Geophysical Research Abstracts
Vol. 16, EGU2014-8421, 2014
EGU General Assembly 2014

Economic feasibility of biochar application to soils in temperate climate regions

Gerhard Soja (1), Jannis Bücker (1,5), Stefan Gunczy (2), Barbara Kitzler (3), Michaela Klinglmüller (3), Stefanie Kloss (1,4), Andrea Watzinger (1), Bernhard Wimmer (1), Sophie Zechmeister-Boltenstern (4), and Franz Zehetner (4)

(1) AIT Austrian Institute of Technology GmbH, Tulln, Austria (gerhard.soja@ait.ac.at), (2) Joanneum Research, Graz, Austria, (3) Federal Research Center for Forests (BFW), Vienna, Austria, (4) University for Natural Resources and Life Sciences, Vienna, Austria, (5) Groundwater Center Dresden, Germany

The findings that fertility improvements in tropical soils have been successfully mediated by biochar applications have caused wide-spread interest to use biochar as a soil amendment also for soils in temperate climate regions. But these soils in intensively cultivated regions are not always as acidic or sandy as the tropical Ferralsols where biochar is most effective. Therefore it is not self-evident that different soil characteristics allow biochar to display the same benefits if site-specific demands for the optimal organic soil amendment are not considered. This study pursued the objective to study the extent of benefits that biochar could provide for crops on two typical Austrian agricultural soils in a two-year field experiment. An economic evaluation assessed the local biochar production costs and compared them with the value of the observed biochar benefits.

From a business economic viewpoint, currently high costs of biochar are not balanced by only moderate increases in crop yields and thus agricultural revenues. Improved water retention due to biochar, however, might justify biochar as an adaptation measure to global warming, especially when considering beside business economic aspects also overall economic aspects.

When not assuming total crop failures but only increased soil fertility, even an inclusion of avoided social (=societal) costs by sequestering carbon and thereby helping to mitigate climate change do not economically justify the application of biochar. Price of biochar would need to decrease by at least 40 % to achieve a break-even from the overall economic viewpoint (if optimistic assumptions about the social value of sequestered carbon are applied; at pessimistic assumptions price for biochar must decrease even more in order to break even).

When applying an alternative type of soil treatment of using modified biochar but avoiding additional N-fertilization, a similar picture arises: Social benefits due to avoided N-fertilization and therefore reduced N_2O emissions are lower than reduced crop yields and thus revenues due to avoided N-fertilization. Also this kind of social benefits is much lower than social benefits from carbon sequestration.

In summary, an economically sustainable biochar strategy for biochar application to soils without severe fertility problems will require that

- the biochar benefits for climate change mitigation, groundwater protection, as soil amendment or crop fertilizer have to be connected with a higher financial value
- biochar production costs have to decrease e.g. by upscaling of the production processes or increased nutrient recovery by recycling of wastes.