

Mycorrhizal inoculated biochar as an active filter of dairy wastewater in constructed wetlands

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Phosphorus is one of the principal nutrient pollutants that causes eutrophication and consequent population decline of plant and animal populations in aquatic ecosystems. Constructed Wetland treatment of dairy wastewater, a major point source of P pollutant, is currently being researched as a viable mitigation of fresh water eutrophication. However because wetland plants have relatively low P requirements, they often do not remove it to satisfactory standards. Therefore, research is needed of how different substrates might enhance P uptake and retention in constructed wetlands. The addition of biochar, or pyrolyzed biomass, to soil has proven to greatly increase P retention. Biochar acts as a "sponge," providing micro habitat, and subsequent increased microbial populations, including mycorrhizal fungi, in the soil. Based on mycorrhizal fungi's positive correlation with P uptake, mycorrhizal colonies are believed to be key in the biochar's nutrient retention.

The purpose of this study is to conduct a column experiment to test the efficacy of mycorrhizal inoculated biochar as a substrate for phosphorus removal in constructed wetlands.

Intellectual Merit:

The main objective of this proposal is to quantify the ability of biochar inoculated with mycorrhizal fungi to uptake and retain phosphorus. The project is unique in several aspects. First, activated charcoal has long been touted as an effective filter of water. Our experiment will expand on this already proven, time tested effectiveness of activated charcoal to physically filter water, by adding a biological component. Our hope is to prove that by actively inoculating with mycorrhizae, the filtering effects of biochar, a material almost identical to activated charcoal, will be compounded beyond physical filtration by the biological plant-fungal mutualistic community. Second, in a time of ever inflating fertilizer prices, farmers need methods for recycling nutrients within their agroecosystem. Our proposed study could potentially provide evidence that biochar is an effective way to mine and retain nutrients from farm wastewater, which could then be returned as a microbial inoculated, nutrient rich soil amendment. And lastly, once in the soil, biochar not only continues to retain nutrients, but also acts as a carbon sink, resisting degradation for thousands of years. To summarize the goal of our experiment is to produce an integrated on farm design that 1) cleans polluted water, reducing eutrophication issues, 2) recycles nutrients within an agroecosystem, reducing necessary external fertilizer inputs, and 3) sequesters carbon, mitigating global warming.

Biochar Engineering Corporation: current technical and economic performance

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Biochar Engineering Corporation (BEC) manufactures a mobile biochar production unit. The intent of this equipment is to provide the following technical advantages to the user:

- Mobility for field and front country use
- Scalable throughput by number of machines
- Standard parts in standard sizes
- Continuous operation
- Automated operation
- Biochar production
- Forest by product mitigation
- Thermal heat production and utilization
- Fully off grid operation or grid connected operation per project needs

This unit has a cost of operation that may include; wood product inputs, energy inputs, water inputs, personnel, and capital costs. Potential revenues from the system include; thermal heat utilization, biochar sales, waste mitigation and carbon values. The following work will cover the details of technical and economic characteristics, successes, challenges, and needed next steps.

De Terra Preta a biochar: controversia de una resurreccion

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Se analiza la controversia sobre la reproduccion contemporanea de Terra Preta de Indio.

Se definen los distintos enfoques sobre las diversas incertidumbres acerca del rol asignado a las practicas y tecnologias bajo el nombre de "biochar". Se procura identificar las agendas de distintos actores involucrados en el debate. En particular se analiza la forma en que intervienen en el debate conceptos clave como geingenieria, practicas tradicionales/ancestrales y mercado de carbono.