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Trace element content in fungi sporocarps as assessment of the relationship with the inorganic substrate.

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Recently, many papers have been published on the subject of the accumulation of trace elements in mushrooms. Some focused on edible mushrooms to explore the possible toxic effects on the human health (Cocchi et al, 2006; Kalac, 2010) and others on the implication of fungi on biogeochemical cycles, weathering processes, decomposition, etc (Hoffland et al, 2004; Amundson, et al 2007). The purpose of this study is to give values of trace elements bioaccumulation in fungi sporocarps to assess the similarities on their occurrence among different fungal species. It is expected that the differences among the species in their relationship with the soil mineral particles will come reflected in the element concentrations reached in the fungal biomass.
The content of 19 metals (Al, V, Cr, Co, Ni, Cu, Zn, Ga, Rb, Sr, Zr, Nb, Cs, Ba, Ce, Pb, Th, U and Nd) was measured in the sporocarps of 15 fungi species. Four different samples (500 g fresh weight) of each species were collected, dried, ground and measured. The element determination was carried out through an X-ray spectrometer (PHILIPS-PW2404 Pananalytical, Magix-Pro) calibrated to provide an error below 2-%. Quartzite ground sand was used as blank.
The classification of the species was performed according with the systematic keys of Phylum Basidiomycota for European fungi, regarding the chorological list of species cited in the region of the study area (Castilla–La Mancha).The data obtained were tested with a principal components analysis (PCA) and a cluster analysis (CA).
In summary we can state that appreciable amounts of trace elements and heavy metals are bioaccumulated in fungal biomass of mushrooms and that the factors by which these elements are first absorbed and then accumulated are still unknown. The species sampled in this work show statistical significant differences in the absorption of the elements and these differences could reflect both the superficial heterogeneity of bioavailable elements in the soil solution and the particularities in the absorptive behavior of each species. Aluminum and zinc are significantly more accumulated than the others and may indicate the extent of clay weathering or may also be considered as an expression of the nutritive relation between the fungal species and the inorganic substrate. The PCA shows that the elements belonging to clay composition gather in a group which may indicate a close relation between fungi and clay particles. For some elements studied here, the distribution of data shows skewness with respect to normality greater than 1.5. In all these cases the curve is displaced to the left which means that the skewness is the result of an intense absorption of these elements by some species.

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