

Introduction:

Biochar is the result of burning biomass (any kind of organic matter, such as wood chips, rice husks, coconut husks, etc.) in a low-oxygen environment in a process known as pyrolysis (Fig. 1). It can then be mixed with compost and other soil amendments to be used in a garden or agricultural land, and has many beneficial effects including:

- Improved soil quality and crop yields.
 - Attraction of beneficial microorganisms and bacteria.
 - Increased nutrient retention.
 - Increased water retention.
 - Decreases need for fertilizer, plowing, and tilling.
- Sequesters carbon dioxide.
- Can provide a heating source for large spaces as an alternative to using fossil fuels.
- Provides an alternative, productive use for organic material waste piling up in landfills and releasing methane into the atmosphere.

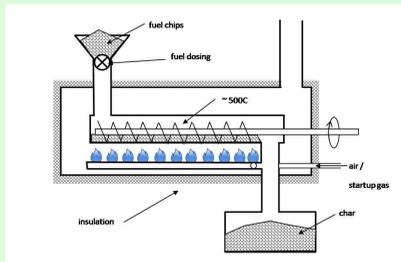


Fig. 1: "Fuel chips" or any other kind of biomass is funneled into the kiln at the top, and is heated in an airtight chamber at around 500C. A conveyor belt moves the charred material along until it is funneled out at the end into a container, where it can then be mixed with compost and various other soil amendments if desired (4).

The kiln:

Biochar can be made on both an industrial, highly efficient level, or in your own backyard. Due to the fact that biochar can use basically any organic material as fuel, whether it be rice husks in Vietnam, coconut husks in Peru, or wood chips in the U.S., it can be suited to fit the needs of virtually any locality.



Fig. 3: Conceptual model of an industrial biochar pyrolysis unit in Switzerland. This minimizes the introduction of oxygen into the burning chamber and allows syngas, a by-product of pyrolysis, to be utilized as a source of heat and electricity as an alternative to fossil fuels (3).

Proposal for biochar network in Ann Arbor:

- Wood chips used as biomass will be provided by Broadscape Landscape Supplies. Otherwise, huge unused piles of wood chips sit on the property (i.e. They want to get rid of them! Thus, minimal or no cost for fuel source).
- Biochar is either produced on-site in a kiln that can then be used to heat nearby facilities, or can then be transported to nearby farms, garden centers, Community Supported Agriculture businesses (CSAs), and other places of interest.
 - In Ann Arbor, this could include: White Lotus Farms, Downtown Home & Garden, Zingerman's Cornman Farms, English Gardens, **Matthaei Botanical Gardens and Nichols Arboretum (MBGNA)**, Sunseed Farm (a CSA), etc. for usage.

One proposed pathway:

- Wood chips are transported from Broadscape to MBGNA.
- Kiln and heat converter installed on site at MBGNA in or near future hoop house on Campus Farm (2).
- Wood chips used to fuel kiln, which provides heat source for hoop house in colder months.
- Hoop house and use of biochar serves as educational demonstration, which creates more interest and demand for biochar, garnering more support for future funding for biochar projects and production.

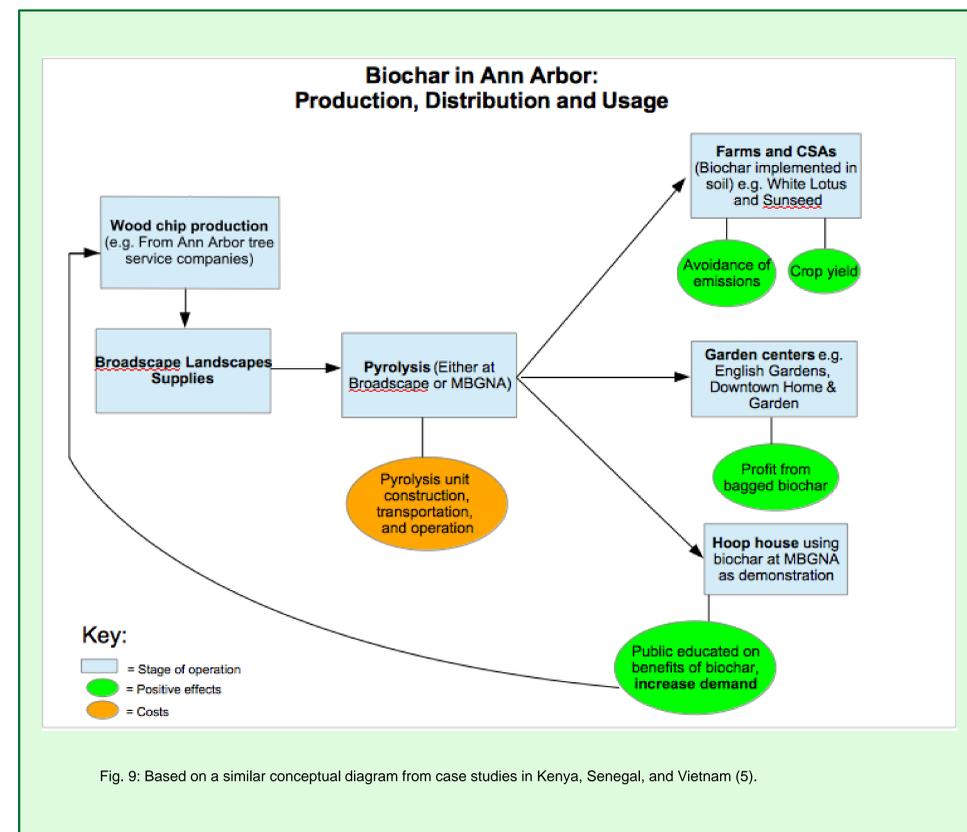


Fig. 9: Based on a similar conceptual diagram from case studies in Kenya, Senegal, and Vietnam (5).

Map of local network in Ann Arbor:



Fig. 10: Locations of stages of biochar production, distribution and usage, beginning at Broadscape Landscape Supply and moving to farms, CSAs, etc.

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Biochar-based initiatives around the world:

Stockholm Biochar Case Study

In Stockholm, a local network of cooperation has led to the implementation of a system that is closed-loop and carbon negative to which biochar production is central.

Components of the system:

- Pyrolysis plants are used to produce both biochar and renewable energy.
- Park and garden waste are used as biomass.
- Renewable energy (syngas) is a by-product of pyrolysis.
- Energy is converted into heat and is substituted for fossil fuel burning in Stockholm's "Open District Heating project" (6).
- Biochar produced will be added to public gardens (Fig. 6).



Fig. 6: Biochar being added to tree lines alongside roads. In this urban setting, biochar is also beneficial for storm water filtration (1).

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