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Fungicides for sclerotinia stem rot control in winter oilseed rape

Paul Gosling (AHDB), Faye Ritchie (ADAS)

Summary of AHDB Cereals & Oilseeds fungicide project 2010–2014 (RD-2007-3457) and (214-0006)

Background

Fungicides for control of sclerotinia stem rot have been evaluated over the last seventeen years in commercial crops at sites with a history of sclerotinia, most recently in the West Midlands near ADAS Rosemaund, Herefordshire and Ceredigion in Wales by ADAS. Fungicides were tested at half and full label dose applied as a single spray at early to mid-flowering in years 2010 to 2014. From 2015, all products have been tested at four doses (¼, ½, ¾ and the full recommended label dose) plus a completely untreated control. Disease assessments were done at the end of flowering and pre-harvest, with combine harvested yield data adjusted to 91% dry matter.

Potential new fungicides are tested under AHDB code within the project and data are made available after product registration and launch in the UK.

Results

In 2010, fungicides were applied at mid-flowering on 13 May to an experiment in Herefordshire (cv. DK Cabernet). The main sclerotinia epidemic was late and occurred in late May and early June with moderate disease levels recorded in the untreated control (43% stems affected). All fungicide treatments significantly improved yield relative to the untreated control, with responses to fungicides in excess of 1 t/ha. An average of 5.30 t/ha was achieved where half dose fungicides were applied and 5.45 t/ha when full dose fungicides were applied, although the actual response varied depending on the product applied.

There was no disease recorded in the trials in 2011.

In 2012, fungicides were applied on the 12 May at the site in Herefordshire (cv. DK Sequoia). There were several infection events during flowering, with about 20% of plants infected in early May prior to fungicide application. Fungicide performance therefore relates to control of further infection (approximately 40%) that occurred in late May/early June. Sclerotinia stem rot incidence was high (62%) when assessed on 10 July. All fungicide treatments significantly decreased sclerotinia stem rot relative to the untreated control, however, there were no statistically significant differences between products and all treatments gave significant yield increases. An average yield of 3.55 t/ha was achieved where half dose fungicides were applied and 3.73 t/ha when full dose fungicides were applied although the actual response varied depending on the product applied.

Combined 2010 and 2012 data from these two moderate epidemics is shown in Figure 1. There was a significant reduction in disease for all treatments compared to the untreated control, but marginal differences between products and rates. Similarly, there was a significant yield response to treatment compared to the untreated control, but no difference between products and marginal differences between rates. The marginal impact of dose can be seen more clearly in Figure 2, which shows full dose response for products included at all four dose rates in 2012.

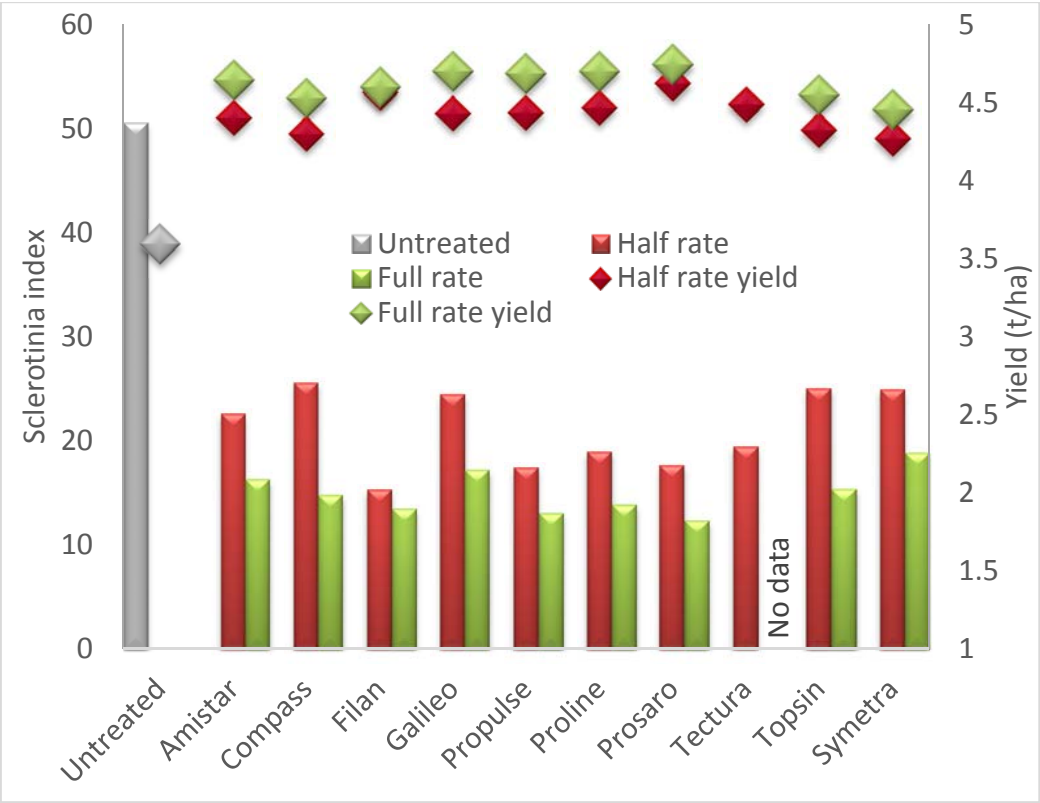


Figure 1. Sclerotinia stem rot index (bars - as severity on main stems) and yield (points - adjusted to 91% dry matter) mean of Herefordshire sites in 2010 and 2012. LSD for disease = 8.06, LSD for yield = 0.23. *Galileo no longer available after 30 November 2018.

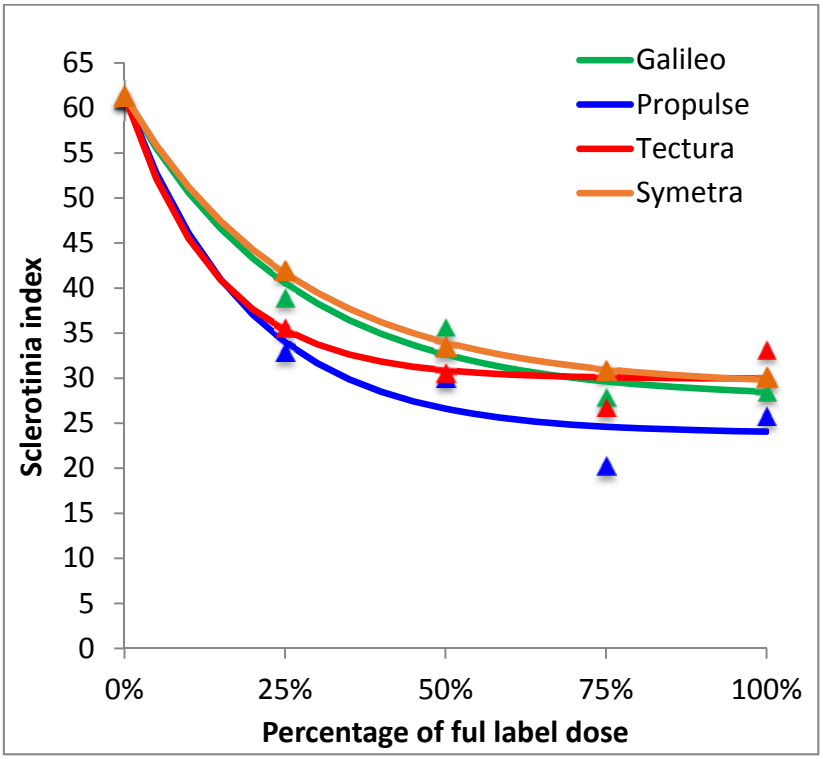


Figure 2. Sclerotinia stem rot index dose response of Herefordshire site in 2012. *Galileo no longer available after 30 November 2018.

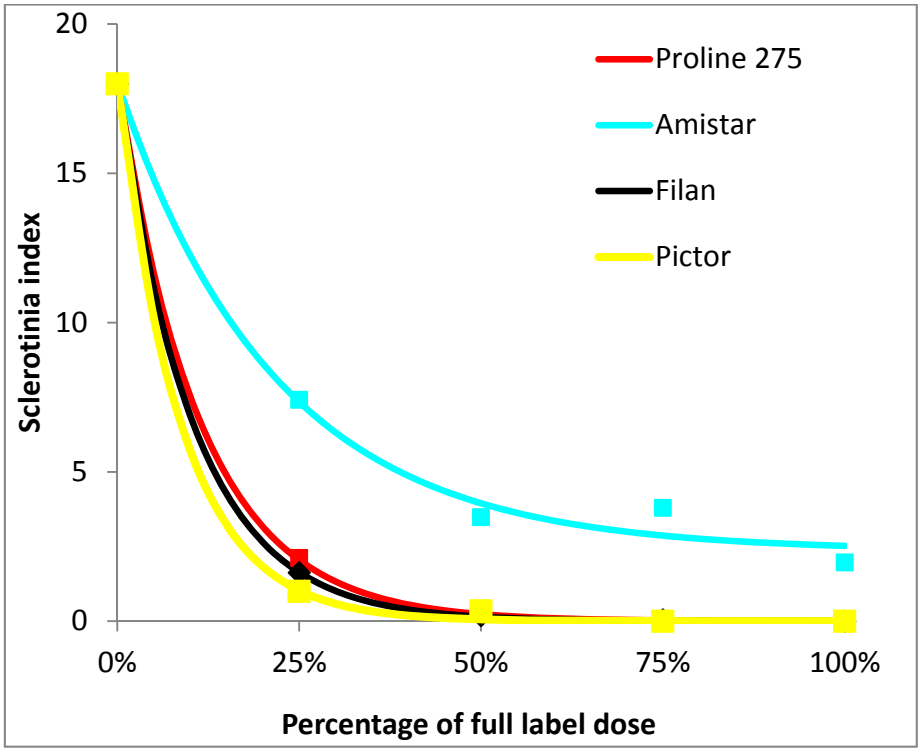
In 2015, fungicides were applied on 23 April at the site in Ceredigion (cv. PT229CL). Sclerotinia stem rot levels were moderate (20% plants affected) in the untreated control when assessed on 19 June. All fungicides and doses significantly decreased sclerotinia stem rot giving over 90% control and yield responses in excess of 1 t/ha.

In 2016, moderate levels of disease were recorded in the two trials, one in Herefordshire and the other in Ceredigion. There were significant yield responses to mid-flowering fungicide treatments at both sites. From the three trials in 2015 and 2016, with moderate levels of disease, average yield improvements from a single spray of between 0.4 and 0.8 t/ha were reported.

In 2017, fungicides were applied on 14 April to the trials in Herefordshire and Ceredigion. Moderate levels of sclerotinia stem rot were observed at the two sites: 10% plants affected at the Ceredigion site and 35% plants affected at the Herefordshire site. Untreated yield at the Ceredigion site was 3.3 t/ha and yield responses at the higher doses ranged from 0.1 to 0.2 t/ha. These small increases were unsurprising given the low disease levels at this site. At the Herefordshire site, untreated yield was 3.8 t/ha with yield improvements of 0.6 t/ha for all commercially available products.

Combining the results from the five moderately infected trials from across both sites in 2015, 2016 and 2017 demonstrated the benefits of mid-flowering fungicides, with between 75% and 100% control achieved at the higher doses and yield responses of up to 0.6 t/ha (Figure 3).

a)



b)

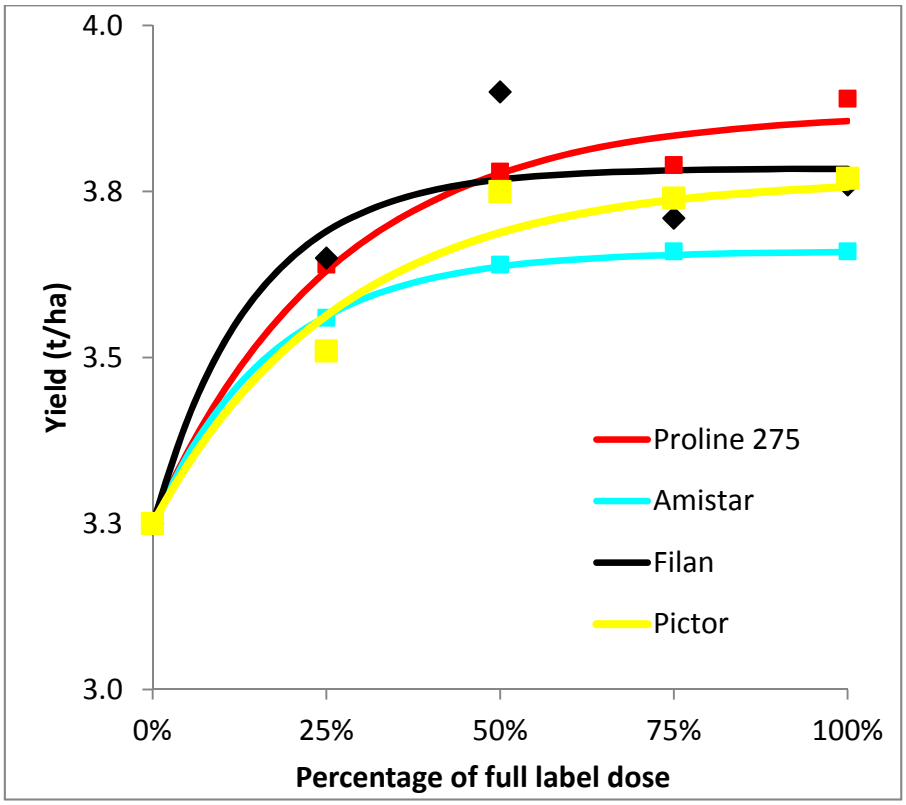


Figure 3. Dose response curves for sclerotinia stem rot as the mean of five sites: Herefordshire in 2016 and 2017, and Cardigan 2015, 2016 and 2017. a) disease b) yield. Pictor data is included from 2015 and 2016 only.

Using single sprays at these high risk sites is a very severe test of the products as most will only provide good control for up to 3 weeks after application. Lower levels of disease control and yield for some products and doses may therefore be observed if infection occurs beyond 3 weeks. It should be noted that all the four products presented in this analysis were also included in the trials conducted in the high disease pressure years of 2006, 2007 and 2008. There has been no change in the efficacy of these products during this time and they all provide a similar level of control as they did over 10 years ago.

Fungicides are only effective against sclerotinia when applied protectantly before infection occurs but a single spray applied at mid-flowering and before significant petal fall can give good control if this application occurs prior to infection and covers the majority of the remaining flowering period. This does not protect the crop against infection during early flowering or in high risk years where weather favourable for infection occurs regularly throughout flowering or the flowering period is extended. In such cases, a two spray programme has been demonstrated to be more effective and higher doses will provide a longer period of protection. The benefits of using higher doses (>75% of the recommended label dose) was demonstrated in previous work between 2006 and 2008 where infection was occurring at least weekly during flowering (Figure 4). A two spray programme can also offer benefits by controlling late infection and preventing formation/deposition of sclerotia (resting bodies). Good spray penetration into the crop canopy is important for sclerotinia control and fungicides should be applied in a minimum of 200 litres water/ha.

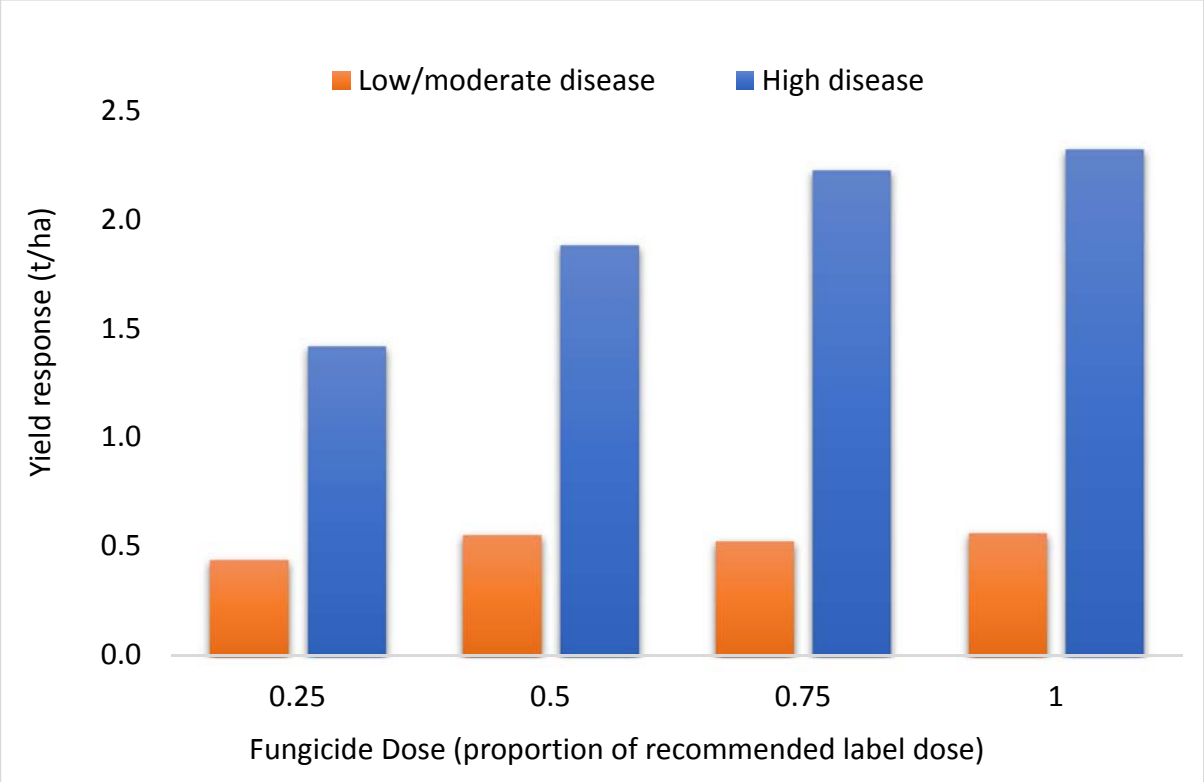


Figure 4. Effectiveness of fungicide dose when sclerotinia stem rot was low/moderate (<30% plants affected) and high (>80% plants affected). Yields were adjusted to 91% dry matter. Data taken from AHDB funded Fungicide Performance trials conducted in 2006 to 2008.

Updated information on fungicide efficacy - products

Pictor, an SDHI + strobilurin co-formulation (200g/L boscalid + 200g/L dimoxystrobin: BASF) with phoma/stem canker, light leaf spot, sclerotinia stem rot and alternaria dark leaf and pod spot on the label. It is for use in winter oilseed rape and cannot be applied to the crop before 1 February or prior to growth stage BBCH 20 (no side shoots visible) in year of harvest. The maximum label dose for Pictor is 0.5 L/ha and it can be applied twice up to 50% pods reached final size (GS75). Data are available from 2015 experiments.

Symetra, an SDHI + strobilurin co-formulation (200g/L azoxystrobin + 125g/L izopyrazam: ADAMA) is registered for use against sclerotinia stem rot in winter and spring oilseed rape. It can be applied from early (BBCH61 – 10% flowers on main raceme open) to mid-flowering (BBCH65 – Full flowering: 50% flowers on main raceme open) with a latest application timing at end of flowering (BBCH69). The maximum label dose for Symetra is 1.0 L/ha and it can be applied once per crop.

It is now recommended that boscalid (as Filan) is restricted to two applications per crop and should be used in tank-mix with another mode of action with good efficacy against sclerotinia stem rot. It can also be used for phoma control in the autumn.

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

Summary – key points for sclerotinia stem rot control

Fungicide timing is important for good control as products available to control sclerotinia stem rot are protectants and have little or no curative activity.

The optimum timing for a single spray is usually just before mid-flowering on the main raceme and prior to significant petal fall. Treatments provide good control for about 3 weeks. Two sprays may therefore be required to protect crops at high risk sites throughout the flowering period and when the flowering period is extended.

Fungicides differ in their physiological effects on the crop and also efficacy against other diseases that may require control during flowering e.g. light leaf spot. Whether additional disease control or growth regulation e.g. to decrease lodging risk is required should be considered when selecting products.

Strategies are required to minimise the risks of selecting for fungicide resistant strains of sclerotinia and other pathogens. No resistance to fungicides has been reported in the UK for sclerotinia and likelihood of it occurring can be decreased by using mixtures, co-formulated products and products with a different mode of action throughout flowering and the whole fungicide programme. Strains with decreased sensitivity to SHDIs and MBCs have been reported in France demonstrating the importance of implementing strategies now. It is important that fungicide resistance management guidelines are followed e.g. do not rely on a single mode of action for sclerotinia stem rot control.

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