

Waste management effects on GHG emissions and climate change – in a life cycle assessment perspective

Waste management strategies are increasingly being adopted to allow organic waste products such as animal manure, organic household waste, yard waste, sludge and plant residues to be used as a resource both in terms of valuable plant nutrients and as a feedstock for bioenergy production. However, it has increasingly been recognised that the waste management strategies used to handle organic waste may affect the release of GHGs. The emissions associated with the application of the organic waste products to agricultural land is the most poorly quantified and is associated with a lot of secondary or substional effects, such as affecting the amount organic matter in the soil and the soil quality and fertility, which in turn affects crop production.

The objective of the current Ph.D. is to quantify and assess the importance of emissions of GHGs after application of organic waste products (sludge, household waste, yard waste, animal manures) and treated waste products (composted, anaerobically digested and carbonized (biochar) waste) and to quantify the effect of soil organic matter levels on crop production. This will be done by:

- Quantifying turnover and GHG emissions of organic waste products and treated waste products after soil application in laboratory experiments.
- Conducting field measurements of emissions of GHGs in the existing field experiment CRUCIAL with application of different organic waste products
- Collecting data from all available sources including national databases and international literature to review available information of soil C sequestration and plant productivity following field application of organic waste.
- Developing life cycle assessment methods to give a realistic expression of long-term organic matter effects on soil quality and C sequestration as well as resource substitution.

It will therefore be an advantage if the applicant has knowledge on mechanisms and processes controlling environmental gas-emissions (CO_2 , CH_4 , N_2O , NH_3) from different systems and their measurement, and is acquainted with technologies for organic waste utilization and life cycle assessment.

The activities are linked to the research group on Soil biological fertility at Department of Agriculture & Ecology. The group has a major research focus on the influence of manure and organic waste products on soil fertility and the project will be associated with a closely related Ph.D project funded by the 3R Research School, and with the SUSANE-II project, as well as with other ongoing projects in the group.

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