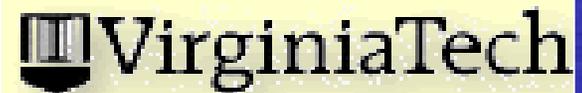


Soil Carbon Research

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2008 NE Cooperative Soil Survey
Conference

Research Areas

- 1) Sequestration Under Biofuel Plots
- 2) Field Kit Testing (values up to 4%)
- 3) Field Scanning OC values

1) Sequestration Under Biofuel Plots

- Introduction –
 - Soil carbon is highly variable spatially in both vertical and horizontal directions
 - Total carbon change over time is seasonally dependent
 - Magnitude of changes in total carbon may be masked by temporal changes and by our ability to measure carbon accurately and precisely

Problem - Solution

- Problem –
 - Microbe and detritivore activity reaches a dynamic equilibrium level over time
 - Changes in inputs or activity (no-till) may affect the soil at some depths but not all (CSSA)
 - Changes in inputs or activity, once ended, may revert to the former levels

Problem - Solution

- Solutions –
 - Search inside water-stable aggregates for carbon
 - Record changes in aggregation over time
 - Record changes at all depths to 1 m
 - Collect bulk density at same time

Solutions – Measure Carbon Pools in Aggregates

- Soil carbon occurs as:
 - Organic matter
 - Active pool available to microbes and detritivores
 - Sequestered pool (physically unavailable)

Organic Matter

- Remove during analysis because an unknown part will become part of sequestered pool

Soil Aggregates

- Use water-soluble aggregate sieving to get the aggregates that do not dissolve, and assume the carbon inside is unavailable to microbes and detritivores
- Assume that total organic carbon minus that inside WS aggregates is available and subject to the dynamic equilibrium

Biofuel plots

- Root decomposition is a very effective way to add carbon to soil, does not require detritivores, weathering, or turbation to incorporate it into the soil
- Warm-season biofuel grasses have massive root systems compared to native or cool-season pasture grasses
- The roots may go deeper into the soil and spread more completely, as these grasses out-compete weeds and other annuals

Biofuel Grasses

- Warm-season biofuel grasses have rhizomes or intense tillering that may decrease bulk density of poorly-aggregated soils
- Aggregation may increase due to increased addition of organic acids
- Soil carbon sequestration may occur if more water-stable aggregates form

2) Field Kit Testing

- Conducted through Rich Ferguson, NSSC
- Initial stages of testing

3) Field Scanning OC values

- Patrick Drohan, Penn State