TOLERANCE TO VANADIUM AS A RESPONSE OF AGRICULTURAL SOIL FUNGI IN THE VALLE LATINA (ITALY): WHICH ARE THE POTENTIALITIES FOR MYCOREMEDIATION?

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The aim of this work was to characterize soil fungal community of contaminated agricultural soils and to test the growth response of selected species to the toxic metal vanadium. Physico-chemical analyses were performed on contaminated agricultural soils in the Valle Latina (southern Latium, Italy). Valle Latina is one of the 57 sites of national interest (S.I.N.). It's a high environmental risk area due to its industrial sites, waste landfills and agricultural activities and the environmental contamination of hexachlorocyclohexane, an anthropogenic pollutant. Moreover, high level of potentially toxic elements due to volcanic rocks (pyroclastic deposits) occurs as natural background in this area in which several elements, including vanadium, thallium and beryllium exceed the threshold values established by Italian legislation, as well. The soil community of saprotrophic fungi of contaminated agricultural soils near the Sacco River have been assessed. The community was found to be rich in fungal species (150 species in total), although the typical *Penicillium* and *Aspergillus* species components were poorly represented. Species, reported to be tolerant/resistant to heavy metals in the literature and potentially useful in bioremediation, were found, and the occurrence of these may be taken as a potential bioindicator of environmental pollution. Vanadium, one of the elements which exceed threshold values, was chosen as metal to test fungi tolerance. In the last decades, evidence in increasing of the environmental levels of vanadium, has raised concern over its release into the atmosphere from anthropogenic sources of which hydrocarbon fuel combustion is the most important. Vanadium is essential for several species of green algae, fungi and nitrogen-fixing microorganisms, as well.

We selected six species : *Aspergillus terreus* Tiegh., *Cladosporium cladosporioides* (Fresen.) G.A. de Vries, *Clonostachys rosea* (Preuss) Mussat, *Paecilomyces lilacinus* (Thom) Samson, *Penicillum citrinum* Sopp and *Rhizopus arrhizus* Fischer, among isolated species, reported to be tolerant/resistant to heavy metals in the literature (Gadd, 2007). We examined the growth response by inoculating them on malt extract agar amended with ammonium vanadate at concentrations of 1, 2, 3 and 6 mM, to simulate potential environmental concentrations. Metal tolerance was assessed in all samples by means of growth measurements, tolerance index, scanning electron microscopy, electron dispersion spectroscopy and biomass metal concentrations. Results revealed that all the fungi tested tolerated 6 mM concentrations, *Clonostachys rosea* and *Rhizopus arrhizus* being the most tolerant. Soil fungi tolerance to natural metal occurrence may explain their tolerance to anthropogenic contamination, as well. Therefore results of this research can contribute to enhance knowledge on the potential use of these fungal species for mycoremediation purposes in polluted sites.

Gadd G.M., 2007. Geomycology: Biogeochemical transformations of rocks, minerals, metals, and radionuclides by fungi, bioweathering and bioremediation. Mycological Research 111: 3-49.

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