



## Sustainability of Bio-based Plastics: General Comparative Analysis

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### Abstract

This study evaluated the sustainability of bio-based plastics including all the stages of their life cycle (cradle to grave) to assist in decision-making about selection of these bio-based materials. Plastics are considered essential materials in today's society, but during their life cycle they contribute to pollution and depletion of natural non-renewable resources. Bio-based plastics appear as more environmentally friendly materials than their petroleum based counterparts when they are compared considering their origin and biodegradability. But which of the bio-based plastics currently on the market or soon to be on the market are preferable from an environmental, health, and safety perspective? Results of this study were summarized in two graphic tools based on analysis of the data gathered on bio-based plastics according to sustainability criteria. They showed that none of bio-based plastics currently in commercial use or under development are fully sustainable. Each of the bio-based plastics reviewed utilizes genetically modified organisms for feedstock manufacture; toxic chemicals in the production process or generates as byproducts, or co-polymers from non-renewable resources, etc. Substitution of conventional petroleum-based plastics with safer bio-based plastics requires the knowledge of the flow of these materials and their adverse impacts in all their life cycle in order to consider new approaches towards sustainability.

**Keywords:** *Bioplastics, bio-based plastics, life cycle analysis.*

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