

“Adult Plant Resistance and Strategic Fungicide use for Integrated Management of Cereal Rust”



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Project Number: FAR W11/11

Trial Duration: 2011

Location: Bordertown, SA
Johnson

Farmer Co-operator: Kraig

Trial Design: Replicated Plot Trials

3 cultivars x 8 treatments x 4 reps (=96 plots)

Rotation position: 1st cereal after canola

Sowing date: 2nd June, 2011

Harvest date: 5th December 2011

Treatments :

Cultivars: Lincoln, Yitpi and Wyalkatchem

Three cultivars of varying resistance to stripe rust (*Puccinia stromiformis*), yellow leaf spot and *Septoria nodorum* blotch were established on a clay loam soil following a canola crop in 2010 and managed with eight different fungicide management strategies

Table 1. Cultivar resistance ratings to stripe rust, yellow leaf spot and Septoria nodorum blotch

Cultivar	Cultivar resistance rating		
	Stripe rust	Yellow Spot	<i>Septoria nodorum</i>
Lincoln	R	MS-S	S-VS
Yitpi	MR-MS	S	MR-MS
Wyalkatchem	MS-S	MR	MS-S

VS -very susceptible, MS-moderately susceptible, MR - moderately resistant & R - resistant

Fungicide Treatment application

Fungicides treatments were based on Jockey and two foliar fungicide spray timings; an early timing at second node (GS32) on 30th August 2011 and a later timing at flag leaf fully emerged on the main stem (GS39) on 23th September.

Table 2. Fungicide programmes for applied in the trial

Fungicide Programme (product rates and timings)

1. Jockey seed treatment 450ml/100kg (full rate)*
2. Jockey seed treatment 450ml/100kg (full rate) f.b. Folicur 145 ml/ha (GS32)
3. Jockey seed treatment 450ml/100kg (full rate) f.b. Folicur 145 ml/ha (GS39)*
4. Jockey seed treatment 450ml/100kg (full rate) f.b. Folicur 145 ml/ha x 2 (GS32 plus GS39)
5. Untreated seed f.b. Folicur 145ml/ha (GS32)
6. Untreated seed f.b. Folicur 145 ml/ha (GS39)*
7. Untreated seed f.b. Folicur 145 ml/ha x 2 (GS32 plus GS39)
8. Untreated seed*

(f.b. followed by)

a) Disease Assessments

Disease was assessed five times during the course of the season at this trial site on the following dates:

July 16 th	– GS21
September 8 th	– GS31-32
September 20 th	– GS38-49
October 14 th	– GS59-69
October 30 th	– GS71-72

At the peak of infection (early grain fill) the best control of stripe rust on the flag leaf in Wyalkatchem and Yitpi was given by fungicide programmes that incorporated a flag leaf fungicide; however these treatments were not statistically superior to other treatments except the fully untreated. No disease was recorded in Lincoln and no difference in green leaf retention was ever observed.

Table 3. Influence of fungicide treatment and cultivar on stripe rust infection (% severity and % disease control of that infection) on the flag leaf assessed at GS71-72 – 30th October.

Seed trt	Fungicides		Lincoln			Yitpi			Wyalkatchem		
	GS32	GS39	%			%			%		
Jockey	-	-	0	-	-	2.3	c	50	10.6	bc	62
	+	-	0	-	-	2.4	c	47	4.6	bc	84
	-	+	0	-	-	0.4	c	92	1.4	c	95
	+	+	0	-	-	0.5	c	90	1.0	c	96
Untreated	-	-	0	-	-	4.6	bc	0	28.2	a	0
	+	-	0	-	-	1.7	c	63	5.6	bc	80
	-	+	0	-	-	0.3	c	93	1.7	c	94
	+	+	0	-	-	0.4	c	92	0.9	c	97
Mean			0			1.6 b			6.8 a		
LSD (5%)	Cultivars		2.4								
	Fungicides*		4.8								
	Cult x Fung		6.8								

**Note: Fungicide refers to both seed treatment and foliar applications*

Earlier assessments revealed better control of stripe rust on the lower leaves (Flag-1 and flag-2) when treatments incorporated a GS32 foliar fungicide or Jockey seed treatment (Table 4).



Table 4. Influence of fungicide treatment on stripe rust infection (% Severity) flag -1 and flag-2, GS59-69, 14th October.

Seed Trt	Fungicide		Flag-1		Flag-2	
	GS32	GS39	Yitpi	Wyalkatchem	Yitpi	Wyalkatchem
Jockey	-	-	2.05 b	4.73 b	0.13 b	0.98 b
	+	-	1.38 b	0.35 b	0.23 b	0.05 b
	-	+	0.38 b	0.65 b	0.40 b	0.28 b
	+	+	0.43 b	0.50 b	0.40 b	0.23 b
Untreated	-	-	4.50 b	18.25 a	0.73 b	15.13 a
	+	-	1.83 b	0.78 b	0.60 b	0.03 b
	-	+	0.75 b	2.35 b	0.45 b	2.15 b
	+	+	0.33 b	0.23 b	0.10 b	0.33 b
Mean			1.45 a	3.48 a	0.38 b	2.39 a
LSD (5%)	Cultivars		2.06		1.24	
	Fungicides*		4.11		2.47	
	Cult x Fung		5.81		3.50	

b) Yield data

Influence of cultivar

There was no significant difference in yield between Lincoln and Yitpi when all treatments were considered, however Wyalkatchem was significantly lower yielding (Table 5). This result is strongly influenced by the untreated Wyalkatchem which only yielded 3.76t/ha. The mean yield response to fungicide treatment (mean of all seven fungicide treatments) was 11.4% (0.54 t/ha) with Lincoln, 14.6% (0.65 t/ha) with Yitpi and 29.8% (1.12 t/ha) with Wyalkatchem.

Influence of seed treatment

Averaged over all three cultivars Jockey seed treatment gave a significant 0.3 t/ha advantage over those treatments based on untreated seed. When Jockey alone was compared to a completely untreated crop the advantage of the seed treatment was increased to 0.6t/ha. However if a single foliar fungicide was applied at GS32 the advantage of Jockey seed treatment over untreated seed with a GS32 spray was reduced to 0.12 t/ha, which would still cover the cost of the product.

Influence of fungicide timing

The average response to a GS32 foliar fungicide over those treatments that did not include a GS32 spray was 0.3 t/ha. The equivalent figure with those treatments that included a GS39 spray was 0.23 t/ha. There no significant differences in yield between the different fungicide treatments in any of the cultivars, however with Wyalkatchem all 7 fungicide treatments were statistically superior to the untreated, whereas with Yitpi only the Jockey treatments with follow up fungicides were statistically superior. In Lincoln for reasons that are still not clearly understood (since there was no disease) Jockey plus two fungicides significantly out yielded the untreated. In the most susceptible cultivar Wyalkatchem there was no difference in yield between untreated seed and Jockey seed treatment if a GS32 foliar fungicide was applied to the crop.

Table 5. Influence of fungicide treatment and cultivar on grain yield (t/ha) and (% of untreated cultivar yield)

Seed Trt	Fungicide		Lincoln			Yitpi			Wyalkatchem		
	GS32	GS39	Yield		%	Yield		%	Yield		%
Jockey	-	-	5.06	a-d	108	4.96	a-d	110	4.73	b-d	126
	+	-	5.28	a-c	113	5.31	a-c	118	4.99	a-d	133
	-	+	5.20	a-d	111	5.29	a-c	117	4.95	a-d	132
	+	+	5.49	a	118	5.41	ab	120	5.00	a-d	133
Untreated	-	-	4.66	cd	100	4.52	d	100	3.76	e	100
	+	-	5.18	a-d	111	5.08	a-d	112	4.96	a-d	132
	-	+	5.00	a-d	107	5.05	a-d	112	4.64	cd	123
	+	+	5.21	a-c	112	5.10	a-d	113	4.90	a-d	130
Mean			5.14	a		5.09	a		4.74	b	
LSD (5%)	Cultivars		0.24								
	Fungicides		0.39								
	Cult x Fung		0.68								



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