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Regional crown rot management – Merriwa 2015

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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:	**"Farley", Merriwa**
Co-operators:	**Ray Inder**
Sowing date:	**9 June 2015**
Fertiliser:	**95 kg/ha Granulock® 12Z and 70 kg/ha of urea at sowing**
Starting N:	**20.6 mg/kg (0–60 cm)**
PreDicta B®:	**1.8 *Pt*/g (low), nil *Pn* and 1.8 log *Fusarium* DNA/g (medium) at sowing (0–30 cm)**
In-crop rainfall:	**~288 mm (142 mm in November)**
Harvest date:	**9 December 2015**

Treatments

Trial 1. Variety evaluation

- Two barley varieties: (Commander$^{\phi}$ and La Trobe$^{\phi}$)
- One durum variety: (Jandaroi$^{\phi}$)
- Eleven commercial bread wheat varieties: (EGA Gregory$^{\phi}$, LRPB Flanker$^{\phi}$, Sunmate$^{\phi}$, LRPB Gauntlet$^{\phi}$, LRPB Lancer$^{\phi}$, LRPB Viking$^{\phi}$, LRPB Spitfire$^{\phi}$, Beckom$^{\phi}$, Mitch$^{\phi}$, Suntop$^{\phi}$ and Sunguard$^{\phi}$; 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$^{\phi}$ 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, ranging from 3.6% (not significant) in the barley variety La Trobe$^{\phi}$ up to 19.7% in the bread wheat entry VO7176-69.

Only the bread wheat varieties Suntop$^{\phi}$ and Mitch$^{\phi}$ were higher yielding than EGA Gregory$^{\phi}$ under high levels of crown rot infection by 0.24 t/ha and 0.52 t/ha, respectively.

This site was noticeably infected with an aphid transmitted virus, Barley Yellow Dwarf Virus (BYDV) which appears to have impacted considerably on the yield of the more BYDV susceptible barley variety La Trobe$^{\phi}$.

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 2.84 t/ha in the barley variety La Trobe up to 4.02 t/ha in the bread wheat variety Mitch (Table 1).
- Barley yellow dwarf virus (BYDV) was evident in this trial site with the yield impact appearing to be greater in La Trobe (2.78 t/ha) than in Commander (3.44 t/ha). Based on Western Australian data Commander is rated moderately resistant-moderately susceptible (MR-MS) to BYDV while La Trobe has a provisional rating of susceptible (S).
- The impact of BYDV on yield is generally greater in barley than in wheat, but as appears to have occurred at Merriwa in 2015, varieties can differ significantly in their levels of resistance.

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

Crop	Variety	Yield (t/ha)		Protein (%)	Screenings (%)
		No added CR	Added CR		
Barley	Commander	3.73	3.15	8.4	2.6
	La Trobe	2.84	2.74	9.2	6.9
Durum	Jandaroi	3.24	2.96	9.5	0.6
Bread wheat	Mitch	4.02	3.69	8.7	1.4
	Suntop	3.63	3.41	9.2	2.0
	Viking	3.62	3.35	9.0	2.5
	LRPB Flanker	3.68	3.34	8.8	2.7
	Beckom	3.61	3.30	9.1	2.6
	QT15046R	3.89	3.23	9.0	2.0
	LRPB Gauntlet	3.43	3.21	9.4	1.7
	Sunguard	3.36	3.19	9.6	1.3
	EGA Gregory	3.67	3.17	9.1	2.7
	Sunmate	3.56	3.05	8.9	1.4
	LRPB Spitfire	3.37	3.01	9.7	1.3
	LRPB Lancer	3.43	2.99	10.5	1.8
	V07176-69	3.68	2.96	9.0	3.4
Site mean		3.55	3.17	9.2	2.3
CV (%)		4.3		2.7	35.4
LSD		0.238		0.29	0.94
P value		0.013		<0.001	<0.001

- The National Variety Trial (NVT) trial conducted at this site was all treated with the seed treatment Hombre® which contains a fungicide and the insecticide imidacloprid. Imidacloprid has been shown to provide early season control of aphids which transmit BYDV. No BYDV symptoms were evident in the NVT trial while interveinal yellowing/reddening of leaves characteristic of BYDV infection was obvious throughout this trial which was all treated with the fungicide seed treatment Dividend M® which does not contain imidacloprid.
- All entries with the exception of the barley variety La Trobe and bread wheat varieties Suntop, LRPB Gauntlet and Sunguard; suffered significant yield loss under higher levels of CR infection (added CR) which ranged from 7.4% in the bread wheat variety Viking (0.27 t/ha) up to 19.7% in the bread wheat entry VO7176-69 (0.73 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 barley variety La Trobe was lower yielding than EGA Gregory (by 0.44 t/ha) under high levels of CR infection (added CR).
- Only the bread wheat variety Suntop (by 0.24 t/ha) and Mitch (by 0.52 t/ha) were significantly 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).

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 very low across entries at this site in 2015 which ranged between 8.4% (Commander) up to 10.5% (LRPB Lancer; Table 1).
- Rainfall late in the season during grain filling (142 mm in November) resulted in quite low screening levels across entries which ranged from 0.6% in the durum variety Jandaroi to 6.9% in the barley variety Commander (Table 1).

Trial 2. Fungicide seed treatment evaluation

- There was no difference in plant establishment between any of the treatments (fungicide seed treatment or crown rot inoculum) at this site in 2015.
- Yield loss in the added CR treatment averaged 14% (0.52 t/ha) across seed treatments compared to the no added CR treatment.
- There was no significant (P=0.674) effect of any of the seed treatments on the yield of EGA Gregory in either the no added CR or added CR treatments (data not shown).

Conclusions

Cereal crop and variety choice provided an 8–16% yield benefit over growing the susceptible bread wheat variety EGA Gregory under high levels of CR infection at Merriwa in 2015. The level of yield loss from CR 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 September, at this site limited the expression of the disease and hence level of associated yield loss. Late rain (142 mm) during grain filling in November in particular limited disease expression impacts on yield and screenings which were quite low across entries. 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 crown rot 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 Merriwa 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.

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