Emerging Concepts From Past Accomplishments

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CSiTE Program Review

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Importance of Vegetation Effects

- **The influence of vegetation on soil carbon sequestration seen in following studies:**
  - **Rotations with and without corn at Coshocton**
  - **Winter cover crops, especially legume**
  - **Mesquite invasion**
  - **Southern pine vs Douglas-fir plantations**
  - **C3 pasture grasses vs C4 prairie grasses**
- **Different influences in different systems**
  - **Life-history and productivity**
  - **Litter chemistry and placement**
  - **Impact on microbial interactions**

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SOC Chemistry and DOC Dynamics

- **Enhanced hydrolysis of active organic C pools**
- **Organic C sorption sites in mineral soil may play a significant role**
  - **Enhance transfer from reactive sites to protected sites**
- **Accelerated humification possible through microbial, physical, or biochemical processes**

New Concepts for Modeling

- **CSiTE experimental results have indicated imprtant mechanisms regulating soil carbon sequestration not included in current generation SOM models:**
  - **Alteration of bacterial : fungal ratios**
  - **Carbon protection in soil aggregates**
  - **Manipulation of humification efficiency**
  - **Quantitative coupling of hydrology and DOC transport**
- **Incorporation of these mechanisms into CSiTE models will**
  - **Lead to an improved and more realistic representation of the processes regulating soil carbon sequestration**
  - **Allow generalization and extrapolation to other vegetation/edaphic conditions**

New Directions

- **Organization of projects will bring more emphasis on vegetation effects**
  - **Enhance soil C sequestration in agroecosystems**
  - **Enhance soil C sequestration in restoration of cropland to perennial vegetation**
  - **Enhance soil C sequestration in forestry management**
- **Management other than vegetation will also be considered where appropriate**
  - **Soil physical and chemical (moisture, pH, desorption/adsorption dynamics)**
  - **Humification controls (enzymes, microbial)**
- **Modeling integrated into process level studies**
- **Science based modeling tools for evaluation of sequestration strategies to be developed**