

**BIOCHAR** — A relatively recent and promising re-discovery of an ancient environment-friendly soil amendment used in the Amazon River Basin (*Terra Preta de Indio* or “Black Earth of the Indian”). Today: one of the most valuable tools in the climate change mitigation “toolbox.”

**Impacts:** Sequesters carbon. Builds soil: Improves fertility and productivity in degraded soils. Reduces need for fossil-fuel based fertilizers. Improves water quality due to retention of pollutants. Disposal of green waste from agriculture and forestry.

**History:** Practice kept fields fertile for centuries. (500-2500 years ago). Worked to manage soil fertility. Healthy soil preserved health of ancient civilization for 2000 years.

**Production:** Process of *pyrolysis* = i.e., a slow clean burn without oxygen (anaerobic). Lower emissions of carbon monoxide, hydrocarbons, nitrous oxide, particulates. Made from available BIOMASS: agriculture wastes, animal and fish bones, pottery, husks, manure, pine needles, bush, straw, feedstocks, etc. Unlike hard charcoal used as a cooking and heating fuel, biochar has a porous crystalline structure since it is made at lower temperatures and can absorb and store nitrogen, nutrients, and moisture in its pores.



#### **Benefits:**

- Sequesters carbon (minimizes ash and CO<sub>2</sub>) and binds it up in soil as a stable form of carbon.
- Enhances soil fertility
- Provides stable microbial habitat for bacteria and fungi (earthworms) to reside and prosper.
- Minimize need for fertilizers and increases crop yields (up to a doubling)
- Remediates acidic soils. (increases pH)
- Attracts mineral ions (+ ammonium calcium, magnesium, potassium; - nitrogen, phosphorus)
- Particularly beneficial in sandy or clay soils.
- Improves soil texture and workability. Aeration of soil.
- Plants in soil with biochar have higher resistance to pests.
- Biomass can be sourced from understory bush and needles so as to minimize forest fires.
- Biomass can be sourced from invasive brush that impedes arability and pasturage of land. Eg., *Marabu* in Cuba – invasive species.

#### **A Darker Side of Biochar?** Precautionary trade-off analyses are necessary.

- Still in experimental stage. Must cook at low temperatures without oxygen for 3 days under the ground or in pyrolysis ovens or kilns. (Experimental ovens at Gorman Farms, Cincinnati.)
- Must inoculate with nitrogen (urine) before application. (Steals nitrogen from soil otherwise.)
- Some biochars can act as source of contaminants (Heavy metals, volatile Organic Compounds).
- Fine ash from biochar may pose a risk for respiratory diseases.
- Demand for wood for cooking and heating can accelerate deforestation.