Fungicide strategies in wheat

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The aim of this trial was to assess the impact of the new strobilurin fungicides on disease management in wheat and determine whether the likelihood of fungicide response can be linked to specific timings, disease and plant available water. The trial was carried out as part of a GRDC funded project (SFS 00006) looking at disease management in southeast Australia. The BCG-WFS trials were at two locations - Birchip and Murtoa.

Summary

Fungicides were not cost effective in the Birchip and Murtoa wheat trials, despite the late appearance of stripe rust at Murtoa. The new strobilurin fungicides conferred no significant yield advantages over the triazole product Folicur®, a feature probably linked to the dry conditions during grain fill. Unlike barley at the same sites, there was no indication that strobilurin treatments conferred any prolonged green leaf retention.

At Birchip, stripe rust did not affect the trial and there was no indication that fungicides had any positive effects. At Murtoa, whilst applications were not cost effective, there was an indication that fungicides gave positive yield effects that correlated with stripe rust control. The best stripe rust control was given by the applications made at Z39 or GS39 (full flag leaf emergence). Where fungicides were applied earlier at GS32 (second node), stripe rust control was not as effective, indicating that for a leaf to be protected with a foliar fungicide it has to have been emerged at the time of application. In this trial, the dry finish did not allow these timing effects on stripe rust to translate into yield, however at Harden in NSW, under higher disease pressure, the early GS32 timings were significantly inferior to GS39 flag leaf timings in both disease control and yield.

There was no clear influence of fungicide application on grain quality.

Background

The lower rainfall associated with the Mallee and Wimmera region has traditionally meant that fungicide application for disease control in cereals is only occasionally justified. In the majority of seasons the low disease pressure and lower yield potential mean that fungicide application is considered uneconomic.

The new strobilurin fungicides such as Amistar Xtra, which are likely to be registered in the near future, offer longer disease protection, prolonged green leaf retention and given sufficient soil moisture, a longer grain fill period. The question to be answered is whether this effect can be employed economically with crops grown in the Wimmera and Mallee.

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

Methods

This trial was conducted using a fully replicated (x4) randomised block design at the Birchip and Murtoa sites.

At Birchip, Wyalkatchem wheat was sown at 175 plants/m^2 on May 12 with 60kg/ha EzyZinc. Prior to sowing, urea was pre-drilled at 50kg/ha and Triflur 480® applied at 0.8L/ha. LVE MCPA® at 400ml/ha and Lontrel® at 75ml/ha were applied on June 20.

At Murtoa, Wyalkatchem wheat was sown at 200 plants/m^2 on May 28 with 60kg EzyZinc. Urea was pre-drilled prior to sowing at 80kg/ha and topdressed on August 19 at 60kg/ha. Triflur 480® was applied at 0.8L/ha prior to sowing and Achieve® at 300g/ha was applied on July 4. Ally® at 3g/ha, Jaguar® at 300ml/ha, LVE MCPA® at 250ml/ha, Lontrel® at 100ml/ha and wetter at 0.1% were applied on August 19.

Fungicides were applied according to Table 1 with the first application applied at second node Zadoks Z32 or GS32 (August 15 at Birchip and September 3 at Murtoa). The second application was applied at full flag leaf emergence Z39 or GS39 (September 12 at Birchip and October 3 at Murtoa). Critical growth parameter stages were monitored throughout the season (plant, tiller and head densities) and yield, screenings and protein were recorded at harvest.

Results

There was no significant effect of fungicides on wheat yield at Birchip or Murtoa in 2003 (Table 1).

Table 1. The influence of fungicide applications at various rates and timings on wheat yield and quality at Birchip and Murtoa.

Product	Timing of applic'n	Rate (ml/ha)	Yield (t/ha)		Protein (%)		Screenings (%)	
			Birchip	Murtoa	Birchip	Murtoa	Birchip	Murtoa
Folicur	Z32	145	2.59	3.20	10.0	13.0	2.5	1.9
Folicur + Amistar	Z32	145 + 250	2.53	3.28	-	-	-	-
Folicur + Amistar	Z32	145 + 500	2.58	3.17	-	-	-	-
Folicur+ Amistar	Z32	145 + 1000	2.53	3.16	10.1	12.9	2.1	2.3
Opus + Amistar	Z32	250 + 500	2.55	3.18	-	-	-	-
Opus + F500	Z32	250 + 400	2.56	3.22	-	-	-	-
Folicur	Flag leaf	145	2.52	3.20	10.0	12.3	3.1	3.6
Folicur + Amistar	Flag leaf	145 + 250	2.46	3.22	-	-	-	-
Folicur + Amistar	Flag leaf	145 + 500	2.48	3.21	-	-	-	-
Folicur + Amistar	Flag leaf	145 + 1000	2.48	3.28	10.1	12.5	2.4	2.7
Opus + Amistar	Flag leaf	250 + 500	2.52	3.06	-	-	-	-
Opus + F500	Flag leaf	250 + 400	2.56	3.00	-	-	-	-
Folicur + Folicur	Z32 + flag leaf	72.5 + 72.5	2.53	3.29	9.6	12.6	3.0	3.3
(Folicur + Amistar) + (Folicur + Amistar)	Z32 + flag leaf	(72.5 + 125) (72.5 + 125)	2.55	3.27	-	-	-	-
(Folicur + Amistar) + (Folicur + Amistar)	Z32 + flag leaf	(72.5 + 250) (72.5+ 250)	2.52	3.18	-	-	-	-
(Folicur + Amistar) + (Folicur + Amistar)	Z32 + flag leaf	(72.5 + 500) (72.5 + 500)	2.53	3.23	10.5	12.0	2.6	2.0
(Opus + Amistar) + (Opus + Amistar)	Z32 + flag leaf	(125 + 250) (125 + 250)	2.49	3.26	-	-	-	-
(Opus + F500) + (Opus + F500)	Z32 + flag leaf	(125 + 200) (125 + 200)	2.55	3.14	-	-	-	-
Untreated	-	-	2.52	3.13	9.4	13.1	2.4	2.2
		LSD (5%)	**N.S**	**N.S**	**-**	**-**	**-**	**-**

Explanatory notes on new fungicides: Amistar is azoxystrobin (250gai); F500 is pyraclostrobin; Opus is epoxiconazole (125 gai).

Interpretation

Whilst October was relatively cool, the dry finish through October and November reduced grain fill potential and with it the opportunity to express any potential benefits of fungicide application. At Birchip the trial was unaffected by stripe rust and showed no benefit either in disease control or yield response from the addition of fungicide. The strobilurins applied at Birchip were not observed to prolong green leaf retention as they had in the barley trial on the same site.

At Murtoa where stripe rust came in late (GS59 or ear emergence), whilst there were no statistically significant differences between individual treatments, there was a trend for fungicide to give positive yield effects. There were also differences in stripe rust control between treatment timings, which illustrated that fungicide application before the flag leaf and leaf 2 emerged (ie. GS32 timing) was not as effective as an application made at flag leaf emergence (Figure 1). The addition of the new strobilurins at the early timing did not change this finding, a feature also observed at the NSW site on H45, where disease pressure was much higher.

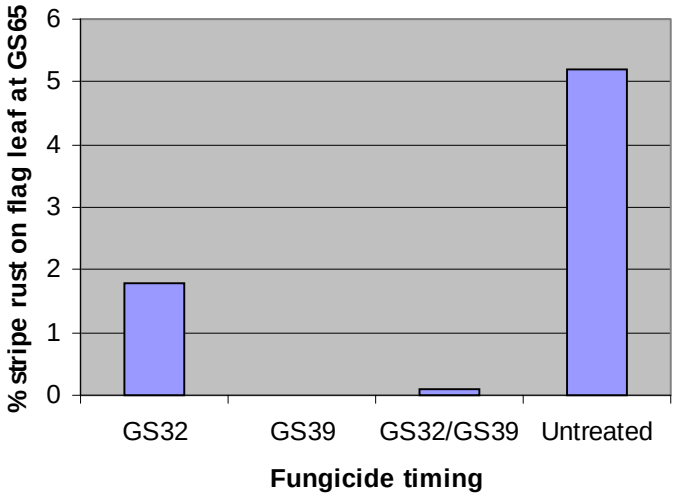

Figure 1. Influence of fungicide timing on stripe rust control assessed at GS65 (flowering) (average of six readings) for variety Wyalkatchem at Murtoa in 2003.

Both the flag leaf application at GS39 and the same level of active ingredient split between the two timings (ie. GS32/GS39) gave complete control of stripe rust at the mid flower assessment (GS65). There was no evidence in this trial that strobilurins conferred any advantages in terms of stripe rust control or yield response over the Folicur® treatments alone.

Folicur® alone gave yield responses of between 2.2% for the single spray timings to 5.1% for the sequence applications (0.07 to 0.16 t/ha), however whilst this would have covered chemical cost, the response would not have been great enough to cover both chemical and application cost.

Commercial Practice

With a slightly later grain fill period than barley, wheat is more likely to be prone to a dry finish curtailing the grain fill period. When this is the case, then fungicide application is more likely to give marginal results, unless disease infection is established relatively early in the season ie. flag leaf or before. There was no evidence from last season's wheat trials in the Mallee and Wimmera that the new strobilurins offered any advantage over the traditional triazoles that are already available such as Folicur®. For the main part this is probably because the long-term protection conferred by these products and the resultant green leaf retention had little chance to be expressed. This lack of expression was probably due to lack of soil moisture and only low to moderate disease infection.

In many commercial crops, disease levels were much higher and infection occurred earlier in the season, thus these results may not be representative of fungicide response on other varieties in the region.

In terms of stripe rust risk for the coming season two factors will be critical,

- The degree of summer/autumn rainfall will determine the intensity of the green bridge (the growth of volunteers will harbour the rust infection until next seasons crop is planted).
- The susceptibility of the variety selected, after the spread of new strains in 2003 many more varieties will have a question mark on susceptibility.

Take these two factors into account when determining new season strategy. Where susceptible varieties are being grown consider seed treatment if green bridge pressure is great, but don't rule out the role of foliar fungicides either cheap insurance products such as triadimefon (Triad®) in the autumn/early season or more persistent products such as tebuconazole (Folicur®) applied at flag leaf.

If seed treatments or early season foliar sprays are applied do not assume that it will give season long protection, since if disease pressure is high then the more important grain fill period may not be adequately covered.

Where no seed treatment is applied the optimum timing for a single foliar fungicide spray is flag leaf emergence (GS39) on the main stem (note this will mean that some side tillers will not have the flag leaf fully emerged). If stripe rust breaks out in early spring then it may be necessary to precede a flag spray with an early season GS32 application that will protect the emerging leaf 3. In this case do not then omit the second spray at flag leaf GS39, since the flag leaf and leaf 2 will be unprotected and could be subject to infection in the second half of the season.