



B1 = *NEPHROLEPIS CORDIFOLIA* (L.) C. PRESL AS A NEW POTENTIAL TOOL FOR THE PHYTOREMEDIATION OF CONTAMINATED SOILS

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The genus *Nephrolepis* displays a pantropical distribution and includes several terrestrial or epiphytic fern species (Hovenkamp & Miyamoto, 2005), some of which are popular ferns cultivated as ornamentals. Among these species, *Nephrolepis cordifolia* is widely used as an ornamental in Italy, where populations possibly escaped from cultivation have only occasionally been observed. *N. cordifolia* form short erect stems bearing tufts of elongated fronds composed by numerous pinnae and scaly runners, in the aerial part, while in the underground parts, the fern forms a rhizome consisting of scaly runners bearing thin roots, which may produce scaly tubers in the soil.

*N. cordifolia* plants were grown in pot on a substrate made up by residues from an ancient mine site, located in the surroundings of Tolfa (Lazio Region, Central Italy) in order to test the ability of this species to accumulate inorganic contaminants under semi-natural conditions. The experimental design was conceived as a randomized complete block one, where the main factor was the substrate type and the blocks were the different plant organs. The plants were kept under observation and about eight months after transplanting the concentrations of aluminium (Al), arsenic (As), barium (Ba), bismuth (Bi), cadmium (Cd), calcium (Ca), cobalt (Co), chromium (Cr), copper (Cu), iron (Fe), mercury (Hg), magnesium (Mg), manganese (Mn), molybdenum (Mo), nickel (Ni), lead (Pb), tin (Sn), sodium (Na) strontium (Sr), vanadium (V) and zinc (Zn) were determined via inductively coupled plasma mass spectrometry (ICP-MS) in either substrate and plant tissues. The analytical values were compared to those obtained for homologous tissues belonging to the mother plants grown on common alluvial-volcanic soils sampled in the Sarno River Plain Area. The plants grew vigorously on the Tolfa mine-substrate as well as on the common soil, despite the content of several inorganic contaminants. Accumulation of Al, Fe and Pb at ratio > 1000 mg/kg in the underground parts was detected in plants grown on the Tolfa mine-substrate. Significant correlation between soil and plant content of several inorganic contaminants in different organs was observed. Our findings partially agree with the results of Cornara *et al.* (2007), who detected comparable levels of Pb in the aerial parts of wild *N. cordifolia* plants grown on Pb rich soils, and with the results of Kachenko *et al.* (2007), who found accumulation of Cd, Cr, Cu, Ni, Pb and Zn in the underground parts of *N. cordifolia* grown in pots on artificially contaminated substrates, but not with the findings reported by Olivares *et al.* (2009), who reported accumulation over 1000 mg per kg of dry matter of Al ions in the aerial parts of wild *N. cordifolia*. Our experimental data indicate that *N. cordifolia* is able to grow on a soil heavily contaminated by ions that are potentially toxic for living organisms and early results from the statistical analysis show that this species is able to accumulate different inorganic contaminants mainly in its underground parts. *N. cordifolia* is therefore potentially useful as a tool for phytoremediation and phytostabilization of contaminated soils.

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Kachenko A. G., Singh B., Bhatia N. P. 2007. Heavy metal tolerance in common fern species. *Australian Journal of Botany* 55: 63-73.

Olivares E., Peña E., Marcano E., Mostacero J., Aguiar G., Benítez M., Rengifo E. 2009. Aluminium accumulation and its relationship with mineral plant nutrients in 12 pteridophytes from Venezuela. *Environmental and Experimental Botany* 65: 132-141.