Vision 2030: Humus Formation increases fertility – reduces greenhouse gases – improves Biodiversity

Application of the keyline formation in Brandenburg
Photo: baumfeldwirtschaft.de

Since 2023, humus-forming measures have been taken on around 10.00 hectares of agricultural land (that is around 30% of the farmed arable land in the Hameln-Pyrmont district), which resulted in a continuous annual build-up of humus. The development of a biological way of working with green mulch and mulch seed was supported and stabilized by the introduction of biochar substrate, made from green waste from the district. More and more farmers are switching to the new system. With the formation of humus, 30% of the greenhouse gas (CO2) emissions of the district population are compensated, in the longer term it should be up to 95% CO2 compensation.

A large pyrolysis plant was built, which produces biochar from the woody parts of the green cuttings, residual forest wood and other untreated woods. This is mixed with the herbaceous parts of the green cuttings to make 24,000 t of biochar substrate every year. This material is given cheaply to the members of the specially founded cooperative.

At the beginning, the farmers were very skeptical about whether they should participate. The new Nitrates Ordinance has only just threatened to lose income. The public image of agriculture was negative for many. And should biochar compost and a changed economic system help against this?

Then the test fields were convincing, on which larger yields were generated in the first year. And not only organic farming but also conventional farming.

The cooperative was chosen as the type of company, in which participation was only possible for people and businesses from the region who benefited from the low prices for Terra Preta. This gradually convinced more and more farmers.

Today a humus content of 12% has developed on the reformed areas, the yields have increased significantly. Broad marginal strips of trees were laid out along the water. Rows of trees along the contour lines (keyline) record the precipitation.

When choosing the tree varieties, attention was paid to their resistance to the increasing hot summer. Fruit trees and nut trees were planted, but also trees with valuable woods. With rows of trees adapted to the shape of the terrain, the precipitation is influenced in such a way that the water remains in the area (see photo above, so-called Keyline method).

The agricultural areas, which were equipped with rows of trees according to the Keyline method, can cope better with the great summer heat, in the cold season they offer protection against wind and water erosion (www.baumfeldwirtschaft.de), they promote biodiversity. Particularly remarkable is the vitalization of the soil: the intensive humus formation led to a healthy soil, the charcoal provides living space for microorganisms and the Mycorrhiza fungi, storing water and nutrients.
At the beginning, care was taken to connect valuable biotopes with each other with the rows of trees (fruit trees, nut trees, wood use) as the waterfront strips and at the waysides, as proposed in the 2020 RROP environmental report. The other areas followed in the second step. Since both the yield and the quality of the crops grown have improved significantly, new brands have been created: Weserbergland potatoes and Weserbergland barley have a good reputation, and a separate Weserbergland label has been set up for better marketing.

A close cooperation has developed with the nature park Weserbergland, some new hiking routes along the verge of trees have been added, connecting Deister, Süntel and Ith. The hotel and catering industry also benefits. On the Süntelner Hohenstein you can enjoy an excellent view - a large explanatory board explains the composition of rows of trees on the banks of waterways and the partly Rows of trees laid out in curved shapes in the fields, which are based on the contour lines - those who have become curious can find out more in the district's humus center with an adjoining permaculture nursery with a conference center. Here the waste heat from the pyrolysis plant is used to heat a large greenhouse with an attached green classroom. Next door is a small hotel that uses these rooms for meetings on weekends. School classes can garden here on raised flower beds with the biochar substrate produced next door and deepen their theoretical experience in the connected classrooms. Outside, a permaculture nursery follows - the garden pioneers from Bec Hellouin were the model, the element biochar substrate was added here.

The combination of the two principles of permaculture and biochar substrate led to high and qualitatively very good yields through the vitalization of the soil. A humus build-up of 20% was achieved. All expectations in terms of quality, quantity and biodiversity have been met and in some cases they have been exceeded.

In the winter half-year there are regular events at which farmers and commercial gardeners exchange and train. In summer, the groups of visitors are shown around between the flower beds; the classrooms are also used for more intensive explanations. In cooperation with the welfare associations, jobs have been created in the nursery for people with disabilities, and under the guidance of master gardeners, the planting and harvesting takes place here. In the adjoining restaurant, visitors are spoiled with delicious dishes, with vegetables delivered directly from the nursery. If visitors need to relieve themselves, they go to the Terra Preta composting toilet, where solid and liquid are separated, collected and mixed with charcoal. In this way people experience the closing of cycles through lived practice. A greengrocer’s shop is attached and visitors can buy products from the farm, including
vegetables, juices and jams. The bestsellers are well designed shopping baskets made of wicker that also fit on a bike. A few rows of willows have been planted on the wood strips along the watercourses and are regularly cut as pollarded willows.

The history:
In the beginning, several hundred tons of biochar substrate were transported to the district Weserbergland from a pyrolysis plant in northern Germany. A conventional farmer, an organic farmer and an organic gardener tried out the material with the support of soil experts. The before-and-after comparison turned out positive and gradually more and more farmers were won over to the cause. A perennial nursery and a flower nursery did also join. The establishment of a Terra Preta cooperative contributed to the success. All members could then be given biochar substrate at particularly favorable conditions. Many farmers and gardeners have joined, but also some gardening and landscaping companies. It is important to accommodate as much biochar substrate as possible in the Weserbergland. Due to an investment subsidy from the federal government's climate fund, the construction of the production plant was made easier.

Today, a considerable share of the finances comes from trading on the CO2 stock exchange in Leipzig, taking into consideration that 1 kg of charcoal binds 3.6 kg of CO2 - including the humus formation - and the avoided slip of methane, nitrous oxide and CO2, which took place within the old method using months of composting. More and more agricultural areas are changing from being a greenhouse gas emitter to a sink for CO2. Companies can offset their CO2 emissions by making payments to farmers, who then reduce CO2 in a controlled process (soil samples on GPS-registered areas) by building up humus on their fields.

Large carbonation plants can produce large quantities of charcoal annually:
small manually operated carbonation systems: Kontiki (left) und Chantico-Terrassenofen

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