Netherlands Institute
for Sustainable Packaging

Factsheet: biodegradable plastic packaging materials

Netherlands Institute for Sustainable Packaging (KIDV)
Factsheet, August 2018

Introduction

Recently, a comprehensive discussion has arisen about the question of whether and how – in light of the circular economy – the use of biodegradable (or compostable) plastic packaging materials presents new opportunities for producers and importers who put packed products on the market. The Netherlands Institute for Sustainable Packaging (KIDV) receives a lot of questions about this topic from businesses. The KIDV has drawn up this factsheet in an attempt to answer these questions.

Biodegradable packaging materials can be broken down into water, methane and CO_2 by microorganisms (bacteria or fungi). This breakdown process is largely dependent on the environment: temperature, the presence of microorganisms, the presence of oxygen and water.
Biodegradable packaging materials are not the same as biobased packaging materials. The latter have a direct or indirect natural origin, for example paper or wood. Various types of plastics also include biobased raw materials, for example sugar made from sugarcane and sugar beets. This factsheet concerns the disposal phase of biodegradable plastic packaging materials.

This factsheet offers action perspective based on current government policies and the current practice. The factsheet will be updated if and when the development of new sorting techniques, new materials or new policies provide sufficient reason to do so.

Considerations

1 At the moment in the Netherlands, consider using reusable or recyclable plastic packaging materials instead of biodegradable packaging materials,
2 unless biodegradable packaging materials offer a demonstrable solution for the litter problem and the plastic soup and these solutions cannot be realised in any other way
3 and if the packaging materials do not have a disruptive effect on the packaging chain, for example on the recycling of other plastics.
4 Use biodegradable packaging materials if they offer an added integral benefit in combination with the packaged product (so-called ‘co-benefit’)
5 or if they can be used for specific applications in materials that can be processed in a closed system.
6 When biodegradable packaging materials are used, make sure they meet the requirements of the EN13432 standard and inform consumers about the proper way to dispose the packaging materials.

Clarification

1. **"At the moment in the Netherlands, consider using reusable or recyclable plastic packaging materials instead of biodegradable packaging materials …"**

For the transition to a circular economy, it is important to use raw materials for as long as possible. The same goes for the use of biomass[1]. Packaging materials often have a relatively short lifespan during which they add value to products. By properly utilising packaging materials, developing them in a way that requires as few virgin materials as possible and making them ***reusable or recyclable***, you can make sure that raw materials are used for as long as possible.

The use of biodegradable packaging materials that are ***industrially compostable*** does not have this effect, since the raw materials are eliminated from the material chain after use. Research conducted by CE Delft[2] shows that composting packaging materials has a larger environmental impact than recycling, incineration and fermentation. Composting biodegradable packaging materials only produces CO_2, methane and water, not compost.

The severity of the environmental impact of bioplastics is not only determined by the processing method used at the end of its lifecycle. The research by CE Delft shows that the environmental impact of bioplastics depends on the type of raw material being used, because the production of biobased plastics requires natural resources (for example fertile soil, fresh water and phosphate fertilisers) as well as raw materials (such as – in ascending order of their environmental impact – waste materials, sugar crops, starch crops and oilseed crops). One of the policy recommendations in CE Delft's report therefore concerns the development of sustainability criteria in order to determine the ecological footprint.

The National Waste Management Plan 3 (LAP 3) indicates that the composting of biodegradable plastics still poses some problems in practice and that a policy statement is being developed pertaining to the use and processing of for example biodegradable plastics. In accordance with LAP 3, biodegradable plastic packaging materials are currently not to be disposed of as part of the organic waste stream (GFT), not even if it features a Seedling logo or an OK Compost logo. The only exception is made for the biodegradable plastic bags that are used to collect organic waste.

2. **"… unless biodegradable packaging materials offer a demonstrable solution for the litter problem and the plastic soup and these solutions cannot be realised in any other way …"**

In general, biodegradable packaging materials can be broken down in industrial composting facilities if these meet the requirements of the EN 13432 standard. Contrary to popular belief, biodegradable plastics cannot currently be broken down in the natural environment. As a result, the use of biodegradable packaging materials ***does not offer a solution for the litter problem or the plastic soup***. This is also mentioned in the report "Biodegradable plastics & Marine Litter, misconceptions, concerns

[1] Green Liasons – Hernieuwbare moleculen naast duurzame elektronen, De Gemeynt, by order of KVGN, Groen Gas Nederland, TKI Nieuw Gas, Gas Terra and Gasunie, April 2018, p.18.
[2] Biobased Plastics in a Circular Economy – policy suggestions for biobased and biobased degradable plastics, CE Delft, September 2017, p.12.

and impacts on marine environments" that is drawn up by the United Nations Environment Programme[3].

The finding that biodegradable packaging materials do not contribute to a solution for the litter problem or the plastic soup will of course change if and when innovations result in the large-scale introduction of degradable materials that can be broken down in the natural environment and/or in water. Innovation is therefore paramount.

3. **"… and if the packaging materials do not have a disruptive effect on the packaging chain, for example on the recycling of other plastics."**

As mentioned, biodegradable packaging materials can be broken down in industrial composting facilities. ***However, if these packaging materials end up in the current collection systems for plastic packaging materials, they may affect the quality of the recyclate***. The packaging materials end up in the mixed or residual waste streams. If they end up in a mono-stream, they may affect the quality. Other types of plastics can also affect the quality of the recyclate.[4]

This does not apply to biobased plastics such as bio-PE and bio-PET. Although these materials are not compostable, they can be recycled via the existing plastic waste collection system. With the current government policy and the current practical situation, this results in the highest added value for the circular economy. These biobased plastics can have a positive effect on the emission of greenhouse gases and reduce the demand for fossil fuels, because materials are kept in the chain as long as possible through reuse and recycling. Furthermore, the recycling of biobased plastics has a smaller environmental impact than incineration, fermentation or composting.[5]

4. **"Use biodegradable packaging materials if they offer an added integral benefit in combination with the packaged product ('co-benefit')…"**

The process of composting biodegradable packaging materials is carbon neutral in and of itself and does not contribute to the production of compost (or gas in the case of fermentation). It is therefore recommended to only use biodegradable packaging materials if they ***form a clear combination with the product and offer the added benefit that more organic waste is collected***. Examples include biodegradable bags for organic waste, tea bags and coffee pads. Furthermore, biodegradable stickers on fruit can help prevent the clogging of sieves used in the composting process and reduce the volume of plastic fragments in the compost. Indirectly, this does contribute to the reduction of greenhouse gas emissions. Current policy states that biodegradable plastics cannot be disposed of as part of the organic waste stream (see sidebar on page 3). An exception is made for the biodegradable bags used to collect organic waste; these can be disposed of as part of the organic waste stream.

[3] Biodegradable plastics & Marine Litter, misconceptions, concerns and impacts on marine environments, UNEP, ISBN 978-92-807-3494-2, p.3.
[4] Technical quality of rPET, Wageningen UR Food & Biobased Research #1661, July 2016, p.6.
[5] Biobased Plastics in a Circular Economy – policy suggestions for biobased and biobased degradable plastics, CE Delft, September 2017, p.12.

5. **"… or if they can be used for specific applications in materials that can be processed in a closed system."**

The costs of setting up separate sorting and recycling processes are high and separate processing only pays off when the stream is large enough. At the moment, separate processes are only organised for packaging waste streams from businesses or for ***streams that are controllable and large enough***, for example PLA drinking cups that are used at festivals and then disposed of. In that case, all used cups can be recycled or fermented separately after the festival.

6. **"When biodegradable packaging materials are used, make sure they meet the requirements of the EN13432 standard and inform consumers about the proper way to dispose of the packaging materials."**

When you choose to use biodegradable plastics for packaging materials, it is important that these meet the requirements of the ***EN 13432 standard***. This is an international standard for biodegradable packaging materials which states that these packaging materials must be degradable and degrade quickly enough in industrial composting facilities. The EN 13432 standard is based on a degradation process for biodegradable plastics of no more than 12 weeks at circa 60 degrees Celsius[6].

Biodegradable plastic packaging materials that meet the EN 13432 standard can be recognised by the Seedling logo or the OK Compost logo.

Seedling logo OK Compost logo

In recent years, however, the processes used at composting facilities have been optimised and therefore significantly shortened. For example, the WUR's Food and Biobased Research indicates that the composting processes in industrial facilities take circa three weeks[7], while the Dutch Waste Management Association lists a duration of two to four weeks.[8] This is led to the question of whether the EN 13432 standard is still useful in practice as composting facilities' lead times become shorter. Ongoing discussions between waste processors, producers of biodegradable plastic packaging materials and the Ministries of Infrastructure & Water Management and Economic Affairs & Climate Policy are to clear up the matter. The KIDV will monitor developments closely and update this factsheet if necessary.

It can be confusing to consumers if a packaging that features the Seedling logo or the OK Compost logo cannot be disposed of as organic waste. The logos of the Disposal Guide can be used to clarify that the packaging should be disposed of in the residual waste stream.

[6] Food and Biobased Research WUR, Bio-based and biodegradable plastics, Facts and Figures, April 2017, http://edepot.wur.nl/408350, p. 42.
[7] Food and Biobased Research WUR, Bio-based and biodegradable plastics, Facts and Figures, April 2017, http://edepot.wur.nl/408350, p. 42.
[8] Dutch Waste Management Association, PDF Bioplastics: welke wel/niet?, 22 March 2018, https://www.verenigingafvalbedrijven.nl/nieuws/nieuwsbericht/bioplastics-recyclen-niet-composteren.html, p.4.

The KIDV has developed a Disposal Guide logo for packaging materials that can be disposed of in the organic waste stream. Current policy states that this logo cannot be used on packaging materials yet. If that should change, the KIDV will make the logo available.

Not all consumers can collect organic waste
At the same time, not all consumers are currently able to dispose of biodegradable packaging materials in the organic waste stream, because some cities do not collect organic waste separately.

When it is clear which biodegradable packaging materials can be disposed of as organic waste, the Disposal Guide can be helpful. However, that does not guarantee that the packaging materials are actually disposed of correctly. For consumers, it is hard to distinguish between (biobased) plastic packaging materials and biodegradable plastic packaging materials. As a result, biodegradable packaging materials may still end up in the wrong waste stream.