Figure 1: Layout of the sampling locations on paddock Chris and Dayswell at Brian McAlpine's farm. Also shown is a soil map used for management zones.

COMMENTS

- Yield differences between soil types were less than seen in previous seasons on this paddock, although they did yield in expected order. At high N the red clay yielded about 3.5 t/ha, while the "good" and "medium" sands yielded 3 t/ha, the gravel yielded 2.7 t/ha, while the "poor" sand yielded 2.1 t/ha. Lack of difference was probably due to the season ending better than average.
- Starting soil nitrogen levels were quite high (> 100 kgN/ha) due to previous crop history.
- Yield responded best to an extra 21 kg/ha N at sowing on the good (+0.6 t/ha) and medium (+0.4 t/ha) sands. These responses are equivalent to 20-30 kg grain per kg N applied. Responses were non-existent on the gravel and poor sand due to high starting soil N relative to a limited plant available water capacity for these two soils.. Follow up modeling analysis will attempt to confirm this.
- The decision to not apply extra N to the red clay soil as indicated by Yield Prophet was warranted as this soil type did not respond to extra N due to its high starting soil N (250 kgN/ha).
- Protein levels were low. Protein only responded (about 1% increase) to more N on the two poorer soils, the gravel and poor sand.
- Overall with the better responses to applied N being achieved on the better soils or where there was plenty of starting soil nitrogen, this experiment has given encouragement to the idea of managing soil types (or management zones) differentially for N. As the response will differ with each season, tools such as Yield Prophet allow one to "play the season" in terms of N application strategies.

ACKNOWLEDGEMENTS

Brian McAlpine, Brianna Peake with assistance with Yield Prophet simulations, CBH for grain analysis, GRDC for funding through the SIP09 Precision Agriculture Initiative.

WHEAT YIELD AND QUALITY IN WESTERN AUSTRALIAN SANDPLAIN FARMING SYSTEMS

Steve Milroy and Kelley Whisson, CSIRO

CSIRO PLANT INDUSTRY

AIM

The aim of the research is to explore the yield potential for wheat in the northern sandplain region and to identify the main constraints to achieving this potential.

BACKGROUND

Our aim is to examine the potential crop yields in the northern sandplain region and to identify means of overcoming the biophysical constraints to production and quality. The focus is primarily on wheat but there is also interest in examining the performance of lupins and canola given their importance in the farming system. There is some concern regarding the potential rates of deep drainage and nutrient leaching on the sandy soils of the area. This will be assessed in parallel with yield and quality.

TRIAL DETAILS

Property	Stuart McAlpine, Liebe Long Term Research Site Buntine-Marchargee Rd, Buntine
Plot size & replication	Mainplots (for crop species) 40m x 10m Sub-plots (for nitrogen rates) 40m x 2.5m

	Sub-sub-plots (Nx Ripping) 20m x 2.5m	
	Randomised complete block with 4 replicates	
Soil type	Eradu yellow sand	
Sowing date	7th June 2005	
Seeding rate	90 kg/ha Wyalkatchem	
Fertiliser (kg/ha)	Super CZM 100 kg/ha at sowing	
	Treatment N broadcast post sowing	
Paddock rotation	As per treatment	
Herbicides	Roundup PowerMax	3 L/ha
	Trifluralin	1.5 L/ha
	Topik	185 mL/ha
Growing Season Rainfall	173mm (7th June-November)	

TREATMENTS

In 2005 the Buntine site was primarily in the rotation phase, with five species being grown as pre-treatments to wheat. The treatments with wheat present this year provided the following contrasts: 4 nitrogen rates with and without deep ripping in 2004 and wheat after canola versus wheat after wheat.

RESULTS

Table 1: The response of wheat yield (t/ha) to nitrogen was greater without ripping because the low nitrogen treatments did poorly.

	Un-ripped	**Ripped**	**Average**
N = 0 kg/ha	1.36	1.74	1.55
N = 40 kg/ha	2.24	2.47	2.35
N = 80 kg/ha	2.46	2.73	2.60
N = 120 kg/ha	2.71	2.92	2.82
LSD 5% for comparing individual values (only) = 0.34			
LSD 5% for comparing the averages (only) = 0.08			

Table 2: Wheat yield (t/ha) responded to the canola rotation with or without ripping.

Rotation	**Un-ripped**	**Ripped**	**Average**
Wheat	2.00	2.02	2.01
Canola	2.38	2.91	2.65
LSD 5% for comparing individual values (only) = 0.37			
LSD 5% for comparing the averages (only) = 0.33			

COMMENTS

- Despite the late sowing, wheat yields were reasonable. The highest wheat yield was for wheat after canola with ripping. With 80 kg/ha of nitrogen, this was 3.1 t/ha.
- The benefit of ripping had decreased markedly from the previous season.
- The canola rotation increased wheat yield by about 0.5 t/ha. It was greater with ripping.
- The main conclusion from this experiment is that on this soil type, potential yields can be obtained with management tools already available to growers.

ACKNOWLEDGEMENTS

Thanks to Stuart McAlpine and the staff of the Liebe Group. Thanks to Shayne Micin and Phil Ward for assistance with instrumentation. This project is funded by the GRDC.