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Regional crown rot management – Bithramere 2013

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Introduction

Crown rot (CR) caused predominantly by the fungus *Fusarium pseudograminearum* (*Fp*), remains a major constraint to the production of winter cereals in the northern grains region. Root lesion nematodes (RLN's) are also a wide spread constraint to wheat production across the region. Two important species of RLN exist throughout the northern region, namely *Pratylenchus thornei* (*Pt*) and *P. neglectus* (*Pn*). Previous surveys have found that *Pt* is more widespread and generally at higher populations than *Pn*. Recent collaborative research between Northern Grower Alliance and NSW DPI has also established that the presence of RLN feeding within root systems increases the severity of crown rot.

Cereal varieties differ in their tolerance to crown rot and either species of RLN. This can have a significant impact on the relative yield of varieties in the presence of these various disease constraints. This site is one of nine trials conducted by NSW DPI in 2013 across central/northern NSW extending into southern Qld to examine the impact of crown rot and RLN on the yield of two durum and ten bread wheat varieties.

Control of crown rot using fungicides has been studied extensively with limited success and quite variable outcomes. No fungicides are currently registered for the control of crown rot in winter cereals either as seed or in-furrow treatments or in-crop sprays. As the name implies, crown rot primarily infects the base of plants through the sub-crown internode, crown and/or outer leaf sheaths at the base of tillers at the soil surface.

The second trial at these sites aimed to take a step back in the approach of using foliar fungicides to determine if targeting application at the base of tillers might improve the level of control and provide more consistent effects. The reduction of crop canopy through slashing at GS30 was also examined for its potential to impact on crown rot expression and yield.

Key findings

This site had a high background level of crown rot as indicated by PreDicta B at sowing.

All bread wheat varieties (except Strzelecki⁽ᵈ⁾) were between 0.58 t/ha to 1.26 t/ha higher yielding than EGA_Gregory⁽ᵈ⁾ under ***high*** levels of crown rot infection.

All bread wheat varieties (except Strzelecki⁽ᵈ⁾) were between 0.78 t/ha to 1.68 t/ha higher yielding than EGA_Gregory⁽ᵈ⁾ under ***extreme*** levels of crown rot infection.

All fungicide application techniques provided a modest increase in yield of between 0.19 t/ha to 0.25 t/ha and slashing at GS30 did not significantly affect yield.

CROP PROTECTION

Site details

Location:	**"Wheatacres", Bithramere**
Co-operator:	**Richard & Michael Bowler**
Sowing date:	**7th June 2013**
Fertiliser:	**50 kg/ha Granulock Supreme Z at sowing**
Starting N:	**180 kg/ha nitrate N to 120 cm**
Starting water:	**~194 mm PAW (0–120 cm)**
In-crop rainfall:	**119 mm**
PreDicta B:	**2.0 *Pn*/g soil (medium risk), 3.4 log *Fusarium* DNA/g (high risk)**
Treatment date:	**All 6th August at GS30**
Harvest date:	**21st November 2013**

Treatments

Variety evaluation

- Two durum varieties (Caparoi⁽ᵈ⁾ and Jandaroi⁽ᵈ⁾).
- Eight commercial bread wheat varieties (EGA_Gregory⁽ᵈ⁾, Strzelecki⁽ᵈ⁾, LRPB Dart⁽ᵈ⁾, LRPB Lancer⁽ᵈ⁾, LRPB Crusader⁽ᵈ⁾, LRPB Spitfire⁽ᵈ⁾, Suntop⁽ᵈ⁾ and Sunguard⁽ᵈ⁾; listed in order of increasing resistance to crown rot).

- Two numbered bread wheat lines (SUN663A and QT14381)
- Added or no added crown rot at sowing using sterilised durum grain colonised by at least five different isolates of *Fp*.

Fungicide application evaluation

- EGA_Gregoryⓓ with added or no added crown rot at sowing using infected durum grain.
- One fungicide (Prosaro® at 300 mL/ha + 0.25% chemwet 1000).
- Three in-crop application strategies all at GS 30-31 using Turbo Teejet (110015) nozzles at ~300 L/ha.
  - Above crop – foliar spray 50 cm above crop height (i.e. normal rust spray with most of product deposited on upper leaf surfaces).
  - On crop – boom dropped to crop height and nozzles moved between wheat rows (i.e. product hitting base of plant and soil).
  - Droppers – solid rod from boom down to below canopy height then two nozzles angled at ~45 degrees towards base of tillers on opposite crop rows (i.e. all of product targeted at base of plants).
- One slashing treatment using a cutter bar at GS30-31 with cut leaf material left on soil surface.

Results – Variety evaluation

Yield

- This site had a high level of background infection with crown rot across the site as predicted by PreDicta B analysis at sowing. The site also has a medium risk level of *Pn*. Determining the impact of *Pn* is difficult as all varieties in the trial are rated moderately intolerant to *Pn*.
- The impact of crown rot on yield (tolerance) is determined by comparing no added CR plots and added CR plots. This would underestimate the yield impacts from crown rot as high inoculum levels already existed across this site. There is no way to determine what the yield of each variety would have been at this site in the absence of crown rot infection. Hence, the no added CR plots represent a high infection level and the added CR plots represent an extreme infection level.
- Under high crown rot infection (no added CR) all bread wheat varieties (except Strzeleckiⓓ) were between 0.58 t/ha (LRPB Crusaderⓓ) to 1.26 t/ha (LRPB Spitfireⓓ) higher yielding than EGA_Gregoryⓓ.
- Under extreme crown rot infection (added CR) all bread wheat varieties (except Strzeleckiⓓ) were between 0.78 t/ha (SUN663A) to 1.68 t/ha (LRPB Spitfireⓓ) higher yielding than EGA_Gregoryⓓ.
- Jandaroiⓓ was higher yielding than Caparoiⓓ under both high and extreme infection levels but both durum varieties are very susceptible to crown rot and lower yielding than all bread wheat varieties except Strzeleckiⓓ and EGA_Gregoryⓓ which are both rated as susceptible to crown rot.
- Varieties with improved resistance to crown rot also have increased yield (tolerance) in the presence of this disease. Selecting varieties with improved tolerance to crown rot can have a large impact on profit in the presence of this disease constraint.
- PreDicta B assessment prior to sowing can identify high risk paddocks to allow growers to implement appropriate management strategies and/or avoid sowing more susceptible varieties.

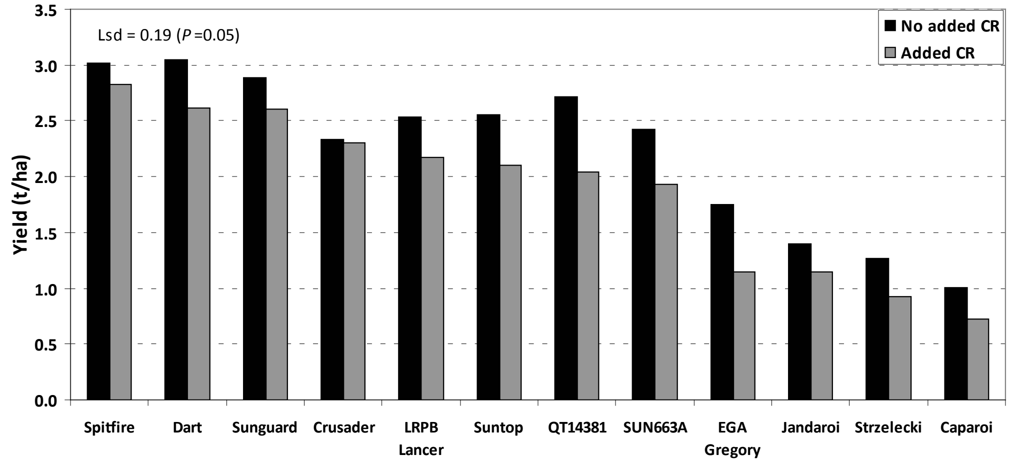

Figure 1. *Yield (t/ha @ 11% moisture) of varieties with no added and added crown rot – Bithramere 2013.*

Protein

- The addition of crown rot inoculum at sowing did not significantly change protein levels in any variety.
- Protein levels were quite high at this site ranging between 13.1% (EGA_Gregory[D]) up to 15.6% (LRPB Spitfire[D]; Figure 2).

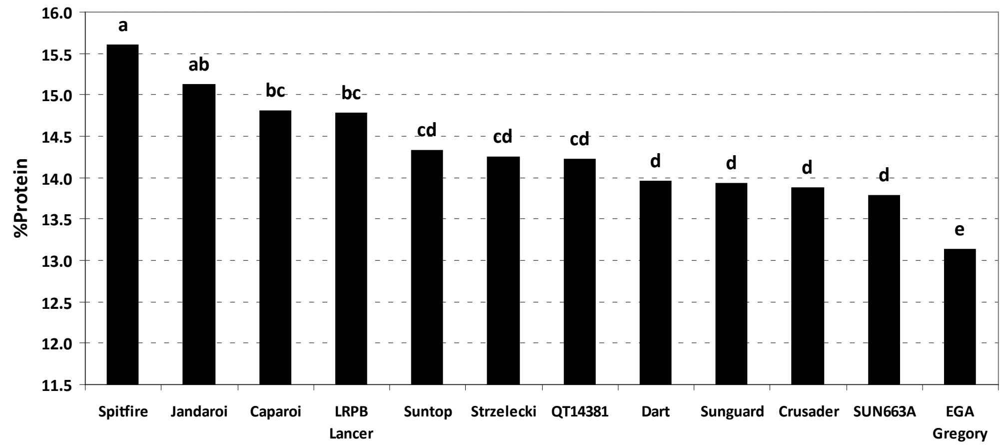

Figure 2. *Average protein concentration achieved by varieties – Bithramere 2013. Bars with the same letter are not significantly different (P=0.05).*

Results – Fungicide application evaluation

Yield

- The effect of treatments was not significant at the added CR versus no added CR level due to high levels of background crown rot infection across the trial site as predicted at sowing using PreDicta B.
- All fungicide application techniques provided a modest increase in yield of between 0.19 t/ha (above crop) to 0.25 t/ha (on crop and droppers; Figure 3).
- Slashing at GS30 did not significantly affect yield compared to the nil treatment but was significantly lower than the fungicide treatments.

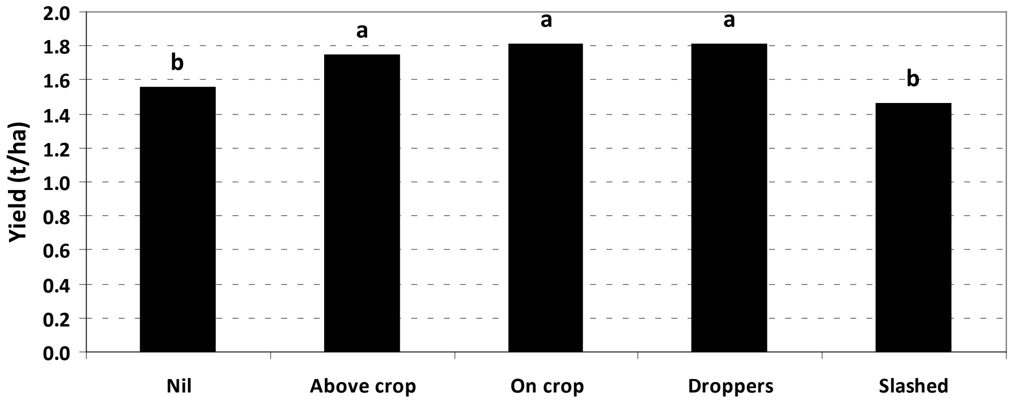

Figure 3. *Effect of fungicide application technique on grain yield in EGA_Gregory*[⚐] *(average of no added or added CR plots) – Bithramere 2013. Bars with the same letter are not significantly different (P=0.05).*

Protein

- Protein levels were slightly lower (0.3%) in the added CR treatment.
- The on crop fungicide application increased protein by 0.3% while application with droppers provided a 0.5% increase in grain protein levels. The remaining treatments did not significantly affect protein.

Acknowledgements

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