Effect of timing of fungicide application to manage sclerotinia stem rot in canola

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Key findings

- Sclerotinia stem rot levels were reduced with a single foliar fungicide applied at 10% and 30%, and multiple applications at the 30% and 50% bloom stages.
- Multiple applications at the 30% and 50% bloom stages had the most significant effect in reducing disease.
- Significant yield benefits were measured when multiple fungicide applications were applied during the growing season.

Introduction

Foliar fungicide application is used to manage sclerotinia stem rot development in canola. Canola plants become more susceptible to Sclerotinia infection once flowering starts. To date, the commercial recommended time of application is 20–50% bloom, when petals start to senesce and fungicide applications can effectively penetrate the crop canopy. However, it is not known if earlier or later fungicide applications are beneficial and reduce Sclerotinia development. This study was undertaken to determine the optimal timing for fungicide application during the growing season to reduce Sclerotinia development.

Site details

The fungicide application timing experiment was conducted at Wagga Wagga Agricultural Institute and at Alma Park. These sites represent the medium–high rainfall cropping region of southern NSW with intensive canola production and frequent Sclerotinia development. Sowing date for the experiment was 28 April and 6 May 2016 for Alma Park and Wagga Wagga, respectively. Both sites relied on natural Sclerotinia infection to develop.

Treatments

Varieties

The conventional hybrid variety, Nuseed Diamond was used for both experiments. Seed was treated with Jockey® and sown with Impact In-Furrow®-treated fertiliser.

Fungicide

Prosaro® 420 SC (450 mL/ha) was applied at nine different timings according to specific growth stages (% bloom), and the combination of growth stages and rainfall events (% bloom–strategic). Single fungicide treatments were applied at 10%, 30%, 50%, and above 50% (late fungicide application – LFA) bloom stages. A multiple fungicide treatment was applied at both 30% plus 50% bloom stages. Strategic treatments were applied before rainfall events at growth stages 10%, 30% and 50% bloom stages. A single 48-hour treatment was included based upon estimating a prolonged period of wet weather given the available forecasts. Nil treatment was included as a control. Each experiment was in a randomised block design with four replications.

Assessment

The guide to assess 10%, 30% and 50% bloom stages was adapted from the Canola Council of Canada bloom assessment guide (http://www.canolacouncil.org/canola-encyclopedia/diseases/sclerotinia-stem-rot/).

Sclerotinia stem rot was assessed at the end of the growing season by counting the number of infected plants in two central locations within each plot. Different types of infection were recorded: main stem (MS), lateral branch (LB) and basal (B). The total number of healthy and infected plants was recorded to calculate the percentage of plant infection. Experiments were later harvested for yield.

Results and discussion

The fungicide experiment at Wagga Wagga showed that the level of Sclerotinia infection was significantly reduced (average 10%) when single fungicide treatments were applied at the 10%

and 30% bloom stages, and at a 30% bloom strategic stage compared with the nil treatment (Table 1). This infection was further reduced with multiple fungicide applications at 30% plus 50% bloom stages, which also increased yield compared with the nil treatment. Single applications after 50% bloom stage (LFA) and 48-hour strategic were ineffective in reducing the infection levels.

At Alma Park, the effects of the fungicide applied at the 10% and 30% bloom stages on Sclerotinia significantly reduced stem infection by around 45% compared with the nil treatment (Table 2). Multiple fungicide applications at the 30% plus 50% bloom stages further reduced stem infection by 8% compared with a single application. A significant yield response was only observed in the treatments with two fungicide applications. A late fungicide application and 48 hour strategic treatment were not significantly different from the nil.

Although both experiments showed differences between the levels of infection at different fungicide timings, yield responses were not consistent. Only applications at both 30% and 50% bloom stages gave a significantly higher yield compared with the nil treatment. It is highly likely that factors other than Sclerotinia affected yields at both sites.

Table 1. Effect of fungicide timing on yield (t/ha) and plant infection (%) to manage sclerotinia stem rot at Wagga Wagga Agricultural Institute in 2016.

Treatment	Yield (t/ha)	Infection (%)
Nil	2.57	24.41
10% bloom	2.75	13.60
30% bloom	2.81	16.38
30% bloom (strategic)	2.61	12.33
50% bloom	3.05	19.57
50% bloom (strategic)	2.67	19.07
30% + 50% bloom	3.18	7.87
30% + 50% bloom (strategic)	3.03	4.64
LFA	2.68	30.68
48 hour rainfall (strategic)	2.43	19.28
l.s.d. ($P = 0.05$)	0.42	0.72

Table 2. Effect of fungicide timing on yield (t/ha) and plant infection (%) to manage sclerotinia stem rot at Alma Park in 2016.

Treatment	Yield (t/ha)	Infection (%)
Nil	2.11	59.71
10% bloom	2.47	25.59
10% bloom (strategic)	2.28	24.21
30% bloom	2.40	13.40
50% bloom	2.50	11.31
50% bloom (strategic)	2.02	40.60
30% + 50%	2.95	3.48
LFA	2.12	58.65
LFA + 50% (strategic)	2.64	15.02
48 hour rainfall (strategic)	2.44	55.82
l.s.d. ($P = 0.05$)	0.40	0.69

Summary

Fungicides are an important tool in managing sclerotinia stem rot in canola. Fungicide application at the critical developmental stages is crucial to reduce disease development and increase returns. In this study, two single fungicide timings at either 10% or 30% bloom stages significantly reduced the level of Sclerotinia at both sites. However, multiple applications of fungicide during the growing season at the 30% plus 50% bloom stages was the most effective.

At these bloom stages, the foliar fungicide applied provided critical early and subsequent protection where senescent petals are abundant and when conditions for infection are likely. Application beyond the 50% bloom stage was too late and ineffective in reducing disease, most likely due to a combination of infection event timing and poor penetration of the fungicide into the crop canopy.

With no significant difference in yield across many of the treatments, except at multiple applications at both 30% plus 50% bloom stages compared with the nil treatment at Wagga Wagga experimental site, more data is needed to compare fungicide efficacy from only a single fungicide application.

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