PHOSPHORUS RECYCLING FROM WASTEWATER: ANNUAL MONITORING OF SEWAGE SLUDGE COMPOSITIONS

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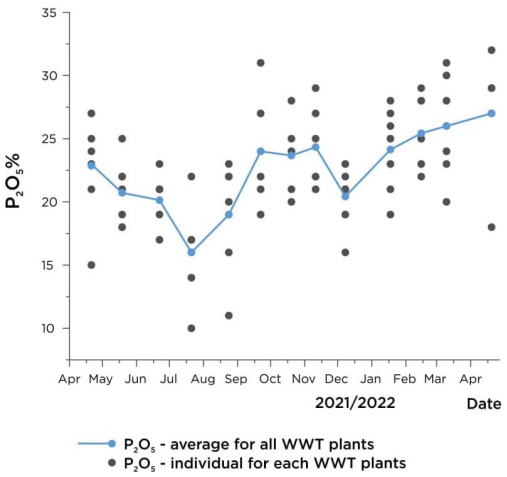
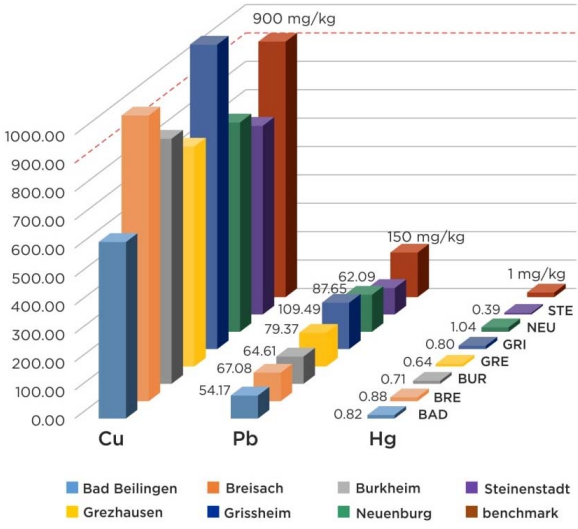
Phosphorus is a vital nutrient for plant growth and is typically obtained from non-renewable sources, such as phosphate rock ore. Sewage sludge, a byproduct of wastewater treatment plants (WWTPs), has been identified as a valuable resource for phosphorus (P) recovery. After combustion, the obtained sewage sludge ashes (SSA) are rich in phosphorus and could thus be used for fertilizer production. Simultaneously, the overall management of the WWTP could be improved as combustion energy is gained and transport costs are reduced [1].



In order to obtain a broad dataset on the potential of SSA use as fertilizer components, we carried out an annual monitoring of sewage sludge composition for seven WWTPs located in South-Western Germany with a focus on P and heavy metal content. Our analysis shows that SSAs contain on average about 22 weight-% P_2O_5 equivalents, confirming that SSAs are a very suitable starting material for P recycling. However, we also observed a significant annual and regional fluctuation of the P_2O_5 content (see Figure), making SSAs a harder to process raw material than the much more homogeneous P ores. The levels of heavy metals in SSA did largely not exceed legal limits all through the monitored year. The only problematic element here was copper, where the limit was reached in two cases. Nevertheless, our study confirms that the recovery of P from SSAs for fertilizer production is feasible and can reduce the dependence on non-renewable sources. The levels of heavy metals in SSA largely do not exceed the norms. Additional investigations by our team focus on investigating and improving the plant availability of P from SSAs, an additional key aspect for the production of P-fertilizers.



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[1] H. Ohtake, S. Tsuneda (Hrsg.) Phosphorus recovery and recycling, Springer, Singapore, 2019.