Geophysical Research Abstracts, Vol. 8, 07978, 2006
SRef-ID: 1607-7962/gra/EGU06-A-07978

Microbial biomass activity as dynamic indicator of horizons characteristics

S. Marinari (1), K. Liburdi (1), **M.C. Moscatelli** (1), G. Brunetti (2), V. La Ghezza (2), F. Matarrese (2), S. Grego (1)

(1) Dipartimento di Agrobiologia e Agrochimica, Università degli studi della Tuscia, Via S. Camillo De Lellis, Viterbo 01100, Italy.

(2) Dipartimento di Biologia e Chimica Agroforestale ed Ambientale, Università di Bari, Via Amendola 165/A, Bari 70126, Italy. e-mail: marinari@unitus.it / fax +39 0761 357242

Introduction. The soil total organic carbon is believed a "static indicator" of process at the equilibrium, in that only allows the determination of changes in the long run. Other indicators, defined as "*dynamic*" are particularly suitable for changes in short times. The origin and the dynamics of the different fractions is the result of soil biological activity, particularly microbial activity through the synthesis and release of extracellular enzymes. Moreover the extracellular enzymes are stabilised on clay and humic substances, therefore the biochemical activity may be protected by organo-mineral complexes. Microbial biomass controls the biogeochemical processes related to nutrients dynamics in soils and represents itself the labile fraction of soil organic matter. The aim of the study was to evaluate the microbial biomass and its activity as dynamic indicators of soil horizons characteristics along a soil profile.

Materials and Methods. In order to better understand the dynamics of soil organic matter (SOM) in an Alfisol (*Typic Haploxeralfs*) of South Italy, we studied the different horizons of the entire profile. In this work it has been considered the relation between chemical [organic carbon (OC), total nitrogen (N_{tot}), clay content] and biochemical properties [dynamic indicators: microbial biomass, enzymatic activities] along a soil profile.

Results and discussion. The organic carbon content as well as the N_{tot} content in the surface horizon (Ap) was adequate, with value respectively of 22.0$\pm$0.4 g Kg^{-1} and 2.2$\pm$0.1 g Kg^{-1}, as a consequence the C/N ratio had a optimal value of 10. Increasing

the depth of the horizon a decrease of both of these values has been observed. OC and N_{tot} content decreased by different rate, in particular the N_{tot} content decreased, in percentage, less than the OC, as a consequence, the lower horizons showed lower C/N ratios. The deepest horizon had an OC content of 1.8$\pm$0.1 g Kg^{-1}, more than ten times lower of the top horizon, a N_{tot}content of 0.4$\pm$0.1 g Kg^{-1}, almost six times lower with respect to the top horizon, and a C/N ratio of 4.6. The biochemical properties of the horizons had a different trend. In fact, the microbial biomass and its activity in the horizons Bt2 and Bt3 were 2-5 times higher than the other horizons. For instance, the acid phosphatase activity in Bt3 was 275$\pm$64 μg pNP g^{-1} h^{-1} while the values of the other horizons ranged from 57$\pm$11 to 112$\pm$18 μg pNP g^{-1} h^{-1}. A similar trend has been observed for chitinase and β-glucosidase. It seems that the biological properties of Bt horizons were not affected by the OC content but probably they were more influenced by the SOM quality (e.g. lower C/N ratio) and by the clay content of the horizons.

Conclusion. The microbial biomass content and its activities are sensitive and dynamic indicators of horizons properties, they can provide useful additional information on soil profile description.