Soil Respiration and Microbial Biomass in a Pecan-cotton Temperate Alley Cropping System. (A08-jose122454-Poster)

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Abstract:

Little information is available on soil respiration and microbial biomass in soils under agroforestry systems. We measured soil respiration rate and microbial biomass under two age classes (young and old) of a pecan (Carya illinoinensis)- cotton (Gossypium spp.) alley cropping system and two age classes of pecan orchards on a well-drained, Redbay sandy loam (a fine-loamy, siliceous, thermic Rhodic Paleudult) in southern U.S.A. Soil respiration was quantified monthly during the growing season from May to November 2001 using the soda-lime technique and was corrected based on infra-red gas analyzer (IRGA) measurements. The overall soil respiration rates ranged from 177 to 776 mg CO2 m-2 h-1. During the growing season, soil respiration was significantly higher in the old alley cropping system (721 g C m-2) than in the young alley cropping system (398 g C m-2), the old pecan orchard (497 g C m-2), and the young pecan orchard (331 g C m-2). Microbial biomass was significantly higher in the old alley cropping system (375 mg kg-1) and in the old pecan orchard (376 mg kg-1) than in the young alley cropping system (118 mg kg-1), and the young pecan orchard (88 mg kg-1). Soil respiration was correlated positively with soil temperature, microbial biomass, organic matter, and fine root biomass. Overall, different land use management practices influenced soil properties such as soil temperature, moisture, microbial biomass, organic matter, and fine root biomass, which in turn affected the magnitude of soil respiration. Our results suggest that agroforestry systems such as alley cropping have the potential to enhance soil fertility and sustainability of farmlands by improving soil microbial activity and accreting residual soil carbon.

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