



Was wissen wir über die Nachhaltigkeit von biobasiertem Plastik?

What is known about the sustainability of bio-based plastic?

Claudia Som, Biologin, Empa, St. Gallen

Bio-based polymers are often perceived as a solution for sustainable plastic manufacturing, offering numerous advantages over traditional fossil-based polymers. One of the most touted benefits is their potential to significantly reduce carbon emissions compared to their fossil-based counterparts. Additionally, bio-based polymers are expected to offer alternative end-of-life pathways, including biodegradability, which further contributes to their appeal as eco-friendly materials. Polylactic acid (PLA) has emerged as one of the frontrunners in the realm of biopolymers, garnering attention for its advanced properties and potential environmental benefits. Since the early 2000s, there has been a surge in life cycle assessment (LCA) for PLA. Over 80 such studies have been conducted, many of which compare PLA to conventional fossil-based plastics to gauge its relative advantages. In this review, the results from these studies were collected and compared to clarify, whether an overall conclusion can be made about the advantages of replacing fossil-based plastics with PLA. The main focus in these comparisons was the global warming potential (GWP), a key indicator of a material's environmental impact.

However, synthesizing the results proved to be a challenging task, as considerable variability was observed among the findings of different studies. This variability can be attributed to the inherent complexity of LCAs and the diverse methodological choices made by researchers. Factors such as the choice of feedstock, electricity sources, end-of-life options, and accounting for biogenic carbon all influence the outcomes of these assessments. It was noted that especially moving towards using renewable energy is beneficial in terms of reducing global warming potential.

Claudia Som

has been conducting research at the Department of Technology and Society at Empa since 1992. As a Senior Scientist, she leads various interdisciplinary research projects for the EU, Innosuisse, and government agencies. Her research focuses on developing decision-making frameworks for sustainable innovation and assessing the future opportunities and risks of new technologies and materials.