Geophysical Research Abstracts
Vol. 12, EGU2010-8877-1, 2010
EGU General Assembly 2010

Soil fungi colony growth and community dynamics

Ruth E Falconer (1), Alexandra Kravchenko (2), and Wilfred Otten (1)

(1) University Abertay Dundee, Scotland, SIMBIOS, Dundee, United Kingdom (r.falconer@abertay.ac.uk), (2) Department of Crop and Soil Sciences, Michigan State University, East Lansing, MI, USA, Email kravche1@msu.edu

Fungi are a major player in soil functioning, they contribute to soil structure formation and shaping of plant communities through their role in nutrient cycling, pathogenesis and symbiosis. Theoretical approaches which have emerged over the years and improved considerably our understanding of above ground plant communities are still lacking below ground. A theoretical framework is needed, such that links soil physics, fungal biology and mathematical biology in order to understand fungal community dynamics and diversity in undisturbed soils. Such a framework is essential if we are to understand how environmental change or soil manipulation impacts biodiversity. Different land use and management practices significantly affect soil environmental characteristics crucial for fungal communities by contributing different quantities and qualities of biomass inputs, generating different levels of soil disturbance, influencing soil temperature and moisture regimes, and affecting structure and geometry of soil pore space. Differences in pore structures generated by long-term differences in land use and management are reflected in notable changes in soil physical and hydraulic properties, including soil porosity, hydraulic conductivity and water retention (Brye and Pirani, 2005). Changes in numbers, shapes, and distributions of soil macropores have been often observed (e.g., Pachepsky et al., 1996; Giménez et al., 1997; Udawatta et al., 2008). However, specific implications of these differences in pore structure and geometries for ability of pathogenic as well as non-pathogenic fungi to colonize soil have not yet been addressed. Recent advances in computed tomography and microscopy facilitate detailed examination of the inner pore structures of undisturbed soil samples as well as visualization of fungal mycelia. Such tools together with modelling generate a new level of understanding of the mechanisms governing fungal behaviour at microscopic scales, and for the first time allow us to examine species interactions in a 3D soil environment.