Backyard Composting

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OSU | EXTENSION

Urban Agriculture and Natural Resources

Josh Campbell

Programs

Natural Resources

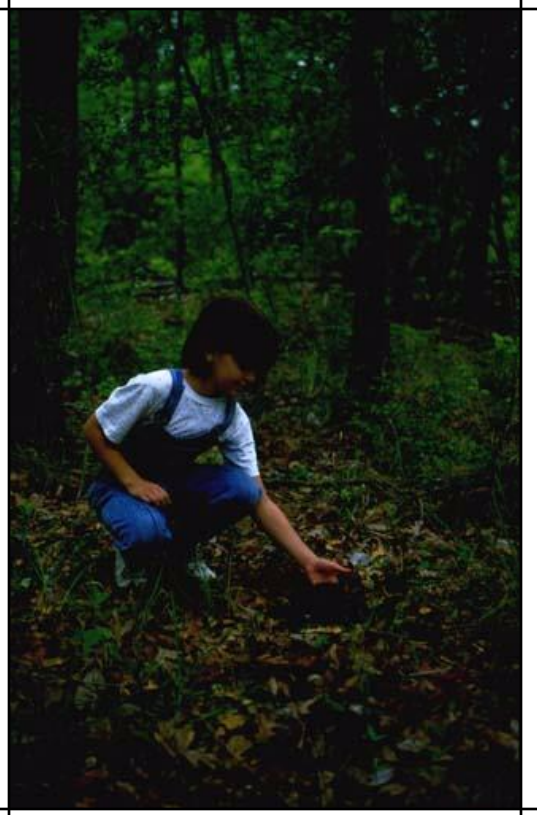
- Composting
- Water Quality
- Recycling
- Soil Health

Urban Agriculture

- Vegetable Gardening
- Farmers Markets
- Backyard Poultry
- Small livestock
- Beginning Farming

What is Composting?

- Nature's way of degrading organic material into humus and minerals
- Natural process for returning nutrients to the soil



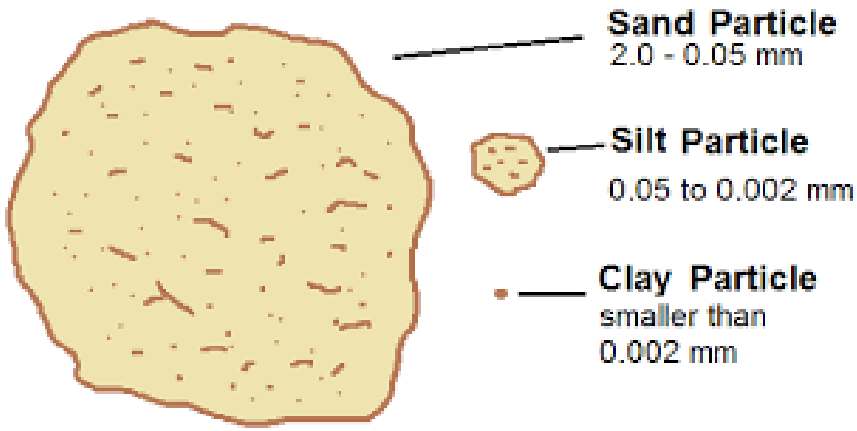
What is soil?

Soil is:

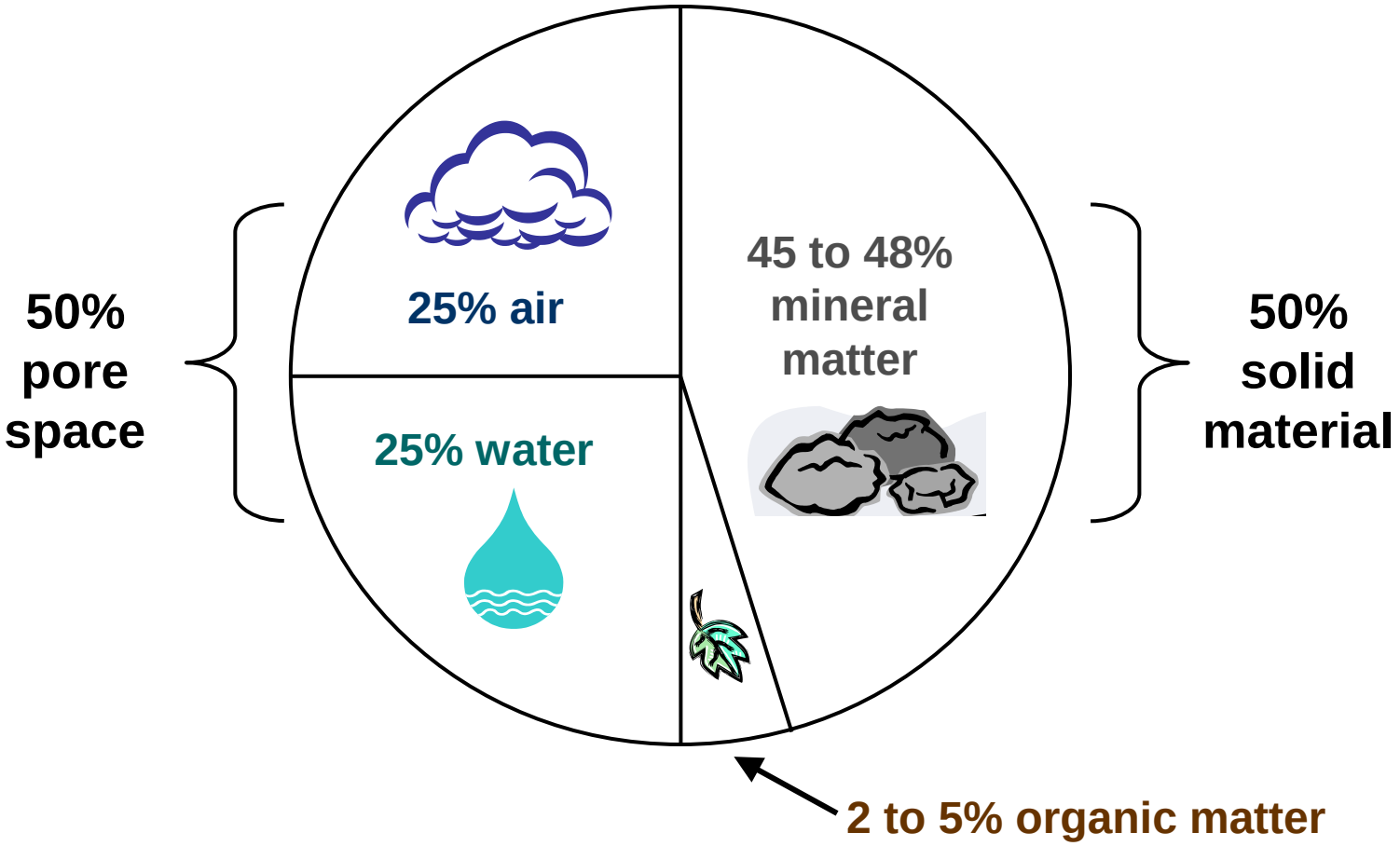
- Mineral & Organic material that supports plant growth
- Mixture of particles of rock, organic materials, living organisms, air, and water

Soil Particles – are the base material (soil type)

- **Sand particles** – the largest soil particles, range in size but are generally course and can be seen by the naked eye. Feels course when held in hand.
- **Silt particles** – cannot typically be seen by the naked eye. They are smooth to the touch but not slick or sticky. They are powdery somewhat when dry.
- **Clay particles** – cannot be seen with the naked eye. They can only be seen with an electron microscope. They feel extremely smooth and powdery and are slick and sticky when wet.

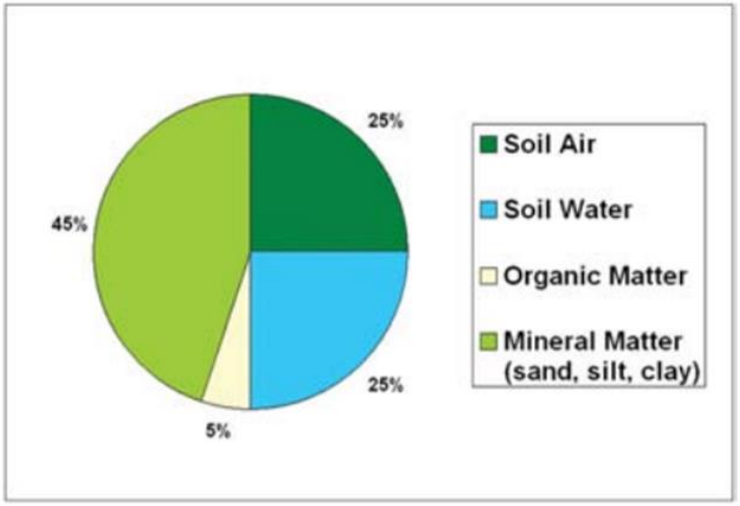


Ideal Composition of Soil

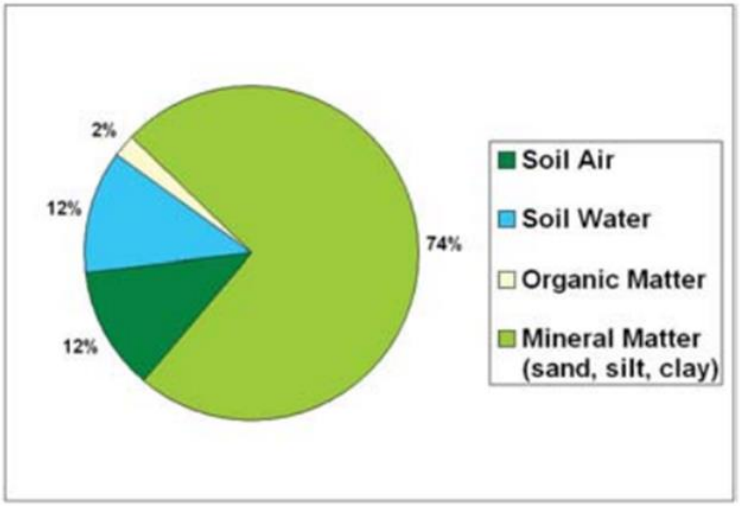


Normal Composition of Urban/Suburban Soils

- Urban soils are usually compacted. Restricting root growth and water infiltration.



General composition of natural soil



General composition of urban soils

Soil Organic Matter

Organic Matter:

- Plant and animal residues in various stages of decay.
- Sources: dead roots, root exudates, litter and leaf drop, and the bodies of soil animals such as insects and worms.
- Primary energy and nutrient source for insects, bacteria, fungi, and other soil organisms.
- After decomposition, nutrients released from the residues available for use by growing plants.

***Soil H*umus:**

- Fully decomposed and stable organic matter.

General factor affecting organic matter content

Tillage: Soils that are tilled frequently are often low in organic matter. Plowing and the soil increases the amount of air in the soil, which increases the rate of organic matter decomposition

Vegetative cover: Soils with greater vegetative biomass will have more organic material.

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Why Compost?

- It reduces and recycles yard waste and produces an excellent soil amendment.
  - 25% or more of landfill space in Oklahoma is yard waste
- Help the garden, the environment, by composting lawn and garden waste.

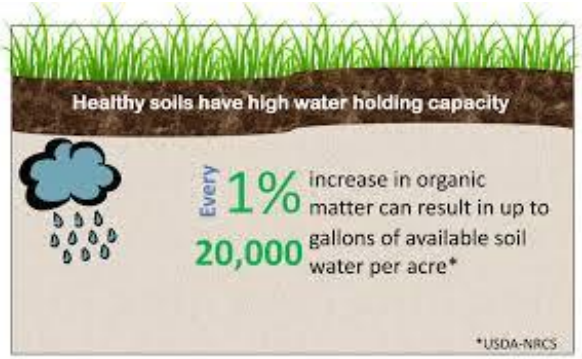
Benefits of Compost

- Free fertilizer / mulch (not just a fertilizer)
- Builds soil structure
  - Improves drainage
  - Water holding capacity
- Diverts organic waste
- Nutrients are more readily available to the plant
- Feeds and supports living things in the soil

How does Compost Impact Water Usage?

- When compost is added to bare soils as a thin layer, it is an effective barrier against evaporation of soil moisture, a practice called top- or side-dressing.

- Compost also reduces a plants need for water by increasing how much water can be held by the soil - **only a 5% increase in organic material quadruples the soil's water holding capacity**.



Earthworm, Bacteria & Fungi and other soil organisms

Living Organisms improve soil

- Ease at which soil can be worked
- Create openings in soil as they tunnel
- Enhances drainage and improves air exchange
- Break down organic matter and to release nutrients

Compost

Compost:

- Increases organic matter content in the soil
- Feeds and supports living things in the soil
- Is an excellent, inexpensive way to increase the productivity and workability of soil.
- Improves drainage and water holding capacity
- It reduces and recycles yard waste and produces an excellent soil amendment.
  - *from March - October, yard waste increases volume of residential solid waste 20 - 50% (EPA)*

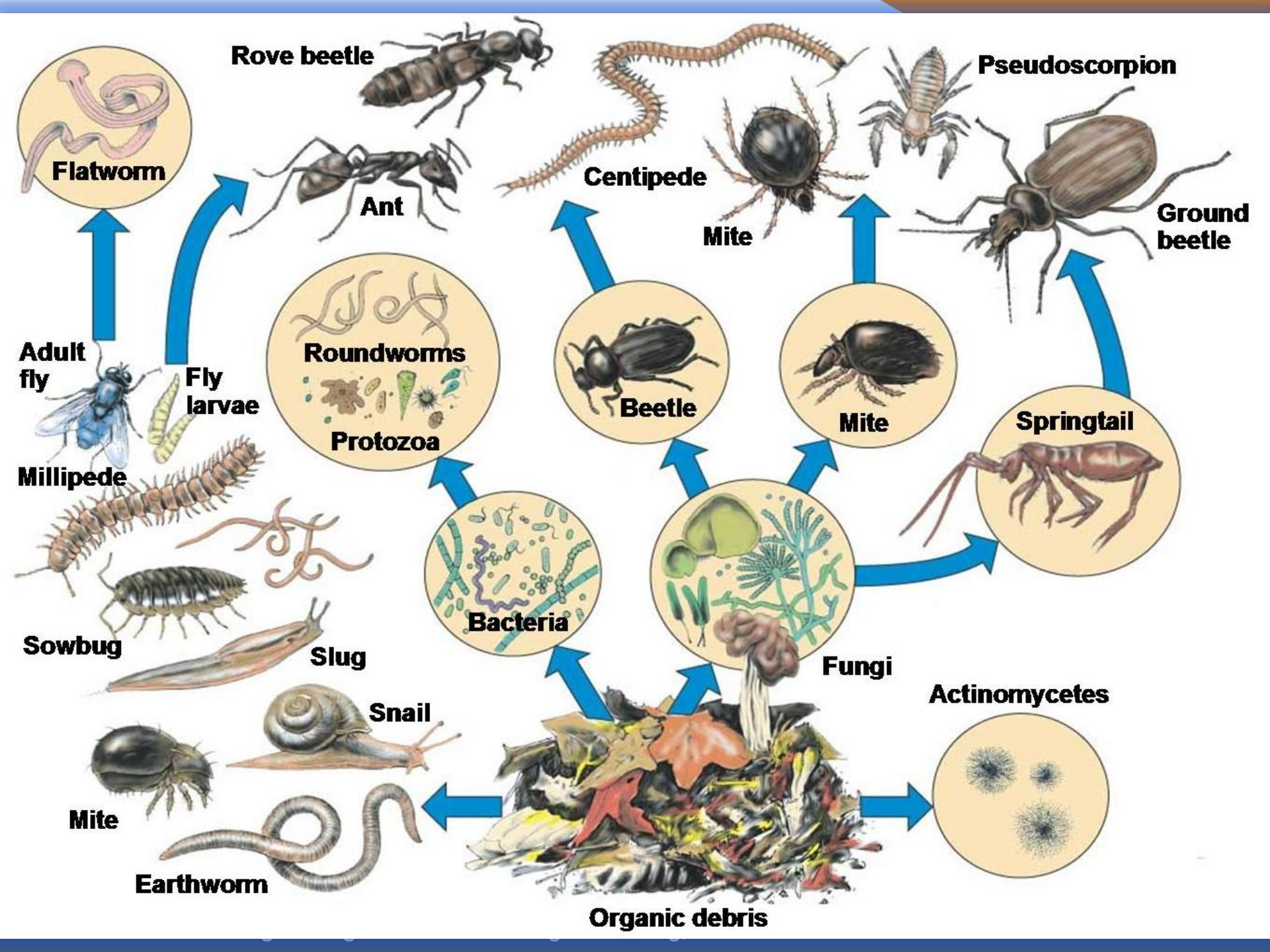
DIRT is a Four Letter Word! @#@$

- Dirt is what people and pets bring into the house that needs to be cleaned up.
- Soil, with its organic material and macro/microorganisms, contains everything that plants need to grow.
- Compost (organic material) is what turns dirt into SOIL

“a poor gardener grows weeds, a good gardener grows vegetables and a great gardener grows soil”

Composting is:

- Harnessing nature's way of degrading organic material into humus
- A natural process for returning nutrients to the soil that were initially absorbed by plant roots


Rove beetle
Flatworm
Ant
Centipede
Mite
Pseudoscorpion
Ground beetle
Adult fly
Fly larvae
Roundworms
Protozoa
Beetle
Mite
Springtail
Millipede
Bacteria
Fungi
Sowbug
Slug
Snail
Actinomycetes
Mite
Earthworm
Organic debris

HOME COMPOSTING MATERIALS

COMPOST

COMPOST TIP

Chopping or shredding these items helps speed up the composting process.

For best results, composters can mix in 2 to 3 volumes of "brown" material with each volume of "green" material.

Carbon-Rich "Browns"

Brown leaves & yard waste

- Brush & twigs (1/2" in diameter or less)
- Cardboard (dry and clean)
- Egg cartons (shredded)
- Newspaper
- Nuts & nut shells (but **not** black walnuts)
- Paper towels
- Pine cones & pine needles
- Sawdust & shavings (from non-treated wood)
- Straw & hay
- Wood chips

Nitrogen-Rich "Greens"

Green leaves & yard waste

- Coffee beans, grounds & used filters
- Dirt & potting soil
- Egg shells
- Flowers & yard plants
- Fruit, including cores & rinds
- Grass clippings
- Gourds & pumpkins
- Melons and melon rinds
- Tea leaves & tea bags
- Vegetables, greens & legumes

NOT FOR COMPOST

Not for Home Composting

- Biodegradable forks, spoons & knives
- Branches or logs more than 6” in diameter
- Charcoal briquettes or briquette ash
- Cigar & cigarette ashes
- Coffee or beverage cups
- Diapers
- Dairy products (butter, milk, cheese, etc.)
- Invasive weeds and plants
- Meat (cooked or raw) & bones
- Oils, greases & fats (including snack chips)
- Pet food
- Pet or human waste
- Pizza boxes with grease or cheese on them
- Recyclables (glass, plastic, metal cans. etc.)
- Sawdust from treated wood
- Trash (wrappers, packaging, etc.)
- Used take-out containers & Styrofoam shells
- Wood treated with varnish or paint

For more, visit dnr.wi.gov & search “compost,” or consult other DNR publications, Home Composting: Reap A Heap of Benefits & Home Composting: The Basic Composter.

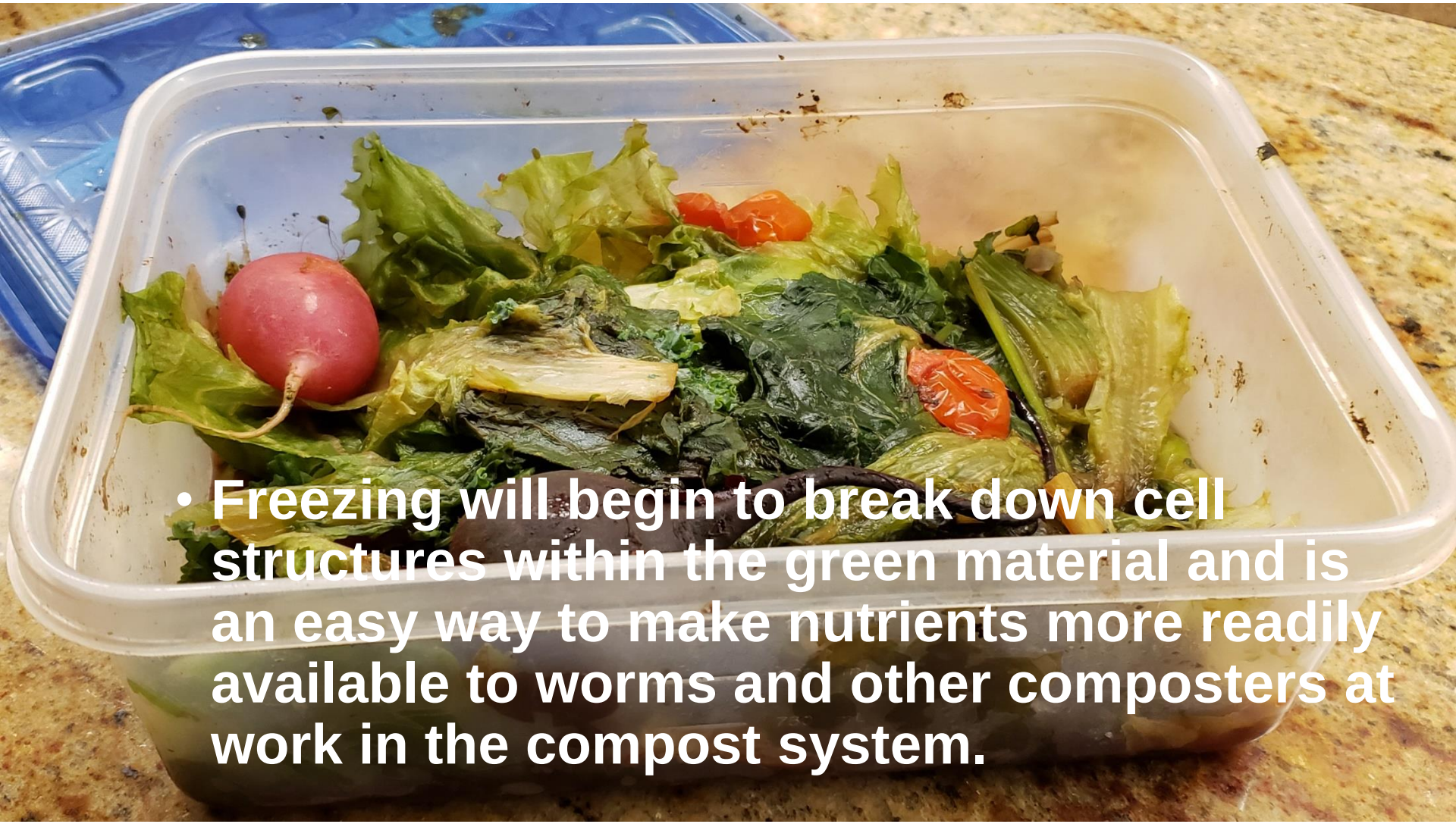


Photo courtesy of Sharon McAllister

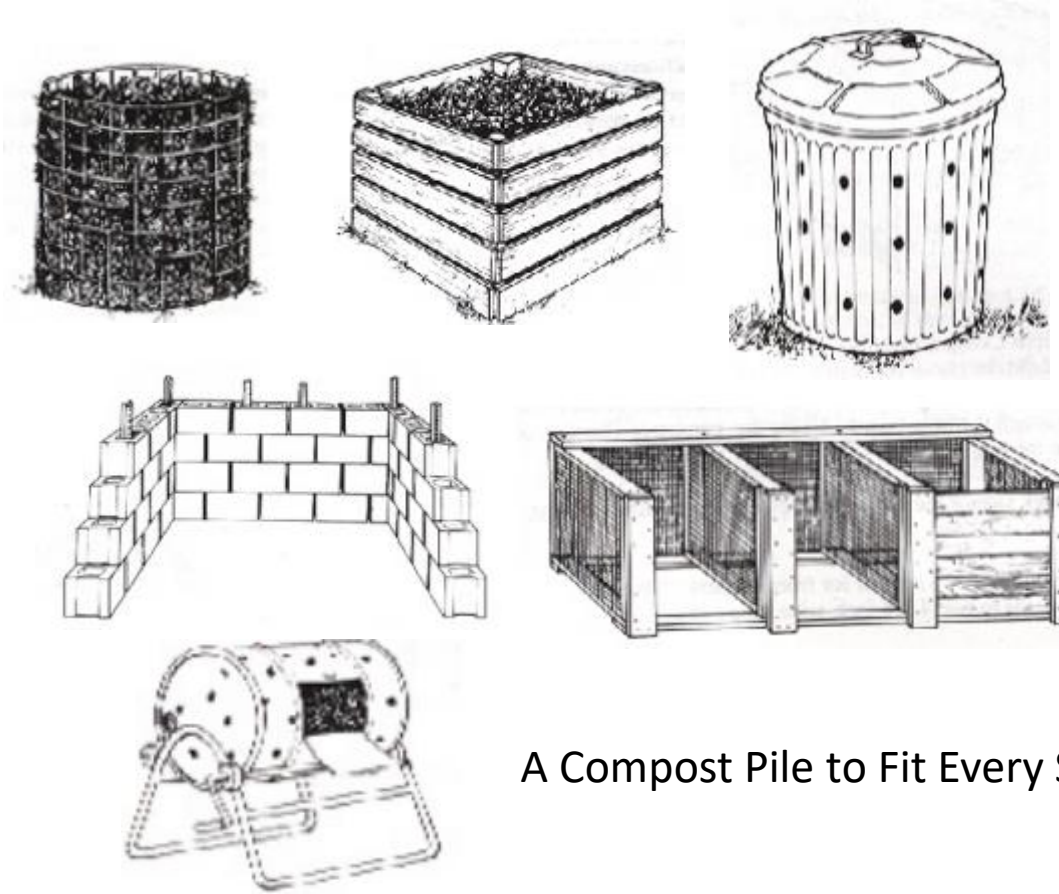
Two Types of Composting

- Cold/Static Composting - A cold pile requires minimal effort but may take a year or longer before it produces compost you can use in your garden. This method involves putting your waste in a pile, and waiting. You can think of cold composting as the add-as-you-have-materials pile. The time it takes to breakdown will depend on the materials in your pile, the size of the particles, etc.

- Hot Composting - A hot pile requires the right mixture of nitrogen and carbon materials to get the pile to heat up. The ratio by volume should be 2-3 parts carbon to 1 part nitrogen. To aid in decomposition, keep the mixture moist but not sopping wet. Use a variety of different-size materials to create air pockets. Regularly turning the pile increases the air/oxygen exchange and will aid breakdown.

Types of Home Composting – Don't get overwhelmed!

- Large scale
- Trench
- Lasagna
- Tumbler
- Vermicomposting
- Wire mesh
- Can composting
- Open pile
- Bokashi bucket
- Etc.



A Compost Pile to Fit Every Style

Photo: Freddy Hill

Lasagna or Sheet Composting

Photo: Sharon McAllister

Trench Composting

Photo:
Sharon
McAllister

Key Hole Composting

Photo: Sharon McAllister

Vermicomposting

Eisenia fetida

- Species of worms used for vermicomposting

Bokashi

Keyhole Composting

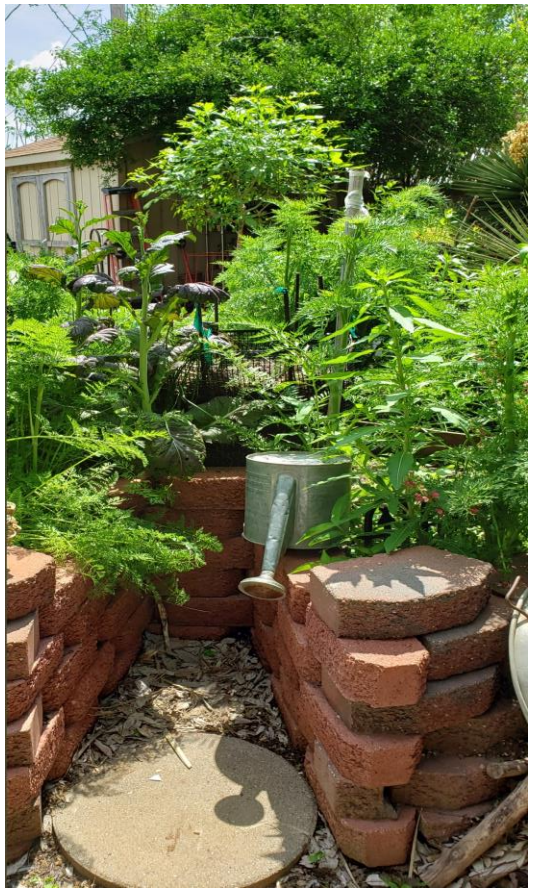
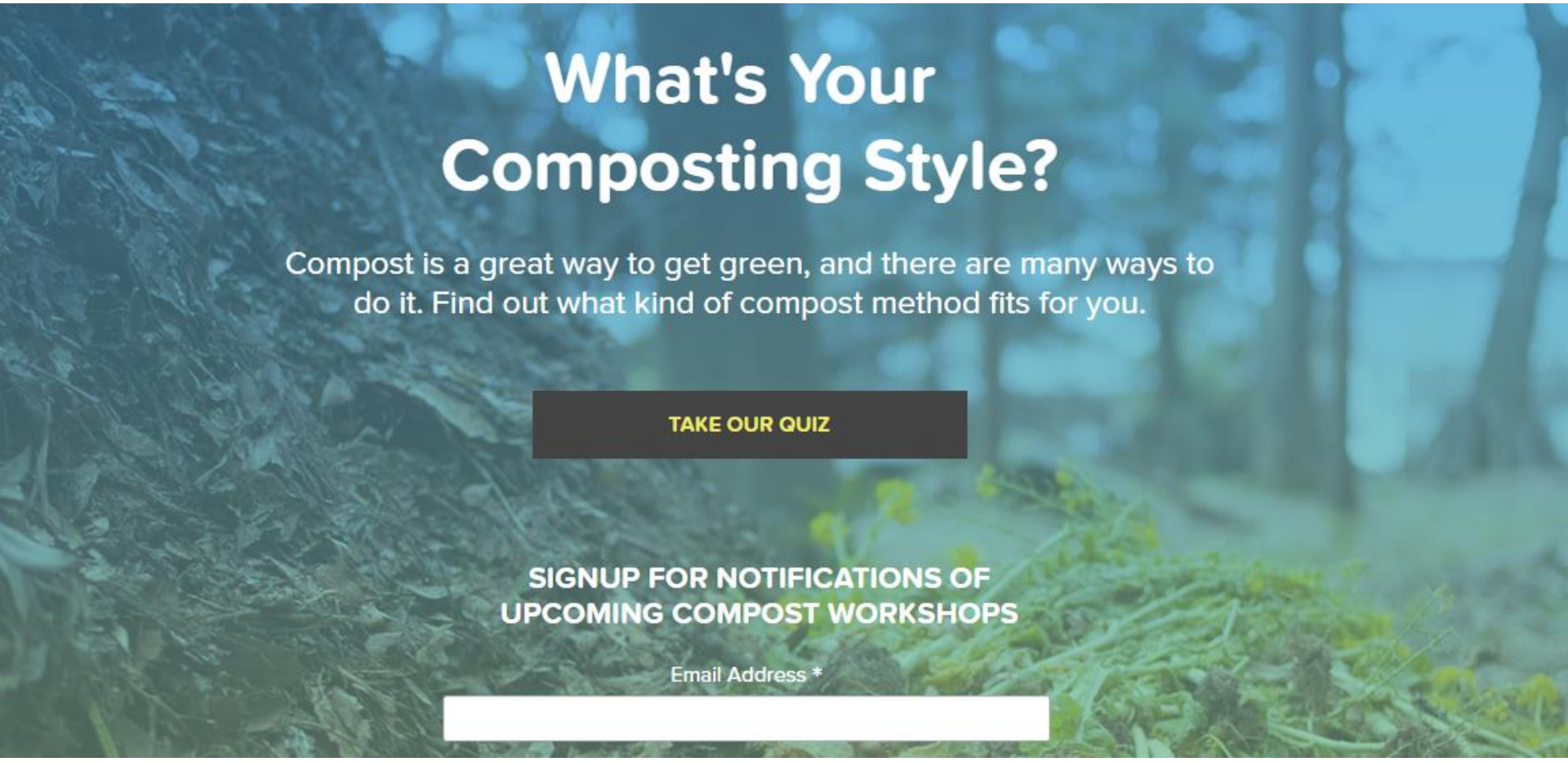


Photo: Sharon McAllister

www.saskwastereduction.ca/quiz/

What Type of Composting is Right For You?

www.saskwastereduction.ca/quiz/



Hands-On Or Hands-Off?

Hands-on composters are willing to closely manage their compost to get good, fast results. Hands-off composters want a simple compost that doesn't need much time or attention.

HANDS-ON

HANDS-OFF

How Much Space Do You Have For Composting?

INDOOR ONLY

BALCONY

YARD, NO GARDEN

YARD AND GARDEN

I WANT TO BUILD A GARDEN IN MY YARD

Do You Want To Compost Grass Clippings?

If all you have to compost is grass clippings, the easiest solution is to leave them on the lawn when you mow. This can be a healthy lawn care strategy.

MORE INFO

YES

NO, I LEAVE THEM ON THE LAWN

YOU COULD CHECK OUT...

1. A Medium-Sized Compost Bin

Bins are a tidy way to compost outdoors and help create the damp, warm conditions needed for materials to break down. A medium-size compost bin (roughly 16 ft^3 - 36 ft^3) provides enough room for a hands-on household with a moderate amount of yard waste.
A wooden stacking bin is an inexpensive option and an Aerobin is a deluxe option.
This method can be used in winter.

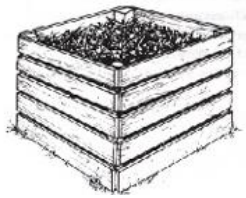
More Info

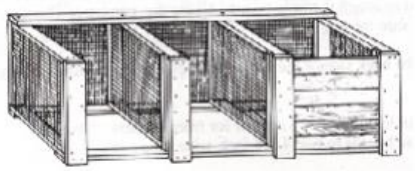
2. A Large Compost Bin

Bins are a tidy way to compost outdoors and help maintain the damp, warm conditions needed for materials to break down. A large compost bin (over 36 ft^3) provides enough room for a hands-off household with lots of yard waste.
A pallet bin is an inexpensive option and a wooden bin with multiple stalls is a deluxe option.
This method can be used in winter.

More Info

Share quiz on Facebook





Summary of Composting Methods

Type	Advantages	Disadvantages
Hot	Quicker harvest. Kills many weed seeds and diseases. Less likely to attract unwanted animals.	Requires careful attention and frequent labor. Requires storage of some materials prior to use. (Most carbon sources can easily be stored for many months.)
Cool	Materials added as generated. Less labor. Compost rich in beneficial organisms.	Takes a year or more. Some nutrients lost to leaching. Can attract animals and flies.
Bin	Neat and tidy appearance. Can be used for either hot or cool method.	Must purchase or fabricate. May be difficult to turn materials. Generally requires more labor than other methods.
Tumbler	Neat and tidy. Good for maintaining aeration. Works well for cool composting. Good for small space.	Costly. Volume is usually inadequate for hot composting. Filling and/or harvesting may be awkward. Requires close attention.
Worm composting	Easy. Little or no odor. Can be done indoors or outdoors. Rich product. Excellent way to compost food waste.	Requires careful attention to food materials added. Must provide suitable location and temperature for worms; may attract fruit flies. (See fact sheet HG-40, Indoor Redworm Composting.)
Sheet composting	Accommodates large volume of material. No turning required. Boosts earthworm population.	Requires timing and patience. Requires some initial labor. May not be ready for planting when anticipated.
Trench composting	Easy. Boosts number of earthworms. Doesn't attract flies or animals.	Requires planning, persistence, and regular trips to the garden.

Backyard Composting

- Typically small compost piles
- 3 feet x 3 feet or greater required for hot composting. Most backyard composters cold compost
- Typically takes 6 months – 1 year to make completed compost

Factors affecting the process

- C:N Ratio
- Surface area of particles
- Moisture
- Aeration

- *All things that we can control*

C:N (Carbon and Nitrogen)

- All organic material contains C and N
- C is found in cellulose and lignin
  - Cell wall strength
- N is found mostly in plant proteins
- C:N ratio is an estimation of the dry weight of the two

Carbon/Nitrogen (C/N)

- Maximum composting efficiency occurs when C is properly balanced with N
  - 30:1 is the optimum C:N ratio

C:N for your pile

- Grass clippings
  - ~12-25:1 (15:1)
- Leaves
  - ~30-80:1 (60:1)
- Vegetable waste
  - ~12-20:1 (12:1)

Simple rule of thumb: Maintain 3/1 brown material to green material ratio

Grass	15
Leaves	60
Veggies	12
Total	87/3
Average C:N	29:1

Use best judgment to calculate C:N ratio

Particle Size

- Significant impact on speed of composting
- Smaller particles compost faster
- Grind or chop brush, prunings and leaves

Water (H_2O)

- Maintain at 50% moisture
  - feel like wet sponge; ideal
  - Too dry if dry, no residue of water; add water
  - water runs freely from hand down arm; too much

Why water your compost?

Moist compost creates an unpleasant habitat for rodents that might otherwise be attracted to a warm, cozy dry environment – especially when there is food sitting on top of the wonderful dry, cozy home.

Photo: Sharon McAllister

Oxygen (O)

- Turn piles as necessary
- Allow access to air flow
  - Open sided bins
  - May want to restrict size of piles to allow good oxygen flow

Hot Composting
Temperatures

- Optimum - between 100^{o} and 140^{o} F
  - Pile must be 3ftx3ft to reach 140^{o} F
- Higher temps kill diseases, insects, and weed seeds
- Complete when temps within pile drop near 100^{o} F or below

Compost Quality

- Ready to use when:
  - temps within pile begin to cool and remain steady even after turning pile
- Improve handling and quality:
  - screen to remove particles larger than 1/2” diameter

Steps for a Successful Compost Pile: ***Site Selection***

- At least 6 hours of sunlight daily
- Does not detract from the landscape
- Convenient for adding materials and removing compost
- Available water

Steps for a Successful Compost Pile: ***Trouble Shooting***

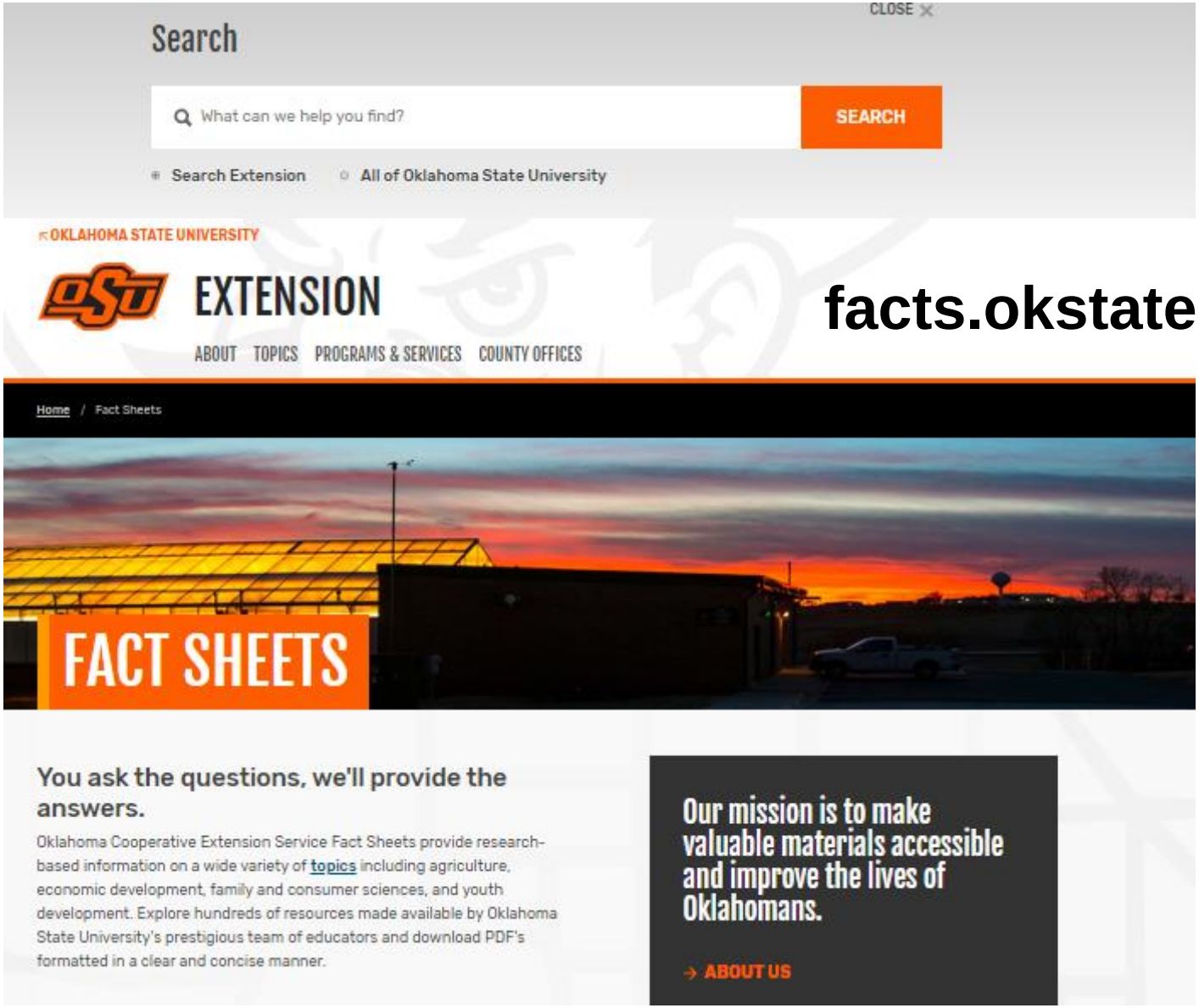
- *Strong odor* - Insufficient oxygen
  - Turn pile
  - Too wet, add dry materials
- *Pile damp, but won't heat* - insufficient nitrogen
  - Add fertilizer or grass clippings OR
  - Too wet, allow to dry or add dry material

Steps for a Successful Compost Pile: ***Trouble Shooting (cont.)***

- *Dry and not composting* - insufficient water
- *Ammonia smell* - too much nitrogen
  - Add sawdust of other high carbon material and turn pile

secret trick to fast compost

OXYGEN



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Vermicomposting – Composting with Worms

Published Mar. 2017 | Id: BAE-1742

By Douglas W. Hamilton

Print-friendly PDF Share Fact Sheet

JUMP TO: What is Vermicomposting? / Why Compost with Worms? / Kinds of Worms / Kind of Bin Needed / What do Worms Eat? /

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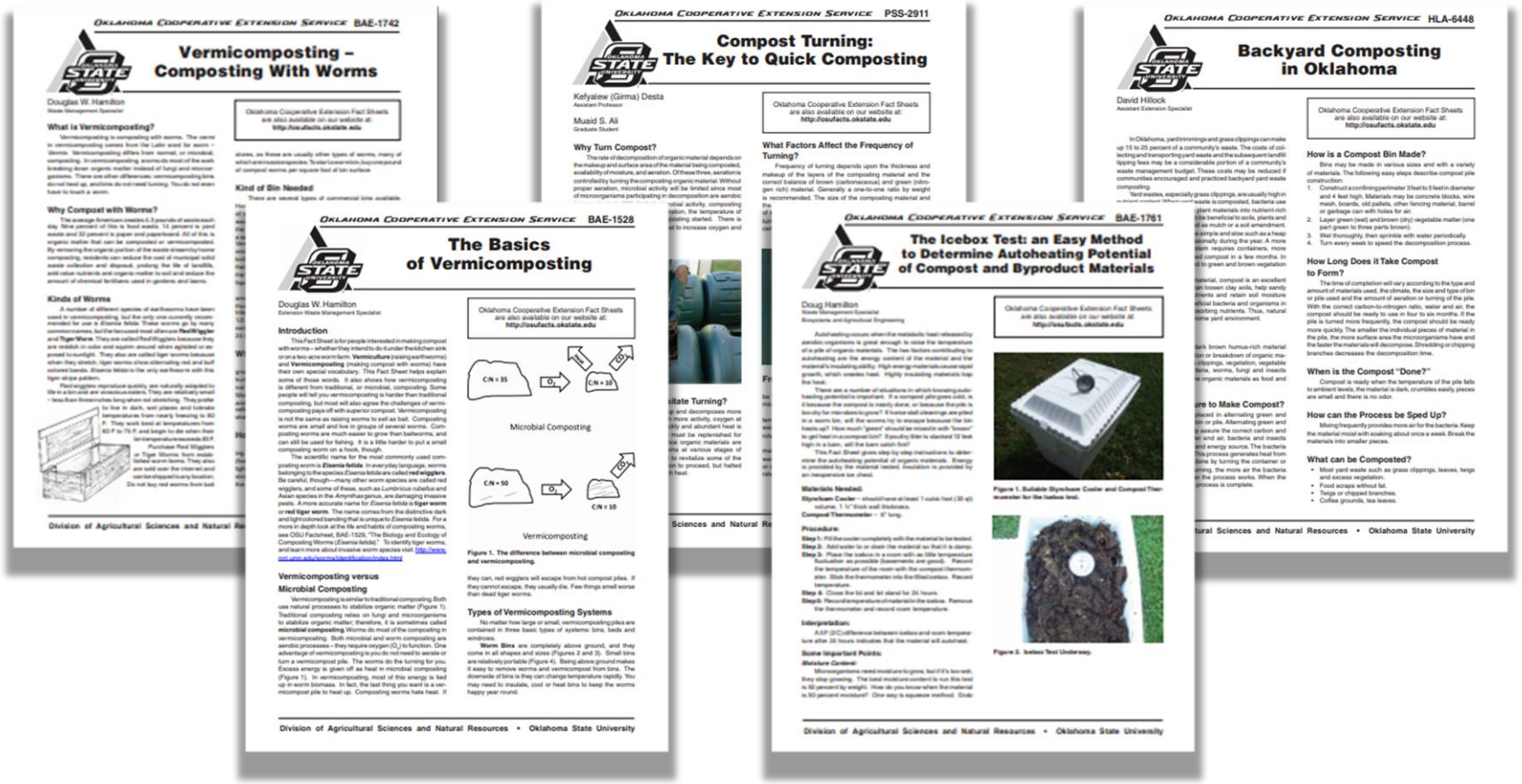

Oklahoma Cooperative Extension Service BAE-1742

Vermicomposting – Composting With Worms

Douglas W. Hamilton
Waste Management Specialist

Oklahoma Cooperative Extension Fact Sheets are also available on our website at: http://osufacts.okstate.edu

What is Vermicomposting?

Why Compost with Worms?

Kinds of Worms

Kind of Bin Needed

Division of Agricultural Sciences and Natural Re

Oklahoma Cooperative Extension Service PSS-2911

Compost Turning: The Key to Quick Composting

Kefyalew (Girma) Desta
Assistant Professor

Muaid S. Ali
Graduate Student

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Why Turn Compost?

What Factors Affect the Frequency of Turning?

Sciences and Natural Re

Oklahoma Cooperative Extension Service HLA-6448

Backyard Composting in Oklahoma

David Hillock
Assistant Extension Specialist

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How is a Compost Bin Made?

1. Construct a confining perimeter 3 feet to 5 feet in diameter and 4 feet high. Materials may be concrete blocks, wire mesh, boards, old pallets, other fencing material, barrel or garbage can with holes for air.
2. Layer green (wet) and brown (dry) vegetable matter (one part green to three parts brown).
3. Wet thoroughly, then sprinkle with water periodically.
4. Turn every week to speed the decomposition process.

How Long Does it Take Compost to Form?

When is the Compost "Done?"

How can the Process be Sped Up?

What can be Composted?

- Most yard waste such as grass clippings, leaves, twigs and excess vegetation.
- Food scraps without fat.
- Twigs or chopped branches.
- Coffee grounds, tea leaves.

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Oklahoma Cooperative Extension Service BAE-1528

The Basics of Vermicomposting

Douglas W. Hamilton
Extension Waste Management Specialist

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Introduction

C/N = 35 → O_2 → C/N = 10 (Heat, CO_2)

Microbial Composting

C/N = 50 → O_2 → C/N = 10 (CO_2)

Vermicomposting

Figure 1. The difference between microbial composting and vermicomposting.

Vermicomposting versus Microbial Composting

Types of Vermicomposting Systems

Division of Agricultural Sciences and Natural Resources • Oklahoma State University

itate Turning?

Oklahoma Cooperative Extension Service BAE-1761

The Icebox Test: an Easy Method to Determine Autoheating Potential of Compost and Byproduct Materials

Doug Hamilton
Waste Management Specialist
Biosystems and Agricultural Engineering

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Figure 1. Suitable Styrofoam Cooler and Compost Thermometer for the Icebox test.

Figure 2. Icebox Test Underway.

Materials Needed:

Procedure:

Interpretation:

Some Important Points:

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Simple Science: Compost!

OklahomaGardening • 961 views • 1 year ago

Airdate (06/22/2019) #4551 Host Casey Hentges stops by a local lemonade stand for a metaphor to explain the simple science behind compost. Questions? To find out more information about show

Unique Keyhole Gardens for Composting

OklahomaGardening • 20K views • 3 years ago

(11/5/16) 4319 Casey Hentges is joined by special guests to take a look at unique key hole gardens used for composting.

Composting Methods

OklahomaGardening • 14K views • 7 years ago

Consumer Horticulturist David Hillock talks about a variety of composting techniques with a couple of examples of them in use at the Botanic Garden at OSU. For more information: Fact Sheet BAE-1744...

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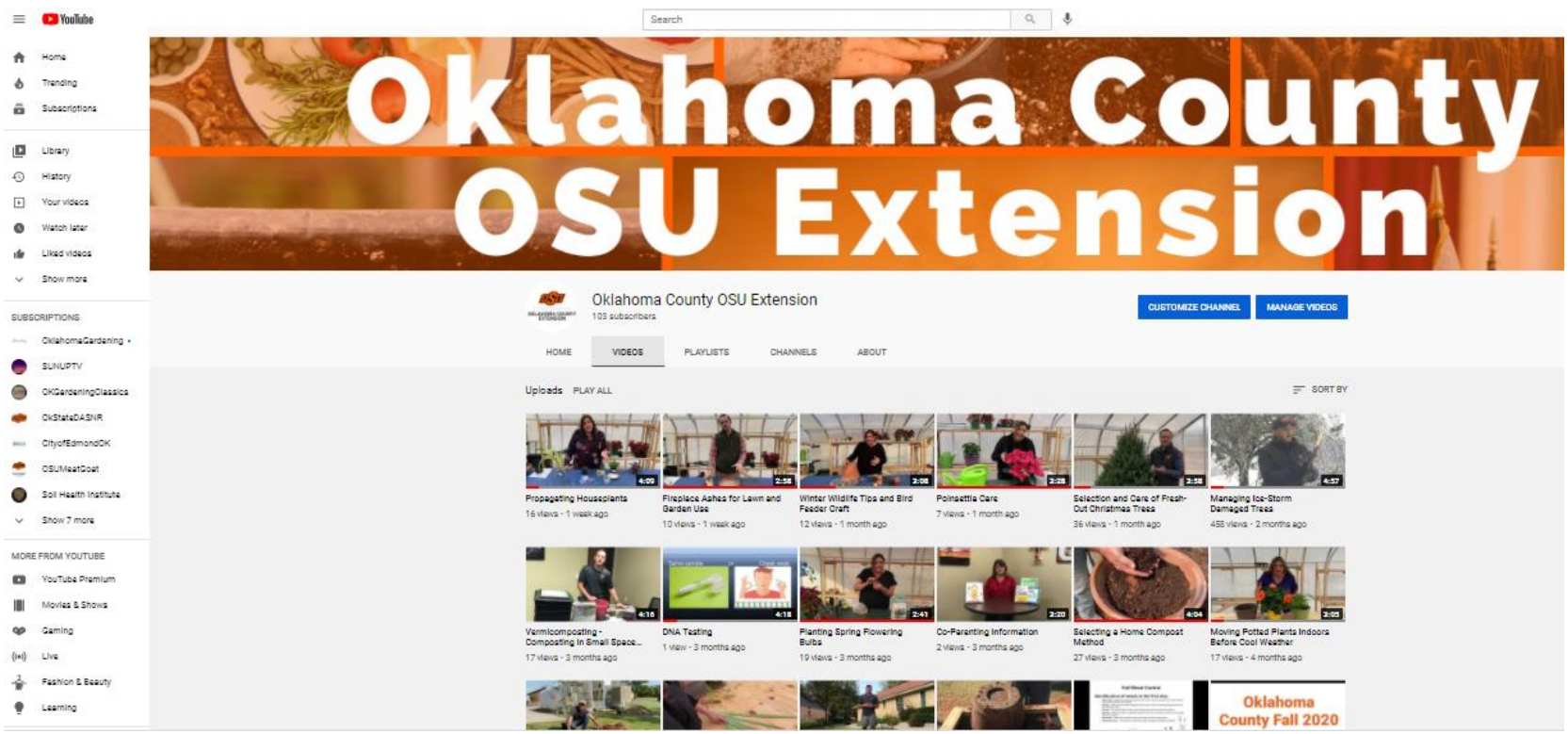
YouTube: Oklahoma County OSU Extension



THANK YOU!

Questions?