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Regional crown rot management – Mullaley 2015

Steven Simpfendorfer and Robyn Shapland

NSW DPI, Tamworth

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:	“Lambrook”, Mullaley
Co-operators:	James Vince and William Adams
Sowing date:	20 May 2015
Fertiliser:	70 kg/ha Granulock® 12Z at sowing
Starting N:	225 kg/ha to 1.2 m
PreDicta B®:	Nil root lesion nematodes, 1.6 log <i>Fusarium</i> DNA/g (medium) at sowing (0–30 cm)
In-crop rainfall:	~154 mm
Harvest date:	25 November 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

Key findings

Yield loss from crown rot was relatively low at this site in 2015 which ranged from 2.6% (not significant) in the barley variety La Trobe[Ⓛ] up to 15.2% in the bread wheat variety Sunmate[Ⓛ].

Bread wheat variety choice had a large effect on yield where there were high levels of crown rot infection with LRPB Lancer[Ⓛ], Suntop[Ⓛ], Beckom[Ⓛ] and Mitch[Ⓛ] being between 0.31 t/ha and 0.51 t/ha higher yielding than EGA Gregory[Ⓛ].

The barley variety La Trobe[Ⓛ] was 0.59 t/ha higher yielding than EGA Gregory[Ⓛ] under high levels of crown rot infection.

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

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 4.18 t/ha in the bread wheat variety LRPB Spitfire up to 4.96 t/ha in the bread wheat variety Mitch (Table 1).
- All entries with the exception of the bread wheat varieties LRPB Lancer, Sunguard and LRPB Spitfire; and the barley varieties La Trobe and Commander, suffered significant yield loss under high levels of CR infection (added CR) which ranged from 5.3% in the bread wheat variety Beckom (0.26 t/ha) up to 15.2% in the bread wheat variety Sunmate (0.68 t/ha). Yield loss was potentially underestimated at this site as a medium 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 varieties LRPB Lancer (by 0.31 t/ha), Suntop (by 0.38 t/ha), Beckom (by 0.48 t/ha) and Mitch (by 0.51 t/ha), along with the barley variety La Trobe (0.59 t/ha) were higher yielding than EGA Gregory under high levels of CR infection (added CR).
- 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 – Mullaley 2015

Crop	Variety	Yield (t/ha)		Protein (%)	Screenings (%)
		No added CR	Added CR		
Barley	La Trobe	4.82	4.69	11.6	11.3
	Commander	4.32	4.15	11.8	9.7
Durum	Jandaroi	4.57	3.90	11.8	3.3
Bread wheat	Mitch	4.96	4.61	10.9	6.0
	Beckom	4.84	4.58	11.4	13.1
	Suntop	4.77	4.48	11.4	8.5
	LRPB Lancer	4.60	4.41	11.9	3.9
	V07176-69	4.58	4.28	10.8	7.2
	Viking	4.80	4.27	10.5	7.4
	QT15046R	4.70	4.24	11.0	8.1
	Sunguard	4.35	4.21	11.3	5.6
	LRPB Gauntlet	4.63	4.12	11.6	4.2
	EGA Gregory	4.55	4.10	11.1	7.7
	LRPB Spitfire	4.18	4.00	11.8	7.6
	LRPB Flanker	4.54	3.94	11.1	9.5
	Sunmate	4.46	3.78	11.3	8.6
	Site mean		4.60	4.24	11.3
CV (%)		3.1		3.7	17.7
LSD		0.222		0.49	1.55
P value		0.001		<0.001	<0.001

Grain quality

- The addition of CR inoculum did not significantly impact on grain quality 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 relatively low across entries at this site in 2015 which ranged between 10.5% (Viking) up to 11.9% (LRPB Lancer; Table 1).
- Screening levels ranged from 3.3% in the durum variety Jandaroi up to 13.1% in the bread wheat variety Beckom (Table 1).

Trial 2. Fungicide seed treatment evaluation

- The addition of *Fp* inoculum at sowing reduced establishment in the added CR treatment (96 plants/m²) compared to the no added CR treatment (105 plants/m²), averaged across seed treatments.
- Averaged across CR inoculum treatments plant establishment with Dividend M[®] (114 plants/m²) and Rancona[®] Dimension (107 plants/m²) was better than that achieved with Jockey Stayer[®] (93 plants/m²) and no seed treatment (89 plants/m²). The interaction between seed treatment and CR inoculum was not significant (P=0.25).
- There was no significant (P=0.044) 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 10% with Dividend M[®], 11% with Rancona[®] Dimension, 13% with no seed treatment and 18% with Jockey Stayer[®] compared to the corresponding no added CR treatment (Figure 1).
- Jockey Stayer[®] slightly reduced yield by 0.27 t/ha compared to Dividend M[®] and Rancona[®] Dimension in the added CR treatment, but was not significantly different from the use of no seed treatment (Figure 1).

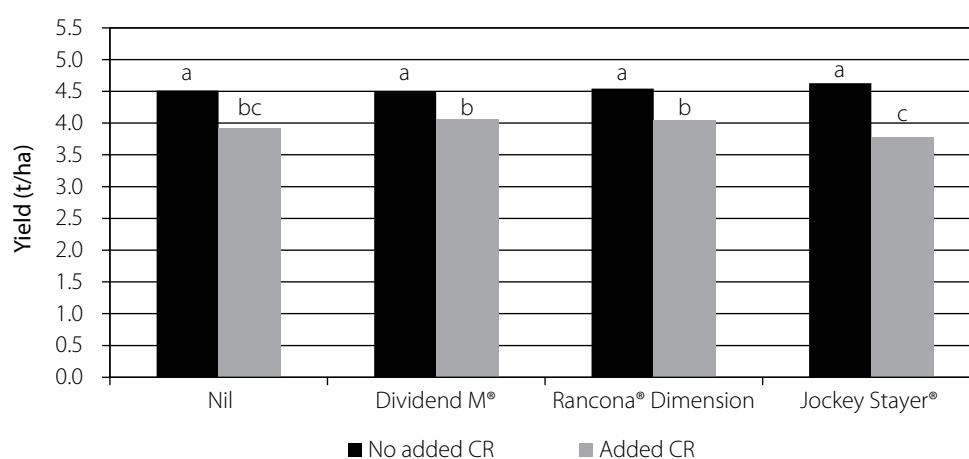


Figure 1. Impact of fungicide seed treatments on the yield of EGA Gregory[®] in the absence and presence of added crown rot inoculum – Mullaley 2015

Bars with the same letter are not significantly different (P=0.044)

Conclusions

Cereal crop and variety choice provided an 8–14% yield benefit over growing the susceptible bread wheat variety EGA Gregory under high levels of CR infection at Mullaley in 2015. The level of yield loss from crown rot infection was modest at this site relative to other trials conducted across the northern grains region in 2015. Reasonable rainfall throughout the growing season, with the exception of July and October, along with a full soil moisture profile at sowing at this site limited the expression of the disease and hence level of associated yield loss. 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 one of the other commonly used seed treatments examined under high

CR pressure at Mullaley in 2015. Although Rancona® Dimension is registered for the suppression of CR, with activity against early infection and potential establishment losses, 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.

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