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SOIL IS ALIVE!

Protecting soil in allotments

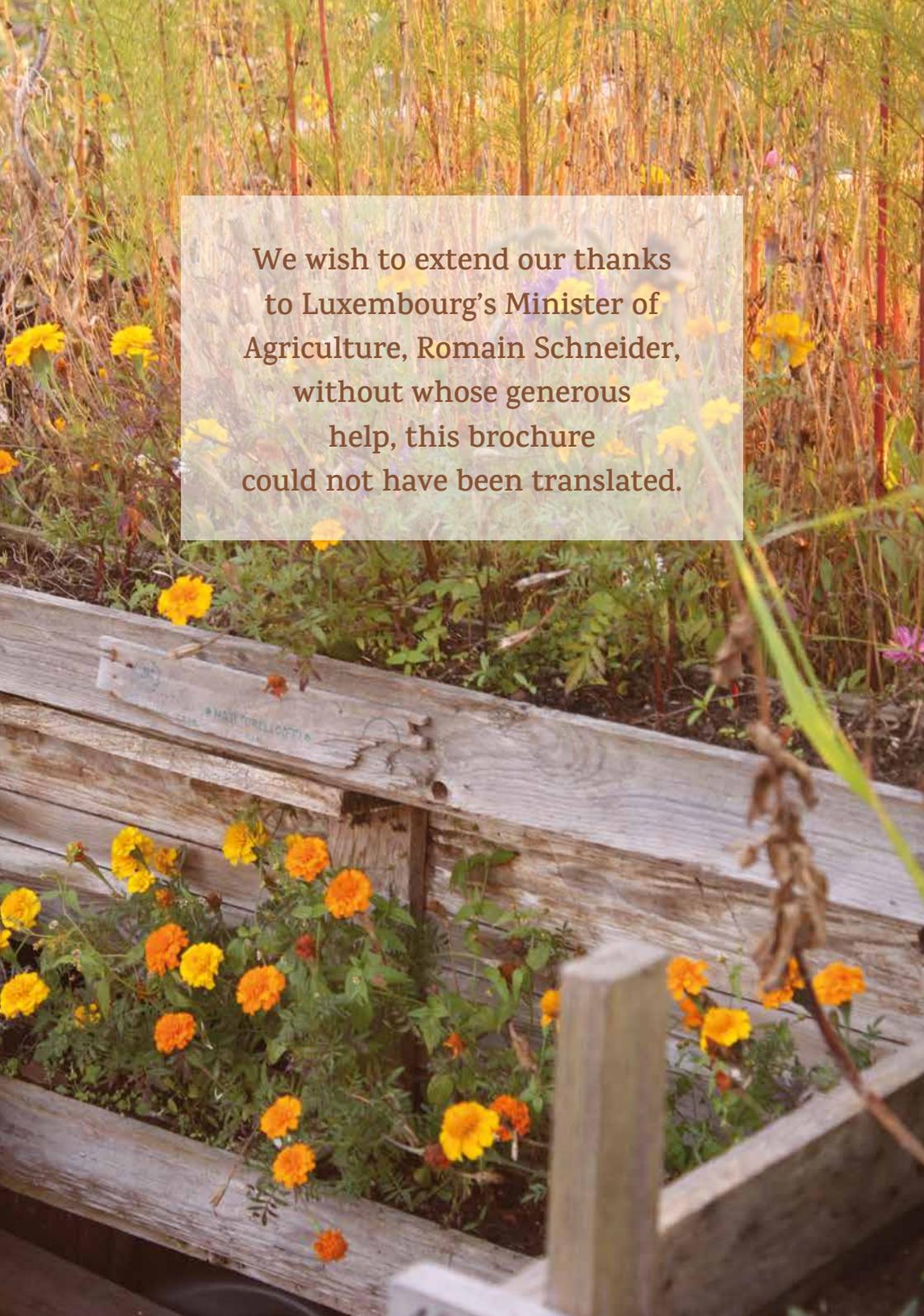
Office International du Coin de Terre et des Jardins Familiaux
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A STUDY

SOIL IS ALIVE!

Protecting soil in allotments





We wish to extend our thanks
to Luxembourg's Minister of
Agriculture, Romain Schneider,
without whose generous
help, this brochure
could not have been translated.

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FOREWORD



Romain Schneider, Minister of Agriculture, Viticulture and
Rural Development for Luxembourg

Small gardens, a huge impact!

In today's society, the importance of a garden is not limited to a place where gardeners grow fresh and healthy food, now it is an oasis where man is in harmony with nature and the environment. Gardening is experiencing a rebirth as a place where people can experience how to deal with nutrition and health and how to live together.

However, this symbiosis between man and garden can only exist if gardeners appreciate and care for their gardens, and above all the basic material of these gardens, the soil. Soil must be considered as the foundation of any garden.

I am delighted that the Office International du Coin de Terre et des Jardins Familiaux has produced this brochure, which deals with both the basic knowledge of the soil as well as with topics such as soil care, fertilisation and composting. The brochure will be available through national associations, giving the numerous members an additional tool for use in engaging in sustainable gardening. By putting this brochure online, many interested gardeners throughout Europe can benefit from the information it provides.

A single small gardener working a healthy plot of soil can now secure sustainably good and healthy harvests for himself and his family. If diverse gardeners follow the principles outlined here, not only will significant food be produced, but also a major positive impact on the environment can be achieved. In terms of biodiversity, gardeners can assume a role similar to that of Noah's Ark.

FOREWORD



Malou Weirich, Secretary General of the
Office International du Coin de Terre et des Jardins Familiaux

„A garden represents cooperation between a gardener,
soil and plants.
In a garden, you become humble.
You are not the master of the garden;
nobody ever talks about dominating gardens.
Instead, everywhere people talk about cultivating a garden“.

Vandana Shiva, winner of the Alternative Nobel Prize

The thin layer of the earth

Gardeners across all borders unite through the love of gardens, which they also want to convey to their children and grandchildren. They want to grow healthy fruits and vegetables and thus provide their families with a high-quality diet.

At the beginning of the 20th century, there was already a fertiliser consultation in France and Germany to help small gardeners to work according to the findings of this time.

Of course, there then came the time when chemical products were seen as progress and panacea, before more and more nature-conscious people sounded the alarm. The small gardening federations called on and trained their members to avoid using chemical crop protection and fertilisers.

The Office has also made its contribution to encourage gardeners to treat the soil with care. In 1994, a brochure was published on natural gardening with the financial support of the European Union, the Council of Europe and the Luxembourg government. On behalf of the Office, representatives from Belgium, Germany and the Netherlands prepared guidelines for soil analyses. In 1997, a certificate of honour for natural gardeners was created to reward the efforts of small gardeners and to motivate other gardeners. The achievements have been considerable. The honorary certificate has been awarded 69 times to date.

But we haven't yet achieved our final goal. The efforts to garden with a view to preserving the soil are a never-ending programme. Highly qualified technical advice must be sought and further developed. The 38th International Congress in Vienna was a step in this direction.

The „Soil is Alive“ publication is an important part of this effort. It is a „must read“ for small gardeners.

At the same time, it illustrates to the authorities, international organizations and the general public that more than two million gardeners are committed to maintaining healthy soil.

We are grateful to the BDG for having taken the initiative for this brochure.



1 Protection and care of soil in allotments (An overview)

Soil fact sheet



- In 2013, the General Assembly of the United Nations decided to declare 5 December “World Soil Day”.
- Number of living things in a handful of soil: in 0.3 cubic meters (equivalent to an area of one square metre 30 cm in depth) live 1.6 trillion organisms – in comparison „only“ 6.9 billion people are currently alive on Earth. Extrapolated to one hectare, this gives about 15 tons of live weight, which corresponds to about 20 cows. In other words: in one hectare of arable land all living organisms taken together weigh up to five tons; in forest soils, this figure can amount to up to 25 tons.
- In Germany, an area as large as about 66 football pitches is currently being built over each day with residences, roads and commercial properties.
- Earthworms shift up to twelve kilograms of earth per year in one square meter of soil.
- Rhodobacterium nodule bacteria, which live in symbiosis with the pea family, such as clover, bean or alfalfa, bind more than 300 kilograms of nitrogen per hectare per year.
- In 1998 a soil protection law was introduced in Germany.



1 Protection and care



- More than 90 percent of global food production depends directly on the soil.
- A total of 75 percent of the drinking water in Germany is extracted from the groundwater.
- Average Europeans currently need about 1.3 hectares of land to produce what they consume. Nearly 60 percent of these areas are outside the EU.
- One hectare of soil can produce 10 tons of wheat, but requires up to 200 kilograms of nitrogen and 80 kilograms of phosphate.
- A thimble-full of soil contains 1,000 unicellular organisms, 100,000 algae, 400,000 mushrooms and 600,000 bacteria.
- Dividing the acreage of land available worldwide by the current population of the earth results in an area of 2,000 square meters per person. This means that a piece of ground the size of a large swimming pool (40 × 50 meters) must feed a human being.





2 What does the term “soil” mean?

A little cultural and historical background on soil

Soil has been a crucial factor for people when they chose a place to settle down. In the transition from the culture of hunters and gatherers to that of the sedentary man who practices agriculture and livestock, soil was a fundamental element. The first settlements and cultures formed where the good soils existed.

Up to the time of the industrial revolution, most artisans and many workers were at the same time farmers, who farmed on more or less small plots.

It was only with the industrialisation of agriculture and the fall of food prices that the close ties between people and the soil came to an end.

Today, most people barely notice a connection between soil fertility and food production, as almost everything is available at almost any time. Gardeners, on the other hand, still strongly feel the connection between good soil and a good harvest.

It is no surprise that there is still much evidence of the importance of soil throughout our culture. For example, in the Bible man's primary ancestor is named „Adam.“ Some scientists translate this as „earthling“. The word comes from the Hebrew and means “human”. „Adama“ stands for the farmland. This illustrates the close connection between people and the soil on which they live and rely.



3 Right to land

Soil is a very particular element. It belongs to what we know as the environment, which means that like water and air, it is not a limitless asset and is basically available to all people. However, much land is privately owned. Because of its extreme importance, German Basic Law restricts the right to do whatever one wants with private property. Article 14 stipulates the following:

*„Owning property has obligations.
Use of land should also serve the public good.“*

With regard to soil, the German Federal Constitutional Court has ruled that land „cannot be equated with other assets, either in economic terms or with regard to social significance“. This established that owners have a special obligation to deal with land in a socially responsible manner, for example by complying with certain environmental obligations.

In 1998, an additional federal soil protection law was enacted. This is the so-called „everyman’s obligation“, which states that every person whose acts concern soil must ensure that no harmful changes are caused to the soil. In addition, landowners are obliged to undertake protective measures against the threat of harmful changes to their ground and to make provisions for preventing any occurrence of harmful changes to soil. These regulations clearly show the importance soil has for society.



4 The basics of Soil science

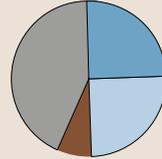
4.1 What is soil? A definition.

Soil is the uppermost living, weathered layer of earth crust subject to the effects of air and water. It generally consists of about 45 per cent of mineral particles originating from rock and half of air and water. The remaining five percent are living and dead plants and animals, which are the organic constituents.

But this is a limited way of describing soil. The really important thing about soil is how these components interact with each other. These interactions can completely profoundly influence the properties of a soil type and are basic to its fertility. Conversion processes are constantly taking place in the soil, rain and temperature promote very different processes in the soil, where nutrients are released or taken in, or plants growing and dying on the soil introduce humus and change the soil properties with their roots. Animals, bacteria and fungi transform matter and influence how the plants on the surface interact with the soil. Soil is a constantly changing organism in which countless processes take place simultaneously and influence one another.

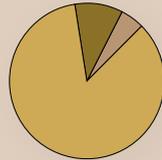
Soil is a living substance.

Composition and formation of soil



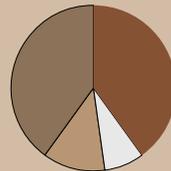
- Mineral substances 45 %
- Water 25 %
- Air 25 %
- Organic Substances 5 %

Composition of organic substances



- Root systems of plants 10 %
- Soil life = All organisms living in the soil 5 %
- Humus = Organic matter formed by dead substances 85 %

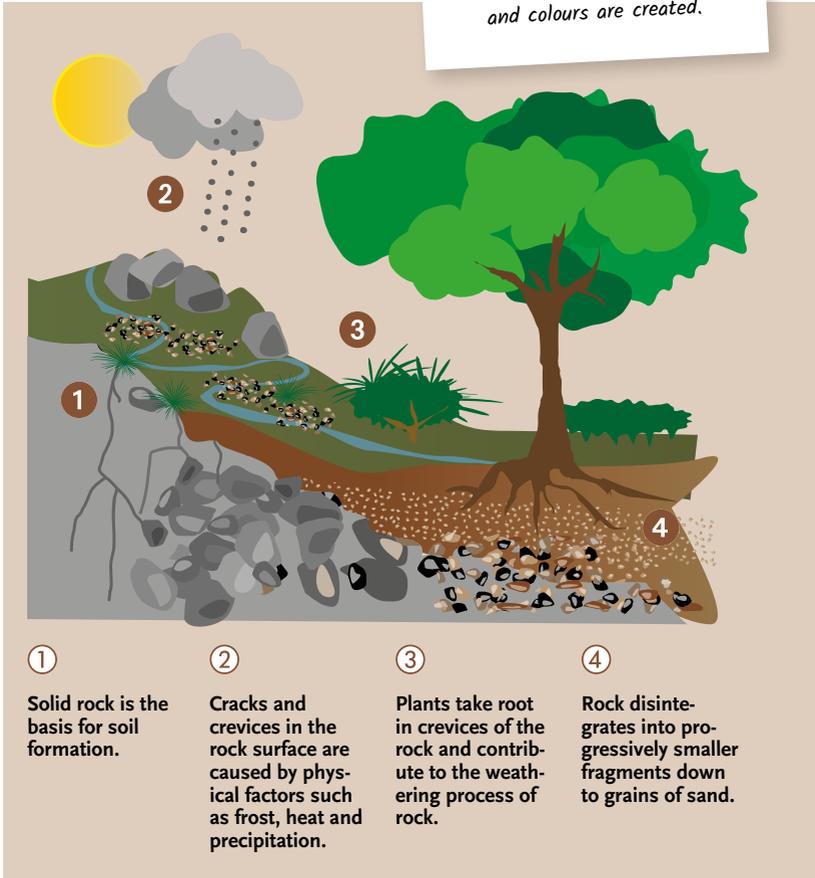
Composition of all organisms living in soil



- Bacteria and Ray Fungi = Actinomycetes 40 %
- Mushrooms and Algae 40 %
- Earthworms 12 %
- Remaining fauna 8 %

4.2 Soil formation

Depending on which rock is weathering, how humid it is, which plants are growing and which temperature prevails, different soils with different characteristics and colours are created.



There is soil, and soil. There are more than a hundred different soil types in Germany. It is amazing how different, for example, a forest floor is to arable land or to soil found in a flood plain. This is because soils are very dynamic structures and evolve under a variety of conditions.

4.3 Mineral Components

Basically, soil always evolves out of the rock that lies beneath it. This rock in turn consists of minerals. Over the millennia, rock is crushed by chemical (water or acid), physical (frost or friction), and biological processes (carbon dioxide resulting from the respiration of living things and water). This results in the solid soil constituents of sand, silt and clay (depending on grain size).

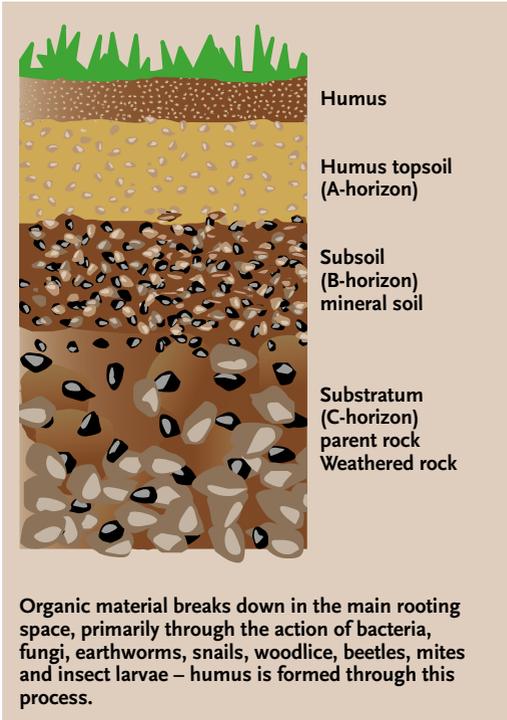
| | Sand | Silt | Clay (Fines) |
|--------------------------|--|---|--|
| Grain size | > 2 to 0.063 mm | 0.063 to 0.002 mm | < 0.002 mm |
| Water retention capacity | Large Voids  | Medium Voids  | Small Voids  |
| Circulation of air |  |  |  |
| Nutrient storage |  |  |  |

4.4 Organic Components

The second main component of soil is organic matter. This means the humus. It is formed through the action of organisms on and in the soil and is the sum of dead organic matter in the soil.

Although only about five percent of the soil consists of humus, it is mainly responsible for the fertility of a soil type. Garden soils usually contain significantly more humus because large amounts of organic matter have been introduced over many years in the form of compost, crop residues and sometimes manure or green manure. Humus is the decisive factor in determining the degree of structural stability that a soil type possesses. Without humus, there would be no life in the soil, as most soil organisms rely on plant remains for nourishment. A biologically active soil therefore needs humus.

4 Soil science



In biological processes, organic substances decompose under the influence of air, or decompose where no oxygen is available. Both of these processes produce humus, which mixes with the mineral soil, creating a fertile soil.

4.4.1 What is humus?

Humus plays a central role in the global carbon cycle. The term humus comes from Latin and means earth or soil.

Just as there is no typical soil, so there is no typical humus. Indeed, the dying off and transformation of plant remains depend very much on



soil life. Thereby a lot of different and sometimes very complex connections are created. Humus may be roughly divided into nutrient humus and permanent humus.



Nutrient Humus consists of parts of plants that can be rapidly decomposed by soil organisms. These are, above all, the herbaceous, soft, non-woody constituents which contain high amounts of starch, sugar, proteins, etc. They provide good food for soil organisms, which they mechanically reduce, break down and subsequently release nutrients that can be fully absorbed by plants. This process is called mineralisation. Nutrient humus is thus the easily convertible humus content, which remains only briefly in the soil. However, it is crucial for how fertile a soil is, because it is important for the nutrient supply of the plants. It contains, for example, a lot of nitrogen, phosphorus and sulphur, as well as many trace elements.

Persistent humus is an organic substance that decomposes only very slowly. It is comprised of mainly woody components that contain a lot of cellulose, or lignin, and therefore can be broken down only slowly. The soil organisms convert this organic substance very slowly, producing very small humus particles (humic substances) that decompose only with difficulty. They can remain in the soil for centuries and cause the typical darkening of a humus-rich soil. In light soils (e.g. sandy soils), permanent humus improves the soil structure and thus the water, nutrient and air balance. It helps to make heavy soils more porous so that they are better aerated and heat up better. The stable ground particles of persistent humus are good for the biological activity of the soil and habitat of many microbes.



C to N ratio

The C to N ratio indicates how much carbon is present in relation to nitrogen in a material. For gardeners, this is important to be able to estimate how quickly a material decomposes when it becomes compost, for example.

| Compost | Carbon (C) | Nitrogen (N) |
|------------------------|------------|--------------|
| Grass cuttings | 10–25 | 1 |
| Green kitchen waste | 10–25 | 1 |
| Manure | 10–30 | 1 |
| Green vegetation waste | 20–60 | 1 |
| Leaves/Pine needles | 30–80 | 1 |
| Straw from crops | 50–150 | 1 |
| Bark | 100–150 | 1 |
| Pruning waste | 100–200 | 1 |
| Paper | 100–200 | 1 |
| Sawdust | 100–500 | 1 |
| Ash from burnt wood | 200–500 | 1 |

An optimum C to N ratio is in the range of 15-25: 1; conversion of compost will be rapid. If the ratio is too high (or if it is too low), the transformation and decomposition process in the compost is slower.

A C to N ratio of more than 25: 1 causes materials to slowly decompose by soil organisms resulting in a rather permanent layer of humus. With a narrower ratio, materials decompose faster and nutrient humus develops. Bacteria need nitrogen to achieve this. Because of this, they can break down nitrogen-rich material faster than that with low-nitrogen content. Grass clippings, for example, have a C to N ratio of about 15: 1 and degrade very rapidly, while straw from cereal crops has a C to N ratio of about 100: 1 and degrades very slowly.



How much humus is in the soil?

It is important for gardeners to be able to estimate how much humus is in soil. There is a simple trick to this: the colour of the soil tells you how much humus it contains. The darker the soil, the greater the humus content. A deep black-brown indicates that a certain garden soil is high in humus. The easiest way to read this is to examine molehills closely. Moles bring earth up from deeper to shallower layers, so you can save yourself digging. By looking at this material it is easy to identify the colour of the soil, especially the deeper layers.

4.5 Soil types and properties

If you know your garden soil type, you can draw conclusions about how to work the soil, which plants thrive on it and how it can improve the soil in such a way that it provides the best yields and keeps plants healthy. The fertility of the soil therefore depends not only on the humus content but also on the soil type.

Particle size of the mineral constituents of the soil is a determining factor in understanding soil types (see info box under 4.3.). Roughly speaking, there are sandy (very large grains), silty (many fine to medium sized grains) and clayey soils (many very fine grains). From these three soil types, there are all corresponding mixtures, such as clayey, silty soils. Silty soils are a mixture of all three grain sizes. The soil is named after which particle sizes occur in a given soil sample.



As a rule of thumb, one can say:

A soil with very large grains, such as a sandy soil, can hold less water and nutrients, while a soil with very fine constituents, such as a clay soil, is very dense and therefore filters water and nutrients only with difficulty. As is often the case, what is ultimately important is a proper mix of elements. If all three grain sizes are evenly balanced in one soil type, as in many clay soils, then the soil has very good properties.

The aim of the gardener should be to produce the optimum grain structure in the soil so that it becomes fertile. This is called the **Tilth** of a soil. Through targeted improvement, even problematic soils can become fertile, for example by improving the aeration and water permeability of heavy soils by adding sand or compost. Compost can also help the very sandy soils to retain more water and nutrients.

Sandy soils: These soils have low water retention capacities and therefore dry out quickly. Nutrients are not retained very easily and wash out quickly. They are very easy to work with, well aerated and warm up quickly, which promotes growth in plants. With these types of soils, you have to fertilise more, but they are not so hard to work with. For example, potatoes can be cultivated in these soils because they require a well-ventilated soil, they have few requirements and don't tolerate excessive humidity.



Loamy soils: These are particularly fertile if they contain sand, silt and clay in almost equal proportions. The voids between grains can be very different, so that in some loamy soils water permeates quickly, while in others it is retained longer. Loamy soils can be quite difficult to work with and can yield good results, but at a price. Vegetables can be grown in this type of soil, as they have very high requirements in terms of water and nutrients and they flourish better than in sandy soils.



Clayey soils: These are the „most difficult“ soils. The high proportion of the very small clay particles ensures good retention of nutrients and water, but the soil only restores these to plants with difficulty. On top of that, this type of soil is very dense, making it more difficult for plant roots to get enough air and water. The soil tends to become waterlogged and warms up only quite slowly. One advantage of this soil type is the usually high nutrient content and good buffering, which compensates for over-fertilisation. Working clay soils is tedious, as the soil is easily silted and compacted.



Roll test

A simple method for roughly determining soil type is the finger test or roll test. Crumble some moistened soil by rolling it between your fingers. The more easily you feel the particles, the sandier the soil. The more the particles stick together and the dirtier the hands become, the higher the content of clay in the soil. With sand, the grains are clearly visible, they do not stick to your hands and you can't roll it into a ball. Clay, on the other hand, has a smooth, glossy surface and is easy to shape. Loamy soils are in between; they are velvety / floury to the touch, the soil sticks to one's hands and crumbles when you try to roll it into a shape. Roll the earth into a ball. If it stays together well and is also smooth and sticky, your garden has largely clayey soil. The ball can be rolled very easily into a sausage shape with a diameter of about half the thickness of a pencil. If the soil feels smooth to the touch and holds its ball shape well, without sticking to your hands, you are lucky: you are working with a loamy and very good soil.

Relatively clayey soil is best for plants such as cabbage, peas, beans, lupines, fodder beets and some fruit trees. Plants such as potatoes, carrots, radishes and rhododendrons do poorly in clayey soils.



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5 Soil is the basis for existence

5.1 Soil is alive

Soil is an entire universe of living things, interdependent processes and mutually influencing reactions. Many of these interdependencies have not yet been explored, so we cannot fully describe how the soil works.

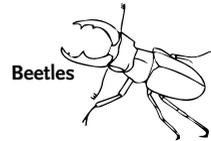
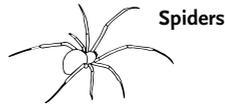
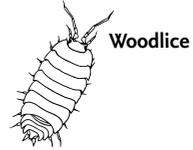
Soils are created over thousands of years and each soil type develops its own character. Soil habitat is very sensitive and also responds to the least interference. Once a certain soil has been destroyed it cannot be restored to its former characteristics. This is why soils must be treated with special care and intervene as little as possible in the natural processes occurring in soil to maintain soil fertility.



It takes 300 to 1,000 years to produce one inch of soil.

5 Soil is the basis

5.2 Which organisms live in the soil?



There can be up to 9,000 km of earthworm corridors in one hectare of ground!

Earthworms

The earthworm is one of the most important and industrious inhabitants of the soil. There are around 40 domestic earthworm species, the most well-known of which is the common earthworm (*Lumbricus terrestris*), which can grow up to 30 cm long. It is found mainly in loamy soils. Smaller species are more common in humus soils. Earthworms are harmless to plants because they have no mandibular apparatus. On the contrary, they are a guarantee of a fertile soil, as they pull organic matter, such as leaves or stalks into their corridors and eat there. Through their movement, they mix it with mineral material and release it as worm humus again. This results in valuable clay-humus complexes that make the soil particularly fertile. The mixing of organic and mineral soil components and the addition of mucilage produces stable grains in the soil.

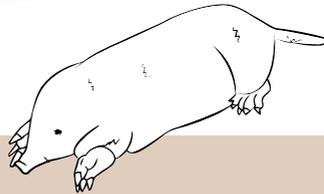
Up to 2,500 kilograms of earthworms can live in one hectare of soil!



The amount of worm humus produced in one year on one hectare can total 100 tons. In addition to this valuable feature, earthworms aerate the soil by building corridors and their activity stirs it up. The tunnels of earthworms can help plants to root into deeper layers that without their activity would otherwise be too compact to penetrate. Water can penetrate better through the multiple corridors in the soil. The earthworm is probably the gardener's best helper and should therefore be encouraged wherever possible. One way to accomplish this is by leaving or applying organic material to garden beds so that the worms can seek from the sun and find enough food (see the section on mulching). Working the soil with machines such as the rotary tillers or motor hoes should be avoided.

Earthworm corridors can extend 2 meters deep into the earth.

One can find up to 400 earthworms in one square metre of healthy soil being found!



Moles

Moles are carnivores and as such do not pose a threat to the plants in the garden. Their gallery digging activity helps aerate soil. They are also helpful in keeping vole mice away. Since they are loners who defend their territory, they do so against voles. Moles as well as earthworms also eliminate insect larvae and thus help to reduce plant pests. Moles eat up to three times their body weight daily. This is a protected species and may not be hunted. Gardeners should tolerate molehills and not destroy or displace them.

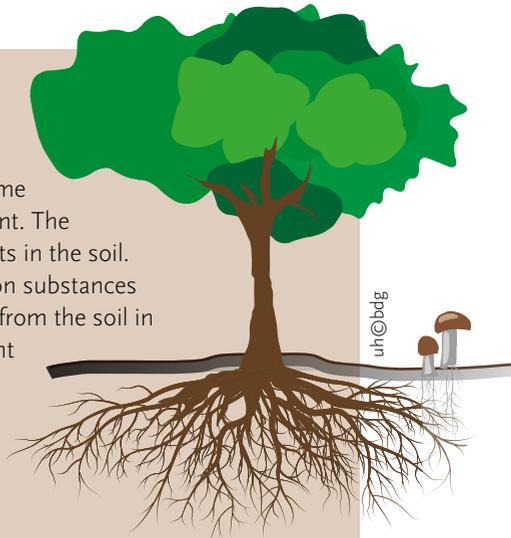
5 Soil is the basis

5.3 How plants obtain nourishment

Plants need nutrients, water, light and carbon dioxide in order to grow. The nutrient salts, especially nitrogen, phosphorus, magnesium and potassium – as well as trace elements and water – are extracted from the soil (some plants extract nitrogen from the air) and have the ability to produce high-energy sugar compounds by means of photosynthesis. Through this property plants represent the basis for all animal life on earth. The growth of plants is not only based on photosynthesis, but is also based on other growth factors. These are the physical, chemical or biotic environments related to them. They include climate and soil factors, the availability of water and nutrients, the presence of toxic substances, pH levels in the soil and the presence of organic substances. Soil plays the central role in plant growth.

Mycorrhizae

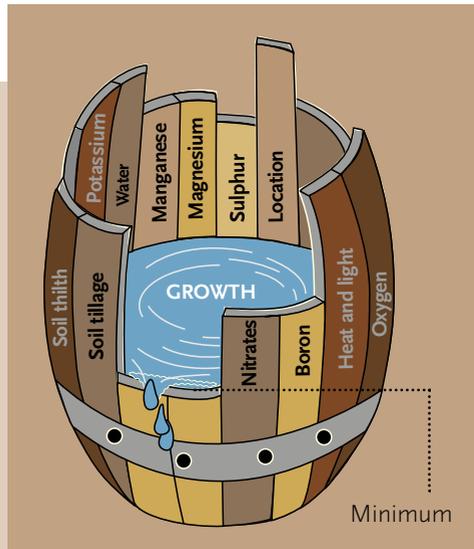
Mycorrhizae is the term used to describe the symbiosis between mushrooms and plants. Certain fungi come into contact with the root system of a plant. The fungus forms a dense network of filaments in the soil. Through these threads, a plant can take on substances such as nitrogen, phosphorus and water from the soil in much larger quantities than what the plant alone is capable of. The fungus provides a part of these nutrient elements to the plant as well as water. In return, it receives sugar compounds resulting from photosynthesis in the plant, known as assimilates, which fungi cannot form themselves. This type of symbiosis is very common. About 80 percent of all terrestrial plants are associated with mycorrhizae fungi, including, for example, wheat and corn.



The 'Minimum law'

The minimum law, which goes back to Carl Sprengel and Justus von Liebig, states that the growth of plants is determined by the scarcest resource in the mix. These resources include, for example, nutrients, water and light.

The scarcest resource is also called the minimum factor. If one of the resources is lacking, then adding another resource that already exists to the required extent will have no impact on growth. The minimum law is an important basis for the fertilisation of plants. The model for the law is called a „minimum cask“. This is a cask made of staves of different lengths.



uh@b6g



adobe stock@puchan



5 Soil is the basis

5.4 When is soil fertile?



Is it true that the dumbest gardener gets the best potatoes? This well-known German proverb certainly does not hold true with gardening. In fact, the yield does not depend only on whether you are wise or less smart, but rather on whether the soil is fertile or not. So fertile soil will compensate for some fertiliser and management errors, which would lend some truth to the proverb. What is it exactly that makes soil fertile? In addition to the soil type, it is above all the number and composition of organisms living in the soil. These are what provide a crumbly, humus-rich structure and loose soil. These types of soil absorb water well and can survive

a dry period or a long rainy season without completely drying or turning into sludge. Plants can absorb nutrients better on such a soil and the roots get enough light, will ensure a good harvest. The yield in a harvest does not depend on whether one fertilises (chemically), but whether or not one supports the biological processes in the soil. This is because the soil is a living organism that interacts with the plants that grow on it. Humus is the deciding factor that gives the soil its structure and fertility.

Tip

The Federal Institute for Geosciences and Natural Resources (BGR) offers various soil maps that may be downloaded for free at:
www.bgr.bund.de/DE/Themen/Boden/Produkte/Karten/Downloads/Karte_Bodenarten_Deutschlands.pdf

Soil fertility coefficient

A certain number of values was determined for all agricultural land in Germany, which is known as the soil fertility coefficient. This fertility coefficient extending from 0 to 100 points, with 100 representing maximum fertile soil (for example, black soil in the Magdeburg fertile plain. However, only the soil type (the particle size distribution), the geological age and bedrock under the soil and the biological status of the soil (from crude soils containing a lot of rock to depleted and acidified soils) are included in the assessment.

In addition, the fertility coefficient of soils determines how deeply plants can take root in a soil and how readily nutrients and water are released. Sandy soils, as are found in the Lüneburg region, only have a fertility coefficient of about 20-30.

Range of values for the fertility coefficient of various soils

| | |
|---|-----------------|
| Sand | 0 – 11 |
| Sandy Loam | 11 – 30 |
| Heavy to clayey loam | 31 – 50 |
| Loam, at times with loess deposits | 51 – 70 |
| Loam with loess | 71 – 90 |
| Loess | 91 – 100 |

<https://deacademic.com/dic.nsf/dewiki/184515>

The Magdeburg fertile plain:

Black earth is a soil type that forms under certain conditions on calcareous dry materials such as loess and is one of the most fertile sites worldwide.



adobe stock © Marco Borchardt



6. Soil management

6.1 The objective is to obtain fertile soil

Even the most fertile soil loses nutrients through the cultivation and harvesting of plants. These have to get back into the soil in some way, so that it remains fertile in the long run.

Mineral fertilisers such as Blaukorn and pesticides are not the best choice when it comes to keeping soil fertile in the long term. In mineral fertilisers, the nutrients are usually in the form of salts. This tends to acidify the soil. In addition, and excessive concentration of salts can disturb the soil life.

If too much nitrogen is applied, bacteria, which extract nitrogen from organic material, disappear. Adding lime will at least contain acidification. Mineral fertilisers can also introduce heavy metals such as cadmium and uranium into the soil, as these turn up in small quantities in fertilisers, especially when phosphorus levels recede.

It is therefore better to fertilise the soil with organic fertilisers such as manure, green manures or compost. In these fertilisers, the nutrients must first decompose for any long-term effect to develop. The advantage is that on the one hand the soil life is „fed“ by organic matter and on the other hand over-fertilisation and leaching of nutrients is thus better avoided, as organic fertilisers contribute to building higher humus content and thus to attaining a higher soil quality.

The cultivation of **leguminous plants** (butterflies) such as **lupins, beans, clover or alfalfa** can fully cover nitrogen requirements. These types of plants can absorb up to 300 kg of nitrogen per hectare from the air each year and bring organic matter into the ground as a green manure.

6 Soil management

When planting beds, it is advisable to first plant narrow-leaved lupin (*Lupinus angustifolius*), yellow lupin (*L. luteus*) or white lupin (*L. albus*).

All three species enrich the soil with nitrogen and also loosen compact soil layers using their tap roots that can extend up to two metres. They are classed as invasive species in Northern Europe.



6.2 Prevention instead of cure: preserving plant health

Encouraging plant health is at the core of garden maintenance. There are a few simple horticultural principles to follow:



Pointer plant for nitrogen-rich soil: Dandelion

Know the conditions of the site

Which areas in the garden get what amount of light? Is the soil rather sandy or loamy, dry or moist? Take a look around – which plants are thriving? These can „display“ as pointer plants to indicate soil features.



Pointer plant for alkaline (calcareous) soil: White clover

Site-appropriate choice of plants

It is important to grow plants that are well suited to local conditions.

Focus on plant diversity and give preference to native species

The more plant diversity in the garden, the more insects will be present that can seek nourishment throughout the year. Native species should be encouraged so these insects can also use the nectar of the flowers.



Regulate pest infestation letting corners grow wild

Gardens should all have natural areas where wild growth is unfettered. These areas provide food and shelter for many creatures. If the conditions are propitious for beneficial organisms to become established, the harmful pest situation will regulate itself automatically.

6 Soil management

Limit wild plants and weeds

Every gardener should be happy to have wild plants or weeds to a certain extent. It's not a question of preventing them, but rather of regulating them.

Beds can be planted in a more compact manner, making it difficult for these types of plants to find a place to grow. Unwanted plants can also be removed by hand. Another option is mulching (see chapter 6.5). The use of chemical agents should be completely eliminated.

Tip

When gardens have many surface plant species, the number of species in the soil will also be greater.

Source: Long-term project „The Jena Experiment – Why ecosystems need diversity“, Friedrich-Schiller-Universität Jena, <http://www.the-jena-experiment.de/>

6.3 Tilling the soil mechanically

Humus, Humus, Humus

Healthy soil requires a high degree of humus. It provides protection against compaction and strengthens the structure of the soil. If the soil organisms are „fed“ with plenty of organic material, then sufficient humus is produced to keep the soil fertile.

The higher the humus content in the soil, the better the nutrient supply to plants

Ideal garden soil has humus content of 4 – 8 %

Low humus: **less than 4 %**

Humus content in soil: **4 – 8 %**

Highly humus content: **up to 15 %**

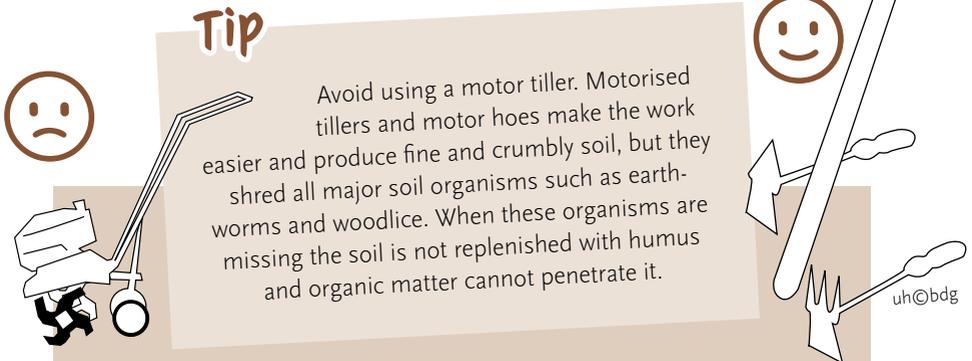
Forest and moorland: **over 15 %**

Soil compaction

When a soil is compacted, the loose structure is destroyed, so that air and water are less able to penetrate the soil. Such a soil tends to form mud, can dry out more quickly, and only with difficulty can roots get air, nutrients and water. Therefore, do not drive or walk on the ground or use it to store building materials. Heavy soils that contain a lot of clay and very moist soils are particularly sensitive to pressure.

Soil friability through frost

A loose bed with a fine grain structure makes sowing and planting easier. In the case of heavy soils (especially clay soils), a spade or pitchfork can be used to coarsely turn over soil in the fall so that clods remain. When these clods freeze during the winter and then thaw out, the earth crumbles into a fine grain structure. Only use this method on heavy soils, as this disturbs the soil life in the uppermost soil layer. Those using green fertiliser don't need to spade the earth. This should be done by the beginning of October at the latest so that the plants have enough time to grow before the winter frosts come.



The organisms living in the ground should be disturbed as little as possible by tillage, because many of them carry out specific activities and are only active in a certain soil layer. Many disturbances negatively affect soil life. Suitable for tillage are pitchforks, trident forks, cultivators, hoes or similar equipment that only loosens the soil in the upper area and protects the soil life.

6 Soil management

6.4 Mulch – Protection for soil and soil dwellers

Since plants grow on almost every type of soil, there is also a layer of plant mulch on almost every type of soil. This is made up from dead and fallen plant remains. This layer protects the ground from the effects of sun and frost and from wind and water erosion. Many organisms living in the soil use it as a source of food and protection. Therefore, it is usually not necessary to remove fallen leaves from flowerbeds unless they contain many tannins or that decompose with difficulty, such as the leaves of walnut trees (tannic acid) or plane trees. It is advisable to mulch ground without vegetation with compost or foliage in autumn as occurs normally in nature. This creates a good habitat for woodlice, earthworms and other soil inhabitants and thus promotes soil fertility. This coincidentally also suppresses unwanted weeds.

Tip

Avoid removing foliage with leaf blowers or leaf vacuums. The airflow can reach up to 200 km/h, which can kill many small, living creatures such as insects, spiders, butterfly larvae, woodlice or centipedes.



Tip

If you use straw, bark or other very „woody“ materials to mulch, you should add a nitrogen-rich fertiliser, for example horn shavings. This is because the micro-organisms, which convert the organic substance, need nitrogen for their activity, which is absent in the soil and consequently also in the plants. You can identify a lack of nitrogen from a yellowish discolouration of plant leaves.

Only apply enough mulch so that the ground under the mulch still gets air. Also, the material should already have dried to prevent rot under the mulch layer. A layer of a few centimetres is quite sufficient, although that may not be sufficient to completely eliminate weeds.

Mulch materials

Tree bark

Bark mulch is a natural bark of coniferous wood shredded to sizes between 10 and 80 mm. Its pH is usually in the acidic range. This favours the growth of fungi, which can encourage disease in plants. If bark mulch is removed, nitrogen must be applied, as the decomposition of bark mulch binds nitrogen. It is recommended to use about three to seven grams of nitrogen per square meter of woody areas and up to 20 grams per square meter of perennial beds. Horn shavings can be used as an organic fertiliser that decomposes slowly, for example. Bark mulch lasts about three to five years before rotting away completely. The bark mulch should be rotting when applied, meaning that it has been stored for at least three months before being put on the bed, so that harmful ingredients such as tannins are sufficiently decomposed.



6 Soil management



Straw

Straw as a mulching material is particularly suitable if the areas are to be walked over. Straw promotes aeration when spread out loosely. This is especially helpful in crops whose fruits rest on the ground, keeping them dry and protecting them from mould. This is helpful, for example, with strawberries, zucchini, cucumbers or squash. Since straw also has a very wide C to N ratio, nitrogen is bound during rotting, which makes additional fertilisation necessary (see bark mulch).



Grass clippings

Grass clippings are very suitable for mulching. Since it has a narrow C to N ratio, which means that it contains a good deal of nitrogen in relation to carbon, it rots quickly, supplying the soil with nitrogen. Allow clippings to dry out before using as a mulch to keep them from rotting. Grass clippings may only be applied in a thin layer; they should not be more than one centimetre thick. As a mulch, clippings can also be left on the lawn itself, if mowing is done regularly and only a fine layer is formed. They break down quickly and supply the lawn with nitrogen. The shorter and finer the lawn is cut, the faster decomposition occurs.





Living mulch / Undersowing

Planting edible undersown species are a good way to mulch. Spinach, lamb's lettuce or winter purslane (miner's lettuce or *Claytonia perfoliata*) not only provide shade to the ground but are also a welcome alternative to salad. However, ground-covering perennials such as wild strawberries are also suitable as undersown plants.

If you want, you can also use annual legumes such as the soil

clover as mulch, which also adds nitrogen, as the clover takes in nitrogen from the air.



6.5 Crop rotation and mixed cultivation

6.5.1 Soil fatigue

If you cultivate the same crop in the same place every year, you may already have noticed that the plants grow poorer every year and yield less. This is because soil becomes „tired“. Soil fatigue comes from the fact that plants repeatedly extract the same nutrients from the soil. As a result, the soil is depleted in a characteristic way.

This causes a depletion of certain trace elements, the accumulation of pests in the soil (for example, club root), the accumulation of metabolic secretions of the roots, which inhibit growth or attract pests. The result is a decline

Take care to vary crop rotation in the garden to avoid soil fatigue.

6 Soil management

in the number of organisms living in the soil and coincident changes in soil structure. Also, pH levels in the soil can change. The diversity of species in nature prevents soil fatigue. To avoid such depleted soil situations, crop rotation in the garden must be diverse and varied.

6.5.2 Crop rotation – Better yields and healthier soils

Proper crop rotation is important to avoid soil fatigue. As early as the Middle Ages people found that fields on which the same crop was cultivated every year hardly produced any yield. The three-field system arose from this experience, in which a field in which was planted the same crop twice was left fallow in the third year. Since then, crop rotation practices have evolved constantly, so that nowadays it can be managed on a continuous basis. According to this principle, it is important that plants incompatible with each other not be grown in the same location for as long a time as possible. Incompatible plants include, for example, leafy plants such as potatoes and turnips and crops such as cereals. Also regular organic fertilisation, especially using compost, combined with checking pH levels in the soil, can prevent the occurrence of soil fatigue. Overall, soil fertility and biological activity of the soil is maintained and even be increased through well-planned crop rotation.



Plants from the same family should not be planted in succession in the same location, as many diseases and pests attack only closely related species.

For example, sunflowers or marigolds should not be grown before or after chicory or salads because they belong to the same family (Asteraceae).

With the cruciferous vegetables one should avoid sowing plants from the same family, such as radish, cress or mustard, after or before cabbages, such as broccoli or cauliflower, or aragula. In principle, vegetables should be planted only if subsequently plants that consume many nutrients are to be sown, such as many types of cabbage, pumpkins, tomatoes or cucumbers.

Since vegetables should also be grown as far away from each other as possible, switching to Phacelia is recommended if you want to grow a green manure. It is not related to any kind of vegetables.

Potatoes or field beans should only be grown in rotated fields. For peas, a rotation period of six years is even recommended.

Knowledge of the family affiliation of individual vegetables is a basic requirement for efficient cultivation planning.



6 Soil management

6.5.3 Mixed cultivation – Good neighbours, bad neighbours

Mixed cultivation is the term used when several plant species are grown in the same area at the same time. For gardeners, it means placing plants adjacent to each other in a bed. It mimics natural processes because in nature plants occur almost exclusively in communities. These communities usually provide advantages for all plants in the area, because the individual species complement each other and occupy different ecological niches. For example, this makes it difficult for pests to multiply massively. In mixed cultivation, gardeners try to create a meaningful juxtaposition of several crops within a growing bed. Vegetables, ornamental plants and herbs are combined in a way that complements the different maturities and nutrient requirements. For this purpose, plant families, genera and species that support each other should be selected.



Examples of mixed cultivation

Follows a classic combination: A row of peas with a row of carrots and then a row of leeks. The peas can take nitrogen from the air as leguminous plants, while the leeks protect the carrots from the carrot fly with their intense scent, and the carrots keep leek moths away from the leeks. Combining nitrogen-collecting legumes almost always makes sense. Clover can be used as undersown plantings, or as planted paths between the beds.

Carrots and onions are often combined to repel the carrot fly.

Nematodes (roundworms in the soil) can be kept away if marigolds or geraniums are placed between potatoes, tomatoes or roses.

The Mayans combined high-growth maize, which served as a trellis aid, with beans that provide the corn with nitrogen and undersowed it with pumpkins whose leaves shade the ground until the corn has grown high enough.





7 Gardening without fertiliser doesn't work – healthy food for the garden

7.1 Why should I use fertiliser?

Harvesting plants removes nutrients from the soil that would otherwise have been returned to the soil after plants die off and rot away. Therefore, the gardener must supply additional nutrients to the soil. Otherwise the soil leaches out and the cultures growing on it yield nothing. A total of 16 nutrients are vital. Without them plants cannot thrive. By taking care and providing well-balanced fertilisation, a supply of organic substances and the favouring soil life, soil can be kept permanently fertile.

Nutrients

Essential nutrients

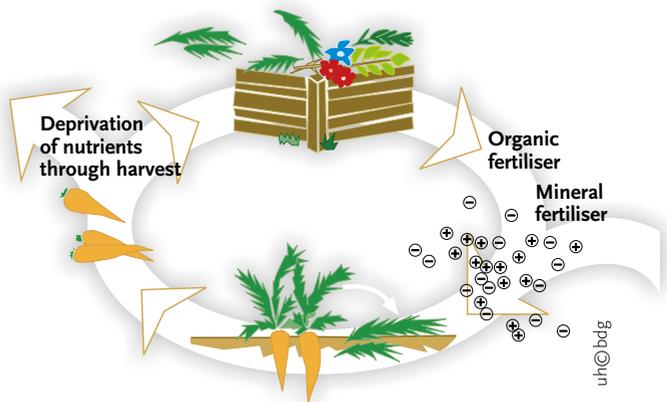
Nitrogen, Phosphorous, Potassium, Magnesium, Calcium, Sulphur and from the air and soil: Carbon, Oxygen and Hydrogen.

Micro-nutrients

Iron, manganese, zinc, copper, boron, molybdenum, chlorine – all are needed by the plants only in small quantities and care should be taken to supply them only in small quantities, since higher concentrations can quickly cause plant damage.



7 True fertiliser



7.2 Various fertilisers for the garden

Organic / Mineral fertiliser

There are many options of fertilisers to choose from. In principle, fertilisers are divided into organic and mineral fertilisers. Mineral fertiliser is an industrial or mining-derived artificial fertiliser in which the nutrients are present as salts. Organic fertiliser is naturally grown fertiliser. Organic fertilisers are fertilisers that are produced as a by-product in agriculture or in horticultural use, i. e. compost, manure effluents, manure or straw.

Organic fertiliser

Manure, manure effluents, straw, horn shavings, compost, bone meal, lupine meal, plant potassium, etc.

Organic fertiliser such as compost or liquid manure contains the nutrients in a complex form. That is, they must first be released by the action of micro-organisms. The advantage of this is that on the one hand the soil life is „fed“ and on the other hand the nutrients are released slowly. In this way, fertilising errors are avoided and the soil is supplied with nutrients over a longer period of time. Organic fertilisers, however, are not suitable to rapidly compensate for deficiencies. It should also be noted that the nutrients become available at different times. When it is warm and humid in the soil, the micro-organisms are more active and metabolize the nutrients faster. Therefore, it may be that more nutrients are available in the fall than in the spring, because the soil is better warmed up and is more “active“. However, the nutrient requirements of the plants depend on the weather, so that this effect does not have too significant a role.

Mineral fertiliser

Blaukorn, Ammonium nitrate, Osmocote, Manna, etc.

Mineral fertilisers already contain nutrients as salts, so these can be released immediately in an aqueous solution and subsequently be absorbed by plants. This can pose problems, as it is easy to over fertilise. For example, the fertiliser can be flushed out and into the groundwater after heavy rainfall. Adding too much mineral fertiliser exposes gardens to the risk of plant damage. If too many salts are dissolved in the soil then water is removed from the interior of the plant. As a result, „burns“ occur at the leaf edges due to the negative pressure and to water loss. Mineral fertiliser is best used to specifically supplement missing nutrients. An example of this would be a deficiency in iron or magnesium. Another aspect is that the production of mineral fertilisers involves a high levels of energy use and often environmental damage through mining.

Nutrient contents are always indicated on fertiliser packaging. They are always listed as percentages in the following order N-P₂O₅-K₂O. A fertiliser with the specification 10 – 5 – 8 contains 10 percent nitrogen, 5 percent phosphorus and 8 percent potash. The levels of magnesium, calcium and trace elements are also given as percentages.

Before fertilisation, a nutrient analysis should be performed to find out what nutrients are present in what quantities in the soil. In most German gardens, there is a surplus of phosphorus and potassium, so you often do not need complementary fertiliser of these two nutrients.

Essential Nutrients

Nitrogen (N)

Nitrogen is required primarily for the growth of plants. It is important for building up protein, DNA and chlorophyll. Nitrogen deficiency can be recognized by yellowish discolouration of the leaves, known as chlorosis. Plants affected by this do not grow properly and bloom poorly. In contrast, overuse of nitrogen also creates imbalances. Plant leaves grow significantly and take on a dark green colour and leaf tissue becomes spongy-soft. As a result, the plants are less stable and susceptible to fungi and insect infestation.



Phosphorus (P)

Plants mainly need phosphorus to build up protein, DNA and ATP, which are needed for energy storage and energy transfer in the plant. Phosphorus promotes flowering and fructification when it compensates for too much nitrogen. Phosphorus deficiency can be recognized by an inhibited growth and discolouration of the leaves to dark green; sometimes the leaf undersides turn reddish. Unlike with nitrogen deficiency, the leaves do not turn yellow. Overuse of phosphorus fertiliser is easily spotted in the soil. Damage occurring through an excess of phosphorus is restricted to the displacement of other nutrients in the soil, such as nitrogen, iron or zinc.

Potassium (K)

Plants need potassium especially to regulate water balance and to improve of water absorption by their cells. Since potassium also has an important role in activating enzymes in plants, especially those that build up the cell walls. This makes plants more resistant to insects and fungi. A lack of potassium may also be at the origin of the problem when plants wither, despite adequate watering. A deficiency in Potassium can also affect the taste and shelf life of vegetables. Over-fertilisation is rare with

potassium and can lead to deterioration of the soil's grain structure and to deficiencies in magnesium and calcium as it displaces it from the soil.

Lime

While lime is not a nutrient for the plants, it is very important for the soil. Soils are slightly acidic because carbon dioxide forms in them through respiration of the plant roots. These roots also excrete acids and acid is introduced externally, for example via acid rain. Lime neutralizes the acids and raises the pH of the soil so that the plants can grow optimally and absorb nutrients. Regular lime intake is very important for the soil in addition to the supply of nutrients. However, over much lime in gardens promotes a breakdown of humus. In the short term, many nutrients are liberated, but the soil will be leached out over the long term. Soil analysis helps to determine the proper level of pH.



Green manure

Fertilisation using green manure is often carried out in gardens. This involves sowing plants specifically for soil improvement, not for harvest. These plants are mulched or ploughed under. Some examples include sowing clover, sunflowers, mustard or phacelia in autumn. The remains of plant that have died of frost are absorbed into the soil in the spring. Plant roots loosen up the soil, the leaf mass provides shade for the soil and through their growth plants take up excess nitrogen that is still present in the soil after harvesting and would otherwise be washed out. The biomass also supplies organic material to the soil. The green manure that is incorporated therefore forms optimal preparation for the subsequent cultivation of, say, vegetables.



Indications of Plant

Young leaves

If the leaf yellowing occurs first on the young leaves, trace elements such as iron, copper or zinc are missing.

Sulphur (S)

Chlorosis
The entire leaf turns yellowish

Boron (B)

Necrosis on the meristem, dark spots on

Iron (Fe)

Interveinal

Older leaves

Magnesium (Mg)

Interveinal

Nitrogen (N)

Chlorosis
The entire leaf turns yellowish

Manganese (Mn)

If the leaf yellowing occurs first on the older leaves, main nutrients such as potassium, magnesium, phosphorus or nitrogen are missing.

Potassium (K)

Necrosis on lamina

Phosphorus (P)

7.3 Fertilising in vegetable gardens

Fertilising in vegetable gardens depends on many factors. It should be remembered that this part of the garden is the most intensively farmed. Therefore, it is here that most of the nutrients are consumed. Fertilisation should not be done by eye or by feeling, but always following a soil analysis. Soil samples should be taken and sent to the German Agricultural Research Institute (LUFA – Landwirtschaftliche Untersuchungs- und Forschungsanstalt). Also many gardening stores offer this service seasonally or as part of sales programmes. The evaluation indicates the amounts of the important nutrients of nitrogen, phosphorus, potassium and magnesium in the soil. Such an examination should be carried out every two to three years in order to be able to adjust the fertilisation process as needed. An analysis of the main nutrients and pH levels costs from € 20 – € 30. Garden clubs often can obtain discounts. Since the nutrient requirements of individual vegetable crops vary considerably, it is advisable to consult the tables that indicate the individual nutrient requirements of different crops via the information service (since 2016, the German Federal Information Centre for Agriculture, BZL).

Soil analysis in an LUFA usually includes

The content of main and trace nutrients such as nitrogen, phosphorus, potassium, magnesium, copper, zinc, boron and manganese. In addition, the pH level, the content of humus and of salts.

The analysis also includes individual fertiliser recommendations. You may also have the soil analysed for heavy metals content, to include lead, cadmium, chromium, copper, nickel, mercury or zinc. This will incur additional costs, which can be considerable. Simple test kits and gauges are available in most shops.

7 True fertiliser

7.4 Fertilising in orchards



If you have old fruit trees in your garden, you do not have to fertilize them separately if there are no signs of a deficiency, such as yellow discolouration on the leaves or far too little yield. Only young trees can be lightly fertilised, and such fertilisation should be limited to compost. Fruit trees have few nutrient requirements, which they can usually cover through their root system. Fertilising should be done in the

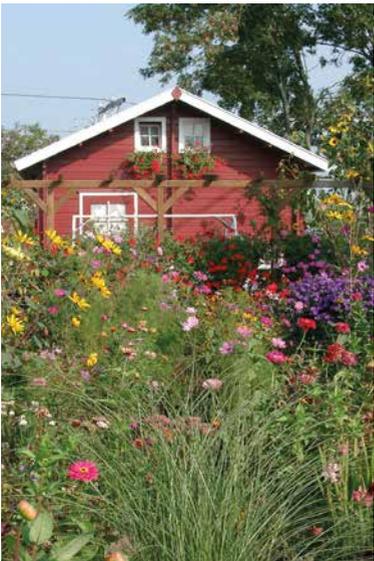
spring (up till July) and not in the fall, so that trees can end their growth phase into the winter.

7.5 Fertilising in ornamental gardens

In contrast to vegetable gardens, ornamental plants produce no harvest and consequently fewer nutrients are withdrawn from the soil. They therefore require less fertilisation. Depending on the type of crop, the need for nutrients varies greatly so that it is not generally possible to recommend how much



fertiliser should be applied. It is usually sufficient to add composting to keep the plants if full vitality. If perennials, shrubs or hedges are already rooted and have been at their site for several years, they will need only a small amount of fertiliser. A mulch layer of compost on the open areas is usually completely sufficient. For special plants or those with high nutritional requirements (rhododendrons, hydrangeas, etc.) additional fertiliser may be required.





8. Compost – the black gold of gardeners

8.1 What is compost?



The word compost derives from the Latin term „compositum“. This means roughly „a mixture, a composite“. Accordingly, compost is a mixture of leaves, vegetable scraps, garden plants, shrubs, grass clippings, etc. It provides all the important nutrients that plants need to grow. A good, mature compost can serve as a fully-fledged fertiliser, so you do not have to use additional fertiliser. During composting, the same processes of humidification and mineralisation take place as in the formation of humus in the soil. This process forms the major minerals and clay-humus complexes that are important for adding fertility to a soil type. Compost is

also valuable for soil life because it contains a large number of soil organisms and thus „vaccinates“ the soil on which it is applied. It also improves the soil structure, protecting its upper layer from dehydration and erosion. Compost can store three to five times its own weight in water and helps plants survive dry periods. Since compost is part of a circular economy, it also enriches itself with pollutants that are in this cycle. This is especially true when composting foods such as fruits and vegetables. In particular, the foods from conventional cultivation can introduce undesirable substances in the garden cycle. Compost is therefore only as good as the substances that are being composted.

8 Compost

8.2 What should be composted?

Composting is more than the mere „stacking up“ of organic waste. A compost only works if the organisms that degrade the organic substance find good living conditions in the heap. This has effects on the materials that belong to a compost heap. They should be mixed and coordinated so that organisms find optimal living conditions in the compost. Most organic waste in the garden or kitchen is good for composting. Certain materials, such as tropical fruit rinds, cut flowers, paper and coffee grounds should be composted only in small quantities, since they can have a relatively high toxin content. This is different for organic products. These can be composted without hesitation.

Completely unsuitable for composting are materials that have a very high level of pollutants, that may contain germs or attract vermin. Some examples of this include cooked food, street debris, vacuum cleaner bags and contents, ashes, coal residues and animal litter.

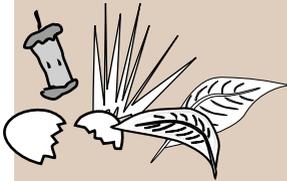


Compost materials

Suitable

Grass, leaves, roots, moss, pruned wood, remnants of perennials, bed and balcony plants, vegetable and fruit waste from the garden, fallen fruit, used potting soil

Organic vegetable and fruit waste from the kitchen, eggshells



Limited suitability

Only if organic: Tea with bag, coffee grounds

If not organic, then vegetable and fruit waste, only in moderation

Suitable in small quantities: chopped straw, shredded and untreated bark and wood waste (shavings, sawdust), cut flowers, potted plants



Unsuited

Vacuum cleaner bags and contents, road dirt, ashes, barbecue charcoal residues

Infested or diseased plants, weeds gone to seed, weeds with long roots

Cooked food, cheese rinds, cooking oil, pasta, meat, fish, fat, bones, bread, raw egg shells

Magazines, newspapers, paper, nappies, handkerchiefs, animal litter

Glass, ceramics, plastic, foils, rubber, bone, common salt, metals



8 Compost

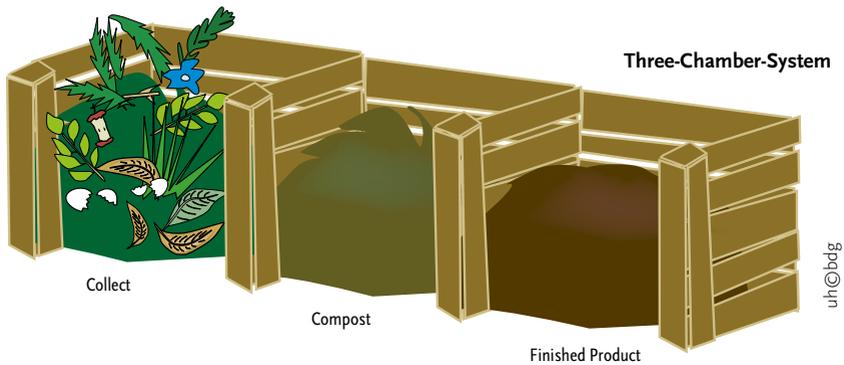
8.3 Creating proper compost

Before setting up a compost pile, you have to choose the right location. It should be set up in an easily accessible place in the garden so that the compost can be easily transported, recovered and worked into the soil. The location can be in either in full sun or shade, as the compost manages to create much of its climate on its own. Protection against rain is useful, either by a tree, a fabric, or a lid.

The size of the compost bin is ideally about one cubic meter per 100 m² garden area. A garden of 300 m² would need three locations, each containing one cubic meter. It makes sense to work with three compartments. A compost heap does not necessarily need to be contained, but building a frame around it will prevent the material from slipping away. The composting process does not specifically require that waste be composted in containers or in piles. Composting time depends mainly on whether you create the right conditions in the compost.

Compost heaps

For soil life to be active in compost, the heap must be well ventilated. Many micro-organisms require oxygen to decompose organic matter. Lack of oxygen leads to putrefaction. For this reason, the base of the compost heap must be made of material that both allows oxygen into the compost and allows excess water to run out of the compost heap. For this purpose, a layer of coarse, structurally stable material such as bark mulch, wood shavings, small branches or straw is the best. This material should be layered 10 to 20 cm high. Coarse shredded material has a highly frayed surface and is well suited as a base material for composting. Various types of waste should be mixed together and composted. Mixing wastes is important in order to mix wet and soft wastes containing many nutrients (grass clippings, vegetable remains and fallen fruit) with those that contain few nutrients such as stems, shredded branches and twigs or remnants of compost. Only when the C to N ratio (the ratio of carbon to nitrogen) is right, can composting take place under ideal conditions. A good range is between 20:1 to 25:1. The drier, woodier a material is, the higher the C to N ratio (wood shavings about 500:1, grass clippings about 15:1, chicken manure 8:1).



The degradation rate of organic matter is the highest during the first weeks of the composting process. Within twelve weeks, 40 % to 70 % of the material will have decomposed. This changes the structure of the compost heap. The rotting material collapses and condenses. Air exchange decreases and zones with different humidity and temperature levels are formed. By turning the compost heap over, i. e. mixing it up during the rotting phase, rotting material will be loosened and ventilated. Additionally, material can pass from the cooler edge of the compost to the warmer centre. Turning compost over significantly accelerates the composting process and leads to uniformly mature compost. However, it is not absolutely necessary to turn the compost over. The heap should be covered with grass clippings, leaves or a thin layer of soil to keep the heat inside.

Closed bins

These are especially suitable for smaller home gardens, or gardens in the city – wherever the space is limited. The compost bin should be of a volume that can handle the amount of waste produced over one year. The same layering and ventilation principles of compost heaps apply. The supply of oxygen can be the limiting factor hindering conversion of the organic substance to humus.

8 Compost

8.4 Recovering compost

Compost does not always have to be sifted. If the compost is to be used for soil improvement, then any residues of not completely rotted material may even be desirable, as they loosen the soil and provide it with humus permanently. On the other hand, if the finished compost is to be used for lawn care or as part of potting soil, then coarse material in the compost will interfere with this. In this case, compost should be put through a sieve with 10 to 15 mm openings. There are compost sieves in specialised stores, which help make sifting compost easy to achieve.



Compost may be sieved.

8.5 Elements to add to compost

The conversion of organic matter to humus requires no special additives. It is therefore not necessary to add compost starter, compost accelerator, lime, rock flour, clay flour or fertiliser to diverse, structurally rich mixes of waste. What has proven useful is to add a few shovels of garden soil and some old compost. With this, decomposition occurs quickly, because the compost pile is „vaccinated“ with micro-organisms. It is not essential to the composting process for waste to be composted specifically in containers or on heaps. Composting time depends mainly on whether one can create the ideal conditions for compost to form. It is not necessary to purchase miracle composting products on the market.

The „Soil of the Year“ award was presented for the first time at the annual World Soil Day on 5 December 2004 for the year 2005. This award is intended to clarify the importance of soil for people and the value of protecting it. Awards are made in Germany, Austria and Switzerland. (Wikipedia)

Soil of the year

Intertidal flat soil – Soil of the Year 2020

Fill soil (Replenished soil) – Soil of the Year 2019

Alpine soils – Soil of the Year 2018

Garden soils – Soil of the Year 2017

Groundwater influenced soils – Soil of the Year 2016

Floodplain or Pseudo-gley soils – Soil of the Year 2015

Marsh soils – Soil of the Year 2014

Plaggen soils – Soil of the Year 2013

Fen soils – Soil of the Year 2012

Alluvial soils – Soil of the Year 2011

Urban soils – Soil of the Year 2010



Tuinhier Foundation • Kolonihaveforbunde •
Bundesverband Deutscher Gartenfreunde e.V.
• Suomen Siirtolapuutarhaliittory • Fédération
Nationale des Jardins Familiaux et Collectifs •
The National Allotment Society • Association
for Japan Allotment Garden • Ligue Luxembour-
geoise du Coin de Terre et du Foyer • Algemeen
Verbond van Volkstuinders Verenigingen in
Nederland • Norsk Kolonihageforbund • Central
Association of allotment gardeners and Settlers in
Austria • Kolonidadstraatforbundet • Swiss Family
Gardening Association

PRESENTATION OF THE LEAGUES OF THE INTERNATIONAL OFFICE



Small gardens of Europe unite for more strength – Office International

Office International is the largest European, non-commercial association of national allotment gardening associations with more than 2.000.000 allotment garden families and allotment gardeners.

The Office International brings together national associations from the following countries: Belgium, Denmark, Germany, Finland, France, United Kingdom, Japan, Luxembourg, the Netherlands, Norway, Austria, Sweden and Switzerland



BELGIUM

vzw Tuinhier

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www.tuinhier.be



BELGIUM

The Belgian allotment federation was created in 1896 as a Royal society. Since 1921 it is an officially recognised association of public utility.

| | |
|-------------------|------------------------|
| Name | Tuinhier |
| Membership | 21,000 gardeners |
| Structure | about 200 associations |
| Foundation | 1896 |

What we offer

- All the members receive eleven garden magazines throughout the year.
- We offer a member card with benefits for individual members, as well as benefits for associations.
- We provide some general insurances for volunteers and councils.
- We have a transparent website with information about all our activities.
- We also have a separate webpage for associations where they can manage their courses and member administration.
- We give support and advice for new allotment gardens or expanding gardens.
- We help in finding subsidies or other finances.
- We organise contact with local and federal government.

What we promote

- Tuinhier is a voluntary organisation which is structured on a local, provincial and regional level. The organisation helps to form and organise the amateur- gardening in Flanders.
- We encourage durable, agreeable and environmentally friendly gardening.
- We create the conditions so that gardening can be useful and healthy leisure activity for all and we stimulate the construction of new allotment gardens.

DENMARK

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www.kolonihave.dk



DENMARK

The Danish union of allotment associations was founded in 1930. It is an organisation of interest that, by means of law and in other ways, focuses on making sure that renting an allotment is a possibility for everybody, including people of moderate income. The law passed in 2001 secured most of the Danish allotments as permanent sites.

| | |
|-------------------|---|
| Name | Kolonihaveforbundet |
| Membership | 39.658 |
| Structure | 394 Associations, 22 Districts, 38 Head Executive committee members, Executive committee 10 members |
| Foundation | 1908 |

What we offer

- Favourable insurance coverage for the associations and their executive committees.
- Training for the members of the executive and evaluation committees.
- Assistance to the associations concerning the foundation and the starting of new associations.
- Assistance concerning the associations' legal questions.
- Assistance concerning the associations' terms of rent.
- Assistance to the associations when negotiating with the authorities regarding bigger construction projects such as sewerage.
- Assistance concerning the associations' economy. The associations pay for this service.
- Four issues per year of the magazine "Havebladet" containing both professional and organisational articles.
- Nineteen horticultural advisors are attached to the Danish union of allotment associations. Depending of the task, either the Danish union or the associations themselves pay the advisors.
- Well-tended gardens, gardens grown in a sustainable way and gardens planned for children are given rewards. The horticultural advisors decide which gardens get the rewards.

What we promote

- Evaluation of the garden and the garden house, thereby avoiding the capitalisation of both.
- Protection of already existing allotment areas.
- Sensitisation for these areas to be cultivated in a sustainable way in order to continuously secure valuable recreational areas in and around our cities.
- Optimisation, for instance, of the tenancy conditions, plot ratio, loan conditions.
- Help for the connection of the sites to the public sewerage.

GERMANY

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Gartenfreunde e. V.**

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www.kleingarten-bund.de



GERMANY

Allotment gardens stand for orientation by nature and sustainability: allotment gardens make cities greener. This has been happening for more than 200 years now. The gardens always adapt to the changing societal conditions, and are open to new influences and challenges without questioning their green core. Since 1921, the BDG, respectively its predecessor organisations have been representing the interests of the allotment gardeners on a national level. The BDG sees itself as a federation that is transparent. Openness is part of the federation's philosophy. Changing living conditions, different concepts of living and individual preferences of people enrich the allotment garden system. Everyone should get involved, evolve and unfold – the allotment garden movement draws its strength for stability and innovation from this: small gardens – colourful diversity!

| | |
|-------------------|---|
| Name | Bundesverband Deutscher Gartenfreunde e.V. |
| Membership | 19 national federations |
| Structure | 910.000 allotment plots, 14.000 associations, 330 regional federations, 19 national federations, 40.000 hectares |
| Foundation | 1921 |

What we offer

- The federal allotment law is the essential foundation for the protection and further development of allotments. It ensures that allotment gardeners as lessees enjoy the benefits of a fixed lease price, protection against the realisation of the lease and compensation arrangements.
- The political representation of interests is one of the most important tasks of the central federation: To give at all political levels and at all times among the right addressees the emphasis it deserves to the concerns of the allotment garden system
- In the allotment garden associations with their approximately four million garden users, there exist the areas and proven structures that enable communal gardening.
- Gardening expert advice: The BDG's range of services include training courses for volunteers and multipliers. The content is oriented towards current social, legal, horticultural and environmental issues.
- specialist publications

What we promote

- The promotion of the allotment garden system, allotments sites and social communities, as well as of the protection of the environment, nature and landscapes is the ideological and selfless basis of the work of the federation.

FINLAND

Suomen Siirtolapuutarhaliitto ry

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www.siirtolapuutarhaliitto.fi



FINLAND

The Finnish federation has made its own Society's commitment to sustainable development within a Finnish initiative taking national sustainability efforts to a new level.

| | |
|-------------------|--|
| Name | Suomen Siirtolapuutarhaliitto ry. |
| Membership | appr. 3700 allotment gardeners |
| Structure | 31 local associations, 234 ha |
| Foundation | 1930 |

What we offer

- A forum for peer support for the officials in the member associations.
- Training courses (gardeners and associations).
- A free allotment garden magazine "Siirtolapuutarha" issued five times a year.
- Membership card offering various benefits.
- Marketing support for public events arranged by the affiliated associations.
- Information, support and advice to member associations and individual gardeners.
- Support and advice to new allotment garden sites.
- Information and assistance to communal decision-makers as well as authorities.

What we promote

- Encourage allotment gardeners to grow their own food, enjoy gardening and support an ecological way of life that helps sustainable development.
- We promote and further develop allotment gardening in Finland. Our aim is to increase the visibility and awareness both of the allotment movement and the sites, as well as building a strong and positive image.
- To save the current allotment sites and to encourage decision-makers, authorities and interested individuals to create new sites.

FRANCE

Fédération Nationale des Jardins
Familiaux et Collectifs (FNJFC)

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JARDINS
FAMILIAUX ET COLLECTIFS



FRANCE

The French allotment garden federation could establish close contacts with scientists. This cooperation has contributed to the realisation that it is important to know, master and improve the soil quality in one's own vegetable garden

| | |
|-------------------|--|
| Name | Fédération Nationale des Jardins Familiaux et Collectifs |
| Membership | 17.100 |
| Structure | national federation, 164 independent associations, 40 local committees and 75 allotments sites in the Ile de France that are managed by the federation |
| Foundation | 1896 |

What we offer

- Lobbying and cooperation: The federation is a founding member of the national council of community and allotment gardens. It has partnerships with the bird protection league, the “Noé Conservation” (union for the preservation of biodiversity), the “Pacte pour le Jardin” (pact for the garden) and the national society for soil planning and design.
- Already in 2007 the federation adopted the Charter: “Gardening and environment”. It calls for a gardening respectful of nature and for the protection of biodiversity.
- Articles about gardening respecting nature are published in the magazine “Jardin Familial de France”
- Lectures and round-table discussions with topical content
- Seminars about nature friendly gardening
- Creation of educational gardens
- An active website

What we promote

- Soil analyses have been implemented to determine contamination through pesticides and heavy metals, as well as the influence of rail and road transport, in cooperation with European scientific institutes.
- Eco-friendly horticultural methods, seminars about soil science, and the ecology of soil are necessary measures, so that the people recognise that they only can get quality products through a living and healthy soil.
- Open for new ideas like permaculture, agro ecology or plant remediation, the French federation continues to stand up for the preservation of its grounds. Because of the urban concentration, this continues to be uncertain, even though the allotment grounds are protected by law.

GREAT-BRITAIN

National Allotment Society

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5JE

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Fax: +44 (1536) 26 45 09

natsoc@nsalg.org.uk

www.nsalg.org.uk



GREAT-BRITAIN

Our aim is to protect the interests and rights of all allotment gardeners. We offer support to all those interested in cultivating an allotment.

| | |
|-------------------|---|
| Name | National Allotment Society |
| Membership | 111,972 |
| Structure | 2,225 Associations with 109,263 associate members 1,098 Individual members, 465 life members 398 Local Authorities and Landowner members 21 school members |
| Foundation | 1930 |

What we offer

- The services of a Regional Representative, Mentor and Regional Panel supporting Associations, Local Authorities, schools and landowners with advice and assistance in site creation and regeneration.
- Assistance and attendance at local and national horticultural and other shows.
- Working with Local Authorities facilitating forums for discussion and delivering training in allotment management.
- A quarterly magazine free to all members with subscriptions available for non- members.
- Website with information downloads on many subjects both horticultural and organisational.
- Funding advice.
- Online discount booklet.
- Quarterly e-newsletter, containing member notices, competitions, reminders and general allotment related news.
- Free initial legal advice from our In-House Lawyer and assistant.
- Discounted seeds from the industry's best.
- Discounted allotment association insurance and free allotmenters' insurance.
- The services of a horticultural advisor.
- Free advice book for School members.
- Work with Government departments on allotment matters.

What we promote

- The protection, preservation, promotion and creation of allotments in the UK
- A better understanding of the health, social and economic benefits that allotment gardening brings to Society as a whole.

JAPAN

**Association for Japan Allotment
Garden**

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Association for Japan Allotment Garden



JAPAN

Japan is located in a Temperate Zone. Many areas are suitable for plant growth. After World War II ended, agriculture quickly raised its production capacity due to chemical fertilisers and agricultural chemicals and the soil was considerably depleted. The allotment garden was born at that time. They spread in order to allow people to harvest fresh vegetables, as a place of a child's education, as a green area in the cities. Allotment gardens with a short period of usage are increasing today. In these gardens, the soil management is insufficient and the soil becomes weak. Therefore, we work to create green areas with allotments, having an improved period of use, to increase the number of allotments, where the citizen can cultivate himself fruit and vegetables. We use communication and information media to reach our aims.

| | |
|-------------------|---|
| Name | Association for Japan Allotment Garden |
| Membership | 1,025 |
| Structure | 17 allotment sites, 4 local associations; 5.32 ha |
| Foundation | 1989 |

What we offer

- An exact information about allotment gardens. The know-how about allotment garden establishment or use, etc.
- The provision of specialists, who give instructions on cultivation techniques, allotment garden management, local activities, etc.
- A study opportunity for parents and children.
- The know-how for regional vitalisation and for a healthy life by the cultivation of an allotment garden.
- An education about the chain of life, or the importance of the soil.

What we promote

- The understanding of the value of an allotment garden.
- The citizens' understanding on how to build a community thanks to an allotment garden site.
- The systematisation of the activities for making allotment garden activity smooth.
- The right judgment over manure and agricultural chemicals as well as an understanding of the food chain.
- An understanding of the importance of the soil in people's lives and a practice of allotment gardening which tackles the preservation of the soil.

LUXEMBOURG

Ligue Luxembourgeoise du Coin de Terre et du Foyer

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Luxembourg

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www.ctf.lu



LUXEMBOURG

Our league “garden and home” works in a country, where the ground price has reached an all-time-high. Since 1993 the league has been a state-approved environmental organisation and repeatedly publishes articles about sustainable soil management in its magazine “Gaart an Heem”.

| | |
|-------------------|---|
| Name | Ligue Luxembourgeoise du Coin de Terre et du Foyer (Gaart an Heem) |
| Membership | 19,003 |
| Structure | umbrella federation for 111 associations |
| Foundation | 1928 |

What we offer

- Expert gardening adviser courses
- A list of legal experts for consultation and lectures
- 6 x a year our magazine “Gaart an Heem” with a popular allotment gardener “exchange market”
- Once a year a bilingual pocketbook in collaboration with our ministries and administrations focusing on a topic that is of interest for allotment gardeners
- We act as an insurance agent for allotment sites
- We have an interactive, flexible and very popular online portal: www.ctf.lu

What we promote

- It is very important to us that the available areas – may they be privately owned, in community gardens or in allotments – are managed in the best possible way and handled in a careful and sustainable way, so as to leave enough gardening space for the future generations.
- We have many partner organisations active in nature protection and biological agriculture and also participate in discussions about sustainable land use.

THE NETHERLANDS

**AVVN-Organisatie voor Samen
Tuinieren**

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Utrecht

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[facebook.com/avvn.nl](https://www.facebook.com/avvn.nl)



THE NETHERLANDS

The spearhead of our activities is the protection and promotion of all forms of Joint Gardening. We stand up for the interests of the gardens and (allotment) gardeners and their organisations. We want to grow into the national organisation for Joint Gardening and to preserve and expand space for Joint Gardening in the urban environment. We promote the knowledge about biodiversity and natural gardening. At the same time, we want to support our members. Cooperation, sustainability and protection are the core values for the promotion of Joint Gardening.

| | |
|-------------------|---|
| Name | AVVN – Organisatie voor Samen Tuinieren (Joint Gardening) |
| Membership | 28,500 (allotment) gardeners |
| Structure | 225 associations, federations and garden groups, about 3,600 hectares |
| Foundation | 26th December, 1928 |

What we offer

- Support of our associations to get a long term legal security, f. ex. by the conclusion of lease agreements and the incorporation in zoning plans.
- Other activities are legal advice and the prevention and solving of any problem a gardener or board can encounter.
- (Skill) training, professional advancement for our members and promotion of expertise in the field of management as well as gardening.
- Magazine with information on (organic) gardening.

What we promote

- An exchange of knowledge and experience and networking.
- Knowledge in the field of gardening and biodiversity. Using organic material is a must in order to get a good soil structure.
- A focus is given to the sustainability of nature and nature-friendly and ecological gardening is recommended and stimulated through information, advice and guidance projects.
- Our members are encouraged not to be just users of a garden plot, but also to be a keeper of nature and valuable green in the urban environment and a manager of a cultural heritage.

NORWAY

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styret@kolonihager.no

www.kolonihager.no



NORWAY

The allotment gardens in Norway have a hundred-year-old history: The Norwegian allotment federation was founded in 1927 and the oldest allotment “Rodeløkkens kolonihager” was founded in 1907. The federation is politically neutral and pursues the goal of maintaining existing allotment gardens and creating new allotments. Most of the allotment gardens are located in Oslo and in other bigger cities as well as their surrounding area. All allotment gardens lie on municipal land. The work in the association is done on a voluntary basis.

| | |
|-------------------|--------------------------------|
| Name | Norsk Kolonihageforbund |
| Membership | 1,500 |
| Structure | 16 allotments |
| Foundation | 1927 |

What we offer

- The federation informs about the social, health and economical aspects of the “garden” life and offers professional expert advice to the associations and members.
- Allotments with their common areas are open for public during the summer months – a green leisure time refuge, without people having to pay for its maintenance.
- The associations organise a variety of external and internal activities for different age groups.
- The members of the federation get discounts in a specialised law firm.
- The federation has a website (portal) and all allotments can get necessary material for their own homepage via “kolonihager.no”.
- The federation insures the boards of all allotment sites.
- The federation regularly distributes information letters and makes a joint request for VAT compensation.

What we promote

- Allotment gardens promote nature and environmental awareness among children and contribute to a better quality of life among adults in cities and densely populated areas. Allotment gardens– similar to urban parks take over the function of green lungs and are important for climate protection, recreation and leisure time.
- Allotment gardens contribute to the preservation of biodiversity.
- Flowers and vegetables are cultivated in the allotment gardens in an eco-friendly and ecological way.

AUSTRIA

**Zentralverband der Kleingärtner
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AUSTRIA

For many years the central federation of allotment gardeners has been aware of the importance of soil and this subject is a major concern for it. Therefore, this issue is being discussed in different areas. In our magazine “Kleingärtner” (allotment gardener), articles about this topic are regularly being published. Of course, during the training of our gardening advisors, great emphasis is being put on showing the importance of our soil. In fact, especially our gardening advisors can enormously contribute to sensitise the allotment gardeners to respect our most important “working material”. Because only if we all preserve the health of our soil by an adequate cultivation, fertilisation and planting, our children still can, as allotment gardeners, play their part in maintaining green oases and habitats for a diversified flora and fauna in the cities.

| | |
|-------------------|---|
| Name | Zentralverband der Kleingärtner (Central federation of allotment gardeners) |
| Membership | 40,235 |
| Structure | 398 associations, 5 national associations (Lower Austria, Upper Austria, Salzburg, Styria and Vienna), 788.9 ha |
| Foundation | 1916 |

What we offer

- Legal advice in all matters within the allotment gardening movement;
- Seminars to get the certificate of competence – required by the law on phytosanitary products
- Expert lectures, with a focus on nature- and environment-friendly gardening
- Publisher of the gardening magazine with the highest circulation in Austria
- An efficient and competitive insurance policy, especially for allotment gardeners

What we promote

- Protection and representing the interests of the allotment gardeners towards authorities, legal and natural persons;
- Professional training of our members for the protection of natural habitats for humans, animals and plants;
- Financial support of associations and members in temporary difficulty or emergency situations
- Improvement of the living conditions in residential areas through the creation and maintenance of green spaces;
- Particularly bringing children closer to the life cycles of nature;
- Strengthening of the social community and prevention of the, in many areas, growing isolation of people

SWEDEN

Koloniträdgårdsförbundet

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www.kolonitradgardsforbundet.se



SWEDEN

In 1895 the first allotment garden areas were established in Malmö and Landskrona in the south of Sweden. In Stockholm, the first allotment gardens were established in 1904. The local authorities were inspired by Anna Lindhagen, a lady of the higher society, who had visited allotment gardens in Copenhagen and was delighted by them. So allotment sites were founded at the same time in many areas in Sweden. The Swedish federation has today approximately 24.000 members unified in 230 local associations.

The land is usually rented from the local authorities, but each member owns his cottage (if there is one). In Stockholm and many other towns, you can only sell your cottage through the society. To avoid unreasonable price rises the societies in these places decide the price of the cottage based on special criteria.

| | |
|-------------------|--|
| Name | Koloniträdgårdsförbundet |
| Membership | 23,386 |
| Structure | 234 member associations throughout the country, 1,300 ha |
| Foundation | 1921 |

What we offer

- Support to our member associations with advice and guidance on gardening and all kinds of problems that they may meet within their pastime, such as economic and legal questions, negotiations, organising study trips etc. We financially support some of these purposes.
- To further encourage our members, we give advice about the cultivation of garden products, good plant material and the environmental aspects of gardening.
- We also support gardening projects of other institutions for example the Swedish University of Agriculture, working to develop good cultivating methods and suitable plant material for allotment gardeners.
- Four times a year each member receives the membership magazine Koloniträdgården (the Allotment Garden) containing information of interest for allotment gardeners: news, consumer information, research, book reviews, reports and practical gardening information as well as useful news from local associations. The Magazine is Sweden's second oldest magazine.

What we promote

- The interest in growing vegetables and flowers.
- The increased interest in gardening has also created a need for more allotments all over the country. Therefore, our organisation works to influence the authorities to include more allotments, with or without cottages, in the town and city planning.

SWITZERLAND

Schweizer Familiengärtner-Verband

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SWITZERLAND

The public garden sites offer important areas for relaxation and crop growing for young and old. They contribute to the health of the gardeners and their neighbourhood. They enrich the biodiversity in the urban areas. They encourage fellowship and provide a major contribution to the integration of foreign fellow citizens. Here children directly experience nature and learn how to care respectfully for the fauna and flora. We help to shape the future. In our magazine “Gartenfreund” (garden friend) we report about these topics – and provide innumerable tips and tricks for vegetables, fruit and flowers in the garden as well as on a balcony and in the living room.

| | |
|-------------------|--|
| Name | Schweizer Familiengärtner-Verband (Swiss federation of family gardeners) |
| Membership | 22,300 |
| Structure | 208 departments and associations, 7 regions German-speaking Switzerland and French-speaking Switzerland (Romandy; without Tessin), 63 ha |
| Foundation | 1925 |

What we offer

- Editor of the federation’s magazine “Gartenfreund | Jardin vivant”
- Brochure for new tenants “Family garden cultivated close to nature” (only in German and French)
- Support through the solidarity fund when losing a site
- Legal advice by lawyers
- Cooperation with politicians in the federal government, canton and municipality

What we promote

- Promotion of professional training of the members affiliated to the local sections and associations in the regions
- Promotion of ecological gardening
- Active PR and publicity for family gardening
- Ensuring and representing the interests of all members’ vis-à-vis public authorities as well as legal and natural persons. In particular members having problems with the safeguarding and the creation of family garden areas should be supported.
- Cooperation with organisations that have similar goals in Switzerland, as well as abroad.
- Reduction of pesticides
- Use of the newly worked out positive list by the FIBL (research institute for biological agriculture and “Green-City-Zurich”). It is given to every new tenant.

| COUNTRY | FEDERATION | ADDRESS | TEL / FAX / EMAIL |
|------------------------|--|--|---|
| Austria | Zentralverband der Kleingärtner und Siedler Österreichs | Simon-Wiesenthal-Gasse 2 A - 1020 WIEN | Tel.: 0043/1-587 07 85 Fax: 0043/1-587 07 85 30 email: zwwien@kleingaertner.at Internet: www.kleingaertner.at |
| Belgium | Tuinhier vzw | PAC Het Zuid Woodrow Wilsonplein 2 B - 9000 GENT | Tel.: 0032/9 267 87 31 email: info@tuinhier.be Internet: www.tuinhier.be |
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