Florida Small Farms and Alternative Enterprises Conference

Beginning Farmer and Rancher

11:00-12:00 Building a Business and Marketing Plan
1:30-3:00 Healthy Soils Healthy Farms
4:30-5:30 Selecting Crops to Fit a Cash Flow Plan
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For more information on Small Farms, visit our website at:
http://smallfarms.ifas.ufl.edu or contact your local County Extension Agent.

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Who am I?

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Other overexploitation (7%)

Industrialization (1%)

Cropland agriculture (28%)

Overgrazing (34%)

Deforestation (30%)
Share a Characteristic from your list
Ideal Soil

- Mineral
- Water
- Air
- Organic Matter

Air
Water
Mineral
Organic Matter
Characteristics for each property
Healthy Soil

Chemical properties:
- pH near neutral
- Optimal nutrient levels
- No harmful chemicals
- Low levels of salts

Biological properties:
- Extensive biodiversity
- Plentiful beneficial organisms
- Low pest pressure

Physical properties:
- Good tilth
- Surface structure porous and stable
- No subsoil layers restricting roots
- Good aeration, water storage, drainage

No text in the image regarding biological properties.
So What is Organic Matter? How does it work???
Functions of SOM

**Biological Functions**
- Provides source of energy (essential for biological processes)
- Provides reservoir of nutrients (N, P, S)
- Contributes to resilience of soil/plant system

**Physical Functions**
- Improves structural stability of soils at various scales
- Influences water-retention properties of soils and thus water-holding capacity
- Alters soil thermal properties

**Chemical Functions**
- Contributes to the cation exchange capacity
- Enhances ability of soils to buffer changes in pH
- Complexes cations (enhanced P availability), reduces concentrations of toxic cations, promotes binding of SOM to soil minerals
Components of Soil Organic Matter

- Decomposing organic matter (active fraction): 33% - 50%
- Stabilized organic matter (humus): 33% - 50%
- Fresh residue: <10%
- Living organisms: <5%
The Soil Food Web

**Plants**
Shoots and roots

**Organic Matter**
Waste, residue and metabolites from plants, animals and microbes.

**Bacteria**

**Fungi**
- Mycorrhizal fungi
- Saprophytic fungi

**Nematodes**
- Root-feeders
- Fungal- and bacterial-feeders

**Arthropods**
- Shredders
- Predators

**Protozoa**
- Amoebae, flagellates, and ciliates

**Animals**

**First trophic level:**
Photosynthesizers

**Second trophic level:**
- Decomposers
- Mutualists
- Pathogens, parasites
- Root-feeders

**Third trophic level:**
- Shredders
- Predators
- Grazers

**Fourth trophic level:**
- Higher level predators

**Fifth and higher trophic levels:**
- Higher level predators
Mineralization and Immobilization

Organisms consume other organisms and excrete inorganic wastes.

Organic nutrients are stored in soil organisms and organic matter.

Inorganic nutrients are usable by plants, and are mobile in soil.

Organisms take up and retain nutrients as they grow.
Read Scenarios
<table>
<thead>
<tr>
<th>Amendment</th>
<th>C:N Ratio</th>
<th>Decomposition rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grass clippings</td>
<td>9-25:1</td>
<td>Rapid decomposition (days to weeks)</td>
</tr>
<tr>
<td>Cow manure</td>
<td>10-30:1</td>
<td>Rapid decomposition (days to weeks)</td>
</tr>
<tr>
<td>Vegetable Waste</td>
<td>11-19:1</td>
<td>Rapid decomposition (days to weeks)</td>
</tr>
<tr>
<td>Composts</td>
<td>20-45:1</td>
<td>Moderate decomposition (about six months)</td>
</tr>
<tr>
<td>Oat Straw</td>
<td>50-100:1</td>
<td>Moderate decomposition (about six months)</td>
</tr>
<tr>
<td>Wood chips</td>
<td>100-1000:1</td>
<td>Slow decomposition (possibly years)</td>
</tr>
<tr>
<td>Sawdust</td>
<td>200-750:1</td>
<td>Slow decomposition (possibly years)</td>
</tr>
</tbody>
</table>
Practices that enhance soil organic matter (source NRCS)

- Diverse, high biomass crop rotations
- Cover crops, green manure crops
- Reduced tillage/no tillage
- Strip cropping, permanent beds
- Rotational or prescribed grazing (if animals are in your system)
Crop rotation

source: 2005 Pearson Education Inc., publishing as Benjamin Cummings

• Alternating the crop planted (e.g., between corn and soybeans) can restore nutrients to soil and fight pests and disease.
Conservation tillage  

source: 2005 Pearson Education Inc., publishing as Benjamin Cummings

• No-till and reduced-tillage farming leaves old crop residue on the ground instead of plowing it into soil. This covers the soil, keeping it in place.
Intercropping

source: 2005 Pearson Education Inc., publishing as Benjamin Cummings

- Mixing crops such as in *strip cropping* can provide nutrients and reduce erosion.
Leucaena leucocephala (alley cropping with corn in Nigeria) Copyrighted by Dr. Erick C.M. Fernandes ©2003