Fungicides for phoma control in winter oilseed rape

Summary of AHDB Cereals & Oilseeds fungicide project
2010-2014 (RD-2007-3457) and 2015-2016 (214-0006)
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1. **Background**

Fungicides for control of phoma leaf spot and stem canker have been evaluated over the last seven years at ADAS Boxworth, Cambridgeshire and ADAS Terrington, Norfolk on the susceptible variety Catana. Products were tested until 2014 at full and half label rate but are now being tested at four doses (¼, ½, ¾ and full label rate) as two spray programmes, plus a completely untreated control. The first fungicide application is in the autumn (ideally 20-40% plants affected) with a second application 4 to 10 weeks later when re-infection at a similar threshold is apparent. Leaf disease assessments are done after each application and stem canker assessed in late June (presented as a canker index 0-100). Combine harvested yield data are adjusted to 91% dry matter. Priority for inclusion for testing in this project is given to products not currently approved to allow independent data to be available when they come to market. Existing data from the previous project (harvest years 2010 to 2014) will continue to be included in these updates to allow information to remain available for existing products where sufficient data were gathered previously.

2. **Results**

2.1. **Mean data for harvest years 2010–2014**

Good control of phoma leaf spot and stem canker was obtained with well-timed two-spray programmes in harvest years 2011 to 2014 at all 8 sites (Figure 1). Yield responses have averaged about 0.3 t/ha from two sprays at half dose relative to the untreated control and were larger in years with moderate or severe stem canker epidemics. Metconazole and tebuconazole gave smaller responses than other products and are known from previous experiments to be less effective when used in an eradicant compared to protectant situations. Experiments have been conducted on crops with various plant sizes and negative yield effects were seen when products with growth regulatory activity were used on small plants in the autumn, particularly when applied at greater than half dose.
2.2. Harvest year 2014

In 2014, phoma stem canker severity was moderate (index 42) at Boxworth, Cambridgeshire. Products were applied in a more eradicant situation with phoma leaf spot incidence high when first sprays were applied at the 11-leaf stage on 7 November (68% plants affected). Re-infection was rapid, with second sprays applied on 26 November (100% incidence; 2.0% leaf area affected). Plants were larger than average but there was a significant decrease in stem canker and a significant yield response to fungicides of up to 0.81 t/ha (untreated 3.37 t/ha) (Figure 2). Some products gave higher yields than might have been expected from the level of canker control achieved. The growth regulatory properties of these products may have contributed to this yield benefit and this effect has been observed in previous oilseed rape fungicide performance trials.

Figure 2. Phoma canker control (bars) and yield (points) at Boxworth with moderate canker severity in 2014. Pale bars and points indicate no statistically significant response to treatment. Note Refinzar was tested as a two spray programme but is restricted to one application per season with a latest application timing of GS30 (stem extension).

2.3. Harvest year 2015

Stem canker severity was moderate at Terrington (index 55) and low at Boxworth (index 27) prior to harvest in 2015. At Terrington, 50% of plants had phoma leaf spot in the untreated control at the 8-leaf stage on 31 October indicating a more eradicant situation. Second sprays were applied on 9 December (48% incidence; 0.1% leaf area affected) and there was a significant effect of treatment on stem canker severity and yield (Figure 2). Decreasing stem canker index to less than 45 gave a
significant increase in yield for all products relative to the untreated control at this high yielding site (untreated yield = 4.55 t/ha) and yield responses ranged from 0.21 to 0.54 t/ha.

Figure 5. Phoma stem canker control (a.) and yield (b.) response in relation to fungicide dose at Terrington, Norfolk in 2015. Note Refinzar was tested as a two spray programme but is restricted to one application per season with a latest application timing of GS30 (stem extension). Pictor cannot be applied prior to 1st February or GS20 in year of harvest.
2.4. Harvest year 2016

Filan was included for the first time in the 2015/2016 season. Overall, stem canker severity was low at Terrington (index 24) and high at Boxworth (index 71) prior to harvest in 2016. Only low levels of phoma leaf spot were observed at both sites until mid-October. At Terrington, first sprays were applied on 26 October 2015, with 32% of plants with phoma leaf spot symptoms in the untreated control at the 5-leaf stage. At Boxworth, 28% of plants had phoma leaf spot at the 6-leaf stage on 23 October 2015. Poor weather meant second sprays were delayed at both sites. The second spray at Boxworth was applied on 15 December 2015 at the 10-leaf stage (87% incidence; 1.4% leaf area affected) and at Terrington on 7 December 2015 at the 9-leaf stage (55% incidence; 0.14% leaf area affected).

At Terrington, stem canker levels were low (index 24 in the untreated control) and no yield differences were observed, however, there were differences in the effectiveness of the individual products on stem canker (Figure 6). A similar pattern was observed at Boxworth, where disease pressure was higher. Stem canker index was decreased from 71 to less than 40 by most treatments. There were statistically significant improvements in yield with fungicide applications at ½ dose for all products compared to the untreated control (Figure 7) but increasing the dose above half of the recommended label rate did not generally improve yields further (untreated yield = 2.52 t/ha). Yield responses ranged from 0.28 to 0.62 t/ha.

![Figure 6. Phoma stem canker control in relation to fungicide dose at Terrington, Norfolk in 2016. Note Refinzar was tested as a two spray programme but is restricted to one application per season with a](image-url)
latest application timing of GS30 (stem extension). Pictor cannot be applied prior to 1st February or GS20 in year of harvest.

Figure 7. Phoma stem canker control (a.) and yield (b.) response in relation to fungicide dose at Boxworth, Cambridgeshire in 2016. Note Refinzar was tested as a two spray programme but is restricted to one application per season with a latest application timing of GS30 (stem extension). Pictor cannot be applied prior to 1st February or GS20 in year of harvest.
2.5. Cross site analysis

Data derived from 3 experiments conducted in years where the canker index was moderate to severe (index 43 to 71: Boxworth 2014, Terrington 2015 and Boxworth 2016) were subjected to a cross site analysis to determine average effects on disease and yield across years (Figure 8). Across the 3 years, average yield response to fungicides was 0.42 t/ha at half recommended label rate and 0.39 t/ha at full recommended label rate. Orius 20EW and Cirkon were weaker overall than other products against phoma stem canker, with no statistically significant effect on canker index compared to the untreated control, even at full rate, however, there were still yield improvements for both products. It is clear that disease risk and crop size are important when deciding on the appropriate product for phoma control and this is demonstrated by data from individual sites in 2015 and 2016.

3. Key points for assessing and managing phoma leaf spot/stem canker risk in harvest year 2017

Use the phoma forecast on the Rothamsted Research website (also linked from the AHDB Cereals & Oilseeds website) to guide crop monitoring and for planning fungicide applications. [http://www.rothamsted.ac.uk/phoma-leaf-spot-forecast](http://www.rothamsted.ac.uk/phoma-leaf-spot-forecast)

Fungicide application timing is important and the first application should be made on crops (RL rating 7 and below) when 10-20% of plants have phoma leaf spot and the second application when re-infection is evident (4 to 10 weeks later). Note some varieties with high resistance ratings for stem canker (RL rating 8 and above) also have good resistance to phoma leaf spot and may not require a phoma fungicide unless the 20% threshold is exceeded. Some varieties are likely to require an autumn fungicide (November) for light leaf spot control if there is a risk and should be considered when planning autumn programmes.

Good control of phoma leaf spot and stem canker can be achieved with two sprays at half the recommended label rate.

Early phoma epidemics are the most damaging to yield and typically put 0.5 t/ha of yield at risk, although rapid re-infection in the autumn can also reduce yields. Late epidemics occurring in February/March can be very damaging if plants are small in late autumn or winter. It should be noted that all azoles offer protection when applied prior to infection, though product choice will also be influenced by requirements for curative activity when small plants are infected.
3.1. New information on fungicide efficacy – Filan

Filan is now available as a non-azole option for autumn phoma leaf spot control. It is an SDHI fungicide (50% w/w boscalid: BASF) and can provide a reduction in phoma leaf spot and stem canker. The maximum label rate for Filan is 0.5 kg/ha and it can be applied twice during the season, from the four leaf stage in the autumn until 50% pods reached final size (GS75). Filan should be applied in mixture with a non-cross resistant fungicide with activity sufficient to provide robust disease control.

Note: label recommendations can change – consult latest version before use.

a.

b.
Figure 8. Phoma stem canker control (a.) and yield (b.) response in relation to fungicide dose across three experiments (Boxworth 2014, Terrington 2015 and Boxworth 2016). Three years data for Proline, Orius 20EW and Refinzar and 2 years data for Pictor and Cirkon. Note Refinzar was tested as a two spray programme but is restricted to one application per season with a latest application timing of GS30 (stem extension). Pictor cannot be applied prior to 1st February or GS20 in year of harvest.