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The effect of sowing date and fungicide application on grain yield of canola – Alma Park 2015

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Key findings

- Sowing date and varietal phenology both affected the exposure of canola to rain days and potential disease infection.
- Early sowing increased the level of pod blackleg infection.
- Early sowing increased sclerotinia infection in the early flowering variety Hyola® 575CL but not in the slower variety Pioneer® 45Y88 (CL).
- Grain yield was higher from the later sowing date (22 April) than the early sowing date (7 April).
- Grain yield was closely correlated to total biomass accumulation, which was greater from the 22 April sowing time than the 7 April sowing time.

Introduction

Sowing canola early has become more common in recent seasons, but there are still concerns about the potential for early sowing to increase disease risk, especially Sclerotinia stem rot. This experiment was sown to determine agronomic management practices that increase grain yield potential while also minimising the risk of fungal diseases.

Site details

Location	Alma Park, 25 km SW of Henty
Previous crop	Barley
Fertiliser applied	100 kg/ha MAP + Flutriafol SC at 200 mL/ha 400 L/ha Sulsa (27 N:7 S w/v)
Plant available water (at sowing)	40 mm
Available nitrogen (N) (at sowing)	76 kg/ha (0–30 cm)
In-crop rainfall (April–October)	360 mm

Treatments

The experiment was sown as a full factorial combination of sowing date, variety and fungicide (Table 1). The fungicide treatment Prosaro® was applied at 450 mL/ha at the start of flowering of each individual treatment, determined as the date when 50% of plants had one open flower.

Table 1. Sowing date, variety and fungicide treatments at Alma Park, 2015.

Sowing date	7 April 22 April
Variety	Pioneer® 45Y88 (CL) Hyola® 575CL
Fungicide (Prosaro®)	Plus Minus

Results

Flowering

Hyola® 575CL was 21 days quicker to flower than Pioneer® 45Y88 (CL) from the 7 April sowing date, but was only six days quicker from the 22 April sowing date. The differences in flowering date affected not only the overall grain yield potential, but also the exposure to rain events during flowering. Sowing Hyola® 575CL early exposed the variety to 23 rain days during flowering, whereas early sowing with the slower variety Pioneer® 45Y88 (CL) exposed the variety to only 13 rain days during flowering (Table 2).

Table 2. The effect of two sowing dates on the flowering date (date when 50% of plants have one open flower) and number of rain days during flowering of two varieties at Alma Park in 2015.

Variety	Flowering date		Rain days during flowering	
	7 Apr	22 Apr	7 Apr	22 Apr
Hyola 575CL	25 Jul	24 Aug	23	10
Pioneer 45Y88 (CL)	15 Aug	30 Aug	13	5

Disease

Blackleg

The experiment was scored at maturity to assess the level of blackleg infection on the pods and branches.

Pod blackleg rating scale	
0	blackleg lesions absent
1	<5 diseased pods/plant
2	5–10 diseased pods/plant
3	10–20 diseased pods/plant
4	>20 diseased pods/plant

Branch blackleg rating scale	
0	no infection
1	small lesions (0–15 mm), few lesions
2	medium lesions (16–40 mm), few lesions
3	large lesions (larger than 40 mm, physical cankers), many lesions
4	death of whole branches (causing significant yield loss)

There was significantly more blackleg on the pods and branches of Pioneer® 45Y88 (CL) than Hyola® 575CL (Table 3). The 7 April sowing date treatments also had more pod blackleg than the 22 April sowing date, but branch blackleg was not affected by the sowing date.

Table 3. The effect of variety and sowing date on pod and branch blackleg severity, Alma Park, 2015.

Variety	Pod blackleg	Branch blackleg
Hyola 575CL	1.4	1.4
Pioneer 45Y88 (CL)	2.3	2.2
l.s.d. (P = 0.05)	0.34	0.34
Sowing date		
7 Apr	2.3	1.9
22 Apr	1.4	1.7
l.s.d. (p = 0.05)	0.34	n.s.

Sclerotinia

Sclerotinia is reported as the percentage of plants in a plot with disease symptoms. There was a significant interaction (P = 0.045) between fungicide and variety (Table 4). Fungicide application had no effect on Sclerotinia in Pioneer® 45Y88 (CL). Hyola® 575CL had more Sclerotinia than Pioneer® 45Y88 (CL) where fungicide was not applied, but had reduced Sclerotinia when fungicide was applied.

Table 4. The effect of variety and fungicide treatment on the level of Sclerotinia infection, Alma Park, 2015.

Variety	Plants infected with Sclerotinia (%)	
	Minus fungicide	Plus fungicide
Pioneer 45Y88 (CL)	0.9	0.7
Hyola 575CL	6.5	1.8
l.s.d. (P = 0.05)	1.4	

Grain yield

There were significant effects of variety (P <0.001), sowing date (P = 0.002) and fungicide (P = 0.001) on grain yield, but there were no interactions between these factors. There was a 0.4 t/ha benefit from planting Pioneer® 45Y88 (CL) compared with Hyola® 575CL; a 0.3 t/ha benefit of sowing on 22 April compared with 7 April; and a 0.4 t/ha yield increase from applying Prosaro® fungicide at flowering (Table 5).

Table 5. The main effects of variety, sowing date and fungicide treatment on grain yield of canola, Alma Park, 2015.

Treatment	Grain yield (t/ha)
Variety	
Pioneer 45Y88 (CL)	3.2
Hyola 575CL	2.8
l.s.d. (p = 0.05)	0.16
Sowing date	
7 Apr	2.9
22 Apr	3.2
l.s.d. (p = 0.05)	0.18
Fungicide treatment	
Minus	2.8
Plus	3.2
l.s.d. (p = 0.05)	0.19

Grain yield was related to biomass at maturity (Figure 1). Sowing on the 22 April increased biomass at maturity compared with sowing on 7 April; sowing Pioneer® 45Y88 (CL) compared with Hyola® 575CL, and with applying fungicide (data not shown).

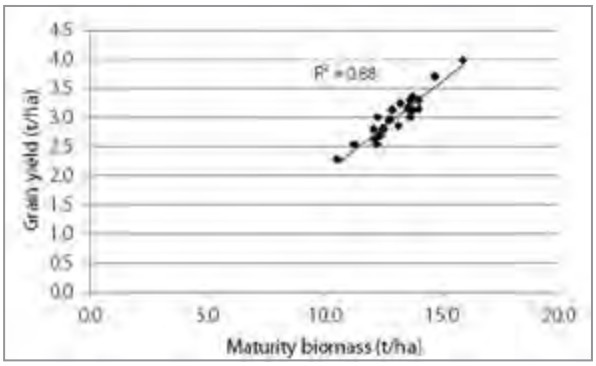

Figure 1. The relationship between biomass at maturity and grain yield of canola at Alma Park, 2015.

Discussion and conclusion

Varietal phenology had a large impact on exposing canola to rain days and hence potential disease development. The slower variety, Pioneer® 45Y88 (CL), had half the number of rain days during flowering (averaged across both sowing dates), compared with the faster variety Hyola® 575CL. Applying the fungicide Prosaro® reduced Sclerotinia infection in the fast variety Hyola® 575CL sown early, but

had no effect on the slower variety Pioneer® 45Y88 (CL). There was a significant grain yield response (0.4 t/ha averaged across sowing dates and varieties) to fungicide application, despite the modest levels of Sclerotinia infection.

Early sowing and variety choice (i.e. Pioneer® 45Y88 (CL)) both increased the level of pod/branch blackleg infection, but there was no effect from fungicide applied at flowering on upper canopy blackleg. Further work is required to quantify yield loss and management strategies for blackleg on branches and pods.

Grain yield was strongly correlated to the amount of total biomass at maturity. Maturity biomass and grain yield were both affected by sowing date, variety choice and fungicide application. Along with nitrogen management and variety type, these factors will be investigated in more detail in the current 'Optimising canola profitability' project.

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