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BIOECO-UP

THE AMAZING PROPERTIES OF BIOCHAR

Biochar is the product of the thermal conversion of biomass in an oxygen-limited environment. This allows approximately 50% of the elemental carbon from the original biomass to be retained, bound in a highly stable form. The resulting product can be used in agriculture, industry and the energy sector. The greatest potential of biochar is represented by its potential for significant soil improvement and long-term carbon sequestration.

PRODUCTION: Biochar is obtained by various thermal processes: pyrolysis, gasification and controlled combustion, often referred to as carbonization processes. Material produced in the temperature range of 350-1000 ¤C, fully thermally processed, can be qualified as biochar. Product can be obtained by various methods and at different scales, from micro solutions to industrial facilities.

SUBSTRATES: Biochar can be produced from any type of biomass. The greatest potential is found in wood industry, agricultural residues and communal biodegradable waste. Through pyrolysis, these materials can be converted to a more valuable material than if they were composted, fermented, burnt or simply left to decompose.

RENEWABLE ENERGY: Pyrolysis is a high-energy process from which heat can be recovered, electricity generated and renewable fuels such as syngas, oils and char obtained. Biochar is actually a by-product of the energy process and should only be used for environmental purposes.

CARBON SEQUESTRATION: Carbonization of biomass is a process that preserves half of the elemental carbon from the starting material. In any other process, almost all of the organic carbon from the biomass would eventually decompose and return to the atmosphere in the form of carbon dioxide. Biochar is a very stable and decomposition-resistant material, thus taking carbon dioxide out of the cycle for thousands of years.

SANITARY SAFETY: Biochar is a sterile product, free of all organic compounds. Weed seeds, pest eggs, plant and animal pathogens and any toxic organic substances are completely neutralized. Biochar applied to soils reduces the harmfulness of fungal pathogens and enhances plant health.

SMELL REDUCTION: Biochar has strong sportive properties and is therefore excellent at suppressing offensive odors from agriculture. It can be used as an additive for manure, liquid organic fertilizers, waste composting and for bedding in livestock production. Good quality biochar is used as a feed supplement in order to regulate the digestive processes of animals.

IMPROVING SOIL PROPERTIES: Biochar enhances soil properties in a comprehensive way. Depending on the dose applied, the water holding capacity of soils, pH value, electrical conductivity, sorption capacity, and microbial activity are increased. Nutrient losses and greenhouse gas emissions from the soil are reduced. An increase in soil organic matter is recorded in the short term.

YIELD INCREASE: Biochar is not itself a fertilizer, however it significantly improves the use of fertilizers by reducing nutrient losses, thereby increasing crop yields. Depending on the application rate and crop species, yield increases of 20-50% have been reported. Unlike natural and synthetic fertilizers, once applied, biochar can increase yields for many years.

SUSTAINABILITY: once incorporated into the soil, biochar remains there for thousands of years, undergoing only minor transformations. Residues of charcoal produced several thousand years ago are still found in the world‘s best soils, such as some tropical black soils and chernozems. Carbon produced by primitive methods such as controlled biomass burning was a key component of these soils. Today, there are opportunities to produce biochar much more efficiently on an unprecedented scale.

NEW OPPORTUNITIES: Producing biochar can be a profitable occupation, as the value of the product is tens of times greater than the substrate from which it is made. With large--scale production, producers can register the product as a soil improver and undertake a certification process. Producers‘ income can also be based on renewable energy provision and organic waste collection. Farmers making biochar and using it on their farms can apply for carbon credits and achieveing higher crop yields at the same time.

Photo 1. Charcoal sample

Photo 2. Charcoal structure

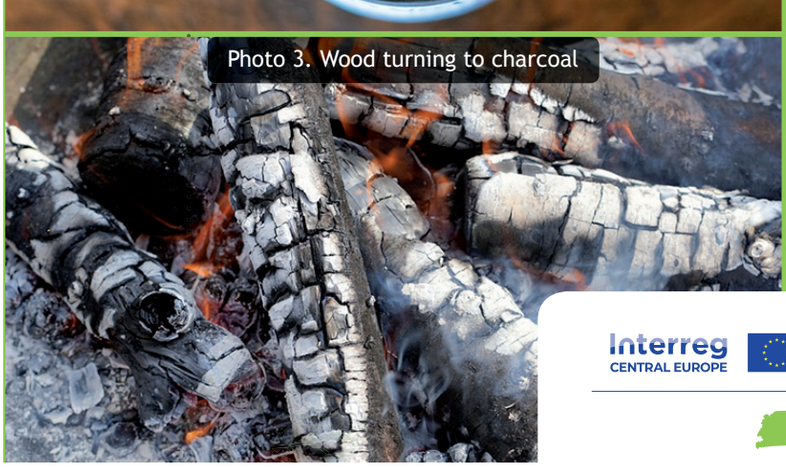

Photo 3. Wood turning to charcoal

Photo 4. Compost soil

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DID YOU KNOW THAT ?

Some of the best soils in the world terra preta do Indio were created by the Paleo-Indians some two thousand years ago using, among other things, charcoal?

Black soils in North America and Eurasia were most likely created by the deposition of carbon left over from natural and man-made fires?

Carbon from biomass burning is already present in all soil types worldwide. It accounts for up to 30% of total soil organic carbon.

A great enthusiast for the use of charcoal in agriculture was Justus von Liebig, known mainly for the law of the minimum attributed to him, which states that, plant growth is limited by that nutrient which is currently most lacking in the environment, i.e. below the necessary minimum in relation to needs.

Useful links

Biochar Europe - CO2 Removal Technology
→ https://biochareu.com/en/

Biochar: How burning stubble could FIGHT air pollution
→ https://www.youtube.com/watch?v=zFX1mOsg36w&t=22s

LITERATURE

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