
Microplastic Fibres in Sewage Sludge Compost: A Noteworthy Source of Microplastics to the Terrestrial Environment

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Abstract

Wastewater treatment plants have been found to be a significant route through which microplastics can enter the environment. In earlier studies, wastewater treatment processes have been shown to effectively remove microplastics from the wastewater influent into sewage sludge, with only $\leq 2\%$ (when using secondary and tertiary processes) of the microplastics being released to aquatic environment via effluent water. However, the application of processed sewage sludge, such as composted sewage sludge, as fertilizers to the soil acts as a direct source of microplastics to the terrestrial environment. The objectives of this study were 1) to develop sample preparation methods for isolating microplastic fibres from sewage sludge compost samples, and 2) to investigate the number concentration of microplastic fibres in a sewage sludge compost used for making commercial garden soil. Particular effort was put to mitigate sample contamination. Three replicates of 1.0 g freeze dried sewage sludge compost samples were analysed. Three replicate laboratory blank samples were handled similarly with the real samples to assess the sample contamination from the laboratory environment. To mitigate sample contamination, the sample preparation and analysis steps were conducted in a separate, synthetic-fibre-free laboratory meant to be used only for microplastic research. Sample pretreatment was a multistep procedure including methods for removing both organic and inorganic matter from the samples. The prepared sample was then filtered onto a silver membrane filter (pore size 5.0 μm , diameter 25 mm). Fibres on the whole filter area were observed with a stereomicroscope (Olympus SZ61TR). A Fourier Transformation Infrared microscope (Spotlight 200i, Perkin Elmer) was then used to identify the microplastic fibres. In this presentation, the number concentration of microplastic fibres in sewage sludge compost (at the end of the composting process) is shown and the amount of microplastic fibres entering the environment via the compost is discussed.

Keywords: microplastic fibres, sewage sludge compost, polyester

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