

The link between genotype, phenotype and IMP2.0

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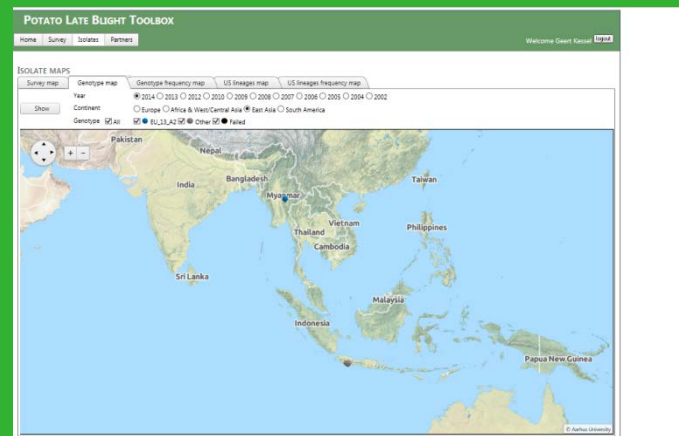
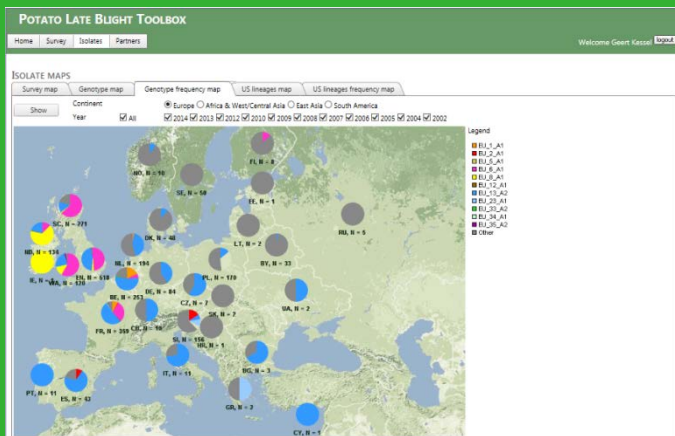
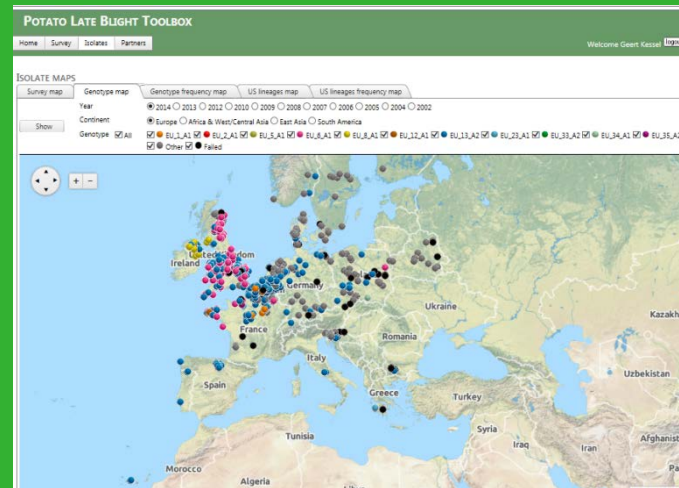
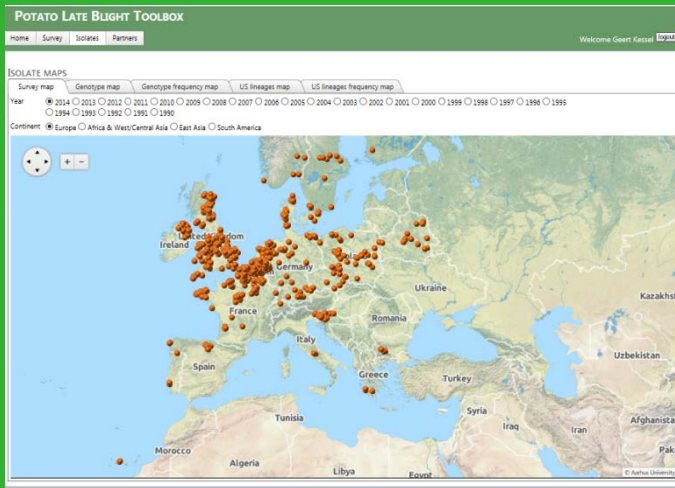
Outline

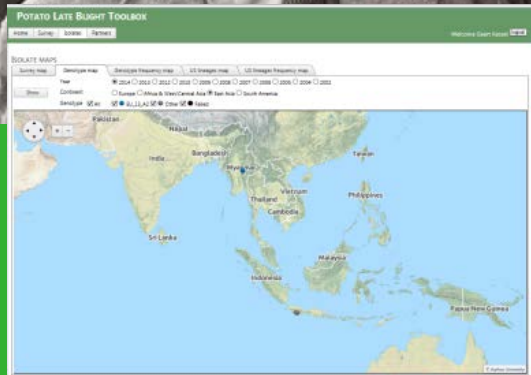
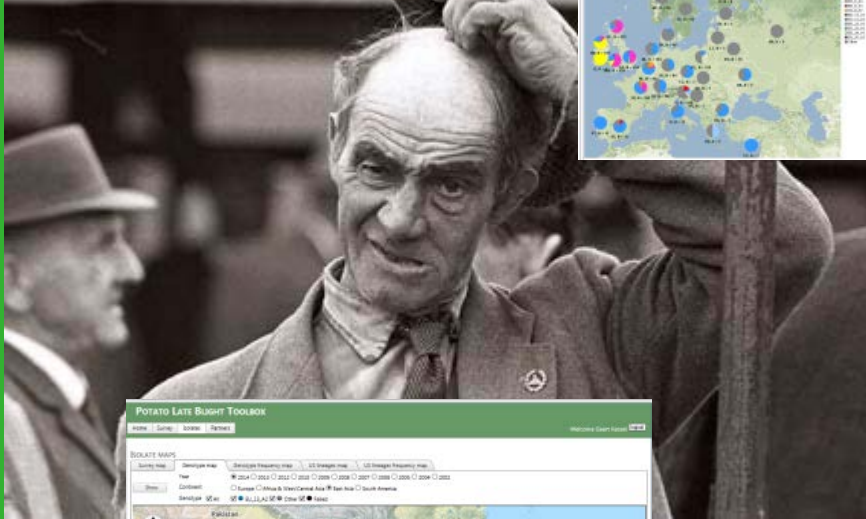
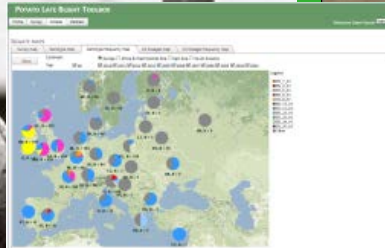
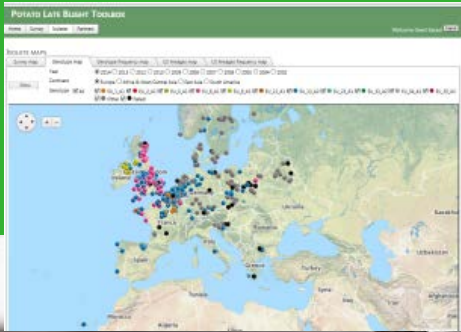
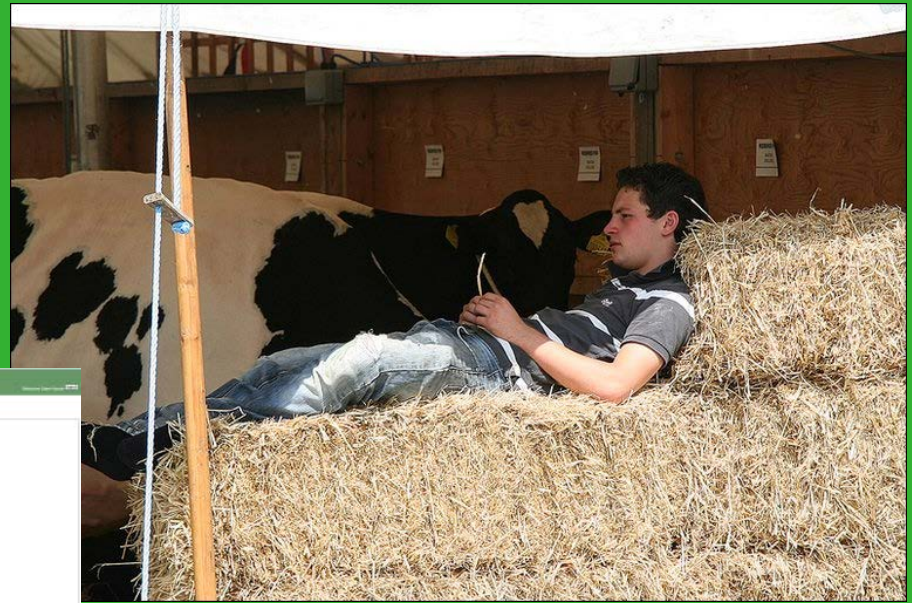
- EU Monitoring versus the target group
- Current use of monitoring information
 - Short update on the NL population 2014
- Future use of monitoring information

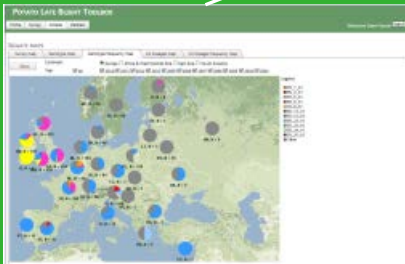
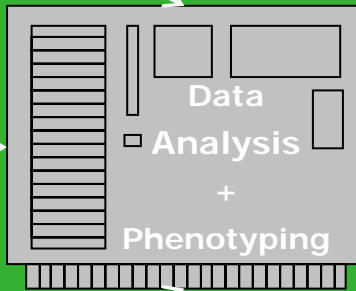
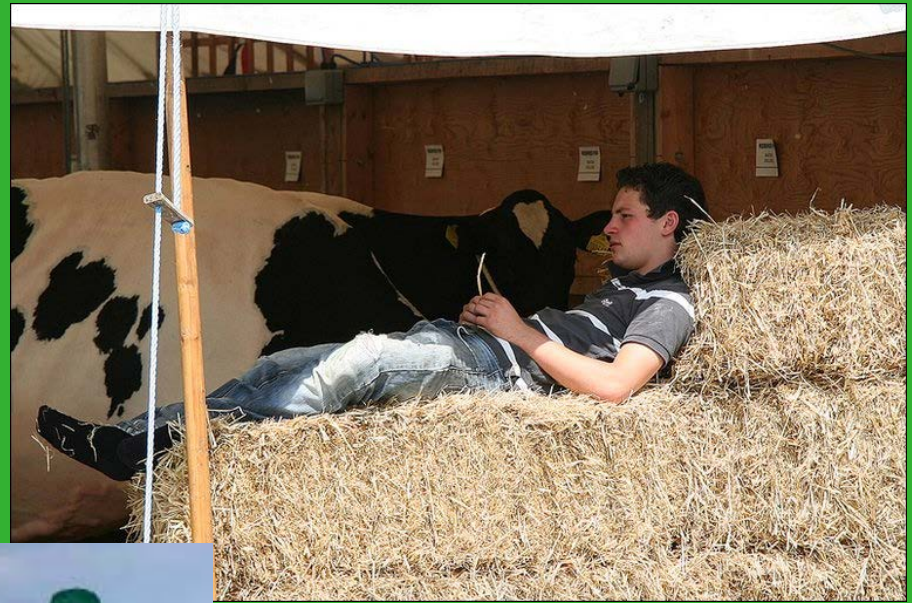
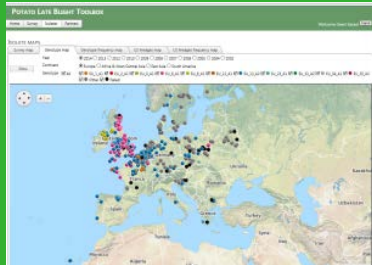
- An IPM2.0 control strategy for PLB
 - Host resistance
 - Fungicides
 - *P. infestans* Population Monitoring



Phytophthora infestans monitoring





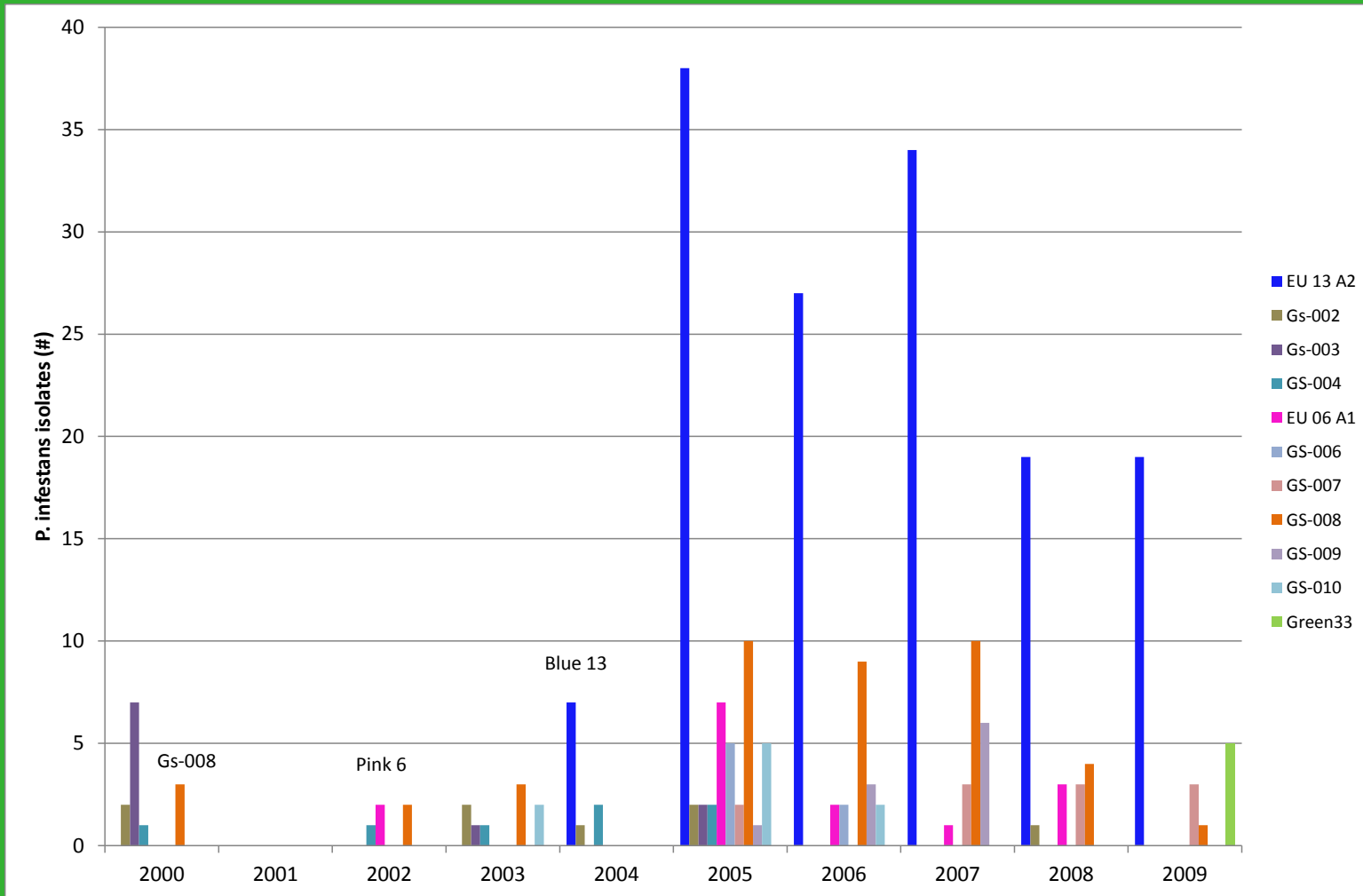


Current use of monitoring (information)

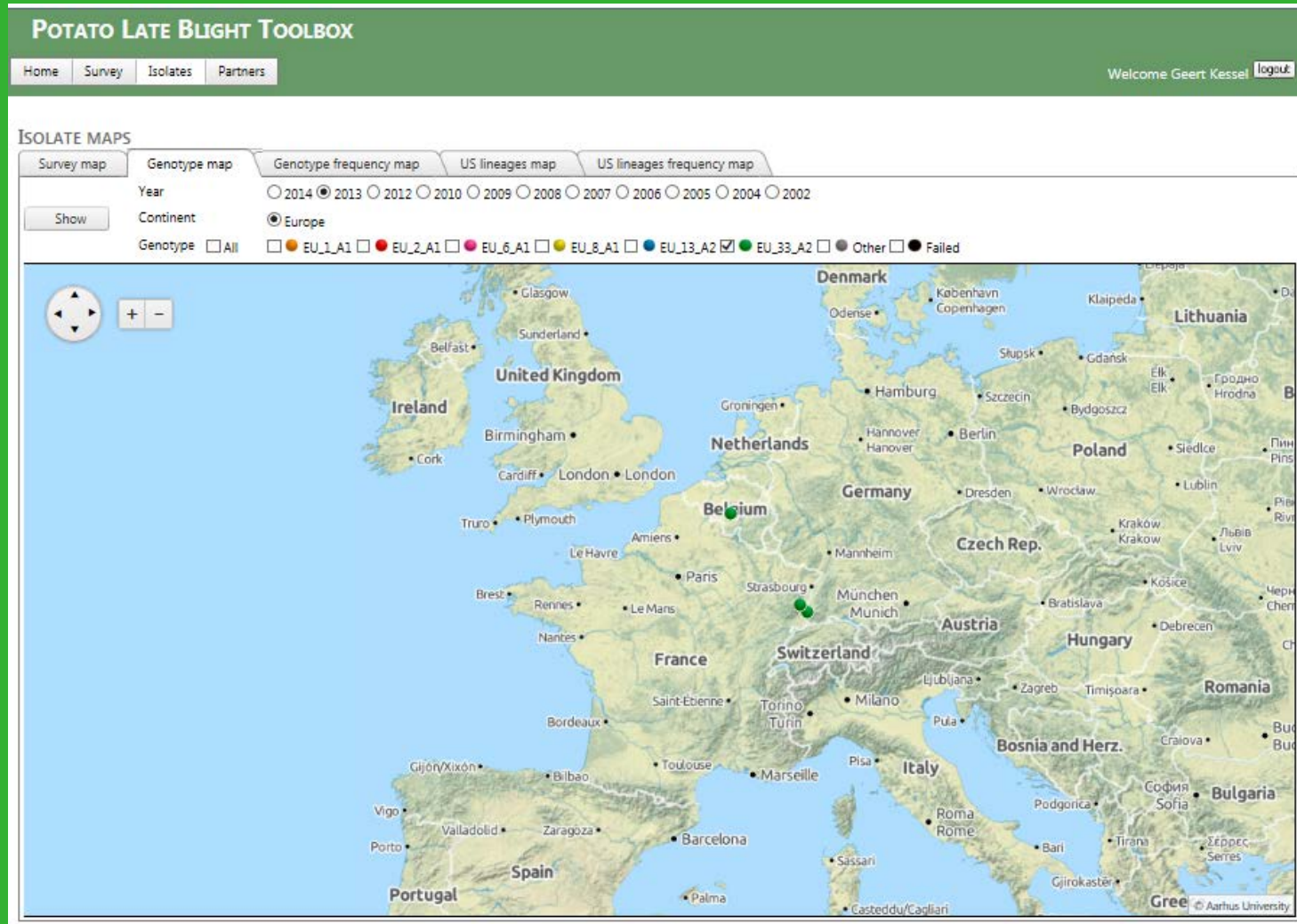
- Analysis of Control problems:
 - (Extreme) weather
 - High primary inoculum
 - Population Changes
- Rapid identification of the culprit when problems occur
 - Blue13
 - Green33
 - New, “Green33 related” clone in the NL
- Population dynamics under a.i. selection pressure
- Population Genetics:
towards a better understanding P. infestans of population dynamics



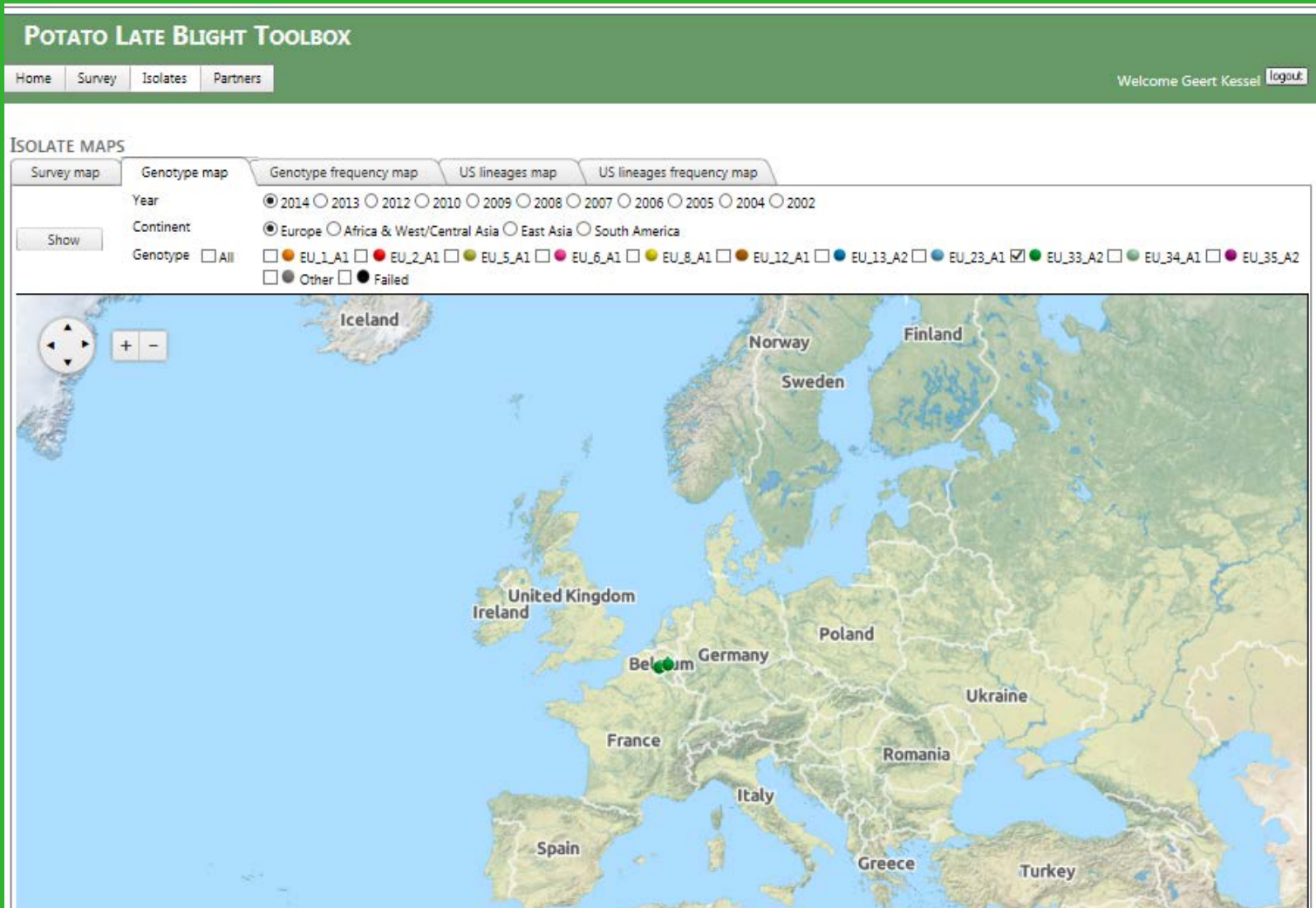
P. infestans clonal lines in the Netherlands



Green33 in 2013

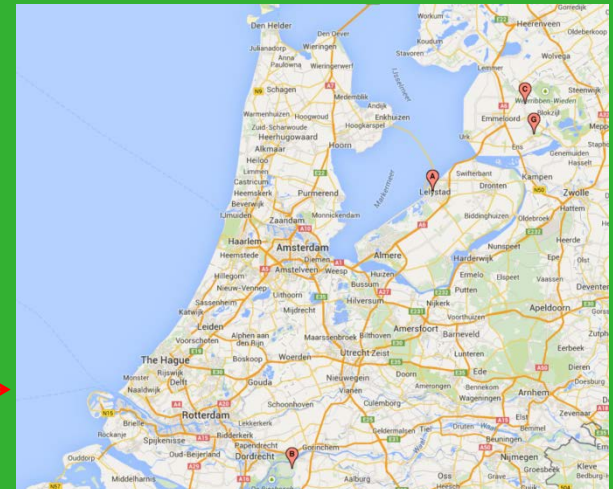
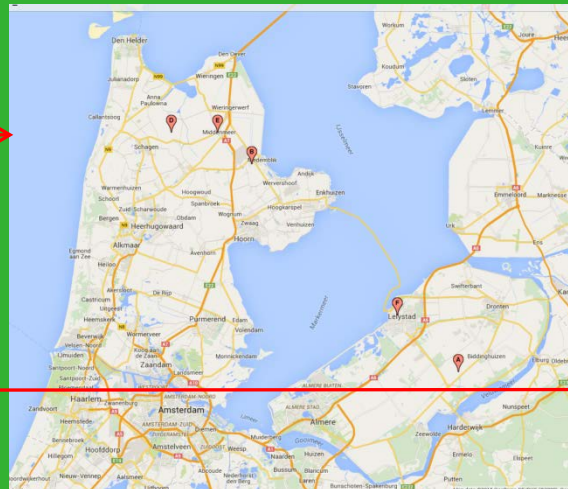
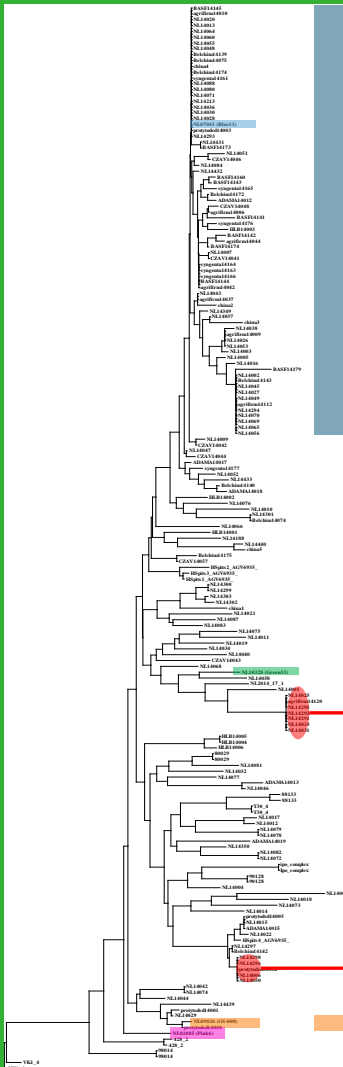


Green33 in 2014



The Dutch Population 2014

- Blue13: 44%
- EU1-A1: 1%
- "Others": 55%
- 2 new clones, implications currently unknown

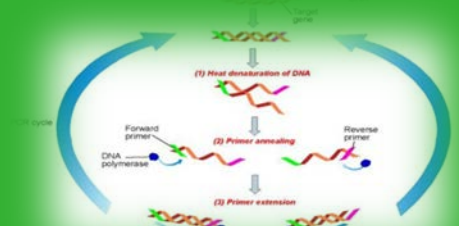


Future use of Monitoring information

- Early warning
- Geographical (mis)matching a.i.'s and R-genes with the local population for efficient PLB control
- ...
- Essential to know the Phenotype behind the genotype
 - Genotyping is “High Throughput” and Quick
 - Phenotyping is Low Throughput and Slow
 - Clonal lines make it easier
 - The “others” group complicates matters

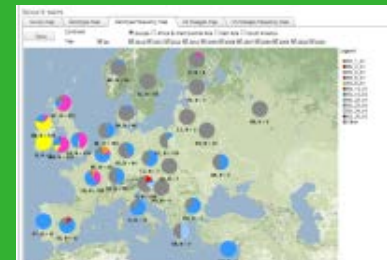
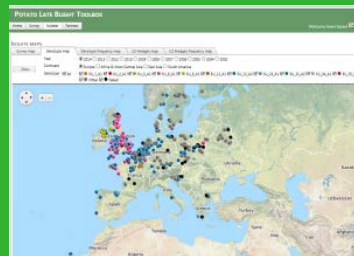
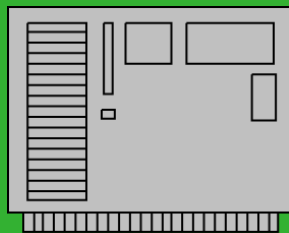


Genotype → Phenotype

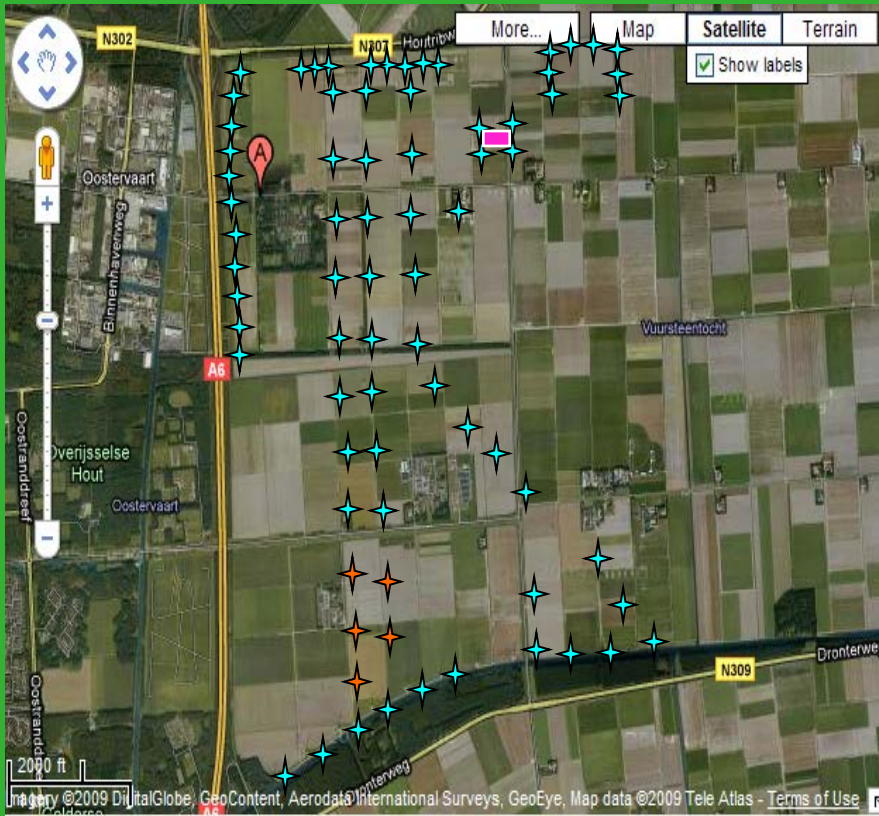


Amplification of a target gene sequence requires a template DNA molecule (usually an extraction of genomic DNA) and a set of gene-specific DNA primers. Each PCR cycle has a heat denaturation step that separates the DNA into two single strands, where the forward and reverse primers bind to their complementary sequences. The primers are then extended by DNA polymerase to form complementary DNA strands.

	Active Ingredients				Resistance Genes					
	Fluazinam	Metalaxyl	Fluopicolide	...	R0	Bib1	Bib2	Bib3	R2	..
Blue13	S	R	?		S	S	R	S	S	
Pink6	S	S	?		S	S	R	S	R	
Green33	MR	S	?		S	S	R	S	R	
EU1-A1	S	S	?		S	R	R	S	S	
...	?	?	?		?	?	?	?	?	



Lelystad & Valthermond 2010 & 2011



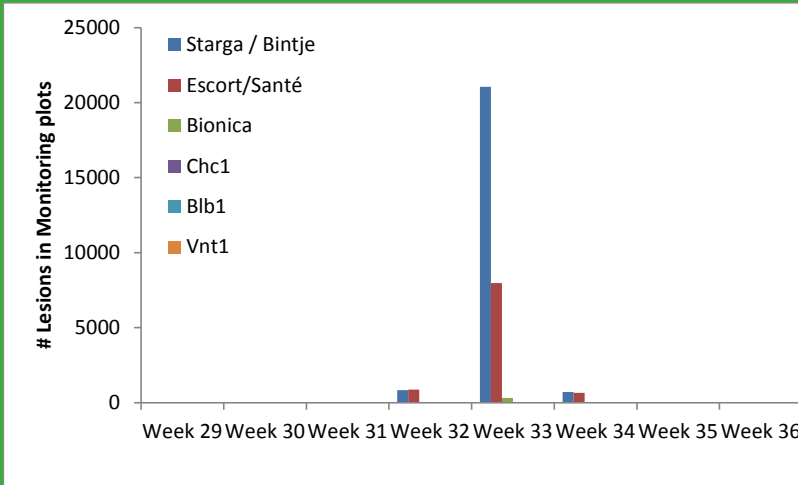
Valthermond 2010



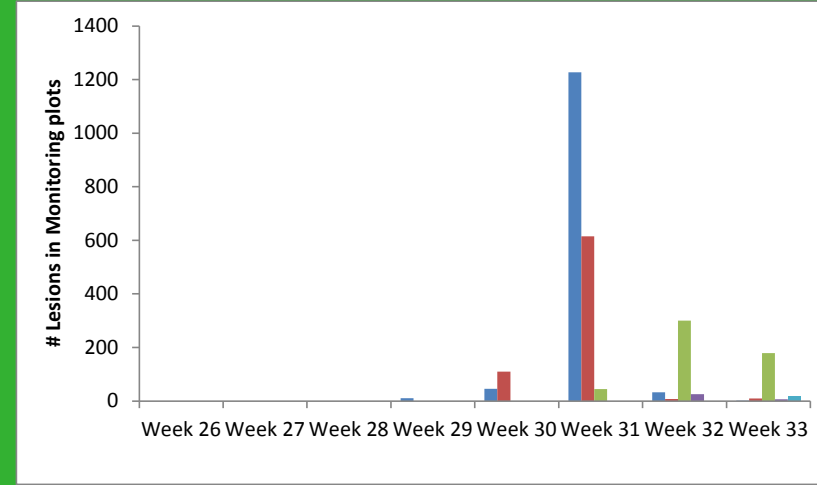
Lesion counts monitoring plots

Valthermond

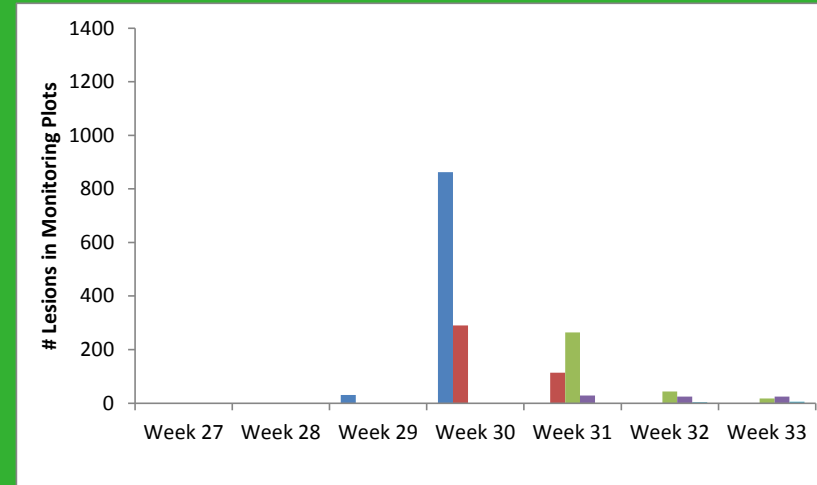
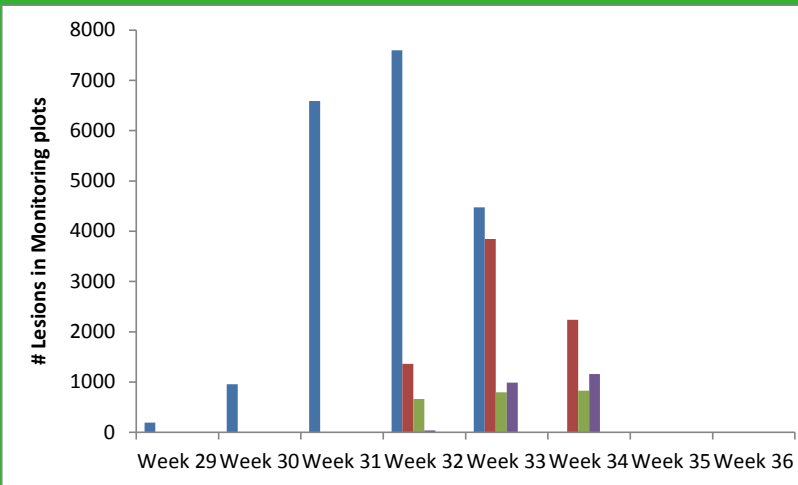
2010



2011

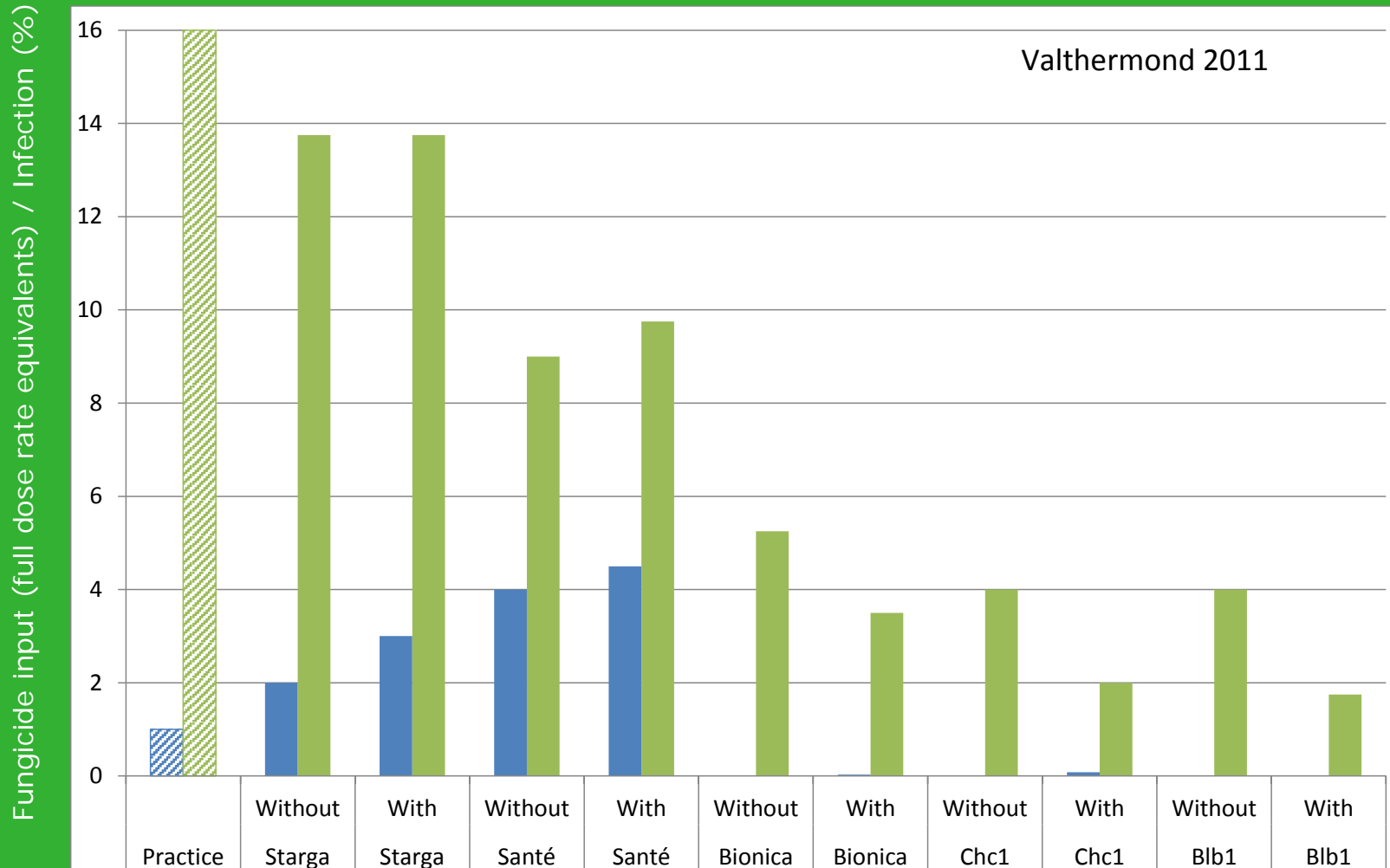


Lelystad



Results

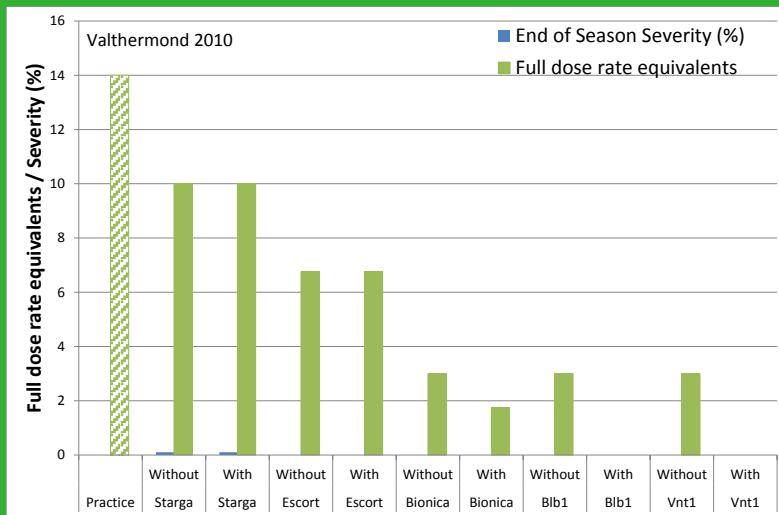
■ Valthermond 2011



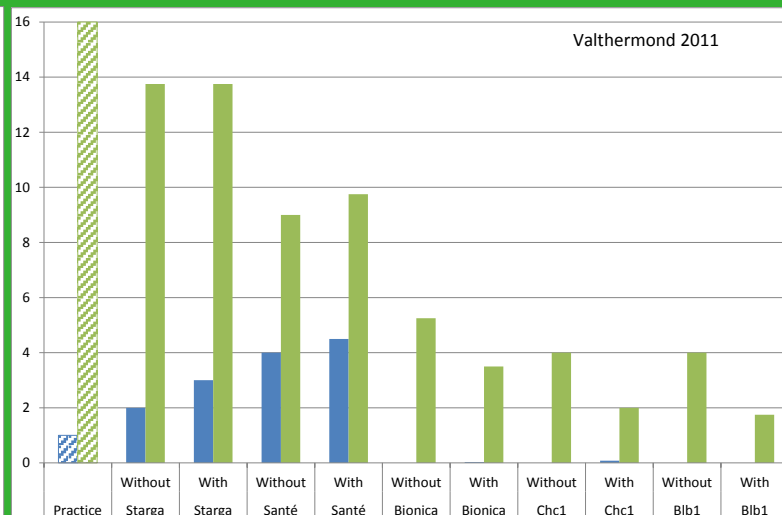
Results

Valthermond

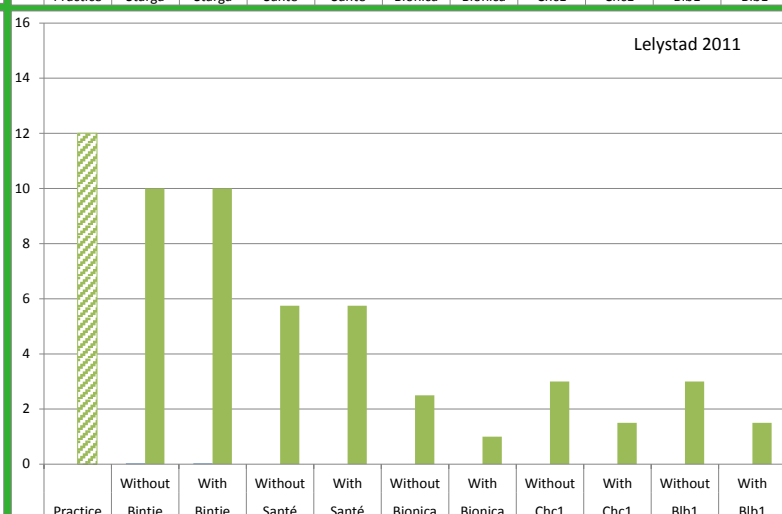
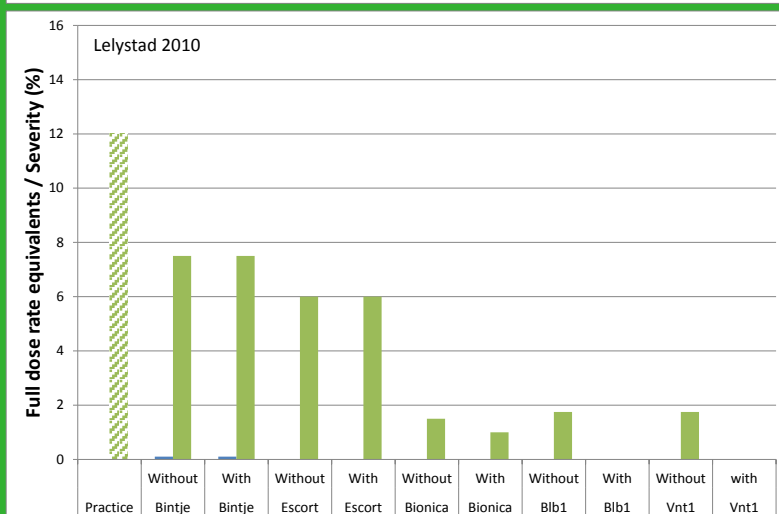
2010



2011



Lelystad



AMIGA trials 2013 & 2014

■ 3 potato cultivars:

- Desiree (Conventional)
- A15-031 (Desiree + Vnt1) (GM)
- Sarpo mira (Conventional)

■ 3 Control strategies:

- No spraying (against PLB)
- Weekly Spray application
- IPM 2.0 (DSS + AVR Monitoring info)



AMIGA, Valthermond 2014



Results 2013

Fungicide applications under extreme disease pressure:				
Variety	Strategy	# sprays	TFI	% Infection
Desiree	NoControl	0	0	100.00
Desiree	WeeklySchedule	12	12	5.01
Desiree	IPM2.0	11	10.333	5.02
SarpoMira	NoControl	0	0	1.09
SarpoMira	WeeklySchedule	12	12	0.00
SarpoMira	IPM2.0	3	0.75	0.00
A15-31	NoControl	0	0	0.01
A15-31	WeeklySchedule	12	12	0.00
A15-31	IPM2.0	3	0.75	0.00



Planting date:	
Emergence:	29-6-2013
Haulm Killing:	25-9-2013
Length of season:	88 Days

Results 2014

Cultivar	Treatment	Spray summary		Severity (%)
		# Sprays	TFI	Final disease severity (%)
Desiree	Unsprayed	0	0.0	100.00
Desiree	Weekly sprays	14	17.0	0.71
Desiree	IPM 2.0 Advice	14	17.0	1.00
Sarpo Mira	Unsprayed	0	0.0	0.02
Sarpo Mira	Weekly sprays	13	13.0	0.00
Sarpo Mira	IPM 2.0 Advice	10	12.0	0.00
A15-31	Unsprayed	0	0.0	26.11
A15-31	Weekly sprays	13	13.0	0.00
A15-31	IPM 2.0 Advice	5	5.0	0.01



Some Conclusions

- For practical application of monitoring information, we need to know the link between genotype and phenotype
- Monitoring is an essential component of next level PLB control strategies
- The full potential of IPM in PLB control is not yet realized, ... not even close!
- Ample room for improvement **IF** host resistance is introduced



Thank you for
your attention



7 August 2013



WAGENINGEN UR
For quality of life