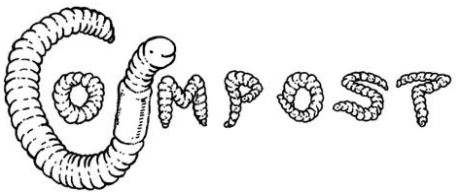
Composting Systems: Wormeries



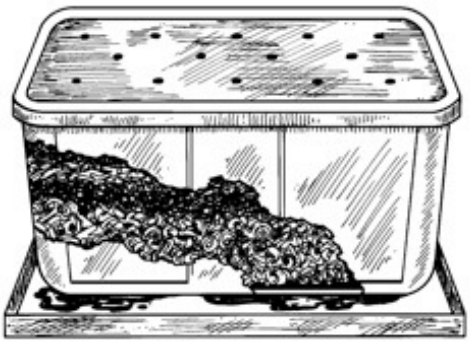


Worms are nature's best composters and can be used to turn food scraps into worm castings, a humus-like compost material that is rich in nutrients and plant stimulating hormones. Red worms, also known as "red wigglers", "manure worms" or "tiger worms," are the best for composting as they thrive on organic materials like cattle manure, leaves and food scraps. Red worms are different from the common earthworms that are found in garden soil and need mineral soils to survive. Red worms breathe through their skin so they require a dark and moist environment to thrive. They also tend to be surface feeders, eating food at the top of a compost pile or wormery (worm bin) where there is sufficient oxygen. You can buy these worms at local fishing tackle shops or on-line with express delivery. But the easiest place to get them is in manure or compost piles, especially well-aged manure or older compost piles.

What kind of worm bins or wormeries are there?

There are many types of wormeries available. Some you can purchase. Most you can make. Worm bins can be made out of many salvaged items like old bath tubs, rubbish cans or crates. Worm bins can also be made from moulded plastic storage containers or from plywood and timber. There are also numerous suppliers where you can buy red worms or ready-made bins.

Some examples of wormeries are shown here:



Wormery made from a moulded plastic storage container (note air holes in lid)



Can O Worms - stackable trays



Wooden worm box

Some important things to know....

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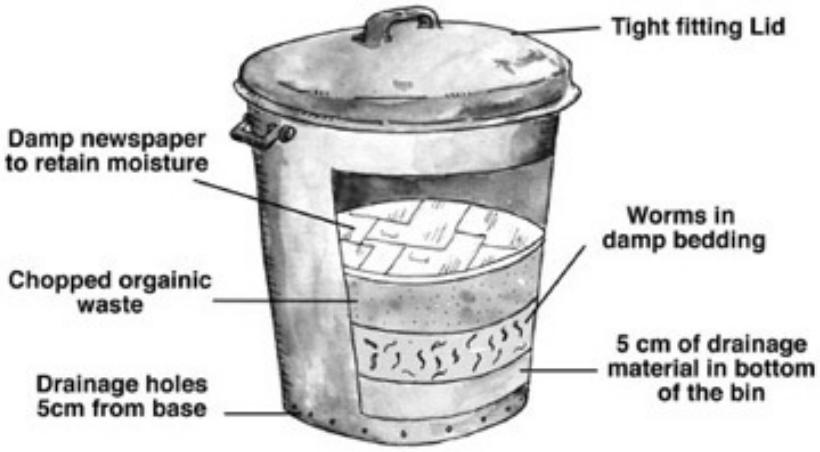
Before you start, there are a few key things you need to know about wormeries:



- Firstly, a shallow box or container works best as worms like to feed near the surface. Worms will only work to a depth of about 12", so a box that is 10-16" deep will provide enough depth to completely bury food scraps in the bedding, yet allow air into the bedding.
- Second is that the worm bin needs holes in the bottom of it to allow excess liquids to drain out and to allow oxygen into the bottom of the bin. This will prevent the bedding from getting too wet and foul smelling. Some people collect this liquid and dilute it as a compost tea to feed their potted plants or garden beds.
- Lastly, the worm bin should be covered or have a tight-fitting lid. This prevents the bedding from getting too wet from rainfall but more importantly, the lid helps the bedding from getting too dry. This is critical as a dark moist environment is key - if the bedding dries out, the worms can die off. The lid also excludes pests such as vermin or insects.

What size bin do I need?

- The size of your bin is dependent on how much food scraps you have to feed the worms. As worms are cold blooded, they work slower in colder winter months than they do in warmer summer months. But, when all conditions are just right, worms can consume half of their body weight of food each day.
- As a general rule of thumb, you will need approximately one square foot of surface area for every ½ kilo of food scraps generated per week. So, for a family of 2-4 people a 2' x 4' worm bin handling 4 kilos of food scraps a week should be sufficient in size.
- But remember, all this is dependent on the type of system used, the type of food fed to the worms, the quantity of materials fed to the worms, the number of worms in the system and the ambient temperature.

Where should I place the bin?

- Wormeries can be placed inside or outside but because worms work best between the temperatures of 12-24°C, make sure they don't get too hot in the summer or too cold during the winter. A utility room, shed or garage provides a sheltered environment with a more or less consistent temperature year around. It can also be placed outside but make sure it is in a shady or partially shady location. Worm bins placed in sunny locations may dry out or the worms can become stressed out with higher temperatures or high daily variation of temperatures between night and day.
- To get the most from your worm bin in Ireland, it is a good idea to place the wormery outside during spring, summer and autumn and then bring it inside or into a greenhouse during the colder winter months.

What kind of food scraps can be fed to worms?

- Due to potential problems with odours and pests, only plant-derived food scraps should be composted in a wormery.
- When adding food to the wormery, it is best to do it in batches rather than every day so keep your food scraps in a covered container until you are ready to add them. This will keep down any potential odours and prevent flies.

Plant Derived Materials = YES	Animal Derived Materials = NO
Vegetable trimmings and skins	Fish or Meat of any kind – raw or cooked
Fruit peels, cores and rinds	Animal fat, bones, skins or guts
Spoiled fruit or vegetables	Cooking oils or grease
Coffee grounds and filter	Dairy products: cheese, yogurt, cream, butter, milk
Tea bags	Eggs or egg shells
Bread, crackers, biscuits, cakes	Sauces or soups with meat or fish
Cereals, pasta, rice, beans	
Cooked vegetable plate scrappings	
Soiled napkins or paper towels in limited quantities	

Food scraps should be collected in a covered container. This keeps odours down in the classroom, canteen or cafeteria and prevents flies from laying eggs in the food which can hatch in the worm bin.

Food scraps should be collected in a specific caddy (supplied by the programme) or any covered container you have with a tight fitting lid.



How do I get my wormery started?

Once you have determined the type and size of bin needed and you have found a good location for it, you are ready to get started. The following provides guidance on setting up and using your wormery.



Select bedding material

The "bedding" material used for wormeries provide worms with a damp place to live, absorbs excess water from food scraps and helps cover the food scraps which controls odours and flies. A variety of materials can be used as bedding and a mix of two or more materials makes the best bedding.

Bedding materials typically consist of high carbon or "brown" materials such as:

- Shredded paper: This is great for holding moisture in the wormery.
- Strips of cardboard: Good for holding moisture, but also provides air pockets within the bedding.
- Rotting straw or hay: Good for nutrients and providing air pockets within the bedding.
- Autumn leaves: A natural habitat for worms which are loaded with nutrients.



A bedding of 25-50% shredded paper/cardboard and 50-75% autumn leaves makes a perfect bedding material. For the wooden box wormeries provided by the programme, you'll need 1-2 large plastic bags of shredded paper and 2-4 large bags of leaves.

Prepare the bedding material

1. Shred or tear up all paper and cardboard bedding materials.
2. Using a dumpy bag, mix all dry bedding materials together.
3. Fill a rubbish can with water.
4. Soak the mixed bedding in the can of water.
5. Use two hands to remove soaked bedding materials from the rubbish can. Hold above the can and squeeze excess water out of bedding materials before transferring it to the wormery.



Place bedding into the wormery

Fill the wormery to the top with the mixed and soaked bedding materials. Don't worry about materials being too wet, the excess water will drain out of the bottom of the bin within an hour or so. As you add bedding to the bin, throw in a few handfuls of soil or sand and mix into the bedding. You'll need about half a bucket of soil or sand for the entire wormery. This grit ends up in the worms' gut and helps the worms "chew" the food as they eat it.

How do I get my wormery started?

Add worms



Once the excess water has drained from the bin, you can add the red worms. Start with a half to a full kilo of worms. This is about a pint to two pints of pure worms. A full kilo will get the wormery started faster so you will be able to feed the wormery more often as the worms are getting established. With fewer worms, you will need to feed the wormery more gradually as the worm population builds up to its optimal level. This could take a month or two. Spread the worms over the top of the bedding and allow them to penetrate into the bedding. They sense light and should disappear in 5 minutes.

Bury the food scraps into the wormery



After adding the worms, you can start to bury plant-derived food scraps into the bin. Use a pitch fork, small hand trowel or your hands to dig a shallow hole or trench in the bedding. Spread a 1-2" thick layer of food scraps in the bottom of the hole or trench. Mix into 2-3" of the bedding underneath and cover over with the bedding removed. Bury in a different spot every few days or each week to give the worms a balanced diet of food scraps and bedding. When you are getting started, be sure not to overload the wormery with too many food scraps. Before adding more, check to see if the food you buried in before is starting to disappear. If so, you can add more food scraps. If not, slow the feeding down until the worm population catches up. It may take a few months for the worm population to get established, depending on how many worms you started with and what time of year it is.



Once a healthy worm population has established itself, you can start to add greater amounts of food scraps to the bin. Food can now be added in trenches weekly, or every other week, depending on the amount of food waste you have and how well your worms are handling it. So when you add the materials in a trench across the wormery, make sure you always cover fresh materials with bedding. Once you reach one end of the bin, start trenching on the other side again where the food has been eaten by the worms.



Once you have added your food waste and covered it with bedding, cover it all with sheets of newspaper. This will serve as a barrier to flies as well as telling you if the bedding is wet enough. If the paper dries out, water the worm bin to remoisten the bedding. A watering can with a rose head is handy for this task. Be sure not to over water. Water a little bit and then see if the newspaper on top is wet in a day or two. If not, water the bedding again.

How do I get my wormery started?

Harvest the worm castings



After 6-12 months, the bedding and food become castings or vermicompost (just a fancy word for worm poo!). You will notice that the bedding has shrunken down so the bin is a third to a half full. The worms don't like too many castings so when the bedding becomes dark and crumbly, you need to stack up all castings to one side and add new bedding to the other empty side. Start feeding the bin in the new bedding closest to the castings. This will tease the worms out of the castings and into the new bedding. After 4-6 weeks, the castings can be removed and used, and then replaced with new bedding.

How do I use a stackable worm bin?



A number of commercially available worm bins use stacking trays to take advantage of the worms' tendency to feed on the surface and migrate out of the finished compost. The top tray is fed with fresh food scraps. When material in the bottom level is decomposed and the worms move up in to the fresh material, the tray is removed, harvested and then rebedded and replaced on top. The important thing to remember when using this type of system is that the bottom of the top tray must rest on top of the materials in the tray below it. If there is a space between them, the worms may have difficulty moving upwards into the new tray. One of the advantages of these systems is their ability to collect liquid from the process in the base of the system. This nutrient rich liquid, diluted with water, can then be used as an organic fertiliser.

What can I use the worm castings for?

Worm castings or vermicompost is magical stuff. Plants really love it. Not only does it contain vital fertilising nutrients, but it also contains hormones that stimulate plant growth. Because worm castings are very nutrient rich, use them sparingly. Here are a few ideas:

- **Potting mixes** - worm casting make an excellent addition to a homemade or commercial potting mix. Mix 1 part vermicompost with 3 parts of a potting mix. If you are making your own, mix equal parts of worm castings, peat, perlite and sand or garden soil.
- **Transplants** - When transplanting plants into the garden from pots or flats, work a handful or more of vermicompost into the hole before planting.
- **Amending planting beds** - Spread ½" to 1" of castings over the planting area and incorporate it into the soil with a fork or spade.
- **Top dressing for garden plants** - Spread ½" to 1" of castings around established plants and scratch into the soil with a trowel.

What are the common problems with wormeries?

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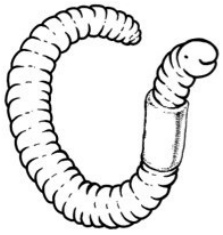
The following chart helps to troubleshoot common problems associated with wormeries.



Symptoms	Cause	Solutions
Smells like rotten eggs or rubbish	• Too wet • Meat, fish, or dairy products in bin • Food scraps not covered • Too many food scraps	• Mix in dry leaves, sawdust or hay • Keep animal derived food scraps out • Cover food with bedding when added • Stop feeding bin and allow worms to work on contents until broken down
Bedding is dry, few worms	Not enough water	• Mix and moisten bedding • Cover bedding with newspaper or plastic • Move bin out of sun
Food scraps building up	• Too much food • Bin too cold or too hot	• Limit food scraps • Add more worms • Build another bin • Move bin to cooler shaded area • Keep bin adequately filled with bedding
Maggots in bin	Meat, fish or dairy products in bin	• Keep animal products out of the bin • Cover bedding with newspaper or plastic
Fruit flies swarm out when bin opened	• Exposed food scraps in kitchen • Exposed food scraps in bin	• Use covered container to collect food scraps to prevent flies from laying eggs in it. • Always cover food scraps with bedding. • Cover bedding with newspaper or plastic • If you still have fruit flies, add an inch of shredded leaves or paper on top of the bedding
Worms crawling up sides of bin	• Too much food • Bedding too wet • Bedding fully decomposed	• Limit food scraps or build another bin • Add dry bedding like leaves, straw or shredded paper • Harvest castings and re-bed bin with new bedding materials.

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