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Platform GenoSol: a new tool for conserving and exploring soil microbial diversity

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Scientific context

Soils are the principal reservoirs of microbial diversity and represent a core component of terrestrial ecosystems. There is an increasing demand for assessing the impact of agricultural and industrial practices on the environment at large scales in a context of global change. To address this demand taxonomic and functional diversity of soil microbial communities, and their stability over time, need to be characterized to better predict soil quality. Recent methodological progresses have led to the development and automation of molecular biological tools (based on

the extraction and characterization of nucleic acids), which now allow their application to large scale samplings making possible the production of a reliable reference system for the characterization and interpretation of the soil microbial diversity. In this context, the **Platform GenoSol** was created in 2008 by the Research Unit of INRA (National Institute for Agronomic Research) « Microbiology of the Soil and Environment » in Dijon (France).

The First "Biological" Soil Conservatory

The aim of this platform is to provide an appropriate **logistic structure for the acquisition, storage and characterization of soil genetic resources** obtained by extensive sampling (several hundred to several thousand soils), on very large space and/or time scales (network of national soil survey, long-term experimental sites, . . .), and to make these resources readily available for the whole scientific community and policy makers. The ultimate goal is to produce a reliable

reference system based on molecular characterization (taxonomic and functional features) of the soil microbial communities that provide scientific interpretations of the analyses from large scales of time and space sampling. The platform also aims at building up and storing for long-term periods a library of soil genetic resources that is made available to national and international scientific communities = **first "biological" soil conservatory**.

Technical and scientific objectives

Technical and logistical tools

- Expertise in soil sampling strategies
- Extraction, storage of soil DNA library, management and provision of soil DNA samples originated from large-scale sampling
- Characterization of genetic resources (taxonomic diversity, functional potential)
- Management of a database ('MicroSol') that collects and makes available the genetic resources data
- Provision of an analytical reference system (statistical tools, modelling, bioinformatics)
- Technological surveillance of the tools used in the molecular characterizations and mathematical analyses and
- Training in the use of molecular tools and data analysis

Scientific Outputs

- Distribution and inventory of microbial diversity at large scales
- Evaluation of the relevance of the different microbialbiogeography hypotheses ('everything is everywhere', taxa-area relationship, biogeographical distribution patterns, . . .)
- Evolution of microbial diversity under different environmental pressures (change of land use such as short crop rotation vs monoculture, climatic change, . . .)
- Relation between microbial diversity and soil functioning and quality
- Identification of microbiological indicators of soil quality and soil evolution
- Progresses in the understanding of the role of biodiversity in agroecosystemics goods and services
- Environmental metagenomic and Post Genomic studies

Diagram of the technical and logistical support

