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Regional crown rot management – Wongarbon 2016

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Key findings

- Seasonal conditions reduced stress during grain fill at this site in 2016, which limited the effects from infection on yield.
- Although the effect of crown rot infection on yield was not significant, there was still a 52% (1.76 t/ha) difference between the overall yield of the best and worst entries.
- Grain protein levels were relatively low across the site, varying from 7.8% in Mitch$^{\Phi}$ up to 9.8% in the durum line 190873. Crown rot did not affect protein levels in any other variety.
- Crown rot infection caused a moderate (2–6%) increase in the level of screenings in 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 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 effects of crown rot on the yield and quality of four barley, three durum and 13 bread wheat varieties.

Site details

Location	'Hillview', Wongarbon
Co-operator	The Kelly family
Sowing date	31 May 2016
Fertiliser	80 kg/ha Granulock 12 Z (treated with 2.8 L/ha of flutriafol) at sowing 100 L/ha Easy N at Z30
Starting nitrogen	145 kg N/ha to 120 cm
Starting soil water	~120 mm plant available soil water (0–120 cm)
Rainfall	The growing season rainfall was 555 mm
PreDicta B	Nil *Pratylenchus thornei*, 1.8 *P. neglectus*/g soil (low risk) and nil crown rot at sowing (0–15 cm)
Harvest date	2 December 2016

Treatments

Varieties (20)

- Four barley varieties: Commander$^{\Phi}$, Compass$^{\Phi}$, La Trobe$^{\Phi}$ and Spartacus$^{\Phi}$.
- Three durum varieties: Jandaroi$^{\Phi}$ and Lillaroi$^{\Phi}$ plus the numbered line 190873.
- Thirteen bread wheat varieties: EGA Gregory$^{\Phi}$, LRPB Flanker$^{\Phi}$, Beckom$^{\Phi}$, Coolah$^{\Phi}$, Sunmate$^{\Phi}$, LRPB Lancer$^{\Phi}$, LRPB Reliant$^{\Phi}$, LRPB Gauntlet$^{\Phi}$, LRPB Spitfire$^{\Phi}$, Mitch$^{\Phi}$, Suntop$^{\Phi}$ and Sunguard$^{\Phi}$; (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

Adding CR inoculum at sowing did not significantly affect the yield of individual varieties at this site in 2016. However, significant differences were still evident between varieties averaged across CR treatments. Yield in the four barley varieties ranged from 4.92 t/ha in Compass[Φ] up to 5.15 t/ha in Spartacus[Φ]. Durum yield ranged from 3.38 t/ha in DBA Lillaroi[Φ] up to 3.68 t/ha with Jandaroi[Φ], while bread wheat yield ranged from 3.99 t/ha with LRPB Lancer[Φ] up to 4.92 t/ha with Mitch[Φ] (Table 1).

Grain quality

Protein levels were low at this site in 2016 and ranged between 7.8% (Mitch[Φ] and Beckom[Φ]) up to 9.8% (190873; 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 added CR treatment increased screening levels by between 1.9 to 5.6% in the bread wheat varieties Beckom[Φ], Coolah[Φ], LRPB Flanker[Φ], Mitch[Φ], EGA Gregory[Φ], LRPB Gauntlet[Φ], LRPB Lancer[Φ], Sunguard[Φ], LRPB Reliant[Φ] and Sunmate[Φ]. In the remaining bread wheat entries, there was no significant difference in the level of screenings between the no added CR and added CR treatments.

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

Crop	Variety	Yield	Protein	Screenings (%)	
		(t/ha)	(%)	No added CR	Added CR
Barley	Spartacus	5.15	9.0	1.8	2.3
	Commander	5.06	7.9	1.7	1.8
	La Trobe	4.93	8.5	2.4	3.0
	Compass	4.92	8.3	1.4	1.6
Durum	Jandaroi	3.68	9.7	3.2	4.0
	190873	3.48	9.8	2.5	3.1
	DBA Lillaroi	3.38	9.6	3.5	4.1
Bread wheat	Mitch	4.92	7.8	4.3	6.7
	LRPB Flanker	4.83	8.5	6.4	8.8
	Beckom	4.78	7.8	4.6	6.4
	LRPB Reliant	4.74	8.2	8.6	12.5
	LPB12-0494	4.73	9.1	6.8	8.1
	EGA Gregory	4.53	8.7	9.1	12.4
	Coolah	4.42	9.1	5.9	7.9
	Sunmate	4.35	8.8	11.9	17.5
	LRPB Gauntlet	4.34	8.8	7.7	11.3
	Suntop	4.30	8.7	6.2	7.4
	Sunguard	4.28	8.8	5.8	9.6
	LRPB Spitfire	4.23	9.1	5.4	6.9
	LRPB Lancer	3.99	9.1	5.8	9.6
Site mean		4.45	8.8	5.2	7.3
CV (%)		4.3	4.3	17.7	
l.s.d.		0.219	0.44	1.80	
P value		<.001	<.001	<.001	

Conclusions

Cereal crop and variety choice affected yield at this site in 2016, which differed by 1.76 t/ha (52%) between the best (Spartacus(ϕ)) and worst (DBA Lillaroi(ϕ)) entries when averaged across CR treatments. CR treatment did not significantly affect yield in any of the entries due to seasonal conditions (~120 mm of plant available water at sowing plus 555 mm in-crop rainfall), which limited stress during grain filling. The added CR treatment also did not affect grain protein levels, but resulted in a modest 2–6% increase in the level of screenings in 10 of the 13 bread wheat entries.

It should be remembered that cereal crop and variety choice in paddocks with a medium crown rot risk can maximise profit in the current 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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