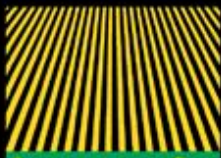


WHERE DO WE GO AFTER SMITH?

Pete Skelsey - David Cooke



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POTATO
COUNCIL

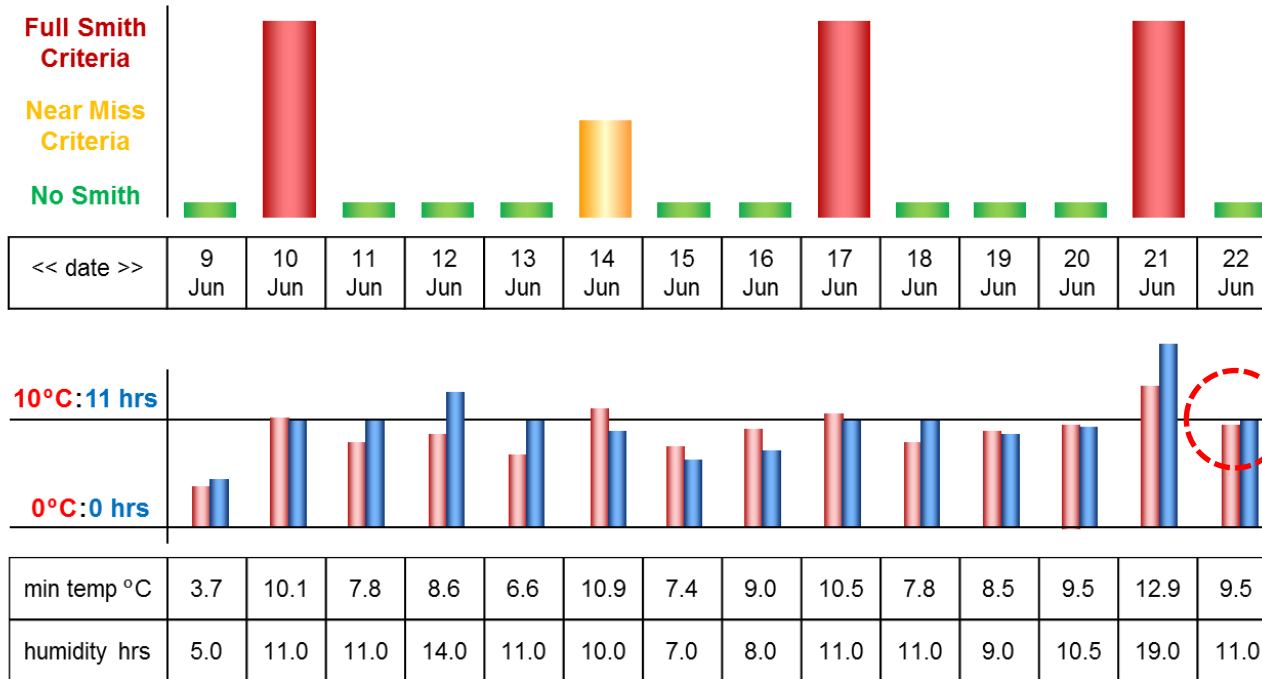


The Scottish
Government

Smith Period = robust model:

- Mainstay of PLB forecasting in the UK since 1975.

There have been 3 days in **KY1** where the Smith Criteria were met during the 14 days of data below.
No full Smith Periods were recorded.



Severe outbreak in KY1
at end of June



Courtesy of E. Anderson
Scottish Agronomy Ltd.

The above management tool is available free of charge to growers and other users at - <http://www.blightwatch.co.uk>



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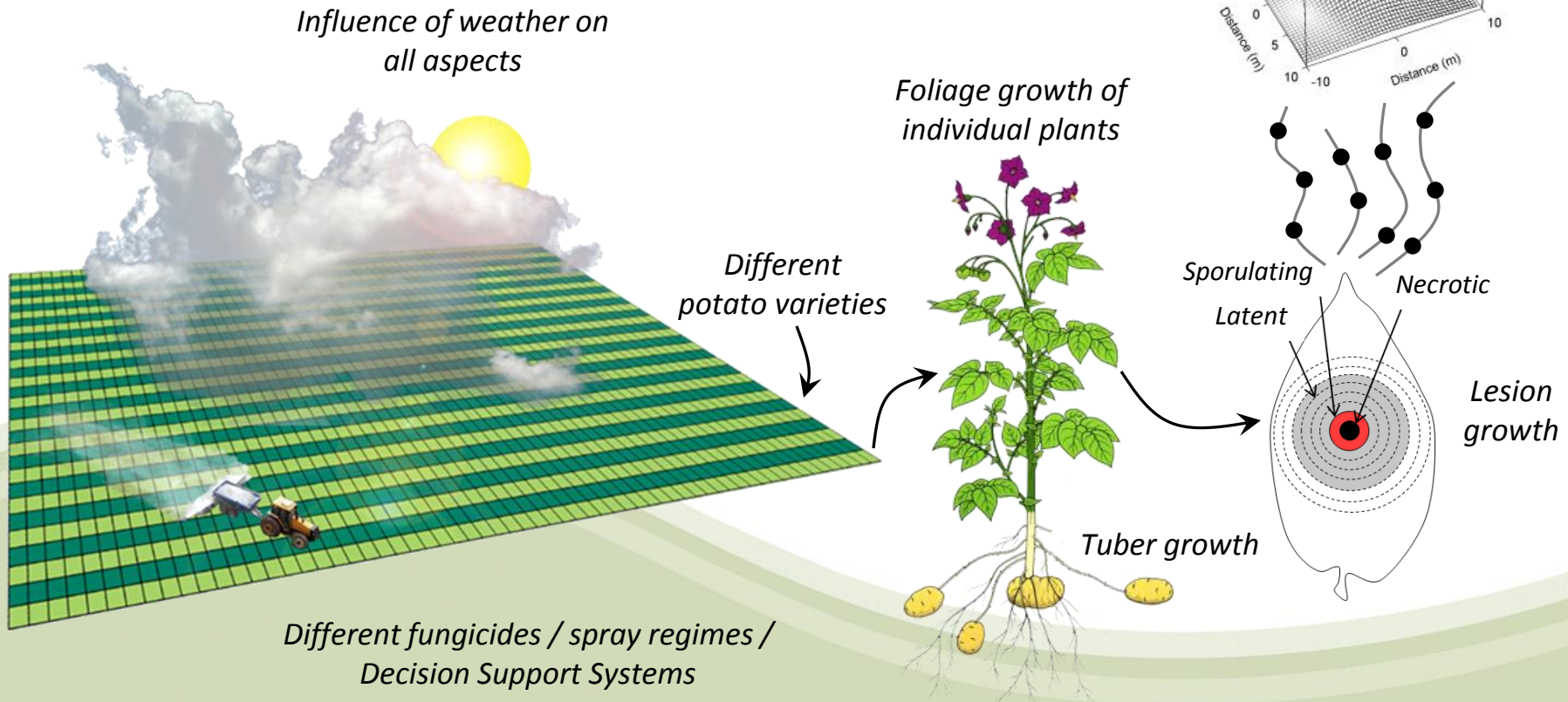
Potato Council funded research:

- *“Improved potato late blight management using sophisticated models of pathogen infection and spread.”*
- Free service: **historical risk >> current risk >> future risk.**



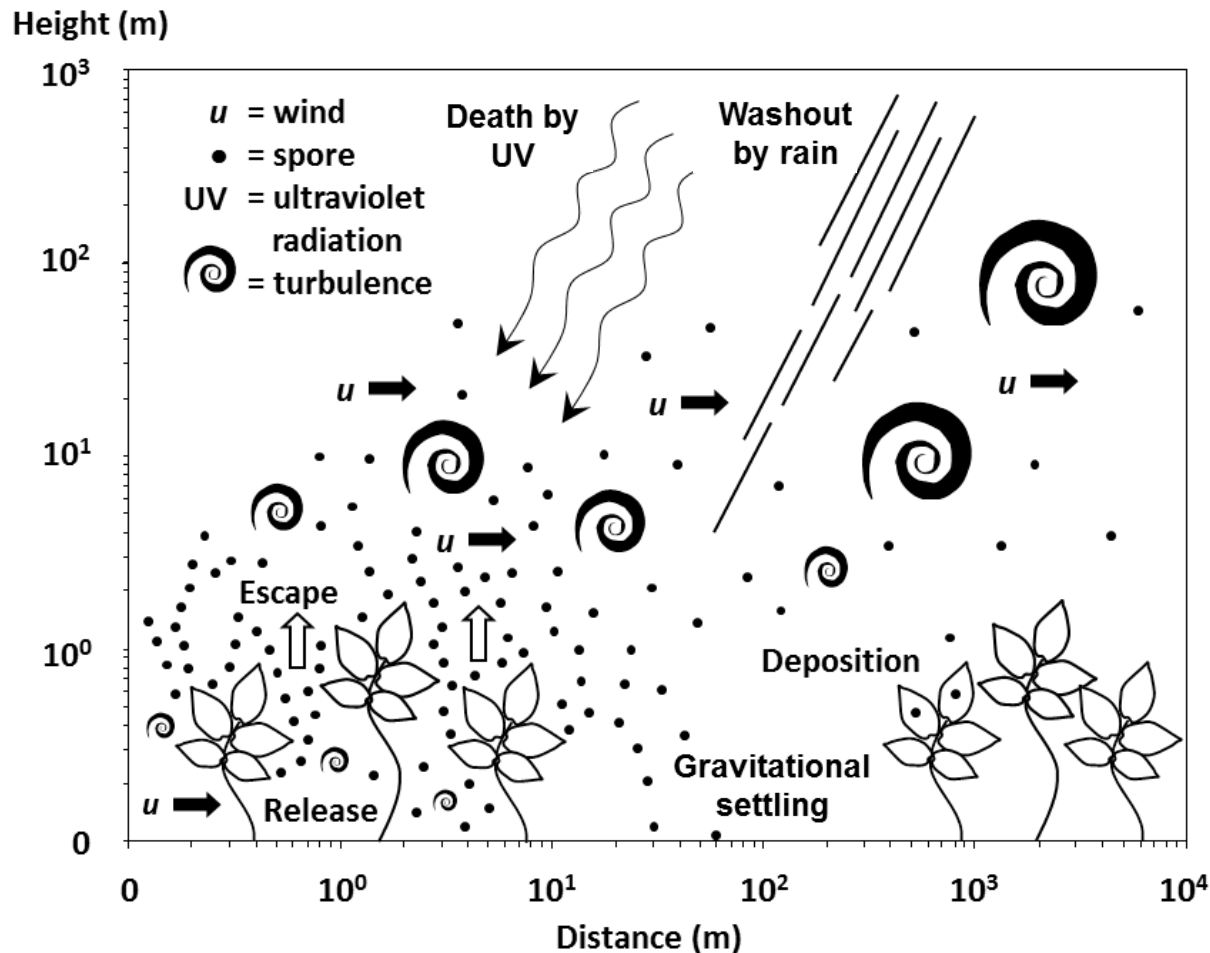
PLB simulation model:

- It simulates (almost) everything that happens in a field.

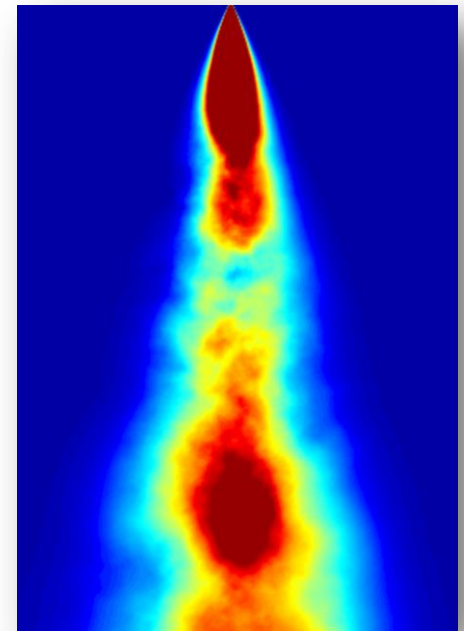


PLB simulation model:

- And also simulates the aerial part of the disease cycle.



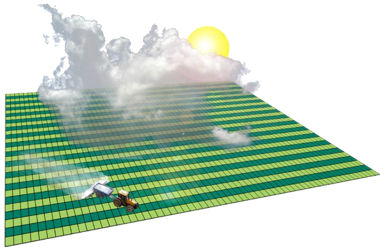
Cloud of spores dispersing over a landscape



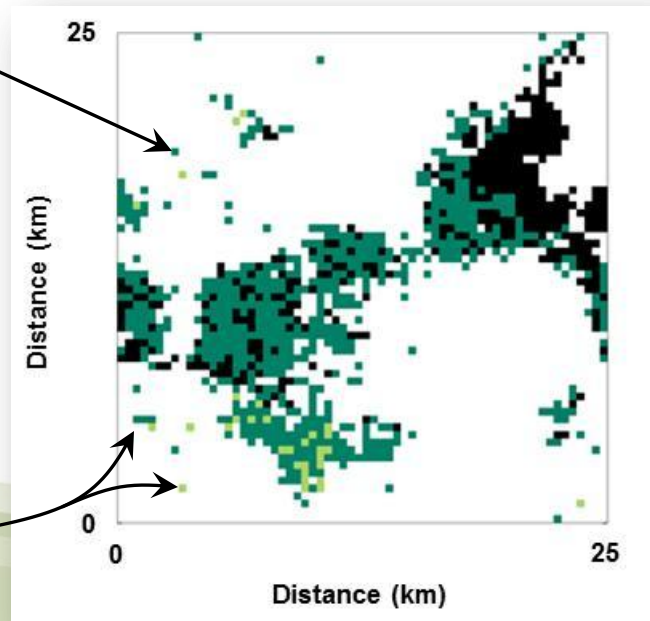
Simulating epidemics:

- On artificial or real landscapes.....

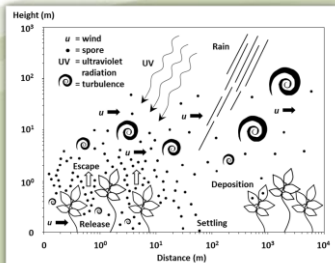
Each pixel is a field where the field-scale model is running



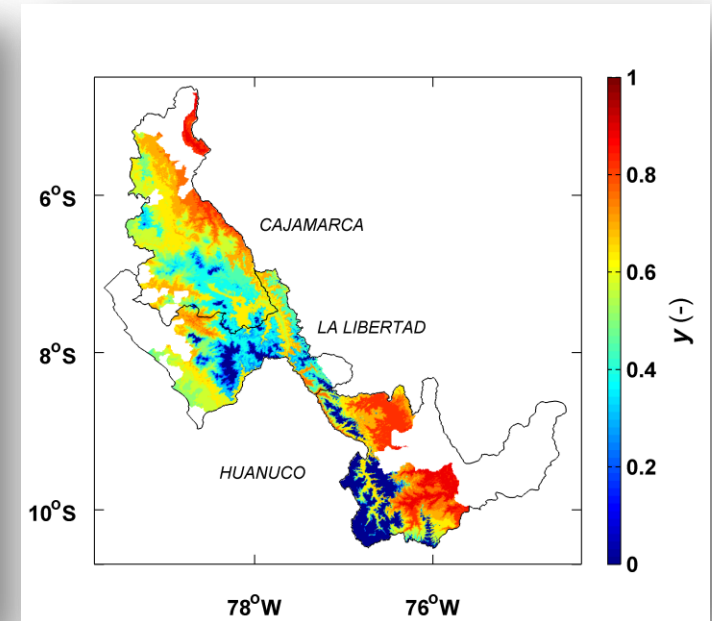
PLB epidemic on a computer generated landscape (black is infected)



For spread between fields I use the aerobiological model



Risk of yield loss in major growing regions of Peru (red is riskiest)



Validation and publication:

Analytical and Theoretical Plant Pathology

Influence of Host Diversity on Development of Epidemics: An Evaluation and Elaboration of Mixture Theory

P. Skelsey, W. A. H. Rossing, G. J. T. Kessel, J. Powell, and W. van der Werf

Analytical and Theoretical Plant Pathology

Parameterization and Evaluation of a Spatiotemporal Model of the Potato Late Blight Pathosystem

P. Skelsey, G. J. T. Kessel, W. A. H. Rossing, and W. van der Werf

AGRICULTURAL AND FOREST METEOROLOGY 149 (2009) 419–430

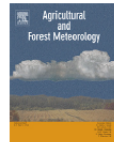


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journal homepage: www.elsevier.com/locate/agrformet



Regional spore dispersal as a factor in disease risk warnings for potato late blight: A proof of concept

P. Skelsey^{a,*}, G.J.T. Kessel^b, A.A.M. Holtslag^c, A.F. Moene^c, W. van der Werf^a

AGRICULTURAL AND FOREST METEOROLOGY 148 (2008) 1383–1394



ELSEVIER

available at www.sciencedirect.com



journal homepage: www.elsevier.com/locate/agrformet



Development and validation of a quasi-Gaussian plume model for the transport of botanical spores

P. Skelsey^{a,*}, A.A.M. Holtslag^b, Wopke van der Werf^a

Ecology and Epidemiology

Scenario Approach for Assessing the Utility of Dispersal Information in Decision Support for Aerially Spread Plant Pathogens, Applied to *Phytophthora infestans*

P. Skelsey, W. A. H. Rossing, G. J. T. Kessel, and W. van der Werf

Ecology and Epidemiology

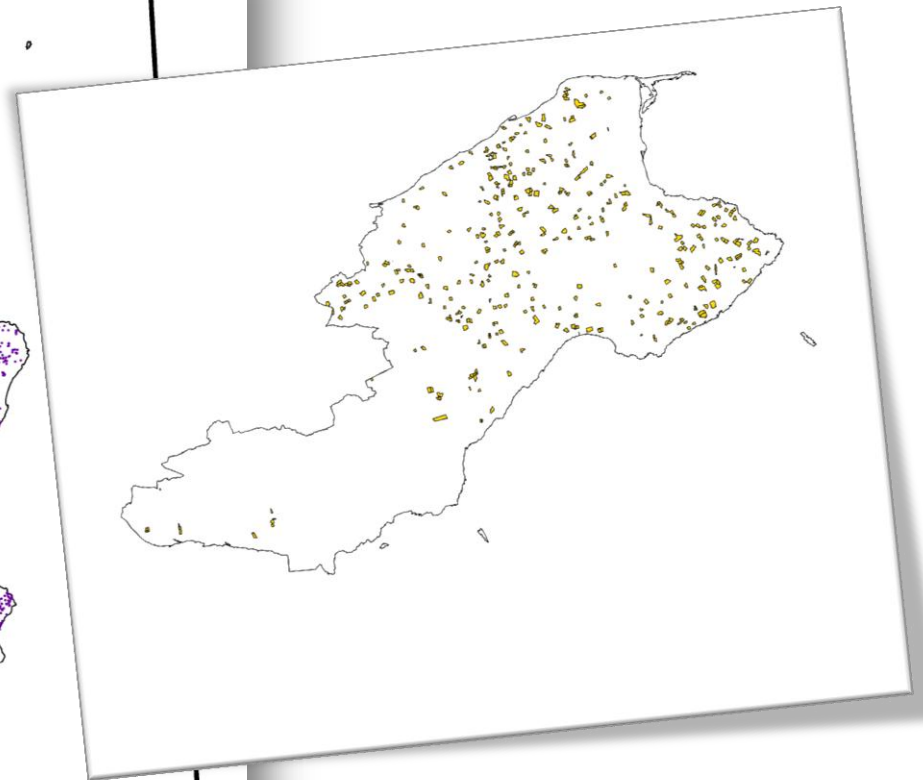
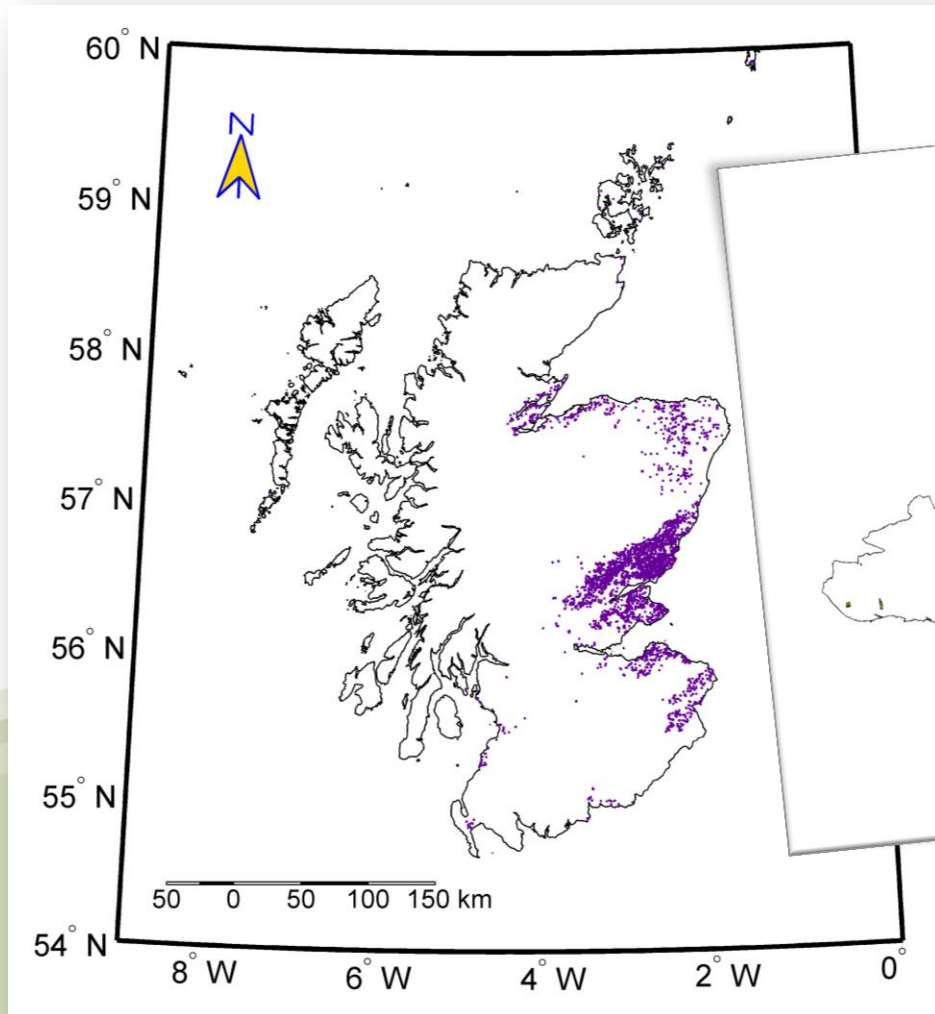
Invasion of *Phytophthora infestans* at the Landscape Level: How Do Spatial Scale and Weather Modulate the Consequences of Spatial Heterogeneity in Host Resistance?

Peter Skelsey, Walter A. H. Rossing, Geert J. T. Kessel, and Wopke van der Werf



Historical risk patterns:

- Distribution of potato fields in Scotland, 2012:

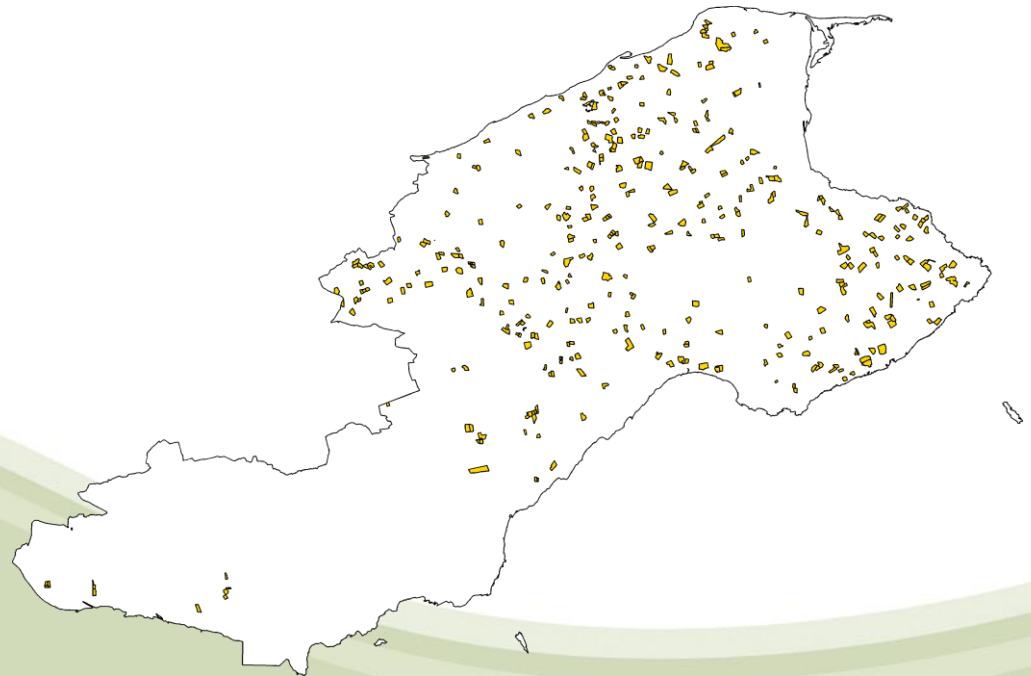
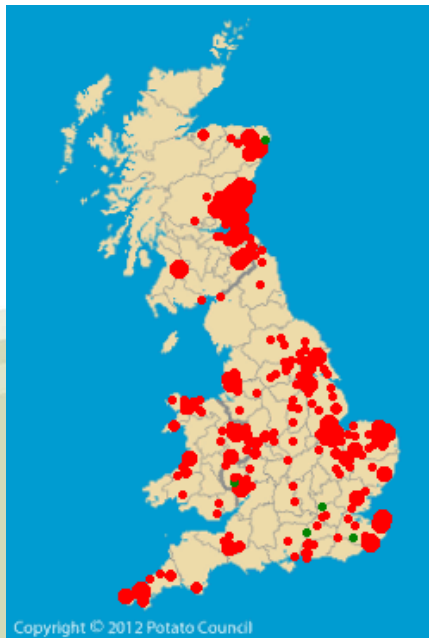


For the rest of my talk I'll use field locations in the Scottish region of Fife as an example.

Historical risk patterns:

- Last season's hot-spots for blight = next seasons hot-spots for primary inoculum (volunteers, oospores, dumps etc.).
- Use field locations and weather from last season, and do many model runs (different starting points for an epidemic).

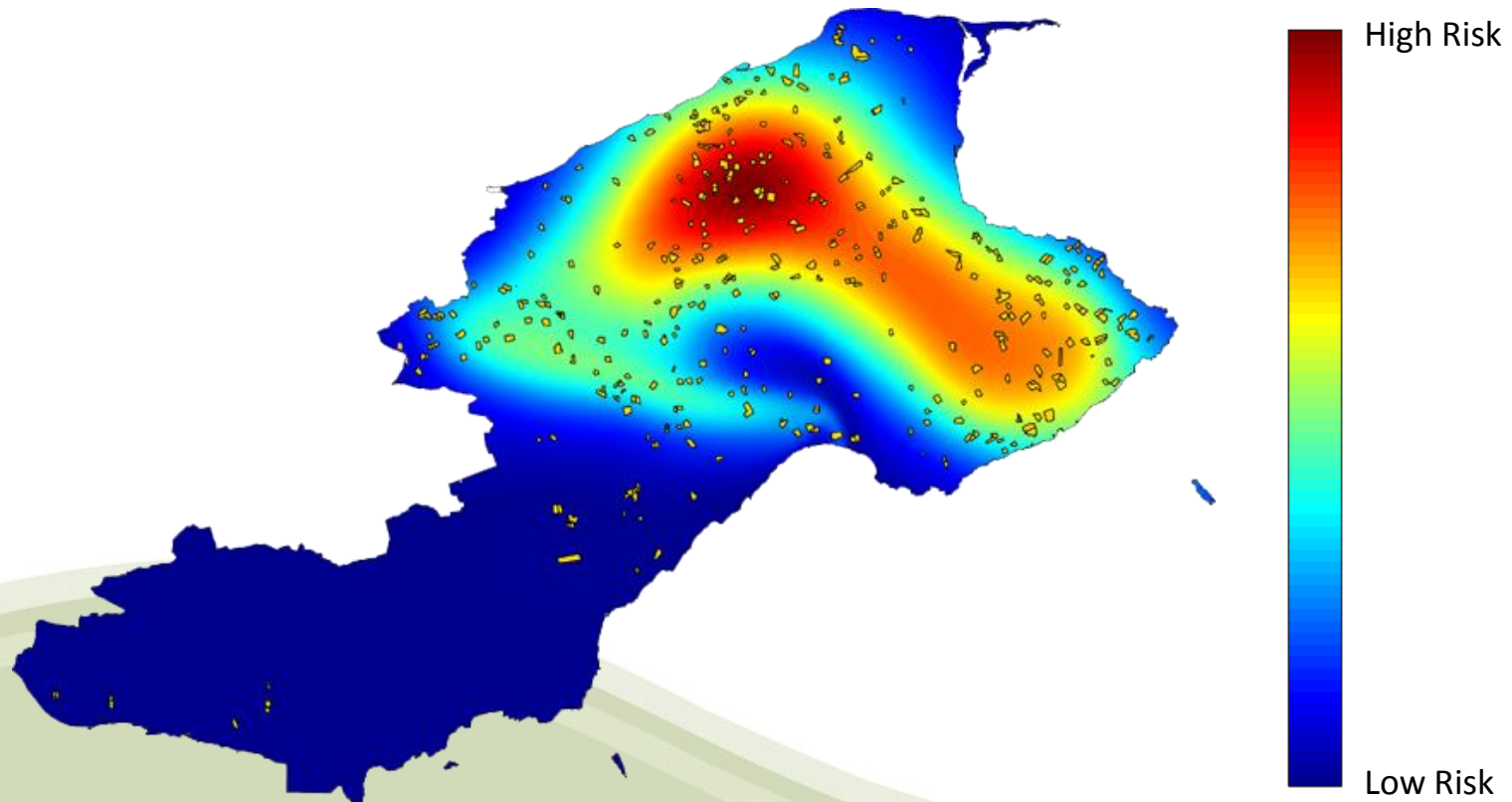
Outbreaks in 2012





Historical risk patterns:

- Map of expected blight activity last season = risk of primary inoculum next season.

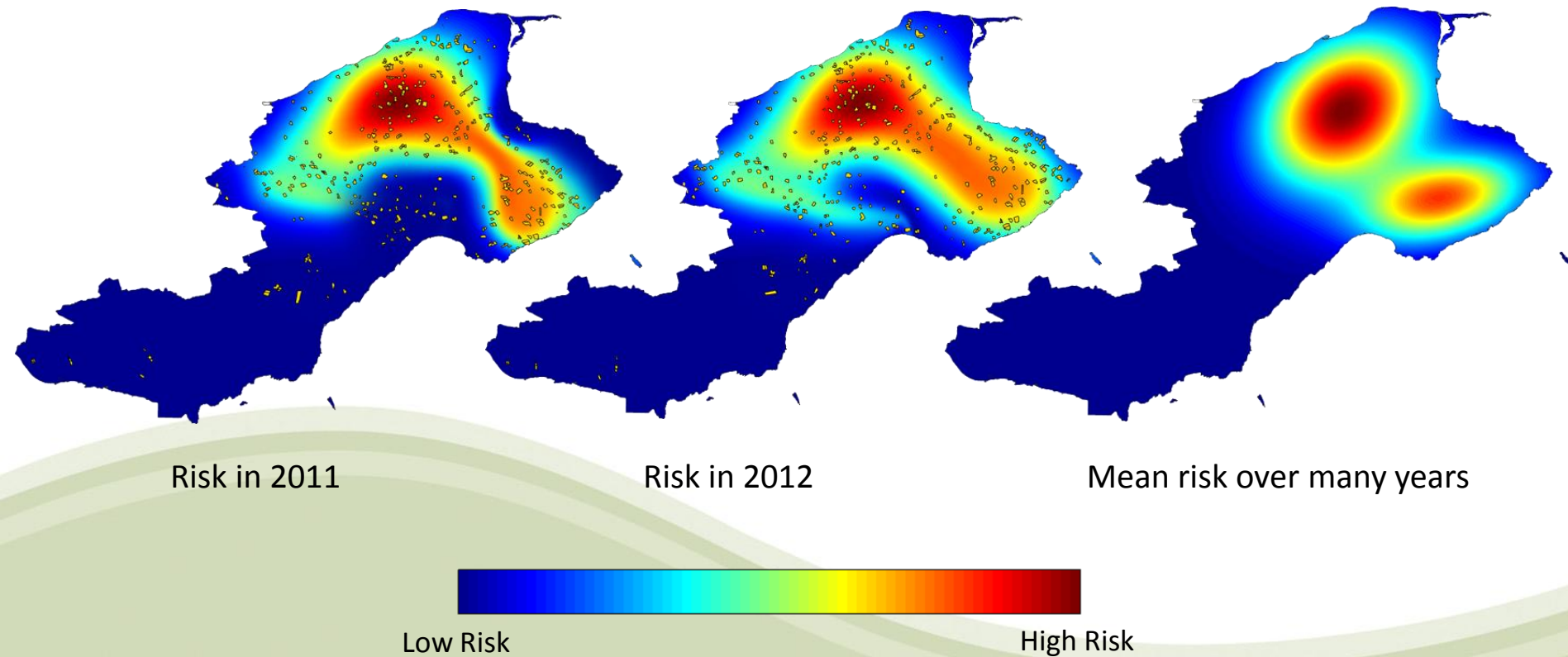




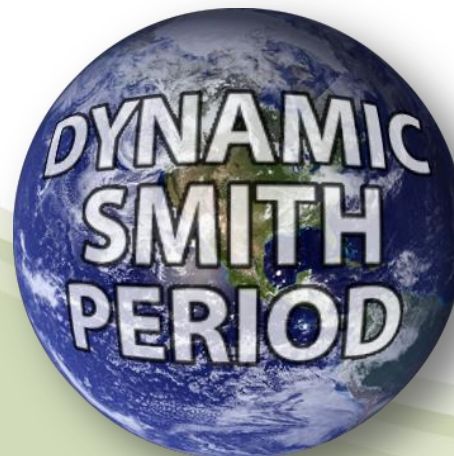
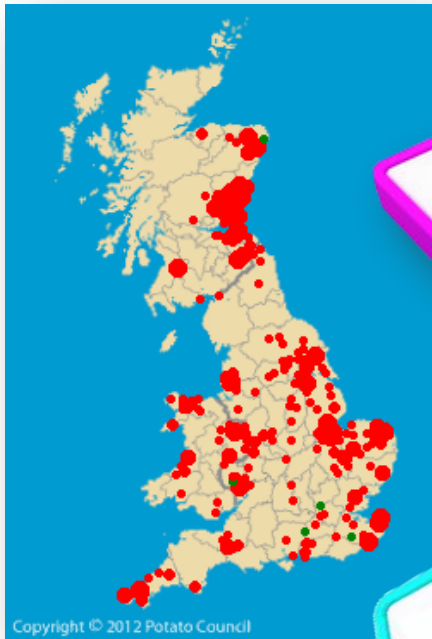
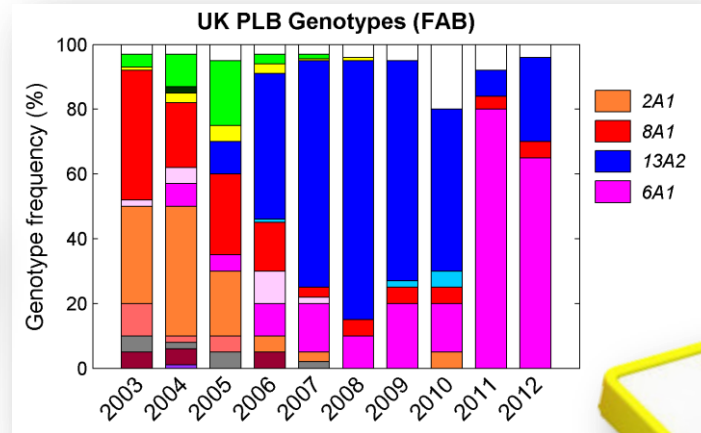
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Historical risk patterns:

- Consider many season's crop rotations and weather data
= long-term trend in expected blight occurrence.



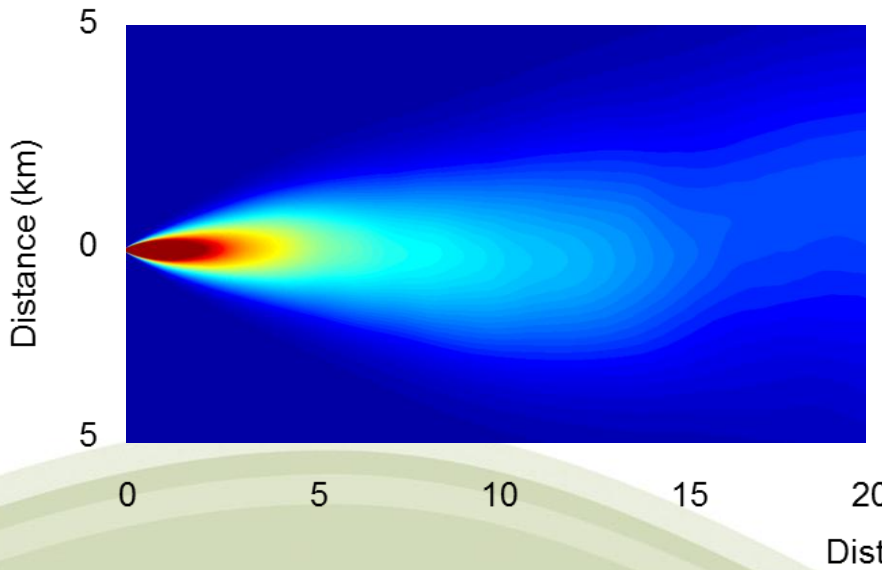
Current risk (of disease occurrence):



Future risk (of disease spread):

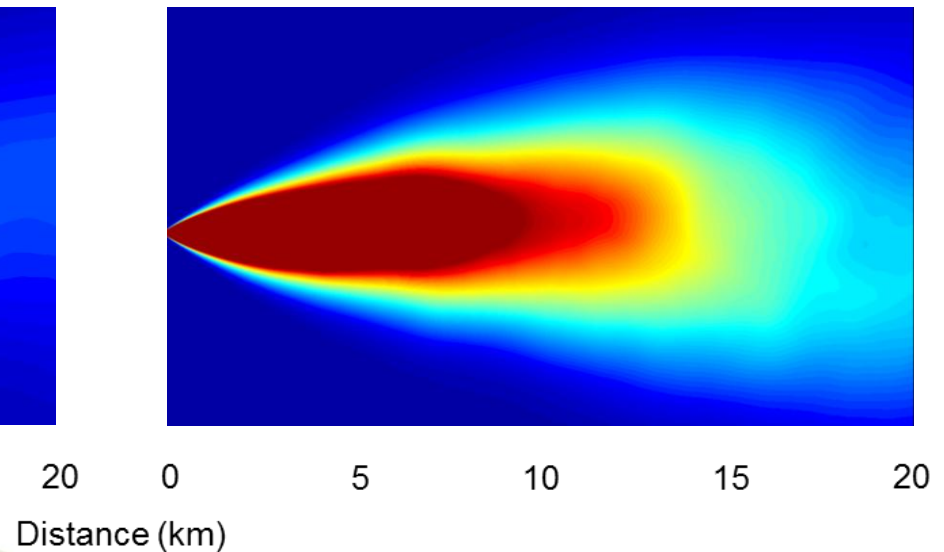
- Weather forecast → predicted spore pressure.
- *More time to act.....*

Forecast spore dispersal: calm, sunny day



Mean spore dispersal distance = 110 m

Forecast spore dispersal: windy, cloudy day



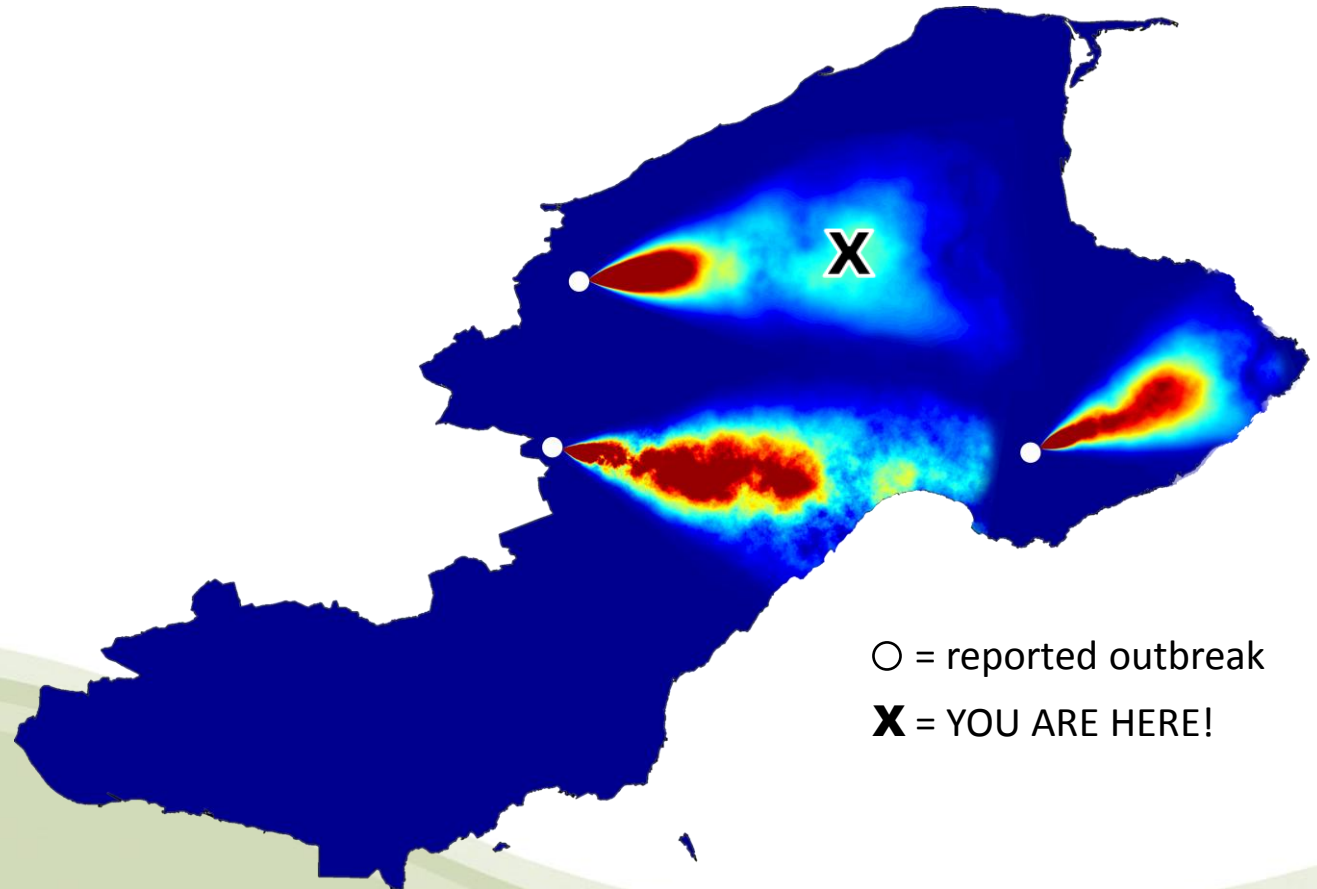
Mean spore dispersal distance = 1027 m



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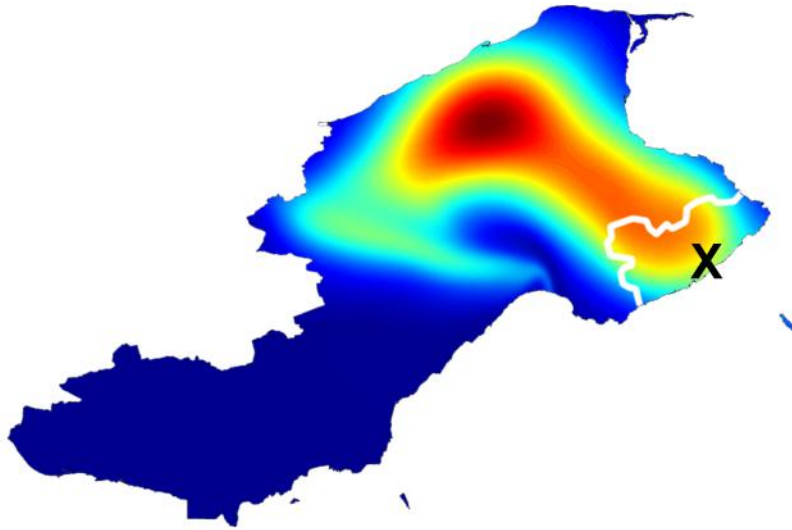
Future risk (of disease spread):

- Weather forecast → predict spore dispersal from reported sources of infection.



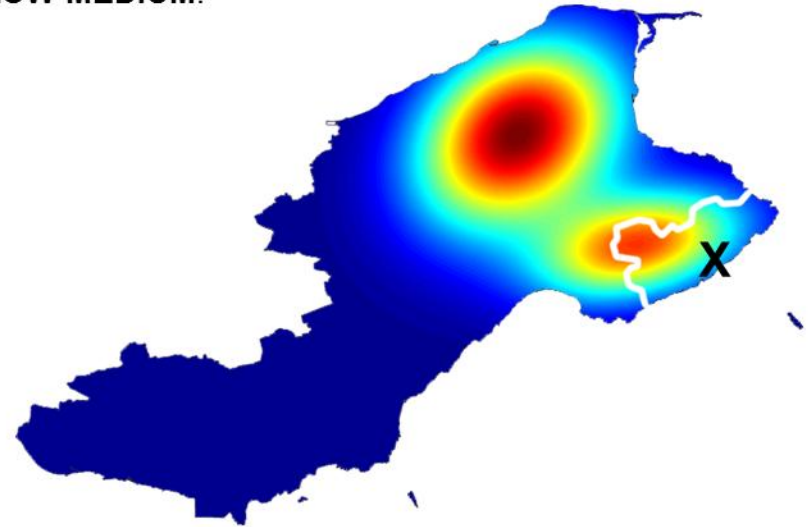
Primary inoculum risk

Primary inoculum risk at your coordinate is **MEDIUM**.



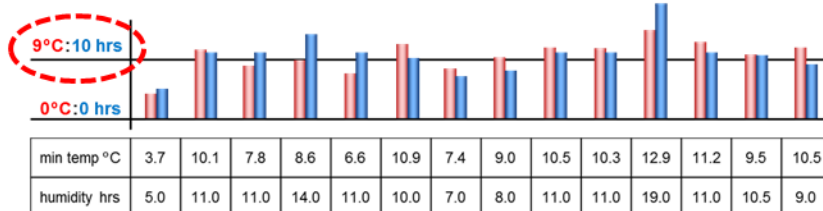
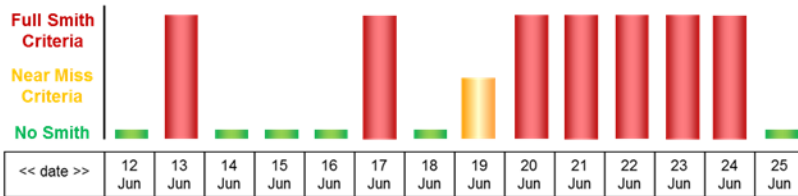
Historical risk

Historical risk of disease activity at your coordinate is **LOW-MEDIUM**.



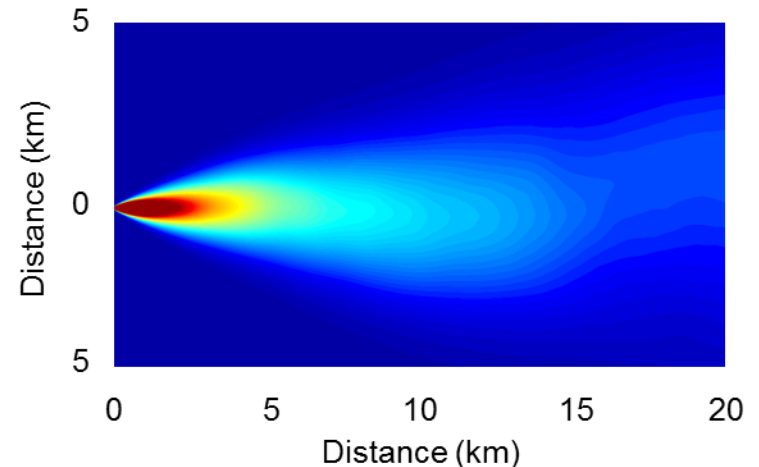
Current risk

There have been 7 days in your postcode where the **dynamic Smith Criteria** were met during the 14 days of data below. 4 full Smith Periods were recorded.



Future risk

Over the upcoming 48 hours, there will be a **FULL SMITH PERIOD** in your location. Mean spore dispersal distance will be 110 m = **LOW** risk of spread between fields.



.....thanks for listening.....



peter.skelsey@hutton.ac.uk