

# Regional crown rot management – Gilgandra 2016

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## Key findings

- Yield loss from crown rot ranged from not significant in the variety DBA Lillaroï<sup>ϕ</sup> and seven of the 13 bread wheat varieties, up to 32.9% in the durum variety Jandaroi<sup>ϕ</sup>.
- Only the bread wheat variety Mitch<sup>ϕ</sup> was higher yielding (0.41 t/ha) than the susceptible bread wheat variety EGA Gregory<sup>ϕ</sup> in the presence of high levels of crown rot infection.
- Grain protein levels were low across the site and varied from 7.7% in Mitch<sup>ϕ</sup> up to 10.1% in the durum line 190873. Crown rot infection did not affect protein levels in any entry.
- Crown rot infection caused a small (1–2%), but significant, increase in the level of screenings in the barley variety La Trobe<sup>ϕ</sup>, and 10 of the 13 bread wheat entries.

## Introduction

Crown rot (CR), caused predominantly by the fungus *Fusarium pseudograminearum* (Fp), remains a major constraint to winter cereal production in the northern grains region. Cereal varieties differ in their resistance to crown rot, which can have a significant effect on their relative yield in the presence of this disease.

This experiment was one of 11 conducted by NSW DPI in 2016 across central/northern NSW extending into southern Qld, to examine the impact of crown rot on the yield and quality of four barley, three durum and 13 bread wheat varieties.

## Site details

Location	'Avondale', Gilgandra
Co-operator	Kevin Kilby
Sowing date	25 May 2016
Fertiliser	80 kg/ha Granulock 12Z (treated with 2.8 L/ha of flutriafol) at sowing
Starting nitrogen	97 kg N/ha to 120 cm
Starting soil water	~120 mm plant available soil water (0–120 cm)
Rainfall	The growing season rainfall was 574 mm
PreDicta B	Nil <i>Pratylenchus thornei</i> , nil <i>P. neglectus</i> and nil crown rot at sowing (0–15 cm)
Harvest date	30 November 2016

## Treatments

### Varieties (20)

- Four barley varieties: Commander<sup>ϕ</sup>, Compass<sup>ϕ</sup>, La Trobe<sup>ϕ</sup> and Spartacus<sup>ϕ</sup>.
- Three durum varieties: Jandaroi<sup>ϕ</sup> and Lillaroï<sup>ϕ</sup> plus the numbered line 190873.
- Thirteen bread wheat varieties: EGA Gregory<sup>ϕ</sup>, LRPB Flanker<sup>ϕ</sup>, Beckom<sup>ϕ</sup>, Coolah<sup>ϕ</sup>, Sunmate<sup>ϕ</sup>, LRPB Lancer<sup>ϕ</sup>, LRPB Reliant<sup>ϕ</sup>, LRPB Gauntlet<sup>ϕ</sup>, LRPB Spitfire<sup>ϕ</sup>, Mitch<sup>ϕ</sup>, Suntop<sup>ϕ</sup> and Sunguard<sup>ϕ</sup>; (listed in order of increasing resistance to crown rot) plus one numbered line LPB12-0494.

### Pathogen treatment

Added or no added crown rot at sowing using sterilised durum grain colonised by at least five different isolates of Fp at a rate of 2.0 g/m of row at sowing.

## Results

### Yield

In the no added CR treatment, yield ranged from 2.16 t/ha in the barley variety La Trobe<sup>Ⓢ</sup> up to 3.55 t/ha in the bread wheat variety Beekom<sup>Ⓢ</sup> (Table 1). Waterlogging at early growth stages (up to GS32) was evident at this site in 2016, which appeared more pronounced in the barley varieties than in the bread or durum wheat entries.

The durum variety DBA Lillaro<sup>Ⓢ</sup> and seven of the bread wheat varieties (Mitch<sup>Ⓢ</sup>, LRPB Flanker<sup>Ⓢ</sup>, LRPB Spitfire<sup>Ⓢ</sup>, Suntop<sup>Ⓢ</sup>, LRPB Reliant<sup>Ⓢ</sup>, LRPB Gauntlet<sup>Ⓢ</sup> and Sunguard<sup>Ⓢ</sup>) did not suffer significant yield loss under high levels of crown rot infection (added CR). In the remaining entries, yield loss ranged from 9.6% in the bread wheat variety Coolah<sup>Ⓢ</sup> (0.32 t/ha) up to 32.9% in the durum variety Jandaroi<sup>Ⓢ</sup> (0.84 t/ha).

All four barley varieties and all three durum entries were lower yielding than EGA Gregory<sup>Ⓢ</sup> under high crown rot infection (added CR). With the exception of Mitch<sup>Ⓢ</sup>, all the bread wheat entries produced a yield equivalent to EGA Gregory<sup>Ⓢ</sup> in the added CR treatment (Table 1).

The bread wheat variety Mitch<sup>Ⓢ</sup> (0.41 t/ha) was the only entry that was higher yielding than EGA Gregory<sup>Ⓢ</sup> under high levels of crown rot infection (added CR; Table 1).

Table 1. Yield and grain quality of varieties with no added and added crown rot – Gilgandra 2016.

Crop	Variety	Yield (t/ha)		Protein	Screenings (%)	
		No added CR	Added CR	(%)	No added CR	Added CR
Barley	Commander	2.22	1.87	8.2	2.1	2.4
	Spartacus	2.58	1.86	8.8	2.1	2.7
	Compass	2.37	1.77	8.4	1.7	2.1
	La Trobe	2.16	1.48	9.3	2.7	4.0
Durum	DBA Lillaro <sup>Ⓢ</sup>	2.23	2.03	9.5	2.0	2.6
	190873	2.49	1.86	10.1	1.8	2.4
	Jandaroi	2.57	1.72	9.8	2.4	2.8
Bread wheat	Mitch	3.52	3.26	7.7	5.0	6.4
	Beekom	3.55	3.08	7.8	4.0	5.0
	Coolah	3.34	3.02	8.9	5.5	6.8
	LRPB Flanker	3.19	2.97	8.3	5.7	7.4
	LRPB Spitfire	3.05	2.91	9.2	4.9	5.6
	Sunmate	3.26	2.89	8.9	8.0	10.3
	Suntop	3.11	2.87	8.6	6.0	6.0
	EGA Gregory	3.23	2.85	8.6	6.4	8.1
	LRPB Reliant	3.05	2.82	8.4	6.9	7.8
	LRPB Gauntlet	2.89	2.78	8.9	5.9	7.0
	LPB12-0494	3.14	2.75	8.8	7.6	8.7
	Sunguard	2.76	2.71	8.7	4.6	4.7
	LRPB Lancer	2.97	2.55	9.2	3.6	4.7
Site mean		2.88	2.50	8.8	4.4	5.4
CV (%)		7.1		4.5	11.0	
I.s.d.		0.310		0.46	0.87	
P value		0.021		<.001	0.05	

### Grain quality

Protein levels were low at this site in 2016 and ranged between 7.7% (Mitch<sup>Ⓢ</sup>) up to 10.1% (190873; Table 1). The low protein levels were likely related to denitrification that occurred with transient water logging at the site early in the season.

Crown rot infection (added CR) did not significantly affect grain protein levels in any of the entries at this site in 2016.

In the no added CR treatment, screening levels ranged from 1.7% in the barley variety Compass<sup>®</sup> up to 8.0% in the bread wheat variety Sunmate<sup>®</sup> (Table 1).

Screening levels were increased by around 1–2% in the added CR treatment with the barley variety La Trobe<sup>®</sup> and the bread wheat entries Mitch<sup>®</sup>, Beekom<sup>®</sup>, Coolah<sup>®</sup>, LRPB Flanker<sup>®</sup>, Sunmate<sup>®</sup>, EGA Gregory<sup>®</sup>, LRPB Reliant<sup>®</sup>, LRPB Gauntlet<sup>®</sup>, LPB12-0494 and LRPB Lancer<sup>®</sup>. In the remaining entries, there was no significant difference in the level of screenings between the no added CR and added CR treatments. In the added CR treatment, screening levels ranged from 2.1% in the barley variety Compass<sup>®</sup> up to 10.3% in the bread wheat variety Sunmate<sup>®</sup> (Table 1).

## Conclusions

Cereal crop and variety choice affected yield in the absence and presence of crown rot infection, which differed by 1.38 t/ha and 1.77 t/ha, respectively between the best and worst entries. Waterlogging at this site during tillering visually affected the barley varieties more than the bread and durum wheat entries. This difference appears to have carried through to a reduced yield in the barley varieties relative to the other winter cereals at this site in 2016.

Only the bread wheat variety Mitch<sup>®</sup> provided a 14% yield benefit over growing the susceptible bread wheat variety EGA Gregory<sup>®</sup> under high levels of crown rot infection at Gilgandra in 2016. This could have maximised profit in this growing season but will **not** reduce inoculum levels for subsequent crops, because all winter cereal varieties are susceptible to crown rot infection. Winter cereal crop and variety choice is therefore **not** the sole solution to crown rot but rather just one element of an integrated management strategy to limit losses from this disease.

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