## NUTRITIONAL STRATEGIES **RESPONSIVE TO CROP SEQUENCING**

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Key words: nitrogen, phosphorus.

#### Take home message:

There may be an opportunity to enhance phosphorus uptake in wheat following an albus lupin crop.

Wheat into canola stubble may respond to higher rates of applied phosphorus.

As commodities continue their roller coaster ride there may be options available to grain growers to further refine fertiliser strategies and perhaps take advantage of crop type and their place in the rotation to enhance fertiliser efficiency. The 2009 and 2010 Incitec Pivot Fertilisers Product Development and Long Term Trial program in central New South Wales has provided some information on the opportunity or otherwise to develop this strategy further.

### Pulse Crops;

Benefits of pulse crops and residual nitrogen (chickpeas, field peas, faba beans, lupins) have been well documented (Armstrong et al) Pot trial results have also supported the enhancement of phosphorus uptake in subsequent wheat plants (Nuruzzaman et al). Anecdotal evidence would also suggest less or nil phosphorus in chickpeas and albus lupin crops in particular having no adverse effect on pulse crop grain vield and the following cereal crops require reduced rates of phosphorus due to enhanced phosphorus uptake.

In 2009 two trials were sown on one site at Chris and Sarah Roche's property "Reedsdale" into 2008 chickpea stubble. These trials were not specifically sown to test the above hypothesis of increased availability of soil phosphorus to the following wheat crop but were sown as product development and row spacing trials.

Trial 1 2009 Phosphorus: Sown - 26/05/2009, Crusader @ 45kgs/ha @ 17.5cm row spacing, Chickpeas 2008

Soil test results: 0-10cm soil test - Colwell P -26mg/kg site mean PB1- 43 site mean 0-60cm Deep N - 100kgs/ha/N



Trial 2 2009 Phosphorus: Sown - 26/05/2009. Crusader @ 45kgs/ha @ 17.5cm row spacing, Chickpeas 2008

Soil test results: 0-10cm soil test - Colwell P -26mg/kg site mean PB1- 43 site mean 0-60cm Deep N – 100kgs/ha/N



Based on the phosphorus responses seen in 2009 to phosphorus in both liquid and granular form there does not appear to be any beneficial effect from chickpeas on the availability of soil phosphorus to wheat following in the crop sequence on these red brown earths with Colwell soil phosphorus of 26mg/ kg. Nitrogen is another issue.

In 2010 two product development trials were sown at Chris and Sarah Roche's property "Reedsdale" into a 2009 albus lupin stubble.

Trial 3 2010 Phosphorus: Sown 18/05/2010 Lincoln @ 45kgs/ha at 25cm row spacing Albus lupins 2009 Soil test results: 10-60cm Deep N – 90kgs/ha/N

**Trial 3 Phosphorus** 



As with many paddocks in the district this trial area suffered from periods of water logging through the growing season. In trial three, enhanced phosphorus, significant yield responses occurred at 18.8kgs/ha and 25kgs over the nil P control. There was no significant difference between 18.8kgs/ha/P and 25kgs/ha/P. There may have been enhanced phosphorus uptake after albus lupins in 2009. A higher rate of phosphorus may have given a better indication of the potential for response.

Trial 4 2010 Nitrogen:	Sown 18/05/2010 Lincoln
	Albus lupins 2009
Soil test results:	0-10cm soil test - Colwell
	10-60cm Deep N – 90kgs/
Trial 4 Nitrogen	





In trial four, the enhanced nitrogen trial, there was no significant yield response to 30kgs/ha/N over the nil N control however there was a significant response to 60kgs/ha over the nil N control treatment. There was no significant protein response to nitrogen product, rate or timing. Adequate soil nitrogen, mineralised nitrogen and applied nitrogen may have been available to achieve plot yields. Higher rates of nitrogen were required based on seasonal conditions and crop potential

## 0-10cm soil test - Colwell P - 29mg/kg site mean PB1- 42 site mean

@ 45kgs/ha at 25cm row spacing

### P - 29mg/kg site mean PB1- 42 site mean /ha/N

**Management Practice** 

#### Canola

In 2009 canola was sown into wheat stubble on the long term high soil phosphorus IPF trial site at Angus McNeil's property at Rand in the southern Riverina.

#### **Trial 5 Phosphorus**



In trial five there was no significant response to phosphorus up to 40kgs/ha/P over the nil phosphorus control.

In 2010 wheat was sown into canola stubble on the long term high soil phosphorus IPF trial site at Angus McNeil's property at Rand in the southern Riverina.

#### **Trial 6 Phosphorus**



In trial six there was a significant response to 10kgs/ha/P over the control and a significant response to 20kgs/ha/P over 10kgs/ha/P and the nil phosphorus control. There was no significant response to 40kgs/ha/P over 30kgs/ha/P and 20kgs/ha/P

Conclusion: There may be benefits gained by including albus lupins in the cropping sequence to enhance the uptake of phosphorus in the following wheat crop. The potential for any economic benefit needs to be considered. Albus lupins do not appear to respond to the addition of phosphorus. The significant responses in wheat to applied phosphorus rates after canola in high phosphorus soils is an area for future research.

#### References

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# **IMPROVING FARMER CAPACITY TO MANAGE PROFITABILITY AND RISK**

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especially in the face of more uncertain seasons Farmers have been seeking guidance for years on how they can better fit the various components and profit margins. of their farm systems together to improve overall Understanding the sensitivity of changes to farm profitability and management of risk.

essential to achieving profitability and managing risk. In the past a lot of attention has been placed Traditional farm business analysis techniques often on agronomic considerations and hence a concentration on varieties, rates, seeding dates, do not pick up this risk whereas this project uses row spacing and similar types of work. Similarly decile break even points to assess sustainability of with livestock there has been work on topics such the business in difficult times. as grazing cereals and other crops as well as The project will roll out on Eyre Peninsula in animal genetics. While all of this work has a place, 2011 and expanded through 2012 and 2013 by farmers are now seeking more advice on how to establishing and working with groups as indicated fit the various technologies together to best effect above and building on previous work. There is also on their business. This no longer simply means an important additional component with consultants/ greater production - profitability, reduced inputs and accountants working with groups of newer/younger management of risk are increasingly recognised by farmers to provide an introduction to farm finance farmers as major factors affecting the performance and risk management. of their businesses and the resilience to tough times.

Since each farmer's business is different, a one size fits all approach is not appropriate. Rather, what is required are simple budgets and guidelines which allow farmers and their advisers to feed in their own figures and ask the "what if" questions appropriate to them. These budgets inform their decisions, yet do not make them for the farmer or adviser. These budgeting tools are available but are not widely used.

Demand for practical farm business management skills training is now coming from farmers, groups and consultants and there is a need to respond quickly to meet this demand.

One response by GRDC has been the Profitability/ Risk Management Project conducted through the Low rainfall Collaboration Project using a whole farm, case study approach which brings together past experiences and activities and involves farm business experts, consultants and farmers. This builds on some excellent pioneering work done on EP in recent years and the results of a pilot project run with Birchip Cropping Group.

The aim of the project is to evaluate adaptive farm systems and to develop simple approaches which farmers can use to help their decision making,

systems and investments with volatile seasons is