

Carbon Footprint and Total Cost Evaluation of Different Bio-plastics Waste Treatment Strategies

John Godleski*

Department of Environmental Health, Harvard School of Public Health, Boston, Massachusetts, USA

Editorial

Because of its characteristics, wide variety of applications, and low cost of manufacture, traditional fossil plastic has produced 57.9 million tonnes in Europe alone throughout the ages. In recent decades, Europe has used material and energy recovery to handle the large quantity of waste generated by huge plastic manufacture. However, the quantity of plastic trash disposed of in landfills is still 24.9 percent of the collected post-consumer plastic garbage. Furthermore, trash management is insufficient or non-existent in many areas, leading in the release of plastic garbage into the environment. Once in the ecosystem, plastics' resilience and longevity allow them to remain for hundreds of years, increasing the probability of contact, ingestion, and harmful impacts across food webs [1].

Bio-plastics waste (BPW) is not collected in a distinct stream and may often be collected among other municipal solid waste (MSW) categories. In general, if the compostability criteria are met, BPW can be processed with the organic part of MSW by industrial anaerobic digestion and/or composting. Several investigations have indicated that BPW has no influence on anaerobic and composting treatment, as well as the effect of the created compost on the soil. However, the parameters of commercial composting and anaerobic digestion (e.g., temperature, retention duration) may differ significantly from those seen during the compostability test. As a result, significant volumes of non-degraded bioplastics remain at the conclusion of the process, contaminating the digestate and/or compost.

The increase in the volume and nature of BPW is prompting a reconsideration of its collection alongside organic trash. As a result, collecting BPW along with plastics and mixed trash may be a viable alternative for their treatment. A complete study of various kinds of waste management from BPW is still lacking today. Most studies have concentrated on the anaerobic digestion and/or composting treatment of BPW, assessing the compatibility of various kinds of bio-plastics in this process. BPW management with municipal plastic trash has received little attention. Only the recycling process of conventional plastics has been studied, demonstrating how even 5% w/w BPW in a homogenous plastic waste stream influences the mechanical and thermal characteristics of recovered polymers [2].

To the best of our knowledge, there is no scientific literature on the effect of BPW on mixed waste processing. Only Muenmee demonstrated plastic breakdown following multiple different pretreatments with mixed garbage in a semi-aerobic landfill setting. This is owing to the still-low quantity of BPW

in comparison to other waste components. As a result, the effect of BPW on the existing MSW management system is still unknown; nevertheless, by ignoring clear consumer education and coordination of trash collection and treatment, BPW might influence the performance of the MSW management system. Quantitative data are required for effective planning of long-term BPW management. A combined environmental and economic impact evaluation can be performed to examine the sustainability and applicability of a waste management system.

Anaerobic and composting processes were used to handle organic waste. Thermal and electric energy are recovered during anaerobic digestion using a combined heat and power system. If the anaerobic digestion output meets the Italian quality level, it is composted and used in agriculture. If the quality is not assured by a larger presence of pollutant BPW residues, the compost is disposed of in a landfill since it is not hazardous waste. The treatment of plastic waste included a preliminary sorting at a material recovery plant, where the plastic trash was separated into two primary streams: one for mechanical recycling and the other constituted of a mix of non-recyclable plastics for energy recovery [3-5].

Conclusion

This investigation revealed that the present amount of BPW in the waste management system is still low, as well as substantial variance in each treatment phase (anaerobic digestion, composting, MRF, MBT and incineration). On the other hand, even a tiny amount of BPW can have a considerable impact on the quality of waste treatment process output, both economically and ecologically. As a result, new management tactics should be followed in order to improve the present waste management system's efficiency.

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Conflict of Interest

No potential conflict of interest was reported by the authors.

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*Address for Correspondence: John Godleski, Department of Environmental Health, Harvard School of Public Health, Boston, Massachusetts, USA; E-mail: johngodleko@gmail.com

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