The Joys of Vermicomposting

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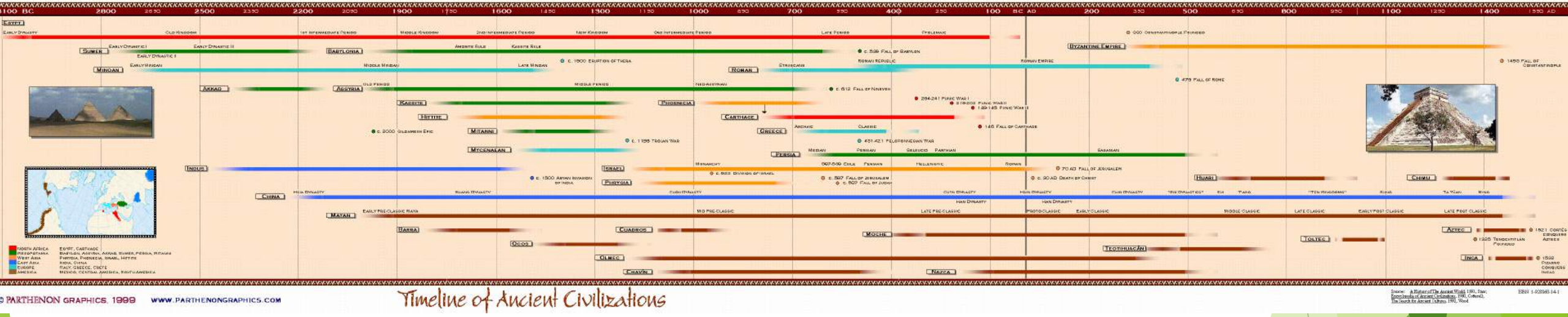
Why worms?

- **“Worm poop is gold”**
- Worms do what medieval alchemists were never able to
  ⇛ turn waste products into gold… gardening gold!
- What goes into a worm at one end and what comes out the other end are **2 entirely different things**
  - N × 5
  - P × 7
  - K × 10
  - Mg × 3
  - Ca × 1.5
  - Enzymes & microbes to enhance soil food web processes
  - Polysaccharides & proteins to improve soil structure
    - Especially for sandy or clayey soils

Composting - The Back-story

- Contrary to popular belief, composting was not invented by Hippies, Granola Crunchers, and Earth Mothers from the ‘60s and ‘70s

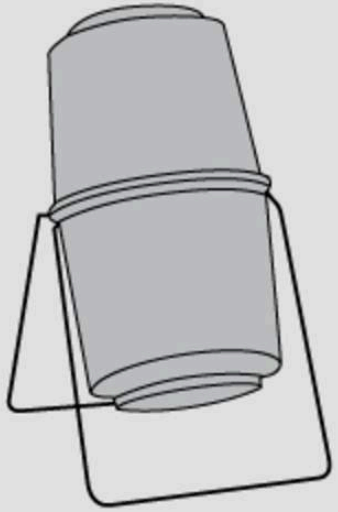


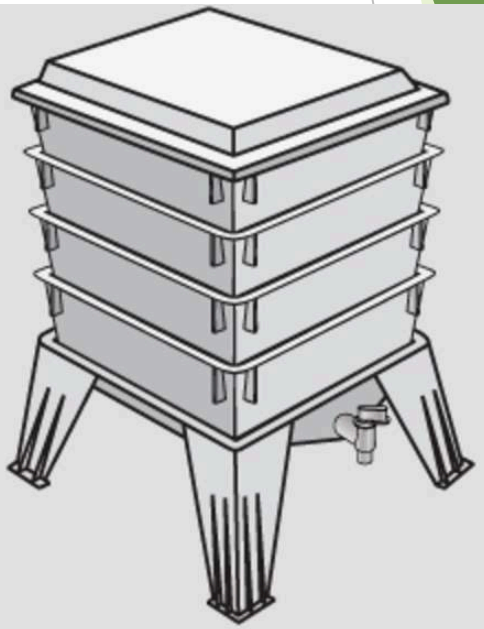
- Architectural digs in ancient Mesopotamia, Rome, and Greece show evidence of composted manures used in agriculture… back to 5000 BCE
- Here, indigenous peoples mixed decaying fish with soil in composting pits
- India, 1923 - Sir Albert Howard formalized the traditional Indore Method of composting as an affordable natural-methods response to the growing chemical fertilizer industry

Basic composting methods

Cold composting, i.e., the backyard heap

Hot composting – the old & new ways





Vermicomposting

Composting methods – Cheat sheet

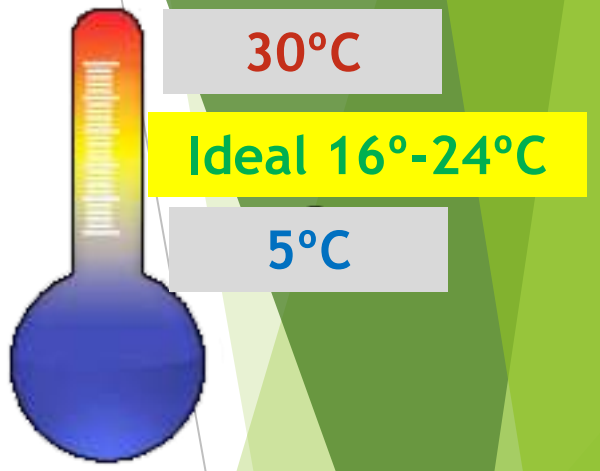
	Cold compost	Hot compost	Worm compost
Microorganisms do the work	✓	✓	✓
Compost made in sequential order		✓	✓
Compost processed in several stages		✓	✓
Requires moisture	✓	✓	✓
Requires oxygen		✓	✓
Requires high temperatures		✓	
Limited to warm weather		✓	
Can be done year-round	✓		✓
Can be done indoors			✓
Requires minimal space			✓
Days to finish	Years?	>90	<90
Needs regular turning (aeration)		✓	

Worm types

- Common earthworms, like *Lumbricus terrestris*, are **anecic** ("reaching up") worms, making deep vertical tunnels into which leaves are pulled to eat
  - Avoid freezing in winter by burrowing deep
- **Epigeic** ("crawling") worms live on soil surface in the litter layer, do not burrow, and are therefore best for composting
  - Native to Mediterranean regions – die in freezing temperatures
- Best composting worm is ***Eisenia fetida* - *the red wiggler***
  - AKA trout worm, trigger worm, red worm, compost worm, manure worm
  - Natural habitat is easily duplicated in a composting bin
  - Voracious eaters, high-density living conditions, reproduce quickly

Vermicomposting - Location, location, location!

- Worms make PERFECT house pets
  - Quiet, clean, and easy to feed
  - Odour-free thanks to the work of aerobic bacteria
- Ideal temperature range: 16°-24°C, but will tolerate 5°-30°C
  - Feeding & reproduction increase/decrease with temperature
- Sensitive to vibrations, so floor or table best
- Basement, laundry room, kitchen cupboard, under the sink, closet, etc. – even in condos or apartments
- In warmer months, may be moved outside
  - But **never** in direct sunlight – choose a shaded area, breezeway, north side of house, balcony, etc.



Making your own worm bin

- Making your own worm bin is a cheap & easy DIY project – perfect for the whole family
- Simple materials
  - Must-haves: plastic storage bins, extra lid or tray, bricks or boards
  - Bedding materials: newspapers, cardboard, dry leaves, sand
  - Optional luxury extras: coir, pumice, rock dust, inoculating compost
  - Only tool required is an electric drill (for ventilation holes)

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  - Optional
    co

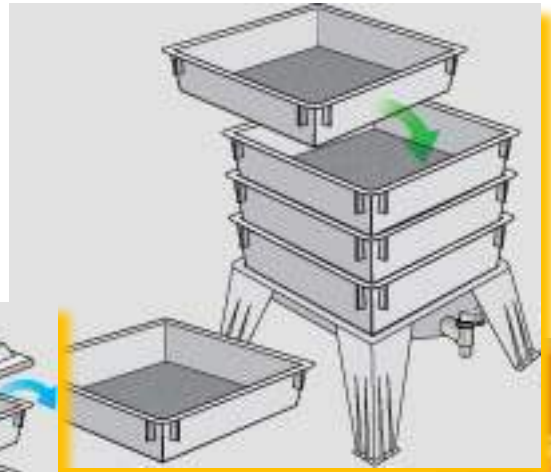
Cheap and cheerful!





Buying a vermicomposting ‘system’

- Multi-tiered vermicomposting systems are available for purchase from specialty shops or by mail order – a turn-key operation
- Encourages upward migration of worms through grid-trays to allow simultaneous feeding, processing, and curing of several batches



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Four ★ hotel!

Finding your worms

- Back yard worms won't do – there's nowhere for them to burrow in a bin
- Composting worms can be purchased at specialty shops or online mail order
  - Avoid bait shops unless you are certain of getting the right worms…
- Not just 'red wigglers' – because that's only a nickname, which is sometimes used to gloss over the fact that they're selling you bait worms
- Practise your Latin by specifying ⇛ ***Eisenia fetida***
- Usually sold by the pound or half-pound
  - Can start with less, will just take longer to reach full composting potential
- Worms will come packed in bedding material, ready to be added to your prepared bin

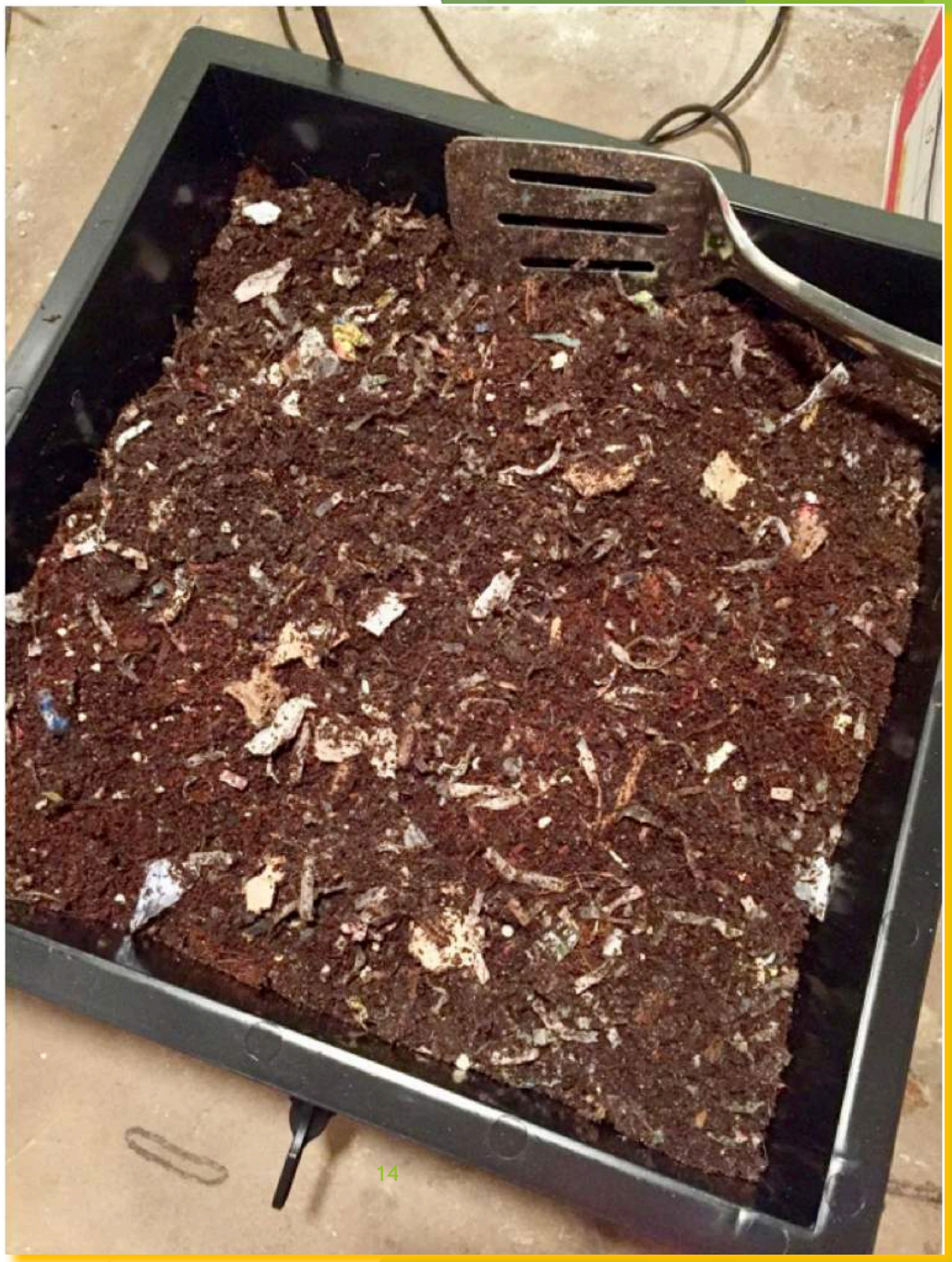
Preparing your worm bin

Stackable grid trays

Line bottom with newspaper or cardboard to fit

Preparing your worm bin - 2

- Bedding material should be prepared in advance, so worms can be transferred right away
- Shredded newspaper, cardboard (especially corrugated – they love the little tunnels!), dried leaves
- Sand, pumice – worms have gizzards (like birds) and need grit for digestion
- Coir – helps keep moisture balance
- Mineral rock dust – boosts nutrient profile of end product
- Inoculate with compost from last batch
  - Or good quality garden compost or soil (source of microbes)
- Moistened enough to become damp, not wet
  - Should feel damp like a wrung-out sponge



Preparing your worm bin -- 3

- Worms are stressed by being packaged & transported – their natural reaction is to bundle together in a tangled mess
  - Looks like raw ground beef – but alive & squirming!
- Carefully place them in the bin & cover with bedding material
- Add small amount of food only to begin – they may not eat for first few days until they have adapted to new environment
- Cover bedding with layers of damp newspaper or cardboard to fit
  - This helps maintain moisture levels and minimizes fruit flies
- Cover bin with lid and place under light for first ~2 days
  - Worms might be curious & go exploring new home – since they are extremely sensitive to light, this will send any potential escapees back into the bin

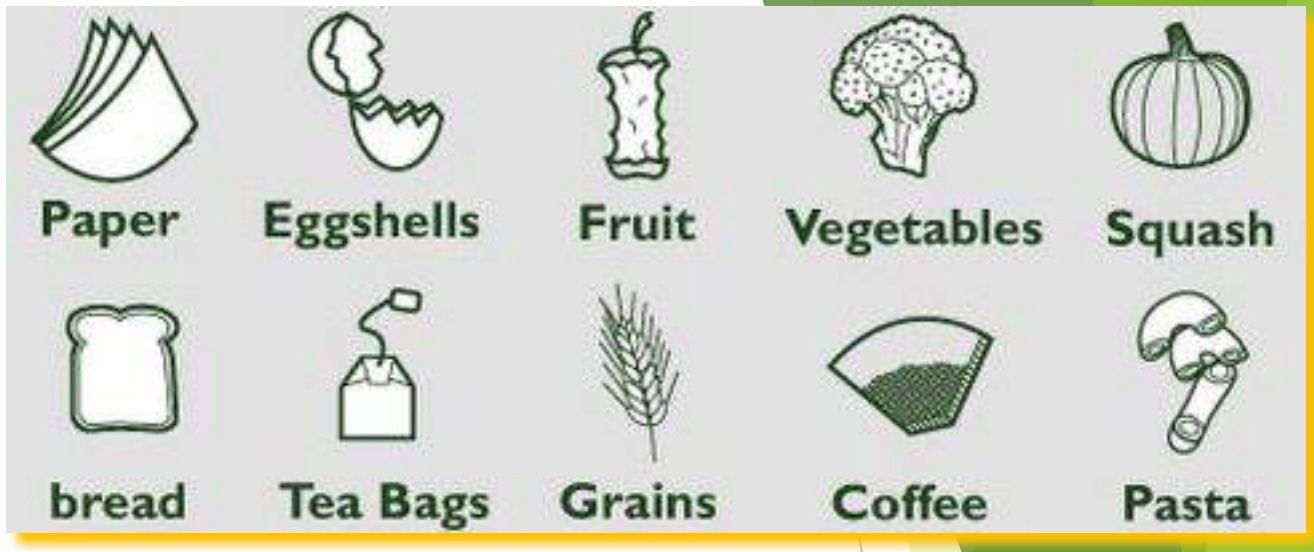
A note about water

- Municipal tap water is treated with chlorine and/or chloramine, which is detrimental to the microbial life we are trying to encourage
- Best to use rain water or dehumidifier water, if possible

- If tap water must be used, allow it to stand for at least 24 hours, stir vigorously from time to time, to allow most of the chlorine to evaporate
  - But chloramine won't evaporate, and still remains

Feeding your worms

- Worms eat your garbage
  - How perfect is that?!?
- Smaller is better
  - Worms have no teeth
  - Chop, freeze, or microwave food to break down faster & speed up composting
- Worm bin is ideal environment for seeds & potato eyes to sprout – chop, freeze, or microwave to avoid this
- Make sure food is at room temp. before adding to bin
- Make sure worms have started eating last food you added before adding more



Feeding – brown vs. green

- Not colours of food, but the nicknames given to the 2 basic types of organic matter used in composting
- Refers to the C:N (carbon:nitrogen) ratio of plants & animals, living or dead
- **Browns** are high in carbon or carbohydrates, supply energy that soil organisms need to survive, help absorb offensive odours
- **Greens** are high in nitrogen or protein, help our 'herd' to grow, breed, and multiply, speed up composting processes, create the heat in hot composting
- 50:50 is a good guideline ratio for worm bins

C

Browns
Paper & cardboard
Maple/oak leaves
Nut shells (unsalted)
Coir

Greens
Fruit & vegetables
Coffee grounds
Tea leaves/bags
Pasta & cereals

N

Feeding – Don’ts

- No meat, meat scraps, bones, dairy products
- No oils or greasy foods
  - Left-over salad is fine if undressed, or dressing washed off well
- No citrus fruits
- No onions, garlic, shallots, leeks, etc.

- Cabbage, broccoli, cauliflower, turnip, etc…
  - Okay in moderation
  - Stop using if cabbage-y odour develops

Other critters – A rogues' gallery

- The worm bin is also an ideal environment for other life forms
  - Micro-organisms in the billions – perfect, just what we want!
  - Other macro-organisms – some helpful, some benign, some unwanted pests or predators
- **Fruit flies, fungus gnats** – not harmful, but annoying – make a fruit fly trap
- **Pot worms** – tiny, thread-like white worms that do the same thing wigglers do – helpful unless so many they're eating all the wigglers' food – slice of bread soaked in milk will draw them out of the bedding
- **Earwigs** – not harmful unless eating too much of wigglers' food
- **Rove beetles** – not harmful to bin
- **Sow bugs, pill bugs, wood louse** – beneficial to bin

Other critters – A rogues' gallery - 2

- **Springtails** (white, wingless jumpers) and **mites** (usually red or brown) are usually a sign that bin is too moist
  - Usually harmless, but rob wigglers' food if numbers are too large
  - Add shredded paper or coir to absorb excess moisture to control their numbers
- **Millipedes** – harmless
- **Slugs** – the beer treatment works in bins, too!
- **House flies** – no meat, greasy foods, or pet waste!!
- **Centipedes** – kill worms & must be removed manually
- **Flatworms & land planaria** – same

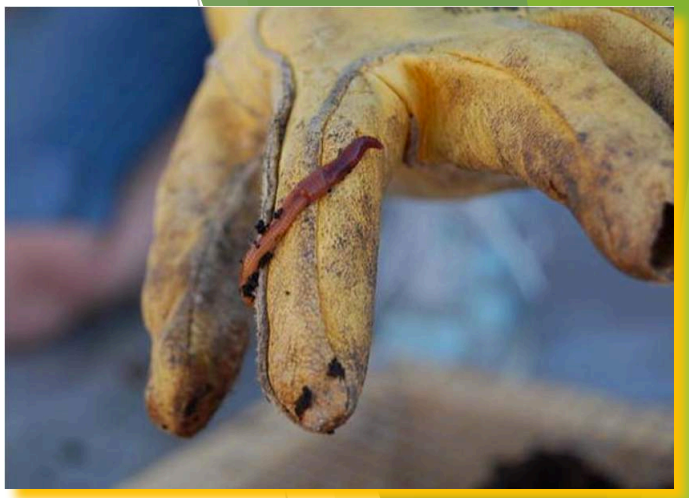
Harvesting worm castings - 1

- When the contents of the bin have been broken down to mostly fine, dark particles, it's time to harvest
- In the multi-tray system, this is easier because worms have migrated up toward new food sources and the lower trays are left full of castings that just need curing time
- For single-bin, the **tarp method** is often used
  - In sunlight, or under a strong light source, bin contents are placed in mounds on a plastic tarp
  - Sunlight drives worms down to bottom of mound
  - Skim off top layer of castings, driving worms further down
  - Repeat process until most of castings have been gathered, then return worms to start a new bin

Harvesting worm castings - 2

- Depending on extent of decomposition, castings may be screened to remove larger chunks that need more processing
  - Use them as inoculant to start a new bin
- Cure castings by stirring and fluffing them up, allow air to dry them **slightly** (but not completely dried out, which would kill some of the valuable micro-organisms)
- Castings can be stored in a bin, just covered lightly with damp newspaper to prevent complete dry-out
  - Re-moisten newspaper as necessary
  - Store for up to a year
- Use in gardens, potted plants, seed starting mix, compost tea, etc.

Vermicomposting resources



- Instructions for making a DIY worm composting bin will be posted on the HMG website
- Sources for supplies & further information:
  - Depending on availablity, worms can be bought in person from Hamilton's Green Venture greenventure.ca/homebusiness/products/
  - It may also be possible to find a local supplier on Kijiji
  - Worms & other supplies can be ordered by mail from:
    - wormcomposting.ca/
    - cathyscomposters.com/
    - worm-composting.ca

Thank you

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