

Boron tolerance of South Australian wheat cultivars

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Boron toxicity has recently been recognized in South Australia (1) with the problem being widespread throughout the cereal growing districts (2). High concentrations of boron occur at depth in the soil profile (1,2,3) and therefore treating the soil is not an economically feasible means of reducing yield losses due to boron toxicity. Rather, cultivars tolerant of boron should be grown in the high boron districts.

A series of field trials was conducted to assess the tolerance to boron for the wheat cultivars currently recommended for commercial cultivation in South Australia.

Methods

Field trials were conducted in 1985-86 and 1986-87 at Two Wells, a site with high concentrations of boron in the subsoil(3). Forty cultivars were sown in 1985-86 and 36 in 1986-87, in replicated trials. Concentrations of boron in the grain were determined for the 1985-86 trial. Grain yields for the two trials were compared with the relative yields for a number of cultivars entered in the 1985 S.A. Dept. of Ag. Secondary Wheat Variety Trials. Yields from 6 sites receiving greater than 400mm rainfall were used for comparison.

Results and Discussion

Significant differences in grain yield and concentration of boron in the grain were found between cultivars when grown at Two Wells. Yields for 6 of the 40 cultivars included in the trials are presented in Table 1. Of interest is the high yield of Halberd and its low concentration of boron in the grain at Two Wells (Table 1). However, when grown at the other sites throughout South Australia, all cultivars but Kite outyielded Halberd. Halberd appears to have an inherent tolerance of boron.

Table 1. Grain yields and boron concentrations, and relative yields for 6 of the cultivars grown at Two Wells.

Cultivar	Grain Yield		S.A. (% Hlbd) 1985-86	Boron Conc
	Two Wells 1985-86	(g/plot) 1986-87		in Grain(µg/g) 1985-86
Halberd	283	320	100	5.84
Spear	234	288	112	7.84
Aroona	211	275	114	7.39
Warigal	207	322	106	9.72
Machete	140	276	106	13.61
Kite	148	245	92	15.96
Site mean	178	271	-	11.30

It is not possible to separate all cultivars into discrete categories with respect to tolerance of boron, however Halberd and Olympic appear to be the most boron tolerant. Spear and Dagger have intermediate tolerance. Aroona, Schomburgk and Warigal have moderate tolerance, while Kite, Sabre, Lance, Vulcan, Cranbrook, Takari and Miling are sensitive to boron.

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2. Cartwright B., Zarcinas B.A. and Spouncer L.R. 1986. Aust. J. Agric. Res. 37 351-59.

3. Cartwright B., Rathjen A.J., Sparrow, D.H.B., Paull J.G. and Zarcinas B.A. 1987. In "Genetic Specificity of Mineral Nutrition in Plants" (Eds.) B.C.Loughman and W.H.Gabelman. Martinus Nijhoff, Dordrecht (in press).