

Biochar production, on spec and with analyses

The potential of biochar is large: for soil improvement, efficient fertilizer use and carbon storage. For researchers and pioneers who perform pot experiments and field tests, ECN can produce biochar on demand under well controlled conditions. We use slow pyrolysis and gasification techniques in order to maximize char production and to minimize the formation of tars.

The quality of biochar depends on:

- the feedstock that is used to produce it from,
- the production conditions (temperature, residence time, presence of oxygen)
- the soil and “target crop” that it will be applied for.

ECN offers biochar on spec, produced under well controlled conditions:

- Quantity: one kilogram (1 kg) to several tonnes
- Temperature: 200 – 700 °C
- Residence time: 10 minutes – 2 hour
- Optional: oxygen/air inlet
- Any feedstock that can be fed into the reactor (densification prior to pyrolysis/gasification optional)
- Products are delivered in air-tight steel drums or in big bags

Quantities

Smaller quantities, up to 5 kg per set of conditions, are produced in-house in bench-scale equipment.

Production of larger batches is done in cooperation with a partner, with ECN controlling the production process and output quality. All biochar batches up to 1 tonne are produced with full control of the conditions. Batches of more than 1 tonne can be produced in cooperation with another partner of ECN, where production is done in a retort (similar to charcoal production). This production process is relatively inexpensive, but there is a limited control of the conditions.

Analyses

In order to support scientific assessment of the biochar promise, ECN includes in the delivery a basic analysis of the product, which includes C, H, N, O, ash and PAHs (polycyclic aromatic



Examples of biochar feedstock and biochar product

hydrocarbons). Further analyses (e.g., S, P, K, calorific value, surface area, porosity, etc.) and characterization of the product properties by so-called “proxi analysis” methods are optional. The latter include the possibility to characterize the produced biochar with respect to water holding capacity, carbon stability, nutrient content and nutrient adsorption properties.

Questions and Answers

What is biochar made of? What feed stocks are available?

Biochar can be made from any biomass feedstock. Preferably, it is made from agricultural residues. Feedstocks that are bulky can be compacted before they are fed into the reactors. ECN can help to select feed stocks.

How is the optimal biochar made?

There may not be a singular optimal biochar. Each soil and plant combination may require a different type of biochar. It also depends on the feedstock. Together with you, ECN can put together a test programme that covers a variety of preparation conditions.

How much biochar is needed for a test?

For simple tests in pots and for chemical and physical analysis, a few kilograms is enough. For a field of 10 x 10 meter, 50-200 kg is suitable. For a hectare, 5-20 ton biochar is needed.

Are there any polycyclic aromatic hydrocarbons present in biochar?

Depending on the exact preparation conditions, there can be PAHs in biochar. ECN always informs its customers on the content of PAHs in delivered biochar samples. The client can then make an informed decision how to handle the biochar and to utilize the samples in the soil.

What are the prices of biochar?

Prices depend on the amount per batch, the number of batches and the conditions. Ask for a quotation.

Can you deliver the biochar as pellets?

Yes, we can have the product pelletized for an additional price. Together with you we can determine pellet size, binder, etc.

More information:

Jan Pels (pels@ecn.nl, +31 224 564884)



ECN Bench-scale reactor for producing batches of up to 5 kg biochar

Disclaimer:

Biochar on spec may contain harmful constituents, e.g. polycyclic aromatic hydrocarbons (PAHs). The analysis that ECN delivers together with the biochar provides information with regard to the 16 PAHs in environmental soil regulations. After delivery, the customer is responsible for health and safety issues and for obtaining the right permits for the use of biochar.

P.O. Box 1, 1755 ZG Petten
Westerduinweg 3, Petten, The Netherlands

T. +31 224 56 4884
F. +31 224 56 8487

Contact: Jan Pels
pels@ecn.nl