Stripe Rust - seed dressings versus foliar fungicide demonstration

By the BCG and Nick Poole, FAR, NZ

The aim of this demonstration was to assess the impact of (i) seed dressings, (ii) fungicide applied in furrow, and (iii) foliar applied fungicides on controlling stripe rust in two wheat varieties.

Summary

Stripe rust if not controlled in a susceptible variety can result in large yield losses. At the Laen trial site the treatments which controlled stripe rust yielded 1 t/ha more compared to the treatments with no or little control (3.6 t/ha compared to 2.6 t/ha). The best seed dressing for reducing the infection of stripe rust was Jockey at the registered rate of 0.45L/100kg of seed, Impact-in-Furrow treatments at the full (0.4L/ha) and half rate reduced stripe rust infections to minimal levels. Foliar fungicides applied at full flag leaf emergence, Triad, Bumper, Folicur and Opus, resulted in complete control of stripe rust.

Background

A new and highly aggressive strain of stripe rust was first found in WA in 2002. This strain has found its way across to the eastern States in 2003 and is now the dominant strain of stripe rust affecting Victorian wheat crops. Many wheat varieties grown in Victoria were previously resistant to stripe rust, have now been found to be susceptible to the new strain. It is very important for growers to know the resistance ratings of the wheat varieties they sow and also what options are available for controlling the disease.

There are four main options available to growers for managing stripe rust:

- only sow the most resistant varieties
- use a seed dressing with activity on stripe rust
- use a fungicide in furrow (with fertiliser)
- use a foliar applied fungicide

The BCG investigated these options for controlling stripe rust at two sites: Birchip and Laen. A moderately resistant variety, Yitpi was compared to a susceptible variety, Krichauff. We compared seed dressings, an in-furrow treatment and foliar applied fungicides for their ability to control the disease.

Methods

This demonstration of Stripe Rust control options was set up at Birchip and Laen. Krichauff and Yitpi wheat were compared. The treatments are listed in Table 1.

The plots were sown on June 8 and May 27 at Birchip and Laen respectively. Foliar fungicides were applied on the 16th and 17th of September at Birchip and Lean respectively (at the full flag leaf emerged stage – GS39).

Table 1. Treatments for the Stripe Rust control demonstration

Product	Active ingredient	Rate	Notes on activity on Stripe Rust (according to the label)
		Seed Dressing (L/100 kg seed)	
Raxil	Tebuconazole 25g/L	0.1	No activity
Baytan	triadimenol 150g/L	0.1	Possibly provides low level protection for approximately 6 weeks
Real	triticonazole 200g/L	0.075	Provides seedling protection
Jockey	fluquinconazole 167g/L	0.45	Control for 6 weeks with suppression up to stem elongation
Jockey	fluquinconazole 167g/L	0.22	Half rate – expect less control and suppression
		Fertiliser treatment (in furrow) L/ha	
Impact	flutriafol 250g/L	0.4	Control up to stem elongation
Impact	flutriafol 250g/L	0.2	Half rate – expect less control
		Foliar treatment at full flag leaf emergence L/ha	
Bumper	propiconazole 250g/L	0.25	Good control
Folicur	tebuconazole 430g/L	0.145	Good control
Triad	triadimefon 125g/L	1.0	Good control
Opus	epoxiconazole 250g/L	0.25	Very Good control

Note: Fertiliser and Foliar treatments: seed was treated with Raxil
Foliar treatments were applied on the 17th September except Triad 24th September.

The crops were assessed and monitored for stripe rust (% level of infection was assessed on the top three leaves, ie. flag leaf, leaf 2 and leaf 3) at early flowering (GS60), which was approximately 18 days post application of the foliar fungicides. A partial assessment of flag leaf senescence at the grain filling stage at Laen was also undertaken.

Results

Stripe Rust at moderately high levels was observed only in Krichauff wheat at the Laen site. The Yitpi at this site only had traces of the disease. At Birchip there was no Stripe Rust found in the Krichauff or Yitpi. The level of infection in Krichauff wheat at Laen is presented in Table 2.

Table 2. Active level of stripe rust at the beginning of flowering on the top three leaves in Krichauff wheat at Laen. For foliar fungicides the % in brackets is the leaf area with dead stripe rust.

Treatment	% leaf area infected		
	Flag leaf	**Leaf 2**	**Leaf 3**
Raxil	37	37	43
Baytan	31	22	13
Real	23	19	22
Jockey full rate	17	12	8
Jockey half rate	23	24	19
Impact full rate	1	1	0
Impact half rate	5	3	2
Bumper	0	0 (1)	0 (1)
Folicur	0	0 (1)	0 (1)
Triad	0 (5)	0 (7)	0 (11)
Opus	0	0 (1)	0 (1)

A further disease assessment was carried out on selected treatments on the 28th October, 41 days after the foliar fungicides were applied. At this stage the crop had started to senesce and

only the flag leaf on the better treatments was assessable. The results of these observations are presented in Table 3.

Table 3. Active level stripe rust during late grain fill on the flag leaf in Krichauff wheat at Laen (applied 41 days after the foliar fungicides were applied)

Treatment	% leaf area infected		
	Flag leaf	Leaf 2	Leaf 3
Impact full rate	4.7	Senesced	Senesced
Impact half rate	7.2	Senesced	Senesced
Opus	0.3	Senesced	Senesced
Folicur	0.3	Senesced	Senesced
Bumper	0.6	Senesced	Senesced

During grain fill, when the crop was under water stress, there was evidence that the Impact in Furrow treatment was fading relative to the foliar applied fungicides, but this small difference did not express itself in yield (Table 4) probably due to the curtailed grain fill period.

Stripe rust infection in Krichauff wheat at Laen resulted in a yield penalty of approximately 1 t/ha (Table 4). Stripe rust had little effect on the Yitpi at Laen; at Birchip neither the Yitpi or Krichauff were infected.

Table 4. Seed dressing, In-Furrow and Foliar Fungicide effects on Yitpi and Krichauff wheat yield at Birchip and Laen, in 2004.

Treatment	Yipti – yield (t/ha)		Krichauff – yield (t/ha)	
	Birchip	Laen	Birchip	Laen
Raxil	1.14	3.8	0.82	2.6
Baytan	1.26	3.4	0.87	2.5
Real	1.29	3.4	1.01	2.6
Jockey full rate	1.11	3.6	0.98	3.3
Jockey half rate	1.23	4.0	1.26	2.9
Impact full rate	1.11	3.7	0.87	4.1
Impact half rate	0.70	3.8	0.98	3.4
Bumper	1.23	3.4	0.98	3.6
Folicur	1.00	3.8	1.12	3.6
Triad	0.73	3.9	1.04	3.5
Opus	1.05	3.7	1.09	3.6

For both varieties and at both sites screenings were less than 2% for all treatments and protein ranged between 13 and 16%.

Interpretation

In 2004, the level of stripe rust in wheat was much higher in the Wimmera (where there was reasonably good early growth) than in the Mallee, where crops struggled for moisture all year.

In the Wimmera, susceptible varieties, such as Krichauff, and moderately susceptible varieties such as Mitre and Whistler had significant levels of stripe rust. Moderately tolerant varieties such as Yitpi had comparably lower levels of stripe rust.

The BCG trial site in the Mallee (Birchip) only had traces of stripe rust; whereas the site in the northern Wimmera (Laen) had high levels of stripe rust in Krichauff (susceptible) and only traces in Yitpi (moderately resistant).

At Laen, Jockey at the higher rate of active ingredient was superior to all other seed treatments in reducing the level of stripe rust. Compared to the Raxil control, which would not be expected to give stripe rust control, Jockey and Baytan showed relatively more stripe rust infection on the upper leaves (flag) than leaf 3, indicating that whilst the seed dressing is giving protection on leaf 3, the effect is fading on the later emerging leaves (which are the most important for yield). With Raxil and Real the disease infection is more typical of what would be found in plants with no disease control in place, i.e. the infection levels are similar or more severe on the lower leaves. Impact in Furrow was superior to all seed treatments tested, even at a 50% dose rate. However, at the half rate, there was a tendency for this treatment to fade in protecting the flag leaf.

All foliar fungicides applied at full flag leaf emergence gave good stripe rust control when assessed 18 days after application. The activity of the foliar fungicides persisted throughout flowering and grain fill and the crop did not require a second application of fungicide.

The highest yielding treatments were those with the lowest level of stripe rust (Jockey at a full rate; Impact-in-Furrow at half and full rates; and the four foliar fungicides – Triad, Bumper, Folicur and Opus). This was not a replicated trial hence the results remain observations – however, the differences were very large (over 1 t/ha higher yield where stripe rust was controlled).

Commercial Practice

Stripe rust infection where not treated can result in large penalties in yield.

Seed dressings such as Jockey (at the registered rate) suppress stripe rust infection up to leaf 2 and in some cases flag leaf emergence. Impact-in-Furrow treatments (at the half and full rate) resulted in excellent suppression of stripe rust up to the flag leaf stage. Depending on yield potential, Wimmera farmers should consider Jockey as a seed treatment or Impact-in-Furrow as a fertiliser treatment where growers are sowing wheat varieties with a resistance rating of less than MR-MS.

In situations where growers can monitor their crops regularly and are able to apply a foliar fungicide, the results illustrate that excellent stripe rust control and yield response can be achieved during the growing season. This ‘wait and see option’ is probably more appropriate, especially where varieties with moderately resistance are used.

Foliar fungicides applied at full flag leaf emergence resulted in excellent stripe rust control and yields were 1 t/ha higher compared to untreated treatments.

A Stripe Rust management plan for 2005 is published in this manual.