Geophysical Research Abstracts, Vol. 9, 01122, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-01122

Fate of Microbial Biomass Carbon in Soil – Microbial Food Webs and Incorporation into Soil Organic Matter

Anja Miltner (1), Reimo Kindler (2), Tillmann Lüders (3), Michael Friedrich (4) and **Matthias Kästner** (1)

1 Department of Bioremediation, Helmholtz Centre for Environmental Research UFZ, Permoserstr. 15, 04318 Leipzig, Germany

2 Department of Soil Science, Berlin University of Technology, Salzufer 11-12, 10587 Berlin

3 GSF - National Research Center for Environment and Health, Institute of Groundwater Ecology, Ingolstädter Landstr. 1, 85764 Neuherberg, Germany

4 Max Planck Institute for Terrestrial Microbiology, Department of Biogeochemistry, Karl-von-Frisch-Str., 35043 Marburg, Germany

(corresponding author: matthias.kaestner@ufz.de / Fax: ++49/341/235-2492 / Phone: +49/341/235-2746)

Soil organic matter (SOM) is one of the most important pools of the global carbon cycle. Soil microorganisms do not only catalyze its mineralization and transformation, but they are also a carbon source for the formation of refractory soil organic matter. We investigated the fate and the contribution of this carbon source by incubation of soil with genetically (*lux* CDABE) and ^{13}C-labeled *Escherichia coli* cells. Cell survival, carbon assimilation, mineralization and stabilization in SOM, persistence of the gene label, and the incorporation of the ^{13}C carbon into fatty acids and amino acids were analyzed. After 105 days, no more viable cells were detectable, but even after 224 d only about half of the carbon was mineralized; the genetic label could always be detected. The *E. coli*-derived carbon in the total and the biomass fatty acids declined within a few days at the beginning of the incubation and *E. coli* C was assimilated by several guilds of microorganisms distinctively feeding on *E. coli* as shown by rRNA-SIP. These bacteria all belong to three groups which are characterized by gliding motility and are known as micro predators. Later on, the level of total fatty acids remained constant whereas the PLFA declined until day 224, which indicates that half of the

remaining ^{13}C label was still associated to living biomass and the other half has been distributed to non-living SOM. The shift in the isotopic composition of the individual fatty acids also indicated that the *E. coli*-derived carbon was incorporated into the microbial food web. The total amino acids of the soil showed a constant amount of *E. coli*-derived ^{13}C, but the biomass amino acids declined. Neither the isotopic enrichment nor the percentages of the individual amino acids changed during incubation, suggesting that amino acids were metabolized as whole peptides. However, more than 90 % of the protein bound ^{13}C were retained in the soil after 224 d indicating strong stabilization capacities for proteins and peptides in soil.