



COMPARATIVE TOXICITY OF CONVENTIONAL VERSUS COMPOSTABLE PLASTIC CONSUMER PRODUCTS

Wang et al. (2023)

Raquel Garcia Matas – EFSA

INTRODUCTION



- Single-use plastics (SUPs) pose a serious environmental threat
- Biodegradable/ Compostable plastics/consumer products (BPs) could be seen as part of the solution to this problem, but they also present challenges. Biodegradability depends not only on the properties of the plastic material itself, but also on the environmental conditions.



European Commission, Directorate-General for Research and Innovation, *Biodegradability of plastics in the open environment*, Publications Office of the European Union, 2021, <https://data.europa.eu/doi/10.2777/690248>

RECOMMENDATIONS

- limiting the use of biodegradable plastics in the open environment
- supporting the development of coherent testing and certification standards
- promoting the supply of accurate information on the properties, appropriate use and disposal, and limitations of biodegradable plastics and their applications to relevant user groups.



THE STUDY

Comparative In vitro study - Biodegradable/compostable plastic vs. conventional plastics

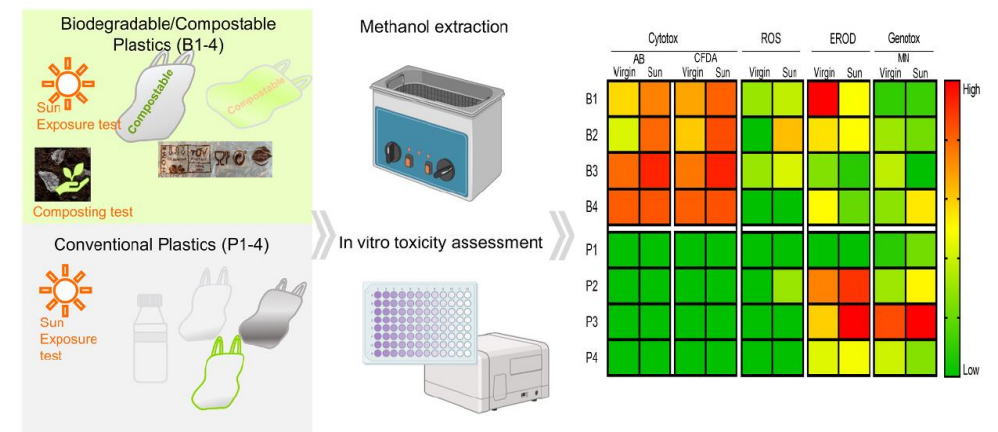
Methods

- Toxic responses in PLHC-1 cells
- investigating the in-vitro effects of methanolic extracts on; (i) cytotoxicity, (ii) generation of reactive oxygen species (ROS), (iii) presence of CYP1A inducers and genotoxic compound

Results

- **Extracts of BPs** - induce a significant decrease in cell viability (<70%) after 24 h of exposure. vs, no cytotoxicity induced by conventional
- **Extracts of conventional / recycled plastics** – the recycling process can concentrate or introduce new chemicals, increasing the toxicity of the plastic items but also higher presence of genotoxic compounds
- Highlights the relevance of the role on toxicity of **additives** in both materials

GRAPHICAL ABSTRACT



In both cases the toxicity was enhanced by **photodegradation** (but also by composting for BPs)



CONCLUSIONS

Discussion and observations

- The increased toxicity observed in BPs samples may not be directly related to the presence of additives (such as erucamide), but to additional compounds released during methanol extraction.
- This high toxicity of BPs is very likely due the addition of new plasticizers to biopolymers to improve their mechanical properties. However, the compounds causing toxicity remain unidentified.

Recommendations to mitigate the negative impact of plastic pollution on human health and the environment

- additional research
- implementation of regulatory measures prior to the release of mature compost into the environment.
- Improvements in plastic production and recycling (emphasis on the development and use of safer additives)



QUESTIONS TO THE GROUP

- Are you aware of any monitoring on the release of biodegradable and compostable consumer products in the environment?
- Do you have information of any toxic compound from the biodegradation of these products?



STAY CONNECTED

SUBSCRIBE TO

efsa.europa.eu/en/news/newsletters
efsa.europa.eu/en/rss
[Careers.efsa.europa.eu](https://careers.efsa.europa.eu) – job alerts



LISTEN TO OUR PODCAST

Science on the Menu – Spotify, Apple Podcast and YouTube



FOLLOW US ON TWITTER

[@efsa_eu](https://twitter.com/efsa_eu) [@methods_efsa](https://twitter.com/methods_efsa)
[@plants_efsa](https://twitter.com/plants_efsa) [@animals_efsa](https://twitter.com/animals_efsa)



FOLLOW US ON LINKEDIN

[Linkedin.com/company/efsa](https://linkedin.com/company/efsa)



FOLLOW US ON INSTAGRAM

[@one_healthenv_eu](https://instagram.com/one_healthenv_eu)



CONTACT US

efsa.europa.eu/en/contact/askefsa

