3.1.2 Quantifying The Influence Of Cultivar Resistance In Wheat On The Requirement For Disease Control In The High Rainfall Zone Of Australia - Inverleigh, Vic

Location: Inverleigh

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Grains Research Development Corporation
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Growing Season Rainfall (Apr – Nov): 393 mm

Summary of Findings:

Stripe rust was slow to develop in this trial due to the dry spring weather. When infection did develop at GS39 it was most pronounced in Mitre, with low levels in Kellalac and none in Amarok. Against this background, fungicide application created significant yield increases in Mitre (maximum advantage 0.36 t/ha) and Kellalac (0.27 t/ha) but not in Amarok (though there were non significant yield increases up to 0.2 t/ha). Overall using the mean of three varieties, there was no significant advantage from the use of Impact in furrow®, but there was a significant (p=0.05) advantage to the use of foliar fungicide at GS32 and 39.

The pattern of response to fungicide application, whilst not always significant, revealed a more even weighting of benefits from upfront fungicide versus foliar fungicides for the susceptible variety Mitre, but a trend for greater advantage to foliar fungicide in the moderately susceptible variety Kellalac.

Looking at margin returns over the untreated, Mitre produced positive margin increases with all fungicide treatments applied, with Impact® treatments producing margin returns equal or greater than foliar fungicides. With Kellalac, foliar fungicides produced the best margins and Impact® based strategies lost money. With Amarok, all fungicide strategies lost money relative to the untreated, with the exception of foliar fungicides applied late.

Background:
Now in its 3rd year, the trial was set up to determine the influence of cultivar resistance on the cost effectiveness and longevity of upfront disease control, such as seed treatment/in furrow treatments, as opposed to later season control based on foliar fungicides.

Trial Design: The trial was sown as a split block with variety as the main block and fungicide as the sub block. Each treatment was replicated four times.

Table 3.4: Trial Inputs

Sowing dates:	16th May 2007
Sowing ate target:	200 plants/m^2
Seed Treatment:	Raxil
Harvest date:	17th December 2007

Type	Product	Rate	Date
At sowing fertiliser	MAP + Zn/Cu	100kg/ha	16th May 07 (at seeding)
	Impact® treated fertiliser (some plots, see treatment list)	40kg/ha N (46% urea)	17th Aug 07 (growth stage 30)
Weed control: Post sowing pre emergent spray	Dual Gold	@ 250mls/ha	16th May 07
	Diuron	@ 500 ms/ha	16th May 07
	Axial	300 ml/ha	3rd July 07
	Adigor	500ml/ha	3rd July 07
	Tigrex	500ml/ha	12th August 07
Fungicide Treatment:	(see Table 3.5)		

Fungicide Treatment:
Three varieties Mitre (MS for stripe rust), Kellalac (MS-MR for stripe rust) and Amarok (R for stripe rust) were treated with seven different fungicide regimes based on three different timings of foliar fungicides and an in-furrow fungicide (Table 3.5).

Table 3.5: Fungicide treatment list

Trt No.	At Seeding	GS 32 – 2nd node (3 leaf)	GS 39 (flag leaf)	GS 59 (ear emergence)
1	Untreated	---	---	---
2	---	---	Opus 250ml/ha	---
3	---	Folicur 145ml/ha	Opus 250ml/ha	---
4	Impact 400ml/ha in furrow	---	---	---
5	Impact 400ml/ha in furrow	---	Opus 250ml/ha	---
6	Impact 400ml/ha in furrow	Folicur 145ml/ha	Opus 250ml/ha	Folicur 145ml/ha
7	Impact 400ml/ha in furrow	---	Opus 250ml/ha	---

Folicur 430EC - 145ml/ha = 62.5 g/ha Tebuconazole ai
Opus 125SC - 250ml/ha = 31.25g/ha Epoxiconazole ai

Trial Results:

i) Disease assessment
Stripe rust was the only disease to develop in this trial, infecting Mitre primarily, with lower levels in Kellalac and none visible in Amarok.

ii) Yield data (t/ha)
Mitre (MS-S) – maximum response to fungicide application 0.37 t/ha
In the susceptible variety Mitre, all fungicide treatments gave yields higher than the untreated. Impact® followed by a fungicide application at GS32 and GS39 provided the only significant yield increase (maximum 12.7%). Note that in Mitre, the yield trend for Impact® treatments is more equal with foliar fungicide treatments compared with Kellalac, indicating the benefit of upfront control in the susceptible variety. However this benefit of Impact® was not apparent in the disease scores at the start of the season, since infection was first noted late in this trial (after GS32).

Kellalac (MR-MS) – maximum response to fungicide application 0.27 t/ha
There was a lower response to fungicide applications overall (maximum 8.2%). Due to a later stripe rust infection there was a greater yield response to foliar fungicides than up front fungicides. The economic optimum was a single spray of Opus 250ml/ha applied at GS39.

Amarok (R) – maximum response to fungicide application 0.2t/ha
Amarok produced statistically higher yields than Mitre and Kellalac but there were no significant benefits to fungicide application in Amarok.
The yield data for individual varieties is featured in Figures 3.3, 3.4 and 3.5.

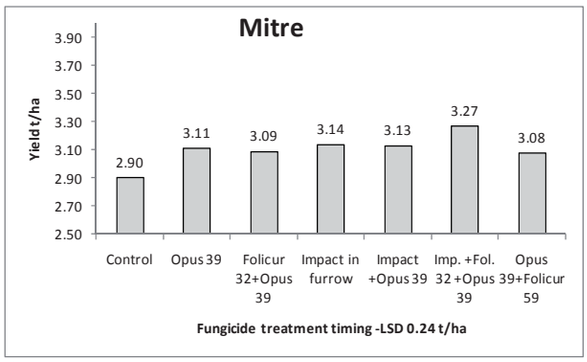

Figure 3.3: Influence of fungicide treatment on the yield (t/ha) of Mitre (stripe rust rating MS-S)

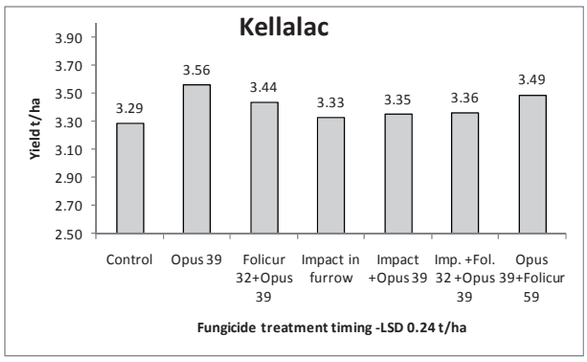

Figure 3.4: Influence of fungicide treatment on the yield (t/ha) of Kellalac (stripe rust rating MR-MS)

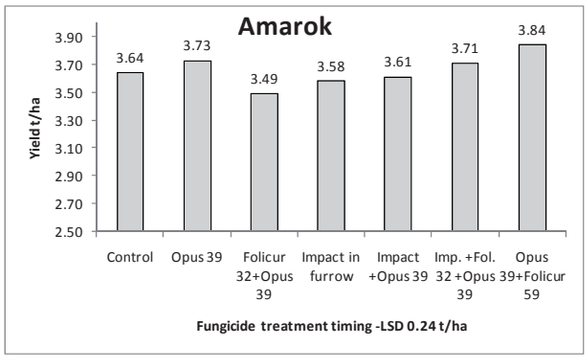

Figure 3.5: Influence of fungicide treatment on the yield (t/ha) of Amarok (stripe rust rating R)

If the three varieties were grouped together, the influence of Impact® on yield was not significant in comparison to the application of foliar fungicide at GS32 & 39 which was significant.

Table 3.6: Influence of disease management strategy on Yield t/ha, % Screenings 2.2mm, % Protein, Test weight kg/hl and Margin over untreated ($/ha) of Mitre, Kellalac and Amarok.

		Yield	Screen.	Protein	Test. wt	Margin over untreated
Cv.	Fungicide	t/ha	%	%	kg/hl	$/ha
Mitre						
	Untreated	2.90	0.9	11.6	76.2	0
	Opus 250ml/ha GS39	3.11	0.7	11.8	76.5	39
	Folicur 145ml/ha GS32 f.b. Opus GS39	3.09	1.0	11.7	76.7	17
	Impact in furrow 400ml/ha	3.14	1.2	11.6	75.3	85
	Impact in furrow f.b. Opus GS39	3.13	0.7	11.5	77.0	30
	Impact in furrow f.b. Folicur GS32 fb Opus GS39	3.27	0.7	11.8	76.3	75
	Opus GS39 f.b Folicur 145ml/ha GS59	3.08	0.9	11.3	77.2	13
Kellalac						
	Untreated	3.29	1.5	11.2	78.5	0
	Opus 250ml/ha GS39	3.56	1.4	11.4	79.1	60
	Folicur 145ml/ha GS32 f.b. Opus GS39	3.44	1.4	11.6	78.5	-4
	Impact in furrow 400ml/ha	3.33	1.5	11.4	77.9	-1
	Impact in furrow f.b. Opus GS39	3.35	1.2	11.3	78.3	-45
	Impact in furrow f.b. Folicur GS32 Opus GS39	3.36	1.1	11.6	78.7	-55
	Opus GS39 f.b Folicur 145ml/ha GS59	3.49	1.4	11.5	78.8	17
Amarok						
	Untreated	3.64	1.9	10.7	78.6	0
	Opus 250ml/ha GS39	3.73	2.7	10.7	78.3	-19
	Folicur 145ml/ha GS32 f.b. Opus GS39	3.49	2.2	11.1	78.0	-126
	Impact in furrow 400ml/ha	3.58	2.4	10.9	78.4	-42
	Impact in furrow f.b. Opus GS39	3.61	2.8	10.9	78.6	-84
	Impact in furrow f.b. Folicur GS32 Opus GS39	3.71	3.0	10.7	78.4	-58
	Opus GS39 f.b Folicur 145ml/ha GS59	3.84	3.4	10.4	78.7	11
LSD						
Within Cultivar		**0.24**	**0.6**	**0.7**	**1.0**	
Other comparisons		**0.26**	**0.6**	**0.8**	**1.0**	
Cultivar/Fungicide interaction		**Nil**	**Variety x Fung_GS32-39**	**Nil**	**Variety x Fung_GS32-39**	

Notes:
Grain prices were $400/t for feed, $425/t for APW and $430/t for AH.
Application cost at $7.50 per pass
It has been assumed that the wheeling damage associated with foliar fungicides reduced yield by 2.5%. This yield reduction was not applied to the untreated or Impact in furrow.