Session 3B

INTEGRATE TREATMENT: TLANDS PILOT STUDY

Organic Matter Stabilization in Reed Bed Systems: Danish and Italian Examples

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Reed bed systems for sludge treatment have been widely used in Denmark for many years, while in other countries, such as Italy, are more recent and less common.

In this study, results about sludge stabilization occurring within beds after the entire period of operation in two different urban wastewater treatment plants situated in Denmark (Helsinge 60,000 p.e.) and in Italy (La Fontina, 30,000 p.e.) were presented.

In order to evaluate the process of sludge stabilization, parameters that highlighted the biochemical and chemico-structural properties of sludge organic matter have been determined.

Statistical procedures were used to evaluate the process effectiveness in order to compare results obtained from the different WWTPs.

From a chemical point of view, the two plants showed different level of nutrients: total organic carbon and total nitrogen were higher in the Italian plants, while the inorganic forms of nitrogen (NH₃ and N-NO₃) were higher in Danish plants. However, the low level of water soluble carbon and dehydrogenase activity, parameters related to overall microbial activity, showed that stabilization of the sludge similarly occurred in both treatment plants, even though in different landscape ecosystems.

The levels of β-glucosidase and urease activities, enzymes related to carbon and nitrogen cycle respectively, were similar to values usually found in composts.

The humic carbon content was higher in the Italian plant with respect to the Danish one, but the chemical-structural characterization of sludge organic matter, carried out with pyrolysis gas-chromatography technique, had highlighted how the processes of humification have been satisfactorily occurred in both reed bed systems: in fact, significant levels of pyrolytic indices mineralization and humification were reached in both plants.

The successful stabilization of organic matter occurred in both plant was also confirmed by the absence of Escherichia coli, showing that the sludge was sanitized, and also by the results of organic and inorganic contaminant evaluations. Finally, the level of bioavailable heavy metals and toxic organic compounds, such as PAH, LAS, NPE, and DEHP, make the stabilised product not dangerous for the environment.

These flow wetlands can reduce and >45 µg/L to <10, <1, and <1 mg/L, respectively. With conceptual expectations of 55 mg/L to <1 mg/L. Seasonal significance, leading to a typical L. Different media types showed proportions of processes such as acclimated within the mediatery basis for estimating media life exposure pathways.