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Published by NSW Department of Primary Industries,
a part of the Department of Regional New South Wales.

Regional crown rot management – Gilgandra 2015

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Key findings

Yield loss from crown rot ranged from 2.5% (not significant) in the bread wheat variety LRPB Gauntlet$^{\phi}$ up to 21.9% in the bread wheat entry VO7176-69.

Bread wheat variety choice impacted on yield in the presence of high levels of crown rot infection with ten entries being between 0.34 t/ha and 0.76 t/ha higher yielding than EGA Gregory$^{\phi}$.

The barley varieties Commander$^{\phi}$ and La Trobe$^{\phi}$ were 0.75 t/ha and 0.99 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:	**"Inglewood", Wongarbon**
Co-operators:	**Kevin Kilby**
Sowing date:	**12 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:	**20.0 mg/kg (0–60 cm)**
PreDicta B®:	**nil root lesion nematodes and 0.9 log *Fusarium* DNA/g (low) at sowing (0–30 cm)**
In-crop rainfall:	**~272 mm**
Harvest date:	**16 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 3.55 t/ha in the durum variety Jandaroi up to 4.66 t/ha in the barley variety La Trobe (Table 1).
- All entries with the exception of the bread wheat varieties LRPB Gauntlet, Sunguard, Mitch and LRPB Spitfire suffered significant yield loss under higher levels of CR infection (added CR) which ranged from 6.8% in the bread wheat variety Beckom (0.29 t/ha) up to 21.9% in the bread wheat entry VO7176-69 (0.79 t/ha).
- Only the bread wheat entry VO7176-69 (0.43 t/ha) was lower yielding than EGA Gregory under high levels of CR infection (added CR).
- The new bread wheat variety LRPB Flanker and the durum variety Jandaroi both produced yield equivalent to EGA Gregory in the added CR treatment (Table 1).
- The bread wheat entries LRPB Spitfire (0.34 t/ha), Mitch (0.34 t/ha), Viking (0.34 t/ha), Sunmate (0.34 t/ha), QT15046R (0.36 t/ha), LRPB Lancer (0.39 t/ha), Suntop (0.40 t/ha), Sunguard (0.42 t/ha), LRPB Gauntlet (0.59 t/ha) and Beckom (0.76 t/ha) were all higher yielding than EGA Gregory under high levels of CR infection (added CR).
- The barley varieties Commander (0.75 t/ha) and La Trobe (0.99 t/ha) were both 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 – Gilgandra 2015*

Crop	Variety	Yield (t/ha)		Protein (%)	Screenings (%)	
		No added CR	Added CR		No added CR	Added CR
Barley	La Trobe	4.66	4.23	10.4	1.4	2.1
	Commander	4.44	3.99	11.1	3.0	2.6
Durum	Jandaroi	3.55	3.14	12.5	0.9	3.4
Bread wheat	Beckom	4.29	4.00	10.7	1.1	1.5
	LRPB Gauntlet	3.93	3.83	11.2	0.8	1.2
	Sunguard	3.79	3.66	11.4	1.0	1.8
	Suntop	4.04	3.64	11.3	2.8	4.9
	LRPB Lancer	4.01	3.63	11.8	1.1	1.6
	QT15046R	4.21	3.60	10.5	1.1	2.9
	Sunmate	4.08	3.58	10.8	1.4	1.8
	Viking	4.00	3.58	11.0	1.4	3.7
	Mitch	3.68	3.58	11.0	2.8	3.1
	LRPB Spitfire	3.72	3.58	11.7	1.0	2.0
	LRPB Flanker	4.06	3.30	10.3	1.1	4.4
	EGA Gregory	3.95	3.24	10.9	1.8	4.7
	V07176-69	3.60	2.82	11.0	5.4	7.3
Site mean		4.00	3.59	11.1	1.7	3.1
CV (%)		4.6		3.6	33.2	
LSD		0.286		0.46	0.92	
P value		0.006		<0.001	0.002	

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 relatively low at this site which ranged between 10.3% (LRPB Flanker) up to 12.5% (Jandaroi; Table 1).
- Screening levels were quite low across entries at this site in 2015, averaging 1.7% in the no added CR and 3.1% in the added CR treatments.
- In the no added CR treatment, screening levels ranged from 0.8% in the bread wheat variety LRPB Gauntlet up to 5.4% in the bread wheat entry VO7176-69 (Table 1).
- Screening levels were increased in the added CR treatment by between 1.0 to 3.3% in LRPB Spitfire, QT15046R, VO7176-69, Suntop, Mitch, Commander, EGA Gregory and LRPB Flanker.
- In the added CR treatment, screening levels ranged from 1.2% in the bread wheat variety LRPB Gauntlet up to 7.3% in the bread wheat entry VO7176-69 (Table 1).

Trial 2. Fungicide seed treatment evaluation

- The addition of *Fp* inoculum at sowing reduced establishment in the added CR treatment compared to the no added CR treatment with all seed treatments except Dividend M®.
- With Nil seed treatment establishment was reduced from 130 plants/m^2 down to 89 plants/m^2, with Jockey Stayer® the reduction was from 126 plants/m^2 down to 101 plants/m^2 and with Rancona® Dimension the reduction was from 130 plants/m^2 down to 117 plants/m^2.
- In the added CR treatment, Rancona® Dimension (117 plants/m^2) and Dividend M® (135 plants/m^2) had better establishment than the use of no seed treatment (89 plants/m^2).
- Yield loss in the added CR treatment averaged 23% (0.86 t/ha) across seed treatments compared to the no added CR treatment.
- There was no significant (P=0.281) 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 a 10–31% yield benefit over growing the susceptible bread wheat variety EGA Gregory under high levels of CR infection at Gilgandra 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 Gilgandra 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.

Acknowledgements

This research was co-funded by NSW DPI and GRDC under project DAN00175: National crown rot epidemiology and management. Thanks to the Kevin Kilby and 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.