Nitrogen fertilisation: an option in stubble retained fallow systems of the Victorian Wimmera

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Compared to a bare fallow, the retention of stubble generally increases the accumulation of water to a depth of 2 m by about 20 mm on Wimmera clay soils (1). Previous findings have indicated that this additional water is likely to be reflected in an increase in crop yields only if adequate mineral nitrogen is available. A long-term experiment was therefore initiated in 1984 to investigate the effects of applying nitrogen to crops grown on stubble retained fallows. The experiment has now completed five fallow/crop sequences.

Methods

Chemically prepared and blade ploughed fallows with retained stubbles and a conventionally cultivated bare fallow were sown to wheat and the effect of up to 60 kg/ha nitrogen applied at sowing and tillering was investigated.

Results and discussion

In 1988 nitrogen fertilisation increased yield by 21% (0.75 t/ha) to 4.25 t/ha on a chemical fallow compared to 10% (0.40 t/ha) to 4.44 t/ha in 1987 (Table 1). In both years, nitrogen had no effect on conventional fallow. All fallow treatments appeared to he nitrogen deficient in 1986 and responded to applied nitrogen. There was no response to nitrogen in 1984 or 1985 where all the nitrogen was applied at sowing (1).

Table 1. Soil water and mineral nitrogen (0-1 m) at sowing and yield on each fallow. Rate of applied nitrogen (N) is kg/ha over two applications. Wheat cultivar is Matong.

Fallow	Soil water (mm)	Nitrogen (kg/ha)	Yield (t/ha) 0 N	40 N	Fallow	LSD (P < 0.10)	
1987 Chemical	478	141	4.04	4.44	3.88	Fallow:	0.42
Blade	455	130	3.35	3.75	3.55	N:	0.18
Conventional	449	139	3.74	3.74	3.74	F*N:	0.46
Mean N			3.71	3.98		Between F:	0.34
LSD (P < 0.05)	13	24					
1988 Chemical	*	*	3.52	4.25	3.88	Fallow:	0.25
Blade			3.71	3.98	3.84	N:	0.26
Conventional			3.81	3.63	3.72	F*N:	0.40
Mean N			3.68	3.95		Between F:	0.46

*Soil water and nitrogen data analysis for 1988 not completed

In the Victorian Wimmera, response to nitrogen fertilisation of wheat has previously been shown to he variable and dependent upon favourable weather conditions, and therefore the practice has not been recommended. Reduced tillage systems, by increasing available soil water may, however, offer more frequent and more predictable responses to nitrogen. Measurement by farmers or technical consultants should therefore enable the appropriate management decisions to be made to capitalise on the additional soil water often made available through stubble retention on long fallows.

1. O'Leary, G. J. (1987). Proc. 4th Agron. Conf., Melbourne, p. 279.