Soil Organic Matter Oxidation Potential with Fluctuating Water Table Under Sugarcane. (S05-morris084233-Oral)

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Abstract:

Histosols in the Everglades Agricultural Area (EAA) are subsiding primarily from aerobic microbial oxidation. Flooding reduces microbial activity. An experiment was set up outside in lysimeters with sugarcane (interspecific hybids of Saccharum species) growing in Pahokee muck soil to determine oxidation potential under varying water-table levels after flood. Treatments were: continuously drained control to 50 cm water-table depth, and flood for 7 days followed by drainage to 16-, 33-, and 50-cm water-table depths for 14 days. Parameters measured were organic matter oxidation potential (OP) using benzoate with a C14-carboxyl label, soil respiration (CO2 evolution) (RESP), microbial biomass C (MBC), and soluble organic carbon (SOC) in the 0 to 16-cm surface horizon. For the flood followed by drainage to 50-cm water table, OP increased to maximum within 3 d after drainage. With flood followed by drainage to 16- or 33-cm water table, OP was similar to OP in flooded soil. Apparently soils were saturated sufficiently to inhibit OP. In contrast to OP, RESP was similar for all drained treatments. There was a large flux in CO2 within 24 hrs after drainage likely due to air drawn into soil voids as water was being withdrawn from the lysimeters resulting in increased respiration by soil microorganisms and plant roots. Microbial biomass carbon increased in all drainage treatments up to 7 d after drainage, with a tendency to have higher MBC with higher water table levels even though SOC decreased after flooding for the drained treatments. Correlation analysis indicated the OP was negatively correlated with SOC. Soil respiration and MBC were neither intercorrelated nor correlated with OP or SOC. It appears that high water tables can maintain OP similar to flooding, and that the C14 method appears best for monitoring oxidation potential in organic soils.

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