Farmer fungicide demonstration strips

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DEMO

Searching for answers

Location:
Buckleboo
Graeme and Heather Baldock
Rainfall
Av. Annual: 295 mm
Av. GSR: 210 mm
2014 Total: 298 mm
2014 GSR: 201 mm
Yield
Potential: 2.2 t/ha (W)
Actual: 1.4 t/ha
Paddock History
2014: Mace wheat
2013: Mace wheat
2012: Chemical fallow
Soil Type
Brown sandy loam

Location:
Lock - Andrew, Jenny and Tim Polkinghorne
Rainfall
Av. Annual: 333 mm
Av. GSR: 253 mm
2014 Total: 350 mm
2014 GSR: 254 mm
Yield
Potential: 3.5 t/ha (W)
Actual: 2.9 t/ha
Paddock History
2014: Mace wheat
2013: Medic pasture
2012: Hindmarsh barley
Soil Type
Grey calcareous sandy loam

Location:
Cleve
Matt and Amanda Price
Rainfall
Av. Annual: 402 mm
Av. GSR: 220 mm
2014 Total: 290 mm
2014 GSR: 209 mm
Yield
Potential: 2.7 t/ha (B)
Actual: 2.6 t/ha
Paddock History
2014: Scope barley
2013: Mace wheat
2012: Justica wheat
Soil Type
Red loam

Key messages

- **In the 2014 season there were no significant yield advantages recorded at five sites across upper Eyre Peninsula when using the fungicide products over the nil treatments. This was in a season with an early start and minimal stress during crop establishment, and at sites with high Rhizoctonia inoculum levels.**
- **The broad acre farmer demonstrations in the 2014 season showed no visual differences or early plant growth measured at the given sites during the cropping season.**
- **There were differences in the level of crown root infection at Cleve, where the nil treatment had a higher number of crown roots infected and a greater % of crown root infection than the fungicide treatments.**
- **There were differences between treatments recorded in the mid-May sown barley crop at Piednippie in Rhizoctonia patch score and the seminal root score.**
- **Differences in protein, screenings and test weights were recorded between treatments at several sites with a general trend of lower yields having higher protein, higher screenings and lower test weights.**
- **Further evaluation of research trials and farmer demonstrations using new fluid products and fungicide placement, will occur over two more seasons to evaluate the economics of using fungicides in low rainfall farming systems.**

Why do the demonstration?

Caring for Our Country funding was obtained to demonstrate the impact of new fungicides for Rhizoctonia suppression by monitoring farmer broad acre strips in their current farming systems in 2014.

How was it done?

Farmers applied fungicide products within broad acre paddocks using fluid systems and different nutrient mixes depending on their individual systems. None of these systems implemented split application of the fungicide products, all were applied with or below the seed.

Within each of the treated areas of the paddock, and an untreated control, four sampling lines were established to measure and collect data. Five paddock demonstrations were monitored; Graeme and Heather Baldock, Buckleboo, Andrew and Jenny Polkinghorne, Lock, Matt and Amanda Price, Cleve, Simon and Tanya Patterson, Piednippie and Peter Kuhlmann, Mudamuckla. Plant establishment, dry matter, Rhizoctonia seminal and crown root scores, grain yield and quality were measured in the treated and nil strips.

Plants were sampled 8-9 weeks after the sowing date to be assessed for root disease and early dry matter. Paddock patch score for Rhizoctonia is a visual score (0-5) of the number plants out of 5 plants affected by Rhizoctonia (400 plants scored per treatment) across 4 transects measured at the same time. Rhizoctonia seminal root scores were measured using 0-5 root scoring rating (McDonald and Rovira, 1983) of 80 plants per treatment across 4 transects and tops of plants were collected, dried and weighed for dry matter. Crown roots were also counted on the same plants with the number of roots infected with Rhizoctonia used to calculate % crown root infection.

Location:
Piednippie
Simon Patterson
Rainfall
Av. Annual: 366 mm
Av. GSR: 295 mm
2014 Total: 374 mm
2014 GSR: 284 mm
Yield
Potential: 4.4 t/ha (B)
Actual: 1.57 t/ha
Paddock History
2014: Fleet barley
2013: Scout wheat
2012: Medic pasture
Soil Type
Grey calcareous sandy loam

Location:
Mudamuckla
Peter Kuhlmann
Rainfall
Av. Annual: 291 mm
Av. GSR: 216 mm
2014 Total: 369 mm
2014 GSR: 293 mm
Yield
Potential: 3.8 t/ha (W)
Actual: 1.5 t/ha
Paddock History
2014: Mace wheat
2013: Mace wheat
2012: Axe wheat
Soil Type
Grey calcareous sandy loam

Buckleboo

The paddock was sown on 6 May with Mace wheat@ 60 kg/ha pre-treated with Rancona C as seed dressing with 18:20:0:0 @ 60kg/ha and $ZnSO_4$ @ 2 L/ha and UAN @ 20 L/ha. The paddock was top-dressed with 40 kg/ha of urea on 3 August. Uniform was added to the fluid at 200, 300 or 450 ml/ha rates. The initial Rhizoctonia inoculum level was high risk at 719 pg/DNA g soil, and all other disease levels were below detection levels. Eight 20 m strips were harvested with the plot header in each seeder run and the yield data from broad acre header was also obtained.

Lock

The paddock was sown on 16 May with Mace wheat @ 55 kg/ha with the control being fluid fertiliser with 8 units P, 13.8 units N as urea and elemental rates of trace elements dissolved as 1 kg zinc monosulphate, 2 kg of manganese sulphate, 150 g of copper sulphate plus flutriafol @ 200 ml/ha. The Rhizoctonia fungicide treatment was applied with APP (ammonium polyphosphate) at 30 L/ha, UAS (urea ammonium sulphate (28% N)) at 25 L/ha and Uniform at 325 ml/ha. The initial Rhizoctonia inoculum level was medium risk at 60 pg/DNA g soil, Crown rot and Take-all were high risk, and low levels of *Pratylenchus neglectus*, with all other diseases below detection levels. Seven 20 m strips were harvested with the plot header in each seeder run and the yield data from the broad acre header was also obtained.

Cleve

Broad acre strips were sown on 11 May with Scope barley@ 45 kg/ha with control having 40 kg/ha 18:20:0:0, trace element mix 60:40:20 ZMC@10 L/ha and 20 L/ha UAN. Uniform was applied at 200, 300 or 400 ml/ha with all having 360 ml Vibrance seed dressing and Agriphar experimental product was applied at four rates of 160, 320, 480 or 640 ml/ha (Table 4). The initial Rhizoctonia inoculum level was high risk at 113 pg/DNA g soil, Crown rot and Take-all were medium level risk, with all other disease levels below detection levels. The plot header was used to harvest 20m strips within the treatments and grain quality was analysed.

Piednippie

Paddock 6 at Piednippie was sown on 20 May with Fleet barley at 60 kg/ha with a fluid fertiliser system using 4 units of phosphorus as phosphoric acid, 12 kg/ha of nitrogen as granular urea, 450 g/ha Zn and Intake Hiload Gold @150ml/ha. Uniform at 280 ml/ha and Agriphar Experimental product at @ 270 ml/ha was applied in strips with the fertiliser the same as the rest of the paddock. The initial Rhizoctonia inoculum level was in the high risk range at 314 pg/DNA g soil and all other diseases were below detection levels. Eight 20 m strips were harvested with the plot header in each seeder run and the yield data from the broad acre header was also obtained.

Mudamuckla

Paddock 25 at Mudabie was sown on 26 April with Mace wheat treated with Raxil seed dressing using variable rate technology (Rx) with three different rates of seed, phosphoric acid and urea depending on the paddock zone. The rates were 40, 50 or 55 kg/ha of seed, rates of 3.2, 5 or 6.3 kg P/ha as phosphoric acid and urea at rates of 0, 15, 22 kg/ha. Flutriafol was applied at 100 ml/ha and zinc monosulphate at 330 g/ha on the whole paddock.

A run with the standard rate of input, phosphoric acid at 5 kg P/ha, was included to compare with the normal practice variable rate runs. Uniform was applied at 300 ml/ha in a variable rate run and the standard rate (5 kg P/ha) run to compare to the nil treatments. The runs were approximately 1.5 km x 25.4 m wide. The initial Rhizoctonia inoculum level was high risk level at 105 pg/DNA g soil, Crown rot risk and *Pratylenchus thornei* risk were also high and all other disease levels were below detection levels. Eight 20 m strips were harvested with the plot header in each treatment and the yield data from the broad acre header was also obtained on 21 November, and the paddock grain protein averaged 10.2%.

What happened?

The 2014 season with early summer and good autumn rains resulted in adequate soil moisture and early sowing, providing exceptional conditions for early crop growth. The plants were not limited by moisture and the increased availability of nutrition, especially nitrogen and phosphorus, enabled greater root growth. This allowed the plants to grow through the impact of Rhizoctonia root infection due to soil moisture and nutrition not being as limiting as in other seasons.

The farmers implemented the addition of the fungicides within their current farming practices, with different fluid fertiliser mixes which prevents a direct comparison of all the farmer demonstrations.

At Buckleboo the initial Rhizoctonia inoculum level was in the high risk category.

Table 1 Farmer fungicide demonstrations, Buckleboo 2014

Treatment	Early DM (g/plant)	Rh patch score (0-5)	Seminal root score (0-5)*	Crown root infection (%)	Number crown roots	Late DM (g/m row)	Plot header yield (t/ha)	Protein (%)	Screenings (%)	Test weight (kg/hL)	Broad acre yield (t/ha)**
Nil Control	0.55	1.51	2.86	74.4	7.7	112	1.39	12.2	1.2	84.3	1.75
Uniform 200 ml/ha	0.6	1.68	2.86	78.5	8.8	122	1.36	13.6	1.0	83.7	1.75
Uniform 300 ml/ha	0.56	1.7	2.91	75.8	7.4	72	1.16	14.5	1.0	83.2	1.68
Uniform 450 ml/ha	0.55	1.69	2.93	69	8.4	82	1.25	14.1	1.2	83.3	1.81
LSD (P=0.05)	*ns*	*ns*	*ns*	*ns*	*ns*	*ns*	*0.09*	*0.7*	*ns*	*0.4*	*ns*

**(0=nil damage, 5=all seminal roots with spear tips) **Average of two separate runs*

This demonstration had different rates of Uniform applied, and the Uniform 300 ml/ha treatment coincided with high barley grass numbers. There were no differences in the plant growth parameters or disease infection levels at this site. The plot header yields were significantly different with the Uniform 300 ml/ha area being lower, possibly due to the higher grass competition. There were no significant differences in the broad acre paddock yields taken as an average of the two runs, although the Uniform 300 ml/ha area was lowest. There were differences in protein and test weight with the highest yielding Nil treatment having the lowest protein and highest test weight of grain, due to the dilution of protein in the grain (Table 1).

At Lock the initial Rhizoctonia inoculum level was medium risk but Crown rot and Take-all were high risk. In this demonstration the differences in fertiliser mixes of APP and phosphoric acid, do not allow a direct comparison of the effect of the fungicide treatment (Table 2). There were no differences detected in early growth or root disease levels. There were differences in late dry matter, yield and grain quality but we are unable to determine if this is a fertiliser or fungicide effect.

At Cleve the initial Rhizoctonia inoculum level was high risk with Crown rot and Take-all at a medium level risk. With a base granular fertiliser this extensive demonstration compared different nutrition and fungicides at different rates. The early dry matter, Rhizoctonia patch score and seminal root scores measured were not significant, but the % of crown root infection and the number of crown roots were significant (Table 3). The Nil treatment had a greater % crown root infection and a greater number of crown roots compared to the Uniform treatments.

There were no differences in plot header yields but protein, screenings and test weights differed with a general trend of lower yield having higher protein, higher screenings and lower test weight (Table 4).

Table 2 Farmer fungicide demonstrations, Lock 2014

Treatment	Run	Early dry matter (g/plant)	Rhizoctonia seminal root score (0-5)	Crown root infection (%)	Late dry matter (g/m row)	Plot header yield (t/ha)	Protein (%)	Screenings (%)	Test weight (kg/hL)	Broad acre yield (t/ha)**
APP, UAS, Uniform 325 ml/ha	23	1.15	2.4	65	153	3.16	11.7	7.0	82.5	2.82
Phos acid, UAS, Flutriafol, TE	24	1.25	2.8	65	193	2.91	12.5	7.5	81.4	3.01
Phos acid, 25 kg/ha Urea, Flutriafol	22	-	-	-	-	2.75	10.9	4.0	84.0	2.92
LSD (P=0.05)		*ns*	*ns*	*ns*	*17*	*0.13*	*0.3*	*1.3*	*0.8*	-

**(0=nil damage, 5=all seminal roots with spear tips) **Average of two separate runs*

Table 3 Plant growth and root disease levels of farmer fungicide demonstration at Cleve, 2014

Treatment	Early DM (g/plant)	Plants/m²	Rh patch score (0-5)	Seminal root score (0-5)	Crown root infection	Number crown roots	Late DM (g/m row)
Nil –Run 19	0.8	82.5	1.02	2.8	68.8	6.2	170
Uniform 200 – Run 20	0.96	66	1.26	2.76	60.4	4.8	188
Uniform 300 – Run 21	0.87	77	1.45	2.81	58.4	4.0	200
Uniform 400 – Run 22	0.81	72	1.36	2.9	59.3	3.8	198
LSD (P=0.05)	*ns*	*ns*	*ns*	*ns*	*7.9*	*0.8*	*ns*

Table 4 Yield and grain quality of farmer fungicide demonstrations, Cleve 2014

Fluid mix	Seed treat-ment	Plot header yield (t/ha	Protein (%)	Screenings (%)	Test weight (kg/hL)
Normal – 300 ml/ha flutriafol, 10 L/ha trace element, 20 L/ha UAN	No	2.60	11.2	4.1	74.2
Nil Control - 10 L/ha trace element, 20 L/ha UAN	No	2.69	11.1	3.5	74.9
200 ml/ha Uniform , 10 L/ha trace element, 20 L/ha UAN	360ml Vibrance	2.76	10.3	2.3	74.8
300 ml/ha Uniform, 10 L/ha trace element	360ml Vibrance	2.74	10.8	3.4	74.5
400 ml/ha Uniform, 10 L/ha trace element	360ml Vibrance	2.76	11.5	6.4	73.3
160 ml/ha Agriphar Experimental, UAN and Trace	No	2.72	10.8	2.7	73.4
320 ml/ha Agriphar Experimental, 10 L/ha trace element	No	2.72	9.8	2.0	74.1
480 ml/ha Agriphar Experimental, 10 L/ha trace element	No	2.41	10.0	2.2	74.4
640 ml/ha Agriphar Experimental, 10 L/ha trace element	No	2.72	9.7	2.5	73.8
10 L/ha trace element, 20 L/ha UAN	No	2.59	9.4	2.9	74.4
Normal – 300 ml/ha flutriafol, 10 L/ha trace element, 20 L/ha UAN	No	2.66	8.9	2.2	75.0
LSD (P=0.05)		*ns*	*0.73*	*1.6*	*1.0*

At Piednippie the initial Rhizoctonia inoculum level was a high risk level. This demonstration used a base fluid fertiliser of phosphoric acid and granular urea and compared different fungicides. The paddock had some grass weeds present and was the latest sown of all the demonstrations on the 20 May. There were differences in the Rhizoctonia patch score and the seminal root score with the Uniform treatment having the lowest (Table 5). There were also differences in the number of crown roots with Intake Hiload Gold having lower numbers. There were no differences in plot header yields at this site at the 5% significance level. There were differences in protein, screenings and test weights again with a general trend of lower yield having higher protein and higher screenings.

At Mudabie variable rate technology is used over different paddock zones using 3 different rates of phosphoric acid, urea and seeding rates. A standard run using 5 kg P/ha as phosphoric acid was also included to compare the use of the fungicide Uniform. The initial Rhizoctonia inoculum level was in the high risk range at 105 pg/DNA g soil, Crown rot risk and *Pratylenchus thornei* risk were also high. This was the earliest paddock sown in the demonstrations. There were no significant differences in early dry matter or root disease measurements.

There were differences in plot header yields with the phosphoric acid and Uniform treatment being lowest, but this may have also been a slight nitrogen response due to added urea.

Table 5 Plant growth and root disease levels of farmer fungicide demonstrations, Piednippie 2014

	Early DM (g/ plant)	Rh patch score (0-5)	Seminal root score (0-5)*	Crown root infection (%)	Number crown roots	Plot yield (t/ha)	Protein (%)	Screenings (%)	Test weight (kg/ hL)	Broad acre yield (t/ ha)**
Intake Hiload Gold 150 ml/ ha	0.34	2.1	3.2	70.2	2.9	1.79	9.0	0.37	66.5	1.60
Uniform @ 280 ml/ha	0.29	1.9	2.9	78.3	3.4	1.78	9.2	0.46	66.6	1.66
In furrow fungicide	0.37	2.1	3.1	76.2	4.2	1.76	9.5	0.50	67.6	1.42
Agriphar Experimental 270 ml/ha	0.27	2.5	3.0	77.4	3.9	1.46	9.6	0.64	68.1	1.63
LSD (P=0.05)	*ns*	*0.3*	*0.2*	*ns*	*0.6*	*ns*	*0.34*	*0.13*	*1.1*	-

**(0=nil damage, 5=all seminal roots with spear tips) ** (average of two strips)*

Table 6 Plant growth and root disease levels of farmer fungicide demonstrations, Mudamuckla 2014

Treatment	Run	Early DM (g/ plant)	Rh patch score (0-5)	Seminal root score (0-5)	Crown root infection (%)	No. crown roots	Plot yield (t/ ha)	Protein (%)	Screenings (%)	Test weight (kg/ hL)	Broad acre yield (t/ ha)**
Rx (VRT)	8	0.41	1.54	2.5	60	8.6	2.09	10.0	1.2	85.5	1.53*
Rx (VRT) +300 ml/ha Uniform	9	0.41	1.38	2.6	73	9.9	2.30	9.9	1.6	85.6	1.50
Phos Acid	10	0.56	1.51	2.4	66	9	2.10	10.0	1.6	85.4	1.57
Phos acid +300 ml/ha Uniform	11	0.48	1.50	2.7	65	8.8	1.88	9.7	1.3	85.4	1.57
LSD (P=0.05)		*ns*	*ns*	*ns*	*ns*	*ns*	*0.17*	*ns*	*ns*	*ns*	-

**(0=nil damage, 5=all seminal roots with spear tips) ** (average of two strips)*

What does this mean?

In 2014 the exceptional start to the season resulted in early seeding, good crop establishment and early growth. The farmer demonstrations were all sown early, with the latest being the Piednippie barley on 20 May. The broad acre farmer demonstrations in the 2014 season showed no visual or differences in early plant growth measured at the given sites during the cropping season. There were differences in crown root numbers and % crown root infection at Cleve with the Nil treatment having higher numbers of both. There were differences at Piednippie in the barley crop sown mid-May, in Rhizoctonia patch score and the seminal root score which was later than the other crops included in the demonstrations.

In the 2014 season there were no significant yield advantages in the small plot header yields when using the fungicide products over the Nil treatments, but this was at sites with high Rhizoctonia inoculum levels, and in a season with an early start and minimal stress during crop establishment. There were differences in protein, screenings and test weights with a general trend of lower yields having higher protein, higher screenings and lower test weights. Further evaluation of research trials and farmer demonstrations using new fluid products and fungicide placement, will occur over two more seasons to evaluate the economics of using fungicides in low rainfall farming systems.

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