



Soil fauna activity and soil porosity: characterization by micromorphological image analysis

Laura Gargiulo (1), Giacomo Mele (2), and Fabio Terribile (1)

(1) Dipartimento di Scienze del Suolo, della Pianta, dell' Ambiente e delle Produzioni Animali, Università di Napoli Federico II, Via Università 100, 80055 Portici, Italy (laura.gargiulo@unina.it), (2) Istituto per i Sistemi Agricoli e Forestali del Mediterraneo, Consiglio Nazionale delle Ricerche, Via Patacca 85, 80056, Ercolano, Italy

The soil biological communities are characterized by a higher diversity, by several orders of magnitude, compared to aboveground biomass, and therefore, this environmental compartment has become one of the last great frontiers in the study of biodiversity. One of the main cause of its high biological diversity is represented by the complexity of the soil pore system, which provides an heterogeneous environment that allows the coexistence of several different species.

The organization of the pore system influences soil flows which, directly or indirectly, affect metabolism, reproduction and ecological interactions of soil fauna. On the other hand one of the most significant effects of soil organisms on the soil structure is due to their activity as soil engineers through their burrowing and excreting activities.

Micromorphology has been for long a useful tool for characterizing the interaction between pedofauna and soil physical properties. The study of soil thin sections provides the opportunity for investigating fauna–soil relationships since evidence of animal activities such as burrowing and deposition of excrement (fecal pellets) can be identified and quantified. Image analysis techniques allow direct investigations of the soil pore system and provide valid tools to quantitatively analyze both shape and size distribution of pores.

Using a large collection of thin sections from very different soil types, we identified microsites with specific signs of pedofauna activities. Then for each feature produced by biological activity we have investigated pore size distribution (PoSD) and we have proved that different organisms produce very different PoSD signals.

The outcoming results from this research are (i) the urgent need to better quantify relationships between soil biological activity and pores system in different soil types, (ii) the evidence that tests are required to understanding the influence of specific pedofauna activities over soil structure and consequently on the soil functions.