Bioplastics

From nature, for nature!

What does bio really mean?

There is no general definition for the term "bioplastic"

The term „bio-plastic" covers many different plastics with varying properties

Bioplastic

Bio-based
<u>or</u>
biodegradable

Bio-based
<u>and</u>
biodegradable

Bio-based
The material or the product is (to some extent) produced from biomass (maize, sugar cane, cellulose)

Biodegradable
Biodegradability is a chemical process, in which microorganisms that are present in the environment convert materials into natural substances, such as water, nitrogen or biomass.

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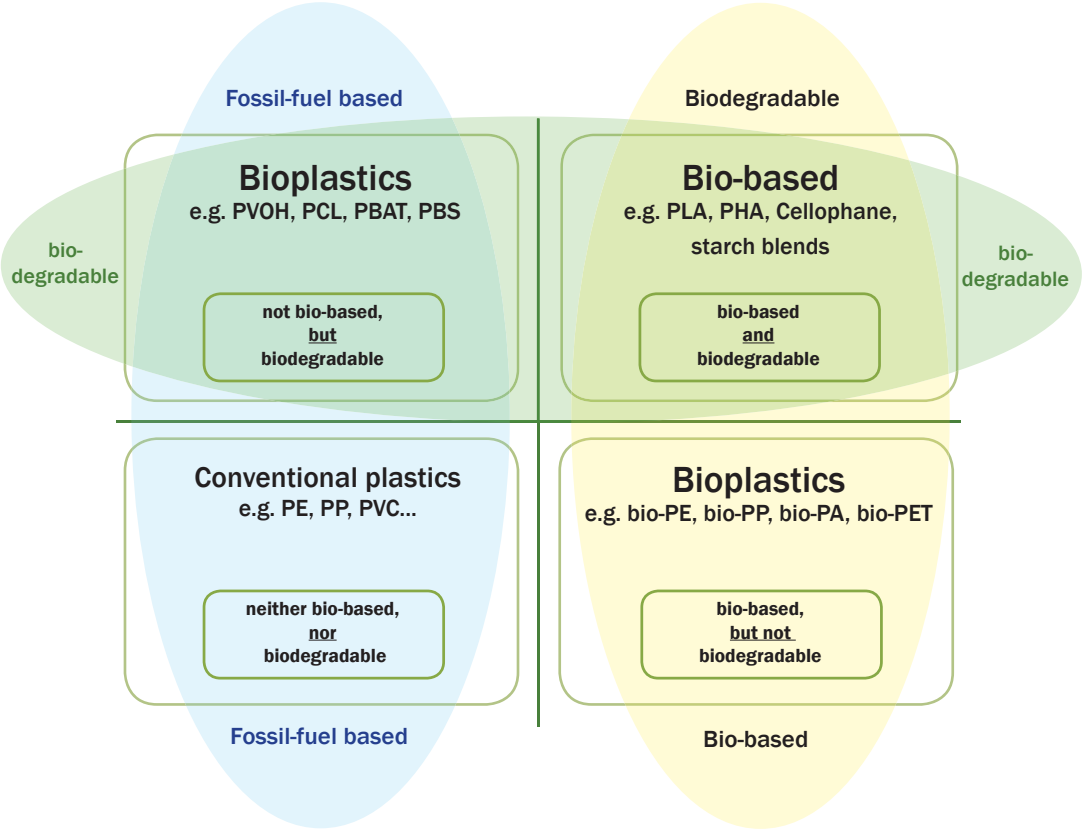
Classification of bioplastics!



What are the sources of bio-based plastics?

Plant origin

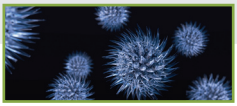
Starch (maize/potato)
Cellulose] Wood
Lignin] Wood
Natural rubber
Vegetable-oil-based-Polymers (oilseed rape)
Polylactic acid (PLA)

Animal origin

Chitin
Proteins
e.g. casein, gelatin

Microorganisms

PHA, PHB, PHBV
Polylactic acid (PLA)
Sugar – fructose



Land use for bioplastics

Arable land area worldwi-
de 1,500 million hectares

Plastic production today
250 million tonnes/year
((99% using fossil fuels as raw

100 million hectares of arable land would be needed to produce these plastics using biological materials.

≙ **7% of global arable land area**

Currently, 0.1% of arable land area is used for bioplastics!

Why should we use products made from bio-based bioplastic?

- Conservation of fossil-fuel resources
- Reduction of CO2 emissions
- There is sufficient cultivated land available for bioplastics
- There is the potential to use brownfield land

What does ... mean?

PLA (polylactic acid): Polymer produced on the basis of lactic acid, e.g. food packaging

PHA (polyhydroxyalkanoate): Polyester produced on the basis of sugar or starch, using fermentation, e.g. plant pots

Cellophane (cellulose hydrate): Polymer produced on the basis of cellulose, e.g. film used in wrapping flowers

PVOH (artificial polyvinyl alcohol): Thermoplastic, water-soluble polymer, e.g. barrier films in food packaging

PCL (polycaprolactone): Biodegradable plastic produced on the basis of petroleum, e.g. wound dressings

PBAT (polybutyrate adipate terephthalate): Biodegradable plastic produced on the basis of petroleum, e.g. packaging films, carrier bags, mulch films

PBS (polybutylene succinate): Biopolyester produced on the basis of fossil-fuel- and bio-based raw materials, e.g. packaging, sealing layer, mulch film

What is the difference between true biodegradable bioplastic and so-called “OXO-degradable” plastic?

BIO plastic

Certification with regards to biodegradability

↓

PLA, starch blends, PHA, Cellophane, etc.

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Behaviour in the environment

↓

Microorganisms help to break down the bioplastic. Humus, water and CO2 remain at the end.

OXO-degradable plastic

No certification with regards to biodegradability

↓

PE, PP, PS, PET
+
additives, such as kobald, manganese, iron, etc.

↓

Behaviour in the environment

↓

The plastic fragments into infinitesimally small pieces (littering).

↓

Although we cannot see the OXO-degradable plastic, it is nevertheless still there and accumulates in our environment!

Only an appropriate certification can give peace of mind!

Certification
←
biodegradable or compostable

Original material

Bioplastics

With BioWit® products, Witasek is trying to focus on biodegradability for you.

Source: Documents from the “Bio-based plastics” department at Fraunhofer UMSICHT (Oberhausen, Germany) were used as a source of information about bioplastics: www.umsicht.fraunhofer.de