

VERMICOMPOSTING KIT

With RED WIGGLER EARTHWORMS (*Eisenia fetida*)

Instructions on care and housing, feeding, harvesting, and cool worm facts

Your Worm Kit Includes:

- Approximately 1/2 pound of red wiggler worms, of various sizes
- approx 2 cups of established vermicompost including castings and cocoons
- approx 5 pounds of bedding: a custom blended of substrates from our lab. This bedding will include food for your worms, and possibly some springtails (tiny, beneficial jumping invertebrates which cohabitate in a bioactive unit with your worms).



Things You Might Need:

- a spoon, scoop, or other tools for scooping dirt
- a large tote-type container for their habitat (big rubbermaid or flip-top bin: it must be opaque)
- a spray bottle with mist function, in case your soil gets dry

Vermi-Composting, or Worm Composting, is a **clean and odourless** way to transform your 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. The amount of Red Wiggler Worms (not to be confused with backyard earthworms) in your kit is considered an great starter size for the average 50-60L indoor compost bin, and can be used for larger projects as well (allowing for more time). With this kit, designed the way we have, you should be able to harvest vermicompost within 5 months.

Composting can be done either indoors or outdoors. This species of worm will do their best work at temperatures from 15 to 25 degrees Celsius: and take the temperature of the substrate in the bin, not of the room: the substrate will be a different temperature. 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. So these worms will have to come indoors during winter. Below is basic information for starting your colony (which will last a very long time if properly maintained).

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 in captivity.
- They are voracious eaters, consuming half their body weight each day, so when determining how many to buy, use this 2:1 ratio based on the poundage of your waste.
- 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 perfect for keeping in bins (unlike backyard earthworms and nightcrawlers, which live deep below the surface and won't typically survive in a bin due to needing different temperatures).
- They move using groups of tiny bristles (setae) on each body segment that grip nearby surfaces as the worm contracts and expands.
- Red Wigglers are not native to Canada, so **do not release them outdoors, under any circumstances.** They out-compete native species for food in the summer, affecting local species populations, and then they will die in the winter.

THE BIN

Your bin needs to have a lid, be waterproof, opaque, and ventilated. Your bin should be a 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. There are a lot of commercial plastic tote bins you could use from heaps of places. At our lab, we use a type called the "Blue Planet flip-top bins,"

from Canadian Tire, because they have these great flip-open, unsealed lids and barely need any modification at all. Ensure if you do use a bin with a lid that seals, that you drill some **air holes** in the top for ventilation – be sure you have plenty! Ventilation is important, the worms need air. If you ever find your worms attempting to escape, that means that the substrate is too wet and you need to add more ventilation. If the substrate is drying out too much, just cover some holes up with duct tape. **Please be aware you cannot use a transparent bin!** Although it sounds appealing to see the worms "in action," worms are scared of light, and surrounding them on all sides by it will force them away from the walls and surface, and they will neither feed nor reproduce sufficiently. They need darkness.

THE SUBSTRATE

Proper bedding is important to maintain the health of your worms. Your worms have been started in about 5lbs of mixed fresh bedding, and this is enough for them to thrive for a little while: but you will need to add to this. The more habitat the have, the healthier and longer-lived they will be. Your kit also includes around 2 cups of established vermicompost: this is mature material from our mother bins, and contains castings, cocoons, and immature worms that may be too small to see. This mature substrate will increase the efficiency of your starter bin by introducing beneficial bacteria, and will help secure your colony in their new habitat. Suitable substrates are always a mix of layers and textures so that there is variety and oxygen flow, so vary the bedding in the bin to provide texture diversity for the worms: this will create richer compost because air flow will improve. **Moisten the bedding before you add your worms,** and don't use tap water: spring water or dechlorinated water is best. If you only have tap water, fill up a jug and let it sit in a window for 24 hrs; the chlorine will dissipate out. The overall

moisture needs to be on the damp side, like a wrung-out sponge. Compare it to what your got with your kit, and never should it be wet enough for water to be squeezed out. Some good substrate suggestions:

- clean black earth potting soil (no chemicals, no fertilizer)
- coconut coir (we recommend going to a garden centre, not a pet store: to save on costs)
- peat moss
- small amounts of sawdust (NOT cedar), shredded brown cardboard or newspaper
- add a couple handfuls of CLEAN sand to provide necessary grit for the worm's digestion

Fill your bin halfway to three-quarters full with your mixed bedding substrate. Note: though shredded leaves, sticks and wood seem attractive, collecting substrate from outside is risky. If you are intent on this, stick to *hardwood* species (birch, oak) and ensure that anything from outside you are adding is **not** from a public location that may have been sprayed with pesticides or herbicides, or anyplace that might encounter city or private runoff. Pesticides and fertilizers will be lethal in the closed environment of the bin. Once you have what you want, wild-collected items **must** be baked in an oven at around 200°C for 4 hours to sterilize it. There are all kinds of "hitchikers" that might be on wild collected material, and for the most part, you don't want those.

FEEDING YOUR WORMS

The size of your bin and the number of worms you have purchased will determine how much food to add each day or week. 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. 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. Favourite foods appear to be avocado, apple cores and melons, but there are guidelines to what you can and can't feed:

DO FEED semi-soft, non-citrus vegetable and fruit scraps, such as avocado, lettuce trimmings, cucumber, zucchini slices, carrot, fruit rinds and peels, well rinsed and pulverized eggshells. Hard scraps are good famine foods: a supply of chopped carrot will last longer than avocado. Very hard vegetables such as broccoli are not always ideal because the worms are slow to eat them. Foods that are high in nitrogen will warm your bin up, so use strategically (high-nitrogen foods are tofu, lentils, broccoli and cauliflower, beans, oatmeal, and mushrooms).

A SMALL AMOUNT of grains, breads, coffee grounds and filters, and even the occasional tea bag may be added.

DO NOT FEED meat, fish, pet waste, human waste, cheese, onions, potato peelings, oil, butter, inks containing toner, or any animal products. Stay away from citrus fruits as well; though the worms would eat them in the wild, excessive amounts of these in a closed environment will alter the PH of your soil and your worms cannot escape.

TO AVOID ODOUR PROBLEMS, always bury the food by gently pulling aside some of the bedding, dumping the food in, and then covering it up with anywhere between 1-4 inches of substrate. If you want, mark the location where you last fed the worms with a stick, and next time move to a different location.

Work your way around the bin so no one site is never over-saturated. We never spread our food around on the surface, but instead bury it in one spot so we can monitor the progress easily. 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.

PRODUCTIVE POOP: HOW WORMS BENEFIT YOU

*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.*

Vermicast have been shown to contain reduced levels of plant pathogens and contaminants than 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).

TROUBLESHOOTING

Fruit Flies – Discourage these tiny irritants by always burying your scraps with a few inches of bedding, and by not overfeeding your worms. If the worms can't eat the food fast enough, the flies will.

Odour: If your bin smells bad, it has too much of either food or 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. Skip feeding for a week or two; don't worry, your worms won't starve. During this period, stir up the the top layer of substrate a little to allow more airflow, and you could also leave the lid off for spans of time to allow for evaporation.

Worms too Wet: You will know your worm bin is too wet if you open it up and see worms on the walls of the bins. They are trying to escape. The substrate will be actively wet to the touch, like mud, and water might be present on the lower layers if you dig a bit. Prop open your lid an inch or two for a week or more, and add less food. Spread a layer of shredded cardboard or newspaper around on the top to give the worms something to escape onto if they are drowning. Wait until you see dry spots on the peaks of the substrate to close it again.

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 helpful creatures and will not cause you problems. Some "volunteers" sometimes appear from other substrates, or may be clever enough to find their way into your bin on their own. The only ones you might have to worry about

will be centipedes: and these are extraordinarily rare – unless, of course, you have a lot of raw material from the wild.

HARVESTING YOUR VERMICAST:

METHODS

Again, the best stuff is always at the bottom of the bin, so prepare yourself for getting a little dirty. There are a few different methods. Try some of our suggestions out to see if they work; you could also google other methods that might work better. There are heaps of methods. While harvesting, it is a good idea to try and pick out as many eggs and cocoons as possible (which will mostly be on the surface) and return them to the bin. Eggs are small, lemon-shaped yellowish objects that can be seen pretty easily with the naked eye and picked out.

- ***The “Side-to-Side” Migration Method:***

Wait until basically your whole bin is vermicast. This may require patience.

-Move all the contents compost 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 castings.

- ***The “Bright Light & Scoop” Method***

This method produces less nutrient-rich castings, but is easy.

-Shine a bright light on the worm bin. They will avoid the light and burrow deep down into the bottom of the bin.

-Carefully scoop off the top layer of vermicast until you begin to see worms again.

-Repeat the process. Eventually the worms will be concentrated at the very bottom of the bin. You can now add fresh bedding.

-Place everything you've scooped on a screen (wire fishtank lids work surprisingly great!) and suspend it over your fresh bin for a couple days. Any remaining worms in what you have scooped will wiggle down and away from the light, ensuring you don't kill any. Pick out any cocoons you find.

- ***The “Sun Dried” Method***

This is fast and easy, expanding on the last step from the previous entry: but it takes longer and requires a second bin and some stiff plastic or metal screen (again, wire screen fish tank lids can be good... whatever you use has to be sturdy, with a frame to increase stability).

-Put some fresh moistened bedding in a **NEW** bin and place the screen over top of it.

-Dump some of the vermicompost from the first bin on top of this screen and put the new bin out in the sun or under a bright warm light.

-The light will dry the old vermicompost out, and the worms will retreat through the mesh and into the new moist bedding below.

-The worm compost on top of the screen can be easily scooped or lifted off, and this can be repeated until the whole bin is "turned over."

- ***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 remove the whole bag! 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.

- ***The Handfuls' Method***

-This is easy, but not clean, and is often traumatic to your worms.

-Simply scoop away as much of the top layers (which are the high-density areas for the worms and their cocoons) to get to the bottom layers which are mostly castings.

-Scoop out the stuff on the bottom. Replace what you've removed with fresh bedding on top.

- ***Getting Fancy***

There are oodles of fancy products on the market that can help you out with harvesting if you want to go that way, like flow-through bins, and cylinder harvesters. Some people add taps and second layers and all kinds of things. Getting into that is up to you! All of the methods we've detailed above are compatible with any over-the-counter DIY bins.

HOW TO USE YOUR VERMICAST:

Once you have it out of your bin, your "black gold" can be used in a variety of ways. Some of our suggestions include:

- ***Top Dressing***

-Use your vermicast directly on top of what you want fertilized. This is super easy and your plants will love it.

- ***Soil Tilling or Blending***

-Till your castings into your garden or ground plot in between growing seasons, when you are turning the soil anyways.

-This requires loads of castings: layer 2-3 inches all around the surface of the dirt before you fold it in and till it over as you usually would.

- ***Seed Starting***

-Combine no more than 1 part vermicompost to 2 parts seed starter (commercial or homemade)

-Please note that you need to take your plant species' needs into consideration with this one, because the plant is contained in a little pot with all this amazing rich fertilizer. Worm castings are extremely dense with nutrients, and not all types of plants want that.

- ***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 work great), and let it steep overnight. In the morning, the water is nice and brownish-yellow. Use immediately to water plants, or in a spray bottle: worm tea expires within 24 hours of being made.

-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 really fancy, or if you want to get your tea to last longer, you have to aerate it. Add a fishtank bubbler into your tea, so that there is some bubbly action going on. This allows the bacteria to carry on. There is a lot more information about this online if you google it, and we know people who even

add things into this tea such as organic sugars to encourage a punch of rapid microbiotic growth, which may increase nutrient levels and will help your tea last longer. We're a little data deficient on this though.

- **Worm Leachate**

-This is a little different from worm tea: it's harvested differently. You have to securely attach a spigot to the bottom of the bin, so that you can drain out excess liquid from the bottom where the worms are not. If the liquid smells nice and clean, you can simply dilute it in 10 parts water to 1 part leachate, and use it like tea (if it smells yucky like rotten food, don't use it! Something has rotted, re-read the troubleshooting section). Adding a spigot is obviously a little bit hard if your bin is on the floor, so you'd need an elevated spot for the bin.

- **Top Dressing Your Lawn**

-Consider ditching your lawn! A big barren patch of non-native grass may as well be pavement to pollinators. If you're using pesticides or some fertilizers on your lawn, animals can even die from being in contact with it. To help out the bees, the birds, the bats and the butterflies - and many more! - consider replacing your lawn with a low-maintenance native grasses and wildflower patch. Your life will be enriched with a colorful panorama of life dancing through your yard, the soil will benefit from diversification, you'll save on water, and you will have more vermicast to use elsewhere, because native plants are well adapted to our harsh northern climate and need very little babying from us to thrive. We have lists of plant species for you if you want to plant something especially for our native bees and butterflies, and we'd be thrilled to help you if you want to take this on!

That aside: if you are really, really into the lawn concept, straight up just sprinkle the vermicast all around the parts you want fertilized: or, get some tea into a spray bottle or spray attachment for a hose, and as they say, "give 'er."

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. You are benefiting by contributing to your plant's healthy lives (by enhancing root growth, germination, and yield), reducing waste flow to landfills, eliminating soluble biowastes in our watershed, and even 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. Thank you!

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 Canada and out of our northern soils. The only worms who escaped this are ones who lived in places with no glaciers, such as the west coast of British Columbia. This left a mostly wormless environment even once the glaciers disappeared, and most of our forests evolved without worms at all. By the time the first colonial settlers arrived here, there were still no worms across much of Canada. These settlers, and their descendants, introduced a lot of plants and soil here, in turn bringing foreign worms and creating a good place 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 in the 21 centuries. Now, there are a variety of species found all around Canada, mostly introduced, and the truth is that many are highly destructive to our forest and grassland ecosystems.

This goes against the modern gardener's idea of worms as an ally, because we are usually taught that worms are only good. However, our ecosystems are mostly not adapted for the increased temperature, aeration, and high nutrient output worms produce. Most of our land never needed these little wiggly ecosystem engineers, and the drastic changes they bring about have consequences. You can help by never accidentally 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: just not in earthworms: 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 (which are a really interesting animal to google, if you are into that). 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 to hear and no noses to breathe, either, instead just using their body to sense vibrations, and breathing air through their skin. If you see a worm in a puddle of water, it is drowning! Help it by moving it to high ground: worms get confused by pavement. In the wild, where there is no pavement, they would crawl onto rocks or logs to avoid drowning in waterlogged soil during heavy rain. But they get washed into dangerous places when they try this with pavement.

Worm parts

Their brain is very small and simple, but it can interpret all these signals and also a sense of taste, to help them survive and find food. They have no teeth, but they have a strong muscular mouth and front end to dig into food and dirt and find things to eat. They also don't have kidneys. Worms have 5 hearts, all in one spot near the front of their body.

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 cocoons! Cocoons look a little bit like small transparent popcorn seeds when they are fresh, so look for them in your bin (they will be in the top layers). These cocoons are very tough, and can survive drought, floods, and lower temperatures than the worms can. Over time they darken to a reddish brown, and after around 3-4 weeks, 4-6 baby worms will hatch from one cocoon.

The resulting juvenile worms are about the thickness of 4 human hairs and are no more than a half inch in size. They have no markings and no clitellum (check out the worm anatomy chart). 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 its 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 weeks without new food. 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 feed them a bit).

Identifying worms in the wild

If you've never looked closely at a worm, you'd never 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. 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! :)

How many worms?

Over half a million earthworms can live in just one hectare of soil. That's a lot of worms! So far, we know about 2,700 distinct species of earthworms: but the subclass of animals they are in, called oligochaeta, is much bigger. There's probably about 10,000 species in this subclass, and it includes all terrestrial (land-based) segmented earthworms, as well as some species which live in freshwater, a few that live in marine habitats, and even a whole bunch that live mostly in glaciers called "ice worms." They can only live below freezing!

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. 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, it can cause gurgling or sucking sounds that can be heard from the surface! **However**, these are absolutely **dwarfed** by the ocean-dwelling "Bootlace worm" (*Lineus longissimus*), which can reach an absolutely staggering 180 feet in length, and has toxic mucus. However, it is not closely related to earthworms: it doesn't live on land, and it doesn'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.

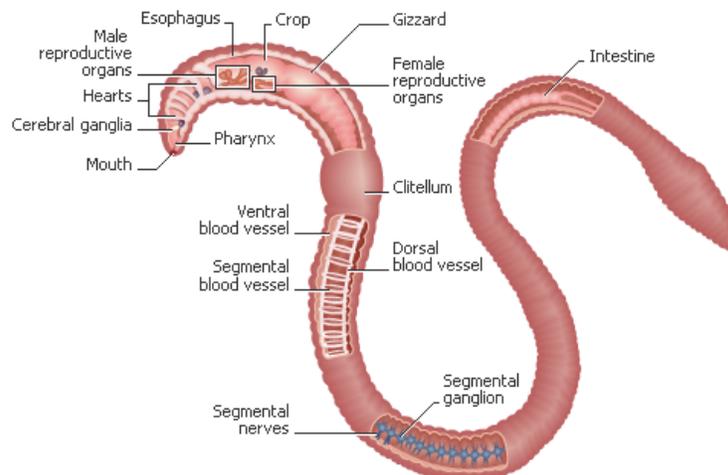
Should at any point you find yourself without the ability or desire to care for your worms, you have several options:

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.