

Motivation for using 1M KCl exchangeable Al in New Zealand

Dr Hendrik Venter¹

¹*Analytical Research Laboratories*

Aluminium toxicity is the primary yield limiting factor for acid soils, affecting crop production in large areas of the world and over a diverse range of climates. Managing aluminium levels requires appropriate methods of measurement and interpretation.

Two measurement methods dominate viz., dilute CaCl₂ extractable aluminium designed to mimic Al in the soil solution, and 1M KCl exchangeable aluminium. Dilute CaCl₂ extracts only a fraction of Al compared to 1M KCl and consequently dual interpretation guidelines have been developed for the two methods.

Exchangeable Al are expressed as Al saturation percentage based on ECEC while absolute threshold values are used for CaCl₂ Al, being 3 mg/kg Al in New Zealand for extraction with 0.02 M CaCl₂.

CaCl₂ extractable Al are affected by changes in ionic strength of the soil solution and therefore fertiliser history whereas with 1M KCl the effect of salts present are swamped, resulting in a less arbitrary measure of Al. A typical detection limit for Al is 0.5 mg/kg, while for 0.02 M CaCl₂ extractable Al the uncertainty of measurement is $\pm 16\%$ compared to $\pm 4.7\%$ for exchangeable Al. The large uncertainty of measurement and small numeric threshold is probably responsible for lack of crop response curves while crop responses against exchangeable Al % or exchangeable acidity % are well documented.

Data from ARL, for New Zealand and Australia, and data from South Africa are used to motivate the use of Al saturation % as a complimentary measure for soil Al in New Zealand.