Degradability of chelating agents in a soil contaminated with lead

[a]Freitas E V S, [b]Nascimento C W A, [c]Silva F B V, [b]Silva W M

Purpose Study of the rate of degradation of chelating agents is important to identifying an environmentally appropriate inducing agent for *in situ* phytoextraction. Thus, the objective of the present study was to evaluate the degradation rate of the complexes formed between synthetic and organic chelating agents and Pb, with the goal of maximizing the efficiency of phytoextraction and reducing adverse effects resulting from the leaching of metals.

Methods Four different chelating agents with different chemical characteristics were investigated in this study: two low-molecular-weight organic acids, citric acid P.A. and commercial citric acid (to make application economically viable), and glutamic acid PA and monosodium glutamate. Two APCs (NTA and EDTA), as well as a control treatment (contaminated soil without the addition of a chelating agent), were also studied. The chelators were applied at a concentration of 10 mmol dm^{-3} in pots with 1 dm^3 of soil contaminated with Pb, both with pH correction and without.

Results The results of this study showed that commercial citric acid, which has a reduced acquisition cost compared to the P.A. composite, adequately solubilized Pb to levels suitable for plant uptake and showed relatively rapid biodegradation in soil. The synthetic chelating agents EDTA and NTA demonstrated Pb solubilization ability greater than the capacity for uptake by plants, as well as low rates of biodegradation.

Conclusions The commercial citric acid may be a highly promising alternative for phytoextraction studies in the field. The agents synthetic are not recommended for use in phytoextraction programs due to their high environmental impact.

[a] *Graduate Student (Doctorate) of Programa de Pós-Graduação em Ciência do Solo. Federal Rural University of Pernambuco, Recife, PE, 52171-920, Brazil.*
[b] *Professor of Department of Agronomy, Federal Rural University of Pernambuco, Recife, PE, 52171-920, Brazil (cwanascimento@yahoo.com)*
[c] *Graduate Students (Doctorate) of Programa de Pós-Graduação em Ciência do Solo. Federal Rural University of Pernambuco, Recife, PE, 52171-920, Brazil.*