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SPATIAL AND TEMPORAL CHARACTERIZATION OF BACTERIAL COMMUNITIES IN A PHYTOREMEDIATION PILOT PLANT AIMED AT DECONTAMINATING POLLUTED SEDIMENTS DREDGED FROM LEGHORN HARBOR AREA

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Abstract

The Agriport project (Agricultural Reuse of Polluted Dredged Sediments, Eco-innovation EU Project n. ECO/08/239065) aims at developing a new technology for the treatment of polluted sediments dredged from the seabed of a commercial port through phytoremediation processes. Through plant activities and microorganism metabolisms, it is possible to recover dredged saline sediments by decontaminating them and adapting their composition until the obtainment of a techno-soil that is reusable in the terrestrial environment. This is an important advantage from the environmental point of view, and allows to partially solve one of the main problems of most commercial ports, that is the accumulation, storage and disposal of polluted dredged sediments. Aim of the present study is the monitoring of spatial and temporal variation of microbial communities that are present in an experimental phytoremediation plant. The pilot plant is made up of a sealed 80 m³ basin that was filled with a mixture of dredged sediments (70%) and natural soil (30%). It was planted with three plant species, and has been properly cultivated with optimized fertilization and irrigation for two years. Terminal Restriction Fragment Length Polymorphism (TRFLP) was chosen to study the composition of microbial communities in different points of the mixture under treatment. Here we present the results of the first two years of experimentation focusing on the evolution of bacterial community structures. In detail we observed that, starting from a heterogeneous mixture of different microbial communities at time zero, in a short time a microbial community homogeneously distributed in the pilot plant developed. This community is gradually becoming similar to those originally present in the rhizospheres of the three adopted plant species.
