

A Demonstration of Biochar Farming at the North Carolina Farm Center

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Background

Farmers around the world are strongly motivated to use biochar because of its potential to improve soils, increase water retention and accelerate crop productivity. Yet, there are very few models suggesting how a biochar farming system may work. A first step towards understanding how farmers and agricultural operations may be better equipped to capture the benefits of biochar is to demonstrate the workings of a more comprehensive biochar farming enterprise within the context of a working farm.

The NC Farm Center is developing a comprehensive biochar farming management approach by utilizing on-farm agricultural residues for feedstocks to produce and apply biochar on-site. The idea is to gain more knowledge of what a working biochar farming operation looks like, including cost-benefits of mobile biochar production and indicators of improving soil quality and increasing agricultural productivity. The Center's biochar project is supported by a 2009 three-year USDA/NRCS Conservation Innovation grant and located on its farm in southeastern North Carolina.

Discussion

The project evaluates the impacts of biochar added to soil for cultivating traditional rotational row crops in North Carolina- winter wheat, soybeans, cotton and corn. Crop yield, plant

tissue and mass density growth indicators are developed to examine general productivity characteristics associated with biochar. While field trials are important to gather information about changes in soil quality that positively affect increases in crop yields, other data is recorded to assess biochar's affects to retain moisture in light of the Farm Center's marginal sandy soil types. Applications of the farm's biochar use levels of 2.25, 4.5 and 6.75 tons per acre on two different field trial sites over the course of three years. Biochar is evaluated as a standalone soil amendment and as a blended amendment mix with poultry litter and swine manure compost. The Farm Center has signed a Cooperative Agreement with the USDA/ARS Coastal Soil Center to add a more scientific approach to analyzing soil moisture relationships to biochar.

The mobile Pyrolysis unit-BEC1000 is used on the farm to produce biochar, and care is taken to apply the best sustainable biomass harvesting techniques by incorporating conservation wildlife corridors as the source of much of the pinewood feedstocks.

Preliminary Results

Early findings point to a positive growth affect by adding biochar. Winter wheat planted in no till fashion at the mid-point of maturation, when measured by average plant density (g/0.5m²) indicated a 36% higher mass rate with biochar compared to the control plots.