

Towards soil micro-zymography: linking enzymes activity at mezo- and micro-scales

Negar Ghaderi and Evgeniya Blagodatskaya

Göttingen, Büsgen-Institute, Dept. of Agropedology, Göttingen, Germany (janeblag@mail.ru)

The soil microbial hotspots are mainly associated with availability of organic substrates commonly occurring in the rhizosphere, detritusphere and biopores. Rhizosphere hotspots are the most important plant-soil interfaces with very dynamic interactions between roots and microorganisms. Recently elaborated soil zymography identifies two-dimensional (2D) distribution of enzyme activity based on contact of fluorogenic substrate-saturated membranes with soil at the mesoscale (mm-cm) level. We challenged to pioneered development of the micro-zymography approach to visualize enzymes activity at the microscopic level combining the microinjections of fluorogenic substrates with epifluorescence microscopy. The detection of enzyme activity in the intact soil matrix is optimized by the application of gel or resin for the impregnation and stabilization of soil structure. After impregnation, the soil thin sections are obtained by soil slicer and the images are captured under UV light to visualize the distribution of enzyme activity at mm scale. Thereafter, the soil thin sections are analyzed by both UV- and epi-fluorescent microscopy. This enables visualization the distribution of enzyme activity at the single cell, microbial population and root hair level. The first results on micro-zymography will be presented and critically discussed.