KEY COMPOSTING PARAMETERS

Component	Reasonable Range	Preferred Range
Moisture (%)	40 - 70	55 - 65
C:N	12:1 - 60:1	25:1 - 40:1
Oxygen (%)	Greater than 5	Greater than 10
Temperature (°F)	113 - 160	120 - 150
pH	5.5 - 9.0	6.5 - 8.0
Particle size (in.)	1/8 - 2	Depends on feedstock
Porosity: Bulk Density (lbs/cy)	Less than 1,200	700 - 1,000
Free Air Space (%)	40 - 60	50 - 60

COMMON FEEDSTOCK C:N

CARBON SOURCES

Source	XX:1
Wood Chips	200-700
Newspaper	560
Cardboard	200-500
Mixed Paper	150-200
Wheat Straw	140-150
Sawdust	100-230
Bark	100-130
Oat, Rye Straw	70-90
Almond Hulls	60-100
Corn Cobs	55-120
Leaves	30-80

COMMON FEEDSTOCK C:N

NITROGEN SOURCES

Source	XX:1
Blood or Bone Meal	3-4
Pig Manure	5-7
Poultry Manure	5-10
Alfalfa	13
Horse manure	15-25
Timothy Hay	15-25
Grass Clippings	15-25
Food Scraps	15-25
Grape Pomace	17-30
Coffee Grounds	20
Clover	23

Compost Use Calculator

Cubic Yards Compost Required to Cover One Acre

1/4-inch layer	→	approx. 0.75 cy
1/2-inch layer	→	approx. 1.5 cy
1-inch layer	→	approx. 3.0 cy
1 1/2-inch layer	→	approx. 4.5 cy
2-inch layer	→	approx. 6.0 cy
2 1/2-inch layer	→	approx. 7.5 cy
3-inch layer	→	approx. 9.0 cy

Formula: area to cover (ft2) x inches of compost x 0.0031 = ___ cy

What is Compost?

A product and a process!

- Controlled, aerobic biological decomposition
- Undergoes mesophilic and thermophilic temperatures
- Finished product is stabilized to benefit plant growth

Why Make Compost?

01 Manage a waste product

02 Make a profit or reduce costs

03 Produce a soil amendment

04 Reduce manure methane

05 Kill pathogens

06 Kill weed seeds

Compost Thoughts

- ***Why*** are you composting?
- ***Where*** are you composting?
- ***How*** are you composting?
- ***Who*** is composting?
- ***What*** are you composting?
- ***What*** will you do with the product?

Adapted from Compost Research & Education Foundation

Compost Bacteria

Compost is alive!

In = feedstocks, microorganisms, oxygen, water

Out = water, CO_2, heat, odors, gases, **compost**

Why does the pile compost?

- Microbes consume feedstocks to obtain energy and nutrients
- Activity generates heat
- Heat trapped in pile accelerates activity

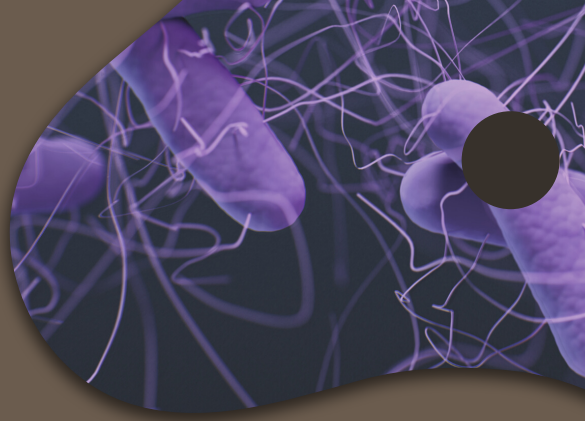
Microbes need:

- Food
  - Energy
  - Nutrients
- Water
- Oxygen
- Hospitable environment
  - Temperature
  - pH

Microbes secrete enzymes which break down feedstocks

Pathogens die or consumed around 131 °F

Sustained temperatures above 160 °F kills good bacteria



Types of Microbes:

Bacteria

- 80-90% of population

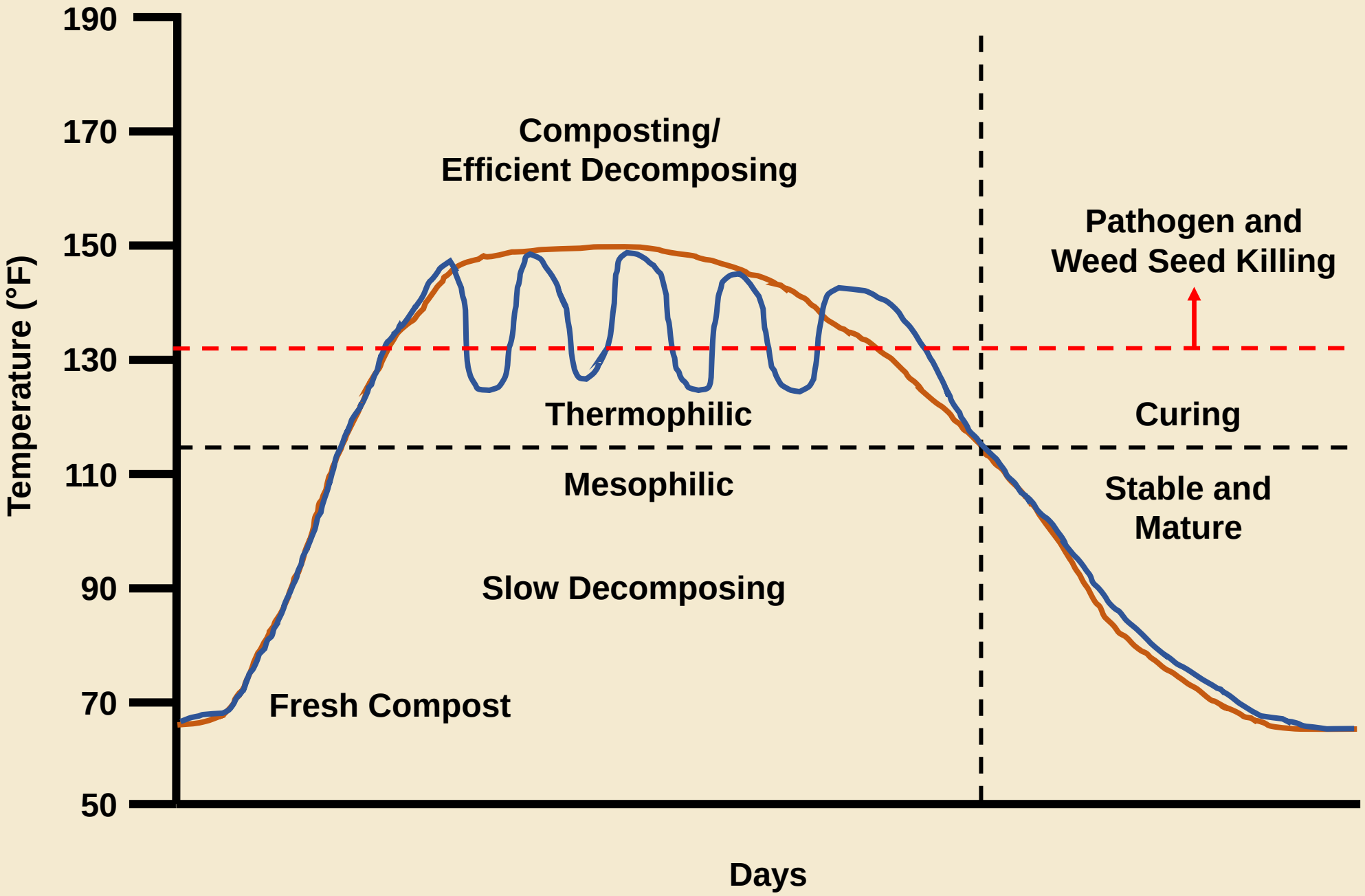
Fungi

- Molds, yeasts, mushrooms
- Mostly present during mesophilic stages
- Live on outer layers when temps high
- Breakdown tough organic material (cellulose, hemicellulose, lignin)

Actinomycetes

- Grey in color
- Resemble fungi, but bacteria with filaments
- Give earthy smell

Adapted from Compost Research & Education Foundation


190
170
150
130
110
90
70
50
Temperature (°F)
Composting/
Efficient Decomposing
Pathogen and
Weed Seed Killing
Thermophilic
Curing
Mesophilic
Stable and
Mature
Slow Decomposing
Fresh Compost
Days

Key Composting Components

1. **Feedstocks**
2. Moisture
3. Aeration
4. Shape and size
5. Temperature
6. Time

Feedstock Considerations

01 **Chemical Composition**

Organic Matter, Nutrients, pH, Degradability

02 **Physical Characteristics**

Moisture, Bulk Density, Heterogeneity

03 **Other**

Contamination, Cost, Availability, Regulations

Adapted from Compost Research & Education Foundation

Carbon "browns"

- Source of energy for decomposers
- Sources:
  - Woodchips
  - Straw
  - Almond Hulls
  - Sawdust

Nitrogen "greens"

- Source of protein for decomposers
- Sources:
  - Fresh plant material (green leaves, grass, vegetables)
  - Animal wastes (manure, feathers, hair)

C:N ratio

- How much more carbon than nitrogen
- Does not count for availability (particle size, surface area, degradability)
- Ideal starting range: 25:1 to 35:1

Porosity and Free Air Space

Porosity = non-solid portion of pile

Free Air Space (FAS) = pore space not containing liquid

Start at > 50% FAS

Feedstocks

Recipe = feedstock combination

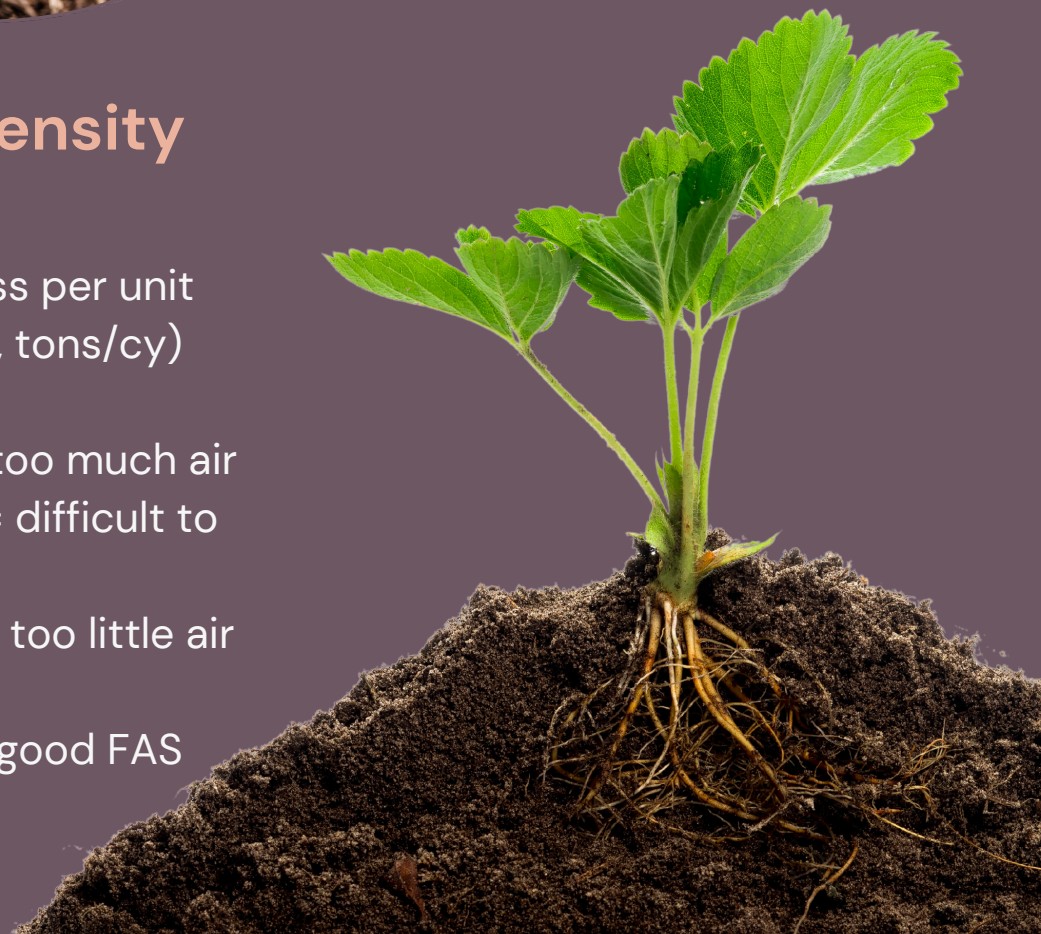
Combine based on characteristics to meet composting needs (moisture, nutrients, temperature, etc.)

Bulk Density

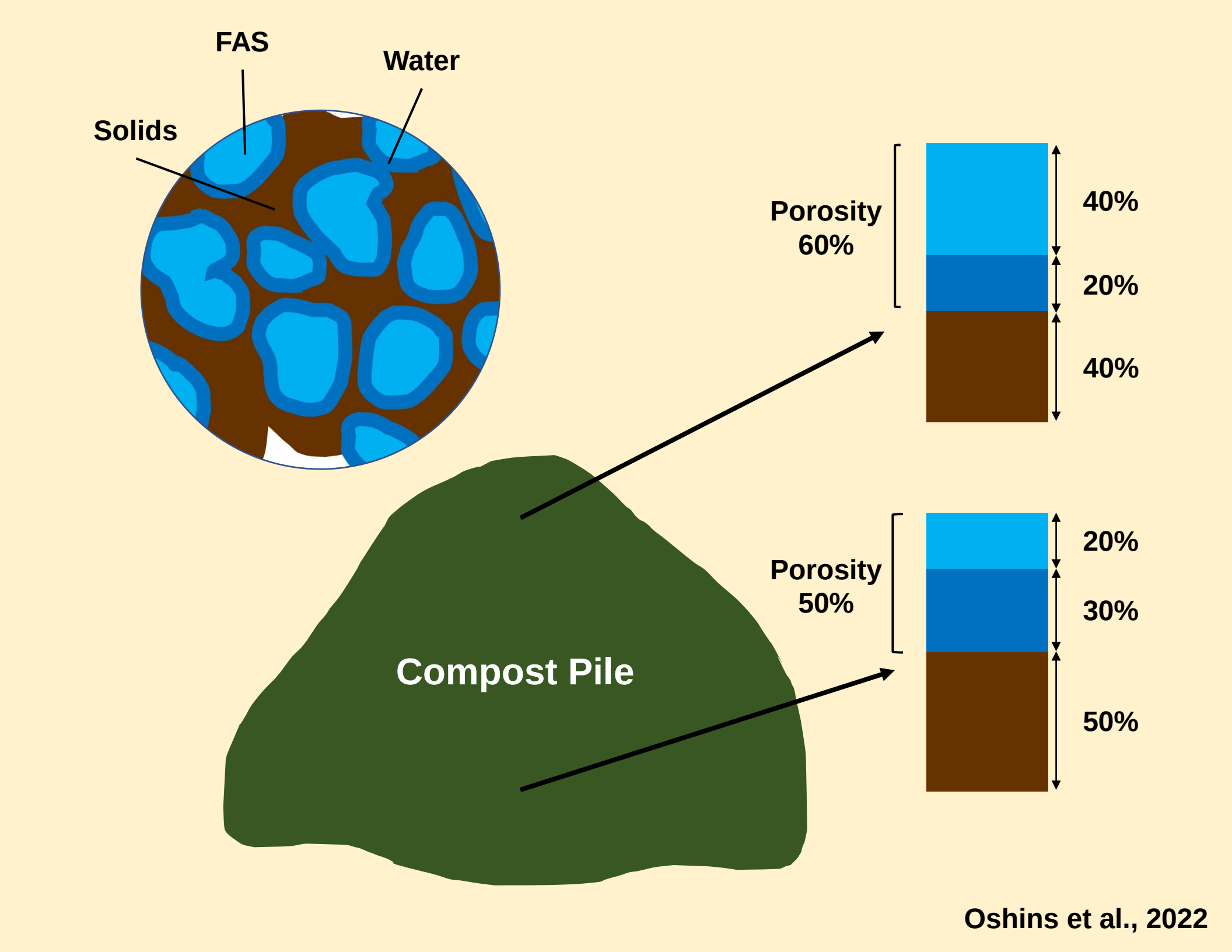
Measure of mass per unit volume (lbs/ft3, tons/cy)

< 700 lbs/cy = too much air
> 1,000 lbs/cy = difficult to aerate
> 1,200 lbs/cy = too little air

700 to 1,000 = good FAS



Adapted from Compost Research & Education Foundation



Oshins et al., 2022