Geophysical Research Abstracts,
Vol. 11, EGU2009-5270-2, 2009
EGU General Assembly 2009

Changes on sewage sludge stability after greenhouse drying

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The progressive implementation of the Urban Waste Water Treatment Directive 91/271/EEC in all the European member states is increasing the quantities of sewage sludge requiring disposal. Sludge application onto cultivated soils as organic fertilizers allows the recycling of nutrients. The application of only dehydrated sludges has generated many problems including unpleasant odours and difficult management (regarding transport and application) related to their high water content.

One way to overcome these problems, in a cheap and clean way, is the drying of sludges using the energy of the sun under greenhouse conditions. This drying may affect sludge chemical characteristics including organic matter stability and nitrogen availability, parameters which have to be controlled for the proper management of dry sludge application onto soils. For this reason, the main aim of this work was to study the impact of greenhouse drying of different sewage sludges on their organic matter stability and nitrogen availability, assessed by biochemical fractionation and mineralization assays.

Three sewage sludges were sampled before (dehydrated sludges) and after greenhouse drying (dried sludges). The analyses consisted of: humidity, organic matter, mineral and organic N contents, N and C mineralization during 91-day laboratory incubations in controlled conditions, and biochemical fractionation using the Van Soest procedure.

Greenhouse drying decreased the water content from 70-80% to 10% and also the odours, both of which will improve the management of the final product from the perspective of application and transport. We also found that drying reduced the organic matter content of the sludges but not the biodegradability of the remaining carbon. Organic N mineralization occurred during greenhouse drying, explaining why mineral N content tended to increase and the potential mineralization of organic nitrogen decreased after greenhouse drying. The biochemical stability did not change so much except for the one of the sludges, which experienced an important reduction.

According to the results, and from a point of view of future soil applications, the balance of the drying process could be considered as positive. It is using a free, renewable and clean energy, which reduces the water content and odours of sludge, thereby improving their management. Except for the water content, there was little modification of the behaviour in soil of greenhouse dried sludges compared to the dehydrated sludges, maintaining its large amount of available nitrogen after drying.

Acknowledgements: Jose. M. Soriano-Disla gratefully acknowledges the Spanish Ministry of Innovation and Culture for a research fellowship (AP2005-0320).