

## VERMICOMPOSTING

### And CARING FOR RED WIGGLER EARTHWORMS (*Eisenia fetida*)

Plus cool worm facts!



#### Contents:

*We sell worms in ½ lb increments. This is also how much we include in a rental bin.*

*-Expect worms of all sizes, plus cocoons (eggs)!*

*-Worms come with 5+ pounds of bedding. Bedding is custom blended here: we combine established substrate from the mother bin with coco coir, black earth, and paper for varied texture. We do ensure they have food for their journey to you.*

*-You may encounter other organisms such as springtails (tiny, beneficial jumping invertebrates which cohabitate in a bioactive unit with your worms)*

#### Things You Might Need:

*-a spoon, scoop, or other tool for scooping dirt*

*-a large opaque tote-type container for their habitat – included with all rentals*

Vermi-Composting, or Worm Composting, is a **clean and odourless** way (when done properly) to transform some food waste into fertilizer. It is also an eco-friendly, divertive method for preventing waste from making it's way into our landfills, helping to close the carbon cycle and reduce your carbon footprint.

species of worm will do their best work at temperatures from 15 to 25 degrees Celsius: and take the temperature of the substrate, not of the room: the substrate will be a different temperature from your room Hotter than 30, and they will cook! Any cooler than about 12 they will slow down, and stop eating; although they can survive short stretches by going dormant down to about 4 degrees. Any lower than that (or if they freeze) they will die. Below is basic information for starting your colony (which will last a very long time if properly maintained).

**Red wigglers are not native to Canada. Our ecology has not evolved with them, and they are an invasive, damaging species in the wild. Do not release them outdoors under any circumstances.**

#### A Little About Red Wigglers

- Red Wigglers are native to Europe
- Adapted to eating decaying organic matter, they are considered one of the best worm species for producing rich, healthy compost
- They are voracious eaters, consuming half their body weight each day
- They can live in high density and are a semi “epigeal” worm, meaning they spend most of their lives very near or even on the surface of the soil - this makes them adaptable for keeping in bins (unlike nightcrawlers and earthworms, which need deep soil and cool temperatures)

#### BASICS: THE BIN

*If you have a rental, this is already set up for you.*

**Material:** Make sure it has a lid, is waterproof, opaque, and ventilated.

**Size:** Minimum of 40 litres – and can be as big as you please (bigger means more worms, and more compost). Most people go with 50-60 L sizes, and if you have a rental, you have a 52L size.

**Ventilation:** Ensure you drill air holes if your bin has a lid that seals: be sure you have plenty! Worms need air.

At our lab, we use a “flip-top” bin, because they have an ideal lid for easy ventilation, and barely need any modification (this is what you have if you have a rental from us).

**NOTE: You cannot use a transparent bin!** Although it sounds appealing to see the worms “in action,” worms are scared of light, and this would be an unnatural setup because you are surrounding them on all sides by light. Your worms will be stressed, and it will force them away from the walls and surface, and they will neither feed nor reproduce sufficiently.

#### THE SUBSTRATE (“bedding”)

*If you have a rental, this is already set up for you.*

Proper bedding is important to maintain the health of your worms. Your worms have been started in at least 5lbs of mixed bedding, which is the minimum for starting a colony: you will need to add to this (unless you have a rental). The more habitat the have, the healthier and more stable your colony will be. The substrate you received is established: it is mature material from our mother bins, and contains castings, cocoons, and immature worms that may be too small to see, as well as beneficial bacteria. It is at the correct PH for your worms to thrive, and will help cycle any new substrate into happy conditions for worms.

**Depth:** you want your bedding to be at least 6 inches deep.

**Moisten the bedding before you add your worms,** spring water or dechlorinated water is best. The overall moisture needs to be on the damp side, so it clumps in your hands but is not muddy. Compare it to what your got with your kit, and never should it be wet enough for water to be squeezed out.

**Good Bedding Materials:** Suitable substrates are always a mix of layers and textures so that there is variety and oxygen flow.

Here are some suggestions, variety is good!

- black earth potting soil (no chemicals, no fertilizer)
- coconut coir or peat moss
- small amounts of sawdust (NOT cedar)
- shredded brown cardboard or newspaper, or other undyed, ink-free paper – not too much!
- Decaying wood/leaves (browns, see NOTE below)
- add a couple handfuls of CLEAN sand for grit

**WARNING:** collecting substrate from outside is risky.

Pesticides, herbicides, fertilizers, and road runoff all may be lethal in the closed environment of the bin. There are also various wild “hitchikers” that might be on collected material, and for the most part, you don't want those.

## FEEDING YOUR WORMS

**AMOUNT:** Each worm eats about half its own body weight per day, so a half pound of worms will eat a quarter pound of food a day. We recommend feeding worms weekly. Your worm colony will grow as they reproduce; you will find they begin to eat the food faster, and you will be able to feed them more.

**CUT YOUR FOOD UP!** The smaller you cut your scraps of food, the easier and faster the worms will be able to eat it. The more varied and aerated the bedding (without being dry), the faster they can eat.

**WHAT TO FEED:** *Note that soft foods are always preferred, and will be eaten faster.*

<b>DO FEED:</b>	<b>DO NOT FEED:</b>	<b>NOT MUCH OF:</b>
-Banana/Peels	-Citrus Fruits	-Grains
-Apple	-Onions	-Bread
-Pear	-Potato	-Coffee Grounds
-Melon	-Oil	-Tea/tea bags
-Squash	-Butter	-High-nitrogen
-Avocado	-Meat or Fish	veggies such as
-Lettuce	-Pet/Human Waste	broccoli, lentils,
-Cucumber	-Cheese	cauliflower,
-Zucchini		oatmeal,
-Carrot		mushrooms

**BURY THE FOOD:** gently pulling aside some of the bedding, dumping the food in, and then cover it up with anywhere between 1-4 inches of substrate. If you leave it on the surface, your bin will be stinky and attract flies.

We recommend feeding **once a week**, and it is fine if there is still a little bit of scrap left over when you add more.

## TROUBLESHOOTING

**FRUIT FLIES!** Discourage these tiny irritants by always burying your scraps under a few inches of bedding, and by not overfeeding your worms.

**ODOUR:** If your bin smells bad, it has too much rotting food, too much water, or you are adding the wrong types of food. The solution is to stop adding food until the worms and other organisms have completely broken down everything in the bin. It is fine to skip feeding for a week or two; don't worry, your worms won't starve. You could also leave the lid off for spans of time to allow for evaporation.

**MY WORMS ARE ESCAPING!** Something is wrong with the substrate. Usually, it is because **your bin is too wet**. Worms can drown! So check that first: you may need to dry your bin out, if the bedding is muddy or slimy, and dripping water when squeezed. Open your lid right up for a couple days, and let the top layer of substrate dry out. Add a layer of newspaper or plain cardboard on the top to give the worms something to escape onto, because they may be drowning. Wait until you see dry spots on the peaks of the substrate to close it again. However, they may also be trying to escape because the PH has spiked, or because there is too much putrefying food: review the amount and type of food you have added. If there is a LOT of rotting uneaten food, you need to stop feeding them for awhile to catch up. If you have fed the wrong food, such as orange or potato peels, you need to get it out immediately.

**WORMS TOO DRY:** You will know it is too dry if the surface of the substrate is dry and crumble, and there are no worms within 2 inches of the surface. The usual culprit is too much ventilation. Using dechlorinated water, mist the substrate, and eliminate a third to a half of your ventilation to troubleshoot.

Ensure you provide adequate food buried deep enough for the worms during this.

**OTHER CREATURES:** Many other critters can and will share the bin with your worms, including the springtails that came with your worms. These are usually helpful creatures and will not cause you problems. However, some may be competitive with your worms, or dangerous, such as centipedes and some types of mites: if you are unsure what you are looking at, give us a call at 780-462-1839 so we can troubleshoot for you.

### **PRODUCTIVE POOP: WORM COMPOST FACTS**

*Expect it to take at least 3-6 months for your bin to mature to a state where you can harvest compost from it. The worms will have digested not just their food, but a large amount of the fresh bedding as well: we call this vermicompost, vermicast, worm humus, worm manure, or worm castings... and the best stuff is usually **at the bottom of the bin**. It will be rich, dark, and crumbly: and there should be no stinky smell. There are also less worms at the bottom, so this is where you want to be harvesting from.*

*This "black gold" has been shown to contain reduced levels of plant pathogens and contaminants when compared to organic compost produced without worms, because their amazing gut bacteria scrubs it. Castings are alive, full of microorganisms living in a high saturation of water-soluble nutrients, nutrient-rich organic fertilizers and soil conditioners. This is the perfect and ideal additive to your garden, greenhouse, houseplants, or flowerbeds, and it will not stink. You have to harvest it out of your bin, but once you have retrieved this black gold, you'll be glad you did (more on that later).*

## HOW TO HARVEST YOUR VERMICAST

The best stuff is always at the bottom of the bin, so prepare to get a little dirty. There are many methods, and these are just some suggestions! We always appreciate feedback too, so let us know what you think!

*NOTE: While harvesting, it is a good idea to try and pick out as many egg cases as possible and return them to the bin. They can be hard to see... egg cases are 1-2 mm in diameter, lemon-shaped whitish-yellowish balls that feel sort of hard and crispy.*

### • **The "Side-to-Side" Migration Method:**

-Move all the old bedding to one side of the bin. Fill the empty side with **fresh** bedding.

-For the next six weeks, bury food waste **ONLY** in the freshly bedded side of the bin.

-The worms will all move to the fresh side as they seek food. After 6 weeks or so, you can scoop out the old side which is mostly casting at this point!

### • **The Screen Method**

This requires a stiff screen, like a wire fish tank lid. Don't want it too fine: the worms will need to fit through the holes!

-suspend your screen over your bin by placing it sideways over the top, or by suspending it over some rocks or something on the surface of the bin.

-Scoop some of the vermicompost in your bin onto the screen

-Leave the lid open and the screen exposed. Shining a light on it will make this even faster! Leave it for a week or so, then check it.

-The light and exposure will scare worms that are in the scoops on the screen downwards, and they will evacuate downwards through the screen to drop into the bedding below.

-The worm compost on top of the screen can be easily scooped

or lifted off, though you may need to pick out any egg cases

- **The WORM CORRAL!**

You're now a worm rancher, so why not set up a corral? This one's fun.

-Use an old but somewhat clean onion or burlap sack that has holes and spaces in it, like what a little worm could wriggle through.

-Generously fill the bag (your corral) with some fresh bedding and some of your worm's favourite food. Bury it in your worm bin, enough so that you can access the opening.

-For a couple weeks, ONLY put food in the bag. The worms will eventually all find their way in there, making it MUCH easier to remove the castings outside the bag... or, just transfer your worm corral into a new bin with new substrate! We've left sacks in bins for months, and eventually you have a very concentrated population of worms inside the bag, and only juicy castings waiting to be scooped outside.

### **HOW TO USE YOUR VERMICAST:**

Once you have it out of your bin, your "black gold" can be used in a variety of ways. There are tons of resources online for how to use compost: far too many for this instruction set which is already pretty long. Some key methods you can look up are **Top Dressing** (adding directly on top of soil), **tilling/blending** (mixing into the soil), or even using as **seed starter**. We do want to take a minute to highlight one cool way to use your compost, and that is **Worm Tea**:

-Disclaimer: *not actually made with hot water!*

-Proportions are 1 part vermicompost to 5-10 parts room-temperature dechlorinated or spring water (do not use tap or treated water!).

-Put the vermicompost in a cloth sack (like a giant teabag - old t-shirts or reusable fine-mesh produce bags work great), and let it steep overnight. In the morning, the water is nice and brownish-yellow. **Use immediately** to water plants! Worm tea expires within 24 hours of being made, because all the good bacteria will die: this does not have a shelf life!

-Worm tea is *especially* known for its ability to boost microbiological activity in soil by adding in bacteria, fungi, actinomycetes, and protozoa. Lots of data suggests that ongoing fertilization via worm tea in crops reduces plant pathogens in lineages. It also goes a lot farther than vermicastings alone...

BUT, it requires some strategy.

-If you want to get fancy, you can make it last longer by aerating it and feeding it. There's a lot to get into with that: we suggest doing some research if you are going to try.

*Congratulations, fellow worm rancher!*

*You are now the proud owner of your very own mini recycling plant, all with the aid of our invertebrate allies. Everyone benefits from reducing waste flow to landfills, eliminating soluble biowastes in our watershed, and closing the metabolic gap through recycling!*

*Your compost will aerate your soil for you, enrich it with microorganisms, and even improve its water-holding capacity. Good job!*



### **THE DIRT ON WORMS! (FUN FACTS)**

#### **Worms in Canada**

During the last ice age, when glaciers scoured North America, they pushed most of the worms out of the glaciated areas... which is a LOT of Turtle Island, as you know! The only worms who escaped this are ones who lived in places with no glaciers, such as the west coast of British Columbia, or regions far south. This left a mostly wormless environment even once the glaciers disappeared, and most of our forests and grasslands evolved without worms at all.

By the time the first colonial settlers arrived here, there were still no worms across much of Turtle Island. These settlers, and their descendants, introduced a lot of plants and soil here, in turn bringing foreign worms and creating places for them to live. A lot of the plants colonial settlers wanted to grow needed things like worms to thrive, so this was very helpful for them; fishermen and cottage garden culture has only increased this as time passed: worms are released all the time to this day. This means that there are a lot of invasive, non-native worms now found all around Canada, and they are actually very destructive to most of our ecosystems. This goes against the common idea of worms as an ally, because we are usually taught that worms are good. However, our wild lands are mostly not adapted for the increased temperature, aeration, and high nutrient output worms produce. Our habitats never needed these little wiggly ecosystem engineers, and the drastic changes they bring about have consequences. You can help by never releasing worms outside!

#### **If I cut a worm in half, will I get two worms?**

NO. Lots of people think that if you cut a worm in half (or into more pieces), the pieces survive, and you get more worms. This is not true! The worm will die. They can no more survive being cut in half than you can. However, this process *does* exist in other organisms: it's called *reproduction by fragmentation*, and it works sort of like cloning. Some examples of animals who can do it would be corals and hammerhead flatworms. It's very common in other organisms as well, such as plants, fungi, lichens, mold, and bacteria.

#### **Worm senses**

Earthworms are very different from us. They have no eyes, instead just little light receptors that can tell if it's light or dark. They have no ears or noses, either, instead just using their body to sense vibrations, and breathing air through their porous skin. Heavy rain can saturate soil, and worms will come to the surface to climb onto rocks or logs avoid drowning. Unfortunately, pavement confuses them (it wouldn't exist in the wild) and they often get trapped in puddles on the road or sidewalk.

#### **Worm parts**

Worm brains are very small and simple, but they can still interpret all kinds of signals to help them survive and find food. See the next page for a diagram of worm body parts!

#### **The life cycle of worms**

Worms are what we call hermaphrodites, which is when an animal has both male and female body parts. Some animals are like this because it means they can reproduce without meeting another of their kind, but your red wigglers do need a mate. When two adult worms meet, both will end up producing eggs, which are housed in little egg cases called cocoons! Worm cocoons are very tough, and can survive drought, floods, and lower temperatures than the worms can. Hatching takes about 3-4 weeks, and from each cocoon with hatch 3-6 tiny worms. The newborn worms are about the thickness of 4 human hairs and are no more than a half inch in size! They are already organic waste eating machines, but it will take them 40-60 days to reach adulthood, when they can begin reproducing. You can tell an adult worm by it's clitellum, which is the thick, smooth band about 1/3 of the way down the worm's body. This organ is where they make the hardened cocoon shell to keep their babies safe.

#### **What if I go on vacation?**

Have fun! The worms can go 3-4 weeks without new food, as long as you leave them with a good amount before you go. Longer than that, they may get rambunctious and begin to throw parties and disturb the neighbours. Consider getting a worm sitter (just kidding - just get someone to stop by and throw in a carrot).

## Identifying worms in the wild

If you've never looked closely at a worm, you may not realize that different species all have different markings. IDing worms is only possible with the adult worms, who have a developed clitellum. Identifying marks will be black or dark bands, saddles, swelling, or certain patches of discoloration. There are probably about 180 earthworm species in North America; and even with these markings, identifying them is often more about where they live as opposed to what they look like. Some species prefer living deep in the earth or shallow; some prefer grasslands, or disturbed ground, and some prefer forests.

## Worms as food

You might have seen robins hopping around in the springtime, looking for a tasty worm snack. Those are earthworms! For some reason, red wiggler worms are NOT the preferred food of most animals – it is thought they produce a yucky taste. So if you were hoping to use your red wigglers as a food source for other pets you may have to think again. Chances are they will turn their nose up at them. However, it is not dangerous to eat a worm: so if one of us has maybe put one into our mouths, there is no need to call poison control. Though we doubt they taste very good!

## Monster worms!!

The biggest earthworm in the world that lives on land is called the Giant Gippsland earthworm (*Megascolides australis*) and it can reach 3 meters in length. This is about 9.8 feet long – that is longer than the tallest basketball player! They live deep underground in Australia, have a dark purple head and a blue-grey body, and can have between 300-400 body segments. They are big enough that when they move around in their burrows, you can hear them!! They cause gurgling or sucking sounds that can be heard from the surface, and there are YouTube videos where you can hear this!

**However**, these monster worms are **dwarfed** by the ocean-dwelling "Bootlace worm" (*Lineus longissimus*), which can reach an absolutely staggering 180 feet in length, and has toxic mucus. It may be cheating to mention them though, because they are not closely related to earthworms: Bootlace worms don't live on land, and they don't have a lot of the distinctive earthworm body parts.

### We really can't emphasize this enough:

#### Your worms cannot be released outdoors.

Your colony has the potential to live indefinitely, with proper care. Please take this into consideration: they are living creatures.

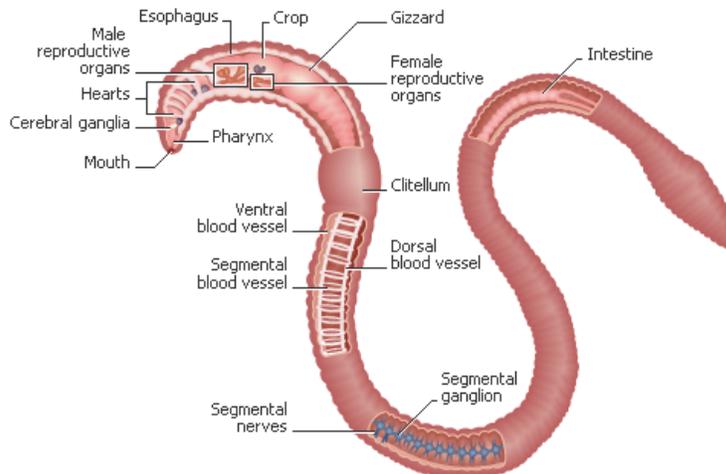
Should at any point you find yourself without the ability or desire to care for your worms, you have several options:

Find them a good home. Chances are you know someone personally who would be willing to take on your compost bin. Please be sure you pass along all the information you have at your disposal.

Alternatively, notify us, and we will be happy to help you re-home them.

***Your red wigglers are not native. Releasing them is highly unethical, and is not good for either the animals OR the environment.***

### Red Wiggler Earthworm Anatomy:



*Butterfly Wings N' Wishes respectfully acknowledges that we operate on Treaty 6 territory, a traditional gathering place for diverse Indigenous peoples whose histories, languages, and cultures continue to influence our business, our way of life, and our community.*

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