Alternative Composting Models Research

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PROPAGATE
RETHINKING LOCAL FOOD

GLASGOW COMMUNITY FOOD NETWORK

COMMUNITY FUND

Introduction

Over 40% of the contents of the average UK household bin can be home composted, yet many people are still binning this fantastic resource"
Brighton and Hove food partnership.

"The Scottish Government has stipulated that no biodegradable material will be permitted disposal within landfill by January 2025." https://www.glasgow.gov.uk/index.aspx?articleid=17043

It's hard to find anyone who doesn't think composting is a good idea, but many people are turned off by the list of things we "shouldn't" compost; cooked foods, meat, dairy. Some see composting as a process you need lots of space for or something which requires lots of care and maintenance and some people are scared of compost causing odours or attracting rodents.

This report aims to set out in black in white the options available for communities who want to compost and simplify the somewhat confusing (in appearance) legislation. The information is this report does not relate to commercial waste, for which there are different regulations.

This report has been researched and written by Propagate, and commissioned by Glasgow Community Food Network for their Food and Climate Action project: aims to work alongside local communities to co-create a more resilient food system that is fairer and kinder to both people and the planet. The majority of the information presented here is already available and we are indebted to the people who have worked for years to ensure the legislation laid out by DEFRA, SEPA and the environment agency is relevant to community scale composting. Nicky Scott of the Community Composting Network, Thomas Daniell founder of Old Tree Soil and the many members of the Mycelium Network; a global network of knowledge sharing for the compost revolution, including Martyn Richards of Agriton. Frank MacMaster of Glasgow Eco Trust has been an incredible help in navigating how the legislation effects our efforts in Scotland.

What is compost?

Nicky Scott, who was chair of the Community Compost Network's (The CCN was wound up in 2016 and it's legacy was taken under the wing of Social Farms and Gardens https://www.farmgarden.org.uk/composting-community and https://www.farmgarden.org.uk/sites/farmgarden.org.uk/files/cinc_history_0.pdf) definition of what compost is :

"A short definition: Biologically processed, stabilised and sanitised (waste) organic matter with beneficial properties for plants and soil.
A long definition: A complex mix of organic matter (partially decomposed plant cell-wall constituents, cellulose and lignin and humus), micro organisms (alive, dead and decomposed) and minerals (nitrogen, phosphorous and potassium and others in lesser quantities) with unique biological, chemical and physical properties.

"The role of the Community Composting Network is to promote the environmental, social and economic benefits of community composting. CCN campaigns for community composting to be acknowledged as one of the most sustainable ways of managing domestic and other organic wastes"

Why should we compost?

Gardeners are always in need of compost and we ALL create waste. Waste is something which does not exist in nature, we need to close the loop.
So much energy is expended collecting waste and transporting it to be incinerated or Anaerobically Digested. (Anaerobic digestion is a series of biological processes in which microorganisms break down biodegradable material in the absence of oxygen. One of the end products is biogas, which is combusted to generate electricity and heat, or can be processed into renewable natural gas and transportation fuels. American biogas council)
We need to simplify composting household food waste and make it easier to transform food waste into living soils locally which can inoculate our soils with life, capture carbon, and allow us to grow more nutrient dense food. We need to shift the narrative from “food waste” to “soil nutrients”.

- Soil holds **three** times as much carbon as the atmosphere.
- Carbon is a store of energy for the soil.
- Helping with the storage of this energy would give plants more energy.
- By composting our food waste we can return nutrients to the soil and help to re-build it.

A key concept in the EU Waste Framework Directive (2008/98/EC) is the Waste Hierarchy, which sets out and defines five different steps in dealing with waste in order of preference. The aim is to deal with the waste or the avoidance of waste as high up the Waste Hierarchy as possible.

“The waste framework directive advocates the “proximity principle” such that waste is dealt with as near to the place of production as possible. Regional planning bodies are guided towards incorporating this principle in their waste strategies and plans, along with the idea of self-sufficiency.” Nicky Scott.

Community Composting can also help generate an income stream for projects.

The values used as part of the compost calculator are based on current market prices for fertilisers and the typical readily available nutrient content of composts and digestates.

It is worth remembering that, in addition to the readily available nutrients, organic materials contain nutrients in more complex forms which will become available for crop uptake in future seasons.

For example, composts have a low readily available nitrogen content (5%), but a high total nitrogen content (11kg/tonne of green/food compost) which will contribute to soil nitrogen supply.

Using the table below – you can calculate the values for your particular types of compost:

	Nitrogen (N)	Phosphate (P_2O_5)	Potash (K_2O)	Total
Market price of fertilisers (£/kg)	0.74	0.59	0.44	
Green Compost				
Readily available nutrient content (kg/tonne compost)	0.00	1.50	4.40	
Financial value of readily available nutrient content (£/tonne compost)	0.00	0.88	1.95	**2.83**
Green/Food Compost				
Readily available nutrient content (kg/tonne compost)	0.55	1.90	6.40	
Financial value of readily available nutrient content (£/tonne compost)	0.40	1.12	2.84	**4.36**
Digestate (Biofertiliser)				
Readily available nutrient content (kg/tonne digestate)	4.00	0.25	1.60	
Financial value of readily available nutrients (£/tonne digestate)	2.94	0.15	0.71	**3.80**

Taken from wrap.org.uk

The table above demonstrates the financial value of creating compost from food waste. If Community Gardens/projects set-up Compost Clubs, they could sell compost to members, as compost or soil amendments, thereby generating income and helping to make the bigger projects more financially sustainable.

History of composting activity in Glasgow

Examples of community composting activities can be found in community gardens across Glasgow. Most Glasgow Community Gardens work with bigger bay systems made from pallets and wood. They are often designed for easy access for rotation, so either have an open front or a removable door. Some gardens have additional hot composting systems like the Kelvindale Growers who created a hot compost by insulating 4 pallet bays with plastic sheeting and carpet to create a hotter environment.

Organisations like South Seeds have already been working for a few years to make composting more accessible and help communities to set up community compost bins. For example, in 2015

they helped a sheltered housing complex to set up a composting system for the residents. They designed a 2-bay compost bin. The two bays system and an easy-access door allows for the compost to be easily rotated.

South Seeds have also created composting hubs for residents in the Southside of Glasgow. In Queen's Drive Lane, they have installed 3 bins to encourage local residents to bring their green household waste to the Queen's Drive Lane Garden. Another two Community Composting Hubs where residents are welcome to bring their compost to are; Nan McKay Hall and Samaritan House Garden, which have already had a compost system since 2015 and have extended it in recent years.

Since 2020 Woodland Community has been piloting a new Woodlands Community Compost Project. Participants receive a 220-litre compost bin for their back garden. Additionally, Woodlands Community has created in their garden a 4-bay compost bay system where they can compost brown and green waste as well as 2 big bays for weed composting.

Bigger-scale composting within Glasgow can be found at the City of Glasgow College that installed an A900 Rocket Composter to help them turn their 26 tonnes of yearly food waste into compost. Sadly this composting system is not currently in use. The same composting system has been operational since September 2010 at the Glasgow Clyde College Anniesland Campus. At the Anniesland Campus, they used to collect food waste from their own canteen as well as a few other locations in order to be turned into compost that can be reused. However neither City of Glasgow nor Glasgow Clyde use their Rocket composters anymore. Interestingly the Yes Project at Rouken Glen also have a Rocket and also no longer use it.

Strengths Weaknesses Opportunities Threats: Analysis of different systems and set ups

Traditional Pallet Bays

Pallet Bays at South Seeds

Strengths	Weaknesses	Opportunities	Threats
Quick to set-up	Cannot compost cooked food, meat or dairy	Easy to expand bays	Can be used as dumping ground for garden waste
Low cost	Not rat proof	Abundant supply of materials	Can dry out
Very low maintenance	Can be hard to keep temperatures high - thereby limiting what materials can be composted		

COST : FREE

Legality - Falls under SEPA exemption paragraph 12 <2m3 form (Simple form to notify of small composting unit - no meat, for non domestic use i.e. office or school.)
No fee to register

Case Study - Woodlands Community.

Basic composting bins 4 bays, plus one small composting bin, plus 2 double weed composting bays.
They add 50% "green" and 50% "brown" waste, only taking uncooked vegetable waste such as veg peelings etc no cooked food or meat etc. There are also two weed bins.
Composting has always been a part of the garden, community composting has been going on for around 8 years.
Typically 80-120litres of "green" food waste e.g uncooked vegetable waste such as peelings etc no cooked food or meat etc, is collected per week in the communal food waste bin.This is then decanted into the main compost bay and equivalent volume of "brown" material (often torn up cardboard).

As this is an urban community garden, rodents are a challenge at this site. The gardens would benefit from a process whereby the material composted faster.

To alleviate this issue, Woodlands have invested in a 400 Litre Ridan composter.

Woodlands Community

Hot Compost in a Pallet Bay

Kelvindale Growers

4 ½ ft by 4 ½ ft Pallet bay insulated with plastic sheeting, carpet and mushroom blocks. Mixed every four days.

Strengths	Weaknesses	Opportunities	Threats
Quick to set-up	No food waste used	Using materials which already exist	Forgetting to turn the pile.
Low cost Compost produced in 5 or 6 weeks	Lots of physical energy for turning	Easy for any group to replicate	
Can avoid council charges for brown bin collection	Time taken to turn pile		

COST : FREE
How To Make Hot Compost All Year Round

Rocket

Anniesland College A900

City of Glasgow article
A handful of magic - rich organic compost made from food waste Anniesland's Rocket composter

Strengths	Weaknesses	Opportunities	Threats
It's easy to record temperatures	Needs power to operate	Potential to compost high volumes and produce high volumes of compost for projects	Needs to be continually fed large volume of material
Can compost high quantities of food waste quickly - 26 tonnes/year	Requires knowledgeable operator	Opportunity to employ someone to oversee the operation.	
Speed - 10-14 days	Needs regular high volume of food waste		
Electronic inbuilt thermometer	Requires a lot of covered space		
High cost			

Cost : £28,000 plus VAT for unit or £32,000 plus VAT for it to be installed. Rouken Glen and City of Glasgow College no longer use their Rocket and Glasgow Clyde college have relocated theirs to Kibble Care.

Big Hanna

(Big Hanna went bust and there is an issue with sourcing spare parts, however they are included as there are some operating in the UK)

Strengths	Weaknesses	Opportunities	Threats
It's easy to record temperatures	Needs power to operate	Potential to compost high volumes and produce high volumes of soil amendment for projects	Needs to be continually fed large volume of material
Fully automated	Requires big covered space		
Can compost high quantities of food waste quickly	Requires knowledgeable operator	Opportunity to employ someone to oversee the operation.	
Speed - 10-14 days	Needs regular high volume of food waste		
Electronic inbuilt thermometer	High cost		

Cost : Unknown

Aerobin

Rat damage from first night of use before rat proof mesh.

Strengths	Weaknesses	Opportunities	Threats
Very little Maintenance	Needs to be really flat	Can be raised and wrapped in rat proof mesh	Needs to be protected from Sun
Contained vessel	Price	Great bin for maturing compost	
Easy to empty (Doors on two sides)	Central pipe can fall easily - impacting ventilation		
Keeps temps high even in winter	Not rat poof (although website claims it's vermin proof)		
Doesn't require any power electrical or physical	Tricky to collect the compost - can't insert fork into door.		
Stays productive in winter			
Worms can access bin and thrive in lower section			
Can collect Leachate			

Cost: 400L **£356** 200L **£219**

Case Study : Train household (2 adults, 3 children and 2 house rabbits

Aerobin 400L been in use since 2020. Handles all (vegan) food waste, weeds and litter trays of two rabbits (wood pellets). Central ventilation shaft regularly falls over which slows down the composting process. Due to this the pile is mixed by hand sometimes. Top section of pile regularly 40 C. 50:50 mix of food waste to wood pellets or chipped bark. 40% of bin gets emptied every three weeks.
Compost produced and matured for one year (in pallet collars) is heavy in weeds.

Jora

The Jora is a metal insulated tumbler with two chambers.

Albion Community Garden

Strengths	Weaknesses	Opportunities	Threats
Volume	Involved physical build	Knowledge base of Mycelium Network - mighty network.	Reasonably complicated build process
Temperatures 40-60C	Cost	To improve perception of composting	
Chambers can be padlocked - controlling who can use it.			
Speed - 6 weeks per chamber			
Raised - ease of access to compost			
No or low odour			
Rodent proof			
Can be turned by hand - requiring no external power			
Stays productive in winter			
Worms cannot access or thrive (temp too high)			

Build video JK400 Assembly

Cost - JK400 -£1095
JK 270 £545
JK 125 £425

Members of the Mycelium Network can access discounts on the Joras

Compost is matured in a "Scotty Hotbox" (which are sadly no longer available) or a bin built out of pallet corners with a locked lid on top.

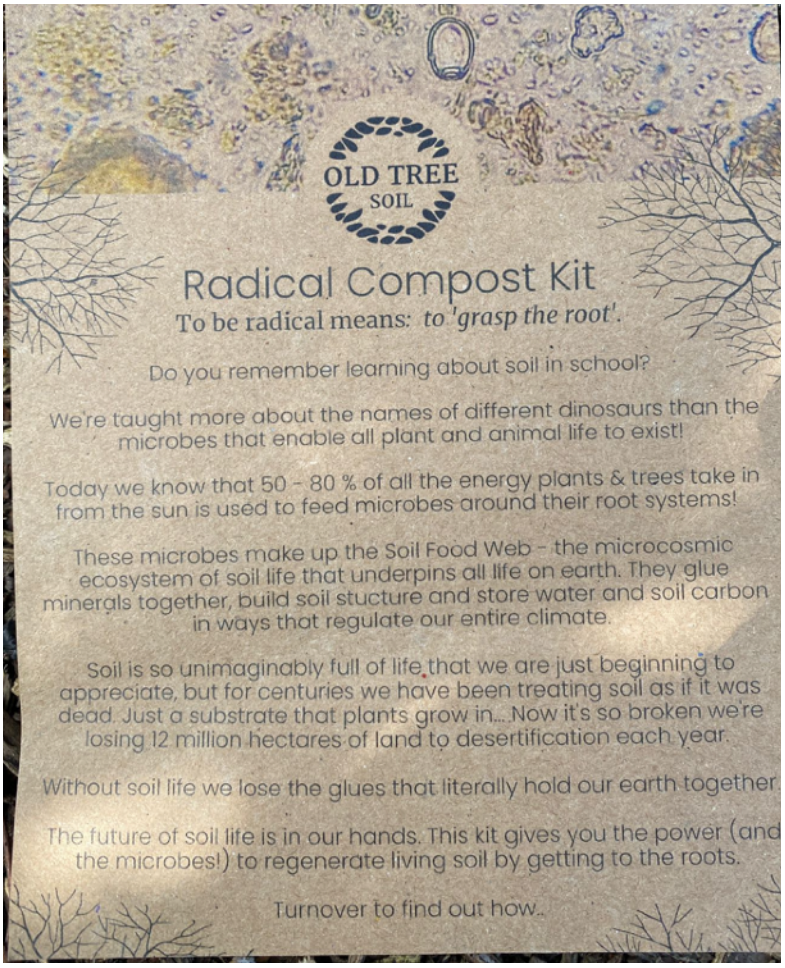
Case Study : Albion Community Garden.

The Jora is maintained by Old Tree Soil CIC. Old Tree Soil supply residents with Bokashi. They ensure there is a constant source of dry brown materials under the Joras and empty the chamber into the pallet bay when it is ready.
Residents bring their food waste to the Joras weekly, the bins are padlocked and residents have the code. Whatsapp group for residents to communicate when they drop off.

In this model, residents pay a low monthly fee and in return they receive complete compost once a year, the rest is used in local community gardens. This compost, or living soil, can either be used as compost or to create compost teas and extracts to inoculate soils with life.

Jora's in use https://vimeo.com/774808592/b585c9bfeb

Sold with a small straining bag and compost extract making is taught to recipients. Education regarding the Soil Food Web is shared.



OLD TREE SOIL

Radical Compost Kit

To be radical means: *to 'grasp the root'.*

Do you remember learning about soil in school?

We're taught more about the names of different dinosaurs than the microbes that enable all plant and animal life to exist!

Today we know that 50 - 80 % of all the energy plants & trees take in from the sun is used to feed microbes around their root systems!

These microbes make up the Soil Food Web - the microcosmic ecosystem of soil life that underpins all life on earth. They glue minerals together, build soil stucture and store water and soil carbon in ways that regulate our entire climate.

Soil is so unimaginably full of life that we are just beginning to appreciate, but for centuries we have been treating soil as if it was dead. Just a substrate that plants grow in.... Now it's so broken we're losing 12 million hectares of land to desertification each year.

Without soil life we lose the glues that literally hold our earth together.

The future of soil life is in our hands. This kit gives you the power (and the microbes!) to regenerate living soil by getting to the roots.

Turnover to find out how..

Reinstalling the Soil Food Web

This complete compost contains billions of benefcial baoteria, five hundred & sixty thousand protoza, metres of fungal nyphae and 260 nematodes in every gram! These are the Soil Food Web microbes that make living soil for us. There are 5000 grams in this bag!

Complete compost + water

With this simple action we can reinstall the soil food web anywhere on earth to reap the benefits of natural soil fertility. The key is to get the biology that this compost contains into soil alive, then keep it protected with mulch & fed by plant roots.

Make a compost extract

Simply add this hessian bag to 15 - 30 litres of rain water. Flexible garden trugs or standard packaging buckets are ideal. Use your hands to massage the biology off the surfaces of the compost until all the liquid is dark brown. You can use two buckets and make 30 - 60 litres. 30 seconds of rinsing the bag is enough.

Add the mix to a watering can and soak the area of soil you want to see growing healthy plants. Compost the used bag, or use it as a mulch to cover your soil around the plants you want to encourage.

Old Tree Soil Compost extract leaflet

Hotbin

Strengths	Weaknesses	Opportunities	Threats
Possible to purchase under £300	Lack of ventilation	Good for maturation stage	Can't handle a large volume of food waste
Small footprint	Increases risk of anaerobic conditions	Good for a single household	
Can collect Leachate	Easy to break material - polystyrene	Can be raised and wrapped in rat proof mesh	
In-built thermometer	Not rat proof		
No assembly required			

Cost : £294.

Green Joanna

Strengths	Weaknesses	Opportunities	Threats
Build from Recycled Plastic	Not rat poof (although website claims it's vermin proof)	Can be raised and wrapped in rat proof mesh	Good size for a family, but not suited to community scale, if using food waste.
Claims to be able to reach 65C	Pile is not mixed	Could be good for maturation	
300L capacity			
3 year warranty			
Low maintenance			
Low cost - approx £100			

Cost : approx £140

Ridan


Ridan Composter
Keeping the World Turning


The Ridan Process
You can do it !
Take one food waste caddy and add either:
One sixth of a caddy of WOOD PELLETS
or one caddy of WOOD CHIP
FOOD WASTE
WOOD PELLETS
WOOD CHIP
1/6
Put these proportions into The Ridan. Rotate at least six times.
RIDAN COMPOSTER
Continually add to The Ridan. Put output into Hot Box.
Leave to mature in The HotBox for six months to one year. Monitor moisture levels. If too dry add rain water.
Put compost as a surface mulch onto your growing area-do not dig in.
That's it - Compost happens!
For more information visit Devon Community Composting Network www.dccn.org.uk

Strengths	Weaknesses	Opportunities	Threats
Zero operating costs	Manually turn handle	Ability to handle large amount of waste	Must be monitored so it doesn't dry out
Delivered pre-assembled	Needs to be fed continually	Challenge peoples perceptions of what composting looks like	Can't be padlocked
Rodent proof	Cost		
Easy to fill			
Easy to collect compost			
Can handle large volumes of food waste 200 or 400 litres per week			
Speed - 6 weeks			

COST : Ridan Pro 200 £3950 +VAT, Pro400 £4650 + VAT
Also recommends Ridan Maturation boxes at £480 + Vat each. (2 for the Pro 200 and 3 for the Pro 400)

Case Study : Frome

Loop : Frome Soilful - a Loop:Frome film

Set-up as a CIC, they collect from businesses using an electric bike. They supply the businesses with a clean bucket which has a bag of bokashi inside it. Food waste is transformed into a living soil via a Ridan and maturation bays and is sold back to the public for £1/litre. Also collect food waste from local residents, whom they ask for financial donations.

With any of the above systems, if you are asking people to bring food waste to be composted, it's important to supply them with a bucket and lid. A small kitchen caddy can be filled by an average family in a couple of days, so it's important it's big enough to allow them to collect food waste without having to empty it every couple of days.

25L buckets can be sourced for **£6.55** https://buybuckets.co.uk/product-category/plastic-buckets/

Or sometimes sourced as Ex-builders buckets on facebook marketplace.

Composting - the process

"The composting process is characterized by four phases:
(1) the initial mesophilic phase (10–42 °C), during which, the temperature rapidly rises and initiates organic matter decomposition;
(2) the thermophilic phase (45–70 °C), which is distinguished by prolonged high temperatures due to the extensive metabolic activities undertaken by endogenous microorganisms;
(3) the middle mesophilic phase (65–50 °C), during which, the temperature decreases, allowing for re-establishment of the heat-resistant microbes;
(4) the finishing phase (5–23 °C), during which, the organic matter and biological heat production stabilize." The case of Ground Coffee Compost

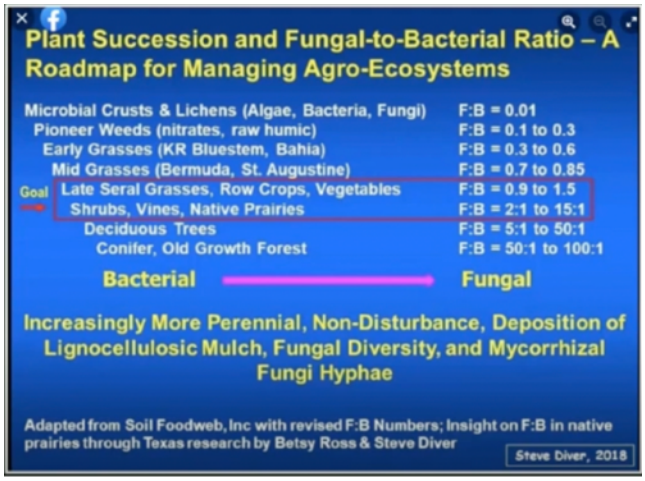
Micro organisms in the food waste break the material down into compost, releasing heat, water and carbon dioxide. If Bokashi is used the volume of Carbon Dioxide released is greatly reduced (See What is Bokashi?).

Some Micro organisms thrive in the hotter phases and others thrive as the pile cools down. Its important the compost never exceeds 60-65C.
These stages happen in both cold and hot composting. The difference in hot composting is that the heat becomes trapped within the compost bin/vessel, the heat increases the speed of the composting process. Therefore hot composting is much faster at breaking material down. Hot composting is an aerobic composting technique, which means it happens with the presence of oxygen. In order for this to be maintained, there must be airflow in the pile. Air flow can be increased in a pallet bay set-up by the turning of the pile. This is where tumblers have an advantage as much less physical effort is required to incorporate more air. Some static hot compost bins exist with infrastructure built-in to maintain airflow such as the Joanna and the Aerobin.

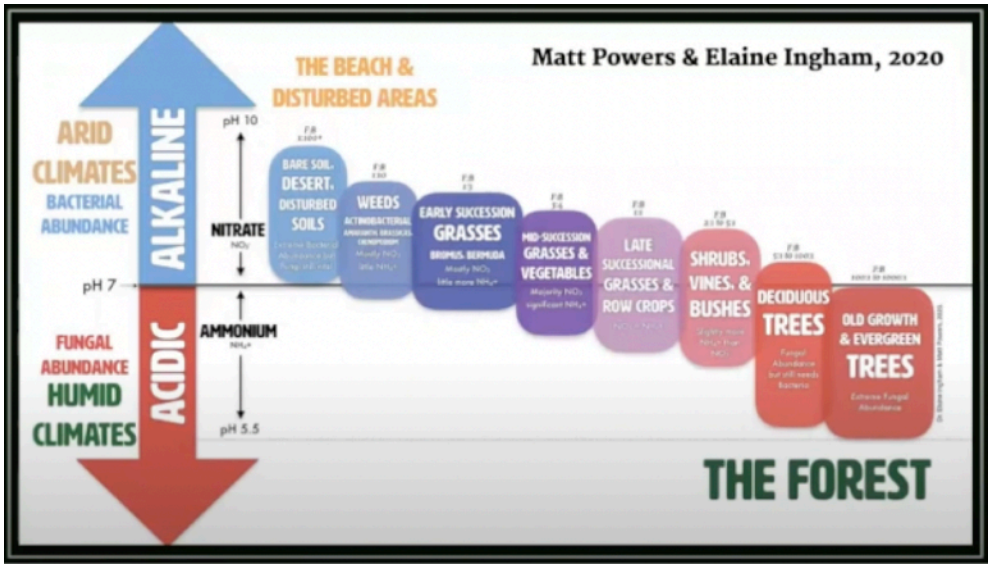
Whilst lots of the manufacturers of hot compost bins will make claims of "creates in compost in four weeks", this is not finished compost, or complete compost. After the first two phases the compost has a high bacteria to fungi ratio, an ideal compost, or "biologically complete compost" which is what Elaine Ingam of the Soil Food Web refers to, has a high Fungi to Bacteria (F:B).

Fungi to Bacteria F:B

Why is this important? The tables from the Soil Food Web below illustrate soils with a low fungal to bacteria ratio happen early in the succession of soils.



Fungal to Bacterial ratios



Soil Succession

This means these Bacterial abundant soils are the conditions where pioneer weeds thrive, not row crops and vegetables. In order to create a compost where vegetables thrive, the compost needs to mature in order to allow the fungal count to increase.

How do we increase the Fungal count in compost?

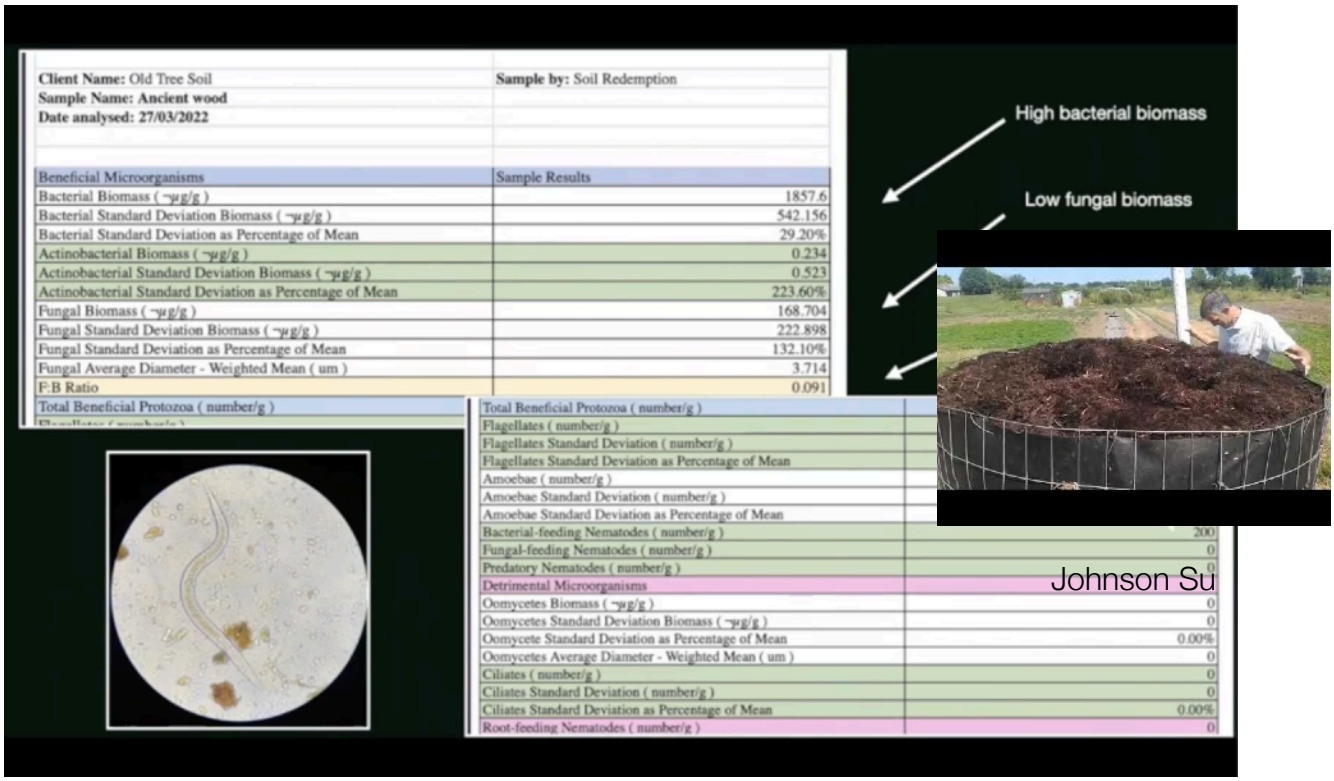
Every time we turn compost, we destroy the mycelial hyphae, the network of fungal threads, therefore, it is important to have a maturation phase where the compost is undisturbed. Even sifting the finished compost has a significant impact on the fungal count.

Old Tree Soil have lots of their batches tested (analysed by Soil Food Web technicians) and have concluded that;

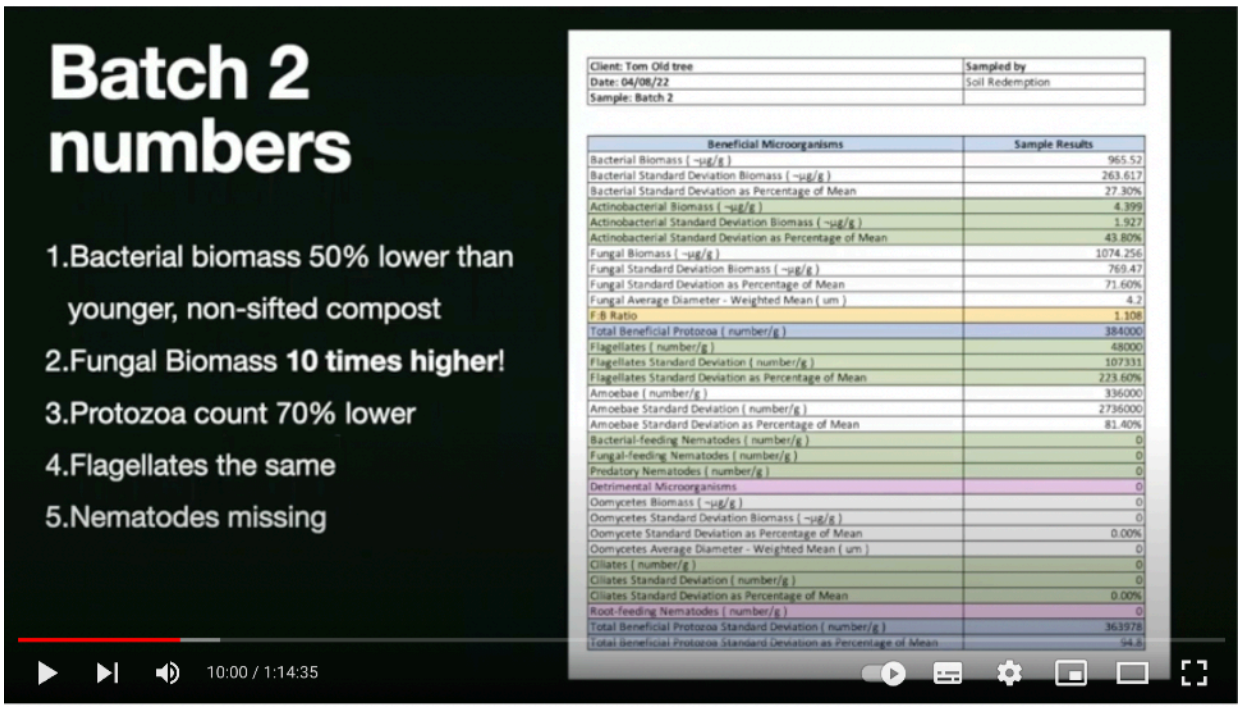
- “Compost sifting with force is destructive to fungi and nematodes

- Less turning of compost and not screening it, helps increase beneficial fungi.
- Adding EM Bokashi to pre-Jora mix seems to indicate increases in the speed of fungal colonisation of maturing compost."

It can be seen below that the same compost when sifted had a F:B ratio of 0.091 which is the perfect soil for pioneer weeds, however, that same compost unsifted has a F:B ratio of 1.108, which is an ideal ratio for growing vegetables.



Batch 1:16 month old, sifted



Same Batch as above, except unsifted

Maturation phase

During the maturation phase we're wanting the compost to move from a high bacterial : fungal ratio to one where the fungi : bacteria is at least 1:1. How is this best achieved?

- Not disturbing/turning the compost
- Adding Bokashi
- Ensuring it remains moist - this is a living soil and the microbes need moisture to thrive. However, letting the compost to dry out slightly decreases the bacteria load so therefore selects for fungi.
- Worms also love a moist compost and worm castings are fabulous food for plants. Worms are also great at removing pathogens in the soil.
- Allowing compost to rest in a Johnson Su Bio reactor - see video
- Johnson Su set up in a woods created high F:B (20:1) - Adam Swan Soil Ecology Lab.
- Setting up Johnson Su pile within a leaf mould pallet bay.
- Adding dry additives such as keratin, seaweed, calcium or sulphur (Gypsum) increases the nutrition of the compost, in addition adding them in a dry food increases the fungal content, because dry powders have edges and fungi love edges! So Fungi flourish with dry powders added.
- Adding kerotine (biodynamics adding horn into the soil) - sets up environment where decomposers of keratin are high which can speed up break down of those components in soil, such as if you're applying manure.
- Adding kelp
- Adding granular Calcium priming factor to balance the amount of potassium in the pile the phase can increase the fungal count as ..fungi slow down the passing of calcium through the compost.
- Adding a handful of mature complete compost can speed up the quantities of beneficial microorganisms.
- Adding a bird feeder to the bay: birds bring fungal feeding micro-organisms!

Bokashi

A few of the Community Composting projects mentioned above, supply residents with Bokashi.

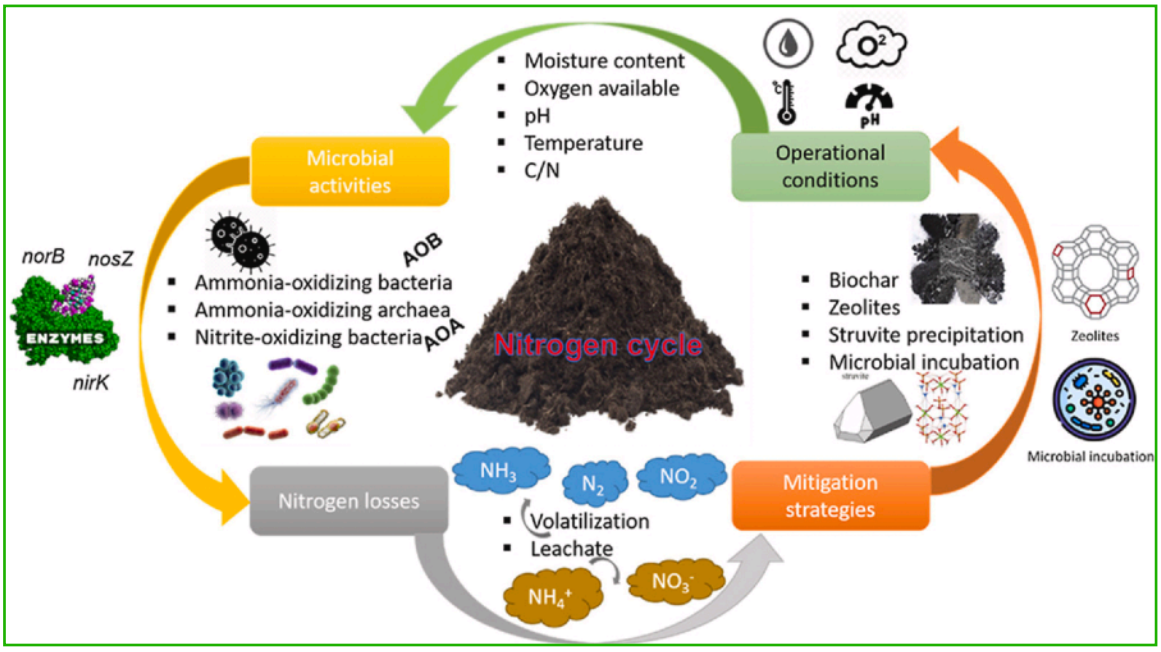
What is Bokashi?

Bokashi (Japanese for "Fermented Organic matter") Is a bran inoculated with a source of EM - Effective Microorganisms. Discovered by Dr. Teruo Higa in the 1980's. Author of "Earth Saving Revolution" - published in 1996.

EM are primary decomposers in the soil, inside plants, guiding the decomposition of the plant material inside our bodies and therefore helping with the nutrient release. Added to food waste, they ferment the waste without the presence of oxygen.

"Anaerobic decomposition, or fermentation, is a process in which microbes feed on organic matter without the presence of oxygen. This process doesn't generate any heat and almost no Carbon Dioxide is released. This process creates a stable, nutrient dense, pre-digested food for the soil with almost no Carbon Footprint." Agriton

- Fully Aerobic Soil - Full of oxygen is what tilled soil is; lacking in energy.
- Facultative soil is part aerobic part anaerobic…just under the surface. Our compost needs to also be a mix of aerobic and anaerobic.



https://www.sciencedirect.com/science/article/abs/pii/S0045653522010074

Therefore , it stops smells from rotting or putrification of food waste, as it's fermenting instead. This means it's also stopping methane gas from being released.
Adding Bokashi also allows food waste to be stored indefinitely (in sealed containers, although the Bokashi juice would need to be drained regularly) and used when needed. This means food collection frequency can be decreased.

Green waste in a landfill does not break down in the same way. Without the addition of effective microorganisms, in a landfill waste breaks down without oxygen and produces methane gas. Methane gas is around 25 times (over a 100 year period) more powerful as a greenhouse gas than Carbon Dioxide that is produced from composting.

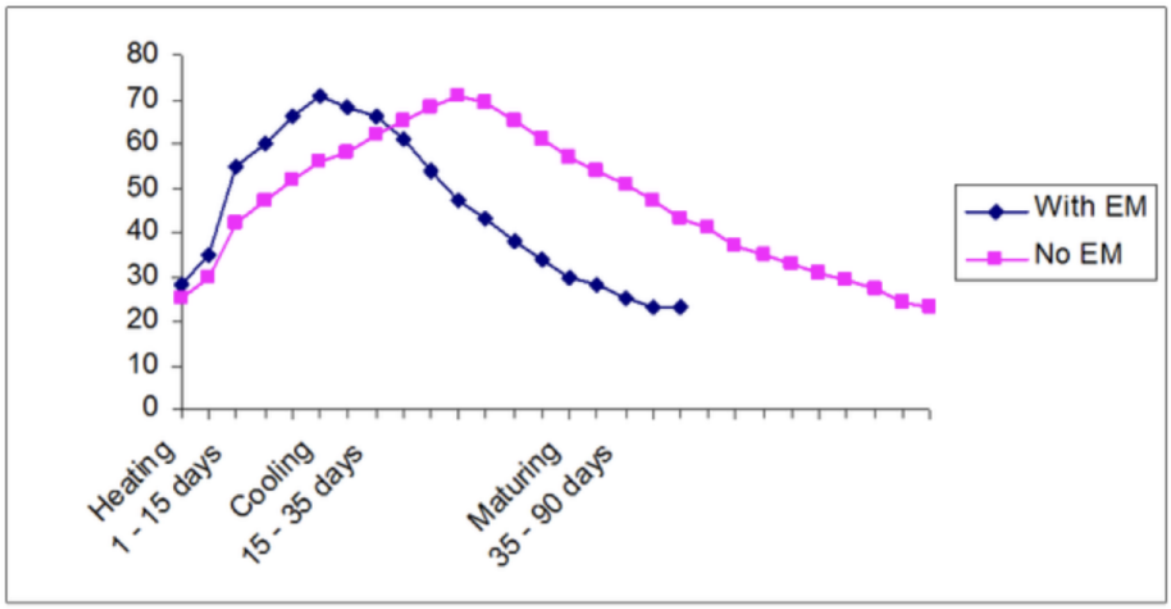
Effective Microorganisims turn the nitrogen into Amino Acids and take the nitrates down. They turn the excess sugars into nitrogen for plants. Which can help plants regulate themselves better and strengthen their immune systems. The most diverse hot compost is full of EM - compost expert Matt Powers has analysed and sequenced their DNA.

- It speeds up the composting process
- "More Microbes in our soils and improving soil health, it will help plants grow better
- Have Stronger root structures
- Better access to nutrition
- More resistance to pest and disease."
- Better water retention
- Organic fertiliser

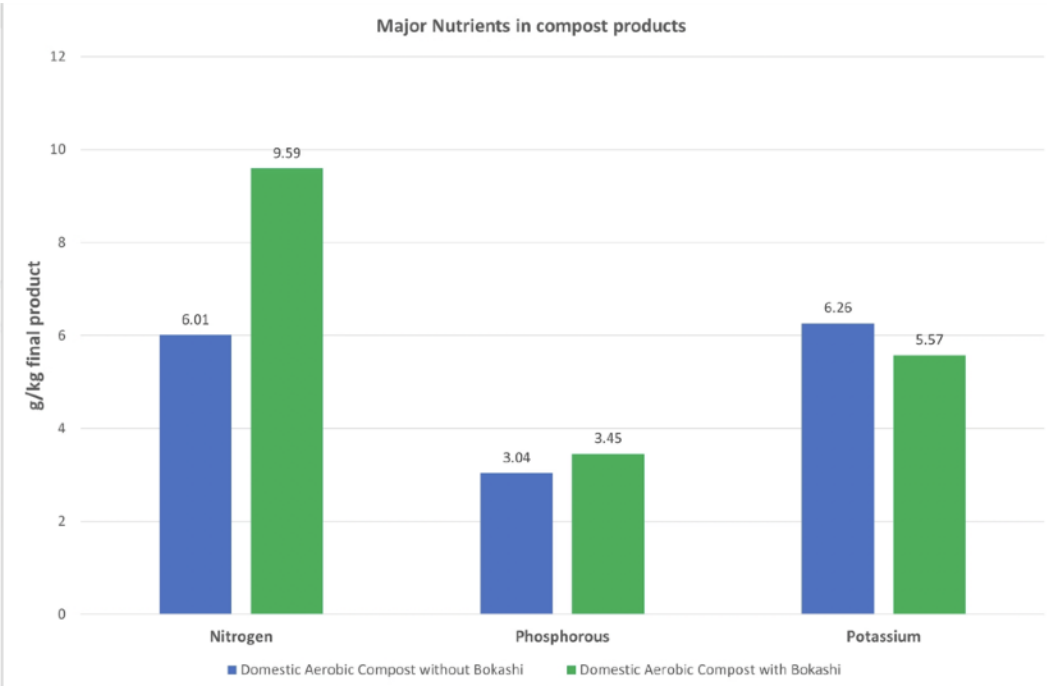
Martyn Richards "Bokashi" Presentation

Cost of Bokashi - 250g / 15L bucket 15kg = **£64.80** (which would help 60 buckets so **£1.08/bucket of food waste**. Based on Agriton calculations included as Appendix A And Price List as Appendix B) Or projects can make their own Bokashi Bran, instructions included as Appendix C**.**

Benefits of Bokashi



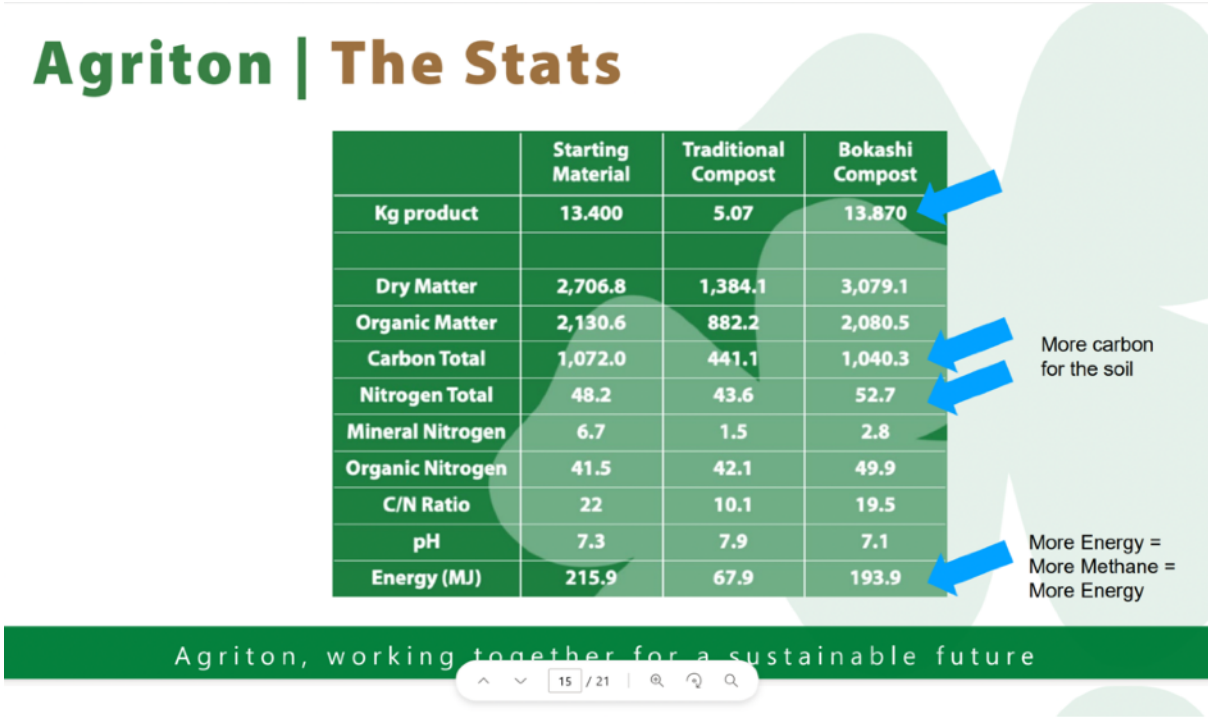
Report from Agriton demonstrating the use of EM in aerobic systems to speed up decomposition.



Martyn Richards of Agriton - who worked with the Haydons, Demonstrating the retention of Nitrogen in Compost with Bokashi added.

In normal compost piles or hot compost, there's up to 50% loss of volume of material. With the addition of Bokashi this loss of volume is reduced to a maximum loss of 20%.

Adding Bokashi increases the final output volume by 30-50%.
Bokashi reduces Nitrates released by the decomposition process, therefore meaning the finished compost has a higher ratio of Nitrogen. It also retains higher levels of other nutrients.



From "Bokashi Presentation Council" by Agriton. This was for a static no turn bokashi system.

Community Composting around Scotland and further afield.

Lochaber Environmental Group used to run community composting sites in Kinlochleven, Glencoe and Lochaber which have been taken over by the local communities. Only garden waste is composted in these pallet bay systems.

Polbeth in West Calder have a Ridan as part of a community composting project funded by Community Climate Action Fund.

Brighton and Hove Food Partnership - Residents use bays to compost their food waste (no meat or cooked food) - However they now use Joras and collect **ALL** food waste https://vimeo.com/774808592/b585c9bfeb

Bute Produce Collect garden waste to make compost for market garden.

Tiphereth in Edinburgh - collect garden waste from 500 households to create compost which is sold back to residents. Project supported by council.

Lancaster Cohousing - Compost food waste excluding meat.

Torridon hotel - A900 Rocket - composting all food waste.

Setting up a Compost Club

A compost club can be a useful way to manage the composting process. There are examples of different models already in operation in the UK.

Brighton Living Soil CIC offer two levels of membership which give the member different quantities of compost once a year. Members are given instructions on how to use the living soil to create a compost extract which can inoculate other soils (photos below)

- Houseplant - 12L
- Garden - 80L

Food waste is collected from members doorsteps once a month, the club give them a clean bucket and some Bokashi when they collect the food waste. This food waste is then transported to a main site where it is composted via Jora Tumblers and matured for a minimum of 6 months, but normally 12 months (allowing a more diverse selection of micro-organisms to thrive). Living Soils are best applied in Spring in Autumn when conditions are more favourable.

If Bokashi is added, food collections can happen every four weeks as the Bokashi elements odours.

In this model, the group collecting and transporting the waste would need to apply for a waste carrier license with SEPA which costs £261 for the first year and £165 to renew (as of August '23). In this model someone is employed to collect the food waste.

The surplus compost can be used in the community garden or sold to members which can help make the composting activities financially sustainable.

Food Waste bucket on left, small tubs are what the Bokashi to members is supplied in. The Brown paper bags are what the living soil is returned in.

Bags ready to be sold

Strengths	Weaknesses
Control over what is composted	Waste Carrier license required
Members feel empowered their waste is being transformed	Transport required to pick up food waste
Creates income stream for activity	Staff Costs - Collecting food waste: 1 day per month Washing buckets approx 50p/bucket Litter picking - up to 1 hr/month Turning 1 cubic metre of compost - up to one hour. Any social media/admin/communication
Creates employment	
If Bokashi is given to members it can increase volume of compost created.	
It allows people who don't have space at home, to compost.	

Another model is a "Compost Hub" which Old Tree Soil operate in places including Albion Community Garden

In this model residents bring their food waste to the compost bins, again Joras. The bins have a combination which only members have the code for. Members message a WhatsApp group when they make a deposit. Old Tree Soil ensure there is a supply of carbon materials at the bins for members to use. Members are all responsible for ensuring the space is kept to an agreed standard.

Old Tree Soil are also responsible for emptying the bins into the maturation bays. This is required every 2-3 weeks.

Members pay £4 a month to access the compost bins, a carbon supply and once a year, to receive a wheelbarrow worth of compost back, which can either be used as a mulch or used as a compost extract to inoculate life into other soils.

Neither members nor the group overseeing the compost activities would require a waste carriers license for this model.

Strengths	Weaknesses
Low running costs	Need to ensure adequate supply of carbon
No Waste Carrier License required	Ensuring site stays clean/tidy
No time spent collecting waste	Ensuring restricted items are not added

Strengths	Weaknesses
Low running costs	Need to ensure adequate supply of carbon
Low maintenance	Members can forget to cut up veg
Members feel part of the process	Staff Cost - approx 2 hours/week Litter picking - up to 1 hour/month Turning of 1 cubic metre - up to 1 hour Any social media/admin/communication

Woodlands Community have a big bin where local residents can add their (uncooked and meat and dairy free) food waste. The contents of this bin are then added to compost bays by a community gardener and are required to be turned by hand.

Strengths	Weaknesses
Very low Cost	Restrictions on what can be composted
No Waste Carrier License required	Bin bin needs emptying regularly to avoid smells
No time spent collecting waste	Loss of volume of material in composting process
	High input of physical labour

Available Funding

Compost Clubs have previously been funded by the National Lottery Community Fund. It's also worth keeping an eye on any climate or zero waste related funds.

Legalities

If you are looking to set up a community composting scheme, the first step is to speak to your local council.

In Scotland we have SEPA - Waste Management Licensing. Exemptions from the need to have a waste management licence are permitted by the Waste Management Licensing (Scotland) Regulations 2011.
SEPA produce a guidance note which you can find here:

http://www.sepa.org.uk/regulations/waste/activities-exempt-from-waste-management-licensing/

The composting project is exempt if it is composting under 100 tonnes/year. If the project is composting over 100 tonnes, it costs £605 to register and £481 to renew every year.
It also has links to the various application forms and guidance notes for various exempt activities.

Projects will need to complete form WMX-FM12 to register or renew a **paragraph 12 exemption** http://www.sepa.org.uk/media/104975/register-a-paragraph-12-exemption.doc (Note: there is another form WMX-FM12small but this should not be used as it only applies to very small, e.g. school, meat-excluded composting.)

The form looks a bit daunting but it's actually very easy to do - it can be completed in just 10 minutes!

To find grid reference for location use https://gridreferencefinder.com/

As part of this exemption form, you need to include a plan of the place at which the exempt activity will be carried on showing the boundary of that place and the locations within that place at which the exempt activity is to be carried on. The plan must also show the locations of any buildings, public right of ways, abstraction points or surface waters situated within 250 metres of the boundary.

There is also a Technical Guidance Note for Paragraph 12 exemptions http://www.sepa.org.uk/media/105248/wmx-tg12.pdf

However, the guidance note is wrong in relation to ABP approval (sections 2.2 and 2.3) as it has not been updated to include reference to the latest guidance from APHA/DEFRA (see below).

Animal by-products (ABP) approval

ABP approval is administered by the Animal & Plant Health Agency (APHA) an executive agency of the UK Department for Environment, Food & Rural Affairs (DEFRA)
The current APHA/DEFRA guidance pertaining to projects such as the rocket at Rouken Glen can be found here:

Using animal material in home, work or community compost heaps - GOV.UK

While the title refers to compost "heaps" Dr Jenny Purcell of APHA has confirmed that it also covers composting in In Vessel Composters such as the A900 Rocket. This would also apply to the Ridan and Jora models. **If composting any animal-by products, this must be done in an enclosed container.**

"The Defra guidance, published on the gov.uk website, puts the responsibility of assessing the impact of the composting site/unit on to the operator. It allows all the activities previously covered by the AHVLA/Scottish Government guidance on community composting, and aims to highlight the risky aspects (risky in terms of animal/public health) so that composters can make sensible decisions about their composting operation." Dr Jenny Purcell of APHA

The guidance note therefore includes a self assessment questionnaire with a scoring system - ideally you want to score as few points as possible and certainly 19 points or less.

If you score 19 or less, you can use your compost off-site or sell it to other people without taking any further action. If you score 20 or more, you must contact your nearest APHA office to seek approval first.

Question 6 on the self assessment is "Do you have and follow a biosecurity/ hygiene plan for your composting site?" scores zero if you answer "Yes". This should be covered by an appropriate Hazard Analysis Critical Control Point (HACCP) plan.

Question 7 "Do you follow the Association for Organics Recycling or Community Composting Network guidance code of practice?" also scores zero if you answer "Yes".
The composting industry code of practise http://www.organics-recycling.org.uk/page.php?article=1749&name=The+Composting+Industry+Code+of+Practice

If going out collecting food waste the group or organisation would need to register for a waste carriers license with SEPA **COST £261** https://www.sepa.org.uk/regulations/authorisations-and-permits/application-forms/waste-carriers-and-brokers/

Conclusion

All Organic matter will eventually decompose and composting need not be complicated. There are many basic pallet set up's creating great compost from garden waste and uncooked veg waste across the city. These are free or cheap to set-up and maintain and can be a great way to get people interested in compost. However, especially living in cities, rodents can find pallet bays favourable places to live, which can interfere with composting and ultimately put some gardeners and projects off composting.
There is infrastructure on the market now which is tried and tested to transform ALL food waste into precious living soil and which is Rodent proof. It is supported by some local councils. Whilst it may seem like a big investment, it has the possibility to remove so much food waste from "waste streams", and to transform it into something which can restore our soils and greatly increase the volume community scale projects can produce (whilst staying under 100 tonnes!). Adding Bokashi to the "food waste" allows the compost to retain nutrients, normally lost as Greenhouse gases and can make our plants more resilient and healthier. We can make Fungi rich composts by adjusting our compost making processes slightly, whether that's with the addition of Bokashi, adding leaves or not disturbing the pile. It is also possible to take "complete" composts, those with higher F:B and use them as additives to less mature piles in order to inoculate them. With these composts we can rebuild our soil health, grow healthier and more resilient plants and humans.

Useful links

How to make and use compost - Nicky Scott
https://www.bloomsbury.com/uk/how-to-make-and-use-compost-9780857845481/
(This has a great section on community composting and compares different systems)

Proper Job - compost project which has been going for over 27 years

https://www.proper-job.org

Bokashi knowledge share by Martin Richards - this is an incredible folder of resources

Richards, M. "Bokashi Presentation"
https://drive.google.com/file/d/14V12nsp5nwRqUtc5JOvTL74XdQZ_Ob9n/view?usp=sharing

Composting Industry Code of Practise

http://www.organics-recycling.org.uk/dmdocuments/Composting_Industry_Code_of_Practice.pdf

Community Composting Guide by Community Composting Network (CCN)
https://www.dccn.org.uk/wp-content/uploads/2015/09/CCN_CommunityCompostingGuide.pdf

Compost School Special - Devon Community Compost Network https://www.dccn.org.uk/

Mycelium Network
https://mycelium-composting-network.mn.co/share/OI_NW0R_gh08LRQ-?utm_source=manual

https://www.carryoncomposting.com/142941492.html

Compost Calculator
https://wrap.org.uk/resources/tool/compost-calculator

Zero waste Scotland
https://www.zerowastescotland.org.uk/resources/composting-food-garden-waste

Aberdeenshire Community Compost Resource
https://aberdeenshirecompost.scot/

Big Hanna
https://www.bighanna.com/

Frome : Loop
https://www.loopfrome.org/

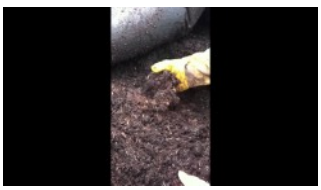
Nitrification within composting: A review
https://www.sciencedirect.com/science/article/abs/pii/S0045653522010074

EU Waste Framework Directive
https://environment.ec.europa.eu/topics/waste-and-recycling/waste-framework-directive_en

Waste and Resources Action Plan
www.Wrap.org.uk

Kelvindale Growers - How to make compost all year round

Anniesland A900 Rocket



Aerobin
https://www.aerobin400.com/

Jora Composter
https://www.joracomposters.com/

Jora assembly
JK400 Assembly

Jora in use
https://vimeo.com/774808592/b585c9bfeb

Hotbin
https://www.hotbincomposting.com/

Joanna
https://www.greatgreensystems.com/product/green-johanna-330-litre-hot-composter/

Ridan
https://www.ridan.co.uk/

Buckets
https://buybuckets.co.uk/product-category/plastic-buckets/

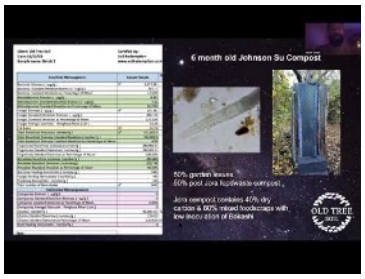
Dr Teruo Higa
https://www.emrojapan.com/dr-higa/

Agriton
https://www.animalhusbandry.agriton.co.uk/

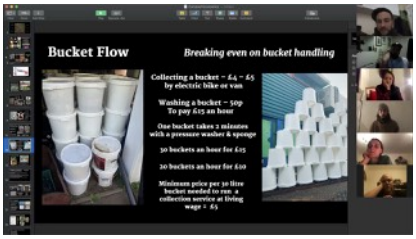
Matt Powers
https://matt-powers.mykajabi.com/

The Case of Ground Coffee Compost
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7911569/#:~:text=The%20composting%20process%20is%20characterized,due%20to%20the%20extensive%20metabolic

Johnson Su Bio reactor



Q&A with Adam Swan of the Soil Ecology Lab



Compost Economics by Old Tree Soil

Appendix - A
Bokashi Bran Needed for each bucket

These are rough estimates, but gives you an idea.

Agriton Essential bokashi bucket 15.3L (40051 & 40050)

5cm each of food waste then 40g of bokashi bran

5 layers x 40g per layer = 200g round up to **250g per bucket**

Agriton Organko 1 bokashi Bucket 16L (40006)

5cm each of food waste then 40g of bokashi bran

5 layers x 40g per layer = 200g round up to **250g per bucket**

Agriton Commercial 120L

5cm each of food waste then 120g of bokashi bran

15 layers x 120g per layer = 1.8 kg round up to **2kg per bucket**

This is the fresh weight. So you may be able to press the food waste down to add more.

Make sure the bokashi bran is stores in an airtight container to help with freshness.

Appendix - B

Price List - 2024

AGRITON
HOME & GARDEN

Agriton | Bokashi™			
Bokashi Buckets Buckets			
Product Code	Quantity	Product Name	RRP
40006	2 x 16 ltr	Agriton Bokashi™ Buckets (last remaining stock)	£60.00
40050	2 x 15.4 ltr	Agriton Bokashi™ Essential (Grey)	£67.00
40051	2 x 15.4 ltr	Agriton Bokashi™ Essential (Black)	£67.00
40012	1 x 120 ltr	Agriton Bokashi™ 120 ltr Wheelie Bin	£220.00
40017	1 x 9.6 ltr	Cream Organko Bokashi Bucket	£65.00
40117	2 x 9.6 ltr	Twin Cream Organko Bokashi Bucket	£105.00
40033	1 x 3.3 ltr	Grey Organko Daily Bucket	£20.00
40034	1 x 3.3 ltr	Black Organko Daily Bucket	£20.00
Bokashi Bran			
40100	1 x 1kg	Agriton Bokashi™ Bran 1kg	£6.00
40200	1 x 2kgs	Agriton Bokashi™ Bran 2kgs	£10.50
40300	1 x 3kgs	Agriton Bokashi™ Bran 3kgs (last stock remaining)	£13.50
40215	1 x 15kgs	Agriton Bokashi™ Bran 15kgs	£54.00
Spare parts for Buckets			
40050L	x1	Spare Lid for 40050 & 40051	£10.00
40050H	x1	Spare Handle for 40050 & 40051	£7.50
40050T	x1	Spare Tap for 40050 & 40051	£14.00
40050C	x1	Spare Liquid Cup for 40050 & 40051	£7.00
40050SC	x2	Spare Scoop for 40050 & 40051	£6.00
40050P	x1	Spare Presser for 40050 & 40051	£7.00
94005	x1	Spare Strainer for 40050 & 40051	£8.00

All prices are Ex-VAT and Ex-Delivery.
Products marked with a * are exempt from VAT.
Prices valid from 1st February 2024 until further notice.
For full pallet prices, please enquire.

EM Agriton Ltd, Ebear Farm, Westleigh, Tiverton, EX16 7HN
01823 673344 | info@agriton.co.uk

Agriton, working together for a sustainable future

Appendix - C

How to make your own Bokashi Starter

EM1 is the main ingredient for Bokashi. It prevents putrefaction in food (residues). EM1 connects with the wheat bran or coffee granules and uses the right sugar molasses as a food source.

SUPPLIES

- ✔ EM1
- ✔ Wheat Bran or Coffee grounds
- ✔ Sugar cane molasses
- ✔ Water
- ✔ Small plastic buckets to mix the ingredients
- ✔ plastic pockets with sealing strips

Mixing ratio

The mixing ratio for making EM-Bokashi is: 1:1:100. 1 part EM1, 1 part cane sugar molasses, on 100 parts water. If this ratio is used, a good quality Bokashi is created.

20 kilos of Bokashi can compost about 400 kilos of food residues

or 20 compost barrels with a capacity of 20 litres.

- ✔ 20 kilos of Wheat bran or coffee granules
- ✔ 10 litres of water
- ✔ 100 ml EM1
- ✔ 100 ml Sugarcane molasses

Recipe

1) Dissolve the 100 ml cane sugar molasses in a litre of warm water (around 50 C). Stir this solution well into the remaining 9 litres of water.
2) Add the 100 ml EM1 solution and mix well.
3) Using a cup, pour the mixture little by little over the wheat bran or coffee granules and mix well. Mix so that there are no more dry spots / bran. The wheat bran mixture then has a degree of activity of 35 to 40%.

This can be tested by squeezing a handful of the bran mash into a ball. No liquid should drip between the fingers. When the hand is open again, the 'Bokashi ball' must still have the same shape and crumble easily when touched. If there is too much moisture, more bran can be added and mixed until the right ratio is found. In the event that the mixture is too dry ,water can be mixed in.

4) Use a plastic bag of 5 litres filled with the wet Bokashi. Properly squeeze out all the air (very important because the fermentation must be done under anaerobic conditions) and close the bag. In summer, the Bokashi should ferment for at least 2 weeks. In winter, the Bokashi should ferment for at least 4 weeks . More than a month is also possible .
5) During the fermentation/maturation process, the smell and appearance of the EM-Bokashi can be followed by occasionally opening the bag (and closing it tightly airtight again). The smell is characteristically sweet and sour and similar to apple cider vinegar. It is possible that there will be a white blemish on the Bokashi. This is fine and indicates that good fermentation is taking place.
6) After 2 to 4 weeks , the bag can be opened. If the bag is not sealed properly then it will smell like putrefaction. This happens if the bags were not properly sealed airtight or if the humidity level has been higher than 40%.
7) The Bokashi can be stored for a year if closed off from the air.
8) The Bokashi is ready for use to process the food residues into Bokashi.

An alternative to fermenting large amounts of Bokashi is in an airtight sealable barrel or a thick garbage bag.