Climate friendly food growing

EARTH UP

Contents

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Operation Farm is a community organisation in Tameside promoting engagement, involvement and enjoyment of food and growing. We improve wellbeing and share skills through community events, learning and activity sessions.

A huge thanks to all the contributors, everyone at Operation Farm and the National Lottery for making this Zine possible.

For more info visit: www.operationfarm.org.uk

INTRODUCTION

In 2023 the climate has felt stranger than ever. Anyone who grows produce tends to become attuned to weather: we must protect plants against cold, water in the heat, and ward off pests in plants weakened by environmental stress. But alongside continuous global news stories of droughts, storms and floods, the changes in the seasons here feel more concerning.

Operation Farm's Climate Action project was originally inspired by the moorland fires bearing down on Saddleworth in 2018: We asked how we could respond with collective action in the face of this threat? The project started in 2022 and we've aimed to promote conversations and develop skills around access to food and looked and ways to grow community food in tune with, rather than against nature.

We've run sessions and workshops for community groups and allotment plot holders on no-dig, composting, soil ecology and fungi and alternative food plants for soil health and biodiversity. With contributions from people involved in the project, this 'zine brings together some aspects of these activities, to help share ideas and learning more widely. It is about resilience but also collective action, as anyone/everyone can play a part.

Awareness has grown dramatically in recent years about the incredible diversity of life in healthy soils and how this is critical not only to sustainable harvests but also the wider ecosystems we can see above ground. Composting, no-dig and understanding what's happening in the soil was something we have returned to. And we've looked into the environmental harm of peat and offered simple tips for switching to peat free growing. As the climate changes, there are more threats to native species - insects have already suffered huge declines so we look here at how to better appreciate and support invertebrates in the garden.

This zine is a collection of tips, ideas and perspectives on climate (and people) friendly approaches to growing food; ideally low cost and less energy intensive ways to do this. There is no one single answer, and we've only just scratched the surface but more conversations and ideas-sharing can only be positive.

Operation Farm, October 2023

PEAT

Peat is an amazing material. Created in bogs and mosses, it plays a vital climate role, locking away tonnes of atmospheric carbon and supporting a host of amazing flora and fauna whilst also playing a key role in flood prevention. But in the UK and Ireland much of it has been damaged and from the end of 2024 there will be a ban on retail sales of peat-based composts.

But fear not! The range of peat-free composts has grown in recent years. It's a fast-evolving market and quality can vary, so it's worth understanding a few basics.

It's worth remembering that plants can grow just as well in peat-free media as in peat mixes. Peat is a consistent and lightweight material favoured by some growers, but it has only actually been widely used in the last 50 years; prior to that popular ready to use composts were based on other ingredients.

What are these alternatives? Fortunately many are by-products of existing industries. Peat free composts are generally made up of a mix of some decomposed organic materials which could be wood fibres, bracken, green waste (like that collected in your domestic bins), wool fibres and sometimes coir (coconut husk fibre) with additional inorganic materials such as loam, sand, grit, perlite or vermiculite to change the properties of the final mix and additional organic or synthetic fertilisers (as with peat-based composts).

So what to buy? Firstly be sure to buy bags labelled "peat-free". Without this, any compost labelled "eco" or "organic" or "peat reduced" may still be mostly peat! Secondly, if it's really cheap, don't be surprised if it's not up to the job. Quality of ingredients can really vary and we've found that the exclusively peat-free compost brands such as Dalefoot (based on bracken and wool), Sylvagrow (decomposed wood/bark and green waste) and Fertile Fibre (coir based) have a better, crumblier texture and give consistent results. They're not available in all garden centres though. Some widely available none-specialist brands we've used contained fibrous chunks of materials but with sieving and augmenting have performed reasonably well. Coir is lightweight and can be bought affordably online and is a good basis for a seed sowing compost or to mix into other peat-free composts or ingredients.

The range of peat-free composts has grown hugely in recent years.

Using Peat free

Having different properties to peat, these composts need to be used a little differently for good results:

FREE COMPOSTS

• Watering needs more care as peat-free composts can vary in water holding properties. They can look dry on the surface but be moist underneath, and vice-versa, so it's important to get into the habit of checking moisture more regularly by lifting pots and modules to see how heavy they feel before watering, or putting a finger down into the pot to check if it is moist lower down. Be careful not to over-water, especially with young plants.

• Be ready to feed plants in peat free composts sooner, as nutrients won't last as long as peat based. Always check bags for advice on feeding and watch the plants for signs that nutrients are running low.

• Try to use up peat free composts in the same year you bought them, they're more biologically active than peat-based composts so lose quality quicker. It's important to store them in a cool dry place; not outside or in greenhouses, so check when you buy them that bags aren't waterlogged or faded from the sun.

DIY growing media

If you're concerned about costs, you could meet your compost needs by supplementing with home-made solutions. Composting garden waste to feed soils is an essential skill for soil health (see p8.) but a well-seasoned garden compost can also be sieved and used in your own potting mixes, especially with more mature plants. Leaf mould is another fantastic free ingredient for home-made potting mixes. In combination with other ingredients these can reduce or remove the need to buy compost.

For a general garden potting medium, Monty Don recommends a rough mix of one third coir or leaf mould, a quarter each of sieved garden compost and sieved loam (tip - molehills are a good source!) and for drainage add just under a fifth of sharp sand, perlite or horticultural grit depending on what you have available. Garden Organic also has some simple recipes for your own growing mixes from seed sowing to mature plants - see our further reading page for details.

With a few adjustments and a bit of experimentation, your veg plants can thrive as well as special and important peatland habitats.

Sphagnum moss that makes peat

LIFE'S FOUNDATION

Solvi Goard from Myco Manchester outlines the importance of the soil beneath our feet; what makes a healthy soil and the critical role of fungi.

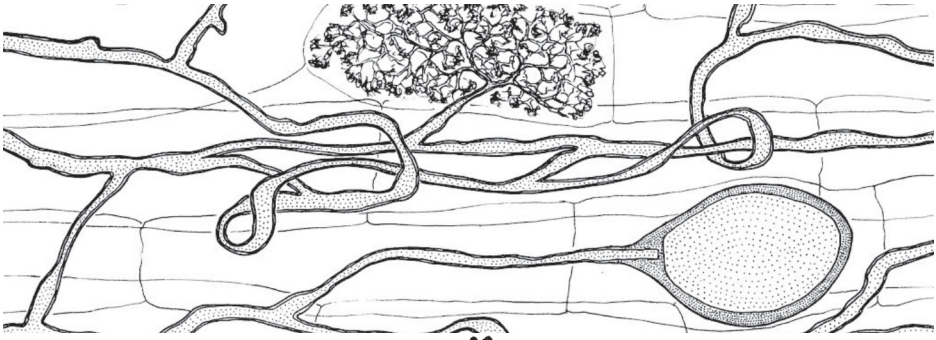
If the 20th century was the century of chemicals, the 21st century must become the century of soil. We're finally realising that soil is not an infinite resource, recognising that we need to care for it, precisely because it is alive. Earthworms, tardigrades, bacteria, rotifers, protozoa, fungi and springtails: soil is populated by a rich cast of species that both create and enrich it. As an ecosystem, soil may even be more diverse and biologically active than what's on top of it.

That is, when it hasn't been made into a desert. Through industrial agriculture, soil has been stripped of life. Pesticides tend to kill insects indiscriminately, causing problems that cascade up the food chain. Synthetic fertiliser means that plants don't form mycorrhizal associations with fungi. Without those associations, the fungi can't live either. Without fungal mycelia, soil loses its ability to store water and carbon. As a result it becomes increasingly vulnerable to erosion, literally washing away.

Because ecological processes are not given the respect and value they deserve, soils have become depleted of nutrition, demanding more and more synthetic fertilisers. For farmers, this systemic pressure forces them into a cycle that becomes increasingly harder to escape. Depleted soil requires ever more fertilisers to ensure reliable crop yields. And leaving fields fallow, to allow the ecology to recover by itself, is an option few farmers can afford without support. We can break out of this cycle. We knew how to farm without industrial methods for generations, we just need to remember. By knowing what healthy soil is, we can know how to fight for it.

Many have now heard that we have a limited number of harvests left, at current rates of soil erosion. There is a wider understanding that we need to transform our relationship with soil and ensure that we're giving back as much as we're taking out. If we don't, we won't eat. But there's another key reason - healthy soil is a huge carbon sink.

How does that work? Glomeromycota, a division of fungi that represents several hundred species, live in soil and produce a



Arbuscular Mycorrhizae by Roo Vandegrift

chemical called glomalin. It's thought that glomalin acts like a glue, binding soil together. It's the cement that helps transform soil from dirt into a living matrix. The belief is that glomalin also locks atmospheric carbon into the soil. [1]

Without access to expensive testing how can we tell when soils are healthy? One way is by learning what certain plants can tell us. Orchids are key in helping us see healthy, fungal soils. The largest family of plants in the world, by number of species, orchids have evolved a symbiosis with a specific group of fungi we call orchid mycorrhiza. The orchids cannot germinate without receiving food from a thriving mycorrhizal fungi partner. So if the soil has been treated carelessly, we end up with no orchids. Not only is this tragic for us, lacking the beautiful diversity of orchids in our everyday life, but it's also catastrophic for nectar-eating insects, and the birds that rely on those insects.

Ironically we are sometimes more likely to find orchids these days on the verges of urban industrial estates, unkempt places that have been uncared for, than in gardens, parks or farmland. Excessive 'tidying' leaves nothing for decomposers to break down and feed on.

When it comes to the soil we do want to grow in, it's the low effort methods that work best. Composting and mulching keeps competitor plants down, and feeds decomposers who then provide the nutrition in the mulch to the plants you're growing. Minimal tillage helps avoid tearing the mycelial networks in the soil. It's worth noting that while we can often see these, as white threads or mats, much of it we can't see.

It's estimated that a single teaspoon of healthy soil contains over a 10 kilometres of mycelial thread! [2] If that's how intricate and extensive the network of threads is, we can begin to comprehend how deeply interconnected soil is when it's ecologically rich. As redistributors and recyclers of nutrients, fungi are able to construct 'supply chains' that leave ours to pale in comparison.

By learning more about soil and building up a new common sense about soil ecology, we can transform our collective relationship with the land. I love to imagine school children, in the decades to come, drawing pictures of smiling tardigrades and messy mycorrhizae, learning about soil with hands-on composting lessons. This is a future we can all contribute to bringing about, in the stories we tell, in the food systems we fight for, and the pleasure we share in stewardship of the small and precious patches of soil all around us.

Myco is a Community mushroom farm and workers' co-operative based in Manchester. They run regular walks, talks and workshops. www.mycomanchester.com

[1] Treseder, K. K., & Turner, K. J. (2007). Glomalin in Ecosystems. Soil Science Society of America Journal, 71(4), 1257–1266. [2] Sheldrake, M. (2021). Entangled Life: How Fungi Make Our Worlds, Change Our Minds & Shape Our Futures. Random House Trade Paperbacks.

Composting for Allotments

Dave Galley from Fairfield Moravian Allotments, Droylesden has some simple rules to follow for hot composting success, based on many years of composting on his allotment plot.

Why use compost in any kind of gardening? Simple answer - the soil we grow in needs to be kept in good health:

Healthy soil = Healthy plants.

Allotment soil works harder than the ornamental garden due to the fact you're constantly removing plants from the soil and nutrients as a consequence. The purpose of composting is to replace these nutrients and to maintain a healthy microbiological balance which is fundamental to good growing. This principle applies regardless of whether you're a double or no-dig gardener. There are many theories and methods of making compost - the idea of this article is to keep it simple and do-able for everyone.

> The main advantage of hot composting is that temperatures over 55°C will kill weed seeds

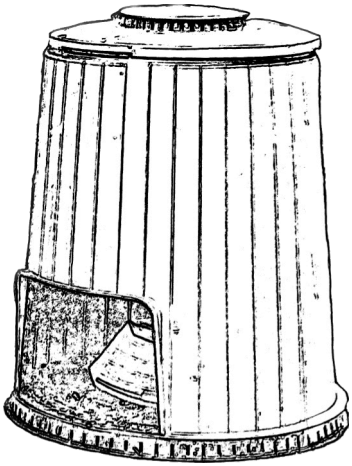
Composting is a natural bacterial process which requires fundamentally four key ingredients to work: Nitrogen, Carbon. Water and Air. (There are many more nutrients compost will give you and plants need lots including: potassium, phosphorus, calcium etc. which you will achieve from the trace elements in the materials used.)

- Nitrogen: from nitrogen-rich materials such as grass cuttings, weeds (roots and all), leafy trimmings, kitchen & veg waste, coffee grounds, seaweed, comfrey
- Carbon: from carbon rich materials such as shredded paper, cardboard, wood chip, spent compost, soil, dried leaves & stalks, straw, woody prunings
- Water = moisture
- Air = oxygen

The Carbon and Nitrogen rich materials listed above are examples of ingredients that can produce a good compost - the trick is how you use them. A 50:50 mix of the carbon to nitrogen rich materials by volume is best. There are many theories about the best proportions, but I can assure you 50:50 works a treat.

The best kind of composting is "hot" composting, achieved by the volume of material and a balanced mix. Hot composting will give you compost quickly, in weeks rather than months. The heat depends on the volume of material and the main advantage is that temperatures over 55°C will kill weed seeds. Temperatures over 65/70° C will however also kill the beneficial microbes you need to break down the material.

To achieve hot temperatures, expose as much surface area of the material as possible, ideally by shredding or cutting everything as small as possible; to save time you can use a shredder. Also



A 'Dalek' style bin

remember though, we are mostly making compost to mulch the plot and any bigger bits will continue to break down when spread on the ground. You can use this compost for potting on by sieving it - however it's not suitable for starting seeds.

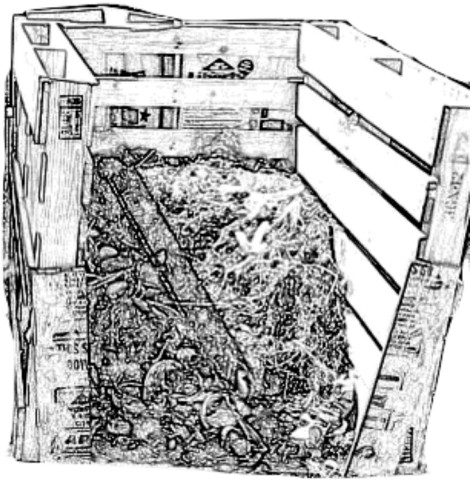
If you haven't got room for a bay or bin you can use a 'Dalek style' compost bin; it won't get as hot and will take longer but should give the same results - perhaps with some weed seeds in it!

What You'll Need

To achieve temperatures of 50°C+ you'll need a 1.5-2 metre square box to accommodate the volume of material. For an easy fix, use four pallets, screwed or held together with wire. The base needs to be open to the soil below to allow worms to enter the pile. Line the pallets with cardboard to ensure you retain all the material and insulate the pile.

The moisture in the green material will generally be enough to keep the heap moist, test the middle from time to time to ensure it's not drying out. If it is dry simply water to get it cooking again, so it's moist but not wet. To control the amount of water within the pile a cover will be needed to keep out the rain as a wet pile won't heat up. The secret is to have control of the four elements at all times.

Where does AIR come in? A compost heap is a living, breathing system and needs oxygen to live. To keep the heap aerobic for the bacteria doing all the work you need to keep air in or it will die. Once the heap is full, tip it out onto the ground then throw it back into your box. The heat, which is always hottest in the middle of the pile, will be dispersed to the rest of the heap, giving the weed seeds that have been lurking around the edge the chance to get cooked. A compost bin of that size will realistically take around three months to fill and around six months after that you should have a bin of "Black Gold," an amazing, biologically rich addition to your soil!



A pallet bin

PERENNIAL VEG

Based on information from a workshop by local social enterprise Northern Lily, Anna from Operation Farm outlines some climate-resilient perennial food plants we could be growing.

One way to become more resilient and sustainable in the face of changes to the climate is to grow a wider variety of food plants. We tend to rely heavily on a relatively small selection of annual vegetable crops, but as the challenges of climate change require us to look for drought, disease and pest resistant options, there's a growing interest in growing perennials to enjoy harvests year round.

Perennials are plants that live for more than two years, mostly cold hardy plants that die back in winter and return in spring. They can live for a long time and require much less work and maintenance than annuals, though for many you'll need to regularly propagate/ divide plants to ensure vigour and taste and in some cases stop them overtaking the garden.

They are mostly easy to propagate and share with others and can be cheaper, without the need to buy seed every year. You may only need to acquire them once, then with a little maintenance can be in your garden for years to come!

There are significant ecosystem benefits to growing perennials for food. Firstly without the annual cycle of removal and re-cultivation there's less soil disturbance and more organic matter is added to the soil as more roots stay in the ground and leaves can be allowed to fall and slowly decompose to further feed the soil life. In general keeping plants in the ground for longer protects the soil from erosion and will help it hold moisture. And because we aren't clearing them all away every year they can provide habitats and food for predatory and other beneficial insects.

From a growers perspective, perennials also provide harvests during times when annuals aren't available such as in spring, so complementing traditional crops. Furthermore, perennials' roots have more time to establish over a number of years, so they can take up minerals from lower down, providing additional nutritional benefits when we eat them.

So... there must be some downsides?

Most perennial plants will take more time to establish; in some cases it could be a few years before they yield well and you'll still need to protect, weed and mulch young plants during this time.

Many perennial greens can taste bitter once they flower so their availability is largely

They are mostly easy to propagate and share with others and can be cheaper, without the need to buy seed every year.

early in the season. You might want to research recipes and ways to eat them as in some cases the flavours can be stronger - a trade off for their ability to survive the colder parts of the year.

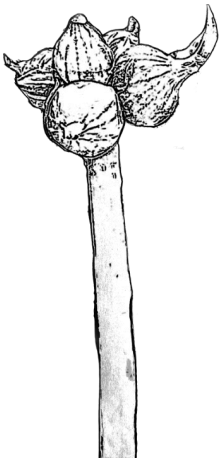
If you're already growing conventional veg, you will probably want a separate area for perennials as you can't rotate them with annual veg. This also means that disease issues can be a problem if they strike, as you have to get rid of the plant altogether, something to watch out for if you're getting shared plant material as brassica viruses in particular can be an issue. However, as they have deeper roots they tend to be more robust and disease resistant and they are suited to growing in a polyculture (lots of different plants mixed in together) which can really help with confusing pests.

Which ones to grow?

Rhubarb, asparagus and globe artichokes are all familiar in our gardens and many veg plots have areas for them. Here are some others to consider for a perennials plot:

- **Taunton Deane perennial kale:** one of the most prolific and best tasting of perennial Kales - a tall plant with broad tender green leaves available all year round.
- **Egyptian Walking Onion**: Onion like plant with edible stalks, bulbs and a cluster of bulblets in place of flowers, which if left will bend to ground so the plant can walk.
- **Sorrels:** Leafy plants with long tap roots providing nutritious leaves from spring to autumn. Garden sorrel, sheep's sorrel and red sorrel are common species for eating.
- **Jerusalem artichoke:** Tall flowering plant in the sunflower family, with tubers typically 7.5–10 cm long with a sweet nutty flavour, harvested from November.
- **Wild Garlic:** Shade tolerant with a distinctive garlicky aroma, but milder flavour when briefly cooked. Most people eat the leaves but flowers and bulbs are also edible.
- **Hablitzia:** Caucasian spinach: an edible, shade tolerant climbing plant.Once established provides plentiful mild tasting leaves from Feb - June and tasty young shoots in spring.

This is just a starting point; there are lots more perennial food plants and seeds available to buy, with more being discovered and improved all the time. For plants/ seeds as well as cooking ideas check out the resources listed in the further reading section at the back.



Egyptian Walking Onion

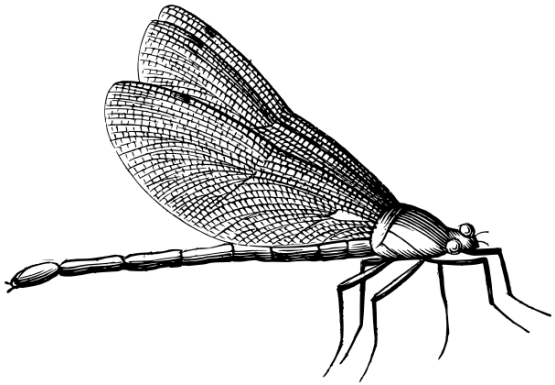
More Buzz Than Just Bees

Elsa Little of The Orchard Project introduces helpful bugs in the garden! We know that invertebrates are on the decline. There are many reasons for this from industrial agriculture, land use change, and the use of pesticides. Plenty of our ornamental flowers are not doing invertebrates any favours as they have little value to our pollinators.

Luckily, many invertebrates can bounce back quickly if the right ingredients are put in place. When considering attracting any wildlife to your garden it's important to consider providing them with food, shelter, and a place to breed.

For example, it's great if we can attract damselflies and dragonflies to the garden, but if we do not have a pond they will have to travel elsewhere to lay their eggs. Most of us are fans of ladybirds as we know that

The UK boasts over 4,000 species of beetles that play important functions in our gardens.



their larva and the adults eat aphids. There are many other insects that deserve our attention. Let's learn about them.

Lacewings

There are many species of lacewings in the UK all of which are voracious predators with aphids on the menu. They even camouflage themselves by sticking carcasses of aphids on their backs so they can eat more undetected. A great invertebrate indeed. Adult lacewings also forage on nectar rich plants.

Hoverflies

These often yellow and black flies can be mistaken for bees or wasps. Hoverflies often stay in one place 'hovering' similar

to a kestrel in the air. They are also called 'flower flies' in other countries. There are over 280 species of hoverfly, some of which are predatory eating aphids. They are an overlooked pollinator and I personally think they are beautiful!

Beetles

When we think of pollinators, we often don't think of beetles, but they are in fact one of the top pollinators worldwide. The UK boasts over 4,000 species of beetles that play important functions in our gardens such as pollination, predation and decomposition. Let's hear it for the beetles!

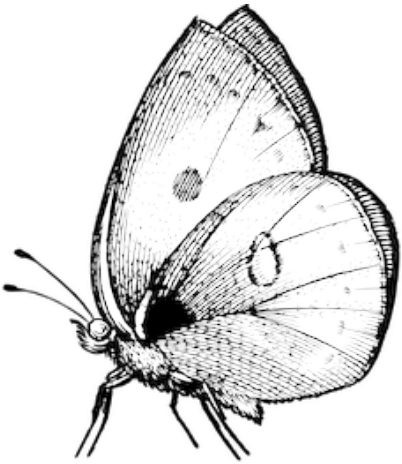
Attracting Invertebrates to your garden

Nectar Rich Plants

It's not surprising that you need to include a wide variety of flowering plants to attract a wide variety of invertebrates. Opt for flowers with different flower sizes and different shapes. Insects that pollinate and feed on foxgloves may not be suited to forage on an umbellifer flower, like meadowsweet.

More habitats

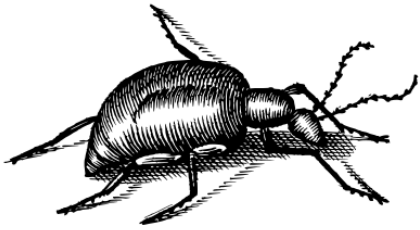
It's obvious that insects need food which can come from flowering plants, but they also need a place to rest. Creating a mosaic landscape with little habitat niches will really help. This could be a log pile, an area of tall grass, or even some areas of bare soil (important for bumblebees as they nest in the ground). A dead hedge (leaves, sticks, and branches piled up in a row) can provide a great habitat for a wide range of invertebrates, including beetles.



Water

Water in your garden is so important. Even insects need a drink! Putting out small shallow dishes filled with stones can be a great resource for many invertebrates. Just make sure that you fill it up regularly and that there is a clear way to get out of the water. Having a pond, even a small one, is one of the best ways to boost biodiversity. You are providing a source of water, are able to grow aquatic plants which will attract different wildlife, and have created a place for many invertebrates to breed. Plus, ponds are just good fun!

Elsa Little works as an ecologist and has a background in agroforestry and permaculture. She is the Greater Manchester Project Manager for The Orchard Project and loves spending her time collaborating with others to create a just and regenerative food system.



FURTHER READING

Peat Information and Peat-free compost

- **What's so Special About Peatlands? IUCN** leaflet, download from www.iucn-uk-peatlandprogramme.org/about-peatlands
- **Garden Organic Campaign and information on peat free growing** www.gardenorganic.org.uk/get-involved/campaigns/for-peats-sake
- **Garden organic detailed factsheet on home made potting mixes & ingredients** www.gardenorganic.org.uk/sites/www.gardenorganic.org.uk/files/resources/fflp/A38-Making-potting-mixes.pdf

No Dig and Soil Care

- **Charles Dowding**: books, videos online courses - www.charlesdowding.co.uk
- **Stephanie Hafferty**: Blogs and videos - https://nodighome.com

Fungi and Soil Ecology

- **Video** https://thisnzlife.co.nz/how-mushrooms-can-transform-the-soil-in-your-garden
- Book: Entangled Life: How Fungi Make Our Worlds, Change Our Minds & Shape Our Futures. Merlin Sheldrake (2021), Random House Trade Paperbacks.

Perennial Vegetables

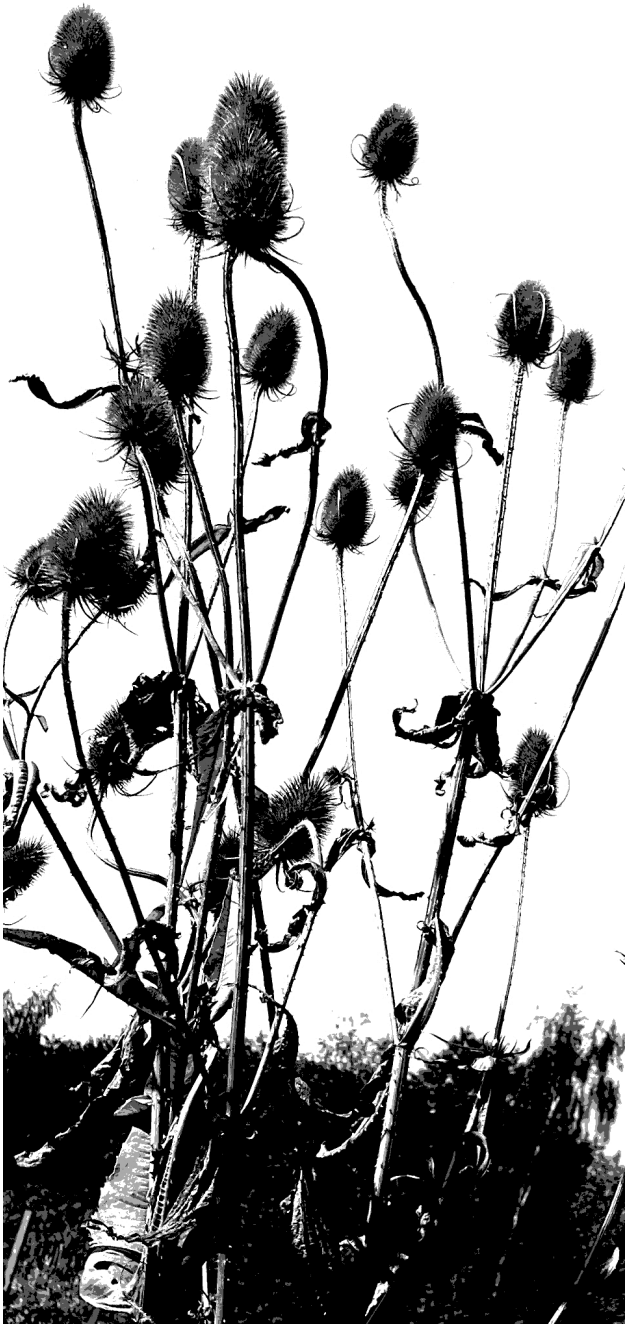
- **Incrediblevegetables.co.uk** - sells seeds and plants, has a good selection and are committed to breeding & developing good strains of perennial vegetable varieties.
- **Backyardlarder.co.uk** - supplies seeds, advice also for book list of recipes - https://backyardlarder.co.uk/2019/05/perennial-vegetable-recipe-books
- See also **books by Martin Crawford and Stephen Barstow.**

Organic Pest and Disease Prevention and Garden Biodiversity

- **Garden Organic** www.gardenorganic.org.uk/expert-advice/garden-management/pests-and-diseases
- **Buglife.org.uk** Bug friendly gardening guide - www.buglife.org.uk/get-involved/gardening-for-bugs
- **Identification guides and directory**: www.buglife.org.uk/bugs/bug-directory

Sustainable Community Food Projects

- **Good to Grow** - online platform to support food growing in the UK, run by Sustain to support getting people involved in their local community garden. www.goodtogrowuk.org/aim
- **Capital Growth** - London Network of community gardens - toolkits & community food guides available to download at www.capitalgrowth.org/toolkits_and_guides



OPERATION FARM

Produced by **Operation Farm** with funding from
The National Lottery Community Fund.

Printed on recycled paper. Outer sleeve made from 40% post consumer waste + 15% natural plant fibres.

Printed using Risograph SF5350 by KIN.DER
in Glossop, 2023 (www.kin-der.co)