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Regional crown rot management – Trangie 2016

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Key findings

- Yield loss from crown rot ranged from not significant in the bread wheat variety LRPB Reliant[Ⓛ] up to 16.9% in the barley variety Compass[Ⓛ].
- Bread wheat variety choice affected yield in the presence of high levels of crown rot infection with three entries being between 0.45 t/ha and 0.85 t/ha higher yielding than the susceptible bread wheat variety EGA Gregory[Ⓛ].
- Grain protein levels were low across the site (mean of 9.8%) and varied from 8.7% in Mitch[Ⓛ] up to 10.6% in LRPB Spitfire[Ⓛ]. Crown rot infection did not affect protein levels in any entry.
- Crown rot infection caused a small (1–4%), but significant increase in screenings in the barley variety La Trobe[Ⓛ] and all 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 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	Trangie Agricultural Research Centre, Trangie.
Sowing date	19 May 2016
Fertiliser	80 kg/ha Granulock Z Extra (Sapphire) (11.5% N 19.8% P 5.4% S) at sowing.
Starting nitrogen (N)	170.8 kg N/ha (0–120 cm)
Starting soil water	~60–70 mm plant available soil water (based on a 25% fallow efficiency) (0–120 cm)
Rainfall	The growing season rainfall was 379 mm
PreDicta B	Nil <i>Pratylenchus thornei</i> , nil <i>P. neglectus</i> and 2.0 log <i>Fusarium</i> DNA/g soil (medium crown rot risk) at sowing (0–15 cm)
Harvest date	24 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 3.81 t/ha in the durum variety DBA Lillaroi[Ⓛ] up to 5.98 t/ha in the bread wheat variety Beckom[Ⓛ] (Table 1). Only the bread wheat variety LRPB Reliant[Ⓛ] did not suffer significant yield loss under high levels of crown rot infection (added CR). In the remaining entries, yield loss ranged from 5.4% in the bread wheat variety LRPB Lancer[Ⓛ] (0.26 t/ha) up to 16.9% in the barley variety Compass[Ⓛ] (0.74 t/ha).

Three of the barley varieties (except Commander[Ⓛ]), all three durum entries and the bread wheat variety LRPB Flanker[Ⓛ] were significantly lower yielding than EGA Gregory[Ⓛ] under high crown rot infection (added CR). Three bread wheat varieties – Beckom[Ⓛ] (by 0.85 t/ha), Coolah[Ⓛ] (by 0.57 t/ha) and Mitch[Ⓛ] (by 0.45 t/ha) – were the only entries higher yielding than EGA Gregory[Ⓛ] under high levels of crown rot infection (added CR; Table 1). The remaining nine bread wheat entries produced yields equivalent to EGA Gregory[Ⓛ] in the added CR treatment.

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

Crop	Variety	Yield (t/ha)		Protein	Screenings (%)	
		No added CR	Added CR	(%)	No added CR	Added CR
Barley	Commander	4.93	4.52	9.0	2.1	1.7
	Spartacus	5.01	4.28	9.8	2.7	3.2
	La Trobe	4.34	4.05	9.6	3.0	4.7
	Compass	4.36	3.62	9.2	1.7	2.2
Durum	Jandaroi	4.12	3.88	10.0	4.1	5.6
	190873	3.95	3.53	10.5	4.8	5.7
	DBA Lillaroi	3.81	3.48	10.0	6.0	6.8
Bread wheat	Beckom	5.98	5.45	9.3	4.2	6.0
	Coolah	5.45	5.17	9.4	7.4	9.9
	Mitch	5.48	5.05	8.7	7.7	9.7
	LRPB Reliant	4.86	4.73	9.6	9.8	13.5
	LPB12-0494	4.94	4.64	10.1	7.6	11.5
	Sunmate	4.93	4.63	9.9	10.6	14.6
	LRPB Lancer	4.86	4.60	10.4	6.4	10.0
	Suntop	5.10	4.60	10.0	5.1	8.7
	EGA Gregory	5.25	4.60	9.5	10.6	12.5
	LRPB Spitfire	4.88	4.58	10.6	5.9	9.8
	LRPB Gauntlet	4.70	4.43	10.1	7.3	10.9
	Sunguard	4.72	4.42	9.9	7.3	9.2
	LRPB Flanker	4.98	4.24	9.6	9.2	12.3
Site mean		4.83	4.42	9.8	6.2	8.4
CV (%)		3.0		3.7	13.9	
I.s.d.		0.227		0.42	1.65	
P value		0.002		<.001	0.001	

Grain quality

Protein levels were low at this site in 2016 and ranged between 8.7% (Mitch[Ⓛ]) up to 10.6% (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 1.7% in the barley variety Compass[Ⓛ] up to 10.6% in the bread wheat varieties Sunmate[Ⓛ] and EGA Gregory[Ⓛ] (Table 1).

Screening levels were increased by around 1–4% in the added CR treatment, with the barley variety La Trobe and all 13 bread wheat entries (Table 1). 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 1.7% in the barley variety Commander[Ⓛ] up to 14.6% in the bread wheat variety Sunmate[Ⓛ] (Table 1).

Conclusions

Three of the bread wheat varieties (Mitch[Ⓛ], Coolah[Ⓛ] and Beckom[Ⓛ]) provided a 10–19% yield benefit over growing the susceptible bread wheat variety EGA Gregory[Ⓛ] under high levels of crown rot infection at Trangie 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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