

## LIXIVIATION OF METALS IN COLUMNS OF TROPICAL SOIL AMENDED WITH PHOSPHOGYPSUM

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The Brazilian phosphate fertilizer is obtained by wet reaction of the igneous phosphate rock with concentrated sulphuric acid, giving as final product, phosphoric acid, and dehydrated calcium sulphate (phosphogypsum-PG) as a by-product. PG presents in its composition metals originally present in the phosphate rock used as raw material. The main phosphate industries in Brazil are responsible for the production of  $5.5 \times 10^6$  metric tons of phosphogypsum annually, which is stored in stacks. The level of impurities present in phosphogypsum makes its disposal or reutilization an environmental concern. This PG has been used for many years in agriculture as a soil amendment. For its safe long-term application, it is necessary to characterize the impurities present in PG. This study is important since such impurities can migrate to agricultural products and food chain or contaminate the water. The concentration of metals (As, Cd, Cr, Hg, Ni, Pb and Se) in fertilizers and soil conditioners are controlled by national agriculture regulation agency Ministério da Agricultura, Pecuária e Abastecimento. The State Environmental Agency, Companhia Ambiental do Estado de São Paulo established also reference values for soil quality for the following elements As, Cd, Co, Cr, Cu, Hg, Ni, Pb, Se and Zn. Several papers were published concerning the characterization of heavy metals in Brazilian PG and fertilizers. The main objectives of this paper is to study the availability of As and metals (Cd, Cr, Ni, Se, Hg and Pb) present in the Brazilian phosphogypsum used in agriculture. For this purpose, an experiment was conducted in the laboratory, in which, columns were filled with Brazilian typical sandy and clayish soils and phosphogypsum and were percolated with water, in order to achieve a mild extraction of these elements. The volume of water to be percolated was based in the average rainfall of the study area. The availability of the metals was evaluated by measuring the total concentration in the soil + phosphogypsum and the concentration in the leachate, in order to establish the ratio between the total fraction and the available one. The clayish soil presented concentration of the elements As, Cd, Cr, Ni, Pb higher than the sandy soil. It was concluded that the addition of PG to the soils, even in quantities that exceeded 10 times the amount of phosphogypsum necessary to achieve the base saturation of the soils, does not contribute to an enhancement of the metals content in water.