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Regional crown rot management – Macalister Qld 2015

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Key findings

Yield loss from crown rot ranged from 6.9% in the bread wheat variety Viking$^{\phi}$ up to 31.9% in the durum variety Jandaroi$^{\phi}$.

Bread wheat variety choice had a large effect on yield where there were high levels of crown rot infection with Suntop$^{\phi}$, Sunguard$^{\phi}$, Beckom$^{\phi}$ and Viking$^{\phi}$, being between 0.37 t/ha to 0.62 t/ha higher yielding than EGA Gregory$^{\phi}$.

The barley varieties La Trobe$^{\phi}$ and Commander$^{\phi}$ were 0.62 t/ha and 0.84 t/ha higher yielding than EGA Gregory$^{\phi}$ 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:	**"Curraweena", Macalister, Qld**
Co-operator:	**Rob Taylor**
Sowing date:	**1 June 2015**
Fertiliser:	**250 kg/ha urea and 40 kg/ha Granulock® 12Z at sowing**
Starting N:	**126 mg/kg to 0.6 m**
In-crop rainfall:	**121 mm**
PreDicta B®:	**5.5 *Pratylenchus thornei*/g soil (medium risk), 1.8 log *Fusarium* DNA/g (medium) at sowing (0–30 cm)**
Harvest date:	**2 November 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

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 3.47 t/ha in the bread wheat variety LRPB Spitfire up to 4.52 t/ha in the barley variety Commander (Table 1).
- All varieties suffered significant yield loss under high levels of CR infection (added CR), which ranged from 6.9% in the bread wheat variety Viking (0.28 t/ha) up to 31.9% in the durum variety Jandaroi (1.12 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 durum variety Jandaroi was lower yielding (0.73 t/ha) than EGA Gregory under high CR infection (added CR). Nine bread wheat entries (LRPB Gauntlet down to LRPB Spitfire) produced yield equivalent to EGA Gregory in the added CR treatment (Table 1).
- The bread wheat varieties Suntop (0.37 t/ha), Sunguard (0.38 t/ha), Beckom (0.44 t/ha) and Viking (0.62 t/ha) were all higher yielding than EGA Gregory under high levels of CR infection (added CR).
- The two barley varieties were 0.62 t/ha (La Trobe) and 0.84 t/ha (Commander) higher yielding than EGA Gregory under high levels of CR infection (added CR, Table 1).

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

Crop	Variety	Yield (t/ha)		Protein (%)	Screenings (%)	
		No added CR	Added CR		No added CR	Added CR
Barley	Commander	4.52	3.96	13.4	2.3	3.4
	La Trobe	4.40	3.74	13.5	2.2	5.1
Durum	Jandaroi	3.52	2.40	14.6	1.3	3.5
Bread wheat	Viking	4.02	3.74	12.3	6.1	6.3
	Beckom	4.39	3.56	11.9	4.8	7.1
	Sunguard	3.79	3.50	13.0	4.6	6.7
	Suntop	3.91	3.49	12.3	7.6	7.4
	LRPB Gauntlet	4.13	3.37	12.8	2.5	4.9
	LRPB Lancer	3.94	3.36	13.6	3.7	5.1
	Mitch	3.83	3.34	12.3	7.2	9.0
	V07176-69	4.18	3.27	12.1	4.6	7.4
	QT15046R	4.02	3.24	12.1	4.1	6.6
	EGA Gregory	4.22	3.12	12.4	4.2	8.2
	Sunmate	3.96	3.04	11.9	4.0	5.9
	LRPB Flanker	4.16	3.04	12.3	4.1	8.9
	LRPB Spitfire	3.47	3.01	13.8	4.3	6.2
Site mean		4.03	3.32	12.8	4.2	6.3
CV (%)		4.3		2.0	15.9	
LSD		0.257		0.29	1.37	
P value		<0.001		<0.001	<0.001	

Grain quality

- Adding CR inoculum did not significantly affect 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 ranged between 11.9% (Beckom and Sunmate) to 14.6% (Jandaroi; Table 1).
- In the no added CR treatment, screening levels ranged from 1.3% in the durum variety Jandaroi up to 7.6% in the bread wheat variety Suntop (Table 1).
- Screening levels were increased in the added CR treatment with all entries except the barley variety Commander and bread wheat varieties Viking, Suntop and LRPB Lancer.
- In the added CR treatment, screening levels ranged from 3.4% in the barley variety Commander up to 9.0% in the bread wheat variety Mitch (Table 1).

Trial 2. Fungicide seed treatment evaluation

- Plant establishment was significantly (P = 0.003) lower with Rancona® Dimension (49 plants/m^2) and Dividend M® (52 plants/m^2) compared with no seed treatment (78 plants/m^2) in the no added CR treatment.
- Only Dividend M® (52 plants/m^2) had significantly different establishment from no seed treatment (35 plants/m^2) in the added CR treatment.
- There was no significant (P = 0.124) 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 20.3% with Dividend M®, 21.7% with no seed treatment, 27.0% with Rancona® Dimension and 25.7% with Jockey Stayer® compared with the corresponding no added CR treatment (Figure 1).
- Rancona® Dimension slightly reduced yield by 0.17 t/ha compared with the nil control, and by 0.21 t/ha compared with Dividend M® in the added CR treatment (Figure 1).

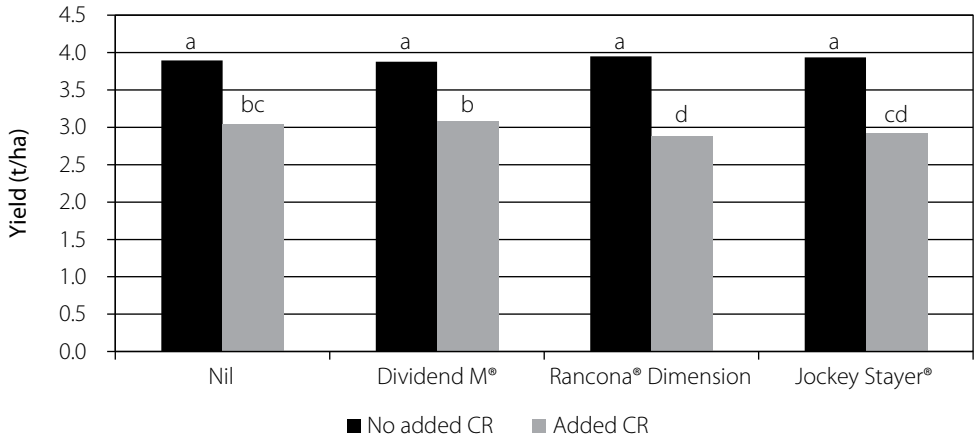

Figure 1. *Impact of fungicide seed treatments on the yield of EGA Gregory[1] in the absence and presence of added crown rot inoculum – Macalister 2015*
Bars with the same letter are not significantly different (P = 0.124)

Conclusions

Cereal crop and variety choice provided a 12–27% yield benefit over growing the susceptible bread wheat variety EGA Gregory under high levels of CR infection at Macalister in 2015. 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 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 using no seed treatment or the two other commonly used seed treatments examined under high CR pressure at Macalister in 2015. Although Rancona® Dimension is registered for the suppression of CR, with activity against early infection and potential establishment losses evident in this study (data not shown), 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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