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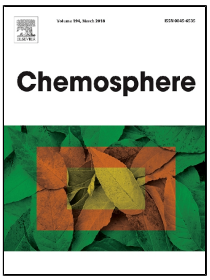

Lithium as an emerging environmental contaminant: mobility in the soil-plant system

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Lithium as an emerging environmental contaminant: mobility in the soil-plant system

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Abstract

Contamination of soil with lithium (Li) is likely to increase due to its wider dispersal in the environment, associated in particular, with the disposal of the now ubiquitous Li-ion batteries. There is, however, a paucity of information on the behaviour of Li in the soil-plant system. We measured the sorption of added Li to soil, and uptake of Li by food and fodder species. Around New Zealand, soil concentrations were shown to range from 0.08 mg/kg to 92 mg/kg, and to be positively correlated with clay content. Most geogenic Li in soil is insoluble and hence unavailable to plants but, when Li^+ is added to soil, there is only limited sorption of Li. We found that Li sorption increased with increasing soil pH, and decreased proportionately with increasing Li concentrations. Compared to other cations in soil, Li is mobile and may leach into receiving waters, be taken up by plants, or have other biological impacts. In a soil spiked with just 5 mg/kg, plants took up several hundred mg/kg Li into leaves with no reduction in biomass. Lithium appears to be a phloem immobile element, with the highest concentrations occurring in the older leaves and the lowest concentrations