



Soil biological fertility in Pavia Province: LUCAS survey to monitor territory

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The global evaluation of soil fertility is a very difficult concepts. This is why we are usual to divided fertility factors in physical, chemical and biological categories. Only a complex interactions of three aspects can opportunely represent the integral fertility of soil. This research focus on the concepts of biological fertility considered as the total-ity of microbial activity in soil. Microorganism, in fact, play a key role in soil because they connect the abiotic and biotic compartments. In particular microbial activity is of crucial importance in biogeochemical cycles. Since microorganisms respond rapidly to changing environmental conditions, they can be reasonably considered as sensible indicators of soil biological fertility.

This study arises from the project “Biodiversity and Bioindication in Pavia Province”, co founded by Pavia Province and Joint Research Centre in Ispra (Italy). The aim of the project was to obtain a retailed spatial evaluation of soil quality of Pavia Province by using a Land Use Cover Area frame Statistical survey (LUCAS). This approach foresees a statistical method (EUROSTAT 2000) based on the observation of sample points used as valid generalization of the entire area under investigation.

The sampling was organized in three different monitoring levels. The first one was carried out by identifying 7 principal points far away 18x18 km one from each other (AM 1 – Monitoring Action 1); the second one identified 34 secondary points in a distance of 9x9 km (AM 2 – Monitoring Action 2); the third one focus attention on six specific areas in a small area of 3x1,5 km, for a whole of 116 soil samples (AM 3 – Monitoring Action 3). All samples collected were 30 cm depth, air-dried and 2 mm sieved.

Determinations regarded biochemical parameters need to assess the “status” of soil fertility. They involved: total organic carbon content, Corg, determined according to

the Springer and Klee method (1954); microbial biomass carbon, C_{mic} , determined by using the fumigation- extraction method (Vance, 1987) on samples conditioned at their water holding capacity for 10 days at 30°C; soil respiration through CO₂ evolution measures, C_m (soil cumulative production), and R_b (soil basal respiration), determined according to Isermayer method (1952). Besides metabolic quotient, qCO_2 , and microbial carbon to total organic carbon ratio, were calculated to better understand soil microbial community metabolism as status of soil biological fertility.

We propose a fertility class status for each point of the three monitoring levels, identified by LUCAS survey starting from stress status to very good situation, to furnish to public administration of Pavia Province a useful tool to take sustainable environmental decisions.

Results put in evidence a average good situation of soil biological fertility, especially in the centre and south areas of Pavia Province. In contrast the north area appeared close to a stress status of soil biological compartments.