



POLICY BRIEF

Supporting environmentally safe biodegradable plastics

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SUMMARY

Plastic pollution is a major environmental problem that requires urgent action. Biodegradable plastics can help reduce the accumulation of plastic in the environment, when used in specific and relevant applications. However, use of ambiguous terms such as biopolymers and bioplastics needs to be discouraged, and the existing labeling should be improved to enable informed consumer choice. Furthermore, there is a need for a better understanding of environmental biodegradability and development of improved testing methods and certification schemes. This policy brief highlights current challenges regarding biodegradable plastics and provides recommendations for policymakers in order to better develop the legislative framework.

DESCRIPTION OF THE PROBLEM

Biodegradable plastics were developed, as an alternative to conventional plastics, for specific applications. These types of plastics have the same properties and behavior as conventional plastics, but can be metabolized by microbes into carbon dioxide and biomass. Hence, the introduction of biodegradable plastics in specific applications such as mulch films helps prevent the accumulation of persistent (micro and nano) plastics in the environment.

In parallel to biodegradable materials, bio-based plastics have been developed in an effort to strive for a circular use of resources and for defossilization. However, the term biopolymer or bioplastics is often used to describe both bio-based and biodegradable plastics, although the



products often do not fulfill both requirements. Examples include terms such as bio-PE or bio-PET that contain the prefix bio- to describe products that are bio-based, but are not biodegradable. This ambiguous terminology results in confusion for consumers. Such confusion is further amplified by similar green marketing claims such as “self-destructing” or “undergoing biotransformation”, which are sometimes misused to refer to oxo-degradable technologies and which has nothing to do with biodegradable plastics and can mislead consumers. Over the years, great efforts have been put into the development of standard methods, certification schemes and labels to assess plastic biodegradability and renewable content. However, green claims are often not appropriately regulated by a legislative framework.

For applications in which the use of biodegradable plastics is considered beneficial, the materials used should be certified through recognized schemes based on validated and standardized tests. Still, there is a need for a deeper understanding of environmental biodegradability, as well as for further development of test methods and certification schemes. Environmental conditions vary substantially depending on the climate zone, nutrient availability and microbial consortia. Additionally, current test methods require long testing times and high costs (e.g. testing for soil and marine

biodegradability is currently performed for up to two years) and are only partially suitable to investigate slow degrading materials. Therefore, methods with high environmental relevance and reproducibility and shortened testing times are necessary to complement the already existing methods.

Environmentally biodegradable materials and products should be truly benign in the application and at their typical end of life. Therefore, the ecotoxicity of the materials and all their components, e.g. additives, as well as their intermediate biodegradation fragments in the micro and nano-size range should be investigated. This is already part of existing testing schemes and certifications such as mandatory ecotoxicity testing of intermediate products and additives. Nevertheless, gaps are still present, such as specific methods and specifications for the plastics products designed for use in the marine and freshwater environments.

All these aspects are key for the sustainable development of environmentally safe and sustainable biodegradable materials capable of replacing persistent conventional plastics and ensuring that the cure will not be worse than the disease.

POLICY CHALLENGES

The current greatest policy challenge is to support consumer choices to deal with biodegradable and biobased plastics. Specifically, the need for a uniform and transparent terminology that does not confuse the consumer. The EC identified the lack of reliable labeling information on those products as a problem, but associates this problem only to the use of the confusing term “biopolymer”, which encompasses bio-based plastics (BBP) and biodegradable and compostable plastics (BDCP). In fact, these two materials are very different in terms of the environmental problems they target and the end-of-life management they demand: the waste

of bio-based plastics (BBP) must be managed just like conventional plastics, whereas biodegradable and compostable plastics (BDCP) facilitate composting and may reduce the environmental impacts associated with accidental loss.

The LABPLAS Project aims to provide scientific information to plastic producers, regulatory agencies and certifiers (TUV Austria, DIN) to manufacture, certify and label biodegradable plastic materials. The goal is to further improve the available standard methods to ultimately give consumers access to clearer and more trustworthy information when making their purchasing decisions.

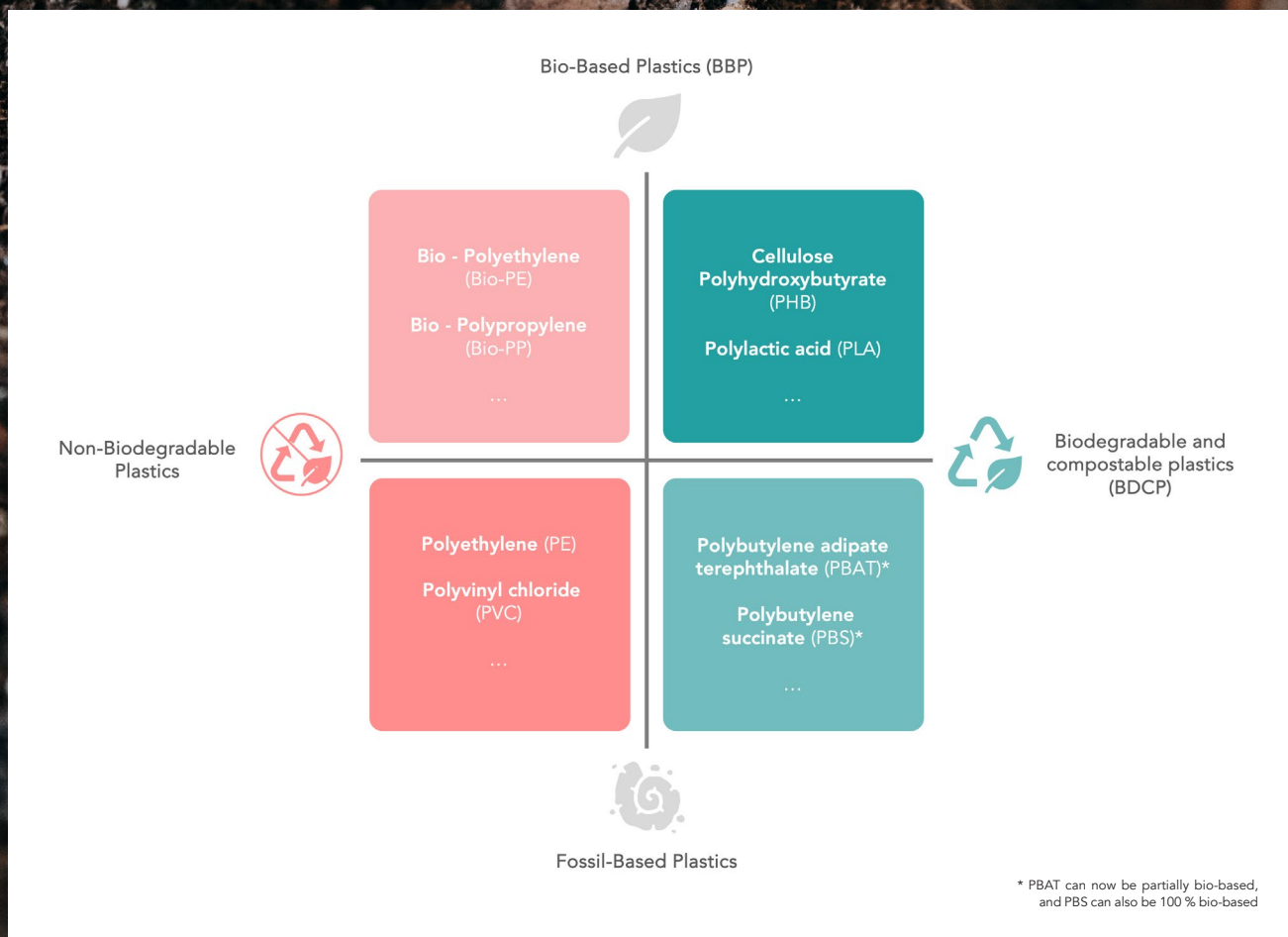
RELEVANCE TO LEGISLATION

- Plastics Strategy (2018)
- SUP Directive (Directive EU 2019/904)
- Packaging and packaging waste Regulation
- Revision of the Waste Framework Directive
- Empowering consumers in the green transition Directive
- Ecodesign for Sustainable Products Regulation
- Green Claims Directive (Product Environmental Footprint)
- Unintentionally-added microplastics
- Intentionally-added microplastics
- Taxonomy

BIO-BASED plastics are made from biological resources (using plant-based sources, naturally existing structures, or generated through biological processes like microbial activity), rather than relying solely on fossil raw materials. However, they are not necessarily biodegradable or compostable.

BIODEGRADABLE plastics can be biodegraded by microorganisms into CO², water, and biomass. The efficiency and outcome of biodegradation are contingent upon various factors, including the environmental conditions specific to the given location and the nature of the material or application. For example, compostable plastics are biodegradable under industrial composting conditions.

Using the terms “biodegradable” or “compostable” alone without specifying the applicable standards or environments where the degradation process occurs, is deceptive and these terms are vulnerable to greenwashing.



POLICY RECOMMENDATIONS

- The general term “bioplastics” as well as the general prefix “bio-” on final products is misleading and akin to greenwashing. Bio-based and biodegradable products should be clearly differentiated. For both classes of materials, renewable content and biodegradability claims should be regulated by law. They should refer to the exact properties of the products and their intended end of life, determined through internationally recognized and accepted standards and certifications. According to current certification schemes, these subdivisions can be “Marine biodegradable”, “Freshwater biodegradable”, “Soil biodegradable”, “Home compostable” and “Industrial compostable”. Claims on standard methods or on standards not suitable for proving biodegradation should be forbidden. Claims about biodegradability in the open environment, such as marine, water and soil biodegradability should occur exclusively in business-to-business communications. Putting these claims on the end consumer products might encourage littering behaviors and therefore should be forbidden.

- More efforts must be invested in the development of new biodegradability and ecotoxicity test methods. Cost-effective, ecologically-relevant and high throughput standard tests representative of biodegradation under environmentally realistic conditions to complement existing methods and standards are needed. Shortened testing times as well as complementary testing for slow-degrading materials should be developed. Validation of these test methods should be performed through relevant field testing. Ecotoxicity tests should be developed to take into consideration fragmentation scenarios and reflect realistic scenarios (e.g., concentrations). In addition, minimum criteria should be defined for biodegradation and ecotoxicity studies published in the literature to be considered for the drafting of regulations.

SOURCES

European Bioplastics (2021) - Claims on biodegradability and compostability on products and packaging. Berlin: European Bioplastics 3pp.

Communication from the commission to the European Parliament, the Council, The European Economic and Social Committee and the Committee of the Regions (2022) - EU policy framework on biobased, biodegradable and compostable plastics.