Cadmium leaching in New Zealand agricultural soils

Mahdiyeh Salmanzadeh[1], Professor Louis Schipper[1], Dr Megan Balks[1], Dr Adam Hartland[1], Dr Paul Mudge[2]
[1]The University of Waikato, [2]Landcare Research

Cadmium (Cd) is a biotoxic metal which has increased in New Zealand agricultural soils due to phosphate fertilizer application. It is not clear whether Cd is moving through the soil depth. Understanding Cd losses from soil is important because of potential for leaching through the soil profile to groundwater or uptake by plants and animals. The concentration and distribution of Cd in irrigated and unirrigated soils that had received the same phosphate fertiliser history were investigated. Pairs of soil samples from 4 depths (0-10, 10-20, 20-30 and 30-40 cm) were taken from irrigated and unirrigated areas in the same paddock on 22 dairy farms in Canterbury, Manawatu and the Bay of Plenty. The mean concentration of Cd in topsoil (0-10 cm) as well as the total mass of Cd (0-40 cm) in unirrigated soils were higher ($P < 0.05$) than irrigated soils. The difference in Cd concentration between the irrigated and unirrigated topsoils was less than 0.1 mg kg-1 in about 82% of samples and about 5% of added Cd was removed from the topsoil due to irrigation. Thus, the results indicated that Cd was strongly adsorbed to the topsoil and was not significantly mobilized by irrigation and evidence for movement of Cd with drainage to lower soil horizons and groundwater is very limited.