4.1.3 FOLIAR FUNGICIDE EVALUATION ON SUSCEPTIBLE WINTER WHEAT - CV KELLALAC - GNARWARRE AND HAMILTON

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Background:
The following data has been generated as part of a **GRDC funded project (SFS 0006)**, which is taking place across southeast Australia. These trials are examining the role of foliar fungicides and canopy management in cereal husbandry under a range of climatic conditions.

Next year the number of fungicide products available to the grower is set to increase, some of the most interesting promise to be the strobilurins (products such as Amistar Xtra).

This fungicide which is likely to be registered in the near future, offers longer disease protection, prolonged green leaf retention and given sufficient soil moisture, a longer grain fill period. However the question to be answered is whether this effect can be employed economically with crops grown in southern Victoria.

In this past season there was the additional benefit of assessing how the new fungicides performed against stripe rust, which was a feature of project trials at Murtoa (cv Wyalkatchem) and at two of the New South Wales trials at Harden (cv H45 and Chara). (see GRDC adviser update paper)

Aims:
To develop specific disease management strategies for more susceptible wheat varieties.
The individual objectives within the trial are as follows:

- To compare the disease control and yield response associated with two different timings of triazole fungicide (Folicur) application and to assess whether two sprays are superior to one **(Trt 1,7 & 13)**
- To compare the performance of the Tebuconazole (Folicur) and Epoxiconazole (Opus) in one and two spray programmes when mixed with the same level of strobilurin (125g/ha ai Azoxystrobin) **(Trt 3,5,9,11,15 & 17)**
- To examine the disease control, green leaf area retention and yield response from one and two spray programmes of triazole with and without strobilurin inclusion. **(Trt 1-4, 7-10, 13-16)**
- To examine the influence of increasing the rate of strobilurin dose (Azoxystrobin – Amistar) from 62.5 g/ha ai to 250 g/ha ai in one and two spray programmes and at 2 different timings **(Trt 2-4, 8 –10, 14-16)**
- To compare whether the same level of fungicide active ingredient was better applied in a one spray or two-spray programme and to assess whether the optimum rate of strobilurin is influenced by the number of fungicide applications. **(Trt1-5, 7-11 & 13 - 17)**
- To compare the performance of the strobilurins Azoxystrobin (Amistar) and Pyraclostrobin (F500) when used in mixture with Opus in one and two spray programmes at 50% dose rates. **(Trt 5,6 11,12,17 & 18)**

N.B. Some of these results have been generated using products that are currently not registered for use in cereals, please check with your agrichemical reseller for label approvals at the time of purchase, since it is expected that new fungicide products will be approved over the next couple of seasons.

GNARWARRE Summary:

None of the fungicide treatments gave a statistically significant yield increase at the Gnarwarre site. Despite Kellalac's susceptibility to leaf rust in other regions and the presence of this disease in last years trials at the same site, green leaf area assessments during grain fill (GS72) revealed no difference between treatments. Thus despite the observations relating to strobilurin yield increases in the absence of visual disease, there was no evidence to suggest a yield response to the new fungicide chemistry at this site. Two factors look to have helped maintain very low disease levels at this site.

Firstly the very dry conditions in the Geelong region last autumn cut down the green bridge pressure (this is the growth of volunteers which harbour disease between crops). The late break resulted in later plantings, which will have further reduced disease pressure. In addition whilst October was relatively cool, November was dry and many crops may have had grain fill curtailed during this period. A further indication that disease pressure was low, came from quality analysis, which illustrated excellent grain test weights in all treatments including the untreated.

Methods:

This trial was conducted using a fully replicated (x4) randomised block design at the Gnarwarre and Hamilton sites using the more disease prone variety Kellalac. 18 fungicide treatments were evaluated at 2 different timings versus 2-3 untreated controls.

Fungicides were applied according to Table 42 with the first application applied at second node Zadoks Z32 or GS32 (22/9/03 Kellalac and 13/10/03 MacKellar) at Gnarwarre and 30/9/03 Kellalac and 14/10/03 MacKellar at Hamilton. The second application was applied at full flag leaf emergence Z39 or GS39 (22/10/03 Kellalac and 27/10/03 MacKellar) at Gnarwarre and 24/10/03 Kellalac and 4/11/03 MacKellar at Hamilton. Critical crop development stages were monitored throughout the season.

Disease Assessments:

There were no obvious disease or green leaf area differences in this trial, due to fungicide treatment.

Table 42: The Influence of Fungicide Applications at Various Rates and Timings on Kellalac Wheat Yield at Gnarwarre

trt	GS32 (leaf 3 emergence)	GS39 (Flag leaf emergence)	Yield T/ha	Test Weight kg/hl	% GLA at GS72
1	Folicur 145 ml/ha	Nil	5.26	80.2	38
2	Folicur 145 ml/ha + Amistar 250ml/ha	Nil	5.49	80.6	41
3	Folicur 145 ml/ha + Amistar 500ml/ha	Nil	5.71	80.3	36
4	Folicur 145 ml/ha + Amistar 1000ml/ha	Nil	5.36	80.9	35
5	Opus 250 ml/ha + Amistar 500ml/ha	Nil	5.21	80.5	38
6	Opus 250 ml/ha + F500 400ml/ha	Nil	5.31	80.2	34
7	Nil	Folicur 145 ml/ha	5.08	80.2	34
8	Nil	Folicur 145 ml/ha + Amistar 250ml/ha	5.19	80.2	37
9	Nil	Folicur 145 ml/ha + Amistar 500ml/ha	5.01	80.6	40
10	Nil	Folicur 145 ml/ha + Amistar 1000ml/ha	5.20	80.0	38
11	Nil	Opus 250 ml/ha + Amistar 500ml/ha	5.56	80.1	39
12	Nil	Opus 250 ml/ha + F500 400ml/ha	5.35	81.0	33
13	Folicur 72.5 ml/ha	Folicur 72.5 ml/ha	5.19	80.6	39
14	Folicur 72.5 ml/ha + Amistar 125ml/ha	Folicur 72.5 ml/ha + Amistar 125ml/ha	5.10	80.1	38
15	Folicur 72.5 ml/ha + Amistar 250ml/ha	Folicur 72.5 ml/ha + Amistar 250 ml/ha	5.08	80.3	35
16	Folicur 72.5 ml/ha + Amistar 500ml/ha	Folicur 72.5 ml/ha + Amistar 500 ml/ha	5.07	80.6	36
17	Opus 125 ml/ha + Amistar 250ml/ha	Opus 125 ml/ha + Amistar 250ml/ha	5.38	80.3	40
18	Opus 125 ml/ha + F500 200ml/ha	Opus 125 ml/ha + F500 200ml/ha	5.42	80.7	36
19	Untreated		5.33	80.4	34
		LSD(5%)[Fungicide treatments]	**0.44**	**1.0**	
		LSD(5%)[Untreated versus treated]	**0.38**	**0.9**	
		CV%	**5.8%**		

None of the fungicide treatments gave a statistically significant increase or decrease in yield compared to the untreated. Disease levels were extremely low all season at the Gnarwarre site, such that at GS72 (milky ripe stage) there was little difference between treatments in terms of green leaf area (GLA) of the whole crop canopy.

HAMILTON **Summary:**

The generally wetter conditions at Hamilton gave greater disease pressure than that experienced at Gnarwarre. From flag leaf emergence (GS39) onwards leaf rust (*Puccinia recondita*) developed strongly, reaching 25% infection on the flag leaf and 39% on leaf 2 by late grain fill (December 9th). Fungicide treatment gave good control of this disease with the optimum timings being single applications applied at flag leaf emergence. Strobilurin (Amistar–azoxystrobin) addition to Folicur was noted to give better leaf rust control, however this could not be related to yield (statistically) in this experiment. Overall timing of fungicide had a greater impact on disease control than product used, a feature also noted in this season's stripe rust control trials.

Yields generally, were rather variable making them difficult to correlate with disease control assessments. However when meaned across the different treatments there was a significant response to fungicide application, which measured 4.5% with GS32 timings/GS32+39 timings and 6% with GS39 timings.

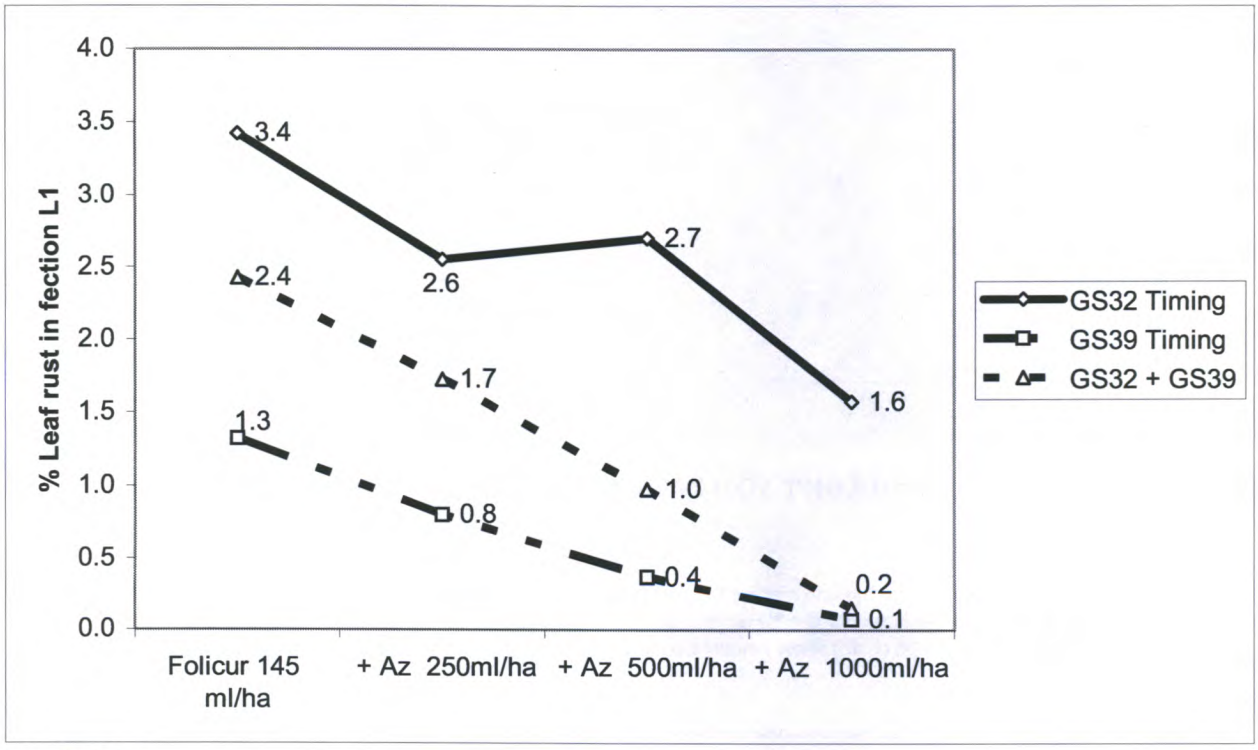
It is thought that the drier grain fill finish may well have reduced overall yield response, since the disease differences visually manifest between GS32 and GS39 timings were not strongly apparent in yield (1.5% yield difference).

Unlike the 2002/03 season it could not be shown that strobilurins gave statistically significant yield increases over the triazoles (Folicur), a result that in part maybe due to the good performance of Folicur alone, particularly at flag leaf.

Disease Assessments:

The wetter nature of the Hamilton site lead to greater disease pressure, with high levels of "Kellalac yellowing" mixed with *Septoria tritici* on leaf 4 between GS32 (second node) and GS39 (flag leaf emergence). At flag leaf emergence the first signs of leaf rust were apparent in the untreated crop, this disease progressed rapidly through November, with very good visual differences apparent by late November and early December (Figure 11, Figure 12, Figure 13).

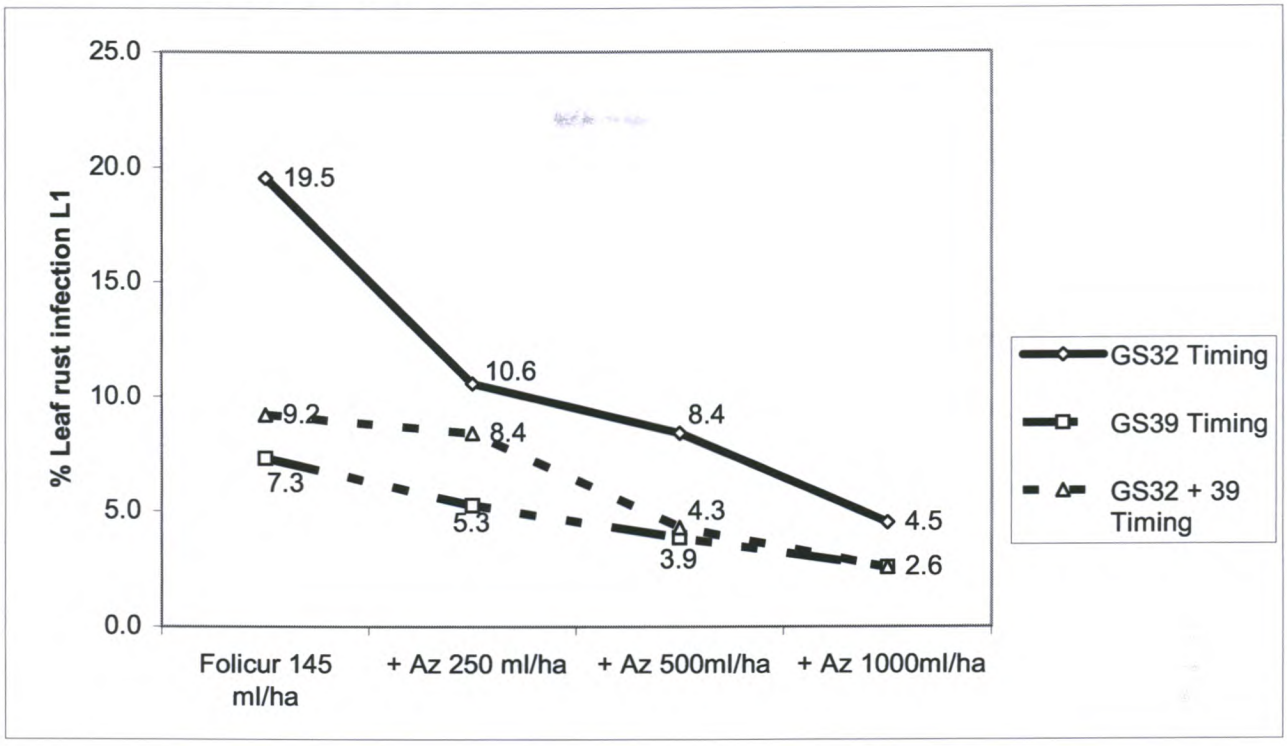
Figure 11: Influence of Timing and Strobilurin Rate on Flag Leaf Rust Infectioin @ GS71 (26/11/03) cv Kellalac, Hamilton, Victoria



Az = Amistar

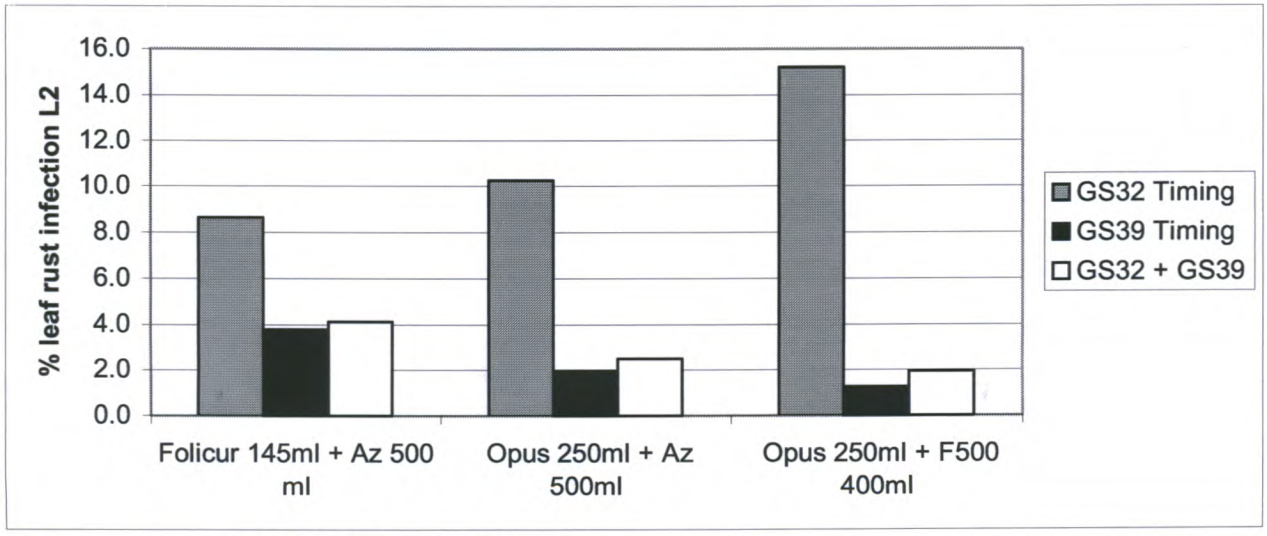
For the same level of active ingredient the lowest disease levels were recorded with the single GS39 flag leaf emergence timings. The sequence of 2 sprays held no advantage over the same level of active applied as a single application at GS39, with the exception of the highest rate of strobilurin tested. The addition of strobilurin (Amistar) to Folicur reduced leaf rust infection, with higher rates giving better disease control.

Figure 12: Influence of Timing and Strobilurin Rate on Leaf Rust Infection @ GS80 (08/12/03) CV Kellalac, Hamilton, Victoria



The pattern was similar to that illustrated in Figure 11, however the level of leaf rust at this stage had increased to 25% in the untreated from 3.7% 13 days earlier. The impact of the strobilurin was greatest at the inferior GS32 timing, however the best disease control from GS32 timing could be achieved with a quarter of the active ingredient if employed at the optimum timing of GS39. Thus there was no real substitute for applying the fungicide to the leaf you wished to protect.

Figure 13: Influence of Fungicide Mixture on Leaf Rust Infection @ GS80 (09/12/03) Leaf 2 (-cv Kellalac, Hamilton, Victoria)



F500 = Pyraclostrobin (an experimental strobilurin)

Differences in performance due to fungicide mixture were small, however there was an indication that the Opus/F500 mixture was more suited to the GS39 timing, where as the Folicur/Amistar and Opus/Amistar combinations performed relatively better at GS32.

Overall however irrespective of product mixture the GS39 timings gave the best disease control, indicating as was so often the case in 2003-04 that timing is more important than product.

Table 43: The Influence of Fungicide Applications at Various Rates and Timings on Wheat Yield at the Hamilton Site cv Kellalac

trt	GS32 (leaf 3 emergence)	GS39 (Flag leaf emergence)	Yield t/ha
1	Folicur 145 ml/ha	Nil	4.56
2	Folicur 145 ml/ha + Amistar 250ml/ha	Nil	4.53
3	Folicur 145 ml/ha + Amistar 500ml/ha	Nil	4.67
4	Folicur 145 ml/ha + Amistar 1000ml/ha	Nil	4.78
5	Opus 250 ml/ha + Amistar 500ml/ha	Nil	4.59
6	Opus 250 ml/ha + F500 400ml/ha	Nil	4.50
7	Nil	Folicur 145 ml/ha	4.78
8	Nil	Folicur 145 ml/ha + Amistar 250ml/ha	4.59
9	Nil	Folicur 145 ml/ha + Amistar 500ml/ha	4.84
10	Nil	Folicur 145 ml/ha + Amistar 1000ml/ha	4.72
11	Nil	Opus 250 ml/ha + Amistar 500ml/ha	4.42
12	Nil	Opus 250 ml/ha + F500 400ml/ha	4.60
13	Folicur 72.5 ml/ha	Folicur 72.5 ml/ha	4.56
14	Folicur 72.5 ml/ha + Amistar 125ml/ha	Folicur 72.5 ml/ha + Amistar 125ml/ha	4.54
15	Folicur 72.5 ml/ha + Amistar 250ml/ha	Folicur 72.5 ml/ha + Amistar 250 ml/ha	4.47
16	Folicur 72.5 ml/ha + Amistar 500ml/ha	Folicur 72.5 ml/ha + Amistar 500 ml/ha	4.64
17	Opus 125 ml/ha + Amistar 250ml/ha	Opus 125 ml/ha + Amistar 250ml/ha	4.78
18	Opus 125 ml/ha + F500 200ml/ha	Opus 125 ml/ha + F500 200ml/ha	4.61
19	Untreated		4.40
		LSD(5%)[Trtd vs Trtd]	**0.45**
		LSD(5%)[Ctrl vs Trtd]	**0.37**
		CV%	**7.0**

Overall fungicides gave yield responses of between 0 - 8.5%, however the only statistically significant yield differences were recorded between untreated and treated, plus an advantage to Opus (epoxiconazole) over Folicur (tebuconazole) when applied in a 2 spray sequence.

At this site the level of fungicide response was surprisingly low in comparison to the level of leaf rust recorded at the beginning of December, indicating that grain fill may have been curtailed by a drier finish, despite earlier spring conditions conducive to disease.

However yields were rather variable for this site, which has made it difficult to interpret various yield trends.

Another factor, which points to grain fill being curtailed, is the far superior performance of flag leaf emergence sprays (GS39) in disease assessments compared to second node GS32 application, yet only a 1.5% yield advantage to GS39 treatments compared to GS32 i.e. GS32 sprays generated 4.5% yield increase compared to 6% with GS39 sprays.