Tillage and Wind Effects on CO2 Concentrations in Muck Soils. (S01-reicosky134348-Oral)

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Abstract:

Increased CO2 concentration from agricultural activities has prompted the need to quantify greenhouse gas emissions to better understand C cycling and its role in environmental quality. The objective of this work was to determine the effect of no-tillage, deep plowing and wind speed on the soil CO2 concentration in muck soils. Miniature infrared gas analyzers were installed at 30 cm in muck soil plowed and not tilled. Loosening the soil with the Harrell Switch Plow (HSP) to 42 cm resulted in a very rapid decline in CO2 concentration as a result of wind-induced gas exchange from the soil surface. Higher wind speeds during mid-day resulted in a more rapid loss of CO2 from the HSP than from the Not Tilled (NT) plots that appeared independent of barometric pressure fluctuations. The subtle trend in the NT plots was similar, just lower in magnitude. Tillage-induced change in soil air permeability enabled wind speed to affect the gas exchange and soil CO2 concentration at 30 cm. This literally drew the CO2 out of the soil resulting in a rapid decline in the CO2 concentration and likely a subsequent increase in the oxygen concentration. Carbon dioxide concentrations in the NT plots averaged about 3.3% CO2 while the average concentration in the plowed pots was about 1.4% at the end of the study. Wind and associated aerodynamic pressure fluctuations have a definite effect on gas exchange from soils, especially tilled muck soils with very low bulk densities and high soil air permeabilities.

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