

Growing Risk? The Potential Impacts of Plant Disease on Land Use and the UK Rural Economy

UK crops and non-food plants are vulnerable to plant diseases that directly affect yields, disrupt food chains, disturb the natural environment and impact on land use and social infrastructure. This Rural Economy and Land Use (RELU) research project, funded by a range of UK Research Councils and Defra, brought together plant pathologists from the University of Warwick and Imperial College London, crop scientists and statistical modellers from the Food and Environment Research Agency (FERA) and social scientists from the Countryside and Community Research Institute (CCRI). The main objective was to develop an interdisciplinary and holistic appraisal of the potential impacts of plant diseases on land use and the UK rural economy. Some of the main findings from the project are summarised here.

The purpose of this major piece of research was to develop a critical and interdisciplinary analysis of the impacts of plant diseases (food and non-food) on land use and the UK rural economy. More specifically, the project attempted to:

- develop a conceptual framework for taking a holistic approach to risk analysis, regulation and governance in relation to catastrophic plant disease epidemics.
- examine the routes and network nodes of emerging or changing plant diseases through trade diffusion and natural transmission.
- analyse the environmental and socio-economic impacts of specific food and non-food plant diseases in selected areas of the UK.
- explore the implications of the research findings for the regulation and governance of plant disease epidemics in the UK.

Four specific case studies – potato blight, wheat leaf blotch (septoria), mushroom virus X and ramorum die-back (sudden oak death) – formed the focus of the research. Drawing on a wide range of concepts and methods, the CCRI contributed to all work packages but with a specific focus on conceptual development, stakeholder risk framing and an analysis of the socio-economic impacts of plant diseases in the UK wheat and potato sectors (disease spread by natural transmission). The latter two sectors have become increasingly concentrated in the core arable farming area of eastern England and affected by processes of vertical integration, with supermarkets the key supply chain ‘actor’ for potatoes and millers for wheat.

Focus groups, futures workshops and email questionnaires with up to 50 key stakeholders, together with in-depth interviews with 60 key supply chain ‘actors’ in the potato and wheat sectors (including 30 growers in two parts of England - Lincolnshire and Herefordshire) were the main social science research methods used by the CCRI.

The rest of this summary focuses on the main findings from the risk framing exercises with stakeholders and the in-depth interviews with key actors in the wheat and potato sectors.



Stakeholder analysis

Focus group findings informed the structure and content of an email questionnaire survey, which yielded 47 responses from key stakeholders. Among the many findings, the following were emphasised:

- Plant disease risk ranked as the fourth current most important (increasing to third in future assessments) out of 12 potential risks to supply chain management.
- Current disease management strategies, especially chemical control, were deemed as adequate in reducing the threat of plant disease. However, this could change with a) the implementation of a proposed new EU Directive on the use of active substances in disease control and b) the importation of 'exotic' pathogens.
- Primary producers would suffer the greatest financial losses in the event of a disease outbreak.
- The government should take a more prominent role in compensating growers of staple food products (eg wheat and potatoes) if yields are seriously affected.

Socio-economic impacts in the wheat and potato sectors

Results from the stakeholder analysis helped to inform the content of the interview schedule used for the in-depth interviews with key 'actors' in the UK wheat and potato sectors. The large number of findings included the following points:

- Recognising septoria and blight as the key disease risks, growers felt that plant disease is a controllable production risk. This encouraged them to grow high-yielding varieties demanded by millers and supermarkets, even if risk is increased.
- Disease management practices in wheat and potatoes are often based on joint decision making between growers and agronomists. This grower-agronomist relationship is based on trust and experience.

- Agronomists emphasised the importance of experiential knowledge, local conditions and a sense of feeling in their decision making. This often overrides the findings from scientific trials and recommended spray dosages using dose response curves.
- For 'downstream actors' in the wheat and potato supply chains, disease is not a major risk compared to those associated with volatile prices and supplies.
- While acting as a threat, plant disease can also present opportunities for technological developments in plant breeding and integrated farming practices.

Conclusion

The research highlighted the fact that technical assessments of disease risk may not provide an adequate guide to the strategies undertaken by growers and government to manage disease. One important output from the research was a proposed framework for greater integration of stakeholders in policy decisions. Further details on this can be found in:

Mills, P., Dehnen-Schmutz, K., Illbery, B., Jeger, M., Jones, G., Little, R., MacLeod, A., Parker, S., Pautasso, M., Pietravalle, S. and Maye, D. (2011). Integrating natural and social science perspectives on plant disease risk, management and policy formulation. *Philosophical Transactions of the Royal Society B*, 366, 2035-2044.

Further information on the importance of the grower-agronomist relationship can be found in:

Illbery, B., Maye, D. and Little, R. (2012) Plant disease risk and grower-agronomist perceptions and relationships: an analysis of the UK potato and wheat sectors. *Applied Geography*, 34, 306-315.

Details of the whole RELU programme can be found at www.relu.ac.uk

