

Will Biochar Help Mitigate the Global Agricultural Bubble?

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Introduction

An unprecedented series of global imperatives are currently challenging the health and stability of agroecosystems and are a threat to long-term global food security. Population growth and diet changes associated with economic growth are rapidly increasing the demand for food, fuel, and fiber. Given the finite global land base and the fact that the most productive lands are already being used for agriculture, we must increase yields on existing agricultural lands to meet future demand for food, fuel, and fiber. As crop yield increase, however, agricultural systems become less robust and increasingly dependent on inputs of energy from fossil fuels and other non-renewable resources.

Results and Discussions

As we pass through peak global oil production, the price of fossil fuels and nitrogen fertilizer, which is heavily dependent of fossil fuel, are anticipated to increase sharply. As we approach peak global rock phosphate production, the price of phosphorous fertilizer will become prohibitive for marginal farmers. While only 18% of agricultural lands are irrigated 40% of global food production comes from irrigated land. Ground water in many irrigated areas, notably the Punjab in India and north-east China, is being rapidly depleted. Soil degradation through erosion, nutrient depletion, oxidation of soil organic matter, and salinization are reducing the productivity of agricultural lands. Increasing demand for biofuels threatens to divert agricultural production capacity from food to biomass and from the world's poor to the wealthy. Global climate change (GCC) caused by emissions of greenhouse gasses (GGE) from both industry and agriculture is anticipated to increase the severity and frequency of both droughts and floods, to which agricultural production is vulnerable.

These trends give every indication of an emerging agricultural bubble. The consequences of this bubble bursting will be starvation for the 2 billion people on the planet who are already threatened with food shortages

and rapidly growing global poverty and political instability.

Biochar is not the solution to these problems. However, global deployment of a pyrolysis-biochar industry is uniquely positioned to help mitigate many of these problems and perhaps help prevent a disastrous bursting of the agricultural bubble. Biochar is a means of recycling nutrients and increasing both nutrient and water use efficiency and thereby increasing the fundamental capacity of soils to sustain food production. Furthermore, the pyrolysis-biochar platform is simultaneously a system for producing renewable fuels that will help reduce dependence on fossil fuels and a means of reducing net global GGE. Although the potential of the pyrolysis-biochar platform to simultaneously address many of the largest challenges facing our planet is very large, it is imperative that we proceed with caution and due diligence in developing a pyrolysis-biochar industry. Dust inhalation and fire are serious safety hazards associated with the handling of biochar. Emissions of black carbon during production or application biochar could reduce the efficacy of biochar in mitigating GCC. The presence of toxic compounds such as heavy metals and/or PAHs in biochar could temporarily or even permanently contaminate agricultural soils. Growth of a dedicated biomass production industry to feed a pyrolysis industry could threaten natural ecosystems, displace endogenous people from the land, and exacerbate regional poverty and food shortages.

Conclusions

The world appears headed towards an agricultural bubble that threatens global food security. Development of a global pyrolysis-biochar industry is not the solution, but may help mitigate the severity of food security, energy security, and GCC challenges facing humanity. However, a substantial amount of research is needed to ensure the safe and effective development of a pyrolysis-biochar industry and to develop policies that incentivize the equitable and environmentally sustainable development of the industry.