

S1T1**Rhizobiome interactions among trophic levels affected by agricultural practices**

Anne Winding¹, Paul Henning Krogh², Mille Anna Lilja¹, Zivile Buivydaite¹, Rumakanta Sapkota¹

¹Aarhus University, Roskilde, Denmark. ²Aarhus University, Aarhus, Denmark

Abstract

Interactions among trophic levels in rhizosphere are affected by agricultural practices such as crop, type of fertilizer and tillage, as well as indigenous organisms of the soil and seed. In this study, we hypothesized that agricultural practices such as type of fertilizer and tillage have a dominating effect on the rhizobiome interactions compared to soil and seed. The effects of three fertilizers (pig slurry, nitrogen sulfur chemical fertilizer and urea-ammonium nitrate) were tested in two locations with different soil types – sandy clay in western Denmark and clayey sand in eastern Denmark (approx. 200 km apart) in the growth seasons of 2020 and 2021 of spring barley and winter wheat, respectively, in conventional tillage and no-tillage systems. The effects on interactions among soil organisms including bacterial, fungal and invertebrate communities were studied four weeks after fertilizer application and after crop harvest. We used the substrate induced respiration assay MicroResp® and environmental DNA (eDNA) metabarcoding for characterizing the changes in bacterial and fungal communities. Soil microarthropods were studied by a combination of eDNA metabarcoding and taxonomy-based quantification and identification, while earthworms were assessed by identification and biomass. The results from both growth seasons showed differences in the soil microbial and microarthropod communities between the two agricultural sites and type of fertilizer, which impact the interactions. Conventional tillage versus no-tillage had significant effects on the microbiomes as well as on earthworms. Generally, soil type and common agricultural practices significantly influence the rhizobiome interactions among microorganisms, microarthropods and earthworms.

