Oxygen Respiration and Hydraulic Properties by Individual Soil Aggregates from Tilled and No-Tilled Agroecosystems. (S03-park102026-Poster)

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Abstract:

Dissolved oxygen consumption in solutions flowing through single aggregates, 6.3-9.5 mm across, were measured to estimate the internal soil respiration rates within whole aggregates and aggregates with external layers removed. Oxygen consumption rates of 0.07 mg O2/g soil/min for whole aggregates from conventional-till (CT) soils were twice those of no-till (NT). Respiration rates of interior one-third regions of peeled aggregates were 2-fold (0.14 mg O2/g soil/min), 7-fold (0.20 mg O2/g soil/min), and 8-fold (0.29 mg O2/g soil/min) greater than their whole aggregates from CT, NT, and native forest (NF) soils, respectively. Respiration rates of interior regions of CT aggregates were 70% of NT interiors, suggesting more C was sequestered in centers of NT aggregates. Long-term tillage significantly reduced aggregate porosities by 15%. Saturated hydraulic conductivity (Ks) through individual aggregates from NF soils (1.6*10-4 cm/sec) were 12-fold greater than for tilled soils. Ks through CT aggregates were 53% of NT aggregates. These results indicate soil solution flow through whole aggregates was limited by CT processes bypassing much of the more compacted aggregate interiors.

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Presentation Information:

Presentation Date: Tuesday, November 12, 2002
Presentation Time: 10:00 am-12:00 pm
Poster Board Number: 1914

Keywords:

Oxygen respiration, Hydraulic properties, Porosity, Soil aggregates