Home & Community Food Scrap Composting Success

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www.nerc.org

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organics

Waste Rescue
Reduction
food Composting scraps
Food Waste

- 30-40% of food is wasted each year
- Equals about $1,600 each year per family
- ~13% of carbon pollution emissions are related to the growing, manufacturing, transporting, & disposal of food
Food Waste in Maryland

- Food waste & yard trimmings (organics) make up ~1/3 waste
- Only ~9.6% of food waste was composted in Maryland in 2014
- 9.4% of Cecil County residents are food insecure
Science of Composting
What is Compost?

Compost is a value-added product that converts residue material into:

- Easy-to-handle
- Humus-like product
- Rich in organic matter & organisms
Composting

- Controlled, aerobic biological process
  - Results in the decomposition of organics
- Decomposers: Micro & Macroorganisms
  - Digest organic residues for food & energy
  - Speed up the process by creating heat
Raw materials

- Organic matter - including carbon, chemical energy, protein and nitrogen
- Mineral nutrients - including nitrogen and other elements
- Water
- Microorganisms

Process

- Water
- Heat
- CO₂

Product

Finished compost containing organic matter - including carbon, chemical energy, nitrogen, protein, humus, mineral nutrients, water and microorganisms

Recycled Organics University
www.recycledorganics.com
Compost Bacteria

- **Mesophilic**
  - ✓ Active at lower temperatures

- **Thermophilic**
  - ✓ They’re hot! Active above 120° F
  - ✓ Necessary for more rapid composting
Healthy biological activity is essential to successful composting—setting up the right environment and conditions is fundamental to the process.
Composting Science Basics

- **Aeration**
  - ✓ Oxygen concentrations: 10-14+ %.

- **Carbon to Nitrogen (C:N) Ratio**
  - ✓ 20:1 – 60:1
  - ✓ Preferred 30:1-50:1

- **Moisture**: 40 to 65 percent
  - ✓ Like a damp sponge
Science, cont.

- **Optimum pH range**
  - ✓ 5.5 to 8

- **Temperature** – 90°-150°F (32°-66°C)
  - ✓ *Process to Further Reduce Pathogens*
  - ✓ 131°F for 3-15 days (f of system)
Basic Recipe

- 2-3 Parts Carbon - “Brown” materials
  - Woody, dry materials: wood shavings, leaves, soiled/shredded paper, straw, animal bedding

- 1 Part Nitrogen - “Green” materials
  - Fresh, “wet” materials: food scraps, grass clippings, garden trimmings (no weeds), manures

- Keep it small!
  - Mowing, grinding, chipping, or shredding

Does your site have enough of the right mix?
High Carbon 2-3 volumes

High Nitrogen 1 volume
Recipe, Cont.

- A little soil, finished compost, or horse manure
- Moisture
  - Just a little, like a damp sponge
  - Leave lid or cover off during rain
  - Required to keep microorganisms alive & active
<table>
<thead>
<tr>
<th>Carbon Sources</th>
<th>Carbon:Nitrogen Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yard wastes</td>
<td>50 - 90:1</td>
</tr>
<tr>
<td>Straw/hay</td>
<td>50 - 80:1</td>
</tr>
<tr>
<td>Wood chips/sawdust</td>
<td>250 - 500:1</td>
</tr>
<tr>
<td><strong>Nitrogen Sources</strong></td>
<td></td>
</tr>
<tr>
<td>Vegetable scraps</td>
<td>10 – 30:1</td>
</tr>
<tr>
<td>Fruit scraps</td>
<td>10 – 30:1</td>
</tr>
<tr>
<td>Grass &amp; garden gleanings</td>
<td>10 – 20:1</td>
</tr>
<tr>
<td>Chicken manure</td>
<td>10 – 25:1</td>
</tr>
<tr>
<td>Cow manure</td>
<td>20 – 30:1</td>
</tr>
<tr>
<td>Horse manure</td>
<td>25 – 30:1</td>
</tr>
</tbody>
</table>

Recipe, cont.

- Containers or piles
- Cover

Minimum of 3 x 3 x 3
Recipe Tips for Tumblers

- Start with equal parts C to N or 2 parts C to 1 part N
- Adjust to speed decomposition
  - ✓ Temperature
  - ✓ Moisture level
  - ✓ Active decomposition
Recipe Tips for Bins/Piles

- Carbon – keep with the $30^+:1$ C:N
- Bulking agents – wood shavings, chips
  - Odor control – shavings
  - Chips/twigs on bottom
    - Provide porosity
    - Pile stabilization
    - Aid air flow
General TIPS

- Mix ingredients together to create a better balance—homogeneous mix
  - Adding food scraps
    - No more than 20%, more okay in tumblers/Jora
    - Balance C:N ratio, moisture, bulk density
  - Observation, temperature, look & feel of compost, trial & error
Aeration Techniques

- Tumblers: Close lid & rotate
- Piles, bins: Lift materials with pitch fork
  ✔ Move materials from outside to inside
  ✔ Or, place materials on perforated pipes or pipe through middle
Acceptable Materials

- Vegetable food scraps, peels
- Fruit food scraps, peels
- Nuts & nut shells
- Dairy, cheese, eggs/egg shells
- Coffee grounds/filters & tea bags
- Leaves, garden trimmings
- Napkins, paper towels
- Sawdust
- Livestock bedding/manure
- Straw
DO NOT COMPOST

- Meat/Bones/Grease
- Weeds
  - Tomatoes & squash may sprout “volunteers”
- Cat litter or dog manure

** Small amounts of meat & grease, e.g., in soups, casseroles, sauces should be fine.
COMPOST SYSTEMS & OPERATIONS

FOOD SCRAPS
Tumblers
Compost Bins
Aerobin & Jora
3-BIN SYSTEM

Image Cr.: George McDonald, Maine DEP
Windrows

Images Cr.: David Hurd, GrowNYC
In-Vessel

The Dirt Factory community composting facility in University City
Image Cr.: PlanPhily
Aerated Static Piles

Images Cr.: David Hurd, GrowNYC
Black Dirt Farm  Devine Gardens

Vermicomposting

Image Cr.: Black Dirt Farm  Image Cr.: Devine Gardens
Brattle
grow Compost

Windham Solid Waste Management District’s All Purpose Compost

Call to order 802-257-0272
Grow Compost Vermont
Onondaga County Resource Recovery Agency

Tipping fee: $34/ton vs. $84/ton MSW
Community Composting

- Often volunteer run; some operated by nonprofit organizations or farms
- Produces compost for local use
- Promotes community connections
- Provides an essential role in the evolution of food scrap diversion
- Range of sizes - 10 sq. ft. – 20,000 sq. ft.
Maryland Regulations

- Exempt
  - Any feedstocks
  - No more than 5,000 sq. ft. “in support of composting”
  - Maximum pile height restrictions
    - Feedstocks no higher than 9 ft.
    - All other piles no higher than 12 ft.
  - Operated so as to not be a nuisance
Costs & Inputs to Build System

Materials, Equipment, Supplies, Tools
Bins, Screener

- Purchased Bins, Tumblers
- Tools to assemble or build
- Wood
- Screws, bolts, nails, etc.
- Hardware cloth
- Screening material
Supplies

- Gloves
  - ✔ Rubber for handling food scraps
  - ✔ Gardening for turning
- Tarps
- Signage & fliers
- Scissors (cut bags)
- Water-proof box for logs
Equipment/Tools

- Chopping & Shredding
  - Trowels for tumblers
  - Hatchet
  - Garden edger or spade shovel
  - Pruners
  - Mulch mower
Equipment/Tools

- Turning & Material Moving Tools
  - Pitch fork
  - Shovel
  - Bobcat/tractor
- Thermometer
  - For hot composting
PROCESS & MANAGEMENT & MONITORING

Food2
Site

- Year-round accessibility
- Access to a water source is necessary
- Shrubbery, fencing, or cover to block wind
- Shady/partial sun is best
- Sit bins/piles on ground, grass or vegetated area
  - Tumblers can be mounted
Ludlow Community Compost Site

Jora/Tumbler

3-Bin System

Signage

Food scrap collection bins & carbon storage
Receiving/Mixing

- Feedstock Preparation
  - ✓ Size reduction: chop, shred
  - ✓ Mix: homogenous blend
- Blend proper C:N ratios
- Add moisture, if needed

Image Cr.: Dreamkeeper Garden
Mixing in the Tumblers
Mixing Food Scraps in Bins

Food Land Opportunity - Chicago

Nola Greens – New Orleans
Simple & “Slow” Method

- Follow the basic recipe
- Turn occasionally
- Compost ready in 12-18 months
Hot Compost

- Temperature should rise to at least 90-120° F
  - 130°F for PFRP
  - Turn/rotate materials to achieve heat
    ➢ 1-2 times per week, as needed
“Hot” or Active Composting

- Enclosed containers
  - Insulate in winter
  - Larger containers or tumblers
  - Cover piles – tarp or chips
- Proper C:N “mix” of feedstocks
- Add water, as necessary
Hot Compost, cont.

- Fill one tumbler or bin completely prior to moving to next
- More frequent turning of materials
  - ✓ 1-2 times per week
- Temperature should rise to 120° F
- Finished compost in 4-8 months
Ready for Curing

- Ingredients are digested & bacterial activity declines
- Compost pile heats up very little
  - Even after turning or aerating the pile
- Compost has a uniform, crumbly appearance, earthy smell
Curing

- Store in bin or pile
- Turn occasionally
- Keep moist

Image Cr.: Rodale
Chapel Hill Community Compost

Image Cr.: Chapel Hill Spring Garden Tour
Harvesting & Screening

- Remove finished compost from curing area
- Screen/sift
- Send sample for testing
- Cover until ready for use
- ✓ Signage – “finished compost”
Finished Compost - Screening

Image Cr.: University of Florida/IFAS Extension Sarasota County

Image Cr.: EcoCity Farms
Monitoring the Process

- **Observation**
  - ✓ Are the bins or piles steaming?
  - ✓ Are materials looking different?
  - ✓ Is decomposition occurring?
  - ✓ Materials looking like soil?
  - ✓ Is the pile uniformly composting?
Monitoring the Process, cont.

- **Compost feel**
  - ✔ Does the squeeze test indicate that there is moisture in the material
  - ✔ Does it feel like a damp sponge & stick together?
  - ✔ Is the material too wet.slimy?
Monitoring the Process, cont.

- **Oxygen**—Smell is the best measure of properly aerated composting
- Unpleasant odor – indicative of anaerobic conditions
  - ✓ Pile needs to be turned
Temperature monitoring

- Is the temperature rising appropriately for rapid compost?
- Does the temperature rise to 90°F
- Maintain for PFRP (131°F...ideal)
Tips

▪ Adequate amount of carbon
▪ **Always** cover food scraps with carbon & soil
  ➢ Sawdust is best
▪ Cover with lime if fruit flies & vermin (rodents, bears) an issue
Tips

- Line bottoms of bins with wire mesh
  - To detour vermin
- Use vinegar to wash collection containers
If Critters Become An Issue

- Use Jora, Tumblers for full decomposition
- Eliminate any meat, sauces, cheese
- Discontinue adding food scraps, especially in early spring
- Build an enclosure around the compost area
Bins within Fencing

Down to Earth Community Garden
Compost Testing

- Maturity
- At a minimum—analyze the basic nutrient content—nitrogen, phosphorous, & potassium (N:P:K:)
- Bioassay testing
BE ONE WITH YOUR COMPOST

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