



Control of blackleg with soil and foliar fungicides

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PURPOSE:

1. Compare crop emergence between treatments
2. Compare programs of seed and foliar fungicides for BL control
3. Compare yield and \$ROI between Canola disease programs

Location: cnr NW Road, Moora main trial site
Soil Type: Banksia sand
Soil Test Results: Predicta B: *Rhizoctonia solani* Low, *Pythium* Low
Rotation: Canola 2015

BACKGROUND SUMMARY

- Blackleg is the major disease of canola production across Australia with current GRDC estimated yield losses of \$66 /ha
- Aviator® Xpro® contains the high performing triazole prothioconazole + bixafen the first registered SDHI for foliar application. Aviator Xpro is now registered for use in canola for blackleg with a rate range of 550-650 mL/ha. A submission for sclerotinia has been made and is anticipated to be available in time for the 2017 season.
- Aviator Xpro's formulation contains Leafshield™ technology to provide rapid rain fastness and improved spreading and penetration into the plant due to its inbuilt adjuvant system.
- EverGo!® Xtend is registered in canola for damping off and hypocotyl root rot caused by rhizoctonia and fusarium.
- DC-155 is an experimental seed treatment being evaluated by Bayer Crop Science.

TRIAL DESIGN

Plot size: 2 x 10 m
Machinery use: Knife point and press wheels, small plot seeder
Repetitions: 3
Crop type and varieties used: Crusher canola
Seeding rates and dates: 2.5 kg/ha 14/05/16
Treatment rates and dates: 14/05/16: Pre-emergent: 2 L/ha Sprayseed + 2 L/ha trifluralin + 2 L/ha Avadex® Xtra + 1.1 kg/ha atrazine + 100 mL/ha Talstar® + 500 mL/ha Lorsban®
Fertiliser: 100 kg/ha Gusto® Gold banded + 60 kg/ha Gusto Gold top dressed + 50 L/ha UAN
Post emergent herbicide: 1.1 kg/ha atrazine + clethodim 500 mL/ha + Hasten® 1 % v/v
Post emergent fungicide: 29/6/16 - Crop ~5 leaf applied under good conditions

Hand boom 100 L/ha, 5 km/h, 3 bar, DG110015 nozzles

SITE OBSERVATIONS

The trial establishment was variable early due to some non-wetting soil and the crop was sown too deeply due to furrow fill from significant rain after sowing. Early crop vigour as a result was low with blackleg further reducing plant establishment; this coupled with high levels of Vegetable beetle damage also reduced the evenness of the plots.

According to the DAFWA sporacle model spore maturity occurred on approximately the 22 May which meant this trial was at very high risk of significant disease risk as emergence coincided with high spore levels being released from last year's stubble.

RESULTS

Vegetable beetle control:

At 61 days after sowing Poncho® Plus recorded a 55% reduction in Vegetable beetle damage over Gaucho® and 61% over Cruiser® Opti based on whole plot counts.

Table 1. Crop emergence 17 days after application (DAA) and crop biomass (NDVI) 82 DAA

Date		31/05/2016			04/08/2016		
Days after first application		17 DAA			82 DAA		
Application A: Seed treatment	Application B: + flutriafol 400 mL/ha	Emergence Plants/m ²	% Gaucho Reference	NDVI	% Gaucho Reference		
Gaucho 4 L/t (Reference treatment)	Nil	24 a	100	0.190	a	100	
Gaucho 4 L/t	Yes	27 a	111	0.193	a	101	
Maxim® XL 4 L/t + Cruiser Opti 10 L/t	Nil	32 a	130	0.215	a	113	
Maxim XL 4 L/t + Cruiser Opti 10 L/t	Yes	22 a	91	0.204	a	107	
EverGol Xtend 650 mL/t + Poncho Plus 5 L/t	Nil	28 a	114	0.193	a	101	
EverGol Xtend 650 mL/t + Poncho Plus 5 L/t	Yes	31 a	125	0.194	a	102	
Jockey® Stayer® 20 L/t + Poncho Plus 5 L/t	Nil	33 a	136	0.205	a	108	
Jockey Stayer 20 L/t + Poncho Plus 5 L/t	Yes	37 a	152	0.193	a	101	
DC-155 + Poncho Plus 5 L/t	Nil	24 a	98	0.199	a	104	
DC-155 + Poncho Plus 5 L/t	Yes	26 a	107	0.194	a	102	
LSD P=.05		11.9		0.0214			
Standard Deviation		7		0.0126			
CV		24.29		6.34			

Means followed by same letter do not significantly differ (Duncan's New Multiple Range at 5% significance level).

The trial was set up to assess blackleg so the reference treatment was a fungicide free seed treatment of Gaucho insecticide only to assess the impacts of various fungicide seed, in-furrow or foliar fungicide treatments.

There were no significant differences in crop emergence although establishment was patchy due to the non-wetting soil type.

At 82 DAA none of the treatments recorded a significant difference to the reference treatment Gaucho based on biomass alone. The addition of flutriafol did not have a negative impact on emergence apart from with Maxim XL although that is likely due to the early patchiness of emergence across the trial site.

Table 2. 4/08/16 - Blackleg leaf severity rating (leaf score 0-5) 82 DAA/36 DAC

Application A: Seed treatment		Application B: flutriafol 400 mL/ha	Application C: foliar at 5 leaf crop					
			Nil foliar		Aviator Xpro 550 mL/ha		Prosaro 375 mL/ha	
Gaucho 4 L/t (Reference treatment)		Nil	4.3	a	3.0	cde	3.2	bcd
Gaucho 4 L/t		Yes	3.3	bc	2.5	d-g	2.8	c-f
Maxim 4 L/t + Cruiser Opti 10 L/t		Nil	3.7	b	3.0	cde	3.2	bcd
Maxim 4 L/t + Cruiser Opti 10 L/t		Yes	3.2	bcd	2.2	fg	2.7	c-g
EverGol Xtend 650 mL/t + Poncho Plus 5 L/t		Nil	3.7	b	3.0	cde	3.3	bc
EverGol Xtend 650 mL/t + Poncho Plus 5 L/t		Yes	3.2	bcd	2.3	efg	2.5	d-g
Jockey Stayer 20 L/t + Poncho Plus 5 L/t		Nil	3.2	bcd	2.3	efg	2.7	c-g
Jockey Stayer 20 L/t + Poncho Plus 5 L/t		Yes	2.5	d-g	2.0	g	2.2	fg
DC-155 + Poncho Plus 5 L/t		Nil	2.8	c-f	2.5	d-g	2.5	d-g
DC-155 + Poncho Plus 5 L/t		Yes	2.7	c-g	2.0	g	2.2	fg
LSD P=.05			0.55					
Standard Deviation			0.34					
CV			11.96					

Means followed by same letter do not significantly differ (Duncan's New Multiple Range at 5% significance level).

At 36 DAC the oldest green leaf on the plant was assessed for blackleg leaf lesions. All treatments recorded a significant reduction compared to the Gaucho only reference treatment.

The addition of flutriafol reduced foliar infection with all seed treatments. The application of Aviator Xpro reduced foliar infection the most of the two foliar applications. The lowest level of foliar infection (2.0) was recorded with either Jockey Stayer or DC-155 on seed followed by flutriafol infurrow and Aviator Xpro foliar.

Table 3. 13/10/16 - Blackleg stem cuts, % Incidence and % stem area infected 152 DAA/106 DAC

Application C: foliar at 5 leaf crop		C: Nil Foliar		C: Aviator Xpro 550 mL/ha		C: Prosaro 375 mL/ha	
Application A: Seed treatment	Application B: flutriafol 400 mL/ha	% Stem Incidence	% Stem area infected	% Stem Incidence	% Stem area infected	% Stem Incidence	% Stem area infected
Gaucho 4 L/t (Reference treatment)	Nil	80.0 a	14.5 a-d	46.7 a-g	11.0 a-h	66.7 abc	15.0 abc
Gaucho 4 L/t	Yes	53.3 a-f	17.4 ab	60.0 a-e	9.2 a-i	53.3 a-f	6.8 b-i
Maxim 4 L/t + Cruiser Opti 10 L/t	Nil	63.3 a-d	18.1 a	46.7 a-g	14.0 a-e	36.7 b-h	5.1 c-i
Maxim 4 L/t + Cruiser Opti 10 L/t	Yes	53.3 a-f	13.1 a-g	26.7 d-h	2.2 hi	53.3 a-f	5.8 c-i
EverGol Xtend 650 mL/t + Poncho Plus 5 L/t	Nil	73.3 ab	14.2 a-e	63.3 a-d	13.5 a-f	56.7 a-e	6.1 c-i
EverGol Xtend 650 mL/t + Poncho Plus 5 L/t	Yes	60.0 a-e	11.6 a-h	40.0 b-h	7.9 a-i	26.7 d-h	4.9 c-i
Jockey Stayer 20 L/t + Poncho Plus 5 L/t	Nil	46.7 a-g	4.9 c-i	33.3 c-h	5.1 c-i	40 b-h	3.7 d-i
Jockey Stayer 20 L/t + Poncho Plus 5 L/t	Yes	33.3 c-h	8.8 a-i	13.3 gh	3.5 e-i	23.3 e-h	6.1 c-i
DC-155 + Poncho Plus 5 L/t	Nil	33.3 c-h	7.4 b-i	23.3 e-h	3.3 e-i	26.7 d-h	3.1 f-i
DC-155 + Poncho Plus 5 L/t	Yes	23.3 e-h	7.3 b-i	3.3 h	0.1 i	10 gh	2.6 ghi

Mean disease level from fungicide seed treatment	54.2	11.2	41.7	9.0	40.0	4.5
Mean disease level from fungicide ST + flutriafol	42.5	10.2	20.8	3.4	28.3	4.9
LSD P=.05	30.48	8.78				
Standard Deviation	18.66	5.38				
CV	44.74	65.65				

Means followed by same letter do not significantly differ (Duncan's New Multiple Range at 5% significance level).

Based on stem cuts all treatments recorded reduced incidence of blackleg compared to the reference treatment with DC-155 the only seed treatment that was significant ($P \geq 5\%$). The addition of flutriafol did not make a significant difference apart from when combined with Jockey Stayer or DC-155.

The addition of a foliar fungicide across the reference treatment Gaucho (80% incidence and 14.5% infected) reduced both the incidence and severity of blackleg. Aviator Xpro (46.7% and 11.0%) recorded the lowest levels with Prosaro (66.7% and 15%) comparable to flutriafol infurrow (53.3% & 17.4%).

The lowest incidence and severity results were recorded from the combination of DC-155 + flutriafol + Aviator Xpro.

Table 4. 13/10/16 - Blackleg plant counts, % dead and % plants lodged and dead combined 152 DAA/106 DAC

Application C: foliar at 5 leaf crop		C: Nil Foliar		C: Aviator Xpro 550 mL/ha		C: Prosaro 375 mL/ha	
Application A: Seed treatment	Application B: flutriafol 400 mL/ha	Plant Dead % Control	% Plant lodged/ dead % control	Plant Dead % Control	% Plant lodged/ dead % control	Plant Dead % Control	% Plant lodged/ dead % control
Gaicho 4 L/t (Reference treatment)	Nil	11/ plot a	17/ plot a	71 cd	62 cde	73 cde	44 bc
Gaicho 4 L/t	Yes	65 bc	64 c-f	88 cde	88 e-h	94 de	86 e-h
Maxim 4 L/t + Cruiser Opti 10 L/t	Nil	41 b	32 b	85 cde	78 d-h	73 cde	70 c-g
Maxim 4 L/t + Cruiser Opti 10 L/t	Yes	82 cde	72 d-h	82 cde	82 d-h	91 cde	82 d-h
EverGol Xtend 650 mL/t + Poncho Plus 5 L/t	Nil	41 b	34 b	91 cde	80 d-h	82 cde	72 d-h
EverGol Xtend 650 mL/t + Poncho Plus 5 L/t	Yes	73 cde	72 d-h	88 cde	86 e-h	94 de	86 e-h
Jockey Stayer 20 L/t + Poncho Plus 5 L/t	Nil	73 cde	54 bcd	97 de	92 fgh	91 cde	82 d-h
Jockey Stayer 20 L/t + Poncho Plus 5 L/t	Yes	85 cde	78 d-h	100 e	100 h	94 de	94 gh
DC-155 + Poncho Plus 5 L/t	Nil	88 cde	78 d-h	100 e	96 gh	100 e	94 gh
DC-155 + Poncho Plus 5 L/t	Yes	97 de	92 fgh	94 de	96 gh	100 e	100 h
Mean % control from fungicide seed treatment		61	50	93	86	87	80
Mean % control from fungicide ST + flutriafol		80	76	91	90	94	90
	LSD P=.05	2.65	3.98				

Standard Deviation	1.62	2.44
CV	80.03	60.22

Means followed by same letter do not significantly differ (Duncan's New Multiple Range at 5% significance level).

Based on plant counts all treatments recorded a significant reduction ($P \geq 5\%$) in plants dead or combined plants lodged and dead compared to the Gaucho reference treatment.

Of the seed treatments alone DC-155 was the most effective followed by Jockey Stayer. The addition of flutriafol to Gaucho recorded a comparable level of control with Jockey Stayer. Flutriafol added to disease control when a seed treatment was used stand-alone but did not record the same impact when either Aviator Xpro or Prosaro foliar fungicide was applied.

The application of a foliar fungicide reduced the levels of plant lodging and death with the highest level of control recorded from combining an effective seed treatment like Jockey Stayer or DC-155 with either product. Though not significant Aviator Xpro on average recorded 86% control of plants lodged or dead just slightly ahead of Prosaro (80%).

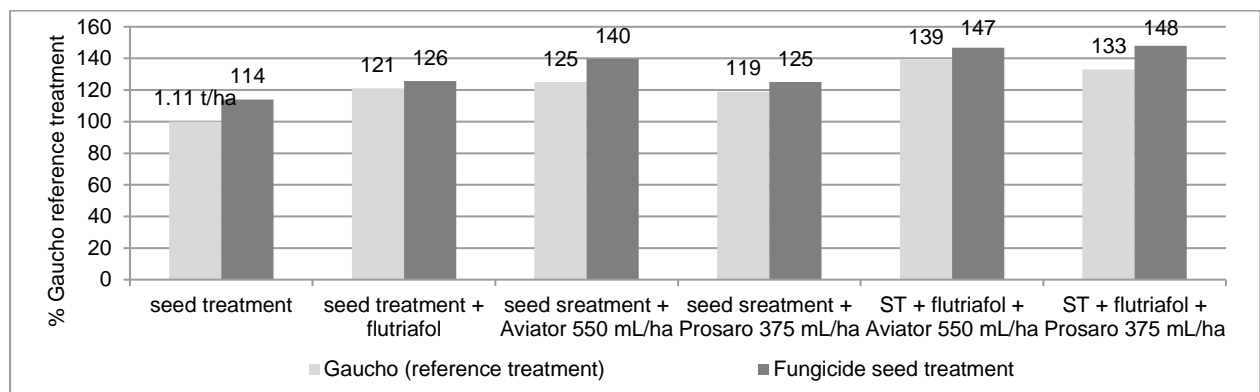


Figure 1. %Yield relative to nil fungicide (Gaucho), 1.11 t/ha in Crusher canola, 10/11/16 (180 DAA/ 134 DAC)

Due to the patchy nature of the crop, some treatment yields were influenced by site position and patches of competing annual ryegrass so yield results have been summarized to highlight trends from disease control options for blackleg in canola.

The use of an effective seed treatment fungicide recorded a 14% increase in yield over Gaucho standalone reference treatment. This was consistent across all fungicide combinations. The use of a fungicide seed treatment followed by Aviator Xpro recorded the highest yield from two fungicide applications (140%) with the addition of flutriafol under high pressure further increase in yield (147%).

Table 5. Control of blackleg, Yield (t/ha), %Oil, Gross \$/ha and \$ \$ROI, Crusher canola

Treatment		Seed treatment only					Seed treatment + Aviator Xpro 550 mL/ha at 6 leaf				
Assessment	Cost \$/ha at 2.5 kg sowing	% Blackleg control	Yield t/ha	% Oil	Gross \$/ha	ROI \$/ha	% Blackleg control	Yield t/ha	% Oil	Gross \$/ha	ROI \$/ha
Gaicho 4 L/t	\$0.35	0	1.11	37.5	\$585.73	-	62	1.39	41.0	\$733.92	\$110.87
EverGol Xtend 650 mL/t + Poncho Plus 5 L/t	\$4.03	34	1.24	40.2	\$654.72	\$65.04	80	1.44	41.0	\$760.32	\$133.67
Jockey Stayer 20 L/t + Poncho Plus 5 L/t	\$4.99	54	1.33	41.3	\$702.24	\$111.61	92	1.56	40.3	\$823.68	\$196.07
Treatment		Seed treatment + flutriafol 400 mL/ha					Seed treatment + flutriafol 400 mL/ha + Aviator Xpro 550 mL/ha at 6 leaf				
Assessment	Cost \$/ha + flutriafol	% Blackleg control	Yield t/ha	% Oil	Gross \$/ha	ROI \$/ha	% Blackleg control	Yield t/ha	% Oil	Gross \$/ha	ROI \$/ha
Gaicho 4 L/t	\$5.15	64	1.34	40.8	\$707.52	\$116.73	88	1.54	39.9	\$813.12	\$185.27
EverGol Xtend 650 mL/t + Poncho Plus 5 L/t	\$8.83	72	1.28	40.2	\$675.84	\$81.36	86	1.64	40.3	\$865.92	\$234.47
Jockey Stayer 20 L/t + Poncho Plus 5 L/t	\$9.79	78	1.48	39.5	\$781.44	\$186.01	100	1.60	40.6	\$844.80	\$212.39
CAN Kwinana del. 9/11/16	\$528.00										
Flutriafol 400 mL/ha	\$4.80										
Aviator Xpro 550 mL/ha	\$29.98										
Application cost	\$7.00										

ACKNOWLEDGMENTS

Thanks to the Brennan family for hosting the site, to Living Farm for sowing and maintenance of the trial and to Susie Mason from Elders Moora for assistance with several assessments.

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