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Use of filler limestone and construction and demolition residues for remediating soils contaminated with heavy metals: an assessment by means of plant uptake.

Ascension Banegas, Maria Jose Martinez-Sanchez, Ines Agudo, and Carmen Perez-Sirvent
Faculty of Chemistry, Agricultural Chemistry, Geology and Pedology, Murcia, Spain (melita@um.es, 34 968 364148)

A greenhouse trial was carried out to evaluate the assimilation of heavy metals by three types of horticultural plants (lettuce, broccoli and alfalfa), different parts of which are destined for human and animal consumption (leaves, roots, fruits). The plants were cultivated in four types of soil, one uncontaminated (T1), one soil collected in the surrounding area of Sierra Minera (T2), the third being remediated with residues coming from demolition and construction activities (T3) and the four remediated with filler limestone (T4).
To determine the metal content, soil samples were first ground to a fine powder using an agate ball mill. Fresh vegetable samples were separated into root and aboveground biomass and then lyophilized. The DTPA-extractable content was also determined to calculate the bioavailable amount of metal. Finally, the translocation factor (TF) and bioconcentration factor (BCF) were calculated.
Arsenic levels were obtained by using atomic fluorescence spectrometry with an automated continuous flow hydride generation (HG-AFS) spectrometer and Cd, Pb and Zn was determined by electrothermal atomization atomic absorption spectrometry (ETAAS) or flame atomic absorption spectrometry (FAAS). Samples of the leached water were also obtained and analyzed.
According to our results, the retention of the studied elements varies with the type of plant and is strongly decreased by the incorporation of filler limestone and/or construction and demolition residues to the soils. This practice represents a suitable way to reduce the risk posed to the biota by the presence of high levels of heavy metal in soil.