



Low molecular weight organic acids, soil microbial communities and mineral weathering in a temperate Australian forest soil

D. Little (1,2), S. Welch (1,3), J. Field (1,2), S. Rogers (1)

(1) Cooperative Research Centre for Landscape Environments and Mineral Exploration (CRC LEME), Australia

(2) School of Resources Environment and Society, Australian National University, Canberra, Australian Capital Territory, Australia

(3) Department of Earth and Marine Sciences, Australian National University, Australian Capital Territory, Australia

(david.little@anu.edu.au, david_a_little@hotmail.com / Fax: +61 2 6125 0746 / Phone: +61 2 6125 2745)

Detailed examination of soil biogeochemistry was undertaken using rhizosphere and non-rhizosphere soil beneath juxtaposed *Eucalyptus mannifera* and *Acacia falciformis* at Mulloon Creek, on the Southern Tablelands of New South Wales, Australia. A series of experiments used samples from the A₁ and B₂ soil horizons beneath the cohabiting trees: firstly to examine the water extractable low molecular weight carboxylic acid (LMWCA) composition; secondly to examine the influence of selected LWM-CAs on metal solubilisation; thirdly to examine the potential associations between the LMWCAs and soil bacterial and fungal communities; and finally to examine the distribution of metal elements for the bio-available and exchangeable, acid digestible as well as bulk soil fractions in rhizosphere and non-rhizosphere soils. Results indicate low molecular weight carboxylic acids potentially in root exudates in these soils, especially citric and oxalic acids, are clearly able to affect metal mobilisation and mineral weathering soils directly through ligand exchange or sorption processes. Nevertheless they are at least equally as likely to be utilised by the resident soil microbial communities (SMC) and therefore be indirectly involved in microbial weathering processes in these soils. The results of this research indicate that root exudates such as LMWCAs

are important in soil weathering regardless of whether they interact directly with soil minerals, or indirectly through utilisation by resident SMCs.