

EFFECT OF CO-COMPOSTED CHARCOAL FROM GASIFIER PLANTS ON PLANT GROWTH, NUTRIENT UPTAKE AND SOIL FERTILITY

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Biomass gasification plants generate energy from woody materials. During the production process, charcoal is produced. Charcoal is a carbon rich material out of woody material with a high potential for different applications. In this study the usage of charcoal as a soil amendment is tested. In the experiments the influence of charcoal on plant growth and nutrient availability should be determined. Therefore a laboratory experiment and a trial under field conditions were performed.

In both experiments the plant growth testing was performed according to DIN ISO 11269-2 and OECD guidelines. These methods were developed to investigate the effects of contaminated soil on the emergence and early growth of higher plants (DIN ISO 11269-2, 2012) and to evaluate the possible effect of substances on the ability to germinate, and the growth of seedlings (OECD guidelines, 2003).

In a first step organic material (landscape care material) was composted with three different amounts of charcoal (5 % (v/v), 10 % (v/v), 25 % (v/v)). As a reference the organic material was composted without adding biochar. Under field conditions 2 t of compost was applied on each testing area, which has a length of 12.5 m and a width of 6 m. The amount of compost is equal to the legal requirements in Austria (160 t dry mass per hectare) for compost application on agricultural land with the aim of recultivation or protection against erosion. Silage maize was chosen as crop plant for cultivation. Soil samples, which were taken with an interval of two weeks during the experiment, were analyzed for nitrogen, nitrate, ammonium, potassium and phosphorus. After harvesting the fresh and dry mass of the plants were measured. Afterwards the biomass was mechanically decomposed to analyze the nutrient uptake.

First results showed significant positive effects on plant growth in the laboratory. In contrast no significant influence due to plant growth could be observed in the field. Indeed the influence of biochar on the availability of potassium was significant. Also an effect on nitrogen compounds could be observed. To determine if the application of co-composted biochar could improve plant growth more experiments should be done, especially the influence of proceedings should be determined. Long term effects, according to conventional compost, should be evaluated with multi-year trials. Even if biochar isn't able to improve the plant growth or nutrient uptake significantly, it could become a leading part for carbon sequestration and further climate protection.