

Composting, Organic Matter



Waste facts

Organic materials comprise
more than 25% of residential waste

most of this is compostable



Organic Matter

Any material that was once living, has died, has decomposed to one degree or another



Organic Matter

horse, cow, duck, sheep manures

straw and hay

grass clippings, shredded leaves

vegetable waste

shredded bark, wood chips, sawdust

garden debris - compost

oil particle size or type, but can control organic matter



Organic Matter



Influences physical, chemical properties of soils and way soil behaves

Organic Matter

improves heavy clay - better drainage

improves sandy soils - increases water-
holding capacity

Organic Matter

organic matter affects soil -

better able to store nutrients, water

improved structure

Organic Matter

Compost adds organic matter,
recycles plants



Organic Matter

Animal manures - should be well rotted,
usually applied in fall, may have weed seeds



Horse

Cow

Poultry

Rabbit

Sheep, goat

Liquid manure



What is compost?

Product of decomposition of organic materials
by decomposers

What is compost?

Valuable soil amendment

Dark, crumbly, earthy odor

Can be utilized in home yards, commercial landscapes



Benefits of composting

Valuable soil amendment

Effective mulch

Reduction in waste



Soil amendment

Improves soil structure

Increases aeration

Holds moisture



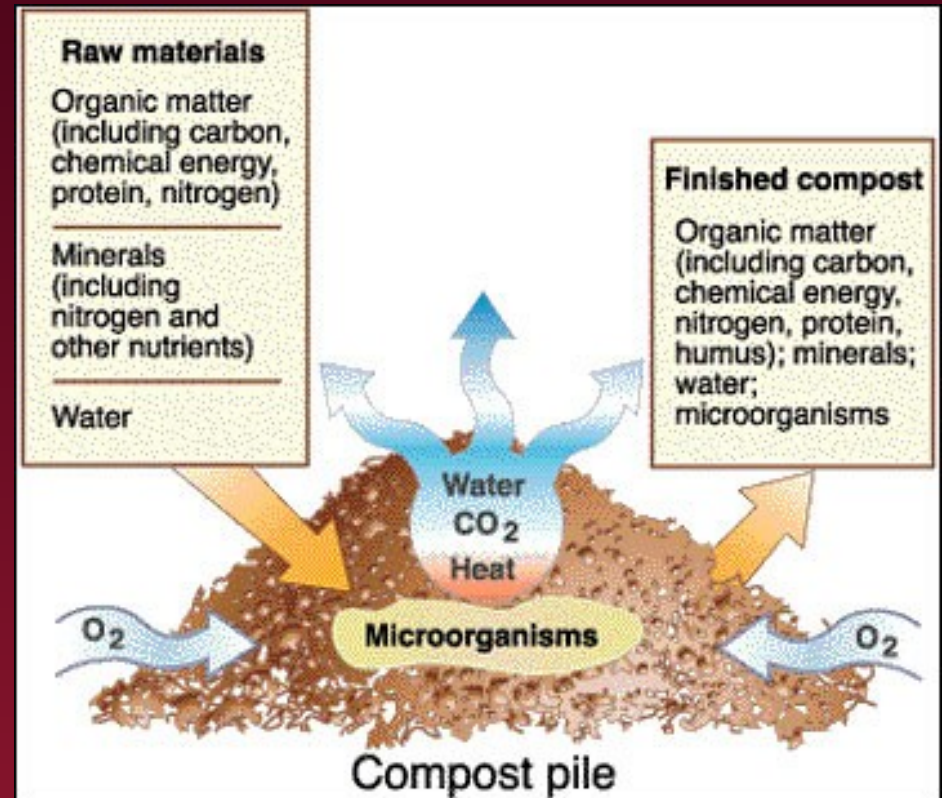
Soil amendment

Promotes plant growth

Stores nutrients

Contains essential
micronutrients

Prevents disease



Soil amendment

Flower and vegetable gardens:

Dig or till 8 to 10 inch deep

Mix 3 to 4 inches of compost



Mulch

Suppress weeds

Maintain moisture levels

Control temperature

Prevent soil erosion



Reduce waste

Reduces amount of waste sent to landfills

Often illegal to dispose of yard waste with other municipal solid waste



How does compost happen?

Organic material processed by decomposers:

Bacteria

Fungi

Worms

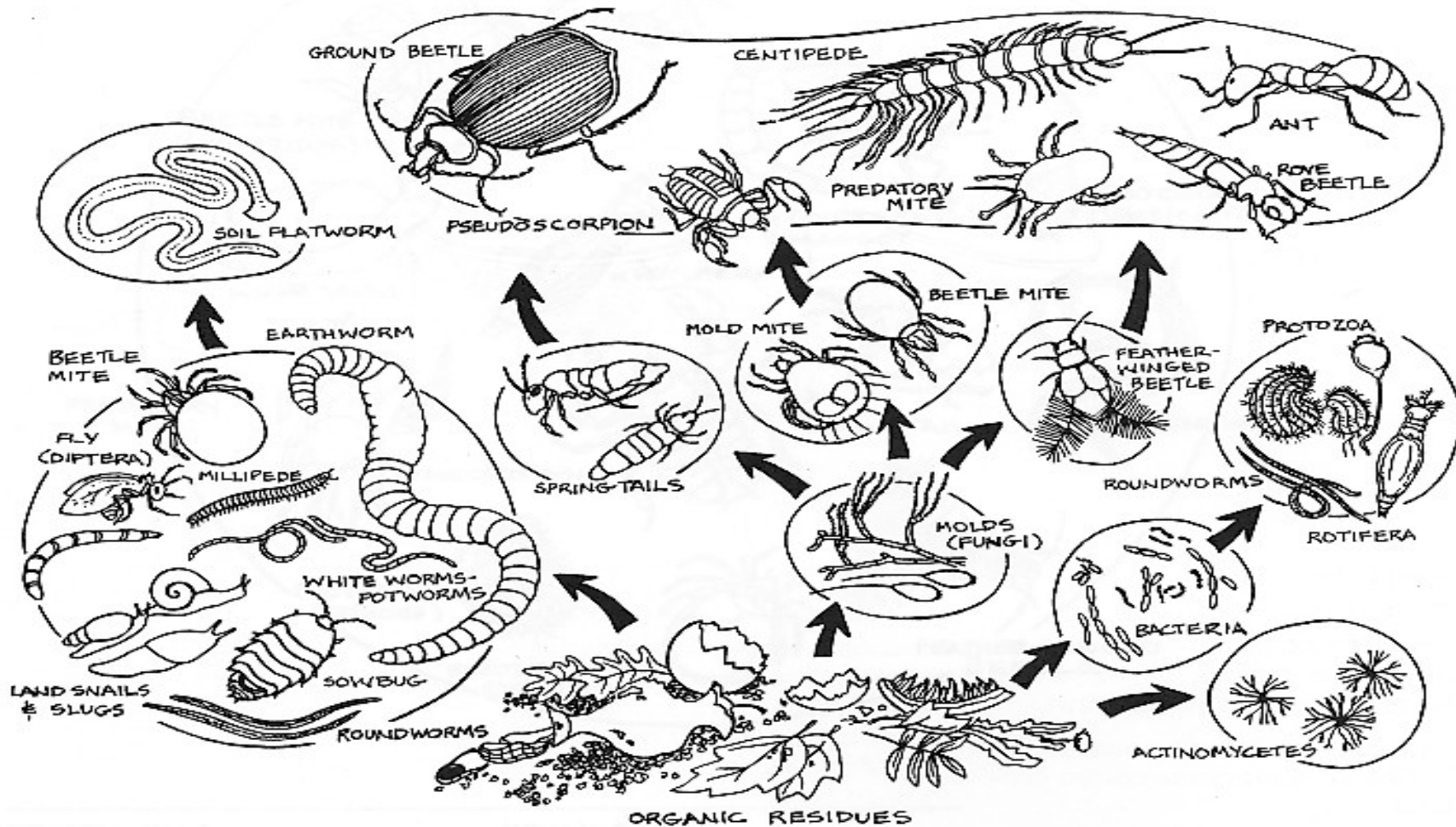
Invertebrates

Need food, air and water
(we supply)

Need heat
(they supply their own)



Decomposers - microorganisms and soil animals

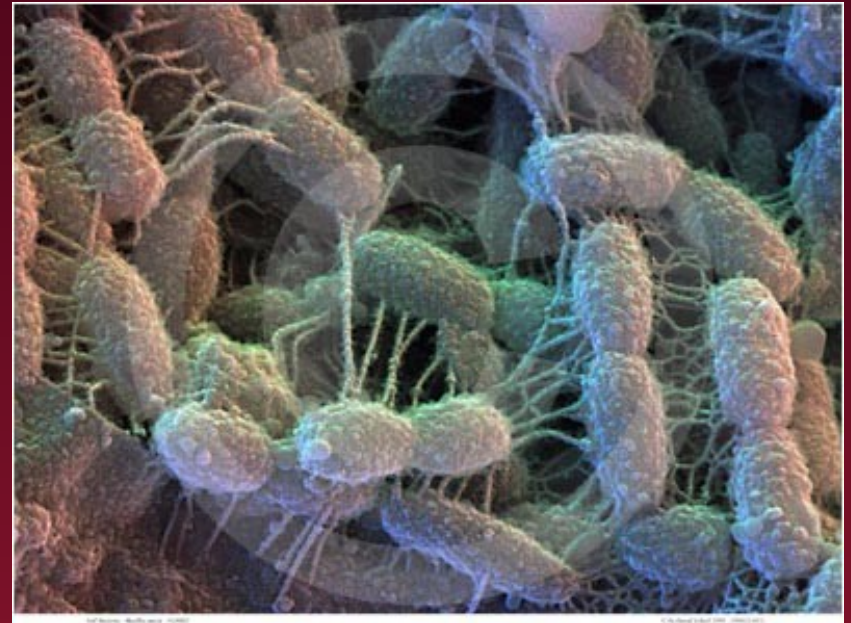


Decomposers - bacteria

Most numerous organisms in
compost pile

Don't need to be added -
present everywhere

Generate heat associated
with composting



Perform primary breakdown of organic materials

Decomposers - fungi

Perform primary decomposition

Identified by hyphae or
presence of mushrooms

Not as efficient as bacteria

Less temperature tolerant than
bacteria



Decomposers - nematodes

Most abundant invertebrate in soil

Usually less than 1 millimeter in length

Prey on bacteria, protozoa, fungal spores and each other



Decomposers - mites

Called fermentation mites or mold mites

Transparent

Feed on yeast

Masses often develop over fermenting surfaces



Decomposers - collembula

springtails

Feed mainly on fungi but
also eat organic detritus



Decomposers - sow bug

Feed on rotting woody
Material, leaf tissue
pill bugs



Decomposers - ground beetle

Many different types found in, around compost piles

Feed on other organisms, seeds vegetable matter



Decomposers - earthworms

Coat processed organic material with mucus films that binds small particles together

Aerate soil, compost pile



Other compost residents - pests

House flies
Fruit flies
Rodents
Raccoons



Proper bin maintenance,
selective material usage
will reduce pest problems

Pest control

Avoid
meat
dairy
fats
pet food
pet feces



Cover food waste with layer
of grass, straw, leaves,
soil or finished compost



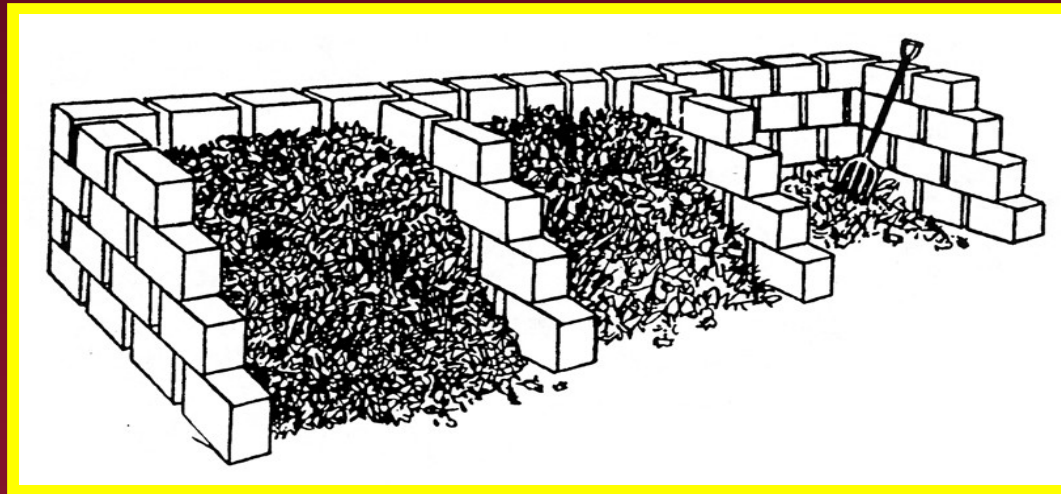
Key ingredients

Green and brown materials

Moisture

Air movement

Temperature



Carbon:Nitrogen Ratio

Microorganisms in compost use:

carbon for energy

nitrogen for protein synthesis

Green materials = nitrogen
green grass clippings



Brown materials = carbon
autumn leaves, straw

Average Carbon:Nitrogen Ratios

Food Scraps	15:1	GREENS
Grass Clippings	19:1	
Rotted Manure	25:1	
	30:1	Ideal for Composting
Corn Stalks	60:1	
Leaves	40-80:1	
Straw	80:1	BROWNS
Paper	170:1	
Sawdust, woodchips	500:1	





Moisture

Strive for moisture content around 50%

lower - bacteria slow down

higher - anaerobic decomposition

Moisture

Optimal moisture levels:
moist as wrung out sponge

Mix when watering to avoid shedding



Aeration

Mixing monthly
increases rate of decomposition
by increasing air spaces

Takes 3-6 times longer
if not turned



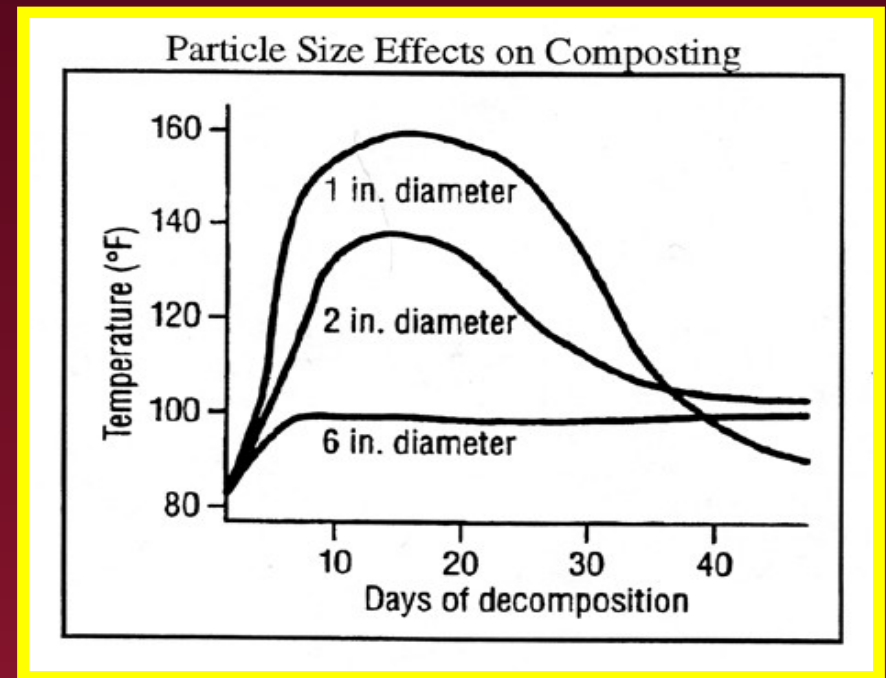
Particle size

Reduce particle size by shredding

increases surface area for decomposers

If too small, may compact

Mixture of small and

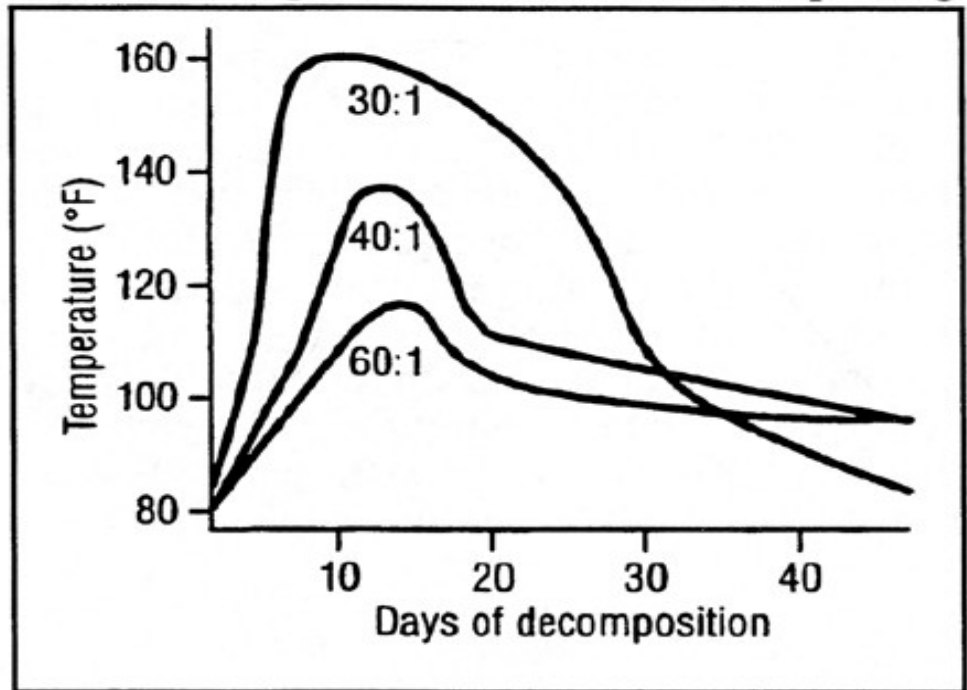


Temperature

High temperature =
Faster decomposition

High temperature
kills weeds and
pathogens

Carbon:Nitrogen Ratio Effects on Composting



What can be composted?

Grass, yard trimmings/clippings

Leaves

Coffee grounds/filters

Tea leaves/bags

Fruit, vegetable trimmings

Wood chips

Sawdust

Egg shells

Livestock manure



What should not be composted?

Diseased, insect infested plants

Cat, dog manure

Evergreen needles

Poison ivy, other poisonous plants

Weeds that contain seeds

Meat, animal products

Dairy products



Virginia Tech Weed I.D. Guide



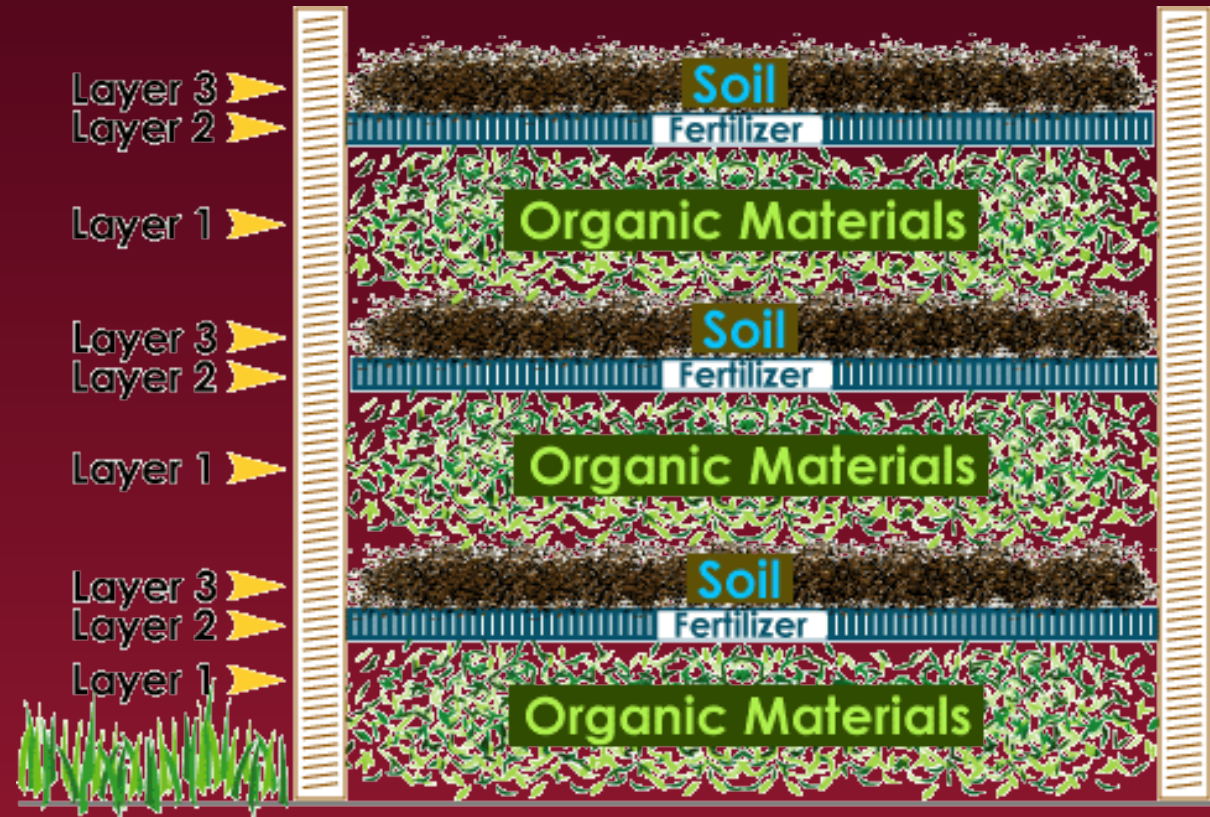
Building compost pile

Build in layers

8 to 10 inches of
'brown' material

Several inches of
'green' material

One inch of soil



Compost bins

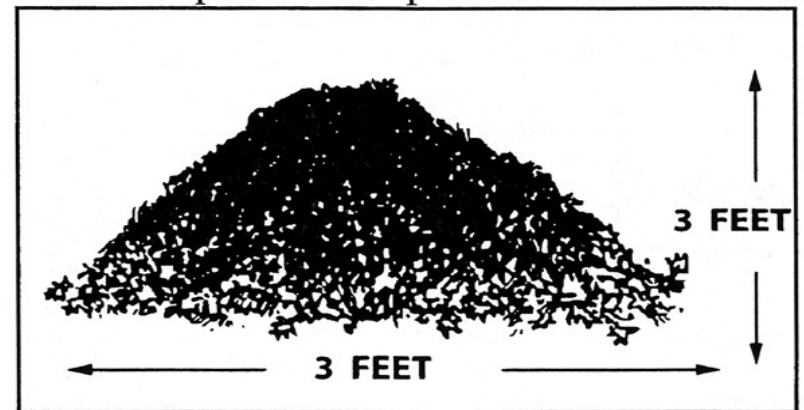
At least 3 x 3 x 3

No larger than 5 x 5 (any length)

Large enough to hold heat, moisture
Small enough for air to reach middle

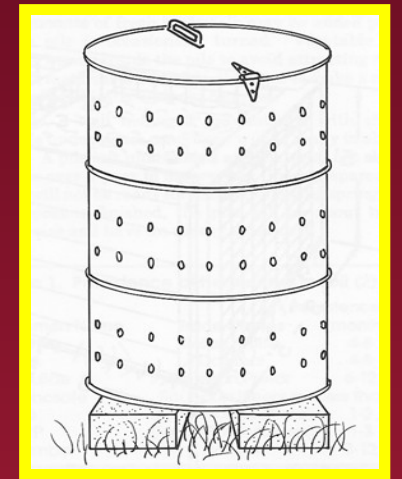
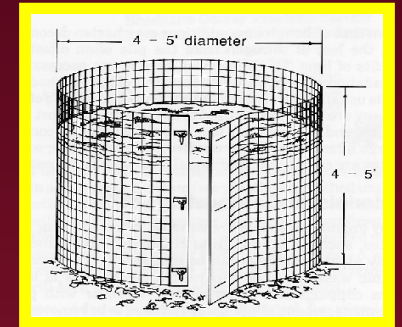
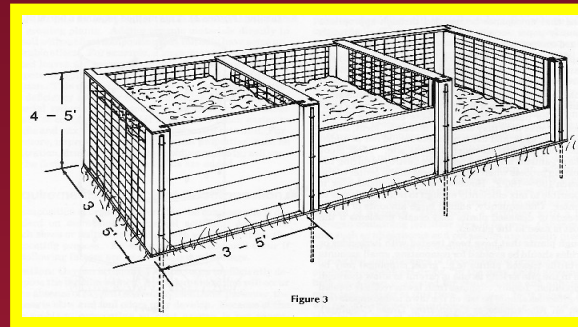
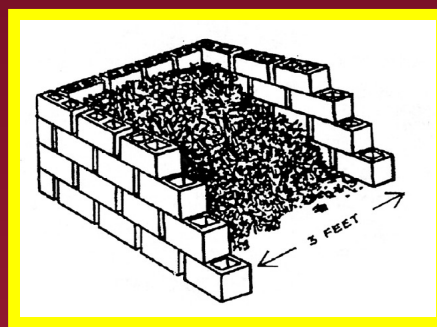
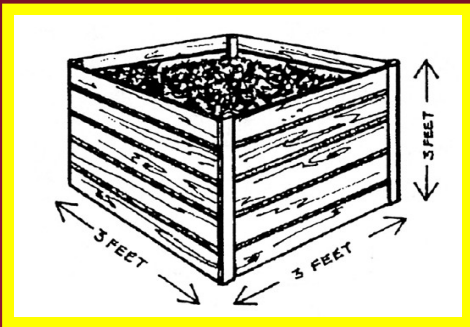


Optimal Compost Pile Size



Compost bin types

Variety in cost, labor,
volume, time required for
finished compost





Open piles

Slowest rate of decomposition

Least expensive method

Minimal pest control, containment



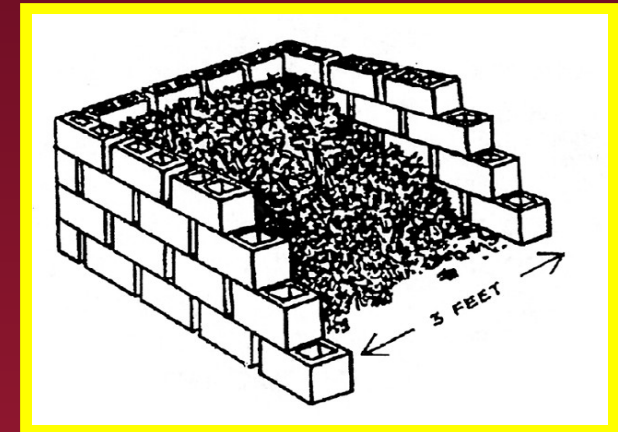
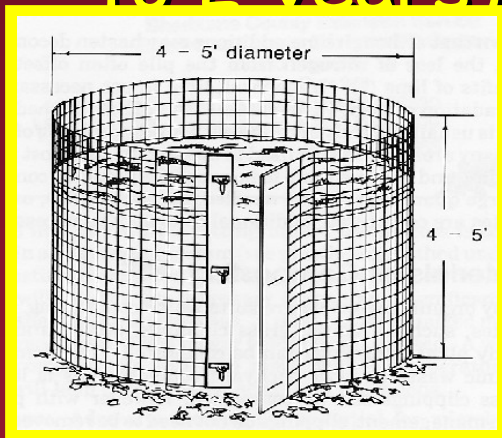
Holding units

Helps keep decomposing materials organized

Reduces pest problems

Requires no turning

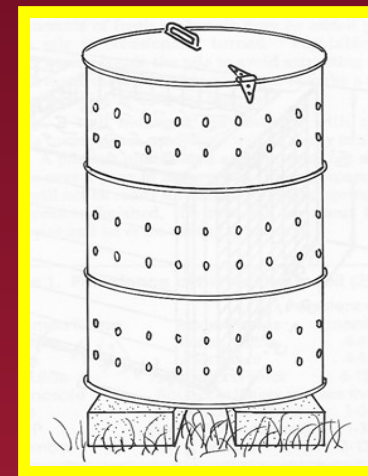
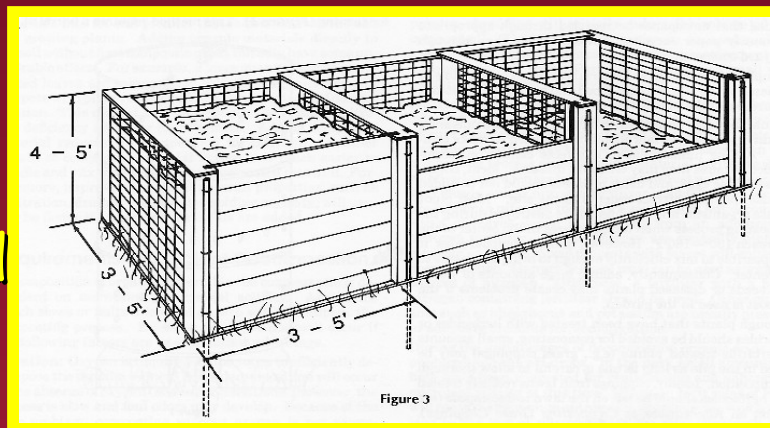
Relatively slow rate of decomposition (6 months to 2 years)



Turning units

Allow easier mixing of materials
hotter pile, reduced composting
time (as soon as 2-3 weeks)
more expensive, more labor
intensive

Three-
chambered
bin



Barrel or
drum
composter



Location

Avoid areas with drying wind

Partial sun will help heat pile

easily accessible yet not
interfere with yard activities

not be offensive to neighbors

Finished Compost

Avoid using unfinished compost

Organic acids may harm plant roots

Do not use if:

still hot

smells like ammonia

plant parts are still identifiable

Finished Compost

Use if:

Pile stays at or near ambient temperature

Compost is dark, crumbly, and has earthy smell

Volume of has been reduced by 30 to 50 percent

Problem solving

Smells like rotten eggs:

Not enough air/too much water

Add coarse material like dry leaves

Pile should be wet like a wrung out sponge

Smells like ammonia:

Too much nitrogen, not enough carbon

Add dry leaves, sawdust or straw

Problem solving

Pile not heating up:

bin too small

Too dry

Too little air flow

material ratios (C:N)

Pile attracting pests:

Eliminate meat, dairy products, fats

Bury food waste under leaves, grass

Municipal Composting

Available though many cities,
villages

Often take larger yard
trimmings for chipping

Usually offered as
free service

Finished compost often



Vermicomposting

Method of composting kitchen scraps and other organic material indoors

Materials placed in aerated container with redworms

Redworms able to digest
2/3 their body weight in a day





