Precision Ag Trials

DEMONSTRATION 1: Assessing the effect of varying P and seeding rate and N rich stripes

Rand, Southern NSW

Aims:

- To compare the effects of variable rate P and seeding rate on the yield of wheat
- To assess if remote sensing using a Crop Circle and/or satellite maps can determine if there are difference between the treatments.
- To assess if N rich stripes and remote sensing using NDVI and satellite map can be used as an aid to better assess the requirement for N in crop.

Background:

In 2010 a demonstration was established on "Bogandillon" Rand to examine the effect variable rates of P and differing seeding rates in high P situations and the use of N rich stripes to assess N requirement. The plots on the site were assessed using a Crop Circle to determine NDVI as part of the program but no satellite maps were produced. The site was used as a major demonstration site for precision agriculture (PA) with over 70 farmers attending the main field day. The demonstration was repeated in 2011 to further demonstrate the benefits of precision agriculture and to assess the effect of varying P and seeding rate and N rich stripes. This was because the 2010 plots were flood affected.

About the trial:

Location of trial, "Bogandillon" Rand
Crop variety type, Lincoln Wheat
Equipment used. Janke 12.3 metre tyne airseeder (300 mm rows) equipped with Janke press wheels. Goldacre 24.6 metre boomspray. Lely Spreader with actuator spreading on 37 metres centres. Auto Farm 2 cm guidance in the sowing, spraying and spreading tractors.

Sketch of trial design

	1	2	3	4	5	6	7	8
Sowing Treatment	70 kg/ha Seed*	35 kg/ha Seed*	50 kg/ha Seed*	0 kg/ha MAP (0 P)**	30 kg/ha MAP (6.5 P)	50 kg/ha MAP (13 P)	75 kg/ha of MAP (15 P)**	100 kg/ha MAP (21 P)
Zone 1								
N Rich Strip[1]								
Zones 1 into 2								
N Rich Strip[2]								
Zone 2								

*- P applied at sowing as 50 kg/ha of MAP at sowing. **- Seeding rate 70 kg/ha.

Plot Size – 36 x 800 metres

Sowing Date – 12th May 2011
Herbicides – Glyphosate and Trifluralin applied to all plots.
Comment – Some stubble movements due to the flooding in 2010.

What and when treatments were applied and what layers of spatial data were utilised.
- P (0,30,50,75 and 100 kg/ha as MAP) applied at sowing
- Differing seeding rates (35,50,70) applied at sowing
- N rich stripes applies about 5 leaf stage (growth stage Z15) about 5 weeks prior to the time when NDVI and Satellite maps could be used to better assess optimum N. Most N was to be applied at growth stage Z31.

Assessments:
- Plant counts,
- Tiller counts,
- Head counts,
- DSN
- Soil analysis: Soil analysis was completed on the zone in the paddock prior to establishing the demonstration.

In 2012 each treatment will be separately soil tested. Results show the site had very high P (average 83 mg/kg) and low to moderate N.
- Yield: Determined from the yield map on the header

Results:

Table 1
Results of the NDVI Test at the Rand Demonstration Site – July 2010

Treatment	NDVI
1. 35/11/0	0.3
35/11/40 (N rich strip[1])	0.4
2. 70/11/0	0.7
70/15/40 (N rich strip[1])	0.7+

1 – N rich strip – Strip of 50 kg/ha of urea applied in early June (3 leaf stage). See notes in Nitrogen Application below. NDVI calculated as an average of 10 individual measurements taken from the each plot from the N rich strip and the treatment area to the south of the N rich strip.

Table 2
Results of the Assessments and Yield

Treatment	Plants (pl/m2)	Tillers (tiller/m2)	Grain/head	Yield (t/ha)
Seed 70 kg/ha MAP 50kg/ha	124	447	38	3.1
Seed 35kg/ha Map 50 kg/ha	65	321	56	3.2
Seed 50 kg/ha Map 50kg/ha	74	422	44	3.1
Seed 70kg/ha Map 0kg/ha	117	265	66	2.9
Seed 70kg/ha Map 30kg/ha	131	463	42	2.9

Seed 70kg/ha Map 50kg/ha	128	455	40	2.9
Seed 70kg Map 75kg	119	466	36	2.9
Seed 70kg Map 100kg	133	421	42	2.9

Table 2
Grain Quality Results

Treatment	Moisture	Protein	C/W kg/hl	Screening
Seed 70 kg/ha MAP 50kg/ha	9.1	10.4	80	1.2
Seed 35kg/ha Map 50 kg/ha	8.9	11.2	80	1.5
Seed 50 kg/ha Map 50kg/ha	9	11.1	81	1.5
Seed 70kg/ha Map 0kg/ha	8.9	10.9	80	2.9
Seed 70kg/ha Map 30kg/ha	8.9	11.1	80	3
Seed 70kg/ha Map 50kg/ha	9	11.1	80	2.6
Seed 70kg Map 75kg	9	11.1	80	2.8
Seed 70kg Map 100kg	9	11.4	81	2.6

There was a visual response to P applied at sowing and up until after Z31. This did not translate into yield at harvest. There was an inital response to varying seeding rate but this was not obvious at Z31 and did not translate into a yield response. The results may have been a reflection of the dry spring and the time of application. The addition of P therefore resulted in the loss of money.

There was no visual response to applying N in the N rich strip in either zone. DSN results and yield targets assessed using weather prediction and the French and Schultz model were therefore used to determine a single rate of N for all plots in both zones of 3.5 t/ha. The harvest results showed no response in the N rich strip but as these were only 80 metres wide and had additional N at Z31, the result may not be a reliable guide to whether there was a response at the site. There was no response to N at harvest.

Overall the yield was disappointing and well below the target and the quality was also below the target.

Who was involved:

Property owner: Roy and Leanne Hamilton
People and or businesses involved in data collection/ analysis/ services:
Riverine Plains Inc, Jason Collier of Rand Fertilizers Limited, Peter Baines of P Baines Agronomy, Paul Ianson, John Sykes of John Sykes Rural Consulting.

Trials coordinator: John Sykes and Jan Davis
FSG contact: Leighton Wilksch

Crop walk at Rand, inspecting trials of variable rates of P and seeding.
- 26th August 2011

Grower/Regional feedback:

Up to 15 farmers associated with the group are intending to use PA to better assess the need for gypsum and lime application on paddocks. This will involve EM Surveying, zoning the paddocks and soil testing in zones prior to making individual zonal recommendations for lime and gypsum.

Up to 12 farmers in the group have yield maps that will be processed in 2012 and about 3 of these intend to try at least 1 paddock with variable rate P or N.

Cooperators and associated growers were disappointed that the promised satellite map of the demonstrations sites were not made available. Riverine Plains Inc is now making efforts to get these images for discussion groups meetings to be held in autumn 2012. However, up to 4 are still interested in trying satellite maps and N rich stripes (in addition to DSN testing in zones) as an additional aid to better determine N requirement.

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For more information

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