Geophysical Research Abstracts,
Vol. 10, EGU2008-A-03174, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-03174
EGU General Assembly 2008
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Effect of a green waste/biowaste compost on the properties of a silty soil

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Intensive agricultural practices contribute to lower soil organic matter content which has serious repercussions on soil properties. For example, soil structural stability decreases with organic matter amount, which favours soil erosion [1]. In order to balance this impoverishment, amendments from organic residues i.e. compost, sewage sludge have been studied [2]. However biotransformation mechanisms of the molecular constituents of these amendments in soil are not well known.

The aim of this work was to follow the chemical transformation of green waste/biowaste compost constituents in soil. The study focused on anthropic (compost) and endogenic organic matter (OM) transformations after amendment and on the effects on soil aggregates stability.

The field experiment is located in the vicinity of Poitiers (INRA Lusignan, France). The superficial horizon of the studied soil contains a high proportion of silt involving a low structural stability. The amendment ratio was based on the addition of 5 $T.ha^{-1}$ of organic carbon. The control soil was characterized and compared to the amended soil at different times: 4 days, 7, 12, 18 and 24 months. The OM was fractionated following the IHSS protocol (lipids, fulvic acids, humic acids and humin) and the results were compared with those arising from particle size fractionation (clay, silt, sands). The result outline that soil amendment with compost induced an increase in organic matter amount and in TOC content. Moreover the soil structural stability was enhanced. It also influenced the distribution of organic matter in the granulometric fractions and the repartition of the different kinds of OM. Lipids were mainly constituted of long,

odd-chained hydrocarbons, long fatty acids with even carbon numbers predominence, and triterpenic compounds, all of plant origin. Branched and unsaturated fatty acids and hopanoïc compounds arose from microbial activity. Humic substances were characterized by thermochemolysis (TMAH). Lignin compounds were more represented in humin than in humic acids. Fatty acids were also observed and the increase in branched fatty acids traduced an enhancement of microbial activity. The biotransformation of the lipidic constituents from compost, and their interactions with the soil organic matter is now under investigation.

[1] Le Bissonnais Y., Le Souder C (1995), Etude et gestion des sols, 2, 1, 43-56

[2] Albiach R. *et al.* (2001), Bioresource Technology, 76, 125-129