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# Microplastics in compost from municipal solid waste. Assessment of their presence in the products generated with different industrial strategies.

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## Abstract

Circular economy has become a key factor for the future of our societies as a powerful tool that maximizes the useful life of the resources reducing the amount of residues that arrive in the environment. In the case of municipal solid waste, it is estimated that in the domestic garbage discarded every day there is a 40% of organic matter that could be useful for agriculture.

Compost is produced when organic matter is separated from the rest of the garbage (metal, plastics, etc.) and mixed with other vegetable pruning remains that balance the equilibrium of Carbon, Nitrogen and Phosphorus, creating a useful product for growing plants.

In the present work, compost from five different municipal facilities was evaluated to assess the presence of microplastics. These facilities were different because of variations in collection systems, non-desired materials rejection, population served and composting methodologies. To obtain microplastics, oxidation and flotation processes were followed by spectroscopic identification of the particles found.

Results showed a concentration of plastics in the 10-30 items/g of dry compost range. In samples, five different polymers were dominant between plastics: polyethylene, polystyrene, polyester, polypropylene, polyvinyl chloride, and acrylic polymers. Smaller plants, with door-to-door collection systems produced the cleaner compost. In contrast compost from big facilities that uses street bin collection, accounted for highest contents of microplastics. Despite being used in some locations from the study, compostable bioplastics were not found in any of the evaluated samples, meaning that if processed correctly, do not finish as visual anthropogenic pollution.

Our results point that the implementation of controlled door-to-door collection systems and compostable polymers could reduce the concentration of plastic impurities in compost from municipal waste.

**Keywords:** Organic Fraction of Municipal Solid Waste, Plastic impurities, Microplastics, Bioplastics, Compost

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