Geophysical Research Abstracts
Vol. 14, EGU2012-14055, 2012
EGU General Assembly 2012

Evaluation of the effect of an additional fertilizer on the dynamics of microbial community and the decomposition of organic matter in soil

B. Fabiola (1), M. Olivier (2), F. Houdusse (3), M. Fuentes (4), M.J.M. Garcia (4), J. Lévêque (2), J.C. Yvin (3), P.A. Maron (1), and D. Lemenager (3)

(1) UMR Agroecology, AgroSup/INRA/Université de Bourgogne, DIJON Cedex, France, (2) UMR CNRS 5561 Biogéosciences, Université de Bourgogne, Dijon, France, (3) Timac AGRO International, CRIAS, DINARD, France, (4) Timac AGRO International, Poligonno Arazuri-Orcoyen, Navarra, ESPAGNE

Organic matter (OM) influences many of the soil functions and occupies a central position in the global carbon cycle. At the scale of the agro-ecosystem, primary productivity is dependent on the recycling of soil organic matter (SOM) by the action of decomposers (mainly bacteria and fungi), which mineralize organic compounds, releasing the nutrients needed for plant growth. At a global scale, the recycling of the SOM determines the carbon flux between soil and atmosphere, with major consequences in terms of environmental quality. In this context, the management of SOM stocks in agro-ecosystems is a major issue from which depend the maintenance of the productivity and sustainability of agricultural practices. The use of additional fertilizer appears to be a promising way to achieve such management. These products have been proven effectives in many field trials. However, their mode of action, particularly in terms of impact on soil microbial component, is still nearly unknown.
In this context, this study aims to test the influence of an additional fertilizer on (i) soil microbial communities (total biomass, density of bacteria and fungi), and (ii) soil functioning in terms of dynamics of organic matter. It is based on experiments in soil microcosms which follow in parallel the kinetics of mineralization of different organic carbon compartments (endogenous compartment: soil organic matter; exogenous compartment: wheat residue provided) and the dynamics of microbial communities after the addition of wheat residues in soil. Two different soils were used to evaluate the influence of soil physicochemical characteristics on the effect induced by the addition in terms of fertilization.
The first results show a significant effect of the input of additional fertilizer on the dynamics of soil organic matter. They also show that soil pH as well as the dose at which the additional fertilizer is applied are important for modulating the observed effect. Characterization of microbial communities by molecular tools (quantification of molecular biomass, quantitative PCR of 16S and 18S ribosomal genes to quantify bacteria and fungi, respectively) will allow linking the changes of the mineralization of carbon compartments with the response of the soil microbial communities.