Geophysical Research Abstracts
Vol. 16, EGU2014-71, 2014
EGU General Assembly 2014

Do anaerobic digestates promote dispersion, acidification and water repellency in soils?

Amrei Voelkner, Dörthe Holthusen, and Rainer Horn
Germany (a.voelkner@soils.uni-kiel.de)

Digestates are used as organic fertilizer on agricultural land due to their high amounts of nutrients (e.g. potassium, sodium). It is commonly expected that the application of sludge derived from anaerobic digestion can influence the soil structure and soil stability. Due to the fact that digestates contain large quantities of monovalent salts and long-chained fatty acids, the consequence of sludge amendment can be soil degradation caused by acidification, dispersion and increased water-repellency. Thus, water infiltration can be impeded which results in a preservation of stable soil aggregates. However, a diminished water infiltration can support water erosion and preferential flow of easy soluble nutrients into the groundwater.
Our research was conducted with different digestates derived from maize, wheat and sugar beet to examine occurring processes in soils of two different textures after the application of anaerobic sludges. Particularly, we focused on the wetting properties of the soil. For this purpose, the wetting behavior was investigated by determining the sorptivity-based Repellency Index with moist samples and the contact angle with homogenized, air-dried soil material. Further surveys were carried out to assess the flow behavior of digestates application and the deformation of the particle-to-particle association by microscaled shearing. Additionally, the acidification process in the soil as a result of sludge application was investigated. To account for the dispersive impact of digestates, the turbidity of soil suspensions was ascertained.
We summarize from the results that the digestates have a clear impact on the water repellency of the soil. We recognized a shift to more hydrophobic conditions. Partially, the pH remains on a high level due to the alkaline digestate, but several samples show a decline of pH, depending on the soil texture, respectively. However, soil structure was weakened as was shown by an increase of turbidity.
As a conclusion, we point out the necessity to take into account the impact which anaerobic digestates might have on soil structure and stability in addition to their fertilizing effect to sustain the soil in a good state.