Fungicide strategies in barley

BCG-WFS & Nick Poole (FAR-NZ)

The aim of this trial was to assess the impact of the new strobilurin fungicides on disease management in barley 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 (SFS0006) looking at disease management in south east Australia. The BCG-WFS trials were at two locations - Birchip and Murtoa.

Summary

At both Murtoa and Birchip Gairdner barley developed spot form of net blotch; however it was most evident at Murtoa where fungicide applications gave yield responses varying from minus 0.4% to 8.5% (0-0.38t/ha). At this site three treatments gave significant yield increases over the untreated controls.

At the Birchip site, none of the fungicide treatments gave any significant yield increase over the untreated control despite evidence that fungicide treatments were giving net blotch control and prolonged green leaf retention. Birchip yields varied from minus 5.8% to 3.6% with little or no trends to suggest fungicide yield response.

There was evidence from both sites that strobilurin fungicides prolonged green leaf retention compared to triazole application alone, however this did not translate to yield at Birchip. At Murtoa three treatments gave significant yield increases over the untreated; all three were triazole/strobilurin mixtures with two of the three involving the highest rate of strobilurin. The yield response to the strobilurin (Flint) was greatest at the highest rate and when the product was applied in a sequence. At Murtoa there was a trend suggesting that the highest yielding treatments gave the lowest screenings.

Background

Economic fungicide response is generally linked to the severity, type, time of disease infection and the inherent yield potential of the crop. In the Mallee and to a certain extent the Wimmera, yield potential and drier conditions during grain fill tend to make fungicide application marginal. However, the widespread adoption of Gairdner barley has brought with it higher seasonal levels of diseases such as spot form of net blotch (*Pyrenphora teres*). In this project, fungicides are being evaluated in light of this disease and the fact that cereal growers will shortly have access to a new group of foliar fungicides called the strobilurins. These new products, which are widely used in higher rainfall zone cereal production, give excellent long-term disease protection and given sufficient soil moisture lead to a prolonged greening of the crop. This prolonged greening has the effect of extending grain fill, and given sufficient moisture, increases yield.

The aim is therefore not only to evaluate fungicide strategies in light of these products but to define which cereal growing situations within south east Australia have the greatest opportunities for capitalising on this new technology.

Methods

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

At Birchip Gairdner barley was sown at 175 plants/m^2 on May 12 with 60kg/ha EzyZinc. Prior to sowing, urea was pre-drilled at 50kg/ha (23 kg/ha N) 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 Gairdner barley was sown at 175 plants/m^2 on May 28 with 60kg/ha EzyZinc. Urea was pre-drilled at 80kg/ha prior to sowing and topdressed at 60kg/ha on August 19. Triflur 480® was applied at 0.8L/ha prior to sowing and Achieve® at 300g/ha was applied on July 4. Ally® at 2g/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. GS30-31 applications were applied on August 12 at Birchip and August 29 at Murtoa. GS39-49 applications were applied on September 5 at Birchip and October 3 at Murtoa. Critical crop development stages were monitored throughout the season and yield, screenings and protein were recorded at harvest.

Results

There were no significant barley yield differences from fungicide applications at Birchip, at Murtoa there were some positive responses (Table 1).

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

Product	Timing of applic'n	Rate (ml/ha)	Yield (t/ha)		Protein (%)		Screenings (%) 2.2mm	
			Birchip	Murtoa	Birchip	Murtoa	Birchip	Murtoa
Folicur	Z30	145	4.37	4.61	6.7	8.7	2.1	9.7
Folicur + Flint	Z30	145 + 125g	4.39	4.61	-	-	-	-
Folicur + Flint	Z30	145 + 250g	4.53	4.67	-	-	-	-
Folicur + Flint	Z30	145 + 500g	4.44	4.68	7.0	8.7	2.4	9.1
Opus + Flint	Z30	250 + 250g	4.51	4.61	-	-	-	-
Opus + Amistar	Z30	250 + 500	4.33	4.68	-	-	-	-
Folicur	Flag leaf	145	4.47	4.44	6.6	8.2	2.2	11.6
Folicur + Flint	Flag leaf	145 + 125g	4.36	4.51	-	-	-	-
Folicur + Flint	Flag leaf	145 + 250g	4.24	4.49	-	-	-	-
Folicur + Flint	Flag leaf	145 + 500g	4.31	4.51	6.4	8.5	1.9	10.2
Opus + Flint	Flag leaf	250 + 250g	4.49	4.52	-	-	-	-
Opus + Amistar	Flag leaf	250 + 500g	4.41	4.55	-	-	-	-
Folicur + Folicur	Z30 + flag leaf	72.5 + 72.5	4.22	4.57	6.6	8.4	2.6	8.4
(Folicur + Flint) + (Folicur + Flint)	Z30 + flag leaf	(72.5 + 62.5g) (72.5 + 62.5g)	4.44	4.56	-	-	-	-
(Folicur + Flint) + (Folicur + Flint)	Z30 + flag leaf	(72.5 + 125g) (72.5+ 125g)	4.34	4.58	-	-	-	-
(Folicur + Flint) + (Folicur+ Flint)	Z30 + flag leaf	(72.5 + 250g) (72.5 + 250g)	4.51	4.84	6.6	8.6	2.2	8.3
(Opus + Flint) + (Opus + Flint)	Z30 + flag leaf	(125 + 125g) (125 + 125g)	4.33	4.65	-	-	-	-
(Opus + Amistar) + (Opus + Amistar)	Z30 + flag leaf	(125 + 250g) (125 + 250g)	4.57	4.53	-	-	-	-
Bumper + Bumper	Z30 + flag leaf	250 + 250	4.64	4.54	-	-	-	-
Untreated	-	-	4.48	4.46	7.1	8.5	2.2	11.2
		LSD (5%)	**N.S**	**0.22**	-	-	-	-

Explanatory notes on new fungicides: Amistar is azoxystrobin (250gai); Flint is trifloxystrobin; and Opus is epoxiconazole (125gai).

Interpretation

Disease levels (spot form of net blotch) throughout the season were higher at the Murtoa site than the Birchip site, a factor most probably related to the Murtoa site rotation position (Gairdner following Gairdner two years ago with a failed lentil crop in between). Infection at the Murtoa site was evident from before stem elongation (GS30) and as a consequence before fungicide application. In contrast spot form of net blotch was more evident in the second half of the season at Birchip. This difference was reflected in disease control differences recorded in the trials.

At Murtoa, under higher (earlier) disease pressure, fungicides were at best giving 50-60% control of disease, with a slight advantage to earlier timing (Figure 1). Sequences tended to give disease control similar to a single early application, but only when higher fungicide rates were used, indicating that splitting a dose of fungicide into 2 applications can create inferior results when the resultant sprays are

too weak to give initial disease control. In general those timings and treatments associated with the best disease control gave the better yields, thus GS30-31 timings gave an average yield increase of 4.1% compared to 1% with the same treatments applied at GS39-49. The sequence gave no yield advantage over an early spray except at the highest rate of strobilurin used (ie. Folicur plus Flint 500g/ha – 8.5 % response).

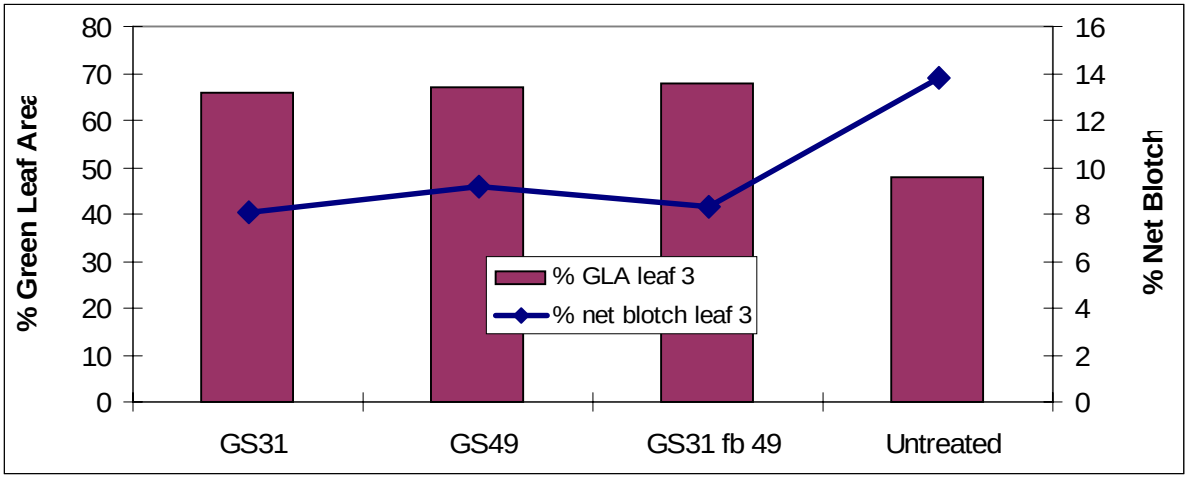

Figure 1. Influence of fungicide timing on disease control and green leaf area of Leaf 3, at GS65 on Gairdner barley (2003), at Murtoa.

Overall, the response to strobilurin (Flint) over Folicur® alone was very small and not statistically significant except where the highest rate was applied as a sequence (ie. Folicur® plus Flint 500g/ha).

Although it did not produce significant yield increases over the untreated as the three triazole/strobilurin treatments did, the Bumper® 250 ml/ha sequence produced one of the best GLA and net blotch control scores (52% control).

At Birchip, despite evidence that fungicide treatment gave improved green leaf retention and that strobilurins improved net blotch control, differences did not translate into significant yield effects (Figure 2).

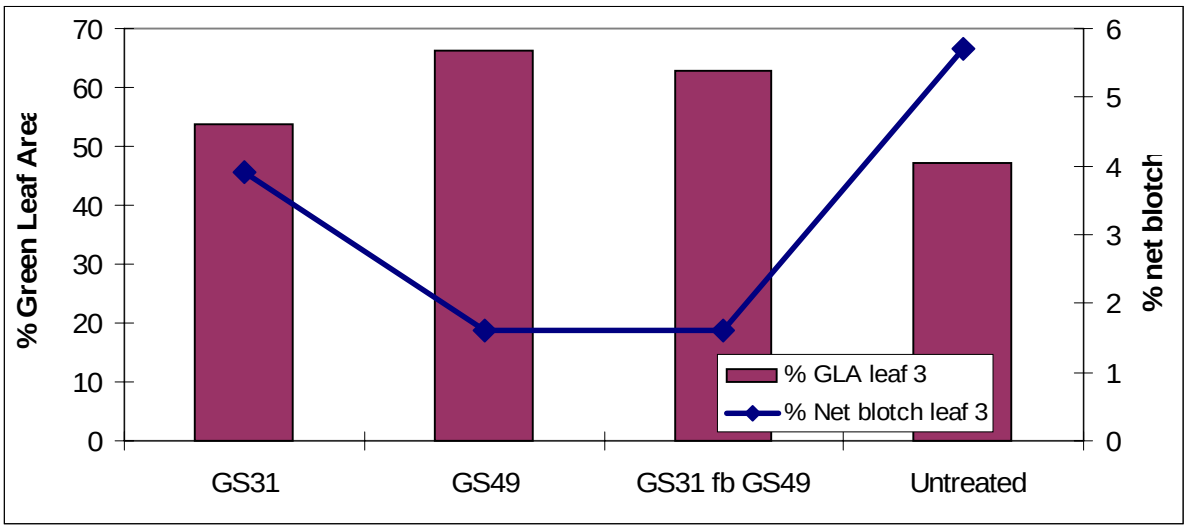

Figure 2. Influence of fungicide timing on disease control and green leaf area on Leaf 3, at GS65 on Gairdner barley (2003), at Birchip

In terms of quality, there were no consistent effects of fungicide on quality, however at Murtoa the highest yielding treatments produced the lowest screening levels of those treatments assessed.

Commercial Practice

Overall, the impact of fungicides in this season's trials has been greater in barley than in wheat. In part this maybe linked to higher yield potential with barley. The new strobilurin fungicides may have more of a role in barley (particularly the Wimmera) than in wheat, since earlier disease infection associated with the crop (particularly Gairdner) and a less moisture stressed grain fill period give the products more opportunity to express their potential benefits. It is also noticeable that existing triazole fungicides are not as effective on diseases such as net blotch and Scald (*Rhynchosporium)* than they are on rusts, thus strobilurins may help improve overall levels of control.

Unlike the flag leaf timing in wheat, there is no single timing that appears to be quite as effective, thus sequences tend to be more important in barley than wheat.

For next season consider Gairdner crops following Gairdner as a high disease risk option. Where disease infection establishes early in the spring consider foliar fungicide application at GS 30-31 when leaf 4 and 3 (leaf positions in the final canopy) are emerging. Depending on disease pressure consider a follow up 3-4 weeks later, ideally as the first awns become visible at GS39-49. At present in barley there seems to be little need to move away from propiconazole (Bumper®), however based on overseas data the new molecule epoxiconazole (Opus) also has an excellent spectrum of activity in barley.