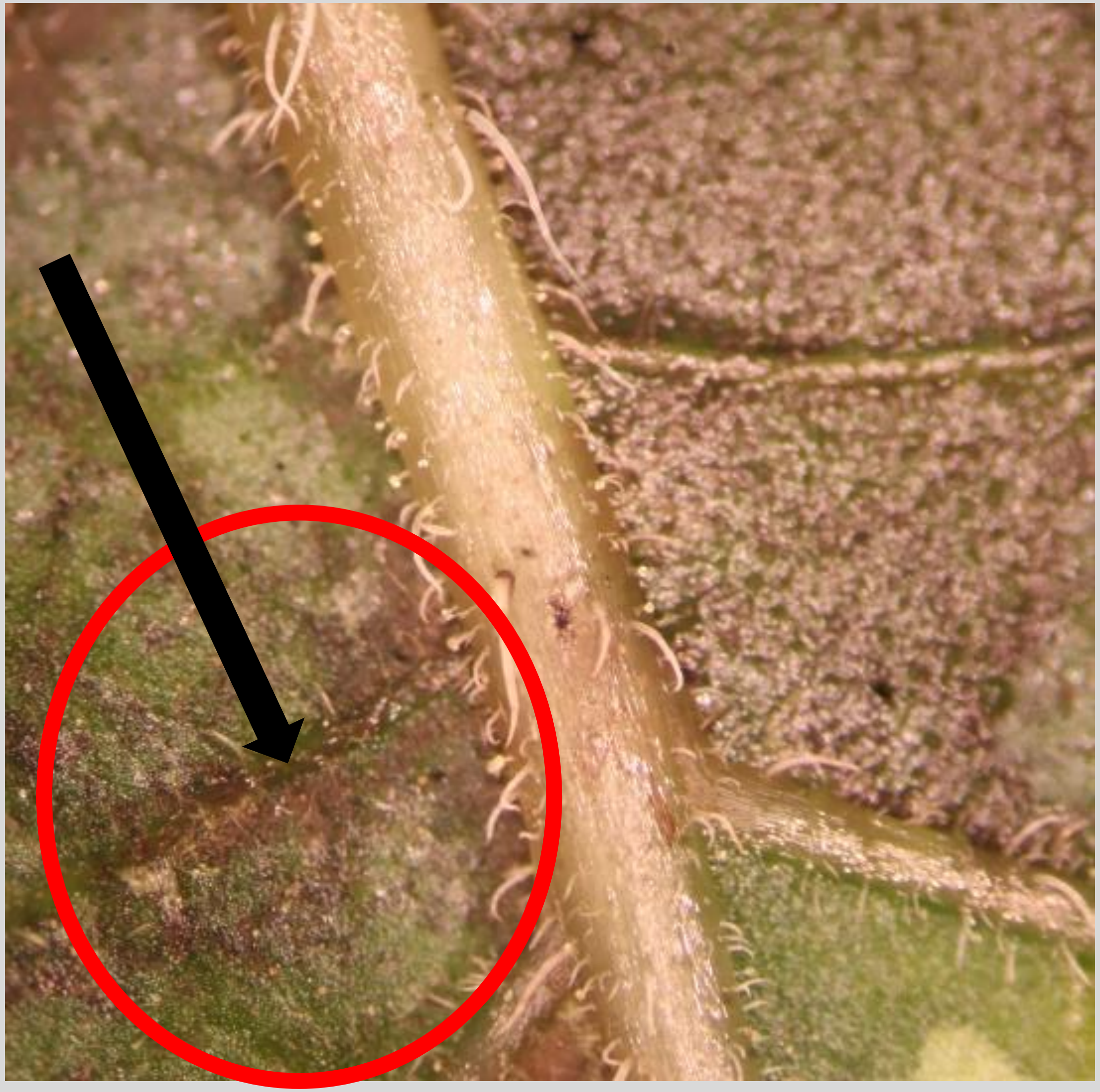
- Europe-wide dataset - valuable insights on pathogen diversity
- Dominance of a few clones across large areas of European crops - EU growers/industry share management challenges
- New clones (EU_36_A2, 37_A2 and 41_A2) established and displacing older genotypes (EU_13_A2, 6_A1 and 1_A1)
- EU41 was identified via SSR analysis in Iceland in 2021 after PLB attacks in 2020 and 2021
- New clones identified in 2020 **EU_43** (DK) **EU_42_A2** (GB). EU43 found in NL in 2021
- Reduced sensitivity of EU_37_A2 to fluazinam has reduced its use, prevented management failures & driven a decline of this genotype in most countries.
- Population displacement suggests EU_36_A2 more fit but we need more evidence of specific fitness trait.
- Primary inoculum is locally generated and spread. Better management of inoculum sources needed
- 'Other' populations highly diverse, ephemeral, occurring more in the north and east & most likely the result of sexual oospore germination
- High genetic diversity increases risk management failure: virulence against novel host resistance or reduced sensitivity to specific fungicide active ingredients

- The clones (EU41 & EU43) are less aggressive compared to the other types
- Factors supporting their dominance still remains to be answered?





Nofy



Kuras

IPMBlight2.0 also concluded that EU41 is not more aggressive than the ”other” types

Abstract

Until recently, genotypes of Phytophthora infestans were regionally distributed in Europe, with populations in western Europe being dominated by clonal lineages and those in northern Europe being genetically diverse due to frequent sexual reproduction. However, since 2013, a new clonal lineage (EU_41_A2) has successfully established itself and expanded in the sexually recombining P. infestans populations of northern Europe. The objective of this study was to study phenotypic traits of the new clonal lineage of P. infestans, which may explain its successful establishment and expansion within sexually recombining populations. Fungicide sensitivity, aggressiveness and virulence profiles of isolates of EU_41_A2 were analyzed and compared to those of the local sexual populations from Denmark, Norway, and Estonia. None of the phenotypic data obtained from the isolates collected from Denmark, Estonia and Norway independently explained the invasive success of EU_41_A2 within sexual Nordic populations. Therefore, we hypothesize that the expansion of this new genotype could result from a combination of fitness traits and more favorable environmental conditions that have emerged due to climate change.

B) Average (± standard error) results for different aggressiveness traits by genotype groups in Denmark (Unique MLGs, n = 38; EU_41_A2, n = 8).

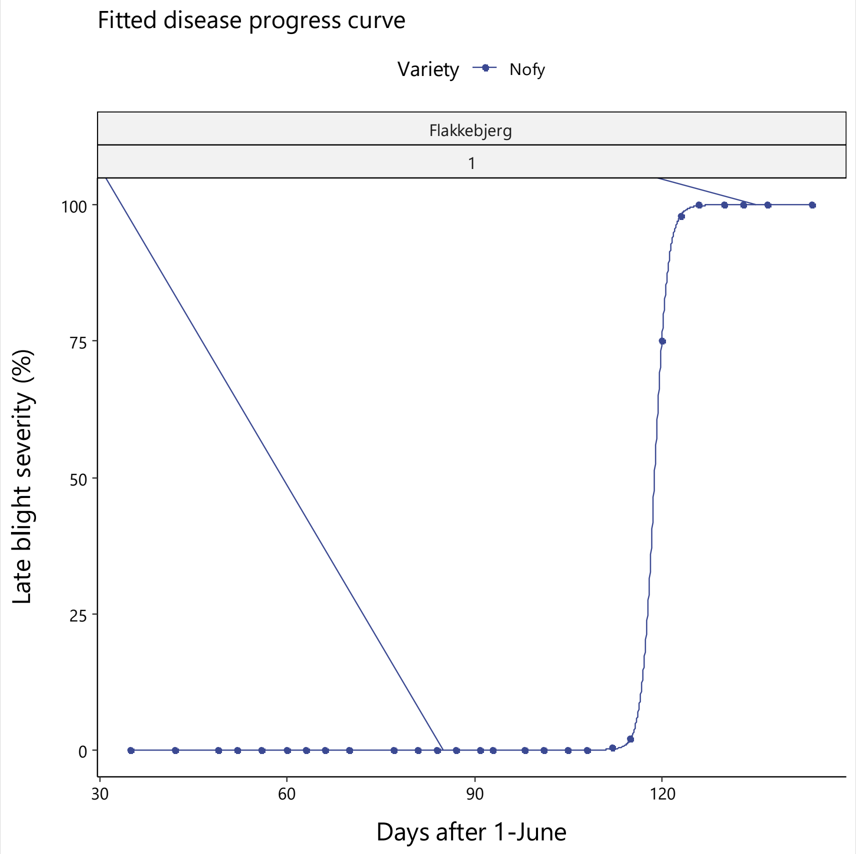
Variable	Genotype	
	Unique MLGs	EU_41_A2
Latent period	3.16 a (± 0.09)	3.00 a (± 0.14)
Spore density	98.71 a (± 8.65)	84.96 a (± 13.84)
Lesion growth rate	425.80 a (± 13.53)	405.08 a (± 24.52)
Fitness index	61093.51 a (± 4672.14)	55520.87 a (± 9633.53)

Source: Britt Puidet et al., (2021), Examining Phenotypic Traits Contributing to the Spread in Northern European Potato Crops of EU_41_A2, a New Clonal Lineage of Phytophthora infestans. Phytopathology, 3 Jun 2021 https://doi.org/10.1094/PHYTO-12-20-0542-R

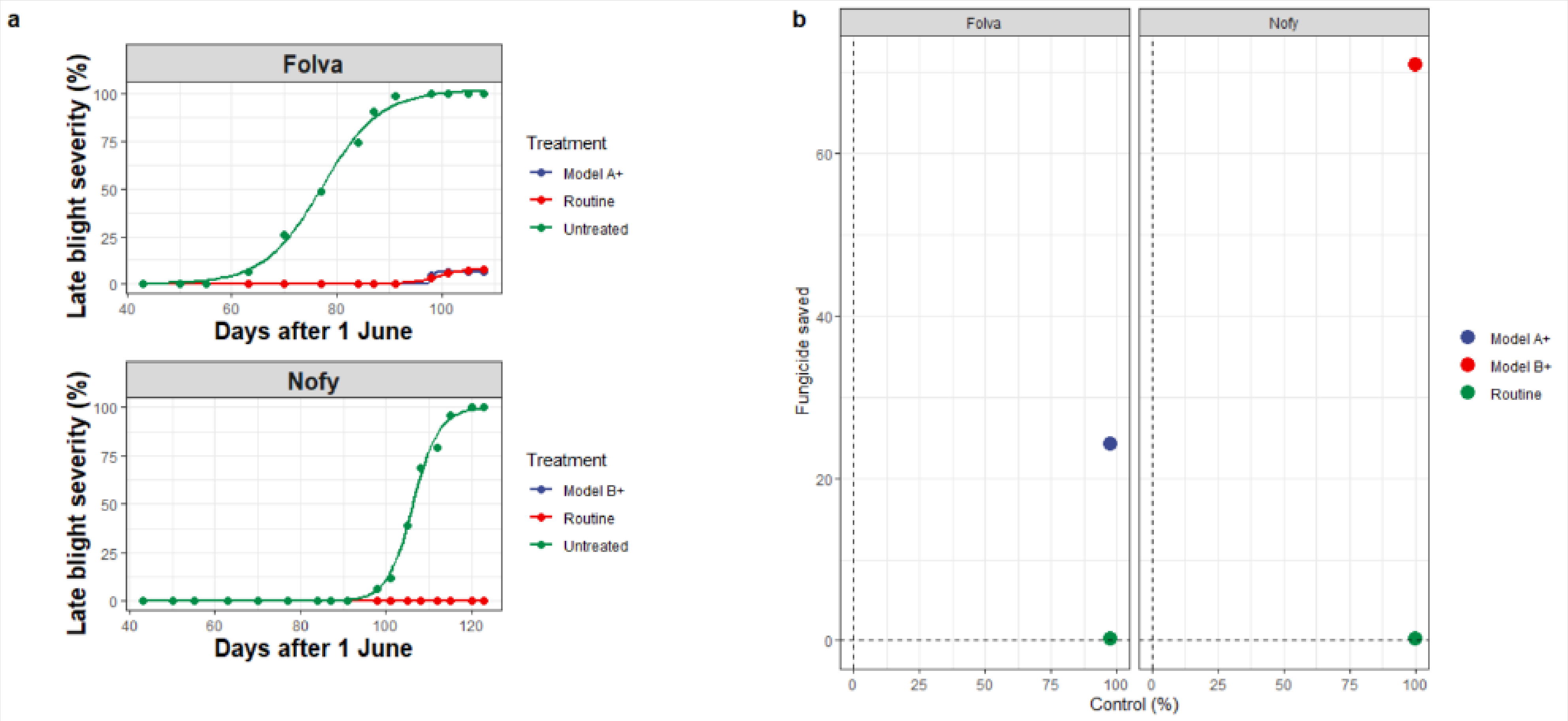
Model for resistant cultivar

Dose	Phase 1 (Not present)	Phase 2 (Country Not region)	Phase 3 (In Region)	Phase 4 (In the field or close by)
Inf. pres. > 60	0	0	50	100
Inf. pres. 41-60	0	0	50	100
Inf. pres. 21-40	0	0	50	100
Inf. pres. 1-20	0	0	0	75
Inf. pres. 0	0	0	0	0

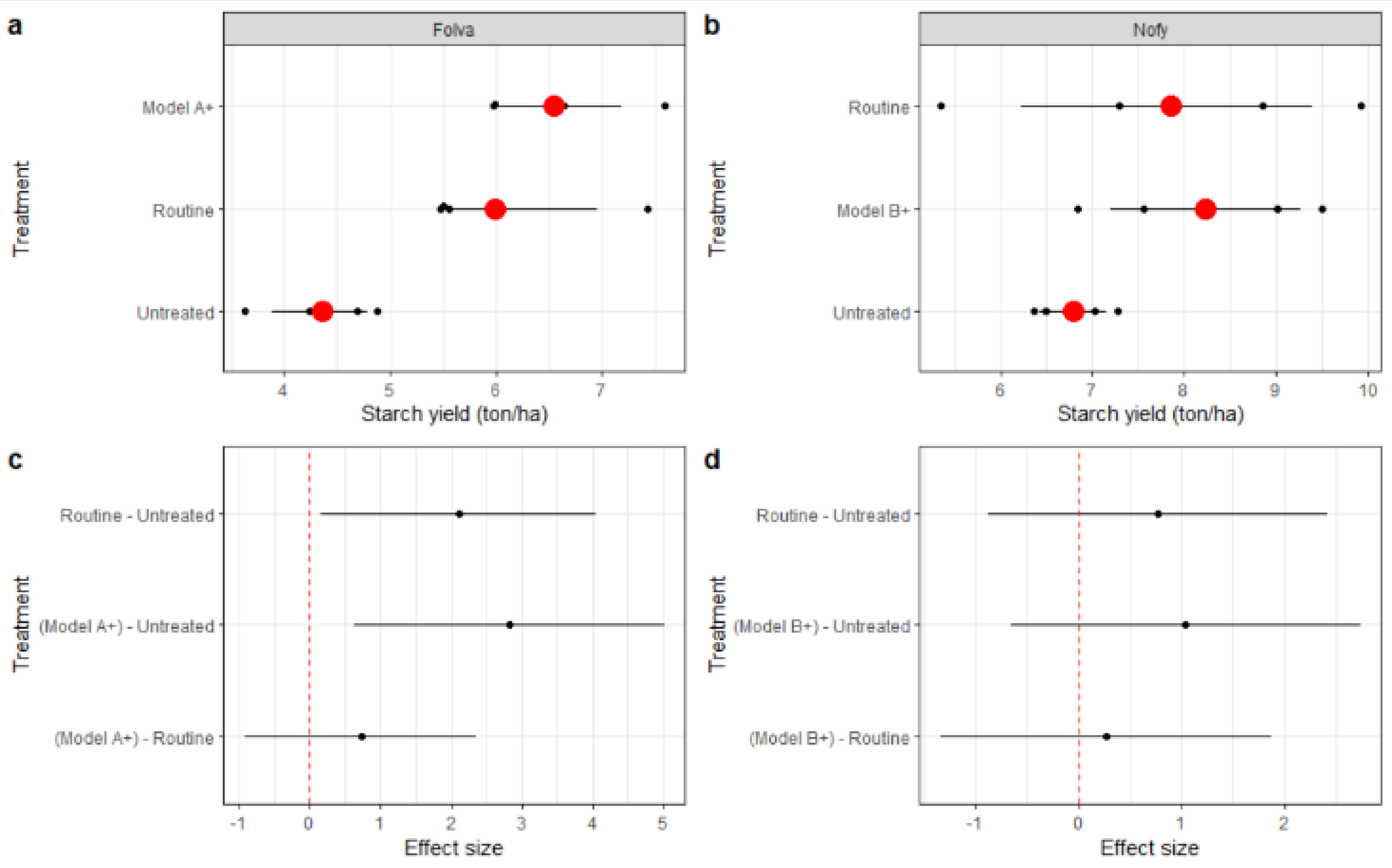
Increasing inoculum load and plant age



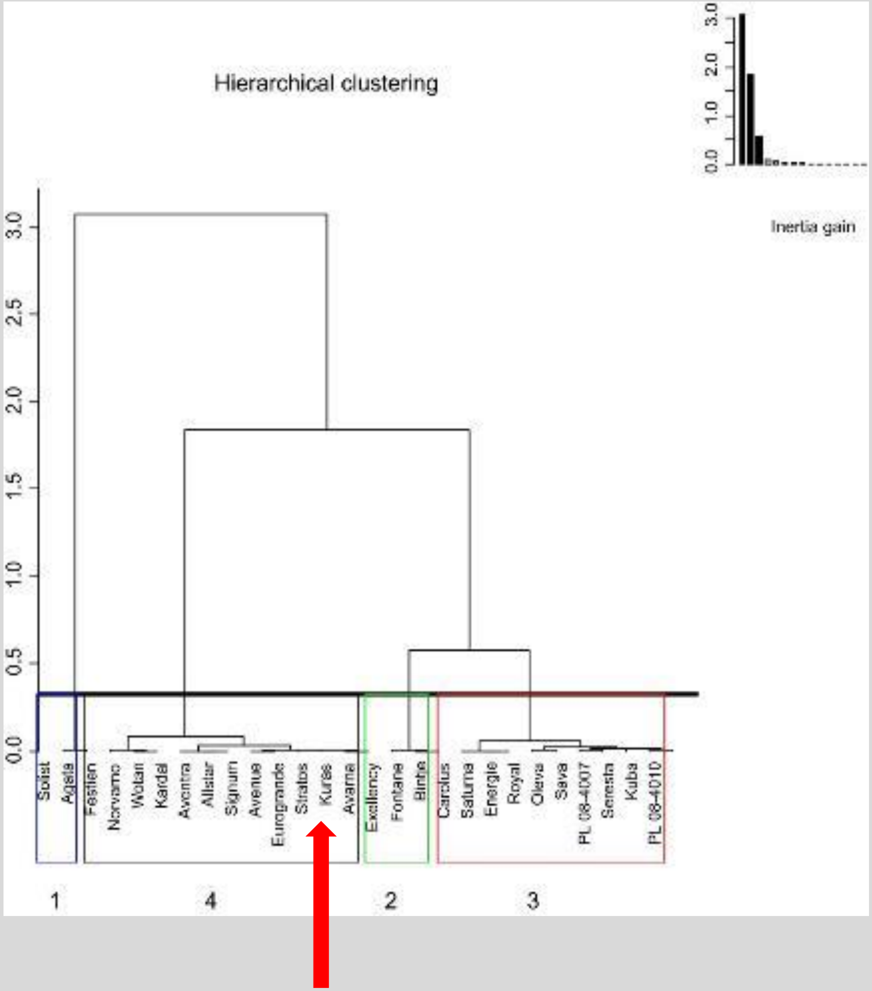
Disease development and fungicide saved

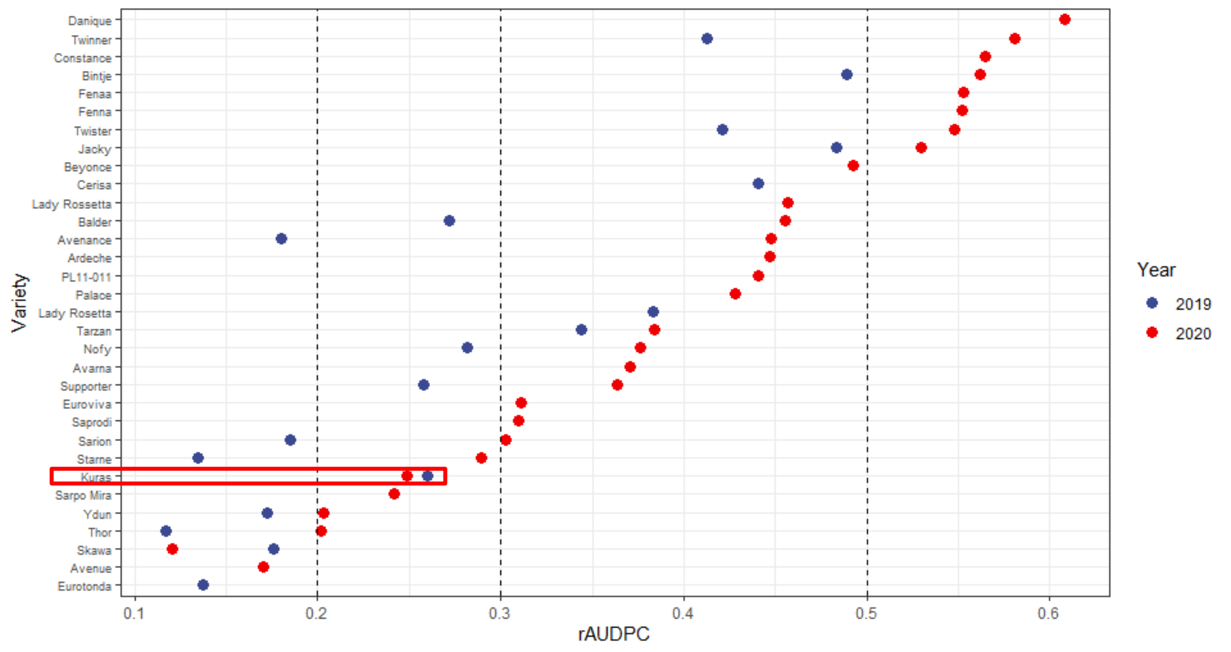


Starch yield



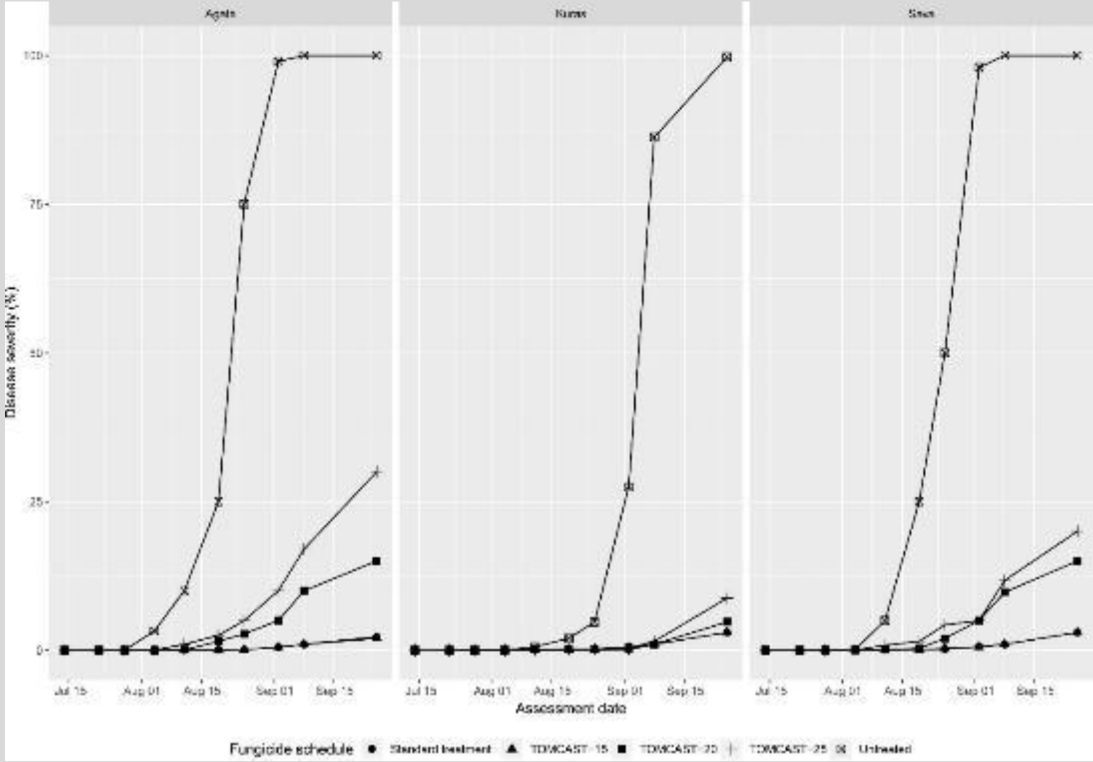
Cultivar resístance is worth considering for early blight control



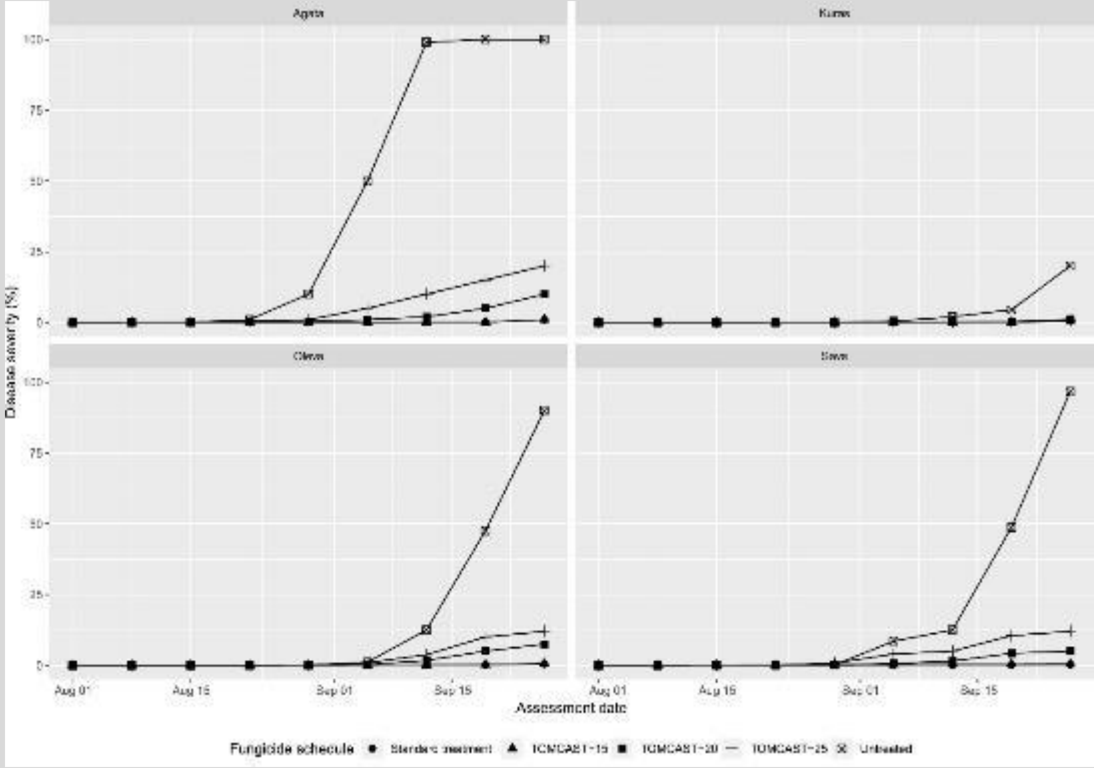


Integrating cultivar resistance with the TOMCAST model

2016



2017



Recommendations

1. DIVERSIFICATION (Introduce more resistant cultivars)
2. SANITATION (no dumps, more years between potatoes, control of volunteers, use healthy seed)
3. IPM strategies and DSSs that make use of information about the pathogen, host resistance, weather and fungicide information and make use of precision agriculture tools
4. Include relevant BIOLOGICALS (PRI and BCA) and BIOSTIMULANTS in more resistant cultivars to replace fungicides in low risk periods. Use a DSS for timing
5. COLLABORATE and share data with Nordic and European colleagues – link up with EuroBlight, and make data and tools FAIR to obtain faster and more robust conclusions
6. More and better EDUCATION and KNOWLEDGE TRANSFER.

Thank you for your attention