

## Creating soil food at home – three options:

### **1) Soil Food through Fermentation - Bokashi**

Many people eat sour fermented foods such as yoghurt, salami and sauerkraut; cattle eat silage. These foods are soured and preserved by an acid made by the fermenting bacteria; no alcohol is produced.

Soil food made and preserved this way is eagerly devoured by the myriad creatures that live in soil. They release and transform its nutrients into the form that plants need. Just as important, they live, multiply, eat one another and die, and their excretions and dead bodies add to “soil organic matter”. Their activities also improve soil texture for plant roots to grow. Together these processes make soil richer in carbon and more fertile.

When acidic fermentation is applied to our food rejects it is often known by a Japanese name: Bokashi

#### What goes in?

Acidic fermentation accepts almost every kind of food, including cooked leftovers; the exceptions are large bones and liquids.

To each batch you add some specialist microorganisms, usually supplied in dried bran flakes.

#### Equipment

Household fermentation happens in an airtight bin, which replaces your Council food waste bin and can be kept indoors. You need two bins in practice, one being filled while the other finishes the previous batch. A two-bin starter kit with utensils, microorganisms and instructions costs about £25 (Sep 2021), making this the cheapest to buy of the options discussed here. Plenty of advice and DIY variations are to be found online.

#### Getting started

Read the instructions. Attach the bin’s drain tap, insert the base plate, add the first lot of food and microorganisms, teach yourself to close the lid tightly all round, and off you go!

As with all home processing activity, you’ll need to establish a routine based on how much reject food you generate. It’s best to collect scraps in a kitchen caddy so that you aren’t letting air into the fermenting bin more than once a day. As you go on you’ll improve your skills and knowledge; things like cutting up food to avoid air pockets, how often to drain liquid from the bin, and so on.

#### Using the fermented soil food

The standard instructions tell you to dig a small trench in soil, tip the fermentate into it, mix it in, and cover it up with the removed soil. In a few weeks (sometimes only two) the food will have “disappeared”, consumed by the complex ecosystem that inhabits soil. You may well discover a ball of worms vying for what remains: in effect you have made an in-soil wormery with native species.

As with other methods, fermentation releases a liquid as cell walls in the food break down. It is collected from a tap on the bin. The best thing to do with it is to dilute it in a bucket or watering can: dilution weakens the acid content and ensures that the acid will convert naturally into a food for soil

microbes. Then pour this on soil that needs food, but not too close to plants. Ignore suggestions to tip it down the drain, which wastes the goodness in it and releases the carbon.

### Problems - resolved

This method solves some problems and poses others. On the positive side:

1. *Waste of waste.* This method, unlike every other, allows all of the original carbon, energy and nutrients in reject food to reach the soil. (Composting emits at least half of the carbon and energy and some of the nitrogen, for example.) This matters: the mass of every ecosystem is governed by the amount of energy it receives and you want your soil's ecosystem to be as massive as possible to make the soil as fertile as possible.
2. *Slow composting.* Both stages - fermentation in bin and consumption in soil - take a few weeks to complete. You avoid the long "curing" stage of compost.
3. *Nastiness.* The airtight bin does not smell, and when opened (to add more food) the smell of fermentation is much less offensive than decomposition. This is why you can use the method indoors, unaffected by weather.
4. *Pests.* The bin does not attract pests or let them in, putting an end to plagues of maggots in bins and flies in kitchens. The preserve in soil is reputed not to attract rats and mice. Foxes may have to be prevented from digging by means of temporary chicken wire on the soil surface; they are probably more interested in the worms than the waste.
5. *You have a distant allotment.* The fermentate and the tightly closed, portable bin are just right for infrequent transport from home.
6. *You have no garden.* If you'd like to give your soil food to a more worthy cause than a foreign-owned waste collection company, a friend, a nearby community garden or a local grower may like to collect it.

### Problems - posed

1. *Cost of fermenting bacteria.* This ongoing cost is the probable reason why fermentation is not more widespread. In the writer's case it is less than 18 pence per kilo of soil food, which to me seems good value given all the benefits; it is similar to what you'd pay in Reading for compost made from the town's green waste, which is less rich. The cost would be at least halved by bulk buying or manufacture in the community and we aim to work on this. However, its very existence is what really matters. This may only be resolved when growers value fermented soil food properly for what it does for soil and for its other benefits; then they will be glad to support producers.
2. *Shortage of space.* The standard instructions don't tell you that in a mature garden it is hard to find space for even a small trench to take the preserve and not harm plant roots. People get round this by creating a "soil factory", of which there are two types:
  - a. One is a small area of soil, perhaps half a square metre, devoted to taking successive batches. Ideally this moves with the rotation system in a vegetable patch, or it might be a permanent fixture from which soil is exchanged with hungry areas.

- b. The other type is a large box in which each batch is mixed with living soil. Once the soil food is consumed, the enriched soil is typically used for top dressing.

A soil factory can revive spent or sterilised soil and compost as long as there's plenty of living soil in there too.

3. *No-dig gardening*. Digging the fermentate into soil conflicts with the principles of "no-dig" cultivation, increasingly seen as essential to soil regeneration. Possibly a non-issue, as whatever is lost in digging should be more than balanced by what is nurtured by the soil food. Alternatively, the top dressing method (see 2b above) need not disturb established soil.

## 2) Worm Bins

This is a simple process to convert vegetable materials into a compost and liquid fertiliser. Worms eat the vegetables and their excretions form the compost and fertiliser.

### What goes in?

Fruit and vegetable offcuts or rejects, cooked or uncooked, bread, egg shells, tea leaves, coffee grounds: worms are vegetarian. Definitely not meat, fish or dairy. Shredded non-glossy paper can go in as bedding. Some annual weeds can go in as well, but there will not be the heat of a compost heap to kill weed seeds.

### Equipment

There are DIY worm bin options on the web to build yourself. Make sure that there are drainage holes and ventilation holes in the construction. [www.farmhomestead.com](http://www.farmhomestead.com) is one example. Alternatively, buy a system online for about £50, including the worms. You'll receive a four stage container on legs with a bottom sump and tap to drain off liquid fertiliser, two layers of worm housing for the bedding and food scraps and a ventilated lid. In addition, you get a packet of bedding and a voucher for a packet of worms that you mail off as soon as you have set up the worm bin and are ready to start.

### Getting started

Erect the worm bin in a garage, a shed, under trees, on the veranda. It needs a flat, shady place and some protection from heavy rain. A worm bin should not smell. The key thing is convenience. If the worm bin is too far from the house or a path then vegetable matter won't get to the worms regularly and will start to rot in the kitchen caddy.

Add the bedding and put in the worms. Add a small amount, a few centimetres, of easily accessible food, such as vegetable peelings or chopped up larger material, and leave the worms alone for a week. Check how much food has been eaten and add more as needed. The amount consumed will increase over time as the worm colony increases. They will eat less in winter and in very hot weather.

Remember to add more bedding as well as food. Shredded newspaper or cardboard, wetted and then squeezed dry, moss, dead leaves or leafmould. The worms live in this and consume it so that it needs replacement.

#### Using the compost and fertiliser

The compost is rich in nitrogen and potassium. Add it to the garden as a soil conditioner or make it part of a home potting medium. The liquid fertiliser needs to be diluted 1:10 with water and then sprayed over the soil in the garden or as foliar feed.

#### Problems

1. *Unreasonable expectations!* The worm has to eat the food scraps. Vegetable and fruit peelings are wonderful, lettuces are nice and thin, the tops and tails of radishes and beans are just right. No worm has a mouth big enough to do the core of a red cabbage or end stalk of a cauliflower or corn cobs. Either chop these up thoroughly or dispose of elsewhere to avoid growing moulds inside the worm bin. Worms do not consume large amounts of citrus peel or huge quantities of dry onion skins or corn husks.
2. *Cold.* We have quite warm winters these days, but a cold snap could kill the worms if the bin is outdoors. Put some dry insulation down the sides of the bin: for example padded envelopes, envelopes full of shredded paper, and leave the tap open so that ice does not build up in the sump. Even if the worms die, there will be cysts in the bin to develop in the spring.
3. *Wet.* If the bin is outside and not protected by an overhang, then the ventilation holes in the top will let in rainwater. If you put in too much soggy vegetation, the water content will increase as well. Finally, the tap at the bottom can become clogged and need de-bunging. Some moisture is useful, vast amounts are not. It is unlikely that the worms will drown, but the mixture of food can turn anaerobic and smelly if too wet. Check the drainage tap is clear and run off any excess water in the sump, dilute if it looks coloured and put on the garden. Then remove any soggy/mouldy food (put it on the ground for a while in case there are worms in it that need to escape) and add some dry bedding material such as shredded paper.
4. *Flies.* These are usually little fruit flies and no real problem, but they can be reduced by either burying the food scraps in the bedding or putting a sheet of damp newspaper over the food in the worm bin.
5. *Collapse.* If the worm bin isn't sited on flat ground, then the weight of a full bin may cause one of the legs to start to buckle. It may be sensible to put some supporting bricks underneath.

### **3) HotBin**

This is a vertical composter that takes garden waste and food scraps and converts them into a good quality compost in 1-3 months, including during the winter months. Making good quality compost (weed and disease free) is a hard ask in most small gardens as there isn't the quantity of suitable mixed

materials to ensure that the compost heats up enough to kill weed seeds and spores. Food scraps added to the compost heap would help the process but attracts vermin as well as family pets.

A Hot Bin might be your answer to food scraps and green waste and take up the space of a green waste wheelybin, but it isn't quite as simple as "just chuck the stuff in and magic happens!" You still need to balance the input materials to control nitrogen to carbon ratios, and add enough bulking materials to keep air flowing through the mix and control the water content, but it can be done in a small space.

This is designed to be a fast aerobic process releasing carbon dioxide to the atmosphere. It is better for the environment if it saves using a council green waste bin or taking the waste to Smallmead for industrial composting because it saves energy from transport and puts nutrients back into your garden soils. Do not choose this method just for food scraps; fermentation is a much better (and cheaper) option for climate change mitigation.

### What goes in?

All food, cooked and uncooked, except large bones; preferably cut up if you want quick composting. Mixed green waste from the garden, but not stuff that can't be cut by secateurs or the lawn mower, or anticipate sieving the larger stuff out at the end of 3 months and sending it through for a second time. It's essential to add a bulking material with the food to ensure aeration, such as dry broken twigs or wood chips from the garden shredder, roughly 1: 5 bulking agent to food. You get a starter bag with the Hot Bin and can buy more wood chip from them, but this puts up the costs. Also needed is paper to dry out the waste roughly 1:2 paper to food volumes. This is shredded non-glossy paper (perfect for shredded confidential office papers) or shredded cardboard. There is a huge amount of information about the system and how to use it on <https://www.hotbincomposting.com/>

### Equipment

There are many kinds of contained composters for sale that can also take food, or you can make your own. A HotBin is a proprietary brand fitted with a thermometer to check temperature of the process, a biofilter against spores and smells, a load of instructions and advice, and the usual places for putting the materials in and getting the compost out. It received an award for the best new gardening kit at the Chelsea Flower Show 2019, so the RHS like it. They are expensive to buy at £150 for a 100 litre bin and £200 for a 200litre one, but if this can replace your current green waste bin from the council it has paid for itself in a few years (longer if you purchase bulking agent)

### Getting started

Put the Hot Bin on a flat hardstanding in a place that is convenient for the kitchen. Make sure that it can be kept closed. Any gaps will lose heat and stop the system working. You can get proprietary straps to fit around the hatch or use old luggage straps.

Start feeding the HotBin with a scattering of twigs for aeration and then a mixture of easy to digest materials to get the bin off to a good start.

Easy to compost food scraps: vegetable peelings, fruit and fruit peelings, rather than bones, mixed with paper and bulking agent

Easy garden waste: some grass clippings mixed with half as much again shredded paper ,nettles or comfrey chopped up, annual weeds

A bit of bonemeal if you have it

If you can fill it half way with the first go, great. Otherwise continue with this sort of mixture until half full. the temperature will then start to increase and you can begin to put in a wider range of materials

Don't start with just a huge pile of lawn mowings unless you want black slime.

#### Using the compost and fertiliser

The compost is rich in nitrogen and potassium. Add it to the garden as a soil conditioner or mulch or make it part of a home potting medium. Expect to empty the bin from the base 3-4 times a year.

The liquid fertiliser is drawn off at the base and does not need dilution before use PROVIDED it smells clean and is a transparent brown colour. Dark, yellow or smelling liquid means there is something wrong in the bin. These liquids need dilution 1:10 with water and then spraying over open ground.

#### Problems

1. *Flies* These shouldn't occur. Check that no food is left around the edge of the entry points.
2. *Bin is cold* Aerobic decomposition stops either because there is too much or too little moisture, or there is too little air or there isn't enough material for the bacteria to work on. First check for evil smelling liquids at the base showing that anaerobic conditions have started throughout or in part of the bin. If so, you'll probably need to empty the bin, dry out the evil section or dig it into the ground and restart the process. If not anaerobic, then try feeding the bin with easy materials to digest. You might also find that there is perfectly good compost at the bottom of the bin that needs to come out and be used to allow more air flow.