SOIL-IDARITY FOREVER!

a grower's guide to taking care of our soils

written and illustrated by rosa for BHOGG

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Imagine an infinitely intricate universe, full of strange three dimensional worlds built by zillions of microscopic creatures. These worlds are so tiny that the laws of physics don't apply; there is no light, and the atmosphere is 100% humidity.

There is no sound, because sound waves can't travel. Instead there is a symphony of chemical vibrations and a mosaic of atmospheric gradients that go from 100% CO2 to 100% oxygen in the space of a few hundred micrometres.

This strange teeming universe turns death into life and holds more carbon than the Earth's atmosphere and all of the world's plants and forests combined.

"We are the soil. It is no accident that the words "humus" and "humans" have the same roots."
- Vandana Shiva

What is soil made from?

The formation of soil begins with the parent rock, which is slowly broken down by weather, chemical erosion and the roots of plants. Over hundreds of years, healthy soil settles into six layers, or horizons.

It is the top few layers that we gardeners work with most. In fact, 95% of global food production and the existence of most of life on earth relies solely on the top six inches of soil covering our planet.

This precious and fragile top layer of soil is made from a combination of the atmosphere, (air), the lithosphere, (rocks and minerals), the hydrosphere, (water), and the biosphere, (living organisms and their dead remains, including humans!).

These components are arranged and rearranged in incredibly intricate ways by soil organisms. Soil organisms break down organic matter; without them nothing would ever decay and we would all be drowning in an ocean of vegetable peelings, prunings, dead things, and fallen leaves.

Broken down organic matter is called humus. Humus is a sticky glue-like substance, with which soil organisms bind all the other components of soil, like mineral particles and chemical compounds, into a complex architecture of little structures called aggregates. Between these aggregates are pore spaces, containing air and moisture, forming microhabitats for plant roots, microbes, and fungi. These aggregates are what give healthy soil its fluffy crumbly structure. Soils rich in humus, and therefore aggregates, also store huge amounts of carbon, hold more moisture, and prevent the erosion of nutrients, minerals and pollutants.

Woodlice can break down environmental pollutants like heavy metals!

soil aggregates

It is estimated that more than half of all species on Earth live in the soil, and most of these are minuscule microorganisms. A single teaspoon of healthy soil contains more living organisms than there are humans on the planet, and up to 10km of microscopic thread-like fungi. You could fit ¼ of a million soil-dwelling bacteria on a pinhead, in case you felt like trying...

Soil is a alive and breathing...

Soil is spun in symbiosis, a living breathing community full of complex webs of relations that have evolved over 500 million years.

It is this diversity of symbiotic relationships that enables life on Earth to thrive. Up to 90% of plants rely on mycorrhizal fungi to access soil nutrients, feeding the fungi carbon in the form of sugars in return.

endophytes

Many plant hormones essential for growth are produced by bacteria that live inside the plant, just like we rely on bacteria in our guts.

hooray for microbes!

In fact, Lactic Acid Bacteria, found in yogurt and other fermented foods, are beneficial to both soil organisms and our gut microbes!

Plants also feed other soil microbes via their roots, or provide them with shelter such as the root nodules housing nitrogen-fixing bacteria in peas and other legumes.

root nodules

mycelium

Clay Silt Sand

Soil minerals are divided into 3 classes. The percentage of each determines the soil's texture.

No two soils are alike. The varying amounts of different minerals, nutrients, and organic matter are what determine the characteristics of different types of soil and the different ecosystems that sprout from them.

Most soils are made up of a combinaton of sand, silt and clay. Soils with more clay particles will feel sticky when wet, have poor drainage, but good water and nutrient retention. Much of Brighton is on chalky soil. Chalky soil is often shallow, low in nutrients and very free draining. However, it often warms up faster in spring and will not become waterlogged and heavy like clay.

You can do a simple tests at home to get to know your soil by scanning the QR code on the other side.

There are 26 species of worm in the UK.

Earthworms are excellent soil stewards. They improve soil structure by mixing and aerating soil and breaking down organic matter. Worm poo contains 5 times more nitrogen, 7 times more phosphorus, and 1000 times more beneficial bacteria than the original soil they ingest. They are nature's soil engineers, doing the digging in our gardens for us!

Please turn over...

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Why should we care?

Aside from being the source of 95% of global food production, healthy soils, or soils rich in organic matter and aggregates, sequester more carbon than the atmosphere and all of the world's plants and forests combined.

Healthy soils also grow healthy plants, rich in nutrients and beneficial bacteria, which in turn grow healthy happy human beings, bees, birds, and everyone in between who take better care of each other and the soil.

They enable the thriving of every ecosystem on the planet by regulating the nutrient cycle, the water cycle, and the carbon cycle, preventing flooding, erosion and climate chaos.

Nearly half of the world's topsoil has been lost in the last 150 years.

It takes up to 400 years for a single centimetre of top soil to form, and 3,000 years for that soil to become fertile (plentiful enough and with enough soluble nutrients to support plant growth).

Nevertheless, every minute we lose the equivalent of 30 football pitches of fertile topsoil. At this rate, it is estimated that we have roughly 50 harvests left.

soil-idarity forever!

The last 150 years has seen the explosion of industrial agriculture, an intensive form of agriculture that puts profit over people and the planet. Plants and seeds have been genetically modified and patented to require vast amounts of chemical inputs. such as artificial fertilisers, pesticides, herbicides and fungicides.

Needless to say, these chemicals are disastrous for soil biodiversity, and without that biodiversity there is no humus, and no soil aggregates so top soil and all the carbon it holds is lost to the atmosphere.

Land, sea, rivers and sky have been poisoned in the process and we have lost our right to healthy nutritious food and autonomy over its production.

WE ARE ALL

SOIL

"The dominant economic model that shapes the food system in the UK and beyond is inherently violent. This is because its foundations were built with the intention of pursuing profit and enhancing corporate control rather than actually feeding people. This industrial-scale intensive way of producing food has brought us to a situation where our natural resources are depleting, biodiversity is in rapid decline, millions are dependent on food banks for survival, our collective health is suffering, and international trade deals continue to deliberately reinforce neo-colonial control over the Majority World."
-The Landworkers' Alliance

It is easy to feel small, powerless and hopeless in the face of climate breakdown and systemic injustice.

"A garden is a nursery for nurturing connection. And its power goes far beyond the garden gate..."
-Robin Wall Kimmerer

But we as gardeners each have a unique and incredible corner of these precious six inches of soil. No matter how small, a corner of well-tended soil is one less lost to a handful of greedy fossil fools, and one more corner helping our communties thrive.

compost capitalism!

Taking Care of Our Soil

Soil your pants!

Get to know your soil! How does it feel? Are there lots of earthworms? How does it smell? There are lots of things you can do to get to know your soil, including burying a pair of underpants! Scan the QR code for some DIY soil speed-dating!

Keep it covered!

think like a fungus

Keep the soil covered! All the microbes and earthworms and wonderful creatures in your soil need protecting from the weather and erosion, just like we need shelter too. Nature does this by keeping soil covered, either with living plants like in a meadow, or with organic material, like fallen leaves. We can do this too, using organic material as a mulch- such as fallen leaves, straw, wool, cardboard, or even seaweed, mulching between plants in our gardens.

mulch mulch mulch

Compost is COOL!

Compost is vital to soil health. Rich in organic matter and humus, it feeds soil biodiversity and improves soil structure. Composting also reduces waste, recycling nutrients from our gardens and kitchens back into the soil, rather than removing them and depleting the soil. Composting is a way of giving back to the soil just as the soil gives to us. Composting is often made to seem very complicated, but it really is very simple. Scan the QR code to find out how to make compost!

Do not disturb!

Digging and disturbing the soil destroys the mycorrhizal networks, the delicate web of fungi that distribute nutrients (and even enable plants to communicate) in the soil. It also exposes bare soil, releasing carbon and harming the organisms living beneath the surface. However, sometimes as gardeners we have to dig and disturb a little bit, just like other creatures do. The reason why weeds pop up so quickly on bare soil is because it is nature's way of repairing soil, by getting plants to cover, feed and protect the soil. So if you do have to disturb the soil, feed and cover it as soon as possible afterwards.

Feed the soil!

Feed the soil! Soil biology doesn't just need shelter, it needs feeding! The more organic material we feed our soil, the more diversity, and the healthier our soil and plants will be. Keeping plants in the soil as much as possible is also key- plants feed soil organisms via their roots, who in turn make soil nutrients available to the plants. Feed your soil with organic compost and other feeds like liquid seaweed or microbial teas.

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