Department of Primary Industries
Department of Regional NSW

NSW research results

RESEARCH & DEVELOPMENT – INDEPENDENT RESEARCH FOR INDUSTRY

The following paper is from an edition of the Northern or Southern New South Wales research results book.

Published annually since 2012, these books contain a collection of papers that provide an insight into selected research and development activities undertaken by NSW DPI in northern and southern NSW.

Not all papers will be accessible to readers with limited vision.
For help, please contact: Carey Martin at carey.martin@dpi.nsw.gov.au

Published by NSW Department of Primary Industries,
a part of the Department of Regional New South Wales.

Impact of stripe rust on wheat yield and role of up-front vs in-crop fungicide management – Gilgandra 2012

Steven Simpfendorfer NSW DPI Tamworth **Kathi Hertel** NSW DPI, Dubbo

Key findings

Stripe rust reduced the yield of moderately susceptible varieties by between 12–20% at this site in 2012.

There was **no** yield benefit from applying fungicide(s) in varieties rated MR or better.

Fungicide application(s) **did not** impact on grain protein levels in any variety.

The up-front treatment of Flutriafol® at the 400mL/ha rate on starter fertiliser provided good disease control and yield benefit (33%) in the MS variety LongReach Crusader⁽ᵈ⁾.

Introduction

Stripe rust, caused by the fungus *Puccinia striiformis*, has re-emerged as a significant issue for wheat production in eastern Australia since 2002. Yield and quality losses are related to reductions in green leaf area, which results from pustule formation on infected leaves. Variety resistance is ultimately the best option for managing stripe rust in the long term. However, in the short to medium term growers planting moderately susceptible varieties are reliant on the use of fungicides either at sowing (in-furrow on fertiliser or seed treatment) or in-crop (application of foliar fungicides), or a combination of both options. The development of new pathotypes of the stripe rust fungus, which reduce the resistance of selected commercial varieties, can make fungicide intervention necessary in other situations.

This study evaluated a range of at sowing (up-front) and in-crop fungicide strategies on the control of stripe rust in a moderately susceptible (MS) bread wheat variety, LongReach Crusader⁽ᵈ⁾ and a moderately resistant (MR) variety, LongReach Spitfire⁽ᵈ⁾ at Gilgandra in central NSW in 2012. The trial further examined the relative yield loss from stripe rust in 12 varieties (11 bread and 1 durum) by comparing nil and full disease control treatments.

Site details

Location:	**"Inglewood", Gilgandra**
Co-operator:	**Kevin Kilby**
Nematodes:	**0 *Pt*, 0 *Pn*/kg soil (0–30 cm)**
Fertiliser:	**50 kg/ha Granulock 12Z at sowing**

Treatments

- Two bread wheat varieties LongReach Spitfire⁽ᵈ⁾, which is moderately resistant (MR), and LongReach Crusader⁽ᵈ⁾ which is moderately susceptible (MS) to the Yr17+ pathotype of stripe rust.
- Nine fungicide treatments:
  1. Nil control treatment with no fungicide application either at sowing or in-crop.
  2. Full disease control treatment of Flutriafol on Granulock® 12Z (400 mL/ha) + Tebuconazole (145 mL/ha) at growth stages Z32 (2nd Node) + Z39 (flag leaf emergence)
- Four at sowing (up-front) fungicide options for controlling stripe rust:
  3. Flutriafol (Intake®) on Granulock® 12Z (400 mL/ha)
  4. Flutriafol (Intake®) on Granulock® 12Z (200 mL/ha)
  5. Triadimefon (Triad®500WP) on Granulock® 12Z (200 g/ha)
  6. Fluquinconazole (Jockey Stayer®) on seed (450 mL/100 kg seed)
- Three in-crop foliar fungicide options of:
  7. Tebuconazole (Folicur®, 145 mL/ha) at Z32
  8. Tebuconazole (Folicur®, 145 mL/ha) at Z25 + Z39
  9. Tebuconazole (Folicur®, 145 mL/ha) at Z32 + Z39
- Nil vs full disease control treatments for 8 other bread wheat and one durum variety (Figure 1).

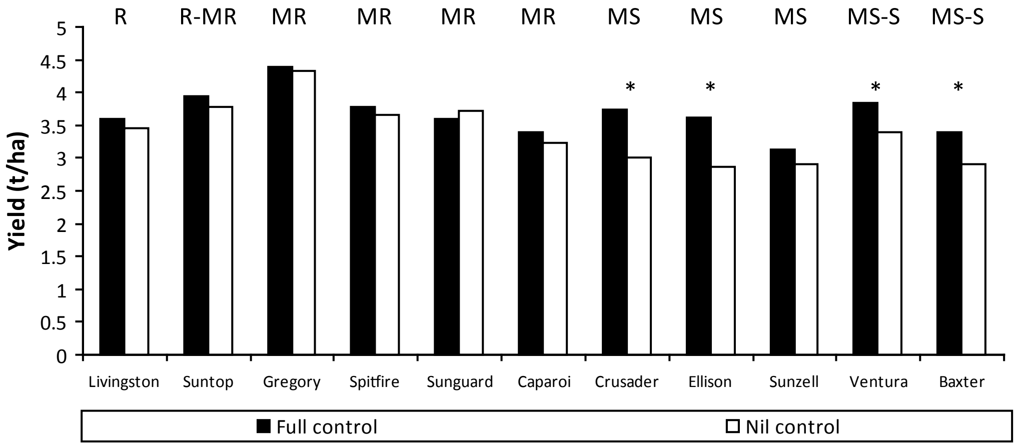
Results

Impact of varietal resistance

The Gilgandra site experienced moderate pressure from stripe rust in 2012. Stripe rust infection only caused a significant reduction in yield in four of the 11 varieties evaluated. The greatest yield loss (Full vs nil control) occurred in the MS varieties Ellison⊕ (–20%), LongReach Crusader⊕ (–19%) and the MS-S varieties Baxter⊕ (–15%) and Ventura⊕ (–12%) (Figure 1).

The full disease control treatment (Flutriafol® at sowing + Folicur® at GS32 + Folicur® at GS39) did not increase yield in any of the varieties rated MR or better for the WAYr17+ pathotype of stripe rust. It is important to note that Livingston⊕ does have reduced resistance (MR-MS) to the WAYr17+Yr27+ pathotype of stripe rust, which was not present at this site in 2012.

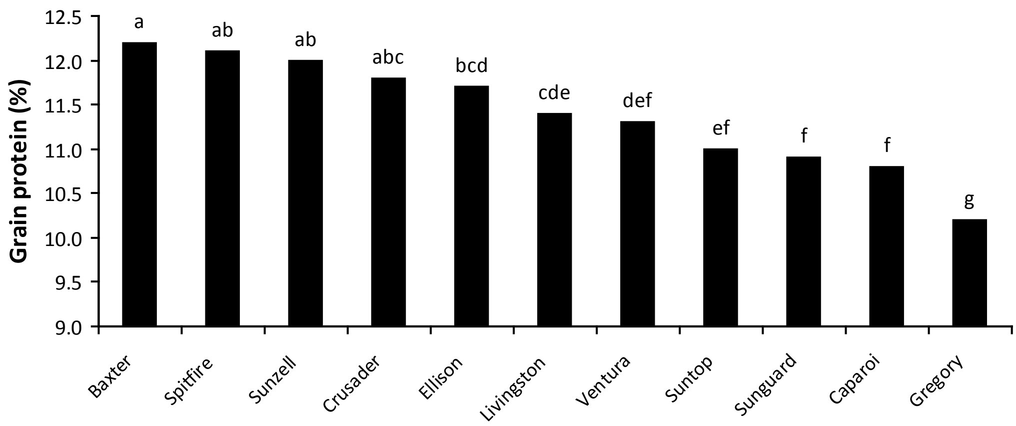
Figure 1: *Impact of stripe rust control on the yield of 10 bread and 1 durum variety with varying levels of resistance – Gilgandra 2012. Stripe rust resistance ratings along top of graph are to the WAYr17+ pathotype of stripe rust. Bars with asterix (*) denote a significant increase in yield with the full stripe rust control treatment compared to nil control for that variety. Lsd (P=0.06) = 0.39 t/ha.*



Grain protein

The full fungicide treatment did not significantly affect the grain protein levels in any of the 11 varieties irrespective of the resistance level of that variety to stripe rust. However, there were inherent differences between the grain protein levels achieved by the different varieties at this site in 2012. EGA Gregory⊕ had the lowest level of grain protein (10.2%), which was 2% behind the highest variety Baxter⊕ (12.2%) (Figure 2) The lower protein level of EGA Gregory⊕ appears to be a function of yield dilution as it was the highest yielding variety in this trial.

Figure 2: *Grain protein levels – Gilgandra 2012. Bars with the same letter are not different at 95% confidence level.*



CROP PROTECTION

Up-front vs in-crop fungicides

There was no significant difference between the nil control treatment and any of the up-front or in-crop fungicide treatments in MR variety LongReach Spitfire⟨D⟩ (data not shown).

In the MS variety LongReach Crusader⟨D⟩, the 400 mL/ha of Flutriafol® provided a 33% (1.0 t/ha) yield benefit over the nil fungicide control treatment (Figure 3). The other three up-front fungicide treatments did not significantly change yield compared to the nil control. All three in-crop fungicide treatments provided a significant yield benefit over the nil control of between 12% (GS32 only) and 16% (GS32 + GS39) which was around half the benefit seen with Flutriafol® (400mL/ha) on the starter fertiliser at sowing.

None of the nine fungicide treatments had a significant impact on grain protein levels in either LongReach Crusader⟨D⟩ or LongReach Spitfire⟨D⟩ (data not shown).

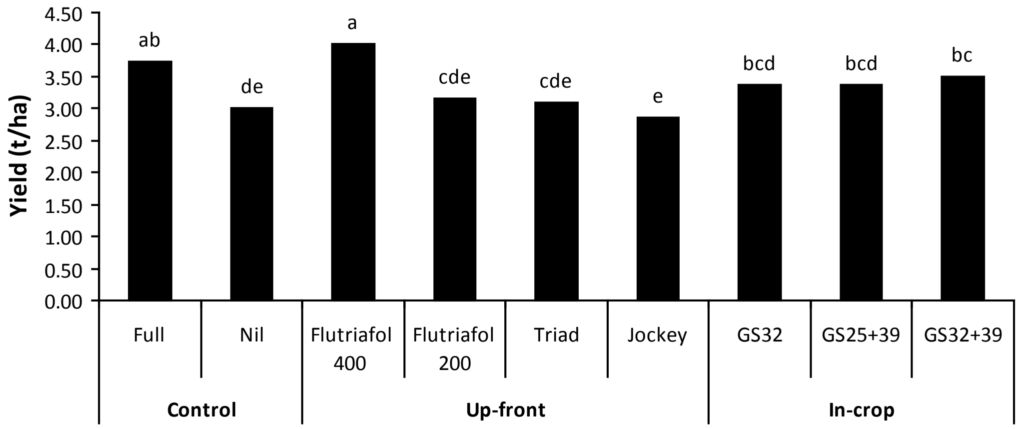


Figure 3: *Effect of fungicide treatments on the yield of LongReach Crusader⟨D⟩ in the presence of stripe rust – Gilgandra 2012. Bars with the same letter are not different at 95% confidence level.*

Conclusions

The 2012 season in much of the northern grains region was less conducive to the development of leaf diseases such as stripe rust compared to the previous two seasons. However, moderate levels of stripe rust still developed at this Gilgandra site in moderately susceptible varieties in 2012.

There was a 12% to 20% yield benefit from controlling stripe rust in moderately susceptible varieties. However, there was no yield benefit from applying fungicide to any variety that was rated MR or better. Fungicide application in MR is not warranted. Fungicide application did not affect grain protein levels in any of the varieties.

The up-front fungicide treatment of Flutriafol® (400 mL/ha) provided a 33% yield benefit over the nil control treatment compared to 12% to 16% with in-crop treatments in the MS variety LongReach Crusader⟨D⟩.

Acknowledgements

The authors would like to thank Kevin Kilby, “Inglewood”, Gilgandra for providing the trial site. Technical assistance provided by Zeb Taylor, Peter Formann, Robyn Shapland, Rod Bambach, Kay Warren, Finn Fensbo and Karen Cassin are gratefully acknowledged. Trial was sown, maintained and harvested by NSW DPI mobile trial unit operated by Scott Boyd. This research was co-funded by NSW DPI, University of Sydney and GRDC under project DAN00143 and US53.