69-5 - The Microbial Indicators of Cover Crops in High N-Input Agroecosystems

Monday, November 8, 2021

11:15 AM - 11:30 AM

Grand Ballroom D (1st Level, Salt Palace Convention Center)

Abstract

Cover cropping is anticipated for its ability to mitigate soil N loss from heavy nitrogen (N) fertilizer uses. However, despite the critical roles that the soil microbiota, there is a lack of indicators with higher taxonomic resolutions that well describe the soil microbial responses to the cover crops under high N input agroecosystem. Thus, our goal was to identify genus-level indicators of the soil microbial community responding to N fertilization and introduction of cover crops. A 3x2 split-plot arrangement of N fertilization rates (0, 202, 269 kg N/ha) and cover cropping (cover crops vs. bare fallow) treatments under continuous corn was studied in a randomized complete block design with three replicates over two years. Bacterial and archaeal 16S rRNA and fungal ITS regions were sequenced with Illumina MiSeq system, processed with QIIME 2.0, and classified using the Ribosomal Database Project (RDP) database. Acidophilic indicators increased in abundance with N fertilization while neutrophiles and alkaliphiles increase with unfertilized control. We found N fertilization increasing the abundances of indicators of nitrate (NO_3^-) reducers, and nitrite (NO_2^-) oxidizers. In unfertilized control, we detected greater abundances of heterotrophic nitrifiers, NO_2^- oxidizers, and complete denitrifiers. The bioindicators of unfertilized soils implied adaptation to N-poor condition, and N cycling with microbially reduced risk of N loss as nitrous oxide (N_2O) and NO_3^-. More indicators with diverse niches associated with cover crops than bare fallow, including the N-fixing *Mesorhizobium*, and potentially mycorrhizal *Albatrellus*. However, cover cropping decreased the abundances of indicators of anaerobic ammonia oxidizers and N_2O reducers, while increasing that of NO_2^- reducers. These indicators suggested higher risk of microbially mediated N_2O emission with N abundance. This study provides the primary information

on the soil microbial aspects of the cover cropping that is necessary for better evaluating its ability to reduce soil N loss.

Abstract Citation

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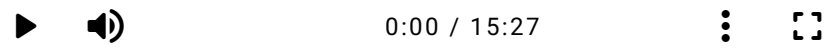

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