Composting for the Home Gardener

Presented by Abby Foulk
• Why compost?

• Benefits of composting

• How to compost with good results

• Using compost: home or commercial
Why compost “organics”? 

• Food (and other organics) are too good to waste by throwing into a landfill where they can’t decompose (it creates methane and leachate).

• In Vermont, Act 148 is a phased-in law banning all food waste from our landfills (by 2020), so that it can be turned into compost (an aerobic process) or used to make energy (an anaerobic process).
Overarching Compost Vision

• Recycle your organic materials into compost

• Apply *Compost*. It regenerates your landscape, because organic matter is the main energy source for microbial life

• Nurture life in the soil by giving organisms what they need (diverse food and balanced nutrients, air, water, minimal disturbance)
Why is *Compost* so wonderful?

- Finished (well-made) compost is made up mostly of humus; stable organic matter relatively resistant to further decay

- Compost helps soil **structure** (tilth), **chemistry** (nutrient balance) and **biology** (all 3 support the eco-system of living organisms that enable plant uptake of nutrients)
Soil Benefits of Compost

- Provides carbon/energy source for healthy microbial population
- Increases population of earthworms and other beneficial creatures
- Improves soil tilth (balance of sand, silt, clay, organic matter)
- Stabilizes and holds soil particles together
- Improves aeration, water infiltration, retention and flow
- Reduces compaction, crusting, run-off and erosion
- Encourages plant root development and penetration
- Supplies, stores and retains macro and micro-nutrients
- Moderates pH levels*
- Suppresses soil borne pests and diseases*
- Binds metals and other pollutants
There are environmental benefits too.

- Diverts food, yard waste, manures, bio-solids and other organics from landfill
- Sequesters atmospheric carbon dioxide in soil as stable humus
- Conserves water by reducing irrigation needs
- Reduces need for synthetic fertilizers and pesticides
- Supports storm-water management; erosion control, pollutant filters and reduces site discharge
Green Infrastructure

Healthy soils protect local watersheds;
Engineered compost media slows water, binds contaminants, quickly revegetates
Compost blankets, compost socks, green roofs, rain gardens, bio-swales
So, what *is* compost?

The return of organic wastes to a rich, stable, humus-like material, through a **managed** oxidative decomposition process that is mediated by microbe metabolism. ***(decomposition naturally happens, but compost is managed)  
**(taking place in the presence of oxygen)  
*** (the means by which a microbe obtains the energy and nutrients it needs to live and reproduce.)
Meet the organisms

The micro-organisms (bacteria, fungi) on our food scraps and in our environment do the major work of “decomposing” food scraps. Different kinds of bacteria and fungi thrive in different conditions—relating to temperature, moisture, oxygen levels and chemical composition of the pile. They ALL need:

**AIR**  **WATER**  **FOOD/ENERGY***

*a “balanced diet” of compounds built from **carbon** (carbohydrates) and **nitrogen** (proteins)*
Meet the organic matter: The **carbon** and **nitrogen** “feedstock” for our layering recipe

- Food scraps (chopped up)
- Pruned garden materials
- Manure (type) bedding
- Grass clippings, straw, wood shavings
- Straw
- Leaves (type, mowed)
## Basic Composting Recipe

Carbon: Nitrogen = 3:1 by volume

<table>
<thead>
<tr>
<th>3 Parts Brown or Carbon (C)</th>
<th>1 Part Green or Nitrogen (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown materials are dead or dry. Carbon provides food energy (carbohydrates) to microbes</td>
<td>Green materials are still living or wet. Nitrogen provides protein to microbes for cell building and reproduction</td>
</tr>
<tr>
<td>Mow, grind, hatchet, chip, shred. Variety of material and particle size</td>
<td>Chop into smaller pieces with knives. More surface area for microbes to digest</td>
</tr>
<tr>
<td>Leaves, sawdust, woodchips, hay/straw, dried stalks/thick stems, cardboard, paper towels</td>
<td>Kitchen scraps, vegetative garden debris, grey water, anything rotting, manures, young weeds (if your pile gets hot)</td>
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</tbody>
</table>
Put them together! In Piles...
Or in containers

You may need to add animal barrier- e.g. hardware cloth
Have tools and storage on hand

- Work gloves
- Temperature probe
- Project monitoring binder or shared online documents
- Scales for weighing feedstocks and compost
- Garden hose with spray nozzle
- Manure forks for moving and mixing bulkier materials
- Spade shovels for moving finer materials
- Flathead shovels for chopping materials and cleaning surfaces
- Ice chopper to chop up large garden materials or whole food scraps
- Storage container or shed for storing tools
- Buckets & bins for chopping, mixing, & measuring materials
- Wheelbarrows for transporting mixing, & measuring materials
Combine materials in proper ratios:
Build piles incrementally or make a large BATCH
Layer, mix and stir...water if needed

<table>
<thead>
<tr>
<th>Material</th>
<th>Recipe 1</th>
<th>Recipe 2</th>
<th>Recipe 3</th>
<th>Recipe 4</th>
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</thead>
<tbody>
<tr>
<td>Food Scraps</td>
<td><img src="image1.png" alt="Buckets" /></td>
<td><img src="image2.png" alt="Buckets" /></td>
<td><img src="image3.png" alt="Buckets" /></td>
<td><img src="image4.png" alt="Buckets" /></td>
</tr>
<tr>
<td>Horse Manure</td>
<td><img src="image5.png" alt="Buckets" /></td>
<td><img src="image6.png" alt="Buckets" /></td>
<td><img src="image7.png" alt="Buckets" /></td>
<td><img src="image8.png" alt="Buckets" /></td>
</tr>
<tr>
<td>Leaves</td>
<td><img src="image9.png" alt="Buckets" /></td>
<td><img src="image10.png" alt="Buckets" /></td>
<td><img src="image11.png" alt="Buckets" /></td>
<td><img src="image12.png" alt="Buckets" /></td>
</tr>
<tr>
<td>Chips/Sawdust</td>
<td><img src="image13.png" alt="Buckets" /></td>
<td><img src="image14.png" alt="Buckets" /></td>
<td><img src="image15.png" alt="Buckets" /></td>
<td><img src="image16.png" alt="Buckets" /></td>
</tr>
<tr>
<td>Mulch Hay</td>
<td><img src="image17.png" alt="Buckets" /></td>
<td><img src="image18.png" alt="Buckets" /></td>
<td><img src="image19.png" alt="Buckets" /></td>
<td><img src="image20.png" alt="Buckets" /></td>
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<tr>
<td>Shredded Paper</td>
<td><img src="image21.png" alt="Buckets" /></td>
<td><img src="image22.png" alt="Buckets" /></td>
<td><img src="image23.png" alt="Buckets" /></td>
<td><img src="image24.png" alt="Buckets" /></td>
</tr>
</tbody>
</table>
The first layer in each bin is about 12” of horse manure bedding. Then we add food scraps. Food scraps vary in carbon, nitrogen, moisture content.
The second layer is dry leaves. Notice that adequate feedstock are stored in a dry space.
The third and final layer is horse manure bedding. The food scraps must be totally covered to keep in moisture and reduce smells.
However you build or add to your pile...

Bio-cover is a CRUCIAL *BMP*. Keeps in moisture, helps build heat, keeps down smells.
Taking Care of the Decomposers

Basically, it’s our job to maintain ideal conditions in the compost bin for the fungi and bacteria (or worms), so they can thrive and do their work. Think of us as responsible farmers for all of the “decomposers”.

You learn to judge the health of the pile (and therefore the organisms), by smell, appearance, wetness or dryness. And data collection (with students)!
At CCS we collect data every week; we weigh all the food scraps, we do a smell and squeeze test, measure the height of the pile before and after adding food scraps, and we take the temperature.

What do these data tell us and why is it important?
Smell Test

- **Rotten egg smell** Your pile may not be getting enough air because it's too wet. Turn the pile with a shovel or pitchfork to let in air and mix things up. If particle size is small (under one inch), add a bulking agent such as wood chips.

- **Ammonia odors** often indicate too much nitrogen such as grass clippings or food waste. Add more carbon materials — dead leaves, non-recyclable paper, or straw. Mix the pile thoroughly and see that it passes the squeeze test for moisture.

- **Sweet molasses** smell or **earthy** means the microbes are happy!
Squeeze Test

Too dry

Just right
Like a Garden Journal: needed for cooperative or community compost system
Stirring and Turning Compost
COMMON STEPS IN THE COMPOSTING PROCESS

1. COLLECT & STORE COMPOSTING FEEDSTOCKS
   - Food Scrap Drop-off Mix Scraps with Carbon
   - Browns

2. RECORD VOLUME OR WEIGHT OF INCOMING MATERIALS

3. CHOP LARGE FEEDSTOCKS AS NEEDED

4. MIX FEEDSTOCKS & BUILD YOUR COMPOST PILE

5. MONITOR & RECORD TEMPERATURE MOISTURE LEVEL & ODOR

6. MIX & WATER REGULARLY

7. TROUBLESHOOT AS NEEDED

8. CURE
   - Shh... I'm curing

9. USE OR STORE FINISHED COMPOST

10. SIFT
Common Challenges

• Winter
• Food scrap storage, especially if “batching” instead of incremental pile building
• Enough mass to reach temps
• Animals
• Turning

What are yours?
Using Compost in Gardens

- Creating (or annually amending) garden beds
- Seed Germination mixes
- Side-dressing (fertilizing)
- Compost tea
- Compost as mulch
- Top-dressing lawns
Using Compost in the Home Garden

See Handout from UC Master Gardener program
Quantity and Application Guide
Suggested parameters of compost for use in planting beds

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
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<tbody>
<tr>
<td>pH</td>
<td>5.5</td>
</tr>
<tr>
<td>Soluble Salts</td>
<td>&lt;3.0 mmhos (dS)</td>
</tr>
<tr>
<td>Moisture content</td>
<td>35%-55%</td>
</tr>
<tr>
<td>Particle Size</td>
<td>&lt;1 inch</td>
</tr>
<tr>
<td>C:N ratio</td>
<td>15-30:1</td>
</tr>
<tr>
<td>Bulk Density</td>
<td>&lt;1000 lbs/cu yd</td>
</tr>
<tr>
<td>Organic Matter</td>
<td>&gt;40%</td>
</tr>
<tr>
<td>Foreign Matter</td>
<td>&lt;1% by weight</td>
</tr>
</tbody>
</table>

- Dark brown or black
- Crumbly-textured
- Rich earthy smell
- Same temperature as the air
Be Aware: not all compost is alike

Compost quality and characteristics depend upon:

- Nitrogens or “Greens”: Human bio-solids vs. Food waste vs. Manures
- Carbons or “Browns”: Wood chips vs. Sawdust vs. Leaves vs. Paper Fiber
- Scale and length of composting process, temperatures achieved and “curing” time
- Age: Active vs. Aged vs. Depleted
- Screened vs. Unscreened (particle size)
Finished Compost Varies

- Organic matter content
- pH, soluble salts and other nutrients
- Moisture content
- Texture and particle size
- Maturity and stability
- Weeds seeds
- Biodiversity (mycorrhizae, etc.)
- Plant growth test results (bio-assay)
Some Compost Concerns

• Unfinished compost can rob plants of nitrogen

• Nutrient, metals, soluble salt profile may conflict with soil/plant/siting needs (pH, soluble salts and more)

• Weed seeds

• Persistent herbicides; if using manure, research animal feed, hay/straw, grazing

• PFOA’s and bioplastic polymers (from residual food packaging, compostable food ware)

• Particle size may be wrong for intended use (Adapt USE)
Compost Assurances

- **“Bag smell test”** home compost

- **Germination test** home compost

- If you want certainty, get a **lab test** for: pH, salt, organic matter, maturity and available nitrogen (Penn State, Solvita)

- Commercial compost: buy organic! Check labels (for P-N-K), speak with manufacturer: inputs, bio-assay germination tests
Questions?
Resources

Healthy Soil

Dunne, Niall, ed. Healthy Soils for Sustainable Gardens (Brooklyn Botanic Garden Guide) 2015

Faucette, Britt The Soil and Water Connection: a watershed manager’s guide to organics US Composting Council 2014

Healthy Soils are...Fact Sheets National Resources Conservation Service (online)

UNM Extension Living Soil, Healthy Garden (online)

Composting

ACSWMD A User’s Guide to Backyard Composting (online)

Brown, Sally, Faucette, Britt, Kurtz, Kate The Compost and Climate Connection: a land manager’s guide to organics US Composting Council 2017

Buxton, Cat Building a Healthy and Active Backyard Compost Heap (online)
Grow More, Waste less Go to any talk she gives!

Dunne, Niall, ed. Easy Compost (Brooklyn Botanic Garden Guide) 2013

Institute for Local Self-Reliance Community Composting Done Right: a guide to best management practices (online)

UC Master Gardener Program Using Compost in the Home Garden (online)
Resources, cont.

Vermi-composting

Cornell University  Vermicomposting a Living Soil Amendment  (online) YouTube 9.16 min

Oregon State University  Composting with Worms  (online)

Shedd Aquarium  The Care and Keeping of Worms  (online)

Sherman, Rhonda  The Worm Farmer’s Handbook  Chelsea Green Publishing 2018
Announcements

Bulk Compost Sale
Saturday May 4 from 9 am – noon, at CCS Quonset Hut parking lot
Champlain Valley Compost, Steven Wisbaum

Community Food Scrap Composting Training
This training is designed to help community groups determine the composting system that will best meet their goals for collecting and composting food scraps. Participants will gain the knowledge to: chose the best system for their site; composting basics; safely collect and manage food scraps; accumulate and store carbon sources; site management; volunteer recruitment and training; and more.

Saturday May 11 from 10:00am- 1:00 pm, at Charlotte Library
Optional tour of CCS Compost Shed 1:15 pm
Natasha Duarte, Compost Association of Vermont