

MWP – Young Researcher Abstract 2024

Project title: Evaluation and establishment of new methodology for visualizing the development of the rhizosphere	
Author: Shandry Tebele	
Affiliation: Swedish University of Agricultural Sciences	E-mail: shandry.tebele@slu.se
<p>Abstract (approx. 200 words):</p> <p>Forest tree roots naturally form microbial networks, predominantly with mycorrhizal fungi. Trees release sucrose into the soil through root exudations, providing carbon to mycorrhizal communities. The small diameter of fungal hyphae enables them to access nutrients in smaller soil pores and reciprocate by transporting water and nutrients to roots where finer roots cannot reach. However, this complex interaction between tree roots and mycorrhizae is highly spatially and temporally heterogeneous. Understanding these belowground processes without using destructive methods in their natural habitat is challenging. The symbiosis occurs around roots covered by opaque soil, making it impossible to visualize the influence of root exudates on fungal colonization through ordinary microscopes. This study aimed to develop a label-free confocal microscopic method using 3D printed growth chamber to visualise these “invisible” events in soil by combining it with micro-dialysis technique. This <i>in-situ</i> system precisely represents belowground natural microenvironments without destroying the fungal hyphae network. It allowed us to determine the spatial and temporal changes between root and mycorrhizae networks in the rhizosphere. Additionally, metabarcoding will be performed to characterize root microbiome. Our vision is to comprehend the intricate interaction between tree roots and mycorrhizae to enhance sustainable forestry practices through maintaining beneficial microbial communities.</p>	
Key words: Pine trees, root exudates, rhizosphere, mycorrhizal fungi, microscopy,	