

Effects of liquid organic fertilisers on selected soil quality indicators

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Background

With an increased focus on biogas production in recent years, biogas digestates, i.e. the residues from the anaerobic digestion process, have been used increasingly in crop fertilisation in recent years.

Untreated biogas digestates are high in available nitrogen (NH_4^+) and are thus efficient fertilisers, but they are low in dry matter. Thus relatively little organic matter is added when fertilising with liquid digestates.

Addition of organic fertilisers is generally expected to maintain or even improve soil quality. Many Norwegian soils have a relatively high soil organic matter content.

➔ **Will fertilisation with liquid organic fertilisers such as biogas digestates have positive effects on soil quality in such soils?**

Materials and methods



3 Field experiments (south-eastern Norway)

Ås: Loam soil

- Treatments: **C, MF, SL, D-FW1, D-FW/SS**
- Amounts added based on available N content in fertiliser
- Soil samples after 3 years of treatments

Apelsvoll: Moraine soil

- Treatments: **C, MF, SL, D-FW2, D-FW3**
- Amounts added based on total N content in fertiliser
- Soil samples after 7 years of treatments

Henni: Silt soil

- Treatments: **C, MF, D-FW1**
- Amounts added based on total N content in fertiliser
- Soil samples after 3 years of treatments



Treatment explanations

C	<i>Control</i>
MF	<i>Mineral fertiliser</i>
SL	<i>Cattle slurry</i>
D-FW	<i>Digestates* from 3 municipal plants with biogas processes running on food waste</i>
D-FW/SS	<i>Digestate* from a municipal plant with a biogas process running on food waste and sewage sludge (50:50)</i>

*Dry matter content of digestates: 1.8 - 3.5 %



Soil quality effects of digestates – Results summary



Trends for digestates	Loam soil	Moraine soil	Silt soil
Plant-available water	less compared to SL		more compared to MF
Plant-unavailable water (Water content at PWP*)	more compared to SL and C		less compared to MF
Aggregate size distribution	less dust-size particles (all organic fertilisers) compared to C and MF		
Aggregate stability	higher	no difference	higher
pH	slightly higher	higher	higher compared to MF
Total carbon	higher compared to C	higher compared to C and MF	



High variability of the results

Small changes in soil properties, longer-term experiments required

* PWP: permanent wilting point



Thanks to

- The biogas companies involved for supplying the digestates
- Toril Trædal, Øyvind Vartdal, Ivan Dragicevic, Oddny Gimmingsrud and Irene E.E. Dahl for help with the experiments and/or analyses

Financial support was provided by the Norwegian Research Council (Project no. 228747).

