

Impact of functional microbial diversity on soil ecosystem services and assessment thereof

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Abstract:

Microorganisms are key players in many soil ecosystem services: turnover of organic matter, including anthropogenic organic compounds, remineralisation of essential nutrients for plant growth, plant beneficial microorganisms, plant, animal and human pathogens, and competition and dilution of pathogens. Microbial diversity is responsible for these services but knowledge of the exact functions of the microbial diversity are scattered. In the EU FP7 EcoFINDERS project techniques of measuring microbial functional diversity such as MicroResp (Campbell et al 2003) and Enzyme Activity Assay (EAA) (Winding and Hendriksen 2007) are being optimized, standardised and compared across soils with different land-uses from European long-term observatories.

The MicroResp technique is partly growth dependent and measures the microbial respiration of a selected range of carbon substrates while the EEA is a growth independent assay of enzymatic activity. These techniques are chosen as they are mimicking vital functions of the microbial communities in carbon and nutrient turnover and hence are possible candidates as indicators of microbial biodiversity and soil ecosystem services. In addition, they are among the top prioritized potential biological indicators of soil monitoring (Ritz et al. 2009). They and other microbial diversity techniques will be evaluated for use as indicators of biodiversity and soil ecosystem services.

References:

- Campbell, C.D., Chapman, S.J., Cameron, C.M., Davidson, M.S. and Potts, J.M. (2003) *A rapid microtiter plate method to measure carbon dioxide evolved from carbon substrate amendments so as to determine the physiological profiles of soil microbial communities by using whole soil*. Applied and Environmental Microbiology, Vol. 69, No. 6, pp. 3593-3599.
- Ritz, K., Black, H.I.J., Campbell, C.D., Harris, J.A. and Wood, C. (2009) *Selecting biological indicators for monitoring soils: a framework for balancing scientific and technical opinion to assist policy development*. Ecological Indicators, Vol. 9, pp. 1212-1221.
- Winding, A. and Hendriksen, N. B. (2007) *Comparison of CLPP and enzyme activity assay for functional characterization of microbial communities*. Journal of Soils and Sediments, Vol 7, pp 411-417.