

Towards an index of biological state of the soil as a new tool for ecotoxicological studies

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Typically, ecotoxicological studies concerning the soil ecosystem are performed using a combination of two approaches. The first one deals with the dynamics of toxic compounds in the soil, the second one concerns the effects of these compounds on selected non-target species. In addition, ecotoxicological risk assessment needs probabilistic or modelling features.

Nevertheless the interpretation of the results obtained using these approaches is often difficult in the case of soil micro-organisms (the main actors of soil functioning) and can be in many cases non-conclusive. It is especially true regarding cultivated soil ecosystems because of numerous pedoclimatic and environmental situations, agricultural practices, parameters and protocols to measure their levels... Thus, for all these reasons, a biological state of reference is difficult to precise in cultivated soils.

We develop an approach intended to combine physico-chemical and biological descriptors of the soil (bacterial/fungal biomass and activity) in order to (i) define an index characterizing the biological state of the soil, (ii) assess/rank the effects of soil pollutants (organics and metals) on that index, in excluding the natural variations of the microbial communities in response to pedoclimatic and agricultural conditions.

Our work is centred on three main topics:

- the building of an index for natural (meadow) or cultivated soils,
- the study of the variation of the index in response to environmental (pollutions) or agronomic (practices) in microcosms,
- the validation of the index in situ using sites/field exhibiting various physico-chemical and biological properties.

The experimental data will be used for mathematic modelling in order to explain/predict the variation of the index.