

Wheat Yield and Quality in Western Australian Sandplain Farming Systems

Aim: To examine the potential for crop yield in the northern sandplain systems and explore practices that will allow the potential to be approached.

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Location: Liebe Long Term Research Site, Buntine-Marchagee Rd



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: The 2004 season was the first in which the experiment had wheat grown after the various rotation crops: canola, lupin, serradella and wheat. A ripping treatment was also imposed and the nitrogen fertiliser treatments maintained from the previous season.

Treatments:

Rotation (2003) canola, lupin, serradella, wheat

Nitrogen 0, 40, 80, 120 kg/ha

Ripping None or after sowing

Plot size and replication	Mainplots (for crop species) 40m*10m Sub-plots (for nitrogen rates) 40m*2.5m Sub-sub-plots (N*ripping) 20m*2.5m Randomised complete block with 4 replicates.
Soil type	Deep yellow sand
Sowing date	1 st June 2004
Conditions at sowing	Good
Machinery	Minimum tillage
Seeding rate	Wheat = 70 kg/ha
Fertiliser	Super CZM 100 kg/ha at sowing Treatment N broadcast post sowing
Herbicides and Insecticides	Sprayseed, Trifluralin, Monza, Giant, Chlorpyrifos
Paddock History	2003 = Rotations, 2002 = Wheat, 2001= Wheat

Results: The results presented here focus on wheat yield. The legume rotations had a particularly large impact on wheat yield. The benefit averaged 1 t/ha and was slightly larger at low N applications than at high. The wheat after wheat treatment yielded 2.04 t/ha with 120 kg/ha of applied N. However, the wheat/legume treatments responded to applied N to produce yields of 3.14 and 3.31 t/ha with 120 kg of applied N.

The effect of ripping was slightly higher at low N rates than at high. It was also higher for wheat grown after the legumes than after wheat or canola. On average the increase in yield was 0.55 t/ha for wheat after legumes

but only 0.15 t/ha for wheat after wheat. This difference may have been due to ripping allowing a more rapid break down of the legume residues, providing more N.

At the N application rate of 80 kg/ha, the combined effect of rotation and ripping provided a yield benefit of about 1.4 t/ha; with an increase from 1.74 to 3.14 t/ha.

Wheat grain yields in 2004.

Rotation Crop 2003	Ripping	Fertilizer Nitrogen Applied			
		0 kg/ha	40 kg/ha	80 kg/ha	120 kg/ha
Wheat	Non-ripped	0.54	1.38	1.74	2.04
	Ripped	0.70	1.54	2.04	2.04
Lupin	Non-ripped	1.68	2.10	2.53	2.70
	Ripped	2.21	2.65	3.10	3.14
Serradella	Non-ripped	1.48	2.11	2.51	2.88
	Ripped	2.25	2.65	3.14	3.31

There was little effect on grain size or screenings due to yield increases from N application, ripping or rotation. Screenings were always below 2% and were highest and most variable with yields less than 2.5 t/ha. Wyalkatchem has previously been reported as having a relatively stable grain size.

These results look very promising but further analysis is needed and they will need to be confirmed in the next cycle of the experiment. Grain protein concentrations, as well as leaching and drainage results, are still being analysed.

Summary:

- The legume rotations increased wheat yields in the following crop by 1 t/ha.
- Ripping gave a higher benefit after the legume rotations than non-legume rotations.
- No significant adverse effect on screenings was detected in the higher yielding treatments.

Technically reviewed by: Fulco Ludwig (CSIRO)