Vermiculture
Vermiculture vs. Vermicomposting?

Vermiculture is the **culture** of earthworms. The goal is to continually increase the number of worms in order to obtain a sustainable harvest.

Vermicomposting is the process by which worms are used to convert organic materials (usually wastes) into a humus-like material known as vermicompost.
The Value of Vermiculture

- Earthworms provide a natural method for recycling organic material
  - Food prep leftovers
  - Scrap paper
  - Garden crop remains
  - Yard trimmings
- Earthworm castings:
  - Are an eco-friendly fertilizer
  - Stimulate the natural activity of beneficial soil microorganisms
  - Promote the activity of enzymes and natural plant growth regulators
  - Regulate the availability of essential plant nutrients
"Plants Grown In Worm Castings Grew 3 Times Faster Than Identical Plants Grown In Potting Mix"
Small turnip – no vermicompost
Medium turnip – 10% by volume
Large turnip – 20% by volume
Are All Worms Equal?

• Over 9,000 different species of earthworms
• Only the group of earthworms identified as epigeic are suitable for vermiculture
• Epigeic earthworms
  • Live in topsoil
  • Deposit castings on the surface
  • Don’t burrow deep in the ground
• The most commonly used is the Eisenia fetida aka ‘red wiggler’
• Fetida means foul-smelling
Environment

• Moisture content should be 60-85% with 80% being perfect
• Ideal temperature is about 70 degrees but worms will tolerate a range of 40-90 degrees
• A good worm bin should be maintained at a pH of 7.0
Worm Bedding

- Shredded Paper
- Shredded Corrugated Cardboard
- Coir
- Wood Shavings
- Dry Dead Leaves
- Hay or Straw
- Commercial bedding

Things to remember:
Aeration
Continuous moisture content
Up to 50% may be used as food
My Favorite Bedding

Coir Brick

Shredded Coir
My Favorite Bedding

Shredded Coir mixed with Paper Shreds
What Worms Eat

- Vegetables
- Fruit
- Coffee grounds
- Tea
- Bread
- Leaves
- Yard waste
- Egg shells
- Paper
- Pasta
A Feeding Example

Banana Peel  Rotting coleslaw
Egg Shells    Kale leaves

What’s Missing?
Don’t Feed

- Meat
- Dairy
- Citrus
- Sauces
- Oils
- Foods with preservatives
- Spicy foods
- Pet wastes (dog and cat)
Food Prep

Smaller is better

Grind, puree, shred,

Freeze, Precook food
It Takes Two!

• Red worms have both males and female characteristics

• Line their bands up releasing a mucus film that covers both

• They wriggle out of their band which creates a cocoon

• The cocoon has a hard shell to protect eggs/developing babies
It Takes Two!

• The size of a grain of rice, it starts out white, then darkens turning yellow, then brown and when it turns reddish worms are ready to hatch

• Can take from 3 weeks to a year. Typically hatch in warmer weather

• Cocoon may have as many as 10 eggs but only 2-6 worms will emerge

• In 2-3 months they are ready to start reproducing
These Aren’t Baby Red Wigglers!

Actually they are POTWORMS
Indicate potential problems in your worm box
About Potworms

Potential issues indicated by potworms:

• Too acidic
• Too wet
• Overfeeding
• Too much starch

Remedies:

• Add carbon, cardboard, paper, soak up moisture
• Cut back on fruit and vegetable scraps
• Remove fermenting excess food
• Aerate Soil
• Add crushed egg shells to neutralize the pH (acidity)
Habitats

- DIY worm boxes
- Purchased worm boxes
- Worm towers
DIY Worm Box

Components:
• 3-4 Plastic tubs or buckets (1 lid)
• 4 small plastic containers
Drill Holes in 2-3 Tubs
Small Containers Create Area for Leachate
Disaster Waiting to Happen
Purchased Worm Boxes
Worm Towers

Vegetable scraps -> Flower pot lid
Pipe tower

Worms

Worm castings and juice

Manure

Courtesy of Permaculture News
Worm Byproducts

- Worm Castings
- Worm Bin Leachate
- Worm Tea
Separating Worms from Castings

**Tarp Method**

**Vertical Method**

**Horizontal Method**
Worm Castings

Worm castings can be used as:

• a soil additive
• a soilless mix
• a tea / slurry
Worm Castings as an Additive

• When planting new plants – simply put a handful in the planting hole.
• When you are propagating seeds, mix them with coir as a seed raising mix, 2 parts coir to 1 part worm castings
• As a general soil conditioner by digging them in through the soil.
• Before you mulch, spread them thinly and then mulch over the top.
• For container grown plants, 25 % worm castings to 75% potting soil
Worm Castings Soilless Mix

- 40% Castings
- 30% Perlite
- 30% Vermiculite
Worm Tea

Natural fertilizer made from worm castings, water and a sugar

To make the tea:

• Dechlorinate 10 gallons of water
• Put 1 pound of worm castings in a mesh bag, panty hose, etc
• Drop the castings bag into a 5 gallon bucket and cover with ½ the water.
• Add 1 Tablespoon of molasses, honey or other sugar
• Sink an aquarium bubbler in the water and let it run for 24 – 48 hours
• Remove the bubbler and the castings
• Mix with remaining water
Worm Bin Leachate

- Liquid that drains out of a worm bin
- May carry a bad mixture of microorganisms
- Must be diluted (10 parts water to 1 part leachate)
- Only use fresh leachate
- Better to aerate if planning to regularly use
Practice Benign Neglect

• Don’t overfeed

• Remember to keep adding bedding

• Keep worm bedding moist

• Don’t freeze your worms

• Be sensitive to big changes in the worm box
Great Resources

NC State Extension:
https://composting.ces.ncsu.edu/vermicomposting-2/

Worm Tower:
https://www.permaculturenews.org/2016/02/02/how-to-build-a-worm-tower/

Composting Tea:
https://www.redwormcomposting.com/worm-tea/making-vermicompost-tea/
For more information about our programs, visit our website at
extension.arizona.edu/yavapai

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