

IMPROVING WINTER CROPPING SYSTEMS RESULTS FROM RIVERINE PLAINS TRIALS

2008 Results from the Third Crop Program

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Take Home Messages

- Riverine Plains members are up to date in the field of precision agriculture, nitrogen use and crop choice and are following the recommendations from the Riverine Plains' programs.
- Wheat following wheat can be a viable alternative, particularly to growing crops such as lupins and canola.
- To maximise yields, wheat after wheat requires protection from root diseases and possibly more nitrogen than would be required by wheat after canola.
- Using barley or triticale in the crop rotation is a more economic option than a higher proportion of canola or lupins.
- Barley and triticale require high inputs (similar to wheat) to yield near their potential.
 - All cereals respond to similar amounts of N (up to 80 kg/ha) and fungicide in wet years.
 - Barley has significantly higher yield than other cereals in dry years.
 - Barley responds significantly to N and fungicide in dry years whereas wheat and triticale respond variably.
- Barley grain quality is not significantly affected by N or fungicide applications until the yield is maximised.
- Wheat responds to 5-10 kg/ha of P at high soil test levels (80 mg/kg Colwell) in dry years.
- Crops with low initial tiller numbers can be manipulated to yield well.

In 2008, there were a number of aspects of the trial work.

Survey of Members' Activities

At the 2008 meeting, about 100 members completed a survey about their farm activities and practices in the fields of precision agriculture, changing the crops grown in the rotation and input use (N and fungicide) in crops. Despite the dry seasons, Riverine Plains Cropping Systems Group (RP) members are continuing to adopt the best technology. Table 1 shows a summary of the results.

Table 1
Practices Related to Precision Agriculture Used by Respondents

Practice	Used this 3 years ago	Use Now	Intend to use
Use a Light Bar	27%	68%	74%
Use Precision Agriculture for guidance	7%	19%	82%
Use 2cm Accurate Guidance	1%	8%	47%
Obtain Yield Maps	8%	14%	64%
Use Yield Maps	4%	9%	43%
Conduct EM Studies	3%	14%	59%
Use Variable Rate Technology	2%	5%	45%
Apply Lime/Gypsum at Variable Rate	1%	13%	57%
Apply P or N at Variable Rate	1%	3%	54%

In summary, Table 1 shows that in the last three years

- Use of light bars has increased from 27% to 68% of the respondents. This is about double the level for all farmers.
- Use of other precision agriculture equipment for guidance has increased from 7% to 19%.
- Use of 2cm accurate guidance equipment has risen from 1% to 8%.
- Use of yield maps has increased from 4% to 9%. A higher number of respondents had yield maps than used them.
- Obtaining Electromagnetic Surveys (EM) has risen from 3% to 14%.
- 13% had applied some lime or gypsum using a form of variable rate technology.

In addition, about half the respondents intended to continue to adopt precision agriculture. They indicated an intention to adopt a number of practices including using 2cm accurate guidance equipment, conducting EM studies and applying N and P using variable rate technology.

Crop Experiment Program

Since 2003, RP has been studying crop rotation and input use in a program now funded by GRDC called the *Third Crop Program*. The aim of the program was to examine what crops were best to follow the canola and wheat rotation that had become common in the area in the last ten years. The results are summarised in Table 2.

Table 2
Summary of Yield (t/ha & %) and Gross Margin (\$/ha) of the Third Crop Program 2004-2008

Crop	Control			40 N (Hi N)			<i>HiN+Fungicide</i>		
	2005 ¹	Yield ²	GM ³	2005	Yield	GM	2005	Yield	GM
Wheat	3.3	100%	\$148	4.8	144%	\$173	5.6	156%	\$155
Triticale	3.5	120%	\$197	5.6	159%	\$169	6.1	171%	\$181
Barley	2.8	115%	\$235	3.7	146%	\$276	4.9	169%	\$309
Canola	1.4	40%	\$39	2.1	71%	\$75			
Lupins	1.4	30%	-\$16						
LSD	0.3								

1- 2005 – 2005 yield in t/ha. 2- Yield – Average 2004-2008 yield expressed as % of wheat control (1.6 t/ha with 20 kg/ha of P and 0 N). 3- GM – Average 2004-2008 Gross Margin in \$/ha. LSD – 0.05. Site - Balldale NSW. Ave GSR rainfall – 319 mm (2004-2008 – 207 mm)

As a result of five years of experiments, it has been established that wheat after wheat following canola

- Yields and returns better than barley or triticale in wet years and is a better option than growing a higher proportion of canola or lupins (Table 2).
- Responds significantly to Take all control (Impact or Triad on fertiliser or Jockey on seed) but not always to in-crop fungicide.
- May require 10% more N than a wheat crop grown after a canola crop to maximise yield (that is: it is less N efficient).

The experiments also demonstrated that the yield difference noted between wheat, triticale and barley is due to a lack of input in barley and triticale. Barley and triticale need similar inputs to those used to maximise wheat yield. All respond to up to 80 kg/ha of N and fungicide applications in high rainfall years in medium to low soil N situations.

Barley has been the best yielding crop with the highest returns in the drought conditions of the last three years. It has responded significantly to up to 40 kg/ha of N and fungicide with no loss of grain quality. Grain quality suffers if more inputs than are required to maximise yield are applied.

Growing wheat on wheat after canola is now a normal practice and will remain this way until seasons improve. In response to these findings, Riverine Plains is promoting better agronomy of barley and has a high yield protocol that is currently being tested.

2008 Program

In addition to the completion of the Third Crop Program, a number of new programs started in 2008 designed to assist with the transition from the old program to the new program that will start this year. Preliminary results of these are

- Wheat responds significantly to 5-10 kg/ha of P even in soils with very high soil test values (80 mg/kg Colwell).
- Sowing more seed and less fertiliser is currently the most economic method of developing early tillers.
- Wheat with low early tiller numbers (sown with low P and N rates and a low sowing rate) can be at least partially restored to full production using fungicides and early N. These crops, without extra input, will have the highest yield and best gross margin in dry seasons.

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