



Biodegradability of Plastics in the Open Environment

Scientific Advice Mechanism (SAM)
Group of Chief Scientific Advisors
Scientific Opinion No.10, December 2020

Independent
Expert
Report



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Biodegradability of Plastics in the Open Environment.

EXECUTIVE SUMMARY

The Opinion on the '*Biodegradability of Plastics in the Open Environment*' is provided in support of the European Commission Directorate-General for Environment. This Opinion intends to contribute to informing the forthcoming Commission's policy framework related to bio-based, biodegradable and compostable plastics, and help define the main challenges and policy actions needed in this area. It builds on some of the recommendations of the Scientific Opinion on '[Environmental and Health Risks of Microplastic Pollution](#)' published in 2019.

The 2018 EU Plastics Strategy sets out a cautious approach for the use of biodegradable plastics (BDP). While it acknowledges that targeted BDP applications have shown some benefits, it also identifies several challenges and points out that "*It is important to ensure that consumers are provided with clear and correct information, and to make sure that biodegradable plastics are not put forward as a solution to littering*". Moreover, "*Applications with clear environmental benefits (and criteria for such applications) should be identified, and in those cases the Commission will consider measures to stimulate innovation and drive market developments in the right direction*".

The mandate outlined in the [scoping paper](#) requests the Group of Chief Scientific Advisors to investigate the following question: *'from a scientific point-of-view and an end-of-life perspective, and applying to plastics that biodegrade either in the terrestrial, riverine or marine environments, and considering the waste hierarchy and circular economy approach: What are the criteria and corresponding applications of such plastics that are beneficial to the environment, compared with non-biodegradable plastics?'*

The recommendations below are informed by an [extensive review of the scientific literature and evidence](#) carried out by the consortium of European Academies under the Horizon 2020 funded SAPEA grant agreement. In the context of this Opinion, biodegradation of plastic is understood as the microbial conversion of all its organic constituents to carbon dioxide (CO₂) (or carbon dioxide and methane in conditions where oxygen is not present), new microbial biomass and mineral salts, within a timescale short enough not to lead to lasting harm or accumulation in the open environment. Here, the term *'open environment'* (as opposed to a controlled environment) denotes any environment, including agricultural and urban environments, with no or only minimal control over conditions that influence biodegradation. It excludes managed waste systems, such as industrial composting facilities.

Recommendation 0

Adopt a definition of biodegradability as a system property which takes into account material properties and specific environmental conditions

Recommendation 1

Limit the use of BDPs in the open environment to specific applications for which reduction, reuse, and recycling are not feasible

- 1.1 Prioritize reduction, reuse and recycling of plastics before considering biodegradation
- 1.2 Limit use of BDP in the open environment to specific applications where collection from the open environment is not feasible
- 1.3 Do not consider BDPs as solution for inappropriate waste management or littering

Recommendation 2

Support the development of coherent testing and certification standards for biodegradation of plastic in the open environment

- 2.1 Support the development of testing and certification schemes evaluating actual biodegradation of BDP in the context of their application in a specific receiving open environment
- 2.2 Require testing of biodegradation of BDP applications under laboratory and simulated environmental conditions
- 2.3 Require assessment of biodegradation and environmental risk of BDP under the conditions of specific open environments
- 2.4 Support the development of a materials catalogue and their relative biodegradation rates in a range of environments

Recommendation 3

Promote the supply of accurate information on the properties, appropriate use and disposal, and limitations of BDPs to relevant user groups

- 3.1 Initiate and support information campaigns to address current misconceptions and confusion related to bio-based, compostable and biodegradable plastics
- 3.2 Support the development of standards for clear, effective European labelling for a) end-users and consumers to ensure proper use and disposal of BDP applications in the open environment; and b) manufacturers and vendors to ensure accurate information transfer along the value chain

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