

## The fertilizer requirements of continuous wheat

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The decrease in the profitability of wool in the late 1960's focussed attention on the vulnerability of systems which depended overwhelmingly on wool production. Diversification by inclusion of cropping is an obvious remedy, but its application on some properties is severely limited by topography. In some cases these limitations may be such that to make an appreciable impact on the whole system, suitable areas might have to be heavily, perhaps continuously, cropped. The experiment described here was done to explore the feasibility and fertilizer requirements of continuous wheat cropping in the Southern Tablelands.

Treatments consisted of the factorial combinations of 5 N levels (0,33.5,67, 100.5 & 134 kg N/ha  $\text{NO}_3^-$  respectively) and 3 P levels (0,15.5 & 31 kg P/ha  $\text{PO}_4^{3-}$  respectively) replicated in time and space (2 blocks, each comprising the above treatments were commenced in 1969, 1970 & 1971; in this way it was possible to compare, for example, 1st, 2nd and 3rd wheat crops given the same fertilizer treatment in the same climatic environment). The experiment was done on a red earth at Ginninderra, A.C.T.; the site had been pasture (sub clover) for many years, and had had about 1200 kg/ha superphosphate over the years previously.

Yields and responses to fertilizer were strongly influenced by rainfall. In 1972, which was very dry, responses were negligible, but in the following year some treatments were over 5.5 t/ha. The main effects of treatments on yields in two years are given in Table 1.

**Table 1. Grain yields, t/ha.**

Years in crop	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	* N <sub>0</sub>	N <sub>1</sub>	N <sub>2</sub>	N <sub>3</sub>	N <sub>4</sub>	Cultivar
1 } 1971	0.85	1.95	2.01	2.00	2.01	1.95	1.95	1.98	Robin
2 }	0.71	1.81	1.81	1.61	1.93	1.93	1.88	1.70	Robin
3 }	0.91	1.90	1.92	1.67	1.91	2.04	2.01	1.93	Robin
4 } 1974	1.92	4.05	4.34	3.92	4.19	4.26	4.47	4.16	Pitic
5 }	1.74	3.79	4.08	3.57	4.11	4.23	4.15	3.63	Pitic
6 }	1.40	3.40	3.57	3.01	3.73	3.42	3.82	3.92	Pitic

\*Nitrogen data are averages over P<sub>1</sub> and P<sub>2</sub>

Yields were usually doubled by application of P at the lower rate; in the absence of P there was no response, or a small negative one, to N. Response to N became apparent in the second crop, but then and thereafter N needs appeared to be largely satisfied by application of N at the lowest rate, and there were often negative responses at the higher rates. In 1974, the sixth crop showed some evidence of decline in yield compared with the fourth and fifth crops: this was associated with an increase in grass weeds in one of the two blocks concerned, yields on the other being comparable with those of the fifth crop. Under these conditions, then, grass weeds appeared to be the main limitation to continuous cropping. Of soil-borne diseases (e.g. 'Take-all'), there was little evidence at any time.