The Effect of Total Carbon on Microscopic Soil Properties and Implications for Crop Production. (S01-lebron133147-Oral)

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Abstract:

Soil structure is a dynamic property affected by physical, chemical, and microbiological processes. Addition of organic matter to soils and the use of different management practices have been reported to impact soil structure and crop production. A field experiment was conducted to study the effect of summer cover crop and in-season management system on soil structure. The experiment was a factorial with summer cover crop and management system as the two factors. Summer cover crops were cowpea (Vigna unguiculata L.Walp.) incorporated into the soil in the fall (CI), cowpea used as mulch in the fall (CM), sudangrass (Sorghum vulgare) incorporated into the soil in the fall (S), and dry fallow or bare ground (B). Management systems were organic (ORG), integrated management (ICM), and conventional (CNV) systems. A rotation of lettuce (Lactuca sativa L.) and cantaloupes (Cucumis melo L) were cultivated in the plots for three consecutive years using the same cover crops and management systems for each plot. Disturbed and undisturbed soil cores were collected at the end of the third year and used for laboratory experiments to measure physical, chemical, and hydraulic properties. Image analysis was used to quantify soil structure properties using scanning electron microscope on thin sections prepared from the undisturbed soil cores. We found that total carbon in soils was correlated with porosity, saturation percentage, and pore roughness. Pore roughness correlated with crop production in general and with marketable production in particular.

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