

# Biotic & Abiotic Drivers of Soil Microbial Communities in Response to Manure Amendment

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Livestock manure is a common soil amendment in forage and row cropping systems used to provide plant-available nutrients, build soil organic matter, and enhance soil health. Many of the benefits of manure applications are thought to be driven via their impacts on soil microbial communities. However, manure amendments may also introduce potential undesirable microbes (e.g., pathogens, those with antibiotic resistance elements) to soils. To better understand the forces driving the assembly of microbial communities in soil in response to manure amendments we constructed soil microcosms using five soils from distinct locations to investigate the impacts of manure amendments on microbial communities. We used combinations of sterilized manure and soils to determine the importance of abiotic and biotic factors in the response of indigenous soil communities to manure and the fate of manure-borne microbes. We found that taxa responsive to manure amendment were largely dependent on soil origin. Initial shifts in soil communities were driven by the introduction of manure-borne bacteria. However, introduced taxa died off rapidly while some indigenous populations increased in relative abundance over time. Introduced taxa died off even in the absence of indigenous microbiota, suggesting that the soil abiotic environment is a strong barrier to colonization by manure-borne bacteria. Finally, the response of indigenous soil populations to sterilized manure was similar to that of unsterilized manure, indicating that organic matter, nutrients, or other physiochemical factors associated with manure amendments are primary drivers of shifts in indigenous soil populations.