Sewage sludge hygienization for its use as soil amender

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Up till recently sewage sludge has been regarded as waste with high risks and problematic re-use and due to its considerably lower quantities than solid waste it has been neglected in circular economy targets. Furthermore, health and environmental risks have been identified, mandatory targets have been set by the EU Landfill Directive (European Comission, 2018) to reduce the biodegradable landfilled fraction, and cautious approaches have been adopted by countries towards the spreading of the material on agricultural lands for health reasons. Nevertheless, constant increase in sludge quantities has been observed globally. In EU the amount of sewage sludge produced per year was 10 million tonnes in 2008, 11.5 million tonnes in 2015 and is expected to approach 13 million tonnes of dry matter (DM) by 2020. Many countries have already set up national wastewater management strategies to aid the industry, especially in resolving issues with sludge disposal. In other countries, including Latvia, the problem is still left to the individual wastewater treatment company. At the same time the importance of sewage sludge as potential resource has already been recognized in global community.

Sludge management is one of the most difficult and challenging tasks of wastewater treatment plants due to its high water content and poor dewaterability and strict regulations for sludge reuse or disposal. This also includes the methods to be applied for hygienization and stabilization for prolonged period of time that requires extensive territories of land and cause unpleasant odours. Thus, the aim of this research was to assess the aspects of simplified hygienization methods and subsequent microbiological quality and plant growth without stabilization.

To perform the study sewage sludge from municipal sewage system was collected, treated (addition of calcium compounds, thermal treatment, and UV irradiation) and mixed with non-sludge origin soil. Further, peas were grown in the samples and their growth and biomass development recorded (Fig. 1).

Figure 1. Growth of pea plants in treated sludge after 7 (left) and 14 days (right)

In conclusion, the most effective treatment was liming that significantly limited the growth of sludge microorganisms. At the same time, the sludge pH increased to levels not suitable for plant development. The most acceptable results (> 1 log reduction in cfu counts and plant growth) was observed after sludge pasteurization for 6 hours. There are methods applicable to sewage sludge to ensure hygienization and simultaneous use as soil amender without the need for long term stabilization.

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References
European Comission, 2018. Landfill Directive – Directive (EU) 2018/850.