Geophysical Research Abstracts, Vol. 9, 02553, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-02553

The effects of carboxymethylcellulose on selenium speciation in soil and selenium uptake by plants

1 B. Pezzarossa (1), G. Petruzzelli (1), F. Malorgio (2), T. Ferri (3)

(1) CNR, Istituto per lo Studio degli Ecosistemi, Sede di Pisa, Via Moruzzi 1, 56124 Pisa, Italy, (2) Dipartimento di Biologia delle Piante Agrarie, Università di Pisa, Italy, (3) Dipartimento di Chimica, Università "La Sapienza", Roma, Italy

(beatrice.pezzarossa@ise.cnr.it)

Several organic compounds of high molecular weight present in soil interact with selenium and may act as active binding agents affecting its availability in soil, and, consequently, selenium uptake by plants. This study is aimed at an investigation of the effects of the polysaccharide carboxymethylcellulose (CMC) on selenium speciation in soil and on selenium absorption by *Lactuca sativa* L. plants. The selenium speciation carried out in soil after plant harvesting may provide information about the possibility that CMC affects selenium availability in soil if the growth substrate is reused for subsequent growth cycles. *Lactuca sativa*, a secondary Se accumulating plant, was chosen as target plant, and CMC was selected as polysaccharide in consideration of its quite high water solubility. Selenium was added either as selenite or selenate to investigate their different availability.

Three-week-old seedlings were transplanted into pots filled with soil, and sodium selenite at rates of 1.5 and 5 mg Se kg^{-1} of soil, or sodium selenate at a rate of 1.5 mg Se kg^{-1} of soil were applied. Carboxymethylcellulose was added to the soil at rates of 0, 3 and 30 mg kg^{-1} of soil. After 48 d and 110 d from transplanting plants were harvested, separated into root and shoot, and fresh and dry matter weights were recorded. Total selenium was determined in both soil and plant samples. A sequential extraction was used to investigate the different Se oxidation states and assess the avail-

ability of Se in soil after the final harvesting. Both selenite and selenate were absorbed by roots, but plants amended with Se^{+VI} showed higher selenium concentration than plants amended with Se^{+IV}. Selenite appears to be less mobile than selenate both in soil and plants. The addition of carboxymethylcellulose to soil decreased the amount of selenium absorbed by plants. CMC interacted with Se, making it less mobile as evidenced by the increase in the insoluble fractions. The insoluble Se forms in soil may represent environmental Se sinks potentially available for plants if the substrate is re-used for subsequent growth cycles and selenium species are mobilized as a result of biological and chemical processes.