Composting

What is composting?
Controlling the natural process of decay to transform organic wastes into a valuable soil amendment called compost.

Benefits of adding compost to soil
• Supplies organic matter
• "Lightens" heavy soils
• Improves moisture retention in sandy soils
• Contains humus – "soil glue"
• Improves soil structure

Benefits of adding compost to soil
• Encourages vigorous root growth
• Allows plants to more efficiently utilize nutrients
• Enables soils to retain nutrients
• Buffers soil pH
• Supplies beneficial microorganisms
• Feeds soil life

How is compost made?
Natural process:
Biological decomposition of organic matter in the presence of oxygen

Human influenced:
We can speed up or slow down the process

Microbes do the work
- Bacteria (including actinomycetes) and fungi
- Chemical decomposers – enzymes
- Found in:
  • Soil
  • Leaves
  • Food scraps
  • Manure
  • Finished compost

Are compost starters needed?
One teaspoon of good garden soil to which compost has been added may contain:
- 100 million bacteria
- 800 feet of fungal threads

Macroorganisms

Needs for the composting process

Acceptable materials – “food for decomposers”
- Leaves, grass clippings and yard debris
- Kitchen scraps: vegetable and fruit peels, coffee grounds and egg shells
- Used potting soil
- Paper and cardboard
- Manure from herbivores
- Most weeds and garden debris
- Sawdust, hay and straw
- Hair, fur and other natural fibers

Compost pile “food” to avoid
- Persistent weeds: crabgrass and quackgrass, invasive species and weeds gone to seed
- Meat, dairy and oils
- Cat or dog waste
- Diseased plants
- Lime and ashes
- Treated lumber or sawdust

Plant materials treated with pesticides
- Some pesticides can be persistent
- Some survive the composting process
- Can damage other plants
Organisms need a balanced diet – Carbon (C) and Nitrogen (N) –

Composting will be most rapid if the decomposers are fed a diet of carbon-rich and nitrogen-rich materials

*Carbon-rich materials are known as “browns”
*Nitrogen-rich materials are known as “greens”

Rule-of-thumb is 2-3 browns for every green by volume

C:N Ratio

<table>
<thead>
<tr>
<th>Materials High in Carbon</th>
<th>C/N*</th>
</tr>
</thead>
<tbody>
<tr>
<td>autumn leaves</td>
<td>30-80:1</td>
</tr>
<tr>
<td>straw</td>
<td>40-100:1</td>
</tr>
<tr>
<td>wood chips or sawdust</td>
<td>100-500:1</td>
</tr>
<tr>
<td>bark</td>
<td>100-130:1</td>
</tr>
<tr>
<td>mixed paper</td>
<td>150-200:1</td>
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<tr>
<td>newspaper or corrugated cardboard</td>
<td>560:1</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Materials High in Nitrogen</th>
<th>C/N*</th>
</tr>
</thead>
<tbody>
<tr>
<td>vegetable scraps</td>
<td>15-20:1</td>
</tr>
<tr>
<td>coffee grounds</td>
<td>20:1</td>
</tr>
<tr>
<td>grass clippings</td>
<td>15-25:1</td>
</tr>
<tr>
<td>manure</td>
<td>5-25:1</td>
</tr>
</tbody>
</table>

Effects of Carbon:Nitrogen ratios on composting

Materials high in carbon break down slowly

*High C:N = 30:1 and higher amounts of C

Diet, continued

Materials that are too rich in nitrogen can lead to anaerobic conditions in the compost pile

*Low C:N = less than 25:1

Oxygen

A pile starved for air will become anoxic or even anaerobic

* Oxygen acids and amines (stinky compounds)
* Aerobic activity stops

Compost pile is out-of-balance

* Food or water out-of-balance (low C:N ratio or pile is too wet)
* Too many greens

Manure Analysis Information Sheet

<table>
<thead>
<tr>
<th>Sample Identification</th>
<th>1st Result</th>
<th>2nd Result</th>
<th>3rd Result</th>
<th>4th Result</th>
<th>5th Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Sample Weight (g)</td>
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<tr>
<td>Sample Volume (ml)</td>
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<tr>
<td>Date</td>
<td></td>
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<td></td>
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<tr>
<td>Time</td>
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</tr>
</tbody>
</table>

Treatment:

- [ ] Liquid Muscle
- [ ] Trace Elements
- [ ] Plant Food
- [ ] Fish Emulsion
- [ ] Kelp
- [ ] Blood Meal
- [ ] Bone Meal
- [ ] Oyster Shell
- [ ] Fish Bone
- [ ] Lime
- [ ] Dried Fish
- [ ] Fish Oils

Type of Storage:

- [ ] Liquid
- [ ] Powder
- [ ] Granules
- [ ] Pellets
- [ ] Solid
- [ ] Fertilizer
- [ ] Organic
- [ ] Compost
- [ ] Manure
- [ ] Soil
- [ ] Compost Tea
- [ ] Tea Blend
- [ ] Powdered Fish
- [ ] Fish Emulsion
- [ ] Kelp
- [ ] Blood Meal
- [ ] Bone Meal
- [ ] Oyster Shell
- [ ] Fish Bone
- [ ] Lime
- [ ] Dried Fish
- [ ] Fish Oils

Note: This is a sample manure analysis information sheet.
**Water**

Vital to support compost pile organisms

"Damp as well as wrung-out sponge"

40% to 60% moisture

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**Temperature**

90° – 140° is optimal

Temperatures above 130° can kill pathogens and weed seeds

Excessive temps (greater than 160°) can kill beneficial organisms

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**Does my compost have to get hot?**

Good compost can be made in a pile that never gets hot, but

* Decay will be slower
* Not enough air, too little water or too many browns in the mix could all keep a pile from heating

High pile temperature provides the benefit of

* The most rapid composting
* Killing pathogenic (disease causing) organisms
* Killing weed seeds

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**Choosing a compost strategy**

**Hot** piles

* Process takes about three months
* Plan ahead
* Store brown

**Cool** piles

* Process takes one-half to two years
* Add materials as they accumulate
* Less effort

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**Troubleshooting**

Nothing is happening!

* Pile is too dry
* Not enough “greens”

My pile stinks!

* Too wet
* Excess “greens”
* Pile compacted

Pests

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**When the composting process should be finished**

Finished is also known as “mature” or “stable” compost

Compost is dark, loose and crumbly

Organic materials are unrecognizable

Ambient temperature
Composting key points

✓ Balanced diet
✓ Keep pile damp
✓ Turn pile when you need to