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Title:

Importance of agricultural practices on functional diversity of soil microbiota: first tracks of response with a diachronic study of biogeochemical cycles

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SOFIA project aims to provide new knowledge on environmental stakes linked to crop system management, in the context of biodiversity conservation, climate changes and biogeochemical cycles understanding. One aim of SOFIA is to understand impacts of agricultural practices on functional diversity of soil microbiota, particularly via a change in nutrients availability to soil organisms. SOFIA is set up on a LTER site "Agroécosystèmes, Cycles Biogéochimiques et Biodiversité" (SOERE ACBB) located at Estrées-Mons, Picardie, France. This field experiment consists in series of experimental treatments varying on anthropogenic pressure according to: crop rotation, fertilisation, residue management or soil tillage. This communication presents the diachronic response of microorganisms with modification of soil management, allowing predictive information of agroecosystem functioning.

Soils enzymes are interesting indicators to approach the release of nutrients for microbial and plants growth. This diachronic study (four years), following enzymatic activities linked to C, N, P and S cycles, allows hierarchizing firstly, the importance of the anthropic factors introduced and secondly the sensibility of each cycle to these factors.

Before application of different agricultural practices, enzymatic activities were homogeneous on the site, whatever the cycle considered. After four years, the amounts of active enzymes were lower with conventional tillage than under reduced tillage and zero tillage. Significant increases appear after two years in the 0-5cm surface layer with reduced tillage, for C and N cycles. P cycle evolution started after two years but significant effects on P and S cycles were observed only after four years. Increased enzyme activity under reduced tillage systems may be related to increased available carbon and/or functional diversity of soils.

Results will allow us to assess the ecosystem services potentially provided by the different cropping systems (habitat for biodiversity, maintenance of soil physical quality and nutrient cycles), and the rapidity of the turnover of the microbiota.