"Precision Ag Project, 2010"

Felicity Turner, 0400 299 087, mf.turner@bigpond.com

Key Outcomes:

- Knowing the amount of moisture that is available in the soil profile is invaluable when making nitrogen management decisions
- Previous crop history (particularly that of pulses) can have a very large impact on the levels of nitrogen required in following seasons

Trial Objectives: To look at the economic benefits of varying inputs based on various technologies. To assess the technologies that have the 'best' or 'most reliable' outcome in varying situations over a 3-4 year period, and to assess what is happening at sites where soil manipulation has occurred by looking at above ground yields and comparing with below ground soil carbon levels.

Trial Duration: 2009-2013

Location: Various

Soil Type: Various

Paddock History: Various

Farmer Co-operators: Ted & Bill Langley
Lachie Seears, Tom Porter,
Wayne Hawkins, Tony Mackereth,
Peter Phillips

Yield Limiting Factors: Waterlogging at several sites, wet harvest

Type of Trial: Field Demonstration

Treatments

Field Demonstration sites were maintained at sites around Bordertown, Frances, Padthaway, Apsley, Conmurra and Penola.

All trials were sown with farmer equipment, and paddocks were managed as per standard farmer practice. The only thing that varied was the treatment that was applied (again with farmer equipment) in strips across the paddock & across different soil types. Trials were harvested with farmer equipment and a yield monitor used to capture the yield responses to treatments (where applied) and variation across the paddock.

Sites at Bordertown, Apsley and Conmurra successfully had treatments applied/maintained and successful yield data was collected. Those at Frances, Padthaway and Penola experienced either difficulty in applying treatments due to seasonal conditions, or harvest complications where the yield data was not collected accurately / at all and unable to be utilised.

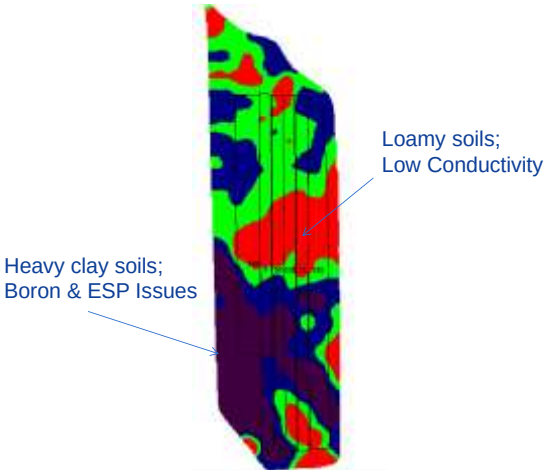
NB/ Responses are specific to each individual site and relative to individual farmer practices under 2010 environmental conditions.

Results

Bordertown; Nitrogen Management in Wheat

Varying rates of Nitrogen were applied at GS30 to compare responses of different Nitrogen rates to farmer practice and also to look at how the response varied across soil zones during 2010 to improve understanding of how variable rate may be utilised / applied across the farm.

Standard farmer practice was to apply 100Kg/ha Urea (46Kg/ha N) at GS30.



Map1: Location of test strips across "soil zones"

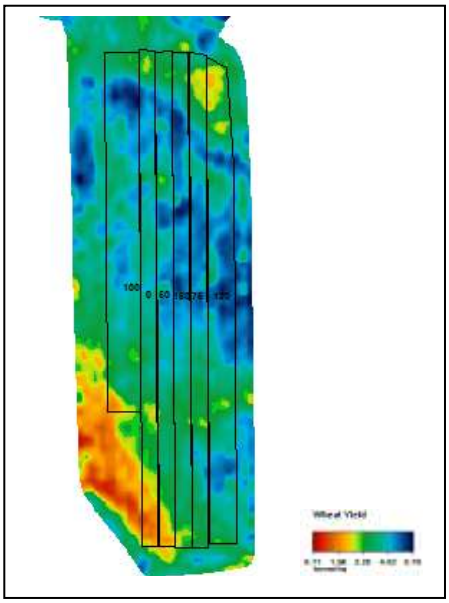
The various Urea rates were applied in strips across the different soil zones (soil zones were established based on conductivity of the soil as determined from an EM38 survey).

Map 1 shows the location of the test strips across the soil zones and explains some of the soil properties as determined by site-specific soil testing.

Yield data (Map 2) was collected from the farmers harvester and analysed post-harvest to determine the responses to different Urea rates across the different soil zones. The results are shown in Table 1.

Table 1: Highest return ($/ha) x Soil Zone

	Farmer Practice	Highest Return	Max Yield	Additional $
Zone	Yld (T/ha)	Urea Rate (kg/ha)	(T/ha)	+/- Std Practice
1	4.491	75	4.545	$ 13.88
2	4.556	100	4.566	-
3	4.156	100	4.156	-
4	3.486	120	4.5	$ 224.06



In 2010 where the crop had the opportunity to finish, there were benefits (and an economic response) in fertilising the "heavier" soils with an above average rate. This result was in contrast to 2009, where a hot, dry finish was experienced and those soils with sub-soil constraints were penalised greatly where higher Nitrogen rates were used.

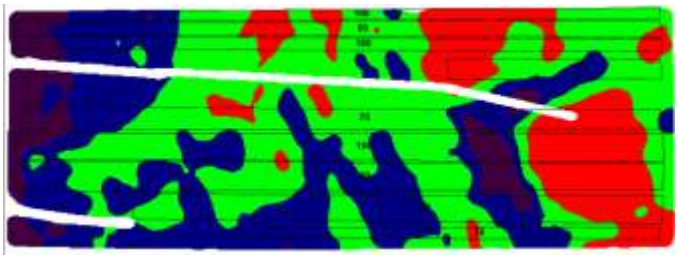
Map 2: Yield Data, Bordertown

If Variable rate had been carried out across the whole paddock in 2010, there would have been an economic benefit of $53/ha, however the contrasting results to 2009 showed the importance of understanding the levels of sub-soil moisture when making N-management decisions.

Conmurra; Nitrogen Management in Wheat

Varying rates of Nitrogen were applied at GS30 to compare responses of different Nitrogen rates to farmer practice and also to look at how the response varied across soil zones during 2010.

Standard farmer practice was to apply 75Kg/ha Urea (46Kg/ha N) at GS30.

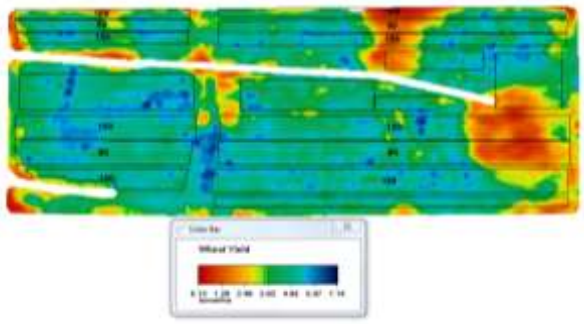


The various Urea rates were applied in strips across the different soil zones (soil zones were established based on conductivity of the soil as determined from an EM38 survey).

Map 1: Location of test-strips across the different soil zones of the paddock.

EM38 values were strongly related to depth of soil. (Red zones = shallow soils with limestone close to /on the surface, through to purple soils that were "deep" soils, in which no evidence of rock was found through the profile.

A Greenseeker (active sensor measuring the "greenness of the crop" passed over the crop before Urea was applied and an application map was generated based on a "N-rich" strip. Recommended application rates varied from 63-110Kg/ha. The generation of this map will allow the effectiveness of this method to be assessed.



Map 2: 2010 Conmurra Wheat Yield

Table 2: Highest Return ($/ha) for each soil zone:

Zone	Farmer Practice	Highest Return	Max Yield (t/ha)	Additional $
	Yield (T/ha)	Urea Rate (Kg/ha)		+/- Std Practice
1	2.63	150	3.46	$164
2	4.6	50	4.8	$52
3	4.9	75	4.9	-
4	4.7	75	4.7	-

The results from this site highlighted the importance of paddock history. The areas that were the most responsive to Nitrogen were the shallow soils. These are the areas which

would have thought to be the 'highest risk' as they are the first areas to run out of moisture. However the 2010 season had a good finish where water may not have been limiting.
The previous crop grown in this paddock was beans and the amount of biomass produced from the beans in 2009 on these shallow soils was very low. It is therefore expected that a lot less nitrogen was fixed and put into the ground compared with the areas in Zone 2 which were the highest yielding bean areas in 2009. The paddock is being sown down to beans again in 2011, and prior to the 2012 season, deep N tests will be taken to try and quantify the difference in nitrogen being fixed to allow for better Nitrogen management in the following crop.
If variable rate was applied across the whole paddock, then there would have been an additional economic benefit of $51/ha.

Acknowledgements

Sites are managed by Felicity Turner, Turner Farm Services

Greenseeker data collection was carried out by Grant Yates, Southern Precision

Funding body

Australian Government
Department of Agriculture, Fisheries and Forestry

CARING FOR OUR COUNTRY