

3.3.2 Stem rust control in wheat - Inverleigh, Vic

Location:

Inverleigh Research Site.

Funding:

This is a FAR led project that covered Victoria and South Australia funded by GRDC.

Researchers:

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Background/Aim:

Stem rust in wheat (*Puccinia graminis f.sp. tritici*) was first reported in the southern Mallee on 1st November. Most crops in the region were post flowering and at varying stages of grain fill. Further south it appeared in trials the following week, being identified from Lake Bolac to Gippsland. Against this backdrop two trials were set up in these regions to look at the economics and performance of foliar fungicides to combat this disease. This was part of a nationally co-ordinated project funded by the GRDC to gather more data on both the efficacy and economics of spraying for stem rust. There has been a large increase in the number of fungicide active ingredients available to cereal growers since the last major outbreak of stem rust in 1973. Therefore the objective of this work was:

- To evaluate the efficacy of different foliar fungicides against stem rust (*Puccinia graminis f.sp. tritici*) in wheat.
- To account for possible shortages in foliar fungicide supply, products were tested over as wide a rate range as possible (N.B. Use of products and rates lower than label rates in this trial does not constitute a recommendation).

Summary of findings:

- Fungicide application for stem rust control was more effective and economic where product application was made prior to visible infection in the crop.
- Where fungicide application was made at an early stage of grain fill (GS71) disease control of stem rust was inferior to the same products applied at the same rate 16 days earlier at 50% ear emergence (GS55).
- Higher rates of fungicide (label rates for stem rust control) need to be employed for this disease in order to give effective control; this is particularly the case with fungicides containing a single active ingredient such as tebuconazole (e.g. Folicur) or epoxiconazole (e.g. Opus).
- The strobilurin/triazole mixture of azoxystrobin/cyproconazole (Amistar Xtra) gave excellent stem rust control at its highest rate but its higher cost reduced its economic return.
- The performance of propiconazole (e.g. Tilt) against stem rust was poor in terms disease control, relative to other products tested..

Rainfall:

Avg. Annual:	548
Avg. G.S.R.:	408
2010 Total:	609
2010 G.S.R.:	407

Treatment list

Cultivar: Beaufort (Susceptible-S rating for stem rust)

The trial was set up at the SFS Inverleigh site in an unsprayed block of wheat cv. Beaufort (Susceptible-S rating for stem rust) near Geelong. In this trial the treatments outlined in Table 1 were sprayed prophylactically at approximately 50% ear emergence (GS55) on the 10th November, before any infection was recorded. In addition, the highest rates of fungicide (Trt 3,6,9,12,15,18 and 21) were also applied post infection on 26th November (16 days after the first timing) when the crop was at early grain fill (GS71).

Stem rust started to develop from late November onwards when the crop had finished flowering. The disease incidence increased from approximately 15% to over 90% in 18 days in the untreated crop (Figure 1).

Figure 1: Stem rust development (% incidence & severity) on the flag leaf sheath of the untreated crop 0, 7, 16 and 34 days following trial treatment application – Inverleigh (HRZ), VIC.

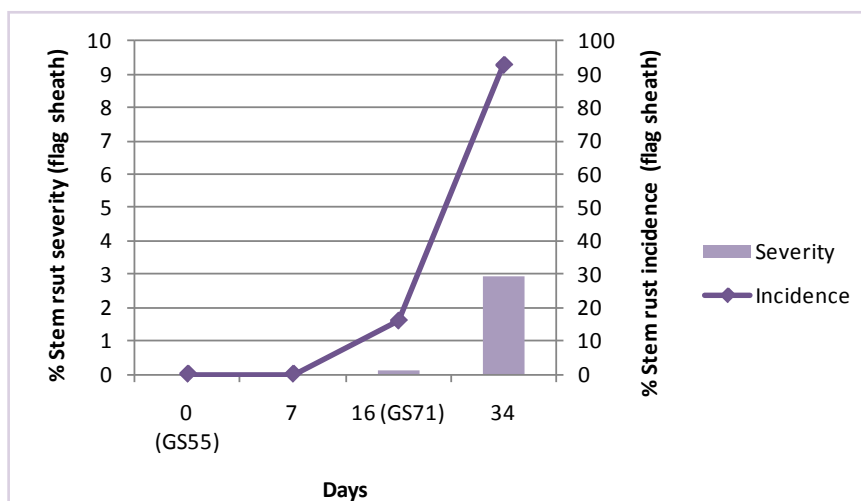


Table 1: Fungicide treatment and formulation, application rate and active ingredient content (label rate for stem rust highlighted where label recommendation exists)

Fungicide treatment & rate (ml/ha)	Active ingredient (g/ha ai)
1. Prosaro 420SC 75 ml/ha + Hasten 1% v/v	Prothioconazole 15.6+ Tebuconazole 15.6
2. Prosaro 420SC 150ml/ha + Hasten 1%v/v	Prothioconazole 31.3+ Tebuconazole 31.3
3. Prosaro 420SC 300ml/ha + Hasten 1 %v/v	Prothioconazole 62.5+ Tebuconazole 62.5
4. Opus 125SC 125 ml/ha	Epoxiconazole 15.6
5. Opus 125SC 250 ml/ha	Epoxiconazole 31.3
6. Opus 125SC 500ml/ha	Epoxiconazole 62.5
7. Amistar Xtra 280SC 200 ml/ha	Azoxystrobin 40 + Cyproconazole 16
8. Amistar Xtra 280SC 400 ml/ha	Azoxystrobin 80 + Cyproconazole 32
9. Amistar Xtra 280SC 800 ml/ha	Azoxystrobin 160 + Cyproconazole 64
10. Tilt 250EC 125 ml/ha	Propiconazole 31.3
11. Tilt 250EC 250 ml/ha	Propiconazole 62.5
12. Tilt 250EC 500 ml/ha	Propiconazole 125
13. Tilt Xtra 330EC 125 ml/ha	Cyproconazole 10 + Propiconazole 31.3
14. Tilt Xtra 330EC 250 ml/ha	Cyproconazole 20 + Propiconazole 62.5
15. Tilt Xtra 330EC500 ml/ha	Cyproconazole 40 + Propiconazole 125
16. Folicur 430SC 72.5 ml/ha	Tebuconazole 31.3
17. Folicur 430SC 145 ml/ha	Tebuconazole 62.5
18. Folicur 430SC 290 ml/ha	Tebuconazole 125
19. Opera 147SC 250 ml/ha	Pyraclostrobin 21.3 + Epoxiconazole 15.6
20. Opera 147SC 500 ml/ha	Pyraclostrobin 42.5 + Epoxiconazole 31.3
21. Opera 147SC 1000 ml/ha	Pyraclostrobin 85 + Epoxiconazole 62.5
22 – 24. Untreated	

Influence of fungicide timing and rate on stem rust incidence and severity (mean of 7 fungicide product) – (34 days after GS55 and 18 days after GS71):

34 days after the GS55 fungicide application and 18 days after the GS71 fungicide, the control of stem rust was significantly better (both incidence and severity) on the flag sheath with the earlier timing. The later timing gave results equivalent to the low and intermediate fungicide rates applied at GS55 (Figure 2). However on the peduncle that was unaffected with stem rust at the time of the later fungicide application (GS71) there was no significant difference in stem rust control between the early and late spray, though the trend was for better performance from the earlier timing (Figure 3).

34 days after application the influence of all fungicide treatments were assessed in terms of severity (% cover of the leaf sheath) and incidence (% of flag leaf sheath with infection) (Figure 4 & 5).

All fungicide treatments irrespective of rate gave significant control of stem rust compared to the untreated. The low rates of fungicide were more effective at reducing disease severity than incidence of the disease. In contrast to other trial sites in the project rate appeared to have a greater influence than product. At the high rate of active there was no difference in fungicide performance (based on stem rust severity). Results revealed that all products gave at least 83% control of the disease when applied at the full rate with the strobilurin mixtures Opera (Pyraclostrobin /Epoxiconazole) and Amistar Xtra (Azoxystrobin/Cyproconazole) mixtures giving approximately 95% control and the azole based combination of Tilt Xtra (Propiconazole/Cyproconazole) giving about 97% disease control. Nationally Tilt (propiconazole) gave inferior performance to other fungicides tested however at Inverleigh this was not as evident in the data.

Figure 2: Influence of fungicide timing (50% ear emergence (GS55) v watery ripe (GS71) and rate on stem rust % incidence and severity on the flag leaf sheath 34 days after fungicide application at GS55 and 18 days after fungicide application at GS71 (mean of 7 fungicide products) – Inverleigh (HRZ), VIC.

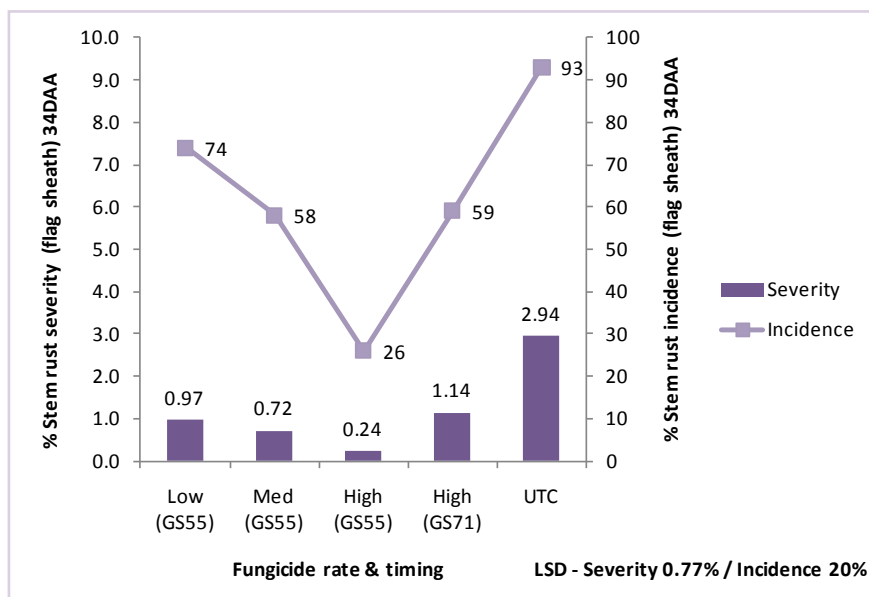
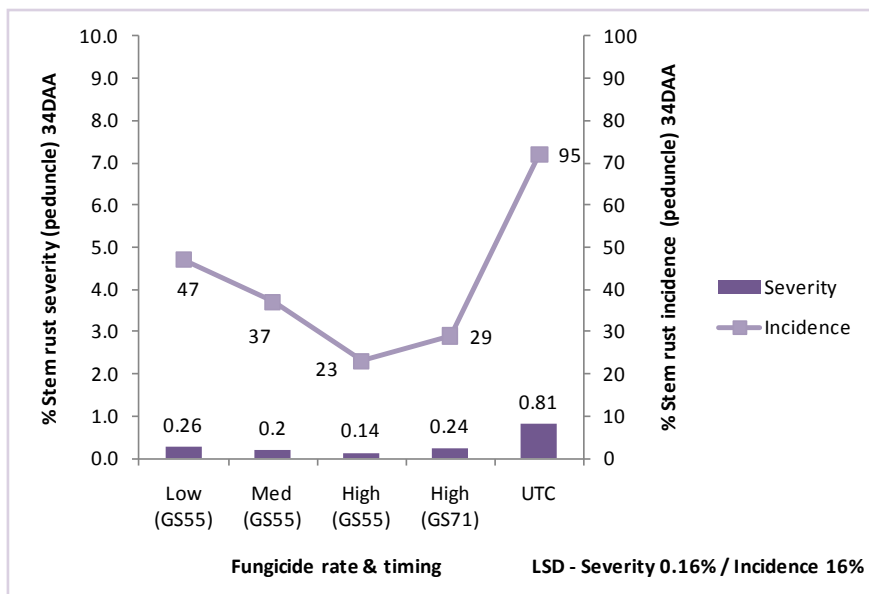


Figure 3: Influence of fungicide timing (50% ear emergence (GS55) v watery ripe (GS71) and rate on stem rust % incidence and severity on the peduncle 34 days after fungicide application at GS55 and 18 days after fungicide application at GS71 (mean of 7 fungicide products) – Inverleigh (HRZ), VIC



Yield Results t/ha and % of untreated control:

Yields across the trial varied by 1.2t/ha, with a small number of treatments being significantly different to the untreated. The influence of timing (GS55 v GS71) on yield correlated with the earlier disease assessments in that the later timing gave yield results inferior to the earlier timing, on a par to that of the low rate of application.

The prophylactic high rate application at GS55 gave a mean 3% yield increase over the untreated. The mean yield when the same fungicide rate was applied at GS71 was less than that of the untreated.

Where different dose rates were compared at the ear emergence timing GS55, there was no increase in yield with low rate applications a 2.6% increase with the intermediate rate and 3% with the high rate.

The lack of significant difference makes it inappropriate to comment on yield differences between products.

Table 2: Influence of fungicide product and rate on yield t/ha and % yield above the untreated - Beaufort, Inverleigh (HRZ)

Fungicide treatment	GS55 Timing						GS71 Timing	
	Low Rate		Mid Rate		High Rate		High Rate	
	Yield t/ha	% Yield	Yield t/ha	% Yield	Yield t/ha	% Yield	Yield t/ha	% Yield
Prosaro + Hasten	6.18	100	6.38	103	6.93	112	6.08	98
Opus	6.03	97	6.40	103	6.03	97	6.20	100
Amistar Xtra	6.13	99	6.25	101	6.53	105	6.23	100
Tilt	6.35	102	6.78	109	6.35	102	5.97	96
Tilt Xtra	6.30	102	6.35	102	6.40	103	6.38	103
Folicur	5.70	99	6.25	101	6.40	103	6.10	98
Opera	6.18	100	6.10	98	6.20	100	5.95	96
Mean	6.12	98.7	6.36	102.5	6.40	103.3	6.13	98.8

*LSD [Treatment comparisons at same rate] – 0.57t/ha

*LSD [Treatment comparisons at all rates] – 0.56 t/ha

*Untreated 6.20

*LSD [Treatment comparisons to untreated] – 0.42t/ha

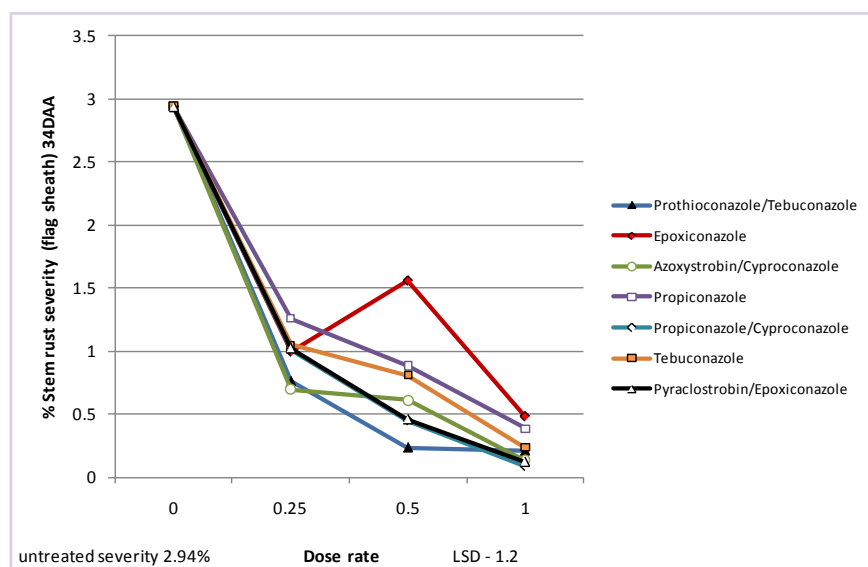


Figure 4: Influence of fungicide product and rate on stem rust infection on the flag sheath (% severity) assessed 34 days after fungicide application – Inverleigh (HRZ), VIC

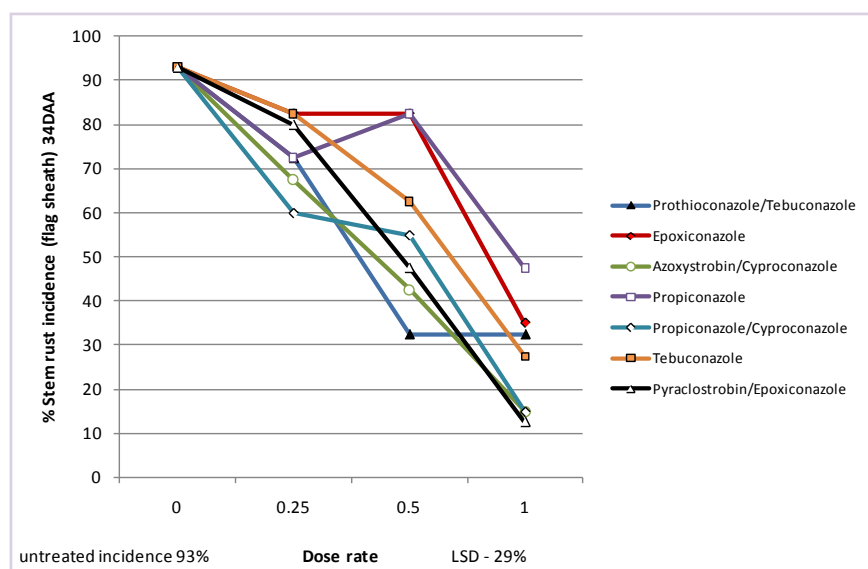


Figure 5: Influence of fungicide product and rate on stem rust infection on the flag sheath (% incidence) assessed 34 days after fungicide application – Inverleigh (HRZ), VIC