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# SEASONAL VARIATION, DISTRIBUTION AND CHARACTERISTICS OF MICROPLASTIC IN SEWAGE SLUDGE

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## Abstract

Microplastic particles (MPs) pollution is widespread in the oceans, atmosphere, and soils due to the diverse applications and origins of plastic. Microplastic particles were found in marine animals and birds organisms, moreover recent research even have shown that MPs are detected in human blood (1). Nowadays, microplastics are considering as an emerging global pollutant. Recent research has noted that plastic pollution is greatly influenced by seasonal variation and especially the amount of precipitation. However, there is a knowledge gap regarding microplastic pollution pathways by seasonal variation.

Microplastic particles enter the environment easily and can accumulate in a variety of biological systems. The distribution of microplastic particles in wastewater treatment plants (WWTP) and their entry into the environment is a critical area of microplastic particle research. 60 % – 99 % of MPs from different sewage sources are detained in sludge (2). Due to its valuable organic composition, sludge is widely used for agricultural purposes, especially for soil fertilization. For instance, Norway applies about 80 % of sewage sludge in agriculture, Ireland – 60 %, JAV and Canada 45 – 55 % (3).

When MPs are mixed with the soil matrix, the additives contained in the microplastic particles can be released and participate in the chemical and biological processes in the terrestrial environment, especially in the cycling of soil elements. It has been reported that sewage sludge containing a high concentration of MPs may affect water and nutrient uptake processes in crops and cause a negative effect on their growth (4).

This work presents the identification and characterization of MPs in sewage sludge collected from the WWTP in each season. Results review the abundance of microplastic particles in size range from 20  $\mu\text{m}$  to 1000  $\mu\text{m}$  and analyze concentration, classification, morphological properties, and chemical composition of MPs extracted from sewage sludge.

**Keywords:** Microplastic particles, microplastic pollution, sludge disposal, wastewater treatment plant, seasonal variation, environmental research

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