



Worm Your Way Into Composting

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My Background

- Permaculture Design Certification (PDC)
- Soil Food Web Foundational coursework, advanced workshop in Costa Rica, CLP program
- Board of Directors for Cultivate Community Food Coop (CCFC)
- Healthcare – Deputy Director at Contra Costa Behavioral Health
- Passionate about living in a sustainable way, planet health, and healthy local communities
- Composting, vermicomposting, casting production – becoming more than a hobby!



Agenda

- BENEFITS OF WORM COMPOSTING AND SOIL HEALTH
 - WORM ANATOMY
 - TYPES OF WORM BINS
 - WHAT TO FEED THE WORMS
 - SETTING UP A WORM BIN
 - HARVESTING WORM CASTINGS
 - APPLYING WORM CASTINGS
- BENEFICIAL MICROBES – SOIL FOOD WEB
 - WHERE TO SOURCE WORMS?



Before we start, what are your goals?

- Get rid of food waste without throwing it away?
- Live in a more sustainable way?
- Generating garden amendments?
- You are fascinated by worms?
- Just curious?



Benefits of Worm Castings

- Increase of organic matter – critical for microorganisms in the soil (bacteria, fungi, protozoa, nematodes, etc.). Shooting for 5% organic content (OC) in soil
- Improved soil structure and soil retention
- Nutrient delivery due to microbes – slow delivery and plant available
- Faster germination – microbial metabolites from gut and castings
- Quicker seedling growth
- Pathogen suppression due to worm digestive system
- Higher yield

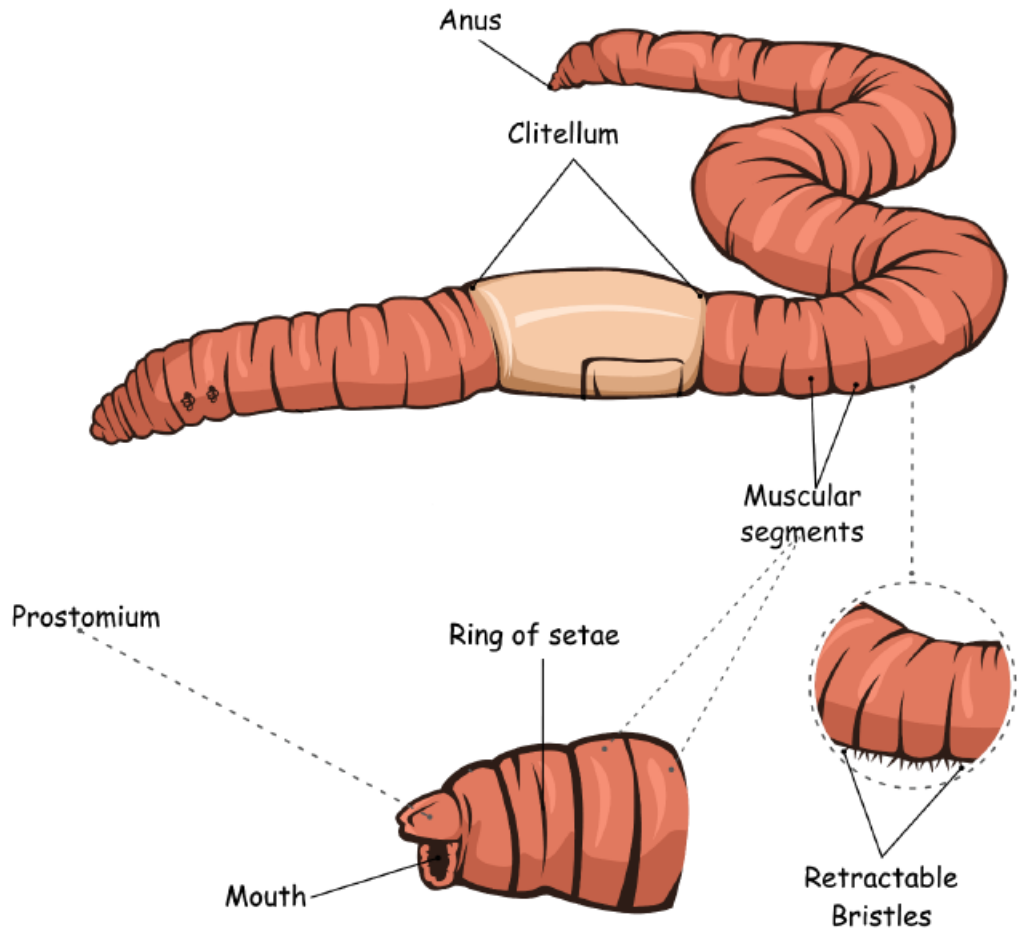


Research supporting higher yield from castings

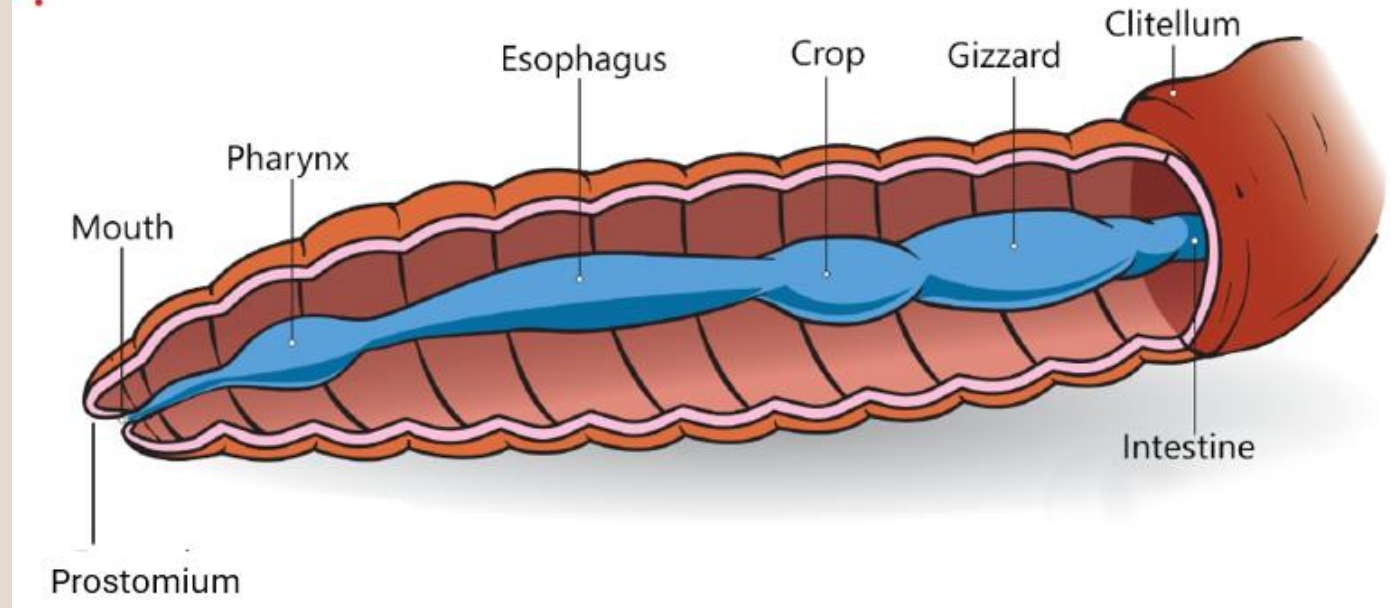
Metric	Improvement Factor
Plant Height	Up to 38% higher
Total Biomass/Yield	Up to 80% more
Yield (e.g., radishes)	Up to 10X greater
Germination rate	1.5 to 2 times higher
Nutrient concentration	5-11 times more concentrated

Worm Anatomy

The Surface Anatomy of an Earthworm



The Digestive Anatomy of an Earthworm



Example from home



Types of bins and vermicompost systems



Vermicomposting Process



Simple Bin System

- Feed on top, then one side for harvesting
- Advantages – inexpensive, easy to make
- Disadvantages – moisture control, leachate not really worm tea, harvest effort



Stackable bins

- Feed on top
- Multiple bins
- Harvest second tray
- Advantages – inexpensive, batch system, small footprint
- Disadvantages – Not breathable, moisture control, leachate not really worm tea (caution needed)



CFT – Bag System

- Feed on top
- Harvest on bottom (string tie and Velcro attached)
- Breathable bag, zipper on top for feedstock
- Advantage – no worm disturbance, continuous feed, space efficient
- Disadvantage – vertical space, larger than some stackable trays



CFT - Continuous Flowthrough



- Feed on top
- Harvest on bottom via cutting bar
- Advantage – no worm disturbance, continuous feed, modular/scales well
- Disadvantage – expense, space



Feeding and Bedding

Feedstock –

Small doses, chopped is best (ok to freeze if too much)

- Vegetable and fruit scraps
- Ground eggshells (as grit)
- Coffee grounds
- Plain bread or pasta

Bedding –

Needed to hold moisture to ~60%

- Shredded cardboard
- Shredded newspaper
- Aged leaves
- Coco coir
- Peat

Beware

- Kitchen scraps are about 80% water
- Glossy paper or cardboard
- Plastic
- Citrus, onions and other higher acidity foods
- No meat or dairy, greasy foods



Harvesting Worm Castings

- Leverage worm behavior
 - Photophobic
 - Drawn to food
 - Drawn to moisture
- Sifting



How to apply worm castings as a soil amendment

- Near roots when planting
- Add to potting mix
- Top Dress
- Slurry
- Foliar spray



What's in the soil?

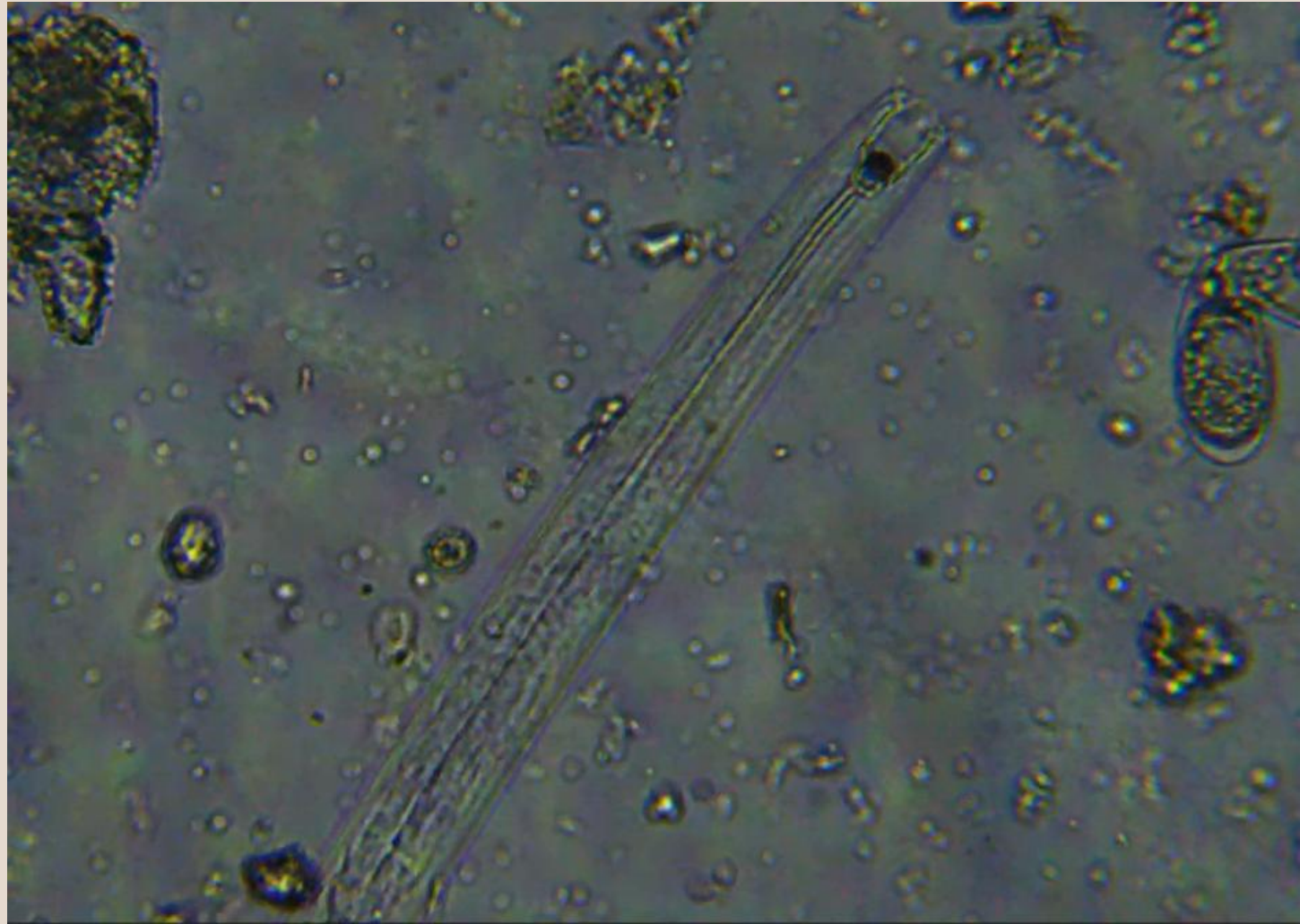
Beneficial microbiology – soil food web

- Beneficial bacteria
- Fungi
- Protozoa – Flagellates, Amoebae, Ciliates
- Nematodes
- Microarthropods



Bacterial Feeding Nematode + Testate Amoeba

- Nematodes consume 100,000+ bacteria per day, keeping bacteria numbers in balance
- Important for nutrient cycling as they excrete excess nitrogen back into the soil as ammonium (plant available nitrogen)
- Amoeba also consume bacteria in the thousands to ten thousands per day, also helping to keep bacteria numbers in balance





thank you



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