

# Regional crown rot management – Bullarah 2016

Steven Simpfendorfer and Robyn Shapland

NSW DPI, Tamworth

## Key findings

- Yield loss from crown rot ranged from 7.6% in the bread wheat variety LRPB Spitfire<sup>Ⓢ</sup> up to 29.1% in the barley variety Commander<sup>Ⓢ</sup>.
- Bread wheat variety choice affected yield in the presence of high levels of crown rot infection with nine entries being 0.30 t/ha to 1.33 t/ha higher yielding than the susceptible bread wheat variety EGA Gregory<sup>Ⓢ</sup>.
- Grain protein levels varied from 12.0% in Mitch<sup>Ⓢ</sup> up to 15.8% in the recently released durum variety DBA Lillaro<sup>Ⓢ</sup>. Crown rot infection did not affect any grain protein level in any entry.
- Screening levels varied from 2.2% in the barley variety Compass<sup>Ⓢ</sup> up to 9.5% in the bread wheat line LPB12-0494.
- Crown rot infection did not affect screening levels in any entry.

## Introduction

Crown rot (CR), which is 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 significantly affect 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 effect of crown rot on the yield and quality of four barley, three durum and 13 bread wheat varieties.

## Site details

Location	'Dunbar', Bullarah
Co-operator	Brad Coleman
Sowing date	25 May 2016
Fertiliser	250 kg/ha Urea and 60 kg/ha Granulock 12Z (treated with 400 mL/ha of flutriafol) at sowing
Starting nitrogen	111 kg N/ha to 120 cm
Starting soil water	95 mm plant available soil water (0–120 cm)
Rainfall	The growing season rainfall was 344 mm
PreDicta B	2.7 <i>Pratylenchus thornei</i> /g soil (medium risk), nil <i>P. neglectus</i> and nil crown rot was detected at sowing (0–15 cm)
Harvest date	7 December 2016

## Treatments

### Varieties (20)

- Four barley varieties: Commander<sup>Ⓢ</sup>, Compass<sup>Ⓢ</sup>, La Trobe<sup>Ⓢ</sup> and Spartacus<sup>Ⓢ</sup>.
- Three durum varieties: Jandaroi<sup>Ⓢ</sup> and Lillaro<sup>Ⓢ</sup> plus the numbered line 190873.
- Thirteen bread wheat varieties: EGA Gregory<sup>Ⓢ</sup>, LRPB Flanker<sup>Ⓢ</sup>, Beckom<sup>Ⓢ</sup>, Coolah<sup>Ⓢ</sup>, Sunmate<sup>Ⓢ</sup>, LRPB Lancer<sup>Ⓢ</sup>, LRPB Reliant<sup>Ⓢ</sup>, LRPB Gauntlet<sup>Ⓢ</sup>, LRPB Spitfire<sup>Ⓢ</sup>, Mitch<sup>Ⓢ</sup>, Suntop<sup>Ⓢ</sup> and Sunguard<sup>Ⓢ</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 treatments, yield ranged from 3.76 t/ha in the barley variety Spartacus<sup>db</sup> up to 5.86 t/ha in the bread wheat variety Beckom<sup>db</sup> (Table 1).

All entries suffered significant yield loss under high levels of crown rot infection (added CR), which ranged from 7.6% in the bread wheat variety LRPB Spitfire<sup>db</sup> (0.44 t/ha) up to 29.1% in the barley variety Commander<sup>db</sup> (1.32 t/ha).

All four barley varieties were lower yielding than EGA Gregory<sup>db</sup> under high crown rot infection (added CR). The bread wheat entries (LPB12-0494, Sunguard<sup>db</sup> and LRPB Gauntlet<sup>db</sup>) all produced a yield equivalent to EGA Gregory<sup>db</sup> in the added CR treatment (Table 1).

The bread wheat entries LRPB Spitfire<sup>db</sup> (1.33 t/ha), Beckom<sup>db</sup> (0.98 t/ha), Mitch<sup>db</sup> (0.81 t/ha), Coolah<sup>db</sup> (0.71 t/ha), Sunmate<sup>db</sup> (0.61 t/ha), LRPB Flanker<sup>db</sup> (0.48 t/ha), LRPB Lancer<sup>db</sup> (0.39 t/ha), LRPB Reliant<sup>db</sup> (0.33 t/ha) and LPB12-0494 (0.30 t/ha) were all higher yielding than EGA Gregory<sup>db</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 – Bullarah 2016.

Crop	Variety	Yield (t/ha)		Protein	Screenings
		No added CR	Added CR	(%)	(%)
Barley	Compass	4.53	3.72	14.5	2.2
	La Trobe	4.01	3.48	14.8	6.2
	Commander	4.54	3.22	14.2	4.1
	Spartacus	3.76	3.17	15.3	6.2
Durum	DBA Lillaro	5.29	4.76	15.8	4.8
	190873	5.31	4.58	14.9	4.1
	Jandaro	5.59	4.52	14.6	4.6
Bread wheat	LRPB Spitfire	5.84	5.39	14.4	8.4
	Beckom	5.86	5.04	12.7	5.2
	Mitch	5.45	4.87	12.0	6.5
	Coolah	5.32	4.77	12.3	5.4
	Sunmate	5.28	4.67	12.7	7.0
	LRPB Flanker	5.03	4.54	12.9	6.0
	LRPB Lancer	5.60	4.45	13.6	6.9
	Suntop	5.04	4.39	12.8	5.8
	LRPB Reliant	4.74	4.36	12.5	8.6
	LPB12-0494	4.84	4.33	12.5	9.5
	Sunguard	4.93	4.32	12.7	7.3
	EGA Gregory	4.67	4.06	12.5	7.8
	LRPB Gauntlet	4.28	3.90	12.9	8.3
Site mean		5.00	4.33	13.5	6.2
CV (%)		3.9		1.2	19.2
I.s.d.		0.296		0.19	1.38
P value		<.001		<.001	<.001

### Grain quality

Protein levels were relatively high at this site in 2016 and ranged from 12.0% (Mitch<sup>Ⓢ</sup>) up to 15.8% (DBA Lillaro<sup>Ⓢ</sup>; Table 1). The recently released durum variety DBA Lillaro<sup>Ⓢ</sup> achieved 0.9–1.2% higher grain protein levels than the other two durum entries in the experiment. Crown rot infection (added CR) did not significantly affect grain protein levels in any of the entries at this site in 2016.

Screening levels ranged from 2.2% in the barley variety Compass<sup>Ⓢ</sup> up to 9.5% in the bread wheat line LPB12-0494 (Table 1). Crown rot infection (added CR) did not significantly affect grain protein levels in any of the entries at this site in 2016. The three durum varieties produced similar screenings levels to each other, in the range of 4.2–4.8%.

### Conclusions

Cereal crop and variety choice provided a 7–33% yield benefit over growing the susceptible bread wheat variety EGA Gregory<sup>Ⓢ</sup> under high levels of crown rot infection at Bullarah in 2016. This could have maximised profit in the 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.

### Acknowledgements

This research was part of the project *National crown rot epidemiology and management program* (DAN00175), with joint investment by NSW DPI and GRDC. Thanks to Brad Coleman for providing the experiment site and Rick Graham, Jim Perfrement, Mick Dal Santo, Stephen Morphett (NSW DPI) for sowing, maintaining and harvesting the trial. Thanks to Chrystal Fensbo (NSW DPI) for grain quality assessments and to Jason Lowien (GrainCorp) for use of an NIR machine to determine grain protein levels.