Effect of compost on soil properties & crop growth

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In a long term field trial comparing compost treated and mineral fertilized plots, the effect of compost on soil bulk density, soil resistance, soil moisture, pH-KCl, Total Organic Carbon (TOC) level, crop yield, earthworm population, microbial population, degradation of the herbicide Linuron (3-(3,4-dichloorfenyl)-1-methoxy-1-methylureum), disease suppression and residual N was measured. There are three N-fertilization levels (0, 100 and 200 kg/ha). The crop rotation of the field trial is Brussels sprouts (*Brassica oleracea convar. Oleracea var. gemmifera*), potatoes (*Solanum tuberosum* L.), maize (*Zea mays* L.) and fodder beet (*Beta vulgaris* L. var. alba). Each crop is grown every year.

Although the soil bulk density of the compost treated plots was slightly lower in the 0-30 cm layer, no significant differences were detected. In the compost treated plots, the soil resistance measured during the summer of 2009 was significantly (p<0.05) higher (on average 0.5 MPa) in the 15-25 cm layer. This is possibly caused by an inert compost-enriched layer, that was brought to this depth by the use of the rotary harrow after compost application. The soil moisture (w/w, %) of the 0-15 cm layer was 0.5% to 1% higher for the compost treated plots (not significant) in the autumn of 2009. Compost can be used for pH-buffering. The pH-KCl was on average 0.4 units higher (p<0.01) in the compost treated soil. As expected, the TOC-level increased significantly (p<0.01) by 0.15% by using compost. The Dry Matter yield (DM-yield) of the crops maize, Brussels sprouts and fodder beet was nearly always higher (but not always significant) in compost treated plots for all three N-fertilization levels. There was no difference in the DM-yield of the potatoes. The underwater weight of the potatoes was significantly (p<0.05) higher in the compost treated plots (0.38 kg/5 kg) than in non-treated plots (0.365 kg/5 kg) on the 200 kg N/ha fertilization level. There was a tendency (not significant) to larger earthworm populations in the compost treated soil. Although compost could increase the soil microbial C-level (not always significant), the influence of the crop was much larger (p<0.001). This might be due to the use of biocides and tillage practices associated with the crops. Despite an increasing microbial biomass, the degradation of Linuron was not faster in compost treated plots. Compost is considered to result a higher potential of disease suppression, but this could not be confirmed in scoring the diseases: *Erisyphe betae*, *Cercospora beticola* and *Uromyces betae* on fodder beet. On almost all soil sampling dates (autumn 2009) and all three N-fertilization levels, the residual N was only slightly higher in compost treated soils in the 0-90 cm layer. The risk of N-leaching is therefore not higher in compost treated soils.

Although these measurements indicate some less understood advantages of compost, they need to be replicated over time before general conclusions can be made.

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