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Regional crown rot management – Wongarbron 2015

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Key findings

Yield loss from crown rot ranged from 5.3% (not significant) in the bread wheat variety Suntop[®] up to 31.0% in the durum variety Jandaroi[®].

Bread wheat variety choice had a large effect on yield where there were high levels of crown rot infection with Beckom[®], LRPB Lancer[®] and Suntop[®] being between 0.30 t/ha and 0.41 t/ha higher yielding than EGA Gregory[®].

The barley varieties Commander[®] and La Trobe[®] were 0.93 t/ha and 1.65 t/ha higher yielding than EGA Gregory[®] under high levels of crown rot infection, respectively.

Rancona[®] Dimension did not provide a yield benefit in the presence of high levels of crown rot infection at this site in 2015.

Introduction

Crown rot (CR), caused predominantly by the fungus *Fusarium pseudograminearum* (*Fp*), remains a major constraint in producing winter cereals in the NSW northern grains region. Cereal varieties differ in their resistance to CR which can have a significant impact on their relative yield in the presence of this disease.

Rancona[®] Dimension (ipconazole + metalaxyl) was recently registered in Australia as a fungicide seed treatment with good activity against cereal bunts and smuts, pythium and for the suppression of rhizoctonia. Rancona[®] Dimension is also the first seed treatment to be registered (at 320 mL/100 kg seed) for the suppression of CR. Suppression, by definition, indicates that the seed treatment reduces the pathogen's growth for a set period of time early in the season.

Two trials were conducted at this site:

1. A variety trial, which was one of 12 conducted by NSW DPI in 2015 across central/northern NSW extending into southern Qld to examine the effect of CR on the yield of two barley, one durum and 13 bread wheat varieties.
2. A second trial aimed to evaluate the efficacy of Rancona[®] Dimension as a standalone option to control CR was also conducted across the same 12 sites in the northern region. This will hopefully ensure that growers have a realistic expectation of what this seed treatment can achieve if used in isolation from other integrated disease management strategies.

Site details

Location:	“Hillview”, Wongarbron
Co-operators:	Kelly family
Sowing date:	27 May 2015
Fertiliser:	95 kg/ha Granulock [®] 12Z and 70 kg/ha of urea at sowing; 100 kg/ha of urea on 9 July 2015
Starting N:	44.5 mg/kg (0–60 cm)
PreDicta B [®] :	5.6 Pt/g (medium), nil Pn and 2.3 log <i>Fusarium</i> DNA/g (high) at sowing (0–30 cm)
In-crop rainfall:	~289 mm
Harvest date:	2 December 2015

Treatments

Trial 1. Variety evaluation

- Two barley varieties: (Commander[®] and La Trobe[®])
- One durum variety: (Jandaroi[®])
- Eleven commercial bread wheat varieties: (EGA Gregory[®], LRPB Flanker[®], Sunmate[®], LRPB Gauntlet[®], LRPB Lancer[®], LRPB Viking[®], LRPB Spitfire[®], Beckom[®], Mitch[®], Suntop[®] and Sunguard[®]; listed in order of increasing resistance to CR) and two numbered lines (VO7176-69 and QT15046R).
- Added or no added CR at sowing using sterilised durum grain colonised by at least five different isolates of *Fp*.

Trial 2. Fungicide seed treatment evaluation

- EGA Gregory[®] with added or no added CR at sowing using infected durum grain.
- Seed treatments evaluated:
 1. Nil seed treatment

2. Rancona® Dimension (ipconazole 25 g/L + metalaxyl 20 g/L) at 320 mL/100 kg seed
3. Dividend M® (difeniconazole 92 g/L + metalaxyl-M 23 g/L) at 260 mL/100 kg seed
4. Jockey Stayer® (fluquinconazole 167 g/L) at 450 mL/100 kg seed.

Dividend M® and Jockey Stayer® are NOT registered for the suppression of CR, but were included to represent a commonly used wheat seed treatment for bunt and smut control, or early control of stripe rust (leaf disease), respectively. Including four treatments across each site ensured statistical rigour for yield outcomes.

Results

Trial 1. Variety evaluation

Yield

- In the no added CR treatment yield ranged from 2.81 t/ha in the bread wheat variety LRPB Flanker up to 4.64 t/ha in the barley variety La Trobe (Table 1).
- All entries with the exception of the bread wheat varieties LRPB Gauntlet and Suntop, suffered significant yield loss under higher levels of CR infection (added CR) which ranged from 7.3% in the barley variety Commander (0.28 t/ha) up to 31.0% in the durum variety Jandaroi (1.08 t/ha). Yield loss was potentially underestimated at this site as a high level of background CR inoculum already existed across the site. Hence, there was a level of infection in the no added CR plots.
- Only the bread wheat variety Viking (0.34 t/ha) was lower yielding than EGA Gregory under high levels of CR infection (added CR).
- The bread wheat varieties Beckom (0.30 t/ha), LRPB Lancer (0.30 t/ha) and Suntop (0.41 t/ha) along with the barley varieties Commander (0.93 t/ha) and La Trobe (1.65 t/ha) were all higher yielding than EGA Gregory in the added CR treatment (Table 1).
- All remaining entries produced yield equivalent to EGA Gregory in the added CR treatment (Table 1).

Table 1. Yield and grain quality of varieties with no added and added crown rot – Wongarbon 2015

Crop	Variety	Yield (t/ha)		Protein (%)	Screenings(%)	
		No added CR	Added CR		No added CR	Added CR
Barley	La Trobe	4.64	4.20	14.5	14.5	11.9
	Commander	3.76	3.48	16.3	27.5	31.9
Durum	Jandaroi	3.47	2.40	17.9	5.3	21.1
Bread wheat	Suntop	3.12	2.96	16.1	25.5	30.0
	LRPB Lancer	3.21	2.85	16.2	10.6	16.8
	Beckom	3.17	2.85	15.6	37.2	49.6
	LRPB Gauntlet	2.97	2.74	16.6	11.4	22.7
	Sunguard	2.98	2.68	15.9	20.3	24.6
	Mitch	2.95	2.64	16.1	22.6	24.0
	Sunmate	3.24	2.64	15.8	18.3	30.4
	V07176-69	3.33	2.61	15.0	12.0	21.8
	LRPB Spitfire	3.04	2.58	17.5	22.1	32.4
	QT15046R	3.68	2.56	15.3	9.3	26.2
	EGA Gregory	3.04	2.55	15.4	11.1	20.0
LRPB Flanker	2.81	2.45	16.2	20.0	26.9	
Viking	2.82	2.21	16.2	16.4	29.8	
Site mean		3.27	2.78	16.0	17.8	26.3
CV (%)		5.2		3.4	19.5	
LSD		0.257		0.629	7.01	
P value		<0.001		<0.001	0.01	

Grain quality

- The addition of CR inoculum did not significantly impact on grain protein levels in any of the entries (data not presented). Hence, the average of added CR and no added CR treatments for each entry are presented (Table 1).

- Protein levels were very high across entries at this site in 2015 which ranged between 14.5% (La Trobe) up to 17.9% (Jandaroi; Table 1).
- In the no added CR treatment (high background inoculum level), screening levels ranged from 5.3% in the durum variety Jandaroi up to 37.2% in the bread wheat variety Suntop (Table 1).
- Screening levels were increased in the added CR treatment with all entries with the exception of the barley varieties La Trobe and Commander and bread wheat varieties Suntop, LRPB Lancer, Sunguard, Mitch and LRPB Flanker.
- In the added CR treatment, screening levels ranged from 11.9% in the barley variety La Trobe up to 49.6% in the bread wheat variety Beckom (Table 1).

Trial 2. Fungicide seed treatment evaluation

- There was no significant difference in plant establishment between seed treatments or CR inoculum treatments at this site in 2015.
- There was no significant ($P=0.028$) difference in the yield of EGA Gregory with any of the seed treatments in the no added CR treatment (Figure 1).
- Yield loss in the added CR treatment was 9% with Jockey Stayer® and no seed treatment, 21% with Dividend M® and 26% with Rancona® Dimension compared to the corresponding no added CR treatment (Figure 1).
- Rancona® Dimension slightly reduced yield by 0.42 to 0.46 t/ha compared to the use of no seed treatment and Jockey Stayer® in the added CR treatment, but was not significantly different from the use of Dividend M® (Figure 1).

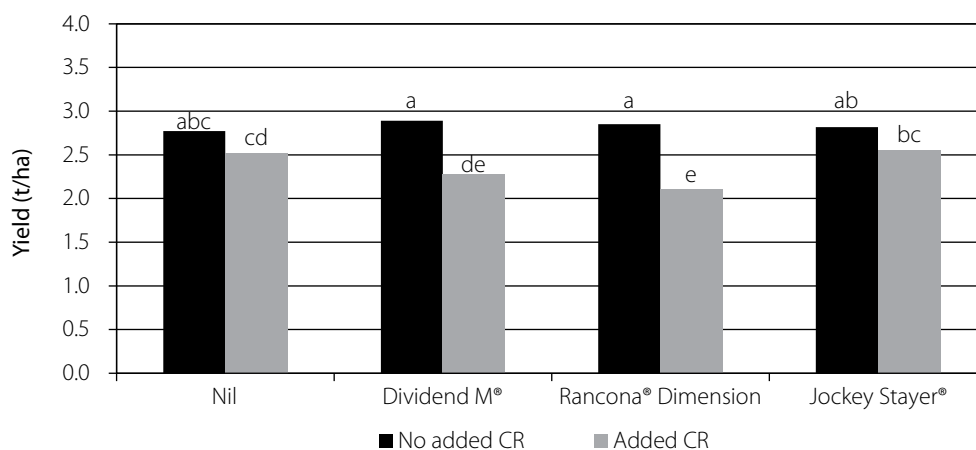


Figure 1. Impact of fungicide seed treatments on the yield of EGA Gregory[®] in the absence and presence of added crown rot inoculum – Wongarbon 2015
Bars with the same letter are not significantly different ($P=0.028$)

Conclusions

Cereal crop and variety choice provided a 12–65% yield benefit over growing the susceptible bread wheat variety EGA Gregory under high levels of CR infection at Wongarbon in 2015. Crop and variety choice can maximise profit in the current season but will not reduce inoculum levels for subsequent crops, because all winter cereal varieties are susceptible to CR infection. Winter cereal crop and variety choice is therefore not the sole solution to CR but rather just one element of an integrated management strategy to limit losses from this disease.

Rancona® Dimension did not provide a significant yield benefit over the use of no seed treatment or the two other commonly used seed treatments examined under high CR pressure at Wongarbon in 2015. Although Rancona® Dimension is registered for the suppression of CR, with activity against early infection and potential establishment losses (not evident at this site), growers should not expect this to translate into a significant and consistent reduction in yield loss from CR infection when the product is used as a standalone management strategy.

Integrated management remains the best strategy to reduce losses to CR.

Acknowledgements

This research was co-funded by NSW DPI and GRDC under project DAN00175: National crown rot epidemiology and management. Thanks to the Kelly family for hosting this trial on their property in 2015. Thanks to Peter Matthews and Ryan Potts (NSW DPI) for technical assistance 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.