Soil Farms: A New Approach to Cropland Restoration

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The world's soils are losing their ability to naturally support crops, and many are approaching exhaustion. Erosion, soil structure degradation, nutrient loss, and soil microorganism population decline have all increased agriculture's need to extensively use chemical fertilizer. Chemical fertilizers allow for high yields, but they perpetuate and don't address the problem of soil degradation. The goal of my project was to determine if soil farms could be used to benefit cropland by increasing cropland microbiological activity, and I am proposing that farmers let their non-profiting pieces of cropland grow back into microbiologically rich prairie to be harvested and applied to unhealthy cropland. I tested how each of 5 exponentially increasing prairie soil applications (0.25x, 0.5x, 1x, 2x, and 4x) affected the Carbon Dioxide emissions, heterotrophic bacteria populations, and actinomycete populations of three cropland soils (sandy, silty, and clay soil). I tested each soil-application combination for CO2 emissions for twelve hours, and I swabbed and plated soil dilutions to test for heterotrophic bacteria and actinomycete populations. I found great increases in soil Carbon Dioxide Emissions, specifically with the 1x, 2x, and 4x application rates on each of the 3 soil types. I found that the 2x application rate statistically increased the sandy and clay soils' CO2 emissions, and the 4x application rate statistically increased actinomycete populations of each soil. In summary, soil farms show considerable potential for increasing the biological activity of soils, which could provide for better soil structures, increased capability of nutrient fixing/mobilization, and capacity to sustainably support crops.

Awards Won:

Fourth Award of $500

ASU Rob and Melani Walton Sustainability Solutions Service: Award of $1,000