Vermicompost: Goal to make fertilizer and more worms

Getting Started

1. Engaging the Community
    a. Who is going to do this? Create a schedule to maintain and monitor bin daily. This is farming, not a hobby.
    b. Worms are Livestock that must be cared for like any other animal

2. Find your food residue sources
    a. What are we feeding the worms?
    Rural: manure, harvest waste, moldy hay
    Urban: food waste, leaves, coffee, wax boxes
    b. Delivery system: How to get from source to compost operation?

3. Secure Site with supportive neighbors that are educated about operation and communicative if odors became noticeable from composting

4. Decide on physical location based on availability and community buy-in

5. Receive Training
    a. Long term development of senses needed to monitor system
    b. Shorten learning curve

6. Time investment
    c. Very physical work that requires passion, patience, confidence and a strong work ethic plus consistency

Action Steps

1. Build Bin: varieties include 5-gallon bucket/plastic 'Rubbermaid' bins/wood bins and windrows
    a. When choosing a bin consider your time and experience, in the end the larger the bin, the more productive and happy your worms will be!
2. Find food: break down waste and prepare for feeding to worms (part of composting process)
3. Add worms: passed on from Growing Power after training

Bucket method: Anaerobic composting (making the worm food)

1. 5 gallon bucket with gasketed lid
2. layer of fruit/veggie waste
3. layer of compost/soil
4. leave ¼ or more empty to create head pressure
5. set lid and turn bucket upside down-back and forth-every 2-3 days
6. ready to feed worms 2-4 weeks later

Prepare food by smooshing and breaking apart food. Adding coffee waste also helps create more heat!!!!

Adding the Worms

1st feeding

1. add worms mixed with compost to the bottom of the bin being used to house the worms
2. empty contents of bucket compost on top of worms, maybe 4-8" of pre-digested material
3. Top off with finished castings and a burlap bag. Worms like it in the dark!

Maintenance

Daily

1. Check for new births, look for cocoons * look like little golden eggs
2. Examine food, is it all digested, if so add new layer
    a. Remember- predigesting food helps worms produce castings at an even rate and evenly throughout bin
3. Use fingers to check for temperature 50-60 degrees, ok should be warm not hot
    - Tip-the edges of the bin are cool, if the center is too hot all the worms will be congregated along the sides.
4. Check moisture: Too wet not good.....Too dry add water
    a. Simple test: squeeze a hand-full of soil, if water drips out, too wet
5. Examine activity of worm, real wiggly and moving, things are good!
6. Check size of worms, should be nice and fat! If skinny add more food!!!!

Harvesting the Castings

1. Lay window screening directly on top of soil
2. Layer composted food residue, top off with finished castings to deter fruit flies
3. Worms will begin to crawl through screen to eat; they will wiggle through the tiny holes!
4. Check daily, should be ready to empty into new bin in 2 days to a week
5. Lift screen and dump food, worms and all! And start the process all over! Most bins can be screened 3 to 4 times, starting 3 or 4 new bins. Worms multiply 4 times in an 8 week period using the Growing Power method.
6. Dry castings and sift and use!!!!

Windrow vermi-composting

The concept is that the raw materials will generate heat via composting process. This is a lower maintenance system to be used in the greenhouse or outdoors. This is a living biological growing system.

1. Beds should be about 3 to 4 feet wide
2. Add Compost 12 inches
3. Add Worms 12 inches
4. Add Top Soil/Worm Casting 2 inches
5. Water well
6. Plant Crops

Benefits of Vermicomposting and Worm Castings

- Worms are able to multiply microbial populations by up to 13 times in their gut.
- It is thought that the microbial life in the castings is what makes them so beneficial to plant growth. When castings were heat sterilized (killing all microbes but retaining the same nutritional value) there was not as positive a result in plant growth as regular castings. The microbes help reintroduce natural nutrient cycling in the soil, helping make these nutrients more available to the plants.
- Worm castings can be used for bioremediation, reducing contaminants by up to 98%. Worms do not retain any contaminants in their body. The only byproducts are carbon dioxide and water.
- Pathogens, such as E. coli, are killed in the worm's gut.
- Worm castings to help fight a variety of plant diseases and help protect against certain insects.

*Of the 100% of microbes in the world, we only know 5% and can only cultivate 1%.

Additional Resources:
www.biosci.ohio-state.edu/~soilecol/
www.wormwoman.com
www.soilfoodweb.com/

Worm Composting: Starting a Worm Bin

Step 1: Harvest worms from worm bin using screen method
Step 2: Spread one pound of worms (about a 2 inch layer) in bin
Step 3: Add two 5lbs buckets full of cooled compost. Use water to cool.
Step 4: Toss in a handful of microbes (2 oz)
Step 5: Add 1 inch of worm castings to cover food waste
Step 6: Cover with burlap

- Check daily – temperature, reproduction, food, and general health
- Weekly—Repeat daily checks and add a 2 inch layer of compost

After about 6 weeks you can begin to harvest your worms. Place a screen over worm bin and add a layer of compost and top it off with worm castings.

How do I know the difference between GREENS and BROWNS?

This is a popular question among many first composters or organic gardeners. Regardless of the name, *"Greens"* and *"Browns"* are not differences in physical color. These terms are referring to the C: N ratios in all once living creatures, plant or animal.

Greens and browns are nicknames for different types of organic matter to use in composting recipes.

Greens are high in **nitrogen or protein**, thus organic nitrogen sources. These products help the composting organisms to grow, breed, and multiply fast in the piles, thus creating extreme internal temperatures in hot compost piles.

Browns are high in **carbon or carbohydrates**, thus organic carbon sources. These products supply the energy and food that mostly all soil organism need to survive. Carbons also help absorb the offensive odors and capture and help prevent most of the organic nitrogen in the piles from escaping by evaporation or leaching.

A simple test to determine if your organic matter is a "green" or a "brown" is to wet it, and wait a few days. If it stinks, it is definitely a green. If not, it's a brown.

C/N Ratios (Carbon to Nitrogen Ratios)

Carbon supplies energy in carbohydrates and nitrogen provides growth in proteins. All living things need these elements to survive (including the microorganisms that make compost); and they use roughly 30 parts carbon to each 1 part of nitrogen ... this would make a C/N Ratio of 30:1, simply expressed as 30. If too little nitrogen is present in the pile, not enough heat will be generated, and decomposition will proceed slowly (taking perhaps many months). If there is an excess of nitrogen present, the microorganisms release it into the air as ammonia and carbon dioxide. This is not good, as it results in a loss of valuable nitrogen from the pile and is also likely to cause odor problems.

Normal compost has a C: N ratio ranging from **25:1 to 30:1**. This is considered the origin or dividing line for all organic materials.

Any organic matter that a C: N ratio **smaller** than 30:1 is considered a **GREEN**.

Any organic matter that a C: N ratio **larger** than 30:1 is considered a **BROWN**.

Alfalfa Hay can be brown in color, but it is always a **"GREEN" or "NITROGEN"** source because it's C: N ratio is around 12:1.

All Leaves can change from green, to orange, or to brown in color, but they are usually always considered **"BROWNS" or "CARBON"** sources because their C:N is on the average from 40:1 to 80:1. Evergreen leaves are higher in carbons than most leaves. Deciduous leaves are best for composting. Oak leaves (that is fresh green oak leaves, not the dry oak leaves) are an exception. They can be classed as a **GREEN** and should be added as a nitrogen material (Fresh Green Oak Leaves can have a C: N ratio of 26:1).

All animal manures, grass clippings, and food scraps are **"GREENS"**.

All sawdust's, bark mulches, papers, and other wood products are **"BROWNS"**.

Most sugar products are considered "browns" because they have a C: N ratio near 50:1. However all aerobic microbes love sugar as a quick, easily digestible energy food. So by adding a little tea made from molasses, sugar, syrups, or flat soft drinks, to your compost piles, you will increase the microbial activity and internal heating of a compost pile.

Materials high in Nitrogen	
Alfalfa hay	12:1
Coffee Grounds	20:1
Grass Clippings	19:1
Manure fresh	15:1
Table Scraps	20:1
Young weeds	30:0

Materials high in Carbon	
Cardboard	550:1
Hay (dry)	40:1
Leaves	40-80:1
Paper/napkins	170:1
Sawdust	150-200:1
Straw	80:1
Wood chips	700:1

SOURCING ORGANIC MATERIALS FOR COMPOSTING

When considering starting a composting project, you must take a serious look at how much finished product you want to produce and much material it is going to take to make that product.

One ton of food waste material produces approximately one-half cubic yard of finished compost.

You can get as much as 70% reduction in volume from the size of the initial compost pile.

If you want to create a considerable amount of compost, you will have to identify potential sources for additional organic materials. This is where your community partnerships come into play.

Some potential sources of organic material include:

- Coffee shops (coffee grounds and filters, chaff if they roast their own beans)
- Local breweries (spent grain)
- Food banks or food pantries (spoiled produce)
- Grocery stores (separated produce scraps/waxed cardboard)
- Restaurants (separated produce scraps)
- Local farmers (old hay or straw, manure)
- Public Works department in your town (leaves, wood chips, grass clippings)

You can also start your own program in your community. Develop a system to collect and compost material from individuals, schools or other organizations in a centralized location.