Tactical application of nitrogen fertilizer to wheat

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Several extensive research programs on nitrogen fertilization of wheat conducted in south-eastern Australia about 15 years ago showed low or at best variable yield responses. Fundamental changes in the wheat industry suggest that these conclusions need reassessment: semi-dwarfs appear more nitrogen-responsive than older varieties . the large increases in area sown to crop presumably means less input of biological nitrogen from pastures; the other benefits of pastures, improved soil structure and crop hygeine, may become less important with the spread of direct drilling and rotation crops the grain/nitrogen price ratio has increased

There remains the problem of variable responses in different seasons, with large responses in favourable seasons, and zero or even negative responses in droughts. One possibility for maximizing nitrogen response is to apply fertilizer several months after sowing and then only to crops of low nitrogen status and only at a time of adequate soil water.

Methods

Nitram was applied to Egret wheat from the second to the fourth year of the cropping cycle on a red earth at Jugiong in the south-west slopes of NSW. The fertilizer treatments were on split plots of a cultivation experiment.

Results and Discussion

A selection of the results are shown as the mean of five cultivation treatments. Standard errors are in brackets. There were no significant interactions between nitrogen response and method of cultivation. The time of application was at the terminal spikelet stage, except for one of the 1983 treatments when the fertilizer was that applied at the time of sowing in 1982, and had not been taken up by the 1982 crop.

The excellent recoveries of nitrogen and yield responses in the favourable seasons suggest that a system of delayed, tactical application of nitrogen fertilizer may have a place in some wheat-growing systems. The carry-over of nitrogen from 1982 to the 1983 crop indicates that the financial losses from applying fertilizer in a drought may be partly recovered from a later crop. A model of phasic development, and the water and nitrogen balance is being formulated to define the conditions for payable responses.

Year	Estimated crop ET	Treatment	Grain yield (t/ha)	Total N uptake (kg/ha)	kg grain/ kg N applied
1981	405	Control	3.1	61	
		75 kg/ha N (18 Aug)	4.5(0.1)	109(3.2)	20
1982	136	Control	1.0	32	
		50 kg/ha N (20 Sep)	1.0(0.1)	35(2.5)	0
1983	566	Control	4.6	76	
		50 kg/ha N (9 Aug)	6.3(0.2)	115(4.1)	35
		50 kg/ha N 1982	6.0	107	29