

Accepted Manuscript

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

Brett H. Robinson, Rohith Yalamanchali, René Reiser, Nicholas M. Dickinson



PII: S0045-6535(18)30012-2

DOI: 10.1016/j.chemosphere.2018.01.012

Reference: CHEM 20593

To appear in: *Chemosphere*

Received Date: 15 November 2017

Revised Date: 02 January 2018

Accepted Date: 04 January 2018

Please cite this article as: Brett H. Robinson, Rohith Yalamanchali, René Reiser, Nicholas M. Dickinson, Lithium as an emerging environmental contaminant: mobility in the soil-plant system, *Chemosphere* (2018), doi: 10.1016/j.chemosphere.2018.01.012

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

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

3

4 Brett H. Robinson^{1*}, Rohith Yalamanchali², René Reiser³, Nicholas M. Dickinson²

5

6 ¹School of Physical and Chemical Sciences, University of Canterbury, New Zealand

7 ²Faculty of Agriculture and Life Sciences, Lincoln University, New Zealand

8 ³Agroscope Reckenholz-Tänikon ART, Switzerland

9 *corresponding author: brett.robinson@canterbury.ac.nz

10

11 **Abstract**

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

Download English Version:

<https://daneshyari.com/en/article/8852192>

Download Persian Version:

<https://daneshyari.com/article/8852192>

[Daneshyari.com](https://daneshyari.com)