BIOREMEDIATION OF CONTAMINATED LAND BY AUTOCHTONOUS FUNGI: LIFE-BIOREST STRATEGY

Spina F.[1], Spini G.[2], Poli A.[1], Romagnolo A.[1], Zanellati A.[1], Bentivegna G.N.[1], El-Nazhari N.[3], Echairi A.[3], Prigione V.[1], Puglisi E.[2], Varese G.C.[1]

[1]*University of Turin, Mycotheca Universitatis Taurinensis, Turin, Italy*
[2]*Università Cattolica del Sacro Cuore, Istituto di Microbiologia, Piacenza, Italy*
[3]*Saat Grand-EST, Dijon, France*

Soil degradation is a serious issue in the European Union, causing the loss of more than 340,000 areas. LIFE BIOREST (LIFE15 ENV/IT/000396, www.lifebiorest.com) is a UE funded project in the framework of the LIFE Project, aimed to treat a soil contaminated by PHAs, BTEX and alkanes. This site (about 80,000 m^2 wide) is located in Italy (Fidenza, Emilia Romagna) and has a long history of industrial exploitation.
The project aimed to optimize a biomeredіation method where the transformation made by consortia of fungi and bacteria is finalized by the final step of re-vegetation. The first phase of the project is indeed focused to characterize the microbial community that naturally populate this extreme environment and isolate those microbes capable of growing in the presence of pollutants as sole C source. The best performing strains will be used to set up consortia working in microcosms and mesocosms before up-scaling the process at in-situ level (biopiles).
A solid screening and a liquid enrichment using few selected contaminants (naphthalene, pyrene, phenanthrene, benzene, alkanes and oil extracted from the soil) were carried out to identify the strains with the best adaptation and degradation skills. Despite the strong contamination, microbial communities was consistently developed: more than 220 fungi belonging to 70 species have been identified and more than 140 bacteria. Most of the fungal strains belonged to Ascomycetes (mainly to *Aspergillus, Cladosporium, Fusarium* and *Scedosporium* genera) even though almost 20 Basidiomycetes were also isolated. For bacteria, mostly Gram -.
A further screening was based on an innovative miniaturized approach in 96 multiwell plates in order to evaluate the growth rate of each strain in the presence of 6 contaminants. During the 3 weeks experiments, several strains were capable of growing on the pollutants (at 200 ppm and 1% v/v) as much as positive controls with glucose, highlighting their capability to exploit complex source of nourishment as far as simple and bioavailable ones.
Almost 30 fungi and 30 bacteria have been selected and will be tested in microcosms singly and in consortia with selected bacteria in order to evaluate also their capability to grow and colonize the contaminated soil, and ultimately decontaminate it within 3 months treatment.