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Regional crown rot management – Tamarang 2016

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Key findings

- Yield loss from crown rot ranged from not significant in five of the bread wheat varieties, the barley variety Commander$^{\Phi}$ and the durum variety Jandaroi$^{\Phi}$ up to 12.9% in the bread wheat variety EGA Gregory$^{\Phi}$.
- The recently released durum variety DBA Lillaroi$^{\Phi}$ produced a protein level of 15% which was over 1% higher than the two other durum entries Jandaroi$^{\Phi}$ and 190873.
- Crown rot infection did not significantly impact on the level of screenings in any of the entries due to limited expression under the wet seasonal conditions at this site in 2016. However, genetic differences were evident with screening levels which ranged from 3.2% in the durum line 190873 up to 17.6% in the bread wheat variety Beckom$^{\Phi}$.

Introduction

Crown rot (CR) caused predominantly by the fungus *Fusarium pseudograminearum* (*Fp*), remains a major constraint to the production of winter cereals 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	'The Point', Tamarang
Co-operator	David Ronald
Sowing date	17 June 2016
Fertiliser	60 kg/ha Granulock 12Z (treated with 400 mL/ha of flutriafol) at sowing
Starting N	250 kg N/ha to 120 cm
PAWC	246 mm plant available soil water (0–120 cm)
Rainfall	The growing season rainfall was 472 mm
PreDicta B	Nil *Pratylenchus thornei*, nil *P. neglectus* and nil crown rot at sowing (0–15 cm)
Harvest date	14 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 2.0 g/m of row at sowing.

Results

Yield

In the no added CR treatment, yield ranged from 5.11 t/ha in the bread wheat variety Sunmate$^{\phi}$ up to 7.38 t/ha in the durum variety DBA Lillaroi$^{\phi}$ (Table 1).

The barley variety Commander$^{\phi}$, durum variety Jandaroi$^{\phi}$ and five of the bread wheat entries (LPB12-0494, LRPB Gauntlet$^{\phi}$, LRPB Lancer$^{\phi}$, Sunguard$^{\phi}$ and LRPB Spitfire$^{\phi}$) did not suffer significant yield loss under high levels of crown rot infection (added CR). In the remaining entries, yield loss ranged from 4.2% in the bread wheat variety LRPB Reliant$^{\phi}$ (0.26 t/ha) up to 12.9% in the bread wheat variety EGA Gregory$^{\phi}$ (0.77 t/ha).

Only the bread wheat variety Sunmate$^{\phi}$ was lower yielding than EGA Gregory$^{\phi}$ under high crown rot infection (added CR). The barley variety La Trobe$^{\phi}$ and two bread wheat varieties (Sunguard$^{\phi}$ and LRPB Spitfire$^{\phi}$) all produced yields equivalent to EGA Gregory$^{\phi}$ in the added CR treatment (Table 1).

All three durum entries produced yields higher than EGA Gregory. The bread wheat entries Mitch$^{\phi}$ (0.87 t/ha), Coolah$^{\phi}$ (0.79 t/ha), LRPB Reliant$^{\phi}$ (0.70 t/ha), Suntop$^{\phi}$ (0.63 t/ha), LRPB Flanker$^{\phi}$ (0.61 t/ha), Beckom$^{\phi}$ (0.56 t/ha), LPB12-0494 (0.51 t/ha), LRPB Gauntlet$^{\phi}$ (0.36 t/ha) and LRPB Lancer$^{\phi}$ (0.29 t/ha) were all higher yielding than EGA Gregory$^{\phi}$ under high levels of crown rot infection (added CR; Table 1). The barley entries Spartacus$^{\phi}$ (0.54 t/ha), Commander$^{\phi}$ (0.49 t/ha) and Compass$^{\phi}$ (0.49 t/ha) were also higher yielding than EGA Gregory$^{\phi}$ in the added CR treatment.

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

Crop	Variety	Yield (t/ha)		Protein	Screenings
		No added CR	Added CR	(%)	(%)
Barley	Spartacus	6.43	5.75	14.9	8.2
	Commander	5.83	5.70	14.8	9.3
	Compass	6.21	5.70	15.7	6.1
	La Trobe	6.13	5.39	15.0	10.4
Durum	Jandaroi	7.28	7.05	13.8	3.8
	DBA Lillaroi	7.38	6.85	15.0	3.5
	190873	7.08	6.63	13.9	3.2
Bread wheat	Mitch	6.53	6.08	12.1	8.5
	Coolah	6.36	6.00	12.1	5.7
	LRPB Reliant	6.17	5.91	12.3	7.9
	Suntop	6.14	5.84	12.4	10.2
	LRPB Flanker	6.29	5.82	12.9	7.0
	Beckom	6.34	5.77	12.5	17.6
	LPB12-0494	5.89	5.72	12.1	9.3
	LRPB Gauntlet	5.78	5.57	12.7	8.9
	LRPB Lancer	5.73	5.50	13.1	8.6
	Sunguard	5.34	5.22	12.5	11.6
	EGA Gregory	5.98	5.21	12.6	7.5
	LRPB Spitfire	5.34	5.10	14.0	13.7
	Sunmate	5.11	4.81	12.5	10.8
Site mean		6.17	5.78	13.3	8.6
CV (%)		2.5		2.1	14.8
l.s.d.		0.246		0.32	1.46
P value		0.001		<.001	<.001

Grain quality

Protein levels were relatively high at this site in 2016, which is likely a result of the high starting soil nitrogen levels. Protein levels in the bread wheat entries varied from 12.1% in Mitch$^{\phi}$, Coolah and LPB12-0494 up to 14.0% in LRPB Spitfire$^{\phi}$ (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 recently released durum variety DBA Lillaroi$^{\phi}$ achieved 1.1–1.2% higher grain protein levels (15.0%) than the other two durum entries in this experiment.

Crown rot infection did not significantly affect the level of screenings in any of the entries at this site in 2016. However, genetic differences were evident with screening levels ranging from 3.2% in the durum line 190873 up to 17.6% in the bread wheat variety Beckom$^{\phi}$ (Table 1).

Conclusions

Cereal crop and variety choice affected yield in the absence and presence of crown rot infection, which differed by 2.26 t/ha and 2.24 t/ha, respectively between the best and worst entries. The three durum entries were higher yielding relative to bread wheat and barley entries in both the added CR and no added CR treatments at this site in 2016. This was likely due to seasonal conditions (near full soil water profile at sowing plus 472 mm of in-crop rainfall), which limited crown rot expression.

Cereal crop and variety choice still provided a 9% to 35% yield benefit over growing the susceptible bread wheat variety EGA Gregory$^{\phi}$ under high levels of crown rot infection at Tamarang on the Liverpool Plains in 2016. This 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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