



Recycling of biogas digestates in plant production: The value as NPK fertilizer

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Abstract:

The main purposes of the study were to assess the NPK fertilizer value of biogas digestates in different soils and to evaluate the risk of unwanted nutrient leaching.

The fertilizer value of digestates from anaerobic digesters was investigated in a greenhouse pot experiment with wheat in three different soils; silt, loam and sand. The digestates were based on different feedstock and had a low, dry matter content. The fertilizing effect of digestates was compared to mineral fertilizer and manure. To investigate the fate of excess nutrients in soil after the growing season, the pots were leached after harvest. A complementary soil column leaching experiment without plants was carried out in the laboratory.

The concentration of ammonium in digestates provided a good indicator of the nitrogen fertilizer value of the digestates. In the silt and loam, the ammonium N fraction in digestates had a fertilizer replacement¹ value equal to that of mineral fertilizer N, whereas the replacement value was higher in the nutrient poor sandy soil. Digestates often have a ratio between nitrogen, phosphorus and potassium which is not favourable for plant growth²). However, the suboptimal balance did not result in reduced plant growth or unwanted leaching from soil.

The results show that digestates from biogas production based on fundamentally different feedstock are promising as NPK fertilizers. The N fertilization can simply be based on the digestate NH₄⁺ concentration and, at least for wheat production, considerable variation in the concentrations of K and P can be tolerated.

Biography:

TRINE A. SOGN is a professor in environmental chemistry at The Norwegian University of Life Sciences, Faculty of Environmental Sciences and Natural Resource Management. She has long experience in utilizing organic waste products in agronomic plant production. She is investigating the positive effects of organic waste products on soil physical and biological char-



acteristic, as well as the fertilizer potential. However, also the negative consequences of a potential content of environmental harmful constituents as unwanted trace metals and organic pollutants in organic waste products have been of concern.

Recent Publications:

1. Trine A. Sogn, et al; Correction: Organic contaminants of emerging concern in Norwegian digestates from biogas production, 2020
2. Trine A. Sogn, et al; Organic contaminants of emerging concern in Norwegian digestates from biogas production, 2019
3. Trine A. Sogn, et al; Peat replacement in horticultural growth media: the adequacy of coir, paper sludge and biogas digestate as growth medium constituents for tomato (*Solanum lycopersicum* L.) and lettuce (*Lactuca sativa* L.), 2018
4. Trine A. Sogn, et al; Recycling of Biogas Digestates in Crop Production—Soil and Plant Trace Metal Content and Variability, 2018
5. Trine A. Sogn, et al; Use of high metal-containing biogas digestates in cereal production - Mobility of chromium and aluminium, 2018

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