Getting the Dirt on Diversity II

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Increasing atmospheric CO2 levels and depleting fertility in agricultural soils is a world-wide dilemma. A variety of processes and interactions occur between plants and soil microbial communities (SMC), regulating the incorporation and release of carbon between terrestrial and atmospheric sinks. A greenhouse experiment was conducted to assess the influence of increasing soil fungal: bacterial ratios as a measure of soil fertility, on: a) increase of plant biomass growth (g) of chile plants Capsicum annuum, b) the mass of C (CO2) respired from soil relative to initial soil carbon content. Six experimental treatment ratios, resulting from mixing two soil components, a bacterial dominant arroyo alluvium (sand) and a compost product from a Johnson Su Composting Bioreactor increasing F:B (and its associated increase in soil SMC mass) to observe how a shift from bacterial dominated soils to fungal dominated soils (0.23 to 4.75) influences plant growth and soil C respiration. Increases in biomass of chili plants (g) demonstrated a 5X increase as F:B increased. Treatment soil carbon mass increased 14X and soil respiration only increased 2X. The percentage of initial soil carbon respired demonstrated a reduction from 38% to 5% as F:B ratio increased from 0.23: 4.75 and as initial soil carbon increased from 3.9 g to 59.4 g. Implementing agricultural practices that promote increases in F:B, moving soils towards fungal dominated SMC structures may be a viable mechanism for more efficient capture of atmospheric carbon and higher crop biomass yields.

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