

Assessing and monitoring the impact of GM crops relevant to Irish agriculture

**EPA GMO Technology
Conference, Dublin Castle**

October 11th, 2013



Relevance of genetically modified crops in light of future environmental and legislative challenges to the agri-environment

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Article first published online: 18 DEC 2008

DOI: 10.1111/j.1744-7348.2008.00304.x

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Issue



Annals of Applied Biology

Volume 154, Issue 3, pages 323–340, June 2009

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- 6Mha of potatoes grown in the EU ~€6,000,000,000 pa
- Blight losses (costs of control and damage) > €1,000,000,000 pa
(Haverkort et al. 2008)
- Net worth of potato sector up to €250 million
- Fungicides costs ~€800/ha and ~8000ha pa grown
(IFA Potato Report, 2011)

Phytophthora infestans
(late blight disease)



- 1983 – 2007, blight epidemic each year except for 4
- Pre-2008, spray intervals \sim 10 days and \sim 10 sprays/crop
- In 2004; **364,106kg** fungicide ai on Irish potato crop (DAFM)



- Post-2008, dramatic shift in dynamics of blight strains
- Novel strains of blight (e.g. Blue 13, Pink 6)
- Spray intervals <7 days and ≥ 15 sprays/crop

Impact of blight epidemic on unsprayed potato varieties ?

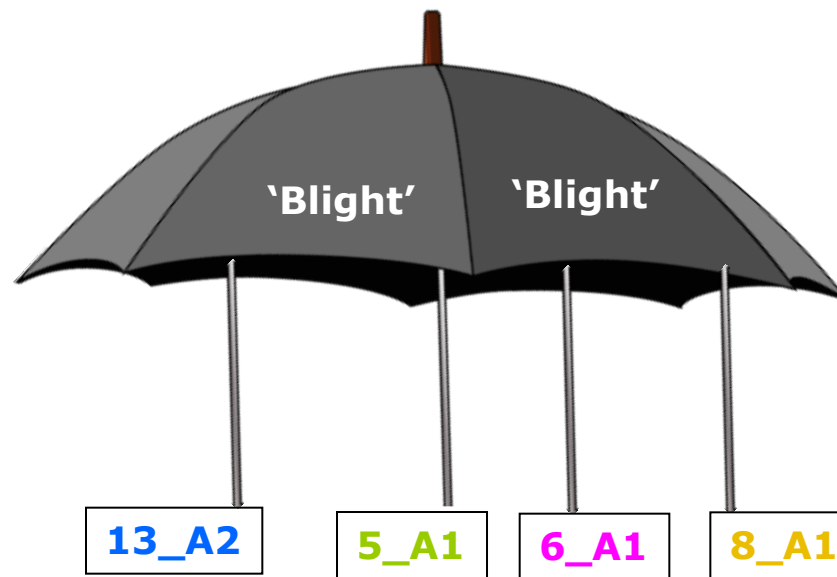
10/07/09



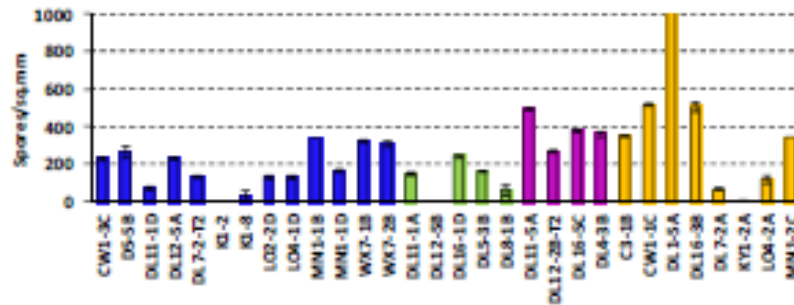
Impact of blight epidemic on unsprayed potato varieties ?

27/07/09

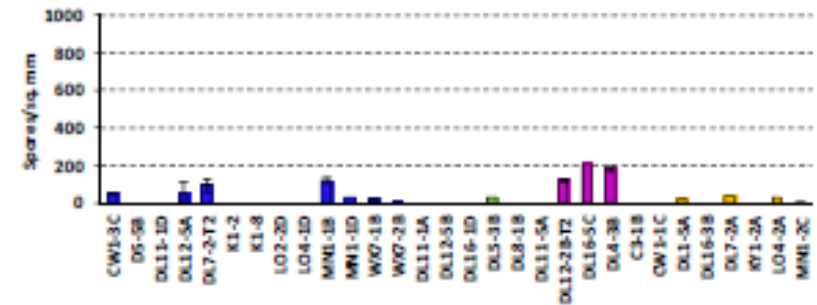




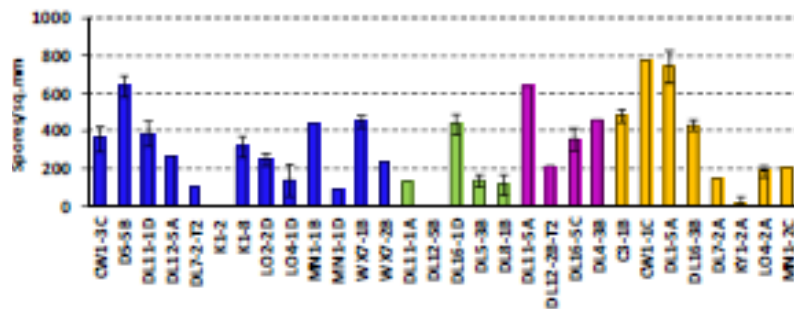
Rooster



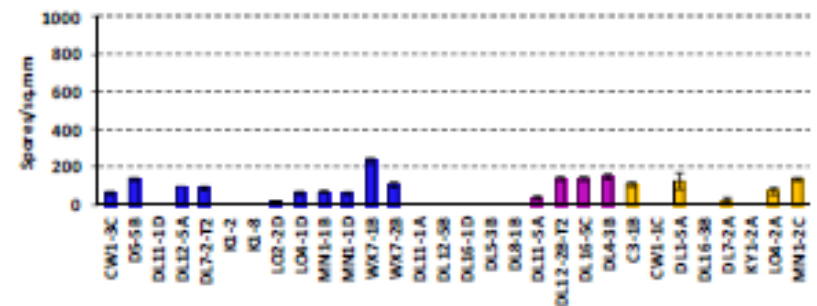
Bionica



British Queen



Sarpo Mira



Native blight strains 'like' new arrivals!

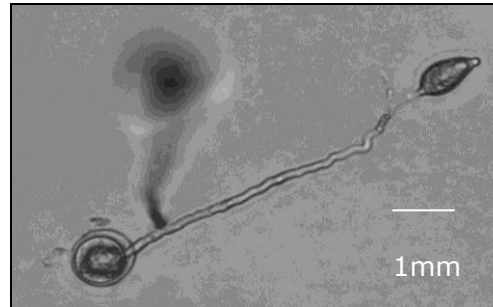
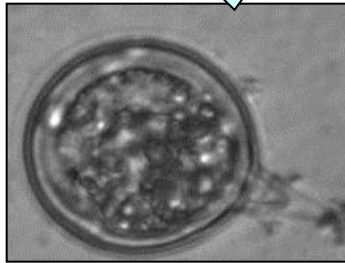
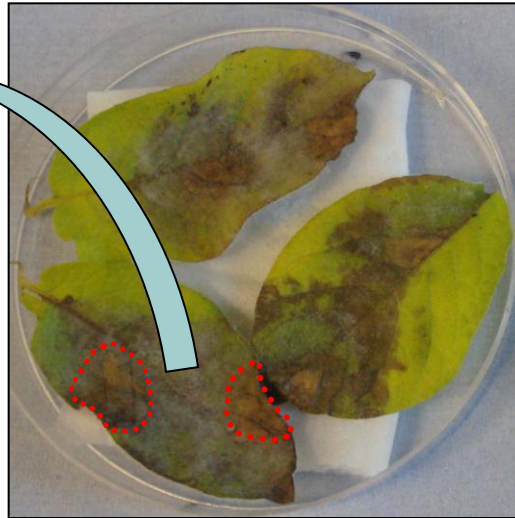
Blue 13 (A2)
(‘male’)

+ Fungicide resistant



Native strain (A1)
(‘female’)

- Fungicide sensitive



Impact ??

What can be done?

- Conventional bred potato > 12 years (35 years for Bionica)
- GM blight resistant potato ~ 18 weeks (+3 - 5 years)
- No 'linkage drag' and **accelerates the breeding process**
- GM potato with blight resistance tested in NL, UK, Belgium
- What is the potential cost...impact on blight, impact on soil ecology?

Assessing and Monitoring the Impacts of Genetically Modified crops on Agroecosytems (AMIGA)

- FP7 funded 22 partners, 15 countries
- 11 work packages
- www.amigaproject.eu
- PI = Salvatore Arpaia, ENEA
- Teagasc involved in 3 work packages
- Identical field studies of cisgenic potato planned for Ireland and the Netherlands
- License awarded by EPA, July 2012
- A goal is to utilise identical sampling procedures in attempt to normalise experimental approach to impact assessment research



Use of wild potato genes to control blight disease

- Cisgenic GM potato generated at Wageningen University as part of DurPh project (<http://www.durph.wur.nl/UK/>)
- Isolated resistance gene (Rpi-vnt1.1) from *Solanum venturii*
- GM Desiree resistant to blight in the Netherlands for 3 years



2012 season proof of concept



2012 season



GM Desiree



Desiree

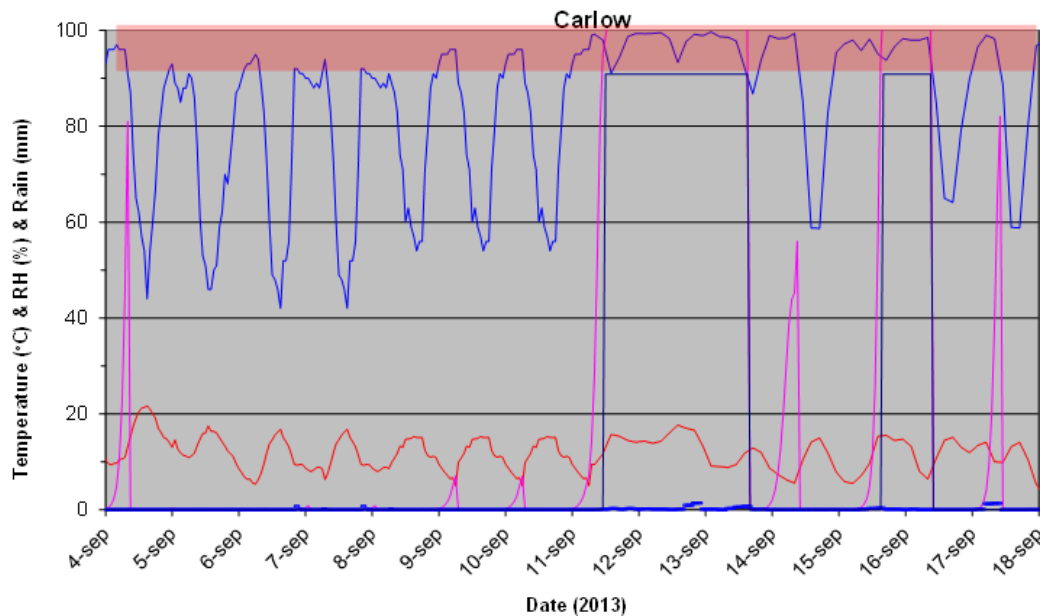
2013, 2014, 2015 field study

Potato varieties

Desiree
GM Desiree
Sarpò Mira

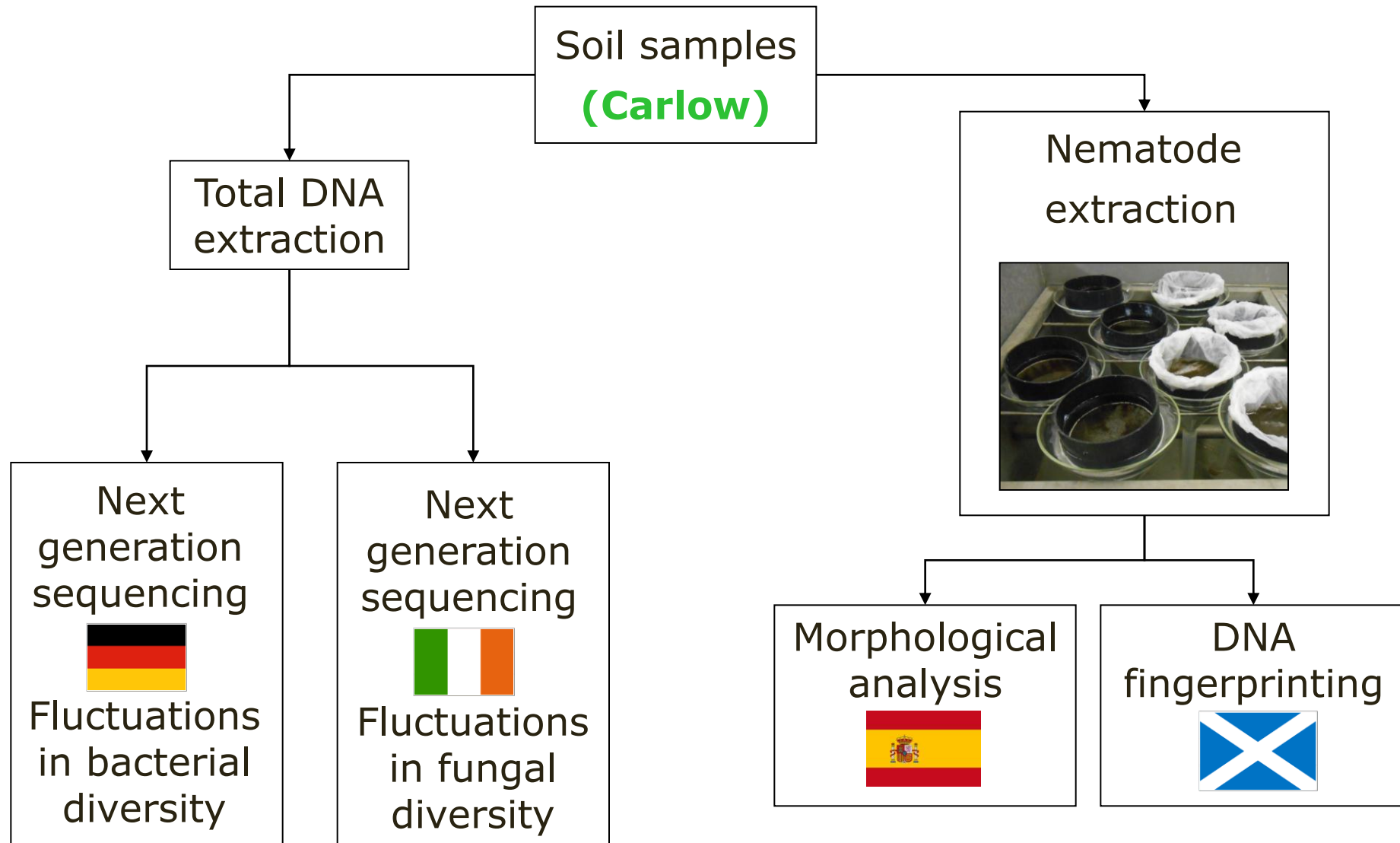
Treatments

No spray
Weekly spray
IPM - 'smart spray'



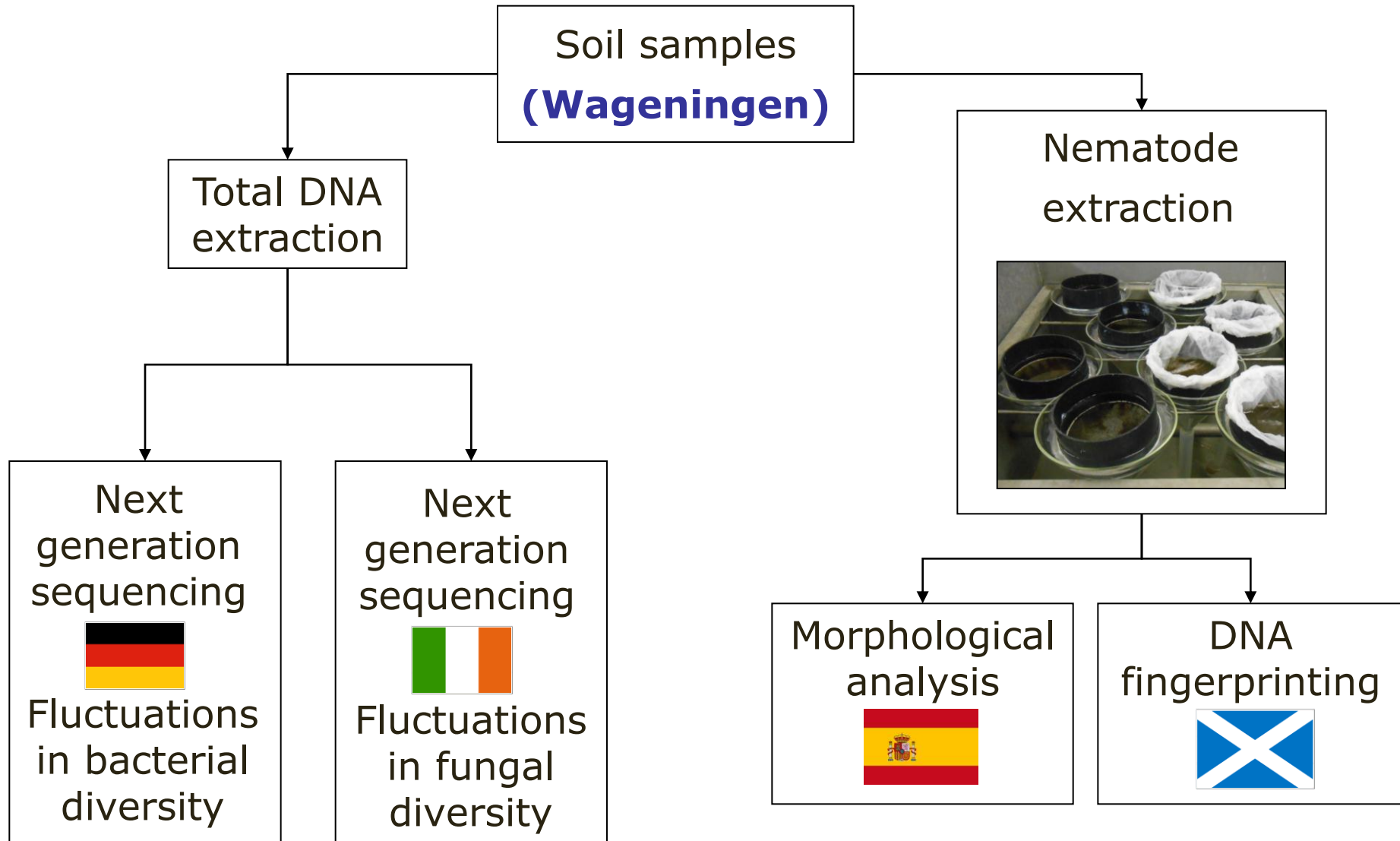
2013, 2014, 2015 research objectives ?

Work Package 4 - Impact on biological components of soil



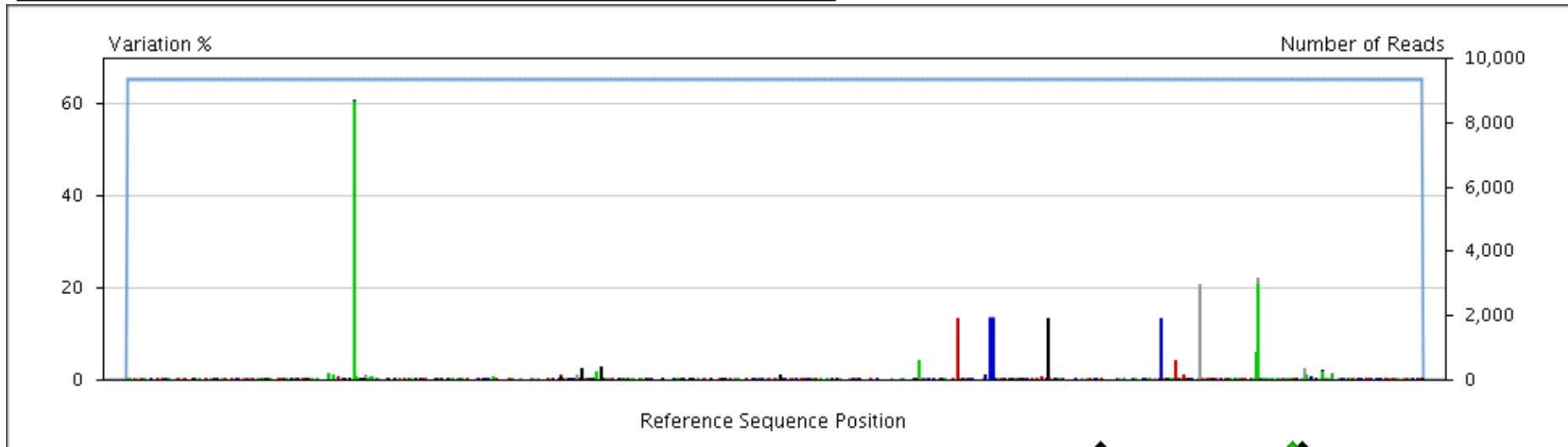
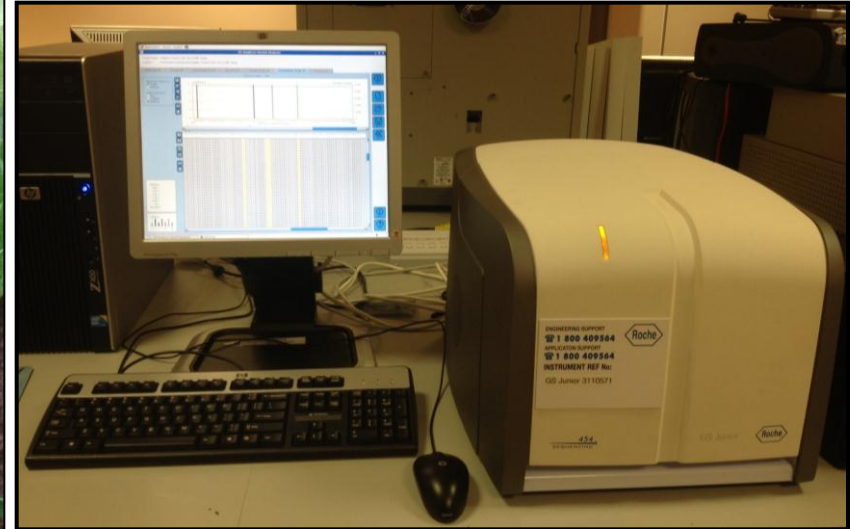
2013, 2014, 2015 research objectives ?

Work Package 4 - Impact on biological components of soil



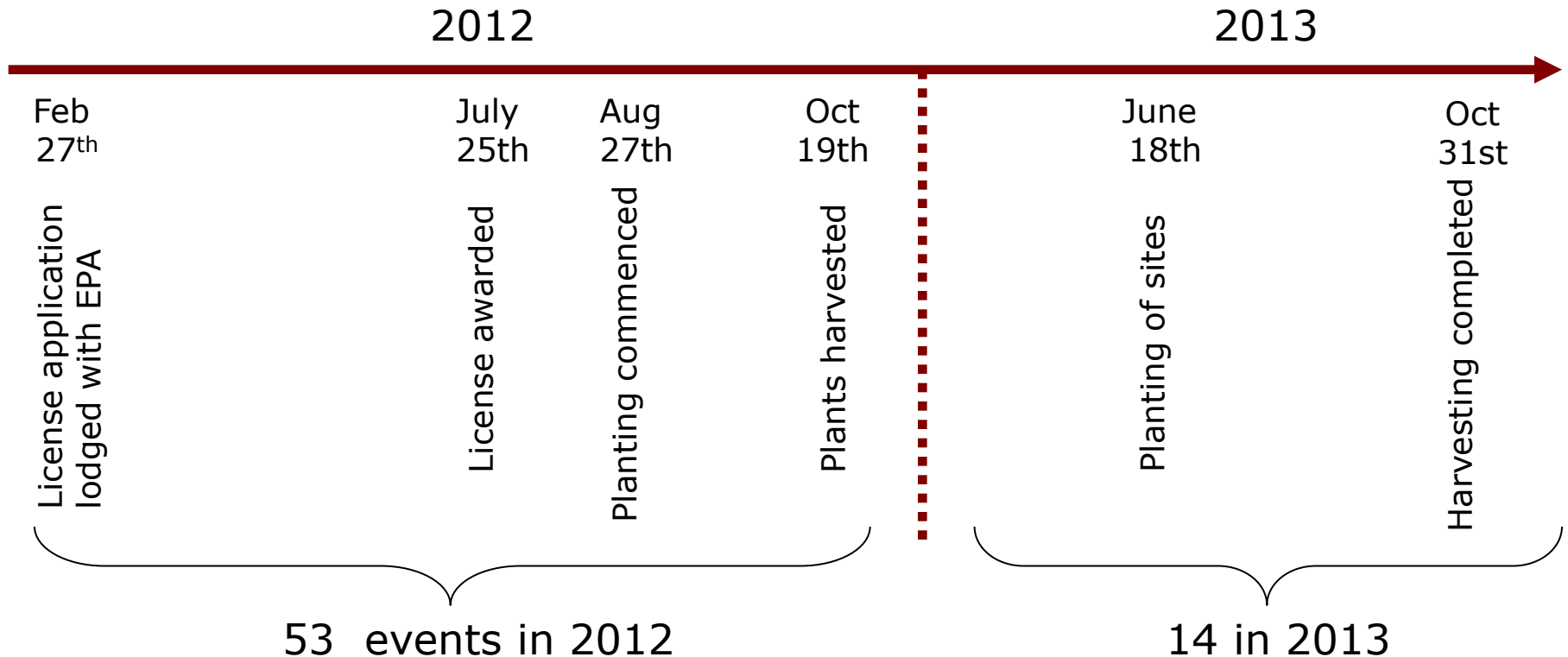
2013, 2014, 2015 objectives ?

Work Package 8 - Impact on blight; how quickly will it adapt?



2013, 2014, 2015 objectives ?

Work Package 11 – Communication, education, dissemination



- Significant international interest
- General public, stakeholders, schools, university students etc...

Progress in the field ...



Progress in the field ...



Progress in the field ...



Progress in the field ...



Progress in the field (Sept 2nd, 2013)



Desiree



GM Desiree



Sarpo Mira

Progress in the field (9th October 2013)...



Desiree



GM Desiree



Sarpō Mira

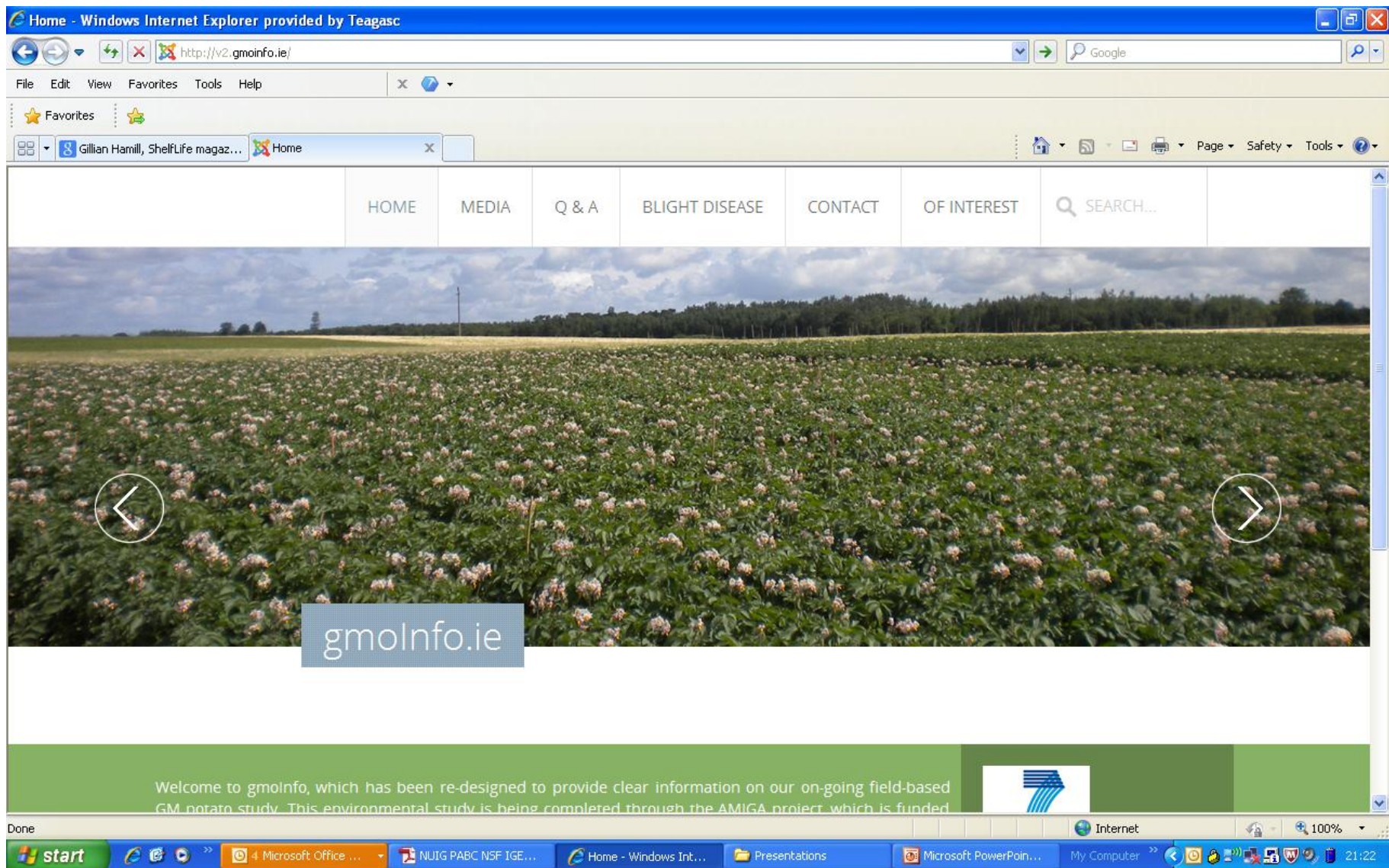


Progress in the field ...



To conclude, what are we not doing?

- Not about proving GM is answer to eradicating blight disease
- Not commercialising GM blight resistant potato
- Not about advocating the GM industry
- Advocating public research, knowledge and debate on a crop with potential relevance to Ireland
- Education through constructive engagement
- Focus on Irish-specific study, NO generalisations
- Research could equally show negative, positive, null impact



www.gmoInfo.ie

Acknowledgements



Admin staff at Oak Park
Teagasc management and research staff

