

## Compost for Organic Systems

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## Overview

- What is compost?
- Composting 101
  - C : N ratio
  - Aeration
  - Water
  - Time
- Equipment
- Assessing quality compost
- Using compost

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## What is Compost?

- Stable, organic, soil-like
- Produced by the aerobic, biological decomposition of organic matter
- Homogeneous
- Pathogen free



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## Benefits of Compost

- Organic Matter: improves soil physical and chemical properties
- Nutrients: N P K and micro-nutrients
- Micro-organisms: replaces soil microbes lost during soil disturbance
- Physical properties: protects soil surface from erosion
- Recyclable!



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## Making Compost

- Think micro-organisms!

FOOD + WATER + OXYGEN



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## Temperature

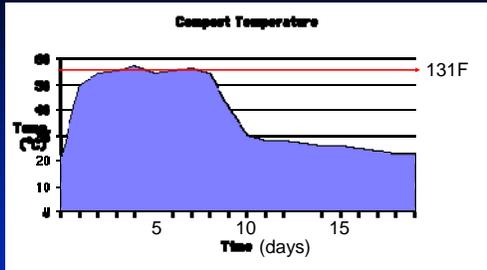
- When microbes are active they give off heat, when they are not they don't!
- Important indicator of things going right (and wrong)
- Too high (>140F)
  - Not enough air
  - Pile too dry
  - Pile too large (> 8 feet)
- Does not heat up
  - Too dry or too wet
  - Not enough nitrogen
  - Pile too small (< 3 feet)



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## Temperature: no turning

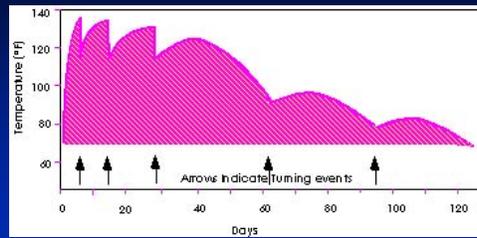


- <http://compost.css.cornell.edu/physics.html>

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## Temperature: with turning



- <http://compost.css.cornell.edu/Factsheets/FS5.html>

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## FOOD: Carbon & Nitrogen

- C:N ratio 25 – 30:1

- Broiler litter: 14:1
- Cattle manure: 19:1
- Swine manure: 14:1

Need additional sources of  
CARBON: woody  
wastes, straw,  
paper etc.

Source: Northeast Regional Agricultural Engineering Service

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## WATER

- Manure: dairy ~ 80%; litter ~ 25%
- Rain
- Other wastes
- 40 to 60% needed
  - Moist to touch but not wet

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## OXYGEN

No oxygen = BAD BUGS + BAD SMELLS

### Aeration systems

- Passive
- Windrows
- Aerated piles
- In-vessel systems

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## Passive Systems

- "Pile-up and Ignore"
- Minimal management
- Long time
- Poor quality end product



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## Windrow Systems

- Build windrows
- Monitor temperatures
- Turn regularly
- Add water
- Good end-product after 3 to 4 months
- Test



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## Aerated Piles

- Similar to windrows
- Less labor
- Air forced through piles: by convection or compressor



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## In-Vessel Systems

- More expensive
- Compost bins
- Not appropriate for manures?



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## Making Compost from Manure

- Construct windrows
- Active composting period: monitor temperature (kill pathogens and weed seeds), 3 months
- Cure: > 2 months



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## Permits for Compost

- Tennessee Department of Environment and Conservation  
<http://www.state.tn.us/environment/index.html>
- Division of Solid Waste
  - Chapter 1200-1-7
  - Solid Waste Disposal and Processing
    - Chapter 1200-1-7-.11
    - Requirements for Compost and Compost Facilities

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## Requirements for Compost and Compost Facilities

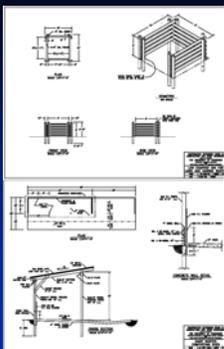
- No permits needed for "*Backyard Composting*" or "*Normal Farming Operations*" for their own use on that property
- Up to 10,000 cubic yards of manure need to obtain a Permit by Rule:
  - 1200-1-7-.02(1)(c)
- Over 10,000 cubic yards need a permit

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## Equipment

- Decide on what system you want
  - Windrows
  - Compost bins
- Use what you have
  - Skid loader
- Buy a long-stem thermometer!



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## Assessing Compost Quality

- Mature Compost = stable, homogenous, no odor
- Does not heat on turning
- No ammonia smell
- Kits available: CO<sub>2</sub> / ammonia



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## Sources of Compost in TN

- Monterey Mushroom plant
  - May need further curing
- Knox County Green-Waste facility
  - Check for biosolids!
- Compost farm, Brentwood & Franklin

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## Using Compost

- Don't guess soil test!
  - How much P and K does your soil need?
- Have your compost tested
  - UT Container Media
    - Saturated Paste Extract - pH, P, K, Ca, Mg, Ammonium and Nitrate Nitrogen, Soluble Salts - \$20.00
  - Specialized labs:
    - Soilfood web, OR (<http://www.soilfoodweb.com/>)
    - Woods End, MA (<http://www.woods.end.org/>)
- Apply based on soil test recommendations

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## Environmental Concerns

- Learn how to compost
  - "Part Science, Part Art!"
- Beware of over-application
- Phosphorus losses
  - Runoff
- Nitrogen losses
  - Nitrate leaching
  - Ammonia volatilization

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