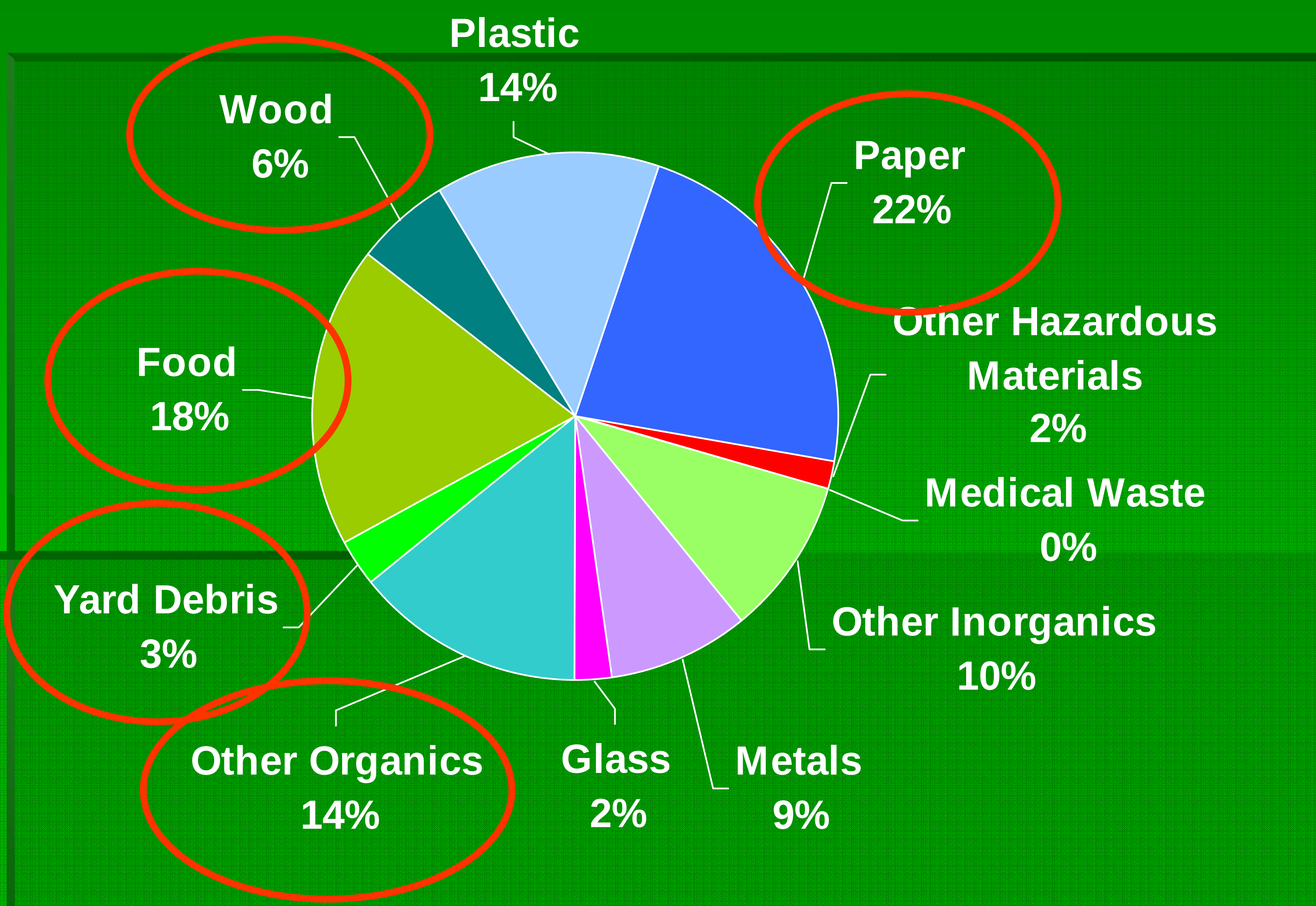
Composting 101

Beth Myers-Shenai, Marion County Public Works – Environmental Services

October 8, 2009

What's in our Garbage?



Decomposition

- Definition: to break up or separate into basic components or parts; to rot
- Through composting, humans have found a way to harness the decomposition process.
  - Defined as the controlled process of decomposition, composting allows us to convert organic materials into humus: a dark, crumbly, nutrient-rich soil amendment.

But even with little help from us….

What is Compost?

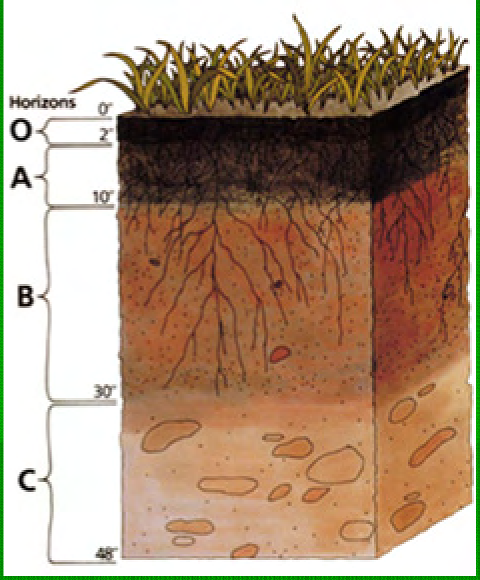
- Compost is a dark brown, crumbly, porous, soil-like material.
  - It is often confused with soil, but in fact is quite distinct.
  - Soil is composed primarily of tiny particles of weathered rock of various sizes.
  - Compost is composed primarily of a material called humus, an organic material made up of microscopic, clay-like particles produced by the process of decomposition, whose properties produce the many benefits of compost.

Nutrient and Water Storage

- The particles of humus that make up compost are extremely small and consequently have a very large surface area.
  - Water and nutrients cling to the large surface area of these particles.
  - Compost holds about six times its weight in water.
- Commercial fertilizers contain N-P-K (Nitrogen, Phosphorous, and Potassium/potash) or “macronutrients” but lack many other essential nutrients necessary for healthy plant growth.
  - Compost contains many of these other “micronutrients”, depending upon the recipe from which the compost was made.
  - Compost stores essential plant nutrients as part of its own chemical make-up and releases them for plant use when it decays.

Improved Soil Structure

- As organic materials decompose, bacteria release gummy substances that work like glues to bind small particles of soil together to form larger clumps, called aggregates.
- These aggregates help to increase the size of pore spaces in the soil, which improves drainage and plants roots' access to both air and water.
- Additions of compost and other fresh organic matter can help "lighten" heavy clay soils, making them easier to work, better aerated, and well drained. Alternatively, they can help sandy soils hold more moisture.



(L)-Seeded Compost (R)-Seeded Clay

Rills Form on Surface w/out Compost

Erosion Prevention

- Garden soil is often exposed, left vulnerable to erosion by wind and water.
- Studies have shown that soils supplied with organic matter such as compost have an improved structure that greatly improves water infiltration – the amount of water that drains through the soil instead of running off.
- This leads to less water runoff in heavy rainstorms, and that means less soil erosion.
- Soil rich in nutrients with a good structure produces lush plant growth quickly, which can provide complete protection against erosion.

Amazon Creek, Oregon

Beef Bend Road, Oregon

Disease Resistance

- Compost has been found to be effective in the suppression of a number of soil-borne plant diseases.
  - This suppression has been attributed to four factors, all related to the presence of beneficial organisms such as fungal-feeding nematodes, protozoa, and fungal-feeding bacteria.
  - Scientists have identified those four factors, including competition between the beneficial organisms and the pathogen, antibiosis, parasitism, and systemic resistance.
- New research indicates that compost may provide resistance against disease caused by foliar-borne disease organisms as well.

Bioremediation

Why Compost?

- Increased Recovery
- More Energy Efficient
- Greenhouse Gas Emissions in Landfills
- Nutrients for Plants
- Water Retention
- Improved Soil Structure
- Bioremediation
- Erosion Prevention
- Disease Resistance

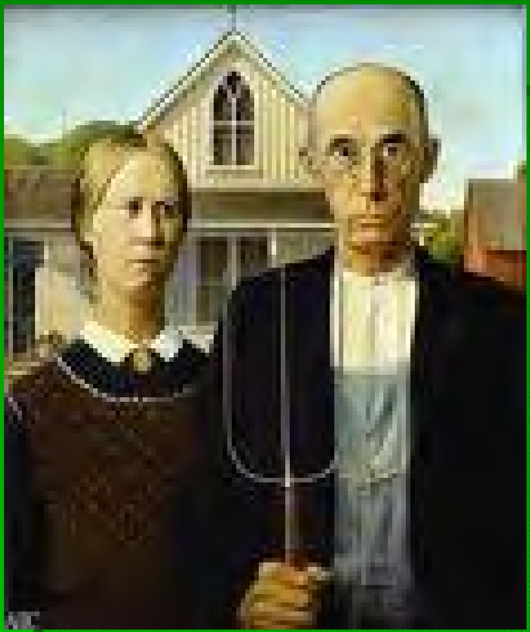
Active Composting

- Fast or "active" composting can be completed by creating ideal conditions to encourage the natural decomposition
- Proper attention should be given to:
  - Aeration
  - Moisture
  - Carbon to nitrogen (C:N) ratio

Organisms

- Aerobic Organisms
  - The microorganisms and invertebrates fundamental to the composting process require oxygen and water to successfully decompose the material.
- Anaerobic Organisms
  - These organisms produce byproducts detrimental to plants.

Backyard Composting Basics:



Air

Water

Food

Shelter

Give it Air
= Oxygen

Turn the compost pile to add oxygen in about 4 to 7 days.

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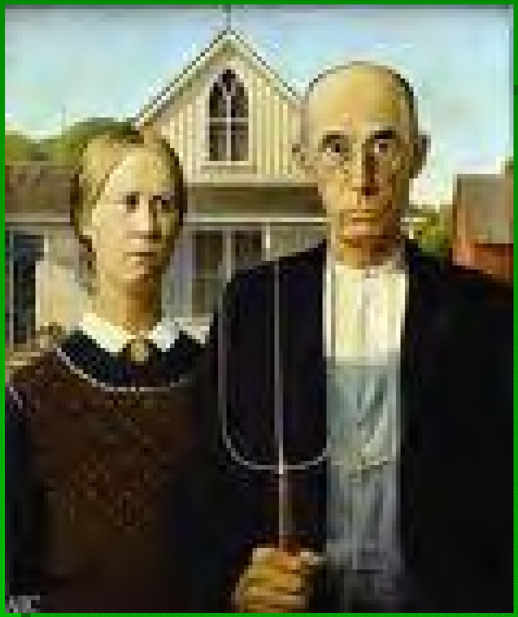


Air

Water

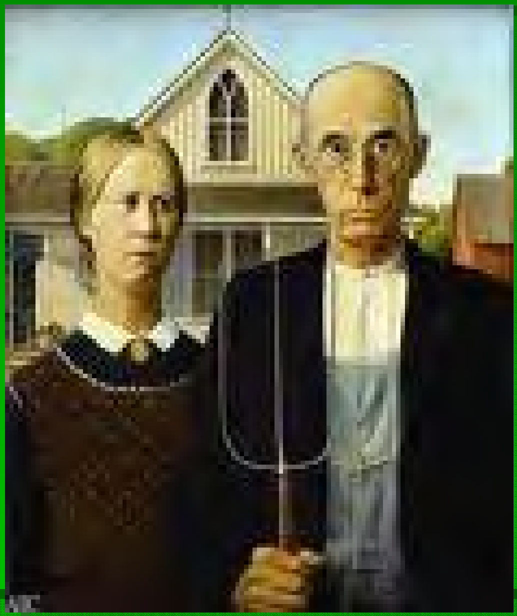
Food

Shelter

Add Water – Not Too Much

- Add water to keep the moisture level consistency of a wrung-out sponge.
- Cover to slow down evaporation & prevent “soggy pile” syndrome in winter.

Backyard Composting Basics:



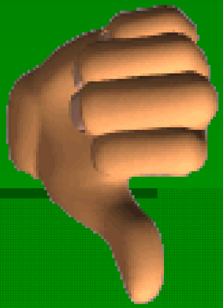
Air

Water

Food

Shelter

Yes	No
Grass Clippings	Butter
Leaves	Junk Food
Weeds*	Meat
Garden Scraps	Fish
Apple Cores	Milk
Carrots	Bones
Banana Peels	Vegetable Oil
Corn Cobs	Cheese
Potato Peelings	Mayonnaise
Egg Shells	Peanut Butter
Coffee Grounds / Filters	
Tea Leaves and Bags	



*no invasive plants or weed seeds

If it grows, it goes!

Brown Material = Carbon

"Browns" are dead plant parts like dry leaves, straw, cornstalks, wood chips, sawdust or shredded paper.

Green Layer = Nitrogen

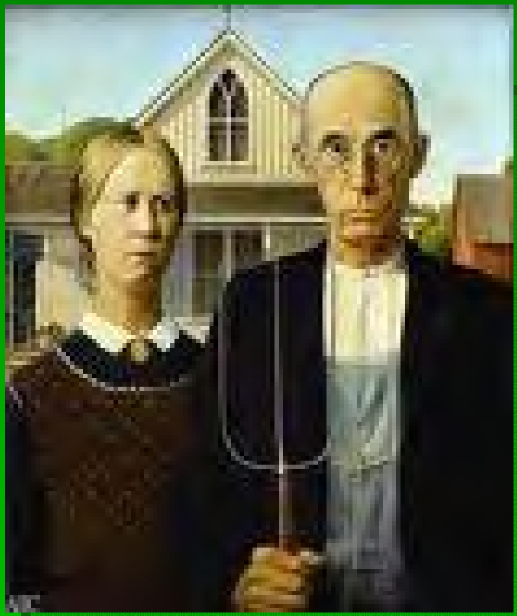
"Greens" are vegetable, fruit scraps, grass clippings and plants.

Estimated Carbon-to-Nitrogen Ratios	
Browns = High Carbon	**C:N**
Ashes, wood	25:1
Cardboard, shredded	350:1
Corn stalks	75:1
Fruit waste	35:1
Leaves	60:1
Newspaper, shredded	175:1
Peanut shells	35:1
Pine needles	80:1
Sawdust	325:1
Straw	75:1
Wood chips	400:1
Greens = High Nitrogen	**C:N**
Alfalfa	12:1
Clover	23:1
Coffee grounds	20:1
Food waste	20:1
Garden waste	30:1
Grass clippings	20:1
Hay	25:1
Manures	15:1
Seaweed	19:1
Vegetable scraps	25:1
Weeds	30:1

A 30:1 (carbon : nitrogen) ratio is ideal.

Use fine pieces when possible.

Backyard Composting Basics:



Air

Water

Food

Shelter

Back Yard Composters

$18.00

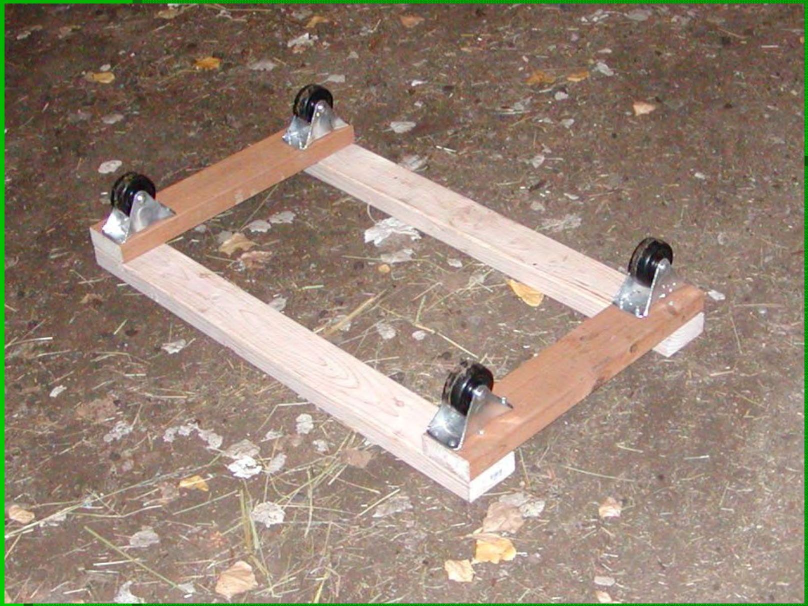
$26.00

$20.00

$44.00

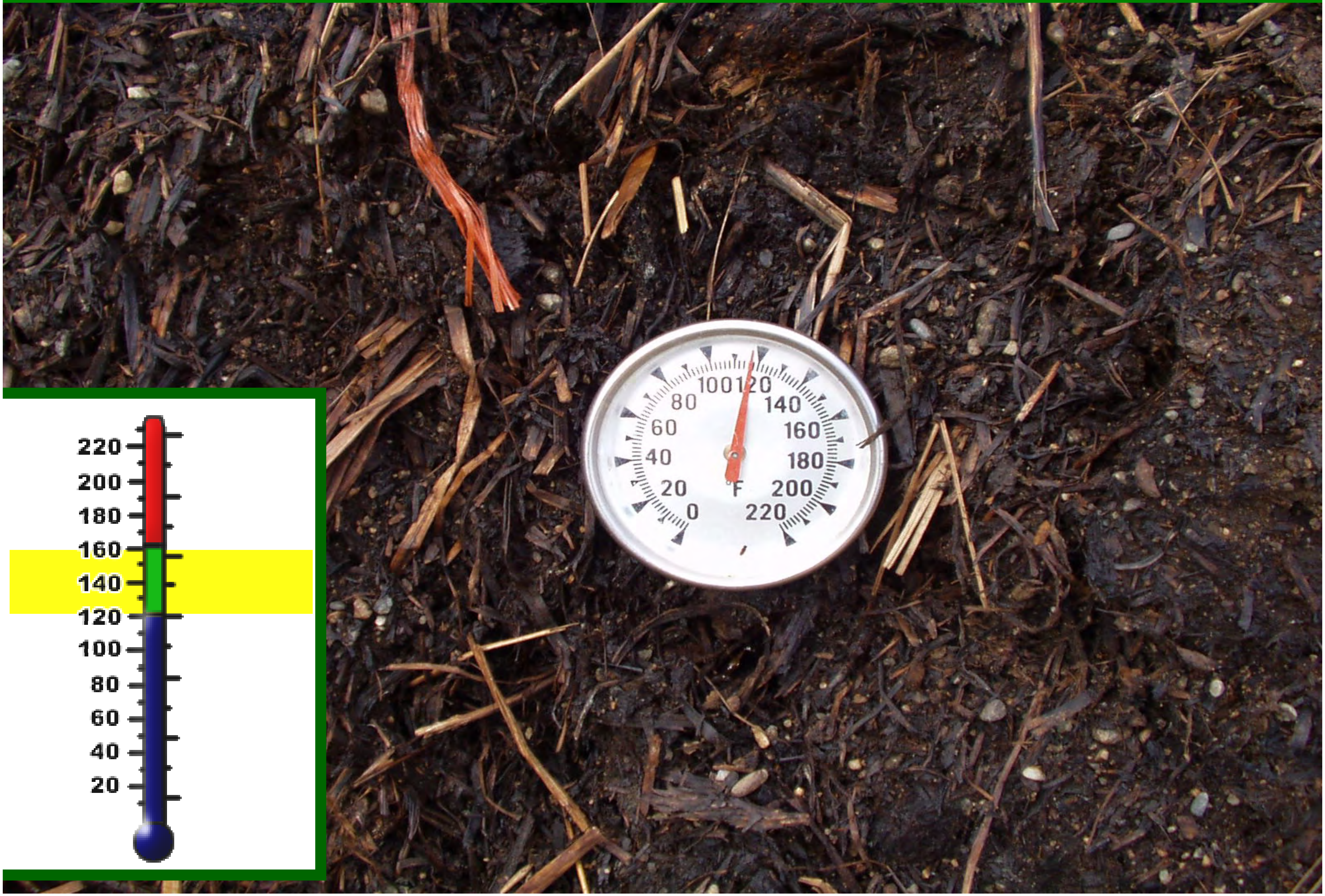

ONE-DAY-ONLY
Composter Sale!
Saturday, May 2nd
9:00 A.M. - 4:00 P.M.
Get this great composter at a great price only at these CONVENIENT LOCATIONS:
South Salem
Roth's Vista Market
East Salem
Fred Meyers (Lancaster & Market)
Keizer
Copper Creek Mercantile
Stayton
Wilco Farm Store
Silverton
Wilco Farm Store
Woodburn
Coastal Farm Stores
THE EARTH MACHINE
ONLY
$28.50
Reg. $80
Marion County
PUBLIC WORKS ENVIRONMENTAL SERVICES
www.co.marion.or.us/pw/es
503.588.5169 Se habla español
090405-17c

Make your own!



- Find materials that otherwise would be recycled or wasted.

Temperature: 115° - 160° F



INTERMISSION

Yard Debris Collection

Compost Oregon
(formerly Wood Waste)

Municipal Composting

- Organics are picked up from residences and delivered to the facility.
- A track hoe removes contaminants and passes material forward.

Municipal Composting

- The material is thoroughly mixed and sent forward to be loaded into windrows

Material is ground up to reduce particle size and increase surface area.

Turned Windrow

Municipal Composting

- Windrow Turner

Forced Air Windrow

Municipal Composting

- Organics are loaded on top of an advanced aeration system

Municipal Composting

Municipal Composting

- Internal Weather Patterns

Municipal Composting

- 32 Day Through-put

Contamination:


PACKAGING
WORLD
BIOTA
COMPOSTABLE
BOTTLES—

Continuous Flow Reactor

Earth Tub

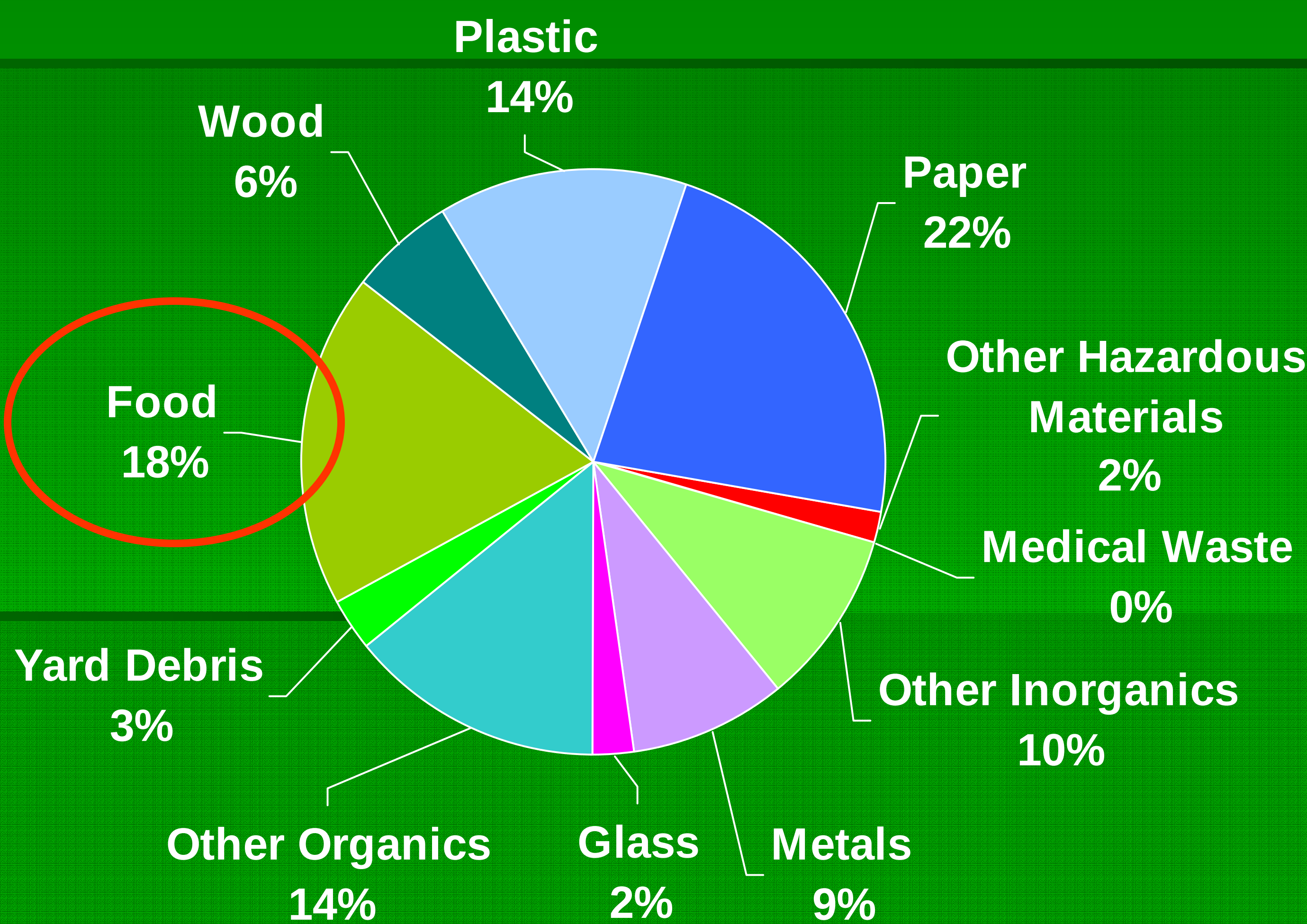
Earth Tubs recover up to 150 pounds of food waste a day.

Passive Composting

- Composting is a dynamic process, which will occur quickly or slowly, depending on the process used and the skill with which it is executed.
  - Creating ideal conditions can encourage this natural decomposition.
- A pile of organic waste will inevitably decompose, but slowly.
  - This has been referred to as "**passive composting**," because little maintenance is performed.

Static Piles

What's in our Garbage?



Food Waste:

Food Waste:

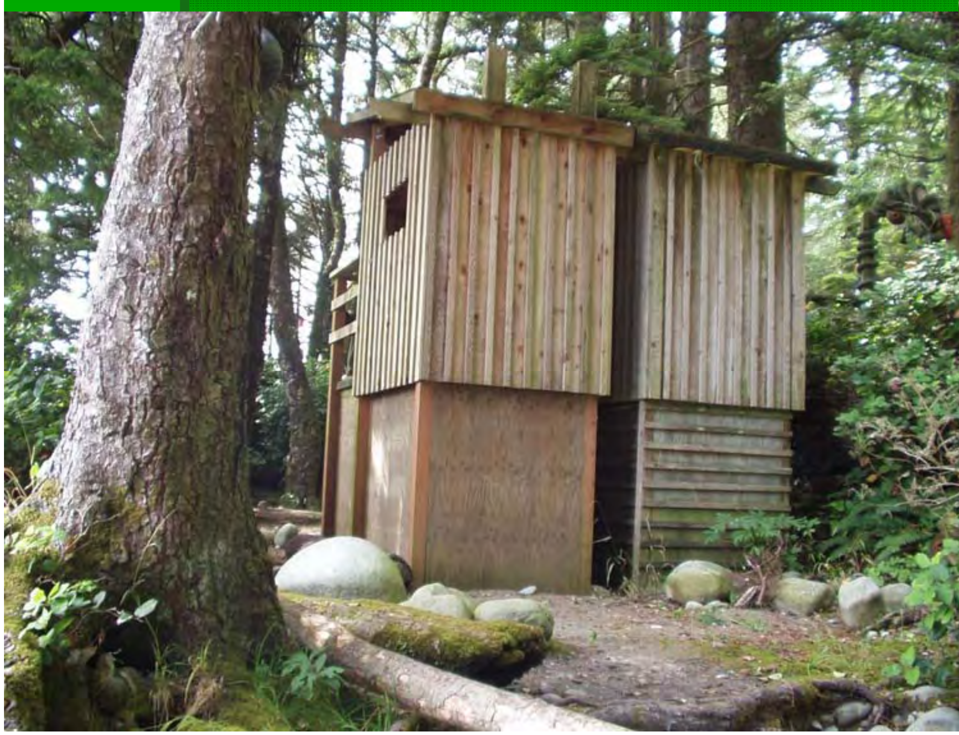
Large Institutions (i.e. jails & hospitals)

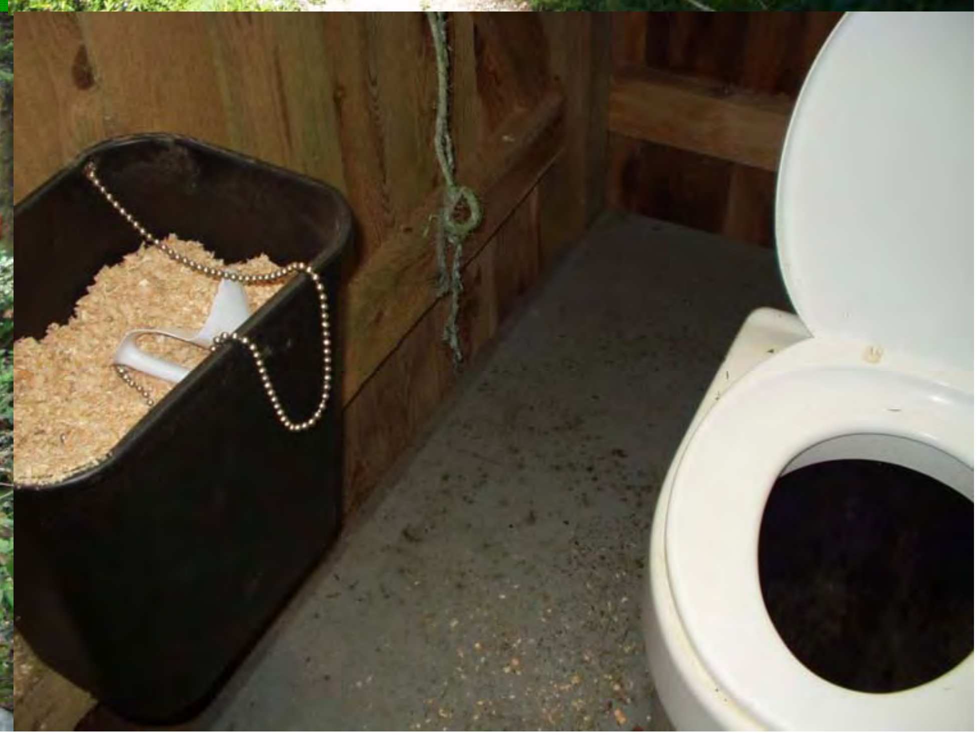
Schools

And households too!

Restaurants

Food that you eat could end up here, but what about the food that you don't eat?





One way or another, microbes handle our food waste!

Marion Soil & Water
Conservation District

Soil & Water Conservation District

OSU Oregon State University

OSU Extension Service ~ Master Gardeners

Beth Myers-Shenai
Marion County Public Works – Environmental Services
(503) 588-5169 x5920
smyersshenai@co.marion.or.us