EPARF Rhizoctonia fungicide trial

Amanda Cook, Nigel Wilhelm, Wade Shepperd and Ian Richter
SARDI, Minnipa Agricultural Centre

RESEARCH

Searching for answers

Location:
Minnipa Ag Centre South 3 North
Rainfall
Av. Annual: 324 mm
Av. GSR: 241 mm
2013 Total: 334 mm
2013 GSR: 237 mm
Yield
Potential: 3 t/ha (Yield prophet MAC S2/8 Mace)
Actual: Wheat 1.3 - 2.1 t/ha, Barley 1.7 - 2.6 t/ha
Paddock History
2013: Hindmarsh barley
2012: Wheat
2011: Canola
Soil Type
Red sandy loam
Plot Size
20 m x 2 m 3 reps

Key messages

- **At Minnipa in 2013 there were cereal yield responses to fungicide treatments in both wheat (up to 14% better than no fungicide) and barley (up to 12 % better than no fungicide, but not all strategies were effective). However there were still visual Rhizoctonia patches present.**
- **In-furrow fungicide applications were more effective than seed treatments.**
- **Tillage, starter nitrogen and zinc produced similar yields to many of the fungicide treatments.**
- **A three week delay in seeding reduced yield by nearly one third.**
- **Fungicide treatments did not prevent an increase in Rhizoctonia inoculum levels during a cereal phase.**

Why do the trial?

Several new fungicide products for Rhizoctonia suppression have been recently released onto the market. This trial was undertaken to assess the benefits of these products, and various application strategies, on wheat and barley performance in a typical upper Eyre Peninsula environment. Historically, fungicidal control of rhizoctonia which infects the major crops grown in southern Australia has generally been poor. However, these new products have shown greater promise in the development trials undertaken so far (McKay *et al,* 2013 GRDC Update) but our experience with them under commercial conditions is still limited. With the relatively recent development of processes to evenly coat fertiliser granules with fungicides and to deliver liquid products around the seed row during the seeding pass, there is now a range of application strategies available to growers to make use of these new products.

This trial assessed the new products with a range of application strategies and compared them to other management options (tillage, zinc, starter nitrogen, deep sowing, fluid fertiliser and late sowing) which can change the impact of rhizoctonia on crop production.

How was it done?

Two identical replicated trials were established in MAC paddock S3N which had a high level of Rhizoctonia inoculum. One trial was sown to CL Kord wheat, the other to CL Scope barley; Clearfield varieties were used due to the potential for grassy weeds to be a problem in the paddock in 2013. Paddock history, PreDictaB disease inoculum levels (RDTS), plant establishment, Rhizoctonia seminal root score, Rhizoctonia crown root score, green leaf area index, Rhizoctonia patch score, grain yield and quality were measured during the season.

The trial was sown with current best management options for Rhizoctonia control on the western end and fungicide products and rates on the eastern end. The control treatment was 60 kg/ha of wheat or barley with 50 kg/ha of 18:20:0:0. For treatments which required tillage prior to seeding plots were worked once on 11 April. Cultivation prior to seeding and seeding itself were conducted with a 6 row seeder at 27 cm spacing and with knife points. Starter N was an extra 20 kg/ha N applied as urea at seeding. A fluid fertiliser delivery system placed fluid fertiliser and banded fungicides approximately 3 cm below the seed at an output rate of 85 L/ha. Fungicides were applied as seed treatments according to label recommendations. The fluid fertiliser treatments were equivalent to 50 kg/ha of 18:20:0:0 as phosphoric acid and zinc sulphate but with N applied as granular urea below the seed.

Chemical control of weeds (eliminating a green bridge) occurred on 4 April with 0.8 L Roundup Attack, 350 ml Ester 680 LVE and 175 ml/ha LI 700. Trials were sown on 13 May @ 60 kg/ha of wheat or barley with 50 kg/ha of 18:20:0:0 (other than fluid fertiliser treatments) after receiving 1.5 L Spray.Seed. The late seeding treatment was sown three weeks later on 4 June. Further weed control was achieved with 700 ml Intervix and 500 ml/ha Supercharge on 27 June after early root sampling (25 June).

Rhizoctonia infection on seminal roots was assessed using the root scoring method described by McDonald and Rovira (1983) six weeks from seeding.

Paddock patch score for Rhizoctonia is a visual score of the number plants of 5 plants affected by Rhizoctonia (400 plants scored per treatment) across 4 transects. Crown roots were sampled on the 17 and 18 September after a rainfall event. Crown roots per plant were counted with the number of roots infected with Rhizoctonia used to calculate % crown root infection. Barley plots were harvested on 25 October and wheat on 30 October. Selected treatments were sampled for rhizoctonia inoculum levels in crop rows after harvest.

Data were analysed using Analysis of Variance in GENSTAT version 16, the late seeding and seeding depth >5 cm data was excluded from the analysis because of obviously poor yield performance, thereby improving the basis for the overall comparison among the remaining treatments.

What happened?

The initial Predicta B inoculum level predicted a high risk of severe Rhizoctonia disease (205 pgDNA/g soil). There were only low levels of inoculum for other soil borne diseases.

Plant establishment was the same for all treatments (an average of 112 plants/m^2 for barley and 128 plants/m^2 for wheat) except with deeper seeding of barley (only 87 plants/m^2). Late sown wheat and barley (sown 3 weeks later) had less dry matter at the same number of weeks after sowing than all other treatments.

Rhizoctonia infection on seminal roots was scored six weeks after seeding. Rhizoctonia infection of wheat was higher on treatments with extra N (Table 1). In barley rhizoctonia infection (Table 2) was higher with high nitrogen and lower rate in-furrow fungicide treatments. Rhizoctonia patch scores both early and at anthesis showed some level of Rhizoctonia patches regardless of treatments (data not shown). Infection of crown roots was the same for all treatments (Table 2).

Table 1 Disease scores and growth measurements, yield and grain quality for CL Kord wheat in EPARF fungicide trial in MAC S3N, 2013

Treatment	Rhizoctonia seminal root score (0-5)	Crown root infection (%)	Late dry matter (g/ plant)	Yield (t/ha)	Protein (%)	Screenings (%)	Test weight (kg/hL)
Vibrance seed dressing 360 ml/t & SYN SIF1 in-furrow medium rate	1.0	75.6	5.0	2.13	11.7	2.8	82.8
Fluid fertiliser with SYN SIF1 in-furrow higher rate	1.5	82.0	4.6	2.12	11.5	2.2	82.5
SYN SIF1 in-furrow higher rate	1.1	88.6	4.3	2.12	12.0	2.5	82.1
SYN SIF1 in-furrow medium rate	1.3	77.1	4.4	2.08	11.6	2.2	82.5
Vibrance seed dressing 360 ml/t	1.3	71.6	4.3	2.08	11.7	2.5	83.5
Vibrance seed dressing 180 ml/t & SYN SIF1 in-furrow medium rate	1.3	80.1	4.6	2.07	12.2	2.5	81.7
EverGol Prime seed dressing 800 ml/t	1.0	76.6	4.3	2.07	11.9	2.6	82.0
DAP, starter N, Zn, Evergol Prime @ seed dressing 800 ml/t	1.3	73.3	4.2	2.04	12.1	2.6	82.1
DAP and starter N	1.8	77.0	4.2	1.93	11.9	3.2	81.8
Fluid fertiliser with fungicide	1.6	73.9	5.3	1.93	12.0	3.5	82.1
Tillage, DAP, starter N, Zn	1.3	80.4	3.9	1.91	11.7	2.6	82.6
DAP, starter N, Zn, Vibrance seed dressing 360 ml/t	1.7	67.6	4.0	1.93	11.5	2.8	82.4
Fluid fertiliser no fungicide	1.3	81.3	3.9	1.91	11.6	3.0	82.7
DAP, starter N and Zn	2.0	85.8	3.8	1.91	11.8	2.6	82.2
Tillage	1.3	88.4	3.5	1.87	11.9	2.6	82.1
Control	1.5	82.8	4.1	1.86	11.5	2.8	82.3
*Seeding depth >5 cm	1.0	71.8	5.5	1.74	11.9	3.2	81.5
*Late seeding	1.5	85.1	2.7	1.31	13.3	4.3	79.1
LSD (P=0.05)	*0.4*	*ns*	*ns*	*0.15*	*ns*	*0.52*	*ns*

**Data removed from Analysis of Variance using GENSTAT16 because of obviously poor yield performance, thereby improving the basis for the overall comparison among the remaining treatments.*

Table 2 Yield and grain quality for CL Scope barley in EPARF fungicide trial in MAC S3N, 2013

Treatment	Rhizoctonia seminal root score (0-5)	Crown root infection (%)	Late dry matter (g/plant)	Yield (t/ha)	Protein (%)	Screenings (%)	Test weight (kg/hL)
Fluid fertiliser with SYN S1F1 in-furrow higher rate	1.22	75	5.55	2.63	12.1	11.7	70.7
Vibrance seed dressing 360 ml/t & SYN S1F1 in-furrow medium rate	1.48	78	6.36	2.56	12.4	18.2	69.6
SYN S1F1 in-furrow higher rate	1.31	85.6	4.69	2.52	12.3	15.0	70.1
Fluid fertiliser with fungicide	1.25	67.2	5.62	2.47	11.8	18.5	70.0
SYN S1F1 in-furrow medium rate	1.75	81.7	5.08	2.46	12.0	14.4	69.8
DAP, starter N, Zn, EverGol Prime seed dressing 800 ml/t	1.34	77.5	4.71	2.42	12.9	24.2	69.0
DAP, starter N, Zn, Vibrance seed dressing 360 ml/t	1.27	61.7	6.17	2.42	12.8	26.5	68.6
Vibrance seed dressing 180 ml/t & SYN S1F1 in-furrow medium rate	1.38	76.7	4.79	2.40	12.8	18.9	69.4
Tillage, DAP, starter N, Zn	1.22	74.6	5.22	2.39	13.0	27.1	68.8
DAP and starter N	1.65	77.9	5.80	2.38	11.7	20.7	69.6
DAP, starter N and Zn	1.57	85.9	5.16	2.37	12.6	23.4	69.2
Tillage	1.14	76.3	5.27	2.36	11.9	22.3	69.6
Control	1.49	74.9	5.65	2.34	12.0	23.5	68.8
EverGol Prime seed dressing 800 ml/t	1.23	79.8	5.57	2.32	12.2	22.8	68.5
Fluid fertiliser no fungicide	1.29	75.6	5.34	2.29	12.6	22.6	68.8
Vibrance seed dressing 360 ml/t	1.43	88.5	4.95	2.27	12.6	22.0	68.7
*Seeding depth >5 cm	1.35	75.6	4.58	2.12	12.8	20.5	68.8
*Late seeding	1.10	88.8	3.40	1.70	13.7	28.1	66.9
LSD (P=0.05)	*ns*	*ns*	*ns*	*0.15*	*ns*	*ns*	*ns*

**Data removed from Analysis of Variance using GENSTAT16 because of obviously poor yield performance, thereby improving the basis for the overall comparison among the remaining treatments.*

Fungicide treatments increased yield of wheat by between 0.07 and 0.27 t/ha (Table 1), and of barley by up to 0.28 t/ha compared to district practice (Table 2) with in-furrow and higher rates having the greater effect. In-furrow fungicides at higher rates increased yield but tillage, starter nitrogen and zinc produced similar yields to many of the fungicide treatments. Delayed sowing for 3 weeks depressed yield in both wheat and barley, as did sowing barley at greater than 5 cm, (a strategy to place the root system below the bulk of Rhizoctonia inoculum). The yield loss in barley may have been partly due to reduced plant numbers (data not shown).

Grain protein contents and screenings were high in these trials due to lack of rain in September and October (Tables 1 and 2).

Rhizoctonia inoculum post harvest was in the high disease risk level after both wheat and barley regardless of treatments (data not shown). This suggests that fungicide treatments will not decrease Rhizoctonia inoculum levels for the next season.

What does this mean?

There were differences in Rhizoctonia seminal root scores in wheat but not in barley, however scoring at six weeks after sowing in this season (with early and warm conditions at seeding) may not have allowed the greatest differences in seminal root infection to be detected. The extra 20 kg/ha N applied as urea at seeding resulted in higher Rhizoctonia root damage in the seminal root scores in wheat.

At Minnipa in 2013 there were yield increases to fungicide treatments in both wheat (up to 14 % of control) and barley (up to 12 % of control), however there were still visual Rhizoctonia patches present in the treatments. The results indicate in-furrow fungicides and higher rates are more effective than seed treatments. In-furrow fungicides at higher rates increased yield but tillage, starter nitrogen and zinc produced similar yields to many of the fungicide treatments.

The placement of the fungicides banded below the seed has resulted in only seminal roots being protected not the crown roots, as the Rhizoctonia % crown root infection and numbers of crown roots were not different between treatments.

A three week delay in seeding resulted in significant loss of yield compared to the control, 29% in wheat and 28% in barley, and grain quality was also reduced in this season. High grain protein and high screenings were present in both wheat and barley due to the dry finish to season, with little spring rainfall. PredictaB soil samples were taken at harvest in selected treatments for Rhizoctonia inoculum levels, and all levels were in the high disease risk level after both wheat and barley indicating the fungicide treatments did not decrease Rhizoctonia inoculum levels.

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EverGol Prime – registered trademark of Bayer CropScience. Vibrance – registered trademark of Syngenta.