

# Precision Ag Trials

**Variable Rate Nitrogen**  
*Nyngan – CWFS NSW*

Although PA tools have been available to Australian grain growers for many years, and the benefits have been well documented, it is estimated that less than 1-% of grain growers utilise PA 'beyond guidance' in any form.

The objective of this GRDC / SPAA funded project is to increase the level of adoption of PA 'beyond guidance' by broadacre farmers. The project specifically aims to increase the level of adoption of variable rate (VR) by growers in the project to 30% by 2013. This goal will be achieved by demonstrating how to use PA tools to growers at a regional level and by increasing the skills of growers and industry in PA to a level where they can then use PA tools in their farming systems to achieve economic, environmental and social benefits.

Trials and demonstrations are conducted on growers' properties and are visited throughout the season using farm walks and workshops to discuss the advantages and disadvantages of PA techniques with the involvement of other regional growers.

This information sheet presents the outcomes of the SPAA trial by CWFS at Nyngan from season 2011.

## **Aims:**

- To compare the effects of nitrogen on cereal crop yield and protein levels
- To compare the performance of variable rate nitrogen applications to determine profitable future rate applications

## **Background:**

In 2010, at Wass brothers' property in Nyngan, a very wet season caused the normally poor performing areas to perform just as well as the good areas in this paddock regardless of additional nitrogen application. In other paddocks across the farm, there were significant yield differences across each paddock.

However, in the previous years Wass's have always wanted to apply N and have had mixed results possibly because of soil and water variability. Most seasons they have areas that burnout and areas which could use a higher application of N and give a better yield. In 2011, Hayden intended to try to understand what was driving these differences, and yield maps are a way of spatially determining different zones. Therefore, this trial was set up.

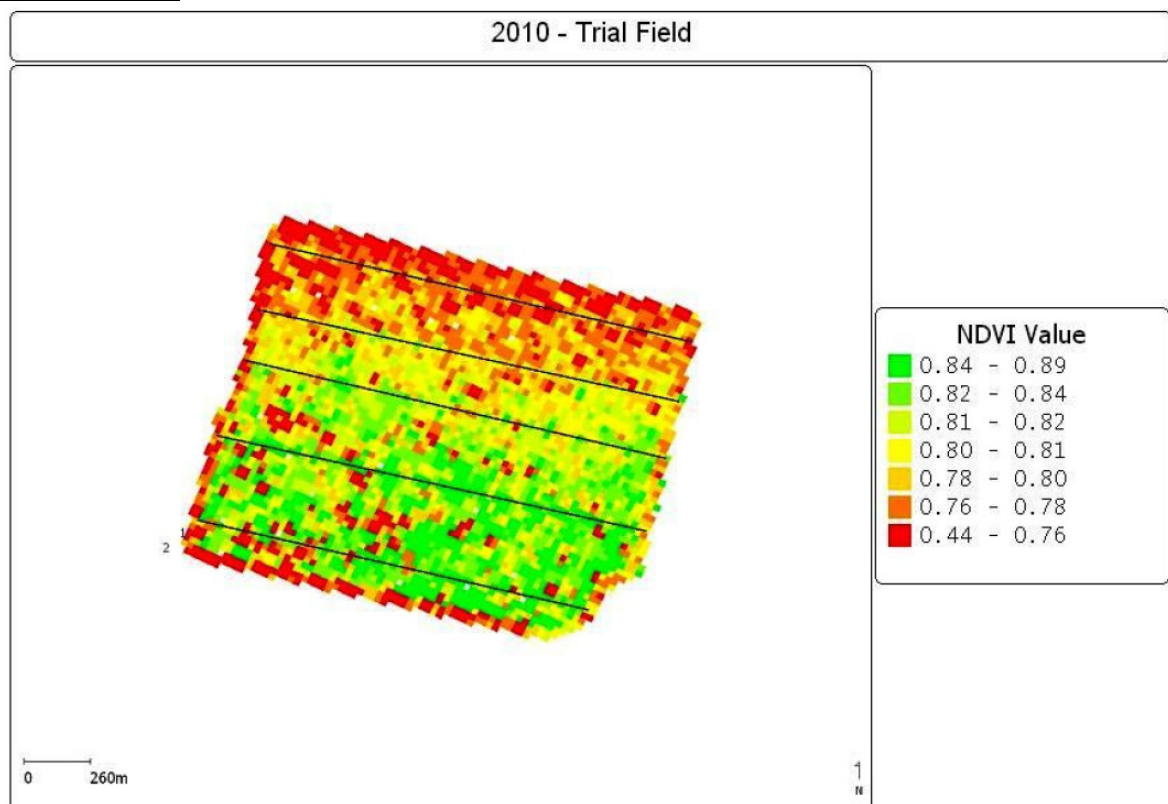
### About the trial:

The 2011 trial was conducted on Wass's Brothers property "The Plains" which is approximately 30kms south on Nyngan in central NSW. The paddock soil type was a sandy red clay loam. The initial crop sown in 2010 was canola, followed by wheat in 2011. The easy N was applied at 60 litres per ha in 5 x 36 meter test strips. Urea was also applied at 250 kgs per ha in small plots (2M by 5M = 10M<sup>2</sup>). To determine biomass, the paddock was sensed using NDVI technology to make a VR map and a Greenseeker was also used.

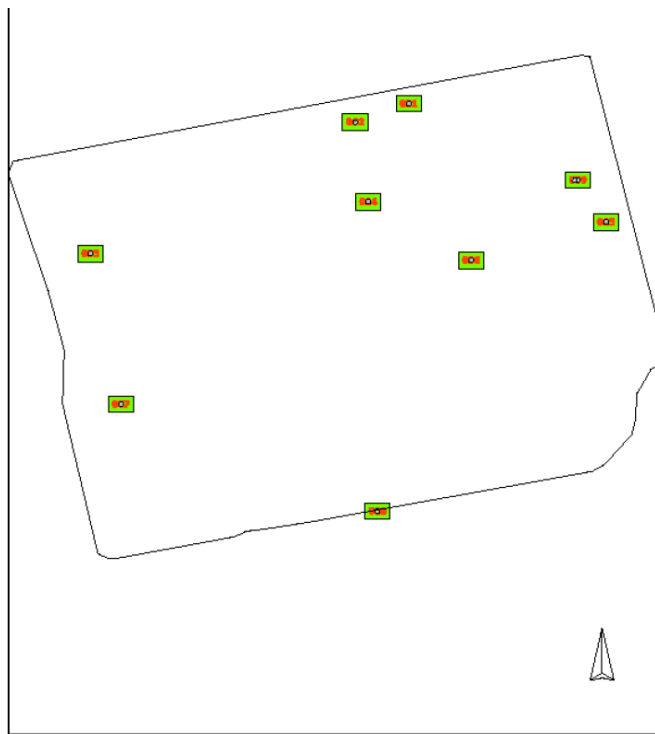
### Sketch of trial design

The trial design was the same as that of 2010 re-imposing on the same N strips as seen on the image 1 below and N rich plots as shown by image 2 below both from 2010 trials.

### NDVI image 1



### NDVI image 2



**Wass N Rich**

Latitude / Longitude  
 Lat: 14°09'26" E  
 Lon: 31°48'07" S  
 Printed at: 6/08/2010

Yield maps and farmer experience and GPS were utilised. However, due to software issues the images are not available.

### **Assessments:**

1. Soil nutrient analysis
2. Soil moisture-using moisture monitoring sensors
3. N-rich strips
4. NDVI – vegetation biomass ( Satellite image and Greenseeker)
5. Yield Mapping

### **Results:**

**1. Soil moisture** data at sowing is shown by the table and graph presented below.

There was a total of 111mm of available soil moisture down to 1.5m

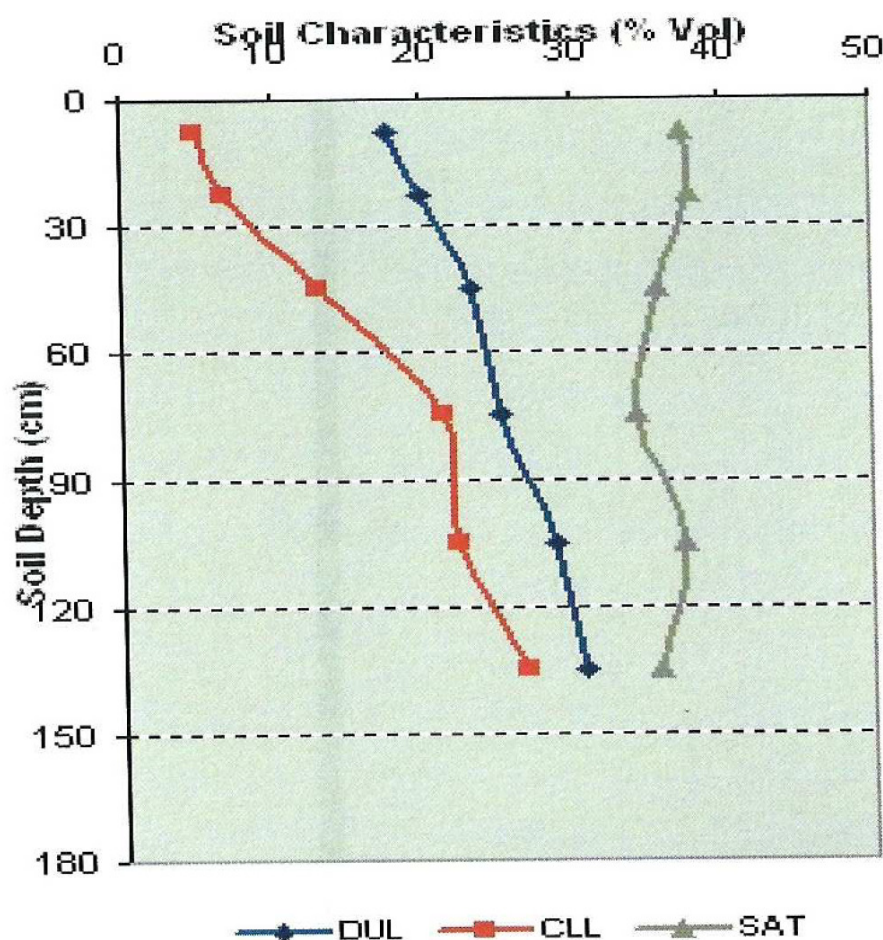
FINAL SOIL CHARACTERISATION									
Core or Rep	Layer Top (cm)	Layer Bottom (cm)	Increment Thickness (cm)	BD (g/cc)	DUL (% Vol)	SAT (% Vol)	0 CLL (% Vol)	0 PAWC (mm/layer)	0 PAWC (mm/layer)
1	0	15	15	1.577193	17.72303	37.48328	5.082596	18.96065	111.0364
1	15	30	15	1.562041	19.8894	38.05504	7.085609	19.20569	
1	30	60	30	1.618501	23.21414	35.9245	13.144	30.21043	
1	60	90	30	1.659011	25.35318	34.39581	21.4704	11.64832	
1	90	120	30	1.57496	28.81819	37.56754	22.35577	19.38727	
1	120	150	30	1.624379	30.70267	35.70267	26.82798	11.62406	

So you have 111mm of available soil moisture down to 1.5m

SAT = Saturation point in soil

CLL = Crop Lower Limit (soil moisture left over after the crop has extracted everything it can)

DUL = Drained Upper Limit (a full profile of soil moisture after drainage has occurred)



## 2. Biomass

In 2010 trial, the readings of the NDVI image showed that the N strips in the paddock might not result in an economic return. Therefore, despite the

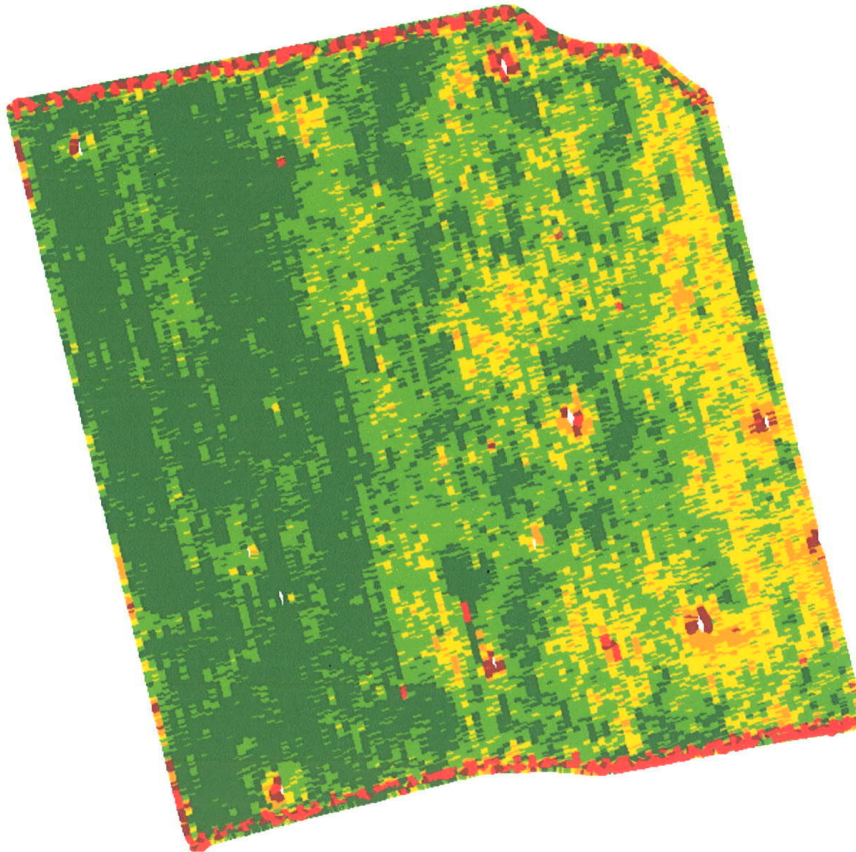
high biomass observed during the growing season there were no significant yield differences between the easy N strips, N rich plots and the control.

In 2011, due to moisture stress during the growing season (June and Jul), there was no need to get a NDVI satellite image because there was no observable differences and it is just too expensive.

### **3. Cereal crop yield**

Yield mapping was not possible in the 2010 canola crop due to multiple harvesters used during harvesting. The 2011 yield map of the wheat crop is supplied below.

There was only 100kg/ha more from the N strips compared with the control. The grain protein was 11.8% for the control compared with 12.8% for the N strips, which is an increase of 1%. This was not enough for the grain to sell at higher grade and therefore there was no economic gain. It was break even if not factoring labour costs.





## Dry Weight



### Client Information:

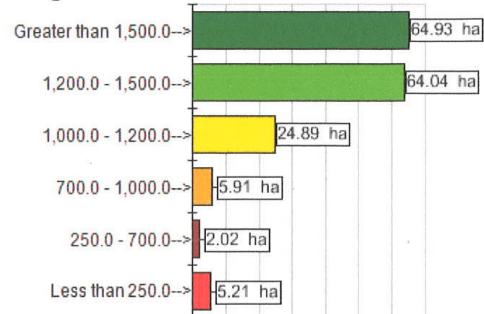
Client: Dave Hogan  
Farm: THE PLAINS  
Field: ADDITIONAL

### Field Information:

Crop: Wheat (White)  
Start Date: 3/11/2011  
Product: Wheat (White)  
Elapsed Time: 10.790 h  
Area: 167.00 ha  
Average Yield: 51.2 bu/ha  
Average Dry Weight: 1,392.4 kg/ha  
Total Yield: 8,543.0 bu  
Total Dry Weight: 232,541 kg  
Average Moisture: 11.21 %  
Productivity(area/hour): 15.48 ha/h

### Legend Information:

#### Units = kg/ha



Field information and legend apply to active map layer only.

## Who was involved?

- Property owner; Wass Brothers Pty Ltd, "The Plains" Nyngan NSW
- Soil tests were processed by Incitec Pivot
- Trials coordinator; Leighton Wilksch
- FSG contact; Neil Macmillan
- CWFS contact; James Mwendwa

## Grower/Regional feedback:

"The return on investment from VR so far has been nil. I think our time would be better spent in the cab of a spray rig controlling weeds; the benefits so far have been disappointing. In 2010 we lost \$8/ha by not spraying weeds"

There are problems with the Apex software provided by John Deere. There are difficulties opening, emailing and printing from this software. Other growers and agronomists have noted this to Mr Wass.

The cost of obtaining NDVI satellite images is very high in the area because only few farmers are involved. The images are important, as they are required to make decisions at crop the critical stages during the growing season especially for spot variable applications if required. Therefore, this becomes the major limiting factor.

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## For more information

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