Effective control of oilseed rape diseases in the UK – challenges and threats

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ABSTRACT

Annual surveys of disease incidence and severity have been carried out in England and Wales since 1986. Disease assessments were carried out at mid-leaf production (autumn), stem extension (spring) and pod ripening (summer). Agronomic information, including sowing date, previous cropping, cultivar and fungicide use, was collected using a questionnaire. Disease incidence continues to fluctuate but the most important have consistently been phoma canker and light leaf spot. Sclerotinia stem rot and dark pod spot remain common but caused little loss of yield. Fungicides are widely used but their effectiveness could be improved with advice on disease risk, active ingredient choice, dose and timing. Trends in agronomic practice, such as a reduction in the average level of disease resistance in cultivars grown, and the continuing occurrence of weather conditions favourable for disease development, are indications of major risks for the future, particularly from phoma.

Key words: Oilseed rape, Diseases, Control

INTRODUCTION

Data from the Winter Oilseed Rape Disease and Pest Survey have been used to quantify changes in pests and diseases and the impacts of crop protection treatments and agronomic practices on their control (Turner *et al*., 2000, 2002). The long-term national survey of winter oilseed rape diseases has highlighted major changes in fungicide control practices as a result of fluctuating disease risk, improved fungicide chemistry, economic pressures and advances in the understanding of disease epidemiology and control (Turner *et al*., 2001). This paper reviews changes in status of the key pests and diseases affecting winter oilseed rape during 2002 in relation to variations seen since the survey began.

MATERIALS AND METHODS

In each year from 1998 to 2002, approximately ninety-five crops were selected for disease assessment from farms throughout England & Wales. The crops were sampled and assessed for disease on three occasions: in the autumn at mid-leaf production (early December), in the following spring at early stem extension (March) and again in the summer at pod ripening (July). Agronomic details and pesticide use were also recorded for each crop surveyed. Summary information from the project can be accessed via the web at: www.crop-disease-surveys.com.

RESULTS

Downy mildew (*Peronospora parasitica*) and phoma leaf spot (*Leptosphaeria maculans*) have consistently been the most prevalent diseases in the autumn, with phoma becoming predominant from 1999/2000 onwards (Table 1). The incidence of phoma in 2002 was high, being the third highest year on record. Incidence of dark leaf spot (*Alternaria brassicae*, *A. brassicicola*) exceeded the ten-year mean for autumn disease levels. In contrast, levels of downy mildew were unusually low.

Table 1. Incidence of diseases in autumn (% plants affected)

	97/98	98/99	99/00	00/01	01/02	Peak (year) (1992 onwards)	Mean (1992-2001)
Phoma leaf spot	29.2	26.8	30.8	51.4	41.3	60.1 (94/95)	30.4
Light leaf spot	0	0.3	0.4	0.6	0.2	1.7 (94/95)	0.5
Dark leaf spot	2.9	2.9	1.0	2.7	5.4	6.6 (93/94)	3.4
Downy mildew	44.8	39.4	20.1	24.9	15.7	51.9 (96/97)	31.6

Incidences of light leaf spot (*Pyrenopeziza brassicae*) and dark leaf spot in spring 2002 surpassed the ten-year mean (Table 2). Incidence of phoma was high, but lower than in 2001 when levels reached the highest ever recorded. Light leaf spot levels have been increasing over the last four years but were well below the peak in 1995 of almost 50% plants affected.

Table 2. Incidence of diseases in spring (% plants affected)

	1998	1999	2000	2001	2002	Peak (year) (1992 onwards)	Mean (1992-01)
Phoma leaf spot	34.3	37.5	31.7	51.7	32.9	51.7 (2001)	36.1
Light leaf spot	3.5	7.8	11.9	18.0	18.1	48.8 (1995)	16.5
Dark leaf spot	4.7	0.2	0.8	1.8	3.7	5.6 (1994)	2.1
Downy mildew	32.5	40.7	31.1	33.6	28.5	40.7 (1999)	29.2

Levels of pod disease in 2002 caused by light leaf spot and dark pod spot were above the ten-year mean (Table 3). Levels of dark pod spot were similar to the very high levels recorded in 1998-2000. The most common stem diseases were phoma canker followed by light leaf spot, which in 2002 occurred at the highest incidence since the epidemic of 1994. Incidence of sclerotinia stem rot (*Sclerotinia sclerotiorum*) was higher in 2002 than in 2001 while incidence of powdery mildew (*Erysiphe cruciferarum*) was exceptionally high compared to all other years except 1997.

Table 3. Incidence of diseases at pod ripening (% plants/stems affected)

	1998	1999	2000	2001	2002	Peak (year) (1992 onwards)	Mean (1992-01)
% plants							
Phoma pod spot	0.6	0.2	2.0	0.1	0.5	3.6 (1997)	0.8
Light leaf spot	7.8	7.5	12.3	8.0	16.7	38.7 (1994)	13.2
Dark pod spot	62.6	48.5	31.5	6.1	40.5	62.6 (1998)	24.0
Downy mildew	11.9	5.9	16.4	3.4	2.8	16.4 (2000)	5.9
% stems							
Light leaf spot	8.8	20.2	21.8	27.1	30.2	57.1 (1994)	26.5
Phoma canker	27.7	40.7	56.8	54.1	52.9	58.4 (1993)	40.1
Powdery mildew	1.2	1.5	1.4	2.1	14.4	19.2 (1997)	3.6
Sclerotinia	1.7	1.7	4.1	1.1	2.3	5.4 (2000)	1.8

During the last five years there has been a decreasing trend in the use of cultivars with high levels of resistance to phoma and a major switch to cultivars considered susceptible to light leaf spot (Figure 1). In 2002, 17% of cultivars grown had a disease resistance rating of 5 or less (indicating susceptibility) for light leaf spot and 53% of cultivars were considered susceptible to stem canker. Ninety-five percent of crops monitored in 2002 received at least one fungicide spray, the highest levels of fungicide use recorded since the survey began. The majority of the increase was due to increases in use of sprays in the autumn and spring, although this was slightly offset by a decrease in use of sprays at flowering (Figure 1).

DISCUSSION

Disease levels have fluctuated considerably during the years 1998 to 2002, with incidence of some diseases reaching unprecedented levels during this period. Levels of all major stem diseases in 2002 were above the ten-year means, as were levels of light leaf spot and dark pod spot on the pods. High levels of phoma canker and light leaf spot continue the increasing trend in incidence of these diseases over the last four or five years. It is clear from analyses of seasonal and regional fluctuation in disease levels over time that the weather is a key driver in these disease epidemics. Data from the UK meteorological office show that the average rainfall in 1997 was equal to the 30-year mean, and that rainfall levels in every year since have greatly exceeded this figure. Similarly, average temperatures for central England have exceeded the 30-year mean in nine out of the last ten years. Whilst these weather conditions may be a

transient feature, the possibility of climate change must be considered. Data show that if these conditions persist there will be a considerable impact on disease activity on an annual basis.

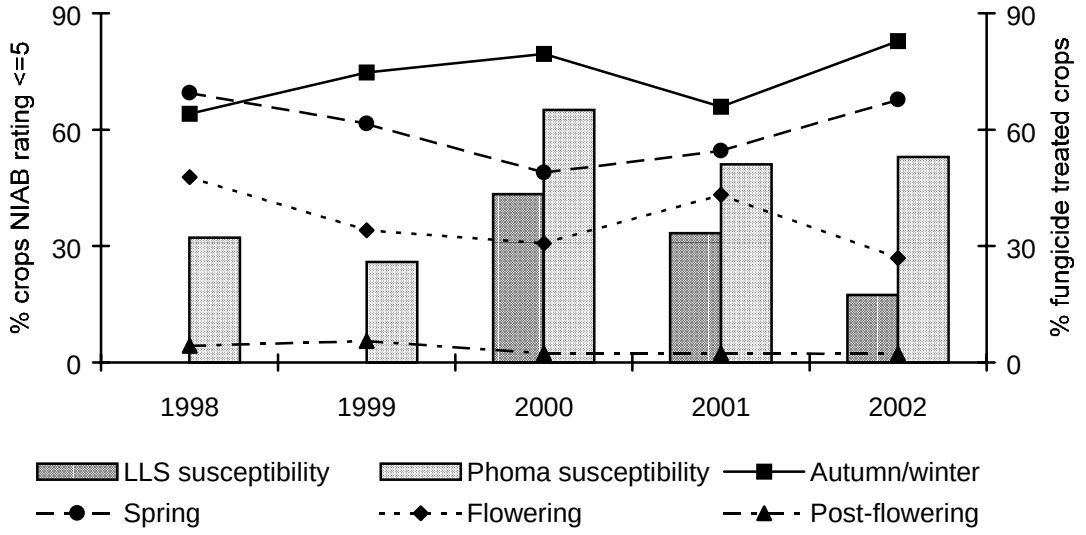

Figure 1. Use of resistant cultivars and fungicide sprays

These levels of disease activity indicate that the potential to control these diseases using chemical methods is still not being fully exploited. This is despite a record level of fungicide applications in 2002. Data show that growers are responding to disease pressure, e.g. increases in use of fungicides in autumn (Turner *et al*. 2000), but that timing and dose are not always optimal. Phoma canker is now the major threat to the industry and losses in 2001 were estimated at £36 million (Turner *et al.,* 2001). Losses for light leaf spot were £18M whilst dark pod spot and sclerotinia each cost less than £1M in lost yield. The need for more reliable forecasts to aid the targeting of sprays for both pests and diseases is clearly highlighted; a requirement which is currently being addressed in the PASSWORD project in the UK which aims to develop a decision support system for pests and diseases of oilseed rape. The benefits of cultivar resistance for disease control are also not being exploited to the full. The most severe and widespread attacks of light leaf spot occurred in 1994 and 1995, and during this epidemic 56% of cultivars grown had a NIAB resistance rating <=5 for light leaf spot indicating that they were susceptible cultivars. Given the current threat from diseases and the need to minimise inputs, growers need to limit potential disease problems by utilising cultivars that have a higher resistance rating to stem canker and light leaf spot. However, despite this, data from 2002 show continued use of susceptible cultivars. Control strategies need to be reassessed to encompass a more targeted and integrated approach using cultural practice and forecasting alongside chemical control. This would result in additional economic and environmental benefits and aid the move towards sustainable crop production.

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