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Varietal yield response to crown rot across two sowing times – Garah 2014

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Introduction

Crown rot, caused predominantly by *Fusarium pseudograminearum* (*Fp*), is a major constraint to winter cereal (bread wheat, barley and durum wheat) production in the northern grains region. Yield loss is largely related to the *expression* of whiteheads which are induced by moisture and/or temperature stress during flowering and grain-fill. Previous NSW DPI research has demonstrated that earlier sowing can reduce the *expression* of crown rot by bringing grain-fill forward a week or two when temperatures are generally lower. Earlier sowing potentially also facilitates increased root growth early in the season which may result in deeper root exploration and access to soil moisture throughout the season. The impact of crown rot on yield and grain quality was examined in a range of durum, bread wheat and barley varieties across two sowing times at Garah in north-west NSW in 2014.

Site details

Location:	**'Miroobil' Garah**
Co-operators:	**Andrew and Bill Yates**
Sowing dates:	**Time 1: 2 May 2014, Time 2: 12 June 2014**
Fertiliser:	**180 kg/ha urea and 60 kg/ha Granulock Z extra at sowing**
Starting N:	**45 kg N/ha to 1.2 m**
Starting water:	**~25 mm PAW to 1.2 m**
In-crop rainfall:	**100 mm**
PreDicta B®:	**1.0 *Pratylenchus thornei*/g soil (low risk), Nil *Fusarium* at sowing (0–30 cm)**

Treatments

Four durum wheat varieties (Caparoi$^{\Phi}$, DBA Aurora$^{\Phi}$, Jandaroi$^{\Phi}$ and Hyperno$^{\Phi}$) and two numbered durum lines (TD241046 and TD290564).

Eleven bread wheat varieties (EGA Gregory$^{\Phi}$, Lincoln$^{\Phi}$, LRPB Gauntlet$^{\Phi}$, LRPB Lancer$^{\Phi}$, LRPB Spitfire$^{\Phi}$, Mitch$^{\Phi}$, Strzelecki$^{\Phi}$, Sunguard$^{\Phi}$, Sunmate$^{\Phi}$, Suntop$^{\Phi}$ and Wallup$^{\Phi}$) and one numbered line (SUN663A).

Ten barley varieties (Bass$^{\Phi}$, Commander$^{\Phi}$, Compass$^{\Phi}$, Fathom$^{\Phi}$, Gairdner$^{\Phi}$, GrangeR$^{\Phi}$, Hindmarsh$^{\Phi}$, La Trobe$^{\Phi}$, Navigator$^{\Phi}$ and Oxford$^{\Phi}$).

Added or no added crown rot at sowing using sterilised durum grain colonised by at least five isolates of *Fp*.

Results

The trial site at Garah had low but reasonable yield in 2014 given the lack of stored soil moisture at sowing and in-crop rainfall of only 100 mm which fell as four main events of 33 mm at sowing, 11 mm mid June, 35 mm at the start of September and 18 mm mid October. The October rain was too late to be effective with harvest occurring at the end of that month. The rainfall event at the start of September may

Key findings

Averaged across all 28 entries in this trial crown rot resulted in 14% (not significant) yield loss with the early sowing on 2 May.

Delaying sowing from 2 May until 12 June resulted in an average yield loss of 48% from crown rot infection.

Individual varieties of durum, bread wheat and barley differed significantly in their extent of yield loss and actual yield in the presence of crown rot infection.

The bread wheat varieties Wallup$^{\Phi}$, Suntop$^{\Phi}$, Sunguard$^{\Phi}$ and LRPB Lancer$^{\Phi}$ were between 0.28 and 0.52 t/ha higher yielding than EGA Gregory$^{\Phi}$ in the presence of crown rot.

The barley varieties Commander$^{\Phi}$, Compass$^{\Phi}$, Fathom$^{\Phi}$, La Trobe$^{\Phi}$ and Hindmarsh$^{\Phi}$ were between 0.28 and 0.82 t/ha higher yielding than EGA Gregory$^{\Phi}$ in the presence of crown rot.

have been more effective for the later sowing. This site had a co-efficient of variation of 17.7% so results should be considered with caution but the variety rankings are consistent with previous data and other sites in 2014. Pathology assessments of samples collected from each plot will occur and may assist in explaining and correcting for some of the variability in yield at this site.

Sowing time impacted on the extent of yield loss from crown rot was not significant with the early sowing time but was highly significant with the second sowing time. There was 48% yield loss (1.61 t/ha uninfected down to 0.85 t/ha infected) with 12 June sowing when averaged across all entries. However, the interaction between sowing time and crown rot infection was not significant at the variety level. Hence, the impact of crown rot infection on the yield of individual varieties is presented as the average of both sowing dates where significant differences were apparent (Figure 1).

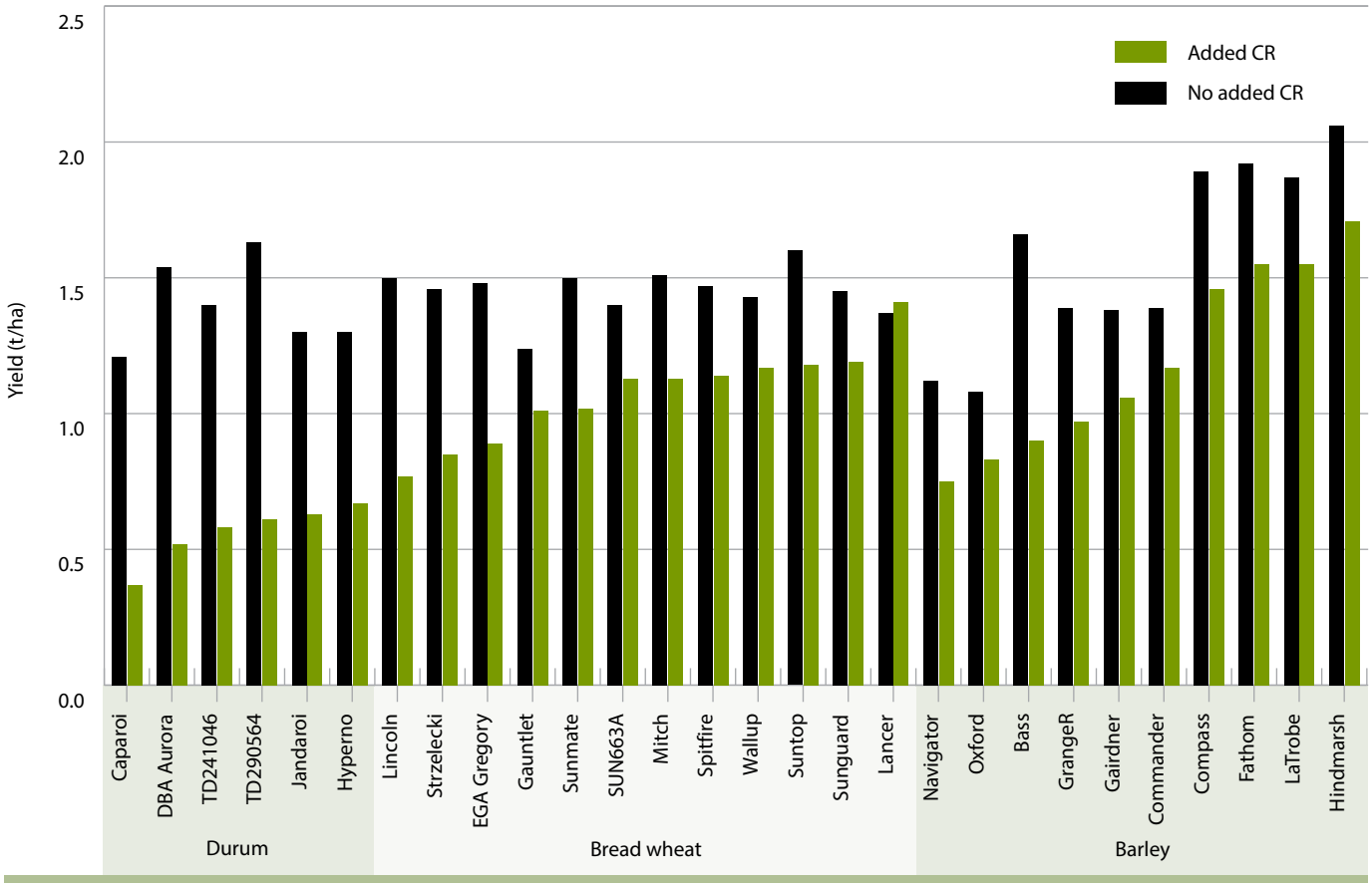

***Figure 1**. Impact of crown rot on yield of durum, wheat and barley averaged across two sowing times – Garah 2014*

- In the absence of crown rot infection (no added CR) yield in the durum varieties ranged from 1.21 t/ha (Caparoi$^{\Phi}$) to 1.63 t/ha (TD290564), in the bread wheat from 1.24 t/ha (LRPB Gauntlet$^{\Phi}$) to 1.60 t/ha (Suntop$^{\Phi}$) and in the barley from 1.08 t/ha (Oxford$^{\Phi}$) to 2.06 t/ha (Hindmarsh$^{\Phi}$) (Figure 1).
- The reduced yield associated with crown rot infection was significant with all entries with the exception of LRPB Gauntlet$^{\Phi}$, LRPB Lancer$^{\Phi}$, Oxford$^{\Phi}$ and Commander$^{\Phi}$. In the remaining entries yield loss in the durum varieties ranged from 49% (Hyperno$^{\Phi}$) to 70% (Caparoi$^{\Phi}$), in the bread wheat from 18% (Sunguard$^{\Phi}$) to 49% (Lincoln$^{\Phi}$) and in the barley from 17% (Hindmarsh$^{\Phi}$ and La Trobe$^{\Phi}$) to 46% (Bass$^{\Phi}$). This equated to a loss in yield of between 0.26 t/ha with Sunguard$^{\Phi}$ up to 1.03 t/ha with DBA Aurora$^{\Phi}$ (Figure 1).

- Actual yield in the presence of crown rot infection (added CR) ranged in the durum varieties from 0.37 t/ha (Caparoi$^{(\phi)}$) to 0.67 t/ha (Hyperno$^{(\phi)}$), in the bread wheat from 0.77 t/ha (Lincoln$^{(\phi)}$) to 1.41 t/ha (LRPB Lancer$^{(\phi)}$) and in the barley from 0.75 t/ha (Navigator$^{(\phi)}$) to 1.71 t/ha (Hindmarsh$^{(\phi)}$) (Figure 1).
- The four bread wheat varieties Wallup$^{(\phi)}$ (0.28 t/ha), Suntop$^{(\phi)}$ (0.29 t/ha), Sunguard$^{(\phi)}$ (0.30 t/ha) and LRPB Lancer$^{(\phi)}$ (0.52 t/ha$^{(\phi)}$) were significantly higher yielding than EGA Gregory$^{(\phi)}$ in the presence of added crown rot.
- The five barley varieties Commander$^{(\phi)}$ (0.28 t/ha), Compass$^{(\phi)}$ (0.57 t/ha), Fathom$^{(\phi)}$ (0.66 t/ha), La Trobe$^{(\phi)}$ (0.66 t/ha) and Hindmarsh$^{(\phi)}$ (0.82 t/ha$^{(\phi)}$) were significantly higher yielding than EGA Gregory$^{(\phi)}$ in the presence of added crown rot.
- Grain quality data was not available at the time of writing this report.

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