Measurement and modeling of soil surface CO2 flux in agroecosystems of the Great Plains. (S03-doyle110716-Oral)

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Abstract:

Soil organic matter dynamics are an important component of net ecosystem C exchange. Soil surface CO2 flux (Fs) represents both microbial and root respiration. The objective of this study was to examine C dynamics in agroecosystems. Soil temperature and H2O, microbial biomass C, microbial activity, leaf area index (LAI) and Fs were monitored at winter wheat (Triticum aestivum L.) and tallgrass prairie sites in Oklahoma from 1998-2001. Fs rates were highest in prairie (~13 mmoles m-2 s-1) during the months May-Sept, while wheat Fs rates were highest during December-May (~8 mmoles m-2 s-1). Microbial respiration was 82% of the total annual flux (1100 g C m-2) for wheat, and 35% of the annual flux in the prairie (1380 g C m-2). Despite lower total microbial biomass in wheat soil, a greater proportion was active. All pools of C (active and recalcitrant) were highest in the prairie soil. A model using soil temperature, H2O and LAI, accounted for 84% and 46% respectively, of the variability in prairie and wheat Fs. Soil temperature and H2O accounted for 59% of the variability in Fs from another prairie in Kansas, while the inclusion of LAI accounted for 93%. Thus, models of Fs should include LAI as well as soil temperature and H2O contents.

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