Decompose (Decay, Rot)
- *Compose* = to make or form by combining things, parts, or elements
- *Decompose* = to separate into constituent parts or elements

Food scraps *decompose* in a compost system leaving a collection of plant nutrients that can be used again to benefit more plants and grow more food.

**Worms - The Original Master Composter!**
Worms get their nutrition from decomposing organic material and the microbes such as bacteria and fungi that grow in compost.

Vermicomposting: Use worm castings to enhance soil by RECYCLING nutrients.

**Why Worms?**
- Recycle kitchen scraps
- Suited to apartments and households
- Castings are great for plants
- Worms can eat ½ their weight in scraps daily
- It’s fun and great science for children!

**Kinds of Worms**
- More than 4000 species of earthworms
- Very diverse group
- Earthworms are divided into 3 categories based upon the soil layer they live in.

*Nightcrawlers go deep*
- Earth workers -- sideways
- Compost worms live in leaf litter and top layers

*Anecic worms (Nightcrawlers)*
*Lumbricus terrestris*
- Deep permanent burrows, up to 4 – 6’ deep
- Cycle HUGE amounts of organic material deep into soil
- Coat burrow w/ mucus, recognize own burrow!
- Anchor with tail and forage in a circle
- Won’t reproduce in a bin

**Endogeic Worms (Earth workers)**

- Live in the top 12 inches of soil -rarely come to the surface
- Create extensive horizontal burrows in upper layers of soil
- Feed on mineral soil particles and decayed organic matter
- Aerate and mix soil

**Epigeic Worms: Your Worm, the Red Wiggler**
- Live in forest litter, duff, loose topsoil layer
- Build no permanent burrows
- Reproduce rapidly
- *Eisenia fetida*
  - Red wiggler
  - Tiger worm
  - Manure worm
  - Fish worm

**Your Worms’ Needs**
1. Water-Moisture
2. Air
3. Decaying organic matter (food scraps)
4. Darkness, Quiet
5. The Right Temperature

**Moisture and Air**
- A worm’s body is 70-90% water
- They breathe through their skin
- Water standing in the bin can reduce available oxygen- anaerobic conditions
- The worms will drown in too much water

**Earthworms and Vibration**
- Can hear robin hopping on surface?
- Come to surface in rain
- Worm fiddling, “grunting”
- Consider where you put your worms!

**Earthworms and Light**
- Worms don’t like light
- First night leave light on and lid off

**Your Worms and Temperature**
- Worms feed most rapidly and convert food waste best at temperature between 60-78°
- They like same temps we like!
• If the bin freezes, or gets too hot in the summer, the worms will die

A Comfortable Worm Bin Has it All!
• Bedding moistened to provide air and water
• The lid keeps it dark
• A cool/warm place with yummy food scraps to eat
• Lots of microbes for company

Worm Anatomy
• Basically one big intestine!
• Worms don’t have eyes, ears, bones or teeth
• Can distinguish between light and dark using sensors in their skin and on their “nose.”

Earthworm Reproduction
• Earthworms are hermaphroditic, meaning each worm have both male and female reproductive organs but it takes two worms to reproduce.
• Two worms join with mucus from their clitella.
• Then, a cocoon forms on the clitellum of each worm. The worm backs out of the hardening cocoon which contains the egg.
• In about 30 days 1-5 babies will hatch from the cocoon.
• They will mature in about 3 months.

How Earthworms Eat
• Worms have no teeth
• Gizzard, sort of like a bird
• No teeth - a flap of skin called a prostomium
• Food moves down to the crop where it is stored
• Food moves to the gizzard where it is ground up
• Food moves out of the worm creating castings

Feeding Your Worms
• Red worms like to eat decaying organic matter; they also eat the little bacteria and fungi etc...
• Worms eat ½ their weight per day. In ideal conditions, worms can eat up to their own weight per day.
• One pound of worms will eat ½ pound of food per day.

Yummy
• Lettuce
• Watermelon rinds
• Banana peels

Yucky
• Bones
• Mayonnaise
• Salad Dressing
• Meat
• Cheese
• Butter
• Oil
• Open a hole in bedding in a corner and deposit food.
• Feed a different corner each time.
• Finished vermicompost in 3-4 months.

How to Harvest
• Dump and sort
• Screen method- plastic mesh
• Vertical or horizontal migration method

Other Harmless Critters in the Bin
• Fruit flies come on the peel or rind of fruit. You can avoid them by freezing the peels, or putting wet newspaper on top.
• Other decomposers you might see: potworms, springtails, black soldier fly larve, mold, rolypolys, mites, soldierfly larvae, mold and fungi, pillbug/sowbug

The Finished Product
Worm castings - the manure of the earthworm - RICH STUFF!

• Contains humus, a complex mixture of nutrients stored in a form that is readily available to plants.
• Stimulates plant growth
• May help control harmful pathogens, bacteria and fungi

A valuable resource -- use it selectively and sparingly. Castings are like concentrated plant fertilizer

• Sprinkle some in the row when planting seeds
• Add a handful to the hole when transplanting young plants (2 tablespoons per 4” pot, ¼ - ½ cup for one-gallon transplants)
• Mix into the top soil of potted plants
• Work it into the soil during the growing season
• Don’t let it dry out!