



## **Fertilization with liquid digestate in organic farming – effects on humus balance, soil potassium contents and soil physical properties**

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Biogas production and use of liquid digestate are subject of controversial discussion in organic farming. Using biomass from intercrops as feedstock for biogas production makes it possible to produce renewable energy without compromising food production. With liquid digestate, crops can be fertilized in a more targeted way than by incorporating intercrop biomass into the soil. For long-term sustainability in organic farming, however, this practice must not have adverse effects on soil fertility.

In order to assess the effects of fertilization with liquid digestate on soil fertility, two randomised field experiments were conducted for two years on different soil types near Bruck/Leitha (Lower Austria). One experiment was set up on a calcareous chernozem with 4 % humus content, the other on a par Chernozem with pH 5.9 and 2.1 % humus.

Soil potassium content, both in the water-soluble fraction and in the exchangeable fraction, increased significantly at both sites. As fertilization with liquid digestate exceeded the potassium requirements of the crops by far, the proportion of potassium of the exchangeable cations increased rapidly.

Soil physical properties were not influenced by digestate fertilization on the chernozem site. On the par Chernozem, aggregate stability was increased by the organic matter applied via digestate. On this acidic site low in humus content, the supply of 4 t/ha organic matter, which featured a lignin content of 37 % and was relatively resistant to decomposition, had a clearly positive impact on soil physical properties.

Humus balances were computed both with the 'Humuseinheiten'-method and with the site-adapted method STAND. They were calculated on the basis of equal amounts of intercrop biomass either left on the field as green manure or used for biogas production and the resulting amount of liquid digestate brought back to the field. The humus balances indicated that the humus-efficacy of the liquid digestate was equal to slightly higher than that of the intercrop biomass left on the field.

The long-term sustainable use of intercrops for biogas and the recycling of liquid digestate as a fertilizer have two prerequisites: the rate of digestate fertilization should correspond to the amount of intercrop biomass harvested, and the digestate fertilization should be adjusted to the potassium requirements and potassium uptake of the crops.