

Aluminium tolerance in triticales

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A number of triticales, cereal ryes, durums, wheats, and wheats containing added pairs of rye chromosomes, have been tested for their tolerance to aluminium in nutrient solution. A sub-irrigated gravel bed technique was used (1) with nutrient solution (2) that was adjusted daily to pH 4.2 and changed twice weekly. Four plants of each line were grown in replicated pots for 4 weeks in solutions containing 0, 5, 10, 15 and 20 ppm aluminium. The plants were then harvested, dried and weighed. The total dry matter of plants in each treatment was compared to the mass of the controls grown in 0 ppm (Fig. 1), and their tolerance to aluminium calculated in terms of their ability to maintain their mass over the range of aluminium concentrations used (Table 1).

Results and Discussion

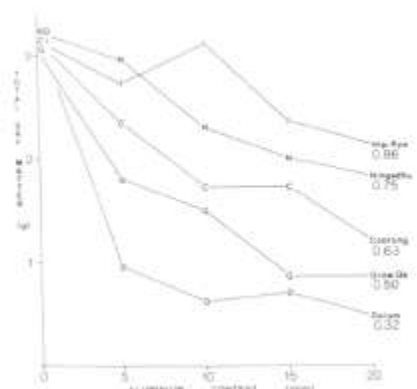


Figure 1. The response of various cultivars to increasing aluminium levels.

Table 1. Aluminium tolerance expressed on a 0 - 1 scale.

Aust. triticales		Wheats	
Tyalla	0.65	Maringa	0.73
Venus	0.63	Chi. Spring (CS)	0.66
Mapache	0.63	Brevor	0.37
Dua	0.53	CS x Imp. Rye	0.77
Satu	0.50		
Other triticales (6)		Rye chromosome add. lines to CS	
0.58 - 0.81		+7R ^{II}	0.70
Durums (3)		+1R ^{II}	0.61
0.27 - 0.32		+6R ^{II}	0.60
Ryes		+3R ^{II}	0.57
S. Australian	0.91	+4R ^{II}	0.57
Petkus	0.91	+2R ^{II}	0.51
Snoopy	0.84	+5R ^{II}	??

The cereal ryes were highly tolerant of aluminium, the durum wheats were highly susceptible and the triticales (produced by hybridizing ryes with durums) ranged between these extremes. From personal observations, it would appear that there is a fairly high correlation between these glasshouse results and the field tolerance of triticales grown in acid soils with high levels of aluminium.

Further, the tolerance of triticales to aluminium is probably conferred by the rye genome. However, of the 6 disomic rye chromosome addition lines screened (the 5R addition was not then available), none was appreciably better than the Chinese Spring wheat to which they were added : nor were they as tolerant as the CS x Imperial Rye octoploid triticales. Consequently, tolerance may be conferred by the presence of 5R alone or by a combination of two or more rye chromosomes.

1. Andrew, C.S. 1974. Lab. Pract. 23: 20-21.

2. Hutton, E.M., Williams, W.T., and Andrew, C.S. 1978. Aust. J. Ag. Res. 29: 67-79.