

# Working with nature: Embracing regenerative methods in home gardens

 Brightstar



## The Te Hōnonga a Iwi project team is committed to harnessing the power of natural processes at Rosedale Park. You can apply the same principles that we use for our environmental restoration in your garden at home.

**T**he best thing you can do for your garden is to build soil. When you build soil, you are creating a sustainable system. If you are losing soil, you will eventually run out. But early signs you are losing soil are a slow decline in the health of your plants, and an increase in their maintenance requirements, rather than any dramatic change in colour of the ground.

We know that the carbon cycle and photosynthesis play a vital role in the soil-building process (see our Engine of Ecology resource). So, what can you do to support your garden to be a healthy self-sustaining ecosystem?

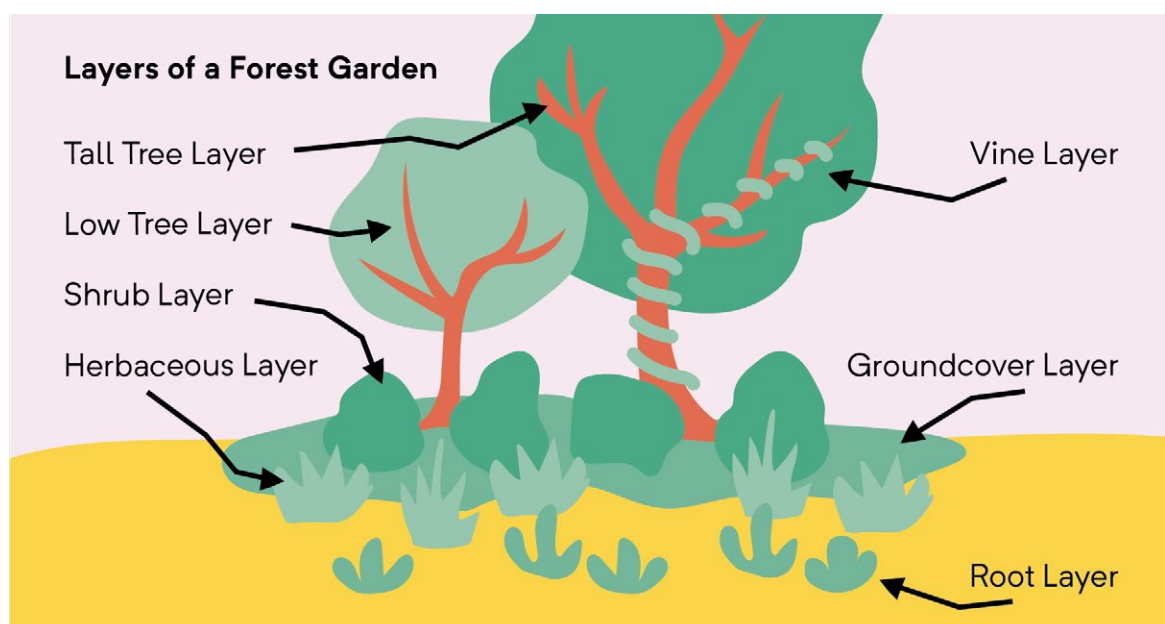


# Plant with diversity

**P**lanting a mixture of species and types of plants prompts a response in the microbiome (the community of microorganisms such as fungi, bacteria and other soil organic matter that exists in a particular environment) that promotes photosynthesis.

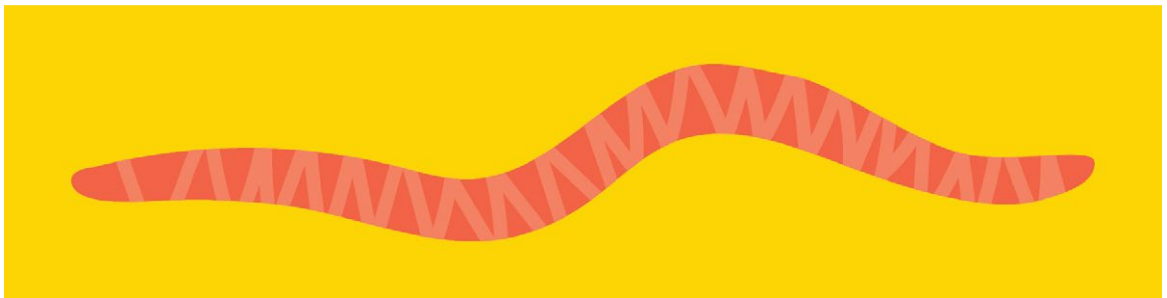
You can plant with diversity by:

- Planting a mix of different species of grasses, shrubs and trees
- If you use cover plants to kick start your soil before planting perennials, use a mix which contains at least five distinct plant families rather than two. For example, poaceae (grasses), fabaceae (legumes), brassicaceae (brassicas), polygonaceae (knotweeds), boraginaceae (flowering herbs), asteraceae (daisies).
- More info: Identifying 50 major plant families.
- Cultivating a vegetable garden with different crops rather than focusing on one or two varieties
- Planting in guilds — that's a grouping of plants that associate well with each other and support each other's health, all filling distinct niches.



# Add organic matter

**W**hen compost or mulch is placed on top of existing soil, it adds nutrients and carbon, mostly in the form of 'microbial necro mass'. What was your garden and food waste becomes the bodies of generations of decomposer microbes! These nutrients are used by plants and soil microbes for raw materials, and some of the living microbes from the compost will stick around to decompose old biomass on the plants and in the litter layer, keeping them clean and lush and creating soil. Here are a couple of ways you can compost at home to create nutrient-rich compost at home.



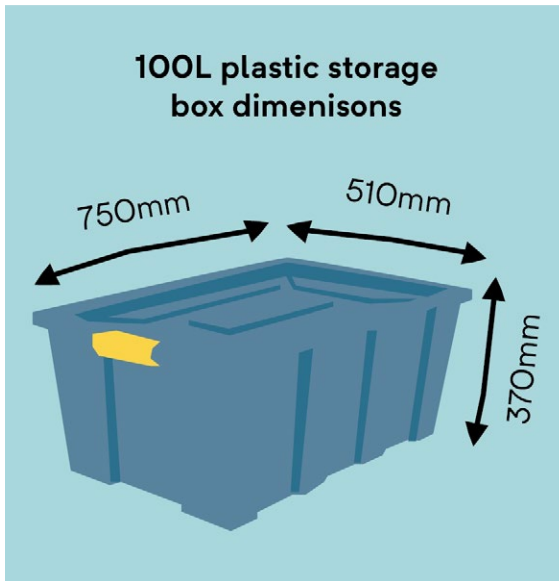
## Worm farm how-to

Worm farms are a great way for people to repurpose organic waste when it's in continuous but low-volume supply. But there are some myths to bust, or at least to explore, so you have the knowledge you need to help you conduct your vermicomposting in a stress-free and low-maintenance manner, while also improving the effectiveness of your compost.

If you've never been exposed to vermicomposting before, the first step is to get a container. You could buy a worm farm from your local hardware or garden supplies store, but we recommend you build your own. There are lots of DIY worm farm ideas online, but many of them are designed without a proper understanding of the processes involved. As we describe each feature of the system we'll explain more.

**Here's our recommended design for families of two to four. You can scale it if you need more capacity by making a second one.**

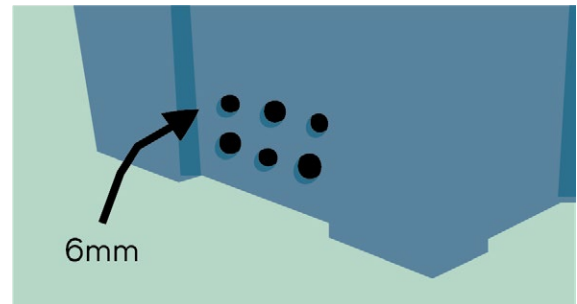
This is a 100L plastic storage box, dimensions



You can use any box but try to make sure it's not any bigger than ~100L, or it'll get very heavy when full. You also don't want to use something like a wheelie bin because it's too deep, without much top surface area. You'll lose processing capacity compared to a wider design.

Heavy duty is good. We want this to last for a long time. You can use wood, but it won't last very long. Stainless steel works, as does fibreglass, if you have the skills to work with them.

Once you have your worm farm container, you will need to drill holes in the sides and floor, with a 6mm drill bit; make sure they are not more than 80mm or so apart. Leave the lid intact and waterproof.



It's very important that all parts of the system can drain freely and breathe (oxygen can diffuse into the vermicast). If you enable these two things your farm will be far more resilient to little mistakes in management, and it will be capable of supporting greater numbers of active microbes. What we're trying to do is simulate having a greater top surface area, using the sides and base. Worms naturally live in the top surface layer (or equivalent), so we'll support more worms and more capacity with a more effective surface.

Too many systems on the market neglect these characteristics, instead focusing on the collection of "worm tea", and sealing odours and fruit flies inside. See why this isn't ideal in the 'What's up with worm tea' panel.

In comparison to worm tea or leachate, castings from a well-designed system that allows for resilience against waterlogging and overfeeding are exceptionally valuable for introducing a balanced portfolio of microbes and organic-form nutrients to your garden. In adding quality worm farm castings to your soil, you are promoting rhizophagy, increasing carbon and organic matter, and reducing the amount of effort and resources you'll need to put into that particular garden in future.

By making sure we have plenty of drain holes in the base, we take advantage of a curious coincidence in nature. The ideal moisture for a worm farm appears to be about 70 per cent, and that corresponds to the threshold at which organic matter tends to start dripping spontaneously. So, what does that mean? If we accidentally water too much, the farm will start dripping out the bottom, rather than getting waterlogged. If this happens regularly, you're watering too much!

So we've covered the reasons for drilling holes, which is the main difference between our DIY system and most others out there. From here, the process is more standard:

**Worm bedding** - fill your worm farm about three quarters full with worm bedding for the worms to live in. Potting mix, soil, hay, compost, dead leaves, pet bedding, coconut fiber or shredded cardboard or paper can be used as the bedding. The bedding needs to be porous and moist.



**Worms** - the best types of worms to use are red or tiger worms, not the ordinary worms that you find in your garden. These worms can be purchased from hardware stores or online. They are sold by the kilo. You will need about 2000 worms or 500 grams of worms to start your farm with.



Food scraps and newspaper or brown matter to feed the worms.

## Tips and tricks

Pick a shady spot to place your worm bin as worms need to be kept cool. A covered area such as a carport or porch is perfect.

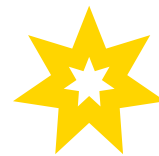
Add the worm bedding to the worm bin and add your worms to the bedding.

Over a few weeks, slowly add food to the bedding and monitor your worms to make sure that they are eating it all. Worms like a ratio of 70 per cent green waste to 30 per cent brown waste. Try fruit and vegetable scraps, coffee grounds and tea bags, eggshells and manure from small animals like rabbits and guinea pigs. Cut food into small pieces (smaller than a golf ball) so the worms can break it down before it starts to rot. They also need carbon-rich materials such as torn up paper or cardboard, mulch, or leaves.

Don't cover the food waste in the bin with the lid or newspaper or cardboard. Even though this encourages your worms to actively eat your top layer of food waste, it reduces the oxygen that can diffuse into the most active decomposition zone. Remember, your worms are only one of the organisms in the vermicompost. The others all need their habitat, too – and everyone needs oxygen. Covering each deposit of green waste (i.e. food scraps) with some mulch or leaves will be much more beneficial for the health of the system than using paper or cardboard.

Once your system is full, you can get the castings by tipping the unit out, and gently but not too ceremoniously separating the layer with the high worm population. Put most of the worms back into the unit with some fresh bedding. Then use the castings however you like as compost on your garden. Take it easy on the system for a week or so after the disruption to allow it to stabilise.





## ***What's up with worm tea***

**Te Hōnonga a Iwi's regenerative gardening expert Matt Cummings, from Untangled Landscapes, explains why worm tea doesn't contain all the nutrients your plants need.**

Several years ago, a local kid was selling bottles of worm tea collected from his family's vermicompost, with a blurb along the lines of "great for your garden, chock full of nutrients and beneficial microbes, plants love it". Rather than making a correcting comment on his social media post, I reached out and offered the kid an opportunity to inspect his tea in the Untangled microscopy lab, knowing what we would see.

His parents took me up on it, and we made a date in a few days. Fast forward to putting the slide under the scope, we looked into the eyepieces, focused, and found... nothing. A honey-tinted, but blank slide. A few mineral crystals lazed around, but nothing alive. There were not even any bacteria! How could this be?

Well, microbes are smart critters. If you think about it, getting dislodged from being where they want to be is probably a death sentence. If that could happen just by the passive movement

of water through the soil system, we wouldn't have many microbes left on land. Every rainfall event is many times more violent than water percolating through a covered vermicompost bin; and microbes hold their positions through plenty of those... so of course no microbes come out of the vermicompost.

What does come out, though, is a leachate containing anything soluble that can't be held onto by the organisms in the system (fungi are great at preventing soluble nutrients washing out of soil). So that's how you get a nutrient rich 'tea' from your vermicompost: first, make sure you design the farm so you can regularly induce low oxygen conditions in the system just by watering it, so fungi can't survive and hold on to the nutrients. Secondly, collect the infusion of excess water and soluble nutrients, then apply it to your plants as an organic fertiliser. This is a way you can support the rhizophagy cycle around here — read more in the Engine of Ecology resource! Whilst worm tea can certainly be used as a homemade foliar spray, we don't want to be producing it forever. There are better ways to get fed!



## Build your own bioreactor

One of the best things you can do for the environment is compost; and by that we mean create a habitat for advanced microbes that wouldn't normally exist in your garden. This requires higher proportions of organic matter and long periods without disturbance or extremes of moisture or toxicity.

An excellent model for that kind of habitat is the Johnson-Su Bioreactor, which we've used at Te Hono to compost all the weeds from the site and return them to the soil.

It's easy to build one at home, and it will work well if you have annualised waste, such as a large deciduous leaf drop in the autumn, or mulched prunings from an orchard or shelterbelt in July.

Find out how to build and fill a bioreactor from these informative YouTube videos:

- Three new Johnson Su Bioreactor designs — [watch here](#)
- How to build and fill a bioreactor quickly — [watch here](#)

After composting for nine months to a year, you can use the material from the bioreactor to create microcosms of advanced microbes around your plants. Slowly, but still quicker than you might expect, your microcosms will get larger and larger, fed by energy from the plant's photosynthesis.



# Get out of nature's way

**O**ur natural environment is very sophisticated — it has amazing inbuilt restorative capacity. But many of the practices that humans have introduced to land management interfere with the environment's ability to heal itself. Here are a couple of easy things we can do to allow nature to do its best work.



**Avoid using fertilisers**  
(they're mostly salt-based)  
or chelators such as

pesticides and insecticides.



**Herbicides are also extremely damaging**

and often marketed with

misleading language to soothe you into thinking they're less persistent, less harmful and more specific or targeted than they are. For example, a commonly touted feature of glyphosate is that it "breaks down on contact with soil". Technically true, but what does it break down into? A compound called AMPA, complete with a long half-life and all the same properties of glyphosate.



**Minimise soil disturbance**

— don't till or dig the soil  
more than you need to. Even

weeding can cause harm so while you need to cut back weeds that threaten to overwhelm your plants, don't be in a hurry to pull out every random weed you see. Ideally just weed just for mental health (tidiness, keeping chaos at bay) and hygiene (some weeds are just annoying – spiky, or give you a contact rash, etc).



**Try not to remove organic matter from your property.**

Your plants and microbes worked hard to create that biomass, knowing it would cycle back into the soil in the future, bringing an increase in overall carbon with it. Don't make their investment in vain by sending biomass away in your garden bag or green waste skip. Instead, invest in an appropriately sized chipper or shredder and use the waste as a feedstock for your compost.



## Signs of success

How will you know your regenerative gardening habits are creating a healthier and more biodiverse ecosystem? Look out for these signs.

- **More wildlife** — you will see an increase in numbers, but also diversity of birds, bees, mushrooms and insects. Look out for spider webs — spiders follow food so an abundance of webs indicates more bugs.
- **The ambient temperature in your garden will be warmer in winter and cooler in summer** (particularly the latter). Greater water holding capacity in soil actually makes a huge difference in local temperature because the water can absorb so much energy; up to half a degree difference in temperature extremes per one per cent increase in organic matter.
- **Each time you put a spade in the ground you'll find 10 to 100+ worms.**
- **Fungal disease will more or less disappear** from your plants as they develop the nutrient sources they need to produce proper cell membranes and wax coatings.
- Sap sucking insects will not be able to digest the sap from a plant that's conducting complete photosynthesis. As a result you won't have aphids, psyllids, caterpillars, etc.
- **The garden will feel different to spend time in;** calmer, more grounded, like a deep pool. There is a demonstrable difference in local electrical charge with a greater density of living biomass, and your hairs are capable of discerning the change.
- **When you pick up a handful of organic litter it'll be full of white mycelium,** moist, and it will smell divine. (You'll understand when you smell it!)
- **You'll have a 90 to 95 per cent reduction in weed germination rates.** Instead, forest trees, such as kowhai, totara and kawakawa, will pop up.
- **Your garden job list will decrease** to more or less just pruning, mulching, harvesting, propagation, and composting.

Learning a new gardening style can take time, and faith, but you might be surprised by how relaxing it can be to integrate regenerative gardening practices into your routine. You will be giving nature a helping hand to protect the soil for future generations, and nature will return the favour by immersing you in an ever-increasing whirlwind of beauty, diversity, life and abundance.

This education resource was produced with generous support from



**Te Hōnonga a Iwi**  
Restoring Rosedale Park