

Regional crown rot management – Garah 2016

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Key findings

- Yield loss from crown rot ranged from not significant in the barley varieties Spartacus[Ⓛ] and Commander[Ⓛ] up to around 20% in the barley variety Compass[Ⓛ] and bread wheat varieties EGA Gregory[Ⓛ] and LRPB Flanker[Ⓛ].
- Bread wheat variety choice affected yield in the presence of high levels of crown rot infection with five entries being between 0.32 t/ha to 0.57 t/ha higher yielding than the susceptible bread wheat variety EGA Gregory[Ⓛ].
- Grain protein levels varied from 11.3% in Mitch[Ⓛ] up to 14.9% in LRPB Spitfire[Ⓛ]. Crown rot infection did not affect protein levels in any entry.
- Crown rot infection increased the level of screenings in all four barley varieties and the two bread wheat varieties Sunmate[Ⓛ] and LRPB Reliant[Ⓛ].

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 impact 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	'Miroobil', Garah
Co-operator	Andrew and Bill Yates
Sowing date	10 June 2016
Fertiliser	60 kg/ha Urea and 60 kg/ha Granulock 12Z (treated with 400 mL/ha of flutriafol) at sowing
Starting nitrogen	167 kg N/ha to 120 cm
Starting soil water	40 mm plant available soil water (0–120 cm)
Rainfall	The growing season rainfall was 174 mm
PreDicta B	1.7 <i>Pratylenchus thornei</i> /g soil (low risk), nil <i>P. neglectus</i> and nil crown rot at sowing (0–15 cm)
Harvest date	23 November 2016

Treatments

Varieties (20)

- Four barley varieties: Commander[Ⓛ], Compass[Ⓛ], La Trobe[Ⓛ] and Spartacus[Ⓛ].
- Three durum varieties: Jandaroi[Ⓛ] and Lillaroi[Ⓛ] plus the numbered line 190873.
- Thirteen bread wheat varieties: EGA Gregory[Ⓛ], LRPB Flanker[Ⓛ], Beckom[Ⓛ], Coolah[Ⓛ], Sunmate[Ⓛ], LRPB Lancer[Ⓛ], LRPB Reliant[Ⓛ], LRPB Gauntlet[Ⓛ], LRPB Spitfire[Ⓛ], Mitch[Ⓛ], Suntop[Ⓛ] and Sunguard[Ⓛ]; (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 3.54 t/ha in the barley variety Commander[Ⓛ] up to 5.61 t/ha in the bread wheat variety LRPB Flanker[Ⓛ] (Table 1).

Only two of the barley varieties, Spartacus[Ⓛ] and Commander[Ⓛ], did not suffer significant yield loss under high levels of crown rot infection (added CR). In the remaining entries, yield loss ranged from 7.6% in the bread wheat variety Mitch[Ⓛ] (0.40 t/ha) up to 21.6% in the barley variety Compass[Ⓛ] (0.93 t/ha).

All four barley varieties, the durum variety DBA Lillaroi[Ⓛ] and the bread wheat variety LRPB Spitfire[Ⓛ] were lower yielding than EGA Gregory[Ⓛ] under high crown rot infection (added CR). The remaining durum entries and six of the bread wheat varieties (LRPB Gauntlet[Ⓛ], Sunguard[Ⓛ], LRPB Reliant[Ⓛ], LRPB Lancer[Ⓛ], LRPB Flanker[Ⓛ] and Beckom[Ⓛ]) all produced yields equivalent to EGA Gregory[Ⓛ] in the added CR treatment (Table 1).

The bread wheat entries Sunmate[Ⓛ] (0.57 t/ha), Mitch[Ⓛ] (0.49 t/ha), LPB12-0494 (0.36 t/ha), Suntop[Ⓛ] (0.34 t/ha) and Coolah[Ⓛ] (0.32 t/ha) were all higher yielding than EGA Gregory[Ⓛ] under high levels of crown rot infection (added CR; Table 1).

Grain quality

Protein levels were relatively high at this site in 2016 and ranged between 11.3% (Mitch[Ⓛ]) up to 14.9% (LRPB Spitfire[Ⓛ]; Table 1). 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 1.9% in the bread wheat variety LRPB Lancer[Ⓛ] up to 7.9% in the barley variety La Trobe[Ⓛ] (Table 1).

Screening levels were increased in the added CR treatment, with all four barley varieties and two of the bread wheat varieties Sunmate[Ⓛ] and LRPB Reliant[Ⓛ] by between 1.7 to 5.6%. 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 2.9% in the bread wheat variety LRPB Lancer[Ⓛ] up to 10.7% in the barley variety La Trobe[Ⓛ] (Table 1).

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

Crop	Variety	Yield (t/ha)		Protein	Screenings (%)	
		No added CR	Added CR	(%)	No added CR	Added CR
Barley	La Trobe	4.63	4.09	13.9	7.9	10.7
	Spartacus	4.35	4.07	14.5	3.8	9.4
	Compass	4.29	3.36	13.8	3.4	5.3
	Commander	3.54	3.24	14.1	5.4	7.9
Durum	Jandaroi	5.17	4.64	13.0	2.8	4.1
	190873	5.21	4.52	12.9	2.7	3.5
	DBA Lillaroi	4.90	4.04	14.2	4.5	5.8
Bread wheat	Sunmate	5.52	4.97	12.1	4.7	6.4
	Mitch	5.29	4.89	11.3	3.4	4.7
	LPB12-0494	5.31	4.76	12.1	5.9	7.2
	Suntop	5.13	4.74	12.2	3.9	4.5
	Coolah	5.52	4.72	11.9	2.2	3.2
	LRPB Gauntlet	5.19	4.68	12.5	4.0	5.4
	Sunguard	5.09	4.61	12.6	3.8	4.8
	LRPB Reliant	5.43	4.52	12.0	6.4	8.7
	LRPB Lancer	5.15	4.50	13.4	1.9	2.9
	LRPB Flanker	5.61	4.47	12.4	3.2	4.2
	EGA Gregory	5.52	4.40	12.4	3.3	4.5
	Beckom	5.37	4.33	12.4	3.8	5.3
	LRPB Spitfire	4.43	3.93	14.9	3.6	5.1
Site mean		5.03	4.37	12.9	4.0	5.7
CV (%)		4.1		1.8	19.5	
I.s.d.		0.310		0.27	1.54	
P value		<.001		<.001	0.019	

Conclusions

Cereal crop and variety choice provided a 7–13% yield benefit over growing the susceptible bread wheat variety EGA Gregory[Ⓛ] under high levels of crown rot infection at Garah 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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