



5 Eyes Farm



Between the trees - learning in Nature

Newsletter

Worm-Farm composting

Worm-farm composting is a great way to reduce and manage your kitchen waste. It's a great way to create 'black gold' (humus) & "compost tea" (fertiliser). These are some of the reasons people have been using worm farms for over a century. Worm farming seeks to replicate what we see happening in nature and contain it to a domestic (or commercial) context.

Red worms (aka tiger worms, wrigglers and various other nicknames) are the most common worm-farm compost worm.

WHAT WORM FARMS NEED

THE FIVE ESSENTIALS

1. A hospitable living environment: bedding
2. A food source
3. Adequate moisture
4. Adequate aeration
5. Protection from temperature extremes



*Charles Darwin is attributed with making worm farming popular through the publication of his: *The Formation of Vegetable Mould Through the Action of Worms, with Observations on their Habits*, London, 1881*



How to setup

We encourage the creative use of recycled materials to make your worm house. This can be a fun project and help the environment too.



Position, position,

position - not too far from the kitchen - preferably undercover - fairly cool and easy to access.

Choose a house. It can be containers, boxes - recycled plastic crates - a made wooden house or similar. Important elements are aeration, drainage and temperature control. (Think of the environment when choosing a house 😊)

bedding material: ground floor level (above the waterline) - where the worms live and hang out away from the food area. This needs to be 1) highly absorbent, 2) have good bulking potential 3) have low protein/and or nitrogen content.

Our method

Coconut fibre and bamboo or banana leaf mixed with wetted scrap

paper mulch (or newspaper) and some twigs, small sticks. This last is to ensure aeration. The worms will nibble on their bedding but will go to the food court upstairs to eat properly

Create water-ump

The area immediately below the bedding (the lowest part of the worm farm) collects water, keeps the worms dry and makes compost tea.

A WORM HOUSE HAS SPECIAL FEATURES

GETTING THE SETUP RIGHT IS IMPORTANT.

Once it is set up it is easy to maintain.

Drainage & moisture

Drainage is important. Having a tap can be good and not so good. A tap that is always turned on is the best option. Sounds strange? Of course, it will need a bucket underneath it to catch the worm tea. Keeping the tap open seems to stop it blocking. There are other ways - creating a straining system in the bed behind the tap is one way. Having drainage holes underneath your system into a tray below is another way. (see Appendix F for more on watering the worms)

Our preferred way

Having a see-through recycled plastic bottle with a small hole in it

quite tight-fitting to go over the tap and help the tap in an open position. Why? It limits mosquito breeding and traps the excess water in a visible place. No nasties are going to grow in here while it is collecting...

Keeping it moist at all times in the worm farm is important. If it floods, having a reservoir at the bottom underneath the bedding saves the worms by regulating the moisture content.

Aeration

Air holes, preferably with gorse or mesh covers are important on each level. This creates basic airflow. Also, sticks and twigs help create air pockets inside especially the bedding layer.

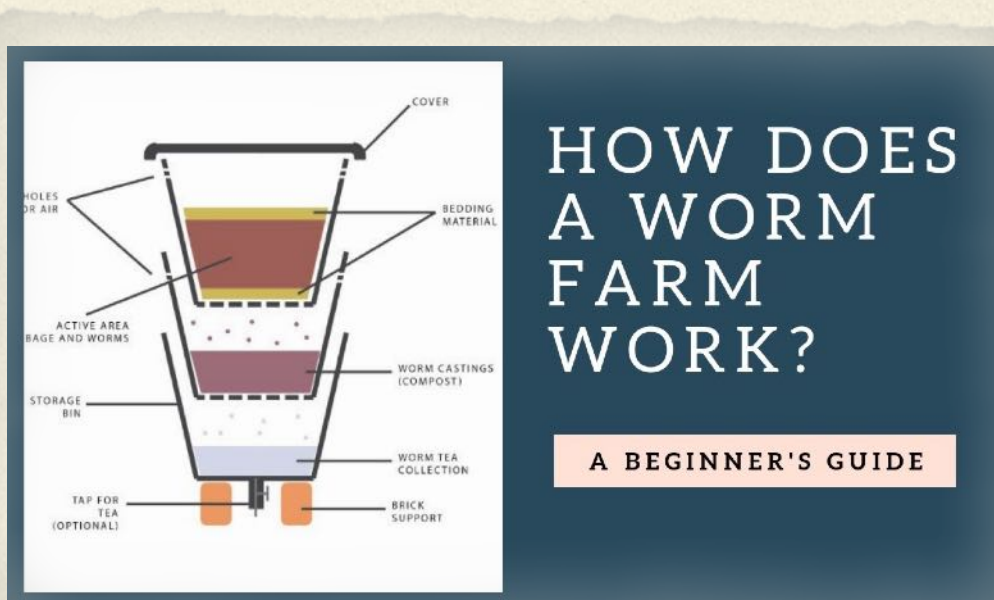
Temperature

Red worms have quite a tolerance between 15-30 degrees Celsius. This is quite a wide range and in the tropics not much of an issue. Using a worm blanket is important. This is a

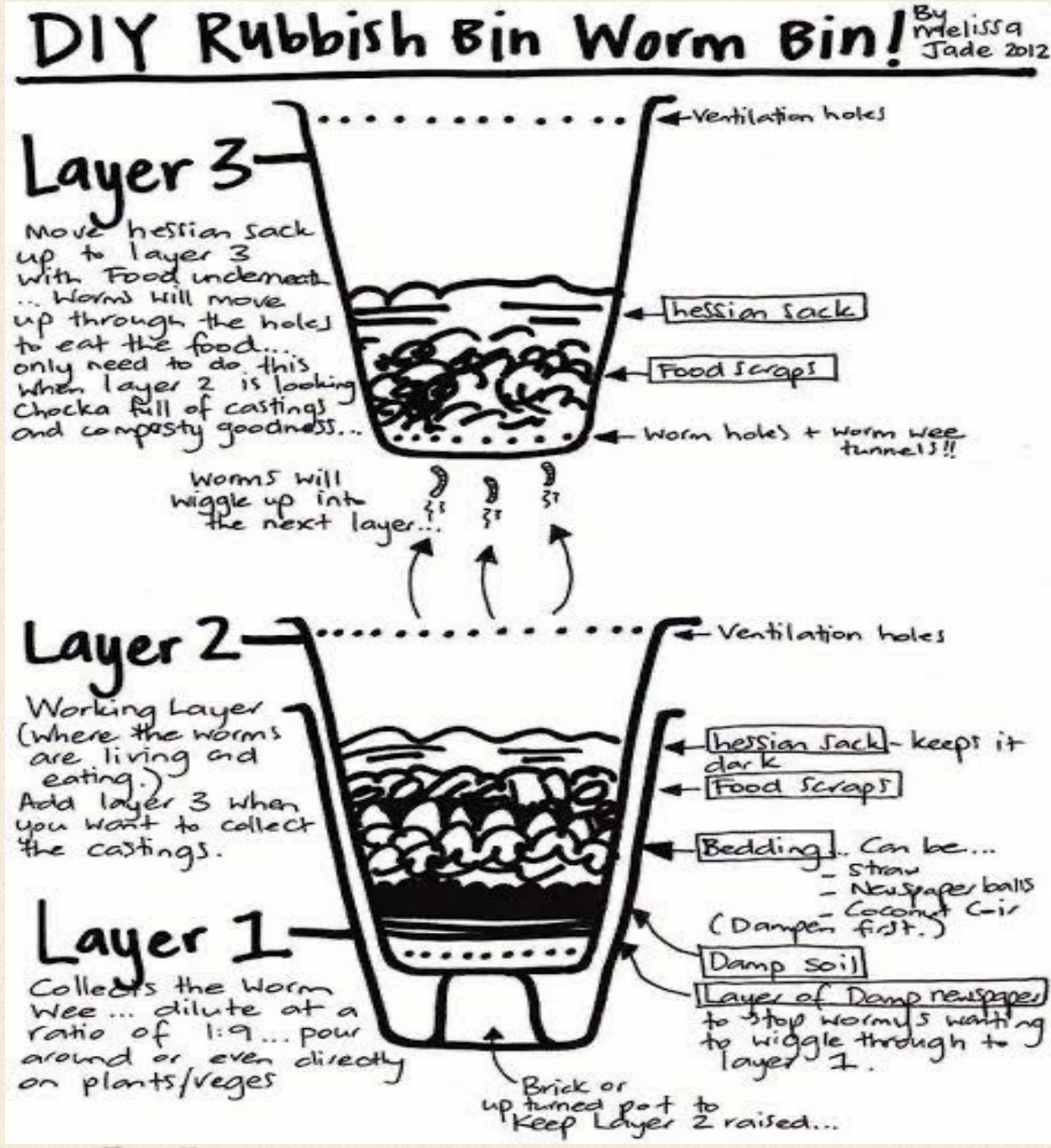
dampened dense material that sits on top of the worm farm under the lid. Also, keeping the worm farm out of direct sunlight is important, preferably undercover.

Watering the worms

Worms need moisture on their skin as this is how they breathe and also move around. Water is so important for a worm farm and for Red Worms, we need at least 70% (up to 90%) water to volume of material, which is a quite lot! How to check this... Pick up some worm farm and squeeze it. It should be damp but not soaked. Squeezing it hard might fill 1-2 centimetres in a drinking glass. Another way: leave the tap open. Water the worm farm with 5-10 litres each week. Have a catching container under the tap. Collect all the excess.



BinCaf



CREATIVE VARIATION

Keep in mind

aeration, temperature, drainage, moisture, bedding

And experiment with different designs

What about the smell?

This is a common question and needs to be understood for all composting and worm farming setups.

A worm farm or compost is based on bacteria.

If conditions in the worm-farm or compost are favourable the bacteria will be aerobic. This gives off a slightly sweet smell and is the sign of a healthy system. If however, the smell is pungent then it tells us there are anaerobic pockets in the system. A new kind of bacteria is breeding now in the anaerobic conditions and this is what smells bad. (See Appendix E for more on microbes and bacteria)

So, what do I do about it?

It is easy to fix the anaerobic conditions in the worm farm. It is a matter of adding some carbon material and gently mixing it through. One way to ensure this doesn't happen is to add a small amount of carbon each time you put nitrogen-rich food scraps into the farm - even up to 50/50. The worms eat both but obviously go for the nitrogen-rich foods more readily as these are being broken down by the microbes that they desire...

Preferred method

Combine coffee grounds and tea bags with the green waste from the kitchen and if you don't have enough then include some striped paper or leaves

Basically, we aim for a 50/50 on carbon and Nitrogen (this is a different and simpler way to achieve close to a 25:1 CN ratio).

Some say

The bedding is all carbon, the food is all nitrogen. This works in optimal conditions (weather, temperature, moisture, light, drainage). We tend to mitigate this by adding a quantity of brown waste with green waste and ensuring the food area has some twigs in it to aerate the food.

Checking in

It is vital to check your worm farm every day or as often as possible, at least several times a week. It doesn't take long at all and perhaps the best time is when you are feeding it! Look for activity and see if you think the population is growing. Smell the system to make sure it is aerobic. Make sure enough food and water but not too much.

**SWEET
SMELLING
WORMFARM
AND
COMPOST
IS EASY TO
ACHIEVE**



Appendix A - Bedding

What you can use for bedding is quite varied. Remember it needs to retain moisture, have good bulking and low nutrient. This last part, low nutrient is also looked at in terms of the C:N ratio. Carbon to Nitrogen ratio or brown waste to green waste ratio needs to be around 25:1.

Some bedding materials not listed in the table below that are potentially available and good to add include bamboo leaves (the direction of the fibres when breaking down suit the worms) and banana leaves and stem. Coconut fibre is great too. Each element on its own usually does not achieve all three conditions (Absorb, Bulk, High C) so it becomes a case of mix and match.

Mix and match for the best bedding options.

Mixing combinations of the items listed and discussed create the best solution for gaining the 3 conditions. The bedding can have a base of straw, hay, fibre, leaf (dry, not absorbent) mixed with wetted mashed paper or stripped newspaper or

peat moss (absorbent) and any other low N product listed in the table below.

Other recommended bedding

Some people have access to Coir that has been compressed and is sold commercially. It is an excellent gritty bedding material. It is also a great blanket material. The worms tend not to eat it and it doesn't break down fast.

Less easy to get hold of here

Peat moss; Sphagnum moss; Hay - various kinds; Straw - various kinds; Commercially made worm cafe, worm farm bins and equipment.

Item	Absorbtion	Bulkage	C:N
Coconut fibre (raw)	Good	Good	115:1
Banana Sheath	Poor	Medium	40:1
Banana leaf	Poor	Medium	75:1
Rice stalk	Poor/medium	Medium	65:1
Paper	Good	Medium/good	250:1
Cardboard	Good/medium	Medium/good	500:1
Grass clippings	Poor/medium	Medium	20:1
Newspaper	Good	Medium/good	480:1
Saw dust	Good/medium	Medium/good	500:1
Coffee Ground	Good/medium	Good	25:1
Bamboo leaf	Poor/medium	Medium	60:1

Appendix B -

IMO's

Worms eat the microbe on the food

Microbes will generally move into your worm farm on their own from what's on the food and in the air. We call these IMO's (indigenous microorganisms) - 'indigenous' because they already live in your particular part of the world.

Adding microbes to get things started and increase initial activity is as easy as adding a small amount of manure, soil (even dirt) of ferment. The farm only needs a couple of spoonfuls spread throughout.

It is most beneficial to add IMO's a week before adding the worms. The microbes will be busy breaking down the material into a slurry for the worms to easily consume. It is this part of the food breakdown process that the worms generate into 'castings'.

Capturing IMO's

Easy! Every time you go to discard rice water put it in a container with a lid and store it. In a week or so you have IMO's for the worm farm and other composting options. You can also look at the more complex KNF (Korean Natural Farming) techniques of capturing solid IMO's.

Don't overdo it!

Just a little bit of microbial additive gets things going. We are simply accelerating a natural process and it is best to let things happen in due course. Be patient in the setup process. Worms don't like to travel too much and take a while to settle down. New farms need to settle and populations need to be built up. But don't stress. A couple of months of initial tending for a few minutes a day or so and you can have a ragingly happy and productive little farm eating everything you put in there.

Make it small



Appendix C - Feeding

What you can feed a worm is the same as what you can feed a pig. This is not entirely helpful if you don't keep pigs! The idea is that they both eat most things.

Avoid

Oily/fatty foods - meat - citrus and onion family.

Emphasise fruit and vegetables, coffee grounds and eggshells.

Speed things up

The smaller the food particles the better. Blend if you have time. Chop if you have time. Pre-compost if you have space. Anything we can do to assist with the food breakdown and the smaller the food particles the quicker it breaks down.

Kitchen container.

It is good practice to use one or more containers to organise food waste. These are daily containers with lids. If you have one for food that needs chopping up or blending and another for food that

is ready for the farm it can help to organise the routine of processing kitchen waste.

Freezing packets

When you start the worm farm the worms first need to settle in (1-2 weeks). After that, they need to start eating small amounts of kitchen waste - a handful every day or 2. This will get things going and then it will build up. In the meantime, it might be wise to freeze packets of prepared worm farm food. This will give you stock and can be used on days when there is little or no waste, holidays or when you are not around as a backup.



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Microbes

Microorganisms or microbes are microscopic organisms that exist as unicellular, multicellular, or cell clusters. Microorganisms are widespread in nature and are beneficial to

life, but some can cause serious harm. They can be divided into six major types: bacteria, archaea, fungi, protozoa, algae, and viruses.

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Appendix F

More about worms

Lots of worms

There are many species of worms, so many that they are broken up into three families. The deep soil dwellers (Anecic), the medium soil dwellers (Endogeic) and the surface dwellers (Epigeic).

Not all worms are good compost worms. Most are good for gardens and live in the soil. Compost worms (Epigeic) enjoy the leaf surface material and like being in a big bunch together. Red worms are the most common of these and are used for composting around the world. They are also called Tiger Worms, Red Wigglers and their scientific name is *Eisenia fetid* or (*E.fatida*). There are other worms that are potentially good for composting with but we will focus on the red worm in this overview.

Worms are sensitive

Worms don't have eyes. They sense light from their skin and they are very sensitive to light. This means they are easy to

contain in dark, damp spaces with the right air, food, temperature and moisture.

Use the ADAM principle



It is easy once you get it setup

If all this sounds complicated it is just because it is new to some of us. Once we are set up with the basics it is easy to maintain with just a few small adjustments. It is a life skill that will help the process of cooking, the health of your gardening and also the environment! It is a great way to offset greenhouse gasses and to limit the use of pesticides and herbicides and garden additives. Be patient with the setup process and give it time to evolve. A thriving worm farm awaits just around the corner.

Tune into our next occasional news about dry/hot composting. And don't forget to check out 5EyesFarm.com and arrange a tour or another workshop. Thanks for coming!

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