

Zinc affects yield, protein and quality of wheat

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Zinc deficiency occurs in cropping areas of all states of Australia. The frequency and severity of zinc deficiency has increased markedly in the eastern states during this decade. This paper deals with aspects of a large project on diagnosis of the deficiency, yield responses to zinc, residual value of zinc, protein increases and improvement of quality, and genotypic effects in relation to zinc.

Methods. The predominant soil type on which most experiments have been carried out is a black earth with a self-mulching surface at Narrabri, NSW. Zinc (as zinc sulphate hepta hydrate) was applied at rates up to 40 kg/ha. Nitrogen was applied at 30 kg/ha. Wheat cv. Hartog was sown at 30 kg/ha. In some experiments Cu was applied at 5kg/ha.

Results and discussion.

Both yield and the percentage protein in the grain responded to an application of zinc (Table 1). The crop had shown zinc deficiency symptoms throughout tillering and leaf samples confirmed the deficiency. The reduction in yield was largely due to plant mortality and fewer productive tillers per plant. Bread making quality as measured by a mixograph showed that the dough strength of zinc deficient grain was very poor. However, the dough itself mixed very quickly.

Table 1. Yield and protein in wheat

Treatment	Yield (kg/ha)	Protein (%)
+ Zn* + Cu	4430	12.5
+ Zn - Cu	4320	11.1
- Zn + Cu	1890	8.3
- Zn - Cu	1940	7.9

*Zinc applied at 20 kg/ha.

The residual value of the initial application of zinc is at least 2 years: yield responses have occurred in successive seasons. In yield response experiments, responses to zinc have been recorded up 10 kg/ha; at 40 kg/ha, toxicity has been recorded at early tillering but the crop has recovered totally by maturity.