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# Regional crown rot management – Spring Ridge 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 (RLNs) 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 around GS30 was also examined for its potential to impact on crown rot expression and yield.

## Site details

| | |
|---|---|
| Location: | **"Yoorooga", Spring Ridge** |
| Co-operator: | **Angus Murchison** |
| Sowing date: | **23rd June 2013** |
| Fertiliser: | **50 kg/ha Granulock Supreme Z at sowing** |
| Starting N: | **200 kg/ha nitrate N to 1.2 m** |
| In-crop rainfall: | **105 mm** |
| PreDicta B: | **Nil RLN, 2.0 log *Fusarium* DNA/g (medium risk)** |
| Treatment date: | **All 27th August at GS30** |
| Harvest date: | **27th November 2013** |

### Key findings

All bread wheat varieties (except Strzelecki$^{\phi}$) were between 0.42 t/ha to 1.11 t/ha higher yielding than EGA_ Gregory$^{\phi}$ under high levels of crown rot infection.

Under high crown rot levels all fungicide application techniques significantly increased yield by between 0.35 t/ha (above crop) to 0.53 t/ha (droppers). However, fungicide application **does not** provide complete control being 0.52 to 0.70 t/ha lower yielding than no fungicide application at a lower level of crown rot infection.

Slashing did not affect yield with no added CR but provided a 0.53 t/ha benefit with added CR.

## 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 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.

### Whitehead assessment

- Each plot was scored for the extent of whitehead development on a 0 to 10 scale (0 = no whiteheads, 10 = 100% whiteheads) on the 5th of November.

## Results – Variety evaluation

### Yield

- Yield loss from added CR ranged from 9% in EGA_Gregory$^{\Phi}$ (0.38 t/ha) up to 26% in Strzelecki$^{\Phi}$ (1.28 t/ha).
- Yield loss in the two durum varieties with added CR was 0.71 t/ha with Caparoi$^{\Phi}$ and 0.93 t/ha with Jandaroi$^{\Phi}$.
- Yield loss in added CR plots was not significant in LRPB Spitfire$^{\Phi}$ and LRPB Lancer$^{\Phi}$. Background levels of crown rot across this site are likely to have resulted in an underestimation of the full extent of yield loss from crown rot infection.
- With the exception of Strzelecki$^{\Phi}$, all bread wheat varieties were between 0.42 t/ha (Sunguard$^{\Phi}$) to 1.11 t/ha (LRPB Crusader$^{\Phi}$) higher yielding than EGA_Gregory$^{\Phi}$ in the added CR treatment (Figure 1).

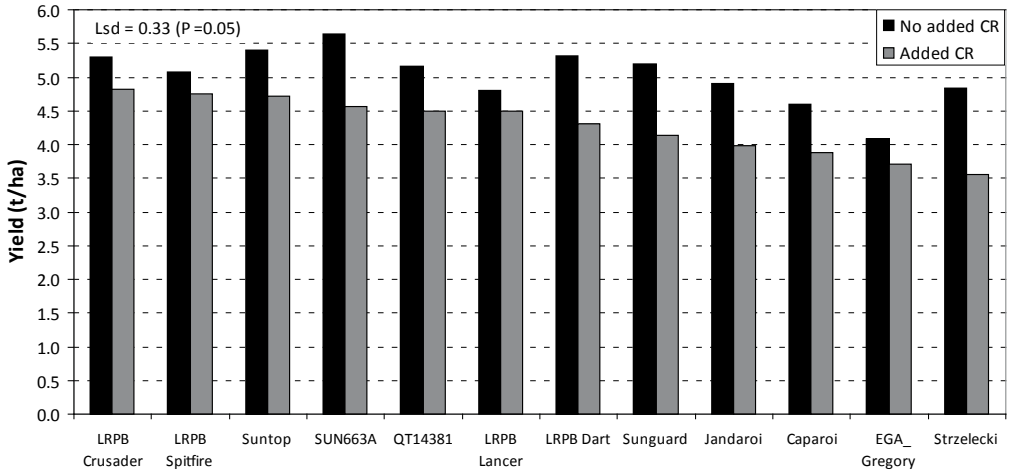


***Figure 1.*** *Yield (t/ha @ 11% moisture) of varieties with no added and added crown rot – Spring Ridge 2013.*

### Protein

- Crown rot infection did not impact on protein levels in any variety.
- Protein levels ranged between 11.4% (SUN663A) up to 13.0% (Jandaroi$^{\Phi}$; Figure 2).
- Even though Suntop$^{\Phi}$ was amongst the lower protein achievers at this site its grain N removal in no added CR treatments was only significantly lower than Jandaroi$^{\Phi}$ and LRPB Spitfire$^{\Phi}$ and was actually significantly higher than Strzelecki$^{\Phi}$, LRPB Lancer$^{\Phi}$ and EGA_Gregory$^{\Phi}$. Protein levels are influenced by dilution or concentration within grain with increasing or decreasing yield, respectively.

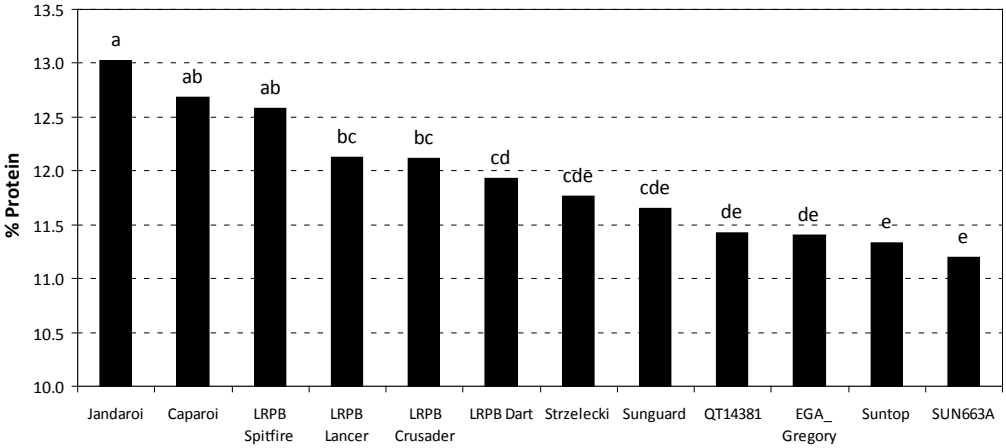


***Figure 2.*** *Average protein concentration achieved by varieties – Spring Ridge 2013. Bars with the same letter are not significantly different (P=0.05).*

## Results – Fungicide application evaluation

### Yield

- Fungicide application using on crop or dropper techniques provided a modest (0.20 t/ha) yield benefit in the no added CR treatment.
- Under high crown rot levels (added CR) all fungicide application techniques significantly increased yield by between 0.35 t/ha (above crop) to 0.53 t/ha (droppers). However, fungicide application **did not** provide complete control being 0.52 to 0.70 t/ha lower yielding than no fungicide application at lower levels of crown rot infection (no added CR).
- The on crop and dropper techniques reduced the number of whiteheads by around 10% compared to the nil treatment averaged across added and no added CR infection levels.
- Slashing did not affect yield with no added CR but provided a 0.53 t/ha benefit with added CR.

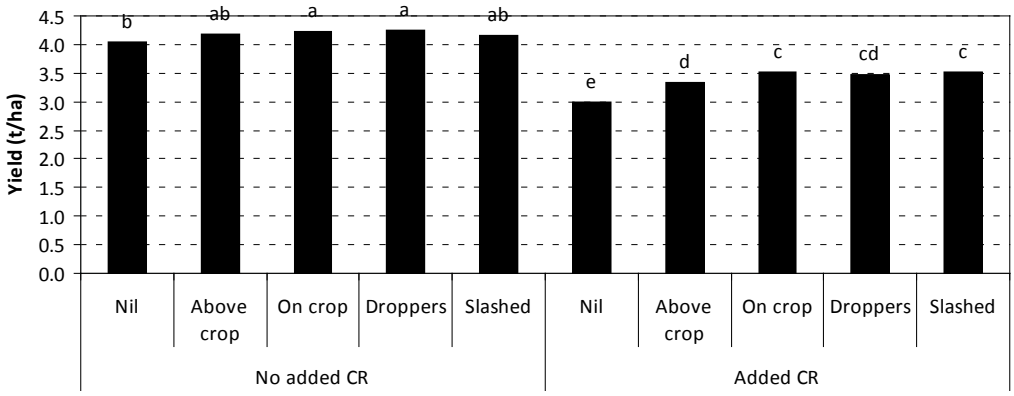


***Figure 3.*** *Effect of fungicide application technique on grain yield of EGA_Gregory(◊) with no added or added crown rot inoculum – Spring Ridge 2013. Bars with the same letter are not significantly different (P=0.05).*

**Protein**

- Protein levels were slightly lower (0.4%) in the added CR treatment.
- None of the fungicide treatments or slashing significantly influenced protein levels.

## Acknowledgements

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