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Regional crown rot management – Westmar Qld 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 trial is one of nine 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 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 around GS30 was also examined for its potential to impact on crown rot expression and yield.

Key findings

QT14381, Suntop$^{\phi}$, LRPB Spitfire$^{\phi}$ and Sunguard$^{\phi}$ were between 0.52 t/ha to 0.30 t/ha higher yielding than EGA_ Gregory$^{\phi}$ under high crown rot pressure.

Targeting fungicide application at the base of plants increased yield under high crown rot pressure by 0.36 t/ha with droppers and 0.20 t/ha with the on crop application. However, they **do not** provide complete control. Application 50 cm above crop height provided no benefit.

Slashing reduced yield by 0.42 t/ha with no added CR but had no yield penalty with added CR.

Site details

Location:	**"Enarra", Westmar, Qld**
Co-operator:	**Phil Coggan**
Sowing date:	**31st May 2013**
Fertiliser:	**100 kg/ha Urea and 40 kg/ha Granulock Z extra at sowing**
Starting N:	**85 kg/ha nitrate N to 1.0 m**
In-crop rainfall:	**~60 mm**
PreDicta B:	**Nil RLN, 1.7 log *Fusarium* DNA/g (medium risk), 0.8 log *Bipolaris* DNA/g**
Treatment date:	**All 2nd August at GS31**
Harvest date:	**14th October 2013**

Treatments

Variety evaluation

- Two durum varieties (Caparoi$^{\phi}$ and Jandaroi$^{\phi}$)
- Eight commercial bread wheat varieties (EGA_Gregory$^{\phi}$, Strzelecki$^{\phi}$, LRPB Dart$^{\phi}$, LRPB Lancer$^{\phi}$, LRPB Crusader$^{\phi}$, LRPB Spitfire$^{\phi}$, Suntop$^{\phi}$ and Sunguard$^{\phi}$; 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$^{\phi}$ 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 at GS30-31 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

- Only four varieties (QT14381, Suntop$^{\phi}$, LRPB Spitfire$^{\phi}$ and Sunguard$^{\phi}$) did not suffer significant yield loss in the presence of added CR compared to the no added CR treatment (Figure 1).
- In the presence of high crown rot infection (added CR) these four varieties were between 0.30 t/ha (Sunguard$^{\phi}$) up to 0.52 t/ha (QT14381) higher yielding than EGA_Gregory$^{\phi}$.
- Yield loss from crown rot infection was highest in the durum variety Caparoi$^{\phi}$ at 44% (0.84 t/ha). Even though the other durum variety Jandaroi$^{\phi}$ lost 27% yield from crown rot it was 0.56 t/ha higher yielding than Caparoi$^{\phi}$ under high crown rot infection (added CR).
- LRPB Crusader$^{\phi}$ was the highest yielding variety with no added CR being 0.30 t/ha higher than the nearest variety Suntop$^{\phi}$.
- LRPB Crusader$^{\phi}$ had 19% yield loss (0.53 t/ha) in added CR plots but its higher yield at this site meant it still remained amongst the top four varieties under high crown rot infection (added CR) along with QT14381, Suntop$^{\phi}$ and Sunguard$^{\phi}$.

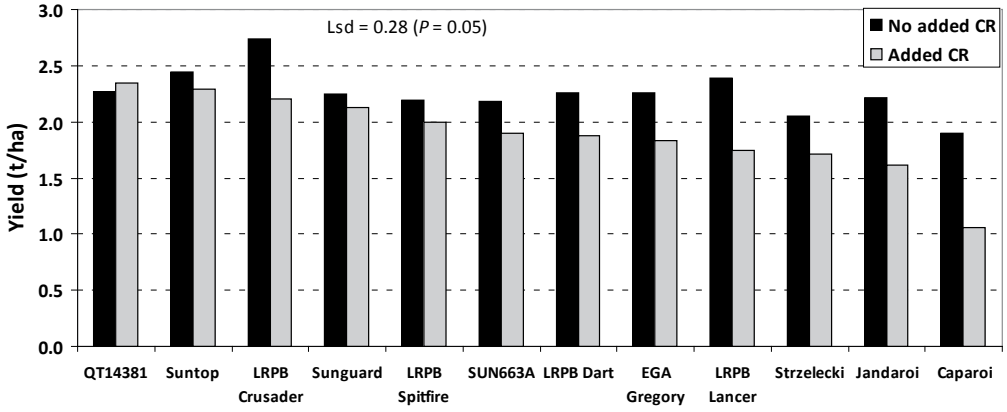

Figure 1. *Yield (t/ha @ 11% moisture) of varieties with no added and added crown rot – Westmar 2013.*

Protein

- There was a slight (0.3%) decrease in protein with added CR when averaged across varieties but the effect was not significant in any individual entry.
- Protein levels ranged between 12.7% (LRPB Dart$^{\phi}$) up to 14.5% (LRPB Lancer$^{\phi}$; Figure 2).
- The higher protein content in LRPB Dart$^{\phi}$ is largely a function of its lower yield at this site. Conversely, Suntop$^{\phi}$ and QT14381 were amongst the lower protein achievers but were amongst the highest yield achievers across the added and no added CR treatments.
- Consequently, grain N removal was not different between LRPB Crusader$^{\phi}$, Suntop$^{\phi}$, LRPB Lancer$^{\phi}$, QT14381, Sunguard$^{\phi}$ and LRPB Spitfire$^{\phi}$ at this site.

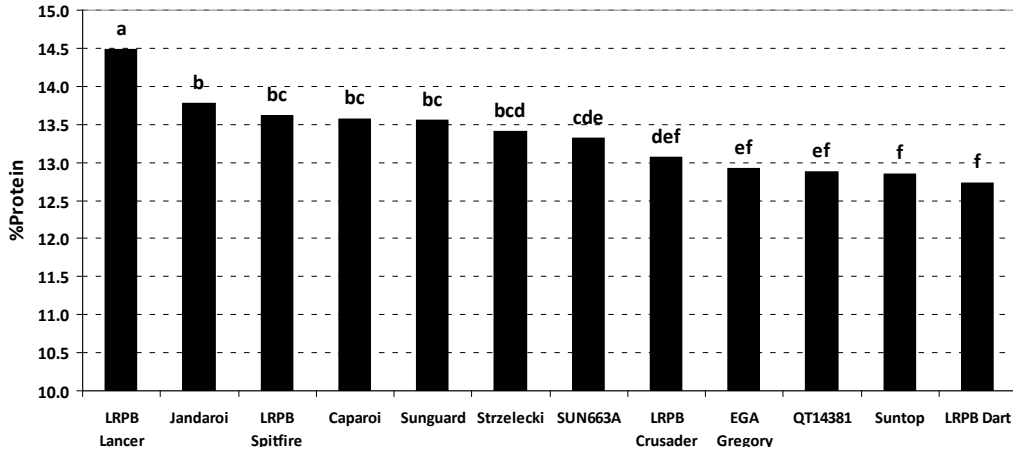

Figure 2. *Average protein concentration achieved by varieties – Westmar 2013. Bars with the same letter are not significantly different (P=0.05).*

Results – Fungicide application evaluation

Yield

- With background levels of infection (no added CR) none of the fungicide applications provided a significant yield benefit over the nil treatment at the 95% confidence level (Figure 3). The 0.18 and 0.19 t/ha yield benefit provided by the on crop and dropper applications, respectively was only significant at the trend level (90% confidence).
- Under high crown rot pressure (added CR) the on crop application increased yield by 0.20 t/ha and the dropper application by 0.36 t/ha compared to no fungicide application (Figure 3).
- Fungicide application 50 cm above crop height did not provide a yield benefit with either no added CR or added CR.
- Slashing at GS31 significantly reduced yield by 0.42 t/ha compared to the nil control with no added CR. However, there was no yield penalty from slashing under higher crown rot levels in the added CR treatment.

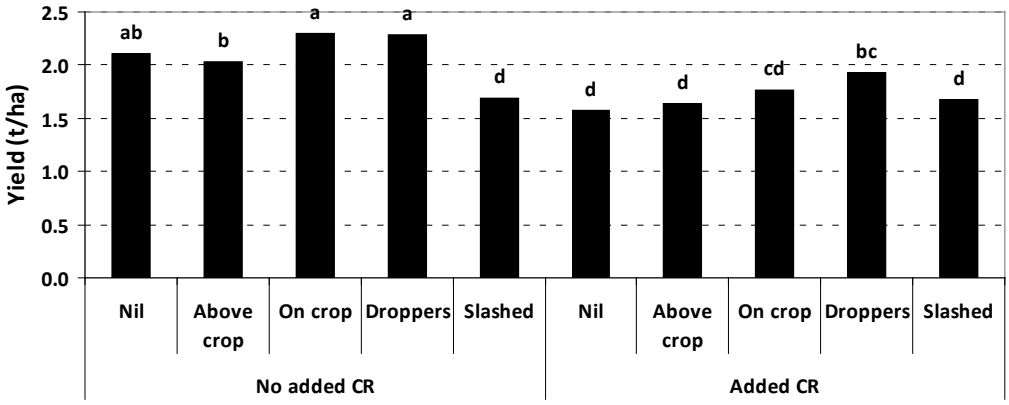

Figure 3. *Effect of fungicide application technique on grain yield of EGA_Gregory(◊) with no added or added crown rot inoculum – Westmar 2013. Bars with the same letter are not significantly different (P=0.05)*

Protein

- Fungicide application did not significantly change protein levels compared to nil treatments.
- There was a trend (90% confidence) for reduced (0.7%) protein levels in the slashing treatments.

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