

# Backyard Composting For Beginners

Presenter  
Mikal Heintz  
Program Coordinator



Yakima County Solid Waste

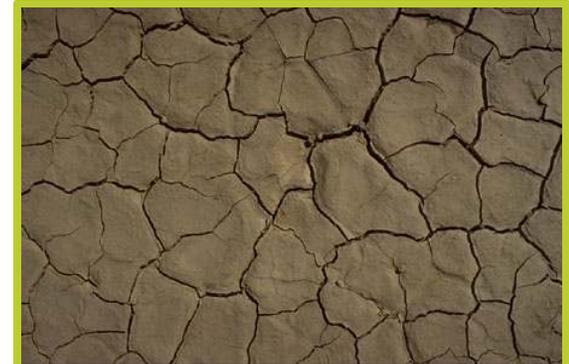


## Soil Ecology

Plaster (1992) estimates that one-fourth teaspoon of a fertile soil (about one ml) contains:

- 50 Nematodes
- 62,000 Algae
- 72,000 Protozoa
- 111,000 Fungi
- 2,920,000 Actinomycetes
- 25,280,000 Bacteria

# Soil vs. Dirt



Dirt is what you find under your fingernails.

Soil is what you find under your feet.

The soil is different from "powdered rock" or "dirt" in that it supports life; in particular, the growth of plants.

Soil can be thought of as the "skin" of the land; without it the land would die.

# Functions of Soil

- Regulating water - Soil helps control where rain, snowmelt, and irrigation water goes. Water and dissolved solutes flow over the land or into and through the soil.
- Sustaining plant and animal life - The diversity and productivity of living things depends on soil.
- Filtering potential pollutants - The minerals and microbes in soil are responsible for filtering, buffering, degrading, immobilizing, and detoxifying organic and inorganic materials, including industrial and municipal by-products and atmospheric deposits.

# Fundamentals of Building Soil

1. Provide a regular supply of organic matter to the soil.
  
2. Minimize or eliminate
  - a) Tillage
  - b) Erosion
  - c) Compaction



# What is compost?



The transformation of raw organic materials into biologically-stable, humic substances suitable for a variety of soil-plant uses.

# Benefits of Composting

- Could replace or supplement use of commercial fertilizers by homeowners.
- Done properly - can reduce air pollution, reduce the volumes at the landfill or incinerator.
- The most cost effective method of dealing with the yard and compostable kitchen waste.
- Composting being the most efficient way to divert organic wastes from our county's solid waste stream.

# What Can Be Composted

- Grass Clippings
- Leaves
- Chopped Cornstalk
- Farm Manure
- Hedge Clippings
- Kitchen and Vegetable & Fruit Scraps
- Sods

- Hay
- Weeds
- Straw
- Sawdust



# Alternatives to Composting Grass Clippings



- When proper lawn management is used, there is no need to collect grass clippings.
- Leaving the grass clippings benefits the turf by returning nutrients and organic matter to the soil.
- If evenly distributed, clippings left on the lawn can be equivalent to one fertilizer application per year.

# What To Avoid Composting

- Pig and Pet Manure
- Meat Scraps
- Vegetation Treated with Fungicides
- Fats & Oils
- Diseased Plants
- Perennial weeds, such as: morning glory, quack grass, other hard to kill weeds



# Getting Started

1<sup>st</sup> Location Selection

2<sup>nd</sup> Type of Bin

3<sup>rd</sup> Creating Compost

# Location Selection

Convenient

Access to Water

Space to turn pile

# Location Selection

The pile will do best where it is protected from drying winds and is in partial sunlight to help heat the pile.



Factors that contribute to spontaneous combustion

Height of pile exceeds 12'.

Temperatures of pile exceed 200 degrees F.

Moisture content of pile is between 26-46%.

No documented/recorded instances of spontaneous combustion occurring in a backyard compost pile that does not meet the above parameters.

# Spontaneous Combustion



Spontaneous combustion is the occurrence of fire without the application of an external heat source and can be caused by chemical, biological, or physical processes.

# Spontaneous Combustion



If a compost pile gets too hot--more than 160 degrees F--you can cool it down by:

- 1) reducing the size of the pile
- 2) adding water to 55% moisture
- 3) mixing in coarse, bulky material such as woodchips.

Compost piles work best at temperatures between 130-150 degrees F.

# Size of Compost Pile

## Minimum Size

3' x 3' x 3'

Keep it manageable...too big you won't be able to turn it and oxygen will not be able to reach center.

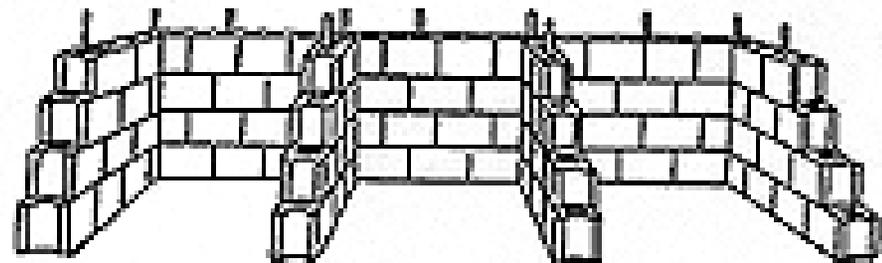
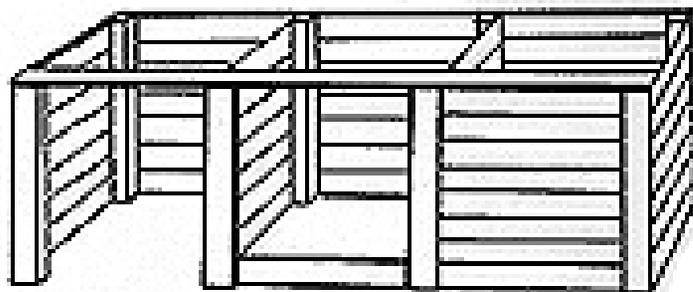
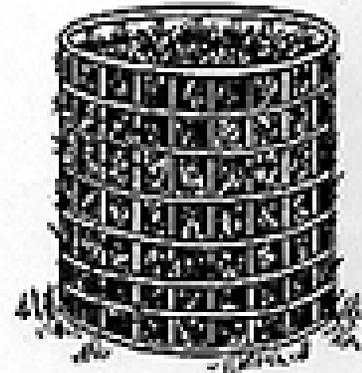
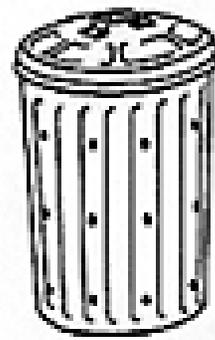
Too small and it will not be able to heat up.



# Compost Bins



# Homemade Compost Bins



\*How to Build Handout

# Creating Compost

- Recipe
- Particle Size
  - Moisture
- Temperature
  - Timeline
  - Climate
- Turning/Aeration/Oxygen
  - When to use

# Compost Recipe



## Getting Technical

The ideal proportion...

C:N ratio is  
30 parts carbon  
to 1 part nitrogen  
(by weight).

When mixing by volume the ratio is

**1 part grass clippings: 3 parts  
leaves**

If carbon and nitrogen are too far out of balance,  
the microbial system will suffer.

# What does “Green” mean?

## Green = Nitrogen

Nitrogen is a crucial component of the proteins, nucleic acids, amino acids, enzymes and co-enzymes necessary for cell growth and function (of microbial population).

# What does “Green” mean?



## Examples:

Grass Clippings  
Fruit and Vegetable  
Scraps  
Coffee Grounds  
Manure\*

# What does “Brown” mean?

Brown=Carbon

Carbon provides both an energy source and the basic building block making up about 50 percent of the mass of microbial cells.

Think...carbon...

Think...carbohydrates

# What does “Brown” mean?

Examples:

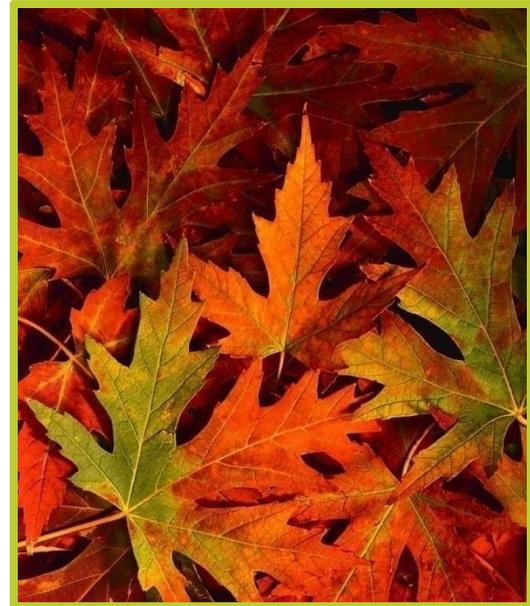
Fall leaves

Straw

Sawdust

Tree Prunings

Shredded paper



# Particle Size

- Shredded or chopped materials decompose the fastest.
- If a shredder is not available, break/cut larger pieces.
- The landfill has free chipped yard waste available. The yard waste does need to be composted.



A moisture content of 50% - 70% is recommended (think rung-out wet sponge).

# Moisture



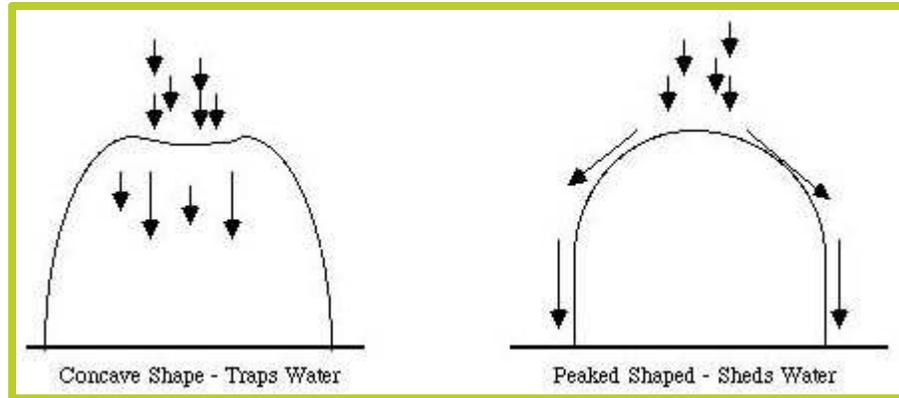
The compost pile must be kept moist for proper heating and decomposition.

If it is too wet, water will fill the pore space needed for air movement, and anaerobic conditions can result.

How to keep  
your pile  
moist?

- PVC drilled pipe.
- Set-up drip irrigation.
- Set a sprinkler on top.

## Moisture



Shape of pile effects the ability  
of compost to accept water.

# Temperature

- As organisms decompose waste, they generate heat.
- Most rapid decomposition when temps are between 90 & 140 degrees.
- If temperatures rise above 160 degrees, the pile can sterilize itself, killing off the beneficial microorganisms.
- When it drops below 70 degrees, the composting process is nearly complete.\*



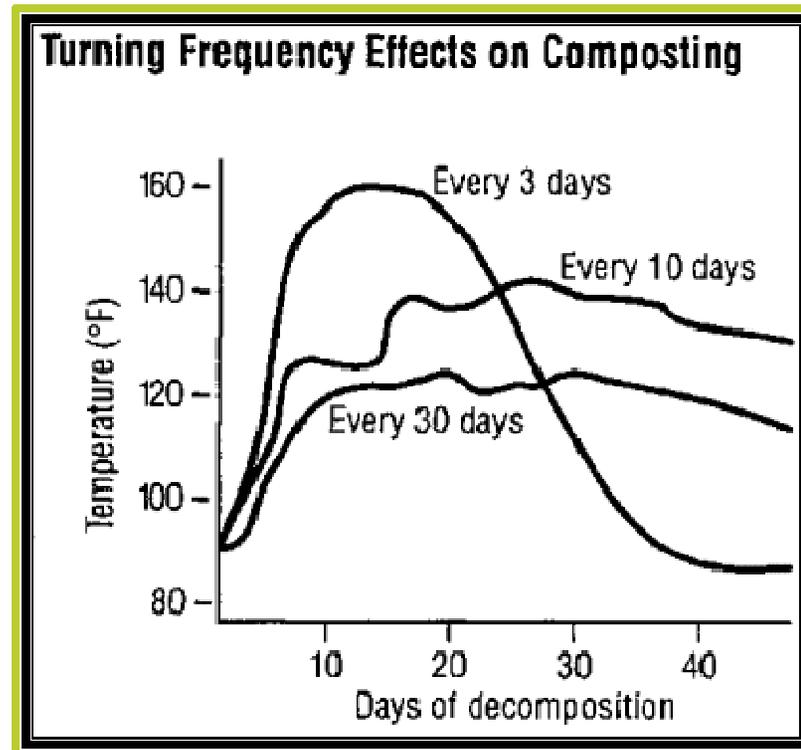
# Temperature

- The temperature of 150 is needed for killing many of the pathogenic diseases and weed seeds.
  - Compost thermometers are available to test the temperature of a pile.
- Failure to reach this temperature may be caused by too much water, improper aeration, too little nitrogen or too small a pile.

# Timeline

- Speed up the decomposition by turning the pile regularly.
- If pile is turned every two days, complete compost can be achieved in about 6 weeks (if the materials are finely shredded).
- Turning a pile monthly will produce compost in about 6 months.

# Turning Your Pile



# Climate

In the heat of the summer, you may need to add water more frequently.

If you notice your pile is not doing much during the winter, check your pile size. If it is too small or spread too thin, the heat will escape the pile.

Insulate pile.

# Turning/Aeration/Oxygen

## Aerobic vs. Anaerobic

Aerobic – presence of oxygen

Anaerobic – no oxygen

As anaerobic organisms decompose waste, they produce methane gas and hydrogen sulfide (rotten egg smell).

# Turning/Aeration/Oxygen

## Problems with Methane Gas

- Greenhouse gas.
- 21 times stronger than carbon dioxide.
- Landfills are the single largest source of methane.
- The US sent 25 million tons of food waste to landfills in 2005. This is equivalent to 7.8 million passenger cars.

# Turning/Aeration/Oxygen

- Use a pitchfork to turn the pile weekly, and add water when needed.
- Turning improves the porosity of the pile and speeds the biological decay.
- Turning also mixes material from the outside of the pile into the hot center.

# Passive vs. Aggressive

## Passive or slow composting

Requires less personal time and energy.

Compost will happen, however it will take much longer.

May be less effective at killing weed seeds, because the pile may not achieve high enough temperatures.

# Passive vs. Aggressive

## Aggressive/fast/hot composting

Speeds up the decay process.

Temperatures achieved kills most weed seeds and pathogens (disease organisms), but does not kill beneficial fungi that help plant roots absorb nutrients.

# Applying Compost

When is it ready?

- Should fit through a 1/2" screen.
- Should be dark and crumbly.
- Should smell earthy and sweet.
- Consists of 25-30% organic material.
- Reached temps of 150 degrees.

# Applying Compost

## Remember:

Healthy lawns with deep root systems require less water during summer and are more resistant to weed invasion.



## Lawn Establishment

Apply 0.5 – 1 inch of compost and incorporate it into 6 inches of soil.

# Applying Compost

## Trees and Shrubs

- New tree planting
- Established tree
- Shrubs & Raised Beds



# Applying Compost

## Flower and Vegetable Beds

Apply  $\frac{1}{2}$  to 1 inch of compost over the entire bed, or place in rings around each plant - extended to their drip line.

Always keep compost 1 to 2 inches away from the base of the plant to prevent damage by pests.

# Problems and Solutions

- Nothing is happening
- Stinks
- Odor like ammonia
- Attracts rodents, flies, or other animals

# Problems and Solutions

Nothing is happening...

- Is the pile dry?

It needs more moisture.

- Does the pile have too much bulking agent?

Add more nitrogen.

# Problems and Solutions

The pile stinks...

It needs more air and less water.

Try turning the pile more often or adding more bulking agent.

# Problems and Solutions

The pile smells like ammonia...

Add brown materials like leaves, straw, hay, shredded newspaper, etc.

# Problems and Solutions

## Attracting rodents, flies, and other animals

- Check for inappropriate materials (meat, oil, bones).
- Do you have organic materials too close to surface?

# Nature's Helpers

Microorganisms are not distributed uniformly throughout compost.

Factors that effect colony size:

- Amount of undecomposed organic matter.
- Moisture content.
- Contains anaerobic or aerobic regions.

# Nature's Helpers - Bacteria

- Make up 80 to 90% of the billions of microorganisms typically found in a gram of compost.
- Responsible for most of the decomposition and heat generation in compost.
- Most nutritionally diverse group of compost organisms.
- Use a broad range of enzymes to chemically break down a variety of organic materials.

# Nature's Helpers - Actinomycetes

- Earthy smell when it rains???
- Enzymes enable them to chemically break down tough debris ( woody stems, bark, or newspaper)
- Formation of humus during last stage of composting—look like spider webs stretching through compost.

# Nature's Helpers - Fungi

- Molds and yeasts.
- Work to break down dense debris.
- They can even break down materials that are too dry, acidic or low in nitrogen for final bacterial decomposition.

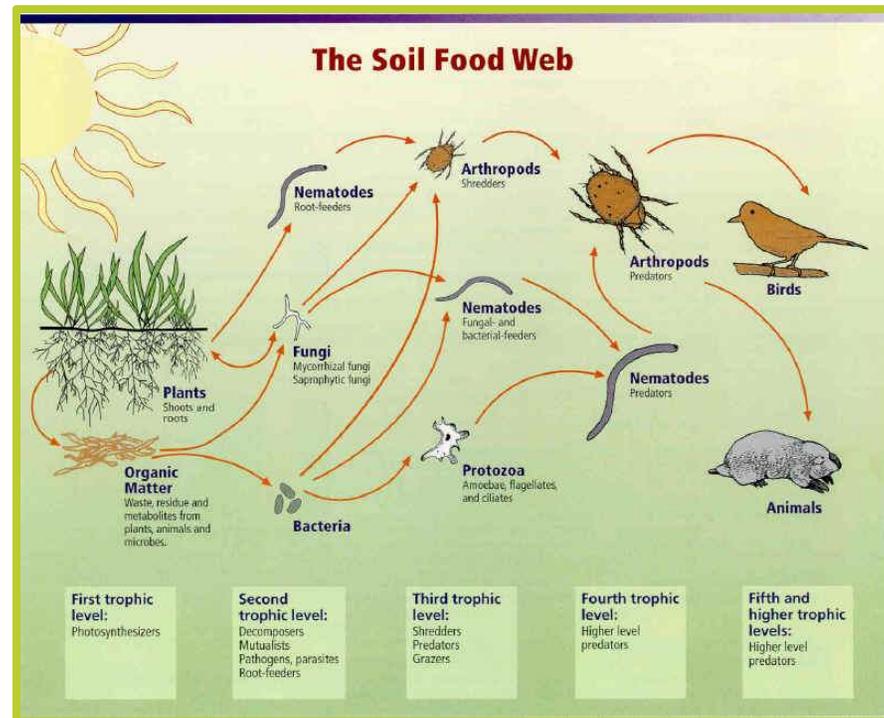


# Nature's Helpers - Invertebrates

- Millipedes
- Sow bugs
- Snails
- Slugs
- Worms (including earthworms, nematodes, red worms and potworms)
- Mites
- Springtails
- Centipedes
- Flies
- Spiders
- Beetles
- Earwigs



# Soil Food Web



# Helpful Equipment



# Worm Composting

Presenter  
Mikal Heintz  
Program Coordinator



Yakima County Solid Waste



# Worm Composting

- What is worm composting?
  - Setting up a worm bin
    - Containers
    - Harvesting
  - Using worm compost

# What is worm Composting?

Worm composting is using worms to recycle food scraps and other organic material into a valuable soil amendment called vermicompost, or worm compost.

# Setting Up Worm Bin

## Supplies Needed:

- Container
- Shredded Newspaper
- Worms

## What worms need:

- Moisture
- Air
- Food
- Darkness
- Warmth



**Getting started**

After lining holey bin #1 with shredded paper and soil, moisten the mixture with water, then add worms and food scraps

# Containers

- A worm's home is called a Worm Bin.
- Worm bins can be made from wood or plastic containers.
- They can be store bought or homemade.



# Homemade Containers

- The most important factor is to not build your worm bin be too deep. Ideal depth is about 12" – 18".
- Worms needs air to breathe, so don't forget to make holes in your container (on the top, sides, or bottom).
- 1-2-3 Portable worm bin (1' deep, 2' wide and 3' long)**

# Bedding

Must be able to retain moisture and allow air to circulate.

- Shredded newspaper
- Shredded cardboard
- Peat moss

Fill bin to 2/3 full of fluffed bedding.

Keep as moist as a well wrung sponge.



# Red Worms

**Eisenia foetida (aka red wigglers)**

**Where to buy:**

Order them through lawn and garden catalogs.

**How many are needed?**

One pound will easily take care of half pound of garbage per day.

# Feed the Worms!

## **Do:**

Fruit Peelings  
Vegetable Peelings  
Cereals & Oatmeal  
Cornmeal  
Crushed Egg Shells  
Coffee Grounds  
Tea Bags  
Newspaper

## **Do Not:**

Animal Bones  
Meat, Fish & Poultry  
Cheese  
Butter  
Salad Dressing  
Mayonnaise  
Glossy Colored  
Paper  
Greasy Foods

# Harvesting

Takes approximately 3-4 months for worms to digest nearly all the garbage and bedding.

Dividing the “castings” from the worms

3 Methods:

- Let sit
- Push to one side
- Divide and sort

# Castings vs. Vermicompost

Worm castings have moved through the digestive tract of a worm.

Vermicompost is a mixture of worm castings, organic material, and bedding in varying stages of decomposition.

# Application

- Seed beds/rows – sprinkle sparingly in the hole or in the row.
- Transplants – throw a little in the bottom of the hole.
- Top dressing – sprinkle at the base and along the drip line – do not disturb the root system.

# Application

Reminder: Worm castings could have high concentrations of salts and should be diluted with other potting materials so that plants gain the advantage of the nutrients without suffering from the possible high concentration of salts.

# Worms Eat My Garbage

My personal mission is to change the way the world thinks about garbage. To think of it as a resource, rather than something to throw away. Worms help me to do that.

*~ Mary Appelhof*

# Websites

[www.yakimarecycles.com](http://www.yakimarecycles.com)

[http://compost.css.cornell.edu/Composting\\_Homepage.html](http://compost.css.cornell.edu/Composting_Homepage.html)

<http://earth911.com/>

<http://watoxics.org/>

<http://www.wagreenschools.org/>