DETECTING SHIFTS IN SOIL MICROBIAL COMMUNITY STRUCTURE AND FUNCTION POST LANDSPREAD OF MANURE OR BIOSOLIDS CONTAINING ANTIMICROBIAL CHEMICALS

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ABSTRACT

Soil microbial diversity and community interaction play an indispensable role in 2,4-dichlorophenoxyacetic acid (2,4-D) herbicide degradation. The addition of manure or municipal waste biosolids through landspreading may alter soil community structure and function if these materials contain antimicrobial chemicals like chlortetracycline (CTC), administered in livestock feed to promote animal growth and health or tetracycline (TET) utilized in human health. In this study, soil applied with manure collected from pigs fed standard CTC levels was compared to soil containing manure from control pigs fed no CTC, and a comparison of soil applied with biosolids containing TET or without TET to distinguish soil microbial shifts. Culturable aerobic heterotroph counts on R2A agar plates revealed unexpectedly high counts 7 days after treatment (DAT) of the CTC enriched applications. By 28 DAT, these counts were comparable to other treatments. It is unknown if the increase in culturable counts was due to native soil organisms or organisms present in manure. The density of 2,4-D degrading microorganisms using the Most Probable Number (MPN) method indicate increased growth of these degraders nearly 20 fold after adding 2,4-D to soil samples compared to MPN results of soil samples without the enhancement. Denaturing gradient gel electrophoresis (DGGE) analysis of polymerase chain reaction (PCR) -amplified 16S rDNA fragments from each soil sample allowed for representation of all microorganism present, culturable or not. Significant shifts in bacteria communities between the different manure treated soils are apparent. Future cloning and sequencing of specific DGGE bands will show the taxonomical diversity of the microbial community.