Crop rotation trial

2014 is the second of three years for the crop rotation trial. The trial is funded through Southern Farming Systems as part of the GRDC crop sequencing project. The trial is designed to investigate the merit of fodder crops in the crop rotation, with particular interest in weed control, nitrogen and gross margin.

The trial is a randomised blocked design with four 4m x 8m plots for each treatment. Each treatment appears 4 times in the trial, once in each of the 4 blocks. A summary of the rotations can be seen in TABLE 1 below. For example, in the 'KI rotation plus fodder' treatment, Balansa clover was grown in four reps in the trial in 2013. In 2014 canola was grown on the 4 Balansa plots. In 2015, wheat will be grown on the same plots. This will enable us not only to compare the relative performance of different crops in one year but also their influence on long term productivity and gross margin.

The trial site is located on Alan and Janice Mills's 'Coolalie' property on East West Highway One. The soil is a duplex loam over clay with high fertility. Soil testing in 2013 indicated Colwell P of 66mg/kg, Colwell K of 147mg/kg and sulphur content of 11.5mg/kg; all adequate. Soil testing this year determined that the concentrations of these macronutrients remained relatively constant in 2014.

The site received 511mm of rain for the year compared to the average of 580mm. The trial did not get waterlogged.

TABLE 1: **Rotation plan for crop rotation trial**

Treatment Name	Year 1 (2013)	Year 2 (2014)	Year 3 (2015)
Typical KI crop rotation	Canola	Wheat	Canola
KI rotation plus fodder	Balansa clover fodder crop	Canola	Wheat
KI rotation plus regenerated pasture	Regenerating sub clover pasture	Canola	Wheat
KI Rotation plus Broad Beans	Beans	Canola	Wheat

As per TABLE 1 for Year 2 (2014), Crusher TT canola was grown on the broad bean, Balansa clover and sub clover plots from 2013. Canola and wheat crops were treated as per district practice. All plots were sown on the 13th of May. Agronomy, including fertiliser, was the same for all canola plots.

Plant residues were retained on the plots though summer and autumn. This could have given the rotations that had Balansa or sub clover an advantage compared to the bean crop which had a lot of fixed N removed with the seed at harvest. This advantage to the fodder options was managed by raking and removal of material prior to sowing. Removal of trash was necessary to enable passage of the trial seeder.

Canola yields were good considering the dry finish to the season. For 2013 crop details refer to the rotation treatment in TABLE 1. Yields ranged from; 1.79t/ha for canola grown on Broad Beans to 2.07t/ha for canola grown on Balansa clover plots.

The difference in canola yields for 2014 for the 3 different rotation treatments are not statistically significant. As a result we can not, with confidence, draw any conclusions about the impact of legume crop (Balansa clover, sub clover or broad beans in 2013) on canola yield in the following year. The results suggest that canola yields were higher on the fodder/clover crop residue, than when planted on broad bean residue.

It is not possible to make statistical comparisons between wheat and canola as they are different crops and were treated differently. Wheat yield at 3.62t/ha was good considering the poor spring.

TABLE 2: **Summary of 2014 yields, cost, income and gross margin estimates**

Rotation treatment	2014 Crop	Yield (t/ha)	Expenses ($/ha)	Income ($/ha)	Gross margin ($/ha)
Typical KI crop rotation	Wheat	3.62	415	887	472
KI rotation plus fodder*	Canola	2.07	454	938	484
KI rotation plus regenerated pasture	Canola	2.02	454	899	445
KI rotation plus Broad Beans	Canola	1.79	454	797	343

* *Canola from the KI rotation plus fodder had higher oil content, and therefore received an oil bonus of $8/t.*

Gross margins were good for all crops in 2014, ranging from canola planted on broad bean stubble at $343 per ha to canola on Balansa clover residue at $484 per ha. It is interesting to note that while 'KI rotation plus broad beans' produced the highest gross margin in 2013, this rotation had the lowest in the following year. However, the 'KI rotation plus broad beans' has the highest average over the two years and is well positioned to be the most profitable over the 3 year trial.

The 'typical KI rotation' had a good gross margin ($472) for the 2014 wheat crop but its average is poor over the last two years. This treatment will struggle to recoup the loss made from the failed canola crop in 2013.

At the end of the three year trial it may be worthwhile calculating gross margins using 5 or 10 year averages for grain and fertiliser prices. This would reduce the impact of variation in grain price on the outcome of the trial. For example, if canola prices are high next year and wheat low (relative to average) this would favour the 'typical KI rotation' gross margin. We will have no such luxury to deal with differences in seasonal conditions between years.

FIGURE 1: **Comparison of gross margin of the different rotations over the last two years, and two year average.**

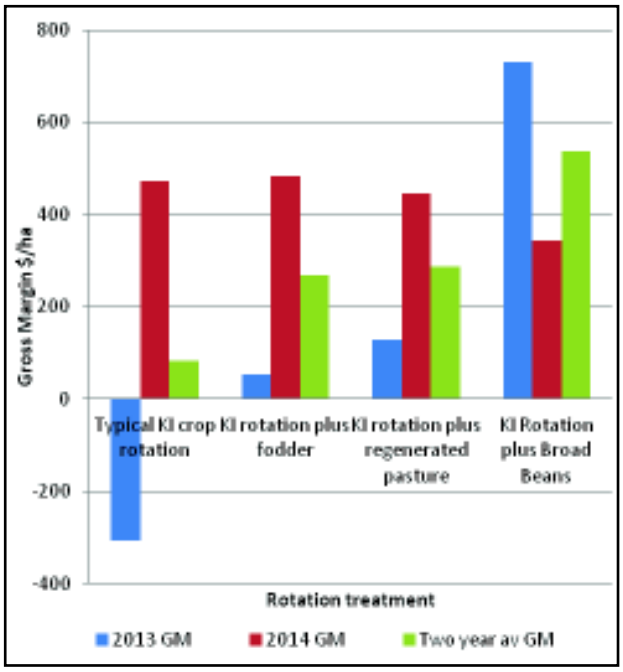

FIGURE 2: **Canola sown on broad bean residue.**

FIGURE 3: **Canola sown on sub clover residue.**

Take home messages

- All 4 rotations produced good gross margins for 2014.
- 'KI rotation plus broad beans' best gross margin based on 2 year average.
- Need to compare data over 3 years of crop rotation.

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