

TAKING CARE OF THE SOIL IN AN ORGANIC GARDEN



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Taking care of the soil is one of the most important things in organic gardening. Permaculture teaches us that we should care for this planet that we call home, as well as taking care of people. We should make sure that we do not take more than our fair share and should return surplus to the system, all while working with nature, rather than fighting against it.

The systems that we put in place to care for the soil in our gardens offer some of the clearest examples of these core permaculture ethics. When we take care of the soil, we can take care of the natural ecosystem and make sure it is not degraded. We can produce food in abundance to care for ourselves, our families and even our wider communities. Waste materials from our gardens and homes can be funnelled back into the enhanced ecosystem in order to perpetuate the natural cycles.

By adhering to certain practices, organic gardeners can make sure that they can continue to harvest food from their gardens for years to come, in a way that will not deplete resources and will make the most of the land. In fact, by gardening organically, using permaculture methods and practices, we can not only conserve but also enhance the soil ecosystem.

Why Soil is So Important



The topsoil in which we grow our food is a valuable resource. It contains water, nutrients and minerals which allow plants to grow. This may sound obvious, but many people fail to properly consider that the soil is an ecosystem like any other, and like many other ecosystems on earth, this is an ecosystem that is often now under threat.

Bacteria, fungi and other organisms like earth worms work together beneath the surface – the hidden helpers in our growing efforts. All of these elements work together to create the soil web – the hidden guild without which we could not grow the food we need to eat and the other plants that

sustain life on this planet.

It takes 1,000 years to build up just three centimetres of top soil, which is why it is so vitally important that we all begin to take better care of the soil we have, and look to the future before it is too late.

Threats to the Soil Ecosystem

Globally, soil degradation is a huge threat to food security and our continued survival as a species. It is important that we all become more aware of the importance of the topsoil on our planet. Over 40% of agricultural soil on our planet is already classed as degraded or seriously degraded. In the last 150 years, half of the topsoil on the planet has been lost.

Soil is degraded by the use of herbicides, pesticides and other harmful chemicals. The fragile soil web is damaged by over-fertilisation, by tilling or digging, by the loss of vegetation which protects it from run-off, erosion and nutrient leaching, by mono-crop planting and other harmful agricultural practices. If things continue as they are, we could have as few as 60 years of farming left. It is a depressing picture.

But by using organic gardening methods to protect our own patches of soil, however small, we can play our own small part in providing food security for humanity on our swiftly warming planet.



In our gardens and on our farms, an awareness of how a soil ecosystem operates can help us take measures to ensure its continued health.

No Dig Gardening & Mulching

Sometimes in organic gardening, what we do not do is more important than what we do. Experienced gardeners soon learn that sometimes it can be a good policy to leave things alone and let nature do its thing. This is in no instance more true than when it comes to the soil. The soil web functions at its best when given the basics it needs and then left as undisturbed as possible to do its job.

Permaculture espouses the idea of 'no dig' gardening. In no dig gardening, the soil is left as undisturbed as possible. Rather than 'digging in' or tilling organic matter into your garden vegetable beds, you will instead layer it on top of the soil as a sheet mulch. Amazingly, the hidden garden helpers – bacteria and fungi in the topsoil – will help to break it down and can work undisturbed to move water and nutrients to where they are needed. Most soils will be sufficiently aerated by the action of earthworms and other creatures which live beneath the soil surface.

The type and quantity of mulch that you lay in order to retain fertility in your soil and to protect it from wind, water and degradation will depend on the soil and weather conditions where you live, as well as which plants you wish to grow.

However, some common mulches are:

- Straw (or partially composted straw or 'strulch')
- Bark/woodchip/wood shavings
- Bracken
- Seaweed
- Grass clippings
- Comfrey leaves (or other weeds/plant leaves)
- Dead leaves or partially composted leaf mould
- Garden compost



These are just some examples of the materials that can be used to help protect and feed the soil that might be found in your garden or in the wider local environment.

Mulching not only protects and feeds the soil, it also helps to retain moisture for water-wise gardening or farming, and it can also aid in keeping weeds down in your annual growing areas.

Improving the Soil Where You Live



If you are interested in creating a new garden, or simply in improving your existing one and giving it a sustainable makeover, considering how to improve the soil is a good place to start.

There are several reasons why we want to improve the soil. The first reason is to improve the nutrient profile and make sure it has enough 'food' to feed growing plants. The second reason is to improve the soil's ability to retain water, or allow it to drain. The third reason is to make sure that the soil ecosystem functions as it should.

Once you have spent some time examining the soil in your garden, you will be able to answer questions about it and determine which problems you will need to address. For example, if you have a heavy clay soil, you will likely have a good nutrient profile but will need to address issues of waterlogging and compression (when the soil packs down hard and plant roots can lose the oxygen they need). Another example is a sandy soil, which is low in nutrients and extremely free-draining. For both problems, however, the answer is the same – add organic matter. Organic matter can be added in the form of mulches, such as those listed above.

Of these mulch materials, garden compost is, arguably, the most important. Making compost is an essential skill for any organic gardener, especially for organic gardeners who want to protect, and even improve, the soil where they live. If you do not already have a composting system in place it is essential to begin one right away.

Composting

There are a number of different ways to create compost. The main methods used in a permaculture garden are:

- **Composting in Place** (Sheet mulching with organic materials and allowing them to decompose on top of the soil of your growing areas.)
- **Cold Composting** (Creating a heap or large bin in which compost is slowly created.)
- **Hot Composting** (Creating the conditions for faster, warmer decomposition in a bin or other container.)
- **Vermiculture** (Creating compost with the help of special worms.)



No matter which method you are using to create your compost, the principles at play remain the same. You are taking organic materials that are considered to be 'waste' and creating the conditions for their decomposition. Creating a good compost involves a basic understanding of the different sorts of material in a compost heap.

The materials are usually grouped into two categories – carbon rich 'brown' materials and nitrogen-rich 'green' materials. Both types are needed in order to create a good-quality compost. Brown materials include cardboard, straw, twiggy material, wood chips and bark. Green materials include green leafy matter, grass clippings, and fruit and vegetable scraps. In order to get a good mix in your compost, you should add 'brown' and 'green' materials in thin layers. Adding in thin layers allows for the right conditions for aerobic decomposition and helps to ensure that your compost does not become too wet or too dry.

In addition to thinking about getting the right mix of carbon-rich and nitrogen-rich materials in your compost, creating good compost also involves thinking about getting a good balance of the main nutrients that plants need to grow: nitrogen, phosphorus and potassium, as well as the various micro-nutrients needed by plant life. Adding a good mix of different ingredients to your compost will help to create compost with a good nutrient balance.

Biochar



Another way to improve soil is through the use of biochar. The use of biochar – made up of the words 'biomass' and 'charcoal' - as a fertiliser has a history stretching back hundreds if not thousands of years.

Various native peoples, including the Pre-Colombian Amazonians, are believed to have covered burning biomass with soil as a means of enhancing soil productivity.

Charcoal is a material created by burning wood or other organic material in the absence of oxygen. Biochar is charcoal that has been soaked in a compost mix to enrich it with nutrients. Biochar has been used as a soil-amendment to improve fertility in certain soils, and is also under consideration as a means of sequestering, or trapping carbon to reduce carbon dioxide in the atmosphere.

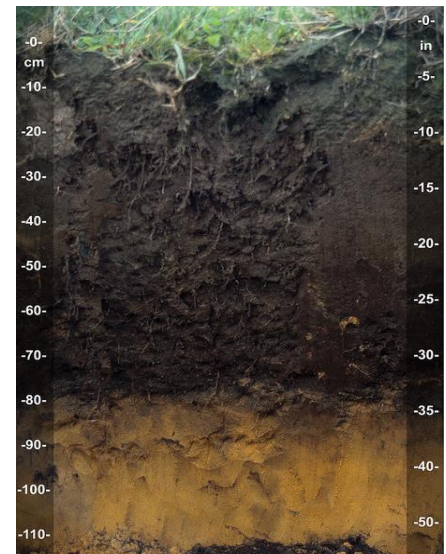
Adding biochar to the soil in your garden or on your farm can:

- Improve water retention in the soil, reducing watering needs and aiding plants.
- Increase the retention of water-soluble nutrients in free-draining soil.
- Reduce soil acidity (often of benefit for growing vegetables).
- Be beneficial for crops requiring high potash (fruits).
- Improve soil biodiversity and aid soil micro-organisms.

You could consider making your own biochar at home.

If you plan to make biochar, the easiest way to do so is in the ground. Native peoples in the Americas used this technique to create more fertile growing areas. After you have harvested summer crops from a growing area, dig a pit and fill this with wood. Then simply set this alight and cover it with a blanket of soil to exclude oxygen. Once the area has stopped smouldering, simply water the area with a nutrient rich compost tea, which will be absorbed by the porous charcoal.

You could also consider using primitive techniques and garden resources to create a charcoal 'oven'. Make a tipi-like stack of wood and cover it with mud/clay, leaving a hole open at the top. Make temporary ventilation holes around the base. Light a fire at the top and allow the fire to spread down through the structure. When you see flames through the holes at the base, block all the holes to exclude oxygen. Leave overnight. The next day, create a door in the oven and break it open to retrieve what remains inside. There will be some partially combusted wood and ash, but should also be plenty of charcoal. Soak this charcoal in compost 'tea'. You can then reuse this mud/clay structure to make more charcoal if you wish.



Planning & Planting for Soil Health

When thinking about the soil in your organic garden, it is important to consider it not only as an ecosystem in its own right, but also as part of the wider ecosystem, including humans, wildlife and, of course, plants. What you plant, where and when, will help to keep soil healthy and feed and improve it over time. Some common practices to help care for the soil in organic gardens include:

Soil Stabilisation through Tree Planting



Re-Foresting in the Philippines

On sloping sites, trees and shrubs can be planted to stabilise the soil and prevent water run-off and erosion. The plants roots will help to fix soil in place, and catch and store water from rainfall. Planting trees is often one of the first steps in re-claiming land that has become degraded. Not only will climate-appropriate planting help to stabilise the soil and catch and store water, it will also provide a source of biomass for soil amendment, shade for people, wildlife and other plants, and, of course, will also help capture and store carbon dioxide. Over time, tree planting can improve biodiversity – even deserts can be 'greened'. In designs for almost all gardens, however small, tree selection and placement will usually be the first stage of planting.

Polycultures & Companion Planting

One of the key features of permaculture gardens and farms are polycultures. Rather than just planting one crop, organic gardeners and farmers combine different plants to create more biodiverse growing areas. This can help to create and maintain a healthy soil ecosystem.

Some plants in a polyculture are included due to their ability to dynamically gather nutrients from

the air, or from deep below the soil surface. Through beneficial bacteria on root nodules, legumes and other nitrogen fixers gather nitrogen from the air and deliver it to the topsoil, where it can be taken up by other plants. Deep rooted plants, such as comfrey, borage, yarrow and dandelions can be chopped and dropped to return nutrients that have been washed deep below ground to the topsoil.

Other companion plants, such as marigolds, have particular effect on the soil web. Marigolds aid plant health by producing a pesticidal chemical from their roots which will repel nematodes and other pests – even for a number of years after they are gone.



Crop Rotation

In annual planting schemes, growing the same crops in the same patch of soil year after year can cause that soil to become degraded, and depleted of the essential nutrients that plants need to grow. Organic gardeners and farmers rotate certain families of crops, as well as companion planting. Crop rotation helps to avoid soil degradation, and also helps to reduce incidence of pests and disease.

Planting Cover Crops

Bare soil is something to be avoided in an organic growing system as much as possible. Bare soil is vulnerable to being blown or washed away, or leached of water and nutrients. In permaculture growing systems, cover crops (which offer a range of different benefits) are used to cover and protect the soil throughout the whole year.

The soil ecosystem is complex. But taking care of it is relatively easy. Make sure you take care of the soil in your organic garden or on your organic farm and it will continue to provide for you for years to come.

About the Author

Meet Elizabeth Waddington

Elizabeth Waddington is a writer and green living consultant living in Scotland.

Permaculture and sustainability are at the heart of everything she does, from designing gardens and farms around the world, to inspiring and facilitating positive change for small companies and individuals.

Elizabeth also works on her own property, where she grows fruit and vegetables and keeps chickens and is working on the eco-renovation of an old, stone barn.

