Soil Farms II: Optimizing Cropland Soil Conditions for Microbiological Supplementation

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Inspired by the low and declining cropland microorganism populations in agriculture today, the goal of my study was to determine if specific cropland soil adjustments could better prepare soil to receive an application of soil microorganisms (specifically from a Soil Farm) by determining the effects of these adjustments on existing soil microorganism populations. Before conducting my research, I expected that soil acidity/basicity would impact the balance of the major groups of soil microorganisms. I also expected that higher soil organic matter content (cover-cropping), and increased soil aggregate size (gypsum application) would each increase soil microorganism populations. Throughout my project, I studied the impacts of 4 soil pH ranges, 3 cover-cropping levels, and 3 gypsum levels (and each combination formed by the interactions between these applications – 36 combinations) on soil actinomycete, heterotrophic bacteria, and fungi populations as well as any associated impacts on plant shoot/root lengths and dry masses at 2 and 3 weeks after planting. I used swabbing and plating techniques to determine relative soil microorganism populations and used a biological decomposition test to determine the comprehensive microbiological impacts of the soil supplements. I found out that while the soil supplements didn't consistently impact early-stage plant growth, the highest level of cover-cropping statistically significantly increased the fungi populations of the highly acidic soil and the heterotrophic bacteria populations of the low/highly basic soils with some statistically significant increases of heterotrophic bacteria populations by lower cover-cropping/gypsum levels, these increases potentially providing for increased plant growth at later stages.

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