Profitable crop sequences on upper Eyre Peninsula – the final year

RESEARCH

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Location:
Minnipa Agricultural Centre Airport paddock
Rainfall
Av. Annual: 325 mm
Av. GSR: 241 mm
2015 Total: 333 mm
2015 GSR: 258 mm
Yield
Potential: 3.0 t/ha (W)
Actual: 2.9 t/ha
Paddock History
Prior to 2011 >10 years cereal
Soil Type
Red sandy clay loam
Plot Size
20 m x 2 m x 3 reps
Yield limiting factors
Nitrogen, Phosporus, Grass weed competition

Key messages

- **For the first year following breaks in 2011-12, wheat production was unaffected by break history compared to continuous wheat, but only because expensive herbicides kept high grassy weed seed banks at bay.**
- **Soil mineral N and water leading into 2015 were the same in all treatments.**
- **Oats was a poor break option for managing grassy weeds.**

Why do the trial?

To determine the comparative performance of alternative crops and pastures as pest and disease breaks in an intensive cereal phase and to evaluate their impact on following wheat crops.

In low rainfall regions of south-eastern Australia broad-leaf crops make up only a very small proportion of the total area of sown crops. In light of increasing climate variability farmers have adopted continuous cereal cropping strategies, as non-cereal crops are perceived as riskier than cereals due to greater yield and price fluctuations. At the same time, this domination of cereals is increasing the need for non-cereal options to provide profitable rotational crops, disease breaks and weed control opportunities to sustain cereal production. Currently, the most common 'break crop' is a poorly performing volunteer annual grass dominant pasture. They are often havens for cereal pests and diseases and are seen as having negative impacts on subsequent cereal grain yield and quality. For greater detail of trial management over the past four years refer to articles EPFS Summaries 2011, p111, 2012, p94, 2013, p104 and 2014, p134. GRDC granted an extension of this project to capture a third cereal year after the break options because many were still impacting on wheat production in the second cereal year

How was it done?

In year five of the trial (2015) as in the previous two years, all treatments were sown wheat, in the last season it was again Corack wheat @ 57 kg/ha with 64 kg/ha DAP and 50 kg/ha urea banded under the seed row on 13 May. All plots were broadcast with 90 kg/ha urea in late July prior to 20 mm of rain.

The whole trial was treated for weed control in the same way (118 g/ha Sakura, 1.5 L/ha Triflur X and 1.2 L/ha Sprayseed pre-seeding and Amicide 700 @ 800 ml/ha in crop) except for treatments with medics in their history which also received Lontrel Advance @ 75 ml/ha for medic control. The trial was harvested in early November.

The trial was monitored for grassy weeds and grain yield and quality. Soil water and mineral N to depth were also measured pre-seeding.

What happened?

See the other article in this section which is a detailed summary of the economic impacts of break options in three of these crop sequencing trials (including Minnipa) over the first four years of these trials. This article summarises the agronomic performance of wheat in 2015.

Soils

Pre-seeding soil water and mineral N measured in the 0- 90 cm profile were similar across all treatments (which were all sown to wheat in 2013 and 2014) with soil water averaging 94 mm and mineral N 89 kg N/ha.

Production

Just like many crops on upper Eyre Peninsula in 2105, this trial suffered from low spring rainfall. Yields varied from 2.46 t/ha through to 2.94 t/ha. For the first time in the trial, continuous wheat was not amongst the very lowest performing treatments. In general, most treatments yielded better than 2.5 t/ha with only one treatment, early sown medic in 2011 followed by oats, yielding less than 2.5 t/ha.

Table 1 Yield of Corack wheat in 2015 at Minnipa.

2011 outcome / 2012 outcome	Average of yield t/ha	Grassy Weed Seed Bank Plants/m^2	2011 outcome / 2012 outcome	Average of yield t/ha	Grassy Weed Seed Bank Plants/m^2
WHEAT grain / WHEAT grain	2.70	132	EARLY SOWN MEDIC hay / OATS graze	2.58	151
ANG MEDIC seed / WHEAT grain	2.85	279	CANOLA grain / FIELD PEA grain	2.76	106
VETCH+OATS hay / WHEAT grain	2.54	83	CANOLA grain / EARLY SOWN MEDIC graze	2.79	128
OATS hay / CANOLA grain	2.94	377	CANOLA grain / OATS graze	2.71	211
OATS hay / FIELD PEA grain	2.75	453	FIELD PEA grain / OATS graze	2.82	158
OATS hay / EARLY SOWN MEDIC graze	2.80	377	FIELD PEA grain / WHEAT grain	2.76	204
FALLOW / FALLOW	2.94	121	FIELD PEA grain / CANOLA grain	2.81	257
ANG SOWN MEDIC seed / WHEAT grain	2.56	332	FIELD PEA+CANOLA hay / WHEAT grain	2.71	106
SOWN MEDIC hay / MEDIC+CANOLA graze	2.46	166	SULLA graze / REG SULLA graze	2.63	113
EARLY SOWN MEDIC hay / CANOLA grain	2.75	151			
LSD (P=0.05)	*0.24*	*ns*			

Grain quality was affected by the dry finish with small grain size (an average of only 27 g/1000) and screenings averaging 11%, regardless of treatments. Protein in grain averaged over 13% for the whole trial.

Weeds were not a production issue in 2015 because the pre-seeding application of Sakura, Sprayseed and Triflur X was very effective at keeping grassy weed competition low in-crop, despite grassy weed seed banks varying from 83-453 plants/m^2 across treatments. Treatments with medic in their history required a Lontrel in-crop spray for their control. Grassy weed seed banks were not consistently different between treatments leading into 2015 (see table 1),

What does this mean?

The wheat crop in 2015 was the third or fourth consecutive wheat crop following breaks imposed in 2011 and 2012. For the first time in this trial crop performance was not affected by previous break history. In all previous years, wheat performance was increased by breaks which reduced grassy weed pressure. All treatments performed well in 2015 relative to the French/Schultz potential (ranging from 82 to 98%) suggesting that there were few constraints to crop production other than water. Soil mineral N and water were not affected by break history leading into the 2015 season.

However, production in 2015 was reliant on an expensive pre-seeding herbicide package to keep large grassy weed seed banks at bay in those treatments without the opportunity to run grassy weeds right down. Oats was a poor break choice in terms of managing grass weed seed banks as they generally had the highest levels over the life of the trial. A small penalty for including medics as a break in previous years was the need for an in-crop herbicide action to eliminate them as a weed in 2015.

All trials in this project are now being assessed for the impact of breaks on five year gross margins and soil condition. See article "The value of break crops in low rainfall farming systems" in this edition which summarises the four year gross margin performance of three of these trials across Southern Australia.

Acknowledgements

We would like to thank Ian Richter and Wade Shepperd for technical expertise throughout the duration of the trial over the past five years. Thank you to Chris Dyson for biometric expertise. Thanks to GRDC for funding the project, project code DAS00119.