



Compared Biochar and Compost effects on plant growth and soil factors as reported for three consequent greenhouse trial setups

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Since ten years there is a major increase in research concerning biochar applications to soils trying to mimic effects known from Terra Preta do Indio (Glaser 2002). We conducted a preliminary study in which we analyzed the synergistic effects of biochar in combination with conventional and with organic fertilizers, whereas our latter experiments use biochar which was blended with fresh organic material and underwent the whole composting procedure leading to the first known composted biochars. Our first pot experiment (with two consequent growth periods without additional fertilization) helped to distinguish the effects from conventional and organic fertilizers in combination with biochar, where biochar revealed abilities for stabilizing carbon content (Total Organic and Black Carbon) and reducing nitrification. Plant weights were highest with pure compost, but biochar combined with compost (50:50) showed a sustained progression comparing second growth period's results. Those outcomes let us focus on biochar-compost-mixes. Our second greenhouse experiment concentrated on the question of the minimal biochar content to enhance plant growth and soil properties and was performed on a very poor sandy and on a richer loamy soil with rising concentrations between 0% and 1% biochar per compost. We could not find significant differences between the pure compost and the biochar amended pots. For our third experiment we tried to elevate the biochar share as high as possible and tested treatments with up to 200 Mg ha⁻¹(eq.) in steps with up to 50% biochar content, again in poor sandy and richer loamy soil pots. The measured seed weight of applied *Avena sativa* L. plants showed very different results on sandy soil compared to the loamy soil. Whereas compost on loam showed a seed weight 2 times higher than on pure loam control and seed weights 1.6 times higher compared to compost with highest biochar amounts, on sand the pure compost was even slightly less productive than pure sand control (factor: 0.8) and the highest biochar applications yielded 13.8 times the seed harvest of the sand compost (10.4 times sand control). We will try to present possible explanations for those results based on TOC, TN, pH, NO₃, NH₄ and electrical conductivity data.

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