Tolerance of barley genotypes to manganese-deficient calcareous soil on Eyre Peninsula

R.D. Graham[a], *W.J.* Davies[b] and D.H.B. Sparrow[a]

[a] Department of Agronomy , Waite Agricultural Research Institute, Glen Osmond 5064
[b]Department of Agriculture, Port Lincoln 5606

One hundred barley lines from a world collection were grown in plant breeders' plots (4 rows x 5 m) on a severely manganese-deficient soil at Wangary, Eyre Peninsula, S.A. The soil is derived from porous sand-sized shell-fragments of marine origin (80-90% $CaCO_3$). The experimental design contained check-plots of Weeah barley every fourth plot and entries were located at random in each of two parallel blocks.

Only 10% of the lines showed good tolerance of manganese-deficient conditions, which were severe enough to kill many of the entries in the tillering stage. Extreme sensitivity to manganese deficiency was shown by all progeny of CI3576, an introduction from Egypt, which has conferred considerable yield advantage and disease resistance on its progeny under more highly fertile conditions. In all, there were 20 lines from CI3576, including Corvette, and Galleon, a newly released high-yielding feed barley. At present, Galleon is not recommended for calcareous sands, pending further agronomic work on its manganese fertilizer requirements. The established variety Clipper and its relatives, and Forrest, were also sensitive to manganese deficiency.

The tolerant lines fell into three genetically related groups, all of which had pedigrees going back to traditional English land races or their derivatives (shown in brackets) as follows:

The derivation of tolerance from old English lines is most interesting since the South-eastern third of England is formed on Cretaceous marine limestone on which manganese deficiency is well known, especially in Cambridgeshire and around the Fens. This then appears to be the origin of the considerable tolerance to this soil condition which we have demonstrated in Weeah and Dampier.

Barleys Tolerant of Manganese Deficiency

1. 76T006-1←Dampier, Weeah←Research←Resibee
   ↑
   (Plumage-Archer)→Maltworthy
2. Duckbill←(Spratt)
3. W12598←Golden Promise←Maythorpe←(Goldthorpe)

"Assessing the Need for Change". Edited by MJT Norman. Proceedings of the 2nd Australian Agronomy Conference, 1982, Riverina College of Advanced Education, Wagga Wagga, New South Wales