

# INFLUENCE OF SOIL Cd LEVELS ON ROOT EXUDATE SECRETION IN CHICORY AND PLANTAIN

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Cadmium (Cd) is a key environmental contaminant associated with long term high application rates of superphosphate fertilizer to New Zealand agricultural soils. Recent studies indicate that elevated levels of Cd in New Zealand soils can lead to high Cd accumulation in forage species such as chicory and plantain. These studies suggest the different abilities of pastoral species to absorb Cd by roots and to translocate it from root to shoot. Plant roots exude Low Molecular Weight Organic Acids (LMWOAs) into rhizosphere which are important to enhance Cd mobility in soil. Therefore, a glasshouse experiment was carried out to evaluate the influence of soil Cd levels on root exudate secretion in chicory and plantain. Germinated seedlings were grown in a rhizo-column under increasing Cd levels: 0 (Control), 0.4, 0.8 and 1.6 mg Cd/kg soil for 8 weeks. At harvest, root exudates were collected from plants separately and LMWOAs determined using High Performance Liquid Chromatography. The results showed that oxalic, fumaric, malic and acetic acids in chicory, and oxalic, fumaric and malic acids in plantain were the major LMWOAs in all treatment root exudates. There was no significant difference in fumaric acid secretion in chicory up to 0.8 mg Cd/kg, and then significantly ( $P < 0.05$ ,  $n=3$ ) increased by 141% at 1.6 mg Cd/kg compared to the control. The acetic and oxalic acids concentration in chicory did not significantly vary among the Cd treatments. Malic acid in chicory, and fumaric and malic acid concentrations in plantain did not show any definite trend with increasing levels of Cd. Further, there were no significant differences in oxalic acid secretion in plantain with increasing soil Cd levels, only 21% increase of oxalic acid observed at 1.6 mg Cd/kg compared to control. Therefore, this study highlights that elevated Cd concentrations in soil (i.e. 1.6 mg Cd/kg) modify the root LMWOAs secretion, especially in chicory, which may influence plant Cd uptake.

**Editor's Note:** An extended manuscript has not been submitted for this presentation.