Backyard Composting: Avoiding Toxic Compost

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Whether you have one

many cows,

a few goats,

or food waste…

Organic matter is a resource!! Don't waste it!

Methods of Composting

- Active windrows/bins: This presentation
- Passive windrows
  - Requires passive aeration technology
- Worms: Online Fact Sheet (vermicomposting)
  - http://www.ext.colostate.edu/PUBS/LIVESTK/01224.pdf
  - http://www.ext.colostate.edu/PUBS/LIVESTK/01225.pdf
  - http://www.ext.colostate.edu/PUBS/LIVESTK/01226.pdf

What Are the Benefits of Composting?

- Reduces volume of material by approx. 30%
- Minimizes pathogen, weed, odor, and insect problems
- Stabilizes nitrogen and phosphorus compounds which minimizes water pollution
- Produces a useful and marketable soil amendment
- Sequesters carbon into a stable form that can be put back into the soil (instead of in a landfill)

What is Composting?

- Composting is the
  - managed,
  - biological,
  - oxidation process that converts
  - heterogeneous organic matter into a more
  - homogeneous, fine-particle humus-like material.

from FIELD GUIDE TO ON-FARM COMPOSTING (Rodale Institute)
http://www.css.cornell.edu/compost/OnFarmHandbook/onfarm_TOC.html

MANAGED: what YOU do!

- Provide carbon (C) and nitrogen (N) in 30:1 ratio
- Provide oxygen for oxidation process at 5-50%
- Provide water to keep moisture at 50%

BIOLOGICAL:
what microorganisms (MO's) do

- Many species of bacteria and fungi metabolize the C and N to grow and multiply, using oxygen and water in the process

- Composting is farming MO's, which are present in the soil!

OXIDATION

- "In the presence of air"
- Used by MO in respiration
- Oxygen is in pore space in compost windrow
- Use bulking material and turn to maintain pore space for air

A variety of initial materials creates lots of air pockets, or pore space.

Heterogeneous Organic Matter

- Kitchen scraps
- Bedding
- Waste hay
- Spoiled feed or grain
- Leaves and grass clippings
- Horse manure

Homogeneous, Fine-particle Humus-like Material

- This is the final product that you are aiming for at the end of a successful composting process.

How to Make Compost!

For any scale that you choose

Choose a site

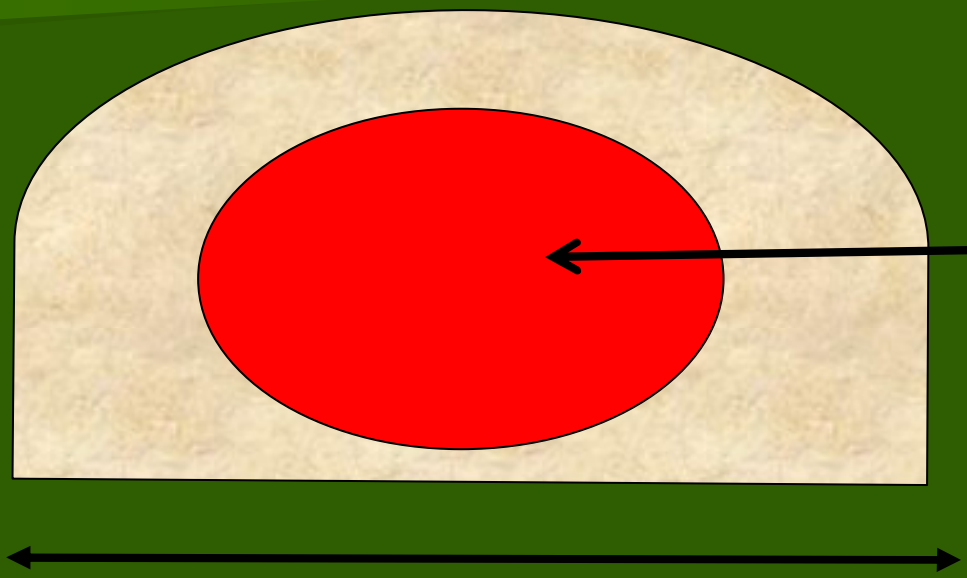
- Mowed area, smooth, slightly sloping
- Near feedstock source
- Near water tap and at least 100 ft. from "waters of the state" or wells
- Control run-on and run-off

This is a bad location for manure or compost. Keep them 100 feet away from open water or wells.

Building the Pile

- Layer manure loosely with bulking material, adding water to 50%
- Add new material at one end if you want to build a windrow instead of a pile

What happens inside the pile?



Height and width depend on your feedstock volumes and equipment

END VIEW OF COMPOST WINDROW/PILE

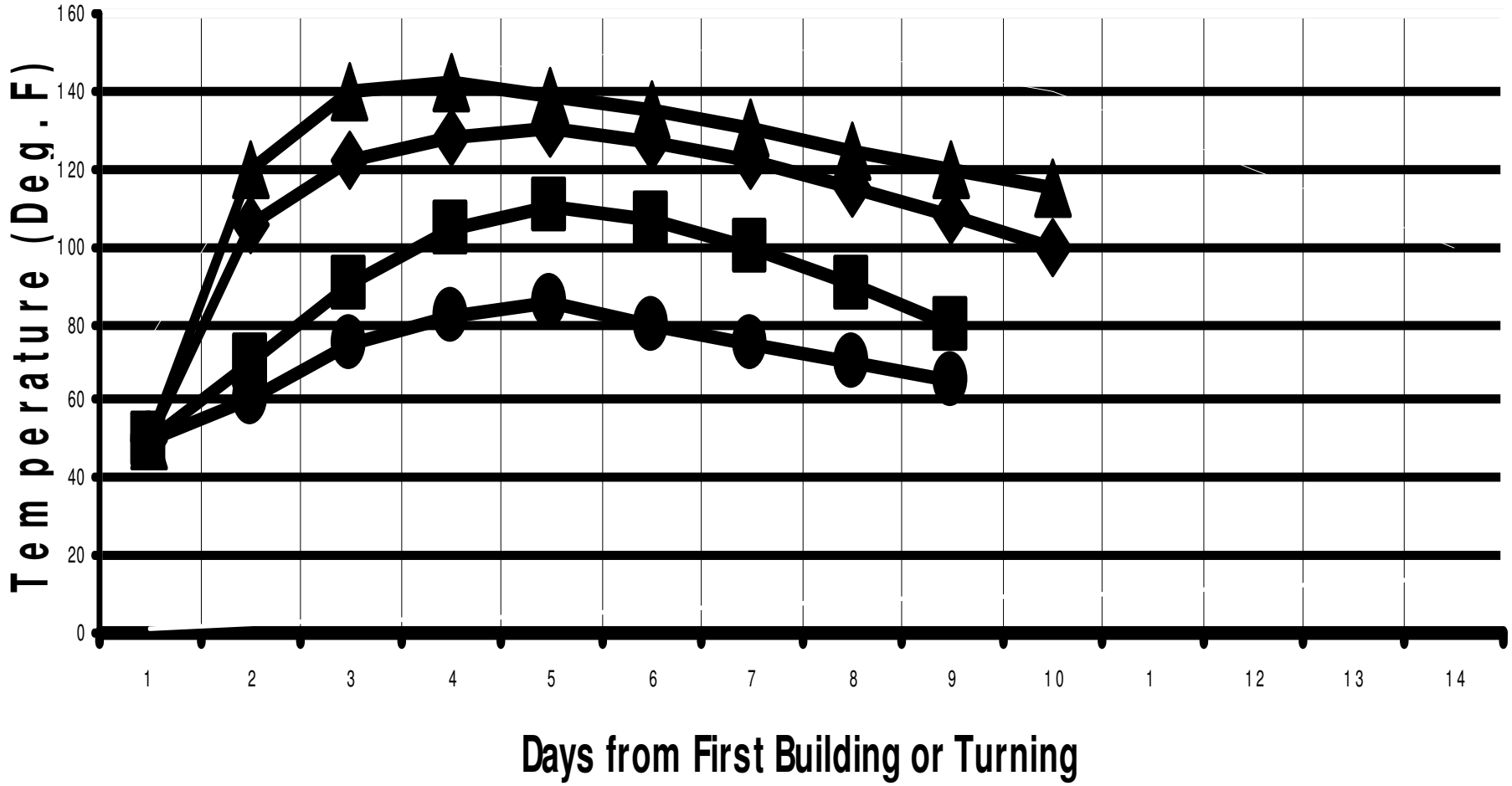
Monitor the Windrow

- Check temperature with compost thermometer (www.reotemp.com) or your hand
- Heat is an indicator of biological activity
- Graph heating cycle: increase then decrease
- After decrease, turn to aerate and add water, use graph to help with timing

Insert a thermometer into center of pile to monitor temperature, which is an indication of biological activity.

Even in winter composting organisms metabolize enough to produce substantial heat.

Relationship of Time and Temperature to Compost Turning



Continued Monitoring…

- After turning, monitor heat cycle again
- Turn when temperature decreases
- Check moisture and add if necessary
- Repeat turnings until temperature ceases to rise (about 4-5 turning cycles)

Curing Phase

- When temperature curve flattens, mesophilic (mid-temperature) MO's take over to finish process
- Keep windrow moist, less th
- Cure for 1-2 months

Why cure?

- Assures highest quality product
- pH shifts to neutral
- Soil MO's re-colonize compost, impart disease suppressing qualities to compost
- If too much C left, use of this compost as a soil amendment may cause a temporary N deficiency, just the opposite of what you want!
- Makes compost optimum for plant growth

When is my compost done?

- After heating cycles stop
- After curing
- Check for homogenous, fine-particled humus-like appearance
- Earthy smell
- Maturity tests: Solvita test (becoming recognized by highway departments), and others, experience!
  - **www.woodsend.org**

Avoiding Toxic Compost I

- Never add meat/cheese/bones to a compost bin
  - This will avoid the colonization of maggots in your pile
- Know where your feedstocks came from
  - Antibiotics? De-wormer? A mature compost will be antibiotic free
  - Herbicides? Some broadleaf herbicides (chlopyralid) do not break down in the composting process and may deter growth of your broadleaf garden plants
  - Heavy metals? This is typically not an issue in compost unless you are composting biosolids

Avoiding Toxic Compost II

- Assure that your compost is **mature**
  - **Maturity = low microbial activity = fully composted**
  - This will avoid ammonia burn in your plants
  - Nitrogen in your garden soil will not be immobilized by unfinished compost and 'rob' your plants of nutrients
  - Pathogens (E .coli/Salmonella) are destroyed during a well managed composting process
- Test your compost!!! And your soil!!!
  - This will help you determine how much compost your soil needs. More is not always better!

Now what??

- Useful soil amendment
- Contains N,P, K, micronutrients, and live microorganisms, amounts vary
- N is released slowly
- Topdressing with ½-1 inch is usually OK
- Send compost sample to soil lab **with** soil sample to correctly determine how much to apply

Troubleshooting

- No heating
- Smells: rotten smell or like ammonia
- Etc, Etc!
- See troubleshooting handout from On-Farm Composting Handbook, http://www.css.cornell.edu/compost/OnFarmHandbook/onfarm_TOC.html
- Contact: Addy Elliott
  - 970-491-6984, Adriane.Elliott@ColoState.edu

QUESTIONS?

Happy Composting!