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ABSTRACTS

KEYNOTE LECTURES, COMMUNICATIONS, POSTERS

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3.4 = Rhizosphere microbiota responses to nickel stress

Stefano Rosatto[1], Enrica Roccotiello[1], Grazia Cecchi[2], Mirca Zotti[2] and Mauro Mariotti[1]
DISTAV – Department of Earth, Environment and Life Sciences, University of Genoa, Corso Europa 26, 16132, Genova.
[1]Laboratory of Plant Biology, [2]Laboratory of Micology. [1*]Corresponding author: stefano.rosatto@gmail.com

The serpentine soils, characterized by high level of metals like Ni, Cr, Co, Mn (1,2), and low levels of N, P, K, Ca (3), provide inhospitable habitat for many plant species (4,5), except for hyperaccumulators, able to store metals such as nickel (Ni) in aboveground biomass (6). Despite the high number of research on plants growing on serpentine substratum, the interest on the root system of hyperaccumulators, and in its interactions with the other components of the rhizosphere is quite recent (7). The rhizosphere plays a crucial role in hyperaccumulation, since plant root-associated bacteria and fungi provide beneficial effects on their host, improving the efficiency of phytoremediation processes (7).
This study aims at characterizing the microbiota associated with the rhizosphere of the facultative Ni-hyperaccumulator *Alyssoides utriculata* (L.) Medik. from serpentine and non-serpentine sites, and at obtaining a screening of bacterial and fungal strains which are capable to promote metal uptake, and hence allow plant development. Culturable bacteria and fungal strains were isolated on agar by a dilution plate technique from the rhizosphere of *A. utriculata*, as well as from bare soil samples. Microbiota isolated from serpentine soil were selected on the basis of their Plant Growth-Promoting Rhizobacteria (PGPR) properties, and Ni tolerance.
Isolated strains from the rhizosphere of plants that grow on serpentine soils were evaluated for their ACC deaminase activity, production of phytohormone IAA, synthesis of siderophores, phosphate solubilizing capacity, and Ni tolerance, up to 20 mM of nickel sulphate hexahydrate ($NiSO_4*6H_2O$) on agar.
Eight tested bacterial isolates were positive for more than one plant growth-promoting character. The rhizobacteria *Pantoea* exhibits all PGP activities, showing high production of IAA and siderophores, such as *Pseudomonas*. The solubilization of phosphates is mainly observed in *Pantoea* and *Erwinia*, while *Streptomyces* grows better on ACC as the sole source of N. Only two strains (*Pseudomonas* and *Streptomyces*) are able to tolerate up to 15 mM $NiSO_4*6H_2O$.
Among fungal strains, *Trichoderma harzianum* Rifai group exhibits Ni tolerance (up to 500 mg l^{-1} of $NiSO_4*6H_2O$), and high bioextraction capability (more than 10000 mg kg^{-1}) (8).
Bacteria and fungal communities associated with root system could be useful to alleviate metal stress, and to promote plant growth and Ni uptake, through the development of an integrated plant-microbiota system.

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