



# Composting in Your Backyard

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*Protecting Maine's Air, Land and Water*

## Why Do People Want Compost?





# Food Recovery Hierarchy

Most Preferred

## Source Reduction

Reduce the volume of surplus food generated

## Feed Hungry People

Donate extra food to food banks, soup kitchens and shelters

## Feed Animals

Divert food scraps to animal feed

## Industrial Uses

Provide waste oils for rendering and fuel conversion and food scraps for digestion to recover energy

## Composting

Create a nutrient-rich soil amendment

## Landfill/ Incineration

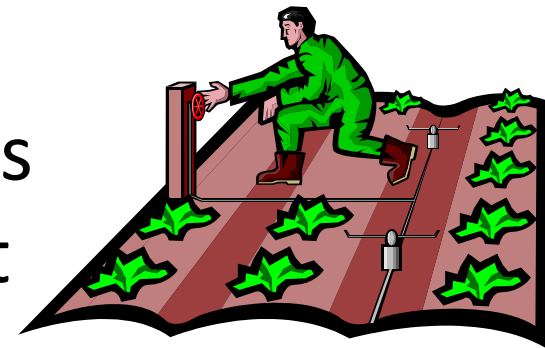
Last resort to disposal

Least Preferred



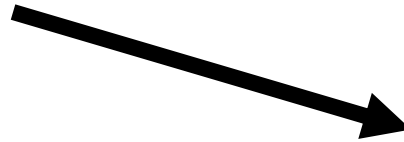
# Benefits of compost

- Add organic matter to soil
- Increase water holding capacity
- Increase infiltration
- Reduce erosion
- Enhance microbial activity
- Soil compaction
- Resistance to disease and insects
- Revolving nutrient bank account



# What is Composting?

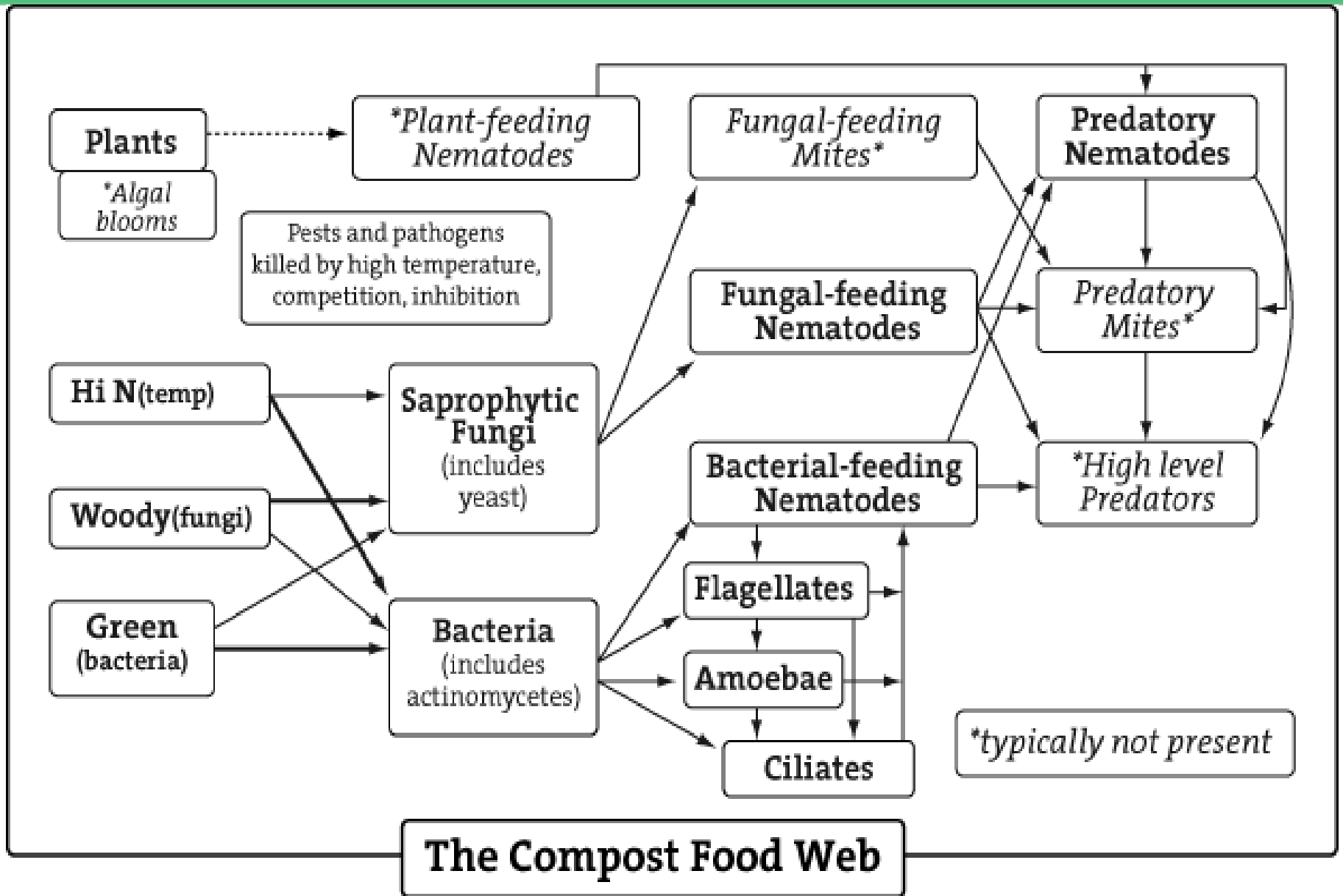
- A biological process that *transforms* raw organic materials into a nutrient rich, biologically-stable soil additive suitable for plant and crop use.



# Compost Community

- Macroscopic Invertebrates-do most of initial mechanical break-down of organic materials into smaller particles
  - Snails, slugs, mites, sow bugs, worms, ants, centipedes, millipedes, beetles
- Microorganisms-digest and “transform” organic matter into stable humus-like particles
  - Bacteria, fungi, actinomycetes, and protozoa





# What Makes a Compost Pile Work?

- C:N ratio
- Oxygen content (porosity)
- Moisture content
- pH
- Particle size





# So...What is a C:N Ratio?

- Supply of total carbon compared to total nitrogen in compost feedstock
- If C:N is too high the compost process will slow
- If C:N is too low, more likely to lose Nitrogen as ammonia gas or in leachate
- Ideal initial C:N mixture range is 20 – 30:1



# Carbon Feedstocks

- **Carbon: 30:1 or >**
  - Leaves
  - Wood shavings
  - Card board: caution
  - Shredded Newspaper
  - Wood chips
  - Corn stalks
  - Straw

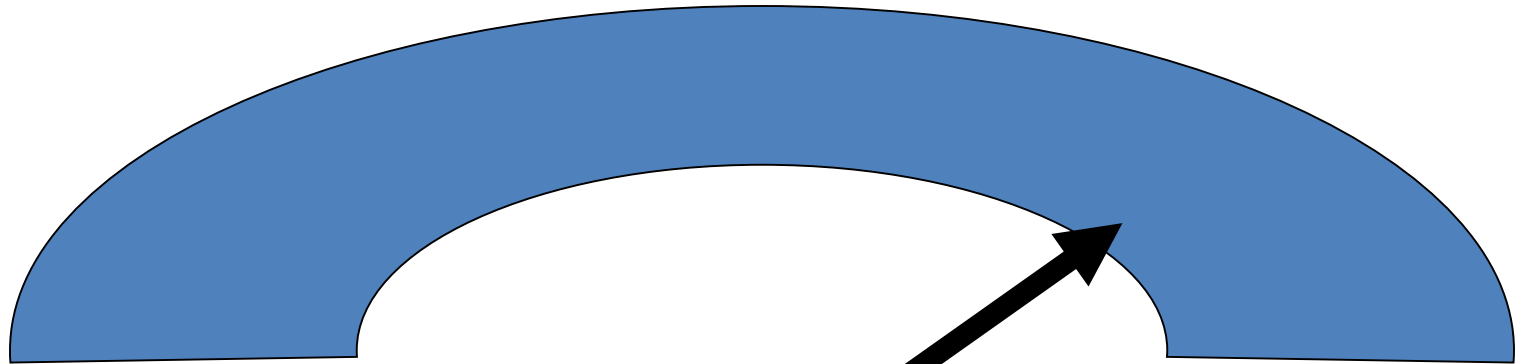


# Nitrogen Feedstocks

- **Nitrogen: 30:1 or <**
  - Animal manures
  - Food waste
  - Lawn clippings: caution
  - Fish
  - Garden clippings: caution



# Oxygen, We All Need It!!



**Bad!**

- Low oxygen
- Slows Down
- High odors

**Excellent!**

- High oxygen
- Efficient
- Low odors



# Microbial Classification

- Based on Two factors:
  - Oxygen Consumption
    - Aerobes (use  $O_2$ , largest population)
      - Facultative-use  $O_2$ , but can swap
      - Obligate-use  $O_2$  only!
    - Anaerobes (mostly killed or inhibited by  $O_2$ , but can be facultative)



# Oxygen!!!

- **Aerobic respiration**-use  $O_2$  as primary oxidizing agent (most efficient)
- **5%-10% is optimal for compost process**

**Aerobic Decomposition is the “quickest” way to achieve biological stability!!**



# Aerobic Composting and Temperature

- Active composting occurs in the temperature range of 110°F to 160°F
- Pile temperature may increase above 160°F but this is too hot for most bacteria and decomposition will slow until temperature decreases again



Remember, compost pile heat is the direct result of bacteria working!



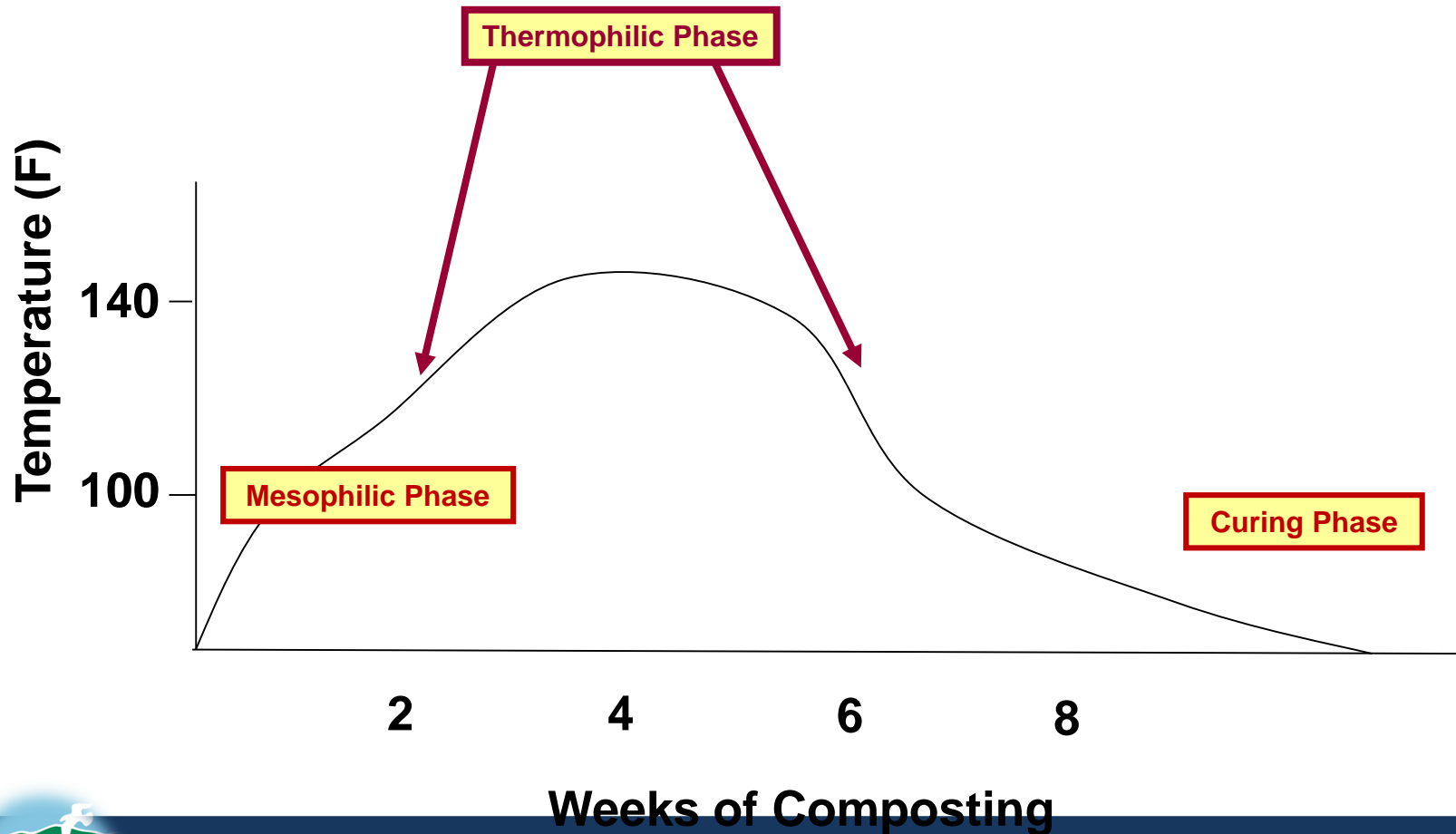
# Phases of *Aerobic* Composting

- **Initial Mix**-Materials are blended together (day one)
- **Mesophilic phase**-Moderate temperatures (50-110°F) lasts for a few days
- **Thermophilic phase**-High temperatures (110-160°C) lasts for 4-6 weeks
- **Curing and Maturation phase**-Temperature moderate down to ambient lasts for 3-6 months

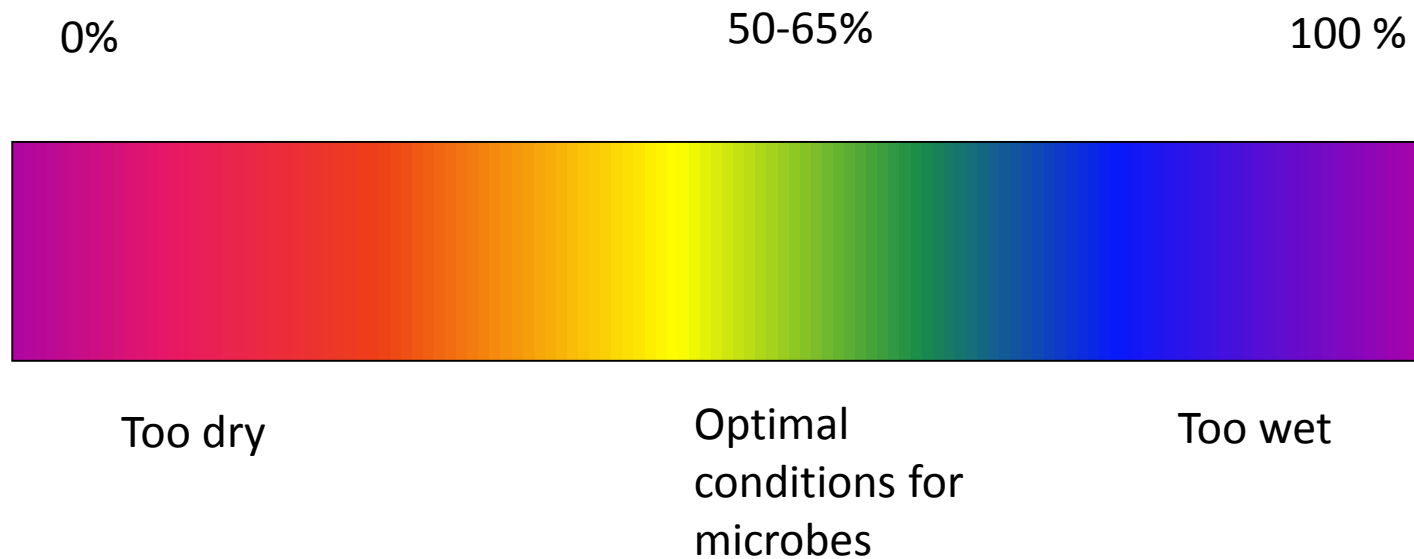




# Typical Temperature Profile



# Compost Moisture



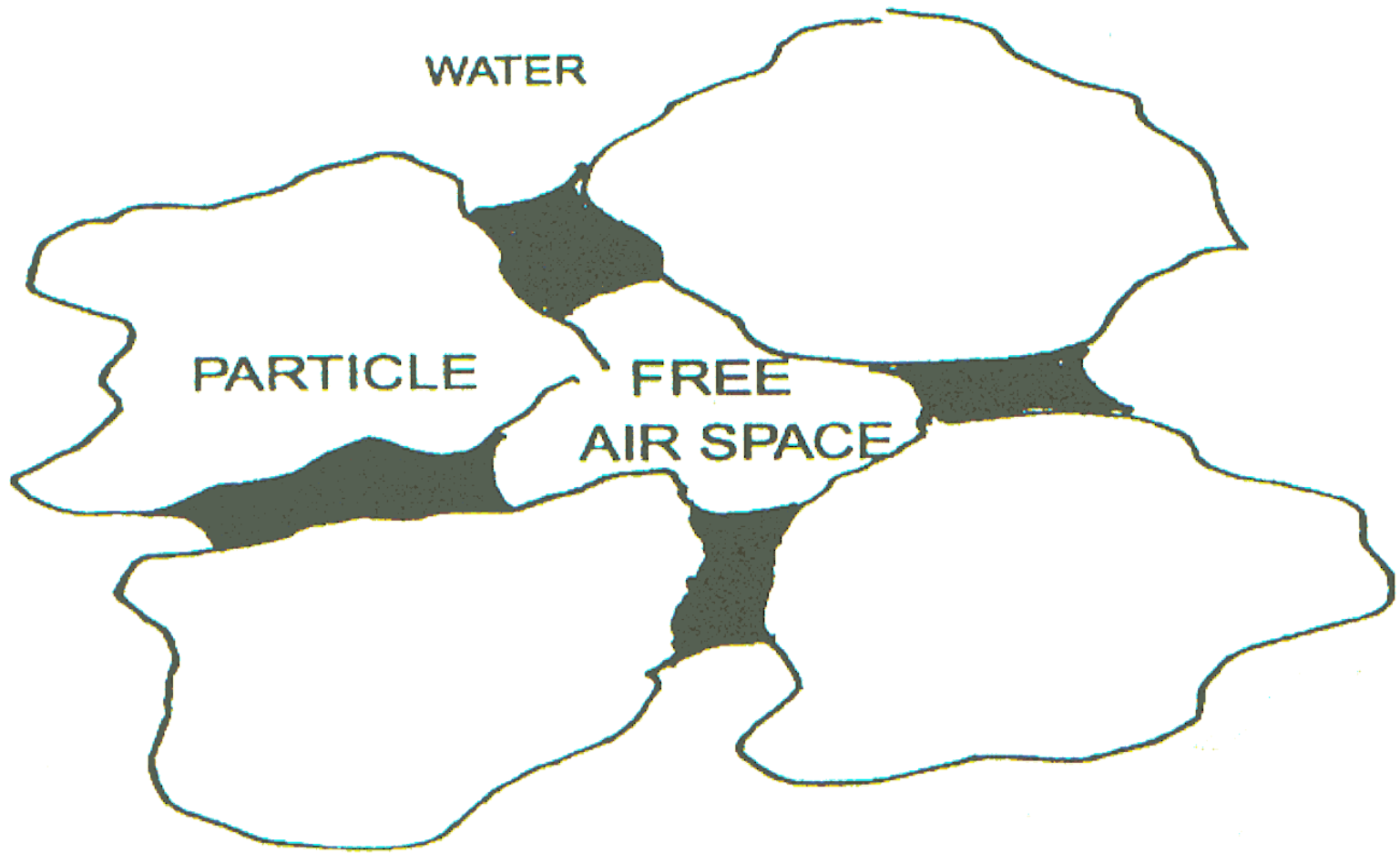
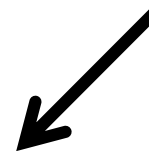


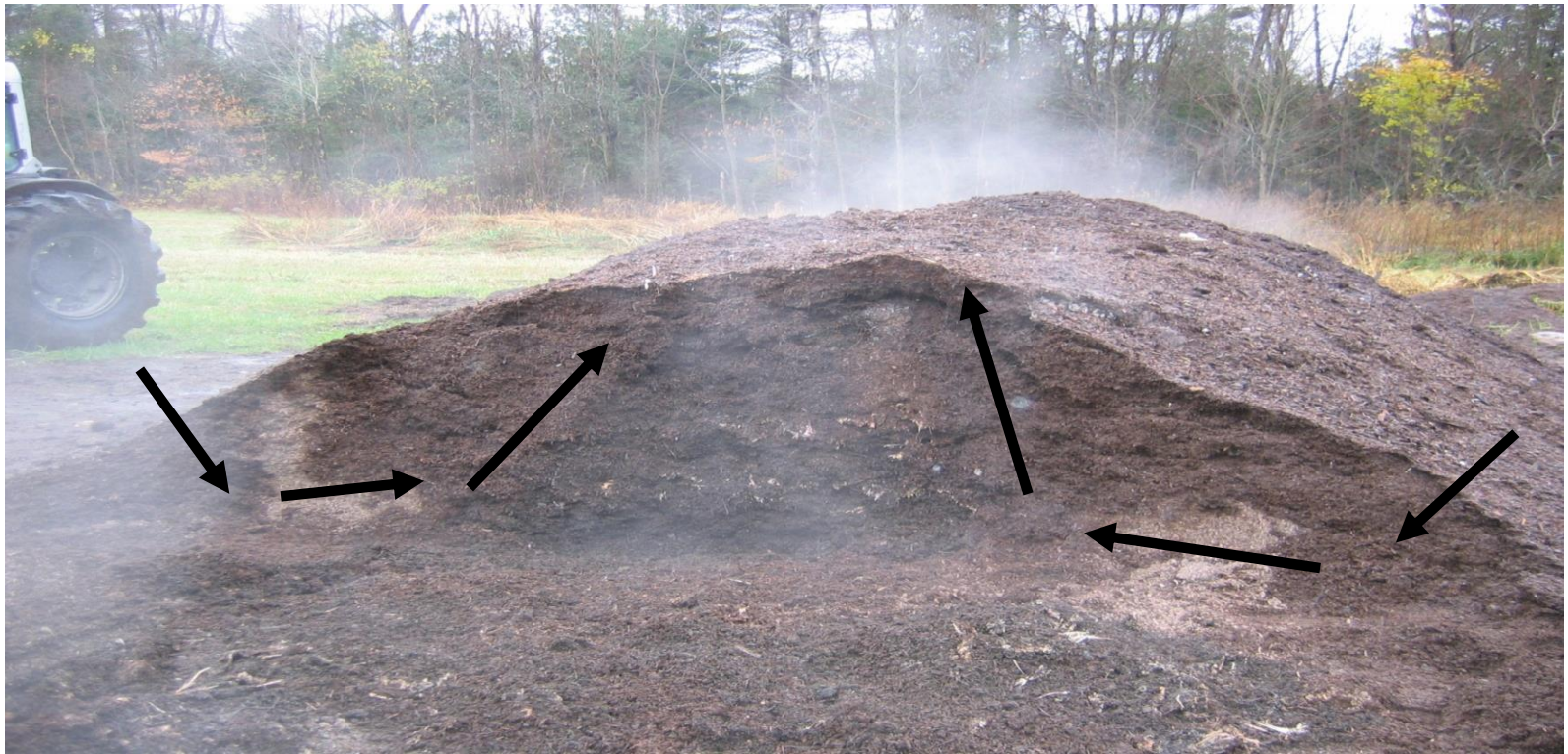
FIGURE 2.10. The relationship of free air space to water and particles in a composting media.



# What Does Particle Size Do?



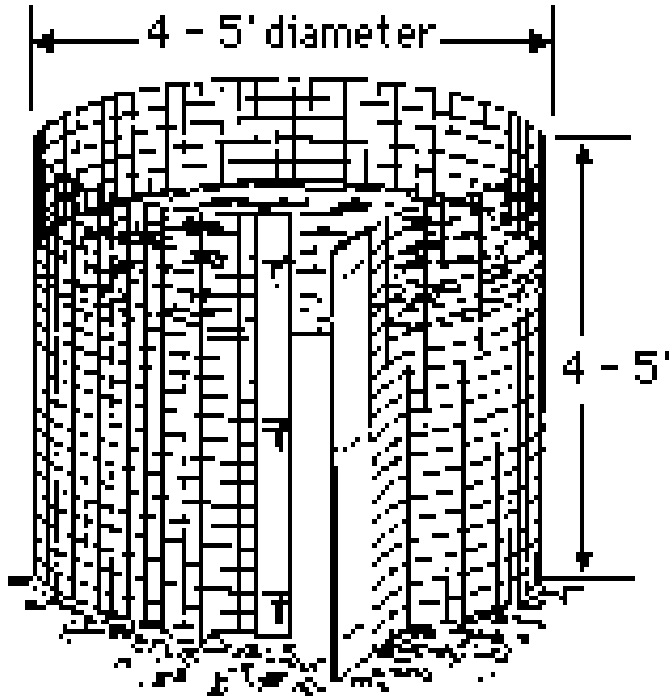
# Moisture Distribution vs. Air Flow Through Compost Pile



# What Compost System Should I Use?



# Simple Bins

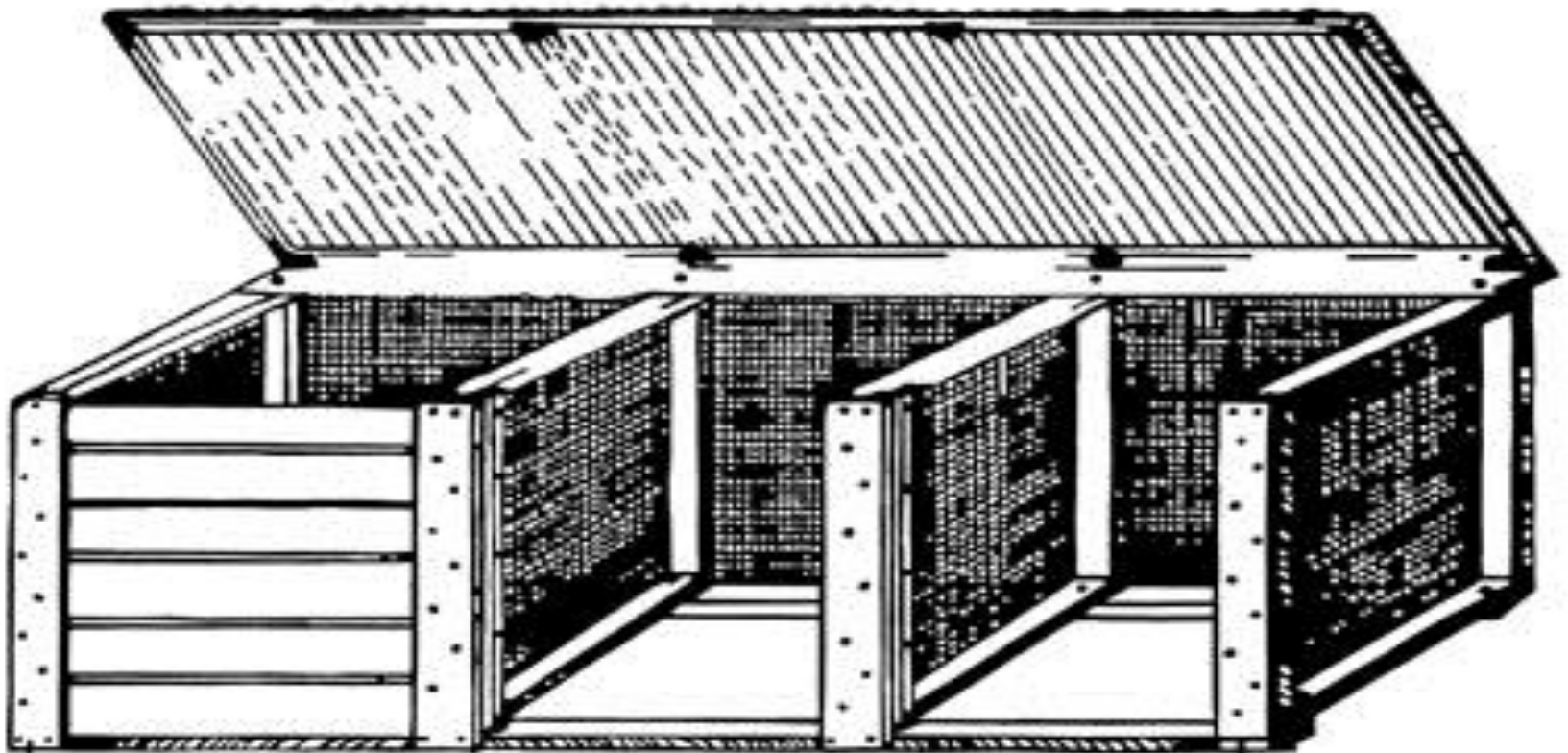






# Backyard Compost Bins

## 3 Bin System





Y P O C O L D Emma Emily

Dani Chloee

COMPOST





# Backyard Compost Bins “Tumblers”





# Open System



# Tools...

- **Spade fork**
- **Kitchen food collector**
- **Thermometer**
- **Aerator (Wing-digger)**



# How Do I Get Started?





# The reality:

- Daily task  
½ hr-1 hr
- Weekly task  
1-2 hrs



# Daily task

- Collect compost material
- Weigh compost material (optional)
- Take to compost site
- Take compost temperature
- Mix in new ingredients
- Add bulking material
- Clean up







# Weekly Task

- Maintenance of bins
- Turn piles
- Troubleshooting
- Supplying bulking material



# When is the Compost Finished?



# Okay, Now What??

- You now have a collection and compost system, understand how compost works, and have the full support of all involved...
- Let's give it a try!!!
  - Start small (pilot)
  - Success breeds success or as they say in the military..."Slow is smooth and smooth is fast!"





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