



Risk perception, crop protection and plant disease in the UK wheat sector



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ABSTRACT

While plant diseases have been the subject of scientific research, little is known about the perceptions of key actors towards plant disease risk within specific food sectors. Drawing on concepts of risk and uncertainty, and using in-depth interviews, this paper examines the ways in which endemic plant disease risks in the UK wheat sector are perceived and managed by key 'upstream' and 'downstream' businesses, as well as by farmers and agronomists. A majority of interviewees feel that plant disease is a controllable risk and one that rests mainly at the point of production (i.e. with farmers) within the wheat sector. This assumed 'control' is based mainly around the availability of plant protection products (e.g. fungicides) which reduce the sense of risk attributable to outbreaks of plant disease. As a consequence, there can be a tendency to grow higher-yielding wheat varieties that are less disease-resistant. The potential banning of certain fungicides under EU legislation and climate change are perceived future threats that could increase uncertainty and change the balance between 'control' and 'resistance', the latter through the use of more disease-resistant wheat varieties. Further research is needed on the perceived impacts of plant diseases and on how different wheat sector actors will contribute to the future control of plant diseases and the development of more integrated systems of plant disease management.

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1. Plant disease risks

Plant and animal diseases represent a significant and growing threat to food supplies (Waage and Mumford, 2008; Lucas, 2010; Mills et al., 2011; Ilbery, 2012; Kirwan and Maye, 2013; Maye and Kirwan, 2013). While considerable scientific research has been conducted on the potential threat of plant diseases to food production (e.g. Strange and Scott, 2005; Gregory et al., 2009; Strange and Gullino, 2010; Chakraborty and Newton, 2011), very little is known about the perceptions of key decision makers in different agricultural sectors towards the potential impacts of plant diseases. Existing research tends to focus on the perceptions of farmers and growers, but it is also important to examine other key sector actors' views and priorities (Drew et al., 2010). This is because of their potential role in disease transmission and the significant, but usually hidden, perspectives they might hold on the management and impacts of plant diseases on food supplies.

Pest outbreaks have been known to cause up to 15% losses in global crop production (Strange and Scott, 2005) and to decimate non-food crops (Potter et al., 2011). According to Waage and Mumford (2008: 865), biosecurity problems are getting worse ow-

ing to globalisation and, more specifically, to 'growing trade, travel, transportation and tourism'. Attempts to manage the possible risks from plant diseases have focused on preventing and controlling invasive and 'exotic' rather than indigenous and 'endemic' pathogens (MacLeod et al., 2010), despite the fact that the latter can decimate large areas of agricultural production (Mills et al., 2011). The management of, and protection against, endemic diseases has, like food supply governance more generally, effectively been privately regulated and the prevailing socio-technical regime for commercial crops is essentially market-based. There is, for instance, minimal government surveillance of unregulated endemic plant pests and pathogens. It is mostly an industry matter and self regulated, with industry-led trade agreements and market structures in place to try and discourage bad practice among producers that might create 'plant health risks' (Wilkinson et al., 2011: 1936).

The focus of this paper is very much on endemic diseases as it attempts to examine the ways in which plant disease risks in the UK wheat sector are perceived and managed by key sector 'actors'. This is necessary because the wheat sector operates within an environment of risk and uncertainty, and global wheat prices entered a period of unprecedented volatility between 2007 and 2011 (Ghosh, 2010: 76; Wamae et al., 2011); this volatility has continued ever since. Indeed, the wheat sector functions within a rather fragile context of managed risk, where the threat of disease is ever present but chemically controlled. More specifically, the

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paper aims to understand the perceptions of growers and agronomists, as well as those of particular 'upstream' and 'downstream' actors, in relation to the main types of disease affecting wheat and how these might impact on specific parts of their business. By obtaining a more holistic, industry-wide view of connections and risks within the wheat sector, it is possible to develop improved and more integrated plant disease management strategies and policies. It will also help to incorporate local knowledge, experiences and socio-cultural factors into more technical assessments of risk, thereby providing a better understanding of risk behaviour in the UK wheat sector.

This is a relatively rare piece of social science research on the risks and impacts of plant diseases in the UK arable sector¹; it complements other papers on the importance of the grower–agronomist relationship and the management of plant disease risks in the UK wheat and potato sectors (Ilbery et al., 2012; Maye et al., 2012). The next section provides a contextual setting in relation to crop protection and the UK wheat sector. This is followed by some conceptual insights into risk and uncertainty to help frame the empirical analysis. An outline of the methodology used to examine wheat diseases in two regions of England is then provided. The results focus firstly, on the risk perceptions and impacts of diseases on individual groups of businesses in the wheat sector; and secondly, on the changing balance between control and resistance within the wider wheat sector given potential future threats in terms of changing EU regulation and climate change. A brief conclusion relates the findings to key conceptual debates around crop protection and risk perception.

2. Crop protection and the UK wheat sector

It is in the best interests of wheat sector actors to ensure that the wheat crop is protected from potentially damaging plant diseases. Crop protection is defined by Stack et al. (2010: 115) as 'the protection of natural and managed plant systems from the introduction of exotic organisms or from the emergence of indigenous organisms'. This definition highlights the distinction drawn in the introduction of this paper between exotic and endemic plant diseases. In addition, MacLeod et al. (2010) distinguishes between plant health, which deals with 'invasives', and crop protection, which is the farm-level management of indigenous pests and pathogens. This distinction is instructive because, while the State is essentially responsible for preventing the entry of exotic diseases into a country, it is farmers and other wheat sector actors (such as plant breeders, agri-chemical companies, and agronomists) who have primary responsibility for controlling endemic wheat diseases. Hence an understanding of their perceptions and priorities is vital.

Crop protection is a branch of agriculture concerned with protecting crops from pests, weeds, disease and theft; it includes chemical, biological and cultural controls. The idea of 'control', exerted through the use of agri-chemicals such as herbicides, insecticides and fungicides, is a key element of crop protection and disease mitigation; without it, disease could cause up to 17% losses in the global wheat crop (MacLeod et al., 2010). However, pathogens can respond to agri-chemicals by evolving resistance through mutation. As well as chemical control, therefore, the development and use of disease-resistant wheat varieties, quality seed, crop rotations and biological control are other forms of crop protection. Nevertheless, chemical control dominates forms of crop protection; it is embedded within the wheat sector and reflects the dom-

inance of powerful agri-industrial actors (Morgan et al., 2006; Clapp, 2012: 98–99). Thus any changes to legislation that reduce the availability of chemical controls and thus offer potentially significant environmental benefits, as is proposed in the European Union (EU) under its June 2011 Regulation (EC) 1107/2009 (formerly 91/414/EEC), could increase uncertainty in terms of perceptions of disease risk along the food chain and may translate into difficult decisions in the future for wheat sector actors² (Beddington, 2010; Jaggard et al., 2010).

While crop protection is enacted at the production end of the wheat sector, plant diseases can impact on other key actors and businesses; however, these wider industry perceptions of risks associated with endemic diseases are not well understood. By examining their views, one is able to complement important scientific risk assessments with more intuitive aspects of risk in relation to wheat diseases and crop management practices. Drew et al.'s (2010) analysis of invasive species control of horticultural trade in the USA shows the value of developing industry-level perspectives. Their study demonstrates how approaches to invasive horticulture crop control that target players in the distribution channel have limited impact and buy-in because they do not address the sector's complexities and economic incentives. Developing a range of industry-level perspectives for wheat is equally valid, but is not an easy task because the UK and European wheat sector is highly diverse, complicated and fragmented (Wamae et al., 2011). For example, there are sub-sectors for human consumption (where quality is the key driver), animal feed (where yield is the main factor) and biofuels.

Some research has been conducted on attitudes towards plant disease risk management in the UK wheat and potato sectors. Thus Maye et al. (2012) demonstrated that, while wheat and potato growers' strategies for plant disease risk are highly rational, this rationality is 'bounded by practical concerns and conditions, with technical framings modified by local conditions, grower knowledge, past experiences, professional advisory relations and other farm business risks' (Maye et al., 2012: 345). In a parallel paper, Ilbery et al. (2012) found that neither growers nor agronomists rely solely on scientific knowledge in their decision making and that intuitive responses play an important role in relation to plant disease risks. They emphasised the importance of the grower–agronomist relationship in plant disease management strategies. However, neither paper adopted a more holistic and industry-wide perspective by incorporating the views and influences of other key actors both 'upstream' and 'downstream' of growers and agronomists. Such an approach is vital because their attitudes towards risk and uncertainty could have an important bearing on risk behaviour in the UK wheat sector. This paper adopts such an industry-wide perspective by incorporating the views of a range of upstream and downstream actors.

The UK wheat sector comprises important 'upstream' providers of inputs such as seed, fertilisers and chemicals; farmers and agronomists; key intermediaries such as grain merchants; and important 'downstream' players such as flour and feed mills, retailers and consumers. Indeed, it is actors up to and including the flour/feed mills that are potentially the most directly affected by plant disease risks and these form the focus of this study. Separate studies are needed to examine consumer perceptions of plant disease risk and how they might impact on the supply of products made from wheat and flour. Within this view of the wheat sector (from input suppliers and plant breeders to farmers, agronomists, merchants and flour/feed mills), there is a relatively high level of vertical integration, often with key inputs like seed being provided

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² This has been demonstrated to some extent in the recent (2013) EU ban on neonicotinoids.

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