

The use of biochar substrates for soil reclamation - results of experiments in Northeastern Germany

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After the model of the very fertile "Terra preta do Indio" in Amazonia, the joint project "LaTerra" has been taken up a new technology for the production of organic substrates using biochar as admixture to the composting and fermentation of biomass to test its application for soil improvement, reclamation and remediation purposes. Processing organic materials or residues and the creation of high quality organic soil improving materials will close material cycles and contribute to the value added on a regional scale. This should be an essential part of a sustainable material flow management.

The presentation will focus on the application of biochar substrates for the reclamation of sandy soils in Northeastern Germany. Lignite mining activities leave raw soils without humus on dumps and tips. The rapid formation and maintenance of a balanced humus and nutrient budget is of great importance. Field, lysimeter and pot experiments were part of the research program in order to find out the impact of biochar substrate application on soil functions and plant growth and to derive quality criteria and recommendations for practice.

The results of the experiments show that application of biochar substrates (BCS) improved soil properties like nutrient supply, organic carbon content, water storage and cation exchange capacity. However, crop yields did not increase in the year of BCS application on the test sites or even decreased on the dumped soil with rising amounts of BCS. This is a consequence of nitrogen immobilization and sorption in the soils treated with BCS. Therefore, BCS applications should be combined with mineral fertilization of nitrogen and BCS production should be modified aiming to improve contents and release of plant available nitrogen. In the third year after BCS application variants treated with 60 t BCS ha⁻¹ (15 Vol.-% biochar) showed highest yields, exceeding the variants with mineral fertilization. On the dumped soil, in the fourth and fifth year after application all variants exceeded yields of mineral fertilization by 5 to 15 % with maximum in variants treated with 90 t BCS (15 Vol.-% biochar) ha⁻¹.