



Biochar in waste water treatment to produce safe irrigation water, recover nutrients and reduce environmental impacts of waste water irrigation

Steffen Werner (1), Korbinian Kätzl (2), Marc Wichern (2), and Bernd Marschner (1)

(1) Ruhr-University Bochum, Institute of Geography, Soil Science and Soil Ecology, Germany (steffen.werner@rub.de), (2) Ruhr-University Bochum, Institute of Urban Water Management and Environmental Engineering, Germany

In many arid and semi-arid areas, agricultural production relies on irrigation for which often wastewater is the only available water source. While having the advantage of also providing nutrients for plant growth, wastewater carries the risk of contaminating the products and soils with pathogens and pollutants.

Among other technologies to treat waste water for irrigation purpose like settling ponds and sand filter, the use of carbonaceous material like activated carbon is well known in drinking water treatment but low availability and too high cost hamper application especially for farmers in developing countries.

One alternative could be a biochar filter system. Biochar can be produced by simple means while generating heat which can be used for cooking or as process heat. The material has a high surface area and because of its reactivity it can be used in water filters to remove pathogens and organic substances like lipids or phenols from the water. This could help to avoid negative impacts of waste water reuse on soil properties. It is also possible to reclaim nutrients from effluents. As an additional benefit, the "filterchar" can be used as valuable soil amendment after the life time of the filters.

In tests on lab and field scale biochar removed up to 4 log units of pathogen from irrigation water in Ghana. Irrigation with water treated in a biochar filter produced even more crop yields (+ 40%) in leafy green vegetable production in Ghana than non-treated waste water.

However, processes in the filter, influence of biochar characteristics and implication in social and economic systems are not fully understood and needs more research.