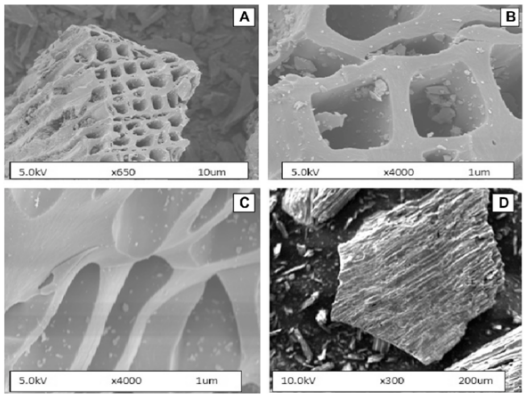
Understanding Biochar

Biochar is the predominantly carbon material from the thermochemical conversion of biomass in an oxygen-limited environment. It is also described as charcoal suitable for use in soil to promote biological function and plant interaction.

Biochar is of significant scientific interest because of its potential for promoting soil biologic activity, building soil organic matter, and conserving water and soil nutrients. In recent years, hundreds of soil studies have shown the importance of biological diversity in soil health.



Note the pictures on the left: this biochar from wood of a pine tree still shows the physical structures which moved nutrients between the leaves and the roots.

Since biochar is black elemental carbon rather than an organic compound, it is not taken up by soil organisms or plants to be used as food, but rather serves as a catalyst for all of the important soil functions. In the words of Dr. Johannes Lehman, biochar treatments shift plant nutrient uptakes to their particular optimum ranges. Like coral reefs that support ocean habitats for marine life, biochar supports habitat for soil microbes. It also acts by holding water and nutrients in the rhizosphere—the soil region surrounding plant roots where bacterial activity occurs—and making them available to the plant.

Biochar can be used as a product itself or as an ingredient within a blended product, notably compost, with a range of potential applications as an agent for soil improvement. When biochar is added to the right soil, biochar can, among other benefits, improve resource use efficiency, remediate and/or protect soils against particular environmental pollution, and become an avenue for greenhouse gas (GHG) mitigation.

Adding biochar can shorten compost times; it functions as a bulking agent and reduces odor. For the material itself, undergoing composting charges (or *activates*) the biochar itself. The material absorbs nutrients, holds water and small air pockets, without breaking down the biochar substance in the process.

Biochar has been found to accelerate the composting process mainly through improving the homogeneity and structure of the mixture and ***stimulating microbial activity in the***

composting mix. Thus, it helps SymSoil with cultivating the regional soil microbes in otherwise sterile commodity compost and ultimately enhances the soil and plant health of the customer, a grower.

The porous nature of biochar can reduce the bulk density of compost and facilitate aeration in the composting mix. For compost feedstocks that are high in nitrogen (N), such as animal manures, biochar offers the opportunity to reduce the overall nitrogen loss over the process, especially that of NH3.

In active composting, Biochar is also helpful in reducing off-gassing and can reduce odor, nitrogen loss and effects on livestock caused by NH3 emission in animal enclosures and during composting. Studies have found a 20% (mass basis) biochar addition to poultry litter reduced the NH3 concentration in the emissions by up to 64% and Nitrogen losses by up to 52%.

Biochar is of increasing importance in carbon farming and carbon emissions reductions. Life cycle analysis studies show a net sequestration of between 9 and 14 tons - with a theoretical potential of 20 tons – of CO2e for every ton of biochar committed to the soil.

SymSoil's unique value proposition is cultivating the biology based on regional indigenous soil microfauna within the commodity compost, creating a compost which is bio-equivalent to the highest quality thermal compost. To accomplish this, the company is committed to leadership in exploring and applying the new uses of biochar and other technologies which are under continuous development by science and technology, all of which contribute to the regenerative improvement of the health of a customer's soil.