

Environmental impact assessment of biochar in AD digestate

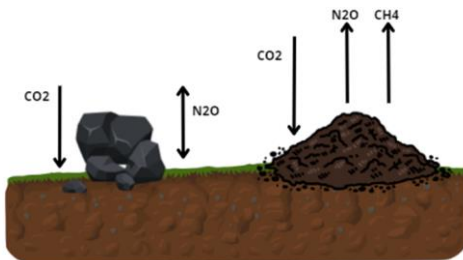
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Introduction and background:

Today, agriculture soil is fed with excessive amounts of chemical fertilizers, and because of the high energy intensity of production it will not be sustainable in the long-term. Using a circular economy approach where organic waste such as digestate is recycled back to the soil reduces the dependency on synthetic fertilizers. Digestates are abundant in macronutrients, micronutrients, and organic material which are important for soil ecosystem. However, digestate have some problems regarding N_2O volatilization which is a dangerous greenhouse gas and is 298 times more potent than CO_2 . The amendment of biochar in digestate can potentially reduce leaching and N_2O emissions by adsorption and can thereby improve nutrient retention.

Problem description and objective:

To address the real contribution of biochar and digestate's potential for greenhouse gas (GHG) reduction, it is necessary to evaluate the entire life cycle. The life cycle involves biochar production, distribution, and utilization of biochar and digestate as a fertilizer product. Life cycle assessment (LCA) is a well-established and standardized method which is widely employed to assess the environmental impact of biogas as a replacement for conventional fossil fuels. However, digestate management and quality can have crucial impact on the net emission balance of the overall LCA. The analysis is assessed for digestate from The Magic Factory (TMF) owned by Greve Biogas. TMF is an anaerobic digestion (AD) facility treating organic wastes from industry and households in the eastern part of Norway. The products from the AD are biogas with biofuel quality and biofertilizer which can replace mineral fertilizer. TMF is ran by Lindum which is a waste management company. Lindum provides biochar from wastes received at the facility such as garden waste. This study helps to evaluate the global warming potential of two waste streams and assess the benefits of biochar-digestate in agroecosystem.



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