

# Composting Basics

## *From Backyards to Schoolyards!*



# Clean Water Starts at HOME

Minimize pesticide and herbicide use



Have your septic tank pumped and inspected regularly.



Don't drip and drive! Check vehicles for leaks and always recycle used motor oil.



Wash your car at a commercial car wash or on the grass.

Compost yard waste and reuse as mulch in your landscape.



Direct downspouts onto lawns, landscaped areas, or rain gardens and away from paved surfaces.



Replace lawn with landscaping where possible.



Always scoop the poop, when on a walk or in your yard.



Follow all directions on fertilizer labels carefully.



Remember, only rain down the storm drain!



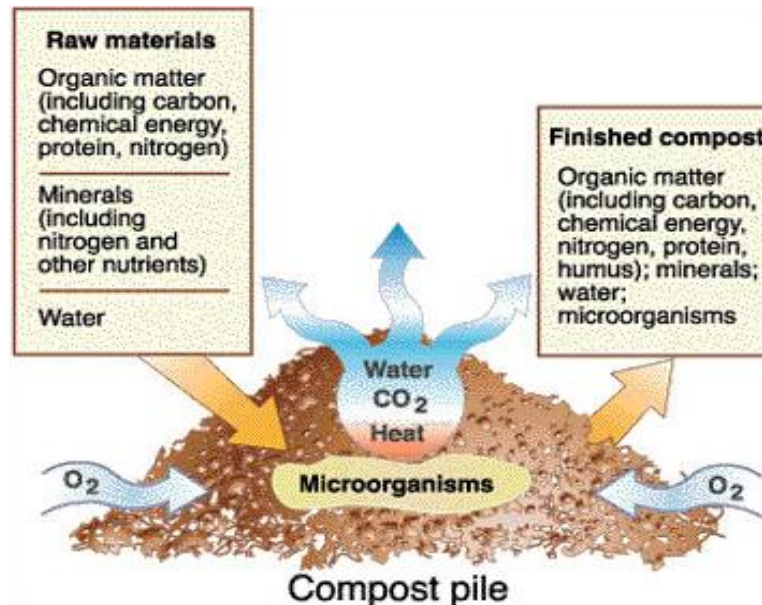
Geauga Soil and Water Conservation District



# What is Composting?

“Using natural processes to recycle organic material into a useable soil enrichment product.” - *Cornell Cooperative Extension*

Decomposition happens naturally – but composting accelerates the process by providing an ideal environment for microorganisms & bacteria.



Courtesy of University of Missouri Extension Service

# Poll Time!



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# Why Compost?

## Single **BEST WAY** to **IMPROVE** **Gardens, Plants, and Landscapes**



- Boosts plant production
- Buffers pH / neutralizes
- Enables more available nutrients to plants
- Is a great mulch and soil amendment



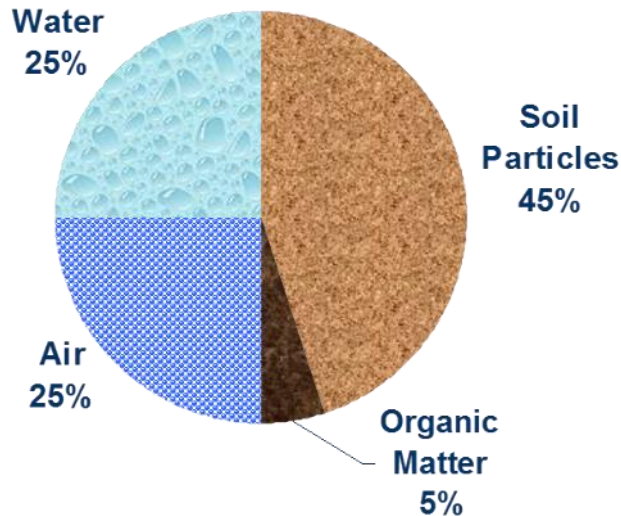


# Why Compost?

## Builds Soil Health!



- Adds biodiversity & increases microbe populations
- Increases porosity so soil holds more air & retain more water
- Improves soil structure (more aggregates)



*Photo credit: Jonathan Bates*



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# Why Compost?

## **Better Water Quality!**



Increases soil's water-holding capacity



**Acts as a slow-release fertilizer**

**Deters garden pests**

**Less fertilizers & pesticides needed**

**Less runoff from rain events**

*Photo credit: Tom Archer*



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# Composting Enhances Soil and Protects Watersheds

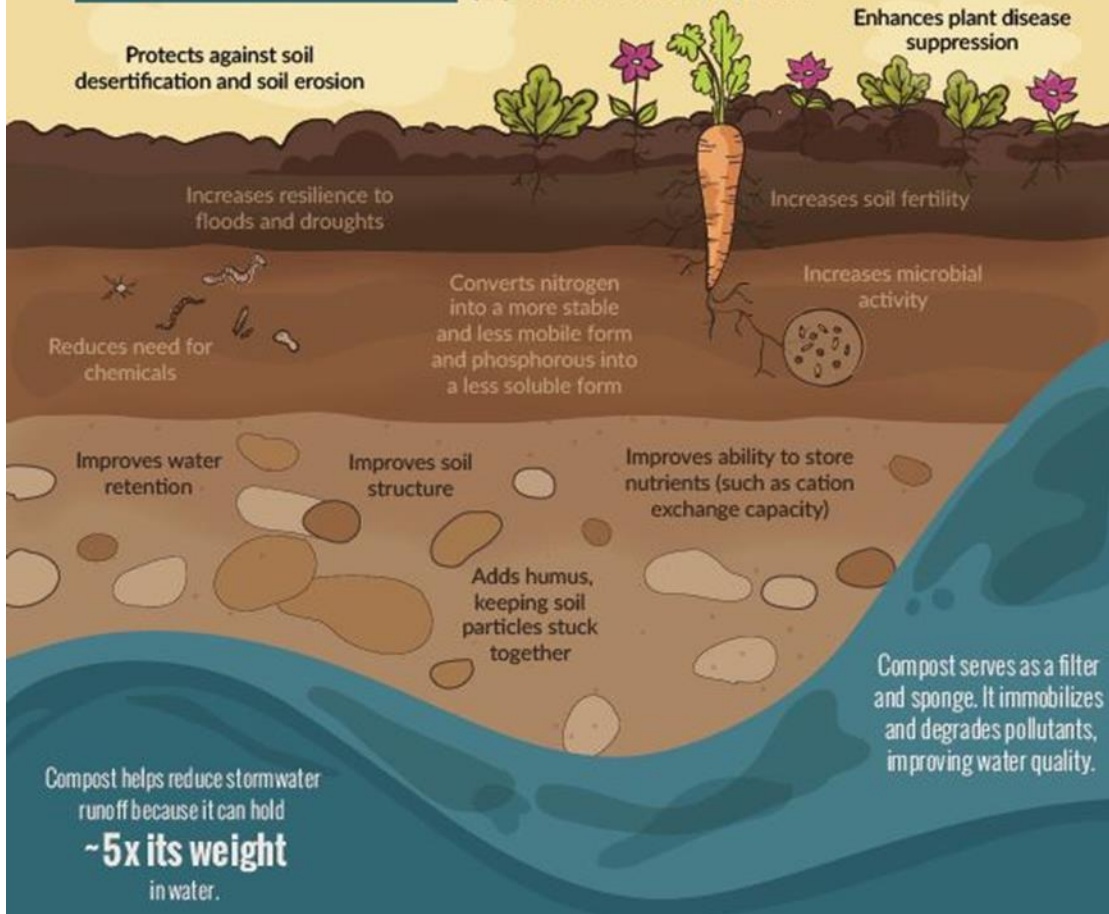
Healthy soils are essential for protecting watersheds. Compost is the best way to add organic matter—which is vital—to soils.

When added to soil, compost can filter out urban stormwater pollutants by an astounding **60-95%**



## IT'S ALL ABOUT THE SOIL

COMPOST improves biological, chemical, and physical characteristics of soil.



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# Why Compost?

## Reduces Waste Stream!

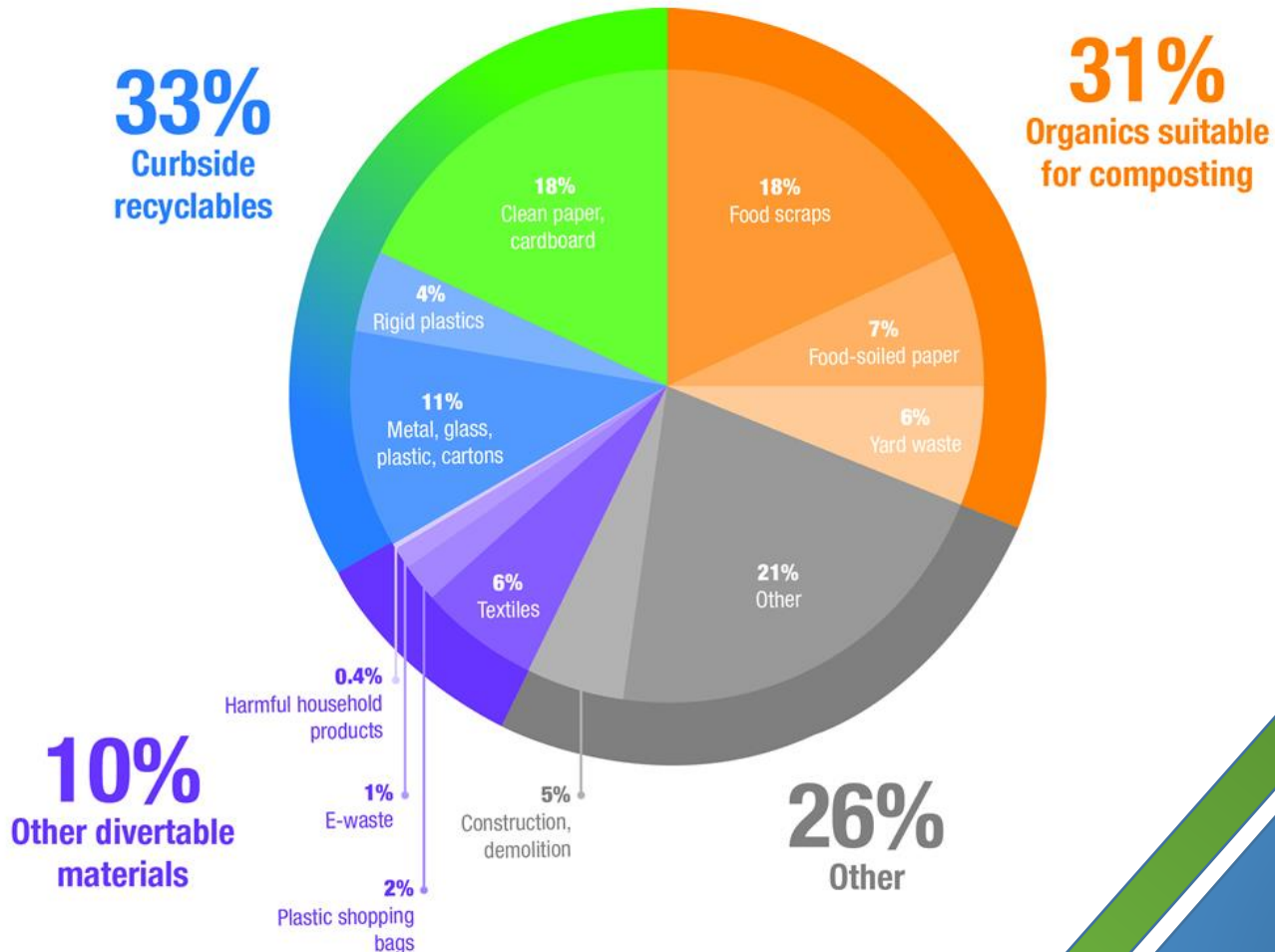


Image: NYC Waste Management



Every year, U.S. landfills and trash incinerators receive **167 MILLION TONS** of garbage.

Landfills and incinerators are dangerous.  
Every bag thrown out contributes to:



Pollution of surrounding  
soil, air, and water

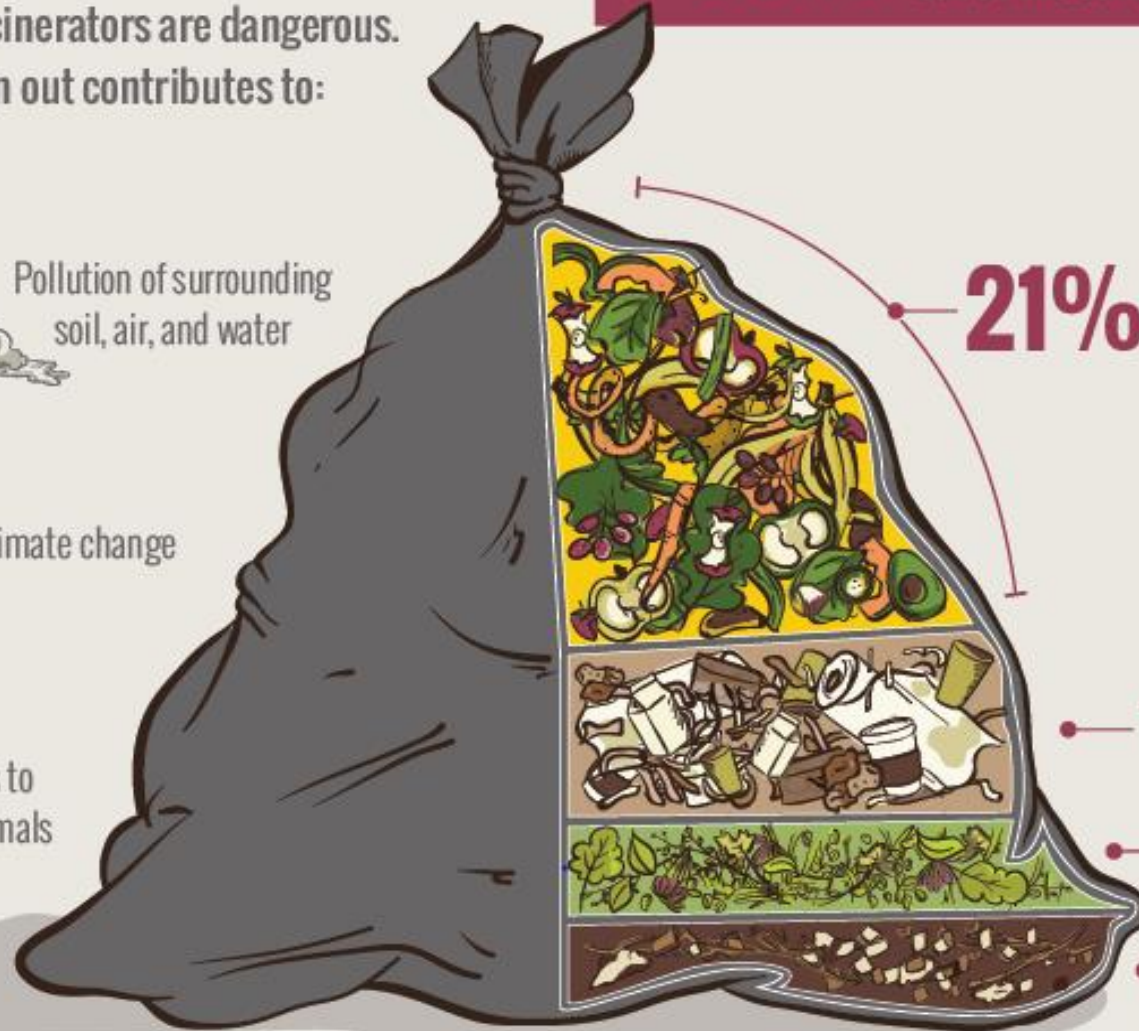


Climate change



Health hazards to  
humans and animals

**> 50%** of typical municipal garbage set  
out at the curb is compostable.



**21%** is food scraps alone

• **15%** paper/paperboard

• **8%** yard trimmings

• **8%** wood waste

*"The following comes from the Institute for Local Self-Reliance ([www.ilsr.org](http://www.ilsr.org)), a national nonprofit organization working to strengthen local economies, and redirect waste into local recycling, composting, and reuse industries. It is reprinted here with permission."*

# Why Compost?

## Reduces Food Waste!



Food and Agriculture Organization  
of the United Nations



OVER  
ONE THIRD OF  
OUR FOOD GOES  
TO WASTE...

...AND UP TO A HALF  
OF OUR HOUSEHOLD  
WASTE COULD BE  
COMPOSTED TO HELP  
CREATE NEW SOIL

More than **40 million tons of food waste goes to landfills** each year in the US. (EPA 2018)

Yet many households struggle to put food on the table.

1 ton of food waste in a landfill generates .25 tons of methane (or **6 tons of CO<sub>2</sub>**) in the first 2 months.

***Composting this waste instead = equivalent of taking 8.4 million cars off the road.***



World Soil Day  
5 December



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# Why Compost?

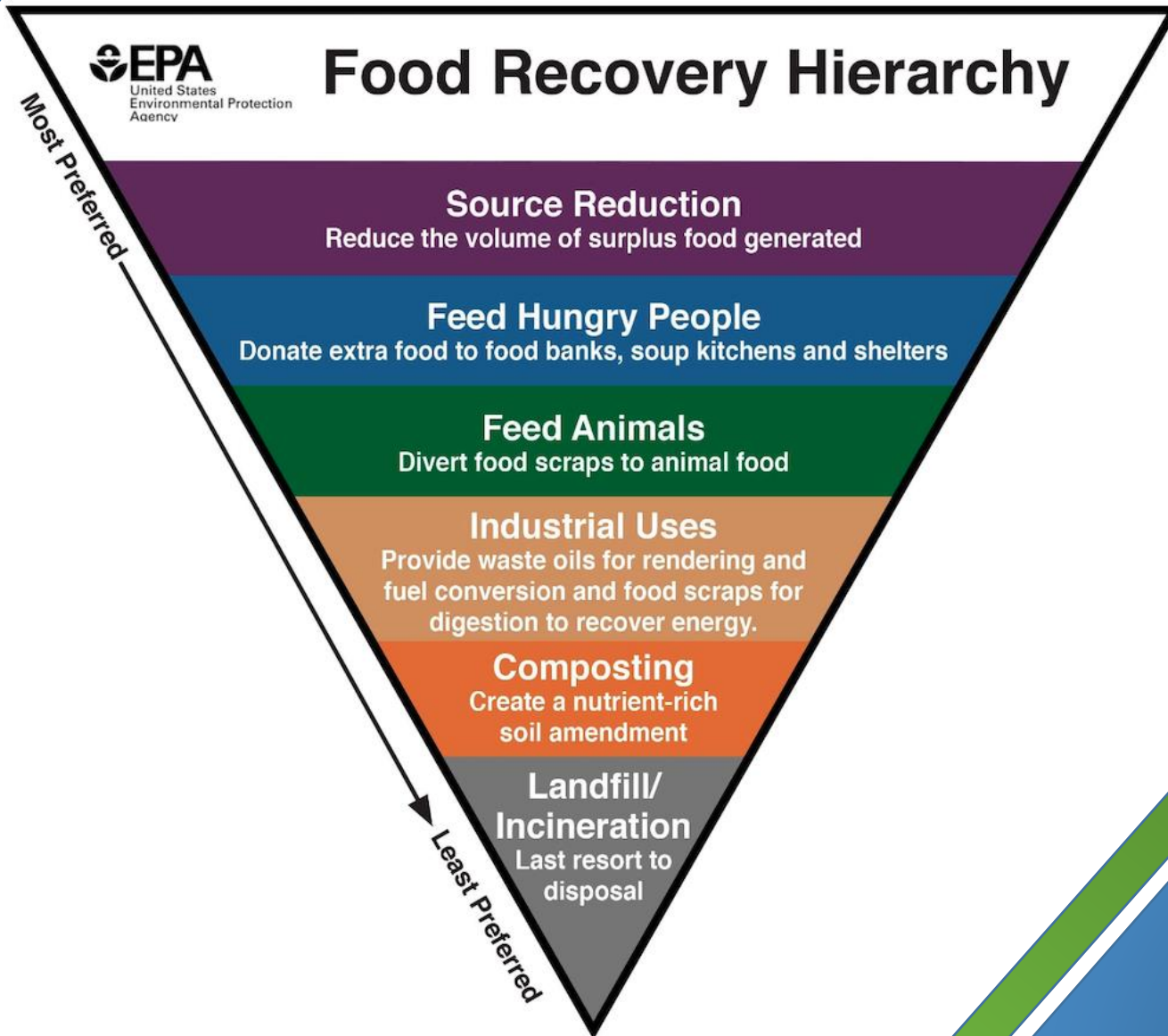


Image Courtesy of US EPA



# Why Compost?

## Reduces Yard Waste!



**Grasscycling, mulching leaves, & composting yard waste** saves LOTS of time, landfill space, feeds your soil and lawn, and greatly reduces chemical fertilizer use.



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# Why Compost?

## Carbon Sequestration

### Composting Protects the Climate

Food scraps in landfills generate methane, a greenhouse gas with a global warming potential 84x more potent than CO<sub>2</sub> in the short term.

Incinerators also emit climate pollutants

...but when converted into compost and applied to the land, compost sequesters carbon.

One research project found that ½ inch of compost applied to rangeland sequestered the equivalent of **1 metric ton of CO<sub>2</sub>e/hectare** over three years.

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Composting lowers amount of warming gases created by organic matter in our landfills. EPA estimates that landfills = single largest emitters of toxic methane gases!



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# Why Compost?

Before we “dig in” know that local entrepreneurs are in NE Ohio offering:

- *Residential Drop Offs*
- *Curbside Pick Ups*
- *Commercial Services*
- *Compost for Sale*



Image Courtesy of Rust Belt Riders



Rubber City Reuse Logo from Website

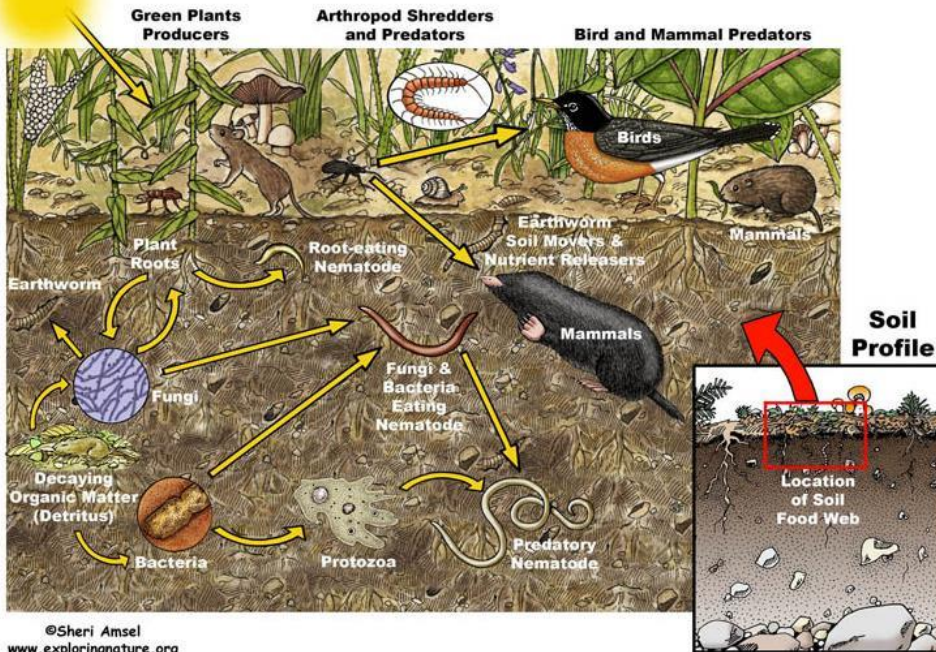


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# How a Compost Pile Works

## Soil Food Web



Making a  
**COMPOST**  
**CASSEROLE!**  
*Right foods in the  
right proportion*



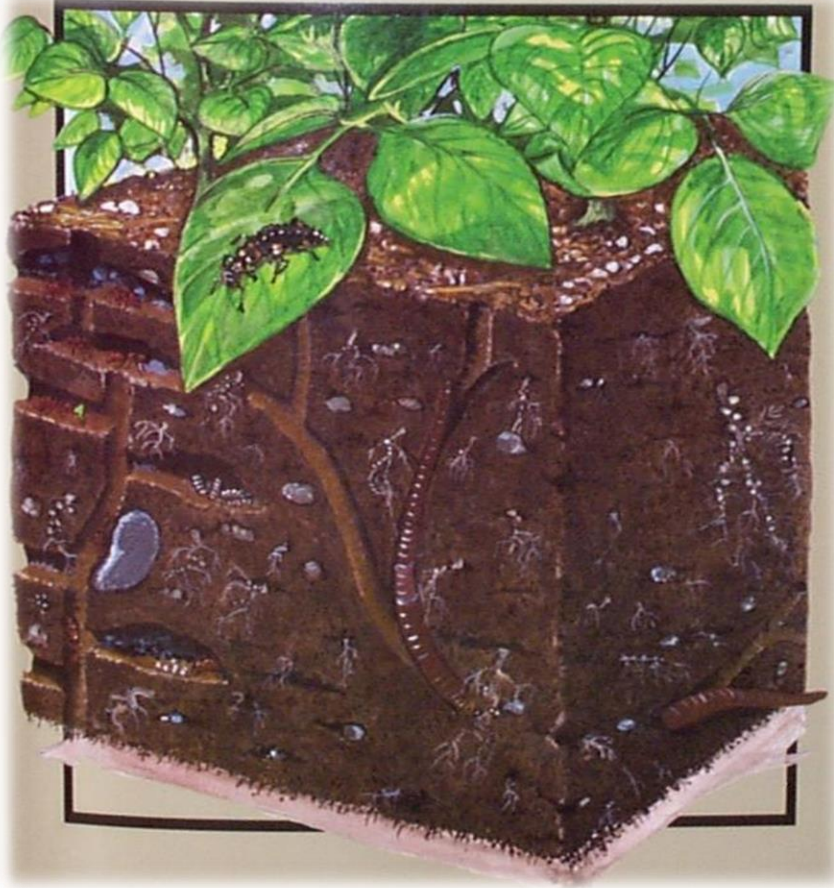
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# How a Compost Pile Works

Along with 3 other  
essentials:

**Air**

**Moisture**  
**Warmth**



USDA NRCS

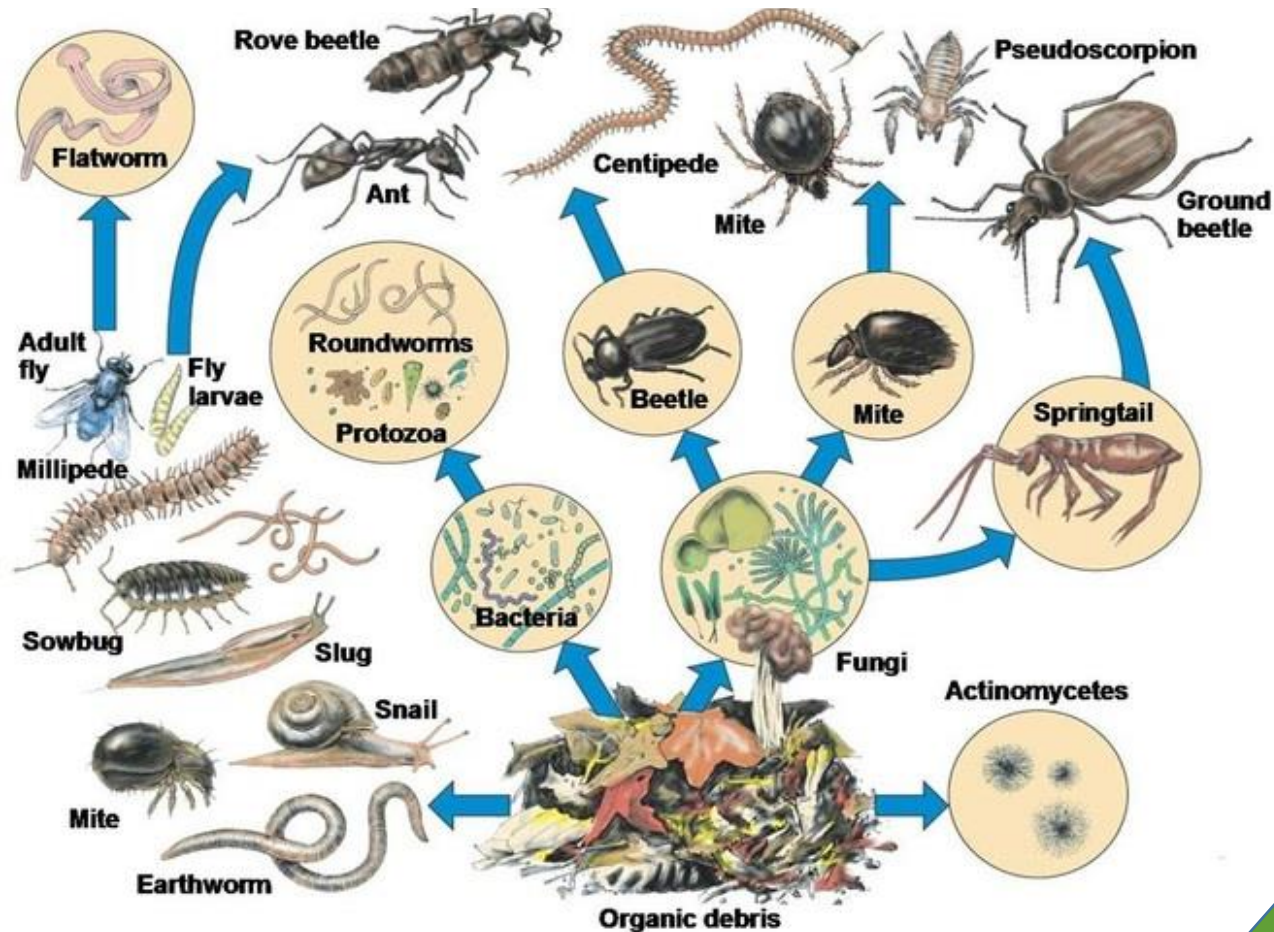


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# Composting The Cast! *(Something die? Enter... the F.B.I.)*

The majority of decomposition happens by **CHEMICAL DECOMPOSERS**.  
Microscopic bacteria, protozoa, and fungi. Byproduct of bacteria's work = heat!



Other animals are **PHYSICAL DECOMPOSERS** (beetles, flies, centipedes, slugs, worms) who help out by chewing, digesting, and mixing materials, creating more surface area for microorganisms. They are more active where and when your compost is cooler.



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2 Vital Ingredients  
in a decay organism's diet?

**CARBON**

for Energy!



**NITROGEN**

for Building Protein!



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# Composting: What Goes?

**“Browns”**: bulky, tough, dry, fibrous materials provide carbohydrates (carbon)

Carbon provides the energy food for microorganisms



A little weathered is best!

**“Greens”**: fresh, green, wet materials provide protein (nitrogen)

Nitrogen materials provide protein that microorganisms need to break down the carbon food



Bury and cover food scraps to deter rodents

# Composting Materials Everywhere!

## Greens

- ✓ Kitchen scraps (veggies, fruit rinds, grain products, old bread)
- ✓ Coffee grounds
- ✓ Tea bags/leaves
- ✓ Fresh grass clippings
- ✓ Other garden waste (plants, stalks, flowers)
- ✓ Chicken/livestock manure
- ✓ Corn husks
- ✓ Cut flowers
- ✓ Sod (great insulator- place roots up)
- ✓ Lake weeds
- ✓ Herbivorous animal bedding (hamsters, rabbits, guinea pigs, gerbils)
- ✓ Feathers, hair, & fur
- ✓ Regional by-products (apple mash from cider factories, spent hops from microbreweries, grape skins from wineries)
- ✓ Shredded hay (weathered first)

## Browns

- ✓ Leaves
- ✓ Shredded straw (weathered first)
- ✓ Sawdust (untreated)
- ✓ Woody plant trimmings, chips, & twigs
- ✓ Shredded paper\*
- ✓ Nut shells (slow to decompose)
- ✓ Corn stalks and cobs (slow to decompose)
- ✓ Brown paper bags
- ✓ Toilet paper and paper towel rolls
- ✓ Cereal boxes\*
- ✓ String/cotton thread
- ✓ Wool
- ✓ Paper towels

\*Colored paper no longer contains toxic metals and it's okay to use. Research indicates that hydrocarbons are rendered inert by composting.

## Avoid!

- x Meat & dairy
- x Fats, Oils
- x Feces (cats, dogs, pet birds, pigs)
- x Charcoal barbeque/coal ashes
- x Treated wood products
- x Diseased plants\*
- x Weeds seeds\*
- x Plants with invasive root material (bindweed, thistles, nut sedge)

\*Home compost rarely gets hot enough to destroy pathogens and seeds

## Other

- ✓ Eggs shells (add calcium)
- ✓ Wood ash (in moderation)
- ✓ Ground stone & shells (adds minerals)



# Composting Materials Everywhere!



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# Composting Carbon to Nitrogen Ratio

Average Carbon to Nitrogen Ratios*	Compostable Material	
15:1	Food scraps	<b>Nitrogen - rich GREENS</b>
19:1	Grass clippings	
20:1	Coffee grounds	
25:1	Rotted manure	
30:1 (ideal ratio)		
60:1	Corn stalks	<b>+</b> <b>Carbon - rich BROWNS</b>
40-80:1	Leaves	
80:1	Straw	
170:1	Paper	

Get things a-cookin'! Too much & your pile will be stinky.

Provide structure & allow air circulation. Too much and your pile won't break down.

*\*Estimated ranges. Actual carbon to nitrogen ratio varies on plant species, material composition, and moisture content.*

Mixing “browns” and “greens” together can help achieve an ideal ratio for decomposers that prefer a diet with 30 times the amount of carbon-rich material as nitrogen-rich material, or a C:N ratio close to 30:1. You can get scientific and use equations, but in most cases **2-3 times as much BROWNS as GREENS** will result in desired ratio. Variety is good!



# GREENS



# BROWNS



When you're starting out composting, a simple way to achieve a suitable C:N ratio is to add two buckets of browns for every one bucket of greens you add to your compost system. As you observe the conditions in your compost system over a few weeks or months, you might decide to alter these proportions.



# Getting Started ...

## Things to Consider

- Location
- Size
- Proximity to garden
- Sources of water
- Amount of shade / sunlight *avoid intense sun*





# Poll Time!



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# Getting Started ...

## Bin Considerations

- Holds heat
- Size, adequate volume
- Scavenger resistant
- Ease of use & access





# Building the Pile

- 1) Coarse materials on bottom for aeration
- 2) Alternate brown & green layers or heap on shovelfuls and **MIX!**
- 3) Not more than 4-5 feet high – keep it manageable



- 4) Mix with pitchfork and add water
- 5) Turn 3 - 4 weeks after initial assembly
- 6) Then, about every 2 weeks is recommended.

## Composting Basics



1. Chop materials ½ to 1½ inches.
2. Mix equal volumes of carbon-rich dry brown and nitrogen-rich green plant materials.
3. Keep compost only as moist as a wrung out sponge.
4. Turn often.





# Composting: Temp and Turning

## ***Fever!***

**150° F**

Excessive heat above 150° will kill beneficial bacteria that can help suppress diseases in the soil and protect your plants.

## ***Avoid weed seeds and disease.***

**130° F**

Unless you are carefully monitoring your pile to ensure it reaches at least 130° for a few days, avoid adding weeds that have gone to seed and diseased plants.

## ***When to turn it?***

**100° F**

Decomposition will happen faster if you turn your pile whenever the temperature drops below 100°. Every 6 weeks to 3 months is good, too; if it's turned *too* often, you'll disturb the bacteria's work and slow them down temporarily. Ideal temperatures for composting are between 90° and 150° F.

*Courtesy of Franklin SWCD*

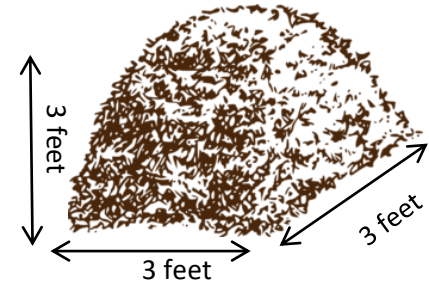
**Turning your pile ensures you're mixing well-rotted materials with fresh, green material and dry stuff with wet stuff. How often you turn your pile is up to you and when you'd like finished compost!**

# Composting Size, Air, Water

1 cubic yard is ideal



If too small, your compost won't hold enough heat. If too large, air won't penetrate the pile.



Efficient bacteria need oxygen!



**For good aeration:**

- Add a coarse layer to the bottom of the pile
- Use ventilating stacks like perforated PVC pipe, wire mesh cylinders, or metal pipes
- Use an aerator tool



Too little moisture slows decomposition and too much is suffocating



Your pile should be about as moist as a wrung-out sponge with a moisture content of 45-50%.

Rainwater is best!





# Two Methods of Composting:

## Passive (cool) ~ *slow and requires little maintenance*

- Start with a layer of bulky browns
- Add greens and browns, alternating / mixing
- May need to stockpile browns (leaves)
- Easier, less work, but takes longer – up to one year
- Remove compost from bottom

## Active (hot) ~ *faster but more labor intensive*

- Build up pile with 30:1 mix of C:N
- Chop or shred larger items before adding them
- Make the pile big to produce heat (at least 3x3) but not more than 5 ft high
- When full, turn at least weekly, optimal temp 135-140 degrees
- Water when needed
- A lot of work, but decomposes quicker (2 - 3 months)



# Composting Containers

## Rollers, Tumblers, Bins





# Composting Methods/Types

## DIY & Alternatives



*Wire mesh*



*Wooden bins*



*Cinder blocks*



*Flexible hoop*



*Vermicomposting*



*Bokashi (indoor) composting*

# Compost Bins Available

ONLY  
\$35



Can purchase bins from Geauga-Trumbull Solid Waste Management District  
at Geauga County Collection Facility on Fridays 10 am – 3 pm.  
(12685 Merritt Rd. Chardon 44024)



# Troubleshooting

## Compost Problems

**Bad Odor** Too much nitrogen: add Carbon OR Anaerobic: turn pile

**Pile is too Wet** Turn and add Carbon

**Pile is too Dry** Check moisture and add water

**Intruders** Evaluate design, install fence or more barriers

**Flies** Be sure food scraps are well-covered & don't add wrong materials

**Materials not Breaking Down** Turn, check water, or add Nitrogen

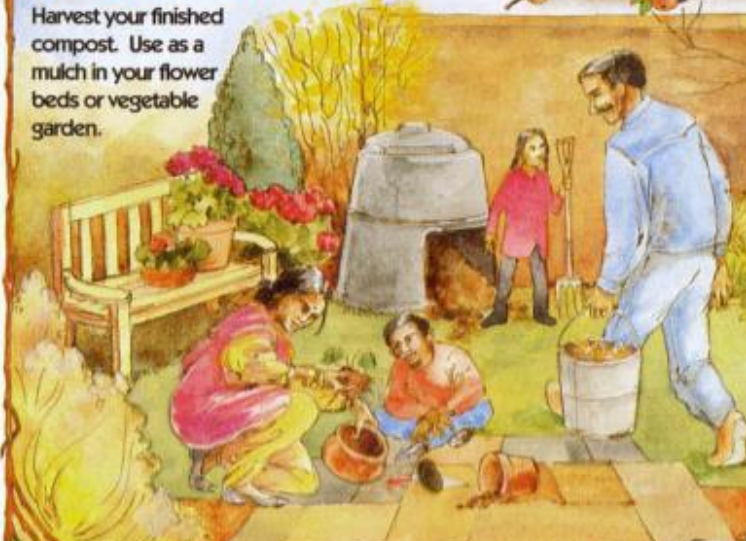
**Too Hot** Turn and add Carbon

# Autumn

Harvest your finished compost. Use as a mulch in your flower beds or vegetable garden.

## The Four Seasons of Composting

# Winter



### Greens & Browns

(Nitrogen rich materials) (Carbon rich materials)

- Fruit and vegetable scraps
- Coffee grounds
- Grass clippings
- Plant trimmings
- House plants
- Cut flowers
- Tea bags
- Egg shells

- Dry leaves
- Wood chips
- Sawdust
- Straw
- Twigs



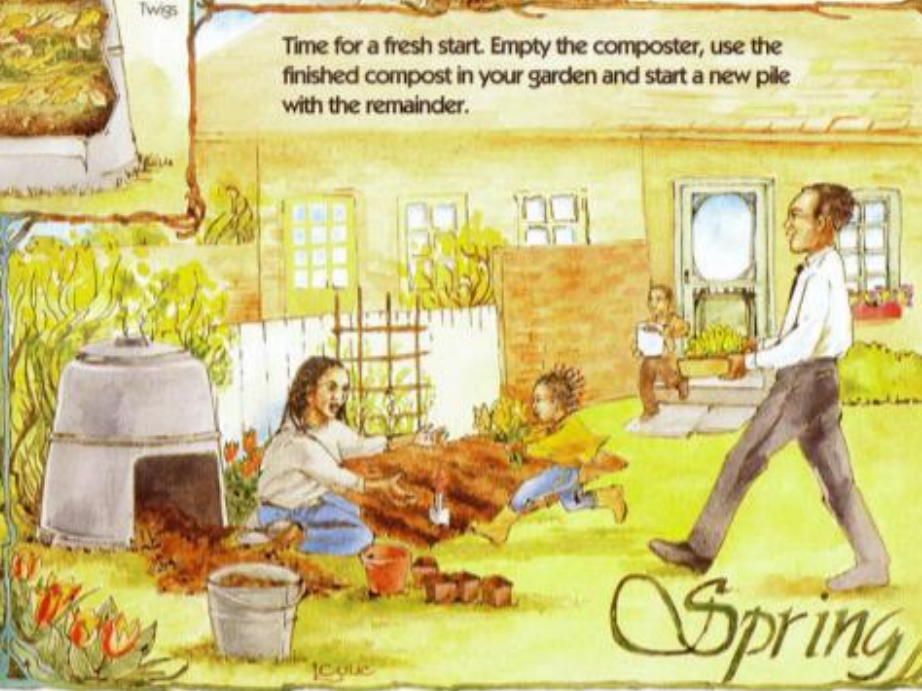
Keep your composter going during the cold weather by adding kitchen scraps regularly.

Time for a fresh start. Empty the composter, use the finished compost in your garden and start a new pile with the remainder.



To keep your composter in top condition, just layer and stir. Cover each layer of kitchen scraps with leaves or peat moss and poke or stir the pile often.

# Summer



# Spring



*Take The  
Leap  
&  
Start Your  
Heap!*



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# The Good News?

Remember that whatever you do...



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*Photo credit: Oregon Metro*

**Thank You &  
Happy Composting!**



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