BCG Precision Ag Trials

Paddock Demonstration: Up-front Nitrogen

Nyah West, VIC

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 **managed by BCG** from season 2010.

Aims:

- To compare the effects of up-front nitrogen (N) (Urea®) on wheat yield (c.v. Yitpi) at Nyah West in the Victorian Mallee.

Background:

The Victorian Mallee has experienced more than a decade of below average rainfall (including 3 droughts). This has placed an enormous amount of financial pressure on the farm businesses. By reducing up-front expenditure on inputs such as fertiliser, provided there is no yield penalty, delayed applications can significantly reduce risk. Delayed applications also allow for rates/inputs to be refined to suit the season.

The Mallee is predominantly a dune-swale landscape with deep sands on the dunes and heavy clay loams (with moderate subsoil constraints) on the swales. Precision Agriculture (PA) has already been widely adopted in the area as each soil type requires specific agronomy, especially N on the sands. This trial will compare the performance of wheat (c.v. Yitpi) to upfront and delayed Urea® (46% N) application over 3 different soil types.

About the trial:

Yitpi wheat was sown on the 16 May 2010 into wheat stubble at Nyah West at various sowing rates. Dune-swale systems are typical to the Mallee landscape, and soil types generally get broken down into three zones (sand, sandy loam and heavy flat). This paddock contains each of the zones and the farmers are currently practicing a variable rate application (not automated) for sowing rate, nitrogen and phosphorus. A control strip of no Urea was compared to 40kg/ha Urea (18kg N).

The strip was sown across three different zones/soil types within the paddock. Sowing rates varied within the zones, 54kg/ha (flat), 60kg/ha (sandy loam) and 64kg/ha (sand). MAP (22%P, 10%N) was applied at 25kg/ha as a blanket rate in both strips. Sulphate of Ammonia (24% S, 20% N) was top-dressed at 25kg/ha with 25kg/ha Urea (46% N) on the sand only on the 27 June. Soil samples at sowing, crop biomass at Z30 and grain yield were measured.

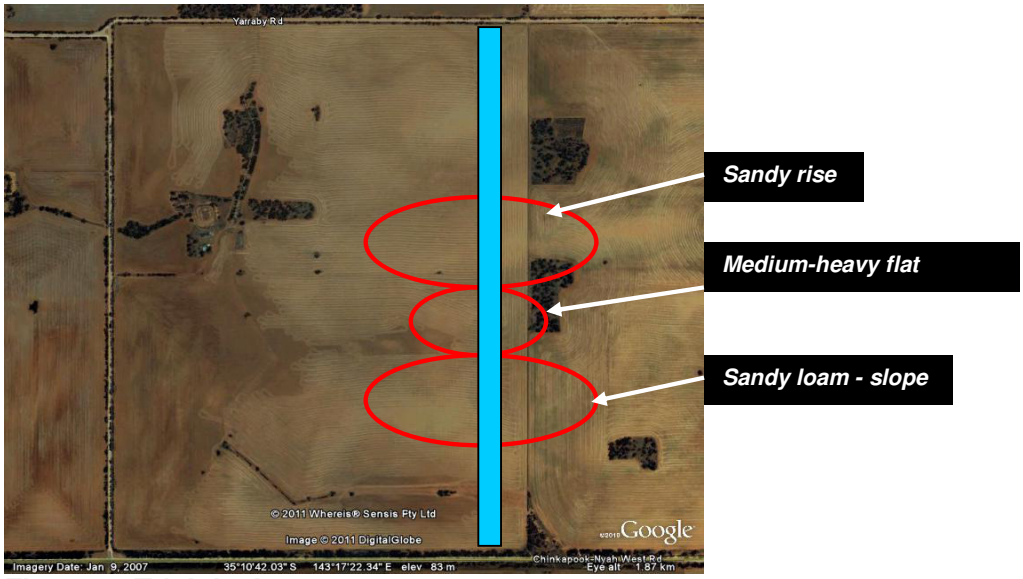

Figure 1: Trial design

Assessments:

- Soil Analysis at sowing
- Dry matter and tissue analysis (GS30)
- Crop Specs taken in August
- Grain Yield (maturity)

Results:

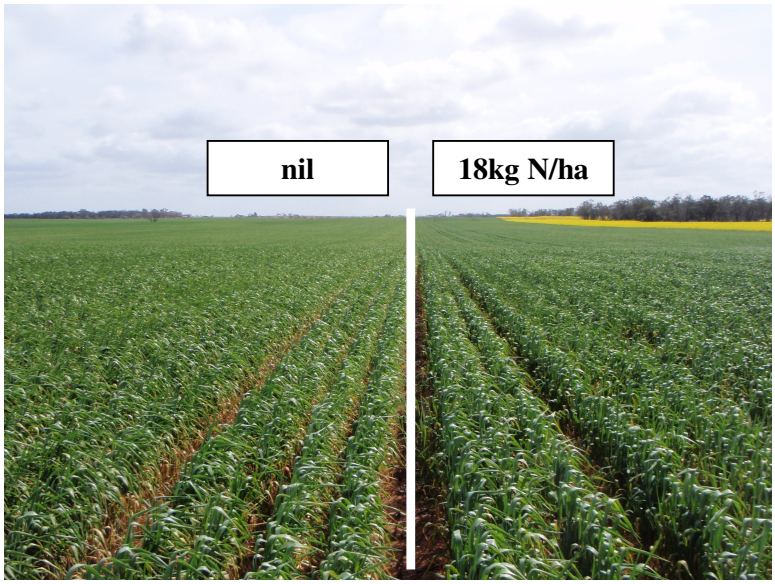

Figure 2. Photo showing the visual difference observed in August.

In August, biomass measurements found differences between soil types or zones with the heavier soil type producing more biomass compared to the sandy rise (Figure 3). Differences were also identified between the strips, with higher biomass being produced in the 18kg N/ha strip. Despite these increases being found in biomass, only small differences were found in the crop reflectance (determined by hand-held Greenseeker) (Figure 4).

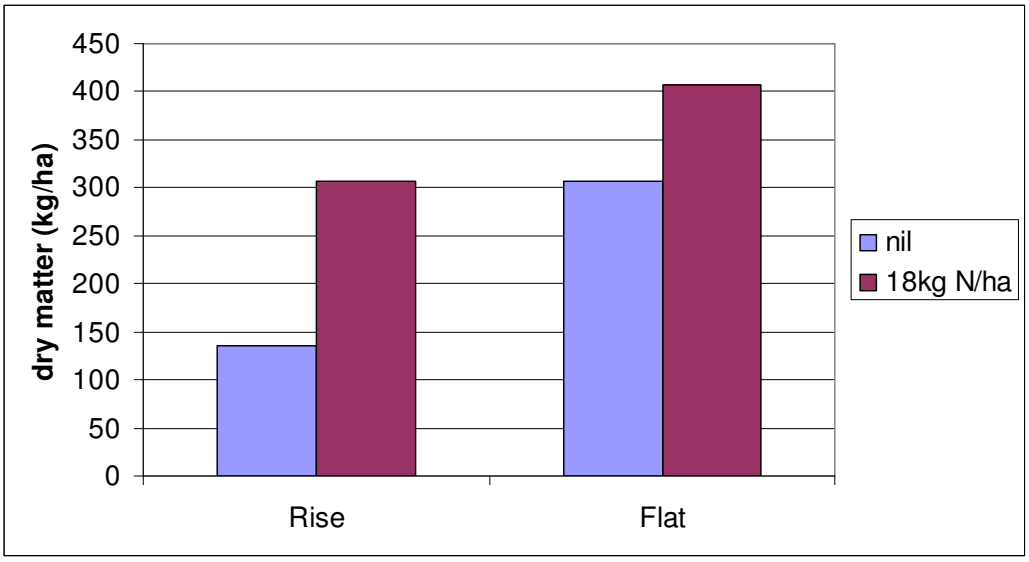

Figure 3. Biomass measurements of the strips in the rise and flat at GS30.

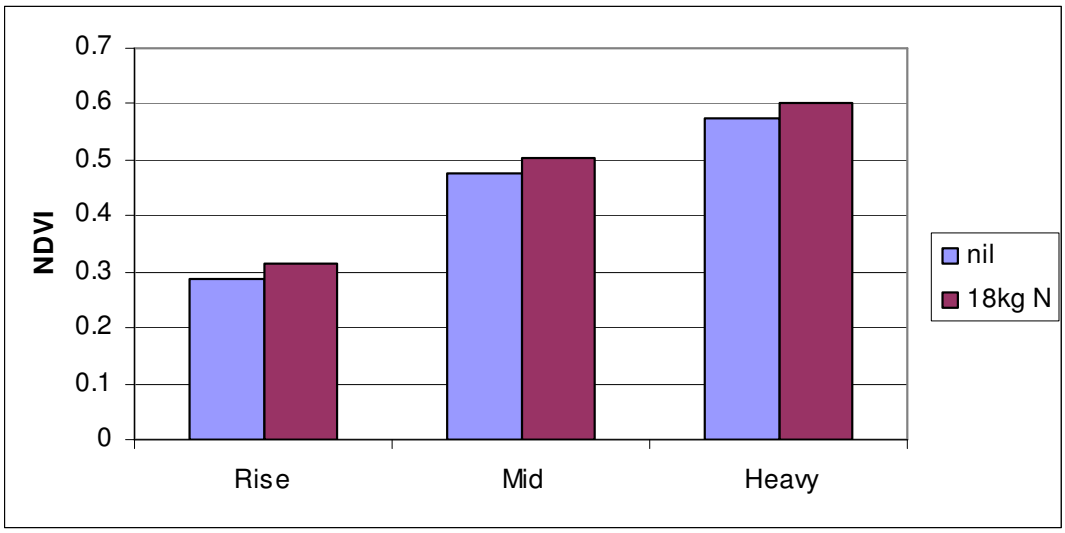

Figure 4. NDVI of the strips in each zone using a hand held GreenSeeker.

In terms of grain yield and crop specs data (Figure 4), there was little differences found between the strips. What was evident in both the yield data and crop specs is that the heavier soil produced more biomass and hence greater yield compared to the lighter soil. The low yielding areas are represented by the red and yellow colours which coincides with the pale blue-white colour in the crop specs data. High yielding areas are reflected by the dark blue in both the yield and crop specs data.

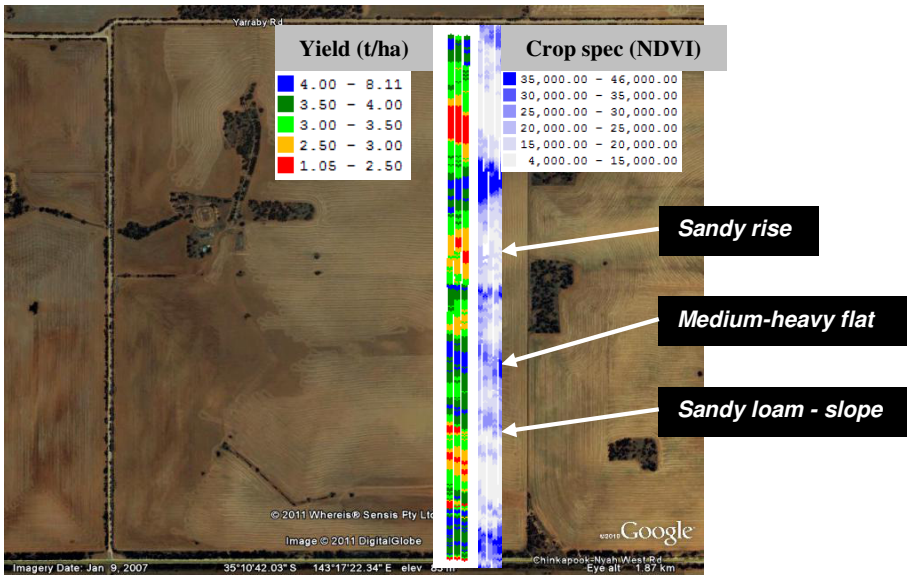

Figure 4. Yield and crop specs (NDVI) data

To illustrate the effect of seasonal conditions on yield outcomes on different soil types, yield from the strips were compared over the 2009 and 2010 seasons against elevation (Figure 5). The figure shows the 2009, a dry finish, yields was the complete opposite to the 2010. For example, the high yielding areas in 2009 was the lighter sandier soil, whereas in 2010 the heavy flats were the more productive.

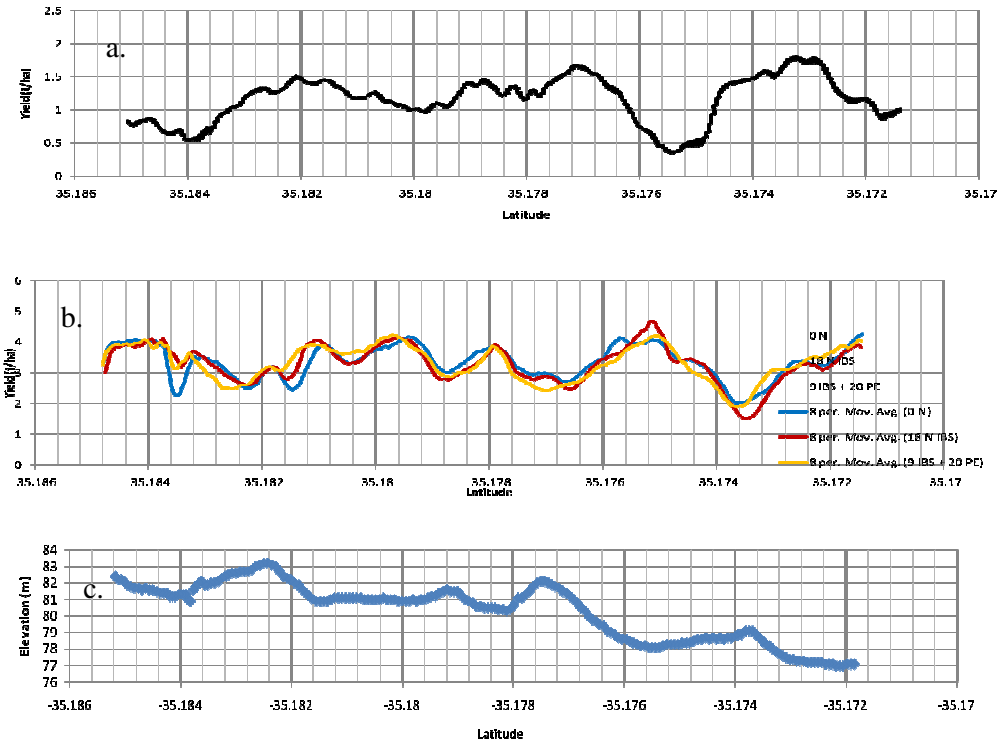

Figure 5. a. 2009 yield data, b. 2010 yield data, c. Elevation

What this trial has now shown is that compiling yield maps over multiple seasons, especially years that differ, will provide a better guide when using other risk management tools such as Yield Prophet®.

Who was involved?

The author would like to thank Roger, Lisa and Brad McQueen for hosting this trial. The yield data was transformed by Sam Trengove (Galaxy Ag & Allan Mayfield Consulting) and Tony Williams (TopCon Pty Ltd) for providing the Crop Specs data.

Trials coordinator: Simon Craig (BCG Research Agronomist)

BCG managed the trial and data collection during the season.

Grower/Regional feedback:
The farmer group are yet to meet to discuss the findings of the trial

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For more information

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