



## **Assessment of phytoavailability of heavy metals in tropical soils by modified Neubauer method (organic extractor).**

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Nowadays authors discuss the use of metal content phytoavailable in replacement of the total content to establish regulatory limits for metals in soils. However, there is still no patterning in the method to be used to estimate the phytoavailability of metals present in soils and is usually used extraction solutions such as: DTPA, Mehlich 3 and HCl. Although the use of these solutions is an alternative, these extractors have large efficacy variation according to the metal concentration in soil, soil type, the presence of other chemical species, plant species and the metal in question. An alternative would be to use biological methods, with the use of plants to assess the availability of metals that could be used in routine laboratories. The aim of this study was to determine the phytoavailability of Cd, Cu, Ni and Zn by the method of Neubauer, correlating levels of soluble metals determined by DTPA in soil treated with sewage sludge, and its absorption by rice plants. In this experiment it was used the modification proposed by Catani and Bergamin (1960) of the original procedure established by Neubauer and Schneider (1923). Studies were conducted on samples of a Rhodic soil (clayey), obtained in experiments in which sewage sludge was applied in corn, located in the Experimental Field of Embrapa Environment, Jaguariúna (SP), latitude 22°41'south, longitude W. 47th Gr and altitude of 570 m. The sewage sludge were generated in the Stations of Sewage Treatment of Barueri (State of São Paulo, Brazil), which treats domestic and industrial sludge (Sludge Barueri - SB) and Stations of Sewage Treatment of Franca (State of São Paulo, Brazil), which deals mainly with domestic sludge (Sludge Franca - SF). The applications of sewage sludge were made from 1999 for five consecutive years and on average, it was applied the following amounts of sludge per year: 0, 5, 10, 20 and 40 t ha<sup>-1</sup>. It was evaluated the dry matter production, nutrient concentrations in the plant and the quantities of Cu, Ni and Zn extracted by plants. As a possible term of comparison with the contents of heavy metals in leaf tissue of rice, it might be considered to phytotoxic levels in mg kg<sup>-1</sup>: 30 to 20 for Cu, 50 to 100 for Ni and 500 to 1500 for Zn. The concentration of Cu extracted by rice plants had significant influence only for the amount of sludge factor regardless of its source. The elements Ni and Zn showed significant response to both doses of sludge used in the field, and for the type of sludge used, with the greatest accumulation of these metals in the samples treated with domestic and industrial sewage (Sludge Barueri - SB). Based on these results it can be concluded that the modified Neubauer method can be an efficient method for the determination of phytoavailable metals in soils, requiring further studies to confirm such efficiency.