Grass weed management in pasture

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Location:
Minnipa Agricultural Centre, paddock S3S
Rainfall
Av. Annual: 325 mm
Av. GSR: 241 mm
2016 Total: 391 mm
2016 GSR: 268 mm
Yield:
Potential: 3.6 t/ha (W)
Actual: 2.6 t/ha
Paddock History
2016: Mace wheat
2015: Mace wheat
2014: Regenerated medic pasture
Soil Type
Red loam
Plot Size
10 m x 2 m x 3 reps

Key messages

- **A two year pasture break has been more beneficial in the first cereal year than a one year break, resulting in lower grass weed numbers, higher soil reserves of N and low disease levels.**
- **The impact of pasture management and pre-seeding tillage on grain yield and quality was greater following a medic pasture in 2015 than in 2016.**

Why do the trial?

The GRDC project 'Maintaining profitable farming systems with retained stubble - upper Eyre Peninsula' aims to produce sustainable management guidelines to control pests, weeds and diseases while retaining stubble to maintain or improve soil health, and reduce exposure to wind erosion. The major outcome to be achieved is increased knowledge and skills allowing farmers and advisers to improve farm profitability while retaining stubble in farming systems on upper Eyre Peninsula (EP).

The Minnipa Agricultural Centre S3S pasture trial was established in 2013 to assess barley grass weed management with a two year medic pasture break. The trial had different grass weed management and tillage treatments imposed in 2013 and in 2014. The trial was then sown with wheat in 2015 and 2016.

How was it done?

The replicated trial was established in 2013 in MAC S3S paddock. Pasture treatments imposed in 2013 were:

(i) selective grass control,

(ii) selective grass control and mowing/haycut and

(iii) selective grass control and pasture topping.

In 2014 on 1 March the 3 blocks were each split into:

(i) worked (a light tillage with an off-set disc)

(ii) unworked areas.

In 2015 pre-sowing treatments were:

(i) harrowing to remove medic stubble,

(ii) disc/light tillage,

(iii) full cut tillage and

(iv) direct drill across the worked and unworked split plots.

In 2015 the trial was sown with Mace on 20 May and harvested on 12 November. See Eyre Peninsula Farming Systems Summary 2015 p136 for details of the treatments imposed in previous seasons.

In 2016 the trial was direct drilled with Mace wheat @ 60 kg/ha and base fertiliser of 18:20:0:0 @ 60 kg/ha on 13 May. The trial was first sprayed on 13 May with a knockdown of 1.5 L/ha of trifluralin, 1.5 L/ha of glyphosphate and 80 ml/ha of carfentrazone-ethyl. The trial was also sprayed with 75 ml/ha clopyralid on 17 June, and 1 L/ha of 2-ethylhexyl ester and a wetter on 24 August for wild oats. It was also sprayed with tebuconazole at 290 ml/ha for leaf rust on 25 August. The trial was harvested on 7 November.

Measurements taken during the season were soil moisture and nutrition, soil-borne disease inoculum, emergence counts, dry matter, grass weed counts (pre-seeding, at establishment and at harvest), grain yield and grain quality.

Data were analysed using Analysis of Variance in GENSTAT version 16 by Chris Dyson.

What happened?

Table 1 shows the soil profile at the trial site is alkaline in pH, with just adequate phosphorus and high mineral nitrogen reserves (especially after working), moderate phosphorus buffering index (PBI) and salinity in the low range near the surface. The soil available sulphur level in March on this red loam was lower than expected with 3 and 6 mg/kg being minimum levels for wheat and canola respectively. Rhizoctonia risk was high, and Pratylenchus risk of both species (*P. neglectus* and *P. thornei*) was low after one year of wheat. All other cereal disease inoculum levels were below detection.

Table 1 Soil analysis of direct drilled treatments after a cereal following two years of medic pasture in 2016

Depth (cm)	pH (CaCl)	Cowell P (mg/kg)	PBI	EC (1:5)	ECe (dS/m)	Available S (mg/kg)	Total soil N (kg/ha)		Volumetric soil moisture April 2016 (mm)	
							unworked	*worked*	*unworked*	*worked*
0-10	7.7	23	103	0.20	2.0	2.3	55	73	8	8
10-30	7.8	2	140	0.13	1.3	1.2	34	35	18	18
30-60							11	20	27	27
60-100							50	93	40	36
Total reserves (0-100)							149	221	93	88

Wheat establishment in 2016 was slightly higher in the disc treatments than in the full cut treatments (Table 2).

The trial yielded well with an average of 2.56 t/ha with 11.0 % protein and 1.7% screenings, due to the mild finish to the season. There were no differences in 2016 grain yield due to any of the treatments imposed in previous seasons although grain protein was slightly higher after discing in 2015 compared to harrowing (Table 2).

Pre-seeding grass weed counts were low in 2016 with an average of 2.6 grass weeds/m^2, but the selective grass control treatment in 2013 with a working in 2014, is showing a trend to slightly higher grass weed numbers (5.8 grass weeds/m^2) than hay cut or pasture topping, regardless of the 2015 tillage systems (data not presented). The late weed counts in October were very low with no differences in treatments with an average of 0.07 barley grass/m^2 and 0.03 ryegrass/m^2 across the trial (data not presented).

What does this mean?

Two years of medic pasture in 2013 and 2014 with different grass weed management regimes resulted in high soil nitrogen and lowered disease inoculum to minimum levels, including *Rhizoctonia solani*. Soil nitrogen was in excess nitrogen for a typical second year cereal, but it was located deeper in the soil profile (60-100 cm). However one year of wheat in the rotation increased disease levels of Rhizoctonia to high risk and Pratylenchus to low risk, which supports previous Rhizoctonia research with the one year break effect for non-cereal crops.

Extractable sulphur on this red loam is lower than expected with 3 mg/kg being an adequate level for wheat, which may have limited yield this season rather than nitrogen. This is a nutrient which growers may need to monitor due to the removal in grain over the previous good seasons.

In 2015 tillage impacted on wheat yield with full cut tillage yielding highest and discing the lowest, however in 2016 there was no yield effect due to previous tillage treatments. The light disc imposed in 2015 before seeding had very slightly higher protein in 2016 compared to the harrowed treatment, but the disc also had a lower yield in 2015.

The 2014 light tillage with an off-set disc in the medic pasture resulted in higher germination of both grass and broadleaved weeds in 2015. In 2016 the selective grass control and worked treatment from 2014 is showing slightly higher grass weed numbers than hay cut or pasture topping, regardless of the 2015 tillage system.

Overall the effect of the two year pasture break has been more beneficial in the first year cereal after pasture, with low grass weed numbers and low disease levels. The high nitrogen levels fixed by the medic pasture were adequate for two cereal crops, but located deeper in the soil profile by the second season. The impact of pasture management and pre-seeding tillage on grain yield and quality was greater in the season directly after the medic pasture than in the second year.

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Registered products: see chemical trademark list.

Table 2 Establishment, grain yield and grain quality of wheat in 2016 as affected by previous medic pasture management

2013 treatment*	2014 treatment	2015 yield (t/ha)	2015 protein (%)	2016 establishment (plants/m²)	2016 yield (t/ha)	2016 protein (%)
		2015 Tillage Treatment				
		Disc				
Pasture topped	unworked	2.00	14.9	83.8	2.69	11.0
	worked	1.84	15.5	89.1	2.58	11.1
Mowing/haycut	unworked	2.25	14.3	89.5	2.54	10.9
	worked	2.07	14.9	97.2	2.53	10.9
Selective grass only	unworked	1.77	15.6	89.4	2.51	11.5
	worked	1.55	16.2	95.4	2.57	11.5
	Average	**1.91**	**15.2**	**90.7**	**2.57**	**11.1**
		Full cut				
Pasture topped	unworked	2.30	14.5	81.5	2.66	10.9
	worked	2.17	14.9	78.1	2.60	11.0
Mowing/haycut	unworked	2.33	13.8	85.0	2.55	10.8
	worked	2.15	14.7	84.3	2.54	11.0
Selective grass only	unworked	1.98	14.1	95.9	2.54	11.2
	worked	1.77	15.5	84.0	2.53	11.4
	Average	**2.12**	**14.6**	**84.8**	**2.57**	**11.1**
		Harrowed				
Pasture topped	unworked	2.21	15.0	88.6	2.65	11.0
	worked	2.14	15.2	90.9	2.60	10.8
Mowing/haycut	unworked	2.27	14.0	92.7	2.50	10.8
	worked	2.20	14.8	90.0	2.53	11.6
Selective grass only	unworked	1.93	15.1	86.0	2.47	11.6
	worked	1.77	15.7	80.9	2.55	11.6
	Average	**2.09**	**15.0**	**88.2**	**2.55**	**11.0**
		Direct drilled				
Pasture topped	unworked	2.15	14.6	85.6	2.63	11.0
	worked	1.95	15.3	87.9	2.55	11.0
Mowing/haycut	unworked	2.31	13.9	81.1	2.55	10.7
	worked	2.28	14.6	82.8	2.56	11.0
Selective grass only	unworked	1.78	15.4	95.4	2.53	11.3
	worked	1.60	16.2	86.3	2.53	11.4
	Average	**2.01**	**15.0**	**86.5**	**2.56**	**11.1**
LSD (P=0.05) Individual treatments		*0.12*	*0.54*	*10.4*	*0.08*	*0.27*
2015 tillage averages		***0.05***	***0.22***	***4.3***	***ns***	***0.11***