

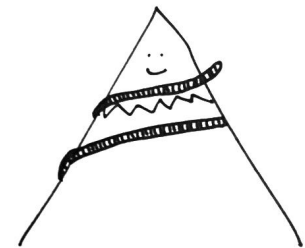
Introduction to Home Vermicomposting

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[Happy Mountain Worms]

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- What is Vermicomposting?
 - How is it different from “regular” composting?
- Worm Basics
- Home Vermicomposting
 - The Bin
 - The Bedding
 - The Worms
 - The Food
- Troubleshooting
- Harvesting/Using
- Worms!



What do I need?

- Spill space in your home where you can keep a damp, dark bin
- 40-80 degrees F (no freezing, no direct sun)
- materials you can find cheaply or in your own home
- food waste and paper products/dry leaves
- interest in reducing amount of waste in landfills; managing your own waste (maybe even using the compost!)

- No odors, no pests in this self-contained ecosystem!

What is Vermicomposting?

Vermicomposting = the process of using worms to compost food and/or natural wastes.

Worms + decomposing food source = **Vermicast** (worm poop/worm manure/humus/castings)

Vermicast outperforms regular compost. It has higher nutrient density, more microbial activity, reduced contaminant levels.....



Growers Prefer Worm Castings Over Compost

Because research shows
Worm Castings Produce Superior Results

Higher

Concentrations of micro-organisms
Percentage of available nutrients.
Aggregate formation.
Capacity to hold water.

Faster Growth Rates

Greater

Diversity of micro-organisms
Plant Heights
Leaf Area
Root Weights
Germination Rates

More

Fruit on Plants
Nutrient availability over time.



Larger Fruit

Better

Disease Control

Exclusively

Enzymes & Plant Growth
Regulators Only Found in
Worm Work Soil.

Sweeter

Tasting Fruit & Vegetables



No Vermicompost // 11% Vermicompost // 21% Vermicompost

Aside from the wormy benefits...

Compared to typical composting:

- No yard or large space (indoors)
- No large quantities of “browns and greens”
- Minimal turning
- Temperature controlled
- Constant
- Manageable
- Flexible
- Faster
- Fun!



Worm Basics

We use *Eisenia fetida* → Thanks to GroundWork Somerville

Also known as: Red worm, Red Wiggler, Tiger Worm, Striped Worm, Bandling, Manure Worm, Dung Worm, Fecal Worm, Stink Worm, Fish Worm, Angleworm.



← red wiggler

← “night crawler” or earth worm

Eisenia fetida

= organic waste decomposers, bait, potential protein source. yum!

(Reinecke 1991).

- Consume organic wastes very rapidly by passing them through a grinding gizzard, an organ that all earthworms possess.
- Derive their nourishment from the **microorganisms** that grow upon the organic materials, not the organic matter itself.
- **Microbial groups** with nutritive value to earthworms:
fungi, protozoa, algae, bacteria and actinobacteria. (Edwards and Fletcher 1998)
- Produce worm casts that are **more microbially active than what they consumed.**
- Casts are toxic to the worms – harvesting is very important

More on the vermicompost...

During the process, crucial plant nutrients in the organic material (e.g. nitrogen, potassium, and calcium) are released and converted through microbial action into media that are much more soluble and bioavailable to plants than in the original media or than what is found in regular compost!

Retention time of the waste in the earthworm is short. Worms can digest +/- ½ their weight in food each day.

(Slejska, 1996)

Research on Industrial/Environmental Uses of Vermicompost

- Vermicomposting can be an alternate technology for the **management of textile mill sludge** if mixed with cow dung in certain ratios (Kaushik, P. & Garg, V.K., 2004)
- **Primary sewage sludge** can be converted into good quality manure by vermicomposting when mixed with cow dung 30-40% (Gupta, R. & Garg, V.K., YEAR)
- Vermicompost mitigates the **toxicity of metals and thermal power station waste** when mixed with cow dung in certain ratios. (Gupta, A.T., Srivastava, R., Murthy, R.C., Chandra, C., 2005)
- **Food industry wastewater and sludge** can be converted into good quality manure by vermicomposting if mixed up to 30% with cow dung. (Yadav, A. & Garg, V.K., 2009)
- Vermicompost mitigates the metal toxicity and to enhances the nutrient profile in **distillery industry sludge** (Suthar, S. & Singh, S., 2008)
- Vermicompost can be used to manage **palm oil mill effluent** (Rupani, P.F., Singh, R.P., Ibrahim, M.K., Esa, N., 2010).
- **Solid waste animal flesh from tanneries** can be converted into nutrient-enriched compost with vermicomposting (Ravindran, B., Dinesh, S.L., Kennedy, L.J., Sekaran, G., 2008)

Home Vermicomposting... Welcome to your own pet ecosystem!



The Bin

- 10-15 gallon bin with cover (light, moisture)
- ~ 2 big fruit and veggie eaters
 - bigger bins are harder to manage in the beginning
- Catch tray for liquids (cookie sheet; another bin that can later be used in your multi-tiered system)
- Blocks or mechanism for raising the bin above the catch tray

The Bin cont'd

- Air circulation and liquid drainage
 - create several small holes (drill)
 - 4+ in cover for vertical circulation
 - 10+ around the sides for lateral circulation
 - 6+ on the bottom for drainage
 - may clog – check them during troubleshooting



The Bedding

- 4-6 inches of (shredded):
 - newspaper
 - egg cartons
 - unbleached corrugated cardboard
 - toilet paper rolls
 - brown organic matter, some soil
- Place in the bottom of the bin. Moisten well (75%). Worms breathe through their skin and need moisture to do so.
- Bedding provides a matrix of environment and food, balances carbon-nitrogen ratio, helps retain/absorb moisture and aerates bin.

The Worms

- Add the worms slowly, along with some bioactive, microbe-rich vermicompost.
- They are in shock from just having moved into a new place – feed them slowly (1-2 cups of wilting greens) the first week.
 - layer it on top of the worms, cover with moist bedding
- After a few days, slowly increase feeding to accommodate them.
- The population will adjust to its food source, but mindfulness is still necessary. Be careful of over- and under-feeding the bin.
- Note life cycle (last slide)

The Food



**Always add equal parts
food and bedding**

Raw fruit & veggie scraps
Coffee grounds and filters
(no bleach)
Tea and tea bags (no
staples or bleach)
Crushed eggshells
the finer the better!



Oily foods
Salty foods
Citrus and garlic, onions
(harmful oils)
Meat, fish, dairy (smells,
pests)
Fecal matter (“ ”)
Other strange things

Vermicompost Maintenance

- Add food 1x/week, 2 quarts/week
 - add equal parts “browns”
 - balances moisture and fertility of castings
- Move things around to discourage anaerobic bacteria
- Check in with your bin!
 - odor, climbing worms? lots of worms?

Troubleshooting

Problem	Reason	Solution
Worms are dead; trying to escape	too wet; too dry; no more bedding; too acidic (too much rotting food).	Add bedding; moisten bedding; withhold food for a little while if there is too much; Harvest!
Smelly	Not enough air; too much food; too wet.	Mix; Drill/unclog more holes; withhold food; add bedding.
Fruit flies	Exposed food; lots of fruit.	Bury food in bedding; use less fruit. Vacuum; open window.
Fungus gnats (harmless)	They like fungus. So do worms!	Not much. Vacuum; open window.
Overpopulation	Healthy bin	Time to Harvest!

Harvesting Vermicompost

- After 3-6 months, you will see lots of beautiful, dark, wet, rich, lumpy, clay-like compost
- Time to Harvest!
- Different techniques
 - inevitable worm sacrifice
 - leave enough to start a new bin!

Technique #1: Easy

1. Remove top 1/3 of bin (worms, food, bedding)
2. Use that to start a new bin
3. Remove remaining compost

OR

1. Push the top layer of worms, food, bedding to side #1
2. Only feed side #2 for the next few weeks - the worms will leave side #1 to live on side #2
3. Harvest compost from side #1

Technique #2: Hands-On

1. Spread a tarp, plastic bag, etc. on the floor, under a light or in the sun
2. Dump out the contents of your bin
3. Make little pyramids
4. Remove top layer of each pyramid to uncover worms, **start collecting that compost**
5. Remove the worms, **add to new bin**
6. Wait 20 minutes (worms dive deeper to escape light)
7. Steps 4-6 for a few hours until you have saved lots of worms and earned lots of compost

Using Vermicompost

- Adds plant growth hormones, microbes, humus, nutrients to soil
- Let it sit for a few months out of rain and sun = fine-grained fertilizer
- Sprinkle it on indoor/outdoor plants (no contact)
- 20% potting/garden soil mix
- Dilute in water to make “tea” (1TB per watering can)
- Dilute the liquid that drains out of the bottom
- GUERRILLA COMPOSTING
- Ask your local growers, gardeners, farmers
- Share with friends

References

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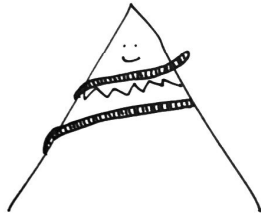
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GroundWorks Somerville Guide to Home Worm Composting (source of our worms)

Mary Applehoff's *Worm Eat my Garbage*

Thanks to Arielle Solomon, BU Organic Gardening Collective, and you!



Happy Mountain Worms

Worms, cultures, ferments, and other funny things.

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Worm Life

