

## Best Natural History Presentation at Environ 2020

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Understanding the effects of multi-species grasslands on the diversity and function of the soil microbiome for improving resource use efficiency and mitigating the effects of climate change



Population growth is leading to the intensification of agricultural systems globally, driving the need for more efficient agricultural systems that enable sustainable climate-resilient food production, while minimising environmental impacts. Multi-species grasslands have been shown to be more productive and have greater nitrogen use efficiency than less diverse grasslands. Our study aimed to provide a better understanding of how 1) multi-species grasslands and 2) climatic stress, affect the diversity and function of the soil microbiome. Soil samples were taken before,



during and after a drought treatment. A series of functional assays were performed to investigate the microbial communities' potential nutrient cycling ability. Molecular assays assessed the abundance of phylogenetic and functional N-cycling microbial communities across treatments, and sequencing approaches were used to assess community composition. Community function was found to be primarily affected

by plant species presence rather than interactions between species. Potential nitrification and denitrification differed between species and drought treatments. Plantain monocultures were found to have the lowest potential denitrification rates while leguminous monocultures had the highest rates of biological nitrogen mineralisation. Bacterial abundance was greatest in chicory monocultures, whereas there was no difference in the abundance of archaea between monocultures. Fungi were most abundant in grasses. This work provides an enhanced understanding of the impact of aboveground diversity on belowground diversity and function, and of the potential use of mixed-species grasslands to enhance the resistance/resilience of soil microbial communities in response to drought.

