



HUMUS Farming

Climate-friendly farming for high yields

Healthy soils have been cultivated in agriculture for generations. Although the progressive industrialisation of agriculture in recent decades promises short-term gains in yield, it is increasingly damaging the soil and is already causing problems for many farmers today, such as declining fertility and water storage capacity, compaction and weed growth. Climate change and loss of biodiversity are exacerbating the effects of unsustainable soil cultivation.

The alternative is an ecologically orientated regenerative farming method. It builds up humus and binds carbon in the soil. It can even have a climate-positive balance.

Ecologically regenerative agriculture takes into account the soil habitat and the requirements of the plants growing on it. Therefore, active exchange between soil organisms and plants leads to healthier and more productive crops.

What is Humus?

Humus is an important part of our soil. It is formed from the remains of decayed plants and dead animals. Initially, this mass is particularly rich in proteins, sugars, carbohydrates, starch and amino acids. Bacteria, fungi and other microorganisms in the soil break these molecules down into smaller molecules. This process is called humification or composting. At the end of the decomposition process we have humus - a naturally grown mass consisting largely of carbon. The special aspect of humus is that microorganisms cannot decompose it. The humus is so stable that it can remain in the soil for hundreds of years.

You can easily implement the following measures to build up humus:



1. Maintain living roots in the soil all year round

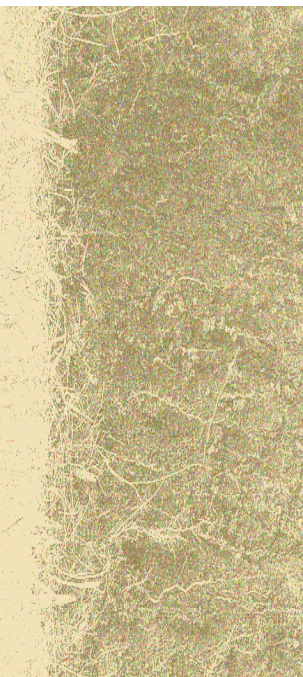
Roots form a large part of the organic matter in the soil. A well-developed root system not only serves to acquire nutrients, but is also an indispensable component of soil biology. Many microorganisms, such as mycorrhizal fungi, form symbioses with cultivated plants. However, in order to establish themselves permanently, living roots must be available in the soil all year round. In addition to these biological aspects, well-developed root systems ensure the necessary loosening of the soil with reduced tillage. This can counteract the aspect of dense storage on weak sites. To provide the soil with living roots all year round, work with catch crops and undersown crops.

2. Keep the soil covered

Leaving organic matter in the form of crop residues on the field is an important lever for achieving positive humus balances in the first place. The carbon bound in the crop residues serves as a starting material to build up new humus fractions in the soil. In addition, the crop residues are the food source for the many micro-organisms in the soil. Furthermore, a mulch layer protects the soil from wind, rain and sun and thus prevents water and wind erosion. It cushions temperature fluctuations, reduces weed pressure and minimises unnecessary water loss through evaporation. Crop residues with a wide C/N ratio (e.g. maize straw) are particularly suitable for ensuring long-term soil cover.

Soil organisms provide the basis for soil fertility

10 million to 1 billion bacteria from 4,000-50,000 species and 100,000 to 1 million fungi from more than 3,000 species per gram of soil are the basis of soil fertility. They want to grow and multiply in a well-structured environment. If we support them in their diversity and vitality, we harvest their yield-relevant agroecosystem services, such as natural nutrient replenishment, optimal utilisation of soil resources including water by plant roots and healthy crops. What's more, soil organisms also support society with climate-protecting humus formation.



3. Reduce soil preparation

The benefits of intensive tillage are offset by long-term negative effects. Soil preparation represents a massive intervention in the soil ecosystem and destroys important structures of soil life. It leads to strong mineralisation. Although this provides crops with essential nutrients in the short term, mineralisation is the decomposition of organic matter and therefore the exact opposite of humus formation. In order to increase humus concentration in the long term, the intensity of tillage should therefore be reduced to a necessary level. This will also result in further advantages such as a higher water storage capacity, greater aggregate stability and better trafficability. However, especially in the first few years of reduced tillage, it is necessary to take into account that deficiency symptoms may occur due to the low supply of certain nutrients. These must be remedied by targeted fertilisation.



4. Integrating animal husbandry

One component of a complete circular economy is the integration of animals into the system. Animals return significant amounts of organic matter to the soil through their faeces. In our field trials, we have successfully demonstrated a simple method for producing "Terra Preta", which we can recommend for all tree crops or hedges that require regular pruning.

What is Terra Preta?

Terra Preta (black soil) is a mixture of animal manure and biochar. Organic material, e.g. tree cuttings, is carbonised, mixed with animal manure and, after a maturing phase and the possible addition of compost, applied to the field or incorporated into the soil. Due to its enormous surface area, the biochar acts as a store of nutrients and water, which are released to the plants as required, e.g. during dry periods. You can use charcoal to dispose of your tree cuttings in a sustainable way and produce a valuable product for improving your soil. The addition of animal manure or compost is important, as the char would otherwise bind surrounding nutrients in the soil. Detailed instructions on charring in the field, the production of Terra Preta and its use can be found on our website www.terrebiosfera.org.



5. Increase plant diversity

A requirement for healthy and diverse soil life is a high number of different plant species. This can best be realised through extensive crop rotation, which is characterised by a constant alternation between winter and summer crops and between leaf and stalk crops. The inclusion of legumes can also be beneficial.



6. Do not use pesticides and mineral fertilisers

Converting to organic farming often requires more effort, but pays off in favour of your own health and that of your soil, crops and animals. Through skilful marketing, e.g. the establishment of joint marketing structures, you can achieve higher prices for your products. Higher agricultural subsidies remunerate you for maintaining the landscape and preserving the environment and clean groundwater.

If you follow these principles and increasingly integrate them into your farm, your soil will revitalise, the humus layer will grow and after a few years, you will see success:

Higher yields, better quality

Reduced incidence of diseases and weeds

Increased water efficiency and resilience to climate changes such as drought

Resistance to erosion by water and wind

Decrease in the leaching of nutrients and fine soil

Easier workability of the soil and disappearance of stones

Higher nutrient efficiency of fertilisation

These recommendations are just an impulse to awaken your interest in living soil and humus formation and to start with ecological-regenerative agriculture. Observe your soil and the root growth of your crops, learn and exchange ideas! We would also be happy to invite you to interesting presentations, webinars or field workshops.

Your Giacche Verdi Bronte Team



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