



Biomass, Bioenergy and the Sustainability of Soils and Climate: What Role for Biochar?

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Biochar is the solid, carbon rich product of heating biomass with the exclusion of air (pyrolysis). Whereas charcoal is derived from wood, biochar is a co-product of energy capture and can derive from waste or non-waste, virgin or non-virgin biomass resources. But also, biochar is not a fuel - rather it is intended for the beneficial amendment of soil in agriculture, forestry and horticulture. This results in long-term storage of plant-derived carbon that could improve yield or efficiency of crop production, and/or mitigate trace gas emissions from the land.

Life cycle analysis (LCA) shows that pyrolysis bioenergy with biochar production should offer considerably more carbon abatement than combustion, or gasification of the same feedstock. This has potential to link climate change mitigation to bioenergy and sustainable use of soil. But, in economic terms, the opportunity cost of producing biochar (reflecting the calorific value of its stored carbon) is inflated by bioenergy subsidies. This, combined with a lack of clear regulatory position and no mature pyrolysis technologies at large scale, means that pyrolysis-biochar systems (PBS) remain largely conceptual at the current time.

Precise understanding of its function and an ability to predict its impact on different soils and crops with certainty, biochar should acquire a monetary value. Combining such knowledge with a system that monetizes climate change mitigation potential (such as carbon markets), could see schemes for producing and using biochar escalate - including a context for its deployment in biomass crops, or through pyrolysis of residues from other bioenergy processes.

This talk explores the opportunity, challenges and risks in pursuing biochar production in various bioenergy contexts including enhanced sustainability of soil use in biomass crop production, improving the carbon balance and value chain in biofuel production, and using organic waste streams more effectively (including the processing of clean agricultural residues).

Research knowledge that has emerged since 2005, when the term "biochar" was coined will be summarized (and currently resulting in over 200 research papers per year), highlighting the limits of predictability and certainty for biochar function and the extent to which these may ultimately be addressed. The policy context will be highlighted, including some recommendations and priorities for potential next steps.